PacT Series

Master**PacT,** Com**PacT,** Power**PacT** Modbus Communication

User Guide

PacT Series offers world-class circuit breakers and switches.

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Table of Contents

Safety Information 9
About the Document 10
Modbus Communication with PacT Series Circuit Breakers 15
Introduction 16
Description 17
Intelligent Modular Unit 18
EcoStruxure Power Commission Software 22
IFM Communication Interface 24
Introduction 25
Hardware Description 26
Configuration 30
Communication Test 31
IFE Communication Interface 32
Introduction 33
Hardware Description 35
EIFE Ethernet Interface for Drawout Circuit Breaker 40
Introduction 41
Hardware Description 42
Modbus Protocol 46
Modbus SL Client-Server Principle 47
Modbus Programming Recommendations 50
Modbus Functions 52
Modbus Exception Codes 57
Password Management 59
Command Interface 61
Command Examples 66
Date Management 68
History Mechanism 69
Dataset 71
Standard Dataset 72
Standard Dataset 73
Standard Dataset Modbus Register Tables 74
Readout Examples 76
Standard Dataset Common Registers 78
Legacy Dataset 93
Legacy Dataset 94
Legacy Dataset Modbus Register Tables 95
Readout Examples 97
Legacy Dataset Common Registers 99
MicroLogic X Control Unit Data for MasterPacT MTZ Circuit Breakers 111
MicroLogic X Modbus Register Tables 112
MicroLogic X Control Unit Registers 114
Tripping Data 115
Circuit Breaker Data 122
Circuit Breaker Characteristics 125
Real-Time Measurements 129

Harmonic Values ... 136
Minimum and Maximum Values of Real-Time Measurements ... 149
Maintenance and Diagnostic Data ... 159
Energy Measurements ... 164
Protection Settings ... 167
Demand Values of Real-Time Measurements ... 169
Peak Values of Demand Values of Real-Time Measurements ... 170
MicroLogic X Control Unit Commands ... 172
List of MicroLogic X Control Unit Commands and Error Codes ... 173
Protection Get Commands without Session ... 174
Protection Set Commands without Session ... 180
Measurement Set and Reset Commands ... 183
Diagnostic Get Commands ... 184
Measurement Settings Set Commands ... 190
Circuit Breaker Operation Set Commands ... 192
MicroLogic X Get and Reset Commands ... 194
MicroLogic X Control Unit Protection Commands with Session ... 203
Description of Commands with Session ... 204
List of MicroLogic X Control Unit Protection Commands with Session and Error Codes ... 206
Session Management Commands ... 207
Protection Submit Commands ... 209
Protection Get Commands with Session ... 214
MicroLogic Active Control Unit Data for MasterPacT MTZ Circuit Breakers ... 222
MicroLogic Active Modbus Register Tables ... 223
MicroLogic Active Control Unit Registers ... 225
Real-Time Measurements ... 226
Minimum/Maximum Values of Real-Time Measurements ... 230
Energy Measurements ... 231
Demand Measurements ... 233
MicroLogic Active Control Unit Identification ... 235
Circuit Breaker Status ... 239
Counters ... 242
Trip History ... 243
Standard Protection Parameters ... 245
Measurement Parameters ... 247
Time-Stamped Information ... 250
Maintenance Indicators ... 252
Miscellaneous ... 253
MicroLogic Active Control Unit Commands ... 255
List of MicroLogic Active Commands and Error Codes ... 256
Circuit Breaker Control Commands ... 257
Reset Minimum/Maximum Commands ... 258
MicroLogic Active Control Unit Protection Commands with Session ... 259
Description of Commands with Session ... 260
List of MicroLogic Active Control Unit Protection Commands with Session and Error Codes ... 262
Session Management Commands ... 263
Protection Submit Commands ... 265
Protection Get Commands with Session ... 269

MicroLogic A/E/P/H Trip Unit Data for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-Frame Circuit Breakers 276
MicroLogic A/E/P/H Modbus Register Tables 277
MicroLogic A/E/P/H Trip Unit Registers 279
Real-Time Measurements 280
Minimum/Maximum Values of Real-Time Measurements 288
Energy Measurements 290
Demand Measurements 291
Spectral Components 294
MicroLogic A/E/P/H Trip Unit Identification 300
Status 304
Alarm History 307
Trip History 309
Analog Predefined Alarms 312
Basic Protection Parameters 316
Advanced Protection Parameters 321
Configuration of the M2C/M6C Programmable Contacts 338
Measurement Parameters 340
Time-Stamped Information 344
Maintenance Indicators 346
Miscellaneous 347
MicroLogic A/E/P/H Trip Unit Files 350
File Mechanism 351
Protection Event Log 353
Metering Event Log 355
Maintenance Protection Event Log 357
Maintenance Metering Event Log 359
Minimum/Maximum Event Log 361
Waveform Capture 363
Fault Waveform Capture 366
MicroLogic A/E/P/H Trip Unit Commands 369
List of MicroLogic A/E/P/H Trip Unit Commands and Error Codes 370
Measurement Configuration Commands 371
BCM ULP Module Data for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-Frame Circuit Breakers 375
BCM ULP Module Registers 376
BCM ULP Module Identification 377
Circuit Breaker Status 378
Time-Stamped Information 383
Counters 384
Trip History 386
BCM ULP Module Files 388
Circuit Breaker Manager Event Log 389
BCM ULP Module Commands 391
List of BCM ULP Module Commands and Error Codes 392
Circuit Breaker Control Commands 393
MicroLogic 5/6/7 Trip Unit Data for ComPacT NSX and PowerPacT H-, J-, and L-Frame Circuit Breakers 394

MicroLogic 5/6/7 Modbus Register Tables 395
MicroLogic 5/6/7 Trip Unit Registers 397
Real-Time Measurements 398
Minimum/Maximum Values of Real-Time Measurements 403
Energy Measurements 405
Demand Measurements 407
Minimum/Maximum Measurements Reset Time 409
MicroLogic 5/6/7 Trip Unit Identification 410
Status 414
Alarm History 416
Trip History 418
Earth-Leakage Test History 421
Maintenance Operation History 423
Pre-Alarms 426
User-Defined Alarms 428
Protection Parameters 432
Configuration of the SDx Module 436
Measurement Parameters 437
Time-Stamped Information 440
Maintenance Indicators 447
Miscellaneous 451
MicroLogic 5/6/7 Trip Unit Commands 454
List of MicroLogic 5/6/7 Trip Unit Commands and Error Codes 455
MicroLogic 5/6/7 Trip Unit Protection Commands 456
Event Commands 461
Measurement Configuration Commands 462
BSCM Modbus SL/ULP Module Data for ComPacT NSX and PowerPacT H-, J-, and L-Frame Circuit Breakers 467
BSCM Modbus SL/ULP Module Registers 468
BSCM Modbus SL/ULP Module Identification 469
Circuit Breaker Status 472
Maintenance Indicators 474
Event History 475
BSCM Modbus SL/ULP Module Commands 477
List of BSCM Modbus SL/ULP Module Commands and Error Codes 478
Circuit Breaker Control Commands 479
Counter Commands 482
Configuration Commands 484
BSCM Module Data for ComPacT NSX and PowerPacT H-, J-, and L-Frame Circuit Breakers 487
BSCM Module Registers 488
BSCM Module Identification 489
Circuit Breaker Status 490
Maintenance Indicators 492
Event History 493
BSCM Module Commands 495
List of BSCM Module Commands and Error Codes 496
Circuit Breaker Control Commands 497
Counter Commands 500

IO Module Data 502
IO Module Registers 503
Introduction 504
Digital Inputs 506
Digital Outputs 509
Hardware Setting 511
Digital Input and Output Status 513
IO Module Identification 514
Alarm Status 517
Applications 520
Analog Inputs 523
IO Module Events 525
Event History 526
IO Module Events and Alarms 528
IO Module Commands 533
List of IO Module Commands 534
Generic Commands 535
Application Commands 540
IFM Communication Interface Data 544
IFM Communication Interface Registers 545
Introduction 546
IFM Communication Interface Identification 547
Modbus Network Parameters 550
IFM Communication Interface Commands 552
List of IFM Communication Interface Commands 553
IFM Communication Interface Commands 554
IFE/EIFE Communication Interface Data 557
IFE/EIFE Communication Interface Registers 558
Introduction 559
IFE/EIFE Interface Identification and Status Registers 561
EIFE Interface Specific Registers 567
IP Network Parameters 569
IFE/EIFE Communication Interface Commands 570
List of IFE/EIFE Interface Commands 571
IFE/EIFE Interface Generic Commands 572
EIFE Interface Specific Commands 574
Appendix 579
Modbus Data Type Definitions 580

Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Document

Document Scope

The aim of this document is to provide users, installers, and maintenance personnel with the technical information needed to operate the Modbus protocol on:

- MasterPacT™ MTZ circuit breakers with MicroLogic™ X control unit
- MasterPacT MTZ circuit breakers with MicroLogic Active control unit and BCIM module
- MasterPacT NT/NW, ComPacT™ NS and PowerPacT™ P- and R-frame circuit breakers with MicroLogic A/E/P/H trip unit and BCM ULP module
- ComPacT NSX and PowerPacT H-, J-, and L-frame circuit breakers with MicroLogic 5/6/7 trip unit and BSCM module

Validity Note

This document is valid for intelligent modular units (IMU) composed of MasterPacT, ComPacT and PowerPacT circuit breakers and their communicating modules, and connected:

- either to an RS 485 serial line Modbus network using an IFM Modbus-SL interface for one circuit breaker
- or to an Ethernet network using
  - an IFE Ethernet interface for one circuit breaker,
  - an IFE Ethernet switchboard server,
  - or an EIFE embedded Ethernet interface for one MasterPacT MTZ drawout circuit breaker.

This document describes the registers and commands available for the IMU communicating modules with the following firmware versions:

IMU module	Part number	Firmware version
MicroLogic X control unit	-	≥ V005.103.003
MicroLogic Active control unit	-	≥ V004.004.000
BCIM module	LV908000	≥ V001.000.004
BCM ULP module	-	≥ V004.002.003
MicroLogic 5/6 trip unit	-	≥ V001.008.003
MicroLogic 7 trip unit	-	≥ V002.003.001
BSCM Modbus SL/ULP module	-	≥ V001.000.000
BSCM circuit breaker status control module	-	≥ V002.002.007
IFM interface	LV434000	≥ V003.001.012
IFE Ethernet interface	LV434001	≥ V004.007.000
	LV434010	
IFE Server	LV434002	≥ V005.001.000
	LV434011	
EIFE Ethernet interface	LV851001	≥ V004.007.000

You can update the firmware of the IMU modules by using the latest version of EcoStruxure Power Commission software.

Online Information

The characteristics of the products described in this document are intended to match the characteristics that are available on www.se.com. As part of our corporate strategy for constant improvement, we may revise the content over time to enhance clarity and accuracy. If you see a difference between the characteristics in this document and the characteristics on www.se.com, consider www.se.com to contain the latest information.

General Cybersecurity Information

In recent years, the growing number of networked machines and production plants has seen a corresponding increase in the potential for cyber threats, such as unauthorized access, data breaches, and operational disruptions. You must, therefore, consider all possible cybersecurity measures to help protect assets and systems against such threats.

To help keep your Schneider Electric products secure and protected, it is in your best interest to implement the cybersecurity best practices as described in the Cybersecurity Best Practices document.

Schneider Electric provides additional information and assistance:

- Subscribe to the Schneider Electric security newsletter.
- Visit the Cybersecurity Support Portal web page to:
  - Find Security Notifications.
  - Report vulnerabilities and incidents.
- Visit the Schneider Electric Cybersecurity and Data Protection Posture web page to:
  - Access the cybersecurity posture.
  - Learn more about cybersecurity in the cybersecurity academy.
  - Explore the cybersecurity services from Schneider Electric.

Product Related Cybersecurity Information

⚠WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

- Change default passwords and PIN codes at first use to help prevent unauthorized access to device settings, controls, and information.
- Disable unused ports/services and default accounts to help minimize pathways for malicious attackers.
- Place networked devices behind multiple layers of cyber defenses (such as firewalls, network segmentation, and network intrusion detection and protection).
- Use cybersecurity best practices (for example, least privilege, separation of duties) to help prevent unauthorized exposure, loss, modification of data and logs, or interruption of services.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For more information about cybersecurity, refer to DOCA0122•• *MasterPacT, ComPacT, PowerPacT - Cybersecurity Guide*, page 12.

Environmental Data

For product compliance and environmental information, refer to the Schneider Electric Environmental Data Program.

Available Languages of the Document

The document is available in these languages:

- English, original language (DOCA0384EN)
- Spanish (DOCA0384ES)
- French (DOCA0384FR)
- Chinese (DOCA0384ZH)

Related Documents for IEC Devices

Title of documentation	Reference number
MasterPacT MTZ - MicroLogic X Control Unit - User Guide	DOCA0102EN DOCA0102ES DOCA0102FR DOCA0102ZH
MasterPacT MTZ - MicroLogic Active Control Unit - User Guide	DOCA0265EN DOCA0265ES DOCA0265ZH
MasterPacT NT/NW MicroLogic A and E Trip Units - User Guide	04443724AA (EN) 04443723AA (FR)
MasterPacT NT/NW MicroLogic P Trip Units - User Guide	04443726AA (EN) 04443725AA (FR)
MasterPacT NT/NW MicroLogic H Trip Units - User Guide	04443728AA (EN) 04443727AA (FR)
ComPacT NS - MicroLogic A/E Trip Units - User Guide	DOCA0218EN DOCA0218ES DOCA0218FR DOCA0218ZH
ComPacT NS - MicroLogic P Trip Units - User Guide	DOCA0219EN DOCA0219ES DOCA0219FR DOCA0219ZH
ComPacT NSX MicroLogic 5/6/7 Trip Units - User Guide	DOCA0188EN DOCA0188ES DOCA0188FR DOCA0188ZH
MasterPacT, ComPacT, PowerPacT - Cybersecurity Guide	DOCA0122EN DOCA0122ES DOCA0122FR DOCA0122ZH
ULP (Universal Logic Plug) System - User Guide	DOCA0093EN DOCA0093ES DOCA0093FR DOCA0093ZH
Enerlin'X IO Input/Output Application Module for One Circuit Breaker - User Guide	DOCA0055EN DOCA0055ES DOCA0055FR DOCA0055ZH
Enerlin'X IFE - Ethernet Switchboard Server - User Guide	DOCA0084EN DOCA0084ES DOCA0084FR DOCA0084ZH
Enerlin'X IFE - Ethernet Interface for One Circuit Breaker - User Guide	DOCA0142EN DOCA0142ES DOCA0142FR DOCA0142ZH

Title of documentation	Reference number
Enerlin'X EIFE - Embedded Ethernet Interface for One MasterPacT MTZ Drawout Circuit Breaker - User Guide	DOCA0106EN DOCA0106ES DOCA0106FR DOCA0106ZH
Enerlin'X IFE – Ethernet Interface for One Circuit Breaker – Instruction Sheet	QGH13473
Enerlin'X EIFE – Embedded Ethernet Interface for One MasterPacT MTZ Drawout Circuit Breaker – Instruction Sheet	NVE23550
Enerlin'X IFM – Modbus-SL Interface for One Circuit Breaker – Instruction Sheet	NVE85393
BSCM Modbus SL/ULP Module - Instruction Sheet	PKR1891407
Modbus SL Hub - Instruction Sheet	BQT1758409
Enerlin'X IO – Input/Output Application Module for One Circuit Breaker – Instruction Sheet	HRB49217

Related Documents for UL/ANSI Devices

Title of documentation	Reference number
MasterPacT MTZ - MicroLogic X Control Unit - User Guide	DOCA0102EN DOCA0102ES DOCA0102FR DOCA0102ZH
MasterPacT NT Low-Voltage Power/Insulated Case Circuit Breaker- User Guide	0613IB1209 (EN, ES, FR)
MasterPacT NW Low-Voltage Power/Insulated Case Circuit Breaker - User Guide	0613IB1204 (EN, ES, FR)
MicroLogic 5 and 6 Electronic Trip Units for PowerPacT H-, J-, and L-Frame Circuit Breakers - User Guide	48940-312-01 (EN, ES, FR)
PowerPacT H-, J-, and L-Frame Circuit Breakers with MicroLogic Trip Units - User Guide	48940-313-01 (EN, ES, FR)
MasterPacT, ComPacT, PowerPacT - Cybersecurity Guide	DOCA0122EN DOCA0122ES DOCA0122FR DOCA0122ZH
ULP (Universal Logic Plug) System - User Guide	DOCA0093EN DOCA0093ES DOCA0093FR DOCA0093ZH
Enerlin'X IO Input/Output Application Module for One Circuit Breaker - User Guide	DOCA0055EN DOCA0055ES DOCA0055FR DOCA0055ZH
Enerlin'X IFE - Ethernet Switchboard Server - User Guide	DOCA0084EN DOCA0084ES DOCA0084FR DOCA0084ZH
Enerlin'X IFE - Ethernet Interface for One Circuit Breaker - User Guide	DOCA0142EN DOCA0142ES DOCA0142FR DOCA0142ZH
Enerlin'X EIFE - Embedded Ethernet Interface for One MasterPacT MTZ Drawout Circuit Breaker - User Guide	DOCA0106EN DOCA0106ES DOCA0106FR DOCA0106ZH
Enerlin'X IFE – Ethernet Interface for One Circuit Breaker – Instruction Sheet	QGH13473
Enerlin'X EIFE – Embedded Ethernet Interface for One MasterPacT MTZ Drawout Circuit Breaker – Instruction Sheet	NVE23550
Enerlin'X IFM – Modbus-SL Interface for One Circuit Breaker – Instruction Sheet	NVE85393
BSCM Modbus SL/ULP Module - Instruction Sheet	PKR1891407

Title of documentation	Reference number
Modbus SL Hub - Instruction Sheet	BQT1758409
Enerlin'X IO – Input/Output Application Module for One Circuit Breaker – Instruction Sheet	HRB49217

Information on Non-Inclusive or Insensitive Terminology

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Modbus Communication with PacT Series Circuit Breakers

What's in This Part

Introduction....16
IFM Communication Interface....24
IFE Communication Interface....32
EIFE Ethernet Interface for Drawout Circuit Breaker....40

Introduction

What's in This Chapter

Description 17
Intelligent Modular Unit 18
EcoStruxure Power Commission Software 22

PacT Series Master Range

Future-proof your installation with Schneider Electric's low-voltage and medium-voltage PacT Series. Built on legendary Schneider Electric innovation, the PacT Series comprises world-class circuit breakers, switches, residual current devices and fuses, for all standard and specific applications. Experience robust performance with PacT Series within the EcoStruxure-ready switchgear, from 16 to 6300 A in low-voltage and up to 40.5 kV in medium-voltage.

Description

Modbus Communication

The Modbus communication option enables Schneider Electric low voltage circuit breakers to be connected to a network with a client Modbus communication channel.

The Modbus communication option is available with:

- MasterPacT MTZ circuit breakers with MicroLogic X control unit
- MasterPacT MTZ circuit breakers with MicroLogic Active control unit and BCIM module
- MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame circuit breakers with MicroLogic A/E/P/H trip unit and BCM ULP module
- ComPacT NSX and PowerPacT H-, J-, and L-frame circuit breakers with MicroLogic 5/6/7 trip unit and BSCM module

The circuit breakers can be connected:

- to an RS-485 serial line network with Modbus RTU protocol using the IFM Modbus-SL interface for one circuit breaker
- to an Ethernet network with Modbus TCP/IP protocol using dedicated interfaces like:
  - the IFE Ethernet interface for one circuit breaker.
  - the IFE Ethernet switchboard server.
  - the EIFE embedded Ethernet interface for MasterPacT MTZ drawout circuit breaker.

Access to Functions

The Modbus communication option provides access to many functions, including:

- read metering and diagnostic data
- read status conditions and remote operations
- transfer of time-stamped events
- display protection settings
- read the circuit breakers identification and configuration data
- remote control of the circuit breaker
- time-setting and synchronization

This list depends on the composition of the intelligent modular unit (type of circuit breaker, type of MicroLogic control unit or trip unit, IO application module, and so on) and the enabled functions.

Intelligent Modular Unit

Definition

A modular unit is a mechanical and electrical assembly containing one or more products to perform a function in a switchboard (incoming protection, motor command, and control).

The circuit breaker with its internal communicating components (MicroLogic control unit or MicroLogic trip unit) and external ULP modules (IO module) connected to one communication interface is called an intelligent modular unit (IMU).

An IMU is composed around a circuit breaker from the following ranges:

- MasterPacT MTZ circuit breakers with MicroLogic X control unit
- MasterPacT MTZ circuit breakers with MicroLogic Active control unit
- MasterPacT NT/NW circuit breakers
- ComPacT NS 630b–1600 circuit breakers
- ComPacT NS 1600b–3200 circuit breakers
- PowerPacT P- and R-frame circuit breakers
- ComPacT NSX circuit breakers
- PowerPacT H-, J-, and L-frame circuit breakers

ULP Modules Per Circuit Breaker Range

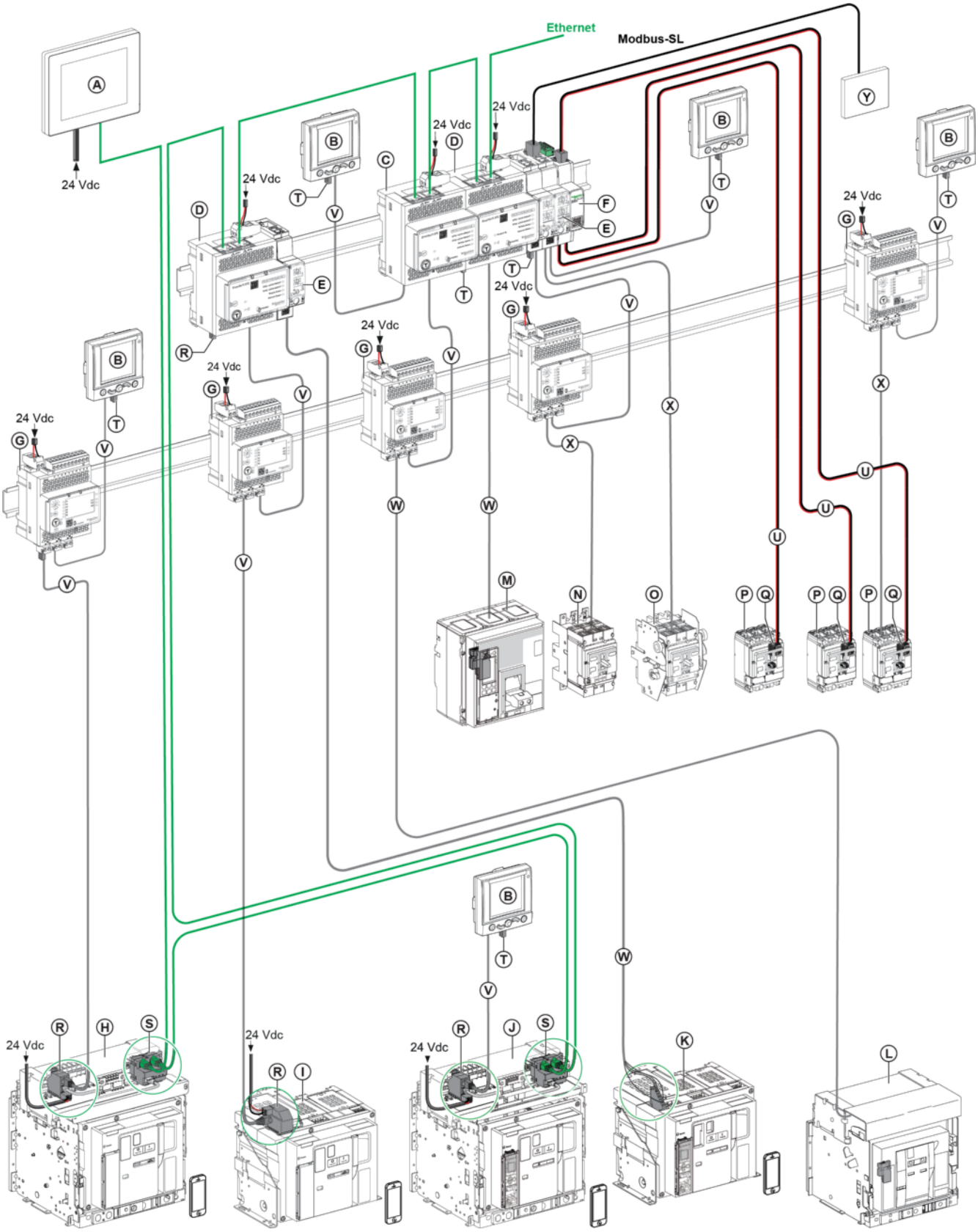
The following table lists the compatible ULP modules for each range of circuit breakers.

ULP Module	Part Number	MasterPacT MTZ with ULP Port Module and MicroLogic X Control Unit	MasterPacT MTZ with BCIM Module and MicroLogic Active Control Unit	MasterPacT NT/NW or ComPacT NS or PowerPacT P- and R-Frame with BCM ULP Module and MicroLogic Trip Unit	ComPacT NSX or PowerPacT H-, J-, and L-Frame with BSCM Modbus SL/ULP Module and/or MicroLogic Trip Unit
IFE Ethernet communication interface for one circuit breaker	LV434001 LV434010	✓	✓	✓	✓
IFE Ethernet switchboard server	LV434002 LV434011	✓	✓	✓	✓
EIFE Embedded Ethernet interface for one MasterPacT MTZ drawout circuit breaker	LV851001	✓	✓	–	–
Spare part kit EIFE for one MasterPacT MTZ1 drawout circuit breaker	LV851100SP	✓	✓	–	–
Spare part kit EIFE for one MasterPacT MTZ2/MTZ3 drawout circuit breaker	LV851200SP	✓	✓	–	–
IFM Modbus SL communication interface for one circuit breaker	TRV00210 STRV00210	–	✓	✓	✓
IFM Modbus SL communication interface for one circuit breaker	LV434000	✓	✓	✓	✓

ULP Module	Part Number	MasterPacT MTZ with ULP Port Module and MicroLogic X Control Unit	MasterPacT MTZ with BCIM Module and MicroLogic Active Control Unit	MasterPacT NT/NW or ComPacT NS or PowerPacT P- and R-Frame with BCM ULP Module and MicroLogic Trip Unit	ComPacT NSX or PowerPacT H-, J-, and L-Frame with BSCM Modbus SL/ULP Module and/or MicroLogic Trip Unit
BSCM Modbus SL/ ULP module	LV434220	–	–	–	✓
FDM121 front display module for one circuit breaker	TRV00121 STRV00121	✓	✓	✓	✓
IO input/output application module for one circuit breaker	LV434063	✓	–	✓	✓
USB maintenance interface	TRV00911 STRV00911	–	–	✓	✓

For more information on the ULP System and its components, refer to DOCA0093•• *ULP System User Guide*, page 12.

Communication Architecture



A FDM128 Ethernet display for eight devices

B FDM121 front display module for one circuit breaker

C IFE Ethernet communication interface for one circuit breaker

D IFE Ethernet switchboard server

E IFM Modbus SL communication interface for one circuit breaker

F Modbus SL hub

G IO input/output application module for one circuit breaker

H MasterPacT MTZ drawout circuit breaker with MicroLogic X control unit

I MasterPacT MTZ fixed circuit breaker with MicroLogic X control unit

J MasterPacT MTZ drawout circuit breaker with MicroLogic Active control unit and BCIM module

K MasterPacT MTZ fixed circuit breaker with MicroLogic Active control unit and BCIM module

L MasterPacT NT/NW circuit breaker with MicroLogic trip unit and BCM ULP module

M ComPacT NS/PowerPacT P- and R-frame circuit breaker with MicroLogic trip unit and BCM ULP module

N ComPacT NSX/PowerPacT H-, J-, and L-frame plug-in circuit breaker

O ComPacT NSX/PowerPacT H-, J-, and L-frame drawout circuit breaker

P ComPacT NSX/PowerPacT H-, J-, and L-frame fixed circuit breaker

Q BSCM Modbus SL/ULP module

R ULP port module

S EIFE Embedded Ethernet Interface for one MasterPacT MTZ drawout circuit breaker

T ULP line termination

U BSCM Modbus SL cord

V RJ45 ULP cord

W Circuit breaker BCM ULP cord

X NSX cord

Y Modbus-SL server

Remote Controller

A remote controller is a device that is able to communicate with an IMU using a communication interface, such as the IFE Ethernet communication interface. For example, FDM128 Ethernet display for eight devices, supervisor, PLC, BMS, SCADA system, and so on, are remote controllers.

EcoStruxure Power Commission Software

Overview

EcoStruxure Power Commission software helps you to manage a project as part of testing, commissioning, and maintenance phases of the project life cycle. The innovative features in it provide simple ways to configure, test, and commission the smart electrical devices.

EcoStruxure Power Commission software automatically discovers the smart devices and allows you to add the devices for an easy configuration. You can generate comprehensive reports as part of Factory Acceptance Test and Site Acceptance Test to replace your heavy manual work. Additionally, when the panels are under operation, any change of settings made can be easily identified by a yellow highlighter. This indicates the difference between the project and device values, and hence provides a system consistency during the operation and maintenance phase.

EcoStruxure Power Commission software enables the configuration of the following circuit breakers, modules, and accessories:

Circuit breaker ranges	Modules	Accessories
MasterPacT MTZ circuit breakers with MicroLogic X control unit	• MicroLogic X control unit • Communication interface modules: IFM interface, IFE interface, IFE server, and EIFE interface • ULP modules: IO module, FDM121 display(1)	M2C output module
MasterPacT MTZ circuit breakers with MicroLogic Active control unit	• MicroLogic Active control unit • Communication interface modules: BCIM module, IFM interface, IFE interface, IFE server, and EIFE interface • ULP modules: FDM121 display(1)	-
• MasterPacT NT/NW circuit breakers • ComPacT NS circuit breakers • PowerPacT P- and R-frame circuit breakers	• MicroLogic trip units • Communication interface modules: BCM module, CCM module, BCM ULP module, IFM interface, IFE interface, and IFE server • ULP modules: IO module, FDM121 display(1)	M2C and M6C output modules
• ComPacT NSX circuit breakers • PowerPacT H-, J- and L-frame circuit breakers	• MicroLogic trip units(2) • Communication interface modules: BSCM module and BSCM Modbus SL/ULP module, IFM interface, IFE interface, and IFE server • ULP modules: IO module, FDM121 display(1)	SDTAM and SDx output modules
(1) For FDM121 display, only the firmware and language download are supported. (2) EcoStruxure Power Commission software version 2.20 and later must be used to configure: • MicroLogic 5/6 trip units with firmware version 001.005.001 and later • MicroLogic 7 trip units with firmware version 002.002.000 and later		

For more information, refer to the *EcoStruxure Power Commission Online Help*.

Click here to download the latest version of EcoStruxure Power Commission software.

Key Features

EcoStruxure Power Commission software performs the following actions for the supported devices and modules:

- Create projects by device discovery
- Save the project in the EcoStruxure Power Commission cloud for reference

- Upload settings to the device and download settings from the device
- Compare the settings between the project and the device
- Perform control actions in a secured way
- Generate and print the device settings report
- Perform a communication wiring test on the entire project and generate and print test report
- View the communication architecture between the devices in a graphical representation
- View the measurements, logs, and maintenance information
- Export Waveform Capture on Trip Event (WFC)
- View the status of device and IO module
- View the alarm details
- Buy, install, remove, or retrieve the Digital Modules
- Check the system firmware compatibility status
- Update to the latest device firmware
- Perform force trip and automatic trip curve tests

IFM Communication Interface

What's in This Chapter

Introduction....25
Hardware Description....26
Configuration....30
Communication Test....31

Introduction

Overview

The IFM Modbus SL communication interface for one circuit breaker enables an intelligent modular unit (IMU) with a ComPacT, PowerPacT, or MasterPacT circuit breaker, to be connected to a three-wire plus shield Modbus SL RS-485 serial line Modbus network. Each circuit breaker has its own IFM communication interface and a corresponding Modbus address.

Types of IFM Communication Interface

The part number of the IFM communication interface is LV434000. The IFM communication interface part number LV434000 completely replaces the IFM communication interface with part number TRV00210 or STRV00210.

NOTE:

- The IFM communication interface data for the IFM communication interface with part number LV434000 is the same as for the IFM communication interface with part number TRV00210 or STRV00210.
- The IFM communication interfaces with part number TRV00210 or STRV00210 are not compatible with MasterPacT MTZ circuit breakers with MicroLogic X control unit.

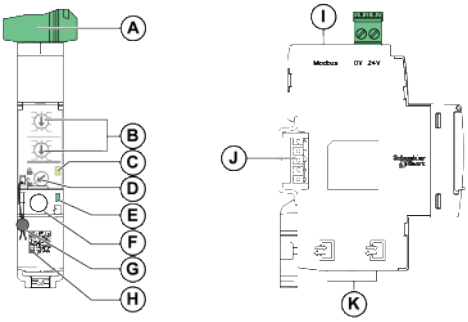
IFM Communication Interface Features

The main features of IFM communication interface are:

- Single Modbus serial line interface provided in
  - RJ45 connector interface
  - Stacking connection interface
- HMI rotary dials for address settings and padlock option
- Pushbutton for test functionality

Hardware Description

General Description



A 24 Vdc power supply terminal block

B Modbus address rotary switches

C Modbus traffic status LED

D Modbus locking pad

E ULP status LED

F Test button

G Mechanical lock

H QR code to product information

I RJ45 Modbus-SL port

J Stacking accessory connection (TRV00217, optional)

K 2 RJ45 ULP ports

For information on installation, consult the instruction sheet available on Schneider Electric website: NVE85393.

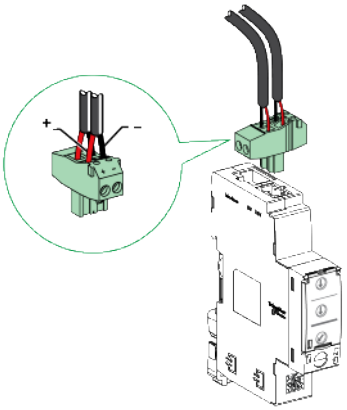
Mounting

The IFM communication interface is a DIN rail mounting device. The stacking accessory enables the interconnection of several IFM communication interfaces without additional wiring.

24 Vdc Power Supply

The IFM communication interface must always be supplied with 24 Vdc:

- IFM communication interfaces stacked to an IFE server are supplied by the IFE server and it is not necessary to supply them separately.
- If IFM communication interfaces are stacked without IFE server, only one of the IFM communication interfaces must be supplied with 24 Vdc.
- A single IFM communication interface must be supplied with 24 Vdc.



It is recommended to use a UL listed/UL recognized limited voltage/limited current or a class 2 power supply with a 24 Vdc, 3 A maximum.

NOTE: For 24 Vdc power supply connection, use copper conductors only.

Modbus Address Rotary Switches

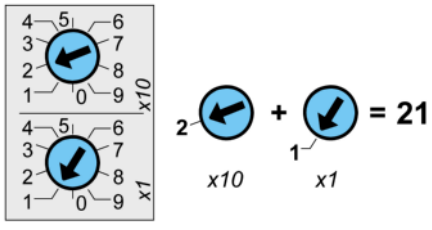
The IFM communication interface bears the Modbus address of the IMU to which it is connected. For more information regarding the IMU, refer to DOCA0093•• *ULP System User Guide*.

Define the Modbus address using the two address rotary switches on the front panel of the IFM communication interface.

The address range is 1 to 99. Do not to use the address 0, because it is reserved for broadcasting commands.

The IFM communication interface is initially configured with address 99.

Example of the configuration of the address rotary switches for address 21:



Modbus Traffic Status LED

The Modbus traffic status LED provides information about the traffic transmitted or received by the IMU over the Modbus network.

- When the Modbus address rotary switches are on value 0, the yellow LED is steady ON.
- When the Modbus address rotary switches are on value anywhere from 1 to 99, the yellow LED is ON during the transmission and reception of messages, OFF otherwise.

Modbus Locking Pad

The Modbus locking pad on the front panel of the IFM communication interface enables or disables remote control commands to be sent over the Modbus network to the IFM communication interface itself, and to the other modules of the IMU.

- If the arrow points to the open padlock (factory setting), remote control commands are enabled.



- If the arrow points to the closed padlock, remote control commands are disabled.



The only remote control commands that are enabled even if the arrow points to the closed padlock are the Set Absolute Time and Get Current Time commands.

NOTE: For IFM communication interface servers connected to an IFE Ethernet switchboard server, the locking pad of the IFE communication interface does not disable the remote control commands in IFM communication interface.

Test Button

The test button tests the connection between all the ULP modules connected to the IFM communication interface.

Pressing the test button launches the connection test for 15 seconds.

During the test, all the ULP modules keep working normally.

ULP Status LED

The yellow ULP status LED describes the mode of the ULP module.

ULP status LED	Mode	Action
	Nominal	None
	Conflict	Remove extra ULP module
	Degraded	Replace IFM communication interface at the next maintenance operation
	Test	None
	Non-critical firmware discrepancy	Use EcoStruxure Power Commission software to check the firmware and

ULP status LED	Mode	Action
	Non-critical hardware discrepancy	hardware compatibility and follow the recommended actions.
	Configuration discrepancy	Install missing features
	Critical firmware discrepancy	Use EcoStruxure Power Commission software to check the firmware and hardware compatibility and follow the recommended actions.
	Critical hardware discrepancy	
	Stop	Replace IFM communication interface.
	Power off	Check power supply

Configuration

General Description

Two configurations of the IFM communication interface are available:

- Automatic configuration (Auto-Speed sensing ON, factory setting): when connected to the Modbus network, the IFM communication interface automatically detects the network parameters.
- Personalized configuration (Auto-Speed sensing OFF): the user can personalize the network parameters using EcoStruxure Power Commission software.

Automatic Configuration

The Modbus server address is defined by the two address rotary switches on the front panel of the IFM communication interface. When connected to the Modbus serial line network, the IFM communication interface automatically detects the network speed and parity. The Auto-Speed sensing algorithm tests the available Baud rates and parities and automatically detects the Modbus Serial Line communication network parameters. The Modbus client must send at least 25 frames on the Modbus network in order to allow the Auto-Speed sensing algorithm to work.

The transmission format is binary with one start bit, eight data bits, one stop bit in case of even or odd parity, and two stop bits in case of no parity.

If the Auto-Speed sensing algorithm does not detect the network parameters, it is recommended to follow this procedure:

Step	Action
1	Set up the IFM communication interface to Modbus address 1, page 27.
2	Send a **Read Multiple Register** request (function code 0x03) to server 1, at any address and for any number of registers.
3	Send this request at least 25 times.

NOTE: If the network speed or parity is changed after the IFM communication interface has automatically detected these settings, the IFM communication interface must be restarted (power off/power on) in order to detect the new network parameters.

Personalized Configuration

The Modbus server address is defined by the two address rotary switches on the front panel of the IFM communication interface.

Disable the Auto-Speed sensing option and set the following Modbus Serial Line communication network parameters with EcoStruxure Power Commission software:

- Baud rate: 4800, 9600, 19200, and 38400 Baud.
- Parity: Even, odd, and none (it is possible to select one stop bit or two stop bits in case of no parity).

NOTE: It is not possible to change the Modbus address or the status of the locking pad with EcoStruxure Power Commission software.

Communication Test

To test the serial line communication on the various circuit breakers, it is recommended to use EcoStruxure Power Commission software.

If a PC running EcoStruxure Power Commission (EPC) software and connected on the Modbus network is able to read data from the IMU, the communication is established. Refer to the *EcoStruxure Power Commission Online Help*.

IFE Communication Interface

What's in This Chapter

Introduction....33
Hardware Description....35

Introduction

Overview

The IFE communication interface enables an intelligent modular unit (IMU) with a ComPacT, PowerPacT or MasterPacT circuit breaker to be connected to an Ethernet network. Each circuit breaker has its own IFE communication interface and a corresponding IP address.

Types of IFE Communication Interface

There are two types of the IFE communication interface:

- IFE Ethernet communication interface for one circuit breaker, with part number LV434001

  This type of IFE communication interface is an Ethernet interface for ComPacT, PowerPacT and MasterPacT circuit breakers.

  For more information about IFE Ethernet communication interface for one circuit breaker, refer to DOCA0142•• *Enerlin'X IFE - Ethernet Interface for One Circuit Breaker - User Guide* in **Related Documents** at the beginning of this guide.

  NOTE: The IFE communication interface with part number LV434001 completely replaces the IFE communication interface with part number LV434010. The LV434001 comes with the real time clock (RTC) feature and allows ULP connections up to 20 m (65.6 ft). The part number LV434010 had a theoretical limitation of 5 m (16.4 ft) over the lifetime of the IFE communication interface.

- IFE Ethernet switchboard server, with part number LV434002

  This type of IFE communication interface is an Ethernet interface for ComPacT, PowerPacT, and MasterPacT circuit breakers and a server for Modbus SL (serial line) connected devices.

  For more information about IFE Ethernet switchboard server, refer to DOCA0084•• *Enerlin'X IFE - Ethernet Switchboard Server - User Guide* in **Related Documents** at the beginning of this guide.

  NOTE: The IFE server with part number LV434002 completely replaces the IFE server with part number LV434011. The LV434002 comes with the real time clock (RTC) feature and allows ULP connections up to 20 m (65.6 ft). The part number LV434011 had a theoretical limitation of 5 m (16.4 ft) over the lifetime of the IFE server.

IFE Communication Interface Features

The main features of IFE communication interface are:

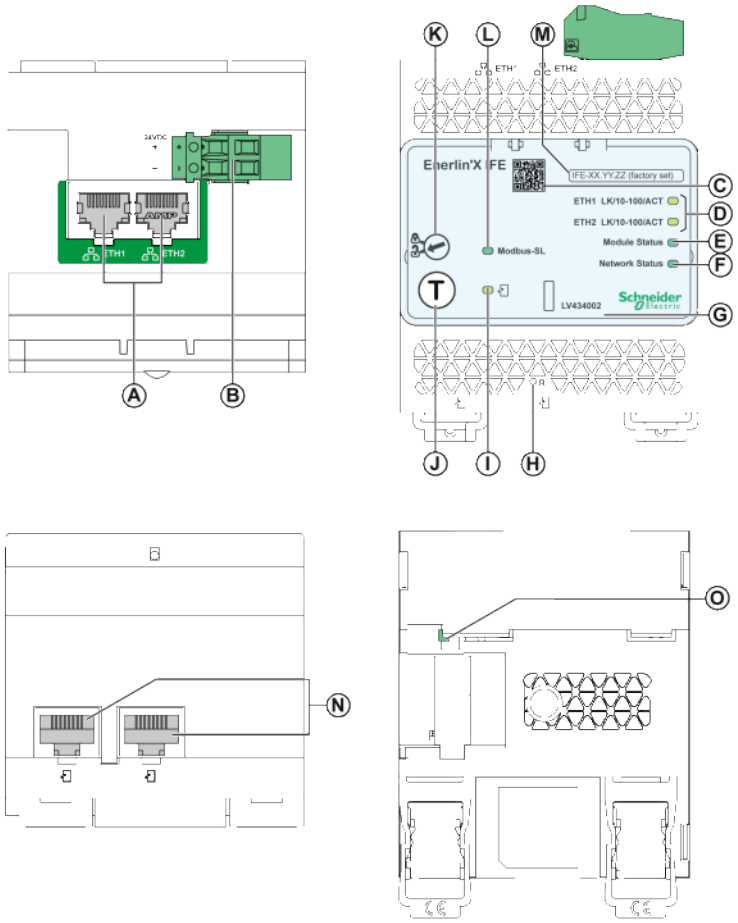
- Dual Ethernet port for simple daisy chain connection
- Device profile web service for discovery of the IFE communication interface on the local area network (LAN)
- ULP compliant for location of the IFE communication interface in the switchboard
- Ethernet interface for ComPacT, PowerPacT and MasterPacT circuit breakers
- Server for Modbus SL connected devices (only for the IFE server with the part number LV434002)
- Embedded setup webpages
- Embedded monitoring webpages
- Embedded control webpages

- Built-in email alarm notification for circuit breaker connected to IFE communication interface.

  NOTE: The built-in switch of IFE communication interface does not support the ring topology as it does not have the feature of the loop back protection.

Hardware Description

Description



A Ethernet 1 and Ethernet 2 RJ45 communication ports

B 24 Vdc power supply terminal block

C QR code to product information

D Ethernet communication LEDs

E Module status LED

F Network status LED

G Sealable transparent cover

H Reset button

I ULP status LED

J Test button (accessible even with closed cover)

K Locking pad

L Modbus traffic status LED (IFE server only)

M Device name label

N Two RJ45 ULP ports

O Grounding connection

For information on installation, consult the instruction sheet available on the Schneider Electric website: QGH13473.

Mounting

The IFE communication interface mounts on a DIN rail. The stacking accessory enables the connection of several IFM communication interfaces to an IFE server without additional wiring.

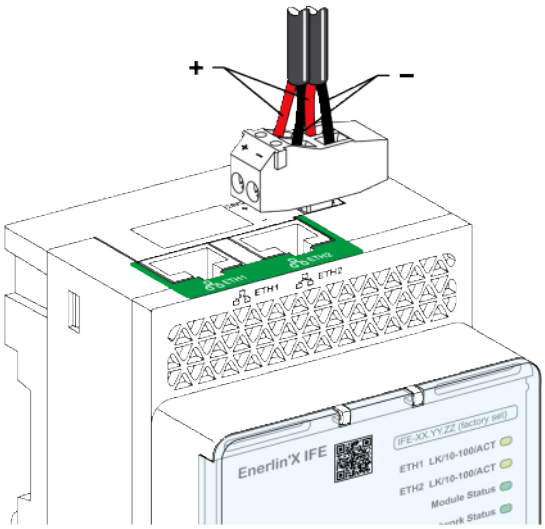
NOTE: The stacking feature is available only for the IFE server with the part number LV434002.

24 Vdc Power Supply

The IFE communication interface must always be supplied with 24 Vdc. The power to the IFM communication interfaces stacked to an IFE server are supplied by the IFE server and it is not necessary to supply power to them separately.

It is recommended to use a UL listed and recognized limited voltage/limited current or a class 2 power supply with a 24 Vdc, 3 A maximum.

NOTE: For 24 Vdc power supply connection, use copper conductors only.



Ethernet Communication LEDs

The Ethernet communication dual color LEDs, indicate the status of the Ethernet ports **ETH1** and **ETH2**.

LED Indication	Status Description
OFF	No power or no link
Steady yellow	10 Mbps, link established, and no activity
Blinking yellow	10 Mbps, ongoing activity
Steady green	100 Mbps, link established, and no activity
Blinking green	100 Mbps, ongoing activity

Module Status LED

The module status dual color LED indicates the IFE communication interface status.

LED Indication	Status Description	Action
OFF	No power	None
Steady green	IFE communication interface operational	None
Blinking green (250 ms ON, 250 ms OFF)	Hidden control webpage available	None
Blinking green (500 ms ON, 500 ms OFF)	IFE communication interface firmware corrupted	Contact your local Schneider Electric service team for support.
Blinking red (500 ms ON, 500 ms OFF)	IFE communication interface in degraded mode	Replace ULP module at the next maintenance operation.
Steady red	IFE communication interface out of service	None
Blinking green/red (1 s green, 1 s red)	Firmware update in progress	None
Blinking green/red (250 ms green, 250 ms red)	Self-test in progress	None

Network Status LED

The network status dual color LED, indicates the Ethernet network status.

LED Indication	Status Description
OFF	No power or no IP address
Steady green	Valid IP address
Steady red	Duplicated IP address
Blinking green/red (250 ms green, 250 ms red)	Self-test in progress
Steady amber	Error in IP configuration

Modbus Serial Line Traffic LED

The Modbus serial line traffic yellow LED, indicates that the traffic is being transmitted or received over the Modbus serial line network through the IFE server.

The LED is ON during the transmission and reception of the messages. The LED is OFF otherwise.

NOTE: The LED is OFF on the IFE communication interface (part number LV434001).

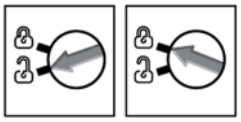
Modbus Address

The IFE communication interface accepts the Modbus address of the IMU to which it is connected.

The Modbus address is 255 and cannot be changed.

Locking Pad

The locking pad on the front panel of the IFE communication interface enables or disables the ability to send the remote control commands over the Ethernet network to the IFE communication interface, and to the other modules of the IMU.



- If the arrow points to the open padlock (factory setting), remote control commands are enabled.
- If the arrow points to the closed padlock, remote control commands are disabled.

  The only remote control command that is enabled even if the arrow points to the closed padlock, is the set absolute time command.

Test Button

The test button has two functions, according to the duration of the button pressed.

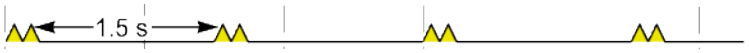
Time Range	Function
1–5 s	Tests the connection between all the ULP modules for 15 s.
10–15 s	Activates the hidden configuration mode. **NOTE:** The hidden configuration is not activated if the button is pressed for more than 15 s.

Reset Button

When the reset button is pressed for 1–5 s, it forces the IP acquisition mode to the factory default setting (DHCP).

ULP Status LED

The yellow ULP status LED describes the mode of the ULP module.

ULP LED	Mode	Action
	Nominal	None
	Conflict	Remove extra ULP module
	Degraded	Replace ULP module at the next maintenance operation
	Test	None
	Non-critical firmware discrepancy	Use EcoStruxure Power Commission software to check the firmware and hardware compatibility and follow the recommended actions
	Non-critical hardware discrepancy	
	Configuration discrepancy	Install missing features
	Critical firmware discrepancy	Use EcoStruxure Power Commission software to check the firmware and hardware compatibility and follow the recommended actions
	Critical hardware discrepancy	
	Stop	Replace ULP module
	Power OFF	Check power supply

EIFE Ethernet Interface for Drawout Circuit Breaker

What's in This Chapter

Introduction....41
Hardware Description....42

Introduction

Overview

The EIFE embedded Ethernet interface for one MasterPacT MTZ drawout circuit breaker (EIFE interface) enables one MasterPacT MTZ drawout circuit breaker to be connected to an Ethernet network.

It provides digital access to all the data delivered by the MicroLogic X or MicroLogic Active control unit of the MasterPacT MTZ circuit breaker. It provides information about the intelligent modular unit (IMU) system. In addition, it monitors the three positions of the circuit breaker when inserted in its cradle:

- Cradle connected
- Cradle disconnected
- Cradle test position

For more information about EIFE interface, refer to DOCA0106•• *Enerlin'X EIFE - Embedded Ethernet Interface for One MasterPacT MTZ Drawout Circuit Breaker - User Guide* in **Related Documents** at the beginning of this guide.

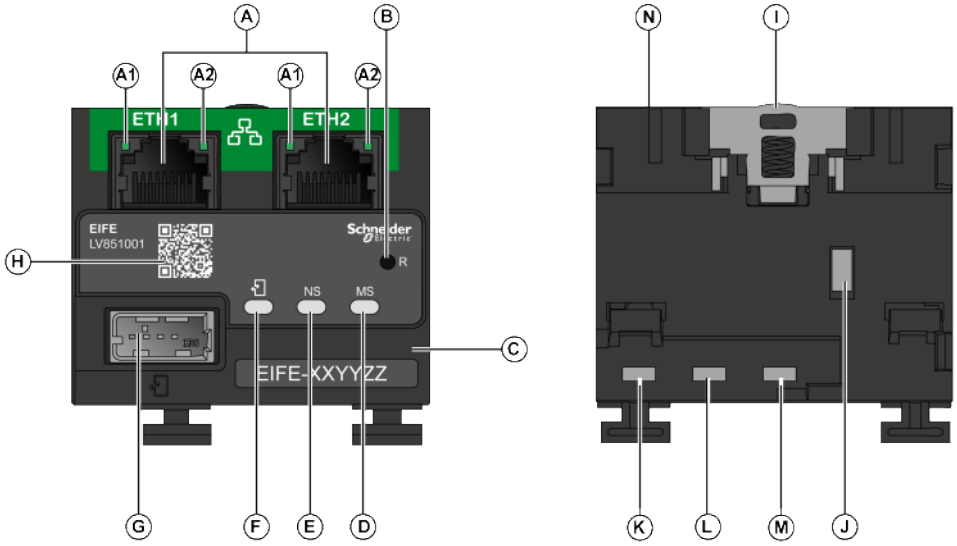
EIFE Interface Features

The main features of EIFE interface are:

- Dual 10/100 Mbps Ethernet port for simple daisy chain connection
- Device profile web service for discovery of the EIFE interface on the local area network (LAN)
- Ethernet interface for MasterPacT MTZ drawout circuit breakers
- Embedded setup webpages
- Embedded monitoring webpages
- Embedded control webpages
- Cradle status management (CE, CD, and CT)
- Built-in email alarm notification
- Network time management (SNTP)

Hardware Description

Description



A Two RJ45 Ethernet ports

A1 OFF: 10 Mbps

Steady green: 100 Mbps

A2 Steady green: link

Blinking green: activity

B IP reset button

C Device identification label

D Module status LED

E Network status LED

F ULP status LED

G USB mode ULP port

H QR code to product information

I DIN clip

J Grounding connection

K CT limit switch

L CE limit switch

M CD limit switch

N MAC ID

For more information on installation, refer to NVE23550 EIFE – Embedded Ethernet Interface for One MasterPacT MTZ Drawout Circuit Breaker – Instruction Sheet.

Mounting

The EIFE interface is embedded in the cradle of the MasterPacT MTZ circuit breaker.

24 Vdc Power Supply

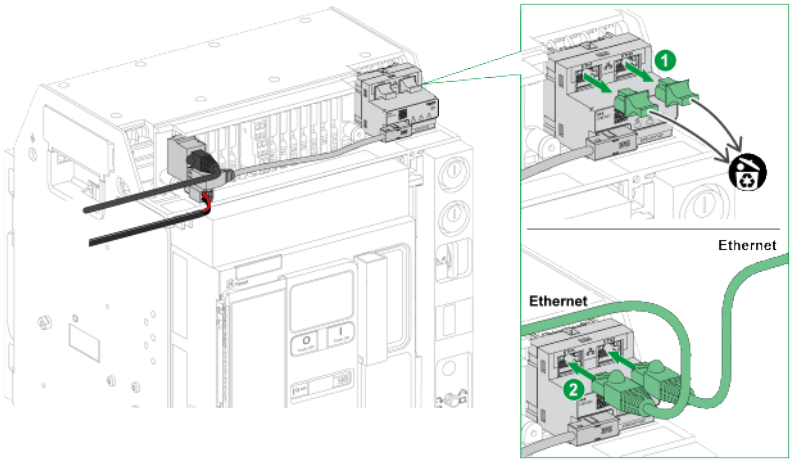
The EIFE interface is powered by the ULP port module.

For more information, refer to DOCA0093•• *ULP (Universal Logic Plug) System - User Guide* in **Related Documents** at the beginning of this guide.

It is recommended to use a UL listed and recognized limited voltage/limited current or a class 2 power supply with a 24 Vdc, 3 A maximum.

NOTE: For 24 Vdc power supply connection, use copper conductors only.

Ethernet Connection



Module Status LED

The module status dual color LED, indicates the EIFE interface status.

LED Indication	Status Description	Action
OFF	No power	None
Steady green	EIFE interface operational	None
Blinking green (250 ms ON, 250 ms OFF)	Hidden control webpage available	None
Blinking green (500 ms ON, 500 ms OFF)	EIFE interface firmware corrupted	Contact your local Schneider Electric service team for support.
Blinking red (500 ms ON, 500 ms OFF)	EIFE interface in degraded mode	Replace ULP module at the next maintenance operation.
Steady red	EIFE interface out of service	None
Blinking green/red (1 s green, 1 s red)	Firmware update in progress	None
Blinking green/red (250 ms green, 250 ms red)	Self-test in progress	None

Network Status LED

The network status dual color LED, indicates the Ethernet network status.

LED Indication	Status Description
OFF	No power or no IP address
Steady green	Valid IP address
Steady red	Duplicated IP address
Blinking green/red (250 ms green, 250 ms red)	Self-test in progress
Steady amber	Error detected in IP configuration

ULP Status LED

The yellow ULP status LED describes the mode of the ULP module.

ULP LED	Mode	Action
	Nominal	None
	Conflict	Remove extra ULP module
	Degraded	Replace EIFE interface at the next maintenance operation
	Test	None
	Non-critical firmware discrepancy	Use the EcoStruxure Power Commission software to check the firmware and hardware compatibility and follow the recommended actions.
	Non-critical hardware discrepancy	
	Configuration discrepancy	Install missing features
	Critical firmware discrepancy	Use the EcoStruxure Power Commission software to check the firmware and hardware compatibility and follow the recommended actions
	Critical hardware discrepancy	
	Stop	Replace EIFE interface
	Power OFF	Check power supply

Modbus Address

The EIFE interface accepts the Modbus address of the IMU to which it is connected.

The Modbus address is 255 and cannot be changed.

Intrusive Command Mode

The EIFE intrusive command mode can be configured with EcoStruxure Power Commission software. This software can enable or disable the ability to send the remote control commands over the Ethernet network to the EIFE interface, and to the other modules of the connected IMU.

- If the intrusive command mode is Locked, the remote control commands are disabled.

- If the intrusive command mode is Unlocked (factory setting), the remote control commands are enabled.

  NOTE: Whatever is the intrusive command mode, the only remote control command that is always enabled is the **Set Absolute Time** command.

Reset Button

When the reset button is pressed for 1–5 seconds, it forces the IP acquisition mode to the factory default setting (DHCP).

Cradle Position Contacts

To identify the cradle position of the circuit breaker, the EIFE interface has three limit switches.

Limit Switch	Description
CE	Cradle connected position contact
CD	Cradle disconnected position contact
CT	Cradle test position contact

Modbus Protocol

What's in This Part

Modbus SL Client-Server Principle 47
Modbus Programming Recommendations 50
Modbus Functions 52
Modbus Exception Codes 57
Password Management 59
Command Interface 61
Command Examples 66
Date Management 68
History Mechanism 69

Modbus SL Client-Server Principle

Overview

The Modbus protocol exchanges information using a request-reply mechanism between a client and a server. The client-server principle is a model for a communication protocol in which one device (the client) controls one or more other devices (the servers). In a standard Modbus network, there is 1 client and up to 31 servers.

A detailed description of the Modbus protocol is available at www.modbus.org.

Characteristics of the Client-Server Principle

The client-server principle is characterized as follows:

- Only 1 client is connected to the network at a time.
- Only the client can initiate communication and send requests to the servers.
- The client can address each server individually using its specific address or all servers simultaneously using address 0.
- The servers can only send replies to the client.
- The servers cannot initiate communication, either to the client or to other servers.

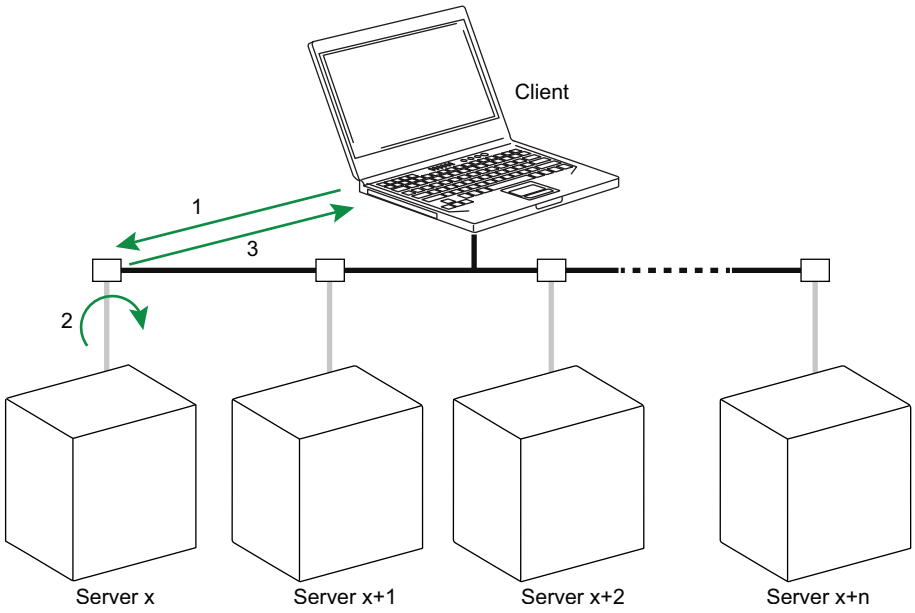
Client-Server Communication Modes

The Modbus protocol can exchange information using 2 communication modes:

- unicast mode
- broadcast mode

Unicast Mode

In unicast mode, the client addresses a server using the specific address of the server. The server processes the request then replies to the client.



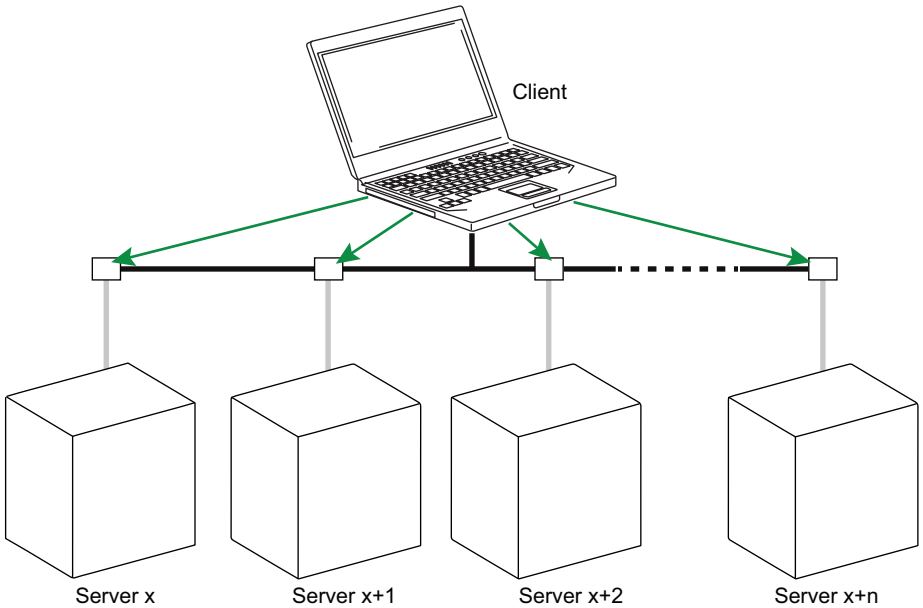
1 Request

2 Process

3 Reply

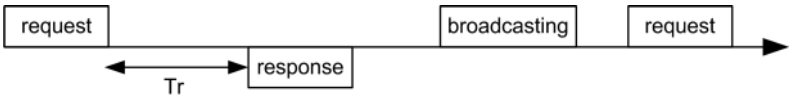
Broadcast Mode

The client can also address all servers using address 0. This type of exchange is called broadcasting. The servers do not reply to broadcasting messages.



Response Time

The response time Tr is the time needed by a server to respond to a request sent by the client:



Values with the Modbus protocol:

- Typical value < 10 ms for 90% of the exchanges
- Maximum value is around 700 ms, so it is recommended to implement a 1 second time out after sending a Modbus request.

Data Exchange

The Modbus protocol uses 2 types of data:

- Single bit
- Register (16 bits)

MasterPacT, ComPacT and PowerPacT circuit breakers support registers only.

Each register has a register number. Each type of data (bit or register) has a 16-bit address.

The messages exchanged with the Modbus protocol contain the address of the data to be processed.

Registers and Addresses

The address of register number n is n-1. The tables detailed in the following parts of this document provide both register numbers (in decimal format) and corresponding addresses (in hexadecimal format). For example, the address of register number 32000 is 0x7CFF (31999).

Frames

All the frames exchanged with the Modbus protocol have a maximum size of 256 bytes and are composed of 4 fields:

Field	Definition	Size	Description
1	Modbus address	1 byte	Destination of the request • For Modbus servers connected on Modbus SL network: ◦ 0: broadcasting (all servers concerned) ◦ 1–247: unique destination ◦ 248–254: reserved • For Modbus servers connected on Modbus TCP network: ◦ 255: unique destination
2	Function codes	1 byte or 2 bytes	Refer to function codes description
3	Data	n registers	Request or reply data **NOTE:** Number of registers n is limited to 52 with MasterPacT NT/NW MicroLogic E trip unit.
4	CRC error checking	2 bytes	CRC16 (to check the integrity of the Modbus frame)

Modbus Programming Recommendations

Read Register Recommendations

The registers of the IMU modules are available through Modbus communication in:

- dataset registers (standard and/or legacy datasets)
- device registers:
  - MicroLogic control unit and trip unit registers
  - IO module registers
  - IFM communication interface registers
  - IFE/EIFE communication interface registers

To read the registers:

- First read the registers that are available in datasets.
  - Standard dataset is recommended because it contains more data in a data format that allows a better accuracy.
  - Legacy dataset is used only for legacy equipments.
- Then read the data that is not available in datasets in the device registers.

The benefit of datasets is that the most useful information of each IMU module is collected in one table that can be read with two or three read requests. Each module updates the values in the dataset registers on a regular basis.

The response time of requests to dataset registers is shorter than the response time of requests to device registers. Therefore, it is recommended to read the dataset registers instead of device registers, to improve the overall performance of the communication system.

Register Update

The values in the registers are updated in two different ways:

- The measurement values are updated periodically, with a fixed refreshment rate.
- The other values are updated when the value is changed.

Type of Registers	Register Update
Identification	Triggered by device replacement
Settings	Triggered by setting change
Measurement	Periodically, with fixed refreshment rate
• Real-time measurements	Every 1 s
• Demand values	Every 1 s
• Harmonic values	Every 3 s
• Energy measurements	Every 5 s
• Peak values of demand values of real-time measurements	Every 5 s
• Minimum and maximum values of real-time measurements	Every 5 s
Maintenance and diagnostic	Triggered by data change
Events	Triggered by event detection
IO status	Triggered by status change

The refreshment rate of values is the same for the dataset registers and the device registers.

Use the refreshment rate to optimize the performance of the communication between the remote controller and the IMU modules.

Modbus Functions

General Description

The Modbus protocol offers a number of functions that are used to read or write data over the Modbus network. The Modbus protocol also offers diagnostic and network-management functions.

Only the Modbus functions handled by the circuit breaker are described here.

Read Functions

The following read functions are available:

Function Code	Subfunction Code	Name	Description
3 (0x03)	–	Read holding registers	Read n output or internal registers
4 (0x04)	–	Read input registers	Read n input registers
43 (0x2B)	14 (0x0E)	Read device identification	Read the identification data of the server
43 (0x2B)	15 (0x0F)	Get date and time	Read the date and time of the server

NOTE: Number of registers n is limited to 52 with MasterPacT NT/NW MicroLogic E trip unit.

Read Register Example

The following table shows how to read the rms current on phase 1 (I1) in register 1016 of a MicroLogic Active control unit. The address of register 1016 is 1016 - 1 = 1015 = 0x03F7. The Modbus address of the Modbus server is 1 = 0x01.

Client Request		Server Reply	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x01	Modbus server address	0x01
Function code	0x03	Function code	0x03
Address of the register to read (MSB)	0x03	Data length in bytes	0x02
Address of the register to read (LSB)	0xF7	Register value (MSB)	0x02
Number of registers (MSB)	0x00	Register value (LSB)	0x2B
Number of registers (LSB)	0x01	CRC (MSB)	0xNN
CRC (MSB)	0xNN	CRC (LSB)	0xNN
CRC (LSB)	0xNN	–	

The content of register 1016 (address 0x03F7) is 0x022B = 555. Therefore, the rms current on phase 1 (I1) is 555 A.

Set Date and Time Example

The following table shows how to set date and time of a Modbus server. The Modbus address of the Modbus server is 1= 0x01, the new date is October 2, 2025, and the new time is 2:32:03:500 p.m.

NOTE: Use the broadcast mode (with Modbus server address = 0) to set the date and time of all Modbus servers.

Client Request		**Server Reply**	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x01	Modbus server address	0x01
Function code	0x2B	Function code	0x2B
Subfunction code	0x10	Subfunction code	0x10
Reserved1	0x00	Reserved1	0x00
Not used	0x00	Not used	0x00
Year = 2025	0x19	Year = 2025	0x19
Month = October	0x0A	Month = October	0x0A
Day Of Month = 2	0x02	Day Of Month = 2	0x02
Hour = 14	0x0E	Hour = 14	0x0E
Minutes = 32	0x20	Minutes = 32	0x20
3 sec. 500 ms	0x0DAC	3 sec. 502 ms	0x0DAE

The normal response is an echo of the request, returned after the date-time has been updated in the remote device. If the date-time structure content is not consistent with a true date-time (that is, an invalid date-time), the value returned in the Date-Time field is set to 0 by the device.

In case of 24 Vdc power loss, the date and time of the Modbus servers without battery is not refreshed anymore. It is therefore mandatory to set date and time for all Modbus servers after recovering the 24 Vdc power supply.

Furthermore, due to the clock drift of each Modbus server, it is mandatory to set date and time for all Modbus servers periodically. Recommended period is at least every 15 minutes.

Scattered Holding Register Read Function

The scattered holding register read function is available:

Function Code	Subfunction Code	Name	Description
100 (0x64)	4 (0x04)	Read scattered holding register	Read n non-contiguous registers

The maximum value for n is 100, but when using a MasterPacT NT/NW MicroLogic A or E trip unit, it is recommended to have n lower or equal to 21.

The scattered holding register read function enables the user to:

- avoid reading a large block of contiguous registers when only few registers are needed
- avoid multiple use of functions 3 and 4 in order to read non-contiguous registers

Read Scattered Holding Register Example

The following table shows how to read the addresses of the register 664 (address 0x0297) and register 666 (address 0x0299) of a Modbus server. The Modbus address of the Modbus server is 1 = 0x01.

Client Request		**Server Reply**	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x01	Modbus server address	0x01
Function code	0x64	Function code	0x64
Data length in bytes	0x06	Data length in bytes	0x06
Subfunction code	0x04	Subfunction code	0x04
Transmission number(1)	0xNN	Transmission number(1)	0xNN
Address of first register to read (MSB)	0x02	Value of the first register read (MSB)	0x12
Address of first register to read (LSB)	0x97	Value of the first register read (LSB)	0x0A
Address of second register to read (MSB)	0x02	Value of the second register read (MSB)	0x74
Address of second register to read (LSB)	0x99	Value of the second register read (LSB)	0x0C
CRC (MSB)	0xNN	CRC (MSB)	0xNN
CRC (LSB)	0xNN	CRC (LSB)	0xNN
(1) The client gives the transmission number in the request. The server returns the same number in the reply.			

Write Functions

The following write functions are available:

Function Code	Subfunction Code	Name	Description
6 (0x06)	–	Preset single register	Write 1 register
16 (0x10)	–	Preset multiple registers	Write n registers
43 (0x2B)	16 (0x10)	Set date and time	Write the date and time of the server

NOTE: Number of registers n is limited to 52 with MasterPacT NT/NW MicroLogic E trip units.

Diagnostic Functions

The following diagnostic functions are available:

Function Code	Subfunction Code	Name	Description
8 (0x08)	10 (0x0A)	Clear counters and diagnostic register	Reset all diagnostic counters
8 (0x08)	11 (0x0B)	Return bus message counter	Read the counter of correct bus messages managed by the server
8 (0x08)	12 (0x0C)	Return bus communication error counter	Read the counter of incorrect bus messages managed by the server
8 (0x08)	13 (0x0D)	Return bus exception error counter	Read the counter of exception responses managed by the server
8 (0x08)	14 (0x0E)	Return server message counter	Read the counter of messages sent to the server
8 (0x08)	15 (0x0F)	Return server no response counter	Read the counter of broadcast messages
8 (0x08)	16 (0x10)	Return server negative acknowledge counter	Read the counter of messages sent to the server but not answered because of the Negative Acknowledge exception code 07
8 (0x08)	17 (0x11)	Return server busy counter	Read the counter of messages sent to the server but not answered because of the Server Device Busy exception code 06
8 (0x08)	18 (0x12)	Return bus overrun counter	Read the counter of incorrect bus messages due to overrun errors
11 (0x0B)	–	Get communication event counter	Read Modbus event counter

Diagnostic Counters

Modbus uses diagnostic counters to enable performance and error management. The counters are accessible using the Modbus diagnostic functions (function codes 8 and 11). The Modbus diagnostic counters and the Modbus event counter are described in the following table:

Counter Number	Counter Name	Description
1	Bus message counter	Counter of correct bus messages managed by the server
2	Bus communication error counter	Counter of incorrect bus messages managed by the server
3	Server exception error counter	Counter of exception responses managed by the server and incorrect broadcast messages
4	Server message counter	Counter of messages sent to the server
5	Server no response counter	Counter of broadcast messages
6	Server negative acknowledge counter	Counter of messages sent to the server but not answered because of the Negative Acknowledge exception code 07
7	Server busy count	Counter of messages sent to the server but not answered because of the Server Device Busy exception code 06
8	Bus character overrun counter	Counter of incorrect bus messages due to overrun errors
9	Comm. event counter	Modbus event counter (this counter is read with function code 11)

Counters Reset

The diagnostic counters are reset to 0 when:

- the maximum value 65535 is reached,

- they are reset by a Modbus command (function code 8, sub-function code 10),
- the power supply is lost,
- the communication parameters are modified.

Modbus Exception Codes

Exception Responses

Exception responses from either the client or a server can result from data processing errors. One of the following events can occur after a request from the client:

- If the server receives the request from the client without a communication error and can handle the request correctly, it returns a normal response.
- If the server does not receive the request from the client due to a communication error, it does not return a response. The client program eventually processes a timeout condition for the request.
- If the server receives the request from the client but detects a communication error, it does not return a response. The client program eventually processes a timeout condition for the request.
- If the server receives the request from the client without a communication error, but cannot handle it (for example, the request is to read a register that does not exist), the server returns an exception response to inform the client of the nature of the error.

Exception Frame

The server sends an exception frame to the client to report an exception response. An exception frame is composed of 4 fields:

Field	Definition	Size	Description
1	Server number	1 byte	Destination of the request • 1–247: unique destination
2	Exception function code	1 byte	Request function code + 128 (0x80)
3	Exception code	n bytes	See next paragraph
4	CRC error checking	2 bytes	CRC16 (to check the integrity of the Modbus frame)

Exception Codes

The exception response frame has two fields that differentiate it from a normal response frame:

- The exception function code of the exception response is equal to the function code of the original request plus 128 (0x80).
- The exception code depends on the communication error that the server encounters.

The following table describes the exception codes handled by the communication interface:

Exception Code	Name	Description
01 (0x01)	Illegal function	The function code received in the request is not an authorized action for the server. The server may be in the wrong state to process a specific request.
02 (0x02)	Illegal data address	The data address received by the server is not an authorized address for the server.
03 (0x03)	Illegal data value	The value in the request data field is not an authorized value for the server.
04 (0x04)	Server device failure	The server fails to perform a requested action because of an unrecoverable error.
05 (0x05)	Acknowledge	The server accepts the request but needs a long time to process it.

Exception Code	Name	Description
06 (0x06)	Server device busy	The server is busy processing another command. The client must send the request once the server is available.
07 (0x07)	Negative acknowledgment	The server cannot perform the programming request sent by the client.
08 (0x08)	Memory parity error	The server detects a parity error in the memory when attempting to read extended memory.
10 (0x0A)	Gateway path unavailable	The gateway is overloaded or not correctly configured.
11 (0x0B)	Gateway target device failed to respond	The server is not present on the network.

Illegal Data Address

This guide describes the registers available for each IMU module with the latest firmware version. When a register described in the guide is not implemented in an IMU module that has an old firmware version, an exception response is returned with the exception code 02 (0x02), illegal data address.

You can update the firmware of the IMU modules by using EcoStruxure Power Commission software.

Password Management

General Description

Remote access to data on MicroLogic trip units and control units, and the ULP modules of the IMU is protected by password. Remote access includes:

- The communication network
- EcoStruxure Power Commission software
- EcoStruxure Power Device App
- FDM128 display
- IFE/EIFE webpages

The following four profiles are defined for remote access. Each IMU has a different password for each user profile.

- Administrator
- Services
- Engineer
- Operator

The Administrator password is required to write the settings to the MicroLogic trip unit or control unit, and the ULP modules of the IMU using EcoStruxure Power Commission software, page 22.

Each intrusive command via the command interface is assigned to one or several user profiles, and protected by the corresponding user profile password. The password for each intrusive command is indicated in the description of the command.

IMPORTANT: Intrusive commands to MicroLogic Active control units are not protected by user profile password:

- Remote protection setting commands are allowed only when the **Remote Settings** parameter of MicroLogic Active control unit is set to **ON**.
- Remote open/close commands from an FDM121 display are allowed only when MicroLogic Active control unit is in Auto Local control mode.
- Remote open/close commands from a remote monitoring and control interface are allowed only when MicroLogic Active control unit is in Auto Remote control mode.
- Remote open/close commands are not allowed when MicroLogic Active control unit is in Manual control mode.

No password is required for non-intrusive commands through the command interface.

Default Passwords

⚠WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Change default passwords at first use to help prevent unauthorized access to device settings, controls, and information.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The default password for each user profile is as follows:

User profile	Default password
Administrator	'0000' = 0x30303030
Services	'1111' = 0x31313131
Engineer	'2222' = 0x32323232
Operator	'3333' = 0x33333333

Changing a Password

A password can be changed with EcoStruxure Power Commission software.

Entering the current password for a given user profile is required to change the password of this user profile. Entering the Administrator password enables you to change the password of any user profile.

A password is composed of exactly 4 ASCII characters. It is case-sensitive and the allowed characters are:

- Digits from 0 to 9
- Letters from a to z
- Letters from A to Z

Passwords of the IMU

The MicroLogic trip unit or control unit, and the ULP modules of the IMU must be protected by the same password for each user profile.

When using EcoStruxure Power Commission software to modify a password, the password is modified in the MicroLogic trip unit or control unit, and the ULP modules of the IMU.

It is compulsory to assign the current IMU passwords to a new module in the IMU, in case of:

- addition of a new ULP module in the IMU.
- replacement of the MicroLogic trip unit or control unit, or one of the ULP modules of the IMU.

Use EcoStruxure Power Commission software to modify the passwords of the new module to match the current IMU passwords.

Example: Addition of an IO module in an IMU with a MicroLogic trip unit and an IFE communication interface.

- The IMU has user-defined passwords for each user profile.
- The IO module has the default passwords for each user profile.

Use EcoStruxure Power Commission software to replace the default passwords of the IO module by the user-defined passwords of the IMU for each user profile.

Password Reset

If the Administrator password of the (IMU) is lost or forgotten, the password can be reset to the default password with EcoStruxure Power Commission software and the support of the Schneider Electric Customer Care Center.

Command Interface

General Description

Circuit breaker Modbus write commands are only allowed through the command interface.

The command interface is used to send commands to:

- read data (for example status, measurements and settings)
- remotely control the circuit breaker
- remotely change settings (for example protection settings and reset counters)

Read commands are non-intrusive commands. They are not password-protected and always enabled.

Remote control and setting commands are intrusive commands and can either be dangerous to personnel near the circuit breaker or can cause equipment damage if the protection settings are altered. Therefore these commands are:

- protected by configuration of the following modules:
  - with the BSCM Modbus SL/ULP module, the remote control commands are enabled when the remote padlock parameter is set to **Enabled** by using EcoStruxure Power Commission software, page 22.
  - with the IFM communication interface, the remote control commands are enabled when the locking pad on the IFM communication interface is in the open position.
  - with the IFE communication interface, the remote control commands are enabled when the locking pad on the IFE communication interface is in the open position.
  - with the EIFE communication interface, the remote control commands are enabled when the intrusive command mode is unlocked by EIFE configuration using EcoStruxure Power Commission software.
- protected by password if a password is required in the command

  IMPORTANT: Remote control and setting commands to MicroLogic Active control units are not protected by a password:
  - Remote protection setting commands are allowed only when the **Remote Settings** parameter of MicroLogic Active control unit is set to **ON**.
  - Remote open/close commands from an FDM121 display are allowed only when MicroLogic Active control unit is in Auto Local control mode.
  - Remote open/close commands from a remote monitoring and control interface are allowed only when MicroLogic Active control unit is in Auto Remote control mode.
  - Remote open/close commands are not allowed when MicroLogic Active control unit is in Manual control mode.

Each command has a specific code. For example, command code 904 defines the command to open the circuit breaker.

Executing a Command

Follow these steps to execute a command:

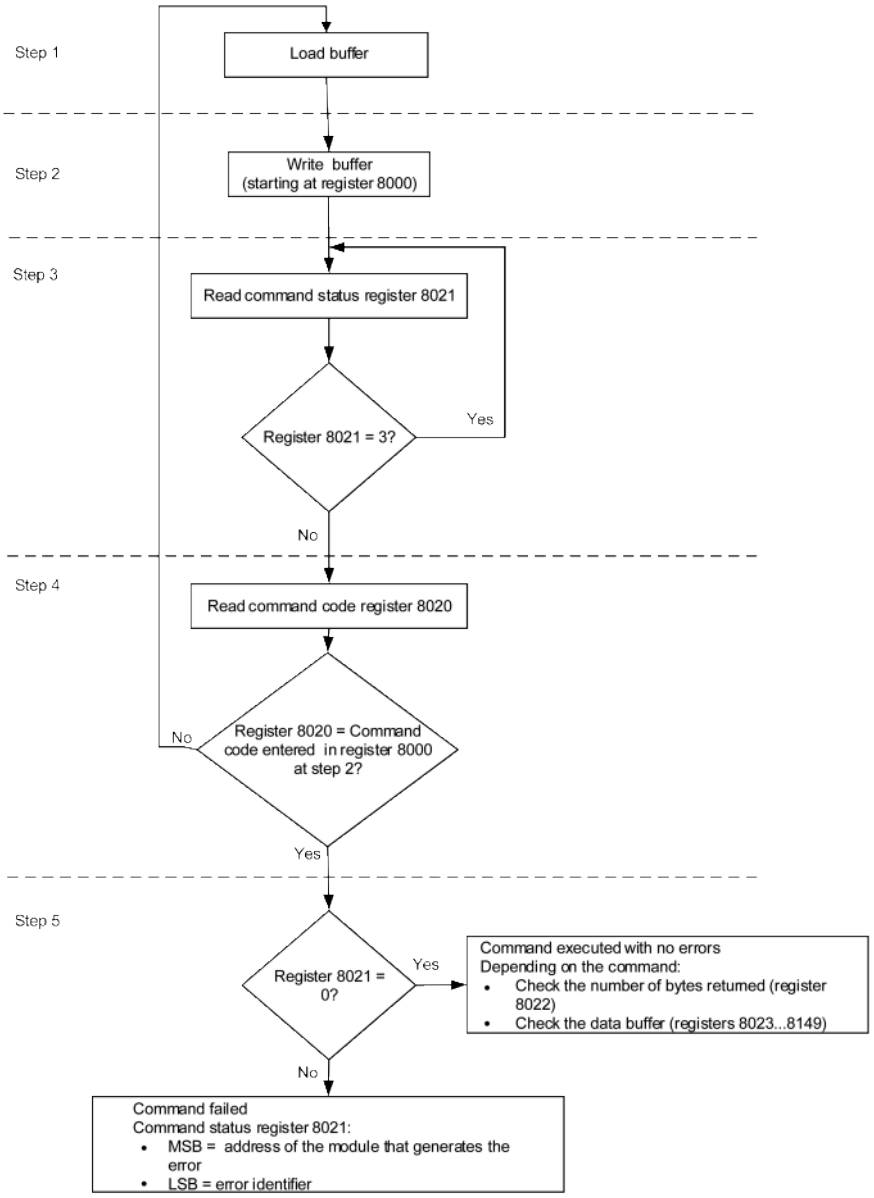
Step	Action
1	Load a buffer.
2	Write this buffer with a write request (Modbus function 16) starting at register 8000.
3	Read the command status register 8021, and wait while its content shows that the command is still in progress (0x0003).

Step	Action
4	Read the last command code register 8020: • If content of register 8020 is the command code entered in register 8000 at step 2, go to next step. • If content of register 8020 is different from the command code entered in register 8000 at step 2, restart at step 1.
5	Read the error code in the LSB of register 8021: • If LSB ≠ 0, then the command failed. Check the error code to understand the cause (see next paragraph). For example, if register 8021 returns 4609 (0x1201), then the error code is 1, which means that the password is not correct (insufficient user rights). • If LSB = 0, then the command is executed with no errors.

NOTE: The Modbus application will wait for the complete execution of one command before sending its next command. In case of no response, the Modbus application can resend the command. In this case, the first command will be aborted automatically.

Command Diagram

The following diagram shows the steps to follow in order to execute a command:



Command Data Structure

The command interface uses registers 8000 to 8149:

- The input parameters of a command are written in registers 8000 to 8015. The registers 8016 to 8019 are reserved.
- The data returned after command execution are written in registers 8020 to 8149.

The input parameters of a command are detailed in the following table:

Address	Register	Description	Comments
0x1F3F	8000	Command code	Writing at this register triggers the command using the parameters in the following registers.
0x1F40	8001	Parameter length	Number of bytes used for the parameters including this one (from 10 to 30). This value is provided for each command.
0x1F41	8002	Destination	A constant value provided for each command. Factory setting: 0x0000
0x1F42	8003	Security type	A constant value provided for each command: • 0 for non-intrusive commands not protected by password • 1 for intrusive commands protected by a password
0x1F43 0x1F44	8004 8005	Password	The password is composed of 4 ASCII bytes. The password to use depends on the command. This information is provided for each command.
0x1F45–0x1F4E	8006–8015	Additional parameters	Additional parameters define how the command is performed. Some commands have no additional parameters.
0x1F4F	8016	Reserved	Must be set to 0 (factory setting).
0x1F50	8017	Reserved	Must be set to 8019 (factory setting).
0x1F51	8018	Reserved	Must be set to 8020 (factory setting).
0x1F52	8019	Reserved	Must be set to 8021 (factory setting).

The data returned after command execution are detailed in the following table:

Address	Register	Description	Comments
0x1F53	8020	Last command code	When the command has been executed, it holds the last command code.
0x1F54	8021	Command status	When the command exits the busy state, it holds the completion code.
0x1F55	8022	Data buffer size	Number of bytes returned.
0x1F56–0x1FD4	8023–8149	Data buffer	Returned values. It is empty if the previous register is 0.

Command Status

When the command is successful, the command status is 0.

When the command is in progress, the command status is 3.

When the command generates an error, the command status register contains:

- LSB: the error code
- MSB: the address of the module that generates the error

Module Returning the Command Result

The following table lists the addresses of the modules:

Module Address	Module
1 (0x01)	USB maintenance interface or UTA tester
2 (0x02)	FDM121 ULP display for one circuit breaker
3 (0x03)	IFM Modbus SL communication interface for one circuit breaker
17 (0x11)	BSCM module or BSCM Modbus SL/ULP module for ComPacT NSX and PowerPacT H-, J-, and L-frame
18 (0x12)	• BCM ULP circuit breaker communication module for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame • MicroLogic Active control unit of MasterPacT MTZ
20 (0x14)	MicroLogic trip unit of ComPacT NSX and PowerPacT H-, J-, and L-frame
21 (0x15)	MicroLogic X control unit of MasterPacT MTZ
32 (0x20)	IO input/output application module 1 for one circuit breaker
33 (0x21)	IO input/output application module 2 for one circuit breaker
34 (0x22)	• IFE Ethernet communication interface for one circuit breaker • IFE Ethernet switchboard server • EIFE embedded Ethernet communication interface for one MasterPacT MTZ circuit breaker

NOTE: The MicroLogic trip units of MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame circuit breakers do not have an IMU module address.

Result of the Command

The following table lists the codes corresponding to the result of the command.

Code	Description
0 (0x00)	Successful command
1 (0x01)	Insufficient user rights (incorrect password)
2 (0x02)	Access violation (IFM locking pad is locked, page 28 or, IFE locking pad is locked, page 37 or intrusive command mode is locked).
3 (0x03)	Unable to perform a read access
4 (0x04)	Unable to perform a write access
5 (0x05)	Unable to execute service (IFM locking pad locked)
6 (0x06)	Not enough memory
7 (0x07)	Allocated memory is too small
8 (0x08)	Resource is not available
9 (0x09)	Resource does not exist
10 (0x0A)	Resource already exists
11 (0x0B)	Resource is out of order
12 (0x0C)	Access out of available memory
13 (0x0D)	String is too long
14 (0x0E)	Buffer is too small
15 (0x0F)	Buffer is too big
16 (0x10)	Input argument is out of range

Code	Description
17 (0x11)	Requested security level is not supported
18 (0x12)	Requested component is not supported
19 (0x13)	Command is not supported
20 (0x14)	Input argument has an unsupported value
21 (0x15)	Internal error during command
22 (0x16)	Timeout during command
23 (0x17)	Checksum error during command
24 (0x18)	Unsupported destination
151 (0x97)	Circuit breaker tripped, reset before commands
152 (0x98)	Circuit breaker already closed
153 (0x99)	Circuit breaker already open
154 (0x9A)	Circuit breaker already reset
155 (0x9B)	Actuator in manual mode
156 (0x9C)	Actuator not present
157 (0x9D)	Bad ASIC configuration
158 (0x9E)	Previous command in progress
159 (0x9F)	Reset command forbidden
160 (0xA0)	Inhibit mode on
169 (0xA9)	Already in asked state
170 (0xAA)	Unable to preset counters
171 (0xAB)	Output command rejected, already assigned
172 (0xAC)	Emitter not allowed to perform the command
173 (0xAD)	Mode not relevant with requested command
174 (0xAE)	Session key is invalid
175 (0xAF)	Out of session scope
176 (0xB0)	Session is already opened
177 (0xB1)	No session is open
178 (0xB2)	No valid setting was submitted
180 (0xB4)	Wireless component not started
190 (0xBE)	Read and get an invalid value
191 (0xBF)	License is not installed

Command Not Supported

The guide describes the commands available for each IMU module with the latest firmware version. When a command described in the guide is not implemented in an IMU module that has an old firmware version, the command status is returned with the error code 19 (0x13), command is not supported.

You can update the firmware of the IMU modules by using EcoStruxure Power Commission software.

Command Examples

Open Circuit Breaker

The following table details the steps to perform in the client remote device to send a remote control command to the BSCM Modbus SL/ULP module to open a ComPacT NSX circuit breaker. The command itself has no parameters.

Step	Action
1	Load a buffer of 20 registers, word0 to word19. • Load into word0 the value 904, the code corresponding to the open circuit breaker command. • Load into word1 the value 10, the length of the input parameters. The command itself has no parameters, 10 is the length of the fixed part. • Load into word2 the value 4353 (0x1101), the destination. This value is a constant for the command. It is provided in the command description. • Load into word3 the value 1. • Load into word4 and word5 the 4 ASCII bytes of the Administrator or Operator password. Assuming this password is 'ABcd', load 16706 (0x4142) into word #4 and 25444 (0x6364) into word #5. • Load into word6 to word16 the value 0. • Load into word17 the value 8019, a command setup constant. • Load into word18 the value 8020, a command setup constant. • Load into word19 the value 8021, a command setup constant.
2	Write this buffer with a write request (Modbus function 16) of 20 registers, starting at register 8000.
3	Read the command status register 8021, and wait while its content shows that the command is still in progress (0x0003). If the command status does not change after a timeout (1 s), check the Modbus connection.
4	Read the last command code register 8020: • If content of register 8020 is the command code entered in register 8000 at step 2, go to next step. • If content of register 8020 is different from the command code entered in register 8000 at step 2, restart at step 1.
5	Read the error code in the LSB of register 8021: • If LSB ≠ 0, then the command failed. Check the error code to understand the cause (see next paragraph). For example, if register 8021 returns 4609 (0x1201), then the error code is 1, which means that the password is not correct (insufficient user rights). • If LSB = 0, then the command was executed with no errors.

Reset Energy Measurements

The following table details the steps to perform to send a command to the MicroLogic trip unit of a ComPacT NSX circuit breaker to reset the minimum/maximum energy measurements. The command itself has one parameter.

Step	Action
1	Load a buffer of 20 registers, word0 to word19. • Load into word0 the value 46728, the code corresponding to the reset minimum/maximum command. • Load into word1 the value 12, the length of the input parameters. The command itself has one parameter, add 2 bytes to 10 which is the length of the fixed part. • Load into word2 the value 5121 (0x1401), the destination. This value is a constant for the command. It is provided in the command description. • Load into word3 the value 1. • Load into word4 and word5 the 4 ASCII bytes of the Administrator or Operator password. Assuming this password is 'Pw57', load 20599 (0x5077) into word #4 and 13623 (0x3537) into word #5. • Load into word6 the value 512 (bit 9 set to one). This value requests that all energy measurements are reset. • Load into word7 to word16 the value 0. • Load into word17 the value 8019, a command setup constant. • Load into word18 the value 8020, a command setup constant. • Load into word19 the value 8021, a command setup constant.
2	Write this buffer with a write request (Modbus function 16) of 20 registers, starting at register 8000.

Step	Action
3	Read the command status register 8021, and wait while its content shows that the command is still in progress (0x0003). If the command status does not change after a timeout (1 s), check the Modbus connection.
4	Read the last command code register 8020: • If content of register 8020 is the command code entered in register 8000 at step 2, go to next step. • If content of register 8020 is different from the command code entered in register 8000 at step 2, restart at step 1.
5	Read the error code in the LSB of register 8021: • If LSB ≠ 0, then the command failed. Check the error code to understand the cause (see next paragraph). For example, if register 8021 returns 4609 (0x1201), then the error code is 1, which means that the password is not correct (insufficient user rights). • If LSB = 0, then the command was executed with no errors.

Read Date and Time

The following table details the steps to perform to send a command to the IFM communication interface to read the date and time. The command itself has no parameters. The date and time are returned in a buffer.

Step	Action
1	Load a buffer of 20 registers, word0 to word19. • Load into word0 the value 768, the code corresponding to the read date/time command. • Load into word1 the value 10, the length of the input parameters. The command itself has no parameters, the length is the length of the fixed part which is 10. • Load into word2 the value 768 (0x0300), the destination. This value is a constant for the command. It is provided in the command description. **NOTE:** Load into word2 the value 8704 (0x2200) for IFE communication interface as destination. • Load into word3 the value 0. • Load into word4 and word5 the value 0x0000 (no password required). • Load into word6 to word16 the value 0. • Load into word17 the value 8019, a command setup constant. • Load into word18 the value 8020, a command setup constant. • Load into word19 the value 8021, a command setup constant.
2	Write this buffer with a write request (Modbus function 16) of 20 registers, starting at register 8000.
3	Read the command status register 8021, and wait while its content shows that the command is still in progress (0x0003). If the command status does not change after a timeout (1 s), check the Modbus connection.
4	Read the last command code register 8020: • If content of register 8020 is the command code entered in register 8000 at step 2, go to next step. • If content of register 8020 is different from the command code entered in register 8000 at step 2, restart at step 1.
5	Read the error code in the LSB of register 8021: • If LSB ≠ 0, then the command failed. Check the error code to understand the cause (see next paragraph). For example, if register 8021 returns 783 (0x030F), then the error code is 15 (0x0F), which means that the input argument is out of range (too many parameters). • If LSB = 0, then the command was executed with no errors.
6	If there were no errors, read the data buffer length in register 8022. Its value must be 8 for this command.
7	In the data buffer: • register 8023 holds the month in the MSB, the day in the LSB. • register 8024 holds the year offset in the MSB (add 2000 to get the year) and the hour in the LSB. • register 8025 holds the minutes in the MSB, the seconds in the LSB. • register 8026 holds the milliseconds.

Date Management

Introduction

Each module of the IMU uses its date to time-stamp events and history registers.

The date of the IMU modules is updated in two steps:

1. External synchronization: The Modbus client synchronizes the IFM or IFE/EIFE communication interface, or the BSCM Modbus SL/ULP module in Modbus SL only mode, and in Modbus SL and ULP mode.
2. Internal synchronization:
   - The communication interface broadcasts the date and time to the MicroLogic control unit or trip unit and the other ULP modules connected in the IMU.
   - for ComPacT NSX or PowerPacT H-, J-, and L-frame circuit breakers with BSCM Modbus SL/ULP module:
     - if the BSCM Modbus SL/ULP module is in ULP only mode, then all ULP modules connected in the IMU, including the BSCM Modbus SL/ULP module itself, are synchronized by the IFM or IFE communication interface.
     - if the BSCM Modbus SL/ULP module is in Modbus SL only mode, or in Modbus SL and ULP mode, then all ULP modules connected in the IMU are synchronized by the BSCM Modbus SL/ULP module.

External Synchronization

There are three ways to externally synchronize the IFM or IFE/EIFE communication interface, or the BSCM Modbus SL/ULP module in Modbus SL only mode, or in Modbus SL and ULP mode:

- Manually with EcoStruxure Power Commission software, page 22.
- By programming of the Modbus client using:
  - either the Modbus function set date and time: function code 43-16, page 54
  - or, set the absolute time command through the IFM or IFE/EIFE communication interface, or through the BSCM Modbus SL/ULP module.
- Automatically with IFE/EIFE communication interface configured as SNTP mode.

The communication interface is considered as externally synchronized if the last synchronization has occurred within the last 2 hours.

NOTE: It is recommended to update the date and time of serial devices such as the IFM communication interface or the BSCM Modbus SL/ULP module periodically, by using the IFE/EIFE communication interface webpages.

Internal Synchronization

The date and time is received from:

- The IFM communication interface
- Or the IFE/EIFE communication interface
- Or the BSCM Modbus SL/ULP module in Modbus SL only mode, or in Modbus SL and ULP mode

The date and time is broadcast to all the ULP modules connected in the IMU.

History Mechanism

General Description

Modbus history registers are only available in MasterPacT NT/NW, ComPacT NS, PowerPacT P- and R-frame, ComPacT NSX, and PowerPacT H-, J-, and L-frame circuit breakers.

Modbus history registers enable the user to track the occurrence of specific events and their corresponding dates.

Several types of history are available:

- Alarm history
- Trip history
- Maintenance operation history
- Event history

See the description of each control unit, trip unit or ULP module for details of available history registers.

History Mechanism

Each event is time-stamped.

When the history is full, the oldest event record is discarded to make room for the most recent event record, which is pushed to the top of the history.

The records are ordered in decreasing occurrence time, the most recent occurrence is in the first record.

The following tables describe the history mechanism for a 10-record history format:

Before event E

Record	1	2	3	4	5	6	7	8	9	10
Event	E-1 (most recent event)	E-2	E-3	E-4	E-5	E-6	E-7	E-8	E-9	E-10 (oldest event)

After event E

Record	1	2	3	4	5	6	7	8	9	10
Event	E (most recent event)	E-1	E-2	E-3	E-4	E-5	E-6	E-7	E-8	E-9 (oldest event)

After event E, event E-10 is lost.

History Reading

A read request is necessary to read a history record (see Modbus function read n input words, function code = 4, in Read Functions, page 52). The number of read requests varies according to the register format and required information. For example, for MicroLogic 5/6/7 trip units, a read request of 5 registers is necessary to read the most recent alarm record of the alarm history format (see Alarm History, page 416).

Furthermore, to read the last n records of a history format, a read request of (m) x (n) registers is necessary, where m is the number of registers that compose the record.

For example, for MicroLogic 5/6/7 trip units, a read request of 7 x 3 = 21 registers is necessary to read the most recent 3 trip records of the trip history format (see Trip History, page 418).

When not used, history registers return 32768 (0x8000).

See each history register description for details of how to read it.

Dataset

What's in This Part

Standard Dataset 72
Legacy Dataset 93

Standard Dataset

What's in This Chapter

Standard Dataset 73
Standard Dataset Modbus Register Tables 74
Readout Examples 76
Standard Dataset Common Registers 78

Standard Dataset

Description

The standard dataset contains the most useful information of each IMU module in one convenient table. The standard dataset is available in the registers 32000 to 32341. It can be read with three read requests.

Each IMU module updates the values in the dataset registers on a regular basis.

The response time of requests to standard dataset registers is shorter than the response time of requests to device registers. Therefore, it is recommended to read the standard dataset registers instead of device registers, to improve the overall performance of the system. For more information refer to Modbus Programming Recommendations, page 50.

The standard dataset can be used with:

- The IFE Ethernet communication interface for one circuit breaker
- The IFE Ethernet switchboard server
- the EIFE embedded Ethernet interface for MasterPacT MTZ drawout circuit breaker
- The IFM Modbus SL communication interface for one circuit breaker with part number LV434000
- The BSCM Modbus SL/ULP module

Standard Dataset Modbus Register Tables

General Description

The main information needed for remote supervision of a MasterPacT, ComPacT and PowerPacT circuit breaker is contained in the table of common registers starting at register 32000.

One Modbus read request is limited to 125 registers maximum. Three Modbus read requests are necessary to read the entire table.

It contains the following information:

- Circuit breaker status
- Tripping causes
- Real-time values of main measurements: current, voltage, power, and energy

The content of this table of registers is detailed in Standard Dataset Common Registers, page 78.

Use of these common registers is highly recommended to optimize response times and simplify the use of data.

Standard Dataset Table Format

Register tables have the following columns:

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description

- **Address**: A 16-bit register address in hexadecimal. The address is the data used in the Modbus frame.
- **Register**: A 16-bit register number in decimal (register = address + 1).
- **RW**: Register read-write status
  - R: The register can be read by using Modbus functions
  - W: The register can be written by using Modbus functions
  - RW: The register can be read and written by using Modbus functions
  - RC: The register can be read by using the command interface
  - WC: The register can be written by using the command interface
- **Unit**: The unit the information is expressed in.
- **Type**: The encoding data type (see data type description below).
- **Range**: The permitted values for this variable, usually a subset of what the format allows.
- **A/E**: Types of ComPacT NSX or PowerPacT H-, J-, or L-frame MicroLogic trip unit for which the register is available.
  - Type A (Ammeter): Current measurements for ComPacT NSX circuit breakers only.
  - Type E (Energy): Current, voltage, power, and energy measurements for ComPacT NSX or PowerPacT H-, J-, or L-frame circuit breakers.

- **A/E/P/H**: Types of MasterPacT NT/NW, ComPacT NS or PowerPacT P- or R-frame MicroLogic trip unit for which the register is available.
  - Type A (Ammeter): Current measurements
  - Type E (Energy): Current, voltage, power, and energy measurements
  - Type P (Power): Current, voltage, power, energy measurements, and advanced protection
  - Type H (Harmonics): Current, voltage, power, energy, energy quality measurements, and advanced protection for MasterPacT NT/NW circuit breakers only
- **Active**: Types of MasterPacT MTZ MicroLogic Active control unit for which the register is available.
  - Type A (Ammeter), applicable to MicroLogic Active A/AP: Current measurements
  - Type E (Energy), applicable to MicroLogic Active E/EP/Ei: Current, voltage, power, and energy measurements
- **X**: Register available in the MicroLogic X control unit for MasterPacT MTZ circuit breakers.
- **Description**: Provides information about the register and restrictions that apply.

Standard Dataset Data Types

Data Types	Description	Range
INT16U	16-bit unsigned integer	0 to 65535
INT64	64-bit signed integer	- 9 223 372 036 854 775 808 to + 9 223 372 036 854 775 807
INT64U	64-bit unsigned integer	0 to 18 446 744 073 709 600 000
FLOAT32	32-bit signed integer with a floating point	2^{-126} (1.0) to 2^{127} (2 - 2^{-23})

See detailed descriptions of the data types, page 580.

Readout Examples

Readout Example of a Standard Dataset Register

The table below shows how to read the RMS current on phase 1 (I1) in registers 32028 and 32029 (coded in FLOAT32).

- The address of register 32028 equals 32028 - 1 = 32027 = 0x7D1B.
- The Modbus address of the Modbus server is 255 = 0xFF.

Request from the Client		**Response from the Server**	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0xFF	Modbus server address	0xFF
Function code	0x03	Function code	0x03
Address of first register to be read (MSB)	0x7D	Data length in bytes	0x04
Address of first register to be read (LSB)	0x1B	Value read at address 0x7D1B (register 32028) (MSB)	0x44
Number of registers (MSB)	0x00	Value read at address 0x7D1B (register 32028) (LSB)	0x0A
Number of registers (LSB)	0x02	Value read at address 0x7D1C (register 32029) (MSB)	0xC0
CRC (MSB)	0xNN	Value read at address 0x7D1C (register 32029) (LSB)	0x00
CRC (LSB)	0xNN	CRC (MSB)	0xNN
-	-	CRC (LSB)	0xNN

The converted value of the FLOAT32 registers 32028 and 32029 is 555.

The RMS current on phase 1 (I1) is thus 555 A.

Readout Example of the Table of Standard Dataset Common Registers

Since there are more than 125 registers in the standard dataset, at least three Modbus read requests are needed to read the entire table.

Request to read registers 32000 to 32123:

- The address of register 32000 is 0x7CFF.
- The length is 124 registers = 0x7C.
- The number of bytes is 124 x 2 = 248 bytes = 0xF8.
- The Modbus address of the server is 255 = 0xFF.

Request to read registers 32124 to 32241:

- The address of register 32124 is 0x7D7B.
- The length is 118 registers = 0x76.
- The number of bytes is 118 x 2 = 236 bytes = 0xEC.
- The Modbus address of the server is 255 = 0xFF.

Request to read registers 32340 to 32435:

- The address of register 32340 is 0x7E53.
- The length is 96 registers = 0x60.
- The number of bytes is 2 x 96 = 192 bytes = 0xC0.
- The Modbus address of the server is 255 = 0xFF.

Request from the Client		**Response from the Server**	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0xFF	Modbus server address	0xFF
Function code	0x03	Function code	0x03
Address of the first register to be read (MSB)	0x7C	Data length in bytes	0x8F
Address of the first register to be read (LSB)	0xFF	Value of register 32000 (MSB)	0xNN
Number of registers (MSB)	0x00	Value of register 32000 (LSB)	0xNN
Number of registers (LSB)	0x7C	Value of register 32001 (MSB)	0xNN
CRC (MSB)	0xNN	Value of register 32001 (LSB)	0xNN
CRC (LSB)	0xNN	–	0xNN
–	–	–	0xNN
–	–	Value of register 32123 (MSB)	0xNN
–	–	Value of register 32123 (LSB)	0xNN
–	–	CRC (MSB)	0xNN
–	–	CRC (LSB)	0xNN

Standard Dataset Common Registers

Circuit Breaker Status Register

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
0x7CFF	32000	R	–	INT16U	–	A/E	A/E/P/H	A/E	X	–	Quality of each bit of register 32001, page 581: • 0 = Invalid • 1 = Valid
0x7D00	32001	R	–	INT16U	–	A/E	A/E/P/H	A/E	X	–	Circuit breaker status register
						A/E	A/E/P/H	A/E	X	0	OF status indication contact • 0 = The circuit breaker is open. • 1 = The circuit breaker is closed.
						A/E	A/E/P/H	A/E	X	1	SD trip indication contact • 0 = Circuit breaker is not tripped. • 1 = Circuit breaker is tripped due to electrical fault, shunt trip, or push-to-trip. Bit always equal to 0 for MasterPacT, ComPacT NS and PowerPacT P- and R-frame circuit breakers with motor mechanism.
						A/E	A/E/P/H	A/E	X	2	SDE fault trip indication contact • 0 = Circuit breaker is not tripped on electrical fault. • 1 = Circuit breaker is tripped due to electrical fault (including ground-fault test and earth-leakage test).
						–	A/E/P/H	A/E	X	3	CH spring charged contact (only with MasterPacT) • 0 = Spring discharged • 1 = Spring charged Bit always equal to 0 for ComPacT NS and PowerPacT P- and R-frame circuit breakers with motor mechanism.
						–	–	–	–	4	Reserved
						–	A/E/P/H	A/E	X	5	PF ready to close contact (only with MasterPacT) • 0 = Not ready to close • 1 = Ready to close Bit always equal to 0 for ComPacT NS and PowerPacT P- and R-frame circuit breakers with motor mechanism.
						–	–	–	–	6–14	Reserved

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
						A/E	A/E/P/H	A/E	–	15	Data availability If this bit is set at 1, all other bits of the register are not significant.

IO Status Registers

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
0x7D01	32002	R	–	INT16U	–	A/E	A/E/P/H	–	X	–	Quality of each bit of register 32003: • 0 = Invalid • 1 = Valid
0x7D02	32003	R	–	INT16U	–	A/E	A/E/P/H	–	X	–	IO1 module and M2C status
						A/E	A/E/P/H	–	X	0	Digital input 1 status: • 0 = Off • 1 = On
						A/E	A/E/P/H	–	X	1	Digital input 2 status: • 0 = Off • 1 = On
						A/E	A/E/P/H	–	X	2	Digital input 3 status: • 0 = Off • 1 = On
						A/E	A/E/P/H	–	X	3	Digital input 4 status: • 0 = Off • 1 = On
						A/E	A/E/P/H	–	X	4	Digital input 5 status: • 0 = Off • 1 = On
						A/E	A/E/P/H	–	X	5	Digital input 6 status: • 0 = Off • 1 = On
						A/E	A/E/P/H	–	X	6	Digital output 1 status: • 0 = Off • 1 = On
						A/E	A/E/P/H	–	X	7	Digital output 2 status: • 0 = Off • 1 = On
						A/E	A/E/P/H	–	X	8	Digital output 3 status: • 0 = Off • 1 = On
						–	–	–	X	9	Digital M2C output 1 status: • 0 = Off • 1 = On
						–	–	–	X	10	Digital M2C output 2 status: • 0 = Off • 1 = On
						–	–	–	–	11–14	Reserved
						A/E	A/E/P/H	–	–	15	Data availability

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
											If this bit is set at 1, all other bits of the register are not significant.
0x7D03	32004	R	–	INT16U	–	A/E	A/E/P/H	–	X	–	Quality of each bit of register 32005: • 0 = Invalid • 1 = Valid
0x7D04	32005	R	–	INT16U	–	A/E	A/E/P/H	–	X	–	IO2 module status
										0	Digital input 1 status: • 0 = Off • 1 = On
										1	Digital input 2 status: • 0 = Off • 1 = On
										2	Digital input 3 status: • 0 = Off • 1 = On
										3	Digital input 4 status: • 0 = Off • 1 = On
										4	Digital input 5 status: • 0 = Off • 1 = On
										5	Digital input 6 status: • 0 = Off • 1 = On
										6	Digital output 1 status: • 0 = Off • 1 = On
										7	Digital output 2 status: • 0 = Off • 1 = On
										8	Digital output 3 status: • 0 = Off • 1 = On
						–	–	–	–	9–14	Reserved
						A/E	A/E/P/H	–	–	15	Data availability If this bit is set at 1, all other bits of the register are not significant.

Tripping Cause

The tripping cause register provides information about the cause of the trip for the standard protection functions. When a tripping cause bit is at 1 in the tripping cause register, it indicates that a trip has occurred and has not been reset.

- For MicroLogic trip units for ComPacT NSX and PowerPacT H-, J-, and L-frame circuit breakers, the tripping cause bit is reset by pressing the OK key (on the keypad of the MicroLogic trip unit) twice (once for validation, once for confirmation).

- For MicroLogic A/E/P/H trip units for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame circuit breakers, the tripping cause bit is reset as soon as the circuit breaker is closed again.
- For MicroLogic X control units for MasterPacT MTZ circuit breakers, the tripping cause bit is reset by pressing the test/reset button (located beside the trip cause LEDs on the MicroLogic X control unit). Press and hold the button for 3 to 15 seconds to reset all the trip causes.
- For MicroLogic Active control units for MasterPacT MTZ circuit breakers, the tripping cause bit is reset by pressing the  button located on the front face of the MicroLogic Active control unit. Press and hold the  button for more than 3 seconds to reset all the trip causes.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
0x7D05	32006	R	–	INT16U	–	A/E	A/E/P/H	A/E	–	–	Quality of each bit of register 32007: • 0 = Invalid • 1 = Valid
0x7D06	32007	R	–	INT16U	–	A/E	A/E/P/H	A/E	X		Tripping cause for the standard protection functions
						A/E	A/E/P/H	A/E	X	0	Long-time protection Ir
						A/E	A/E/P/H	A/E	X	1	Short-time protection Isd
						A/E	A/E/P/H	A/E	X	2	Instantaneous protection Ii
						A/E	A/E/P/H	A/E	X	3	Ground-fault protection Ig
						E	A/P/H	A/P/H	X	4	Earth-leakage protection IΔn
						A/E	A/E/P/H	A/E	X	5	Integrated instantaneous protection (SELLIM and DIN/DINF)
						A/E	–	–	X	6	Internal failure (STOP)
						–	A/E	A/E	–		Other protections
						–	P/H	E	–		Internal failure (temperature)
						–	A/E/P/H	A/E	–	7	Internal failure (overvoltage)
						–	P/H	E	X	8	Other protection (see register 32009)
						–	–	–	–	9	Reserved
						E	–	–	–	10	Unbalance motor protection
						E	–	–	–	11	Jam motor protection
						E	–	–	–	12	Underload motor protection
						E	–	–	–	13	Long-start motor protection
						A/E	–	–	–	14	Reflex tripping protection
						A/E	A/E/P/H	A/E	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D07	32008	R	–	INT16U	–	–	P/H	E	–		Quality of each bit of register 32009: • 0 = Invalid • 1 = Valid
0x7D08	32009	R	–	INT16U	–	–	P/H	E	–	–	Tripping causes for the advanced protection functions
						–	P/H	–	–	0	Current unbalance
						–	P/H	–	–	1	Overcurrent on phase 1
						–	P/H	–	–	2	Overcurrent on phase 2

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
						–	P/H	–	–	3	Overcurrent on phase 3
						–	P/H	–	–	4	Overcurrent on Neutral
						–	P/H	E	X	5	Undervoltage
						–	P/H	E	X	6	Overvoltage
						–	P/H	–	–	7	Voltage unbalance
						–	P/H	–	–	8	Overpower
						–	P/H	–	X	9	Reverse power
						–	P/H	–	X	10	Underfrequency
						–	P/H	–	X	11	Overfrequency
						–	P/H	–	–	12	Phase rotation
						–	P/H	–	–	13	Load shedding based on current
						–	P/H	–	–	14	Load shedding based on power
						–	P/H	E	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D09–0x7D0C	32010–32013	–	–	–	–	–	–	–	–	–	Reserved

Overrun of the Protection Setpoints

The alarm setpoint registers provide information about overrun of the standard and advanced protection setpoints. A bit is at 1 once a setpoint overrun has occurred, even if the time delay has not expired.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
0x7D0D	32014	R	–	INT16U	–	A/E	P/H	E	–	–	Quality of each bit of register 32015: • 0 = Invalid • 1 = Valid
0x7D0E	32015	R	–	INT16U	–	A/E	P/H	E	–	–	Overrun of the standard protection setpoints
						A/E	P/H	E	–	0	Long-time protection pick-up
						–	–	–	–	1–14	Reserved
						A/E	P/H	E	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D0F	32016	R	–	INT16U	–	A/E	P/H	E	–	–	Quality of each bit of register 32017: • 0 = Invalid • 1 = Valid
0x7D10	32017	R	–	INT16U	–	A/E	P/H	E	–	–	Overrun of the advanced protection setpoints
						–	P/H	E	–	0	Current unbalance
						–	P/H	E	–	1	Maximum current on phase 1
						–	P/H	E	–	2	Maximum current on phase 2
						–	P/H	E	–	3	Maximum current on phase 3
						–	P/H	E	–	4	Maximum current on the neutral

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
						–	P/H	E	–	5	Minimum voltage
						–	P/H	E	–	6	Maximum voltage
						–	P/H	–	–	7	Voltage unbalance
						–	P/H	–	–	8	Maximum power
						–	P/H	–	–	9	Reverse power
						–	P/H	–	–	10	Minimum frequency
						–	P/H	–	–	11	Maximum frequency
						–	P/H	–	–	12	Phase rotation
						–	P/H	–	–	13	Load shedding based on the current
						–	P/H	–	–	14	Load shedding based on the power
						–	P/H	E	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D11	32018	R	–	INT16U	–	–	P/H	–	–	–	Quality of each bit of register 32019: • 0 = Invalid • 1 = Valid
0x7D12	32019	R	–	INT16U	–	–	P/H	–	–	–	Advanced protection settings extended
						–	P/H	–	–	0	Ground-fault alarm
						E	P/H	–	–	1	Earth-leakage alarm
						–	–	–	–	2–14	Reserved
						–	P/H	E	–	15	If this bit is at 1, bits 0 to 14 are not valid.

Alarms

The alarm register provides information about the pre-alarms and the user-defined alarms. A bit is set to 1 once an alarm is active.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
0x7D13	32020	R	–	INT16U	–	A/E	–	–	–	–	Quality of each bit of register 32021: • 0 = Invalid • 1 = Valid
0x7D14	32021	R	–	INT16U	–	A/E	–	–	–	–	Pre-alarm extended register
						A/E	–	–	X	0	Long-time protection time pre-alarm (PAL Ir)
						E	–	–	–	1	Earth-leakage protection pre-alarm (PAL IΔn)
						–	–	–	X		Earth-leakage alarm(1)
						A/E	–	–	–	2	Ground-fault protection pre-alarm (PAL Ig)
						–	–	–	X		Ground-fault alarm(2)
						–	–	–	–	3–14	Reserved
						A/E	–	–	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D15	32022	R	–	INT16U	–	A/E	–	–	–	–	Quality of each bit of register 32023:

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
											• 0 = Invalid • 1 = Valid
0x7D16	32023	R	–	INT16U	–	A/E	–	–	–	–	Register of user-defined alarms
						A/E	–	–	–	0	User-defined alarm 201
						A/E	–	–	–	1	User-defined alarm 202
						A/E	–	–	–	2	User-defined alarm 203
						A/E	–	–	–	3	User-defined alarm 204
						A/E	–	–	–	4	User-defined alarm 205
						A/E	–	–	–	5	User-defined alarm 206
						A/E	–	–	–	6	User-defined alarm 207
						A/E	–	–	–	7	User-defined alarm 208
						A/E	–	–	–	8	User-defined alarm 209
						A/E	–	–	–	9	User-defined alarm 210
						–	–	–	–	10–14	Reserved
						A/E	–	–	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D17–0x7D1A	32024–32027	–	–	–	–	–	–	–	–	–	Reserved

(1) Value available on MicroLogic 7.0 X control unit only when the Digital Module ANSI 51N/51G Ground-fault alarm is installed.

(2) Value available on MicroLogic 2.0 X, 3.0 X, 5.0 X, and 6.0 X control units only when the Digital Module ANSI 51N/51G Ground-fault alarm is installed.

Current

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D1B–0x7D1C	32028–32029	R	A	FLOAT32	–	A/E	A/E/P/H	A/E	X	RMS current on phase 1
0x7D1D–0x7D1E	32030–32031	R	A	FLOAT32	–	A/E	A/E/P/H	A/E	X	RMS current on phase 2
0x7D1F–0x7D20	32032–32033	R	A	FLOAT32	–	A/E	A/E/P/H	A/E	X	RMS current on phase 3
0x7D21–0x7D22	32034–32035	R	A	FLOAT32	–	A/E	A/E/P/H	A/E	X	RMS current on the neutral(1)
0x7D23–0x7D24	32036–32037	R	A	FLOAT32	–	A/E	A/E/P/H	A/E	X	Maximum of RMS current of phases 1, 2, 3 and N (most loaded phase) (3)
0x7D25–0x7D26	32038–32039	R	–	FLOAT32	–	A/E	A/E/P/H	A/E	X	Current ratio on ground (Ig setting ratio)

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D27–0x7D28	32040–32041	R	–	FLOAT32	–	E	A/P/H	–	X	Current ratio on earth-leakage (IΔn setting ratio) (2)

(1) Value available when system type register returns 30 or 41.

(2) Value available with MicroLogic 7.0.

(3) Value reset with the reset minimum/maximum command.

Maximum Current Values

Maximum current values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D29–0x7D2A	32042–32043	R	A	FLOAT32	–	A/E	A/E/P/H	A/E	X	Maximum RMS current on phase 1
0x7D2B–0x7D2C	32044–32045	R	A	FLOAT32	–	A/E	A/E/P/H	A/E	X	Maximum RMS current on phase 2
0x7D2D–0x7D2E	32046–32047	R	A	FLOAT32	–	A/E	A/E/P/H	A/E	X	Maximum RMS current on phase 3
0x7D2F–0x7D30	32048–32049	R	A	FLOAT32	–	A/E	A/E/P/H	A/E	X	Maximum RMS current on the neutral(1)
0x7D31–0x7D32	32050–32051	R	A	FLOAT32	–	A/E	A/E/P/H	A/E	X	This is the highest (i.e. maximum) maximum current value since this measurement was last reset. The measurement looks at all 3 currents, MaxI1, MaxI2, MaxI3 and MaxIN and keeps track of the highest value of any of them over time.
0x7D33–0x7D36	32052–32055	–	–	–	–	–	–	–	–	Reserved

(1) Value available when system type register returns 30 or 41.

Voltage

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D37–0x7D38	32056–32057	R	V	FLOAT32	41.6–2250	E	E/P/H	E	X	RMS phase-to-phase voltage V12
0x7D39–0x7D3A	32058–32059	R	V	FLOAT32	41.6–2250	E	E/P/H	E	X	RMS phase-to-phase voltage V23
0x7D3B–0x7D3C	32060–32061	R	V	FLOAT32	41.6–2250	E	E/P/H	E	X	RMS phase-to-phase voltage V31
0x7D3D–0x7D3E	32062–32063	R	V	FLOAT32	24-1500	E	E/P/H	E	X	RMS phase-to-neutral voltage V1N(1)
0x7D3F–0x7D40	32064–32065	R	V	FLOAT32	24-1500	E	E/P/H	E	X	RMS phase-to-neutral voltage V2N(1)
0x7D41–0x7D42	32066–32067	R	V	FLOAT32	24-1500	E	E/P/H	E	X	RMS phase-to-neutral voltage V3N(1)

(1) Value available when system type register returns 40 or 41.

Frequency

When the MicroLogic trip unit cannot calculate the frequency, it returns Not applicable = 0xFFC00000.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D43–0x7D44	32068–32069	R	Hz	FLOAT32	40.0–70.0	E	P/H	E	X	Frequency
0x7D45–0x7D46	32070–32071	R	Hz	FLOAT32	40.0–70.0	E	P/H	E	X	Maximum frequency (1)

(1) This value can be reset with the reset minimum/maximum command.

Power

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D47–0x7D48	32072–32073	R	W	FLOAT32	-16000000–16000000	E	E/P/H	E	X	Active power on phase 1(1) (2)
0x7D49–0x7D4A	32074–32075	R	W	FLOAT32	-16000000–16000000	E	E/P/H	E	X	Active power on phase 2(1) (2)
0x7D4B–0x7D4C	32076–32077	R	W	FLOAT32	-16000000–16000000	E	E/P/H	E	X	Active power on phase 3 (1) (2)
0x7D4D–0x7D4E	32078–32079	R	W	FLOAT32	-16000000–16000000	E	E/P/H	E	X	Total active power(2)
0x7D4F–0x7D50	32080–32081	R	var	FLOAT32	-16000000–16000000	E	E/P/H	E	X	Reactive power on phase 1(1) (2)
0x7D51–0x7D52	32082–32083	R	var	FLOAT32	-16000000–16000000	E	E/P/H	E	X	Reactive power on phase 2(1) (2)
0x7D53–0x7D54	32084–32085	R	var	FLOAT32	-16000000–16000000	E	E/P/H	E	X	Reactive power on phase 3(1) (2)
0x7D55–0x7D56	32086–32087	R	var	FLOAT32	-16000000–16000000	E	E/P/H	E	X	Total reactive power(2)
0x7D57–0x7D58	32088–32089	R	VA	FLOAT32	0–16000000	E	E/P/H	E	X	Apparent power on phase 1(1)
0x7D59–0x7D5A	32090–32091	R	VA	FLOAT32	0–16000000	E	E/P/H	E	X	Apparent power on phase 2(1)
0x7D5B–0x7D5C	32092–32093	R	VA	FLOAT32	0–16000000	E	E/P/H	E	X	Apparent power on phase 3(1)
0x7D5D–0x7D5E	32094–32095	R	VA	FLOAT32	0–16000000	E	E/P/H	E	X	Total apparent power

(1) Value available when system type register returns 40 or 41.

(2) The sign for the active and reactive power depends on the configuration of:

- Register 3316 for ComPacT, PowerPacT and MasterPacT NT/NW circuit breakers.
- Register 8405 for MasterPacT MTZ circuit breakers.

Energy

Energy is stored in big-endian format: the most significant register is transmitted first.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D5F–0x7D62	32096–32099	R	Wh	INT64	–	E	E/P/H	E	X	Total active energy(2)
0x7D63–0x7D66	32100–32103	R	varh	INT64	–	E	E/P/H(1)	E(1)	X	Total reactive energy(2)

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D67–0x7D6A	32104–32107	R	Wh	INT64U	–	E	P/H	E	X	Total active energy delivered (into the load, counted positively)(2)
0x7D6B–0x7D6E	32108–32111	R	Wh	INT64U	–	E	P/H	E	X	Total active energy received (out of the load, counted negatively)(2)
0x7D6F–0x7D72	32112–32115	R	varh	INT64U	–	E	P/H	E	X	Total reactive energy delivered (into the load, counted positively)(2)
0x7D73–0x7D76	32116–32119	R	varh	INT64U	–	E	P/H	E	X	Total reactive energy received (out of the load, counted negatively)(2)
0x7D77–0x7D7A	32120–32123	R	VAh	INT64U	–	E	–	–	X	Total apparent energy(2)
0x7D7B–0x7D7E	32124–32127	R	Wh	INT64U	–	E	–	–	X	Total cumulative active energy delivered (into the load, counted positively, not resettable)
0x7D7F–0x7D82	32128–32131	R	Wh	INT64U	–	E	–	–	X	Total cumulative active energy received (out of the load, counted negatively, not resettable)

(1) This value is always positive with MasterPacT MicroLogic E trip unit.

(2) Value reset with the reset energies command.

Average Values

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D83–0x7D84	32132–32133	R	A	FLOAT32	–	–	–	–	X	Average of 3-phase RMS currents
0x7D85–0x7D86	32134–32135	R	V	FLOAT32	–	–	–	–	X	Average of 3 RMS phase-to-phase voltages: (V12+V23 +V31)/3
0x7D87–0x7D88	32136–32137	R	V	FLOAT32	–	–	–	–	X	Average of 3 RMS phase-to-neutral voltages: (V1N+V2N +V3N)/3(1)

(1) Value available when system type register returns 40 or 41.

Maximum Power Values

Maximum power values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D89–0x7D8A	32138–32139	R	W	FLOAT32	–	–	–	–	X	Maximum total active power
0x7D8B–0x7D8C	32140–32141	R	var	FLOAT32	–	–	–	–	X	Maximum total reactive power
0x7D8D–0x7D8E	32142–32143	R	VA	FLOAT32	–	–	–	–	X	Maximum total apparent power

Maximum Average Values

Maximum average values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D8F–0x7D90	32144–32145	R	A	FLOAT32	–	–	–	–	X	Maximum of average of 3-phase RMS currents
0x7D91–0x7D92	32146–32147	R	V	FLOAT32	–	–	–	–	X	Maximum of average of 3 RMS phase-to-phase voltages
0x7D93–0x7D94	32148–32149	R	V	FLOAT32	–	–	–	–	X	Maximum of average of 3 RMS phase-to-neutral voltages

Ground and Earth-Leakage Current

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D95–0x7D96	32150–32151	R	A	FLOAT32	–	–	–	–	X	Ground-fault current
0x7D97–0x7D98	32152–32153	R	A	FLOAT32	–	–	–	–	X	Earth-leakage current(1)
0x7D99–0x7D9A	32154–32155	–	–	–	–	–	–	–	–	Reserved
(1) Value available with MicroLogic 7										

Current Demand Values

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7D9B–0x7D9C	32156–32157	R	A	FLOAT32	–	E	E/P/H	E	X	Current demand value on phase 1: I1 Dmd
0x7D9D–0x7D9E	32158–32159	R	A	FLOAT32	–	E	E/P/H	E	X	Current demand value on phase 2: I2 Dmd
0x7D9F–0x7DA0	32160–32161	R	A	FLOAT32	–	E	E/P/H	E	X	Current demand value on phase 3: I3 Dmd
0x7DA1–0x7DA2	32162–32163	R	A	FLOAT32	–	E	E/P/H	E	X	Current demand value on the neutral: IN Dmd(1)
(1) Value available when system type register returns 30 or 41.										

Power Demand Values

- For the block window, the demand value is updated at the end of the window.
- For the sliding window,
  - If window duration is configured for less or equal to 15 minutes, the demand value is updated every 15 seconds
  - If window duration is configured for more than 15 minutes, the demand value is updated every 1 minute.

NOTE: For MicroLogic Active control units, the block window demand value is equal to 15 minutes, and updated every 15 minutes.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7DA3–0x7DA4	32164–32165	R	W	FLOAT32	–	E	E/P/H	E	X	Total active power demand: P Dmd
0x7DA5–0x7DA6	32166–32167	R	var	FLOAT32	–	E	P/H	E	X	Total reactive power demand: Q Dmd
0x7DA7–0x7DA8	32168–32169	R	VA	FLOAT32	–	E	P/H	E	X	Total apparent power demand: S Dmd

Current Peak Demand Values

Current peak demand values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7DA9–0x7DAA	32170–32171	R	A	FLOAT32	–	–	–	–	X	Current peak demand value on phase 1: I1 dmd max
0x7DAB–0x7DAC	32172–32173	R	A	FLOAT32	–	–	–	–	X	Current peak demand value on phase 2: I2 dmd max
0x7DAD–0x7DAE	32174–32175	R	A	FLOAT32	–	–	–	–	X	Current peak demand value on phase 3: I3 dmd max
0x7DAF–0x7DB0	32176–32177	R	A	FLOAT32	–	–	–	–	X	Current peak demand value on the neutral: IN dmd max(1)
(1) Value available when system type register returns 30 or 41.										

Power Peak Demand Values

Power peak demand values are updated every 15 seconds. Power peak demand values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7DB1–0x7DB2	32178–32179	R	W	FLOAT32	–	–	–	–	X	Total active power peak demand: P dmd max
0x7DB3–0x7DB4	32180–32181	R	var	FLOAT32	–	–	–	–	X	Total reactive power peak demand: Q dmd max
0x7DB5–0x7DB6	32182–32183	R	VA	FLOAT32	–	–	–	–	X	Total apparent power peak demand: S dmd max

Maximum Ground and Earth-Leakage Current Values

Maximum ground and earth-leakage current values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7DB7–0x7DB8	32184–32185	R	A	FLOAT32	–	–	–	–	X	Maximum ground-fault current
0x7DB9–0x7DBA	32186–32187	R	V	FLOAT32	–	E	–	–	X	Maximum earth-leakage current(1)
0x7DBB–0x7DC0	32188–32193	–	–	–	–	–	–	–	–	Reserved
(1) Value available with MicroLogic 7.										

Maximum Voltage Values

Maximum voltage values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7DC1–0x7DC2	32194–32195	R	V	FLOAT32	41.6–2250	E	E/P/H	E	X	Maximum RMS phase-to-phase voltage V12
0x7DC3–0x7DC4	32196–32197	R	V	FLOAT32	41.6–2250	E	E/P/H	E	X	Maximum RMS phase-to-phase voltage V23
0x7DC5–0x7DC6	32198–32199	R	V	FLOAT32	41.6–2250	E	E/P/H	E	X	Maximum RMS phase-to-phase voltage V31
0x7DC7–0x7DC8	32200–32201	R	V	FLOAT32	24–1500	E	E/P/H	E	X	Maximum RMS phase-to-neutral voltage V1N(1)
0x7DC9–0x7DCA	32202–32203	R	V	FLOAT32	24–1500	E	E/P/H	E	X	Maximum RMS phase-to-neutral voltage V2N(1)
0x7DCB–0x7DCC	32204–32205	R	V	FLOAT32	24–1500	E	E/P/H	E	X	Maximum RMS phase-to-neutral voltage V3N(1)
(1) Value available when system type register returns 40 or 41.										

Power Factor

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7DCD–0x7DCE	32206–32207	R	–	FLOAT32	–	E	E/P/H	E	X	Power factor on phase 1(1)
0x7DCF–0x7DD0	32208–32209	R	–	FLOAT32	–	E	E/P/H	E	X	Power factor on phase 2(1)
0x7DD1–0x7DD2	32210–32211	R	–	FLOAT32	–	E	E/P/H	E	X	Power factor on phase 3(1)
0x7DD3–0x7DD4	32212–32213	R	–	FLOAT32	–	E	E/P/H	E	X	Total power factor
0x7DD5–0x7DD6	32214–32215	R	–	FLOAT32	–	E	H	–	X	Fundamental power factor on phase 1 (cosϕ1)(1)(2)
0x7DD7–0x7DD8	32216–32217	R	–	FLOAT32	–	E	H	–	X	Fundamental power factor on phase 2 (cosϕ2)(1)(2)
0x7DD9–0x7DDA	32218–32219	R	–	FLOAT32	–	E	H	–	X	Fundamental power factor on phase 3 (cosϕ3)(1)(2)
0x7DDB–0x7DDC	32220–32221	R	–	FLOAT32	–	E	H	–	X	Total fundamental power factor(2)

(1) Value available when system type register returns 40 or 41.

(2) The sign for the fundamental power factor (cosϕ) depends on the configuration:

- Register 3318 for ComPacT, PowerPacT and MasterPacT NT/NW circuit breakers.
- Register 8404 for MasterPacT MTZ circuit breakers.

Total Harmonic Distortion (THD)

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7DDD–0x7DDE	32222–32223	R	–	FLOAT32	0–2	E	H	–	X	Total harmonic distortion (THD) of phase-to phase voltage V12 compared to the fundamental
0x7DDF–0x7DE0	32224–32225	R	–	FLOAT32	0–2	E	H	–	X	Total harmonic distortion (THD) of phase-to phase voltage V23 compared to the fundamental
0x7DE1–0x7DE2	32226–32227	R	–	FLOAT32	0–2	E	H	–	X	Total harmonic distortion (THD) of phase-to phase voltage V31 compared to the fundamental

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7DE3–0x7DE4	32228–32229	R	–	FLOAT32	0–2	E	H	–	X	Total harmonic distortion (THD) of phase-to-neutral voltage V1N compared to the fundamental (1)
0x7DE5–0x7DE6	32230–32231	R	–	FLOAT32	0–2	E	H	–	X	Total harmonic distortion (THD) of phase-to-neutral voltage V2N compared to the fundamental (1)
0x7DE7–0x7DE8	32232–32233	R	–	FLOAT32	0–2	E	H	–	X	Total harmonic distortion (THD) of phase-to-neutral voltage V3N compared to the fundamental (1)
0x7DE9–0x7DEA	32234–32235	R	–	FLOAT32	0–2	E	H	–	X	Total harmonic distortion (THD) of current on phase 1 compared to the fundamental
0x7DEB–0x7DEC	32236–32237	R	–	FLOAT32	0–2	E	H	–	X	Total harmonic distortion (THD) of current on phase 2 compared to the fundamental
0x7DED–0x7DEE	32238–32239	R	–	FLOAT32	0–2	E	H	–	X	Total harmonic distortion (THD) of current on phase 3 compared to the fundamental
0x7DEF–0x7DF0	32240–32241	R	–	FLOAT32	0–2	E	H	–	X	Average of 3-phase current Total harmonic distortions (THD) compared to the fundamental
(1) Value available when system type register returns 40 or 41.										

Maximum Power Factor

Maximum power factor can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x7DF1–0x7DF2	32242–32243	R	–	FLOAT32	–	–	–	–	X	Maximum total power factor
0x7DF3–0x7E52	32244–32339	–	–	–	–	–	–	–	–	Reserved

Inhibit Close Order

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
0x7E53	32340	R	–	INT16U	–	A/E	A/E/P/H	–	X	–	Quality of each bit of register 32341: • 0 = Invalid • 1 = Valid
0x7E54	32341	R	–	INT16U	–	A/E	A/E/P/H	–	X	–	Inhibit close order status
										0	Close breaker inhibited by IO module • 0 = Disable • 1 = Enable
										1	Close breaker inhibited by communication • 0 = Disable • 1 = Enable

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
						–	–	–	–	2–15	Reserved

Legacy Dataset

What's in This Chapter

Legacy Dataset 94
Legacy Dataset Modbus Register Tables 95
Readout Examples 97
Legacy Dataset Common Registers 99

Legacy Dataset

Description

The legacy dataset contains the most useful information of each IMU module in one convenient table. The legacy dataset is available in the registers 12000 to 12113. It can be read with one read request.

Each IMU module updates the values in the dataset registers on a regular basis.

The response time of requests to legacy dataset registers is shorter than the response time of requests to device registers. Therefore, it is recommended to read the legacy dataset registers instead of device registers, to improve the overall performance of the system. For more information, refer to Modbus Programming Recommendations, page 50.

The legacy dataset can be used with:

- the IFE Ethernet communication interface for one circuit breaker
- the IFE Ethernet switchboard server
- the EIFE embedded Ethernet interface for MasterPacT MTZ drawout circuit breaker
- the IFM Modbus SL communication interface for one circuit breaker
- the BSCM Modbus SL/ULP module

NOTE:

- The legacy dataset is compatible with legacy versions of the MicroLogic trip unit for ComPacT NSX, PowerPacT H-, J-, and L-Frame, ComPacT NS, PowerPacT P- and R-frame or MasterPacT NT/NW circuit breaker. For this reason, data read directly in the Modbus registers is organized in a different way than in the standard dataset.
- For new applications, it is recommended to use the standard dataset instead of the legacy dataset.

Legacy Dataset for MicroLogic X Control Units

The legacy dataset is available when the Modbus legacy dataset Digital Module is purchased and installed on a MicroLogic X control unit.

The Modbus legacy dataset Digital Module is compatible with MicroLogic X control units with firmware version greater than or equal to version V002.000.nnn.

The Modbus legacy dataset is available on a remote controller using the communication network through the following communication interfaces:

- IFE Ethernet interface
- EIFE Ethernet interface
- IFE server
- IFM Modbus-SL interface

The following table shows the part numbers and firmware versions necessary to access the Modbus legacy dataset through communication interfaces:

Communication interface	Part number	Minimum firmware version required
IFE Ethernet interface	LV434010	V003.007.024
	LV434001	
IFE server	LV434011	V003.007.024
	LV434002	
EIFE Ethernet interface	LV851001	V003.007.024
IFM Modbus-SL interface	LV434000	V003.001.006

Legacy Dataset Modbus Register Tables

General Description

The main information needed for remote supervision of a MasterPacT, ComPacT and PowerPacT circuit breaker is contained in the table of common registers starting at register 12000.

This compact table of 114 registers can be read with a single Modbus request.

It contains the following information:

- Circuit breaker status
- Tripping causes
- Real-time values of main measurements: current, voltage, power, energy, total harmonic distortion

The content of this table of registers is detailed in Legacy Dataset Common Registers, page 99.

Use of these common registers is highly recommended to optimize response times and simplify the use of data.

Legacy Dataset Table Format

Register tables have the following columns:

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description

- **Address**: A 16-bit register address in hexadecimal. The address is the data used in the Modbus frame.
- **Register**: A 16-bit register number in decimal (register = address + 1).
- **RW**: Register read-write status
  - R: The register can be read by using Modbus functions
  - W: The register can be written by using Modbus functions
  - RW: The register can be read and written by using Modbus functions
  - RC: The register can be read by using the command interface
  - WC: The register can be written by using the command interface
- **Unit**: The unit the information is expressed in.
- **Type**: The encoding data type (see data type description below).
- **Range**: The permitted values for this variable, usually a subset of what the format allows.
- **A/E**: Types of ComPacT NSX or PowerPacT H-, J-, or L-frame MicroLogic trip unit for which the register is available.
  - Type A (Ammeter): Current measurements for ComPacT NSX circuit breakers only.
  - Type E (Energy): Current, voltage, power, and energy measurements for ComPacT NSX or PowerPacT H-, J-, or L-frame circuit breakers.

- **A/E/P/H**: Types of MasterPacT NT/NW, ComPacT NS or PowerPacT P- or R-frame MicroLogic trip unit for which the register is available.
  - Type A (Ammeter): Current measurements
  - Type E (Energy): Current, voltage, power, and energy measurements
  - Type P (Power): Current, voltage, power, energy measurements, and advanced protection
  - Type H (Harmonics): Current, voltage, power, energy, energy quality measurements, and advanced protection for MasterPacT NT/NW circuit breakers only
- **Active**: Types of MasterPacT MTZ MicroLogic Active control unit for which the register is available.
  - Type A (Ammeter), applicable to MicroLogic Active A/AP: Current measurements
  - Type E (Energy), applicable to MicroLogic Active E/EP/Ei: Current, voltage, power, and energy measurements
- **X**: Register available in the MicroLogic X control unit for MasterPacT MTZ circuit breakers when the Modbus legacy dataset Digital Module is purchased and installed on the MicroLogic X control unit.
- **Description**: Provides information about the register and restrictions that apply.

Legacy Dataset Data Types

Data Types	Description	Range
INT16U	16-bit unsigned integer	0 to 65535
INT16	16-bit signed integer	-32768 to +32767
INT32U	32-bit unsigned integer	0 to 4 294 967 295
INT32	32-bit signed integer	-2 147 483 648 to +2 147 483 647

See detailed descriptions of the data types, page 580.

Readout Examples

Readout Example of a Legacy Dataset Register

The table below shows how to read the rms current on phase 1 (I1) in register 12016.

- The address of register 12016 equals 12016 - 1 = 12015 = 0x2EEF.
- The Modbus address of the Modbus server is 1 = 0x01.

Request from the Client		**Response from the Server**	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x01	Modbus server address	0x01
Function code	0x03	Function code	0x03
Address of register to be read (MSB)	0x2E	Data length in bytes	0x02
Address of register to be read (LSB)	0xEF	Register value (MSB)	0x02
Number of registers (MSB)	0x00	Register value (LSB)	0x2B
Number of registers (LSB)	0x01	CRC (MSB)	0xNN
CRC (MSB)	0xNN	CRC (LSB)	0xNN
CRC (LSB)	0xNN	–	–

The content of register 12016 (address 0x2EEF) is 0x022B = 555.

The rms current on phase 1 (I1) is thus 555 A.

Readout Example of the Table of Legacy Dataset Common Registers

The table below shows how to read the table of legacy dataset common registers. This table starts at register 12000 and consists of 114 registers.

- The address of register 12000 = 0x2EDF.
- The table length is 114 registers = 0x72.
- The number of bytes is 114 x 2 = 228 bytes = 0xE4.
- The Modbus address of the server is 1 = 0x01.

Request from the Client		**Response from the Server**	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x01	Modbus server address	0x01
Function code	0x03	Function code	0x03
Address of the first register to be read (MSB)	0x2E	Data length in bytes	0xE2
Address of the first register to be read (LSB)	0xDF	Value of register 12000 (MSB)	0xNN
Number of registers (MSB)	0x00	Value of register 12000 (LSB)	0xNN
Number of registers (LSB)	0x72	Value of register 12001 (MSB)	0xNN
CRC (MSB)	0xNN	Value of register 12001 (LSB)	0xNN
CRC (LSB)	0xNN	–	0xNN
–	–	–	0xNN
–	–	Value of register 12113 (MSB)	0xNN
–	–	Value of register 12112 (LSB)	0xNN

Request from the Client		Response from the Server	
Field Name	**Example**	**Field Name**	**Example**
–	–	CRC (MSB)	0xNN
–	–	CRC (LSB)	0xNN

Legacy Dataset Common Registers

Circuit Breaker Status Register

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
0x2EDF	12000	R	–	INT16U	–	A/E	A/E/P/H	A/E	X	–	Validity of each bit in the circuit breaker status register.
0x2EE0	12001	R	–	INT16U	–	A/E	A/E/P/H	A/E	X	–	Circuit breaker status register
						A/E	A/E/P/H	A/E	X	0	OF status indication contact 0 = The circuit breaker is open. 1 = The circuit breaker is closed.
						A/E	A/E/P/H	A/E	X	1	SD trip indication contact 0 = Circuit breaker is not tripped. 1 = Circuit breaker is tripped due to electrical fault, shunt trip or push-to-trip. Bit always equal to 0 for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame circuit breakers with motor mechanism.
						A/E	A/E/P/H	A/E	X	2	SDE fault trip indication contact 0 = Circuit breaker is not tripped on electrical fault. 1 = Circuit breaker is tripped due to electrical fault (including ground-fault test and earth-leakage test).
						–	A/E/P/H	A/E	X	3	CH spring charged contact (only with MasterPacT) 0 = Spring discharged 1 = Spring charged Bit always equal to 0 for ComPacT NS and PowerPacT P- and R-frame circuit breakers with motor mechanism.
						–	–	–	–	4	Reserved
						–	A/E/P/H	A/E	X	5	PF ready to close contact (only with MasterPacT) 0 = Not ready to close 1 = Ready to close Bit always equal to 0 for ComPacT NS and PowerPacT P- and R-frame circuit breakers with motor mechanism.
						–	A/E/P/H	A/E	X	6	Distinction between ComPacT NS,PowerPacT P- and R-frame and MasterPacT NT/NW

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
											0 = ComPacT NS or PowerPacT P- and R-frame 1 = MasterPacT NT/NW
						–	–	–	–	7–14	Reserved
						A/E	–	–	X	15	Data availability If this bit is set at 1, all other bits of the register are not significant.

IO Status Registers

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
0x2EE1	12002	R	–	INT16U	–	A/E	A/E/P/H	A/E	X	–	Status IO 1
										0	Input 1 status • 0 = Off • 1 = On
										1	Input 2 status • 0 = Off • 1 = On
										2	Input 3 status • 0 = Off • 1 = On
										3	Input 4 status • 0 = Off • 1 = On
										4	Input 5 status • 0 = Off • 1 = On
										5	Input 6 status • 0 = Off • 1 = On
										6	Output 1 status • 0 = Off • 1 = On
										7	Output 2 status • 0 = Off • 1 = On
										8	Output 3 status • 0 = Off • 1 = On
										9–14	Reserved
										15	Data availability If this bit is set at 1, all other bits of the register are not significant.
0x2EE2	12003	R	–	INT16U	–	A/E	A/E/P/H	A/E	X	–	Status IO 2
										0	Input 1 status • 0 = Off • 1 = On

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
										1	Input 2 status • 0 = Off • 1 = On
										2	Input 3 status • 0 = Off • 1 = On
										3	Input 4 status • 0 = Off • 1 = On
										4	Input 5 status • 0 = Off • 1 = On
										5	Input 6 status • 0 = Off • 1 = On
										6	Output 1 status • 0 = Off • 1 = On
										7	Output 2 status • 0 = Off • 1 = On
										8	Output 3 status • 0 = Off • 1 = On
										9–14	Reserved
										15	Data availability If this bit is set at 1, all other bits of the register are not significant.

Tripping Cause

The tripping cause register provides information about the cause of the trip for the standard protection functions. When a tripping cause bit is at 1 in the tripping cause register, it indicates that a trip has occurred and has not been reset.

- For MicroLogic trip units for ComPacT NSX and PowerPacT H-, J-, and L-frame circuit breakers, the tripping cause bit is reset by pressing the OK key (keypad of the MicroLogic trip unit) twice (validation and confirmation).
- For MicroLogic A/E/P/H trip units for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame circuit breakers, the tripping cause bit is reset as soon as the circuit breaker is closed again.
- For MicroLogic X control units for MasterPacT MTZ circuit breakers, the tripping cause bit is reset by pressing the test/reset button (located beside the trip cause LEDs on the MicroLogic X control unit). Press and hold the button for 3 to 15 seconds to reset all the trip causes.
- For MicroLogic Active control units for MasterPacT MTZ circuit breakers, the tripping cause bit is reset by pressing the  button located on the front face of the MicroLogic Active control unit. Press and hold the  button for more than 3 seconds to reset all the trip causes.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
0x2EE3	12004	R	–	INT16U	–	A/E	A/E/P/H	A/E	X	–	Tripping cause for the standard protection functions
						A/E	A/E/P/H	A/E	X	0	Long-time protection Ir
						A/E	P/H	A/E	X	1	Short-time protection Isd
						–	A/E	A/E	X	1	Short-time protection Isd or Instantaneous protection Ii
						A/E	P/H	A/E	X	2	Instantaneous protection Ii
						A/E	A/E/P/H	A/E	X	3	Ground-fault protection Ig
						E	A/P/H	A/P/H	X	4	Earth-leakage protection IΔn
						A/E	A/E/P/H	A/E	X	5	Integrated instantaneous protection (SELLIM and DIN/DINF) for: • MasterPacT MTZ • MasterPacT NT06L1, NT08L1, NT10L1, and equivalent ComPacT NS and PowerPacT P- and R-frame • ComPacT NSX and PowerPacT H-, J-, and L-frame
						A/E	–	–	X	6	Internal failure (STOP)
						–	A/E	A/E	–		Other protections or integrated instantaneous protection
						–	P/H	E	–		Internal failure (temperature)
						–	A/E/P/H	A/E	–	7	Internal failure (overvoltage)
						–	P/H	E	X	8	Other protection (see register 12005)
						E	–	–	–	9	Instantaneous with earth-leakage protection on the trip unit.
						E	–	–	–	10	Unbalance motor protection
						E	–	–	–	11	Jam motor protection
						E	–	–	–	12	Underload motor protection
						E	–	–	–	13	Long-start motor protection
						A/E	–	–	–	14	Reflex tripping protection
						A/E	A/E/P/H	A/E	X	15	If this bit is at 1, bits 0 to 14 are not valid.
0x2EE4	12005	R	–	INT16U	–	–	P/H	E	X	–	Tripping causes for the advanced protection functions
						–	P/H	–	–	0	Current unbalance
						–	P/H	–	–	1	Overcurrent on phase 1
						–	P/H	–	–	2	Overcurrent on phase 2
						–	P/H	–	–	3	Overcurrent on phase 3
						–	P/H	–	–	4	Overcurrent on Neutral
						–	P/H	E	X	5	Undervoltage
						–	P/H	E	X	6	Overvoltage

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
						–	P/H	–	–	7	Voltage unbalance
						–	P/H	–	–	8	Overpower
						–	P/H	–	X	9	Reverse power
						–	P/H	–	X	10	Underfrequency
						–	P/H	–	X	11	Overfrequency
						–	P/H	–	–	12	Phase rotation
						–	P/H	–	–	13	Load shedding based on current
						–	P/H	–	–	14	Load shedding based on power
						–	P/H	E	X	15	If this bit is at 1, bits 0 to 14 are not valid.
0x2EE5–0x2EE6	12006–12007	–	–	–	–	–	–	–	–	–	Reserved

Overrun of the Protection Setpoints

The alarm setpoint registers provide information about overrun of the standard and advanced protection setpoints. A bit is at 1 once a setpoint overrun has occurred, even if the time delay has not expired.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
0x2EE7	12008	R	–	INT16U	–	A/E	P/H	A/E	–	–	Overrun of the standard protection setpoints
						A/E	P/H	A/E	–	0	Long-time protection pick-up
						–	–	–	–	1–14	Reserved
						A/E	P/H	E	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x2EE8	12009	R	–	INT16U	–	–	P/H	E	–	–	Overrun of the advanced protection setpoints
						–	P/H	E	–	0	Current unbalance
						–	P/H	E	–	1	Maximum current on phase 1
						–	P/H	E	–	2	Maximum current on phase 2
						–	P/H	E	–	3	Maximum current on phase 3
						–	P/H	E	–	4	Maximum current on the neutral
						–	P/H	E	–	5	Minimum voltage
						–	P/H	E	–	6	Maximum voltage
						–	P/H	–	–	7	Voltage unbalance
						–	P/H	–	–	8	Maximum power
						–	P/H	–	–	9	Reverse power
						–	P/H	–	–	10	Minimum frequency
						–	P/H	–	–	11	Maximum frequency
						–	P/H	–	–	12	Phase rotation
						–	P/H	–	–	13	Load shedding based on the current

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
						–	P/H	–	–	14	Load shedding based on the power
						–	P/H	E	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x2EE9	12010	R	–	INT16U	–	–	P/H	–	–	–	Continuation of the previous register
						–	P/H	–	–	0	Ground-fault alarm
						E	P/H	–	–	1	Earth-leakage alarm
						–	–	–	–	2–14	Reserved
						–	P/H	E	–	15	If this bit is at 1, bits 0 to 14 are not valid.

Alarms

The alarm register provides information about the pre-alarms and the user-defined alarms. A bit is set to 1 once an alarm is active.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Bit	Description
0x2EEA	12011	R	–	INT16U	–	A/E	–	–	X	–	Pre-alarm register
						A/E	–	A/E	X	0	Long-time protection time pre-alarm (PAL Ir)
						E	–	–	–	1	Earth-leakage protection pre-alarm (PAL IΔn)
						–	–	–	X		Earth-leakage alarm(1)
						A/E	–	–	–	2	Ground-fault protection pre-alarm (PAL Ig)
						–	–	–	X		Ground-fault alarm(2)
						–	–	–	–	3–14	Reserved
						A/E	–	–	X	15	If this bit is at 1, bits 0 to 14 are not valid.
0x2EEB	12012	R	–	INT16U	–	A/E	–	–	–	–	Register of user-defined alarms
						A/E	–	–	–	0	User-defined alarm 201
						A/E	–	–	–	1	User-defined alarm 202
						A/E	–	–	–	2	User-defined alarm 203
						A/E	–	–	–	3	User-defined alarm 204
						A/E	–	–	–	4	User-defined alarm 205
						A/E	–	–	–	5	User-defined alarm 206
						A/E	–	–	–	6	User-defined alarm 207
						A/E	–	–	–	7	User-defined alarm 208
						A/E	–	–	–	8	User-defined alarm 209
						A/E	–	–	–	9	User-defined alarm 210
						–	–	–	–	10–14	Reserved
						A/E	–	–	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x2EEC–0x2EEE	12013–12015	–	–	–	–	–	–	–	–	–	Reserved

(1) Value available on MicroLogic 7.0 X control unit only when the Digital Module ANSI 51N/51G Ground-fault alarm is installed.

(2) Value available on MicroLogic 2.0 X, 3.0 X, 5.0 X, and 6.0 X control units only when the Digital Module ANSI 51N/51G Ground-fault alarm is installed.

Current

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2EEF	12016	R	A	INT16U	0–32767	A/E	A/E/P/H	A/E	X	RMS current on phase 1: I1
0x2EF0	12017	R	A	INT16U	0–32767	A/E	A/E/P/H	A/E	X	RMS current on phase 2: I2
0x2EF1	12018	R	A	INT16U	0–32767	A/E	A/E/P/H	A/E	X	RMS current on phase 3: I3
0x2EF2	12019	R	A	INT16U	0–32767	A/E	A/E/P/H	A/E	X	RMS current on the neutral: IN (1)
0x2EF3	12020	R	A	INT16U	0–32767	A/E	A/E/P/H	A/E	X	Maximum of I1, I2, I3, and IN
0x2EF4	12021	R	%Ig	INT16U	0–32767	A/E	A/E/P/H	A/E	X	Ground-fault current Ig (2)
0x2EF5	12022	R	%IΔn	INT16U	0–32767	E	A/P/H	A/P/H	X	Earth-leakage current IΔn (3)

(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral current transformer (ENCT).

(2) This value is only available:

- For MasterPacT MTZ MicroLogic 6.0 X control units, expressed as %Ig pick-up
- For MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame MicroLogic 6.0 trip units, expressed as %Ig pick-up
- For ComPacT NSX and PowerPacT H-, J-, and L-frame MicroLogic 6.2 and 6.3 trip units, expressed as %Ig pick-up

(3) This value is only available:

- For MasterPacT MTZ MicroLogic 7.0 X control units, expressed as %IΔn pick-up
- For MasterPacT NT/NW and ComPacT NS MicroLogic 7.0 trip units, expressed as %IΔn pick-up
- For ComPacT NSX MicroLogic 7.2 and 7.3 trip units, expressed as %IΔn pick-up

Maximum Current Values

Maximum current values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2EF6	12023	R	A	INT16U	0–32767	A/E	A/E/P/H	A/E	X	Maximum RMS current on phase 1: I1
0x2EF7	12024	R	A	INT16U	0–32767	A/E	A/E/P/H	A/E	X	Maximum RMS current on phase 2: I2
0x2EF8	12025	R	A	INT16U	0–32767	A/E	A/E/P/H	A/E	X	Maximum RMS current on phase 3: I3
0x2EF9	12026	R	A	INT16U	0–32767	A/E	A/E/P/H	A/E	X	Maximum RMS current on the neutral: IN (1)
0x2EFA	12027	R	A	INT16U	0–32767	A/E	A/E/P/H	A/E	X	Maximum RMS current out of the 4 previous registers
0x2EFB	12028	R	%Ig	INT16U	0–32767	A/E	A/E/P/H	A/E	X	Maximum ground-fault current Ig (2)
0x2EFC	12029	R	%IΔn	INT16U	0–32767	E	A/P/H	A/P/H	X	Maximum earth-leakage current (3)

(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral current transformer (ENCT).

(2) This value is only available:

- For MasterPacT MTZ MicroLogic 6.0 X control units, expressed as %Ig pick-up
- For MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame MicroLogic 6.0 trip units, expressed as %Ig pick-up
- For ComPacT NSX and PowerPacT H-, J-, and L-frame MicroLogic 6.2 and 6.3 trip units, expressed as %Ig pick-up

(3) This value is only available:

- For MasterPacT MTZ MicroLogic 7.0 X control units, expressed as %IΔn pick-up
- For MasterPacT NT/NW and ComPacT NS MicroLogic 7.0 trip units, expressed as %IΔn pick-up
- For ComPacT NSX MicroLogic 7.2 and 7.3 trip units, expressed as %IΔn pick-up

Voltage

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2EFD	12030	R	V	INT16U	0–1200	E	E/P/H	E	X	RMS phase-to-phase voltage V12
0x2EFE	12031	R	V	INT16U	0–1200	E	E/P/H	E	X	RMS phase-to-phase voltage V23
0x2EFF	12032	R	V	INT16U	0–1200	E	E/P/H	E	X	RMS phase-to-phase voltage V31
0x2F00	12033	R	V	INT16U	0–1200	E	E/P/H	E	X	RMS phase-to-neutral voltage V1N (1)
0x2F01	12034	R	V	INT16U	0–1200	E	E/P/H	E	X	RMS phase-to-neutral voltage V2N (1)
0x2F02	12035	R	V	INT16U	0–1200	E	E/P/H	E	X	RMS phase-to-neutral voltage V3N (1)
(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral voltage transformer (ENVT).										

Frequency

When the MicroLogic trip unit cannot calculate the frequency, it returns Not applicable = 32768 (0x8000).

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2F03	12036	R	0.1 Hz	INT16U	400–600	E	P/H	E	X	Frequency
0x2F04	12037	R	0.1 Hz	INT16U	400–600	E	P/H	E	X	Maximum frequency (1)
(1) This value can be reset with the reset minimum/maximum command.										

Power

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2F05	12038	R	0.1 kW	INT16	-32767–+32767	E	E/P/H	E	X	Active power on phase 1: P1 (1) (2)
0x2F06	12039	R	0.1 kW	INT16	-32767–+32767	E	E/P/H	E	X	Active power on phase 2: P2 (1) (2)
0x2F07	12040	R	0.1 kW	INT16	-32767–+32767	E	E/P/H	E	X	Active power on phase 3: P3 (1) (2)
0x2F08	12041	R	0.1 kW	INT16	-32767–+32767	E	E/P/H	E	X	Total active power: Ptot (2)
0x2F09	12042	R	0.1 kvar	INT16	-32767–+32767	E	E/P/H	E	X	Reactive power on phase 1: Q1 (1) (2)
0x2F0A	12043	R	0.1 kvar	INT16	-32767–+32767	E	E/P/H	E	X	Reactive power on phase 2: Q2 (1) (2)
0x2F0B	12044	R	0.1 kvar	INT16	-32767–+32767	E	E/P/H	E	X	Reactive power on phase 3: Q3 (1) (2)
0x2F0C	12045	R	0.1 kvar	INT16	-32767–+32767	E	E/P/H	E	X	Total reactive power: Qtot (2)
0x2F0D	12046	R	0.1 kVA	INT16U	0–32767	E	E/P/H	E	X	Apparent power on phase 1: S1 (1)
0x2F0E	12047	R	0.1 kVA	INT16U	0–32767	E	E/P/H	E	X	Apparent power on phase 2: S2 (1)

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2F0F	12048	R	0.1 kVA	INT16U	0–32767	E	E/P/H	E	X	Apparent power on phase 3: S3 (1)
0x2F10	12049	R	0.1 kVA	INT16U	0–32767	E	E/P/H	E	X	Total apparent power: Stot

(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral current transformer (ENCT).

(2) The sign for the active and reactive power depends on the configuration of:

- Register 3316 for ComPacT, PowerPacT and MasterPacT NT/NW circuit breakers.
- Register 8405 for MasterPacT MTZ circuit breakers.

Energy

Energy is stored in big-endian format: the most significant register is transmitted first, the least significant second.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2F11–0x2F12	12050–12051	R	kWh	INT32	-1 999 999 999–+1 999 999 999	E	E/P/H	E	X	Active energy: Ep (1)
0x2F13–0x2F14	12052–12053	R	kvarh	INT32	-1 999 999 999–+1 999 999 999	E	E/P/H	E	X	Reactive energy: Eq (1)
0x2F15–0x2F16	12054–12055	R	kWh	IN-T32U	0–1 999 999 999	E	P/H	E	X	Active energy counted positively: EpIn
0x2F17–0x2F18	12056–12057	R	kWh	IN-T32U	0–1 999 999 999	E	P/H	E	X	Active energy counted negatively: EpOut
0x2F19–0x2F1A	12058–12059	R	kvarh	IN-T32U	0–1 999 999 999	E	P/H	E	X	Reactive energy counted positively: EqIn
0x2F1B–0x2F1C	12060–12061	R	kvarh	IN-T32U	0–1 999 999 999	E	P/H	E	X	Reactive energy counted negatively: EqOut
0x2F1D–0x2F1E	12062–12063	R	kVAh	IN-T32U	0–1 999 999 999	E	E/P/H	E	X	Total apparent energy: Es
0x2F1F–0x2F20	12064–12065	R	kWh	IN-T32U	0–1 999 999 999	E	–	–	X	Active energy counted positively (non-resettable): EpIn
0x2F21–0x2F22	12066–12067	R	kWh	IN-T32U	0–1 999 999 999	E	–	–	X	Active energy counted negatively (non-resettable): EpOut
0x2F23–0x2F2E	12068–12079	–	–	–	–	–	–	–	–	Reserved

(1) This value is always positive with MicroLogic E trip units for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame circuit breakers.

IMPORTANT: For the BSCM Modbus SL/ULP module with firmware version 001.000.000, the energy values of registers from 12054 to 12067 are incorrect. These values were expressed in Wh, VARh, VAh instead of kWh, kVARh, and kVAh respectively.

To view the correct energy values, It is recommended to update the firmware of BSCM Modbus SL/ULP module to the latest version.

The following table displays the example of correct and incorrect energy values for registers:

Register	Description	Incorrect Value with Firmware Version 001.000.000	Correct Value with Firmware Version ≥ 001.001.000	Unit
12054–12055	Active energy counted positively: EpIn	0	0	kWh
12056–12057	Active energy counted negatively: EpOut	32000	32	kWh
12058–12059	Reactive energy counted positively: EqIn	20000	20	kVARh
12060–12061	Reactive energy counted negatively: EqOut	166000	166	kVARh
12062–12063	Total apparent energy: Es	150000	150	kVAh
12064–12065	Active energy counted positively (non-resettable): EpIn	0	0	kWh
12066–12067	Active energy counted negatively (non-resettable): EpOut	159000	159	kWh

Current Demand Values

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2F2F	12080	R	A	INT16U	0–32767	E	E/P/H	E	X	Current demand value on phase 1: I1 Dmd
0x2F30	12081	R	A	INT16U	0–32767	E	E/P/H	E	X	Current demand value on phase 2: I2 Dmd
0x2F31	12082	R	A	INT16U	0–32767	E	E/P/H	E	X	Current demand value on phase 3: I3 Dmd
0x2F32	12083	R	A	INT16U	0–32767	E	E/P/H	E	X	Current demand value on the neutral: IN Dmd (1)

(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral current transformer (ENCT).

Power Demand Values

- For the block window, the demand value is updated at the end of the window.
- For the sliding window,
  - If window duration is configured for less or equal to 15 minutes, the demand value is updated every 15 seconds
  - If window duration is configured for more than 15 minutes, the demand value is updated every 1 minute.

NOTE: For MicroLogic Active control units, the block window demand value is equal to 15 minutes, and updated every 15 minutes.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2F33	12084	R	0.1 kW	INT16U	0–32767	E	E/P/H	E	X	Total active power demand: P Dmd
0x2F34	12085	R	0.1 kvar	INT16U	0–32767	E	P/H	E	X	Total reactive power demand: Q Dmd
0x2F35	12086	R	0.1 kVA	INT16U	0–32767	E	P/H	E	X	Total apparent power demand: S Dmd
0x2F36–0x2F38	12087–12089	–	–	–	–	–	–	–	–	Reserved

Maximum Voltage Values

Maximum voltage values can be reset with the reset minimum/maximum command.

Register = 0 if the voltage < 25 V.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2F39	12090	R	V	INT16U	0–1200	E	E/P/H	E	X	Maximum RMS phase-to-phase voltage V12
0x2F3A	12091	R	V	INT16U	0–1200	E	E/P/H	E	X	Maximum RMS phase-to-phase voltage V23
0x2F3B	12092	R	V	INT16U	0–1200	E	E/P/H	E	X	Maximum RMS phase-to-phase voltage V31
0x2F3C	12093	R	V	INT16U	0–1200	E	E/P/H	E	X	Maximum RMS phase-to-neutral voltage V1N (1)
0x2F3D	12094	R	V	INT16U	0–1200	E	E/P/H	E	X	Maximum RMS phase-to-neutral voltage V2N (1)
0x2F3E	12095	R	V	INT16U	0–1200	E	E/P/H	E	X	Maximum RMS phase-to-neutral voltage V3N (1)

(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral voltage transformer (ENVT).

Power Factor

The sign for the fundamental power factor (cosϕ) depends on the MicroLogic configuration.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2F3F	12096	R	0.01	INT16	-100–+100	E	E/P/H	E	X	Power factor on phase 1: PF1 (1)
0x2F40	12097	R	0.01	INT16	-100–+100	E	E/P/H	E	X	Power factor on phase 2: PF2 (1)
0x2F41	12098	R	0.01	INT16	-100–+100	E	E/P/H	E	X	Power factor on phase 3: PF3 (1)
0x2F42	12099	R	0.01	INT16	-100–+100	E	E/P/H	E	X	Total power factor: PF
0x2F43	12100	R	0.01	INT16	-100–+100	E	H	–	X	Fundamental power factor on phase 1: cosϕ1 (1)
0x2F44	12101	R	0.01	INT16	-100–+100	E	H	–	X	Fundamental power factor on phase 2: cosϕ2 (1)
0x2F45	12102	R	0.01	INT16	-100–	E	H	–	X	Fundamental power factor on phase 3: cosϕ3 (1)

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
					+100					
0x2F46	12103	R	0.01	INT16	-100– +100	E	H	–	X	Total fundamental power factor: cosϕ
(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral voltage transformer (ENVT).										

Total Harmonic Distortion (THD)

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	Active	X	Description
0x2F47	12104	R	0.1 %	INT16U	0–5000	E	H	–	X	Total harmonic distortion of V12 compared to the fundamental
0x2F48	12105	R	0.1 %	INT16U	0–5000	E	H	–	X	Total harmonic distortion of V23 compared to the fundamental
0x2F49	12106	R	0.1 %	INT16U	0–5000	E	H	–	X	Total harmonic distortion of V31 compared to the fundamental
0x2F4A	12107	R	0.1 %	INT16U	0–5000	E	H	–	X	Total harmonic distortion of V1N compared to the fundamental (1)
0x2F4B	12108	R	0.1 %	INT16U	0–5000	E	H	–	X	Total harmonic distortion of V2N compared to the fundamental (1)
0x2F4C	12109	R	0.1 %	INT16U	0–5000	E	H	–	X	Total harmonic distortion of V3N compared to the fundamental (1)
0x2F4D	12110	R	0.1 %	INT16U	0–5000	E	H	–	X	Total harmonic distortion of I1 compared to the fundamental
0x2F4E	12111	R	0.1 %	INT16U	0–5000	E	H	–	X	Total harmonic distortion of I2 compared to the fundamental
0x2F4F	12112	R	0.1 %	INT16U	0–5000	E	H	–	X	Total harmonic distortion of I3 compared to the fundamental
0x2F50	12113	R	0.1 %	INT16U	0–5000	E	H	–	X	Total harmonic distortion of total current compared to the fundamental
(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral voltage transformer (ENVT).										

MicroLogic X Control Unit Data for MasterPacT MTZ Circuit Breakers

What's in This Part

MicroLogic X Modbus Register Tables 112
MicroLogic X Control Unit Registers..... 114
MicroLogic X Control Unit Commands..... 172
MicroLogic X Control Unit Protection Commands with Session 203

MicroLogic X User Guide

For more information about MicroLogic X functions, refer to DOCA0102•• *MasterPacT MTZ - MicroLogic X Control Unit - User Guide* in **Related Documents** at the beginning of this guide.

MicroLogic X Modbus Register Tables

General Description

The following chapters describe the Modbus registers of a MicroLogic X control unit embedded in a MasterPacT MTZ circuit breaker. These registers provide information that can be read, such as electrical measures, protection configuration, and monitoring information. The command interface enables the user to modify these registers in a controlled way.

The MicroLogic X control unit registers, page 114 are grouped in tables of logically related information. The contents of the tables are ordered by increasing address.

The MicroLogic X control unit commands, page 172 are described separately.

MicroLogic X Table Format

MicroLogic X Modbus register tables have the following columns:

Address	Register	RW	Unit	Type	Range	Bit	Description

- **Address**: a 16-bit register address in hexadecimal. The address is the data used in the Modbus frame.
- **Register**: a 16-bit register number in decimal (register = address + 1).
- **RW**: register read-write status
  - R: the register can be read by using Modbus functions
  - W: the register can be written by using Modbus functions
  - RW: the register can be read and written by using Modbus functions
  - RC: the register can be read by using the command interface
  - WC: the register can be written by using the command interface
- **Unit**: the unit the information is expressed in.
- **Type**: the encoding data type (see data type description below).
- **Range**: the permitted values for this variable, usually a subset of what the format allows.
- **Description**: provides information about the register and restrictions that apply.

MicroLogic X Data Types

Data Types	Description	Range
INT16U	16-bit unsigned integer	0 to 65535
INT16	16-bit signed integer	-32768 to +32767
INT32U	32-bit unsigned integer	0 to 4 294 967 295
INT32	32-bit signed integer	-2 147 483 648 to +2 147 483 647
INT64U	64-bit unsigned integer	0 to 18 446 744 073 709 600 000
INT64	64-bit signed integer	-9 223 372 036 854 775 808 to +9 223 372 036 854 775 807
FLOAT32	32-bit signed integer with a floating point	2^{-126} (1.0) to 2^{127} (2 - 2^{-23})

Data Types	Description	Range
OCTET STRING	Text string	1 byte per character
XDATE	Date and time of ULP modules	–
DATETIME	Date and time in the IEC 60870-5 format	–

See detailed descriptions of the data types, page 580.

MicroLogic X Control Unit Registers

What's in This Chapter

Tripping Data 115
Circuit Breaker Data 122
Circuit Breaker Characteristics 125
Real-Time Measurements 129
Harmonic Values 136
Minimum and Maximum Values of Real-Time Measurements 149
Maintenance and Diagnostic Data 159
Energy Measurements 164
Protection Settings 167
Demand Values of Real-Time Measurements 169
Peak Values of Demand Values of Real-Time Measurements 170

Tripping Data

Tripping Data Monitoring

To monitor the tripping data, it is recommended:

- to read the tripping cause registers regularly
- to read the data related to the last trip only after detection of a tripping cause:
  - Last trip event
  - ZSI status before the last trip
  - Setting group and settings of protection responsible for the last trip
  - Interrupted currents and measurement before the last trip

Tripping Cause

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E56–0x7E57	32343–32344	R	–	INT32U	–	–	Alarm change counter
0x7E58	32345	R	–	INT16U	–	–	Quality of each bit of register 32346: • 0 = Invalid • 1 = Valid
0x7E59	32346	R	–	INT16U	–	0	Reserved
						1	Alarm status synthesis: • 0 = No active alarms • 1 = At least one alarm is active
						2–15	Reserved
0x7E5A–0x7E72	32347–32371	R	–	INT16U	–	–	Quality of each bit of registers 32372-32396: • 0 = Invalid • 1 = Valid
0x7E73	32372	R	–	INT16U	–	0	Ir trip
						1	Isd trip
						2	Ii trip
						3	Ig trip
						4	IΔn trip
						5	Ultimate self-protection trip (SELLIM)
						6	Self diagnostic trip
						7	Optional protection trip
						8	Ultimate self-protection trip (DIN/DINF)
						9	IΔn/Ig test trip
						10–11	Reserved
						12	IDMTL long time trip
						13	Reserved
						14	Undervoltage on 1 phase trip
						15	Overvoltage on 1 phase trip
0x7E74	32373	R	–	INT16U	–	0	Reserved
						1	Reverse power trip
						2	Underfrequency trip

Address	Register	RW	Unit	Type	Range	Bit	Description
						3	Overfrequency trip
						4	Reserved
						5	Forward directional overcurrent trip
						6-7	Reserved
						8	Undervoltage on all 3 phases trip
						9	Overvoltage on all 3 phases trip
						10	Reverse directional overcurrent trip
						11–14	Reserved
						15	IDMT ground fault trip
0x7E75	32374	–	–	–	–	–	Reserved
0x7E76	32375	–	–	–	–	0	Circuit breaker self-diagnostic trip
						1–15	Reserved

Protection Data

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E77	32376	R	–	INT16U	–	0	Ir start (I > 105% Ir)
						1	Isd start
						2	Ig start
						3	IΔn start
						4	Ultimate self-protection (SELLIM) operate
						5–7	Reserved
						8	Ultimate self-protection (DIN/DINF) operate
						9–11	Reserved
						12	IDMTL long time start
						13	Reserved
						14	Undervoltage on 1 phase start
						15	Overvoltage on 1 phase start
0x7E78	32377	R	–	INT16U	–	0	Reserved
						1	Reverse power start
						2	Underfrequency start
						3	Overfrequency start
						4	Reserved
						5	Forward directional overcurrent start
						6–7	Reserved
						8	Undervoltage on all 3 phases start
						9	Overvoltage on all 3 phases start
						10	Reverse directional overcurrent start
						11–14	Reserved
						15	IDMT ground fault start
0x7E79	32378	R	–	INT16U	–	0	Ir operate
						1	Isd operate

Address	Register	RW	Unit	Type	Range	Bit	Description
						2	Ii operate
						3	Ig operate
						4	IΔn operate
						5–11	Reserved
						12	IDMTL long time operate
						13	Reserved
						14	Undervoltage on 1 phase operate
						15	Overvoltage on 1 phase operate
0x7E7A	32379	R	–	INT16U	–	0	Reserved
						1	Reverse power operate
						2	Underfrequency operate
						3	Overfrequency operate
						4	Reserved
						5	Forward directional overcurrent operate
						6–7	Reserved
						8	Undervoltage on all 3 phases operate
						9	Overvoltage on all 3 phases operate
						10	Reverse directional overcurrent operate
						11–14	Reserved
						15	IDMT ground fault operate
0x7E7B	32380	R	–	INT16U	–	0–8	Reserved
						9	Forward directional overcurrent received
						10	Reverse directional overcurrent received
						11	Forward directional overcurrent sent
						12	Reverse directional overcurrent sent
						13	Request to unlock ERMS by smartphone
						14–15	Reserved
0x7E7C	32381	R	–	INT16U	–	0	Thermal memory reset order
						1	Ir prealarm (I > 90% Ir)
						2	Ig alarm
						3	IΔn alarm
						4–7	Reserved
						8	ERMS engaged
						9	ERMS engaged for more than 24 hours
						10	Reserved
						11	Active curve: • 0 = A curve active • 1 = B curve active
						12	Reserved
						13	Optional protections inhibited by IO
						14	ESM (ERMS switch module) self-diagnostic alarm

Address	Register	RW	Unit	Type	Range	Bit	Description
						15	Communication lost with ESM (ERMS switch module)

Last Trip Event

Address	Register	RW	Unit	Type	Range	Bit	Description
0x0227	552	R	–	INT16U	–	–	Last trip event code: • Standard protection: ◦ 25600 (0x6400) = Ir trip ◦ 25601 (0x6401) = Isd trip ◦ 25602 (0x6402) = Ii trip ◦ 25603 (0x6403) = Ig trip ◦ 25604 (0x6404) = Ivigi trip ◦ 25606 (0x6406) = Ultimate self-protection trip (SELLIM) ◦ 25607 (0x6407) = Internal failure • Optional protection: ◦ 25616 (0x6410) = Undervoltage on one phase trip ◦ 25617 (0x6411) = Overvoltage on one phase trip ◦ 25620 (0x6414) = Reverse power trip ◦ 25621 (0x6415) = Underfrequency trip ◦ 25622 (0x6416) = Overfrequency trip ◦ 25629 (0x641D) = Ultimate self-protection trip (DIN/DINF) ◦ 25630 (0x641E) = Ground fault and earth-leakage test trip ◦ 25633 (0x6421) = IDMTL long time trip ◦ 25635 (0x6423) = Forward directional overcurrent trip ◦ 25636 (0x6424) = Reverse directional overcurrent trip ◦ 25642 (0x642A) = Undervoltage on all 3 phases trip ◦ 25643 (0x642B) = Overvoltage on all 3 phases trip ◦ 25649 (0x6431) = Optional protection trip ◦ 25650 (0x6432) = IDMT ground fault trip
0x0228–0x022B	553-556	R	–	DATETIME	–	–	Timestamp of last trip event
0x022C	557	R	–	INT16U	–	–	Timestamp quality of last trip event
0x022D	558	–	–	–	–	–	Reserved
0x022E	559	R	–	INT16U	–	–	Quality of each bit of registers 560: • 0 = Invalid • 1 = Valid
0x022F	560	R	–	INT16U	–	–	Last trip event origin electrical fault: • 0 = Inactive • 1 = Active
						0	Fault on phase 1
						1	Fault on phase 2
						2	Fault on phase 3

Address	Register	RW	Unit	Type	Range	Bit	Description
						3	Fault on neutral
						4–15	Reserved

ZSI Status Before Last Trip

Address	Register	RW	Unit	Type	Range	Bit	Description
0x0231	562	R	–	INT16U	–	–	Quality of each bit of register 563: • 0 = Invalid • 1 = Valid
0x0232	563	R	–	INT16U	–	0	ZSI in status before last trip: • 0 = Not energized • 1 = Energized
						1	ZSI out status before last trip: • 0 = Not energized • 1 = Energized
						2–15	Reserved

Setting Group of the Last Trip

If a standard protection is responsible of the last trip, the settings of the standard protection responsible of the last trip are recorded in the following registers:

Address	Register	RW	Unit	Type	Range	Description
0x0233	564	R	–	INT16U	1–128	Setting group of the last trip: • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS • 128 = Fallback settings • 255 = N/A

Settings of Protection Responsible of the Last Trip

If a standard protection is responsible of the last trip, the settings of the standard protection responsible of the last trip are recorded in the following registers:

Address	Register	RW	Unit	Type	Range	Description
0x0234–0x0235	565–566	R	–	FLOAT32	–	Generic standard protection last parameter 1
0x0236–0x0237	567–568	R	–	FLOAT32	–	Generic standard protection last parameter 2
0x0238–0x0239	569–570	R	–	FLOAT32	–	Generic standard protection last parameter 3
0x023A–0x023B	571–572	R	–	FLOAT32	–	Generic standard protection last parameter 4
0x023C	573	R	–	INT16U	–	Generic standard protection last parameter 5
0x023D	574	R	–	INT16U	–	Generic standard protection last parameter 6

The following table defines the parameters corresponding to the 6 generic standard protection last parameters according to the protection responsible of the last trip, indicated by register 552.

Protection responsible of the last trip	Registers						
	552 **Last trip event code**	**565-566** **Generic protection last parameter 1**	**567-568** **Generic protection last parameter 2**	**569-570** **Generic protection last parameter 3**	**571-572** **Generic protection last parameter 4**	**573** **Generic protection last parameter 5**	**574** **Generic protection last parameter 6**
Overload protection (Long time)	25600 (0x6400)	Long time over current protection threshold	–	Long time over current protection time delay	–	Long time over current protection curve: • 1 = I²t On	–
Short circuit protection (Short time)	25601 (0x6401)	Short time over current protection threshold	–	Short time over current protection time delay	–	Short time over current protection curve: • 0 = I²t Off • 1 = I²t On	–
Instantaneous protection	25602 (0x6402)	Instantaneous over current protection threshold	–	–	–	Instantaneous over current protection mode: • 0 = Off • 1 = On	Instantaneous over current protection time delay mode: • 0 = Standard • 1 = Fast
Ground fault protection	25603 (0x6403)	Ground fault protection threshold	–	Ground fault protection time delay	–	Ground fault protection curve: • 0 = I²t Off • 1 = I²t On	Ground fault protection mode: • 0 = Off • 1 = On
Earth leakage protection	25604 (0x6404)	Earth leakage threshold	–	Earth leakage protection delay	–	–	–
Ultimate self-protection SELLIM	25606 (0x6406)	SELLIM threshold	–	–	–	–	–
Internal failure	25607 (0x6407)	–	–	–	–	–	–
Ultimate self-protection DIN/ DINF	25629 (0x641D)	DIN threshold	DINF threshold	–	–	–	–
Ground fault test trip	25630 (0x641E)	Ground fault protection threshold	–	Ground fault protection time delay	–	Ground fault protection curve: • 0 = I²t Off • 1 = I²t On	–
Earth leakage test trip		–	Earth leakage protection threshold	–	Earth leakage protection time delay	–	–

NOTE: If an optional protection is responsible of the last trip, use the EcoStruxure Power Commission software or the EcoStruxure Power Device App to get the settings of the optional protection responsible of the last trip.

Interrupted Current

Address	Register	RW	Unit	Type	Range	Description
0x023E–0x023F	575–576	R	A	FLOAT32	–	Last interrupted current on phase 1 (peak)
0x0240–0x0241	577–578	R	A	FLOAT32	–	Last interrupted current on phase 2 (peak)

Address	Register	RW	Unit	Type	Range	Description
0x0242–0x0243	579–580	R	A	FLOAT32	–	Last interrupted current on phase 3 (peak)
0x0244–0x0245	581–582	R	A	FLOAT32	–	Last interrupted current on neutral (peak)
0x0246–0x0247	583–584	R	A	FLOAT32	–	Last interrupted ground current (peak)
0x0248–0x0249	585–586	R	A	FLOAT32	–	Last interrupted earth leakage current (peak)

Measurement Before Last Trip

Address	Register	RW	Unit	Type	Range	Description
0x024A–0x024B	587–588	R	A	FLOAT32	–	RMS current of phase 1 before last trip
0x024C–0x024D	589–590	R	A	FLOAT32	–	RMS current of phase 2 before last trip
0x024E–0x024F	591–592	R	A	FLOAT32	–	RMS current of phase 3 before last trip
0x0250–0x0251	593–594	R	A	FLOAT32	–	RMS current of neutral before last trip
0x0252–0x253	595–596	R	A	FLOAT32	–	RMS current of ground fault before last trip
0x0254–0x0255	597–598	R	A	FLOAT32	–	Current earth leakage before last trip
0x0256–0x0257	599–600	R	V	FLOAT32	–	RMS phase-to-phase voltage V12 before last trip
0x0258–0x0259	601–602	R	V	FLOAT32	–	RMS phase-to-phase voltage V23 before last trip
0x025A–0x025B	603–604	R	V	FLOAT32	–	RMS phase-to-phase voltage V31 before last trip
0x025C–0x025D	605–606	R	Hz	FLOAT32	–	Frequency before last trip
0x025E–0x025F	607–608	R	–	FLOAT32	–	Voltage unbalance V12 before last trip
0x0260–0x0261	609–610	R	–	FLOAT32	–	Voltage unbalance V23 before last trip
0x0262–0x0263	611–612	R	–	FLOAT32	–	Voltage unbalance V31 before last trip
0x0264–0x0265	613–614	R	–	FLOAT32	–	Current unbalance 1 before last trip
0x0266–0x0267	615–616	R	–	FLOAT32	–	Current unbalance 2 before last trip
0x0268–0x0269	617–618	R	–	FLOAT32	–	Current unbalance 3 before last trip

Circuit Breaker Data

Circuit Breaker Status Register

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7CFF	32000	R	–	INT16U	–	–	Quality of each bit of register 32001: • 0 = Invalid • 1 = Valid
0x7D00	32001	R	–	INT16U	–	–	Circuit breaker status register
						0	OF status indication contact • 0 = The circuit breaker is open. • 1 = The circuit breaker is closed.
						1	SD trip indication contact • 0 = Circuit breaker is not tripped. • 1 = Circuit breaker is tripped due to electrical fault, shunt trip, or push-to-trip. Bit always equal to 0 for MasterPacT, ComPacT NS and PowerPacT P- and R-frame circuit breakers with motor mechanism.
						2	SDE fault trip indication contact • 0 = Circuit breaker is not tripped on electrical fault. • 1 = Circuit breaker is tripped due to electrical fault (including ground-fault test and earth-leakage test).
						3	CH spring charged contact (only with MasterPacT) • 0 = Spring discharged • 1 = Spring charged Bit always equal to 0 for ComPacT NS and PowerPacT P- and R-frame circuit breakers with motor mechanism.
						4	Reserved
						5	PF ready to close contact (only with MasterPacT) • 0 = Not ready to close • 1 = Ready to close Bit always equal to 0 for ComPacT NS and PowerPacT P- and R-frame circuit breakers with motor mechanism.
						6–15	Reserved

Inhibit Close Order

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E53	32340	R	–	INT16U	–	–	Quality of each bit of register 32341: • 0 = Invalid • 1 = Valid
0x7E54	32341	R	–	INT16U	–	–	Inhibit close order status
						0	Close breaker inhibited by IO module • 0 = Disable • 1 = Enable
						1	Close breaker inhibited by communication • 0 = Disable • 1 = Enable
						2–15	Reserved

Opening/Closing Release Data

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E64–0x7E65	32357-32358	R	–	INT16U	–	–	Quality of each bit of registers 32382-32383: • 0 = Invalid • 1 = Valid
0x7E66–0x7E65	32359-32371	R	–	INT16U	–	–	Quality of each bit of registers 32384-32396, page 159.
0x7E73–0x7E76	32372-32375	R	–	INT16U	–	–	Tripping cause, page 115
0x7E77–0x7E7C	32376-32381	R	–	INT16U	–	–	Protection data, page 116
0x7E7D	32382	R	–	INT16U	–	0	Reserved
						1	Circuit breaker opened
						2	Circuit breaker closed
						3	Reserved
						4	Closing order sent to XF voltage release
						5	Reserved
						6	Opening order sent to MX voltage release
						7	Circuit breaker did not open or close
						8	Manual mode enabled
						9	Local mode enabled
						10	Closing inhibited by communication
						11	Closing inhibited through IO module
						12	Reserved
						13	Alarm reset
						14	M2C output 1 is forced
						15	M2C output 2 is forced
0x7E7E	32383	R	–	INT16U	–	0	Reserved
						1	Allow control by digital input is disabled
						2–7	Reserved
						8	XF voltage release operation counter is above alarm threshold
						9	XF voltage release reached the maximum number of operations
						10	MX2 voltage release operation counter is above alarm threshold
						11	MX2 voltage release reached the maximum number of operations
						12	MX1 voltage release operation counter is above alarm threshold
						13	MX1 voltage release reached the maximum number of operations
						14	MN undervoltage release operation counter is above alarm threshold
						15	MN undervoltage release reached the maximum number of operations

Last Event Data

Address	Register	RW	Unit	Type	Range	Description
0x028E–0x028F	655–656	R	–	INT32U	–	Last event sequence number. In case of a new event, the last event sequence number will change. Therefore, you can track the occurrence of a new event by monitoring the sequence number. The Get Events command provides the details of the event , page 198.

Remote Control Settings

Address	Register	RW	Unit	Type	Range	Bit	Description
0x0298	665	R	–	INT16U	0–1	–	Remote protection setting enable: • 0 = Disable • 1 = Enable
0x0299	666	R	–	INT16U	0–1	–	Protection lock enable: • 0 = Disable • 1 = Enable
0x029A	667	R	–	INT16U	–	–	Quality of each bit of register 668: • 0 = Invalid • 1 = Valid
0x029B	668	R	–	INT16U	–	0–4	Reserved
						5	Auto mode: • 0 = Remote • 1 = Local
						6–15	Reserved
0x029C	669	R	–	INT16U	–	–	Quality of each bit of register 670: • 0 = Invalid • 1 = Valid
0x029D	670	R	–	INT16U	–	0	Reserved
						1	Control mode: • 0 = Manual • 1 = Auto
						2–15	Reserved
0x029E–0x029F	671–672	–	–	–	–	–	Reserved

Alarm Status

Address	Register	RW	Unit	Type	Range	Description
0x02A0	673	R	–	INT16U	–	Counter of active low-level alarms
0x02A1	674	R	–	INT16U	–	Counter of active medium-level alarms
0x02A2	675	R	–	INT16U	–	Counter of active high-level alarms

Circuit Breaker Characteristics

System Settings

Address	Register	RW	Unit	Type	Range	Description
0x1FD8–0x1FD9	8153–8154	R	V	FLOAT32	208–1000	Rated voltage
0x1FDA–0x1FDB	8155–8156	R	A	FLOAT32	100–8000	Rated current
0x1FDC	8157	–	–	–	–	Reserved
0x1FDD	8158	R	–	INT16U	0–1	Rated frequency: • 0 = 50 Hz • 1 = 60 Hz
0x1FDE–0x1FE0	8159–8161	–	–	–	–	Reserved
0x1FE1	8162	R	–	INT16U	0–1	Number of poles: • 0 = 3 poles • 1 = 4 poles
0x1FE2	8163	R	–	INT16U	30–41	System type (see detailed description below): • 30 = 4CT 3VT • 31 = 3CT 3VT • 40 = 3CT 4VT • 41 = 4CT 4VT
0x1FE3–0x1FE4	8164–8165	R	V	FLOAT32	1000–1250	VT primary voltage
0x1FE5–0x1FE6	8166–8167	R	V	FLOAT32	100–690	VT secondary voltage
0x1FE7–0x1FEA	8168–8171	R	–	DATETIME	–	Current date/time of the source.

System type detailed description:

If...	Then...	Result
the system is 3-pole circuit breaker with external neutral current transformer and without external neutral voltage tap	system type = 30	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are not available. • Measurement of the neutral current is available. • 3 wattmeters method is not possible.
the system is 3-pole circuit breaker without external neutral current transformer and without external neutral voltage tap	system type = 31	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are not available. • Measurement of the neutral current is not available. • 3 wattmeters method is not possible.
the system is 3-pole circuit breaker without external neutral current transformer and with external neutral voltage tap	system type = 40	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are available. • Measurement of the neutral current is not available. • 3 wattmeters method is possible.
the system is 3-pole circuit breaker with external neutral current transformer and external neutral voltage tap, or if the system type is 4-pole circuit breaker	system type = 41	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are available. • Measurement of the neutral current is available. • 3 wattmeters method is possible.

Hardware Revision

The hardware revision is an ASCII string using the format AAA.BBB.CCC with:

- AAA = major version (000-127)
- BBB = minor version (000-255)
- CCC = revision number (000-255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x2047–0x204C	8264–8269	R	–	OCTET STRING	–	Hardware revision

Protection Type

Address	Register	RW	Unit	Type	Range	Description
0x204E	8271	R	–	INT16U	–	Protection type: • 12848 = LSo (Long time and Short time (without timeout) overcurrent protections) • 13104 = LI (Long time and Instantaneous overcurrent protections) • 13616 = LSI (Long time, Short time and Instantaneous overcurrent protections) • 13872 = LSIG (Long time, Short time, Instantaneous overcurrent and ground fault protections) • 14128 = LSIV (Long time, Short time, Instantaneous overcurrent and earth leakage protections)

Application Type

Address	Register	RW	Unit	Type	Range	Description
0x204F	8272	R	–	INT16U	1	Application type: • 1 = Distribution

Circuit Breaker Standard

Address	Register	RW	Unit	Type	Range	Description
0x2072	8307	R	–	INT16U	0–3	Standard or market targeted by the device: • 0 = UL • 1 = IEC • 2 = ANSI • 3 = IEC/GB

Firmware Version

The firmware version is an ASCII string using the format AAA.BBB.CCC with:

- AAA = major version (000-127)

- BBB = minor version (000-255)
- CCC = revision number (000-255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x2094-0x2099	8341–8346	R	–	OCTET STRING	–	Firmware version

Measurement Settings

Address	Register	RW	Unit	Type	Range	Description
0x20C9	8394	R	–	INT16U	–	Current demand calculation: • 0 = Thermal image sliding
0x20CA–0x20CB	8395–8396	R-WC	min	FLOAT32	–	Current demand calculation interval time
0x20CC	8397	–	–	–	–	Reserved
0x20CD	8398	R	–	INT16U	–	Power demand calculation: • 0 = Time interval sliding
0x20CE–0x20CF	8399–8400	R-WC	min	FLOAT32	–	Power demand calculation interval time
0x20D0	8401	–	–	–	–	Reserved
0x20D1	8402	R-WC	–	INT16U	0–1	External neutral voltage sensor: • 0 = Not available • 1 = Available
0x20D2	8403	R-WC	–	INT16U	0–1	External neutral current sensor: • 0 = Not available • 1 = Available
0x20D3	8404	R-WC	–	INT16U	0, 2	Power factor sign convention: • 0 = IEC • 2 = IEEE
0x20D4	8405	R-WC	–	INT16U	0–1	Power sign: • 0 = Direct • 1 = Inverted
0x20D5	8406	–	–	–	–	Reserved
0x20D6	8407	R-WC	–	INT16U	0–1	Energy accumulation mode: • 0 = Absolute • 1 = Signed
0x20D7	8408	R	–	INT16U	0–1	Power calculation method: • 0 = Vectorial • 1 = Arithmetic

Device Identification

Address	Register	RW	Unit	Type	Range	Description
0x20D9	8410	R	–	INT16U	–	Internal identifier of the product: • 17120 = MicroLogic X • 17124 = MicroLogic Xi
0x20DA–0x20E3	8411–8420	R	–	OCTET STRING	–	Vendor name: ‘Schneider Electric’
0x20E4–0x2123	8421–8484	R	–	OCTET STRING	–	Vendor URL

Address	Register	RW	Unit	Type	Range	Description
0x2124–0x212D	8485–8492	R	–	OCTET STRING	–	Product range: ‘MicroLogic’
0x212C–0x2132	8493–8500	R	–	OCTET STRING	–	Product model
0x2134–0x213B	8501–8508	R	–	OCTET STRING	–	Product code
0x213C–0x2148	8509–8521	R	–	OCTET STRING	–	Serial number of the MicroLogic X control unit
0x2149–0x2168	8522–8553	R-WC	–	OCTET STRING	–	User application name
0x2169–0x2178	8554–8569	R	–	OCTET STRING	–	Main capability of device
0x2179	8570	–	–	–	–	Reserved
0x217A–0x2181	8571–8578	R	–	OCTET STRING	–	Product range: ‘MasterPacT MTZ’
0x2182–0x2189	8579–8586	–	–	–	–	Reserved
0x218A–0x218D	8587–8590	R	–	OCTET STRING	–	Performance level: • 'N1': standard short-circuit level (42 kA) • 'H1': high short-circuit level (66 kA) • 'H2': very high short-circuit level (100 kA) with very high selectivity (85 kA) • 'H2V': very high short-circuit level (100 kA) with very high selectivity (100 kA) • 'H3': extremely high short-circuit level (150 kA) • 'L1': extremely high short-circuit level (150 kA) with strong current limitation and significant selectivity (30 kA)
0x218E–0x219A	8591–8603	R	–	OCTET STRING	–	Serial number of the MasterPacT MTZ circuit breaker
0x219B–0x21AA	8604–8619	R	–	OCTET STRING	–	Device family: ‘Circuit breaker’

Wireless Inhibition Status

Address	Register	RW	Unit	Type	Range	Bit	Description
0x887C	34941	R	–	INT16U	–	–	Quality of each bit of register 34942: • 0 = Invalid • 1 = Valid
0x887D	34942	R	–	INT16U	–	0	Bluetooth wireless inhibition status • 0 = Bluetooth is not inhibited • 1 = Bluetooth is inhibited
						1–15	Reserved

Real-Time Measurements

General Description

The real-time measurements are refreshed every second. Real-time measurements include:

- RMS (Root Mean Square) voltage and voltage unbalance
- RMS (Root Mean Square) current and current unbalance
- Active, reactive, and apparent power
- Power factor and fundamental power factor
- Frequency
- Total harmonic distortion (THD) of voltage and current compared to the fundamental
- Total harmonic distortion (thd) of voltage and current compared to the RMS value

Voltage

Address	Register	RW	Unit	Type	Range	Description
0x7D37–0x7D38	32056–32057	R	V	FLOAT32	41.6–2250	RMS phase-to-phase voltage V12
0x7D39–0x7D3A	32058–32059	R	V	FLOAT32	41.6–2250	RMS phase-to-phase voltage V23
0x7D3B–0x7D3C	32060–32061	R	V	FLOAT32	41.6–2250	RMS phase-to-phase voltage V31
0x7D3D–0x7D3E	32062–32063	R	V	FLOAT32	24–1500	RMS phase-to-neutral voltage V1N (1)
0x7D3F–0x7D40	32064–32065	R	V	FLOAT32	24–1500	RMS phase-to-neutral voltage V2N (1)
0x7D41–0x7D42	32066–32067	R	V	FLOAT32	24–1500	RMS phase-to-neutral voltage V3N (1)
(1) Value available when system type register returns 40 or 41.						

Average Voltage

Address	Register	RW	Unit	Type	Range	Description
0x5214–0x5215	21013–21014	R	V	FLOAT32	41.6–2250	Average of 3 RMS phase-to-phase voltages: (V12 + V23 + V31)/ 3
0x5216–0x5217	21015–21016	R	V	FLOAT32	24–1500	Average of 3 RMS phase-to-neutral voltages: (V1N + V2N + V3N)/ 3(1)
(1) Value available when system type register returns 40 or 41.						

Voltage Unbalance

Address	Register	RW	Unit	Type	Range	Description
0x5220–0x5221	21025–21026	R	–	FLOAT32	–	Phase-to-phase V12 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x5222–0x5223	21027–21028	R	–	FLOAT32	–	Phase-to-phase V23 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages

Address	Register	RW	Unit	Type	Range	Description
0x5224–0x5225	21029–21030	R	–	FLOAT32	–	Phase-to-phase V31 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x5226–0x5227	21031–21032	R	–	FLOAT32	–	Phase-to-neutral V1N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages(1)
0x5228–0x5229	21033–21034	R	–	FLOAT32	–	Phase-to-neutral V2N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages(1)
0x522A–0x522B	21035–21036	R	–	FLOAT32	–	Phase-to-neutral V3N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages(1)
(1) Value available when system type register returns 40 or 41.						

Current

Address	Register	RW	Unit	Type	Range	Description
0x7D1B–0x7D1C	32028–32029	R	A	FLOAT32	–	RMS current on phase 1
0x7D1D–0x7D1E	32030–32031	R	A	FLOAT32	–	RMS current on phase 2
0x7D1F–0x7D20	32032–32033	R	A	FLOAT32	–	RMS current on phase 3
0x7D21–0x7D22	32034–32035	R	A	FLOAT32	–	RMS current of neutral(1)
0x7D23–0x7D24	32036–32037	R	A	FLOAT32	–	Maximum of RMS current of phases 1, 2, 3, N (Most loaded phase)
0x7D25–0x7D26	32038–32039	R	-	FLOAT32	–	Current ratio on ground (Ig setting ratio)
0x7D27–0x7D28	32040–32041	R	-	FLOAT32	–	Current ratio on earth-leakage (IΔn setting ratio)(2)
(1) Value available when system type register returns 30 or 41. (2) Value available with MicroLogic 7.0 X.						

Address	Register	RW	Unit	Type	Range	Description
0x7D95–0x7D96	32150–32151	R	A	FLOAT32	–	Ground-fault current
0x7D97–0x7D98	32152–32153	R	A	FLOAT32	–	Earth-leakage current(1)
(1) Value available with MicroLogic 7.0 X.						

Address	Register	RW	Unit	Type	Range	Description
0x5336-0x5337	21301-21302	R	-	FLOAT32	–	Current ratio on phase 1 (Ir setting ratio)
0x5338-0x5339	21303-21304	R	-	FLOAT32	–	Current ratio on phase 2 (Ir setting ratio)
0x533A-0x533B	21305-21306	R	-	FLOAT32	–	Current ratio on phase 3 (Ir setting ratio)
0x533C-0x534D	21307-21308	R	-	FLOAT32	–	Current ratio on neutral (Ir setting ratio x Type of neutral protection: 0.5, 1, 1.6, OFF) If type of neutral protection is OFF, then the value returned is 0.

Current Unbalance

Address	Register	RW	Unit	Type	Range	Description
0x523E–0x523F	21055–21056	R	–	FLOAT32	–	Phase 1 current unbalance with respect to the average of 3 phase RMS currents
0x5240–0x5241	21057–21058	R	–	FLOAT32	–	Phase 2 current unbalance with respect to the average of 3 phase RMS currents
0x5242–0x5243	21059–21060	R	–	FLOAT32	–	Phase 3 current unbalance with respect to the average of 3 phase RMS currents
0x5244–0x5245	21061–21062	R	–	FLOAT32	–	Neutral current unbalance with respect to the average of 3 phase RMS currents(1)
(1) Value available when system type register returns 30 or 41.						

Average Values

Address	Register	RW	Unit	Type	Range	Description
0x7D83–0x7D84	32132–32133	R	A	FLOAT32	–	Average of 3 phase RMS currents
0x7D85–0x7D86	32134–32135	R	V	FLOAT32	–	Average of 3 RMS phase-to-phase voltages: (V12+V23+V31)/3
0x7D87–0x7D88	32136–32137	R	V	FLOAT32	–	Average of 3 RMS phase-to-neutral voltages: (V1N+V2N+V3N)/3(1)
(1) Value available when system type register returns 40 or 41.						

Frequency

Address	Register	RW	Unit	Type	Range	Description
0x7D43–0x7D44	32068–32069	R	Hz	FLOAT32	–	Frequency

Active Power

The flow sign of the active power depends on the configuration of register 8405, page 127:

Address	Register	RW	Unit	Type	Range	Description
0x7D47–0x7D48	32072–32073	R	W	FLOAT32	–	Active power on phase 1(1)
0x7D49–0x7D4A	32074–32075	R	W	FLOAT32	–	Active power on phase 2(1)
0x7D4B–0x7D4C	32076–32077	R	W	FLOAT32	–	Active power on phase 3(1)
0x7D4D–0x7D4E	32078–32079	R	W	FLOAT32	–	Total active power
(1) Value available when system type register returns 40 or 41.						

Reactive Power

The flow sign of the reactive power depends on the configuration of register 8405, page 127:

Address	Register	RW	Unit	Type	Range	Description
0x7D4F–0x7D50	32080–32081	R	var	FLOAT32	–	Reactive power on phase 1(1)
0x7D51–0x7D52	32082–32083	R	var	FLOAT32	–	Reactive power on phase 2(1)
0x7D53–0x7D54	32084–32085	R	var	FLOAT32	–	Reactive power on phase 3(1)
0x7D55–0x7D56	32086–32087	R	var	FLOAT32	–	Total reactive power
(1) Value available when system type register returns 40 or 41.						

Apparent Power

Address	Register	RW	Unit	Type	Range	Description
0x7D57–0x7D58	32088–32089	R	VA	FLOAT32	–	Apparent power on phase 1(1)
0x7D59–0x7D5A	32090–32091	R	VA	FLOAT32	0–16000000	Apparent power on phase 2(1)
0x7D5B–0x7D5C	32092–32093	R	VA	FLOAT32	0–16000000	Apparent power on phase 3(1)
0x7D5D–0x7D5E	32094–32095	R	VA	FLOAT32	0–16000000	Total apparent power
(1) Value available when system type register returns 40 or 41.						

Power Factor

The sign of the power factor depends on the configuration of register 8404, page 127:

Address	Register	RW	Unit	Type	Range	Description
0x7DCD–0x7DCE	32206–32207	R	–	FLOAT32	–	Power factor on phase 1(1)
0x7DCF–0x7DD0	32208–32209	R	–	FLOAT32	–	Power factor on phase 2(1)
0x7DD1–0x7DD2	32210–32211	R	–	FLOAT32	–	Power factor on phase 3(1)
0x7DD3–0x7DD4	32212–32213	R	–	FLOAT32	–	Total power factor
(1) Value available when system type register returns 40 or 41.						

Fundamental Power Factor (cos ϕ)

The sign of the fundamental power factor (cos ϕ) depends on the configuration of register 8404, page 127:

Address	Register	RW	Unit	Type	Range	Description
0x7DD5–0x7DD6	32214–32215	R	–	FLOAT32	–	Fundamental power factor on phase 1 (cos ϕ1)(1)
0x7DD7–0x7DD8	32216–32217	R	–	FLOAT32	–	Fundamental power factor on phase 2 (cos ϕ2)(1)
0x7DD9–0x7DDA	32218–32219	R	–	FLOAT32	–	Fundamental power factor on phase 3 (cos ϕ3)(1)
0x7DDB–0x7DDC	32220–32221	R	–	FLOAT32	–	Total fundamental power factor
(1) Value available when system type register returns 40 or 41.						

Total Harmonic Distortion (THD) of Voltage Compared to the Fundamental

Address	Register	RW	Unit	Type	Range	Description
0x7DDD–0x7DDE	32222–32223	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-phase voltage V12 compared to the fundamental
0x7DDF–0x7DE0	32224–32225	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-phase voltage V23 in compared to the fundamental
0x7DE1–0x7DE2	32226–32227	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-phase voltage V31 in compared to the fundamental
0x7DE3–0x7DE4	32228–32229	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-neutral voltage V1N in compared to the fundamental(1)
0x7DE5–0x7DE6	32230–32231	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-neutral voltage V2N in compared to the fundamental(1)
0x7DE7–0x7DE8	32232–32233	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-neutral voltage V3N in compared to the fundamental(1)
0x528C–0x528D	21133–21134	R	–	FLOAT32	–	Average of 3 phase-to-phase voltage Total Harmonic Distortions (THD) compared to the fundamental average
0x528E–0x528F	21135–21136	R	–	FLOAT32	–	Average of 3 phase-to-neutral voltage Total Harmonic Distortions (THD) compared to the fundamental

(1) Value available when system type register returns 40 or 41.

Total Harmonic Distortion (thd) of Voltage Compared to RMS Voltage

Address	Register	RW	Unit	Type	Range	Description
0x5290–0x5291	21137–21138	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-phase voltage V12 compared to the RMS voltage
0x5292–0x5293	21139–21140	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-phase voltage V23 compared to the RMS voltage
0x5294–0x5295	21141–21142	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-phase voltage V31 compared to the RMS voltage
0x5296–0x5297	21143–21144	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-neutral voltage V1N compared to the RMS voltage(1)
0x5298–0x5299	21145–21146	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-neutral voltage V2N compared to the RMS voltage(1)
0x529A–0x529B	21147–21148	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-neutral voltage V3N compared to the RMS voltage(1)
0x529C–0x529D	21149–21150	R	–	FLOAT32	–	Average of 3 phase-to-phase voltage total harmonic distortions (thd) compared to the RMS voltage

Address	Register	RW	Unit	Type	Range	Description
0x529E–0x529F	21151–21152	R	–	FLOAT32	–	Average of 3 phase-to-neutral voltage total harmonic distortions (thd) compared to the RMS voltage
(1) Value available when system type register returns 40 or 41.						

Total Harmonic Distortion (THD) of Current Compared to the Fundamental

Address	Register	RW	Unit	Type	Range	Description
0x7DE9–0x7DEA	32234–32235	R	–	FLOAT32	–	Total Harmonic Distortion (THD) of current on phase 1 compared to the fundamental
0x7DEB–0x7DEC	32236–32237	R	–	FLOAT32	–	Total Harmonic Distortion (THD) of current on phase 2 compared to the fundamental
0x7DED–0x7DEE	32238–32239	R	–	FLOAT32	–	Total Harmonic Distortion (THD) of current on phase 3 compared to the fundamental
0x7DEF–0x7DF0	32240–32241	R	–	FLOAT32	–	Average of 3 phase current Total Harmonic Distortions (THD) compared to the fundamental

Total Harmonic Distortion (thd) of Current Compared to RMS Current

Address	Register	RW	Unit	Type	Range	Description
0x52AA–0x52AB	21163–21164	R	–	FLOAT32	–	Total harmonic distortion (thd) of current on phase 1 compared to the RMS current
0x52AC–0x52AD	21165–21166	R	–	FLOAT32	–	Total harmonic distortion (thd) of current on phase 2 compared to the RMS current
0x52AE–0x52AF	21167–21168	R	–	FLOAT32	–	Total harmonic distortion (thd) of current on phase 3 compared to the RMS current
0x52B0–0x52B1	21169–21170	R	–	FLOAT32	–	Total harmonic distortion (thd) of current on neutral compared to the RMS current(1)
0x52B2–0x52B3	21171–21172	R	–	FLOAT32	–	Average of 3 phase current total harmonic distortions (thd) compared to the RMS current
(1) Value available when system type register returns 30 or 41.						

Miscellaneous

Address	Register	RW	Unit	Type	Range	Description
0x52C6	21191	R	–	INT16U	0–1	Phase rotation sequence: • 0 = 123 • 1 = 132
0x52C7	21192	R	–	INT16U	1–4	Total power factor quadrant: • 1 = Quadrant I • 2 = Quadrant II • 3 = Quadrant III • 4 = Quadrant IV
0x52C8	21193	R	–	INT16U	0–1	Lead or Lag: • 0 = Capacitive • 1 = Inductive
0x52C9–0x52CB	21194–21196	–	–	–	–	Reserved
0x52CC–0x52CD	21197–21198	R	–	FLOAT32	–	Deviation (%) of 3 RMS phase-to-phase voltages

Harmonic Values

General Description

The Individual Harmonics Analysis Digital Module provides real-time monitoring of individual harmonics of voltages and currents up to rank 40. If harmonic pollution reaches unacceptable levels, it helps you to select appropriate corrective action.

Total harmonic distortions THD(I), THD(V), THD-R(I), and THD-R(V) are calculated as standard by the MicroLogic X control unit , page 133.

Individual harmonics are calculated by the MicroLogic X control unit according to the measurement methods specified in IEC 61000-4-30 (Testing and measurement techniques - Power quality measurement methods). The calculation of individual harmonics is performed every 200 milliseconds. The MicroLogic X control unit provides the aggregated values of individual harmonics calculated on a time period of 3 seconds.

Data Availability

Individual harmonics analysis is available when the Individual Harmonics Analysis Digital Module is purchased and installed on a MicroLogic X control unit.

The Individual Harmonics Analysis Digital Module is compatible with MicroLogic X control units with firmware version greater than or equal to version V002.000.NNN.

The Individual harmonics analysis is not available with IFM interface.

Odd Voltage Harmonics

Address	Register	RW	Unit	Type	Range	Description
0x9470–0x9471	38001–38002	R	V	FLOAT32	–	Harmonic 1 of phase-to-phase voltage V12
0x9472–0x9473	38003–38004	R	V	FLOAT32	–	Harmonic 1 of phase-to-phase voltage V23
0x9474–0x9475	38005–38006	R	V	FLOAT32	–	Harmonic 1 of phase-to-phase voltage V31
0x9476–0x9477	38007–38008	R	V	FLOAT32	–	Harmonic 1 of phase-to-neutral voltage V1N
0x9478–0x9479	38009–38010	R	V	FLOAT32	–	Harmonic 1 of phase-to-neutral voltage V2N
0x947A–0x947B	38011–38012	R	V	FLOAT32	–	Harmonic 1 of phase-to-neutral voltage V3N
0x947C–0x947D	38013–38014	R	V	FLOAT32	–	Harmonic 3 of phase-to-phase voltage V12
0x947E–0x947F	38015–38016	R	V	FLOAT32	–	Harmonic 3 of phase-to-phase voltage V23
0x9480–0x9481	38017–38018	R	V	FLOAT32	–	Harmonic 3 of phase-to-phase voltage V31
0x9482–0x9483	38019–38020	R	V	FLOAT32	–	Harmonic 3 of phase-to-neutral voltage V1N
0x9484–0x9485	38021–38022	R	V	FLOAT32	–	Harmonic 3 of phase-to-neutral voltage V2N
0x9486–0x9487	38023–38024	R	V	FLOAT32	–	Harmonic 3 of phase-to-neutral voltage V3N
0x9488–0x9489	38025–38026	R	V	FLOAT32	–	Harmonic 5 of phase-to-phase voltage V12

Address	Register	RW	Unit	Type	Range	Description
0x948A–0x948B	38027–38028	R	V	FLOAT32	–	Harmonic 5 of phase-to-phase voltage V23
0x948C–0x948D	38029–38030	R	V	FLOAT32	–	Harmonic 5 of phase-to-phase voltage V31
0x948E–0x948F	38031–38032	R	V	FLOAT32	–	Harmonic 5 of phase-to-neutral voltage V1N
0x9490–0x9491	38033–38034	R	V	FLOAT32	–	Harmonic 5 of phase-to-neutral voltage V2N
0x9492–0x9493	38035–38036	R	V	FLOAT32	–	Harmonic 5 of phase-to-neutral voltage V3N
0x9494–0x9495	38037–38038	R	V	FLOAT32	–	Harmonic 7 of phase-to-phase voltage V12
0x9496–0x9497	38039–38040	R	V	FLOAT32	–	Harmonic 7 of phase-to-phase voltage V23
0x9498–0x9499	38041–38042	R	V	FLOAT32	–	Harmonic 7 of phase-to-phase voltage V31
0x949A–0x949B	38043–38044	R	V	FLOAT32	–	Harmonic 7 of phase-to-neutral voltage V1N
0x949C–0x949D	38045–38046	R	V	FLOAT32	–	Harmonic 7 of phase-to-neutral voltage V2N
0x949E–0x949F	38047–38048	R	V	FLOAT32	–	Harmonic 7 of phase-to-neutral voltage V3N
0x94A0–0x94A1	38049–38050	R	V	FLOAT32	–	Harmonic 9 of phase-to-phase voltage V12
0x94A2–0x94A3	38051–38052	R	V	FLOAT32	–	Harmonic 9 of phase-to-phase voltage V23
0x94A4–0x94A5	38053–38054	R	V	FLOAT32	–	Harmonic 9 of phase-to-phase voltage V31
0x94A6–0x94A7	38055–38056	R	V	FLOAT32	–	Harmonic 9 of phase-to-neutral voltage V1N
0x94A8–0x94A9	38057–38058	R	V	FLOAT32	–	Harmonic 9 of phase-to-neutral voltage V2N
0x94AA–0x94AB	38059–38060	R	V	FLOAT32	–	Harmonic 9 of phase-to-neutral voltage V3N
0x94AC–0x94AD	38061–38062	R	V	FLOAT32	–	Harmonic 11 of phase-to-phase voltage V12
0x94AE–0x94AF	38063–38064	R	V	FLOAT32	–	Harmonic 11 of phase-to-phase voltage V23
0x94B0–0x94B1	38065–38066	R	V	FLOAT32	–	Harmonic 11 of phase-to-phase voltage V31
0x94B2–0x94B3	38067–38068	R	V	FLOAT32	–	Harmonic 11 of phase-to-neutral voltage V1N
0x94B4–0x94B5	38069–38070	R	V	FLOAT32	–	Harmonic 11 of phase-to-neutral voltage V2N
0x94B6–0x94B7	38071–38072	R	V	FLOAT32	–	Harmonic 11 of phase-to-neutral voltage V3N
0x94B8–0x94B9	38073–38074	R	V	FLOAT32	–	Harmonic 13 of phase-to-phase voltage V12
0x94BA–0x94BB	38075–38076	R	V	FLOAT32	–	Harmonic 13 of phase-to-phase voltage V23
0x94BC–0x94BD	38077–38078	R	V	FLOAT32	–	Harmonic 13 of phase-to-phase voltage V31
0x94BE–0x94BF	38079–38080	R	V	FLOAT32	–	Harmonic 13 of phase-to-neutral voltage V1N
0x94C0–0x94C1	38081–38082	R	V	FLOAT32	–	Harmonic 13 of phase-to-neutral voltage V2N
0x94C2–0x94C3	38083–38084	R	V	FLOAT32	–	Harmonic 13 of phase-to-neutral voltage V3N

Address	Register	RW	Unit	Type	Range	Description
0x94C4–0x94C5	38085–38086	R	V	FLOAT32	–	Harmonic 15 of phase-to-phase voltage V12
0x94C6–0x94C7	38087–38088	R	V	FLOAT32	–	Harmonic 15 of phase-to-phase voltage V23
0x94C8–0x94C9	38089–38090	R	V	FLOAT32	–	Harmonic 15 of phase-to-phase voltage V31
0x94CA–0x94CB	38091–38092	R	V	FLOAT32	–	Harmonic 15 of phase-to-neutral voltage V1N
0x94CC–0x94CD	38093–38094	R	V	FLOAT32	–	Harmonic 15 of phase-to-neutral voltage V2N
0x94CE–0x94CF	38095–38096	R	V	FLOAT32	–	Harmonic 15 of phase-to-neutral voltage V3N
0x94D0–0x94D1	38097–38098	R	V	FLOAT32	–	Harmonic 17 of phase-to-phase voltage V12
0x94D2–0x94D3	38099–38100	R	V	FLOAT32	–	Harmonic 17 of phase-to-phase voltage V23
0x94D4–0x94D5	38101–38102	R	V	FLOAT32	–	Harmonic 17 of phase-to-phase voltage V31
0x94D6–0x94D7	38103–38104	R	V	FLOAT32	–	Harmonic 17 of phase-to-neutral voltage V1N
0x94D8–0x94D9	38105–38106	R	V	FLOAT32	–	Harmonic 17 of phase-to-neutral voltage V2N
0x94DA–0x94DB	38107–38108	R	V	FLOAT32	–	Harmonic 17 of phase-to-neutral voltage V3N
0x94DC–0x94DD	38109–38110	R	V	FLOAT32	–	Harmonic 19 of phase-to-phase voltage V12
0x94DE–0x94DF	38111–38112	R	V	FLOAT32	–	Harmonic 19 of phase-to-phase voltage V23
0x94E0–0x94E1	38113–38114	R	V	FLOAT32	–	Harmonic 19 of phase-to-phase voltage V31
0x94E2–0x94E3	38115–38116	R	V	FLOAT32	–	Harmonic 19 of phase-to-neutral voltage V1N
0x94E4–0x94E5	38117–38118	R	V	FLOAT32	–	Harmonic 19 of phase-to-neutral voltage V2N
0x94E6–0x94E7	38119–38120	R	V	FLOAT32	–	Harmonic 19 of phase-to-neutral voltage V3N
0x94E8–0x94E9	38121–38122	R	V	FLOAT32	–	Harmonic 21 of phase-to-phase voltage V12
0x94EA–0x94EB	38123–38124	R	V	FLOAT32	–	Harmonic 21 of phase-to-phase voltage V23
0x94EC–0x94ED	38125–38126	R	V	FLOAT32	–	Harmonic 21 of phase-to-phase voltage V31
0x94EE–0x94EF	38127–38128	R	V	FLOAT32	–	Harmonic 21 of phase-to-neutral voltage V1N
0x94F0–0x94F1	38129–38130	R	V	FLOAT32	–	Harmonic 21 of phase-to-neutral voltage V2N
0x94F2–0x94F3	38131–38132	R	V	FLOAT32	–	Harmonic 21 of phase-to-neutral voltage V3N
0x94F4–0x94F5	38133–38134	R	V	FLOAT32	–	Harmonic 23 of phase-to-phase voltage V12
0x94F6–0x94F7	38135–38136	R	V	FLOAT32	–	Harmonic 23 of phase-to-phase voltage V23
0x94F8–0x94F9	38137–38138	R	V	FLOAT32	–	Harmonic 23 of phase-to-phase voltage V31
0x94FA–0x94FB	38139–38140	R	V	FLOAT32	–	Harmonic 23 of phase-to-neutral voltage V1N
0x94FC–0x94FD	38141–38142	R	V	FLOAT32	–	Harmonic 23 of phase-to-neutral voltage V2N

Address	Register	RW	Unit	Type	Range	Description
0x94FE–0x94FF	38143–38144	R	V	FLOAT32	–	Harmonic 23 of phase-to-neutral voltage V3N
0x9500–0x9501	38145–38146	R	V	FLOAT32	–	Harmonic 25 of phase-to-phase voltage V12
0x9502–0x9503	38147–38148	R	V	FLOAT32	–	Harmonic 25 of phase-to-phase voltage V23
0x9504–0x9505	38149–38150	R	V	FLOAT32	–	Harmonic 25 of phase-to-phase voltage V31
0x9506–0x9507	38151–38152	R	V	FLOAT32	–	Harmonic 25 of phase-to-neutral voltage V1N
0x9508–0x9509	38153–38154	R	V	FLOAT32	–	Harmonic 25 of phase-to-neutral voltage V2N
0x950A–0x950B	38155–38156	R	V	FLOAT32	–	Harmonic 25 of phase-to-neutral voltage V3N
0x950C–0x950D	38157–38158	R	V	FLOAT32	–	Harmonic 27 of phase-to-phase voltage V12
0x950E–0x950F	38159–38160	R	V	FLOAT32	–	Harmonic 27 of phase-to-phase voltage V23
0x9510–0x9511	38161–38162	R	V	FLOAT32	–	Harmonic 27 of phase-to-phase voltage V31
0x9512–0x9513	38163–38164	R	V	FLOAT32	–	Harmonic 27 of phase-to-neutral voltage V1N
0x9514–0x9515	38165–38166	R	V	FLOAT32	–	Harmonic 27 of phase-to-neutral voltage V2N
0x9516–0x9517	38167–38168	R	V	FLOAT32	–	Harmonic 27 of phase-to-neutral voltage V3N
0x9518–0x9519	38169–38170	R	V	FLOAT32	–	Harmonic 29 of phase-to-phase voltage V12
0x951A–0x951B	38171–38172	R	V	FLOAT32	–	Harmonic 29 of phase-to-phase voltage V23
0x951C–0x951D	38173–38174	R	V	FLOAT32	–	Harmonic 29 of phase-to-phase voltage V31
0x951E–0x951F	38175–38176	R	V	FLOAT32	–	Harmonic 29 of phase-to-neutral voltage V1N
0x9520–0x9521	38177–38178	R	V	FLOAT32	–	Harmonic 29 of phase-to-neutral voltage V2N
0x9522–0x9523	38179–38180	R	V	FLOAT32	–	Harmonic 29 of phase-to-neutral voltage V3N
0x9524–0x9525	38181–38182	R	V	FLOAT32	–	Harmonic 31 of phase-to-phase voltage V12
0x9526–0x9527	38183–38184	R	V	FLOAT32	–	Harmonic 31 of phase-to-phase voltage V23
0x9528–0x9529	38185–38186	R	V	FLOAT32	–	Harmonic 31 of phase-to-phase voltage V31
0x952A–0x952B	38187–38188	R	V	FLOAT32	–	Harmonic 31 of phase-to-neutral voltage V1N
0x952C–0x952D	38189–38190	R	V	FLOAT32	–	Harmonic 31 of phase-to-neutral voltage V2N
0x952E–0x952F	38191–38192	R	V	FLOAT32	–	Harmonic 31 of phase-to-neutral voltage V3N
0x9530–0x9531	38193–38194	R	V	FLOAT32	–	Harmonic 33 of phase-to-phase voltage V12
0x9532–0x9533	38195–38196	R	V	FLOAT32	–	Harmonic 33 of phase-to-phase voltage V23
0x9534–0x9535	38197–38198	R	V	FLOAT32	–	Harmonic 33 of phase-to-phase voltage V31
0x9536–0x9537	38199–38200	R	V	FLOAT32	–	Harmonic 33 of phase-to-neutral voltage V1N

Address	Register	RW	Unit	Type	Range	Description
0x9538–0x9539	38201–38202	R	V	FLOAT32	–	Harmonic 33 of phase-to-neutral voltage V2N
0x953A–0x953B	38203–38204	R	V	FLOAT32	–	Harmonic 33 of phase-to-neutral voltage V3N
0x953C–0x953D	38205–38206	R	V	FLOAT32	–	Harmonic 35 of phase-to-phase voltage V12
0x953E–0x953F	38207–38208	R	V	FLOAT32	–	Harmonic 35 of phase-to-phase voltage V23
0x9540–0x9541	38209–38210	R	V	FLOAT32	–	Harmonic 35 of phase-to-phase voltage V31
0x9542–0x9543	38211–38212	R	V	FLOAT32	–	Harmonic 35 of phase-to-neutral voltage V1N
0x9544–0x9545	38213–38214	R	V	FLOAT32	–	Harmonic 35 of phase-to-neutral voltage V2N
0x9546–0x9547	38215–38216	R	V	FLOAT32	–	Harmonic 35 of phase-to-neutral voltage V3N
0x9548–0x9549	38217–38218	R	V	FLOAT32	–	Harmonic 37 of phase-to-phase voltage V12
0x954A–0x954B	38219–38220	R	V	FLOAT32	–	Harmonic 37 of phase-to-phase voltage V23
0x954C–0x954D	38221–38222	R	V	FLOAT32	–	Harmonic 37 of phase-to-phase voltage V31
0x954E–0x954F	38223–38224	R	V	FLOAT32	–	Harmonic 37 of phase-to-neutral voltage V1N
0x9550–0x9551	38225–38226	R	V	FLOAT32	–	Harmonic 37 of phase-to-neutral voltage V2N
0x9552–0x9553	38227–38228	R	V	FLOAT32	–	Harmonic 37 of phase-to-neutral voltage V3N
0x9554–0x9555	38229–38230	R	V	FLOAT32	–	Harmonic 39 of phase-to-phase voltage V12
0x9556–0x9557	38231–38232	R	V	FLOAT32	–	Harmonic 39 of phase-to-phase voltage V23
0x9558–0x9559	38233–38234	R	V	FLOAT32	–	Harmonic 39 of phase-to-phase voltage V31
0x955A–0x955B	38235–38236	R	V	FLOAT32	–	Harmonic 39 of phase-to-neutral voltage V1N
0x955C–0x955D	38237–38238	R	V	FLOAT32	–	Harmonic 39 of phase-to-neutral voltage V2N
0x955E–0x955F	38239–38240	R	V	FLOAT32	–	Harmonic 39 of phase-to-neutral voltage V3N

Odd Current Harmonics

Address	Register	RW	Unit	Type	Range	Description
0x9560–0x9561	38241–38242	R	A	FLOAT32	–	Harmonic 1 of current on phase 1
0x9562–0x9563	38243–38244	R	A	FLOAT32	–	Harmonic 1 of current on phase 2
0x9564–0x9565	38245–38246	R	A	FLOAT32	–	Harmonic 1 of current on phase 3
0x9566–0x9567	38247–38248	R	A	FLOAT32	–	Harmonic 1 of current on neutral
0x9568–0x9569	38249–38250	R	A	FLOAT32	–	Harmonic 3 of current on phase 1
0x956A–0x956B	38251–38252	R	A	FLOAT32	–	Harmonic 3 of current on phase 2
0x956C–0x956D	38253–38254	R	A	FLOAT32	–	Harmonic 3 of current on phase 3
0x956E–0x956F	38255–38256	R	A	FLOAT32	–	Harmonic 3 of current on neutral
0x9570–0x9571	38257–38258	R	A	FLOAT32	–	Harmonic 5 of current on phase 1

Address	Register	RW	Unit	Type	Range	Description
0x9572–0x9573	38259–38260	R	A	FLOAT32	–	Harmonic 5 of current on phase 2
0x9574–0x9575	38261–38262	R	A	FLOAT32	–	Harmonic 5 of current on phase 3
0x9576–0x9577	38263–38264	R	A	FLOAT32	–	Harmonic 5 of current on neutral
0x9578–0x9579	38265–38266	R	A	FLOAT32	–	Harmonic 7 of current on phase 1
0x957A–0x957B	38267–38268	R	A	FLOAT32	–	Harmonic 7 of current on phase 2
0x957C–0x957D	38269–38270	R	A	FLOAT32	–	Harmonic 7 of current on phase 3
0x957E–0x957F	38271–38272	R	A	FLOAT32	–	Harmonic 7 of current on neutral
0x9580–0x9581	38273–38274	R	A	FLOAT32	–	Harmonic 9 of current on phase 1
0x9582–0x9583	38275–38276	R	A	FLOAT32	–	Harmonic 9 of current on phase 2
0x9584–0x9585	38277–38278	R	A	FLOAT32	–	Harmonic 9 of current on phase 3
0x9586–0x9587	38279–38280	R	A	FLOAT32	–	Harmonic 9 of current on neutral
0x9588–0x9589	38281–38282	R	A	FLOAT32	–	Harmonic 11 of current on phase 1
0x958A–0x958B	38283–38284	R	A	FLOAT32	–	Harmonic 11 of current on phase 2
0x958C–0x958D	38285–38286	R	A	FLOAT32	–	Harmonic 11 of current on phase 3
0x958E–0x958F	38287–38288	R	A	FLOAT32	–	Harmonic 11 of current on neutral
0x9590–0x9591	38289–38290	R	A	FLOAT32	–	Harmonic 13 of current on phase 1
0x9592–0x9593	38291–38292	R	A	FLOAT32	–	Harmonic 13 of current on phase 2
0x9594–0x9595	38293–38294	R	A	FLOAT32	–	Harmonic 13 of current on phase 3
0x9596–0x9597	38295–38296	R	A	FLOAT32	–	Harmonic 13 of current on neutral
0x9598–0x9599	38297–38298	R	A	FLOAT32	–	Harmonic 15 of current on phase 1
0x959A–0x959B	38299–38300	R	A	FLOAT32	–	Harmonic 15 of current on phase 2
0x959C–0x959D	38301–38302	R	A	FLOAT32	–	Harmonic 15 of current on phase 3
0x959E–0x959F	38303–38304	R	A	FLOAT32	–	Harmonic 15 of current on neutral
0x95A0–0x95A1	38305–38306	R	A	FLOAT32	–	Harmonic 17 of current on phase 1
0x95A2–0x95A3	38307–38308	R	A	FLOAT32	–	Harmonic 17 of current on phase 2
0x95A4–0x95A5	38309–38310	R	A	FLOAT32	–	Harmonic 17 of current on phase 3
0x95A6–0x95A7	38311–38312	R	A	FLOAT32	–	Harmonic 17 of current on neutral
0x95A8–0x95A9	38313–38314	R	A	FLOAT32	–	Harmonic 19 of current on phase 1
0x95AA–0x95AB	38315–38316	R	A	FLOAT32	–	Harmonic 19 of current on phase 2
0x95AC–0x95AD	38317–38318	R	A	FLOAT32	–	Harmonic 19 of current on phase 3
0x95AE–0x95AF	38319–38320	R	A	FLOAT32	–	Harmonic 19 of current on neutral
0x95B0–0x95B1	38321–38322	R	A	FLOAT32	–	Harmonic 21 of current on phase 1
0x95B2–0x95B3	38323–38324	R	A	FLOAT32	–	Harmonic 21 of current on phase 2
0x95B4–0x95B5	38325–38326	R	A	FLOAT32	–	Harmonic 21 of current on phase 3
0x95B6–0x95B7	38327–38328	R	A	FLOAT32	–	Harmonic 21 of current on neutral
0x95B8–0x95B9	38329–38330	R	A	FLOAT32	–	Harmonic 23 of current on phase 1
0x95BA–0x95BB	38331–38332	R	A	FLOAT32	–	Harmonic 23 of current on phase 2
0x95BC–0x95BD	38333–38334	R	A	FLOAT32	–	Harmonic 23 of current on phase 3
0x95BE–0x95BF	38335–38336	R	A	FLOAT32	–	Harmonic 23 of current on neutral
0x95C0–0x95C1	38337–38338	R	A	FLOAT32	–	Harmonic 25 of current on phase 1
0x95C2–0x95C3	38339–38340	R	A	FLOAT32	–	Harmonic 25 of current on phase 2
0x95C4–0x95C5	38341–38342	R	A	FLOAT32	–	Harmonic 25 of current on phase 3
0x95C6–0x95C7	38343–38344	R	A	FLOAT32	–	Harmonic 25 of current on neutral

Address	Register	RW	Unit	Type	Range	Description
0x95C8–0x95C9	38345–38346	R	A	FLOAT32	–	Harmonic 27 of current on phase 1
0x95CA–0x95CB	38347–38348	R	A	FLOAT32	–	Harmonic 27 of current on phase 2
0x95CC–0x95CD	38349–38350	R	A	FLOAT32	–	Harmonic 27 of current on phase 3
0x95CE–0x95CF	38351–38352	R	A	FLOAT32	–	Harmonic 27 of current on neutral
0x95D0–0x95D1	38353–38354	R	A	FLOAT32	–	Harmonic 29 of current on phase 1
0x95D2–0x95D3	38355–38356	R	A	FLOAT32	–	Harmonic 29 of current on phase 2
0x95D4–0x95D5	38357–38358	R	A	FLOAT32	–	Harmonic 29 of current on phase 3
0x95D6–0x95D7	38359–38360	R	A	FLOAT32	–	Harmonic 29 of current on neutral
0x95D8–0x95D9	38361–38362	R	A	FLOAT32	–	Harmonic 31 of current on phase 1
0x95DA–0x95DB	38363–38364	R	A	FLOAT32	–	Harmonic 31 of current on phase 2
0x95DC–0x95DD	38365–38366	R	A	FLOAT32	–	Harmonic 31 of current on phase 3
0x95DE–0x95DF	38367–38368	R	A	FLOAT32	–	Harmonic 31 of current on neutral
0x95E0–0x95E1	38369–38370	R	A	FLOAT32	–	Harmonic 33 of current on phase 1
0x95E2–0x95E3	38371–38372	R	A	FLOAT32	–	Harmonic 33 of current on phase 2
0x95E4–0x95E5	38373–38374	R	A	FLOAT32	–	Harmonic 33 of current on phase 3
0x95E6–0x95E7	38375–38376	R	A	FLOAT32	–	Harmonic 33 of current on neutral
0x95E8–0x95E9	38377–38378	R	A	FLOAT32	–	Harmonic 35 of current on phase 1
0x95EA–0x95EB	38379–38380	R	A	FLOAT32	–	Harmonic 35 of current on phase 2
0x95EC–0x95ED	38381–38382	R	A	FLOAT32	–	Harmonic 35 of current on phase 3
0x95EE–0x95EF	38383–38384	R	A	FLOAT32	–	Harmonic 35 of current on neutral
0x95F0–0x95F1	38385–38386	R	A	FLOAT32	–	Harmonic 37 of current on phase 1
0x95F2–0x95F3	38387–38388	R	A	FLOAT32	–	Harmonic 37 of current on phase 2
0x95F4–0x95F5	38389–38390	R	A	FLOAT32	–	Harmonic 37 of current on phase 3
0x95F6–0x95F7	38391–38392	R	A	FLOAT32	–	Harmonic 37 of current on neutral
0x95F8–0x95F9	38393–38394	R	A	FLOAT32	–	Harmonic 39 of current on phase 1
0x95FA–0x95FB	38395–38396	R	A	FLOAT32	–	Harmonic 39 of current on phase 2
0x95FC–0x95FD	38397–38398	R	A	FLOAT32	–	Harmonic 39 of current on phase 3
0x95FE–0x95FF	38399–38400	R	A	FLOAT32	–	Harmonic 39 of current on neutral

Even Voltage Harmonics

Address	Register	RW	Unit	Type	Range	Description
0x9790–0x9791	38801–38802	R	V	FLOAT32	–	Harmonic 2 of phase-to-phase voltage V12
0x9792–0x9793	38803–38804	R	V	FLOAT32	–	Harmonic 2 of phase-to-phase voltage V23
0x9794–0x9795	38805–38806	R	V	FLOAT32	–	Harmonic 2 of phase-to-phase voltage V31
0x9796–0x9797	38807–38808	R	V	FLOAT32	–	Harmonic 2 of phase-to-neutral voltage V1N
0x9798–0x9799	38809–38810	R	V	FLOAT32	–	Harmonic 2 of phase-to-neutral voltage V2N
0x979A–0x979B	38811–38812	R	V	FLOAT32	–	Harmonic 2 of phase-to-neutral voltage V3N
0x979C–0x979D	38813–38814	R	V	FLOAT32	–	Harmonic 4 of phase-to-phase voltage V12

Address	Register	RW	Unit	Type	Range	Description
0x979E–0x979F	38815–38816	R	V	FLOAT32	–	Harmonic 4 of phase-to-phase voltage V23
0x97A0–0x97A1	38817–38818	R	V	FLOAT32	–	Harmonic 4 of phase-to-phase voltage V31
0x97A2–0x97A3	38819–38820	R	V	FLOAT32	–	Harmonic 4 of phase-to-neutral voltage V1N
0x97A4–0x97A5	38821–38822	R	V	FLOAT32	–	Harmonic 4 of phase-to-neutral voltage V2N
0x97A6–0x97A7	38823–38824	R	V	FLOAT32	–	Harmonic 4 of phase-to-neutral voltage V3N
0x97A8–0x97A9	38825–38826	R	V	FLOAT32	–	Harmonic 6 of phase-to-phase voltage V12
0x97AA–0x97AB	38827–38828	R	V	FLOAT32	–	Harmonic 6 of phase-to-phase voltage V23
0x97AC–0x97AD	38829–38830	R	V	FLOAT32	–	Harmonic 6 of phase-to-phase voltage V31
0x97AE–0x97AF	38831–38832	R	V	FLOAT32	–	Harmonic 6 of phase-to-neutral voltage V1N
0x97B0–0x97B1	38833–38834	R	V	FLOAT32	–	Harmonic 6 of phase-to-neutral voltage V2N
0x97B2–0x97B3	38835–38836	R	V	FLOAT32	–	Harmonic 6 of phase-to-neutral voltage V3N
0x97B4–0x97B5	38837–38838	R	V	FLOAT32	–	Harmonic 8 of phase-to-phase voltage V12
0x97B6–0x97B7	38839–38840	R	V	FLOAT32	–	Harmonic 8 of phase-to-phase voltage V23
0x97B8–0x97B9	38841–38842	R	V	FLOAT32	–	Harmonic 8 of phase-to-phase voltage V31
0x97BA–0x97BB	38843–38844	R	V	FLOAT32	–	Harmonic 8 of phase-to-neutral voltage V1N
0x97BC–0x97BD	38845–38846	R	V	FLOAT32	–	Harmonic 8 of phase-to-neutral voltage V2N
0x97BE–0x97BF	38847–38848	R	V	FLOAT32	–	Harmonic 8 of phase-to-neutral voltage V3N
0x97C0–0x97C1	38849–38850	R	V	FLOAT32	–	Harmonic 10 of phase-to-phase voltage V12
0x97C2–0x97C3	38851–38852	R	V	FLOAT32	–	Harmonic 10 of phase-to-phase voltage V23
0x97C4–0x97C5	38853–38854	R	V	FLOAT32	–	Harmonic 10 of phase-to-phase voltage V31
0x97C6–0x97C7	38855–38856	R	V	FLOAT32	–	Harmonic 10 of phase-to-neutral voltage V1N
0x97C8–0x97C9	38857–38858	R	V	FLOAT32	–	Harmonic 10 of phase-to-neutral voltage V2N
0x97CA–0x97CB	38859–38860	R	V	FLOAT32	–	Harmonic 10 of phase-to-neutral voltage V3N
0x97CC–0x97CD	38861–38862	R	V	FLOAT32	–	Harmonic 12 of phase-to-phase voltage V12
0x97CE–0x97CF	38863–38864	R	V	FLOAT32	–	Harmonic 12 of phase-to-phase voltage V23
0x97D0–0x97D1	38865–38866	R	V	FLOAT32	–	Harmonic 12 of phase-to-phase voltage V31
0x97D2–0x97D3	38867–38868	R	V	FLOAT32	–	Harmonic 12 of phase-to-neutral voltage V1N
0x97D4–0x97D5	38869–38870	R	V	FLOAT32	–	Harmonic 12 of phase-to-neutral voltage V2N
0x97D6–0x97D7	38871–38872	R	V	FLOAT32	–	Harmonic 12 of phase-to-neutral voltage V3N
0x97D8–0x97D9	38873–38874	R	V	FLOAT32	–	Harmonic 14 of phase-to-phase voltage V12

Address	Register	RW	Unit	Type	Range	Description
0x97DA–0x97DB	38875–38876	R	V	FLOAT32	–	Harmonic 14 of phase-to-phase voltage V23
0x97DC–0x97DD	38877–38878	R	V	FLOAT32	–	Harmonic 14 of phase-to-phase voltage V31
0x97DE–0x97DF	38879–38880	R	V	FLOAT32	–	Harmonic 14 of phase-to-neutral voltage V1N
0x97E0–0x97E1	38881–38882	R	V	FLOAT32	–	Harmonic 14 of phase-to-neutral voltage V2N
0x97E2–0x97E3	38883–38884	R	V	FLOAT32	–	Harmonic 14 of phase-to-neutral voltage V3N
0x97E4–0x97E5	38885–38886	R	V	FLOAT32	–	Harmonic 16 of phase-to-phase voltage V12
0x97E6–0x97E7	38887–38888	R	V	FLOAT32	–	Harmonic 16 of phase-to-phase voltage V23
0x97E8–0x97E9	38889–38890	R	V	FLOAT32	–	Harmonic 16 of phase-to-phase voltage V31
0x97EA–0x97EB	38891–38892	R	V	FLOAT32	–	Harmonic 16 of phase-to-neutral voltage V1N
0x97EC–0x97ED	38893–38894	R	V	FLOAT32	–	Harmonic 16 of phase-to-neutral voltage V2N
0x97EE–0x97EF	38895–38896	R	V	FLOAT32	–	Harmonic 16 of phase-to-neutral voltage V3N
0x97F0–0x97F1	38897–38898	R	V	FLOAT32	–	Harmonic 18 of phase-to-phase voltage V12
0x97F2–0x97F3	38899–38900	R	V	FLOAT32	–	Harmonic 18 of phase-to-phase voltage V23
0x97F4–0x97F5	38901–38902	R	V	FLOAT32	–	Harmonic 18 of phase-to-phase voltage V31
0x97F6–0x97F7	38903–38904	R	V	FLOAT32	–	Harmonic 18 of phase-to-neutral voltage V1N
0x97F8–0x97F9	38905–38906	R	V	FLOAT32	–	Harmonic 18 of phase-to-neutral voltage V2N
0x97FA–0x97FB	38907–38908	R	V	FLOAT32	–	Harmonic 18 of phase-to-neutral voltage V3N
0x97FC–0x97FD	38909–38910	R	V	FLOAT32	–	Harmonic 20 of phase-to-phase voltage V12
0x97FE–0x97FF	38911–38912	R	V	FLOAT32	–	Harmonic 20 of phase-to-phase voltage V23
0x9800–0x9801	38913–38914	R	V	FLOAT32	–	Harmonic 20 of phase-to-phase voltage V31
0x9802–0x9803	38915–38916	R	V	FLOAT32	–	Harmonic 20 of phase-to-neutral voltage V1N
0x9804–0x9805	38917–38918	R	V	FLOAT32	–	Harmonic 20 of phase-to-neutral voltage V2N
0x9806–0x9807	38919–38920	R	V	FLOAT32	–	Harmonic 20 of phase-to-neutral voltage V3N
0x9808–0x9809	38921–38922	R	V	FLOAT32	–	Harmonic 22 of phase-to-phase voltage V12
0x980A–0x980B	38923–38924	R	V	FLOAT32	–	Harmonic 22 of phase-to-phase voltage V23
0x980C–0x980D	38925–38926	R	V	FLOAT32	–	Harmonic 22 of phase-to-phase voltage V31
0x980E–0x980F	38927–38928	R	V	FLOAT32	–	Harmonic 22 of phase-to-neutral voltage V1N
0x9810–0x9811	38929–38930	R	V	FLOAT32	–	Harmonic 22 of phase-to-neutral voltage V2N
0x9812–0x9813	38931–38932	R	V	FLOAT32	–	Harmonic 22 of phase-to-neutral voltage V3N
0x9814–0x9815	38933–38934	R	V	FLOAT32	–	Harmonic 24 of phase-to-phase voltage V12

Address	Register	RW	Unit	Type	Range	Description
0x9816–0x9817	38935–38936	R	V	FLOAT32	–	Harmonic 24 of phase-to-phase voltage V23
0x9818–0x9819	38937–38938	R	V	FLOAT32	–	Harmonic 24 of phase-to-phase voltage V31
0x981A–0x981B	38939–38940	R	V	FLOAT32	–	Harmonic 24 of phase-to-neutral voltage V1N
0x981C–0x981D	38941–38942	R	V	FLOAT32	–	Harmonic 24 of phase-to-neutral voltage V2N
0x981E–0x981F	38943–38944	R	V	FLOAT32	–	Harmonic 24 of phase-to-neutral voltage V3N
0x9820–0x9821	38945–38946	R	V	FLOAT32	–	Harmonic 26 of phase-to-phase voltage V12
0x9822–0x9823	38947–38948	R	V	FLOAT32	–	Harmonic 26 of phase-to-phase voltage V23
0x9824–0x9825	38949–38950	R	V	FLOAT32	–	Harmonic 26 of phase-to-phase voltage V31
0x9826–0x9827	38951–38952	R	V	FLOAT32	–	Harmonic 26 of phase-to-neutral voltage V1N
0x9828–0x9829	38953–38954	R	V	FLOAT32	–	Harmonic 26 of phase-to-neutral voltage V2N
0x982A–0x982B	38955–38956	R	V	FLOAT32	–	Harmonic 26 of phase-to-neutral voltage V3N
0x982C–0x982D	38957–38958	R	V	FLOAT32	–	Harmonic 28 of phase-to-phase voltage V12
0x982E–0x982F	38959–38960	R	V	FLOAT32	–	Harmonic 28 of phase-to-phase voltage V23
0x9830–0x9831	38961–38962	R	V	FLOAT32	–	Harmonic 28 of phase-to-phase voltage V31
0x9832–0x9833	38963–38964	R	V	FLOAT32	–	Harmonic 28 of phase-to-neutral voltage V1N
0x9834–0x9835	38965–38966	R	V	FLOAT32	–	Harmonic 28 of phase-to-neutral voltage V2N
0x9836–0x9837	38967–38968	R	V	FLOAT32	–	Harmonic 28 of phase-to-neutral voltage V3N
0x9838–0x9839	38969–38970	R	V	FLOAT32	–	Harmonic 30 of phase-to-phase voltage V12
0x983A–0x983B	38971–38972	R	V	FLOAT32	–	Harmonic 30 of phase-to-phase voltage V23
0x983C–0x983D	38973–38974	R	V	FLOAT32	–	Harmonic 30 of phase-to-phase voltage V31
0x983E–0x983F	38975–38976	R	V	FLOAT32	–	Harmonic 30 of phase-to-neutral voltage V1N
0x9840–0x9841	38977–38978	R	V	FLOAT32	–	Harmonic 30 of phase-to-neutral voltage V2N
0x9842–0x9843	38979–38980	R	V	FLOAT32	–	Harmonic 30 of phase-to-neutral voltage V3N
0x9844–0x9845	38981–38982	R	V	FLOAT32	–	Harmonic 32 of phase-to-phase voltage V12
0x9846–0x9847	38983–38984	R	V	FLOAT32	–	Harmonic 32 of phase-to-phase voltage V23
0x9848–0x9849	38985–38986	R	V	FLOAT32	–	Harmonic 32 of phase-to-phase voltage V31
0x984A–0x984B	38987–38988	R	V	FLOAT32	–	Harmonic 32 of phase-to-neutral voltage V1N
0x984C–0x984D	38989–38990	R	V	FLOAT32	–	Harmonic 32 of phase-to-neutral voltage V2N
0x984E–0x984F	38991–38992	R	V	FLOAT32	–	Harmonic 32 of phase-to-neutral voltage V3N
0x9850–0x9851	38993–38994	R	V	FLOAT32	–	Harmonic 34 of phase-to-phase voltage V12

Address	Register	RW	Unit	Type	Range	Description
0x9852–0x9853	38995–38996	R	V	FLOAT32	–	Harmonic 34 of phase-to-phase voltage V23
0x9854–0x9855	38997–38998	R	V	FLOAT32	–	Harmonic 34 of phase-to-phase voltage V31
0x9856–0x9857	38999–39000	R	V	FLOAT32	–	Harmonic 34 of phase-to-neutral voltage V1N
0x9858–0x9859	39001–39002	R	V	FLOAT32	–	Harmonic 34 of phase-to-neutral voltage V2N
0x985A–0x985B	39003–39004	R	V	FLOAT32	–	Harmonic 34 of phase-to-neutral voltage V3N
0x985C–0x985D	39005–39006	R	V	FLOAT32	–	Harmonic 36 of phase-to-phase voltage V12
0x985E–0x985F	39007–39008	R	V	FLOAT32	–	Harmonic 36 of phase-to-phase voltage V23
0x9860–0x9861	39009–39010	R	V	FLOAT32	–	Harmonic 36 of phase-to-phase voltage V31
0x9862–0x9863	39011–39012	R	V	FLOAT32	–	Harmonic 36 of phase-to-neutral voltage V1N
0x9864–0x9865	39013–39014	R	V	FLOAT32	–	Harmonic 36 of phase-to-neutral voltage V2N
0x9866–0x9867	39015–39016	R	V	FLOAT32	–	Harmonic 36 of phase-to-neutral voltage V3N
0x9868–0x9869	39017–39018	R	V	FLOAT32	–	Harmonic 38 of phase-to-phase voltage V12
0x986A–0x986B	39019–39020	R	V	FLOAT32	–	Harmonic 38 of phase-to-phase voltage V23
0x986C–0x986D	39021–39022	R	V	FLOAT32	–	Harmonic 38 of phase-to-phase voltage V31
0x986E–0x986F	39023–39024	R	V	FLOAT32	–	Harmonic 38 of phase-to-neutral voltage V1N
0x9870–0x9871	39025–39026	R	V	FLOAT32	–	Harmonic 38 of phase-to-neutral voltage V2N
0x9872–0x9873	39027–39028	R	V	FLOAT32	–	Harmonic 38 of phase-to-neutral voltage V3N
0x9874–0x9875	39029–39030	R	V	FLOAT32	–	Harmonic 40 of phase-to-phase voltage V12
0x9876–0x9877	39031–39032	R	V	FLOAT32	–	Harmonic 40 of phase-to-phase voltage V23
0x9878–0x9879	39033–39034	R	V	FLOAT32	–	Harmonic 40 of phase-to-phase voltage V31
0x987A–0x987B	39035–39036	R	V	FLOAT32	–	Harmonic 40 of phase-to-neutral voltage V1N
0x987C–0x987D	39037–39038	R	V	FLOAT32	–	Harmonic 40 of phase-to-neutral voltage V2N
0x987E–0x987F	39039–39040	R	V	FLOAT32	–	Harmonic 40 of phase-to-neutral voltage V3N

Even Current Harmonics

Address	Register	RW	Unit	Type	Range	Description
0x9880–0x9881	39041–39042	R	A	FLOAT32	–	Harmonic 2 of current on phase 1
0x9882–0x9883	39043–39044	R	A	FLOAT32	–	Harmonic 2 of current on phase 2
0x9884–0x9885	39045–39046	R	A	FLOAT32	–	Harmonic 2 of current on phase 3
0x9886–0x9887	39047–39048	R	A	FLOAT32	–	Harmonic 2 of current on neutral
0x9888–0x9889	39049–39050	R	A	FLOAT32	–	Harmonic 4 of current on phase 1

Address	Register	RW	Unit	Type	Range	Description
0x988A–0x988B	39051–39052	R	A	FLOAT32	–	Harmonic 4 of current on phase 2
0x988C–0x988D	39053–39054	R	A	FLOAT32	–	Harmonic 4 of current on phase 3
0x988E–0x988F	39055–39056	R	A	FLOAT32	–	Harmonic 4 of current on neutral
0x9890–0x9891	39057–39058	R	A	FLOAT32	–	Harmonic 6 of current on phase 1
0x9892–0x9893	39059–39060	R	A	FLOAT32	–	Harmonic 6 of current on phase 2
0x9894–0x9895	39061–39062	R	A	FLOAT32	–	Harmonic 6 of current on phase 3
0x9896–0x9897	39063–39064	R	A	FLOAT32	–	Harmonic 6 of current on neutral
0x9898–0x9899	39065–39066	R	A	FLOAT32	–	Harmonic 8 of current on phase 1
0x989A–0x989B	39067–39068	R	A	FLOAT32	–	Harmonic 8 of current on phase 2
0x989C–0x989D	39069–39070	R	A	FLOAT32	–	Harmonic 8 of current on phase 3
0x989E–0x989F	39071–39072	R	A	FLOAT32	–	Harmonic 8 of current on neutral
0x98A0–0x98A1	39073–39074	R	A	FLOAT32	–	Harmonic 10 of current on phase 1
0x98A2–0x98A3	39075–39076	R	A	FLOAT32	–	Harmonic 10 of current on phase 2
0x98A4–0x98A5	39077–39078	R	A	FLOAT32	–	Harmonic 10 of current on phase 3
0x98A6–0x98A7	39079–39080	R	A	FLOAT32	–	Harmonic 10 of current on neutral
0x98A8–0x98A9	39081–39082	R	A	FLOAT32	–	Harmonic 12 of current on phase 1
0x98AA–0x98AB	39083–39084	R	A	FLOAT32	–	Harmonic 12 of current on phase 2
0x98AC–0x98AD	39085–39086	R	A	FLOAT32	–	Harmonic 12 of current on phase 3
0x98AE–0x98AF	39087–39088	R	A	FLOAT32	–	Harmonic 12 of current on neutral
0x98B0–0x98B1	39089–39090	R	A	FLOAT32	–	Harmonic 14 of current on phase 1
0x98B2–0x98B3	39091–39092	R	A	FLOAT32	–	Harmonic 14 of current on phase 2
0x98B4–0x98B5	39093–39094	R	A	FLOAT32	–	Harmonic 14 of current on phase 3
0x98B6–0x98B7	39095–39096	R	A	FLOAT32	–	Harmonic 14 of current on neutral
0x98B8–0x98B9	39097–39098	R	A	FLOAT32	–	Harmonic 16 of current on phase 1
0x98BA–0x98BB	39099–39100	R	A	FLOAT32	–	Harmonic 16 of current on phase 2
0x98BC–0x98BD	39101–39102	R	A	FLOAT32	–	Harmonic 16 of current on phase 3
0x98BE–0x98BF	39103–39104	R	A	FLOAT32	–	Harmonic 16 of current on neutral
0x98C0–0x98C1	39105–39106	R	A	FLOAT32	–	Harmonic 18 of current on phase 1
0x98C2–0x98C3	39107–39108	R	A	FLOAT32	–	Harmonic 18 of current on phase 2
0x98C4–0x98C5	39109–39110	R	A	FLOAT32	–	Harmonic 18 of current on phase 3
0x98C6–0x98C7	39111–39112	R	A	FLOAT32	–	Harmonic 18 of current on neutral
0x98C8–0x98C9	39113–39114	R	A	FLOAT32	–	Harmonic 20 of current on phase 1
0x98CA–0x98CB	39115–39116	R	A	FLOAT32	–	Harmonic 20 of current on phase 2
0x98CC–0x98CD	39117–39118	R	A	FLOAT32	–	Harmonic 20 of current on phase 3
0x98CE–0x98CF	39119–39120	R	A	FLOAT32	–	Harmonic 20 of current on neutral
0x98D0–0x98D1	39121–39122	R	A	FLOAT32	–	Harmonic 22 of current on phase 1
0x98D2–0x98D3	39123–39124	R	A	FLOAT32	–	Harmonic 22 of current on phase 2
0x98D4–0x98D5	39125–39126	R	A	FLOAT32	–	Harmonic 22 of current on phase 3
0x98D6–0x98D7	39127–39128	R	A	FLOAT32	–	Harmonic 22 of current on neutral
0x98D8–0x98D9	39129–39130	R	A	FLOAT32	–	Harmonic 24 of current on phase 1
0x98DA–0x98DB	39131–39132	R	A	FLOAT32	–	Harmonic 24 of current on phase 2
0x98DC–0x98DD	39133–39134	R	A	FLOAT32	–	Harmonic 24 of current on phase 3
0x98DE–0x98DF	39135–39136	R	A	FLOAT32	–	Harmonic 24 of current on neutral

Address	Register	RW	Unit	Type	Range	Description
0x98E0–0x98E1	39137–39138	R	A	FLOAT32	–	Harmonic 26 of current on phase 1
0x98E2–0x98E3	39139–39140	R	A	FLOAT32	–	Harmonic 26 of current on phase 2
0x98E4–0x98E5	39141–39142	R	A	FLOAT32	–	Harmonic 26 of current on phase 3
0x98E6–0x98E7	39143–39144	R	A	FLOAT32	–	Harmonic 26 of current on neutral
0x98E8–0x98E9	39145–39146	R	A	FLOAT32	–	Harmonic 28 of current on phase 1
0x98EA–0x98EB	39147–39148	R	A	FLOAT32	–	Harmonic 28 of current on phase 2
0x98EC–0x98ED	39149–39150	R	A	FLOAT32	–	Harmonic 28 of current on phase 3
0x98EE–0x98EF	39151–39152	R	A	FLOAT32	–	Harmonic 28 of current on neutral
0x98F0–0x98F1	39153–39154	R	A	FLOAT32	–	Harmonic 30 of current on phase 1
0x98F2–0x98F3	39155–39156	R	A	FLOAT32	–	Harmonic 30 of current on phase 2
0x98F4–0x98F5	39157–39158	R	A	FLOAT32	–	Harmonic 30 of current on phase 3
0x98F6–0x98F7	39159–39160	R	A	FLOAT32	–	Harmonic 30 of current on neutral
0x98F8–0x98F9	39161–39162	R	A	FLOAT32	–	Harmonic 32 of current on phase 1
0x98FA–0x98FB	39163–39164	R	A	FLOAT32	–	Harmonic 32 of current on phase 2
0x98FC–0x98FD	39165–39166	R	A	FLOAT32	–	Harmonic 32 of current on phase 3
0x98FE–0x98FF	39167–39168	R	A	FLOAT32	–	Harmonic 32 of current on neutral
0x9900–0x9901	39169–39170	R	A	FLOAT32	–	Harmonic 34 of current on phase 1
0x9902–0x9903	39171–39172	R	A	FLOAT32	–	Harmonic 34 of current on phase 2
0x9904–0x9905	39173–39174	R	A	FLOAT32	–	Harmonic 34 of current on phase 3
0x9906–0x9907	39175–39176	R	A	FLOAT32	–	Harmonic 34 of current on neutral
0x9908–0x9909	39177–39178	R	A	FLOAT32	–	Harmonic 36 of current on phase 1
0x990A–0x990B	39179–39180	R	A	FLOAT32	–	Harmonic 36 of current on phase 2
0x990C–0x990D	39181–39182	R	A	FLOAT32	–	Harmonic 36 of current on phase 3
0x990E–0x990F	39183–39184	R	A	FLOAT32	–	Harmonic 36 of current on neutral
0x9910–0x9911	39185–39186	R	A	FLOAT32	–	Harmonic 38 of current on phase 1
0x9912–0x9913	39187–39188	R	A	FLOAT32	–	Harmonic 38 of current on phase 2
0x9914–0x9915	39189–39190	R	A	FLOAT32	–	Harmonic 38 of current on phase 3
0x9916–0x9917	39191–39192	R	A	FLOAT32	–	Harmonic 38 of current on neutral
0x9918–0x9919	39193–39194	R	A	FLOAT32	–	Harmonic 40 of current on phase 1
0x991A–0x991B	39195–39196	R	A	FLOAT32	–	Harmonic 40 of current on phase 2
0x991C–0x991D	39197–39198	R	A	FLOAT32	–	Harmonic 40 of current on phase 3
0x991E–0x991F	39199–39200	R	A	FLOAT32	–	Harmonic 40 of current on neutral

Minimum and Maximum Values of Real-Time Measurements

General Description

Read the maximum and minimum values of real-time measurements with associated date and time in the following registers.

Maximum and minimum values of real-time measurements can be reset with the reset minimum/maximum command , page 183.

Timestamp of Reset Actions

Address	Register	RW	Unit	Type	Range	Description
0x891C–0x891F	35101–35104	R	–	DATETIME	–	Timestamp of reset of minimum and maximum THD and thd
0x896C–0x896F	35181–35184	R	–	DATETIME	–	Timestamp of reset of minimum and maximum RMS current
0x8970–0x8973	35185–35188	R	–	DATETIME	–	Timestamp of reset of minimum and maximum RMS voltage
0x8974–0x8977	35189–35192	R	–	DATETIME	–	Timestamp of reset of minimum and maximum power
0x8978–0x897B	35193–35196	R	–	DATETIME	–	Timestamp of reset of minimum and maximum power factor and cos Φ
0x897C–0x897F	35197–35200	R	–	DATETIME	–	Timestamp of reset of minimum and maximum frequency

Maximum Current

Address	Register	RW	Unit	Type	Range	Description
0x89E4–0x89E5	35301–35302	R	A	FLOAT32	–	Maximum RMS current on phase 1
0x89E6–0x89E9	35303–35306	R	–	DATETIME	–	Timestamp of maximum RMS current on phase 1
0x89EA–0x89EB	35307–35308	R	A	FLOAT32	–	Maximum RMS current on phase 2
0x89EC–0x89EF	35309–35312	R	–	DATETIME	–	Timestamp of maximum RMS current on phase 2
0x89F0–0x89F1	35313–35314	R	A	FLOAT32	–	Maximum RMS current on phase 3
0x89F2–0x89F5	35315–35318	R	–	DATETIME	–	Timestamp of maximum RMS current on phase 3
0x89F6–0x89F7	35319–35320	R	A	FLOAT32	–	Maximum RMS current on neutral
0x89F8–0x89FB	35321–35324	R	–	DATETIME	–	Timestamp of maximum RMS current on neutral
0x89FC–0x89FD	35325–35326	R	A	FLOAT32	–	This is the highest (i.e. maximum) current value since this measurement was last reset. The measurement looks at all 4 currents, Max I1, Max I2, Max I3, Max IN and keeps track of the highest value of any of them over time
0x89FE–0x8A01	35327–35330	R	–	DATETIME	–	This is the date/time of the highest (i.e. maximum) current value since this measurement was last reset. The measurement looks at all 4 currents, Max I 1, Max I 2, Max I 3, and Max I n.
0x8A02–0x8A03	35331–35332	R	A	FLOAT32	–	Maximum RMS current on ground

Address	Register	RW	Unit	Type	Range	Description
0x8A04–0x8A07	35333–35336	R	–	DATETIME	–	Timestamp of maximum RMS current on ground
0x8A08–0x8A09	35337–35338	R	A	FLOAT32	–	Maximum RMS current on earth leakage
0x8A0A–0x8A0D	35339–35342	R	–	DATETIME	–	Timestamp of maximum RMS current on earth leakage
0x8A0E–0x8A0F	35343–35344	R	A	FLOAT32	–	Maximum of average of 3 phase RMS currents
0x8A10–0x8A13	35345–35348	R	–	DATETIME	–	Timestamp of maximum of average of 3 phase RMS currents
0x8A14–0x8A15	35349–35350	R	–	FLOAT32	–	Maximum phase 1 current unbalance with respect to the average of 3 phase RMS currents
0x8A16–0x8A19	35351–35354	R	–	DATETIME	–	Timestamp of maximum phase 1 current unbalance with respect to the average of 3 phase RMS currents
0x8A1A–0x8A1B	35355–35356	R	–	FLOAT32	–	Maximum phase 2 current unbalance with respect to the average of 3 phase RMS currents
0x8A1C–0x8A1F	35357–35360	R	–	DATETIME	–	Timestamp of maximum phase 2 current unbalance with respect to the average of 3 phase RMS currents
0x8A20–0x8A21	35361–35362	R	–	FLOAT32	–	Maximum phase 3 current unbalance with respect to the average of 3 phase RMS currents
0x8A22–0x8A25	35363–35366	R	–	DATETIME	–	Timestamp of maximum phase 3 current unbalance with respect to the average of 3 phase RMS currents
0x8A26–0x8A27	35367–35368	R	–	FLOAT32	–	Maximum of maximum of 3 phase current unbalances
0x8A28–0x8A2B	35369–35372	R	–	DATETIME	–	Timestamp of maximum of maximum of 3 phase current unbalances

Minimum Current

Address	Register	RW	Unit	Type	Range	Description
0x8A32–0x8A33	35379–35380	R	A	FLOAT32	–	Minimum RMS current on phase 1
0x8A34–0x8A37	35381–35384	R	–	DATETIME	–	Timestamp of minimum RMS current on phase 1
0x8A38–0x8A39	35385–35386	R	A	FLOAT32	–	Minimum RMS current on phase 2
0x8A3A–0x8A3D	35387–35390	R	–	DATETIME	–	Timestamp of minimum RMS current on phase 2
0x8A3E–0x8A3F	35391–35392	R	A	FLOAT32	–	Minimum RMS current on phase 3
0x8A40–0x8A43	35393–35396	R	–	DATETIME	–	Timestamp of minimum RMS current on phase 3
0x8A44–0x8A45	35397–35398	R	A	FLOAT32	–	Minimum RMS current on neutral
0x8A46–0x8A49	35399–35402	R	–	DATETIME	–	Timestamp of minimum RMS current on neutral
0x8A4A–0x8A4B	35403–35404	R	A	FLOAT32	–	This is the lowest (i.e. minimum) current value since this measurement was last reset. The measurement looks at all 3 currents, Min I 1, Min I 2, and Min I 3 and keeps track of the lowest value of any of them over time
0x8A4C–0x8A4F	35405–35408	R	–	DATETIME	–	Timestamp of minimum of RMS current of phases 1, 2, 3 (Least loaded phase)
0x8A50–0x8A51	35409–35410	R	A	FLOAT32	–	Minimum RMS current on ground
0x8A52–0x8A55	35411–35414	R	–	DATETIME	–	Timestamp of minimum RMS current on ground

Address	Register	RW	Unit	Type	Range	Description
0x8A56–0x8A57	35415–35416	R	A	FLOAT32	–	Minimum RMS current of earth leakage
0x8A58–0x8A5B	35417–35420	R	–	DATETIME	–	Timestamp minimum RMS current of earth leakage
0x8A5C–0x8A5D	35421–35422	R	A	FLOAT32	–	Minimum of average of 3 phase RMS currents
0x8A5E–0x8A61	35423–35426	R	–	DATETIME	–	Timestamp of minimum of average of 3 phase RMS currents

Maximum Voltage

Address	Register	RW	Unit	Type	Range	Description
0x8A68–0x8A69	35433–35434	R	V	FLOAT32	–	Maximum RMS phase–to-phase voltage V12
0x8A6A–0x8A6D	35435–35438	R	–	DATETIME	–	Timestamp of maximum RMS phase-to-phase voltage V12
0x8A6E–0x8A6F	35439–35440	R	V	FLOAT32	–	Maximum RMS phase-to-phase voltage V23
0x8A70–0x8A73	35441–35444	R	–	DATETIME	–	Timestamp of maximum RMS phase-to-phase voltage V23
0x8A74–0x8A75	35445–35446	R	V	FLOAT32	–	Maximum RMS phase-to-phase voltage V31
0x8A76–0x8A79	35447–35450	R	–	DATETIME	–	Timestamp of maximum RMS phase-to-phase voltage V31
0x8A7A–0x8A7B	35451–35452	R	V	FLOAT32	–	Maximum RMS phase-to-neutral voltage V1N
0x8A7C–0x8A7F	35453–35456	R	–	DATETIME	–	Timestamp of maximum RMS phase-to-neutral voltage V1N
0x8A80–0x8A81	35457–35458	R	V	FLOAT32	–	Maximum RMS phase-to-neutral voltage V2N
0x8A82–0x8A85	35459–35462	R	–	DATETIME	–	Timestamp of maximum RMS phase-to-neutral voltage V2N
0x8A86–0x8A87	35463–35464	R	V	FLOAT32	–	Maximum RMS phase-to-neutral voltage V3N
0x8A88–0x8A8B	35465–35468	R	–	DATETIME	–	Timestamp of maximum RMS phase-to-neutral voltage V3N
0x8A8C–0x8A8D	35469–35470	R	V	FLOAT32	–	Maximum of average of 3 RMS phase-to-phase voltages
0x8A8E–0x8A91	35471–35474	R	–	DATETIME	–	Timestamp of maximum of average of 3 RMS phase-to-phase voltages
0x8A92–0x8A93	35475-35476	R	V	FLOAT32	–	Maximum of average of 3 RMS phase-to-neutral voltages
0x8A94–0x8A97	35477–35480	R	–	DATETIME	–	Timestamp of maximum of average of 3 RMS phase-to-neutral voltages
0x8A98–0x8A99	35481–35482	R	V	FLOAT32	–	Maximum of RMS phase-to-phase voltages V12, V23, and V31
0x8A9A–0x8A9D	35483–35486	R	–	DATETIME	–	Timestamp of maximum of RMS phase-to-phase voltages V12, V23, and V31
0x8A9E–0x8A9F	35487–35488	R	V	FLOAT32	–	Maximum of RMS phase-to-neutral voltages V1N, V2N, and V3N
0x8AA0–0x8AA3	35489–35492	R	–	DATETIME	–	Timestamp of maximum of RMS phase-to-neutral voltages V1N, V2N, and V3N
0x8AA4–0x8AA5	35493–35494	R	–	FLOAT32	–	Maximum phase-to-phase V12 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages

Address	Register	RW	Unit	Type	Range	Description
0x8AA6–0x8AA9	35495–35498	R	–	DATETIME	–	Timestamp of maximum phase-to-phase V12 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x8AAA–0x8AAB	35499–35500	R	–	FLOAT32	–	Maximum phase-to-phase V23 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x8AAC–0x8AAF	35501–35504	R	–	DATETIME	–	Timestamp of maximum phase-to-phase V23 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x8AB0–0x8AB1	35505–35506	R	–	FLOAT32	–	Maximum phase-to-phase V31 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x8AB2–0x8AB5	35507–35510	R	–	DATETIME	–	Timestamp of maximum phase-to-phase V31 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x8AB6–0x8AB7	35511–35512	R	–	FLOAT32	–	Maximum of 3 phase-to-phase voltage unbalances
0x8AB8–0x8ABB	35513–35516	R	–	DATETIME	–	Timestamp of maximum of 3 phase-to-phase voltage unbalances
0x8ABC–0x8ABD	35517–35518	R	–	FLOAT32	–	Maximum phase-to-neutral V1N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages
0x8ABE–0x8AC1	35519–35522	R	–	DATETIME	–	Timestamp of maximum phase-to-neutral V1N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages
0x8AC2–0x8AC3	35523–35524	R	–	FLOAT32	–	Maximum phase-to-neutral V2N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages
0x8AC4–0x8AC7	35525–35528	R	–	DATETIME	–	Timestamp of maximum phase-to-neutral V2N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages
0x8AC8–0x8AC9	35529–35530	R	–	FLOAT32	–	Maximum phase-to-neutral V3N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages
0x8ACA–0x8ACD	35531–35534	R	–	DATETIME	–	Timestamp of maximum phase-to-neutral V3N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages
0x8ACE–0x8ACF	35535–35536	R	–	FLOAT32	–	Maximum of maximum of 3 phase-to-neutral voltage unbalances
0x8AD0–0x8AD3	35537–35540	R	–	DATETIME	–	Timestamp of maximum of maximum of 3 phase-to-neutral voltage unbalances

Minimum Voltage

Address	Register	RW	Unit	Type	Range	Description
0x8ADA–0x8ADB	35547-35548	R	V	FLOAT32	–	Minimum RMS phase-to-phase voltage V12
0x8ADC–0x8ADF	35549-35552	R	–	DATETIME	–	Timestamp of minimum RMS phase-to-phase voltage V12
0x8AE0–0x8AE1	35553-35554	R	V	FLOAT32	–	Minimum RMS phase-to-phase voltage V23
0x8AE2–0x8AE5	35555-35558	R	–	DATETIME	–	Timestamp of minimum RMS phase-to-phase voltage V23
0x8AE6–0x8AE7	35559-35560	R	V	FLOAT32	–	Minimum RMS phase-to-phase voltage V31
0x8AE8–0x8AEB	35561-35564	R	–	DATETIME	–	Timestamp of minimum RMS phase-to-phase voltage V31
0x8AEC–0x8AED	35565-35566	R	V	FLOAT32	–	Minimum RMS phase-to-neutral voltage V1N

Address	Register	RW	Unit	Type	Range	Description
0x8AEE–0x8AF1	35567-35570	R	–	DATETIME	–	Timestamp of minimum RMS phase-to-neutral voltage V1N
0x8AF2–0x8AF3	35571-35572	R	V	FLOAT32	–	Minimum RMS phase-to-neutral voltage V2N
0x8AF4–0x8AF7	35573-35576	R	–	DATETIME	–	Timestamp of minimum RMS phase-to-neutral voltage V2N
0x8AF8–0x8AF9	35577-35578	R	V	FLOAT32	–	Minimum RMS phase-to-neutral voltage V3N
0x8AFA–0x8AFD	35579-35582	R	–	DATETIME	–	Timestamp of minimum RMS phase-to-neutral voltage V3N
0x8AFE–0x8AFF	35583-35584	R	V	FLOAT32	–	Minimum of average of 3 RMS phase-to-phase voltages
0x8B00–0x8B03	35585-35588	R	–	DATETIME	–	Timestamp of minimum of average of 3 RMS phase-to-phase voltages
0x8B04–0x8B05	35589-35590	R	V	FLOAT32	–	Minimum of average of 3 RMS phase-to-neutral voltages
0x8B06–0x8B09	35591-35594	R	–	DATETIME	–	Timestamp of minimum of average of 3 RMS phase-to-neutral voltages
0x8B0A–0x8B0B	35595-35596	R	V	FLOAT32	–	Minimum of RMS phase-to-phase voltages V12, V23, and V31
0x8B0C–0x8B0F	35597-35600	R	–	DATETIME	–	Timestamp of minimum of RMS phase-to-phase voltages V12, V23, and V31
0x8B10–0x8B11	35601-35602	R	V	FLOAT32	–	Minimum of RMS phase-to-neutral voltages V1N, V2N, and V3N
0x8B12–0x8B15	35603-35606	R	–	DATETIME	–	Timestamp of minimum of RMS phase-to-neutral voltages V1N, V2N, and V3N

Maximum Power

Address	Register	RW	Unit	Type	Range	Description
0x8B1C–0x8B1D	35613-35614	R	W	FLOAT32	–	Maximum active power of phase 1
0x8B1E–0x8B21	35615-35618	R	–	DATETIME	–	Timestamp of maximum active power on phase 1
0x8B22–0x8B23	35619-35620	R	W	FLOAT32	–	Maximum active power of phase 2
0x8B24–0x8B27	35621-35624	R	–	DATETIME	–	Timestamp of maximum active power on phase 2
0x8B28–0x8B29	35625-35626	R	W	FLOAT32	–	Maximum active power of phase 3
0x8B2A–0x8B2D	35627-35630	R	–	DATETIME	–	Timestamp of maximum active power on phase 3
0x8B2E–0x8B2F	35631-35632	R	W	FLOAT32	–	Maximum total active power
0x8B30–0x8B33	35633-35636	R	–	DATETIME	–	Timestamp of maximum total active power
0x8B34–0x8B35	35637-35638	R	var	FLOAT32	–	Maximum reactive power on phase 1
0x8B36–0x8B39	35639-35642	R	–	DATETIME	–	Timestamp of maximum reactive power on phase 1
0x8B3A–0x8B3B	35643-35644	R	var	FLOAT32	–	Maximum reactive power on phase 2
0x8B3C–0x8B3F	35645-35648	R	–	DATETIME	–	Timestamp of maximum reactive power on phase 2
0x8B40–0x8B41	35649-35650	R	var	FLOAT32	–	Maximum reactive power on phase 3

Address	Register	RW	Unit	Type	Range	Description
0x8B42–0x8B45	35651-35654	R	–	DATETIME	–	Timestamp of maximum reactive power on phase 3
0x8B46–0x8B47	35655-35656	R	var	FLOAT32	–	Maximum total reactive power
0x8B48–0x8B4B	35657-35660	R	–	DATETIME	–	Timestamp of maximum total reactive power
0x8B4C–0x8B4D	35661-35662	R	VA	FLOAT32	–	Maximum apparent power on phase 1
0x8B4E–0x8B51	35663-35666	R	–	DATETIME	–	Timestamp of maximum apparent power on phase 1
0x8B52–0x8B53	35667-35668	R	VA	FLOAT32	–	Maximum apparent power on phase 2
0x8B54–0x8B57	35669-35672	R	–	DATETIME	–	Timestamp of maximum apparent power on phase 2
0x8B58–0x8B59	35673-35674	R	VA	FLOAT32	–	Maximum apparent power on phase 3
0x8B5A–0x8B5D	35675-35678	R	–	DATETIME	–	Timestamp of maximum apparent power on phase 3
0x8B5E–0x8B5F	35679-35680	R	VA	FLOAT32	–	Maximum total apparent power
0x8B60–0x8B63	35681-35684	R	–	DATETIME	–	Timestamp of maximum total apparent power

Minimum Power

Address	Register	RW	Unit	Type	Range	Description
0x8B6A–0x8B6B	35691-35692	R	W	FLOAT32	–	Minimum active power of phase 1
0x8B6C–0x8B6F	35693-35696	R	–	DATETIME	–	Timestamp of minimum active power on phase 1
0x8B70–0x8B71	35697-35698	R	W	FLOAT32	–	Minimum active power of phase 2
0x8B72–0x8B75	35699-35702	R	–	DATETIME	–	Timestamp of minimum active power on phase 2
0x8B76–0x8B77	35703-35704	R	W	FLOAT32	–	Minimum active power of phase 3
0x8B78–0x8B7B	35705-35708	R	–	DATETIME	–	Timestamp of minimum active power on phase 3
0x8B7C–0x8B7D	35709-35710	R	W	FLOAT32	–	Minimum total active power
0x8B7E–0x8B81	35711-35714	R	–	DATETIME	–	Timestamp of minimum total active power
0x8B82–0x8B83	35715-35716	R	var	FLOAT32	–	Minimum reactive power on phase 1
0x8B84–0x8B87	35717-35720	R	–	DATETIME	–	Timestamp of minimum reactive power on phase 1
0x8B88–0x8B89	35721-35722	R	var	FLOAT32	–	Minimum reactive power on phase 2
0x8B8A–0x8B8D	35723-35726	R	–	DATETIME	–	Timestamp of minimum reactive power on phase 2
0x8B8E–0x8B8F	35727-35728	R	var	FLOAT32	–	Minimum reactive power on phase 3
0x8B90–0x8B93	35729-35732	R	–	DATETIME	–	Timestamp of minimum reactive power on phase 3
0x8B94–0x8B95	35733-35734	R	var	FLOAT32	–	Minimum total reactive power
0x8B96–0x8B99	35735-35738	R	–	DATETIME	–	Timestamp of minimum total reactive power

Address	Register	RW	Unit	Type	Range	Description
0x8B9A–0x8B9B	35739-35740	R	VA	FLOAT32	–	Minimum apparent power on phase 1
0x8B9C–0x8B9F	35741-35744	R	–	DATETIME	–	Timestamp of minimum apparent power on phase 1
0x8BA0–0x8BA1	35745-35746	R	VA	FLOAT32	–	Minimum apparent power on phase 2
0x8BA2–0x8BA5	35747-35750	R	–	DATETIME	–	Timestamp of minimum apparent power on phase 2
0x8BA6–0x8BA7	35751-35752	R	VA	FLOAT32	–	Minimum apparent power on phase 3
0x8BA8–0x8BAB	35753-35756	R	–	DATETIME	–	Timestamp of minimum apparent power on phase 3
0x8BAC–0x8BAD	35757-35758	R	VA	FLOAT32	–	Minimum total apparent power
0x8BAE–0x8BB1	35759-35762	R	–	DATETIME	–	Timestamp of minimum total apparent power

Maximum Power Factor

Address	Register	RW	Unit	Type	Range	Description
0x8BB8–0x8BB9	35769–35770	R	–	FLOAT32	–	Maximum power factor on phase 1
0x8BBA–0x8BBD	35771–35774	R	–	DATETIME	–	Timestamp of maximum power factor on phase 1
0x8BBE–0x8BBF	35775–35776	R	–	FLOAT32	–	Maximum active power factor of phase 2
0x8BC0–0x8BC3	35777–35780	R	–	DATETIME	–	Timestamp of maximum active power factor on phase 2
0x8BC4–0x8BC5	35781–35782	R	–	FLOAT32	–	Maximum power factor on phase 3
0x8BC6–0x8BC9	35783–35786	R	–	DATETIME	–	Timestamp of maximum power factor on phase 3
0x8BCA–0x8BCB	35787–35788	R	–	FLOAT32	–	Maximum total power factor
0x8BCC–0x8BCF	35789–35792	R	–	DATETIME	–	Timestamp of maximum total power factor
0x8BD0–0x8BD1	35793–35794	R	–	FLOAT32	–	Maximum fundamental power factor on phase 1 (cos φ1)
0x8BD2–0x8BD5	35795–35798	R	–	DATETIME	–	Timestamp of maximum fundamental power factor on phase 1 (cos φ1)
0x8BD6–0x8BD7	35799–35800	R	–	FLOAT32	–	Maximum fundamental power factor on phase 2 (cos φ2)
0x8BD8–0x8BDB	35801–35804	R	–	DATETIME	–	Timestamp of maximum fundamental power factor on phase 2 (cos φ2)
0x8BDC–0x8BDD	35805–35806	R	–	FLOAT32	–	Maximum fundamental power factor on phase 3 (cos φ3)
0x8BDE–0x8BE1	35807–35810	R	–	DATETIME	–	Timestamp of maximum fundamental power factor on phase 3 (cos φ3)
0x8BE2–0x8BE3	35811–35812	R	–	FLOAT32	–	Maximum total fundamental power factor (cos φ)
0x8BE4–0x8BE7	35813–35816	R	–	DATETIME	–	Timestamp of maximum total fundamental power factor (cos φ)

Minimum Power Factor

Address	Register	RW	Unit	Type	Range	Description
0x8BEE–0x8BEF	35823-35824	R	–	FLOAT32	–	Minimum power factor on phase 1
0x8BF0–0x8BF3	35825-35828	R	–	DATETIME	–	Timestamp of minimum power factor on phase 1
0x8BF4–0x8BF5	35829-35830	R	–	FLOAT32	–	Minimum power factor on phase 2
0x8BF6–0x8BF9	35831-35834	R	–	DATETIME	–	Timestamp of minimum power factor on phase 2
0x8BFA–0x8BFB	35835-35836	R	–	FLOAT32	–	Minimum power factor on phase 3
0x8BFC–0x8BFF	35837-35840	R	–	DATETIME	–	Timestamp of minimum power factor on phase 3
0x8C00–0x8C01	35841-35842	R	–	FLOAT32	–	Minimum total power factor
0x8C02–0x8C05	35843-35846	R	–	DATETIME	–	Timestamp of minimum total power factor
0x8C06–0x8C07	35847-35848	R	–	FLOAT32	–	Minimum fundamental power factor on phase 1 (cos φ1)
0x8C08–0x8C0B	35849-35852	R	–	DATETIME	–	Timestamp of minimum fundamental power factor on phase 1 (cos φ1)
0x8C0C–0x8C0D	35853-35854	R	–	FLOAT32	–	Minimum fundamental power factor on phase 2 (cos φ2)
0x8C0E–0x8C11	35855-35858	R	–	DATETIME	–	Timestamp of minimum fundamental power factor on phase 2 (cos φ2)
0x8C12–0x8C13	35859-35860	R	–	FLOAT32	–	Minimum fundamental power factor on phase 3 (cos φ3)
0x8C14–0x8C17	35861-35864	R	–	DATETIME	–	Timestamp of minimum fundamental power factor on phase 3 (cos φ3)
0x8C18–0x8C19	35865-35866	R	–	FLOAT32	–	Minimum total fundamental power factor (cos φ)
0x8C1A–0x8C1D	35867-35870	R	–	DATETIME	–	Timestamp of minimum total fundamental power factor (cos φ)

Maximum THD and thd

Address	Register	RW	Unit	Type	Range	Description
0x8C24–0x8C25	35877-35878	R	–	FLOAT32	–	Maximum of average of 3 phase-to-phase voltage Total Harmonic Distortions (THD) compared to the fundamental
0x8C26–0x8C29	35879-35882	R	–	DATETIME	–	Timestamp of maximum of average of 3 phase-to-phase voltage Total Harmonic Distortions (THD) compared to the fundamental
0x8C2A–0x8C2B	35883-35884	R	–	FLOAT32	–	Maximum of average of 3 phase-to-neutral voltage Total Harmonic Distortions (THD) compared to the fundamental
0x8C2C–0x8C2F	35885-35888	R	–	DATETIME	–	Timestamp of maximum of average of 3 phase-to-neutral voltage Total Harmonic Distortions (THD) compared to the fundamental
0x8C30–0x8C31	35889-35890	R	–	FLOAT32	–	Maximum of average of 3 phase-to-phase voltage total harmonic distortions (thd) compared to the RMS voltage
0x8C32–0x8C35	35891-35894	R	–	DATETIME	–	Timestamp of maximum of average of 3 phase-to-phase voltage total harmonic distortions (thd) compared to the RMS voltage
0x8C36–0x8C37	35895-35896	R	–	FLOAT32	–	Maximum of average of 3 phase-to-neutral voltage total harmonic distortions (thd) compared to the RMS voltage

Address	Register	RW	Unit	Type	Range	Description
0x8C38–0x8C3B	35897-35900	R	–	DATETIME	–	Timestamp of maximum of average of 3 phase-to-neutral voltage total harmonic distortions (thd) compared to the RMS voltage
0x8C3C–0x8C3D	35901-35902	R	–	FLOAT32	–	Maximum Total Harmonic Distortion (THD) of current on neutral compared to the fundamental
0x8C3E–0x8C41	35903-35906	R	–	DATETIME	–	Timestamp of maximum Total Harmonic Distortion (THD) of current on neutral compared to the fundamental
0x8C42–0x8C43	35907-35908	R	–	FLOAT32	–	Maximum of average of 3 phase current Total Harmonic Distortions (THD) compared to the fundamental
0x8C44–0x8C47	35909-35912	R	–	DATETIME	–	Timestamp of maximum of average of 3 phase current Total Harmonic Distortions (THD) compared to the fundamental
0x8C48–0x8C49	35913-35914	R	–	FLOAT32	–	Maximum total harmonic distortion (thd) of current on neutral compared to the RMS current
0x8C4A–0x8C4D	35915-35918	R	–	DATETIME	–	Timestamp of maximum total harmonic distortion (thd) of current on neutral compared to the RMS current
0x8C4E–0x8C4F	35919-35920	R	–	FLOAT32	–	Maximum of average of 3 phase current total harmonic distortions (thd) compared to the RMS current
0x8C50–0x8C53	35921-35924	R	–	DATETIME	–	Timestamp of maximum of average of 3 phase current total harmonic distortions (thd) compared to the RMS current

Minimum THD and thd

Address	Registers	RW	Unit	Type	Range	Description
0x8C5A–0x8C5B	35931-35932	R	–	FLOAT32	–	Minimum of average of 3 phase-to-phase voltage total harmonic distortions (THD) compared to the fundamental average
0x8C5C–0x8C5F	35933-35936	R	–	DATETIME	–	Timestamp of minimum of average of 3 phase-to-phase voltage total harmonic distortions (THD) compared to the fundamental
0x8C60–0x8C61	35937-35938	R	–	FLOAT32	–	Minimum of average of 3 phase-to-neutral voltage Total Harmonic Distortions (THD) compared to the fundamental
0x8C62–0x8C65	35939-35942	R	–	DATETIME	–	Timestamp of minimum of average of 3 phase-to-neutral voltage Total Harmonic Distortions (THD) compared to the fundamental
0x8C66–0x8C67	35943-35944	R	–	FLOAT32	–	Minimum of average of 3 phase-to-phase voltage total harmonic distortions (thd) compared to the RMS voltage
0x8C68–0x8C6B	35945-35948	R	–	DATETIME	–	Timestamp of minimum of average of 3 phase-to-phase voltage total harmonic distortions (thd) compared to the RMS voltage
0x8C6C–0x8C6D	35949-35950	R	–	FLOAT32	–	Minimum of average of 3 phase-to-neutral voltage total harmonic distortions (compared to the RMS voltage) since last reset
0x8C6E–0x8C71	35951-35954	R	–	DATETIME	–	Timestamp of minimum of average of 3 phase-to-neutral voltage total harmonic distortions (thd) compared to the RMS voltage
0x8C72–0x8C73	35955-35956	R	–	FLOAT32	–	Minimum Total Harmonic Distortion (THD) of current on neutral compared to the fundamental
0x8C74–0x8C77	35957-35960	R	–	DATETIME	–	Timestamp of minimum Total Harmonic Distortion (THD) of current on neutral compared to the fundamental
0x8C78–0x8C79	35961-35962	R	–	FLOAT32	–	Minimum of average of 3 phase current Total Harmonic Distortions (THD) compared to the fundamental
0x8C7A–0x8C7D	35963-35966	R	–	DATETIME	–	Timestamp of minimum of average of 3 phase current Total Harmonic Distortions (THD) compared to the fundamental

Address	Registers	RW	Unit	Type	Range	Description
0x8C7E–0x8C7F	35967-35968	R	–	FLOAT32	–	Minimum total harmonic distortion (thd) of current on neutral compared to the RMS current
0x8C80–0x8C83	35969-35972	R	–	DATETIME	–	Timestamp of minimum total harmonic distortion (thd) of current on neutral compared to the RMS current
0x8C84–0x8C85	35973-35974	R	–	FLOAT32	–	Minimum of average of 3 phase current total harmonic distortions (thd) compared to the RMS current
0x8C86–0x8C89	35975-35978	R	–	DATETIME	–	Timestamp of minimum of average of 3 phase current total harmonic distortion (thd) compared to the RMS current

Maximum Frequency

Address	Register	RW	Unit	Type	Range	Description
0x8C90–0x8C91	35985-35986	R	Hz	FLOAT32	–	Maximum frequency
0x8C92–0x8C95	35987-35990	R	–	DATETIME	–	Timestamp of maximum frequency

Minimum Frequency

Address	Register	RW	Unit	Type	Range	Description
0x8C96–0x8C97	35991-35992	R	Hz	FLOAT32	–	Minimum frequency
0x8C98–0x8C9B	35993-35996	R	–	DATETIME	–	Timestamp of minimum frequency

Maintenance and Diagnostic Data

Contact Wear

Address	Register	RW	Unit	Type	Range	Description
0x5DC0–0x5DC1	24001–24002	R	–	FLOAT32	–	Rate of contact wear: • 0 = the contacts are new • 1 = the contacts are worn, the circuit breaker must be changed

Load profile

Address	Register	RW	Unit	Type	Range	Description
0x5DCE–0x5DCF	24015–24016	R	s	INT32U	–	Cumulated duration when current was lower than 49% of rated current In
0x5DD0–0x5DD1	24017–24018	R	s	INT32U	–	Cumulated duration when current was between 50% and 79% of rated current In
0x5DD2–0x5DD3	24019–24020	R	s	INT32U	–	Cumulated duration when current was between 80% and 89% of rated current In
0x5DD4–0x5DD5	24021–24022	R	s	INT32U	–	Cumulated duration when current was higher than 90% of rated current In

Maintenance Data

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E66-0x7E72	32359-32371	R	–	INT16U	–	–	Quality of each bit of registers 32384-32396: • 0 = Invalid • 1 = Valid
0x7E73-0x7E76	32372-32375	R	–	INT16U	–	–	Tripping cause, page 115
0x7E77-0x7E7C	32376-32381	R	–	INT16U	–	–	Protection data, page 116
0x7E7D-0x7E7E	32382-32383	R	–	INT16U	–	–	Opening/Closing release data, page 123
0x7E7F	32384	R	–	INT16U	–	0	Protection settings changed by display enabled
						1	Protection settings changed by display
						2	Protection settings changed by Bluetooth/USB/IFE
						3	Communication lost with EIFE/IFE module
						4	Communication lost with IO1 module
						5	Communication lost with IO2 module
						6	Configuration mismatch between IO and control unit: dual settings or inhibit close order
						7	Communication lost with IFM module
						8–9	Reserved
						10	Configuration mismatch between IO and control unit: optional protection inhibit
						11	Configuration mismatch between IO and control unit: local/remote mode
						12–15	Reserved
0x7E80	32385	R	–	INT16U	–	0–2	Reserved

Address	Register	RW	Unit	Type	Range	Bit	Description
						3	Control unit firmware update mode
						4	Digital module license expires in 30 days
						5	Digital module license expires in 20 days
						6	Digital module license expires in 10 days
						7	Control unit firmware update unsuccessful
						8	Digital module license installed
						9	Digital module license uninstalled
						10	Digital module license expired
						11	Digital module license rejected
						12–13	Reserved
						14	Date and time set
						15	Remote protection settings change enabled
0x7E81	32386	R	–	INT16U	–	0	Connection on USB port
						1	Bluetooth communication enabled
						2	PowerTag communication enabled
						3	Connection on Bluetooth port
						4–5	Reserved
						6	Schedule basic maintenance within one month
						7	Schedule standard maintenance within one month
						8	Schedule manufacturer maintenance within three months
						9	Protection settings still set on factory default settings 6 months after commissioning
						10	Remaining service life of MicroLogic X control unit below alarm threshold
						11	MicroLogic X control unit has reached the maximum service life
						12	Partial Internal Current Power Supply (CPS) sensors malfunction
						13	Partial Internal Current Power Supply (CPS) sensors major malfunction
						14–15	Reserved
0x7E82	32387	R	–	INT16U	–	0	Control unit in test mode
						1	Injection test in progress
						2	Test aborted by user
						3	ZSI test in progress
						4	Ig protection configured in OFF mode
						5	Control unit self test major malfunction 1
						6	Ig function inhibited for test purpose
						7	Internal current sensor disconnected
						8	External neutral current sensor disconnected
						9	Earth leakage sensor disconnected
						10	Internal Current Power Supply (CPS) sensors malfunction
						11	Protection settings reset to factory values
						12	Last modification of protection settings has not been completely applied

Address	Register	RW	Unit	Type	Range	Bit	Description
						13	Unable to read sensor plug
						14	Reserved
						15	Invalid control unit factory configuration 1
0x7E83	32388	R	–	INT16U	–	0	Replace internal battery
						1	NFC invalid communication 1
						2	NFC invalid communication 2
						3	NFC invalid communication 3
						4	Internal battery not detected
						5	Internal Current Power Supply (CPS) sensors malfunction. Tsd forced to 0.
						6	Invalid display screen or wireless communication 1
						7	Reserved
						8	Invalid display screen or wireless communication 3
						9	Invalid PowerTag communication
						10	Loss of Bluetooth communication
						11	Reserved
						12	Self diagnostic test - firmware
						13	Reserved
						14	Control unit alarm reset
						15	Reserved
0x7E84	32389	R	–	INT16U	–	0	IΔn/Ig test - no trip
						1	IΔn/Ig test button pressed
						2	Protection settings not accessible 1
						3	Protection settings not accessible 2
						4	Protection settings not accessible 3
						5	Protection settings not accessible 4
						6	Reserved
						7	Control unit self test 1
						8	Control unit self test 2
						9	Control unit self test 3
						10	Control unit self test 4
						11	Control unit self test 5
						12	Invalid measurement and optional protection 1
						13	Invalid measurement and optional protection 2
						14	Invalid measurement and optional protection 3
						15	Invalid optional protection self test
0x7E85	32390	R	–	INT16U	–	0	Critical hardware module discrepancy
						1	Critical firmware module discrepancy
						2	Non-critical hardware module discrepancy
						3	Non-critical firmware module discrepancy
						4	Address conflict between modules
						5	Firmware discrepancy within control unit
						6	Discrepancy between Display and MicroLogic X control unit

Address	Register	RW	Unit	Type	Range	Bit	Description
						7	Main voltage loss and circuit breaker is closed
						8	Invalid self test - MX2 shunt trip
						9	MX2 shunt trip not detected
						10	Presence of external 24 V power supply
						11	Events in history log have been erased
						12	Control unit self test major malfunction 2
						13	Control unit self test major malfunction 3
						14	Control unit self test major malfunction 4
						15	Control unit self test major malfunction 5
0x7E86	32391	R	–	INT16U	–	0	Contact wear is above 60%. Check contacts.
						1	Contact wear is above 95%. Plan for replacement.
						2	Contacts 100% worn out. CB needs to be replaced.
						3	Remaining service life of circuit breaker is below the alarm threshold.
						4	Circuit breaker has reached the max number of operations.
						5	Invalid self test - MX1 shunt trip.
						6	MX1 shunt trip not detected.
						7	Invalid self test - XF shunt close.
						8	XF shunt close not detected.
						9	Invalid self test - MN undervoltage release
						10	MN undervoltage release not detected.
						11	MCH charging operation counter is above alarm threshold
						12	MCH has reached the max number of operations
						13	Voltage loss on MN undervoltage release.
						14	Communication loss on MN undervoltage release.
						15	Reserved
0x7E87	32392	R	–	INT16U	–	0	Reset min/max currents
						1	Reset min/max voltages
						2	Reset min/max power
						3	Reset min/max frequency
						4	Reset min/max harmonics
						5	Reset min/max power factor
						6	Reset min/max current demand
						7	Reset min/max power demand
						8	Reset energy counters
						9–15	Reserved
0x7E88–0x7EB0	32393–32433	–	–	–	–	–	Reserved

Diagnostic Data

Address	Register	RW	Unit	Type	Range	Description
0x8980	35201	R	–	INT16U	–	MSB: Overall system health state: • 0 = Not evaluated • 1 = Ok • 2 = Medium severity alarm detected • 3 = High severity alarm detected LSB: Reserved
0x8981–0x8982	35202–35203	R	–	FLOAT32	–	Breaker remaining service life ratio: • 0 = End of typical service life of the breaker • 1 = New breaker
0x8983–0x8984	35204–35205	R	–	INT32U	–	Total number of operations (opening operation counter)
0x8985–0x8986	35206–35207	R	–	INT32U	–	Number of total trips in operation

Energy Measurements

Active, Reactive, and Apparent Energy

Address	Register	RW	Unit	Type	Range	Description
0x7D5F–0x7D62	32096–32099	R	Wh	INT64	–	Total active energy(1)
0x7D63–0x7D66	32100–32103	R	VARh	INT64	–	Total reactive energy(1)
0x7D67–0x7D6A	32104–32107	R	Wh	INT64U	–	Total active energy delivered (into the load, counted positively)(1)
0x7D6B–0x7D6E	32108–32111	R	Wh	INT64U	–	Total active energy received (out of the load, counted negatively)(1)
0x7D6F–0x7D72	32112–32115	R	VARh	INT64U	–	Total reactive energy delivered (into the load, counted positively) (1)
0x7D73–0x7D76	32116–32119	R	VARh	INT64U	–	Total reactive energy received (out of the load, counted negatively)(1)
0x7D77–0x7D7A	32120–32123	R	VAh	INT64U	–	Total apparent energy(1)
0x7D7B–0x7D7E	32124–32127	R	Wh	INT64U	–	Total cumulative active energy delivered (into the load, counted positively, not resettable)
0x7D7F–0x7D82	32128–32131	R	Wh	INT64U	–	Total cumulative active energy received (out of the load, counted negatively, not resettable)
(1) Value reset with the reset energies command.						

Address	Register	RW	Unit	Type	Range	Description
0x5608–0x560B	22025–22028	R	Wh	INT64	–	Total cumulative active energy (not resettable)
0x560C–0x5617	22029–22040	–	–	–	–	Reserved
0x5618–0x561B	22041–22044	R	VArh	INT64	–	Total cumulative reactive energy (not resettable)
0x561C–0x561F	22045-22048	R	VArh	INT64	–	Total cumulative reactive energy delivered (out of the load, counted positively, not resettable)
0x5620–0x5623	22049–22052	R	VArh	INT64	–	Total cumulative reactive energy received (into the load, counted negatively, not resettable)
0x5624–0x5627	22053–22056	R	VAh	INT64	–	Total cumulative apparent energy (not resettable)

Timestamp of Reset Actions

Address	Register	RW	Unit	Type	Range	Description
0x8968–0x896B	35177–35180	R	–	DATETIME	–	Timestamp of last reset of accumulated energy

Energy per Phase

Energy per phase is available when the Energy per Phase Digital Module is purchased and installed on a MicroLogic X control unit.

Address	Register	RW	Unit	Type	Range	Description
0xAD70–0xAD73	44401–44404	R	Wh	INT64	–	Active energy delivered on phase 1 (into the load, counted positively)(1)
0xAD74–0xAD77	44405–44408	R	Wh	INT64	–	Active energy received on phase 1 (out of the load, counted negatively)(1)
0xAD78–0xAD7B	44409–44412	R	Wh	INT64	–	Total active energy delivered on phase 1 (not resettable)
0xAD7C–0xAD7F	44413–44416	R	Wh	INT64	–	Total active energy received on phase 1 (not resettable)
0xAD80–0xAD83	44417–44420	R	Wh	INT64	–	Active energy delivered on phase 2 (into the load, counted positively)(1)
0xAD84–0xAD87	44421–44424	R	Wh	INT64	–	Active energy received on phase 2 (out of the load, counted negatively)(1)
0xAD88–0xAD8B	44425–44428	R	Wh	INT64	–	Total active energy delivered on phase 2 (not resettable)
0xAD8C–0xAD8F	44429–44432	R	Wh	INT64	–	Total active energy received on phase 2 (not resettable)
0xAD90–0xAD93	44433–44436	R	Wh	INT64	–	Active energy delivered on phase 3 (into the load, counted positively)(1)
0xAD94–0xAD97	44437–44440	R	Wh	INT64	–	Active energy received on phase 3 (out of the load, counted negatively)(1)
0xAD98–0xAD9B	44441–44444	R	Wh	INT64	–	Total active energy delivered on phase 3 (not resettable)
0xAD9C–0xAD9F	44445–44448	R	Wh	INT64	–	Total active energy received on phase 3 (not resettable)
0xADA0–0xADA3	44449–44452	R	VArh	INT64	–	Reactive energy delivered on phase 1 (into the load, counted positively)(1)
0xADA4–0xADA7	44453–44456	R	VArh	INT64	–	Reactive energy received on phase 1 (out of the load, counted negatively)(1)
0xADA8–0xADAB	44457–44460	R	VArh	INT64	–	Total reactive energy delivered on phase 1 (not resettable)
0xADAC–0xADAF	44461–44464	R	VArh	INT64	–	Total reactive energy received on phase 1(not resettable)
0xADB0–0xADB3	44465–44468	R	VArh	INT64	–	Reactive energy delivered on phase 2 (into the load, counted positively)(1)
0xADB4–0xADB7	44469–44472	R	VArh	INT64	–	Reactive energy received on phase 2 (out of the load, counted negatively)(1)
0xADB8–0xADBB	44473–44476	R	VArh	INT64	–	Total reactive energy delivered on phase 2 (not resettable)
0xADBC–0xADBF	44477–44480	R	VArh	INT64	–	Total reactive energy received on phase 2 (not resettable)
0xADC0–0xADC3	44481–44484	R	VArh	INT64	–	Reactive energy delivered on phase 3 (into the load, counted positively)(1)
0xADC4–0xADC7	44485–44488	R	VArh	INT64	–	Reactive energy received on phase 3 (out of the load, counted negatively)(1)
0xADC8–0xADCB	44489–44492	R	VArh	INT64	–	Total reactive energy delivered on phase 3 (not resettable)
0xADCC–0xADCF	44493–44496	R	VArh	INT64	–	Total reactive energy received on phase 3 (not resettable)
0xADD0–0xADD3	44497–44500	R	VAh	INT64	–	Apparent energy on phase 1(1)
0xADD4–0xADD7	44501–44504	R	VAh	INT64	–	Cumulative apparent energy on phase 1 (not resettable)
0xADD8–0xADDB	44505–44508	R	VAh	INT64	–	Apparent energy on phase 2(1)
0xADDC–0xADDF	44509–44512	R	VAh	INT64	–	Cumulative apparent energy on phase 2 (not resettable)

Address	Register	RW	Unit	Type	Range	Description
0xADE0–0xADE3	44513–44516	R	VAh	INT64	–	Apparent energy on phase 3(1)
0xADE4–0xADE7	44517–44520	R	VAh	INT64	–	Cumulative apparent energy on phase 3 (not resettable)
(1) Value reset with the reset energies command.						

Protection Settings

Active Neutral Protection Settings

Address	Register	RW	Unit	Type	Range	Description
0xAFC8	45001	R	–	INT16U	0–1	Neutral protection mode • 0 = Off • 1 = On (tripping)
0xAFC9	45002	R	–	INT16U	0–3	Neutral protection type • 0 = Off • 1 = Half neutral protection • 2 = Full neutral protection • 3 = Oversized neutral protection

Active Long Time Over Current Protection Settings

Address	Register	RW	Unit	Type	Range	Description
0xAFDE	45023	R	–	INT16U	0–1	Long time over current protection mode • 0 = Off • 1 = On (tripping)
0xAFDF	45024	R	–	INT16U	1	Long time over current protection curve • 1 = Inverse time (I^2t = ON)
0xAFE0–0xAFE1	45025–45026	R	A	FLOAT32	–	Long time over current protection threshold
0xAFE2–0xAFE3	45027–45028	R	s	FLOAT32	–	Long time over current protection time delay

Active Short Time Over Current Protection Settings

Address	Register	RW	Unit	Type	Range	Description
0xAFE8	45033	R	–	INT16U	0–1	Short time over current protection mode • 0 = Off • 1 = On (tripping)
0xAFE9	45034	R	–	INT16U	0–1	Short time over current protection curve • 0 = Definite time (I^2t = OFF) • 1 = Inverse time (I^2t = ON)
0xAFEA–0xAFEB	45035–45036	R	–	FLOAT32	–	Short time over current protection threshold coefficient
0xAFEC–0xAFED	45037–45038	R	s	FLOAT32	–	Short time over current protection time delay

Active Instantaneous Protection Settings

Address	Register	RW	Unit	Type	Range	Description
0xAFF2	45043	R	–	INT16U	0–1	Instantaneous over current protection mode • 0 = Off • 1 = On (tripping)
0xAFF3	45044	R	–	INT16U	0–1	Instantaneous over current protection time delay mode: • 0 = Standard • 1 = Fast
0xAFF4–0xAFF5	45045–45046	R	–	FLOAT32	–	Instantaneous over current protection threshold coefficient

Active Ground Fault Protection Settings

Address	Register	RW	Unit	Type	Range	Description
0xAFFA	45051	R	–	INT16U	0–1	Ground fault protection mode • 0 = Off • 1 = On (tripping)
0xAFFB	45052	R	–	INT16U	0–1	Ground fault protection curve • 0 = Definite time (I^2t = OFF) • 1 = Inverse time (I^2t = ON)
0xAFFC–0xAFFD	45053–45054	R	A	FLOAT32	–	Ground fault protection threshold
0xAFFE–0xAFFF	45055–45056	R	s	FLOAT32	–	Ground fault protection time delay

Active Earth Leakage Protection Settings

Address	Register	RW	Unit	Type	Range	Description
0xB004	45061	R	–	INT16U	0–1	Earth leakage protection mode • 0 = Off • 1 = On
0xB005	45062	R	–	–	–	Reserved
0xB006–0xB007	45063–45064	R	A	FLOAT32	–	Earth leakage protection threshold
0xB008–0xB009	45065–45066	R	s	FLOAT32	0.06, 0.15, 0.23, 0.35, 0.80	Earth leakage protection time delay

Demand Values of Real-Time Measurements

Current Demand Values

Address	Register	RW	Unit	Type	Range	Description
0x7D9B–0x7D9C	32156–32157	R	A	FLOAT32	–	Current demand value on phase 1: I1 Dmd
0x7D9D–0x7D9E	32158–32159	R	A	FLOAT32	–	Current demand value on phase 2: I2 Dmd
0x7D9F–0x7DA0	32160–32161	R	A	FLOAT32	–	Current demand value on phase 3: I3 Dmd
0x7DA1–0x7DA2	32162–32163	R	A	FLOAT32	–	Current demand value on the neutral: IN Dmd(1)
(1) Value available when system type register returns 30 or 41.						

Power Demand Values

Address	Register	RW	Unit	Type	Range	Description
0x7DA3–0x7DA4	32164–32165	R	W	FLOAT32	–	Total active power demand: P Dmd
0x7DA5–0x7DA6	32166–32167	R	var	FLOAT32	–	Total reactive power demand: Q Dmd
0x7DA7–0x7DA8	32168–32169	R	VA	FLOAT32	–	Total apparent power demand: S Dmd

Peak Values of Demand Values of Real-Time Measurements

Current Peak Demand Values

Current peak demand values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	Description
0x7DA9–0x7DAA	32170–32171	R	A	FLOAT32	–	Current peak demand value on phase 1: I1 dmd max
0x7DAB–0x7DAC	32172–32173	R	A	FLOAT32	–	Current peak demand value on phase 2: I2 dmd max
0x7DAD–0x7DAE	32174–32175	R	A	FLOAT32	–	Current peak demand value on phase 3: I3 dmd max
0x7DAF–0x7DB0	32176–32177	R	A	FLOAT32	–	Current peak demand value on the neutral: IN dmd max(1)
0x7DF3–0x7DF4	32244–32245	R	A	FLOAT32	–	Average peak current demand
(1) Value available when system type register returns 30 or 41.						

Power Peak Demand Values

Power peak demand values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	Description
0x7DB1–0x7DB2	32178–32179	R	W	FLOAT32	–	Total active power peak demand: P dmd max
0x7DB3–0x7DB4	32180–32181	R	var	FLOAT32	–	Total reactive power peak demand: Q dmd max
0x7DB5–0x7DB6	32182–32183	R	VA	FLOAT32	–	Total apparent power peak demand: S dmd max

Timestamp of Peak Demand Values and Reset of Peak Demand Values

Address	Register	RW	Unit	Type	Range	Description
0x8940–0x8943	35137–35140	R	–	DATETIME	–	Timestamp of peak current demand on neutral
0x8944–0x8947	35141–35144	R	–	DATETIME	–	Timestamp of average peak current demand
0x8948–0x894B	35145–35148	R	–	DATETIME	–	Timestamp of last reset of peak demand current
0x894C–0x894F	35149–35152	R	–	DATETIME	–	Timestamp of last reset of peak demand power
0x8950–0x8953	35153–35156	R	–	DATETIME	–	Timestamp of peak demand current on phase 1
0x8954–0x8957	35157–35160	R	–	DATETIME	–	Timestamp of peak demand current on phase 2
0x8958–0x895B	35161–35164	R	–	DATETIME	–	Timestamp of peak demand current on phase 3
0x895C–0x895F	35165–35168	R	–	DATETIME	–	Timestamp of peak demand active power

Address	Register	RW	Unit	Type	Range	Description
0x8960–0x8963	35169–35172	R	–	DATETIME	–	Timestamp of peak demand reactive power
0x8964–0x8967	35173–35176	R	–	DATETIME	–	Timestamp of peak demand apparent power

MicroLogic X Control Unit Commands

What's in This Chapter

List of MicroLogic X Control Unit Commands and Error Codes 173
Protection Get Commands without Session 174
Protection Set Commands without Session 180
Measurement Set and Reset Commands 183
Diagnostic Get Commands 184
Measurement Settings Set Commands 190
Circuit Breaker Operation Set Commands 192
MicroLogic X Get and Reset Commands 194

List of MicroLogic X Control Unit Commands and Error Codes

List of Commands

The MicroLogic X control unit commands are performed by the command interface. They are grouped by their functions and types:

- Protection get commands, page 174
- Protection set commands, page 180
- Measurement set and reset commands, page 183
- Diagnostic get commands, page 184
- Measurement settings set or reset commands, page 190
- Circuit breaker operation set commands, page 192
- MicroLogic X get and reset commands, page 194

In the MicroLogic X control unit registers:

- RC indicates the registers that can be read by a get command
- WC indicates the registers that can be written by a set and reset command

Error Codes

Error codes generated by MicroLogic X control units are the generic error codes, page 64.

Protection Get Commands without Session

List of Commands

The following table lists the protection get commands without session, their corresponding command codes, and user profiles:

Command	Command code	User profile
Get neutral protection settings , page 174	51589	No password required
Get ZSI configuration parameters , page 175	49025	No password required
Get dual settings control configuration , page 176	49536	No password required
Get active setting group , page 176	49537	No password required
Get ground fault alarm settings , page 177	51590	No password required
Get earth leakage alarm settings , page 178	51591	No password required

Get Neutral Protection Settings

To get the neutral protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51589	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	0xFFFFFFFF	Key for the protection get command without session

The neutral protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51589	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	32	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	INT32U	0xFFFFFFFF	Key for the protection get command without session
0x1F58	8025	–	INT16U	–	MSB: Neutral protection mode • 0 = Off • 1 = On LSB: Neutral protection function supported • 0 = Not supported • 1 = Supported
0x1F59–0x1F5C	8026–8029	–	DATETIME	–	Timestamp of last change of neutral protection mode
0x1F5D	8030	–	INT16U	–	Timestamp quality of last change of neutral protection mode

Address	Register	Unit	Type	Range	Description
0x1F5E–0x1F61	8031–8034	–	DATETIME	–	Timestamp of last change of any parameter of the neutral protection function
0x1F62	8035	–	INT16U	–	Timestamp quality of last change of any parameter of the neutral protection function
0x1F63	8036	–	INT16U	0–3	MSB: 0 LSB: Neutral protection type • 0 = OFF • 1 = 0.5 • 2 = 1.0 • 3 = Oversized
0x1F64–0x1F65	8037–8038	A	FLOAT32	–	Long time over current protection threshold

Get ZSI Configuration Parameter

To get the ZSI configuration parameter settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49025	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The ZSI configuration parameter settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49025	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	24	Number of bytes returned
0x1F56	8023	–	INT16U	–	MSB: ZSI configuration mode: • 0 = Off • 1 = On (tripping) LSB: ZSI configuration function supported • 0 = Not supported • 1 = Supported
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of last change of ZSI configuration mode
0x1F5B	8028	–	INT16U	–	Timestamp quality of last change of ZSI configuration mode.
0x1F5C–0x1F5F	8029–8032	–	DATETIME	–	Timestamp of last change of any parameter of the ZSI configuration

Address	Register	Unit	Type	Range	Description
0x1F60	8033	–	INT16U	–	Timestamp quality of last change of any parameter of the ZSI configuration
0x1F61	8034	–	INT16U	0-2	ZSI protection selection: • 0 = Short time • 1 = Ground/Earth leakage • 2 = All

Get Dual Settings Control Configuration

To get the dual settings control configuration, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49536	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The dual settings control configuration are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49536	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	6	Number of bytes returned
0x1F56	8023	–	INT16U	–	MSB: Setting group control block mode (Dual settings mode) • 0 = Disabled (factory setting) • 1 = Enabled LSB: Setting group control block operating behavior (Dual settings switch mode) • 0 = Local HMI • 1 = IO module (1 wire) • 2 = IO module (2 wires) • 3 = Remote
0x1F57–0x1F58	8024–8025	–	–	–	Reserved

Get Active Setting Group

To get the active setting group, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49537	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command

Address	Register	Unit	Type	Range	Description
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The active setting group is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49537	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	12	Number of bytes returned
0x1F56	8023	–	INT16U	–	MSB: Active setting group validation • 0 = Invalid, the selection of the active setting group is in progress • 1 = Valid LSB: Active setting group • 1 = Setting group A • 2 = Setting group B
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of last active setting group change
0x1F5B	8028	–	INT16U	–	Timestamp quality of last active setting group change

Get Ground Fault Alarm Settings

To set the ground fault alarm, use the set ground fault alarm settings command , page 182.

To get the ground fault alarm settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51590	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	0xFFFFFFF-F	Reserved

The ground fault alarm settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F52	8020	–	INT16U	51590	Last command code
0x1F53	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F54	8022	–	INT16U	34	Number of bytes returned
0x1F55–0x1F56	8023–8024	–	–	0xFFFFFFFF	Reserved

Address	Register	Unit	Type	Range	Description
0x1F57	8025	–	INT16U	–	MSB: Ground fault alarm mode • 0 = Off • 1 = On LSB: Ground fault alarm function supported • 0 = Not supported • 1 = Supported
0x1F58–0x1F61	8026–8035	–	–	–	Reserved
0x1F62–0x1F63	8036–8037	A	FLOAT32	120–1200	Ig alarm pickup value
0x1F64–0x1F65	8038–8039	s	FLOAT32	1–10	tg alarm time delay

Get Earth Leakage Alarm Settings

To set the earth leakage alarm, use the set earth leakage alarm settings command , page 182.

To get the earth leakage alarm settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51591	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	–	0xFFFFFFF-F	Reserved

The earth leakage alarm settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51591	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	34	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	–	0xFFFFFFFF	Reserved
0x1F58	8025	–	INT16U	–	MSB: Earth leakage alarm mode • 0 =Off • 1 = On LSB: Earth leakage alarm function supported • 0 = Not supported • 1 = Supported
0x1F59–0x1F62	8026–8035	–	–	–	Reserved
0x1F63–0x1F64	8036–8037	A	FLOAT32	0.5-22	Earth leakage alarm threshold
0x1F65–0x1F66	8038–8039	s	FLOAT32	1-10	Earth leakage alarm time delay

Protection Set Commands without Session

List of Commands

The following table lists the protection set commands without session, their corresponding command codes, and user profiles:

Command	Command code	User profile
Set external neutral current transformer settings , page 180	45704	Administrator
Set external neutral voltage sensor settings , page 180	46472	Administrator
Set ZSI configuration parameters , page 181	49033	Administrator
Select active curve , page 181	49545	Administrator or Operator
Set earth leakage alarm settings , page 182	51592	Administrator
Set ground fault alarm settings , page 182	51599	Administrator

Set External Neutral Current Transformer Settings

To set the external neutral current transformer settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	45704	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	INT16U	0–1	External neutral current transformer: • 0 = Not available • 1 = Available

Set External Neutral Voltage Sensor Settings

To set the external neutral voltage sensor settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	46472	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006		INT16U	0–1	External neutral voltage sensor • 0 = Not available • 1 = Available

Set ZSI Configuration Parameter

To get the ZSI configuration parameters, use the get ZSI configuration parameters command , page 175.

To set the ZSI configuration parameter settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49033	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	INT16U	–	MSB: ZSI configuration mode • 0 = Off • 1 = On LSB: 0
0x1F46	8007	–	INT16U	0-2	ZSI protection selection • 0 = Short time • 1 = Ground fault/Earth fault • 2 = All

Select Active Curve

To get the active setting group, use the get active setting group command , page 176.

To set the active setting group, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49545	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	INT16U	–	MSB: Active setting group • 1 = Setting curve A • 2 = Setting curve B LSB: Dual setting operating behavior • 0 = Local • 1 = IO module (1 wire) • 2 = IO module (2 wires) • 3 = Remote

NOTE: After selecting the active setting group, use the get active setting group command , page 176 to get the confirmation that the set command has been executed successfully.

Set Earth Leakage Alarm Settings

To get the earth leakage alarm settings, use the get earth leakage alarm settings command , page 178.

To set the earth leakage alarm settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51592	Requested command code
0x1F40	8001	–	INT16U	24	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45–0x1F46	8006–8007	–	INT32U	0xFFFFFFFF	Reserved
0x1F47	8008	–	INT16U	–	MSB: Earth leakage alarm mode • 0 = Off (alarm disabled) • 1 = On (alarm enabled) LSB: 0
0x1F48–0x1F49	8009–8010	A	FLOAT32	0.5–22.0 (step 0.1)	Earth leakage alarm threshold
0x1F4A–0x1F4B	8011–8012	s	FLOAT32	1-10	Earth leakage alarm time delay

Set Ground Fault Alarm Settings

To get the ground fault alarm settings, use the get ground fault alarm settings command , page 177.

To set the ground fault alarm settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51599	Requested command code
0x1F40	8001	–	INT16U	24	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45–0x1F46	8006–8007	–	INT32U	0xFFFFFFFF	Reserved
0x1F47	8008	–	INT16U	–	MSB: Ground fault alarm mode • 0 = Off (alarm disabled) • 1 = On (alarm enabled) LSB: 0
0x1F48–0x1F49	8009–8010	A	FLOAT32	120–1200	Ground fault alarm threshold
0x1F4A–0x1F4B	8011–8012	s	FLOAT32	1-10	Ground fault alarm time delay

Measurement Set and Reset Commands

List of Commands

The following table lists the measurement set and reset commands, their corresponding command codes, and user profiles:

Command	Command code	User profile
Reset minimum/maximum values and energies , page 183	46728	Administrator or Operator

Reset Minimum/Maximum Values and Energies

To reset minimum/maximum values and energy, set the command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	46728	–	Requested command code
0x1F40	8001	–	INT16U	12	–	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	–	Destination of the command
0x1F42	8003	–	INT16U	1	–	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	INT16U	–	0	Reset min-max current
					1	Reset min-max voltage
					2	Reset min-max power
					3	Reset min-max power factor and cosφ
					4	Reset min-max THD (% fund)
					5	Reset peak current demand
					6	Reset peak power demand
					7	Reset min-max frequency
					8	Reserved
					9	Reset all energies
					10–15	Reserved

Diagnostic Get Commands

List of Commands

The following table lists the diagnostic get commands, their corresponding command codes, and user profiles:

Command	Command code	User profile
Get coil information , page 184	49793	No password required
Get health state , page 185	49794	No password required
Get trip counters in operation , page 186	49795	No password required
Get trip counters in test mode , page 187	49796	No password required
Get trip counters in manual test mode , page 187	49797	No password required
Get motor charging operation information , page 188	49798	No password required
Get breaker durability , page 188	51328	No password required
Get operating times , page 189	51329	No password required

Get Coil Information

To get the coil information, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49793	Requested command code
0x1F40	8001	–	INT16U	11	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45	8006	–	INT16U	–	MSB: Requested coil identification: • 16 = MX1 opening voltage release • 17 = XF closing voltage release • 18 = MN opening undervoltage release • 19 = MX2 opening voltage release LSB: 0 (not used)

The coil information is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	49793	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	4	–	Number of bytes returned
0x1F56	8023	–	INT16U	1–3	–	MSB: Responded coil identification: • 16 = MX1 opening voltage release • 17 = XF closing voltage release • 18 = MN opening undervoltage release • 19 = MX2 opening voltage release LSB: 0 (not used)

Address	Register	Unit	Type	Range	Bit	Description
0x1F58	8024	–	INT16U	–	0	Application type: • 0 = Opening (MX or MN coil) • 1 = Closing (XF coil)
					1	Communication status: • 0 = Not communicating (standard voltage or undervoltage release) • 1 = Communicating ◦ MX1 (Diagnostic and communication) ◦ XF (Diagnostic and communication) ◦ MN or MX2 (Diagnostic)
					2	Physical health (release autotest result): • 0 = Release malfunction (release needs to be replaced) • 1 = Release OK
					3	Coil activation status: • 0 = Plunger not activated ◦ MN diagnostic plunger pull out (opening order activated) ◦ MX2 diagnostic plunger pushed in (opening order not activated) • 1 = Plunger activated ◦ MN diagnostic plunger pushed in (opening order not activated) ◦ MX2 diagnostic plunger pull out (opening order activated)
					4	Model type: • 0 = Not MN undervoltage release • 1 = MN undervoltage release
					5–7	Reserved
					8	Application type quality: • 0 = Invalid • 1 = Valid
					9	Communication status quality: • 0 = Invalid • 1 = Valid
					10	Physical health quality: • 0 = Invalid • 1 = Valid
					11	Quality of coil activation status: • 0 = Invalid • 1 = Valid
					12	Model type quality: • 0 = Invalid • 1 = Valid
					13–15	Reserved

Get Health State

To get the health state, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49794	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command

Address	Register	Unit	Type	Range	Description
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	–	0xFFFFFFFF	Reserved

The health state is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49794	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	6	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	–	–	Reserved
0x1F58	8025	–	INT16U	–	MSB: Overall system health state • 0 = Not evaluated • 1 = Ok • 2 = Medium severity alarm detected • 3 = High severity alarm detected LSB: Reserved

Get Trip Counters in Operation

To get the trip counters in operation, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49795	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The trip counters in operation is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49795	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	24	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	INT32U	–	Number of total trips in operation
0x1F58–0x1F59	8025–8026	–	INT32U	–	Number of long time trips in operation

Address	Register	Unit	Type	Range	Description
0x1F5A–0x1F5B	8027–8028	–	INT32U	–	Number of short time trips in operation
0x1F5C–0x1F5D	8029–8030	–	INT32U	–	Number of instantaneous trips in operation
0x1F5E–0x1F5F	8031–8032	–	INT32U	–	Number of ground/earth leakage fault trips in operation
0x1F60–0x1F61	8033–8034	–	INT32U	–	Number of other trips in operation

Get Trip Counters in Test Mode

To get the trip counters in test mode, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49796	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The trip counters in test mode is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49796	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	12	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	INT32U	–	Number of total trips in test mode
0x1F58–0x1F5B	8025–8028	–	DATETIME	–	Date/Time of last trip in test mode

Get Trip Counters in Manual Test Mode

To get the trip counters in manual test mode, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49797	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The trip counters in manual test mode is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49797	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	12	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	INT32U	–	Number of total trips in manual test mode
0x1F58–0x1F5B	8025–8028	–	DATETIME	–	Date/Time of last trip in manual test mode

Get Motor Charging Operation Information

To get the motor charging operation information, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49798	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The motor charging operation information is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49798	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	8	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	INT32U	–	Motor charging operation counter
0x1F58–0x1F59	8025–8026	s	FLOAT32	–	Motor last charging time after closing

Get Breaker Durability

To get the breaker durability information, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51328	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command

Address	Register	Unit	Type	Range	Description
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The breaker durability information is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51328	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	28	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	INT32U	–	Total number of operations (opening operation counter)
0x1F58–0x1F59	8025–8026	–	INT32U	–	Number of operation with load › 0.4 In
0x1F5A–0x1F5B	8027–8028	–	FLOAT32	0-1	Breaker remaining service life ratio: • 0 = End of typical service life of the breaker • 1 = Breaker is new
0x1F5C–0x1F63	8029–8036	–	–	–	Reserved

Get Operating Times

To get the operating time information, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51329	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The operating time information is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51329	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	8	Number of bytes returned
0x1F56–0x1F57	8023–8024	s	INT32U	–	Time of use
0x1F58–0x1F59	8025–8026	s	INT32U	–	Operating time with load

Measurement Settings Set Commands

List of Commands

The following table lists the measurement settings set commands, their corresponding command codes, and user profiles:

Command	Command code	User profile
Set power flow sign configuration , page 190	47240	Administrator
Set power factor sign convention , page 190	47241	Administrator
Set energy accumulation mode , page 191	47242	Administrator
Set current demand configuration , page 191	47243	Administrator
Set power demand configuration , page 191	47244	Administrator

Set Power Flow Sign Configuration

To set the power flow sign configuration, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	47240	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	INT16U	0–1	Power sign • 0 = Direct or P+ = the active power flows from upstream (top) to downstream (bottom) (factory setting) • 1 = Inverted or P– = the active power flows from downstream (bottom) to upstream (top)

Set Power Factor Sign Convention

To set the power factor sign convention, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	47241	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	INT16U	0, 2	Power factor sign convention: • 0 = IEC • 2 = IEEE (factory setting)

Set Energy Accumulation Mode

To set the energy accumulation mode, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	47242	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	INT16U	0–1	Energy accumulation mode: • 0 = Absolute (factory setting) • 1 = Signed

Set Current Demand Configuration

To set the current demand configuration, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	47243	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	min	INT16U	1–60	Current demand calculation interval time

Set Power Demand Configuration

To set the power demand configuration, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	47244	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	INT16U	0	Power demand calculation method: • 0 = sliding window
0x1F46	8007	min	INT16U	1-60	Power demand calculation interval time

Circuit Breaker Operation Set Commands

List of Commands

The following table lists the circuit breaker operation set commands, their corresponding command codes, and user profiles:

Command	Command code	User profile
Open circuit breaker , page 192	904	Administrator or Operator
Close circuit breaker , page 192	905	Administrator or Operator
Set close breaker inhibition , page 192	910	Administrator or Operator

Open Circuit Breaker

To open the circuit breaker, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	904	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

NOTE: After use of the open circuit breaker command, check that the circuit breaker is open in register 32001.

Close Circuit Breaker

To close the circuit breaker, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	905	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

NOTE: After use of the close circuit breaker command, check that the circuit breaker is closed in register 32001.

Set Close Breaker Inhibition

To enable or inhibit the close circuit breaker command, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	910	Requested command code
0x1F40	8001	–	INT16U	13	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	INT16U	0–1	Close breaker inhibited by communication: • 0 = Enable close order • 1 = Inhibit close order
0x1F46	8007	–	INT16U	1	Origin of the command: • 1 = close breaker enable/inhibit command from remote controller using the communication network

MicroLogic X Get and Reset Commands

List of Commands

The following table lists the MicroLogic X get and reset commands, their corresponding command codes, and user profiles:

Command	Command code	User profile
Get date time , page 194	768	No password required
Reset events , page 194	50056	Administrator or Operator
Get events , page 198	50560	No password required
Get list of Digital Modules , page 199	50816	No password required
Get Digital Modules details , page 201	50817	No password required

Get Date Time

To get the date and time of the MicroLogic X control unit, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	768	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5376 (0x1500)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The date and time of the MicroLogic X control unit is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	768	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	8	Number of bytes returned
0x1F56–0x1F59	8023–8026	–	XDATE	–	Current date/time of the source

Reset Events

To reset events, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	50056	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377	Destination of the command

Address	Register	Unit	Type	Range	Description
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command: Administrator or Operator user profile password

Get Events Command

To get events, set the command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	50560	–	Requested command code
0x1F40	8001	–	INT16U	27	–	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	–	Destination of the command
0x1F42	8003	–	INT16U	0	–	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	–	Password of the command = 0 (no password required)
0x1F45	8006	–	INT16U	–	–	Requested event log book
					0	Trip
					1	Protection
					2	Diagnostic
					3	Metering
					4	Configuration
					5	Operation
					6	Communication
					7–15	Reserved
0x1F46	8007	–	INT16U	0–2	–	Requested get event method , page 198: • 0 = Most recent events • 1 = Events before and up to a date • 2 = Events before and up to a sequence number
0x1F47–0x1F4A	8008–8011	–	DATETIME	–	–	Requested event date time (for method 1 only)
0x1F4B–0x1F4C	8012–8013	–	INT32U	–	–	Requested event sequence number (for method 2 only)
0x1F4D	8014	–	INT16U	–	–	Requested event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved

Events are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	50560	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	–	–	Number of bytes returned

Address	Register	Unit	Type	Range	Bit	Description
0x1F56	8023	–	INT16U	–	–	Responded event log book
					0	Trip
					1	Protection
					2	Diagnostic
					3	Metering
					4	Configuration
					5	Operation
					6	Communication
					7–15	Reserved
0x1F57	8024	–	INT16U	0-2	–	Responded get event method: • 0 = Most recent events • 1 = Events before and up to a date • 2 = Events before and up to a sequence number
0x1F5E	8031	–	INT16U	–	–	Responded event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved
0x1F5F	8032	–	INT16U	0–10	–	MSB: Number of events returned
				0–1	–	LSB: Remaining events • 0 = No more events to get • 1 = More events to get
0x1F60	8033	–	INT16U	1013-25630	–	First event code .
0x1F61–0x1F64	8034–8037	–	DATETIME	–	–	Timestamp of the first event
0x1F65	8038	–	INT16U	–	–	Timestamp quality of the first event
0x1F66–0x1F67	8039–8040	–	INT32U	–	–	First event sequence number
0x1F68	8041	–	INT16U	–	–	MSB: First event status • 1 = Occurrence • 2 = Completion • 3 = Pulse LSB: Reserved
0x1F69	8042	–	INT16U	1–255	–	First event log book
					0	Trip
					1	Protection
					2	Diagnostic
					3	Metering
					4	Configuration
					5	Operation
					6	Communication
					7–15	Reserved
0x1F6A	8043	–	INT16U	–	–	First event severity
					0–7	Reserved
					8	Low
					9	Medium

Address	Register	Unit	Type	Range	Bit	Description
					10	High
					11–15	Reserved
0x1F6B–0x1F75	8044–8054	–	INT16U	–	–	Characteristics of event 2 (same as event 1)
0x1F76–0x1F80	8055–8065	–	INT16U	–	–	Characteristics of event 3 (same as event 1)
0x1F81–0x1F8B	8066–8076	–	INT16U	–	–	Characteristics of event 4 (same as event 1)
0x1F8C–0x1F96	8077–8087	–	INT16U	–	–	Characteristics of event 5 (same as event 1)
0x1F97–0x1FA1	8088–8098	–	INT16U	–	–	Characteristics of event 6 (same as event 1)
0x1FA2–0x1FAC	8099–8109	–	INT16U	–	–	Characteristics of event 7 (same as event 1)
0x1FAD–0x1FB7	8110–8120	–	INT16U	–	–	Characteristics of event 8 (same as event 1)
0x1FB8–0x1FC2	8121–8131	–	INT16U	–	–	Characteristics of event 9 (same as event 1)
0x1FC3–0x1FCD	8132–8142	–	INT16U	–	–	Characteristics of event 10 (same as event 1)

Get Events Procedure

The command allows to get events by using one of the three following methods:

- get the most recent events
- get events logged before and up to a date
- get events before and up to an event sequence number. The event sequence number is an event identifier defined by the device, and is available among the event characteristics. It can be used to sort the events in chronological order.

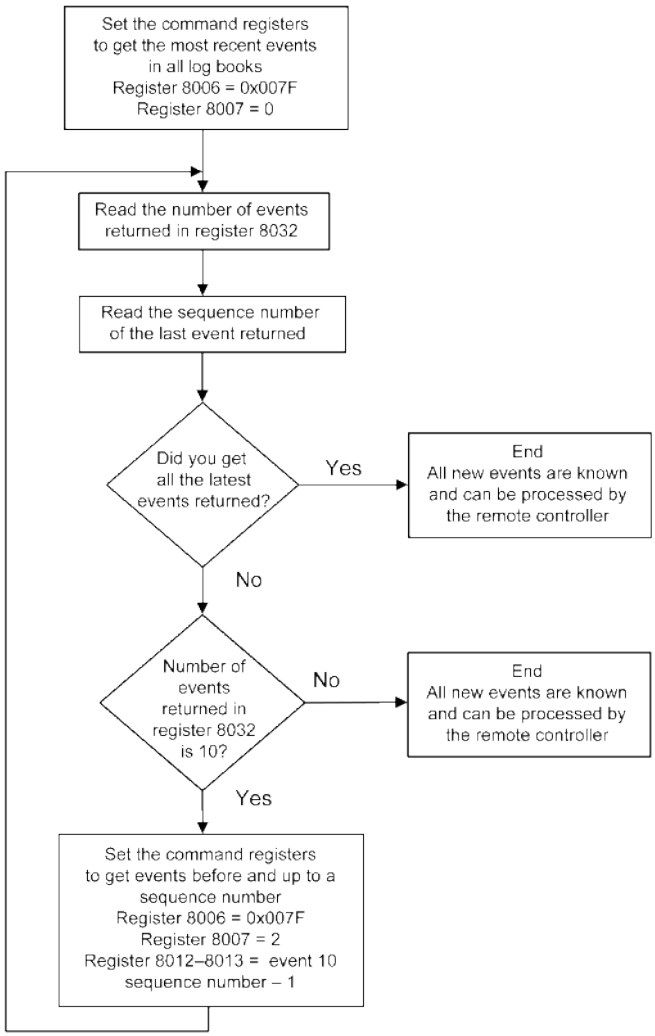
  NOTE: You can detect the occurrence of a new event by reading the last event sequence number available in registers 655–656 , page 124.

The command allows to get 10 events maximum, logged in one or several event log books, for one or several severity levels.

- To get the 10 most recent events, use the method “get the most recent events”.
- If there are more than 10 events, use any of the other two methods (get events logged before and up to a date or get events before and up to an event sequence number) to get rest of the events.

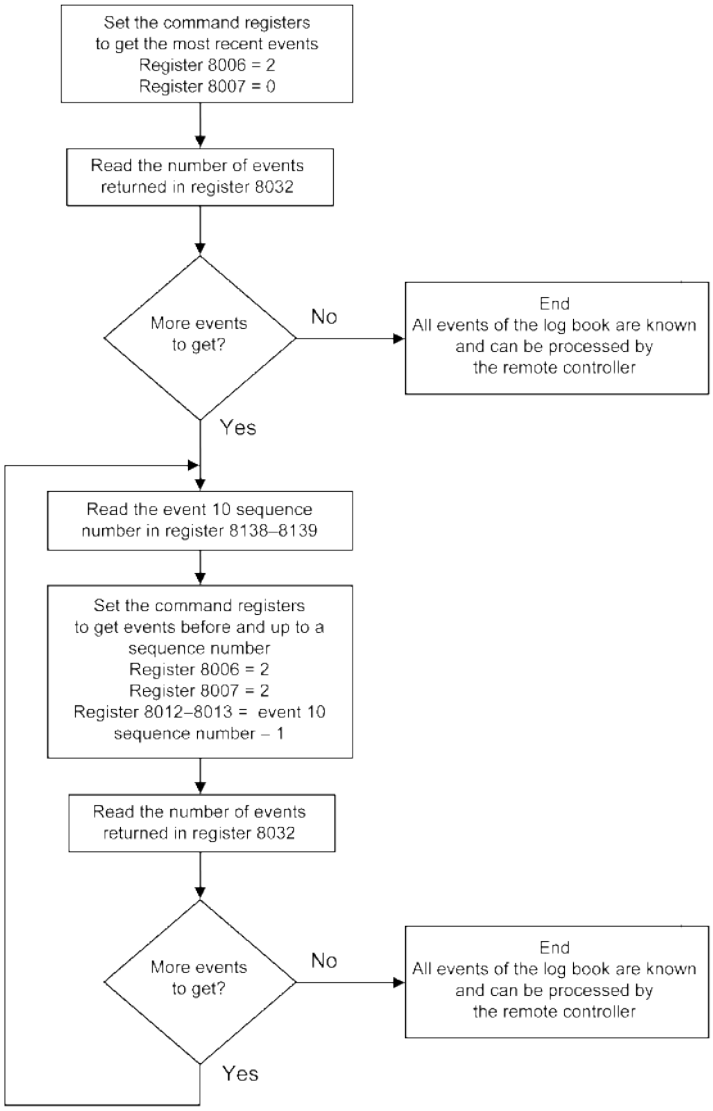
Example 1: Read the new events in all log books

The following diagram shows the steps to follow to read the new events in all log books:



Example 2: Read all events in the protection log book

The following diagram shows the steps to follow to read all events in the protection log book:



Get List of Digital Modules

To get the list of Digital Modules of the MicroLogic X control unit, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	50816	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006	–	INT16U	0	All Digital Modules

The list of Digital Modules of the MicroLogic X control unit is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	50816	Last command code
0x1F54	8021	–	INT16U	–	Command status:

Address	Register	Unit	Type	Range	Description
					• 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	–	Number of bytes returned
0x1F56	8023	–	INT16U	0	All Digital Modules
0x1F57	8024	–	INT16U	0–14	Number of Digital Modules returned
0x1F58	8025	–	INT16U	1–13 15 22	First Digital Module firmware identifier entry: • 1 = WFC trip oriented • 2 = Energy per phase • 3 = Harmonic ranks • 4 = Assistance to power restoration • 5 = Assistance to recloser • 6 = ANSI 27/59 voltage based protection • 7 = ANSI 32P reverse power protection • 8 = ANSI 51N/51G Ground-fault/Earth-leakage alarm • 9 = ERMS protection • 10 = Legacy dataset • 11 = ANSI 81 frequency based protection • 12 = ANSI 67 – Directional overcurrent protection • 13 = IEC 61850 for MasterPacT MTZ • 15 = ANSI 51 – IDMTL overcurrent protection • 22 = ANSI 51G – IDMT ground fault protection
0x1F59	8026	–	INT16U	1–13 15	Second Digital Module firmware identifier entry
0x1F5A	8027	–	INT16U	1–13 15	Third Digital Module firmware identifier entry
0x1F5B	8028	–	INT16U	1–13 15	Fourth Digital Module firmware identifier entry
0x1F5C	8029	–	INT16U	1–13 15	Fifth Digital Module firmware identifier entry
0x1F5D	8030	–	INT16U	1–13 15	Sixth Digital Module firmware identifier entry
0x1F5E	8031	–	INT16U	1–13 15	Seventh Digital Module firmware identifier entry
0x1F5F	8032	–	INT16U	1–13 15	Eighth Digital Module firmware identifier entry
0x1F60	8033	–	INT16U	1–13 15	Ninth Digital Module firmware identifier entry
0x1F61	8034	–	INT16U	1–13 15	Tenth Digital Module firmware identifier entry
0x1F62	8035	–	INT16U	1–13 15	Eleventh Digital Module firmware identifier entry
0x1F63	8036	–	INT16U	1–13 15	Twelfth Digital Module firmware identifier entry
0x1F64	8037	–	INT16U	1–13 15	Thirteenth Digital Module firmware identifier entry
0x1F65	8038	–	INT16U	1–13 15	Fourteenth Digital Module firmware identifier entry

Get Digital Module Details

To get the details of one Digital Module of the MicroLogic X control unit, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	50817	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006	–	INT16U	1–13 15 22	Requested Digital Module entry: • 1 = WFC trip oriented • 2 = Energy per phase • 3 = Harmonic ranks • 4 = Assistance to power restoration • 5 = Assistance to recloser • 6 = ANSI 27/59 voltage based protection • 7 = ANSI 32P reverse power protection • 8 = ANSI 51N/51G Ground-fault/Earth-leakage alarm • 9 = ERMS protection • 10 = Legacy dataset • 11 = ANSI 81 frequency based protection • 12 = ANSI 67 – Directional overcurrent protection • 13 = IEC 61850 for MasterPacT MTZ • 15 = ANSI 51 – IDMTL overcurrent protection • 22 = ANSI 51G – IDMT ground fault protection

The Digital Module details of the MicroLogic X control unit is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	50817	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	124	Number of bytes returned
0x1F56	8023	–	INT16U	1–13 15 22	Responded Digital Module entry: • 1 = WFC trip oriented • 2 = Energy per phase • 3 = Harmonic ranks • 4 = Assistance to power restoration • 5 = Assistance to recloser • 6 = ANSI 27/59 voltage based protection • 7 = ANSI 32P reverse power protection • 8 = ANSI 51N/51G Ground-fault/Earth-leakage alarm • 9 = ERMS protection • 10 = Legacy dataset • 11 = ANSI 81 frequency based protection • 12 = ANSI 67 – Directional overcurrent protection • 13 = IEC 61850 for MasterPacT MTZ • 15 = ANSI 51 – IDMTL overcurrent protection • ANSI 51G – IDMT ground fault protection

Address	Register	Unit	Type	Range	Description
0x1F57–0x1F5E	8024–8031	–	OCTET STRING	–	Digital Module product code (commercial reference)
0x1F5F–0x1F86	8032–8071	–	OCTET STRING	–	Digital Module model name
0x1F87–0x1F8C	8072–8077	–	OCTET STRING	–	Digital Module firmware version
0x1F8D	8078	–	–	–	Reserved
0x1F8E	8079	–	INT16U	–	MSB: Digital Module license type • 0 = No license installed • 1 = Temporary license installed • 2 = Permanent license installed
					LSB: Digital Module activation • 0 = Off • 1 = On
0x1F8F	8080	Days	INT16U	0–65534	Digital Module license remaining days (only for temporary license installed)
0x1F90–0x1F93	8081–8084	–	–	–	Reserved

MicroLogic X Control Unit Protection Commands with Session

What's in This Chapter

Description of Commands with Session 204
List of MicroLogic X Control Unit Protection Commands with Session and Error Codes 206
Session Management Commands 207
Protection Submit Commands 209
Protection Get Commands with Session 214

Description of Commands with Session

Presentation

The procedure for setting a protection setting conforms to UL489SE standard. It is safeguarded by an exclusive editing session and by a two-step procedure for submitting and applying setting changes.

The exclusive editing session means that only one interface at a time can access and set protection settings. Access from other interfaces is blocked when an editing session is open.

During the editing session there is no impact on the active protection provided by the MicroLogic X control unit until the new settings are applied. If the new settings are canceled, or the editing session times out before the new settings are applied, the active settings are maintained.

Enabling and Disabling Access to Protection Settings

You can enable or disable access to the protection settings by using the MicroLogic X display screen at **Home > Configuration > General > Lock protection**.

From the **Lock protection** screen of the MicroLogic X control unit, you can allow changes to the protection settings from the following interfaces:

- **Keypad**: MicroLogic X display screen keypad itself
- **External access**: EcoStruxure Power Commission software, EcoStruxure Power Device app, and communication network

For each interface:

- Set as **Allowed** (factory setting) to enable changes to be made.
- Set as **Not Allowed** to disable changes.

Editing Session for Selecting and Changing Protection Settings

An editing session has the following characteristics:

- Only one editing session at a time can be open. Access to protection settings from other interfaces is blocked when you open an editing session.
- There is a five-minute timeout for submitting and for applying new settings. The session times out as follows:
  - Five minutes after the session opens, if you do not submit the new settings
  - Five minutes after submitting the new settings, if you do not apply the new settings
- After applying new settings, get the apply setting status to check that the new protection settings are applied. Once apply is completed, close the session.
- When setting protection using the communication network, several protection functions of the same setting group can be set in one editing session, with a submit step after changing each function and one apply step to apply all the new settings. Active settings are maintained until the apply step is executed.
- The earth-leakage protection and the neutral protection can be set with the other protections of setting group A or setting group B.

- The protection settings activated when the ERMS function is engaged cannot be set by using the communication network.

  The ERMS settings can be set only as follows:

  - with EcoStruxure Power Commission software through a USB connection (password-protected)
  - with the EcoStruxure Power Device app (password-protected)

Two-Step Procedure for Submitting and Applying Protection Settings

The procedure for changing protection settings requires you to submit and apply the new settings in two consecutive steps:

Step	Action	
1	Submit new settings	Select new settings required and submit. The new settings are displayed so that you can check that the settings are correct before they are applied. Read the new settings to confirm that they are correct.
2	Apply new settings	Apply the new settings. The existing active protection settings are replaced by the new settings.

Protection Setting Procedure with Session

To set protection settings by using the communication network, external access to protection settings must be allowed by using the MicroLogic X display screen , page 204.

The following example shows how to set the long-time overcurrent protection setting group A:

Step	Action
1	Open the editing session with the open setup session command , page 207. **Result:** The session key for the editing session is returned to the command registers. The returned session key must be used in all commands during the session.
2	Submit the new protection settings with the submit long time over current protection settings command , page 209. The requested session key for the command must be the session key returned by the open setup session command.
3	Use the Get long time over current protection settings command , page 214 to read the submitted settings. The requested session key for the command must be the session key returned by the open setup session command.
4	Check that the protection settings submitted at step 2 and the protection settings got at step 3 are identical: • If the settings are identical, go to step 5 • If the settings are not identical, go to step 7 and start the setting procedure again
5	Apply submitted protection settings with the apply settings command , page 207. The requested session key for the command must be the session key returned by the open setup session command.
6	Use the Get apply setting status , page 208 to check that the new protection settings are applied. The requested session key for the command must be the session key returned by the open setup session command. **NOTE:** If the settings of other protection functions must be changed or if the settings of protection functions of another setting group must be changed, restart the setting procedure at step 2 for each protection functions
7	Close the editing session with the close setup session command , page 208. The requested session key for the command must be the session key returned by the open setup session command.

List of MicroLogic X Control Unit Protection Commands with Session and Error Codes

List of Commands

The MicroLogic X control unit protection commands with session are performed by the command interface, page 61. They are grouped by their functions and types:

- Session management commands , page 207
- Protection submit commands , page 209
- Protection get commands with session , page 214

In the MicroLogic X control unit registers:

- RC indicates the registers that can be read by a get command
- WC indicates the registers that can be written by a set and reset command

Error Codes

Error codes generated by MicroLogic X control units are the generic error codes, page 64.

Session Management Commands

List of Commands

The following table lists the commands necessary to manage the editing session of the setting protection function in accordance with UL489SE standard, their corresponding command codes and user profiles.

Command	Command Code	User profile
Open setup session , page 207	1930	Administrator
Apply settings , page 207	1932	Administrator
Get apply setting status , page 208	1924	No password required
Close setup session , page 208	1933	Administrator

Open Setup Session

To open setup session, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1930	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password

The session key for the editing session is returned to the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8020	–	INT16U	1930	Last command code
0x1F40	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = Command with error
0x1F41	8022	–	INT16U	4	Number of bytes returned
0x1F42–0x1F43	8023–8024	–	INT32U	0–4294967294	Session key for the command

Apply Settings

To apply settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1932	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command

Address	Register	Unit	Type	Range	Description
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45–0x1F46	8006–8007	–	INT32U	0–4294967294	Requested session key for the command

Get Apply Setting Status

To get apply setting status, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1924	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	0–4294967294	Requested session key for the command

The apply setting status is returned to the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	1924	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = Command with error
0x1F55	8022	–	INT16U	6	Number of bytes returned
0x1F56–0x1F57	80023–8024	–	INT32U	0–4294967294	Responded session key for the command. It must be equal to the requested session key for the command.
0x1F58	8025	–	INT16U	0–1	Status of the apply settings command: • 0 = No apply settings in progress • 1 = Apply settings in progress

Close Setup Session

To close setup session, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1933	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45–0x1F46	8006–8007	–	INT32U	0–4294967294	Requested session key for the command

Protection Submit Commands

List of Commands

The following table lists the protection submit commands, their corresponding command codes, and user profiles:

Command	Command code	User profile
Submit long time over current protection settings , page 209	51593	Administrator
Submit short time over current protection settings , page 210	51594	Administrator
Submit instantaneous protection settings , page 210	51595	Administrator
Submit ground fault protection settings , page 211	51596	Administrator
Submit earth leakage protection settings , page 212	51597	Administrator
Submit neutral protection settings , page 213	51598	Administrator

Submit Long Time Over Current Protection Settings

To get the long time over current protection settings, use the get long time over current protection setting command , page 214.

⚠WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by qualified electrical personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To submit the long time over current protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51593	Requested command code
0x1F40	8001	–	INT16U	26	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45-0x1F46	8006-8007	–	INT32U	0–4294967294	Requested session key for the command
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group • 1 = Setting group A • 2 = Setting group B
0x1F48	8009	–	–	0xFFFF	Reserved
0x1F49–0x1F4A	8010–8011	A	FLOAT32	–	Long time over current protection threshold setting group A or B (step 0.1 A)
0x1F4B–0x1F4C	8012–8013	s	FLOAT32	0.5-24.0 (step 0.5)	Long time over current protection time delay setting group A or B

Submit Short Time Over Current Protection Settings

To get the short time over current protection settings, use the get short time over current protection settings command , page 215.

⚠WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by qualified electrical personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To submit the short time over current protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51594	Requested command code
0x1F40	8001	–	INT16U	26	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45-0x1F46	8006-8007	–	INT32U	0–4294967294	Requested session key for the command
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group • 1 = Setting group A • 2 = Setting group B
0x1F48	8009	–	INT16U	–	MSB: 0 LSB: Short time over current protection curve setting group A or B • 0 = Definite time (I^2t = Off) • 1 = Inverse time (I^2t = On)
0x1F49–0x1F4A	8010–8011	–	FLOAT32	1.5–10.0 (step 0.1)	Short time over current protection threshold coefficient setting group A or B
0x1F4B–0x1F4C	8012–8013	s	FLOAT32	0–0.4 (step0.1)	Short time over current protection time delay setting group A or B

Submit Instantaneous Protection Settings

To get the instantaneous protection, use the get instantaneous protection settings command , page 217.

⚠WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by qualified electrical personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To submit the instantaneous protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51595	Requested command code
0x1F40	8001	–	INT16U	22	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45-0x1F46	8006-8007	–	INT32U	0–4294967294	Requested session key for the command
0x1F47	8008	–	INT16U	–	MSB: Instantaneous over current protection mode setting group A or B • 0 = Off • 1 = On LSB: Requested setting group • 1 = Setting group A • 2 = Setting group B
0x1F48–0x1F49	8009–8010		FLOAT32	(1)	Instantaneous over current protection threshold coefficient setting group A or B
0x1F4A	8011		INT16U		MSB: 0 LSB: Instantaneous over current protection time delay mode setting group A or B • 0 = Standard • 1 = Fast

(1) Ii setting range:
- for MicroLogic 5.0 X, 6.0 X and 7.0 X: 2.0 to 15.0 (step 0.1)
- for MicroLogic 3.0 X: 2.0 to 12.0 (step 0.1)

Submit Ground Fault Protection Settings

To get the ground fault protection settings, use the get ground fault protection settings command , page 218.

⚠WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by qualified electrical personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To submit the ground fault protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51596	Requested command code
0x1F40	8001	–	INT16U	26	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command

Address	Register	Unit	Type	Range	Description
0x1F43-0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Requested session key for the command
0x1F47	8008	–	INT16U	–	MSB: Ground fault protection mode (1) • 0 = Off (protection disabled) • 1 = On (protection enabled) LSB: Requested setting group • 1 = Setting group A • 2 = Setting group B
0x1F48	8009	–	INT16U	–	MSB: 0 LSB: Short time over current protection curve setting group A or B • 0 = Definite time (I^2t = Off) • 1 = Inverse time (I^2t = On)
0x1F49–0x1F4A	8010–8011	A	FLOAT32	–	Ground fault protection threshold setting group A or B (step 10 A)
0x1F4B–0x1F4C	8012–8013	s	FLOAT32	0–0.4 (step 0.1)	Ground fault protection time delay setting group A or B
(1) On MicroLogic 6.0 X for UL standard, the ground fault protection mode is always On. In case of setting the ground fault protection mode to Off, the result of the command will be 0x10, Input argument is out of range.					

Submit Earth Leakage Protection Settings

To get the earth leakage protection settings, use the get earth leakage protection settings command , page 219.

⚠WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by qualified electrical personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To submit the earth leakage protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51597	Requested command code
0x1F40	8001	–	INT16U	24	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Requested session key for the command
0x1F47	8008	–	–	0xFFFF	Reserved
0x1F48–0x1F49	8009–8010	A	FLOAT32	0.5–30.0 (step 0.1)	Earth leakage protection threshold
0x1F4A–0x1F4B	8011–8012	s	FLOAT32	0.06, 0.15, 0.23, 0.35, 0.80	Earth leakage protection time delay

Submit Neutral Protection Settings

To get the neutral protection settings, use the get neutral protection settings command , page 220.

⚠WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by qualified electrical personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To submit the neutral protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51598	Requested command code
0x1F40	8001	–	INT16U	16	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Requested session key for the command
0x1F47	8008	–	INT16U	0-3	Neutral protection type: • 0 = Off • 1 = 0.5 • 2 = 1.0 • 3 = Oversized

Protection Get Commands with Session

List of Commands

The following table lists the protection get commands with session, their corresponding command codes, and user profiles:

Command	Command code	User profile
Get long time over current protection settings , page 214	51584	No password required
Get short time over current protection settings , page 215	51585	No password required
Get instantaneous protection settings , page 217	51586	No password required
Get ground fault protection settings , page 218	51587	No password required
Get earth leakage protection settings , page 219	51588	No password required
Get neutral protection settings , page 220	51589	No password required

Get Long Time Over Current Protection Settings

To get the long time over current protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51584	Requested command code
0x1F40	8001	–	INT16U	16	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group • 0 = Current setting group • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS

The long time over current protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51584	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	56	Number of bytes returned
0x1F56-0x1F57	8023–8024	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F58	8025	–	INT16U	–	MSB: Requested setting group • 0 = Current setting group • 1 = Setting group A

Address	Register	Unit	Type	Range	Description
					• 2 = Setting group B • 3 = Setting group ERMS LSB: Responded setting group • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS • 128 = Fallback setting
0x1F59	8026	–	INT16U	–	MSB: Long time over current protection mode • 0 = Off • 1 = On (tripping) LSB: Long time over current protection supported • 0 = Not supported • 1 = Supported
0x1F5A-0x1F5D	8027–8030	–	DATETIME	–	Timestamp of last change of long time over current protection mode
0x1F5E	8031	–	INT16U	–	Timestamp quality of last change of long time over current protection mode
0x1F5F-0x1F62	8032–8035	–	DATETIME	–	Timestamp of last change of any parameter of the long time over current protection function
0x1F63	8036	–	INT16U	–	Timestamp quality of last change of any parameter of the long time over current protection function
0x1F64-0x1F65	8037–8038	–	FLOAT32	–	Long time over current protection threshold coefficient high limit
0x1F66-0x1F67	8039–8040	s	FLOAT32	–	Long time over current protection time delay high limit
0x1F68	8041	–	INT16U	1	MSB: 0 LSB: Long time over current protection curve • 1 = Inverse time (I^2t = ON)
0x1F69-0x1F6A	8042–8043	A	FLOAT32	–	Long time over current protection threshold
0x1F6B-0x1F6C	8044–8045	s	FLOAT32	–	Long time over current protection time delay
0x1F6D-0x1F71	8046–8050	–	–	–	Reserved

Get Short Time Over Current Protection Settings

To get the short time over current protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51585	Requested command code
0x1F40	8001	–	INT16U	16	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

Address	Register	Unit	Type	Range	Description
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group • 0 = Current setting group • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS

The short time over current protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51585	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	56	Number of bytes returned
0x1F56-0x1F57	8023–8024	–	INT32U	0–4294967-294	Key for the protection get command with session
0x1F58	8025	–	INT16U	–	MSB: Requested setting group • 0 = Current setting group • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS LSB: Responded setting group • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS • 128 = Fallback setting
0x1F59	8026	–	INT16U	–	MSB: Short time over current protection mode • 0 = Off • 1 = On (tripping) LSB: Short time over current protection supported • 0 = Not supported • 1 = Supported
0x1F5A-0x1F5D	8027–8030	–	DATETIME	–	Timestamp of last change of short time over current protection mode
0x1F5E	8031	–	INT16U	–	Timestamp quality of last change of short time over current protection mode
0x1F5F-0x1F62	8032–8035	–	DATETIME	–	Timestamp of last change of any parameter of the short time over current protection function
0x1F63	8036	–	INT16U	–	Timestamp quality of last change of any parameter of the short time over current protection function.
0x1F64-0x1F65	8037–8038	–	FLOAT32	–	Short time over current protection threshold coefficient high limit
0x1F66-0x1F67	8039–8040	s	FLOAT32	–	Short time over current protection time delay high limit
0x1F68	8041	–	INT16U	–	MSB: 0 LSB: Short time over current protection curve • 0 = Definite time (I^2t = OFF) • 1 = Inverse time (I^2t = ON)
0x1F69-0x1F6A	8042–8043	–	FLOAT32	–	Short time over current protection threshold coefficient

Address	Register	Unit	Type	Range	Description
0x1F6B-0x1F6C	8044–8045	s	FLOAT32	–	Short time over current protection time delay
0x1F6D-0x1F71	8046–8050	–	–	–	Reserved

Get Instantaneous Protection Settings

To get the instantaneous protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51586	Requested command code
0x1F40	8001	–	INT16U	16	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group • 0 = Current setting group • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS

The instantaneous protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51586	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	44	Number of bytes returned
0x1F56-0x1F57	8023–8024	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F58	8025	–	INT16U	–	MSB: Requested setting group • 0 = Current setting group • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS LSB: Responded setting group • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS • 128 = Fallback setting
0x1F59	8026	–	INT16U	–	MSB: Instantaneous over current protection mode • 0 = Off • 1 = On (tripping) LSB: Instantaneous over current protection function supported • 0 = Not supported • 1 = Supported

Address	Register	Unit	Type	Range	Description
0x1F5A-0x1F5D	8027–8030	–	DATETIME	–	Timestamp of last change of instantaneous over current protection mode
0x1F5E	8031	–	INT16U	–	Timestamp quality of last change of instantaneous over current protection mode
0x1F5E-0x1F62	8032–8035	–	DATETIME	–	Timestamp of last change of any parameter of the instantaneous over current protection mode
0x1F63	8036	–	INT16U	–	Timestamp quality of last change of any parameter of the instantaneous over current protection function
0x1F64-0x1F65	8037–8038	–	FLOAT32	–	Instantaneous over current protection threshold coefficient high limit
0x1F66-0x1F67	8039–8040	–	FLOAT32	–	Instantaneous over current protection threshold coefficient
0x1F68	8041	–	INT16U	–	MSB: 0 LSB: Instantaneous over current protection time delay mode: • 0 = Standard • 1 = Fast
0x1F69-0x1F6B	8042–8044	–	–	–	Reserved

Get Ground Fault Protection Settings

To get the ground fault protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51587	Requested command code
0x1F40	8001	–	INT16U	16	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group • 0 = Current setting group • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS

The ground fault protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51587	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	56	Number of bytes returned
0x1F56-0x1F57	8023–8024	–	INT32U	0–4294967294	Key for the protection get command with session

Address	Register	Unit	Type	Range	Description
0x1F58	8025	–	INT16U	–	MSB: Requested setting group • 0 = Current setting group • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS LSB: Responded setting group • 1 = Setting group A • 2 = Setting group B • 3 = Setting group ERMS • 128 = Fallback setting
0x1F59	8026	–	INT16U	–	MSB: Ground fault protection mode • 0 = Off • 1 = On (tripping) LSB: Ground fault protection function supported • 0 = Not supported • 1 = Supported
0x1F5A-0x1F5D	8027–8030	–	DATETIME	–	Timestamp of last change of ground fault protection mode
0x1F5E	8031	–	INT16U	–	Timestamp quality of last change of ground fault protection mode
0x1F5F-0x1F62	8032–8035	–	DATETIME	–	Timestamp of last change of any parameter of the ground fault protection function
0x1F63	8036	–	INT16U	–	Timestamp quality of last change of any parameter of the ground fault protection function
0x1F64-0x1F65	8037–8038	–	FLOAT32	–	Ground fault protection threshold coefficient high limit
0x1F66-0x1F67	8039–8040	s	FLOAT32	–	Ground fault protection time delay high limit
0x1F68	8041	–	INT16U	–	MSB: 0 LSB: Ground fault protection curve • 0 = Definite time (I^2t = OFF) • 1 = Inverse time (I^2t = ON)
0x1F69-0x1F6A	8042–8043	A	FLOAT32	–	Ground fault protection threshold
0x1F6B-0x1F6C	8044–8045	s	FLOAT32	–	Ground fault protection time delay
0x1F6D-0x1F71	8046–8050	–	–	–	Reserved

Get Earth Leakage Protection Settings

To get the earth leakage protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51588	Requested command code
0x1F40	8001	–	INT16U	16	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F47	8008	–	–	0xFFFF	Reserved

The earth leakage protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51588	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	52	Number of bytes returned
0x1F56-0x1F57	8023–8024	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F58	8025	–	–	0xFFFF	Reserved
0x1F59	8026	–	INT16U	–	MSB: Earth leakage protection mode • 0 = Off • 1 = On LSB: Earth leakage function supported • 0 = Not supported • 1 = Supported
0x1F5A-0x1F5D	8027–8030	–	DATETIME	–	Timestamp of last change of earth leakage protection mode
0x1F5E	8031	–	INT16U	–	Timestamp quality of last change of earth leakage protection mode
0x1F5F-0x1F62	8032–8035	–	DATETIME	–	Timestamp of last change of any parameter of the earth leakage protection function
0x1F63	8036	–	INT16U	–	Timestamp quality of last change of any parameter of the earth leakage protection function
0x1F64-0x1F65	8037–8038	–	FLOAT32	–	Earth leakage protection threshold coefficient high limit
0x1F66-0x1F67	8039–8040	s	FLOAT32	–	Earth leakage protection time delay high limit
0x1F68-0x1F69	8041–8042	A	FLOAT32	–	Earth leakage protection threshold
0x1F6A-0x1F6B	8043–8044	s	FLOAT32	0.06, 0.15, 0.23, 0.35, 0.80	Earth leakage protection time delay
0x1F6C-0x1F6F	8045–8048	–	–	–	Reserved

Get Neutral Protection Settings

To get the neutral protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51589	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Key for the protection get command with session

The neutral protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51589	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error
0x1F55	8022	–	INT16U	32	Number of bytes returned
0x1F56-0x1F57	8023–8024	–	INT32U	0–4294967-294	Key for the protection get command with session
0x1F58	8025	–	INT16U	–	MSB: Neutral protection mode • 0 = Off • 1 = On LSB: Neutral protection function supported • 0 = Not supported • 1 = Supported
0x1F59-0x1F5C	8026–8029	–	DATETIME	–	Timestamp of last change of neutral protection mode
0x1F5D	8030	–	INT16U	–	Timestamp quality of last change of neutral protection mode
0x1F5E-0x1F61	8031–8034	–	DATETIME	–	Timestamp of last change of any parameter of the neutral protection function
0x1F62	8035	–	INT16U	–	Timestamp quality of last change of any parameter of the neutral protection function
0x1F63	8036	–	INT16U	0–3	MSB: 0 LSB: Neutral protection type • 0 = OFF • 1 = 0.5 • 2 = 1.0 • 3 = Oversized
0x1F64-0x1F65	8037–8038	A	FLOAT32	–	Long time over current protection threshold

MicroLogic Active Control Unit Data for MasterPacT MTZ Circuit Breakers

What's in This Part

MicroLogic Active Modbus Register Tables.....223
MicroLogic Active Control Unit Registers.....225
MicroLogic Active Control Unit Commands.....255
MicroLogic Active Control Unit Protection Commands with Session 259

MicroLogic Active User Guide

For more information about MicroLogic Active functions, refer to DOCA0265•• *MasterPacT MTZ - MicroLogic Active Control Unit - User Guide* in **Related Documents** at the beginning of this guide.

MicroLogic Active Modbus Register Tables

General Description

The following chapters describe the Modbus registers of a MicroLogic Active control unit embedded in a MasterPacT MTZ circuit breaker. These registers provide information that can be read, such as electrical measures, protection configuration, and monitoring information. The command interface enables the user to modify these registers in a controlled way.

The MicroLogic Active Control Unit Registers, page 225 registers are grouped in tables of logically related information. The contents of the tables are ordered by increasing address.

The MicroLogic Active Control Unit Commands, page 255 commands are described separately.

MicroLogic Active Table Format

MicroLogic Active Modbus register tables have the following columns:

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description

- **Address**: a 16-bit register address in hexadecimal. The address is data used in the Modbus frame.
- **Register**: a 16-bit register number in decimal (register = address + 1).
- **RW**: register read-write status
  - R: the register can be read by using Modbus functions
  - W: the register can be written by using Modbus functions
  - RW: the register can be read and written by using Modbus functions
  - RC: the register can be read by using the command interface
  - WC: the register can be written by using the command interface
  - R-WC: the register can be read by using Modbus functions, and written by using the command interface
- **X**: the scale factor. A scale of 10 means that the register contains the value multiplied by 10. So, the real value is the value in the register divided by 10.

  Example:

  Register 1054 contains the system frequency, page 229. The unit is Hz and the scale factor is 10.

  If the register returns 503, this means that the system frequency is

  503/10 = 50.3 Hz.
- **Unit**: the unit of the information
- **Type**: the encoding data type (see data type description below)
- **Range**: the permitted values for this variable, usually a subset of what the format allows
- **A/E**: the metering type of the MicroLogic Active control unit
  - type A (Ammeter), applicable to MicroLogic Active A/AP: current measurements
  - type E (Energy), applicable to MicroLogic Active E/EP/Ei: current, voltage, power, and energy measurements
- **Bit**: description of bit-level functions, for example circuit breaker status and protection status

- **Description**: provides information about the register and restrictions that apply

MicroLogic Active Data Types

Data Types	Description	Range
INT16U	16-bit unsigned integer	0 to 65535
INT16	16-bit signed integer	-32768 to +32767
INT32U	32-bit unsigned integer	0 to 4 294 967 295
INT32	32-bit signed integer	-2 147 483 648 to +2 147 483 647
INT64U	64-bit unsigned integer	0 to 18 446 744 073 709 600 000
INT64	64-bit signed integer	-9 223 372 036 854 775 808 to +9 223 372 036 854 775 807
FLOAT32	32-bit signed integer with a floating point	2^{-126} (1.0) to 2^{127} (2 - 2^{-23})
OCTET STRING	Text string	1 byte per character
MOD10000	Modulo operation	–
DATE	Date and time	–
XDATE	Same as DATE with a fourth INT16U register for milliseconds information	–
ULP DATE	Date and time in ULP DATE format.	–

See detailed descriptions of the data types in the Appendix, page 580.

MicroLogic Active Control Unit Registers

What's in This Chapter

Real-Time Measurements 226
Minimum/Maximum Values of Real-Time Measurements 230
Energy Measurements 231
Demand Measurements 233
MicroLogic Active Control Unit Identification 235
Circuit Breaker Status 239
Counters 242
Trip History 243
Standard Protection Parameters 245
Measurement Parameters 247
Time-Stamped Information 250
Maintenance Indicators 252
Miscellaneous 253

Real-Time Measurements

General Description

Real-time measurements are refreshed every second. Real-time measurements include:

- voltage and voltage unbalance
- current and current unbalance
- active, reactive, apparent, and distortion power
- power factor and fundamental power factor
- frequency
- active, reactive and apparent energy

Voltage

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x03E7	1000	R	1	V	INT16U	0–1200	E	RMS phase-to-phase voltage V12
0x03E8	1001	R	1	V	INT16U	0–1200	E	RMS phase-to-phase voltage V23
0x03E9	1002	R	1	V	INT16U	0–1200	E	RMS phase-to-phase voltage V31
0x03EA	1003	R	1	V	INT16U	0–1200	E	RMS phase-to-neutral voltage V1N (1)
0x03EB	1004	R	1	V	INT16U	0–1200	E	RMS phase-to-neutral voltage V2N (1)
0x03EC	1005	R	1	V	INT16U	0–1200	E	RMS phase-to-neutral voltage V3N (1)
0x03ED	1006	R	1	V	INT16U	0–1200	E	Arithmetic mean of V12, V23, and V31: (V12 + V23 + V31) / 3 = V_{avg} L-L
0x03EE	1007	R	1	V	INT16U	0–1200	E	Arithmetic mean of V1N, V2N, and V3N: (V1N + V2N + V3N) / 3 = V_{avg} L-N (1)
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 247.								

Voltage Unbalance

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x03EF	1008	R	10	%	INT16	-1000–+1000	E	V12 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages
0x03F0	1009	R	10	%	INT16	-1000–+1000	E	V23 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages
0x03F1	1010	R	10	%	INT16	-1000–+1000	E	V31 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages
0x03F2	1011	R	10	%	INT16	-1000–+1000	E	V1N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages (1)
0x03F3	1012	R	10	%	INT16	-1000–+1000	E	V2N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages (1)
0x03F4	1013	R	10	%	INT16	-1000–+1000	E	V3N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages (1)
0x03F5	1014	R	10	%	INT16	-1000–+1000	E	Maximum phase-to-phase voltage unbalance value of registers 1008, 1009, and 1010

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x03F6	1015	R	10	%	INT16	-1000–+1000	E	Maximum phase-to-neutral voltage unbalance value of registers 1011, 1012, and 1013 (1)
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 247.								

Current

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x03F7	1016	R	1	A	INT16U	0–32767	A/E	RMS current on phase 1: I1
0x03F8	1017	R	1	A	INT16U	0–32767	A/E	RMS current on phase 2: I2
0x03F9	1018	R	1	A	INT16U	0–32767	A/E	RMS current on phase 3: I3
0x03FA	1019	R	1	A	INT16U	0–32767	A/E	RMS current on the neutral: IN (1)
0x03FB	1020	R	1	A	INT16U	0–32767	A/E	Maximum of I1, I2, I3, and IN
0x03FC	1021	R	1	%Ig	INT16U	0–32767	A/E	Ground-fault current (2)
0x03FD-0x0401	1022–1026	–	–	–	–	–	–	Reserved
0x0402	1027	R	1	A	INT16U	0–32767	E	Arithmetic mean of I1, I2, and I3: (I1 + I2 + I3) / 3 = I_{avg}
(1) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 247. (2) Accessible only with MicroLogic Active 5.0 E and 6.0 A/E control units.								

Current Unbalance

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0403	1028	R	10	%	INT16	-1000–+1000	E	I1 current unbalance in relation to the arithmetic mean of the phase currents
0x0404	1029	R	10	%	INT16	-1000–+1000	E	I2 current unbalance in relation to the arithmetic mean of the phase currents
0x0405	1030	R	10	%	INT16	-1000–+1000	E	I3 current unbalance in relation to the arithmetic mean of the phase currents
0x0406	1031	R	10	%	INT16	-1000–+1000	E	IN current unbalance in relation to the arithmetic mean of the phase currents (1)
0x0407	1032	R	10	%	INT16	-1000–+1000	E	Maximum current unbalance of registers 1028, 1029, and 1030
(1) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 247.								

Active Power

The flow sign of the active power depends on the configuration of register 3316, page 247.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0409	1034	R	1	kW	INT16	-32767–+32767	E	Active power on phase 1: P1 (1)
0x040A	1035	R	1	kW	INT16	-32767–+32767	E	Active power on phase 2: P2 (1)
0x040B	1036	R	1	kW	INT16	-32767–+32767	E	Active power on phase 3: P3 (1)

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x040C	1037	R	1	kW	INT16	-32767–+32767	E	Total active power: Ptot
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 247.								

Reactive Power

The flow sign of the reactive power depends on the configuration of register 3316, page 247.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x040D	1038	R	1	kvar	INT16	-32767–+32767	E	Reactive power on phase 1: Q1
0x040E	1039	R	1	kvar	INT16	-32767–+32767	E	Reactive power on phase 2: Q2
0x040F	1040	R	1	kvar	INT16	-32767–+32767	E	Reactive power on phase 3: Q3
0x0410	1041	R	1	kvar	INT16	-32767–+32767	E	Total reactive power: Qtot
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 247.								

Apparent Power

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0411	1042	R	1	kVA	INT16U	0–32767	E	Apparent power on phase 1: S1 (1)
0x0412	1043	R	1	kVA	INT16U	0–32767	E	Apparent power on phase 2: S2 (1)
0x0413	1044	R	1	kVA	INT16U	0–32767	E	Apparent power on phase 3: S3 (1)
0x0414	1045	R	1	kVA	INT16U	0–32767	E	Total apparent power: Stot
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 247.								

Power Factor

The sign of the power factor depends on the configuration of register 3318, page 248.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0415	1046	R	1000	–	INT16	-1000–+1000	E	Power factor on phase 1: PF1 (absolute value equal to |P1|/S1) (1)
0x0416	1047	R	1000	–	INT16	-1000–+1000	E	Power factor on phase 2: PF2 (absolute value equal to |P2|/S2) (1)
0x0417	1048	R	1000	–	INT16	-1000–+1000	E	Power factor on phase 3: PF3 (absolute value equal to |P3|/S3) (1)
0x0418	1049	R	1000	–	INT16	-1000–+1000	E	Total power factor: PF (absolute value equal to |Ptotal| / Stotal) (1)
0x0419-0x041C	1050–1053	–	–	–	–	–	–	Reserved
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 247.								

Frequency

When the MicroLogic Active control unit cannot calculate the frequency, it returns Not applicable = 32768 (0x8000).

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x041D	1054	R	10	Hz	INT16U	400–600	E	System frequency: F

Minimum/Maximum Values of Real-Time Measurements

Minimum of Real-Time Measurements

Registers 1300 to 1599 hold the minimum values of real-time metering parameters:

- Available only with MicroLogic Active E control units.
- The register of the minimum value of a real-time metering parameter is equal to the register of the real-time metering parameter plus 300.

  Examples:

  - Register 1300 holds the minimum value of the phase-to-phase voltage V12 (register 1000).
  - Register 1316 holds the minimum value of the current on phase 1 (register 1016).
- The order of the registers is the same as that of the real-time metering variables.
- The scale factors of the minimum values are the same as those of the real-time metering parameters.
- The minimum values of arithmetic means and unbalance voltage (registers 1306–1315) and for unbalance current (registers 1327 to 1332) are not available with MicroLogic Active E control units.

Maximum of Real-Time Measurements

Registers 1600 to 1899 hold the maximum values of real-time metering parameters:

- Available only with MicroLogic Active E control units.
- The register of the maximum value of a real-time metering parameter is equal to the register of the real-time metering parameter plus 600.

  Examples:

  - Register 1600 holds the maximum value of the phase-to-phase voltage V12 (register 1000).
  - Register 1616 holds the maximum value of the current on phase 1 (register 1016).
- The order of the registers is the same as that of the real-time metering variables.
- The scale factors of the maximum values are the same as those of the real-time metering parameters.
- The maximum values of arithmetic means and unbalance voltage (registers 1606–1615) and for unbalance current (registers 1627 to 1632) are not available with MicroLogic Active E control units.

Energy Measurements

General Description

Energy measurements include:

- active energy Ep
- reactive energy Eq
- apparent energy Es
- active energy counted positively (EpIn) or negatively (EpOut), according to the configuration of register 3316 , page 340
- reactive energy counted positively (EqIn) or negatively (EqOut), according to the configuration of register 3316 , page 340
- active energy and reactive energy are accumulated according to the configuration of register 3324 (absolute mode by factory setting) , page 341

The reset minimum/maximum command (command code = 46728) can reset the content of the energy measurement registers.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x07CF–0x07D2	2000–2003	R-WC	1	kWh	MOD 10000	-10^{16} to $+10^{16}$	E	Total active energy: Ep (1)
0x07D3–0x07D6	2004–2007	R-WC	1	kVARh	MOD 10000	-10^{16} to $+10^{16}$	E	Total reactive energy: Eq (1)
0x07D7–0x07DA	2008–2011	R-WC	1	kWh	MOD 10000	-10^{16} to $+10^{16}$	E	Active energy counted positively: EpIn
0x07DB–0x07DE	2012–2015	R-WC	1	kWh	MOD 10000	-10^{16} to $+10^{16}$	E	Active energy counted negatively: EpOut
0x07DF–0x07E2	2016–2019	R-WC	1	kVARh	MOD 10000	-10^{16} to $+10^{16}$	E	Reactive energy counted positively: EqIn
0x07E3–0x07E6	2020–2023	R-WC	1	kVARh	MOD 10000	-10^{16} to $+10^{16}$	E	Reactive energy counted negatively: EqOut
0x07E7–0x07EA	2024–2027	R-WC	1	kVAh	MOD 10000	-10^{16} to $+10^{16}$	E	Total apparent energy: Es
0x0BDD–0x0BDF	3038–3040	R	1	–	DATE	–	E	Date of last reset of energy meters
(1) Total active energy and total reactive energy are always counted positively with MicroLogic Active E control unit.								

NOTE:

- The MicroLogic Active E control unit screen displays positive values only up to 999 999 999 kWh. Above this value, MicroLogic Active E control unit screen displays 999 999 999 kWh.
- MOD10000 format is explained in the Appendix, page 580.

The behavior is the same for reactive energy and apparent energy.

Energy per Phase

Address	Register	RW	Unit	Type	Range	A/E	Description
0xAD70–0xAD73	44401–44404	R-WC	Wh	INT64	–	E	Active energy delivered on phase 1 (into the load, counted positively)(1)
0xAD74–0xAD77	44405–44408	R-WC	Wh	INT64	–	E	Active energy received on phase 1 (out of the load, counted negatively)(1)
0xAD80–0xAD83	44417–44420	R-WC	Wh	INT64	–	E	Active energy delivered on phase 2 (into the load, counted positively)(1)
0xAD84–0xAD87	44421–44424	R-WC	Wh	INT64	–	E	Active energy received on phase 2 (out of the load, counted negatively)(1)

Address	Register	RW	Unit	Type	Range	A/E	Description
0xAD90–0xAD93	44433–44436	R-WC	Wh	INT64	–	E	Active energy delivered on phase 3 (into the load, counted positively)(1)
0xAD94–0xAD97	44437–44440	R-WC	Wh	INT64	–	E	Active energy received on phase 3 (out of the load, counted negatively)(1)
0xADA0–0xADA3	44449–44452	R-WC	VArh	INT64	–	E	Reactive energy delivered on phase 1 (into the load, counted positively)(1)
0xADA4–0xADA7	44453–44456	R-WC	VArh	INT64	–	E	Reactive energy received on phase 1 (out of the load, counted negatively)(1)
0xADB0–0xADB3	44465–44468	R-WC	VArh	INT64	–	E	Reactive energy delivered on phase 2 (into the load, counted positively)(1)
0xADB4–0xADB7	44469–44472	R-WC	VArh	INT64	–	E	Reactive energy received on phase 2 (out of the load, counted negatively)(1)
0xADC0–0xADC3	44481–44484	R-WC	VArh	INT64	–	E	Reactive energy delivered on phase 3 (into the load, counted positively)(1)
0xADC4–0xADC7	44485–44488	R-WC	VArh	INT64	–	E	Reactive energy received on phase 3 (out of the load, counted negatively)(1)
0xADD0–0xADD3	44497–44500	R-WC	VAh	INT64	–	E	Apparent energy on phase 1(1)
0xADD8–0xADDB	44505–44508	R-WC	VAh	INT64	–	E	Apparent energy on phase 2(1)
0xADE0–0xADE3	44513–44516	R-WC	VAh	INT64	–	E	Apparent energy on phase 3(1)
(1) Value reset with the reset energies command.							

Demand Measurements

General Description

Demand registers include:

- current demand
- active, reactive, and apparent power demand

The window duration of current demand depends on the configuration of register 3352. Refer to Demand Time, page 248.

The window duration and the window type of power demand depend on the configuration of registers 3354 and 3355. Refer to Demand Time, page 248.

- For the block window, the demand value is updated at the end of the window.
- For the sliding window,
  - If window duration is configured for less or equal to 15 minutes, the demand value is updated every 15 seconds.
  - If window duration is configured for more than 15 minutes, the demand value is updated every 1 minute.

The reset minimum/maximum command (command code = 46728) can reset the content of the peak demand measurement registers.

Current Demand

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0897	2200	R	1	A	INT16U	0–32767	E	Current demand on phase 1: I1 Dmd (2)
0x0898	2201	R	1	A	INT16U	0–32767	E	Current demand on phase 2: I2 Dmd (2)
0x0899	2202	R	1	A	INT16U	0–32767	E	Current demand on phase 3: I3 Dmd (2)
0x089A	2203	R	1	A	INT16U	0–32767	E	Current demand on the neutral: IN Dmd (1) (2)
0x089B	2204	R	1	A	INT16U	0–32767	E	Maximum current demand on phase 1 since the last reset: I1 Peak Dmd
0x089C	2205	R	1	A	INT16U	0–32767	E	Maximum current demand on phase 2 since the last reset: I2 Peak Dmd
0x089D	2206	R	1	A	INT16U	0–32767	E	Maximum current demand on phase 3 since the last reset: I3 Peak Dmd
0x089E	2207	R	1	A	INT16U	0–32767	E	Maximum current demand on the neutral since the last reset: IN Peak Dmd (1)
0x089F-0x08AE	2208–2223	–	–	–	–	–	–	Reserved

(1) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 247.

(2) Only the thermal algorithm is available with MicroLogic Active E control units.

Active Power Demand

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x08AF	2224	R	1	kW	INT16U	0–32767	E	Total active power demand: P Dmd (1) (3)
0x08B0	2225	R	1	kW	INT16U	0–32767	E	Maximum total active power demand since the last reset: P Peak Dmd
0x08B1	2226	R	1	kW	INT16U	0–32767	E	Predicted active power demand at the end of the window (2)

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x08B2	2227	R	1000	–	INT16	-1000–+1000	E	Total power factor at last active power demand maximum
0x08B3-0x08B4	2228–2229	–	–	–	–	–	–	Reserved

(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every 15 seconds.

(2) Value is updated every 15 seconds for both block window and sliding window types.

(3) Only the thermal algorithm is available with MicroLogic Active E control units.

Reactive Power Demand

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x08B5	2230	R	1	kvar	INT16U	0–32767	E	Total reactive power demand: Q Dmd (1)
0x08B6	2231	R	1	kvar	INT16U	0–32767	E	Reactive power demand maximum since the last reset: Q Peak Dmd
0x08B7	2232	R	1	kvar	INT16U	0–32767	E	Predicted reactive power demand at the end of the window (2)
0x08B8	2233	R	1000	–	INT16	-1000–+1000	E	Total power factor at last reactive power demand maximum
0x08B9-0x08BA	2234–2235	–	–	–	–	–	–	Reserved

(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every 15 seconds.

(2) Value is updated every 15 seconds for both block window and sliding window types.

Apparent Power Demand

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x08BB	2236	R	1	kVA	INT16U	0–32767	E	Total apparent power demand: S Dmd (1)
0x08BC	2237	R	1	kVA	INT16U	0–32767	E	Maximum total apparent power demand since last reset: S Peak Dmd
0x08BD	2238	R	1	kVA	INT16U	0–32767	E	Predicted apparent power demand at the end of the window (2)
0x08BE	2239	R	1000	–	INT16	-1000–+1000	E	Total power factor at last apparent power demand maximum
0x08BF-0x08C0	2240–2241	–	–	–	–	–	–	Reserved

(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every 15 seconds.

(2) Value is updated every 15 seconds for both block window and sliding window types.

MicroLogic Active Control Unit Identification

Hardware Revision

The hardware revision is an ASCII string using the format AAA.BBB.CCC with:

- AAA = major version (000 – 127)
- BBB = minor version (000 – 255)
- CCC = revision number (000 – 255)

The NULL character ends the revision number.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x2047–0x204C	8264–8269	R	1	–	OCTET STRING	–	A/E	Hardware revision

Firmware Version

The MicroLogic Active firmware version is available in two formats:

- For compatibility with MicroLogic X control units, the firmware version is an ASCII string using the format AAA.BBB.CCC, where:
  - AAA = major version (000 – 127)
  - BBB = minor version (000 – 255)
  - CCC = revision number (000 – 255)

  The NULL character ends the revision number.
- For compatibility with MicroLogic A/E/P/H trip units, the firmware version is an integer, calculated as follows: AAA*1000 + BBB. For example, 004.002.003 is converted to 4002.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x2094–0x2099	8341–8346	R	1	–	OCTET STRING	–	A/E	Firmware version for compatibility with MicroLogic X control units

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x2005	8710	R	1	–	INT16U	–	A/E	Firmware version for compatibility with MicroLogic A/E/P/H trip units

Product Identification

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x20D9	8410	R	1	–	INT16U	16131–16135	A/E	Product identification : 16131 = MicroLogic Active A 16132 = MicroLogic Active E 16133 = MicroLogic Active AP 16134 = MicroLogic Active 6.0 EP 16135 = MicroLogic Active 6.0 Ei
0x20DA–0x20E3	8411–8420	R	1	–	OCTET STRING	–	A/E	Vendor name: ‘Schneider Electric’
0x20E4–0x2123	8421–8484	R	1	–	OCTET STRING	–	A/E	Vendor URL
0x2124–0x212D	8485–8492	R	1	–	OCTET STRING	–	A/E	Product range: ‘MicroLogic’

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x212C–0x2132	8493–8500	R	1	–	OCTET STRING	–	A/E	Product model
0x2134–0x213B	8501–8508	R	1	–	OCTET STRING	–	A/E	Product code
0x213C–0x2148	8509–8521	R	1	–	OCTET STRING	–	A/E	Serial number of the MicroLogic Active control unit
0x2149–0x2168	8522–8553	R-WC	1	–	OCTET STRING	–	A/E	User application name
0x2169–0x2178	8554–8569	R	1	–	OCTET STRING	–	A/E	Main capability of device
0x2179	8570	–	1	–	–	–	A/E	Reserved
0x217A–0x2181	8571–8578	R	1	–	OCTET STRING	–	A/E	Product range: ‘MasterPacT MTZ’
0x2182–0x2189	8579–8586	–	1	–	–	–	A/E	Reserved
0x218A–0x218D	8587–8590	R	1	–	OCTET STRING	–	A/E	Performance level: • ‘N1’: standard short-circuit level (42 kA) with total selectivity • 'H1': standard short-circuit level (42 kA) with total selectivity • 'H2': high short-circuit level (50 kA) with high selectivity (42 kA) • ‘H3’: very high short-circuit level (66 kA) with very high selectivity (50 kA) • 'L1': extremely high short-circuit level (150 kA) with strong current limitation and significant selectivity (10 kA)
0x218E–0x219A	8591–8603	R	1	–	OCTET STRING	–	A/E	Serial number of the MasterPacT MTZ circuit breaker
0x219B–0x21AA	8604–8619	R	1	–	OCTET STRING	–	A/E	Device family: ‘Circuit breaker’

For compatibility with MicroLogic A/E/P/H trip units, the product identification is also available in registers 8716 and 3816.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x220B	8716	R	1	–	INT16U	16131–16135	A/E	Product identification: 16131 = MicroLogic Active A 16132 = MicroLogic Active E 16133 = MicroLogic Active AP 16134 = MicroLogic Active 6.0 EP 16135 = MicroLogic Active 6.0 Ei
0x0EE7	3816	R	1	–	INT16U	16131–16135	E	Product identification with the metering manager: 16132 = MicroLogic Active E 16134 = MicroLogic Active 6.0 EP 16135 = MicroLogic Active 6.0 Ei

Serial Number

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x21FB–0x21FE	8700–8703	R	1	–	OCTET STRING	–	A/E	Serial number encoded in ASCII

Protection Type

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x2223	8740	R	1	–	OCTET STRING	20, 50, 60	A/E	Type of protection: • '20' = MicroLogic Active 2.0 • '50' = MicroLogic Active 5.0 • '60' = MicroLogic Active 6.0

Metering Type

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x2224	8741	R	1	–	OCTET STRING	0x2041, 0x2045	A/E	Type of measurement: • 0x2041 = 'space' and 'A' • 0x2045 = 'space' and 'E'

Long-Time Protection Activity

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x2225	8742	R	1	–	INT16U	1, 10	A/E	Long-time protection activity: 1 = ON 10 = OFF

Circuit Breaker Type

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x2591	9618	R	–	–	INT16U	0–2	E	Circuit breaker type: 0 = 3-pole circuit breaker without external neutral current transformer (factory setting) 1 = 4-pole circuit breaker 2 = 3-pole circuit breaker with external neutral current transformer

Circuit Breaker Characteristics

The characteristics can be downloaded by using the test kit.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x2675	9846	R	–	–	INT16U	0–3	E	Standard: 0 = UL 1 = IEC 2 = ANSI 3 = IEC/GB
0x2676	9847	R	–	–	INT16U	0	E	Circuit breaker range: 0 = MasterPacT
0x2677–0x267C	9848–9853	R	–	–	OCTET STRING	–	E	Circuit breaker characteristics (for example 'MTZ1 08')

Circuit Breaker Status

Local/Remote Mode

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0293	660	R	–	–	INT16U	0–1	A/E	Control mode if Auto mode is selected: 0 = Remote mode, opening and closing of the circuit breaker are enabled from remote controllers. 1 = Local mode, opening and closing of the circuit breaker are enabled from FDM121 display (factory setting).

Auto/Manu

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x029D	670	R	–	–	INT16	0–1	A/E	0 = Manu: opening and closing of the circuit breaker via communication are disabled (factory setting). 1 = Auto: opening and closing of the circuit breaker via communication are enabled.

Circuit Breaker Status

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x0294	661	R	–	–	INT16U	–	A/E	–	Circuit breaker status register
								0	OF status indication contact 0 = The circuit breaker is open. 1 = The circuit breaker is closed.
								1	SD trip indication contact 0 = Circuit breaker is not tripped. 1 = Circuit breaker is tripped due to electrical fault or shunt trip or push-to-trip. Bit always equal to 0 for MasterPacT MTZ circuit breakers with MicroLogic Active.
								2	SDE fault trip indication contact 0 = Circuit breaker is not tripped on electrical fault. 1 = Circuit breaker is tripped due to electrical fault (including ground-fault test).
								3	CH spring charged contact: 0 = Spring discharged 1 = Spring charged
								4	Reserved
								5	PF ready to close contact 0 = Not ready to close 1 = Ready to close
								6–15	Reserved

Energy Reduction Maintenance Switch (ERMS)

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0326	807	R	–	–	INT16U	–	E	ERMS mode register validity: validity of each bit of the ERMS mode register. 0 = Invalid 1 = Valid
0x0327	808	R	–	–	INT16U	–	E	ERMS mode: Bit 0 = 0: ERMS mode OFF Bit 0 = 1: ERMS mode ON Bit 1 = 0: ERMS not degraded mode Bit 1 = 1: ERMS degraded mode
0x0328–0x0329	809–810	R	–	A	INT32U	2 x In–15 x In (limited to Ii settings)	E	ERMS setting: pickup value for ERMS setting 2 x In up to present Ii (instantaneous pickup current) setting. Factory setting = 2 x In
0x032A–0x032B	811–812	R	–	–	–	–	–	Reserved

Protection Status

The following table details the values for each bit of protection pick-up value registers:

- protection status bit = 0: protection pick-up value is not overrun.
- protection status bit = 1: protection pick-up value is overrun, even if the time delay has not expired.

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x229D	8862	R	–	–	INT16U	–	E	0	Long-time protection status
								1–15	Reserved
0x229E	8863	R	–	–	INT16U	–	E	0	Current-unbalance status
								1	Maximum current status on phase 1
								2	Maximum current status on phase 2
								3	Maximum current status on phase 3
								4	Maximum current status on the neutral
								5	Minimum voltage status
								6	Maximum voltage status
								7	Voltage unbalance status
								8	Maximum power status
								9	Reverse power status
								10	Minimum frequency status
								11	Maximum frequency status
								12	Phase rotation status
								13–15	Reserved
0x229F	8864	R	–	–	INT16U	–	E	0	Ground-fault alarm status
							–	1–15	Reserved

Counters

General Description

The MicroLogic Active control unit has counters which are used to manage the circuit breaker.

The MicroLogic Active counters have the following properties:

- All the counters are saved in non-volatile memory to prevent data loss in case of power loss.
- The cumulating OF counter is read only. It stops incrementing when it reaches the maximum value of 65535.
- A threshold is associated to the OF counter. An alarm is generated when a counter reaches the threshold.

Counter Thresholds

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0243	580	R	–	–	INT16U	0–65535	A/E	OF counter threshold Factory setting = 5000

Circuit Breaker Operation Counters

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0296	663	R	–	–	INT16	0–65535	A/E	OF counter (resettable open to close counter)
0x0297	664	R	–	–	INT16	0–65535	A/E	SD counter (close to SD position)
0x0298	665	R	–	–	INT16	0–65535	A/E	SDE counter (close to SDE position)

MX and XF Release Counters

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x02A1	674	R	–	–	INT16U	0–65535	A/E	MX actuation counter
0x02A2–0x02A4	675–677	–	–	–	–	–	–	Reserved
0x02A5	678	R	–	–	INT16U	0–65535	A/E	XF actuation counter

Trip History

General Description

The trip history registers describe the last 17 encountered trips. The trip history format corresponds to a series of 17 records saved in a FIFO (first-in first-out) stack. The last record erases the oldest. Each record is composed of seven registers describing one trip.

Trip Record Number

A read request of 7x(n) registers is necessary to read the last n trip records, where 7 is the number of registers for each trip record.

For example, a read request of 7x3 = 21 registers is necessary to read the last three trip records of the trip history:

- The first seven registers describe the first trip record.
- The next seven registers describe the second trip record.
- The last seven registers describe the third trip record.

Address	Register	Description
0x0095–0x009B	150–156	Trip record 0
0x009C–0x00A2	157–163	Trip record 1
0x00A3–0x00A9	164–170	Trip record 2
0x00AA–0x00B0	171–177	Trip record 3
0x00B1–0x00B7	178–184	Trip record 4
0x00B8–0x00BE	185–191	Trip record 5
0x00BF–0x00C5	192–198	Trip record 6
0x00C6–0x00CC	199–205	Trip record 7
0x00CD–0x00D3	206–212	Trip record 8
0x00D4–0x00DA	213–219	Trip record 9
0x00DB–0x00E1	220–226	Trip record 10
0x00E2–0x00E8	227–233	Trip record 11
0x00E9–0x00EF	234–240	Trip record 12
0x00F0–0x00F6	241–247	Trip record 13
0x00F7–0x00FD	248–254	Trip record 14
0x00FE–0x0104	255–261	Trip record 15
0x0105–0x010B	262–268	Trip record 16

Trip Record

A read request of seven registers is necessary to read a trip record.

The order and the description of the trip record registers are the same as that of the trip record 0:

Trip Record 0 (Most Recent Trip Record)								
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**A/E**	**Description**
0x0095	150	R	1	–	INT16U	0–65535	E	Trip code
0x0096–0x0098	151–153	R	1	–	ULP	–	E	Date of event (trip or acknowledge)
0x0099	154	R	1	–	INT16U	1–2	E	Event type MSB = 0 (reserved) Event occurrence: LSB = 1 Event completion: LSB = 2
0x009A	155	–	–	–	–	–	–	Reserved
0x009B	156	–	–	–	–	–	–	Reserved

Trip Codes

Trip Code	Description
16384 (0x4000)	Trip due to long-time protection Ir
16385 (0x4001)	Trip due to short-time protection Isd
16386 (0x4002)	Trip due to instantaneous protection Ii
16387 (0x4003)	Trip due to ground-fault protection Ig
16389 (0x4005)	Trip due to control unit being over temperature
16390 (0x4006)	Trip due to ultimate self-protection (SELLIM)
16391 (0x4007)	Trip due to self-diagnosis
16394 (0x400A)	Trip due to ENCT disconnection
16413 (0x401D)	Trip due to ultimate self-protection (DIN/DINF)
16414 (0x401E)	Trip due to ground-fault protection test
16435 (0x4033)	Trip due to loss of current sensor
16437 (0x4035)	Trip due to instantaneous protection test

Standard Protection Parameters

Neutral Protection Parameters

Neutral protection is only available when the system type in register 3314 is 30 or 41, page 247.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x2230	8753	R	1	–	INT16U	0–3	A/E	Type of neutral protection: 0 = OFF 1 = N/2 (Ir/2) 2 = N (Ir) 3 = Nx1.6 (1.6 Ir)

Long-Time Protection Parameters

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x2231	8754	R	–	–	INT16U	0–1	A/E	–	Status: 0x0001 = On
0x2232	8755	R	–	–	INT16U	–	–	–	Type of IDMTL curve
							A/E	0	Standard long-time curve It (factory setting)
							E	1	SIT curve
							E	2	VIT curve
							E	3	EIT (It on) curve
							E	4	HVF curve
							E	5	Constant time (It off)
							–	6–15	Reserved
0x2233–0x2234	8756–8757	R	1	A	MOD 10000	40–8000	A/E	–	Ir pick-up value
0x2235	8758	R	1	ms	INT16U	500–24000	A/E	–	tr time delay
0x2236–0x223A	8759–8763	–	–	–	–	–	–	–	Reserved

Short-Time Protection Parameters

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x223B	8764	R	–	–	INT16U	0–1	A/E	–	Status: 0x0001 = On
0x223C	8765	R	–	–	INT16U	0–1	A/E	–	Type of protection: 0 = It On 1 = It Off
0x223D–0x223E	8766–8767	R	1	A	MOD 10000	60–80 000	A/E	–	Isd pick-up value

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x223F	8768	R	1	ms	INT16U	0–400	A/E	–	tsd time delay 0 s: valid only for the I²t off position 100–400 ms: valid for the I²t on and I²t off positions
0x2240–0x2244	8769–8773	–	–	–	–	–	–	–	Reserved

Instantaneous Protection Parameters

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x2245	8774	R	–	–	INT16U	0x0001–0x0101	A/E	–	0x0001 = protection active (factory setting) 0x0101 = protection OFF
0x2246	8775	–	–	–	–	–	–	–	Reserved
0x2247–0x2248	8776–8777	R	1	A	MOD 10000	200–120000	A/E	–	I pick-up value for the instantaneous protection (1)
0x2249–0x224E	8778–8783	–	–	–	–	–	–	–	Reserved

Ground-Fault Protection Parameters

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x224F	8784	R	–	–	INT16U	0x0001–0x0101	A/E	–	Protection status: 0x0001 = protection active (factory setting) 0x0101 = protection OFF
0x2250	8785	R	–	–	INT16U	0–1	A/E	–	Type of protection: 0 = It On 1 = It Off
0x2251–0x2252	8786–8787	R	1	A	MOD 10000	30–1200	A/E	–	Ig pickup for the ground-fault protection
0x2253	8788	R	1	ms	INT16U	0–400	A/E	–	tg tripping time delay for the ground-fault protection: 0 s = valid only for the It off position 100–400 ms = valid for the It on and It off positions
0x2254–0x225D	8789–8798	–	–	–	–	–	–	–	Reserved

Measurement Parameters

System Type

The setup ENVT (External Neutral Voltage Tap) presence command (command code = 46472) configures the content of the system type register.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0CF1	3314	R	–	–	INT16U	30, 31, 40, 41	E	System type Factory setting: • 3-pole circuit breaker: 31 • 4-pole circuit breaker: 41

Determining system type:

If...	Then...	Result
the system type is a three-pole circuit breaker with external neutral current transformer and without external neutral voltage tap	system type = 30	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are not available. • Measurement of the neutral current is available. • 3 wattmeters method for power calculation is not possible.
the system type is a three-pole circuit breaker without external neutral current transformer and without external neutral voltage tap	system type = 31	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are not available. • Measurement of the neutral current is not available. • 3 wattmeters method for power calculation is not possible.
the system type is a three-pole circuit breaker without external neutral current transformer and with external neutral voltage tap	system type = 40	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are available. • Measurement of the neutral current is not available. • 3 wattmeters method for power calculation is possible.
the system type is a three-pole circuit breaker with external neutral current transformer and external neutral voltage tap, or if the system type is 4-pole circuit breaker	system type = 41	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are available. • Measurement of the neutral current is available. • 3 wattmeters method for power calculation is possible.

This table presents the text to choose on the MicroLogic Active E control unit display according to the system type determined previously:

If...	Then...
system type = 31	select **3W3ct**
system type = 40	select **4W3ct**
system type = 41	select **4W4ct**

Power Flow Sign

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0CF3	3316	R	–	–	INT16U	0–1	E	Power flow sign: 0 = the active power flows from upstream (top) to downstream (bottom) (factory setting). 1 = the active power flows from downstream (bottom) to upstream (top).

Reactive Power Sign

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0CF4	3317	R	–	–	INT16U	0–1	E	Sign convention for the reactive power: 0 = alternate IEEE convention 1 = IEEE and IEC convention (factory setting) (1)
(1) With MicroLogic Active E control unit, only IEC convention.								

Power Factor Sign

The power factor sign configuration command (command code = 47241) configures the content of the power factor sign register.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0CF5	3318	R	–	–	INT16U	0–2	E	Sign convention for the power factor and the fundamental power factor (cosϕ): 0 = IEC convention 1 = alternate IEEE convention 2 = IEEE convention (factory setting) (1)
(1) With MicroLogic Active E control unit, only IEC convention.								

Demand Time

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0D16	3351	R	–	–	INT16U	1	E	Current demand calculation method (window type): 1 = thermal, sliding (factory setting)
0x0D17	3352	R	x1	min	INT16U	15	E	Duration of the current demand calculation window, fixed and set at 15 minutes.
0x0D19	3354	R	–	–	INT16U	0	E	Power demand calculation method (window type): 0 = sliding (block interval) (factory setting)
0x0D1A	3355	R	x1	min	INT16U	15	E	Duration of the power demand calculation window, fixed and set at 15 minutes.

Nominal Voltage

The setup nominal primary voltage Vn display command (command code = 47245) configures the content of the nominal voltage register.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x258F	9616	R	1	V	INT16U	100–1150	E	Nominal primary voltage Vn on the voltage transformer. Factory setting = 690 V
0x2590	9617	R	1	V	INT16U	100–690	E	Nominal secondary voltage on the voltage transformer. Factory setting = 690 V

Time-Stamped Information

General Description

The time-stamped information enables the user to know all the dates related to important information.

The time-stamped information table describes:

- the current date
- the last current demand and corresponding dates
- the last power demand and corresponding dates
- the last reset and corresponding dates
- the last k-factor demand peak and corresponding dates
- the last current demand peak and corresponding dates

Last Current Demand

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0BBC–0x0BBE	3005–3007	R	–	–	DATE	–	E	Date of last current demand maximum I1 (register 2204)
0x0BBF–0x0BC1	3008–3010	R	–	–	DATE	–	E	Date of last current demand maximum I2 (register 2205)
0x0BC2–0x0BC4	3011–3013	R	–	–	DATE	–	E	Date of last current demand maximum I3 (register 2206)
0x0BC5–0x0BC7	3014–3016	R	–	–	DATE	–	E	Date of last current demand maximumon the neutral (register 2207) (1)
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 247.								

Last Power Demand

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0BC8–0x0BCA	3017– 3019	R	–	–	DATE	–	E	Date of last active power demand maximum (register 2224)
0x0BCB–0x0BCD	3020– 3022	R	–	–	DATE	–	E	Date of last reactive power demand maximum (register 2230)
0x0BCE–0x0BD0	3023– 3025	R	–	–	DATE	–	E	Date of last apparent power demand maximum (register 2236)

Last Reset

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0BD1–0x0BD3	3026– 3028	R	–	–	DATE	–	E	Date of last reset of current demand maximum values
0x0BD4–0x0BD6	3029– 3031	R	–	–	DATE	–	E	Date of last reset of power demand maximum values
0x0BD7–0x0BD9	3032– 3034	R	–	–	DATE	–	E	Date-Time of last min. registers reset (1300–1599) (1)
0x0BDA–0x0BDC	3035– 3037	R	–	–	DATE	–	E	Date-Time of last max. registers reset (1600–1899) (1)

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x0BDD–0x0BDF	3038– 3040	R	–	–	DATE	–	E	Date of last reset of energy meters
(1) This register is updated whenever any of the min. registers are reset. Command interface authorizes user to clear min. of current rms and unbalance values, voltage rms and unbal values, frequency, P/Q/S/PF, fundamental quantities and THD, voltage crest and current crest independently. However, since only one date/time of last reset is maintained, it is recommended to always set all bits in the command that resets min. values.								

Maintenance Indicators

Rate of Wear Counter

The contacts must be inspected each time the counter reaches the one hundred mark.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x2385	9094	R	1	%	INT16U	0–100	E	Phase 1 contact wear indicator
0x2386	9095	R	1	%	INT16U	0–100	E	Phase 2 contact wear indicator
0x2387	9096	R	1	%	INT16U	0–100	E	Phase 3 contact wear indicator
0x2388	9097	R	1	%	INT16U	0–100	E	Neutral contact wear indicator
0x749C	29853	R	1	%	INT16U	0–100	E	Contact wear indicator

NOTE: The contact wear indicator is equal to 0x8000 (32768) if the contact wear is not available or the circuit breaker information has not been defined. In this case, you can set the circuit breaker information on the MicroLogic Active display screen, from the tree navigation menu, at **Maintenance > Replacement**.

Load Profile Counters

The load profile counters report the number of hours for each range of current in the MicroLogic Active control unit. If the load profile counters reach the maximum value 4 294 967 295 and a new load profile event occurs, then the load profile counters are reset to 0.

A read request of eight registers is necessary to read the load profile counters.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x74B7–0x74B8	29880–29881	R	1	Hour	INT32U	0–4 294 967 295	A/E	Number of hours for 0–49% of the nominal current range
0x74B9–0x74BA	29882–29883	R	1	Hour	INT32U	0–4 294 967 295	A/E	Number of hours for 50–79% of the nominal current range
0x74BB–0x74BC	29884–29885	R	1	Hour	INT32U	0–4 294 967 295	A/E	Number of hours for 80–89% of the nominal current range
0x74BD–0x74BE	29886–29887	R	1	Hour	INT32U	0–4 294 967 295	A/E	Number of hours for 90–100% of the nominal current range

Miscellaneous

Nominal Current

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x222D	8750	R	1	A	INT16U	0–8000	A/E	Rated circuit breaker current Factory setting = 100 A (circuit breaker sensor plug not present)

Protection Setting Change Counter

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x2263	8804	R	–	–	INT16U	0–65535	E	Protection setting change counter, incremented each time a protection setting change is applied.

Battery Status

The following table represents the battery charge status:

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x228A	8843	R	1	%	INT16U	0–100	A/E	Battery-charge indicator: 100 % = U > 2800 mV 50 % = 2200 < U < 2800 mV 0 % = U < 2200 mV

Time Remaining Until Long-Time Tripping

Time remaining until long-time tripping is evaluated every second. If another protection is tripped, then time remaining until long-time tripping continues to be evaluated.

Address	Register	RW	X	Unit	Type	Range	A/E	Description
0x22A0–0x22A1	8865–8866	R	10	s	MOD 10000	–	E	Time remaining until long-time tripping

Language

This register indicates the language used by the control unit. It can be modified on the MicroLogic Active HMI.

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x258D	9614	R	–	–	INT16U	–	E	0	French
								1	US English
								2	UK English (factory setting)
								3	German
								4	Spanish

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
								5	Italian
								7	Chinese
								8	Portugese
								9	Optional language available on order from Schneider Electric
								10–15	Reserved

Nominal Frequency

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x258E	9615	R	–	–	INT16U	–	E	0	50 / 60 Hz (factory setting)
								1–15	Reserved

MicroLogic Active Control Unit Commands

What's in This Chapter

List of MicroLogic Active Commands and Error Codes 256
Circuit Breaker Control Commands 257
Reset Minimum/Maximum Commands 258

List of MicroLogic Active Commands and Error Codes

List of Commands

The following table lists the available MicroLogic Active control unit commands, their corresponding command codes, and user profiles. Follow the command execution procedures, page 61.

Command	Command Code	User Profile
Open circuit breaker, page 257	904	No password required
Close circuit breaker, page 257	905	No password required
Reset minimum/maximum, page 258	46728	No password required

Error Codes

Error codes generated by MicroLogic Active control units are the generic error codes, page 64.

Circuit Breaker Control Commands

Open Circuit Breaker

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Do not operate the circuit breaker without confirming that doing so will not create a hazardous situation.
- Do not use MicroLogic Active remote control functions in a safety chain.
- Do not allow any person to work on the electrical network without physically validating the successful execution of the local or remote software actions for opening the circuit breaker or switching off the electrical circuit.

Failure to follow these instructions will result in death or serious injury.

To open the circuit breaker, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	A/E	Description
0x1F3F	8000	–	–	INT16U	904	A/E	Command code = **904**
0x1F40	8001	–	–	INT16U	10	A/E	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4609	A/E	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	A/E	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	A/E	Password of the command = 0 (no password required)

Close Circuit Breaker

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Do not operate the circuit breaker without confirming that doing so will not create a hazardous situation.
- Do not allow any person to work on the electrical network without physically validating the successful execution of the local or remote software actions for closing the circuit breaker or switching on the electrical circuit.

Failure to follow these instructions will result in death or serious injury.

To close the circuit breaker, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	A/E	Description
0x1F3F	8000	–	–	INT16U	905	A/E	Command code = **905**
0x1F40	8001	–	–	INT16U	10	A/E	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4609	A/E	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	A/E	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	A/E	Password of the command = 0 (no password required)

Reset Minimum/Maximum Commands

Reset Minimum/Maximum

The reset minimum/maximum command resets the minimum values of real-time measurements (registers 1300 to 1599) and the maximum values of real-time measurements (registers 1600 to 1899), page 230.

The reset minimum/maximum command resets the energy measurements (registers 2000 to 2027), page 231.

The reset minimum/maximum command resets the peak demand measurements (registers 2200 to 2241), page 233.

To reset minimum/maximum values of measurements, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	A/E	Bit	Description
0x1F3F	8000	–	–	INT16U	46728	–	–	Command code = **46728**
0x1F40	8001	–	–	INT16U	12	–	–	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4609	–	–	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	–	–	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	–	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	–	INT16U	–	–	–	Reset minimum/maximum of metering variables: • To reset the metering variable, set the bit to 1. • To keep the current values, set the bit to 0.
						A/E	0	Reset minimum/maximum current (I1, I2, I3, IN, Imax, Ig, Iavg, and Iunbal)
						E	1	Reset minimum/maximum voltage (V12, V13, V23, V1N, V2N, V3N, VavgL-L, VavgL-N, and Vunbal)
						E	2	Reset minimum/maximum power (active power, reactive power, apparent power, and distortion power)
						E	3	Reset minimum/maximum power factor and cosϕ
						–	4	Reserved
						E	5	Reset peak of current demand
						E	6	Reset peak of active power, reactive power, and apparent power demand
						E	7	Reset minimum/maximum frequency
						–	8	Reserved
						E	9	Reset energy (active, reactive, apparent)
						–	10–15	Reserved

MicroLogic Active Control Unit Protection Commands with Session

What's in This Chapter

Description of Commands with Session 260
List of MicroLogic Active Control Unit Protection Commands with Session and Error Codes 262
Session Management Commands 263
Protection Submit Commands 265
Protection Get Commands with Session 269

Description of Commands with Session

Presentation

The procedure for setting a protection setting conforms to UL489SE standard. It is safeguarded by an exclusive editing session and by a two-step procedure for submitting and applying setting changes.

The exclusive editing session means that only one interface at a time can access and set protection settings. Access from other interfaces is blocked when an editing session is open.

During the editing session there is no impact on the active protection provided by the MicroLogic Active control unit until the new settings are applied. If the new settings are canceled, or the editing session times out before the new settings are applied, the active settings are maintained.

Enabling and Disabling Access to Protection Settings

You can enable or disable remote access to the protection settings on the MicroLogic Active display screen, from the tree navigation menu, at **Configuration > Communication > Remote Settings**.

- Select **ON** to enable remote access to the protection settings
- Select **OFF** to disable remote access to the protection settings

Editing Session for Selecting and Changing Protection Settings

An editing session has the following characteristics:

- Only one editing session at a time can be open. Access to protection settings from other interfaces is blocked when you open an editing session.
- There is a five-minute timeout for submitting and for applying new settings. The session times out as follows:
  - Five minutes after the session opens, if you do not submit the new settings
  - Five minutes after submitting the new settings, if you do not apply the new settings
- After applying new settings, get the apply setting status to check that the new protection settings are applied. Once apply is completed, close the session.
- When setting protection using the communication network, all protection functions can be set in one editing session. A submit step is required after making changes to each protection function, and one apply step is required to apply all the new settings. Active settings are maintained until the apply step is executed.
- The neutral protection can be set with the standard protections.

Two-Step Procedure for Submitting and Applying Protection Settings

The procedure for changing protection settings requires you to submit and apply the new settings in two consecutive steps:

Step	Action	
1	Submit new settings	Select new settings required and submit. The new settings are displayed so that you can check that the settings are correct before they are applied. Read the new settings to confirm that they are correct.
2	Apply new settings	Apply the new settings. The existing active protection settings are replaced by the new settings.

Protection Setting Procedure with Session

To set protection settings by using the communication network, external access to protection settings must be allowed by using the MicroLogic Active display screen, page 260.

The following example shows how to set the long-time overcurrent protection:

Step	Action
1	Open the editing session with the open setup session command, page 263 . **Result:** The session key for the editing session is returned to the command registers. The returned session key must be used in all commands during the session.
2	Submit the new protection settings with the submit long time over current protection settings command, page 265. The requested session key for the command must be the session key returned by the open setup session command.
3	Use the get long time over current protection settings command, page 269 to read the submitted settings. The requested session key for the command must be the session key returned by the open setup session command.
4	Check that the protection settings submitted at step 2 and the protection settings got at step 3 are identical: • If the settings are identical, go to step 5 • If the settings are not identical, go to step 7 and start the setting procedure again
5	Apply submitted protection settings with the apply settings command , page 263. The requested session key for the command must be the session key returned by the open setup session command.
6	Use the get apply setting status, page 264 to check that the new protection settings are applied. The requested session key for the command must be the session key returned by the open setup session command. **NOTE:** If the settings of other protection functions must be changed, restart the setting procedure at step 2 for each protection function.
7	Close the editing session with the close setup session command, page 264. The requested session key for the command must be the session key returned by the open setup session command.

List of MicroLogic Active Control Unit Protection Commands with Session and Error Codes

List of Commands

The MicroLogic Active control unit protection commands with session are performed by the command interface, page 61. They are grouped by their functions and types:

- Session management commands, page 263
- Protection submit commands, page 265
- Protection get commands with session, page 269

In the MicroLogic Active control unit registers:

- RC indicates the registers that can be read by a get command
- WC indicates the registers that can be written by a set and reset command

Error Codes

Error codes generated by MicroLogic Active control units are the generic error codes, page 64.

Session Management Commands

List of Commands

The following table lists the commands necessary to manage the editing session of the setting protection function in accordance with UL489SE standard, their corresponding command codes and user profiles.

Command	Command Code	User profile
Open setup session, page 263	1930	No password required
Apply settings, page 263	1932	No password required
Get apply setting status, page 264	1924	No password required
Close setup session, page 264	1933	No password required

Open Setup Session

To open setup session, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1930	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The session key for the editing session is returned to the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8020	–	INT16U	1930	Last command code
0x1F40	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = Command with error, page 63
0x1F41	8022	–	INT16U	4	Number of bytes returned
0x1F42–0x1F43	8023–8024	–	INT32U	0–4294967294	Session key for the command

Apply Settings

To apply settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1932	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command

Address	Register	Unit	Type	Range	Description
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	0–4294967294	Requested session key for the command

Get Apply Setting Status

To get apply setting status, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1924	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	0–4294967294	Requested session key for the command

The apply setting status is returned to the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	1924	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = Command with error, page 63
0x1F55	8022	–	INT16U	6	Number of bytes returned
0x1F56–0x1F57	80023–8024	–	INT32U	0–4294967294	Responded session key for the command. It must be equal to the requested session key for the command.
0x1F58	8025	–	INT16U	0–1	Status of the apply settings command: • 0 = No apply settings in progress • 1 = Apply settings in progress

Close Setup Session

To close setup session, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1933	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	0–4294967294	Requested session key for the command

Protection Submit Commands

List of Commands

The following table lists the protection submit commands, their corresponding command codes, and user profiles:

Command	Command code	User profile
Submit long time over current protection settings, page 265	51593	No password required
Submit short time over current protection settings, page 266	51594	No password required
Submit instantaneous protection settings, page 266	51595	No password required
Submit ground fault protection settings, page 267	51596	No password required
Submit neutral protection settings, page 268	51598	No password required

Submit Long Time Over Current Protection Settings

To get the long time over current protection settings, use the get long time over current protection setting command, page 269.

⚠WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by qualified electrical personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To submit the long time over current protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51593	Requested command code
0x1F40	8001	–	INT16U	26	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006-8007	–	INT32U	0–4294967294	Requested session key for the command
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group = 1 (Setting group A)
0x1F48	8009	–	–	0xFFFF	Reserved
0x1F49–0x1F4A	8010–8011	A	FLOAT32	–	Long time over current protection threshold (step 0.1 A)
0x1F4B–0x1F4C	8012–8013	s	FLOAT32	0.5-24.0 (step 0.5)	Long time over current protection time delay

Submit Short Time Over Current Protection Settings

To get the short time over current protection settings, use the get short time over current protection settings command, page 270.

⚠WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by qualified electrical personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To submit the short time over current protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51594	Requested command code
0x1F40	8001	–	INT16U	26	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006-8007	–	INT32U	0–4294967294	Requested session key for the command
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group = 1 (Setting group A)
0x1F48	8009	–	INT16U	–	MSB: 0 LSB: Short time over current protection curve • 0 = Definite time (I^2t = Off) • 1 = Inverse time (I^2t = On)
0x1F49–0x1F4A	8010–8011	–	FLOAT32	1.5–10.0 (step 0.1)	Short time over current protection threshold coefficient
0x1F4B–0x1F4C	8012–8013	s	FLOAT32	0–0.4 (step 0.1)	Short time over current protection time delay

Submit Instantaneous Protection Settings

To get the instantaneous protection, use the get instantaneous protection settings command, page 271.

⚠WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by qualified electrical personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To submit the instantaneous protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51595	Requested command code
0x1F40	8001	–	INT16U	22	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006-8007	–	INT32U	0–4294967294	Requested session key for the command
0x1F47	8008	–	INT16U	–	MSB: Instantaneous over current protection mode • 0 = Off • 1 = On LSB: Requested setting group = 1 (Setting group A)
0x1F48–0x1F49	8009–8010		FLOAT32	(1)	Instantaneous over current protection threshold coefficient
0x1F4A	8011		INT16U		MSB: 0 LSB: Instantaneous over current protection time delay mode = 0 (Standard)

(1) Ii setting range:
- for MicroLogic Active 2.0: 1.5 to 10.0 (step 0.1)
- for MicroLogic Active 5.0 and 6.0: 2.0 to 15.0 (step 0.1)

Submit Ground Fault Protection Settings

To get the ground fault protection settings, use the get ground fault protection settings command, page 273.

⚠WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by qualified electrical personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To submit the ground fault protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51596	Requested command code
0x1F40	8001	–	INT16U	26	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Requested session key for the command
0x1F47	8008	–	INT16U	–	MSB: Ground fault protection mode(1) • 0 = Off (protection disabled) • 1 = On (protection enabled) LSB: Requested setting group = 1 (Setting group A)

Address	Register	Unit	Type	Range	Description
0x1F48	8009	–	INT16U	–	MSB: 0 LSB: Short time over current protection curve • 0 = Definite time (I^2t = Off) • 1 = Inverse time (I^2t = On)
0x1F49–0x1F4A	8010–8011	A	FLOAT32	–	Ground fault protection threshold (step 10 A)
0x1F4B–0x1F4C	8012–8013	s	FLOAT32	0–0.4 (step 0.1)	Ground fault protection time delay
(1) If the ground fault protection mode is set to Off, the result of the command will be 0x10, Input argument is out of range.					

Submit Neutral Protection Settings

To get the neutral protection settings, use the get neutral protection settings command, page 274.

⚠WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by qualified electrical personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To submit the neutral protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51598	Requested command code
0x1F40	8001	–	INT16U	16	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Requested session key for the command
0x1F47	8008	–	INT16U	0-3	Neutral protection type: • 0 = Off • 1 = 0.5 • 2 = 1.0 • 3 = Oversized

Protection Get Commands with Session

List of Commands

The following table lists the protection get commands with session, their corresponding command codes, and user profiles:

Command	Command code	User profile
Get long time over current protection settings, page 269	51584	No password required
Get short time over current protection settings, page 270	51585	No password required
Get instantaneous protection settings, page 271	51586	No password required
Get ground fault protection settings, page 273	51587	No password required
Get neutral protection settings, page 274	51589	No password required

Get Long Time Over Current Protection Settings

To get the long time over current protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51584	Requested command code
0x1F40	8001	–	INT16U	16	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group • 0 = Active settings group • 1 = Standard settings group • 3 = ERMS settings group

The long time over current protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51584	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error, page 63
0x1F55	8022	–	INT16U	56	Number of bytes returned
0x1F56-0x1F57	8023–8024	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F58	8025	–	INT16U	–	MSB: Requested setting group • 0 = Active settings group • 1 = Standard settings group • 3 = ERMS settings group LSB: Responded setting group • 1 = Standard settings group

Address	Register	Unit	Type	Range	Description
					• 3 = ERMS settings group • 128 = Fallback settings
0x1F59	8026	–	INT16U	–	MSB: Long time over current protection mode • 0 = Off • 1 = On (tripping) LSB: Long time over current protection supported • 0 = Not supported • 1 = Supported
0x1F5A-0x1F5D	8027–8030	–	DATETIME	–	Timestamp of last change of long time over current protection mode
0x1F5E	8031	–	INT16U	–	Timestamp quality of last change of long time over current protection mode
0x1F5F-0x1F62	8032–8035	–	DATETIME	–	Timestamp of last change of any parameter of the long time over current protection function
0x1F63	8036	–	INT16U	–	Timestamp quality of last change of any parameter of the long time over current protection function
0x1F64-0x1F65	8037–8038	–	FLOAT32	–	Long time over current protection threshold coefficient high limit
0x1F66-0x1F67	8039–8040	s	FLOAT32	–	Long time over current protection time delay high limit
0x1F68	8041	–	INT16U	1	MSB: 0 LSB: Long time over current protection curve • 1 = Inverse time (I^2t = ON)
0x1F69-0x1F6A	8042–8043	A	FLOAT32	–	Long time over current protection threshold
0x1F6B-0x1F6C	8044–8045	s	FLOAT32	–	Long time over current protection time delay
0x1F6D-0x1F71	8046–8050	–	–	–	Reserved

Get Short Time Over Current Protection Settings

To get the short time over current protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51585	Requested command code
0x1F40	8001	–	INT16U	16	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group • 0 = Active settings group • 1 = Standard settings group • 3 = ERMS settings group

The short time over current protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51585	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error, page 63
0x1F55	8022	–	INT16U	56	Number of bytes returned
0x1F56-0x1F57	8023–8024	–	INT32U	0–4294967-294	Key for the protection get command with session
0x1F58	8025	–	INT16U	–	MSB: Requested setting group • 0 = Active settings group • 1 = Standard settings group • 3 = ERMS settings group LSB: Responded setting group • 1 = Standard settings group • 3 = ERMS settings group • 128 = Fallback settings
0x1F59	8026	–	INT16U	–	MSB: Short time over current protection mode • 0 = Off • 1 = On (tripping) LSB: Short time over current protection supported • 0 = Not supported • 1 = Supported
0x1F5A-0x1F5D	8027–8030	–	DATETIME	–	Timestamp of last change of short time over current protection mode
0x1F5E	8031	–	INT16U	–	Timestamp quality of last change of short time over current protection mode
0x1F5F-0x1F62	8032–8035	–	DATETIME	–	Timestamp of last change of any parameter of the short time over current protection function
0x1F63	8036	–	INT16U	–	Timestamp quality of last change of any parameter of the short time over current protection function.
0x1F64-0x1F65	8037–8038	–	FLOAT32	–	Short time over current protection threshold coefficient high limit
0x1F66-0x1F67	8039–8040	s	FLOAT32	–	Short time over current protection time delay high limit
0x1F68	8041	–	INT16U	–	MSB: 0 LSB: Short time over current protection curve • 0 = Definite time (I^2t = OFF) • 1 = Inverse time (I^2t = ON)
0x1F69-0x1F6A	8042–8043	–	FLOAT32	–	Short time over current protection threshold coefficient
0x1F6B-0x1F6C	8044–8045	s	FLOAT32	–	Short time over current protection time delay
0x1F6D-0x1F71	8046–8050	–	–	–	Reserved

Get Instantaneous Protection Settings

To get the instantaneous protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51586	Requested command code
0x1F40	8001	–	INT16U	16	Number of parameters of the command

Address	Register	Unit	Type	Range	Description
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group • 0 = Active settings group • 1 = Standard settings group • 3 = ERMS settings group

The instantaneous protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51586	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error, page 63
0x1F55	8022	–	INT16U	44	Number of bytes returned
0x1F56-0x1F57	8023–8024	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F58	8025	–	INT16U	–	MSB: Requested setting group • 0 = Active settings group • 1 = Standard settings group • 3 = ERMS settings group LSB: Responded setting group • 1 = Standard settings group • 3 = ERMS settings group • 128 = Fallback settings
0x1F59	8026	–	INT16U	–	MSB: Instantaneous over current protection mode • 0 = Off • 1 = On (tripping) LSB: Instantaneous over current protection function supported • 0 = Not supported • 1 = Supported
0x1F5A-0x1F5D	8027–8030	–	DATETIME	–	Timestamp of last change of instantaneous over current protection mode
0x1F5E	8031	–	INT16U	–	Timestamp quality of last change of instantaneous over current protection mode
0x1F5E-0x1F62	8032–8035	–	DATETIME	–	Timestamp of last change of any parameter of the instantaneous over current protection mode
0x1F63	8036	–	INT16U	–	Timestamp quality of last change of any parameter of the instantaneous over current protection function
0x1F64-0x1F65	8037–8038	–	FLOAT32	–	Instantaneous over current protection threshold coefficient high limit
0x1F66-0x1F67	8039–8040	–	FLOAT32	–	Instantaneous over current protection threshold coefficient

Address	Register	Unit	Type	Range	Description
0x1F68	8041	–	INT16U	–	MSB: 0 LSB: Instantaneous over current protection time delay mode = 0 (Standard)
0x1F69-0x1F6B	8042–8044	–	–	–	Reserved

Get Ground Fault Protection Settings

To get the ground fault protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51587	Requested command code
0x1F40	8001	–	INT16U	16	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F47	8008	–	INT16U	–	MSB: 0 LSB: Requested setting group • 0 = Active settings group • 1 = Standard settings group • 3 = ERMS settings group

The ground fault protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51587	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error, page 63
0x1F55	8022	–	INT16U	56	Number of bytes returned
0x1F56-0x1F57	8023–8024	–	INT32U	0–4294967294	Key for the protection get command with session
0x1F58	8025	–	INT16U	–	MSB: Requested setting group • 0 = Active settings group • 1 = Standard settings group • 3 = ERMS settings group LSB: Responded setting group • 1 = Standard settings group • 3 = ERMS settings group • 128 = Fallback settings
0x1F59	8026	–	INT16U	–	MSB: Ground fault protection mode • 0 = Off • 1 = On (tripping) LSB: Ground fault protection function supported • 0 = Not supported • 1 = Supported

Address	Register	Unit	Type	Range	Description
0x1F5A-0x1F5D	8027–8030	–	DATETIME	–	Timestamp of last change of ground fault protection mode
0x1F5E	8031	–	INT16U	–	Timestamp quality of last change of ground fault protection mode
0x1F5F-0x1F62	8032–8035	–	DATETIME	–	Timestamp of last change of any parameter of the ground fault protection function
0x1F63	8036	–	INT16U	–	Timestamp quality of last change of any parameter of the ground fault protection function
0x1F64-0x1F65	8037–8038	–	FLOAT32	–	Ground fault protection threshold coefficient high limit
0x1F66-0x1F67	8039–8040	s	FLOAT32	–	Ground fault protection time delay high limit
0x1F68	8041	–	INT16U	–	MSB: 0 LSB: Ground fault protection curve • 0 = Definite time (I^2t = OFF) • 1 = Inverse time (I^2t = ON)
0x1F69-0x1F6A	8042–8043	A	FLOAT32	–	Ground fault protection threshold
0x1F6B-0x1F6C	8044–8045	s	FLOAT32	–	Ground fault protection time delay
0x1F6D-0x1F71	8046–8050	–	–	–	Reserved

Get Neutral Protection Settings

To get the neutral protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51589	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	4609 (0x1201)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F46	8006–8007	–	INT32U	0–4294967294	Key for the protection get command with session

The neutral protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51589	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = Successful command • Other value = command with error, page 63
0x1F55	8022	–	INT16U	32	Number of bytes returned
0x1F56-0x1F57	8023–8024	–	INT32U	0–4294967-294	Key for the protection get command with session
0x1F58	8025	–	INT16U	–	MSB: Neutral protection mode • 0 = Off • 1 = On LSB: Neutral protection function supported • 0 = Not supported • 1 = Supported

Address	Register	Unit	Type	Range	Description
0x1F59-0x1F5C	8026–8029	–	DATETIME	–	Timestamp of last change of neutral protection mode
0x1F5D	8030	–	INT16U	–	Timestamp quality of last change of neutral protection mode
0x1F5E-0x1F61	8031–8034	–	DATETIME	–	Timestamp of last change of any parameter of the neutral protection function
0x1F62	8035	–	INT16U	–	Timestamp quality of last change of any parameter of the neutral protection function
0x1F63	8036	–	INT16U	0–3	MSB: 0 LSB: Neutral protection type • 0 = OFF • 1 = 0.5 • 2 = 1.0 • 3 = Oversized
0x1F64-0x1F65	8037–8038	A	FLOAT32	–	Long time over current protection threshold

MicroLogic A/E/P/H Trip Unit Data for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-Frame Circuit Breakers

What's in This Part

MicroLogic A/E/P/H Modbus Register Tables 277
MicroLogic A/E/P/H Trip Unit Registers 279
MicroLogic A/E/P/H Trip Unit Files 350
MicroLogic A/E/P/H Trip Unit Commands 369

MicroLogic A/E/P/H User Guide

For more information about MicroLogic A/E/P/H functions, refer to the following user guides in **Related Documents** at the beginning of this guide:

- *MasterPacT NT/NW MicroLogic A and E Trip Units - User Guide*
- *MasterPacT NT/NW MicroLogic P Trip Units - User Guide*
- *MasterPacT NT/NW MicroLogic H Trip Units - User Guide*
- *ComPacT NS - MicroLogic A/E Trip Units - User Guide*
- *ComPacT NS - MicroLogic P Trip Units - User Guide*
- *MasterPacT NT Low-Voltage Power/Insulated Case Circuit Breaker- User Guide*
- *MasterPacT NW Low-Voltage Power/Insulated Case Circuit Breaker - User Guide*

MicroLogic A/E/P/H Modbus Register Tables

General Description

The following chapters describe the Modbus registers of MicroLogic A/E/P/H trip units embedded in MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame circuit breakers. These registers provide information that can be read, such as electrical measures, protection configuration, and monitoring information. The command interface enables the user to modify these registers in a controlled way.

The MicroLogic A/E/P/H trip unit registers, page 279 are grouped in tables of logically related information. The contents of the tables are ordered by increasing address.

The MicroLogic A/E/P/H trip unit commands, page 369 are described separately.

MicroLogic A/E/P/H Table Format

Register tables have the following columns:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description

- **Address**: a 16-bit register address in hexadecimal. The address is the data used in the Modbus frame.
- **Register**: a 16-bit register number in decimal (register = address + 1).
- **RW**: register read-write status
  - R: the register can be read by using Modbus functions
  - W: the register can be written by using Modbus functions
  - RW: the register can be read and written by using Modbus functions
  - RC: the register can be read by using the command interface
  - WC: the register can be written by using the command interface
- **X**: the scale factor. A scale of 10 means that the register contains the value multiplied by 10. So, the real value is the value in the register divided by 10.

  Example:

  Register 1054 contains the system frequency, page 283. The unit is Hz and the scale factor is 10.

  If the register returns 503, this means that the system frequency is 503/10 = 50.3 Hz.
- **Unit**: the unit the information is expressed in.
- **Type**: the encoding data type (see data type description below).
- **Range**: the permitted values for this variable, usually a subset of what the format allows.
- **A/E/P/H**: the metering type of the MicroLogic trip unit.
  - type A (Ammeter): current measurements
  - type E (Energy): current, voltage, power, and energy measurements
  - type P (Power): current, voltage, power, energy measurements, and advanced protection
  - type H (Harmonics): current, voltage, power, energy, energy quality measurements, and advanced protection
- **Description**: provides information about the register and restrictions that apply.

MicroLogic A/E/P/H Data Types

Data Types	Description	Range
INT16U	16-bit unsigned integer	0 to 65535
INT16	16-bit signed integer	-32768 to +32767
INT32U	32-bit unsigned integer	0 to 4 294 967 295
INT32	32-bit signed integer	-2 147 483 648 to +2 147 483 647
INT64U	64-bit unsigned integer	0 to 18 446 744 073 709 600 000
INT64	64-bit signed integer	-9 223 372 036 854 775 808 to +9 223 372 036 854 775 807
SFIXPT	16-bit signed integer with a fixed point	-32768 to +32767
FLOAT32	32-bit signed integer with a floating point	2^{-126} (1.0) to 2^{127} (2 - 2^{-23})
OCTET STRING	Text string	1 byte per character
MOD10000	Modulo operation	–
DATE	Date and time	–
XDATE	Same as DATE with a fourth INT16U register for milliseconds information	–
DATETIME	Date and time in the IEC 60870-5 format	–
ULP DATE	Date and time in ULP DATE format	–

See detailed descriptions of the data types, page 580.

MicroLogic A/E/P/H Trip Unit Registers

What's in This Chapter

Real-Time Measurements 280
Minimum/Maximum Values of Real-Time Measurements 288
Energy Measurements 290
Demand Measurements 291
Spectral Components 294
MicroLogic A/E/P/H Trip Unit Identification 300
Status 304
Alarm History 307
Trip History 309
Analog Predefined Alarms 312
Basic Protection Parameters 316
Advanced Protection Parameters 321
Configuration of the M2C/M6C Programmable Contacts 338
Measurement Parameters 340
Time-Stamped Information 344
Maintenance Indicators 346
Miscellaneous 347

Real-Time Measurements

General Description

The metering manager refreshes the real-time measurements every second. Real-time measurements include:

- voltage and voltage unbalance
- current and current unbalance
- active, reactive, apparent, and distortion power
- power factor and fundamental power factor
- frequency
- fundamental voltage and current
- fundamental active, reactive, and apparent power
- THD (total harmonic distortion in relation to the fundamental)
- thd (total harmonic distortion in relation to the RMS value)
- voltage to current phase shift
- K-factor
- peak factor
- voltage to voltage phase shift

Voltage

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x03E7	1000	R	1	V	INT16U	0–1200	E/P/H	RMS phase-to-phase voltage V12
0x03E8	1001	R	1	V	INT16U	0–1200	E/P/H	RMS phase-to-phase voltage V23
0x03E9	1002	R	1	V	INT16U	0–1200	E/P/H	RMS phase-to-phase voltage V31
0x03EA	1003	R	1	V	INT16U	0–1200	E/P/H	RMS phase-to-neutral voltage V1N (1)
0x03EB	1004	R	1	V	INT16U	0–1200	E/P/H	RMS phase-to-neutral voltage V2N (1)
0x03EC	1005	R	1	V	INT16U	0–1200	E/P/H	RMS phase-to-neutral voltage V3N (1)
0x03ED	1006	R	1	V	INT16U	0–1200	E/P/H	Arithmetic mean of V12, V23, and V31: (V12 + V23 + V31) / 3 = V_{avg} L-L
0x03EE	1007	R	1	V	INT16U	0–1200	E/P/H	Arithmetic mean of V1N, V2N, and V3N: (V1N + V2N + V3N) / 3 = V_{avg} L-N (1)
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.								

Voltage Unbalance

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x03EF	1008	R	10	%	INT16	-1000–+1000	E/P/H	V12 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages
0x03F0	1009	R	10	%	INT16	-1000–+1000	E/P/H	V23 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages
0x03F1	1010	R	10	%	INT16	-1000–+1000	E/P/H	V31 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x03F2	1011	R	10	%	INT16	-1000–+1000	E/P/H	V1N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages (1)
0x03F3	1012	R	10	%	INT16	-1000–+1000	E/P/H	V2N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages (1)
0x03F4	1013	R	10	%	INT16	-1000–+1000	E/P/H	V3N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages (1)
0x03F5	1014	R	10	%	INT16	-1000–+1000	E/P/H	Maximum phase-to-phase voltage unbalance value of registers 1008, 1009, and 1010
0x03F6	1015	R	10	%	INT16	-1000–+1000	E/P/H	Maximum phase-to-neutral voltage unbalance value of registers 1011, 1012, and 1013 (1)

(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.

Current

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x03F7	1016	R	1	A	INT16U	0–32767	A/E/P/H	RMS current on phase 1: I1
0x03F8	1017	R	1	A	INT16U	0–32767	A/E/P/H	RMS current on phase 2: I2
0x03F9	1018	R	1	A	INT16U	0–32767	A/E/P/H	RMS current on phase 3: I3
0x03FA	1019	R	1	A	INT16U	0–32767	A/E/P/H	RMS current on the neutral: IN (1)
0x03FB	1020	R	1	A	INT16U	0–32767	A/E/P/H	Maximum of I1, I2, I3, and IN
0x03FC	1021	R	1	%Ig	INT16U	0–32767	A/E/P/H	Ground-fault current (2)
0x03FD	1022	R	1	mA	INT16U	0–32767	A/P/H	Earth-leakage current(3)(4)
0x03FE	1023	R	1	A	INT16U	0–32767	H	Apparent current phase 1 (peak/√2)
0x03FF	1024	R	1	A	INT16U	0–32767	H	Apparent current phase 2 (peak/√2)
0x0400	1025	R	1	A	INT16U	0–32767	H	Apparent current phase 3 (peak/√2)
0x0401	1026	R	1	A	INT16U	0–32767	H	Apparent current neutral (peak/√2)
0x0402	1027	R	1	A	INT16U	0–32767	E/P/H	Arithmetic mean of I1, I2, and I3: (I1 + I2 + I3) / 3 = I_{avg}

(1) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 340.

(2) Accessible only with MicroLogic 5.0 P/H and 6.0 A/E/P/H trip units.

(3) Accessible only with MicroLogic 7.0 A/P/H trip units.

(4) If this current exceeds 32767 A, the register blocks at 32767.

Current Unbalance

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0403	1028	R	10	%	INT16	-1000–+1000	E/P/H	I1 current unbalance in relation to the arithmetic mean of the phase currents
0x0404	1029	R	10	%	INT16	-1000–+1000	E/P/H	I2 current unbalance in relation to the arithmetic mean of the phase currents
0x0405	1030	R	10	%	INT16	-1000–+1000	E/P/H	I3 current unbalance in relation to the arithmetic mean of the phase currents
0x0406	1031	R	10	%	INT16	-1000–+1000	E/P/H	IN current unbalance in relation to the arithmetic mean of the phase currents (1)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0407	1032	R	10	%	INT16	-1000–+1000	E/P/H	Maximum current unbalance of registers 1028, 1029, and 1030
(1) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 340.								

Active Power

The flow sign of the active power depends on the configuration of register 3316, page 340.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0409	1034	R	1	kW	INT16	-32767–+32767	E/P/H	Active power on phase 1: P1 (1)
0x040A	1035	R	1	kW	INT16	-32767–+32767	E/P/H	Active power on phase 2: P2 (1)
0x040B	1036	R	1	kW	INT16	-32767–+32767	E/P/H	Active power on phase 3: P3 (1)
0x040C	1037	R	1	kW	INT16	-32767–+32767	E/P/H	Total active power: Ptot
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.								

Reactive Power

The flow sign of the reactive power depends on the configuration of register 3316, page 340.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x040D	1038	R	1	kvar	INT16	-32767–+32767	E/P/H	Reactive power on phase 1: Q1
0x040E	1039	R	1	kvar	INT16	-32767–+32767	E/P/H	Reactive power on phase 2: Q2
0x040F	1040	R	1	kvar	INT16	-32767–+32767	E/P/H	Reactive power on phase 3: Q3
0x0410	1041	R	1	kvar	INT16	-32767–+32767	E/P/H	Total reactive power: Qtot
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.								

Apparent Power

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0411	1042	R	1	kVA	INT16U	0–32767	E/P/H	Apparent power on phase 1: S1 (1)
0x0412	1043	R	1	kVA	INT16U	0–32767	E/P/H	Apparent power on phase 2: S2 (1)
0x0413	1044	R	1	kVA	INT16U	0–32767	E/P/H	Apparent power on phase 3: S3 (1)
0x0414	1045	R	1	kVA	INT16U	0–32767	E/P/H	Total apparent power: Stot
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.								

Power Factor

The sign of the power factor depends on the configuration of register 3318, page 341.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0415	1046	R	1000	–	INT16	-1000–+1000	E/P/H	Power factor on phase 1: PF1 (absolute value equal to |P1|/S1) (1)
0x0416	1047	R	1000	–	INT16	-1000–+1000	E/P/H	Power factor on phase 2: PF2 (absolute value equal to |P2|/S2) (1)
0x0417	1048	R	1000	–	INT16	-1000–+1000	E/P/H	Power factor on phase 3: PF3 (absolute value equal to |P3|/S3) (1)
0x0418	1049	R	1000	–	INT16	-1000–+1000	E/P/H	Total power factor: PF (absolute value equal to |Ptotal| / Stotal) (1)
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.								

Fundamental Power Factor (cosϕ)

The sign of the fundamental power factor (cosϕ) depends on the configuration of register 3318, page 341.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0419	1050	R	1000	–	INT16	-1000–+1000	H	Fundamental power factor on phase 1: cosϕ1 (absolute value equal to |P1 Fund|/S1 Fund) (1)
0x041A	1051	R	1000	–	INT16	-1000–+1000	H	Fundamental power factor on phase 2: cosϕ2 (absolute value equal to |P2 Fund|/S2 Fund) (1)
0x041B	1052	R	1000	–	INT16	-1000–+1000	H	Fundamental power factor on phase 3: cosϕ3 (absolute value equal to |P3 Fund|/S3 Fund) (1)
0x041C	1053	R	1000	–	INT16	-1000–+1000	H	Total fundamental power factor: cosφ (absolute value equal to |Ptot Fund|/Stot Fund)
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.								

Frequency

When the MicroLogic trip unit cannot calculate the frequency, it returns Not applicable = 32768 (0x8000).

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x041D	1054	R	10	Hz	INT16U	400–600	P/H	System frequency: F

Fundamental Voltage

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x041F	1056	R	1	V	INT16U	0–1200	H	Fundamental rms phase-to-phase voltage V12 Fund
0x0420	1057	R	1	V	INT16U	0–1200	H	Fundamental rms phase-to-phase voltage V23 Fund
0x0421	1058	R	1	V	INT16U	0–1200	H	Fundamental rms phase-to-phase voltage V31 Fund

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0422	1059	R	1	V	INT16U	0–1200	H	Fundamental rms phase-to-neutral voltage V1N Fund (1)
0x0423	1060	R	1	V	INT16U	0–1200	H	Fundamental rms phase-to-neutral voltage V2N Fund (1)
0x0424	1061	R	1	V	INT16U	0–1200	H	Fundamental rms phase-to-neutral voltage V3N Fund (1)
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.								

Fundamental Current

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x042B	1068	R	1	A	INT16U	0–32767	H	Fundamental rms current on phase 1: I1 Fund
0x042C	1069	R	1	A	INT16U	0–32767	H	Fundamental rms current on phase 2: I2 Fund
0x042D	1070	R	1	A	INT16U	0–32767	H	Fundamental rms current on phase 3: I3 Fund
0x042E	1071	R	1	A	INT16U	0–32767	H	Fundamental rms current on neutral: IN Fund (1) (2)
(1) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 340. (2) Measured with system type 41.								

Fundamental Active Power

The flow sign of the active power depends on the configuration of register 3316, page 340.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0433	1076	R	1	kW	INT16U	-32767–32767	H	Fundamental active power on phase 1: P1 Fund (1)
0x0434	1077	R	1	kW	INT16U	-32767–32767	H	Fundamental active power on phase 2: P2 Fund (1)
0x0435	1078	R	1	kW	INT16U	-32767–32767	H	Fundamental active power on phase 3: P3 Fund (1)
0x0436	1079	R	1	kW	INT16U	-32767–32767	H	Total fundamental active power: P_{tot} Fund
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.								

Fundamental Reactive Power

The flow sign of the reactive power depends on the configuration of register 3316, page 340.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0437	1080	R	1	kvar	INT16U	-32767–32767	H	Fundamental reactive power on phase 1: Q1 Fund (1)
0x0438	1081	R	1	kvar	INT16U	-32767–32767	H	Fundamental reactive power on phase 2: Q2 Fund (1)
0x0439	1082	R	1	kvar	INT16U	-32767–32767	H	Fundamental reactive power on phase 3: Q3 Fund (1)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x043A	1083	R	1	kvar	INT16U	-32767–32767	H	Total fundamental reactive power: Q_{tot} Fund
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.								

Fundamental Apparent Power

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x043B	1084	R	1	kVA	INT16U	0–32767	H	Fundamental apparent power on phase 1: S1 Fund (1)
0x043C	1085	R	1	kVA	INT16U	0–32767	H	Fundamental apparent power on phase 2: S2 Fund (1)
0x043D	1086	R	1	kVA	INT16U	0–32767	H	Fundamental apparent power on phase 3: S3 Fund (1)
0x043E	1087	R	1	kVA	INT16U	0–32767	H	Total fundamental apparent power: S_{tot} Fund
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.								

Distortion Power

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x043F	1088	R	1	kvar	INT16U	0–32767	H	Distortion power on phase 1: D1 (1)
0x0440	1089	R	1	kvar	INT16U	0–32767	H	Distortion power on phase 2: D2 (1)
0x0441	1090	R	1	kvar	INT16U	0–32767	H	Distortion power on phase 3: D3 (1)
0x0442	1091	R	1	kvar	INT16U	0–32767	H	Total distortion power: D_{tot}
(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.								

Total Harmonic Distortion in Relation to the Fundamental (THD)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0443	1092	R	10	%	INT16U	0–5000	H	Total harmonic distortion of V12 in relation to the fundamental
0x0444	1093	R	10	%	INT16U	0–5000	H	Total harmonic distortion of V23 in relation to the fundamental
0x0445	1094	R	10	%	INT16U	0–5000	H	Total harmonic distortion of V31 in relation to the fundamental
0x0446	1095	R	10	%	INT16U	0–5000	H	Total harmonic distortion of V1N in relation to the fundamental (1)
0x0447	1096	R	10	%	INT16U	0–5000	H	Total harmonic distortion of V2N in relation to the fundamental (1)
0x0448	1097	R	10	%	INT16U	0–5000	H	Total harmonic distortion of V3N in relation to the fundamental (1)
0x0449	1098	R	10	%	INT16U	0–5000	H	Total harmonic distortion of I1 in relation to the fundamental
0x044A	1099	R	10	%	INT16U	0–5000	H	Total harmonic distortion of I2 in relation to the fundamental
0x044B	1100	R	10	%	INT16U	0–5000	H	Total harmonic distortion of I3 in relation to the fundamental

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x044C	1101	R	10	%	INT16U	0–5000	H	Total harmonic distortion of IN in relation to the fundamental (1) (2)

(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.

(2) Measured with system type 41, calculated with system type 40.

Total Harmonic Distortion in Relation to the RMS Value (thd)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x044D	1102	R	10	%	INT16U	0–1000	H	Total harmonic distortion of V12 in relation to the rms value
0x044E	1103	R	10	%	INT16U	0–1000	H	Total harmonic distortion of V23 in relation to the rms value
0x044F	1104	R	10	%	INT16U	0–1000	H	Total harmonic distortion of V31 in relation to the rms value
0x0450	1105	R	10	%	INT16U	0–1000	H	Total harmonic distortion of V1N in relation to the rms value (1)
0x0451	1106	R	10	%	INT16U	0–1000	H	Total harmonic distortion of V2N in relation to the rms value (1)
0x0452	1107	R	10	%	INT16U	0–1000	H	Total harmonic distortion of V3N in relation to the rms value (1)
0x0453	1108	R	10	%	INT16U	0–1000	H	Total harmonic distortion of I1 in relation to the rms value
0x0454	1109	R	10	%	INT16U	0–1000	H	Total harmonic distortion of I2 in relation to the rms value
0x0455	1110	R	10	%	INT16U	0–1000	H	Total harmonic distortion of I3 in relation to the rms value
0x0456	1111	R	10	%	INT16U	0–1000	H	Total harmonic distortion of IN in relation to the rms value (1) (2)

(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.

(2) Measured with system type 41, calculated with system type 40.

Voltage-to-Current Phase Shift

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0457	1112	R	10	Deg	INT16U	0–3600	H	• Phase shift V12/I1 with system type 31 • Phase shift V1N/I1 with system type 40 and 41
0x0458	1113	R	10	Deg	INT16U	0–3600	H	• Phase shift V23/I2 with system type 31 • Phase shift V2N/I2 with system type 40 and 41
0x0459	1114	R	10	Deg	INT16U	0–3600	H	• Phase shift V31/I3 with system type 31 • Phase shift V3N/I3 with system type 40 and 41

K-Factor

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x045A	1115	R	10	–	INT16U	0–1000	H	Phase 1 K-factor(2)
0x045B	1116	R	10	–	INT16U	0–1000	H	Phase 2 K-factor(2)
0x045C	1117	R	10	–	INT16U	0–1000	H	Phase 3 K-factor(2)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x045D	1118	R	10	–	INT16U	0–1000	H	Neutral K-factor (1) (2)

(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.

(2) Not applicable in 400 Hz nominal frequency system.

Peak Factor

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x045E	1119	R	100	–	INT16U	0–10000	H	V12 voltage peak factor(3)(4)
0x045F	1120	R	100	–	INT16U	0–10000	H	V23 voltage peak factor(3)(4)
0x0460	1121	R	100	–	INT16U	0–10000	H	V31 voltage peak factor(3)(4)
0x0461	1122	R	100	–	INT16U	0–10000	H	V1N voltage peak factor (1) (4)
0x0462	1123	R	100	–	INT16U	0–10000	H	V2N voltage peak factor (1) (4)
0x0463	1124	R	100	–	INT16U	0–10000	H	V3N voltage peak factor (1) (4)
0x0464	1125	R	100	–	INT16U	0–10000	H	Phase 1 current peak factor(4)
0x0465	1126	R	100	–	INT16U	0–10000	H	Phase 2 current peak factor(4)
0x0466	1127	R	100	–	INT16U	0–10000	H	Phase 3 current peak factor(4)
0x0467	1128	R	100	–	INT16U	0–10000	H	Neutral current peak factor(2)(4)

(1) Value is not available when the system type in register 3314 is 30 or 31. Refer to System Type, page 340.

(2) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 340.

(3) Value is not available when the system type in register 3314 is 40 or 41. Refer to System Type, page 340.

(4) Not applicable in 400 Hz nominal frequency system.

Voltage-to-Voltage Phase Shift

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x046C	1133	R	10	Deg	INT16U	0–3600	H	• Phase shift V12/V12 with system type 31 • Phase shift V1N/V1N with system type 40 and 41 Always equal to 0.
0x046D	1134	R	10	Deg	INT16U	0–3600	H	• Phase shift V23/V12 with system type 31 • Phase shift V2N/V1N with system type 40 and 41 Under phase balanced conditions, equals 240 degrees.
0x046E	1135	R	10	Deg	INT16U	0–3600	H	• Phase shift V31/V12 with system type 31 • Phase shift V3N/V1N with system type 40 and 41 Under phase balanced conditions, equals 120 degrees.

Minimum/Maximum Values of Real-Time Measurements

Minimum/Maximum Measurements Rule

Minimum and maximum measurements take into account the relative value of real-time measurements. Therefore the following rule applies:

-3800<-400<0<200<600.

In this case:

- the minimum value = -3800
- the maximum value = 600

  NOTE: This rule does not apply for the power factor (PF) and for the fundamental power factor (cosϕ):

  - PFmax (or cosϕ max.) is obtained for the smallest positive value of PF (or cosϕ).
  - PFmin (or cosϕ min.) is obtained for the highest negative value of PF (or cosϕ).

The reset minimum/maximum command (command code = 46728) can reset the content of the minimum/maximum real-time measurement registers.

Minimum of Real-Time Measurements

Registers 1300 to 1599 hold the minimum values of real-time metering parameters:

- Available only with MicroLogic E,P, and H trip units.
- The register of the minimum value of a real-time metering parameter is equal to the register of the real-time metering parameter plus 300.

  Examples:

  - Register 1300 holds the minimum value of the phase-to-phase voltage V12 (register 1000).
  - Register 1316 holds the minimum value of the current on phase 1 (register 1016).
- The order of the registers is the same as that of the real-time metering variables.
- The scale factors of the minimum values are the same as those of the real-time metering parameters.
- The minimum values of arithmetic means and unbalance voltage (registers 1306–1315) and for unbalance current (registers 1327 to 1332) are not available with MicroLogic E trip units.

Maximum of Real-Time Measurements

Registers 1600 to 1899 hold the maximum values of real-time metering parameters:

- Available only with MicroLogic E,P, and H trip units.
- The register of the maximum value of a real-time metering parameter is equal to the register of the real-time metering parameter plus 600.

  Examples:

  - Register 1600 holds the maximum value of the phase-to-phase voltage V12 (register 1000).
  - Register 1616 holds the maximum value of the current on phase 1 (register 1016).

- The order of the registers is the same as that of the real-time metering variables.
- The scale factors of the maximum values are the same as those of the real-time metering parameters.
- The maximum values of arithmetic means and unbalance voltage (registers 1606–1615) and for unbalance current (registers 1627 to 1632) are not available with MicroLogic E trip units.

Energy Measurements

General Description

Energy measurements include:

- active energy Ep
- reactive energy Eq
- apparent energy Es
- active energy counted positively (EpIn) or negatively (EpOut), according to the configuration of register 3316 , page 340
- reactive energy counted positively (EqIn) or negatively (EqOut), according to the configuration of register 3316 , page 340
- active energy and reactive energy are accumulated according to the configuration of register 3324 (absolute mode by factory setting) , page 341

The reset minimum/maximum command (command code = 46728) can reset the content of the energy measurement registers.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x07CF–0x07D2	2000–2003	R	1	kWh	MOD 10000	-10^{16} to $+10^{16}$	E/P/H	Total active energy: Ep (1)
0x07D3–0x07D6	2004–2007	R	1	kVARh	MOD 10000	-10^{16} to $+10^{16}$	E/P/H	Total reactive energy: Eq (1)
0x07D7–0x07DA	2008–2011	R	1	kWh	MOD 10000	-10^{16} to $+10^{16}$	P/H	Active energy counted positively: EpIn
0x07DB–0x07DE	2012–2015	R	1	kWh	MOD 10000	-10^{16} to $+10^{16}$	P/H	Active energy counted negatively: EpOut
0x07DF–0x07E2	2016–2019	R	1	kVARh	MOD 10000	-10^{16} to $+10^{16}$	P/H	Reactive energy counted positively: EqIn
0x07E3–0x07E6	2020–2023	R	1	kVARh	MOD 10000	-10^{16} to $+10^{16}$	P/H	Reactive energy counted negatively: EqOut
0x07E7–0x07EA	2024–2027	R	1	kVAh	MOD 10000	-10^{16} to $+10^{16}$	E/P/H	Total apparent energy: Es
(1) Total active energy and total reactive energy are always counted positively with MicroLogic E trip unit.								

NOTE:

- The MicroLogic E trip unit screen displays positive values (only) up to 999 999 999 kWh. Over this value, MicroLogic E trip unit screen displays 999 999 999 kWh.
- The MicroLogic P or H trip unit screen displays positive values up to 99 999 999 kWh. Over this value, MicroLogic P or H trip unit screen displays 0 and then 1 kWh.
- The MicroLogic P or H trip unit screen displays negative values up to -99 999 999 kWh. Over this value, MicroLogic P or H trip unit screen displays 0 and then -1 kWh.
- MOD10000 format is explained in the data type description.

The behavior is the same for reactive energy and apparent energy.

Demand Measurements

General Description

Demand registers include:

- current demand
- active, reactive, and apparent power demand

The window duration of current demand depends on the configuration of register 3352. Refer to Demand Time, page 342.

The window duration and the window type of power demand depend on the configuration of registers 3354 and 3355. Refer to Demand Time, page 342.

- For the block window, the demand value is updated at the end of the window.
- For the sliding window,
  - If window duration is configured for less or equal to 15 minutes, the demand value is updated every 15 seconds.
  - If window duration is configured for more than 15 minutes, the demand value is updated every 1 minute.

The reset minimum/maximum command (command code = 46728) can reset the content of the peak demand measurement registers.

Current Demand

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0897	2200	R	1	A	INT16U	0–32767	E/P/H	Current demand on phase 1: I1 Dmd (2)
0x0898	2201	R	1	A	INT16U	0–32767	E/P/H	Current demand on phase 2: I2 Dmd (2)
0x0899	2202	R	1	A	INT16U	0–32767	E/P/H	Current demand on phase 3: I3 Dmd (2)
0x089A	2203	R	1	A	INT16U	0–32767	E/P/H	Current demand on the neutral: IN Dmd (1) (2)
0x089B	2204	R	1	A	INT16U	0–32767	E/P/H	Maximum current demand on phase 1 since the last reset: I1 Peak Dmd
0x089C	2205	R	1	A	INT16U	0–32767	E/P/H	Maximum current demand on phase 2 since the last reset: I2 Peak Dmd
0x089D	2206	R	1	A	INT16U	0–32767	E/P/H	Maximum current demand on phase 3 since the last reset: I3 Peak Dmd
0x089E	2207	R	1	A	INT16U	0–32767	E/P/H	Maximum current demand on the neutral since the last reset: IN Peak Dmd (1)

(1) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 340.

(2) Only the thermal algorithm is available with MicroLogic E trip units while MicroLogic P/H trip units have both the thermal and arithmetical mean algorithms.

K-Factor Demand

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x08A3	2212	R	10	–	INT16U	0–1000	H	K-factor demand on phase 1
0x08A4	2213	R	10	–	INT16U	0–1000	H	K-factor demand on phase 2
0x08A5	2214	R	10	–	INT16U	0–1000	H	K-factor demand on phase 3
0x08A6	2215	R	10	–	INT16U	0–1000	H	K-factor demand on the neutral (1)
0x08A7	2216	R	10	–	INT16U	0–1000	H	Maximum K-factor demand on phase 1 since last reset

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x08A8	2217	R	10	–	INT16U	0–1000	H	Maximum K-factor demand on phase 2 since last reset
0x08A9	2218	R	10	–	INT16U	0–1000	H	Maximum K-factor demand on phase 3 since last reset
0x08AA	2219	R	10	–	INT16U	0–1000	H	Maximum K-factor demand on the neutral since last reset (1)
(1) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 340.								

Active Power Demand

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x08AF	2224	R	1	kW	INT16U	0–32767	E/P/H	Total active power demand: P Dmd (1) (3)
0x08B0	2225	R	1	kW	INT16U	0–32767	E/P/H	Maximum total active power demand since the last reset: P Peak Dmd
0x08B1	2226	R	1	kW	INT16U	0–32767	P/H	Predicted active power demand at the end of the window (2)
0x08B2	2227	R	1000	–	INT16	-1000–+1000	P/H	Total power factor at last active power demand maximum
0x08B3	2228	R	1	kvar	INT16U	0–32767	P/H	Reactive power demand at last active power demand maximum
0x08B4	2229	R	1	kVA	INT16U	0–32767	P/H	Apparent power demand at last active power demand maximum
(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every 15 seconds. (2) Value is updated every 15 seconds for both block window and sliding window types. (3) Only the thermal algorithm is available with MicroLogic E trip units while MicroLogic P/H trip units have both the thermal and arithmetical mean algorithms.								

Reactive Power Demand

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x08B5	2230	R	1	kvar	INT16U	0–32767	P/H	Total reactive power demand: Q Dmd (1)
0x08B6	2231	R	1	kvar	INT16U	0–32767	P/H	Reactive power demand maximum since the last reset: Q Peak Dmd
0x08B7	2232	R	1	kvar	INT16U	0–32767	P/H	Predicted reactive power demand at the end of the window (2)
0x08B8	2233	R	1000	–	INT16	-1000–+1000	P/H	Total power factor at last reactive power demand maximum
0x08B9	2234	R	1	kW	INT16U	0–32767	P/H	Active power demand at last reactive power demand maximum
0x08BA	2235	R	1	kVA	INT16U	0–32767	P/H	Apparent power demand at last reactive power demand maximum
(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every 15 seconds. (2) Value is updated every 15 seconds for both block window and sliding window types.								

Apparent Power Demand

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x08BB	2236	R	1	kVA	INT16U	0–32767	E/P/H	Total apparent power demand: S Dmd (1)
0x08BC	2237	R	1	kVA	INT16U	0–32767	E/P/H	Maximum total apparent power demand since last reset: S Peak Dmd
0x08BD	2238	R	1	kVA	INT16U	0–32767	P/H	Predicted apparent power demand at the end of the window (2)
0x08BE	2239	R	1000	–	INT16	-1000–+1000	P/H	Total power factor at last apparent power demand maximum
0x08BF	2240	R	1	kW	INT16U	0–32767	P/H	Active power demand at last apparent power demand maximum
0x08C0	2241	R	1	kvar	INT16U	0–32767	P/H	Reactive power demand at last apparent power demand maximum

(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every 15 seconds.

(2) Value is updated every 15 seconds for both block window and sliding window types.

Spectral Components

Overview

Parity	Spectral Component	Addresses	Registers
Odd rank	Amplitude of voltage harmonic	0x1003–0x105C	4100–4189
	Amplitude of current harmonic	0x105D–0x1098	4190–4249
	Phase of voltage harmonic	0x1099–0x10AA	4250–4267
	Phase of current harmonic	0x10F3–0x1102	4340–4355
Even rank	Amplitude of voltage harmonic	0x112F–0x1188	4400–4489
	Amplitude of current harmonic	0x1189–0x11C4	4490–4549
	Phase of voltage harmonic	0x11C5–0x11D6	4550–4567
	Phase of current harmonic	0x121F–0x122E	4640–4655

Only the registers of the odd rank harmonics are detailed:

- The registers of the even rank harmonics (n) are equal to the registers of the odd rank harmonics (n+1) plus 300.
- The order of the even rank registers is the same as that of the odd rank registers.
- The scale factor of the even rank registers is the same as that of the odd rank registers.

Amplitude of Odd Rank Voltage Harmonic

The amplitude of odd rank voltage harmonic is expressed as a ratio in % to the amplitude of the fundamental (not applicable in 400 Hz nominal frequency system):

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1003	4100	R	10	%	INT16U	0–1200	H	Harmonic 3 of V12
0x1004	4101	R	10	%	INT16U	0–1200	H	Harmonic 3 of V23
0x1005	4102	R	10	%	INT16U	0–1200	H	Harmonic 3 of V31
0x1006	4103	R	10	%	INT16U	0–1200	H	Harmonic 3 of V1N (1)
0x1007	4104	R	10	%	INT16U	0–1200	H	Harmonic 3 of V2N (1)
0x1008	4105	R	10	%	INT16U	0–1200	H	Harmonic 3 of V3N (1)
0x1009	4106	R	10	%	INT16U	0–1200	H	Harmonic 5 of V12
0x100A	4107	R	10	%	INT16U	0–1200	H	Harmonic 5 of V23
0x100B	4108	R	10	%	INT16U	0–1200	H	Harmonic 5 of V31
0x100C	4109	R	10	%	INT16U	0–1200	H	Harmonic 5 of V1N (1)
0x100D	4110	R	10	%	INT16U	0–1200	H	Harmonic 5 of V2N (1)
0x100E	4111	R	10	%	INT16U	0–1200	H	Harmonic 5 of V3N
0x100F	4112	R	10	%	INT16U	0–1200	H	Harmonic 7 of V12
0x1010	4113	R	10	%	INT16U	0–1200	H	Harmonic 7 of V23
0x1011	4114	R	10	%	INT16U	0–1200	H	Harmonic 7 of V31
0x1012	4115	R	10	%	INT16U	0–1200	H	Harmonic 7 of V1N (1)
0x1013	4116	R	10	%	INT16U	0–1200	H	Harmonic 7 of V2N (1)
0x1014	4117	R	10	%	INT16U	0–1200	H	Harmonic 7 of V3N (1)
0x1015	4118	R	10	%	INT16U	0–1200	H	Harmonic 9 of V12

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1016	4119	R	10	%	INT16U	0–1200	H	Harmonic 9 of V23
0x1017	4120	R	10	%	INT16U	0–1200	H	Harmonic 9 of V31
0x1018	4121	R	10	%	INT16U	0–1200	H	Harmonic 9 of V1N (1)
0x1019	4122	R	10	%	INT16U	0–1200	H	Harmonic 9 of V2N (1)
0x101A	4123	R	10	%	INT16U	0–1200	H	Harmonic 9 of V3N (1)
0x101B	4124	R	10	%	INT16U	0–1200	H	Harmonic 11 of V12
0x101C	4125	R	10	%	INT16U	0–1200	H	Harmonic 11 of V23
0x101D	4126	R	10	%	INT16U	0–1200	H	Harmonic 11 of V31
0x101E	4127	R	10	%	INT16U	0–1200	H	Harmonic 11 of V1N (1)
0x101F	4128	R	10	%	INT16U	0–1200	H	Harmonic 11 of V2N (1)
0x1020	4129	R	10	%	INT16U	0–1200	H	Harmonic 11 of V3N (1)
0x1021	4130	R	10	%	INT16U	0–1200	H	Harmonic 13 of V12
0x1022	4131	R	10	%	INT16U	0–1200	H	Harmonic 13 of V23
0x1023	4132	R	10	%	INT16U	0–1200	H	Harmonic 13 of V31
0x1024	4133	R	10	%	INT16U	0–1200	H	Harmonic 13 of V1N (1)
0x1025	4134	R	10	%	INT16U	0–1200	H	Harmonic 13 of V2N (1)
0x1026	4135	R	10	%	INT16U	0–1200	H	Harmonic 13 of V3N (1)
0x1027	4136	R	10	%	INT16U	0–1200	H	Harmonic 15 of V12
0x1028	4137	R	10	%	INT16U	0–1200	H	Harmonic 15 of V23
0x1029	4138	R	10	%	INT16U	0–1200	H	Harmonic 15 of V31
0x102A	4139	R	10	%	INT16U	0–1200	H	Harmonic 15 of V1N (1)
0x102B	4140	R	10	%	INT16U	0–1200	H	Harmonic 15 of V2N (1)
0x102C	4141	R	10	%	INT16U	0–1200	H	Harmonic 15 of V3N (1)
0x102D	4142	R	10	%	INT16U	0–1200	H	Harmonic 17 of V12
0x102E	4143	R	10	%	INT16U	0–1200	H	Harmonic 17 of V23
0x102F	4144	R	10	%	INT16U	0–1200	H	Harmonic 17 of V31
0x1030	4145	R	10	%	INT16U	0–1200	H	Harmonic 17 of V1N (1)
0x1031	4146	R	10	%	INT16U	0–1200	H	Harmonic 17 of V2N (1)
0x1032	4147	R	10	%	INT16U	0–1200	H	Harmonic 17 of V3N (1)
0x1033	4148	R	10	%	INT16U	0–1200	H	Harmonic 19 of V12
0x1034	4149	R	10	%	INT16U	0–1200	H	Harmonic 19 of V23
0x1035	4150	R	10	%	INT16U	0–1200	H	Harmonic 19 of V31
0x1036	4151	R	10	%	INT16U	0–1200	H	Harmonic 19 of V1N (1)
0x1037	4152	R	10	%	INT16U	0–1200	H	Harmonic 19 of V2N (1)
0x1038	4153	R	10	%	INT16U	0–1200	H	Harmonic 19 of V3N (1)
0x1039	4154	R	10	%	INT16U	0–1200	H	Harmonic 21 of V12
0x103A	4155	R	10	%	INT16U	0–1200	H	Harmonic 21 of V23
0x103B	4156	R	10	%	INT16U	0–1200	H	Harmonic 21 of V31
0x103C	4157	R	10	%	INT16U	0–1200	H	Harmonic 21 of V1N (1)
0x103D	4158	R	10	%	INT16U	0–1200	H	Harmonic 21 of V2N (1)
0x103E	4159	R	10	%	INT16U	0–1200	H	Harmonic 21 of V3N (1)
0x103F	4160	R	10	%	INT16U	0–1200	H	Harmonic 23 of V12
0x1040	4161	R	10	%	INT16U	0–1200	H	Harmonic 23 of V23
0x1041	4162	R	10	%	INT16U	0–1200	H	Harmonic 23 of V31

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1042	4163	R	10	%	INT16U	0–1200	H	Harmonic 23 of V1N (1)
0x1043	4164	R	10	%	INT16U	0–1200	H	Harmonic 23 of V2N (1)
0x1044	4165	R	10	%	INT16U	0–1200	H	Harmonic 23 of V3N (1)
0x1045	4166	R	10	%	INT16U	0–1200	H	Harmonic 25 of V12
0x1046	4167	R	10	%	INT16U	0–1200	H	Harmonic 25 of V23
0x1047	4168	R	10	%	INT16U	0–1200	H	Harmonic 25 of V31
0x1048	4169	R	10	%	INT16U	0–1200	H	Harmonic 25 of V1N (1)
0x1049	4170	R	10	%	INT16U	0–1200	H	Harmonic 25 of V2N (1)
0x104A	4171	R	10	%	INT16U	0–1200	H	Harmonic 25 of V3N (1)
0x104B	4172	R	10	%	INT16U	0–1200	H	Harmonic 27 of V12
0x104C	4173	R	10	%	INT16U	0–1200	H	Harmonic 27 of V23
0x104D	4174	R	10	%	INT16U	0–1200	H	Harmonic 27 of V31
0x104E	4175	R	10	%	INT16U	0–1200	H	Harmonic 27 of V1N (1)
0x104F	4176	R	10	%	INT16U	0–1200	H	Harmonic 27 of V2N (1)
0x1050	4177	R	10	%	INT16U	0–1200	H	Harmonic 27 of V3N (1)
0x1051	4178	R	10	%	INT16U	0–1200	H	Harmonic 29 of V12
0x1052	4179	R	10	%	INT16U	0–1200	H	Harmonic 29 of V23
0x1053	4180	R	10	%	INT16U	0–1200	H	Harmonic 29 of V31
0x1054	4181	R	10	%	INT16U	0–1200	H	Harmonic 29 of V1N (1)
0x1055	4182	R	10	%	INT16U	0–1200	H	Harmonic 29 of V2N (1)
0x1056	4183	R	10	%	INT16U	0–1200	H	Harmonic 29 of V3N (1)
0x1057	4184	R	10	%	INT16U	0–1200	H	Harmonic 31 of V12
0x1058	4185	R	10	%	INT16U	0–1200	H	Harmonic 31 of V23
0x1059	4186	R	10	%	INT16U	0–1200	H	Harmonic 31 of V31
0x105A	4187	R	10	%	INT16U	0–1200	H	Harmonic 31 of V1N (1)
0x105B	4188	R	10	%	INT16U	0–1200	H	Harmonic 31 of V2N (1)
0x105C	4189	R	10	%	INT16U	0–1200	H	Harmonic 31 of V3N (1)

(1) Value is not available when the system type in register 3314 is 31. Refer to System Type, page 340.

Amplitude of Odd Rank Current Harmonic

The amplitude of odd rank current harmonic is expressed as a ratio in % to the amplitude of the fundamental (not applicable in 400 Hz nominal frequency system):

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x105D	4190	R	10	%	INT16U	0–32767	H	Harmonic 3 of I1
0x105E	4191	R	10	%	INT16U	0–32767	H	Harmonic 3 of I2
0x105F	4192	R	10	%	INT16U	0–32767	H	Harmonic 3 of I3
0x1060	4193	R	10	%	INT16U	0–32767	H	Harmonic 3 of IN (1)
0x1061	4194	R	10	%	INT16U	0–32767	H	Harmonic 5 of I1
0x1062	4195	R	10	%	INT16U	0–32767	H	Harmonic 5 of I2
0x1063	4196	R	10	%	INT16U	0–32767	H	Harmonic 5 of I3
0x1064	4197	R	10	%	INT16U	0–32767	H	Harmonic 5 of IN (1)
0x1065	4198	R	10	%	INT16U	0–32767	H	Harmonic 7 of I1

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1066	4199	R	10	%	INT16U	0–32767	H	Harmonic 7 of I2
0x1067	4200	R	10	%	INT16U	0–32767	H	Harmonic 7 of I3
0x1068	4201	R	10	%	INT16U	0–32767	H	Harmonic 7 of IN (1)
0x1069	4202	R	10	%	INT16U	0–32767	H	Harmonic 9 of I1
0x106A	4203	R	10	%	INT16U	0–32767	H	Harmonic 9 of I2
0x106B	4204	R	10	%	INT16U	0–32767	H	Harmonic 9 of I3
0x106C	4205	R	10	%	INT16U	0–32767	H	Harmonic 9 of IN (1)
0x106D	4206	R	10	%	INT16U	0–32767	H	Harmonic 11 of I1
0x106E	4207	R	10	%	INT16U	0–32767	H	Harmonic 11 of I2
0x106F	4208	R	10	%	INT16U	0–32767	H	Harmonic 11 of I3
0x1070	4209	R	10	%	INT16U	0–32767	H	Harmonic 11 of IN (1)
0x1071	4210	R	10	%	INT16U	0–32767	H	Harmonic 13 of I1
0x1072	4211	R	10	%	INT16U	0–32767	H	Harmonic 13 of I2
0x1073	4212	R	10	%	INT16U	0–32767	H	Harmonic 13 of I3
0x1074	4213	R	10	%	INT16U	0–32767	H	Harmonic 13 of IN (1)
0x1075	4214	R	10	%	INT16U	0–32767	H	Harmonic 15 of I1
0x1076	4215	R	10	%	INT16U	0–32767	H	Harmonic 15 of I2
0x1077	4216	R	10	%	INT16U	0–32767	H	Harmonic 15 of I3
0x1078	4217	R	10	%	INT16U	0–32767	H	Harmonic 15 of IN (1)
0x1079	4218	R	10	%	INT16U	0–32767	H	Harmonic 17 of I1
0x107A	4219	R	10	%	INT16U	0–32767	H	Harmonic 17 of I2
0x107B	4220	R	10	%	INT16U	0–32767	H	Harmonic 17 of I3
0x107C	4221	R	10	%	INT16U	0–32767	H	Harmonic 17 of IN (1)
0x107D	4222	R	10	%	INT16U	0–32767	H	Harmonic 19 of I1
0x107E	4223	R	10	%	INT16U	0–32767	H	Harmonic 19 of I2
0x107F	4224	R	10	%	INT16U	0–32767	H	Harmonic 19 of I3
0x1080	4225	R	10	%	INT16U	0–32767	H	Harmonic 19 of IN (1)
0x1081	4226	R	10	%	INT16U	0–32767	H	Harmonic 21 of I1
0x1082	4227	R	10	%	INT16U	0–32767	H	Harmonic 21 of I2
0x1083	4228	R	10	%	INT16U	0–32767	H	Harmonic 21 of I3
0x1084	4229	R	10	%	INT16U	0–32767	H	Harmonic 21 of IN (1)
0x1085	4230	R	10	%	INT16U	0–32767	H	Harmonic 23 of I1
0x1086	4231	R	10	%	INT16U	0–32767	H	Harmonic 23 of I2
0x1087	4232	R	10	%	INT16U	0–32767	H	Harmonic 23 of I3
0x1088	4233	R	10	%	INT16U	0–32767	H	Harmonic 23 of IN (1)
0x1089	4234	R	10	%	INT16U	0–32767	H	Harmonic 25 of I1
0x108A	4235	R	10	%	INT16U	0–32767	H	Harmonic 25 of I2
0x108B	4236	R	10	%	INT16U	0–32767	H	Harmonic 25 of I3
0x108C	4237	R	10	%	INT16U	0–32767	H	Harmonic 25 of IN (1)
0x108D	4238	R	10	%	INT16U	0–32767	H	Harmonic 27 of I1
0x108E	4239	R	10	%	INT16U	0–32767	H	Harmonic 27 of I2
0x108F	4240	R	10	%	INT16U	0–32767	H	Harmonic 27 of I3
0x1090	4241	R	10	%	INT16U	0–32767	H	Harmonic 27 of IN (1)
0x1091	4242	R	10	%	INT16U	0–32767	H	Harmonic 29 of I1
0x1092	4243	R	10	%	INT16U	0–32767	H	Harmonic 29 of I2

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1093	4244	R	10	%	INT16U	0–32767	H	Harmonic 29 of I3
0x1094	4245	R	10	%	INT16U	0–32767	H	Harmonic 29 of IN (1)
0x1095	4246	R	10	%	INT16U	0–32767	H	Harmonic 31 of I1
0x1096	4247	R	10	%	INT16U	0–32767	H	Harmonic 31 of I2
0x1097	4248	R	10	%	INT16U	0–32767	H	Harmonic 31 of I3
0x1098	4249	R	10	%	INT16U	0–32767	H	Harmonic 31 of IN (1)
(1) Value is not available when the system type in register 3314 is 31. Refer to System Type, page 340.								

Phase of Odd Rank Voltage Harmonic

These registers contain the odd rank voltage harmonic phase value (not applicable in 400 Hz nominal frequency system):

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1099	4250	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 3 of V12
0x109A	4251	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 3 of V23
0x109B	4252	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 3 of V31
0x109C	4253	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 3 of V1N (1)
0x109D	4254	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 3 of V2N (1)
0x109E	4255	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 3 of V3N (1)
0x109F	4256	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 5 of V12
0x10A0	4257	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 5 of V23
0x10A1	4258	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 5 of V31
0x10A2	4259	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 5 of V1N (1)
0x10A3	4260	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 5 of V2N (1)
0x10A4	4261	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 5 of V3N (1)
0x10A5	4262	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 7 of V12
0x10A6	4263	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 7 of V23
0x10A7	4264	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 7 of V31
0x10A8	4265	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 7 of V1N (1)
0x10A9	4266	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 7 of V2N (1)
0x10AA	4267	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 7 of V3N (1)
(1) Value is not available when the system type in register 3314 is 31. Refer to System Type, page 340.								

Phase of Odd Rank Current Harmonic

These registers contain the odd rank current harmonic phase value (not applicable in 400 Hz nominal frequency system):

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x10F3	4340	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 3 of I1
0x10F4	4341	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 3 of I2
0x10F5	4342	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 3 of I3
0x10F6	4343	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 3 of IN (1)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x10F7	4344	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 5 of I1
0x10F8	4345	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 5 of I2
0x10F9	4346	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 5 of I3
0x10FA	4347	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 5 of IN (1)
0x10FB	4348	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 7 of I1
0x10FC	4349	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 7 of I2
0x10FD	4350	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 7 of I3
0x10FE	4351	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 7 of IN (1)
0x10FF	4352	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 9 of I1
0x1100	4353	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 9 of I2
0x1101	4354	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 9 of I3
0x1102	4355	R	10	Deg	INT16U	0–3600	H	Phase of harmonic 9 of IN (1)
(1) Value is not available when the system type in register 3314 is 31. Refer to System Type, page 340.								

MicroLogic A/E/P/H Trip Unit Identification

Identification of the Metering Manager

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0CE6–0x0CE7	3303–3304	RW	–	–	OCTET STRING	0x00–0x7F	P/H	Short identifier of the metering manager, coded over 4 ASCII characters. Factory setting: **'set!'**
0x0CE8–0x0CEF	3305–3312	RW	–	–	OCTET STRING	0x00–0x7F	P/H	Long identifier of the metering manager, coded over 16 ASCII characters. Factory setting: **'please set me up'**

Serial Number

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x21FB–0x21FE	8700–8703	R	1	–	OCTET STRING	–	A/E/P/H	Serial number encoded in ASCII

Hardware Version

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2204	8709	R	–	–	INT16U	0x0000–0xFFFF	P/H	Hardware version of the MicroLogic trip unit.

Firmware Version

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2205	8710	R	1	–	INT16	–	A/E/P/H	MicroLogic trip unit firmware version. For example, the value 8244 corresponds to version 8.244.

Product Identification

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x220B	8716	R	1	–	INT16U	15133–15137	A/E/P/H	Product identification with the protection manager: 15131 = MicroLogic A 15137 = MicroLogic E 15133 = MicroLogic P 15135 = MicroLogic H
0x0EE7	3816	R	1	–	INT16U	15134–15138	E/P/H	Product identification with the metering manager: 15138 = MicroLogic E 15134 = MicroLogic P 15136 = MicroLogic H

Protection Type

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2223	8740	R	1	–	OCTET STRING	20–70	A/E/P/H	Type of protection: ‘20’= MicroLogic 2.0 ‘30’= MicroLogic 3.0 ‘40’= MicroLogic 4.0 ‘50’= MicroLogic 5.0 ‘60’= MicroLogic 6.0 ‘70’= MicroLogic 7.0

Metering Type

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2224	8741	R	1	–	OCTET STRING	0x2041–0x204D	A/E/P/H	Type of measurement: 0x2041 = ‘space’ and ‘A’ 0x2045 = ‘space’ and ‘E’ 0x2050 = ‘space’ and ‘P’ 0x2048 = ‘space’ and ‘H’ Or type of application: 0x204D = ‘space’ and ‘M’

Long-Time Rating Plug

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2225	8742	R	1	–	INT16U	0–15	A/E/P/H	Type of long-time rating plug: 0 = missing 1 = IEC standard 2 = IEC low 3 = IEC High 7 = UL-A 8 = UL-B 9 = UL-C 10 = OFF 11 = UL-D 12 = UL-E 13 = UL-F 14 = UL-G 15 = UL-H

Identification of the Protection Manager

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2583–0x2584	9604–9605	RW	–	–	OCTET STRING	–	P/H	Short identifier of the protection manager, coded over 4 ASCII characters. Factory setting: **'set!'**
0x2585–0x258C	9606–9613	RW	–	–	OCTET STRING	–	P/H	Long identifier of the protection manager, coded over 16 ASCII characters. Factory setting: **'please set me up'**

Circuit Breaker Type

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2591	9618	RW	–	–	INT16U	0–2	P/H	0 = 3-pole circuit breaker without external neutral current transformer (factory setting) 1 = 4-pole circuit breaker 2 = 3-pole circuit breaker with external neutral current transformer

Circuit Breaker Characteristics

The characteristics can be:

- set by using the MicroLogic HMI in **MicroLogic setup > Breaker selection**
- downloaded by using the test kit

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2675	9846	R	–	–	INT16U	0–3	P/H	Standard: 0 = UL 1 = IEC 2 = ANSI 3 = IEC/GB
0x2676	9847	R	–	–	INT16U	0–2	P/H	Type: 0 = MasterPacT 1 = ComPacT NS 2 = PowerPacT
0x2677–0x267C	9848–9853	R	–	–	OCTET STRING	–	P/H	ASCII character strings (for example, ‘NT08N’)

Status

Predefined Alarms Status

The predefined alarms status register indicates the current status of the alarms:

- alarm bit = 0: alarm is not active.
- alarm bit = 1: alarm is active.

The following table details the values for each bit of the alarm status registers:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x1643	5700	R	–	–	INT16U	–	H	–	Predefined alarms status
								0	Predefined alarm 48
								1	Predefined alarm 49
								2	Predefined alarm 50
								3	Predefined alarm 51
								4	Predefined alarm 52
								5	Predefined alarm 53
								6	Predefined alarm 54
								7	Predefined alarm 55
								8	Predefined alarm 56
								9	Predefined alarm 57
								10	Predefined alarm 58
								11	Predefined alarm 59
								12	Predefined alarm 60
								13	Predefined alarm 61
								14	Predefined alarm 62
								15	Predefined alarm 63
0x1644	5701	R	–	–	INT16U	–	H	–	Predefined alarms status
								0	Predefined alarm 32
								1	Predefined alarm 33
								2	Predefined alarm 34
								3	Predefined alarm 35
								4	Predefined alarm 36
								5	Predefined alarm 37
								6	Predefined alarm 38
								7	Predefined alarm 39
								8	Predefined alarm 40
								9	Predefined alarm 41
								10	Predefined alarm 42
								11	Predefined alarm 43
								12	Predefined alarm 44
								13	Predefined alarm 45
								14	Predefined alarm 46
								15	Predefined alarm 47
0x1645	5702	R	–	–	INT16U	–	H	–	Predefined alarms status
								0	Predefined alarm 16
								1	Predefined alarm 17
								2	Predefined alarm 18

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
								3	Predefined alarm 19
								4	Predefined alarm 20
								5	Predefined alarm 21
								6	Predefined alarm 22
								7	Predefined alarm 23
								8	Predefined alarm 24
								9	Predefined alarm 25
								10	Predefined alarm 26
								11	Predefined alarm 27
								12	Predefined alarm 28
								13	Predefined alarm 29
								14	Predefined alarm 30
								15	Predefined alarm 31
0x1646	5703	R	–	–	INT16U	–	H	–	Predefined alarms status
								0	Predefined alarm 0
								1	Predefined alarm 1
								2	Predefined alarm 2
								3	Predefined alarm 3
								4	Predefined alarm 4
								5	Predefined alarm 5
								6	Predefined alarm 6
								7	Predefined alarm 7
								8	Predefined alarm 8
								9	Predefined alarm 9
								10	Predefined alarm 10
								11	Predefined alarm 11
								12	Predefined alarm 12
								13	Predefined alarm 13
								14	Predefined alarm 14
								15	Predefined alarm 15

M2C/M6C Programmable Contacts Status

The M2C/M6C status register indicates the status of the programmable contacts:

- status bit = 0: the contact is open.
- status bit = 1: the contact is closed.

The contact statuses are automatically updated, a reset is not possible.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x2298	8857	R	–	–	INT16U	–	E/P/H	0	Contact 1 status
							E/P/H	1	Contact 2 status
							P/H	2	Contact 3 status
							P/H	3	Contact 4 status
							P/H	4	Contact 5 status
							P/H	5	Contact 6 status
							–	6–15	Reserved

Protection Status

The following table details the values for each bit of protection pick-up value registers:

- protection status bit = 0: protection pick-up value is not overrun.
- protection status bit = 1: protection pick-up value is overrun, even if the time delay has not expired.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x229D	8862	R	–	–	INT16U	–	E/P/H	0	Long-time protection status
								1–15	Reserved
0x229E	8863	R	–	–	INT16U	–	P/H	0	Current-unbalance status
								1	Maximum current status on phase 1
								2	Maximum current status on phase 2
								3	Maximum current status on phase 3
								4	Maximum current status on the neutral
								5	Minimum voltage status
								6	Maximum voltage status
								7	Voltage unbalance status
								8	Maximum power status
								9	Reverse power status
								10	Minimum frequency status
								11	Maximum frequency status
								12	Phase rotation status
								13	Load shedding based on current status
								14	Load shedding based on power status
								15	Reserved
0x229F	8864	R	–	–	INT16U	–	E/P/H	0	Ground-fault alarm status
							P/H	1	Earth-leakage alarm status
							–	2–15	Reserved

Alarm History

General Description

The alarm history registers describe the last ten encountered alarms. The alarm history format corresponds to a series of ten records saved in a FIFO (first in first out) stack. The last record erases the oldest. Each record is composed of 15 registers describing one alarm.

Register 9300 returns the number of alarms recorded in the alarm history (FIFO). Register 9301 returns the value of the pointer for the last alarm recorded in the alarm history.

Example:

If the register 9300 = 10 and the register 9301 = 3, then the last alarm recorded is the alarm record 3.

In this case, the last but one is the alarm record 2.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2453	9300	R	–	–	INT16U	0–10	P/H	Number of alarms recorded in the alarm history (FIFO)
0x2454	9301	R	–	–	INT16U	0–9	P/H	Value of the pointer for last alarm recorded in the alarm history

Record Number

A read request of 15x(n) registers is necessary to read n alarm records, where 15 is the number of registers for each trip record.

For example, a read request of 15x3 = 45 registers is necessary to read 3 alarm records of the alarm history:

- The first 15 registers describe the first alarm record.
- The next 15 registers describe the second alarm record.
- The last 15 registers describe the third alarm record.

Address	Register	Description
0x2455–0x2463	9302–9316	Alarm record 0
0x2464–0x2472	9317–9331	Alarm record 1
0x2473–0x2481	9332–9346	Alarm record 2
0x2482–0x2490	9347–9361	Alarm record 3
0x2491–0x249F	9362–9376	Alarm record 4
0x24A0–0x24AE	9377–9391	Alarm record 5
0x24AF–0x24BD	9392–9406	Alarm record 6
0x24BE–0x24CC	9407–9421	Alarm record 7
0x24CD–0x24DB	9422–9436	Alarm record 8
0x24DC–0x24EA	9437–9451	Alarm record 9

Alarm Record

A read request of 15 registers is necessary to read an alarm record.

The order and the description of the alarms record registers are the same as that of the alarm record 0:

Alarm Record 0								
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**A/E/P/H**	**Description**
0x2455–0x2458	9302–9305	R	–	–	XDATE	–	P/H	Alarm date
0x2459	9306	R	–	–	INT16U	–	P/H	Alarm code
0x245A–0x245B	9307–9308	R	–	–	MOD 10000	–	P/H	Value of protection setting that caused alarm activation
0x245C	9309	R	–	–	INT16U	–	P/H	Value of time delay that caused alarm activation
0x245D	9310	R	–	–	INT16U	0–16000	P/H	Alarm current phase 1 (1)
0x245E	9311	R	–	–	INT16U	0–16000	P/H	Alarm current phase 2 (1)
0x245F	9312	R	–	–	INT16U	0–16000	P/H	Alarm current phase 3 (1)
0x2460	9313	R	–	–	INT16U	0–16000	P/H	Alarm current neutral (1)
0x2461–0x2462	9314–9315	R	–	–	–	–	P/H	Additional information depending on type of the alarm
0x2463	9316	–	–	–	–	–	–	Reserved
(1) Expressed as x 0.1 of In (rated current).								

Alarm Codes

Alarm Code	Description
1013 (0x03F5)	Long-time protection alarm
1014 (0x03F6)	Ground-fault protection alarm
1015 (0x03F7)	Earth-leakage protection alarm
1016 (0x03F8)	Current unbalance
1017 (0x03F9)	I1 maximum demand
1018 (0x03FA)	I2 maximum demand
1019 (0x03FB)	I3 maximum demand
1020 (0x03FC)	IN maximum demand
1021 (0x03FD)	Undervoltage
1022 (0x03FE)	Overvoltage
1023 (0x03FF)	Voltage unbalance
1024 (0x0400)	Reserved
1025 (0x0401)	Reverse power
1026 (0x0402)	Underfrequency
1027 (0x0403)	Overfrequency
1028 (0x0404)	Phase rotation
1029 (0x0405)	Current load shedding
1030 (0x0406)	Power load shedding
1031–1099 (0x0407–0x044B)	Reserved
1100 (0x044C)	System energized / reset
1101–1105 (0x044D–0x0451)	Reserved
1106 (0x0452)	Loss of date and time
1107–1114 (0x0453– 0x045A)	Reserved
1115 (0x045B)	Battery low

Trip History

General Description

The trip history registers describe the last 10 encountered trips. The trip history format corresponds to a series of 10 records saved in a FIFO (first in first out) stack. The last record erases the oldest. Each record is composed of 20 registers describing one trip.

Register 9098 returns the number of faults recorded in the trip history (FIFO).

Register 9099 returns the value of the pointer for the last fault recorded in the trip history.

Example:

If the register 9098 = 10 and the register 9099 = 5, then the last fault recorded is the trip record 5.

In this case, the last but one is the alarm record 4.

NOTE:

- The contacts must be inspected each time the counter reaches a hundred mark.
- The message **Not available or circuit breaker type not defined** is displayed if the characteristics of the circuit breaker have not been defined. In this case, see **Breaker selection** in the **MicroLogic setup** menu on the MicroLogic HMI, in registers 9846–9853, page 302.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2385	9094	R	1	%	INT16U	0–32767	P/H	Phase 1 contact wear indicator (1)
0x2386	9095	R	1	%	INT16U	0–32767	P/H	Phase 2 contact wear indicator (1)
0x2387	9096	R	1	%	INT16U	0–32767	P/H	Phase 3 contact wear indicator (1)
0x2388	9097	R	1	%	INT16U	0–32767	P/H	Neutral contact wear indicator (1)
0x2389	9098	R	–	–	INT16U	0–10	P/H	Number of alarms recorded in the trip history (FIFO)
0x238A	9099	R	–	–	INT16U	0–9	P/H	Value of the pointer for last alarm recorded in the trip history
(1) Factory setting = 0x8000.								

Trip Record Number

A read request of 20x(n) registers is necessary to read the last n trip records, where 20 is the number of registers for each trip record.

For example, a read request of 20x3 = 60 registers is necessary to read the last 3 trip records of the trip history:

- The first 20 registers describe the first trip record.
- The next 20 registers describe the second trip record.
- The last 20 registers describe the third trip record.

Address	Register	Description
0x238B–0x239E	9100–9119	Trip record 0
0x239F–0x23B2	9120–9139	Trip record 1
0x23B3–0x23C6	9140–9159	Trip record 2
0x23C7–0x23DA	9160–9179	Trip record 3
0x23DB–0x23EE	9180–9199	Trip record 4

Address	Register	Description
0x23EF–0x2402	9200–9219	Trip record 5
0x2403–0x2416	9220–9239	Trip record 6
0x2417–0x242A	9240–9259	Trip record 7
0x242B–0x243E	9260–9279	Trip record 8
0x243F–0x2452	9280–9299	Trip record 9

Trip Record

A read request of 20 registers is necessary to read a trip record.

The order and the description of the trip record registers are the same as that of the trip record 0:

Trip Record 0								
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**A/E/P/H**	**Description**
0x238B–0x238E	9100–9103	R	–	–	XDATE	–	E/P/H	Trip date
0x238F	9104	R	–	–	INT16U	1000–1030	E/P/H	Trip code
0x2390–0x2391	9105–9106	R	–	–	MOD 10000	–	P/H	Value of protection setting that caused alarm activation
0x2392	9107	R	–	–	INT16U	–	P/H	Value of time delay that caused trip
0x2393	9108	R	–	–	INT16U	0–16000	P/H	Trip current phase 1 (1)
0x2394	9109	R	–	–	INT16U	0–16000	P/H	Trip current phase 2 (1)
0x2395	9110	R	–	–	INT16U	0–16000	P/H	Trip current phase 3 (1)
0x2396	9111	R	–	–	INT16U	0–16000	P/H	Trip current neutral (1)
0x2397	9112	R	–	–	–	–	P/H	New value of contact-wear indicator following a trip (2)
0x2398–0x2399	9113–9114	–	–	–	–	–	–	Reserved
0x239A–0x239E	9115–9119	–	–	–	–	–	–	Reserved

(1) Expressed as x 0.1 of In (rated current).

(2) The trip unit records one indicator per contact. Here, only the value for the most worn contact is given. See registers 9094 to 9097.

Trip Codes

Trip Code	Description
1000 (0x03E8)	Trip due to long-time protection Ir
1001 (0x03E9)	Trip due to short-time protection Isd
1002 (0x03EA)	Trip due to instantaneous protection Ii
1003 (0x03EB)	Trip due to ground-fault protection Ig
1004 (0x03EC)	Trip due to earth-leakage protection IΔn
1005 (0x03ED)	Trip due to integrated instantaneous protection I >>
1006–1007 (0x03EE–0x03EF)	Reserved
1008 (0x03F0)	Trip due to advanced protection
1009 (0x03F1)	Trip due to extended advanced protection

Trip Code	Description
1010–1015 (0x03F2–0x03F7)	Reserved
1016 (0x3F8)	Current unbalance
1017 (0x3F9)	I1 maximum demand
1018 (0x3FA)	I2 maximum demand
1019 (0x3FB)	I3 maximum demand
1020 (0x3FC)	IN maximum demand
1021 (0x3FD)	Undervoltage
1022 (0x3FE)	Overvoltage
1023 (0x3FF)	Voltage unbalance
1024 (0x400)	Reserved
1025 (0x401)	Reverse power
1026 (0x402)	Underfrequency
1027 (0x403)	Overfrequency
1028 (0x404)	Phase rotation
1029 (0x405)	Current load shedding
1030 (0x406)	Power load shedding

Analog Predefined Alarms

General Description

The EcoStruxure Power Commission software enables the configuration of analog predefined alarms.

Analog predefined alarms:

- may be modified via the command interface in configuration mode
- are only available with a MicroLogic H trip unit
- can be used to trigger waveform capture

Analog Predefined Alarms Number

The following table describes the list of predefined alarms and corresponding numbers, registers, and addresses.

Alarm Number	Alarm Addresses	Alarm Registers	Alarm Description
1	0x176F–0x177A	6000–6011	Overcurrent phase 1
2	0x177B–0x1786	6012–6023	Overcurrent phase 2
3	0x1787–0x1792	6024–6035	Overcurrent phase 3
4	0x1793–0x179E	6036–6047	Over neutral current
5	0x179F–0x17AA	6048–6059	Over ground current
6	0x17AB–0x17B6	6060–6071	Undercurrent phase 1
7	0x17B7–0x17C2	6072–6083	Undercurrent phase 2
8	0x17C3–0x17CE	6084–6095	Undercurrent phase 3
9	0x17CF–0x17DA	6096–6107	Overcurrent unbalance phase 1
10	0x17DB–0x17E6	6108–6119	Overcurrent unbalance phase 2
11	0x17E7–0x17F2	6120–6131	Overcurrent unbalance phase 3
12	0x17F3–0x17FE	6132–6143	Overvoltage phase 1
13	0x17FF–0x180A	6144–6155	Overvoltage phase 2
14	0x180B–0x1816	6156–6167	Overvoltage phase 3
15	0x1817–0x1822	6168–6179	Undervoltage phase 1
16	0x1823–0x182E	6180–6191	Undervoltage phase 2
17	0x182F–0x183A	6192–6203	Undervoltage phase 3
18	0x183B–0x1846	6204–6215	Overvoltage unbalance phase 1
19	0x1847–0x1852	6216–6227	Overvoltage unbalance phase 2
20	0x1853–0x185E	6228–6239	Overvoltage unbalance phase 3
21	0x185F–0x186A	6240–6251	Over total apparent power
22	0x186B–0x1876	6252–6263	Over total active power
23	0x1877–0x1882	6264–6275	Over total active reverse power
24	0x1883–0x188E	6276–6287	Over total reactive power
25	0x188F–0x189A	6288–6299	Over total reactive reverse power
26	0x189B–0x18A6	6300–6311	Under total apparent power
27	0x18A7–0x18B2	6312–6323	Under total active power
28	0x18B3–0x18BE	6324–6335	Under total active reverse power

Alarm Number	Alarm Addresses	Alarm Registers	Alarm Description
29	0x18BF–0x18CA	6336–6347	Under total reactive power
30	0x18CB–0x18D6	6348–6359	Under total reactive reverse power
31	0x18D7–0x18E2	6360–6371	Lagging true power factor
32	0x18E3–0x18EE	6372–6383	Leading true power factor
33	0x18EF–0x18FA	6384–6395	Lagging displacement power factor
34	0x18FB–0x1906	6396–6407	Leading displacement power factor
35	0x1907–0x1912	6408–6419	Over total harmonic distortion current phase 1
36	0x1913–0x191E	6420–6431	Over total harmonic distortion current phase 2
37	0x191F–0x192A	6432–6443	Over total harmonic distortion current phase 3
38	0x192B–0x1936	6444–6455	Over total harmonic distortion voltage (phase 1 to neutral)
39	0x1937–0x1942	6456–6467	Over total harmonic distortion voltage (phase 2 to neutral)
40	0x1943–0x194E	6468–6479	Over total harmonic distortion voltage (phase 3 to neutral)
41	0x194F–0x195A	6480–6491	Over total harmonic distortion voltage (phase 1 to 2)
42	0x195B–0x1966	6492–6503	Over total harmonic distortion voltage (phase 2 to 3)
43	0x1967–0x1972	6504–6515	Over total harmonic distortion voltage (phase 3 to 1)
44	0x1973–0x197E	6516–6527	Over predicted apparent power demand
45	0x197F–0x198A	6528–6539	Over predicted total active power demand
46	0x198B–0x1996	6540–6551	Over predicted total active reverse power demand
47	0x1997–0x19A2	6552–6563	Over predicted total reactive power demand
48	0x19A3–0x19AE	6564–6575	Over predicted total reactive reverse power demand
49	0x19AF–0x19BA	6576–6587	Under predicted apparent power demand
50	0x19BB–0x19C6	6588–6599	Under predicted total active power demand
51	0x19C7–0x19D2	6600–6611	Under predicted total active reverse power demand
52	0x19D3–0x19DE	6612–6623	Under predicted total reactive power demand
53	0x19DF–0x19EA	6624–6635	Under predicted total reactive reverse power demand

Analog Predefined Alarm Record

Analog predefined alarms are coded on 12 registers.

The order and the description of the analog predefined alarms are the same as that of analog predefined alarm 1:

Analog Predefined Alarm 1								
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**A/E/P/H**	**Description**
0x176F	6000	RW	–	–	INT16U	–	H	The MSB gives the activity of the alarm: 0 = On 1 = Off The LSB gives the priority of the alarm: 0, 1, 2, or 3. The factory setting value is 0x0101. Register set to 0 will not log event into the event log (file number 10) and Waveform Capture file (file number 5).
0x1770	6001	R	–	–	INT16U	1016	H	Register number which content gets in relation to the pick-up value and to the drop-out value. The factory setting is 1016.
0x1771	6002	R	–	–	INT16U	–	H	Comparison mode: The MSB indicates Pickup mode. The LSB indicates the Dropout mode. MSB and LSB can be set to 1, 2 or 4: • 1 = immediate mode (register 6003 contains the numerical value to which the monitored register is compared) (factory setting for pickup mode and dropout mode) (2) • 2 = direct mode (register 6003 contains the register number of the register that is in relation to the monitored register) (percentage is applied) • 4 = selects bit test mode (register 6003 must contain the bitmask that gets compared (AND operation) to the monitored register)
0x1772	6003	RW	1	–	INT16U	–	H	Alarm actuation pick-up value (1) The factory setting is 0x8000.
0x1773	6004	R	100	%	INT16U	–	H	This register contains a numerical value that is multiplied by the content of the pickup register when Direct Mode is selected. Otherwise, register is not used. The factory setting is 0x8000.
0x1774	6005	RW	1	s	INT16U	–	H	Actuation time delay The factory setting is 0x8000.
0x1775	6006	RW	–	–	INT16U	–	H	Release pick-up value (1) The factory setting is 0x8000.

Analog Predefined Alarm 1								
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**A/E/P/H**	**Description**
0x1776	6007	R	–	%	INT16U	–	H	This register contains a numerical value that is multiplied by the content of the pickup register when Direct Mode is selected. Otherwise, register is not used. The factory setting is 0x8000.
0x1777	6008	RW	1	s	INT16U	0–3000	H	Release time delay. The factory setting is 0x8000.
0x1778	6009	R	–	–	INT16U	0–3	A/E	Alarm type: 0 = Over 1 = Under (factory setting) 2 = Equal 3 = Different from 5 is used for all other alarms.
0x1779	6010	RW	–	–	INT16U	–	H	Action associated with overrunning of the pick-up value after the time delay has run out. Log into the Waveform Capture file (file no. 5). Bit 9 set to 1 = action activated The factory setting is 0.
0x177A	6011	–	–	–	–	–	–	Reserved
(1) When Immediate mode is selected, care must be taken to set this register with the same units and scale factors as the register 6001. (2) No percentage is applied.								

Basic Protection Parameters

Neutral Protection Parameters

The neutral protection is only available when system type in register 3314 is 30 or 41, page 340.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2230	8753	RW	1	–	INT16U	0–3	A/E/P/H	Type of neutral protection: (1) 0 = OFF 1 = N/2 (Ir/2) 2 = N (Ir) 3 = Nx1.6 (1.6 Ir) (2)
(1) Write Access only with MicroLogic P and H trip unit. (2) Value accessible only for MicroLogic P and H trip unit.								

Long-Time Protection Parameters

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x2231	8754	R	–	–	INT16U	0–1	A/E/P/H	–	Status: 0x0001 = On
0x2232	8755	RW	–	–	INT16U	–	–	–	Type of IDMTL curve (1)
							A/E/P/H	0	Standard long-time curve I^2t (factory setting)
							P/H	1	SIT curve
							P/H	2	VIT curve
							P/H	3	EIT (I^2t on) curve
							P/H	4	HVF curve
							P/H	5	Constant time (I^2t off)
							–	6–15	Reserved
0x2233–0x2234	8756–8757	RW	1	A	MOD 10000	40–8000	A/E/P/H	–	Ir pick-up value (1)
0x2235	8758	RW	1	ms	INT16U	500–24000	A/E/P/H	–	tr time delay (1)
0x2236–0x2238	8759–8761	–	–	–	–	–	–	–	Reserved
0x2239	8762	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file no. 22 at the end of the time delay tr.
0x223A	8763	RW	–	–	INT16U	–	–	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay tr (factory setting) Bit set to 0 = contact open at the end of the time delay tr
							–	0	Always set to 1

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
							–	1–7	Reserved
							E/P/H	8	Contact 1
							E/P/H	9	Contact 2
							P/H	10	Contact 3
							P/H	11	Contact 4
							P/H	12	Contact 5
							P/H	13	Contact 6
							–	14–15	Reserved
(1) Write Access only with MicroLogic P and H trip unit.									

Short-Time Protection Parameters

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x223B	8764	R	–	–	INT16U	0–1	A/E/P/H	–	Status: 0x0001 = On
0x223C	8765	RW	–	–	INT16U	0–1	A/E/P/H	–	Type of protection: (1) 0 = I²t On 1 = I²t Off
0x223D–0x223E	8766–8767	RW	1	A	MOD 10000	60–80 000	A/E/P/H	–	Isd pick-up value (1)
0x223F	8768	RW	1	ms	INT16U	0–400	A/E/P/H	–	tsd time delay (1) 0 s: valid only for the I²t off position 100–400 ms: valid for the I²t on and I²t off positions
0x2243	8772	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay tsd.
0x2244	8773	RW	–	–	INT16U	–	–	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay tsd (factory setting) Bit set to 0 = contact open at the end of the time delay tsd
							–	0	Always set to 1
							–	1–7	Reserved
							E/P/H	8	Contact 1
							E/P/H	9	Contact 2
							P/H	10	Contact 3
							P/H	11	Contact 4
							P/H	12	Contact 5
							P/H	13	Contact 6
							–	14–15	Reserved
(1) Write Access only with MicroLogic P and H trip unit.									

Instantaneous Protection Parameters

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x2245	8774	R	–	–	INT16U	0x0001–0x0101	A/E/P/H	–	0x0001 = protection active (factory setting) 0x0101 = protection OFF
0x2246	8775	–	–	–	–	–	–	–	Reserved
0x2247–0x2248	8776–8777	RW	1	A	MOD 10000	200–120000	A/E/P/H	–	I pick-up value for the instantaneous protection (1)
0x2249	8778	–	–	–	–	–	–	–	Reserved
0x224D	8782	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x224E	8783	RW	–	–	INT16U	–	–	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay (factory setting) Bit set to 0 = contact open at the end of the time delay
							–	0	Always set to 1
							–	1–7	Reserved
							E/P/H	8	Contact 1
							E/P/H	9	Contact 2
							P/H	10	Contact 3
							P/H	11	Contact 4
							P/H	12	Contact 5
							P/H	13	Contact 6
							–	14–15	Reserved
(1) Write Access only with MicroLogic P and H trip unit.									

Ground-Fault Protection Parameters

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x224F	8784	RW	–	–	INT16U	0x0001–0x0101	A/E/P/H	–	Protection status: (1) (2) 0x0001 = protection active (factory setting) 0x0101 = protection OFF
0x2250	8785	RW	–	–	INT16U	0–1	A/E/P/H	–	Type of protection: (1) 0 = I^2t On 1 = I^2t Off
0x2251–0x2252	8786–8787	RW	1	A	MOD 10000	30–1200	A/E/P/H	–	Ig pickup for the ground-fault protection (1)
0x2253	8788	RW	1	ms	INT16U	0–400	A/E/P/H	–	tg tripping time delay for the ground-fault protection: (1) 0 s = valid only for the I^2t off position

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
									100–400 ms = valid for the I^2t on and I^2t off positions
0x2257	8792	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay tg.
0x2258	8793	RW	–	–	INT16U	–	–	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay tg (factory setting) Bit set to 0 = contact open at the end of the time delay tg
							–	0	Always set to 1
							–	1–7	Reserved
							E/P/H	8	Contact 1
							E/P/H	9	Contact 2
							P/H	10	Contact 3
							P/H	11	Contact 4
							P/H	12	Contact 5
							P/H	13	Contact 6
							–	14–15	Reserved

(1) Write Access only with MicroLogic P and H trip unit.

(2) In order to be able to write this register, the following conditions must be met:

- MicroLogic 6 P or 6 H firmware version 8.244 or above (see register 8710)
- Activation of the option Ground-Fault Inhibit through the utility enable_GFI (available on request)

Earth-Leakage (Vigi) Protection Parameters

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x2259	8794	R	–	–	INT16U	0x0001	A/P/H	–	0x0001 = protection active
0x225A	8795	–	–	–	–	–	–	–	Reserved
0x225B–0x225C	8796–8797	RW	1	mA	MOD 10000	5–300	A/P/H	–	IΔn pickup for the earth-leakage protection (1)
0x225D	8798	RW	1	ms	INT16U	0–1000	A/P/H	–	Δt tripping time delay for the earth-leakage protection (1)
0x2261	8802	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay Δt.
0x2262	8803	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Δt (factory setting) Bit set to 0 = contact open at the end of the time delay Δt

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
							–	0	Always set to 1
							–	1–7	Reserved
							P/H	8	Contact 1
							P/H	9	Contact 2
							P/H	10	Contact 3
							P/H	11	Contact 4
							P/H	12	Contact 5
							P/H	13	Contact 6
							–	14–15	Reserved
(1) Write Access only with MicroLogic P and H trip unit.									

Advanced Protection Parameters

Ground-Fault Alarm

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x259C	9629	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm active 0x0101 = OFF (factory setting)
0x259D	9630	–	–	–	–	–	–	–	Reserved
0x259E–0x259F	9631–9632	RW	1	A	MOD 10000	20–1200	P/H	–	Alarm pick-up value (1) Minimum value = 0.05 x In Factory setting = 1200 A
0x25A0	9633	RW	10	s	INT16U	10–100	P/H	–	Alarm pick-up time delay Factory setting = 100 (10 s)
0x25A1–0x25A2	9634–9635	RW	1	A	MOD 10000	20–1200	P/H	–	Alarm drop-out value (1) Maximum value = alarm pick-up value Minimum value = 0.05 x In Factory setting = 1200 A
0x25A3	9636	RW	10	s	INT16U	10–100	P/H	–	Alarm drop-out time delay (1) Factory setting = 10 (1 s)
0x25A4	9637	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x25A5	9638	RW	–	–	INT16U	–	–	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
							–	0	Always set to 0 (trip disabled for this type of alarm)
							–	1–7	Reserved
							P/H	8	Contact 1
							P/H	9	Contact 2
							P/H	10	Contact 3
							P/H	11	Contact 4
							P/H	12	Contact 5
							P/H	13	Contact 6
							–	14–15	Reserved
(1) Accessible only with MicroLogic 5.0 P, 6.0 P, 5.0 H and 6.0 H trip unit.									

Earth-Leakage Alarm

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x25A6	9639	RW	–	–	INT16U	0x0001– 0x0101	P/H	–	Alarm status: (1) 0x0001 = alarm active 0x0101 = OFF (factory setting)
0x25A7	9640	–	–	–	–	–	–	–	Reserved
0x25A8– 0x25A9	9641–9642	RW	10	A	MOD 10000	5–300	P/H	–	Alarm pick-up value (1) Factory setting = 300 (30 A)
0x25AA	9643	RW	10	s	INT16U	10–100	P/H	–	Alarm pick-up time delay Factory setting = 100 (10 s)
0x25AB– 0x25AC	9644–9645	RW	10	A	MOD 10000	5–300	P/H	–	Alarm drop-out value (1) Maximum value = alarm pick-up value Factory setting = 300 (30 A)
0x25AD	9646	RW	10	s	INT16U	10–100	P/H	–	Alarm drop-out time delay (1) Factory setting = 10 (1 s)
0x25AE	9647	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x25AF	9648	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
									Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Always set to 0 (trip disabled for this type of alarm)
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved
(1) Accessible only with MicroLogic 7.0 P and 7.0 H trip unit.									

Current Unbalance Protection

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x25B0	9649	RW	–	–	INT16U	0x0001– 0x0101	P/H	–	0x0001 = Alarm or protection active 0x0101 = OFF (factory setting)
0x25B1	9650	–	–	–	–	–	–	–	Reserved
0x25B2– 0x25B3	9651–9652	RW	1	%	MOD 10000	5–60	P/H	–	I unbal pick-up value Factory setting = 60 %
0x25B4	9653	RW	10	s	INT16U	10–400	P/H	–	Protection pick-up time delay Factory setting = 400 (40 s)
0x25B5– 0x25B6	9654–9655	RW	1	%	MOD 10000	5–60	P/H	–	Protection drop-out value Factory setting = 60 %
0x25B7	9656	RW	10	s	INT16U	100–3600	P/H	–	Protection drop-out time delay Factory setting = 100 (10 s)
0x25B8	9657	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x25B9	9658	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Bit set to 1 = the circuit breaker trips
								1–7	Reserved

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Maximum Current Protection on Phase 1

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x25BA	9659	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm or protection active 0x0101 = OFF (factory setting)
0x25BB	9660	–	–	–	–	–	–	–	Reserved
0x25BC–0x25BD	9661–9662	RW	1	A	MOD 10000	20–80000	P/H	–	I1 max. pick-up value maximum limitation = 1 x nominal current register value (factory setting), page 347 minimum limitation = 0.2 x nominal current register value, page 347
0x25BE	9663	RW	1	s	INT16U	15–1500	P/H	–	Protection pick-up time delay Factory setting = 1500 s
0x25BF–0x25C0	9664–9665	RW	1	A	MOD 10000	20–80000	P/H	–	Protection drop-out value maximum limitation = 1 x nominal current register value (factory setting), page 347 minimum limitation = 0.2 x nominal current register value, page 347
0x25C1	9666	RW	1	s	INT16U	15–3000	P/H	–	Protection drop-out time delay Factory setting = 15 s
0x25C2	9667	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x25C3	9668	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Bit set to 1 = the circuit breaker trips

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Maximum Current Protection on Phase 2

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x25C4	9669	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm or protection active 0x0101 = OFF (factory setting)
0x25C5	9670	–	–	–	–	–	–	–	Reserved
0x25C6–0x25C7	9671–9672	RW	1	A	MOD 10000	20–80000	P/H	–	I2 max. pick-up value maximum limitation = 1 x nominal current register value (factory setting), page 347 minimum limitation = 0.2 x nominal current register value, page 347
0x25C8	9673	RW	1	s	INT16U	15–1500	P/H	–	Protection pick-up time delay Factory setting = 1500 s
0x25C9–0x25CA	9674–9675	RW	1	A	MOD 10000	20–80000	P/H	–	Protection drop-out value maximum limitation = 1 x nominal current register value (factory setting), page 347 minimum limitation = 0.2 x nominal current register value, page 347
0x25CB	9676	RW	1	s	INT16U	15–3000	P/H	–	Protection drop-out time delay Factory setting = 15 s
0x25CC	9677	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x25CD	9678	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Bit set to 1 = the circuit breaker trips

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Maximum Current Protection on Phase 3

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x25CE	9679	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm or protection active 0x0101 = OFF (factory setting)
0x25CF	9680	–	–	–	–	–	–	–	Reserved
0x25D0–0x25D1	9681–9682	RW	1	A	MOD 10000	20–80000	P/H	–	I3 max. pick-up value maximum limitation = 1 x nominal current register value (factory setting), page 347 minimum limitation = 0.2 x nominal current register value, page 347
0x25D2	9683	RW	1	s	INT16U	15–1500	P/H	–	Protection pick-up time delay Factory setting = 1500 s
0x25D3–0x25D4	9684–9685	RW	1	A	MOD 10000	20–80000	P/H	–	Protection drop-out value maximum limitation = 1 x nominal current register value (factory setting), page 347 minimum limitation = 0.2 x nominal current register value, page 347
0x25D5	9686	RW	1	s	INT16U	15–3000	P/H	–	Protection drop-out time delay Factory setting = 15 s
0x25D6	9687	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x25D7	9688	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
								0	Bit set to 1 = the circuit breaker trips
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Maximum Current Protection on the Neutral

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x25D8	9689	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm or protection active 0x0101 = OFF (factory setting)
0x25D9	9690	–	–	–	–	–	–	–	Reserved
0x25DA–0x25DB	9691–9692	RW	1	A	MOD 10000	20–80000	P/H	–	IN max. pick-up value maximum limitation = 1 x nominal current register value (factory setting), page 347 minimum limitation = 0.2 x nominal current register value, page 347
0x25DC	9693	RW	1	s	INT16U	15–1500	P/H	–	Protection pick-up time delay Factory setting = 1500 s
0x25DD–0x25DE	9694–9695	RW	1	A	MOD 10000	20–80000	P/H	–	Protection drop-out value maximum limitation = 1 x nominal current register value (factory setting), page 347 minimum limitation = 0.2 x nominal current register value, page 347
0x25DF	9696	RW	1	s	INT16U	15–3000	P/H	–	Protection drop-out time delay Factory setting = 15 s
0x25E0	9697	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x25E1	9698	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
								0	Bit set to 1 = the circuit breaker trips
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Minimum Voltage Protection

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x25E2	9699	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm or protection active 0x0101 = OFF (factory setting)
0x25E3	9700	–	–	–	–	–	–	–	Reserved
0x25E4–0x25E5	9701–9702	RW	1	V	MOD 10000	100–1200	P/H	–	U min. pick-up value Maximum value = protection pick-up value of maximum voltage. Factory setting = 100 V
0x25E6	9703	RW	100	s	INT16U	20–500	P/H	–	Protection pick-up time delay Factory setting = 500 (5 s)
0x25E7–0x25E8	9704–9705	RW	1	V	MOD 10000	100–1200	P/H	–	Protection drop-out value Minimum value = protection pick-up value Factory setting = 100 V
0x25E9	9706	RW	100	s	INT16U	120–3600	P/H	–	Protection drop-out time delay Factory setting = 120 (1.2 s)
0x25EA	9707	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = wave form capture into the Fault Waveform Capture file at the end of the time delay.
0x25EB	9708	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
									Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Bit set to 1 = the circuit breaker trips
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Maximum Voltage Protection

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x25EC	9709	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm or protection active 0x0101 = OFF (factory setting)
0x25ED	9710	–	–	–	–	–	–	–	Reserved
0x25EE–0x25EF	9711–9712	RW	1	V	MOD 10000	100–1200	P/H	–	U max. pick-up value Minimum value = protection pick-up value of minimum voltage. Factory setting = +5 % above primary voltage on the voltage transformer, page 342
0x25F0	9713	RW	100	s	INT16U	20–500	P/H	–	Protection pick-up time delay Factory setting = 500 (5 s)
0x25F1–0x25F2	9714–9715	RW	1	V	MOD 10000	100–1200	P/H	–	Protection drop-out value Maximum value = protection pick-up value Factory setting = +5 % primary voltage on the voltage transformer, page 342
0x25F3	9716	RW	100	s	INT16U	120–3600	P/H	–	Protection drop-out time delay Factory setting = 120 (1.2 s)
0x25F4	9717	RW	–	–	INT16U	–	H	–	Waveform capture setting:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
									0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x25F5	9718	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Bit set to 1 = the circuit breaker trips
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Voltage Unbalance Protection

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x25F6	9719	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm or protection active 0x0101 = OFF (factory setting)
0x25F7	9720	–	–	–	–	–	–	–	Reserved
0x25F8–0x25F9	9721–9722	RW	1	%	MOD 10000	2–30	P/H	–	U unbal pick-up value Factory setting = 30 %
0x25FA	9723	RW	10	s	INT16U	10–400	P/H	–	Protection pick-up time delay Factory setting = 400 (40 s)
0x25FB–0x25FC	9724–9725	RW	1	%	MOD 10000	2–30	P/H	–	Protection drop-out value Maximum value = protection pick-up value Factory setting = 30 %
0x25FD	9726	RW	10	s	INT16U	100–3600	P/H	–	Protection drop-out time delay Factory setting = 100 (10 s)
0x25FE	9727	RW	–	–	INT16U	–	H	–	Waveform capture setting:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
									0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x25FF	9728	RW	–	–	INT16U	–	–	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Bit set to 1 = the circuit breaker trips
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Reverse Power Protection

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x260A	9739	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm or protection active 0x0101 = OFF (factory setting)
0x260B	9740	RW	–	–	INT16U	–	P/H	–	Direction of active power flow Bit 0 set to 0 = standard - power connections made to the lower terminals of the circuit breaker Bit 0 set to 1 = reverse - power connections made to the upper terminals of the circuit breaker The direction may be modified by the trip unit or by directly writing to the register after obtaining the right (using a command). Factory setting = 0x0000
0x260C–0x260D	9741–9742	RW	1	kW	MOD 10000	5–500	P/H	–	rP max. pick-up value Factory setting = 500 kW
0x260E	9743	RW	10	s	INT16U	2–200	P/H	–	Protection pick-up time delay

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
									Factory setting = 200 (20 s)
0x260F–0x2610	9744–9745	RW	1	kW	MOD 10000	5–500	P/H	–	Protection drop-out value Maximum value = protection pick-up value Factory setting = 500 kW
0x2611	9746	RW	10	s	INT16U	10–3600	P/H	–	Protection drop-out time delay Factory setting = 10 (1 s)
0x2612	9747	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x2613	9748	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Bit set to 1 = the circuit breaker trips
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Minimum Frequency Protection

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x2614	9749	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm or protection active 0x0101 = OFF (factory setting)
0x2615	9750	–	–	–	–	–	–	–	Reserved
0x2616–0x2617	9751–9752	RW	10	Hz	MOD 10000	450–5400	P/H	–	F min. pick-up value Maximum value = protection pick-up value of maximum frequency Factory setting = 450 (45 Hz)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x2618	9753	RW	100	s	INT16U	20–500	P/H	–	Protection pick-up time delay Factory setting = 500 (5 s)
0x2619–0x261A	9754–9755	RW	10	Hz	MOD 10000	450–4400	P/H	–	Protection drop-out value Minimum value = protection pick-up value Factory setting = 450 (45 Hz)
0x261B	9756	RW	100	s	INT16U	100–3600	P/H	–	Protection drop-out time delay Factory setting = 100 (1 s)
0x261C	9757	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x261D	9758	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Bit set to 1 = the circuit breaker trips
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Maximum Frequency Protection

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x261E	9759	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm or protection active 0x0101 = OFF (factory setting)
0x261F	9760	–	–	–	–	–	–	–	Reserved
0x2620–0x2621	9761–9762	RW	10	Hz	MOD 10000	450–5400	P/H	–	F max. pick-up value

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
									Minimum value = protection pick-up value of minimum frequency Factory setting = 650 (65 Hz)
0x2622	9763	RW	100	s	INT16U	20–500	P/H	–	Protection pick-up time delay Factory setting = 500 (5 s)
0x2623–0x2624	9764–9765	RW	10	Hz	MOD 10000	450–4400	P/H	–	Protection drop-out value Maximum value = protection pick-up value Factory setting = 650 (65 Hz)
0x2625	9766	RW	100	s	INT16U	100–3600	P/H	–	Protection drop-out time delay Factory setting = 100 (1 s)
0x2626	9767	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x2627	9768	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Bit set to1 = the circuit breaker trips
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Phase Rotation Alarm

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x2628	9769	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm active 0x0101 = OFF (factory setting)
0x2629	9770	–	–	–	–	–	–	–	Reserved
0x262A–0x262B	9771–9772	RW	–	–	MOD 10000	0–1	P/H	–	0 = phase rotation is Ph1, Ph2, Ph3 (factory setting)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
									1 = phase rotation is Ph1, Ph3, and Ph2
0x262C–0x262F	9773–9776	–	–	–	–	–	–	–	Reserved
0x2630	9777	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x2631	9778	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Always set to 0 (trip disabled for this type of alarm)
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Load Shedding and Reconnection Based on Current

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x2632	9779	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm active 0x0101 = OFF (factory setting)
0x2633	9780	–	–	–	–	–	–	–	Reserved
0x2634–0x2635	9781–9782	RW	1	%	MOD 10000	50–100	P/H	–	Pick-up for load shedding and reconnection based on current, expressed as a % of the long-time Ir pick-up value Factory setting = 100 %
0x2636	9783	RW	1	%Tr	INT16U	20–80	P/H	–	Pick-up time delay for load shedding and reconnection based on current, expressed as a % of the longtime delay tr pick-up value (20–80 %) Factory setting = 80 %

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x2637–0x2638	9784–9785	RW	1	%	MOD 10000	30–100	P/H	–	Drop-out for load shedding and reconnection based on current, expressed as a % of the longtime Ir pick-up value Factory setting = 100 %
0x2639	9786	RW	1	s	INT16U	10–600	P/H		Drop-out time delay for load shedding and reconnection based on current Factory setting = 10 s
0x263A	9787	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x263B	9788	RW	–	–	INT16U	–	–	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
							P/H	0	Always set to 0 (trip disabled for this type of alarm)
							–	1–7	Reserved
							P/H	8	Contact 1
							P/H	9	Contact 2
							P/H	10	Contact 3
							P/H	11	Contact 4
							P/H	12	Contact 5
							P/H	13	Contact 6
							–	14–15	Reserved

Load Shedding and Reconnection Based on Power

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x263C	9789	RW	–	–	INT16U	0x0001–0x0101	P/H	–	0x0001 = alarm active 0x0101 = OFF (factory setting)
0x263D	9790	RW	–	–	INT16U	–	–	–	Direction of active power flow Bit set to 0 = standard, power connections made to the lower terminals of the circuit breaker Bit set to 1 = reverse, power connections made

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
									to the upper terminals of the circuit breaker The direction may be modified by the command interface or by directly writing to the register after obtaining the right (using a command). Factory setting = 0x0000
0x263E–0x263F	9791–9792	RW	1	kW	MOD 10000	200–10000	P/H	–	Pick-up for load shedding and reconnection based on power Factory setting = 10000 kW
0x2640	9793	RW	1	s	INT16U	10–3600	P/H	–	Pick-up time delay for load shedding and reconnection based on power Factory setting = 3600 s
0x2641–0x2642	9794–9795	RW	1	kW	MOD 10000	100–10000	P/H	–	Drop-out for load shedding and reconnection based on power Factory setting = 10000 kW
0x2643	9796	RW	1	s	INT16U	10–3600	P/H	–	Drop-out time delay for load shedding and reconnection based on power Factory setting = 10 s
0x2644	9797	RW	–	–	INT16U	–	H	–	Waveform capture setting: 0 = no waveform capture 0x0100 = waveform capture into the Fault Waveform Capture file at the end of the time delay.
0x2645	9798	RW	–	–	INT16U	–	P/H	–	M2C/M6C programmable contact setting: Bit set to 1 = contact closed at the end of the time delay Bit set to 0 = contact open at the end of the time delay (factory setting)
								0	Always set to 0 (trip disabled for this type of alarm)
								1–7	Reserved
								8	Contact 1
								9	Contact 2
								10	Contact 3
								11	Contact 4
								12	Contact 5
								13	Contact 6
								14–15	Reserved

Configuration of the M2C/M6C Programmable Contacts

General Description

The M2C and M6C programmable contacts may be used to signal pick-up value overruns or status changes:

- M2C has two contacts, 1 and 2
- M6C has six contacts, 1 to 6

The M2C/M6C programmable contacts can be configured:

- locally via the HMI of the MicroLogic P/H trip unit
- remotely via the communication interface

The remote configuration of each contact can be allowed or forbidden by the local configuration via the HMI of the MicroLogic P/H trip unit with a firmware version > 2009 AJ.

Remote Configuration Status

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2647	9800	R	–	–	INT16U	0–1	P/H	Remote configuration status: 0 = indicates that remote configuration of the contact is not authorized (factory setting). 1 = indicates that remote configuration of the contact is authorized. Remote configuration status can be modified only locally via the HMI of MicroLogic P/H trip unit.

M2C/M6C Programmable Contact Registers

The settings of the M2C/M6C programmable contacts are in the contact registers:

Contact Number	Contact Addresses	Contact Registers
1	0x2648–0x264E	9801–9807
2	0x264F–0x2655	9808–9814
3	0x2656–0x265C	9815–9821
4	0x265D–0x2663	9822–9828
5	0x2664–0x266A	9829–9835
6	0x266B–0x2671	9836–9842

M2C/M6C Programmable Contact 1 Description

The order and the description of the M2C/M6C programmable contacts are the same as that of contact 1:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2648	9801	RW	–	–	INT16U	0–4	–	Output mode
							E/P/H	0 = normal (non-latching) mode (factory setting)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
								Contact closed each time for as long as the assigned alarm remains active.
							P/H	1 = latching mode Contact closed for each assigned alarm and remains activated until the alarm is reset by the user (through the command interface or by a reset on the trip unit).
							P/H	2 = time delay mode Contact closed for a set time for each assigned alarm. It is opened at the end of the time delay whether the alarm is still active or not. The alarm must change status at least once to open the contact again.
							E/P/H	3 = forced to 1 The contact remains closed and is not controlled by the alarm status.
							E/P/H	4 = forced to 0 The contact remains open and is not controlled by the alarm status.
0x2649	9802	RW	10	s	INT16U	10– 3600	P/H	Contact activation time delay for time-delay mode Factory setting: 3600 (360 s)
0x264A– 0x264D	9803– 9806	RW	–	–	OCTET STRING	0x00– 0x7F	P/H	Contact name in ASCII (A–Z and 0–9) using 4 registers Update via the trip unit not possible Factory setting: **'set up !'**
0x264E	9807	RW	–	–	INT16U	1000– 1031	E/P/H	Owner alarm number for the contact 1. Factory setting = 0x8000 (no owner)

Type of Programmable Contacts

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2672	9843	R	–	–	INT16U	0–6	E/P/H	0 = none
							E/P/H	2 = M2C
							P/H	6 = M6C

Event Assignment to M2C/M6C Programmable Contacts

The M2C/M6C programmable contacts can be associated to a basic or advanced protection parameter event.

Depending on the protection parameter, a specific register can contain the programmable contact number which opens or closes at the end of the protection time delay (register 8763 as example).

Measurement Parameters

System Type

The setup ENVT (External Neutral Voltage Tap) presence command (command code = 46472) configures the content of the system type register.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0CF1	3314	R-WC	–	–	INT16U	30, 31, 40, 41	E/P/H	System type Factory setting: • 40 with MicroLogic E trip unit • 41 with MicroLogic P and H trip units

Determining system type:

If...	Then...	Result
the system type is a three-pole circuit breaker with external neutral current transformer and without external neutral voltage tap	system type = 30	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are not available. • Measurement of the neutral current is available. • 3 wattmeters method is not possible.
the system type is a three-pole circuit breaker without external neutral current transformer and without external neutral voltage tap	system type = 31	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are not available. • Measurement of the neutral current is not available. • 3 wattmeters method is not possible.
the system type is a three-pole circuit breaker without external neutral current transformer and with external neutral voltage tap	system type = 40	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are available. • Measurement of the neutral current is not available. • 3 wattmeters method is possible.
the system type is a three-pole circuit breaker with external neutral current transformer and external neutral voltage tap, or if the system type is 4-pole circuit breaker	system type = 41	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are available. • Measurement of the neutral current is available. • 3 wattmeters method is possible.

This table presents the text to choose on the MicroLogic E trip unit display according to the system type determined previously:

If...	Then...
system type = 31	select **3W3ct**
system type = 40	select **4W3ct**
system type = 41	select **4W4ct**

Power Flow Sign

On MicroLogic P and H trip units, the power flow sign is configured by using the MicroLogic HMI or the power flow sign configuration command (command code = 47240).

On MicroLogic E trip units, the power flow sign is configured by using the MicroLogic HMI only.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0CF3	3316	R-WC	–	–	INT16U	0–1	E/P/H	Power flow sign: 0 = the active power flows from upstream (top) to downstream (bottom) (factory setting). 1 = the active power flows from downstream (bottom) to upstream (top).

Reactive Power Sign

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0CF4	3317	RW	–	–	INT16U	0–1	E/P/H	Sign convention for the reactive power: 0 = alternate IEEE convention 1 = IEEE and IEC convention (factory setting) (1)
(1) With MicroLogic E trip unit, only IEC convention.								

Power Factor Sign

The power factor sign configuration command (command code = 47241) configures the content of the power factor sign register.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0CF5	3318	R-WC	–	–	INT16U	0–2	E/P/H	Sign convention for the power factor and the fundamental power factor (cosϕ): 0 = IEC convention 1 = alternate IEEE convention 2 = IEEE convention (factory setting) (1)
(1) With MicroLogic E trip unit, only IEC convention.								

Reactive Power Calculation Convention

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0CF6	3319	R	–	–	INT16U	0–1	H	Reactive power calculation convention: 0 = fundamental alone 1 = harmonics included (factory setting)

Energy Accumulation Mode

The energy accumulation mode configuration command (command code = 47242) configures the content of the energy accumulation mode register.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0CFB	3324	R-WC	–	–	INT16U	0–1	E/P/H	Energy accumulation mode: 0 = absolute accumulation (factory setting) (1) Ep = EpIn + EpOut Eq = EqIn + EqOut 1 = signed accumulation Ep = EpIn – EpOut Eq = EqIn – EqOut
(1) With MicroLogic E trip unit, only absolute computation is available.								

Demand Time

The current demand configuration command (command code 47243) configures the content of registers 3351 and 3352.

The power demand configuration command (command code 47244) configures the content of registers 3354 and 3355.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0D16	3351	RW	–	–	INT16U	0–1	E/P/H	Current demand calculation method (window type): 0 = block interval, sliding 1 = thermal, sliding (factory setting) (1)
0x0D17	3352	R-WC	x1	min	INT16U	5–60	E/P/H	Duration of the current demand calculation window, adjustable in steps of 1 minute. The factory setting is 15 minutes (2).
0x0D19	3354	R-WC	–	–	INT16U	0–5	E/P/H	Power demand calculation method (window type): 0 = sliding (block interval) (factory setting) 1 = sliding (thermal) (1) 2 = block (block interval) 5 = synchronized to communication
0x0D1A	3355	R-WC	x1	min	INT16U	5–60	E/P/H	Duration of the power demand calculation window, adjustable in steps of 1 minute. The factory setting is 15 minutes.
(1) With MicroLogic E trip unit, only the thermal sliding option is available. (2) The duration in minutes of the current demand calculation window set in this register is used for the maximum current I1, I2, and I3 and IN protection functions. When these protection functions are active, it is possible to modify the duration of the calculation window whether the protective cover for the dial settings is closed or not, whether remote access is authorized (MicroLogic) or not, and whether the supervisor knows the remote access control word or not.								

Nominal Voltage

The setup nominal primary voltage Vn display command (command code = 47245) configures the content of the nominal voltage register.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x258F	9616	R-WC	1	V	INT16U	100–1150	E/P/H	Nominal primary voltage Vn on the voltage transformer. Factory setting = 690 V
0x2590	9617	RW	1	V	INT16U	100–690	P/H	Nominal secondary voltage on the voltage transformer. Factory setting = 690 V

Time-Stamped Information

General Description

The time-stamped information enables the user to know all the dates related to important information.

The time-stamped information table describes:

- the current date
- the last current demand and corresponding dates
- the last power demand and corresponding dates
- the last reset and corresponding dates
- the last k-factor demand peak and corresponding dates
- the last current demand peak and corresponding dates

Current Date

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0BB7–0x0BBA	3000– 3003	R	–	–	XDATE	–	P/H	Current date of the metering manager
0x2327–0x232A	9000– 9003	R	–	–	XDATE	–	E/P/H	Current date of the protection manager

Last Current Demand

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0BBC–0x0BBE	3005–3007	R	–	–	DATE	–	E/P/H	Date of last current demand maximum I1 (register 2204)
0x0BBF–0x0BC1	3008–3010	R	–	–	DATE	–	E/P/H	Date of last current demand maximum I2 (register 2205)
0x0BC2–0x0BC4	3011–3013	R	–	–	DATE	–	E/P/H	Date of last current demand maximum I3 (register 2206)
0x0BC5–0x0BC7	3014–3016	R	–	–	DATE	–	E/P/H	Date of last current demand maximum on the neutral (register 2207) (1)
(1) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 340.								

Last Power Demand

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0BC8–0x0BCA	3017– 3019	R	–	–	DATE	–	E/P/H	Date of last active power demand maximum (register 2224)
0x0BCB–0x0BCD	3020– 3022	R	–	–	DATE	–	P/H	Date of last reactive power demand maximum (register 2230)
0x0BCE–0x0BD0	3023– 3025	R	–	–	DATE	–	E/P/H	Date of last apparent power demand maximum (register 2236)

Last Reset

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0BD1–0x0BD3	3026– 3028	R	–	–	DATE	–	P/H	Date of last reset of current demand maximum values
0x0BD4–0x0BD6	3029– 3031	R	–	–	DATE	–	P/H	Date of last reset of power demand maximum values
0x0BD7–0x0BD9	3032– 3034	R	–	–	DATE	–	P/H	Date-Time of last min. registers reset (1300–1599) (1)
0x0BDA–0x0BDC	3035– 3037	R	–	–	DATE	–	P/H	Date-Time of last max. registers reset (1600–1899) (1)
0x0BDD–0x0BDF	3038– 3040	R	–	–	DATE	–	P/H	Date of last reset of energy meters
0x2331–0x2333	9010– 9012	R	–	–	DATE	–	P/H	Date of last reset of the maximum phase, ground-fault, and earth-leakage currents
0x236D–0x236F	9070– 9072	R	–	–	DATE	–	P/H	Date of last reset of the trip history (last 10 faults)
0x2370–0x2372	9073– 9075	R	–	–	DATE	–	P/H	Date of last reset of the alarm history (last 10 alarms)

(1) This register is updated whenever any of the min. registers are reset. Command interface authorizes user to clear min. of current rms and unbalance values, voltage rms and unbal values, frequency, P/Q/S/PF, fundamental quantities and THD, voltage crest and current crest independently. However, since only one date/time of last reset is maintained, it is recommended to always set all bits in the command that resets min. values.

Last K-Factor Demand Peak

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0BE0–0x0BE2	3041–3043	R	–	–	DATE	–	P/H	Date of appearance of last K-factor demand peak (phase 1)
0x0BE3–0x0BE5	3044–3046	R	–	–	DATE	–	P/H	Date of appearance of last K-factor demand peak (phase 2)
0x0BE6–0x0BE8	3047–3049	R	–	–	DATE	–	P/H	Date of appearance of last K-factor demand peak (phase 3)
0x0BE9–0x0BEB	3050–3052	R	–	–	DATE	–	P/H	Date of appearance of last K-factor demand peak (Neutral) (1)

(1) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 340.

Last Current Demand Peak

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0BEC–0x0BEE	3053– 3055	R	–	–	DATE	–	P/H	Date of appearance of last I^2 demand peak (phase 1)
0x0BEF–0x0BF1	3056– 3058	R	–	–	DATE	–	P/H	Date of appearance of last I^2 demand peak (phase 2)
0x0BF2–0x0BF4	3059– 3061	R	–	–	DATE	–	P/H	Date of appearance of last I^2 demand peak (phase 3)
0x0BF5–0x0BF7	3062– 3064	R	–	–	DATE	–	P/H	Date of appearance of last I^2 demand peak (Neutral) (1)

(1) Value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 340.

Maintenance Indicators

Rate of Wear Counter

The contacts must be inspected each time the counter reaches a hundred mark. The message **Not available or circuit breaker type not defined** is displayed if the characteristics of the circuit breaker have not been defined. In this case, see **Breaker selection** in the **MicroLogic setup** menu on the MicroLogic HMI, in registers 9846–9853, page 302.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2385	9094	R	1	%	INT16U	0–32767	P/H	Phase 1 contact wear indicator (1)
0x2386	9095	R	1	%	INT16U	0–32767	P/H	Phase 2 contact wear indicator (1)
0x2387	9096	R	1	%	INT16U	0–32767	P/H	Phase 3 contact wear indicator (1)
0x2388	9097	R	1	%	INT16U	0–32767	P/H	Neutral contact wear indicator (1)
(1) Factory setting = 0x8000.								

Load Profile Counters

The load profile counters (only available with the BCM ULP module) report the number of hours for each range of current in the MicroLogic trip unit. If the load profile counters reach the maximum value 4 294 967 295 and a new load profile event occurs, then the load profile counters are reset to 0.

A read request of eight registers is necessary to read the load profile counters.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x74B7–0x74B8	29880–29881	R	1	Hour	INT32U	0–4 294 967 295	A/E/P/H	Number of hours for 0–49% of the nominal current range
0x74B9–0x74BA	29882–29883	R	1	Hour	INT32U	0–4 294 967 295	A/E/P/H	Number of hours for 50–79% of the nominal current range
0x74BB–0x74BC	29884–29885	R	1	Hour	INT32U	0–4 294 967 295	A/E/P/H	Number of hours for 80–89% of the nominal current range
0x74BD–0x74BE	29886–29887	R	1	Hour	INT32U	0–4 294 967 295	A/E/P/H	Number of hours for 90–100% of the nominal current range

Miscellaneous

Nominal Current

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x222D	8750	R	1	A	INT16U	0–8000	A/E/P/H	Rated circuit breaker current Factory setting = 100 A (circuit breaker sensor plug not present)

Protection Manager Measurements

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2263	8804	R	–	–	INT16U	0–65535	P/H	Protection Manager (PM) configuration change counter This counter is incremented each time a PM setting change is applied through HMI (keyboard or switches) or COM. If switches were changed during power off, this counter is incremented at power-up.
0x2280	8833	R	10	%In	INT16U	0–16000	P/H	Maximum fault current (trip) recorded on phase 1 since last reset (4) Factory setting = 0x8000 (no fault recorded or circuit breaker type not entered)
0x2281	8834	R	10	%In	INT16U	0–16000	P/H	Maximum fault current (trip) recorded on phase 2 since last reset (4) Factory setting = 0x8000 (no fault recorded or circuit breaker type not entered)
0x2282	8835	R	10	%In	INT16U	0–16000	P/H	Maximum fault current (trip) recorded on phase 3 since last reset (4) Factory setting = 0x8000 (no fault recorded or circuit breaker type not entered)
0x2283	8836	R	10	%In	INT16U	0–16000	P/H	Maximum fault current (trip) recorded on the neutral since last reset (4) Factory setting = 0x8000 (no fault recorded or circuit breaker code not supplied)
0x2284	8837	R	1	%Ir	INT16U	0–32767	A/P/H	RMS current on phase 1 expressed as a % of the Ir long-time pick-up value
0x2285	8838	R	1	%Ir	INT16U	0–32767	A/P/H	RMS current on phase 2 expressed as a % of the Ir long-time pick-up value
0x2286	8839	R	1	%Ir	INT16U	0–32767	A/P/H	RMS current on phase 3 expressed as a % of the Ir long-time pick-up value
0x2287	8840	R	1	%Ir	INT16U	0–32767	A/P/H	RMS current on the neutral expressed as a % of the rated current In x the selected neutral setting (x 1, x 2 or x 0.5) (1)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x2288	8841	R	1	%Ig	INT16U	0–32767	A/P/H	"Residual" ground-fault current expressed as a % of the Ig ground-fault protection pick-up value (2)
0x2289	8842	R	100	%Idn	INT16U	0–32767	A/P/H	Earth-leakage current expressed as a % of the IΔN earth-leakage protection pick-up value (3)

(1) Value not accessible when configuration register 9618 selects "no external CT".

(2) Accessible only with MicroLogic 6.0 trip unit.

(3) Accessible only with MicroLogic 7.0 trip unit.

(4) Auxiliary power is required to calculate the fault currents. Calculation is effective only when the circuit breaker selection code has been supplied (see the *MicroLogic P/H trip units user guides*).

Battery Status

The following table represents the battery charge status:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x228A	8843	R	1	%	INT16U	0–100	A/E/P/H	Battery-charge indicator: 100 % = U > 2800 mV 50 % = 2200 < U < 2800 mV 0 % = U < 2200 mV

Time Remaining Until Long-Time Tripping

Time remaining until long-time tripping is evaluated every second. If another protection is tripped, then time remaining until long-time tripping continues to be evaluated.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x22A0–0x22A1	8865–8866	R	10	s	MOD 10000	–	P/H	Time remaining until long-time tripping

Phase Rotation

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x22A7	8872	R	–	–	INT16U	–	P/H	Phase rotation: 0 = ABC (123) 1 = ACB (132)

Language

This register sets the language used by the trip unit. It may be modified through the trip unit keypad. The factory setting is English but it may be factory set if necessary.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x258D	9614	RW	–	–	INT16U	–	P/H	0	French

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
								1	US English
								2	UK English
								3	German
								4	Spanish
								5	Italian
								7	Chinese
								8	Russian
								9	Optional language available on order from Schneider Electric
								10–15	Reserved

Nominal Frequency

This register rates the circuit breaker operating frequency required by the protection manager to disable phase rotation protection for 400 Hz distribution system.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x258E	9615	RW	–	–	INT16U	–	P/H	0	50 / 60 Hz (factory setting)
								1–2	Reserved
								3	400 Hz
								4–15	Reserved

MicroLogic A/E/P/H Trip Unit Files

What's in This Chapter

File Mechanism 351
Protection Event Log 353
Metering Event Log 355
Maintenance Protection Event Log 357
Maintenance Metering Event Log 359
Minimum/Maximum Event Log 361
Waveform Capture 363
Fault Waveform Capture 366

File Mechanism

Overview

The MicroLogic A/E/P/H trip unit stores events and waveform in different files.

Access

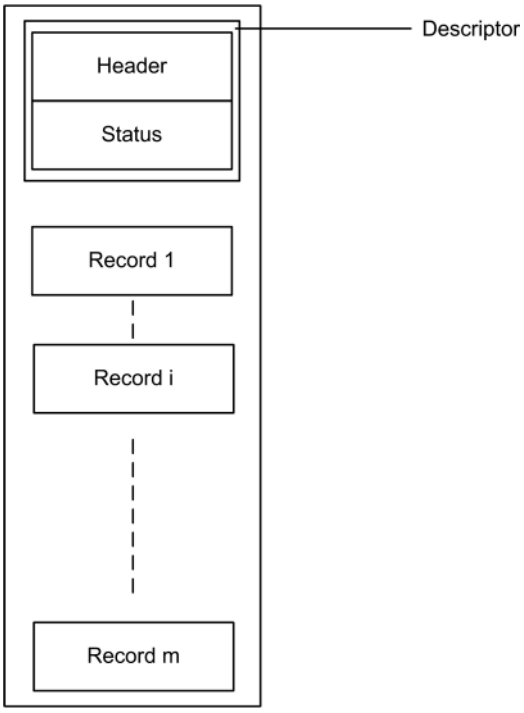
These files can be read with the Modbus function code 20 (0x14): Read file record.

There are two types of files:

- files with dynamic number of records added in a FIFO stack and managed with sequence registers. In this case, the record number of the last record is defined with these sequence registers.
- files with a fixed number n of records. In this case, all record numbers and their descriptions are detailed. The Modbus function 20 (0x14) is handled n times on the n desired records numbers.

Structure

The following graphic shows the structure of a file:



A file is made up of records, with a maximum of 100 records. All records in a file have the same structure and size.

The descriptor is made up of the following two read zones:

- one read zone for file configuration (Header) that gives information about the size of file and records
- one read zone for file characteristics (Status) that gives information about record numbers

Descriptors are updated each time new record is added to the file.

Sequence Registers Description

The file characteristics (Status) make available to the supervisor two sequence registers that indicate the first and last records added in the file. They enable the supervisor to determine whether certain records were deleted before they could be read.

The sequence number for the last record increments from 1 to 8000 each time a new record is added to the file.

When the file is full (maximum of 100 records), the new record overwrites the oldest record. The sequence number for the last record continues to increment normally. When the oldest record is overwritten, the sequence number for the first record also increments.

When the sequence number reaches 8000, the next sequence number will be 1.

Read File Record Example

The Read File Record function is used to access in a standardized manner the file information. This example presents a request to read the most recent record in the event log of the protection manager.

The following table shows how to read the event log of the file number 20 (0x0014). This file is made up of 100 records. Each record is made up of 9 registers, thus the record length is 9 (0x0009). The Modbus address of the Modbus server is 47 = 0x2F.

Client Request		**Server Reply**	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x2F	Modbus server address	0x2F
Function code	0x14	Function code	0x14
Data length in bytes	0x07	Data length in bytes	0x14
Reference type	0x06	File reply length	0x13
File number	0x0014	Reference type	0x06
Record number	0x1234	Record data	9x2 bytes data
Record length	0x0009	CRC (MSB)	0xNN
CRC (MSB)	0xNN	CRC (LSB)	0xNN
CRC (LSB)	0xNN	–	

The sequence number of last record in the file (the most recent) is the content of register 9921. Consider 0x1234 for the content of register 9921.

Protection Event Log

General Description

The system stores the events that concern the protection manager (trips, alarms) in the file number 20.

This file is made up of 100 records and each record is made up of nine registers.

File Header

The following table describes the file header content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x26AB	9900	RW	–	–	INT16U	–	P/H	File status: 0x0000 = file disabled 0xFFFF = file enabled (factory setting)
0x26AC	9901	R	–	–	INT16U	–	P/H	Type of file: 20 = protection event log
0x26AD	9902	R	1	–	INT16U	–	P/H	Size of a file = 100 records
0x26AE	9903	R	1	–	INT16U	–	P/H	Size of a record = 9 registers
0x26AF	9904	R	–	–	INT16U	1	P/H	File filling mode: 0 = circular

File Status

The following table describes the file status content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x26BB	9916	R	1	–	INT16U	–	P/H	Size of a file = 100 records
0x26BC	9917	R	1	–	INT16U	–	P/H	Size of a record = 9 registers
0x26BD	9918	R	1	–	INT16U	–	P/H	0x0000 = file OK 0x000A = record size smaller than expected 0x0014 = record size larger than expected 0x001E = insufficient memory 0x00FA = internal error 0x00FD = corrupted allocation table 0x00FE = configuration zero 0x00FF = invalid configuration 0xFC00 = invalid file number 0xFD00 = invalid record number 0xFE00 = file not supported 0xFF00 = cannot allocate file
0x26BE	9919	R	1	–	INT16U	0–100	P/H	Number of records in the file
0x26BF	9920	R	1	–	INT16U	0–8000	P/H	Sequence number of first record in the file (the oldest)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x26C0	9921	R	1	–	INT16U	0–8000	P/H	Sequence number of last record in the file (the most recent)
0x26C1–0x26C3	9922–9924	R	–	–	DATE	–	P/H	Date the last file was reset. Factory setting = 0x8000 0x8000 0x8000

Protection Event Record

The following table shows the format of 1 record in the protection event log.

Registers	Type	Bits	Description
1–4	XDATE	–	Event date
5	INT16U	–	Event number: alarm code, page 308 or trip code, page 310
6	INT16U	–	Event characteristics for protection event log (1)
7	INT16U	0–7	1 = event of the over type 2 = alarm of the under type 3 = alarm of the minimum type 4 = alarm of the maximum type 5 = alarm of the assorted type
		8–11	1 = start of an event 2 = end of an alarm
		12–15	Alarms 1100–1106 have a priority 3. For other alarms, the value contained in these 4 bits represents the priority linked to the event (if applicable and depending on the alarm configuration).
8	INT16U	–	Logging register associated to the alarm (2)
9	INT16U	–	Action register associated to the alarm (2)

(1) For event numbers 1000–1004, the data is the value of the fault current interrupted by the circuit breaker.

For all other protection events, this value is forced to 32768.

(2) Registers 8 and 9 are a copy of the alarm configuration registers at the moment the event occurred. These registers depend entirely on the user configurations. For the events 1100–1106, these registers are forced to 32768.

Metering Event Log

General Description

The system stores the events that concern the metering manager (analog predefined alarms 1 to 53) in the file 10.

This file is made up of 100 records and each record is made up of nine registers.

File Header

The following table describes the file header content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1BFB	7164	RW	–	–	INT16U	–	H	File status: 0x0000 = file disabled 0xFFFF = file enabled (factory setting)
0x1BFC	7165	R	–	–	INT16U	–	H	Type of file: 10 = metering event log
0x1BFD	7166	R	1	–	INT16U	–	H	Size of a file = 100 records
0x1BFE	7167	R	1	–	INT16U	–	H	Size of a record = 9 registers
0x1BFF	7168	R	–	–	INT16U	1	H	File filling mode: 0 = circular

File Status

The following table describes the file status content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1C0B	7180	R	1	–	INT16U	–	H	Size of a file = 100 records
0x1C0C	7181	R	1	–	INT16U	–	H	Size of a record = 9 registers
0x1C0D	7182	R	1	–	INT16U	–	H	0x0000 = file OK 0x000A = record size smaller than expected 0x0014 = record size larger than expected 0x001E = insufficient memory 0x00FA = internal error 0x00FD = corrupted allocation table 0x00FE = configuration zero 0x00FF = invalid configuration 0xFC00 = invalid file number 0xFD00 = invalid record number 0xFE00 = file not supported 0xFF00 = cannot allocate file
0x1C0E	7183	R	1	–	INT16U	0–100	H	Number of records in the file
0x1C0F	7184	R	1	–	INT16U	0–8000	H	Sequence number of first record in the file (the oldest)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1C10	7185	R	1	–	INT16U	0–8000	H	Sequence number of last record in the file (the most recent)
0x1C11–0x1C13	7186– 7188	R	–	–	DATE	–	H	Date the last file was reset. Factory setting = 0x8000 0x8000 0x8000

Metering Event Record

The following table shows the format of one record in the metering log:

Registers	Type	Bits	Description
1–4	XDATE	–	Event date
5	INT16U	–	Event number: analog predefined alarms 1–53, page 312
6	INT16U	–	Extreme value
7	INT16U	0–7	1 = alarm of the over type 2 = alarm of the under type 3 = alarm of the equal to type 4 = alarm of the different from type 5 = all other alarms
		8–11	1 = start of an alarm 2 = end of an alarm
		12–15	Alarms 1100–1106 have a priority 3. For other alarms, the value contained in these 4 bits represents the priority linked to the event (if applicable and depending on the alarm configuration).
8	INT16U	–	Logging register associated to the alarm (1)
9	INT16U	–	Action register associated to the alarm (1)
(1) Registers 8 and 9 are a copy of the alarm configuration registers at the moment the event occurred. These registers depend entirely on the user configurations. For the events 1100–1106, these registers are forced to 32768.			

Maintenance Protection Event Log

General Description

The system stores the events that concern the maintenance protection manager (power-up, M6C programmable contacts, maximum peak fault current, and so on) in the file number 21.

This file is made up of 20 records and each record is made up of six registers.

This maintenance event log has been implemented on MicroLogic P trip unit with firmware Plogic2002AA and above.

File Header

The following table describes the file header content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x26CB	9932	RW	–	–	INT16U	–	H	File status: 0x0000 = file disabled 0xFFFF = file enabled (factory setting)
0x26CC	9933	R	–	–	INT16U	–	H	Type of file: 21 = maintenance protection event log
0x26CD	9934	R	1	–	INT16U	–	H	Size of a file = 20 records
0x26CE	9935	R	1	–	INT16U	–	H	Size of a record = 6 registers
0x26CF	9936	R	–	–	INT16U	1	H	File filling mode: 1 = disabled if log is full

File Status

The following table describes the file status content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x26DB	9948	R	1	–	INT16U	–	H	Size of a file = 20 records
0x26DC	9949	R	1	–	INT16U	–	H	Size of a record = 6 registers
0x26DD	9950	R	1	–	INT16U	–	H	0x0000 = file OK 0x000A = record size smaller than expected 0x0014 = record size larger than expected 0x001E = insufficient memory 0x00FA = internal error 0x00FD = corrupted allocation table 0x00FE = configuration zero 0x00FF = invalid configuration 0xFC00 = invalid file number 0xFD00 = invalid record number 0xFE00 = file not supported 0xFF00 = cannot allocate file
0x26DE	9951	R	1	–	INT16U	20	H	Number of records in the file = 20

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x26DF	9952	R	1	–	INT16U	1	P/H	Sequence number of first record in the file (the oldest) = 1
0x26E0	9953	R	1	–	INT16U	20	P/H	Sequence number of last record in the file (the most recent) = 20
0x26E1–0x26E3	9954–9956	R	–	–	DATE	–	H	Date the last file was reset. Factory setting = 0x8000 0x8000 0x8000

Maintenance Protection Event Record

The maintenance protection event log has a fixed number of records and all record has a fixed number of registers:

Record Number	Registers	Type	Description
1	1–4	XDATE	Last power loss
	5–6	–	Reserved
2	1–3	DATE	Date/time of last counter reset
	4	INT16U	Number of output operations for relay 1
	5–6	–	Reserved
3–6	1–3	DATE	Date/time of last counter reset
	4	INT16U	Number of output operations for relay 2–5
	5–6	–	Reserved
7	1–3	DATE	Date/time of last counter reset
	4	INT16U	Number of output operations for relay 6
	5–6	–	Reserved
8	1–3	DATE	Date/time of last record updated
	4	INT16U	Worst contact wear
	5–6	–	Reserved
9	1–3	DATE	Date/time of last record updated
	4	INT16U	Maximum reverse power
	5–6	–	Reserved
10	1–3	DATE	Date/time of last record updated
	4	INT16U	Battery indicator, page 348
	5–6	–	Reserved
11	1–3	DATE	Date/time of last record updated
	4	INT16U	Number of power losses
	5–6	–	Reserved
12–15	1–6	–	Reserved
16	1–3	DATE	Date/time of last record updated
	4	INT16U	Number of maximum resets
	5–6	–	Reserved
17	1–6	–	Reserved
18	1–3	DATE	Date/time of last record updated
	4	INT16U	Maximum peak fault current breaker ever opened
	5–6	–	Reserved
19–20	1–6	–	Reserved

Maintenance Metering Event Log

General Description

The system stores the events that concern the maintenance metering manager (counter reset, and so on) in file number 12.

This file is made up of 20 records and each record is made up of six registers.

File Header

The following table describes the file header content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1C3B	7228	RW	–	–	INT16U	–	H	File status: 0x0000 = file disabled 0xFFFF = file enabled (factory setting)
0x1C3C	7229	R	–	–	INT16U	–	H	Type of file: 12 = maintenance metering event log
0x1C3D	7230	R	1	–	INT16U	–	H	Size of a file = 20 records
0x1C3E	7231	R	1	–	INT16U	–	H	Size of a record = 6 registers
0x1C3F	7232	R	–	–	INT16U	1	H	File filling mode: 1 = disabled if log is full

File Status

The following table describes the file status content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1C4B	7244	R	1	–	INT16U	–	H	Size of a file = 20 records
0x1C4C	7245	R	1	–	INT16U	–	H	Size of a record = 6 registers
0x1C4D	7246	R	1	–	INT16U	–	H	0x0000 = file OK 0x000A = record size smaller than expected 0x0014 = record size larger than expected 0x001E = insufficient memory 0x00FA = internal error 0x00FD = corrupted allocation table 0x00FE = configuration zero 0x00FF = invalid configuration 0xFC00 = invalid file number 0xFD00 = invalid record number 0xFE00 = file not supported 0xFF00 = cannot allocate file
0x1C4E	7247	R	1	–	INT16U	20	H	Number of records in the file = 20
0x1C4F	7248	R	1	–	INT16U	1	H	Sequence number of first record in the file (the oldest) = 1

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1C50	7249	R	1	–	INT16U	20	H	Sequence number of last record in the file (the most recent) = 20
0x1C51–0x1C53	7250–7252	R	–	–	DATE	–	H	Date the last file was reset. Factory setting = 0x8000 0x8000 0x8000

Maintenance Metering Event Record

The maintenance metering event log has a fixed number of records and all record has a fixed number of registers:

Record Number	Registers	Type	Description
1	1–3	DATE	Date/time of last counter reset
	4	INT16U	Number of minimum resets
	5–6	–	Reserved
2	1–3	DATE	Date/time of last counter reset
	4	INT16U	Number of maximum resets
	5–6	–	Reserved
3	1–3	DATE	Date/time of last counter reset
	4	INT16U	Number of peak current demand resets
	5–6	–	Reserved
4	1–3	DATE	Date/time of last counter reset
	4	INT16U	Number of peak power demand resets
	5–6	–	Reserved
5	1–3	DATE	Date/time of last counter reset
	4	INT16U	Number of energy resets
	5–6	–	Reserved
6–20	1–6	–	Reserved

Minimum/Maximum Event Log

General Description

The system stores the events that concern the metering manager (minimum and maximum values for the Real-Time measurements 1000–1136) in the file number 11.

This file is made up of 136 records and each record is made up of eight registers.

This file contains the minimum and maximum values reached by the real-time measurements, page 288.

File Header

The following table describes the file header content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1C1B	7196	RW	–	–	INT16U	–	H	File status: 0x0000 = file disabled 0xFFFF = file enabled (factory setting)
0x1C1C	7197	R	–	–	INT16U	–	H	Type of file: 11 = minimum/maximum metering event log
0x1C1D	7198	R	1	–	INT16U	–	H	Size of a file = 136 records
0x1C1E	7199	R	1	–	INT16U	–	H	Size of a record = 8 registers
0x1C1F	7200	R	–	–	INT16U	1	H	File filling mode: 1 = disabled if log is full

File Status

The following table describes the file status content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1C2B	7212	R	1	–	INT16U	–	H	Size of a file = 136 records
0x1C2C	7213	R	1	–	INT16U	–	H	Size of a record = 8 registers
0x1C2D	7214	R	1	–	INT16U	–	H	0x0000 = file OK 0x000A = record size smaller than expected 0x0014 = record size larger than expected 0x001E = insufficient memory 0x00FA = internal error 0x00FD = corrupted allocation table 0x00FE = configuration zero 0x00FF = invalid configuration 0xFC00 = invalid file number 0xFD00 = invalid record number 0xFE00 = file not supported 0xFF00 = cannot allocate file

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1C2E	7215	R	1	–	INT16U	136	H	Number of records in the file = 136 (real-time zone size)
0x1C2F	7216	R	1	–	INT16U	1	H	Sequence number of first record in the file (the oldest) = 1
0x1C30	7217	R	1	–	INT16U	20	H	Sequence number of last record in the file (the most recent) = 136
0x1C31– 0x1C33	7218– 7220	R	–	–	DATE	–	H	Date the last file was reset. Factory setting = 0x8000 0x8000 0x8000

Minimum/Maximum Event Record

The minimum/maximum event log has a fixed number of records and all record has a fixed number of registers:

Record Number	Registers	Type	Description
1	1	INT16U	Last minimum value (register 1300)
	2–4	DATE	Date/time of last minimum value
	5	INT16U	Last maximum value (register 1600)
	6–8	DATE	Date/time of last maximum value
2	1	INT16U	Last minimum value (register 1301)
	2–4	DATE	Date/time of last minimum value
	5	INT16U	Last maximum value (register 1601)
	6–8	DATE	Date/time of last maximum value
3–135	1	INT16U	Last minimum value (register 130*x*)
	2–4	DATE	Date/time of last minimum value
	5	INT16U	Last maximum value (register 160*x*)
	6–8	DATE	Date/time of last maximum value
136	1	INT16U	Last minimum value (register 1435)
	2–4	DATE	Date/time of last minimum value
	5	INT16U	Last maximum value (register 1735)
	6–8	DATE	Date/time of last maximum value

Waveform Capture

General Description

The system stores the variables V1N, V2N, V3N, I1, I2, I3, IN during four cycles (64 points per cycles) in the file number 5.

This file consists of a fixed number of records (29). All records are of similar size that is 64 registers wide.

The capture is triggered as follows:

- manually (user request) by using the command Forcelog (see the *MasterPacT Legacy Modbus User Guide*)
- automatically attached to analog predefined alarms (1 to 53) by setting the log action to 1, page 312

File Header

The following table describes the file header content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1BDB	7132	RW	–	–	INT16U	–	H	File status: 0x0000 = file disabled 0xFFFF = file enabled (factory setting)
0x1BDC	7133	R	–	–	INT16U	–	H	Type of file: 5 = waveform capture
0x1BDD	7134	R	1	–	INT16U	–	H	Size of a file = 29 records
0x1BDE	7135	R	1	–	INT16U	–	H	Size of a record = 64 registers
0x1BDF	7136	R	–	–	INT16U	1	H	File filling mode: 0 = circular 1 = disabled if log is full
0x1BE0	7137	R	1	–	INT16U	–	H	Number of cycle segments: 1 = 4 cycles for waveform capture
0x1BE1	7138	R	1	–	INT16U	–	H	Number of cycles before capture: 2 = waveform capture and fault waveform capture
0x1BE2	7139	R	1	–	INT16U	–	H	Number of points per cycle: 64 = waveform capture

File Status

The following table describes the file status content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x1BEB	7148	R	1	–	INT16U	–	H	Size of a file = 29 records
0x1BEC	7149	R	1	–	INT16U	–	H	Size of a record = 64 registers
0x1BED	7150	R	1	–	INT16U	–	H	0x0000 = file OK 0x000A = record size smaller than expected 0x0014 = record size larger than expected

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
								0x001E = insufficient memory 0x00FA = internal error 0x00FD = corrupted allocation table 0x00FE = configuration zero 0x00FF = invalid configuration 0xFC00 = invalid file number 0xFD00 = invalid record number 0xFE00 = file not supported 0xFF00 = cannot allocate file
0x1BEE	7151	R	1	–	INT16U	–	H	Number of records in the file = 29
0x1BEF	7152	R	1	–	INT16U	–	H	Sequence number of first record in the file (the oldest) = 1
0x1BF0	7153	R	1	–	INT16U	–	H	Sequence number of last record in the file (the most recent) = 29
0x1BF1– 0x1BF3	7154– 7156	R	–	–	DATE	–	H	Date the last file was reset. Factory setting = 0x8000 0x8000 0x8000

Waveform Record

The waveform capture has a fixed number of records and all record has a fixed number of registers:

Record Number	Registers	Type	Description
1	1–4	XDATE	Extended date/time
	5–11	–	Reserved
	12	INT16U	ID of fault WFC trigger: Alarm number 1000 to 1031, page 310
	13	–	System type: 31, 40 or 41, page 340
	14	A	Circuit breaker nominal current
	15	SFIXPT	Voltage multiplier for phase 1
	16	INT16	Voltage offset for phase 1
	17	SFIXPT	Voltage multiplier for phase 2
	18	INT16	Voltage offset for phase 2
	19	SFIXPT	Voltage multiplier for phase 3
	20	INT16	Voltage offset for phase 3
	21	SFIXPT	Current multiplier for phase 1
	22	INT16	Current offset for phase 1
	23	SFIXPT	Current multiplier for phase 2
	24	INT16	Current offset for phase 2
	25	SFIXPT	Current multiplier for phase 3
	26	INT16	Current offset for phase 3
	27	SFIXPT	Current multiplier for neutral
	28	INT16	Current offset for neutral
	29	INT16U	Scaling factor used for SFIXPT math on voltage samples
	30	INT16U	Scaling factor used for SFIXPT math on phase-current samples

Record Number	Registers	Type	Description
	31	INT16U	Scaling factor used for SFIXPT math on neutral-current samples
	32–64	–	Not used
2–4	1–64	INT16U	Voltage V1N sample points (16 points - 12 cycles)
5–7	1–64	INT16U	Voltage V2N sample points (16 points - 12 cycles)
8–10	1–64	INT16U	Voltage V3N sample points (16 points - 12 cycles)
11–13	1–64	INT16U	Current I1 sample points (16 points - 12 cycles)
14–16	1–64	INT16U	Current I2 sample points (16 points - 12 cycles)
17–19	1–64	INT16U	Current I3 sample points (16 points - 12 cycles)
20–22	1–64	INT16U	Current IN sample points (16 points - 12 cycles) Valid only with system type 41

Voltage Calculation

Apply the following rules to derive the voltages:

- on phase 1:

  Sample (Volt) = [(sample – mean value of Voltage V1N sample points) x register number 15 of first record]/(1000 x register number 29 of first record).
- on phase 2:

  Sample (Volt) = [(sample – mean value of Voltage V2N sample points) x register number 17 of first record]/(1000 x register number 29 of first record).
- on phase 3:

  Sample (Volt) = [(sample – mean value of Voltage V3N sample points) x register number 19 of first record]/(1000 x register number 29 of first record).

Current Calculation

Apply the following rules to derive the currents:

- on phase 1:

  Sample (Ampere) = [(sample – mean value of Current I1 sample points) x register number 21 of first record] / ((1000 x register number 30 of first record) / Circuit breaker nominal current).
- on phase 2:

  Sample (Ampere) = [(sample – mean value of Current I2 sample points) x register number 23 of first record] / ((1000 x register number 30 of first record) / Circuit breaker nominal current).
- on phase 3:

  Sample (Ampere) = [(sample – mean value of Current I3 sample points) x register number 25 of first record] / ((1000 x register number 30 of first record) / Circuit breaker nominal current).
- on neutral:

  Sample (Ampere) = [(sample – mean value of Current IN sample points) x register number 27 of first record] / ((1000 x register number 31 of first record) / Circuit breaker nominal current).

Fault Waveform Capture

General Description

The system stores the variables V1N, V2N, V3N, I1, I2, I3, IN during 12 cycles (16 points per cycles) in the file number 22.

This file consists of a fixed number of records (22). All records are of similar size that is 64 registers wide.

The capture is triggered automatically attached to alarms (1000–1030) by setting the log action to 1, page 310.

File Header

The following table describes the file header content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x26EB	9964	RW	–	–	INT16U	–	H	File status: 0x0000 = file disabled 0xFFFF = file enabled (factory setting)
0x26EC	9965	R	–	–	INT16U	–	H	Type of file: 22 = fault waveform capture
0x26ED	9966	R	1	–	INT16U	–	H	Size of a file = 22 records
0x26EE	9967	R	1	–	INT16U	–	H	Size of a record = 64 registers
0x26EF	9968	R	–	–	INT16U	1	H	File filling mode: 0 = circular 1 = disabled if log is full
0x26F0	9969	R	1	–	INT16U	–	H	Number of cycle segments: 1 = 12 cycles for fault waveform capture
0x26F1	9970	R	1	–	INT16U	–	H	Number of cycles before capture: 2 = waveform capture and fault waveform capture
0x26F2	9971	R	1	–	INT16U	–	H	Number of points per cycle: 16 = fault waveform capture

File Status

The following table describes the file status content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x26FB	9980	R	1	–	INT16U	–	H	Size of a file = 22 records
0x26FC	9981	R	1	–	INT16U	–	H	Size of a record = 64 registers
0x26FD	9982	R	1	–	INT16U	–	H	0x0000 = file OK 0x000A = record size smaller than expected 0x0014 = record size larger than expected 0x001E = insufficient memory 0x00FA = internal error 0x00FD = corrupted allocation table

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
								0x00FE = configuration zero 0x00FF = invalid configuration 0xFC00 = invalid file number 0xFD00 = invalid record number 0xFE00 = file not supported 0xFF00 = cannot allocate file
0x26FE	9983	R	1	–	INT16U	–	H	Number of records in the file = 22
0x26FF	9984	R	1	–	INT16U	–	P/H	Sequence number of first record in the file (the oldest) = 1
0x2700	9985	R	1	–	INT16U	–	P/H	Sequence number of last record in the file (the most recent) = 22
0x2701–0x2703	9986–9988	R	–	–	DATE	–	H	Date the last file was reset. Factory setting = 0x8000 0x8000 0x8000

Fault Waveform Record

The fault waveform capture has a fixed number of records and all record has a fixed number of registers:

Record Number	Registers	Type	Description
1	1–4	XDATE	Extended date/time
	5–11	–	Reserved
	12	INT16U	ID of fault WFC trigger: Alarm number 1000 to 1031, page 310
	13	–	System type: 31, 40 or 41, page 340
	14	A	Circuit breaker nominal current
	15	SFIXPT	Voltage multiplier for phase 1
	16	INT16	Voltage offset for phase 1
	17	SFIXPT	Voltage multiplier for phase 2
	18	INT16	Voltage offset for phase 2
	19	SFIXPT	Voltage multiplier for phase 3
	20	INT16	Voltage offset for phase 3
	21	SFIXPT	Current multiplier for phase 1
	22	INT16	Current offset for phase 1
	23	SFIXPT	Current multiplier for phase 2
	24	INT16	Current offset for phase 2
	25	SFIXPT	Current multiplier for phase 3
	26	INT16	Current offset for phase 3
	27	SFIXPT	Current multiplier for neutral
	28	INT16	Current offset for neutral
	29	INT16U	Scaling factor used for SFIXPT math on voltage samples
	30	INT16U	Scaling factor used for SFIXPT math on phase current samples
	31	INT16U	Scaling factor used for SFIXPT math on neutral current samples
	32–64	–	Not used
2–4	1–64	INT16U	Voltage V1N sample points (16 points - 12 cycles)

Record Number	Registers	Type	Description
5–7	1–64	INT16U	Voltage V2N sample points (16 points - 12 cycles)
8–10	1–64	INT16U	Voltage V3N sample points (16 points - 12 cycles)
11–13	1–64	INT16U	Current I1 sample points (16 points - 12 cycles)
14–16	1–64	INT16U	Current I2 sample points (16 points - 12 cycles)
17–19	1–64	INT16U	Current I3 sample points (16 points - 12 cycles)
20–22	1–64	INT16U	Current IN sample points (16 points - 12 cycles) Valid only with system type 41

Voltage Calculation

Apply the following rules to derive the voltages:

- on phase 1:

  Sample (Volt) = [(sample – register number 16 of first record) x register number 15 of first record.]/register number 29 of first record.
- on phase 2:

  Sample (Volt) = [(sample – register number 18 of first record) x register number 17 of first record.]/register number 29 of first record.
- on phase 3:

  Sample (Volt) = [(sample – register number 20 of first record) x register number 19 of first record.]/register number 29 of first record.

Current Calculation

Apply the following rules to derive the currents:

- on phase 1:

  Sample (Ampere) = [(sample – register number 22 of first record) x register number 21 of first record.]/register number 30 of first record.
- on phase 2:

  Sample (Ampere) = [(sample – register number 24 of first record) x register number 23 of first record.]/register number 30 of first record.
- on phase 3:

  Sample (Ampere) = [(sample – register number 26 of first record) x register number 25 of first record.]/register number 30 of first record.
- on neutral:

  Sample (Ampere) = [(sample – register numbr 27 of first record) x register number 28 of first record.]/register number 31 of first record.

MicroLogic A/E/P/H Trip Unit Commands

What's in This Chapter

List of MicroLogic A/E/P/H Trip Unit Commands and Error Codes 370
Measurement Configuration Commands 371

List of MicroLogic A/E/P/H Trip Unit Commands and Error Codes

List of Commands

The following table lists the available MicroLogic A/E/P/H trip unit commands, their corresponding command codes, and user profiles. Follow the command execution procedures accordingly :

Command	Command Code	User Profile
Set up ENVT presence , page 371	46472	Administrator
Reset minimum/maximum , page 371	46728	Administrator or Operator
Power flow sign configuration , page 372	47240	Administrator
Power factor sign configuration , page 372	47241	Administrator
Energy accumulation mode configuration , page 373	47242	Administrator
Current demand configuration , page 373	47243	Administrator
Power demand configuration , page 374	47244	Administrator
Set up nominal voltage Vn display , page 374	47245	Administrator

For additional commands related to protection settings, refer to *MasterPacT Modbus Legacy User Guide*.

Error Codes

Error codes generated by MicroLogic A/E/P/H trip units are the generic error codes, page 64.

Measurement Configuration Commands

Set Up ENVT Presence

The user can read the ENVT (External Neutral Voltage Tap) presence parameters at register 3314, page 340.

To set up ENVT presence, the user must set up the command registers the following way:

Address	Register	X	Unit	Type	Range	A/E/P/H	Description
0x1F3F	8000	–	–	INT16U	46472	E/P/H	Command code = **46472**
0x1F40	8001	–	–	INT16U	12	E/P/H	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4609	E/P/H	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	E/P/H	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	E/P/H	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	E/P/H	0 = ENVT is not present 1 = ENVT is present

Reset Minimum/Maximum

The reset minimum/maximum command resets the minimum values of real-time measurements (registers 1300 to 1599) and the maximum values of real-time measurements (registers 1600 to 1899), page 288.

The reset minimum/maximum command resets the energy measurements (registers 2000 to 2027), page 290.

The reset minimum/maximum command resets the peak demand measurements (registers 2200 to 2241), page 291.

To reset minimum/maximum values of measurements, the user must set up the command registers the following way:

Address	Register	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x1F3F	8000	–	–	INT16U	46728	–	–	Command code = **46728**
0x1F40	8001	–	–	INT16U	12	–	–	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4609	–	–	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	–	–	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	–	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	–	INT16U	–	–	–	Reset minimum/maximum of metering variables: • To reset the metering variable, set the bit to 1. • To keep the current values, set the bit to 0.
						A/E/P/H	0	Reset minimum/maximum current (I1, I2, I3, IN, Imax, Ig, IΔn, Iavg, and Iunbal)
						E/P/H	1	Reset minimum/maximum voltage (V12, V13, V23, V1N, V2N, V3N, VavgL-L, VavgL-N, and Vunbal)

Address	Register	X	Unit	Type	Range	A/E/P/H	Bit	Description
						E/P/H	2	Reset minimum/maximum power (active power, reactive power, apparent power, and distortion power)
						E/P/H	3	Reset minimum/maximum power factor and cosϕ
						E/P/H	4	Reset minimum/maximum total harmonic distortion (THD)
						E/P/H	5	Reset peak of current demand
						E/P/H	6	Reset peak of active power, reactive power, and apparent power demand
						E/P/H	7	Reset minimum/maximum frequency
						–	8	Not applicable
						E/P/H	9	Reset energy (active, reactive, apparent)
						–	10–15	Reserved

Power Flow Sign Configuration

The user can read the power flow sign configuration at register 3316 , page 340.

To set the power flow sign parameters, the user must set up the command registers the following way:

Address	Register	X	Unit	Type	Range	A/E/P/H	Description
0x1F3F	8000	–	–	INT16U	47240	P/H	Command code = **47240**
0x1F40	8001	–	–	INT16U	12	P/H	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4609	P/H	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	P/H	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	P/H	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	P/H	Power flow sign: 0 = the active power flows from upstream (top) to downstream (bottom) (factory setting) 1 = the active power flows from downstream (bottom) to upstream (top).

Power Factor Sign Configuration

The user can read the power factor sign configuration at register 3318, page 341.

To set the power factor sign parameters, the user must set up the command registers the following way:

Address	Register	X	Unit	Type	Range	A/E/P/H	Description
0x1F3F	8000	–	–	INT16U	47241	E	Command code = **47241**
0x1F40	8001	–	–	INT16U	12	E	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4609	E	Destination = 4609 (0x1201)

Address	Register	X	Unit	Type	Range	A/E/P/H	Description
0x1F42	8003	–	–	INT16U	1	E	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	E	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–2	E	Sign convention for the power factor and the fundamental power factor (cosϕ): 0 = IEC convention 2 = IEEE convention (factory setting)

Energy Accumulation Mode Configuration

The user can read the energy accumulation mode configuration at register 3324, page 341.

To set the energy accumulation mode parameters, the user must set up the command registers the following way:

Address	Register	X	Unit	Type	Range	A/E/P/H	Description
0x1F3F	8000	–	–	INT16U	47242	E/P/H	Command code = **47242**
0x1F40	8001	–	–	INT16U	12	E/P/H	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4609	E/P/H	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	E/P/H	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	E/P/H	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	E/P/H	Energy accumulation mode: 0 = absolute accumulation (factory setting) 1 = signed accumulation

Current Demand Configuration

The user can read the duration of the current demand calculation window at register 3352, page 342.

The user can read the current demand parameters from register 2200 to 2207, page 291.

To start current demand, the user must set up the command registers the following way:

Address	Register	X	Unit	Type	Range	A/E/P/H	Description
0x1F3F	8000	–	–	INT16U	47243	E/P/H	Command code = **47243**
0x1F40	8001	–	–	INT16U	12	E/P/H	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4609	E/P/H	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	E/P/H	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	E/P/H	Password of the command: Administrator user profile password
0x1F45	8006	–	Min	INT16U	5–60	E/P/H	Duration of the current demand calculation window, adjustable in step of 1. The factory setting is 15 minutes (sliding).

Power Demand Configuration

The user can read the power demand calculation method from register 3354 to 3355, page 342.

The user can read the power demand parameters from register 2224 to 2237, page 292.

To start power demand, the user must set up the command registers the following way:

Address	Register	X	Unit	Type	Range	A/E/P/H	Description
0x1F3F	8000	–	–	INT16U	47244	E/P/H	Command code = **47244**
0x1F40	8001	–	–	INT16U	14	E/P/H	Number of parameters (bytes) = 14
0x1F41	8002	–	–	INT16U	4609	E/P/H	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	E/P/H	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	E/P/H	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–5	E/P/H	Power demand calculation method (window type): 0 = sliding (factory setting) 2 = fixed 5 = synchronized to communication
0x1F46	8007	–	Min	INT16U	5–60	E/P/H	Duration of the power demand calculation window, adjustable in step of 1. The factory setting is 15 minutes.

Set Up Nominal Primary Voltage Vn Display

The user can read the nominal voltage at register 9616, page 342.

To set the nominal primary voltage Vn display parameters, the user must set up the command registers the following way:

Address	Register	X	Unit	Type	Range	A/E/P/H	Description
0x1F3F	8000	–	–	INT16U	47245	E/P/H	Command code = **47245**
0x1F40	8001	–	–	INT16U	12	E/P/H	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4609	E/P/H	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	E/P/H	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	E/P/H	Password of the command: Administrator user profile password
0x1F45	8006	–	V	INT16U	0–65535	E/P/H	Nominal primary voltage Vn (factory setting = 690 V)

BCM ULP Module Data for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-Frame Circuit Breakers

What's in This Part

BCM ULP Module Registers.....376
BCM ULP Module Files.....388
BCM ULP Module Commands.....391

BCM ULP Module Registers

What's in This Chapter

BCM ULP Module Identification 377
Circuit Breaker Status 378
Time-Stamped Information 383
Counters 384
Trip History 386

BCM ULP Module Identification

Product Identification

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0202	515	R	–	–	INT16U	15139	A/E/P/H	Product identification = 15139 for the BCM ULP module

BCM ULP Module Identifier

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0215–0x0216	534–535	RW	–	–	OCTET STRING	0x0000–0x7F7F	A/E/P/H	Short identifier of BCM ULP module coded over 4 ASCII characters Factory setting = 0x0000
0x0217–0x021E	536–543	RW	–	–	OCTET STRING	0x0000–0x7F7F	A/E/P/H	Long identifier of BCM ULP module coded over 16 ASCII characters Factory setting = 0x0000

BCM ULP Module Firmware Version

The BCM ULP module firmware version starts with a V character and has the following format: VX.Y.Z.

The firmware version is coded as follows: VX.Y.Z = VX*1000 + Y*100 + Z*10

For example if the value of the register is equal to 2000, the BCM ULP module firmware version is equal to V2.0.0.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0240	577	R	–	–	INT16U	–	A/E/P/H	BCM ULP module firmware version

Circuit Breaker Status

Tripping Cause

The tripping cause register indicates the current status of the trip.

- If the trip bit is set to 0, then the trip is not active.
- If the trip bit is set to 1, then the trip is active.

The bit is reset as soon as the circuit breaker is closed again.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x0289	650	R	–	–	INT16U	–	–	–	Tripping cause for basic protection functions
							A/E/P/H	0	Long-time protection Ir
							P/H	1	Short-time protection Isd
							A/E	1	Short-time protection Isd or Instantaneous-protection Ii
							P/H	2	Instantaneous-protection Ii
							A/E/P/H	3	Ground-fault protection Ig
							A/P/H	4	Earth-leakage protection (Vigi)
							A/E/P/H	5	Integrated Instantaneous protection
							A/E	6	Other protection
							P/H		Internal failure (temperature)
							A/E/P/H	7	Internal failure (overvoltage)
							P/H	8	Other protection (see register 651)
							–	9–14	Reserved
							A/E/P/H	15	If this bit is at 1, bits 0 to 14 are not valid.
0x028A	651	R	–	–	INT16U	–	–	–	Tripping cause for advanced protection functions
							P/H	0	Current unbalance
							P/H	1	Overcurrent phase 1
							P/H	2	Overcurrent phase 2
							P/H	3	Overcurrent phase 3
							P/H	4	Overcurrent on neutral
							P/H	5	Undervoltage
							P/H	6	Overvoltage
							P/H	7	Voltage unbalance
							P/H	8	Overpower
							P/H	9	Reverse power
							P/H	10	Underfrequency
							P/H	11	Overfrequency
							P/H	12	Phase rotation

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
							P/H	13	Load shedding based on current
							P/H	14	Load shedding based on power
							–	15	If this bit is at 1, bits 0 to 14 are not valid.

Inhibit Close Order

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x0291	658	R	–	–	INT16U	–	A/E/P/H	–	Validity of each bit in the inhibit close order status register
0x0292	659	R	–	–	INT16U	–	A/E/P/H	–	Inhibit close order status
								0	Inhibit close order activated by IO module
								1	Inhibit close order activated by remote controller
								2–15	Reserved

Local/Remote Mode

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0293	660	R	–	–	INT16U	0–1	A/E/P/H	Mode selected in FDM121 or IO: 0 = Remote mode (factory setting) 1 = Local mode

Circuit Breaker Status

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
0x0294	661	R	–	–	INT16U	–	A/E/P/H	–	Circuit breaker status register
								0	OF status indication contact 0 = The circuit breaker is open. 1 = The circuit breaker is closed.
								1	SD trip indication contact 0 = Circuit breaker is not tripped. 1 = Circuit breaker is tripped due to electrical default or shunt trip or push-to-trip. Bit always equal to 0 for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame circuit breakers with motor mechanism.
								2	SDE fault trip indication contact 0 = Circuit breaker is not tripped on electrical default. 1 = Circuit breaker is tripped due to electrical fault (including ground-fault test and earth-leakage test).
								3	CH spring charged contact (only with MasterPacT NT/NW) circuit breakers

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Bit	Description
									0 = Spring discharged 1 = Spring charged Bit always equal to 0 for ComPacT NS and PowerPacT P- and R-frame circuit breaker.
								4	Reserved
								5	PF ready to close contact (only with MasterPacT NT/NW) circuit breakers 0 = Not ready to close 1 = Ready to close Bit always equal to 0 for ComPacT NS and PowerPacT P- and R-frame circuit breakers.
								6	Distinction between ComPacT NS, PowerPacT P- and R-frame and MasterPacT NT/NW circuit breakers 0 = ComPacT NS 1 = MasterPacT NT/NW
								7	Distinction between ComPacT NS circuit breaker and PowerPacT P- and R-frame circuit breaker, with and without motor mechanism 0 = ComPacT NS and PowerPacT P- and R-frame without motor mechanism 1 = ComPacT NS and PowerPacT P- and R-frame with motor mechanism
								8–15	Reserved

Auto/Manu

This register displays the actual mode used: Auto/Manu. These modes can be modified only locally through the HMI of MicroLogic P/H trip unit.

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x029D	670	R	–	–	INT16	0…1	A/E/P/H	0 = Manu: opening and closing of the circuit breaker via the communication are disabled. 1 = Auto: opening and closing of the circuit breaker via the communication are enabled (factory setting).

Legacy Dataset Activation

Legacy dataset is available only if the BCM ULP module firmware version is greater or equal to V2.0.0 (register 577 must be greater or equal to 2000).

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x031F	800	RW	–	–	–	0…1	A/E/P/H	Legacy dataset activation 0 = Not activated 1 = Activated Factory setting = 0 if firmware version smaller than V3.0.0 Factory setting = 1 if firmware version greater or equal to V3.0.0

NOTE: If the BCM ULP module firmware version is greater or equal to V3.0.0, in 2 Wire + ULP configuration, the value of this register is always 1 and cannot be changed.

Communication Parameter

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0325	806	RW	–	–	–	0–1	A/E/P/H	4 Wire / 2 Wire + ULP communication parameter 0 = 4 Wire 1 = 2 Wire + ULP Factory setting = 0 if BCM ULP module firmware version smaller than V4.0.0 Factory setting = 1 if BCM ULP module firmware version greater or equal to V4.0.0

Energy Reduction Maintenance Switch (ERMS)

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0326	807	R	–	–	INT16U	–	P/H	ERMS mode register validity: validity of each bit of the ERMS mode register. 0 = Invalid 1 = Valid
0x0327	808	R	–	–	INT16U	–	P/H	ERMS mode: Bit 0 = 0: ERMS mode OFF Bit 0 = 1: ERMS mode ON Bit 1 = 0: ERMS not degraded mode Bit 1 = 1: ERMS degraded mode
0x0328–0x0329	809–810	R	–	A	INT32U	2 x In–15 x In (limited to Ii settings)	P/H	ERMS setting: pickup value for ERMS setting 2 x In up to present Ii (instantaneous pickup current) setting. Factory setting = 2 x In
0x032A–0x032B	811–812	R	–	–	–	–	–	Reserved

Contact Wear

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x032C	813	R	–	–	INT16U	0–300	P/H	Contact wear threshold

Time-Stamped Information

General Description

The time-stamped information enables to know all the dates relative to important information (date of last trip, date of last actuation of MX, XF release).

Date of Last Event

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x029E–0x02A0	671–673	R	–	–	DATE	–	A/E/P/H	Date of last actuation of MX auxiliary
0x02A2–0x02A4	675–677	R	–	–	DATE	–	A/E/P/H	Date of last actuation of XF auxiliary
0x02A6–0x02A9	679–682	R	–	–	XDATE	–	A/E/P/H	Current date of BCM ULP module
0x02AB–0x02AD	684–686	R	–	–	DATE	–	A/E/P/H	Date of last circuit breaker opening
0x02AE–0x02B0	687–689	R	–	–	DATE	–	A/E/P/H	Date of last circuit breaker closing
0x02B1–0x02B3	690–692	R	–	–	DATE	–	A/E/P/H	Date of last trip without an electrical fault
0x02B4–0x02B6	693–695	R	–	–	DATE	–	A/E/P/H	Date of last trip with an electrical fault
0x02B7–0x02B9	696–698	R	–	–	DATE	–	A/E/P/H	Date of last “PF ready to close” status
0x02BA–0x02BC	699–701	R	–	–	DATE	–	A/E/P/H	Date of last “End of opening order” event. This event occurs when: • there is no action on the opening pushbutton on the front of the device • the fault-trip reset pushbutton is in (the device is reset) • the MN undervoltage release is powered (if present)
0x02BD–0x02BF	702–704	R	–	–	DATE	–	A/E/P/H	Date of last “CH spring charged” status

Counters

General Description

The BCM ULP module has counters that help managing the circuit breaker.

The BCM ULP module counters have the following properties:

- All the counters are saved in non-volatile memory to prevent data loss in case of power loss.
- The cumulating OF counter is read only. It stops incrementing when it reaches the maximum value of 65535.
- All counters (except the cumulating OF counter) can be preset to any value from 0 to 65535. The counters automatically cycle from 65535 to 0.
- A threshold is associated to the OF counter and to the close circuit breaker command counter.

  The thresholds can be set to any value from 0 to 65534. The factory setting is 5000. An alarm is generated when a counter reaches the threshold.

BCM ULP Module Counters

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0229	554	R	–	–	INT16U	0–65535	A/E/P/H	Counter for the number of times the BCM ULP module is energized
0x022A	555	R	–	–	INT16U	0–65535	A/E/P/H	Counter for the number of times the BCM ULP module is reset whether following power loss or not

Counter Thresholds

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0243	580	RW	–	–	INT16U	0–65535	A/E/P/H	OF counter threshold Factory setting = 5000
0x0244	581	RW	–	–	INT16U	0–65535	A/E/P/H	Close command counter threshold Factory setting = 5000

Circuit Breaker Operation Counters

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x0295	662	R	–	–	INT16	0–65535	A/E/P/H	Cumulating OF counter (non-resettable open to close counter)
0x0296	663	RW	–	–	INT16	0–65535	A/E/P/H	OF counter (resettable open to close counter)
0x0297	664	RW	–	–	INT16	0–65535	A/E/P/H	SD counter (close to SD position)
0x0298	665	RW	–	–	INT16	0–65535	A/E/P/H	SDE counter (close to SDE position)

MX and XF Release Counters

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x02A1	674	R	–	–	INT16U	0–65535	A/E/P/H	MX actuation counter
0x02A5	678	R	–	–	INT16U	0–65535	A/E/P/H	XF actuation counter

Trip History

General Description

The trip history registers describe the last 17 encountered trips. The trip history format corresponds to a series of 17 records saved in a FIFO (first-in first-out) stack. The last record erases the oldest. Each record is composed of seven registers describing one trip.

Trip Record Number

A read request of 7x(n) registers is necessary to read the last n trip records, where 7 is the number of registers for each trip record.

For example, a read request of 7x3 = 21 registers is necessary to read the last three trip records of the trip history:

- The first seven registers describe the first trip record.
- The next seven registers describe the second trip record.
- The last seven registers describe the third trip record.

Address	Register	Description
0x0095–0x009B	150–156	Trip record 0
0x009C–0x00A2	157–163	Trip record 1
0x00A3–0x00A9	164–170	Trip record 2
0x00AA–0x00B0	171–177	Trip record 3
0x00B1–0x00B7	178–184	Trip record 4
0x00B8–0x00BE	185–191	Trip record 5
0x00BF–0x00C5	192–198	Trip record 6
0x00C6–0x00CC	199–205	Trip record 7
0x00CD–0x00D3	206–212	Trip record 8
0x00D4–0x00DA	213–219	Trip record 9
0x00DB–0x00E1	220–226	Trip record 10
0x00E2–0x00E8	227–233	Trip record 11
0x00E9–0x00EF	234–240	Trip record 12
0x00F0–0x00F6	241–247	Trip record 13
0x00F7–0x00FD	248–254	Trip record 14
0x00FE–0x0104	255–261	Trip record 15
0x0105–0x010B	262–268	Trip record 16

Trip Record

A read request of seven registers is necessary to read a trip record.

The order and the description of the trip record registers are the same as that of the trip record 1:

Trip Record 1 (Most Recent Trip Record)								
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**A/E/P/H**	**Description**
0x0095	150	R	1	–	INT16U	0–65535	E/P/H	Trip code
0x0096–0x0098	151–153	R	1	–	ULP	–	E/P/H	Date of event (trip or acknowledge)
0x0099	154	R	1	–	INT16U	1–2	E/P/H	Event type MSB = 0 (reserved) Event occurrence: LSB = 1 Event completion: LSB = 2
0x009A	155	–	–	–	–	–	–	Reserved
0x009B	156	–	–	–	–	–	–	Reserved

Trip Codes

Trip Code	Description
1000 (0x03E8)	Trip due to long-time protection Ir
1001 (0x03E9)	Trip due to short-time protection Isd
1002 (0x03EA)	Trip due to instantaneous protection Ii
1003 (0x03EB)	Trip due to ground-fault protection Ig
1004 (0x03EC)	Trip due to earth-leakage protection IΔn
1005 (0x03ED)	Trip due to integrated instantaneous protection I >>
1006–1007 (0x03EE–0x03EF)	Reserved
1008 (0x03F0)	Trip due to advanced protection
1009 (0x03F1)	Trip due to extended advanced protection
1010–1015 (0x03F2–0x03F7)	Reserved
1016 (0x3F8)	Current unbalance
1017 (0x3F9)	I1 maximum demand
1018 (0x3FA)	I2 maximum demand
1019 (0x3FB)	I3 maximum demand
1020 (0x3FC)	IN maximum demand
1021 (0x3FD)	Undervoltage
1022 (0x3FE)	Overvoltage
1023 (0x3FF)	Voltage unbalance
1024 (0x400)	Reserved
1025 (0x401)	Reverse power
1026 (0x402)	Underfrequency
1027 (0x403)	Overfrequency
1028 (0x404)	Phase rotation
1029 (0x405)	Current load shedding
1030 (0x406)	Power load shedding

BCM ULP Module Files

What's in This Chapter

Circuit Breaker Manager Event Log 389

Circuit Breaker Manager Event Log

General Description

The system stores the events that concern circuit breaker control (for example opening or closing of the contacts) in the file number 30.

This file is made up of 100 records and each record is made up of five registers.

This file is reset in case of 24 Vdc power loss on the BCM ULP module or change of the communication parameter 4W/2W + ULP.

File Header

The following table describes the file header content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x02CD	718	R	–	–	INT16U	–	A/E/P/H	File status: 0x0000 = file disabled 0xFFFF = file enabled (factory setting)
0x02CE	719	R	–	–	INT16U	–	A/E/P/H	Type of file = 30
0x02CF	720	R	–	–	INT16U	–	A/E/P/H	File allocation = 0xFFFF
0x02D0	721	R	1	–	INT16U	–	A/E/P/H	Size of a record = 5 registers
0x02D1	722	R	–	–	INT16U	–	A/E/P/H	File filling mode: 0 = circular

File Status

The following table describes the file status content:

Address	Register	RW	X	Unit	Type	Range	A/E/P/H	Description
0x02DD	734	R	1	–	INT16U	100	A/E/P/H	Size of a file = 100 records
0x02DE	735	R	1	–	INT16U	5	A/E/P/H	Size of a record = 5 registers
0x02E0	737	R	1	–	INT16U	0–100	A/E/P/H	Number of records in the file
0x02E1	738	R	1	–	INT16U	0–8000	A/E/P/H	Sequence number of first record in the file (the oldest)
0x02E2	739	R	1	–	INT16U	0–8000	A/E/P/H	Sequence number of last record in the file (the most recent)
0x02E3–0x02E5	740–742	R	–	–	DATE	–	P/H	Date of the last file reset Factory setting = 0x8000 0x8000 0x8000

Event Record

The following table shows the format of 1 record in the event log of the circuit breaker:

Registers	Type	Description
1–4	XDATE	Event date
5	INT16U	Event number (see table below)

Events

The following table shows the events in the event log of the circuit breaker:

Event Number	Description
1	RESET or system energized
2	Configuration data stored in the cradle manager
3	Spring charged
4	Circuit breaker opened (O)
5	Circuit breaker closed (F)
6	Circuit breaker tripped (SD)
7	Circuit breaker fault tripped (SDE)
8–9	Reserved
10	Closing command input remotely (AUTO) (XF)
11	Opening command input remotely (AUTO) (MX)
12	Modification of Modbus configuration (address, Baud rate, and parity)
13	Event log reset
14	Clock update input locally accepted
15	Clock update input locally rejected (synchronization by the supervisor)

BCM ULP Module Commands

What's in This Chapter

List of BCM ULP Module Commands and Error Codes 392
Circuit Breaker Control Commands 393

List of BCM ULP Module Commands and Error Codes

List of Commands

The following table lists the available BCM ULP module commands, their corresponding command codes and user profiles. Follow the command execution procedures accordingly .

Command	Command Code	User Profile
Open circuit breaker , page 393	904	Administrator or Operator
Close circuit breaker , page 393	905	Administrator or Operator
Enable/Inhibit close order , page 393	910	Administrator or Operator

Error Codes

In addition to generic error codes , the BCM ULP module commands generate the following error codes returned in register 8021:

Error Code	Description
4759 (0x1297)	Circuit breaker tripped. It must be reset before the command.
4760 (0x1298)	Circuit breaker already closed.
4761 (0x1299)	Circuit breaker already open.
4763 (0x129B)	FDM121 in local control mode. Remote commands not allowed.
4766 (0x129E)	Previous command still in progress.
4767 (0x12A0)	Inhibit close order enabled.
4777 (0x12A9)	Already in the asked state (valid only for enable/inhibit close order).

Any other positive error code means an internal error.

Circuit Breaker Control Commands

Open Circuit Breaker

To open the circuit breaker, the user must set up the command registers the following way:

Address	Register	X	Unit	Type	Range	A/E/P/H	Description
0x1F3F	8000	–	–	INT16U	904	A/E/P/H	Command code = **904**
0x1F40	8001	–	–	INT16U	10	A/E/P/H	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4609	A/E/P/H	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	A/E/P/H	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	A/E/P/H	Password of the command: Administrator or Operator user profile password

Close Circuit Breaker

To close the circuit breaker, the user must set up the command registers the following way:

Address	Register	X	Unit	Type	Range	A/E/P/H	Description
0x1F3F	8000	–	–	INT16U	905	A/E/P/H	Command code = **905**
0x1F40	8001	–	–	INT16U	10	A/E/P/H	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4609	A/E/P/H	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	A/E/P/H	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	A/E/P/H	Password of the command: Administrator or Operator user profile password

Enable/Inhibit a Circuit Breaker Close Order

To enable or inhibit a close order of the circuit breaker, the user must set up the command register the following way:

Address	Register	X	Unit	Type	Range	A/E/P/H	Description
0x1F3F	8000	–	–	INT16U	910	A/E/P/H	Command code = **910**
0x1F40	8001	–	–	INT16U	13	A/E/P/H	Number of parameters (bytes) = 13
0x1F41	8002	–	–	INT16U	4609	A/E/P/H	Destination = 4609 (0x1201)
0x1F42	8003	–	–	INT16U	1	A/E/P/H	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	A/E/P/H	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	–	INT16U	1	A/E/P/H	• 0 = Enable close order • 1 = Inhibit close order
0x1F46	8007	–	–	INT16U	–	A/E/P/H	Origin of the command: 256 = command sent via communication interface (IFM or IFE interface)

MicroLogic 5/6/7 Trip Unit Data for ComPacT NSX and PowerPacT H-, J-, and L-Frame Circuit Breakers

What's in This Part

MicroLogic 5/6/7 Modbus Register Tables 395
MicroLogic 5/6/7 Trip Unit Registers 397
MicroLogic 5/6/7 Trip Unit Commands..... 454

MicroLogic 5/6/7 User Guide

For more information about MicroLogic 5, 6, and 7 functions, refer to the following user guides in **Related Documents** at the beginning of this guide:

- DOCA0188•• *ComPacT NSX MicroLogic 5/6/7 Trip Units - User Guide*
- *PowerPacT H-, J-, and L-Frame Circuit Breakers with MicroLogic Trip Units - User Guide*

MicroLogic 5/6/7 Modbus Register Tables

General Description

The following chapters describe the Modbus registers of MicroLogic 5, 6, and 7 trip units embedded in ComPacT NSX and PowerPacT H-, J-, or L-frame circuit breakers. These registers provide information that can be read, such as electrical measures, protection configuration, and monitoring information. The command interface enables the user to modify these registers in a controlled way.

The MicroLogic 5/6/7 trip unit registers, page 397 are grouped in tables of logically related information. The contents of the tables are ordered by increasing address.

The MicroLogic 5/6/7 trip unit commands, page 454 are described separately.

MicroLogic 5/6/7 Table Format

Register tables have the following columns:

Address	Register	RW	X	Unit	Type	Range	Description

- **Address**: a 16-bit register address in hexadecimal. The address is data used in the Modbus frame.
- **Register**: a 16-bit register number in decimal (register = address + 1).
- **RW**: register read-write status
  - R: the register can be read by using Modbus functions
  - W: the register can be written by using Modbus functions
  - RW: the register can be read and written by using Modbus functions
  - RC: the register can be read by using the command interface
  - WC: the register can be written by using the command interface
- **X**: the scale factor. A scale of 10 means that the register contains the value multiplied by 10. So, the real value is the value in the register divided by 10.

  Example:

  Register 1054 contains the system frequency, page 401. The unit is Hz and the scale factor is 10.

  If the register returns 503, this means that the system frequency is

  503/10 = 50.3 Hz.

- **Unit**: the unit the information is expressed in.
- **Type**: the encoding data type (see data type description below).
- **Range**: the permitted values for this variable, usually a subset of what the format allows.
- **Description**: provides information about the register and restrictions that apply.

MicroLogic 5/6/7 Data Types

Data Types	Description	Range
INT16U	16-bit unsigned integer	0 to 65535
INT16	16-bit signed integer	-32768 to +32767
INT32U	32-bit unsigned integer	0 to 4 294 967 295
INT32	32-bit signed integer	-2 147 483 648 to +2 147 483 647
INT64	64-bit signed integer	-9 223 372 036 854 775 808 to +9 223 372 036 854 775 807
FLOAT32	32-bit signed integer with a floating point	2^{-126} (1.0) to 2^{127} (2 - 2^{-23})
OCTET STRING	Text string	1 byte per character
DATETIME	Date and time in the IEC 60870-5 format	–
ULP DATE	Date and time in ULP DATE format	–

See detailed descriptions of the data types, page 580.

MicroLogic 5/6/7 Trip Unit Registers

What's in This Chapter

Real-Time Measurements 398
Minimum/Maximum Values of Real-Time Measurements 403
Energy Measurements 405
Demand Measurements 407
Minimum/Maximum Measurements Reset Time 409
MicroLogic 5/6/7 Trip Unit Identification 410
Status 414
Alarm History 416
Trip History 418
Earth-Leakage Test History 421
Maintenance Operation History 423
Pre-Alarms 426
User-Defined Alarms 428
Protection Parameters 432
Configuration of the SDx Module 436
Measurement Parameters 437
Time-Stamped Information 440
Maintenance Indicators 447
Miscellaneous 451

Real-Time Measurements

General Description

The real-time measurements are refreshed every second. Real-time measurements include:

- Voltage and voltage unbalance
- Current and current unbalance
- Active, reactive, apparent, and distortion power
- Reactive power with harmonic
- Power factor and fundamental power factor
- Frequency
- THD (total harmonic distortion)

Voltage

Register = 0 if voltage < 25 V.

Address	Register	RW	X	Unit	Type	Range	Description
0x03E7	1000	R	1	V	INT16U	0–850	RMS phase-to-phase voltage V12
0x03E8	1001	R	1	V	INT16U	0–850	RMS phase-to-phase voltage V23
0x03E9	1002	R	1	V	INT16U	0–850	RMS phase-to-phase voltage V31
0x03EA	1003	R	1	V	INT16U	0–850	RMS phase-to-neutral voltage V1N (1)
0x03EB	1004	R	1	V	INT16U	0–850	RMS phase-to-neutral voltage V2N (1)
0x03EC	1005	R	1	V	INT16U	0–850	RMS phase-to-neutral voltage V3N (1)
0x03ED	1006	R	1	V	INT16U	0–850	Arithmetic mean of V12, V23, and V31: (V12 + V23 + V31) / 3 = V_{avg} L-L
0x03EE	1007	R	1	V	INT16U	0–850	Arithmetic mean of V1N, V2N, and V3N: (V1N + V2N + V3N) / 3 = V_{avg} L-N (1)
0x0478	1145	R	1	V	INT16U	0–850	Vmax: maximum of V12, V23, and V31 (2)
0x0479	1146	R	1	V	INT16U	0–850	Vmin: minimum of V12, V23, and V31 (2)

(1) This value is not available for motor application and not accessible when the system type in register 3314 is 30 or 31. Refer to System Type, page 437.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 462.

Voltage Unbalance

Address	Register	RW	X	Unit	Type	Range	Description
0x03EF	1008	R	10	%	INT16U	-1000–+1000	V12 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages
0x03F0	1009	R	10	%	INT16U	-1000–+1000	V23 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages
0x03F1	1010	R	10	%	INT16U	-1000–+1000	V31 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages
0x03F2	1011	R	10	%	INT16U	-1000–+1000	V1N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages (1)

Address	Register	RW	X	Unit	Type	Range	Description
0x03F3	1012	R	10	%	INT16U	-1000–+1000	V2N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages (1)
0x03F4	1013	R	10	%	INT16U	-1000–+1000	V3N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages (1)
0x03F5	1014	R	10	%	INT16U	-1000–+1000	Maximum phase-to-phase voltage unbalance value of registers 1008, 1009, and 1010 (2)
0x03F6	1015	R	10	%	INT16U	-1000–+1000	Maximum phase-to-neutral voltage unbalance value of registers 1011, 1012, and 1013 (1)(2)

(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 437.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 462.

Current

Address	Register	RW	X	Unit	Type	Range	Description
0x03F7	1016	R	1	A	INT16U	0–20xIn	RMS current on phase 1: I1
0x03F8	1017	R	1	A	INT16U	0–20xIn	RMS current on phase 2: I2
0x03F9	1018	R	1	A	INT16U	0–20xIn	RMS current on phase 3: I3
0x03FA	1019	R	1	A	INT16U	0–20xIn	RMS current on the neutral: IN (1)
0x03FB	1020	R	1	A	INT16U	0–20xIn	Maximum of I1, I2, I3, and IN (2)
0x03FC	1021	R	1	%Ig	INT16U	0–20xIn	Ground-fault current
0x03FD	1022	R	1	mA	INT16U	0–20xIn	Earth-leakage current
0x0401	1026	R	1	A	INT16U	0–20xIn	Minimum of I1, I2, and I3 (2)
0x0402	1027	R	1	A	INT16U	0–20xIn	Arithmetic mean of I1, I2, and I3: (I1 + I2 + I3) / 3 = I_{avg}

(1) This value is not available for motor application and when the system type in register 3314 is 31 or 40. Refer to System Type, page 437.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 462.

Current Unbalance

Address	Register	RW	X	Unit	Type	Range	Description
0x0403	1028	R	10	%	INT16	-1000–+1000	I1 current unbalance in relation to the arithmetic mean of the phase currents
0x0404	1029	R	10	%	INT16	-1000–+1000	I2 current unbalance in relation to the arithmetic mean of the phase currents
0x0405	1030	R	10	%	INT16	-1000–+1000	I3 current unbalance in relation to the arithmetic mean of the phase currents
0x0406	1031	R	10	%	INT16	-1000–+1000	IN current unbalance in relation to the arithmetic mean of the phase current (1)
0x0407	1032	R	10	%	INT16	-1000–+1000	Maximum current unbalance of registers 1028, 1029, and 1030 (2)

(1) This value is not available for motor application and when the system type in register 3314 is 31 or 40. Refer to System Type, page 437.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 462.

Active Power

The flow sign of the active power depends on the configuration of register 3316. Refer to Power Flow Sign, page 438.

Address	Register	RW	X	Unit	Type	Range	Description
0x0409	1034	R	10	kW	INT16	-10000–+10000	Active power on phase 1: P1 (1)
0x040A	1035	R	10	kW	INT16	-10000–+10000	Active power on phase 2: P2 (1)
0x040B	1036	R	10	kW	INT16	-10000–+10000	Active power on phase 3: P3 (1)
0x040C	1037	R	10	kW	INT16	-30000–+30000	Total active power: Ptot
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 437.							

Reactive Power

The flow sign of the reactive power depends on the configuration of register 3316 , page 438.

Address	Register	RW	X	Unit	Type	Range	Description
0x040D	1038	R	10	kvar	INT16	-10000–+10000	Reactive power on phase 1: Q1 (1)
0x040E	1039	R	10	kvar	INT16	-10000–+10000	Reactive power on phase 2: Q2 (1)
0x040F	1040	R	10	kvar	INT16	-10000–+10000	Reactive power on phase 3: Q3 (1)
0x0410	1041	R	10	kvar	INT16	-30000–+30000	Total reactive power: Qtot
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 437.							

Apparent Power

Address	Register	RW	X	Unit	Type	Range	Description
0x0411	1042	R	10	kVA	INT16	0–10000	Apparent power on phase 1: S1 (1)
0x0412	1043	R	10	kVA	INT16	0–10000	Apparent power on phase 2: S2 (1)
0x0413	1044	R	10	kVA	INT16	0–10000	Apparent power on phase 3: S3 (1)
0x0414	1045	R	10	kVA	INT16	0–30000	Total apparent power: Stot
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 437.							

Power Factor

The sign of the power factor depends on the configuration of register 3318 , page 438.

Address	Register	RW	X	Unit	Type	Range	Description
0x0415	1046	R	100	–	INT16	-100–+100	Power factor on phase 1: PF1 (1)
0x0416	1047	R	100	–	INT16	-100–+100	Power factor on phase 2: PF2 (1)
0x0417	1048	R	100	–	INT16	-100–+100	Power factor on phase 3: PF3 (1)
0x0418	1049	R	100	–	INT16	-100–+100	Total power factor: PF
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 437.							

Fundamental Power Factor (cosϕ)

The sign of the fundamental power factor (cosϕ) depends on the configuration of register 3318 , page 438.

Address	Register	RW	X	Unit	Type	Range	Description
0x0419	1050	R	100	–	INT16	-100–+100	Fundamental power factor on phase 1: cosϕ 1 (1)
0x041A	1051	R	100	–	INT16	-100–+100	Fundamental power factor on phase 2: cosϕ 2 (1)
0x041B	1052	R	100	–	INT16	-100–+100	Fundamental power factor on phase 3: cosϕ 3 (1)
0x041C	1053	R	100	–	INT16	-100–+100	Total fundamental power factor: cosφ
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 437.							

Frequency

When the MicroLogic 5/6/7 trip unit cannot calculate the frequency, it returns Not Evaluated = 32768 (0x8000).

Address	Register	RW	X	Unit	Type	Range	Description
0x041D	1054	R	10	Hz	INT16U	150–4400	System frequency: F

Fundamental Reactive Power

The flow sign of the reactive power depends on the configuration of register 3316 , page 438.

Address	Register	RW	X	Unit	Type	Range	Description
0x0437	1080	R	10	kvar	INT16	-10000–+10000	Fundamental reactive power on phase 1: Q1 Fund (1)
0x0438	1081	R	10	kvar	INT16	-10000–+10000	Fundamental reactive power on phase 2: Q2 Fund (1)
0x0439	1082	R	10	kvar	INT16	-10000–+10000	Fundamental reactive power on phase 3: Q3 Fund (1)
0x043A	1083	R	10	kvar	INT16	-10000–+10000	Total fundamental reactive power: Qtot Fund
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 437.							

Distortion Power

Address	Register	RW	X	Unit	Type	Range	Description
0x043F	1088	R	10	kvar	INT16U	0–10000	Distortion power on phase 1: D1 (1)
0x0440	1089	R	10	kvar	INT16U	0–10000	Distortion power on phase 2: D2 (1)
0x0441	1090	R	10	kvar	INT16U	0–10000	Distortion power on phase 3: D3 (1)
0x0442	1091	R	10	kvar	INT16U	0–10000	Total distortion power: Dtot
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 437.							

Total Harmonic Distortion (THD)

Address	Register	RW	X	Unit	Type	Range	Description
0x0443	1092	R	10	%	INT16U	0–32766	Total harmonic distortion of V12 in relation to the fundamental
0x0444	1093	R	10	%	INT16U	0–32766	Total harmonic distortion of V23 in relation to the fundamental
0x0445	1094	R	10	%	INT16U	0–32766	Total harmonic distortion of V31 in relation to the fundamental
0x0446	1095	R	10	%	INT16U	0–32766	Total harmonic distortion of V1N in relation to the fundamental (1)
0x0447	1096	R	10	%	INT16U	0–32766	Total harmonic distortion of V2N in relation to the fundamental (1)
0x0448	1097	R	10	%	INT16U	0–32766	Total harmonic distortion of V3N in relation to the fundamental (1)
0x0449	1098	R	10	%	INT16U	0–32766	Total harmonic distortion of I1 in relation to the fundamental
0x044A	1099	R	10	%	INT16U	0–32766	Total harmonic distortion of I2 in relation to the fundamental
0x044B	1100	R	10	%	INT16U	0–32766	Total harmonic distortion of I3 in relation to the fundamental

(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 437.

Thermal Image of Motor

Address	Register	RW	X	Unit	Type	Range	Description
0x0477	1144	R	1	%	INT16U	0–32766	Ith image

Minimum/Maximum Values of Real-Time Measurements

Minimum/Maximum Measurements Rule

Minimum and maximum measurements take into account the absolute value of real-time measurements. Therefore the following rule applies:

0<10<200<-400<600<-3800.

In this case:

- The minimum value = 0
- The maximum value = -3800

  NOTE: This rule does not apply for the power factor (PF) and for the fundamental power factor (cosϕ):

  - PFmax (or cosϕ max.) is obtained for the smallest positive value of PF (or cosϕ).
  - PFmin (or cosϕ min.) is obtained for the highest negative value of PF (or cosϕ).

The reset minimum/maximum command (command code = 46728) can reset the content of the minimum/maximum real-time measurement registers.

Minimum of Real-Time Measurements

Registers 1300 to 1599 hold the minimum values of real-time metering parameters:

- The register of the minimum value of a real-time metering parameter is equal to the register of the real-time metering parameter plus 300.

  Examples:

  - Register 1300 holds the minimum value of the phase-to-phase voltage V12 (register 1000).
  - Register 1316 holds the minimum value of the current on phase 1 (register 1016).
- The order of the registers is the same as that of the real-time metering variables.
- The scale factors of the minimum values are the same as those of the real-time metering parameters.
- The minimum values of unbalance current and unbalance voltage are not available.
- The minimum values of Imin (register 1026), Vmax (register 1145), and Vmin (register 1146) are not available.

Maximum of Real-Time Measurements

Registers 1600 to 1899 hold the maximum values of real-time metering parameters:

- The register of the maximum value of a real-time metering parameter is equal to the register of the real-time metering parameter plus 600.

  Examples

  - Register 1600 holds the maximum value of the phase-to-phase voltage V12 (register 1000).
  - Register 1616 holds the maximum value of the current on phase 1 (register 1016).
- The order of the registers is the same as that of the real-time metering variables.

- The scale factors of the maximum values are the same as those of the real-time metering parameters.
- The maximum values of Imin (register 1026), Vmax (register 1145), and Vmin (register 1146) are not available.

Energy Measurements

General Description

The energy measurements are refreshed every second. Energy measurements are saved every hour in the non-volatile memory of the MicroLogic 5/6/7 trip unit.

Energy measurements include:

- Active energy Ep
- Reactive energy Eq
- Apparent energy Es
- Active energy counted positively (EpIn) or negatively (EpOut), according to the configuration of register 3316 Power Flow Sign, page 438.
- Reactive energy counted positively (EqIn) or negatively (EqOut), according to the configuration of register 3316 Power Flow Sign, page 438.
- Active energy and reactive energy are accumulated according to the configuration of register 3324 (absolute mode by factory setting) Energy Accumulation Mode, page 438.

The reset minimum/maximum command (command code = 46728) can reset the content of the energy measurement registers, cumulative energy measurements excepted.

NOTE: The power flow sign configuration command (command code =47240) can reset the content of the energy measurement registers excluding the cumulative energy measurements.

Energy Registers

Energies are stored in big-endian format: The most significant word is transmitted first and the least significant second.

Examples:

If Ep = 7589 kWh, then:

- Register 2000 = 0 (0x0000)
- Register 2001 = 7589 (0x1DA5)

If Ep = 4,589,625 kWh, then:

- Register 2000 = 70 (0x0046)
- Register 2001 = 2105 (0x0839)

4589625 = 70x65536 + 2105

Address	Register	RW	X	Unit	Type	Range	Description
0x07CF– 0x07D0	2000– 2001	R	1	kWh	INT32	-1 999 999 999–+1 999 999 999	Active energy: Ep
0x07D3– 0x07D4–	2004– 2005	R	1	kVARh	INT32	-1 999 999 999–+1 999 999 999	Reactive energy: Eq
0x07D7– 0x07D8	2008– 2009	R	1	kWh	INT32	0–1 999 999 999	Active energy counted positively: EpIn
0x07DB– 0x07DC	2012– 2013	R	1	kWh	INT32	0–1 999 999 999	Active energy counted negatively: EpOut
0x07DF– 0x07E0	2016– 2017	R	1	kVARh	INT32	0–1 999 999 999	Reactive energy counted positively: EqIn
0x07E3– 0x07E4	2020– 2021	R	1	kVARh	INT32	0–1 999 999 999	Reactive energy counted negatively: EqOut

Address	Register	RW	X	Unit	Type	Range	Description
0x07E7– 0x07E8	2024– 2025	R	1	kVAh	INT32	0–1 999 999 999	Apparent energy: Es
0x07EB– 0x07EC	2028– 2029	R	1	kWh	INT32	0–1 999 999 999	Cumulative active energy counted positively (cannot be reset): EpIn
0x07ED– 0x07EE	2030– 2031	R	1	kWh	INT32	0–1 999 999 999	Cumulative active energy counted negatively (cannot be reset): EpOut

Demand Measurements

General Description

Demand registers include:

- Current demand
- Active, reactive, and apparent power demand

The window duration of current demand depends on the configuration of register 3352. Refer to Demand Time, page 438.

The window duration and the window type of power demand depend on the configuration of registers 3354 and 3355. Refer to Demand Time, page 438.

The demand measurements are refreshed every minute with the sliding window type.

The demand measurements are refreshed at the end of the window interval with the block window type.

Current Demand

Address	Register	RW	X	Unit	Type	Range	Description
0x0897	2200	R	1	A	INT16U	0–20xIn	Current demand on phase 1: I1 Dmd
0x0898	2201	R	1	A	INT16U	0–20xIn	Current demand on phase 2: I2 Dmd
0x0899	2202	R	1	A	INT16U	0–20xIn	Current demand on phase 3: I3 Dmd
0x089A	2203	R	1	A	INT16U	0–20xIn	Current demand on the neutral: IN Dmd (1)
0x089B	2204	R	1	A	INT16U	0–20xIn	Maximum of current demand on phase 1: I1 Peak Dmd (2)
0x089C	2205	R	1	A	INT16U	0–20xIn	Maximum of current demand on phase 2: I2 Peak Dmd (2)
0x089D	2206	R	1	A	INT16U	0–20xIn	Maximum of current demand on phase 3: I3 Peak Dmd (2)
0x089E	2207	R	1	A	INT16U	0–20xIn	Maximum of current demand on the neutral: IN Peak Dmd (1) (2)

(1) This value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 437.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 462.

Active Power Demand

Address	Register	RW	X	Unit	Type	Range	Description
0x08AF	2224	R	10	kW	INT16	-30000–+30000	Total active power demand: P Dmd (1)
0x08B0	2225	R	10	kW	INT16	-30000–+30000	Maximum of total active power demand: P Peak Dmd (2)

(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every minute.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 462.

Reactive Power Demand

Address	Register	RW	X	Unit	Type	Range	Description
0x08B5	2230	R	10	kvar	INT16	-30000–+30000	Total reactive power demand: Q Dmd (1)
0x08B6	2231	R	10	kvar	INT16	-30000–+30000	Maximum of total reactive power demand: Q Peak Dmd (2)

(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every minute.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 462.

Apparent Power Demand

Address	Register	RW	X	Unit	Type	Range	Description
0x08BB	2236	R	10	kVA	INT16	0–30000	Total apparent power demand: S Dmd (1)
0x08BC	2237	R	10	kVA	INT16	0–30000	Maximum of total apparent power demand: S Peak Dmd (2)

(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every minute.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 462.

Minimum/Maximum Measurements Reset Time

Overview

The minimum/maximum measurements reset time registers enable the user to know all the dates relative to the last reset minimum/maximum command.

The reset minimum/maximum command (command code 46728) can reset the content of the minimum/maximum measurements registers.

A read request of 30 registers is necessary to read the minimum/maximum measurements reset time.

Minimum/Maximum Measurements Reset Time

Address	Register	RW	X	Unit	Type	Range	Description
0x0B53– 0x0B55	2900– 2902	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum current
0x0B56– 0x0B58	2903– 2905	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum voltage.
0x0B59– 0x0B5B	2906– 2908	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum power (P, Q, S).
0x0B5C– 0x0B5E	2909– 2911	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum power factor and cosϕ.
0x0B5F– 0x0B61	2912– 2914	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum total harmonic distortion.
0x0B62– 0x0B64	2915– 2917	R	–	–	ULP DATE	–	Date and time of reset of peak current demand.
0x0B65– 0x0B67	2918– 2920	R	–	–	ULP DATE	–	Date and time of reset of peak active, reactive, and apparent power demand.
0x0B68– 0x0B6A	2921– 2923	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum frequency.
0x0B6B– 0x0B6D	2924– 2926	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum thermal image of motor.
0x0B6E– 0x0B70	2927– 2929	R	–	–	ULP DATE	–	Date and time of reset of energy (active, reactive, and apparent).

MicroLogic 5/6/7 Trip Unit Identification

Serial Number

The MicroLogic 5/6/7 trip unit serial number is composed of a maximum of 11 alphanumeric characters with the following format: PPYYWWDnnnn.

- PP = plant code
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- nnnn = sequence number (0001–9999)

A read request of 6 registers is necessary to read the MicroLogic 5/6/7 trip unit serial number.

Address	Register	RW	X	Unit	Type	Range	Description
0x21FB	8700	R	–	–	OCTET STRING	–	'PP'
0x21FC	8701	R	–	–	OCTET STRING	'05'–'99'	'YY'
0x21FD	8702	R	–	–	OCTET STRING	'01'–'52'	'WW'
0x21FE	8703	R	–	–	OCTET STRING	D: '1'–'7' n: '0'–'9'	'Dn'
0x21FF	8704	R	–	–	OCTET STRING	'00'–'99'	'nn'
0x2200	8705	R	–	–	OCTET STRING	'0'–'9'	'n' (the NULL character ends the serial number)

Hardware Revision

For MicroLogic 5/6/7 trip units with firmware revision up to V1.2.1, the hardware revision is an integer.

Address	Register	RW	X	Unit	Type	Range	Description
0x2204	8709	R	–	–	INT16U	0–15	Hardware revision of the MicroLogic 5/6/7 trip unit.

For MicroLogic 5/6/7 trip units with firmware version greater than or equal to V1.2.2, the hardware revision is an ASCII string using the format AAA.BBB.CCC with:

- AAA = major version (000-127)
- BBB = minor version (000-255)
- CCC = revision number (000-255)

The NULL character ends the revision number.

Address	Register	RW	X	Unit	Type	Range	Description
0x2212–0x2217	8723-8728	R	–	–	OCTET STRING	–	Hardware revision of the MicroLogic 5/6/7 trip unit.

Product Identification

Address	Register	RW	X	Unit	Type	Range	Description
0x220B	8716	R	–	–	INT16U	15143–15145	Product identification: • 15143 = distribution application, type A • 15144 = distribution application, type E • 15145 = motor application, type E

Protection Type

Address	Register	RW	X	Unit	Type	Range	Description
0x2223	8740	R	–	–	OCTET STRING	52–73	MicroLogic 5/6/7 trip unit protection type: • For ComPacT NSX100/250 and PowerPacT H and J-frame: '52' = LSI '62' = LSIG '72' = LSIV • For ComPacT NSX400/630 and PowerPacT L-frame: '53' = LSI '63' = LSIG '73' = LSIV

Metering Type

Address	Register	RW	X	Unit	Type	Range	Description
0x2224	8741	R	–	–	OCTET STRING	E	MicroLogic 5/6/7 trip unit metering type E

Application

Address	Register	RW	X	Unit	Type	Range	Description
0x222A	8747	R	–	–	INT16U	1–2	Application: 1 = distribution 2 = motor

Standard

Address	Register	RW	X	Unit	Type	Range	Description
0x222B	8748	R	–	–	INT16U	1–3	Standard: 1 = UL 2 = IEC 3 = JIS

Range Variant

Address	Register	RW	X	Unit	Type	Range	Description
0x222C	8749	R	–	–	INT16U	1–4	1 = ComPact NSX 2 = PowerPact H-, J-, and L-frame 3 = ComPacT NSX – New generation 4 = PowerPacT H-, J-, and L-Frame – New generation

Nominal Current

Address	Register	RW	X	Unit	Type	Range	Description
0x222D	8750	R	1	A	INT16U	0–8000	Circuit breaker nominal current In

Pole

Address	Register	RW	X	Unit	Type	Range	Description
0x222E	8751	R	–	–	INT16U	0–1	0 = 3-pole 1 = 4-pole

16 Hz 2/3

Address	Register	RW	X	Unit	Type	Range	Description
0x222F	8752	R	–	–	INT16U	0–1	0 = not a 16 Hz 2/3 MicroLogic 5/6/7 trip unit application 1 = 16 Hz 2/3 MicroLogic 5/6/7 trip unit application

Firmware Version

For MicroLogic 5/6/7 trip units with firmware version up to V1.2.1, the firmware version is an ASCII string using the format VAAA.BBB.CCC with:

- AAA = major version (001-999)
- BBB = minor version (001-999)
- CCC = revision number (001-999)

Address	Register	RW	X	Unit	Type	Range	Description
0x7529–0x752D	29994–29998	R	–	–	OCTET STRING	–	Firmware version of the MicroLogic 5/6/7 trip unit.

For MicroLogic 5/6/7 trip units with firmware version greater than or equal to V1.2.2, the firmware version is an ASCII string using the format AAA.BBB.CCC with:

- AAA = major version (000-127)
- BBB = minor version (000-255)
- CCC = revision number (000-255)

The NULL character ends the revision number.

Address	Register	RW	X	Unit	Type	Range	Description
0x220C–0x2211	8717–8722	R	–	–	OCTET STRING	–	Firmware version of the MicroLogic 5/6/7 trip unit.

Part Number

The MicroLogic 5/6/7 part number starts with the character C and has the format, CaaPTEbbb.

A read request of 5 registers is necessary to read the MicroLogic 5/6/7 trip unit part number.

For example, the commercial reference of ComPacT NSX100/250 MicroLogic 5.2E is C1035E100.

Address	Register	RW	X	Unit	Type	Range	Description
0x752F	30000	R	–	–	OCTET STRING	–	Example: ‘C1’
0x7530	30001	R	–	–	OCTET STRING	–	Example: ‘03’
0x7531	30002	R	–	–	OCTET STRING	–	Example: ‘5E’
0x7532	30003	R	–	–	OCTET STRING	–	Example: ‘10’
0x7533	30004	R	–	–	OCTET STRING	–	Example: ‘0’

Status

Alarms Status

The alarms status register indicates the current status of the alarms:

- Alarm bit = 0: Alarm is not active.
- Alarm bit = 1: Alarm is active.

The following table describes the values for each bit of the alarm status register:

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x1647	5704	R	–	–	INT16U	–	–	Alarm status
							0	User-defined alarm 201
							1	User-defined alarm 202
							2	User-defined alarm 203
							3	User-defined alarm 204
							4	User-defined alarm 205
							5	User-defined alarm 206
							6	User-defined alarm 207
							7	User-defined alarm 208
							8	User-defined alarm 209
							9	User-defined alarm 210
							10	Long-time protection Ir pre-alarm (PAL Ir)
							11	Earth-leakage protection IΔn pre-alarm (PAL IΔn)
							12	Ground-fault protection Ig pre-alarm (PAL Ig)
							13–15	Reserved

SDx Module Status

The SDx module status register indicates the status and the validity of the SDx outputs (2 outputs maximum):

- Status bit = 0: The output is open.
- Status bit = 1: The output is closed.
- Validity bit = 0: The output status is unknown.
- Validity bit = 1: The output status is known.

The following table describes the values for each bit of the SDx module status register:

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x2298	8857	R	–	–	INT16U	–	–	SDx module status
							0	Status of output 1
							1	Status of output 2
							2–7	Reserved
							8	Validity of output 1
							9	Validity of output 2
							10–15	Reserved

Trip Status

The trip status register indicates the current status of the trip:

- Trip bit = 0: Trip is not active.
- Trip bit = 1: Trip is active.

The following table describes the values for each bit of the trip status register:

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x270F	10000	R	–	–	INT16U	–	–	Trip status
							0	Long-time protection Ir
							1	Short-time protection Isd
							2	Instantaneous protection Ii
							3	Ground-fault protection Ig
							4	Earth-leakage protection IΔn
							5	Integrated instantaneous protection
							6	Trip unit internal failure (STOP)
							7	Instantaneous with earth-leakage protection
							8	Unbalance motor protection Iunbal
							9	Jam motor protection Ijam
							10	Underload motor protection Iunderload
							11	Long-start motor protection Ilongstart
							12	Reflex tripping protection
							13–15	Reserved

Alarm History

General Description

The alarm history registers describe the last 10 alarms. The alarm history format corresponds to a series of 10 records. Each record is composed of 5 registers describing one alarm.

The alarm history registers return 32768 (0x8000) when they are not used.

Record Number

A read request of 5x(n) registers is necessary to read the last n alarm records, where 5 is the number of registers for each alarm record.

For example, a read request of 5 x 3 = 15 registers is necessary to read the last 3 alarm records of the alarm history:

- The first 5 registers describe the first alarm record (most recent alarm).
- The next 5 registers describe the second alarm record.
- The last 5 registers describe the third alarm record.

Address	Register	Description
0x1663–0x1667	5732–5736	Alarm record 1 (most recent alarm)
0x1668–0x166C	5737–5741	Alarm record 2
0x166D–0x1671	5742–5746	Alarm record 3
0x1672–0x1676	5747–5751	Alarm record 4
0x1677–0x167B	5752–5756	Alarm record 5
0x167C–0x1680	5757–5761	Alarm record 6
0x1681–0x1685	5762–5766	Alarm record 7
0x1686–0x168A	5767–5771	Alarm record 8
0x168B–0x168F	5772–5776	Alarm record 9
0x1690–0x1694	5777–5781	Alarm record 10 (oldest alarm)

Alarm Record

A read request of 5 registers is necessary to read an alarm record.

The order and the description of the alarm records registers are the same as that of the alarm record 1:

Alarm Record 1 (Most Recent Alarm)							
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**Description**
0x1663	5732	R	1	–	INT16U	0–65535	Alarm code (see next paragraph)
0x1664– 0x1666	5733– 5735	R	–	–	ULP DATE	–	Date and time of alarm
0x1667	5736	R	1	–	INT16U	1–2	Event type MSB = 0 (reserved) Event occurrence: LSB = 1 Event completion: LSB = 2

Alarm Codes

Alarm Code	Description
201 (0x00C8)	User-defined alarm 201
202 (0x00C9)	User-defined alarm 202
203 (0x00CA)	User-defined alarm 203
204 (0x00CB)	User-defined alarm 204
205 (0x00CC)	User-defined alarm 205
206 (0x00CD)	User-defined alarm 206
207 (0x00CE)	User-defined alarm 207
208 (0x00CF)	User-defined alarm 208
209 (0x00D0)	User-defined alarm 209
210 (0x00D1)	User-defined alarm 210
1013 (0x03F4)	Long-time protection Ir pre-alarm (PAL Ir)
1014 (0x03F5)	Ground-fault protection Ig pre-alarm (PAL Ig)
1015 (0x03F6)	Earth-leakage protection IΔn pre-alarm (PAL IΔn)
The list of the predefined alarms from which the user can choose the 10 user-defined alarms is available at User-Defined Alarms, page 428.	

Trip History

General Description

The trip history registers describe the last 17 trips. The trip history format corresponds to a series of 17 records. Each record is composed of 7 registers describing one trip.

The trip history registers return 32768 (0x8000) when they are not used.

Trip Record Number

A read request of 7x(n) registers is necessary to read the last n trip records, where 7 is the number of registers for each trip record.

For example, a read request of 7 x 4 = 28 registers is necessary to read the last 4 trip records of the trip history:

- The first 7 registers describe the first trip record (most recent trip).
- The next 7 registers describe the second trip record.
- The last 7 registers describe the third trip record.
- The last 7 registers describe the fourth trip record.

Address	Register	Description
0x238B–0x2391	9100–9106	Trip record 1 (most recent trip)
0x2392–0x2398	9107–9113	Trip record 2
0x2399–0x239F	9114–9120	Trip record 3
0x23A0–0x23A6	9121–9127	Trip record 4
0x23A7–0x23AD	9128–9134	Trip record 5
0x23AE–0x23B4	9135–9141	Trip record 6
0x23B5–0x23BB	9142–9148	Trip record 7
0x23BC–0x23C2	9149–9155	Trip record 8
0x23C3–0x23C9	9156–9162	Trip record 9
0x23CA–0x23D0	9163–9169	Trip record 10
0x23D1–0x23D7	9170–9176	Trip record 11
0x23D8–0x23DE	9177–9183	Trip record 12
0x23DF–0x23E5	9184–9190	Trip record 13
0x23E6–0x23EC	9191–9197	Trip record 14
0x23ED–0x23F3	9198–9204	Trip record 15
0x23F4–0x23FA	9205–9211	Trip record 16
0x23FB–0x2401	9212–9218	Trip record 17 (oldest trip)

Trip Record

A read request of 7 registers is necessary to read a trip record.

The order and the description of the trip record registers are the same as that of the trip record 1:

Trip Record 1 (Most Recent Trip)							
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**Description**
0x238B	9100	R	1	–	INT16U	0–65535	Trip code (see next paragraph)
0x238C– 0x238E	9101– 9103	R	–	–	ULP DATE	–	Date and time of event (trip or acknowledge
0x238F	9104	R	1	–	INT16U	1–2	Event type MSB = 0 (reserved) Event occurrence: LSB = 1 Event completion: LSB = 2
0x2390	9105	R	1	–	INT16U	0–5	Faulty phase 0 = failure (no faulty phase) 1 = phase 1 2 = phase 2 3 = phase 3 4 = phase N 5 = phase 1 2 3 (motor application, ground-fault, earth-leakage)
0x2391	9106	R	1	A	INT16U	0–65535	Interrupted current (peak) (1)

(1) Measurement depends on the application:

- For electrical distribution application, the interrupted current is measured when a trip occurs, due to the long-time protection, the short-time protection, or the instantaneous protection.
- For motor-feeder application, the interrupted current is measured when a trip occurs, due to the short-time protection.
- In case of other trip types, the interrupted current is not measured and the value recorded is 65535 (0xFFFF).

Trip Codes

Trip Code	Description
1000 (0x03E8)	Long-time protection Ir
1001 (0x03E9)	Short-time protection Isd
1002 (0x03EA)	Instantaneous protection Ii
1003 (0x03EB)	Ground-fault protection Ig
1004 (0x03EC)	Earth-leakage protection IΔn
1005–1009 (0x03ED–0x03F1)	Reserved
1010 (0x03F2)	Integrated instantaneous protection
1011 (0x03F3)	STOP (trip unit internal failure)
1012 (0x03F4)	Instantaneous with earth-leakage protection
1013–1031 (0x03F5–0x0407)	Reserved
1032 (0x0408)	Unbalance motor protection
1033 (0x0409)	Jam motor protection
1034 (0x040A)	Underload motor protection

Trip Code	Description
1035 (0x040B)	Long-start motor protection
1036 (0x040C)	Reflex tripping protection

Earth-Leakage Test History

General Description

The earth-leakage test history registers describe the last 10 earth-leakage tests performed on a MicroLogic 7 trip unit. The earth-leakage test history format corresponds to a series of 10 records. Each record is composed of 5 registers describing one earth-leakage test.

The earth-leakage test history registers return 32768 (0x8000) when they are not used.

Earth-Leakage Test Number

A read request of 5 x n registers is necessary to read the last n earth-leakage test records, where 5 is the number of registers for each earth-leakage test record.

For example, a read request of 5 x 2 = 10 registers is necessary to read the last 2 earth-leakage test records of the earth-leakage test history:

- The first 5 registers describe the first earth-leakage test record (most recent earth-leakage test).
- The last 5 registers describe the second earth-leakage test record.

Address	Register	Description
0x7593–0x7597	30100-30104	Earth-leakage test record (most recent earth-leakage test)
0x7598–0x759C	30105–30109	Earth-leakage test record 2
0x759D–0x75A1	30110–30114	Earth-leakage test record 3
0x75A2–0x75A6	30115–30119	Earth-leakage test record 4
0x75A7–0x75AB	30120–30124	Earth-leakage test record 5
0x75AC–0x75B0	30125–30129	Earth-leakage test record 6
0x75B1–0x75B5	30130–30134	Earth-leakage test record 7
0x75B6–0x75BA	30135–30139	Earth-leakage test record 8
0x75BB–0x75BF	30140–30144	Earth-leakage test record 9
0x75C0–0x75C4	30145–30149	Earth-leakage test record 10 (oldest earth-leakage test)

Earth-Leakage Test Record

A read request of 5 registers is necessary to read a earth-leakage test record.

The order and the description of the earth-leakage test record registers are the same as that of the earth-leakage test record 1:

Earth-Leakage Test Record 1 (Most Recent Earth-Leakage Test)							
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**Description**
0x7593	30100	R	1	–	INT16U	0–65535	Earth-leakage test code (see next section.)
0x7594– 0x7596	30101– 30103	R	–	–	ULP DATE	–	Date and time of earth-leakage test.
0x7597	30104	R	–	–	INT16U	0–1	Test status • 0: test succeeded • 1: test failed

Earth-Leakage Test Codes

Earth-Leakage Test Code	Description
5162 (0x142A)	Earth-leakage test by button
5163 (0x142B)	Earth-leakage test by HMI

Maintenance Operation History

General Description

The maintenance operation history registers describe the last 10 maintenance operations. The maintenance operation history format corresponds to a series of 10 records. Each record is composed of 5 registers describing one maintenance operation.

The maintenance operation history registers return 32768 (0x8000) when they are not used.

Maintenance Operation Number

A read request of 5 x n registers is necessary to read the last n maintenance operation records, where 5 is the number of registers for each maintenance operation record.

For example, a read request of 5 x 2 = 10 registers is necessary to read the last 2 maintenance operation records of the maintenance operation history:

- The first 5 registers describe the first maintenance operation record (most recent maintenance operation).
- The last 5 registers describe the second maintenance operation record.

Address	Register	Description
0x733B–0x733F	29500–29504	Maintenance operation record 1 (most recent maintenance operation)
0x7340–0x7344	29505–29509	Maintenance operation record 2
0x7345–0x7349	29510–29514	Maintenance operation record 3
0x734A–0x734E	29515–29519	Maintenance operation record 4
0x734F–0x7353	29520–29524	Maintenance operation record 5
0x7354–0x7358	29525–29529	Maintenance operation record 6
0x7359–0x735D	29530–29534	Maintenance operation record 7
0x735E–0x7362	29535–29539	Maintenance operation record 8
0x7363–0x7367	29540–29544	Maintenance operation record 9
0x7368–0x736C	29545–29549	Maintenance operation record 10 (oldest maintenance operation)

Maintenance Operation Record

A read request of 5 registers is necessary to read a maintenance operation record.

The order and the description of the maintenance operation record registers are the same as that of the maintenance operation record 1:

Maintenance Operation Record 1 (Most Recent Maintenance Operation)							
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**Description**
0x733B	29500	R	1	–	INT16U	0–65535	Maintenance operation code (see next paragraph)
0x733C– 0x733E	29501– 29503	R	–	–	ULP DATE	–	Date and time of maintenance operation
0x733F	29504	–	–	–	–	–	Reserved

Maintenance Operation Codes

Maintenance Operation Code	Description
2000 (0x07D0)	Push to trip test (with USB maintenance interface)
2001 (0x07D1)	Ground-fault inhibition
2002 (0x07D2)	Reserved
2003 (0x07D3)	Start numerical injection test
2004 (0x07D4)	End numerical injection test
2005 (0x07D5)	Ground-fault test
2006 (0x07D6)	Earth-leakage test
2007 (0x07D7)	Start alarm test
2008 (0x07D8)	End alarm test
2009 (0x07D9)	Start long-time protection
2010 (0x07DA)	End long-time protection
2011 (0x07DB)	Start short-time protection
2012 (0x07DC)	End short-time protection
2013 (0x07DD)	Start instantaneous protection
2014 (0x07DE)	Stop instantaneous protection
2015 (0x07DF)	Start integrated instant protection
2016 (0x07E0)	Stop integrated instant protection
2017 (0x07E1)	Start unbalance protection
2018 (0x07E2)	Stop unbalance protection
2019 (0x07E3)	Start ground-fault protection
2020 (0x07E4)	Stop ground-fault protection
2021 (0x07E5)	Start earth-leakage protection
2022 (0x07E6)	Stop earth-leakage protection
2023 (0x07E7)	Start thermal memory
2024 (0x07E8)	Stop thermal memory
2025 (0x07E9)	Start connection with USB maintenance interface
2026 (0x07EA)	Stop connection with USB maintenance interface
2027 (0x07EB)	Turn rotary wheel 1
2028 (0x07EC)	Turn rotary wheel 2
2029 (0x07ED)	Locking pad open
2030 (0x07EE)	Locking pad closed
2031 (0x07EF)	ZSI test
2032 (0x07F0)	Reserved
2033 (0x07F1)	Reset software
2034 (0x07F2)	Reset minimum/maximum of current measurements
2035 (0x07F3)	Reset minimum/maximum of voltage measurements
2036 (0x07F4)	Reset minimum/maximum of power measurements
2037 (0x07F5)	Reset minimum/maximum of power factor measurements
2038 (0x07F6)	Reset minimum/maximum of total harmonic distortion measurements
2039 (0x07F7)	Reset maximum of current demand measurement

Maintenance Operation Code	Description
2040 (0x07F8)	Reset maximum of power demand (active, reactive, and apparent)
2041 (0x07F9)	Reset minimum/maximum of frequency measurement
2042 (0x07FA)	Reset minimum/maximum of thermal image measurements
2043 (0x07FB)	Reset energy measurements
2044 (0x07FC)	Reset energy counter
2045 (0x07FD)	Phase rotation setting

Pre-Alarms

General Description

EcoStruxure Power Commission software enables the configuration of the following 3 pre-alarms:

- Long-time protection pre-alarm (PAL Ir)
- Ground-fault protection pre-alarm (PAL Ig)
- Earth-leakage protection pre-alarm (PAL IΔn)

Each alarm has a corresponding alarm code:

- PAL Ir = 1013
- PAL Ig = 1014
- PAL IΔn = 1015

Each alarm has a priority level that manages the alarm display on the FDM121 display:

- No priority = N/A (not affected)
- Low priority = 1. No alarm display on the FDM121 display.
- Medium priority = 2. The FDM121 display LED is steady ON.
- High priority = 3. The FDM121 display LED blinks and a pop-up screen informs the user that the alarm is active.

For more information regarding the relationship between alarm priority and FDM121 display, refer to the following guides in **Related Documents** at the beginning of this guide:

- *DOCA0188•• ComPacT NSX MicroLogic 5/6/7 Trip Units - User Guide*
- *48940-312-01 - MicroLogic 5 and 6 Electronic Trip Units for PowerPacT H-, J-, and L-Frame Circuit Breakers - User Guide*

The pre-alarms registers describe the settings of the pre-alarms:

Address	Register	Description
0x19F9–0x1A02	6650–6659	Long-time protection pre-alarm (PAL Ir)
0x1A03–0x1A0C	6660–6669	Ground-fault protection pre-alarm (PAL Ig)
0x1A0D–0x1A16	6670–6679	Earth-leakage protection pre-alarm (PAL IΔn)

Long-Time Protection Pre-Alarm (PAL Ir)

A read request of 10 registers is necessary to read the long-time protection pre-alarm parameters.

Address	Register	RW	X	Unit	Type	Range	Description
0x19F9	6650	R	–	–	INT16U	–	The MSB gives the activity of the alarm: 0 = On, 1 = Off. The factory setting is 0 (On). The LSB gives the priority of the alarm: N/A, 1, 2, or 3. The factory setting is 2 (medium priority).
0x19FA	6651	–	–	–	–	–	Reserved
0x19FB	6652	R	1	%	INT16	(1)	% of Ir pick-up value. The factory setting is 90.
0x19FC	6653	–	–	–	–	–	Reserved
0x19FD	6654	R	1	s	INT16U	1	Pick-up time delay (fixed to 1 s)
0x19FE	6655	R	1	%	INT16	(1)	% of Ir drop-out value. The factory setting is 85.
0x19FF	6656	–	–	–	–	–	Reserved
0x1A00	6657	R	1	s	INT16U	1	Drop-out time delay (fixed to 1 s)

Address	Register	RW	X	Unit	Type	Range	Description
0x1A01–0x1A02	6658–6659	–	–	–	–	–	Reserved
(1) For distribution application, the range is 40–100. For motor application, the range is 10–95.							

Ground-Fault Protection Pre-Alarm (PAL Ig)

A read request of 10 registers is necessary to read the ground-fault protection pre-alarm parameters.

Address	Register	RW	X	Unit	Type	Range	Description
0x1A03	6660	R	–	–	INT16U	–	The MSB gives the activity of the alarm: 0 = On, 1 = Off. The factory setting is 0 (On). The LSB gives the priority of the alarm: N/A, 1, 2, or 3. The factory setting is 2 (medium priority).
0x1A04	6661	–	–	–	–	–	Reserved
0x1A05	6662	R	1	%	INT16	40–100	% of Ig pick-up value. The factory setting is 90.
0x1A06	6663	–	–	–	–	–	Reserved
0x1A07	6664	R	1	s	INT16U	1	Pick-up time delay (fixed to 1 s)
0x1A08	6665	R	1	%	INT16	40–100	% of Ig drop-out value. The factory setting is 85.
0x1A09	6666	–	–	–	–	–	Reserved
0x1A0A	6667	R	1	s	INT16U	1	Drop-out time delay (fixed to 1 s)
0x1A0B–0x1A0C	6668–6669	–	–	–	–	–	Reserved

Earth-Leakage Protection Pre-Alarm (PAL IΔn)

A read request of 10 registers is necessary to read the earth-leakage protection pre-alarm parameters.

Address	Register	RW	X	Unit	Type	Range	Description
0x1A0D	6670	R	–	–	INT16U	–	The MSB gives the activity of the alarm: 0 = On, 1 = Off. The factory setting is 0 (On). The LSB gives the priority of the alarm: N/A, 1, 2, or 3. The factory setting is 2 (medium priority).
0x1A0E	6671	–	–	–	–	–	Reserved
0x1A0F	6672	R	1	%	INT16	50–80	% of IΔn pick-up value. The factory setting is 90.
0x1A10	6673	–	–	–	–	–	Reserved
0x1A11	6674	R	1	s	INT16U	1	Pick-up time delay (fixed to 1 s)
0x1A12	6675	R	1	%	INT16	50–80	% of IΔn drop-out value. The factory setting is 85.
0x1A13	6676	–	–	–	–	–	Reserved
0x1A14	6677	R	1	s	INT16U	1	Drop-out time delay (fixed to 1 s)
0x1A15–0x1A16	6678–6679	–	–	–	–	–	Reserved

User-Defined Alarms

General Description

EcoStruxure Power Commission software enables the configuration of 10 user-defined alarms that can be chosen from a list of 150 predefined alarms.

Each user-defined alarm has a corresponding user-defined alarm number (201–210) and a corresponding alarm code (see next paragraph).

Each alarm has a priority level that manages the alarm display on the FDM121 display:

- No priority = N/A (not affected)
- Low priority = 1. No alarm display on the FDM121 display.
- Medium priority = 2. The FDM121 display LED is steady ON.
- High priority = 3. The FDM121 display LED blinks and a pop-up screen informs the user the alarm is active.

For more information regarding the relationship between alarm priority and FDM121 display, refer to the following guides in **Related Documents** at the beginning of this guide:

- *DOCA0188•• ComPacT NSX MicroLogic 5/6/7 Trip Units - User Guide*
- *48940-312-01 - MicroLogic 5 and 6 Electronic Trip Units for PowerPacT H-, J-, and L-Frame Circuit Breakers - User Guide*

The settings of the 10 user-defined alarms are in the user-defined alarms registers:

Address	Register	Description
0x1A71–0x1A7C	6770–6781	User-defined alarm 201
0x1A7D–0x1A88	6782–6793	User-defined alarm 202
0x1A89–0x1A94	6794–6805	User-defined alarm 203
0x1A95–0x1AA0	6806–6817	User-defined alarm 204
0x1AA1–0x1AAC	6818–6829	User-defined alarm 205
0x1AAD–0x1AB8	6830–6841	User-defined alarm 206
0x1AB9–0x1AC4	6842–6853	User-defined alarm 207
0x1AC5–0x1AD0	6854–6865	User-defined alarm 208
0x1AD1–0x1ADC	6866–6877	User-defined alarm 209
0x1ADD–0x1AE8	6878–6889	User-defined alarm 210

User-Defined Alarm Record

A read request of 12 registers is necessary to read a user-defined alarm record.

The order and the description of the user-defined alarms records are the same as that of user-defined alarm record 1:

User-Defined Alarm 201							
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**Description**
0x1A71	6770	R	–	–	INT16U	–	The MSB gives the activity of the alarm: 0 = On, 1 = Off. The factory setting is 1 (Off). The LSB gives the priority of the alarm: N/A, 1, 2, or 3. The factory setting is N/A (no priority).
0x1A72	6771	R	–	–	INT16U	–	Measurement identifier (1)
0x1A73	6772	–	–	–	–	–	Reserved

User-Defined Alarm 201							
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**Description**
0x1A74	6773	R	1	(2)	INT16	-32767– +32767	Threshold pick-up value. The factory setting is 0.
0x1A75	6774	–	–	–	–	–	Reserved
0x1A76	6775	R	1	s	INT16U	0–3000	Pick-up time delay. The factory setting is 0.
0x1A77	6776	R	1	(2)	INT16	-32767– +32767	Threshold drop-out value. The factory setting is 0.
0x1A78	6777	–	–	–	–	–	Reserved
0x1A79	6778	R	1	s	INT16	0–3000	Drop-out time delay. The factory setting is 0.
0x1A7A	6779	R	–	–	INT16U	0–3	Operator: 0: ≥, 1: ≤, 2: =, 3: I ≥ I
0x1A7B	6780	R	–	–	INT16U	1–1919	Alarm code, page 429
0x1A7C	6781	–	–	–	–	–	Reserved
(1) The value of the measurement identifier is the register number of the measurement. For example, the measurement identifier of current on phase 1 (I1) is 1016. (2) The unit of the threshold depends on the measurement identifier. For example, if the measurement identifier is I1, then the unit is A.							

Predefined Alarms Codes

The following table describes the list of predefined alarms and corresponding codes from which the user can choose the 10 user-defined alarms and configure them with EcoStruxure Power Commission software.

Alarm Code	Alarm Description
1 (0x0000)	Overcurrent instantaneous phase 1
2 (0x0001)	Overcurrent instantaneous phase 2
3 (0x0002)	Overcurrent instantaneous phase 3
4 (0x0003)	Overcurrent instantaneous neutral
5 (0x0004)	Ground-fault current
6 (0x0005)	Undercurrent instantaneous phase 1
7 (0x0006)	Undercurrent instantaneous phase 2
8 (0x0007)	Undercurrent instantaneous phase 3
9 (0x0008)	Overcurrent unbalance phase 1
10 (0x0009)	Overcurrent unbalance phase 2
11 (0x000A)	Overcurrent unbalance phase 3
12 (0x000B)	Overvoltage (phase 1 to neutral)
13 (0x000C)	Overvoltage (phase 2 to neutral)
14 (0x000D)	Overvoltage (phase 3 to neutral)
15 (0x000E)	Undervoltage (phase 1 to neutral)
16 (0x000F)	Undervoltage (phase 2 to neutral)
17 (0x0010)	Undervoltage (phase 3 to neutral)
18 (0x0011)	Overvoltage unbalance (phase 1 to neutral)
19 (0x0012)	Overvoltage unbalance (phase 2 to neutral)
20 (0x0013)	Overvoltage unbalance (phase 3 to neutral)
21 (0x0014)	Over total apparent power

Alarm Code	Alarm Description
22 (0x0015)	Over total active power
23 (0x0016)	Over total active reverse power
24 (0x0017)	Over total reactive power
25 (0x0018)	Over total reactive reverse power
26 (0x0019)	Under total apparent power
27 (0x001A)	Under total active power
28 (0x001B)	Reserved
29 (0x001C)	Under total reactive power
30 (0x001D)	Reserved
31 (0x001E)	Leading power factor (IEEE)
32 (0x001F)	Reserved
33 (0x001E)	Leading or lagging power factor (IEC)
34 (0x0021)	Lagging power factor (IEEE)
35 (0x0022)	Over total harmonic distortion current phase 1
36 (0x0023)	Over total harmonic distortion current phase 2
37 (0x0024)	Over total harmonic distortion current phase 3
38 (0x0025)	Over total harmonic distortion voltage (phase 1 to neutral)
39 (0x0026)	Over total harmonic distortion voltage (phase 2 to neutral)
40 (0x0027)	Over total harmonic distortion voltage (phase 3 to neutral)
41 (0x0028)	Over total harmonic distortion voltage (phase 1– 2)
42 (0x0029)	Over total harmonic distortion voltage (phase 2– 3)
43 (0x002A)	Over total harmonic distortion voltage (phase 3– 1)
44–53 (0x002B–0x0034)	Reserved
54 (0x0035)	Earth-leakage current
55 (0x0036)	Overcurrent (average)
56 (0x0037)	Over maximum current (I1, I2, I3, or neutral)
57 (0x0038)	Undercurrent instantaneous neutral
58–59 (0x0039–0x003A)	Reserved
60 (0x003B)	Undercurrent (average)
61 (0x003C)	Overcurrent demand phase 1
62 (0x003D)	Overcurrent demand phase 2
63 (0x003E)	Overcurrent demand phase 3
64 (0x003F)	Overcurrent demand neutral
65 (0x0040)	Under minimum current (I1, I2, or I3)
66 (0x0041)	Undercurrent demand phase 1
67 (0x0042)	Undercurrent demand phase 2
68 (0x0043)	Undercurrent demand phase 3
69 (0x0044)	Undercurrent demand neutral
70 (0x0045)	Over maximum current unbalance (I1, I2, or I3)
71 (0x0046)	Overvoltage (phase 1– 2)
72 (0x0047)	Overvoltage (phase 2– 3)
73 (0x0048)	Overvoltage (phase 3– 1)

Alarm Code	Alarm Description
74 (0x0049)	Reserved
75 (0x004A)	Overvoltage (average)
76 (0x004B)	Undervoltage (phase 1– 2)
77 (0x004C)	Undervoltage (phase 2– 3)
78 (0x004D)	Undervoltage (phase 3– 1)
79 (0x004E)	Over maximum voltage
80 (0x004F)	Undervoltage (average)
81 (0x0050)	Under minimum voltage
82 (0x0051)	Over maximum voltage unbalance (phases to neutral)
83–85 (0x0052–0x0054)	Reserved
86 (0x0055)	Overvoltage unbalance (phase 1– 2)
87 (0x0056)	Overvoltage unbalance (phase 2– 3)
88 (0x0057)	Overvoltage unbalance (phase 3– 1)
89 (0x0058)	Over maximum voltage unbalance
90 (0x0059)	Phase sequence
91 (0x005A)	Reserved
92 (0x005B)	Under frequency
93 (0x005C)	Over frequency
94–98 (0x005D–0x0061)	Reserved
99 (0x0062)	Over active power demand
100–120 (0x0063–0x0077)	Reserved
121 (0x0078)	Leading cosϕ (IEEE)
122 (0x0079)	Reserved
123 (0x007A)	Leading or lagging cosϕ (IEC)
124 (0x007B)	Lagging cosϕ (IEEE)
125 (0x007C)	Overcurrent thermal image motor
126 (0x007D)	Undercurrent thermal image motor
127–140 (0x007E–0x008B)	Reserved
141 (0x008C)	Overcurrent maximum demand phase 1
142 (0x008D)	Overcurrent maximum demand phase 2
143 (0x008E)	Overcurrent maximum demand phase 3
144 (0x008F)	Overcurrent maximum demand neutral
145 (0x0090)	Lead
146 (0x0091)	Lag
147 (0x0092)	Quadrant 1
148 (0x0093)	Quadrant 2
149 (0x0094)	Quadrant 3
150 (0x0095)	Quadrant 4
151–255 (0x0096–0x00FE)	Reserved
256 (0x00FF)	Contact wear

Protection Parameters

Long-Time Protection Parameters

A read request of 10 registers is necessary to read the long-time protection parameters.

The long-time protection command (command code = 45192) configures the content of the long-time protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x2231	8754	R	–	–	INT16U	1–2	Status: 1 = On, 2 = Inhibit
0x2232	8755	–	–	–	–	–	Reserved
0x2233	8756	R-WC	1	A	INT16U	–	Ir pick-up value. The Ir range depends on the nominal current In.
0x2234	8757	–	–	–	–	–	Reserved
0x2235	8758	R-WC	1	ms	INT16U	500– 16000	tr time delay (distribution application) tr = 500, 1000, 2000, 4000, 8000, 16000 ms
0x2236	8759	R-WC	1	s	INT16U	5–30	Motor class (motor application only) Possible values = 5, 10, 20, 30 s
0x2237	8760	–	–	–	–	–	Reserved
0x2238	8761	R-WC	1	–	INT16U	1–2	Cool fan (motor application only) 1 = auto, 2 = motor
0x2239– 0x223A	8762– 8763	–	–	–	–	–	Reserved

Short-Time Protection Parameters

A read request of 10 registers is necessary to read the short-time protection parameters.

The short-time protection command (command code = 45193) configures the content of the short-time protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x223B	8764	R	–	–	INT16U	1–2	Status: 1 = On, 2 = Inhibit
0x223C	8765	R-WC	–	–	INT16U	0–1	Type of protection: 0 = I^2t On, 1 = I^2t Off. For motor application, tsd = 30 ms and I^2t is Off (fixed values).
0x223D	8766	R-WC	10	–	INT16U	(1)	Isd coefficient, adjustable in steps of 5
0x223E	8767	R	1	A	INT16U	–	Isd pick-up value = (Ir) x (Isd coefficient) / 10
0x223F	8768	R-WC	1	ms	INT16U	0–400	tsd time delay tsd = 0, 30, 100, 200, 300, 400 ms If tsd = 0 ms, then I^2t must be Off.
0x2240– 0x2244	8769– 8773	–	–	–	–	–	Reserved

(1) For distribution application, the range is 15–100. For motor application, the range is 50–130.

Instantaneous Protection Parameters

A read request of 10 registers is necessary to read the instantaneous protection parameters.

The instantaneous protection command (command code = 45194) configures the content of the instantaneous protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x2245	8774	R	–	–	INT16U	1–2	Status: 1 = On, 2 = Inhibit
0x2246	8775	–	–	–	–	–	Reserved
0x2247	8776	R-WC	10	–	INT16U	(1)	Ii coefficient, adjustable in steps of 5
0x2248	8777	R	1	A	INT16U	–	Ii pick-up value = (In) x (Ii coefficient) / 10
0x2249– 0x224E	8778– 8783	–	–	–	–	–	Reserved

(1) The Ii coefficient range depends on the circuit breaker size:

- For 100–160 A, the range is 15–150.
- For 250–400 A, the range is 15–120.
- For 630 A, the range is 15–110.

Ground-Fault Protection Parameters

A read request of 10 registers is necessary to read the ground-fault protection parameters.

The ground-fault protection command (command code = 45195) configures the content of the ground-fault protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x224F	8784	R	–	–	INT16U	0–2	Status: 0 = Off, 1 = On, 2 = Inhibit
0x2250	8785	R-WC	–	–	INT16U	0–1	Type of protection: 0 = I^2t On, 1 = I^2t Off For motor application, tg = 0 ms and I^2t is Off (fixed values).
0x2251	8786	R-WC	100	–	INT16U	–	Ig coefficient, adjustable in steps of 5
0x2252	8787	R	1	A	INT16U	–	Ig pick-up value = (In) x (Ig coefficient) / 100 If ground-fault protection is set to Off, Ig pick-up value = In.
0x2253	8788	R-WC	1	ms	INT16U	0–400	tg time delay tg = 0, 100, 200, 300, 400 ms. If tg = 0 ms, then I^2t must be Off.
0x2254– 0x2258	8789– 8793	–	–	–	–	–	Reserved

Earth-Leakage Protection Parameters

A read request of 10 registers is necessary to read the earth-leakage protection parameters.

The earth-leakage protection command (command code = 45196) configures the content of the earth-leakage protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x2259	8794	R	–	–	INT16U	0–2	Status: 0 = Off, 1 = On, 2 = Inhibit
0x225A	8795	–	–	–	–	–	Reserved
0x225B	8796	R	1	mA	INT16U	–	Earth-leakage current IΔn. The IΔn range depends on the nominal current In.
0x225C	8797	–	–	–	–	–	Reserved
0x225D	8798	R-WC	1	ms	INT16U	0–1000	tΔn time delay tΔn = 0, 60, 150, 500, 1000 ms If IΔn = 0.03 mA, then tΔn = 0 ms.
0x225E– 0x2262	8799– 8803	–	–	–	–	–	Reserved

Jam Protection Parameters

A read request of 4 registers is necessary to read the jam protection parameters.

The jam protection is available for motor application only. The jam protection command (command code = 45448) configures the content of the jam protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x22C3	8900	R-WC	–	–	INT16U	0–1	Status: 0 = Off, 1 = On
0x22C4	8901	R-WC	10	–	INT16U	10–80	Ijam coefficient, adjustable in steps of 1
0x22C5	8902	R	1	A	INT16U	–	Ijam pick-up value = (Ir) x (Ijam coefficient) / 10
0x22C6	8903	R-WC	1	s	INT16U	1–30	tjam time delay

Unbalance Protection Parameters

A read request of 4 registers is necessary to read the unbalance protection parameters.

The unbalance protection is available for motor application only. The unbalance protection command (command code = 45450) configures the content of the unbalance protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x22C7	8904	R	–	–	INT16U	0–2	Status: 0 = Off, 1 = On, 2 = Inhibit
0x22C8	8905	R-WC	1	%	INT16U	10–40	Iunbal coefficient
0x22C9	8906	R-WC	1	s	INT16U	1–10	tunbal time delay
0x22CA	8907	–	–	–	–	–	Reserved

Underload Protection Parameters

A read request of 4 registers is necessary to read the underload protection parameters.

The underload protection is available for motor application only. The underload protection command (command code = 45449) configures the content of the underload protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x22CB	8908	R-WC	–	–	INT16U	0–1	Status: 0 = Off, 1 = On
0x22CC	8909	R-WC	100	–	INT16U	30–90	Iunderload coefficient, adjustable in steps of 1
0x22CD	8910	R	1	A	INT16U	–	Iunderload pick-up value = (Ir) x (Iunderload) / 100
0x22CE	8911	R-WC	1	s	INT16U	1–200	tunderload time delay

Long-Start Protection Parameters

A read request of 4 registers is necessary to read the long-start protection parameters.

The long-start protection is available for motor application only. The long-start protection command (command code = 45451) configures the content of the long-start protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x22CF	8912	R-WC	–	–	INT16U	0–1	Status: 0 = Off, 1 = On
0x22D0	8913	R-WC	10	–	INT16U	10–80	Ilongstart coefficient, adjustable in steps of 1
0x22D1	8914	R	1	A	INT16U	–	Ilongstart pick-up value = (Ir) x (Ilongstart coefficient) / 10
0x22D2	8915	R-WC	1	s	INT16U	1–200	tlongstart time delay

Neutral Protection Parameters

The neutral protection is only available when system type in register 3314 is 30 or 41 , page 437.

A read request of 4 registers is necessary to read the neutral protection parameters.

The neutral protection command (command code = 45197) configures the content of the neutral protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x22D3	8916	R	–	–	INT16U	0–2	Status: 0 = Off, 1 = On, 2 = Inhibit (1)
0x22D4	8917	R-WC	–	–	INT16U	0–3	Neutral coefficient pickup value 0 = Off 1 = 0.5 2 = 1.0 3 = OSN
0x22D5	8918	R	1	A	INT16U	0–32766	Ir pick-up value
0x22D6	8919	R	1	A	INT16U	0–32766	Isd pick-up value
(1) For 40 A IEC and 60 A UL circuit breakers, the user cannot set up the neutral coefficient pickup value to 0.5.							

Thermal Memory Inhibit Parameter

Address	Register	RW	X	Unit	Type	Range	Description
0x22E1	8930	R	–	–	INT16U	1–2	Status: 1 = On, 2 = Inhibit

Configuration of the SDx Module

Output 1

A read request of 3 registers is necessary to read the output 1 parameters.

The user can check the status and the validity of output 1 at register 8857, page 414.

Address	Register	RW	X	Unit	Type	Range	Description
0x2648	9801	R	1	–	INT16U	0–4	Output mode 0 = normal mode 1 = latched mode 2 = time delayed mode 3 = closed forced mode 4 = open forced mode
0x2649	9802	R	1	s	INT16U	1–360	Delay (if the output mode is set to 2). The factory setting is 1 s.
0x264A	9803	R	1	–	INT16U	0–65535	Alarm identifier (201–210, 1013, 1014, 1015). The alarm identifier is set to 0 if there is no alarm.

Output 2

A read request of 3 registers is necessary to read the output 2 parameters.

The user can check the status and the validity of output 2 at register 8857, page 414.

Address	Register	RW	X	Unit	Type	Range	Description
0x264F	9808	R	1	–	INT16U	0–4	Output mode 0 = normal mode 1 = latched mode 2 = time delayed mode 3 = closed forced mode 4 = open forced mode
0x2650	9809	R	1	s	INT16U	1–360	Delay (if the output mode is set to 2). The factory setting is 1 s.
0x2651	9810	R	1	–	INT16U	0–65535	Alarm identifier (201–210, 1013, 1014, 1015). The alarm identifier is set to 0 if there is no alarm.

Measurement Parameters

System Type

The setup ENVT (External Neutral Voltage Tap) presence command (command code = 46472) configures the content of the system type register.

Address	Register	RW	X	Unit	Type	Range	Description
0x0CF1	3314	R-WC	–	–	INT16U	30–41	System type

Determining system type:

If...	Then...	Result
the system type is 3-pole circuit breaker with external neutral current transformer and without external neutral voltage tap	system type = 30	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are not available. • Measurement of the neutral current is available. • 3 wattmeters method is not possible.
the system type is 3-pole circuit breaker without external neutral current transformer and without external neutral voltage tap	system type = 31	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are not available. • Measurement of the neutral current is not available. • 3 wattmeters method is not possible.
the system type is 3-pole circuit breaker without external neutral current transformer and with external neutral voltage tap	system type = 40	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are available. • Measurement of the neutral current is not available. • 3 wattmeters method is possible.
the system type is 3-pole circuit breaker with external neutral current transformer and external neutral voltage tap, or if the system type is 4-pole circuit breaker	system type = 41	• Measurements of the phase-to-phase voltages are available. • Measurements of the phase-to-neutral voltages are available. • Measurement of the neutral current is available. • 3 wattmeters method is possible.

Quadrant Total

Address	Register	RW	X	Unit	Type	Range	Description
0x08C1	2242	R	–	–	INT16U	1–4	Quadrant total
0x08C2	2243	R	–	–	INT16U	0–1	0 = lead 1 = lag

Phase Rotation

The phase rotation setting command (command code = 47246) configures the content of the phase rotation register.

NOTE: The phase rotation setting command is only available for the MicroLogic 5 and 6 trip units.

Address	Register	RW	X	Unit	Type	Range	Description
0X0CF2	3315	R-WC	–	–	INT16U	0–1	Phase rotation: 0 = I1, I2, I3 1 = I1, I3, I2

Power Flow Sign

The power flow sign command (command code = 47240) configures the content of the power flow sign register.

Address	Register	RW	X	Unit	Type	Range	Description
0x0CF3	3316	R-WC	–	–	INT16U	0–1	Power flow sign: 0 = the active power flows from upstream (top) to downstream (bottom) (factory setting). 1 = the active power flows from downstream (bottom) to upstream (top).

Power Factor Sign

The power factor sign configuration command (command code = 47241) configures the content of the power factor sign register.

Address	Register	RW	X	Unit	Type	Range	Description
0x0CF5	3318	R-WC	–	–	INT16U	0–2	Sign convention for the power factor and the fundamental power factor (cosϕ): 0 = IEC convention 2 = IEEE convention (factory setting)

Energy Accumulation Mode

The energy accumulation mode configuration command (command code = 47242) configures the content of the energy accumulation mode register.

Address	Register	RW	X	Unit	Type	Range	Description
0x0CFB	3324	R-WC	–	–	INT16U	0–1	Energy accumulation mode: 0 = absolute accumulation (factory setting) Ep = EpIn + EpOut Eq = EqIn + EqOut 1 = signed accumulation Ep = EpIn – EpOut Eq = EqIn – EqOut

Demand Time

The current demand configuration command (command code 47243) configures the content of register 3352.

The power demand configuration command (command code 47244) configures the content of registers 3354 and 3355.

For more information regarding the demand calculation method, refer to the following guides in **Related Documents** at the beginning of this guide:

- *DOCA0188•• ComPacT NSX MicroLogic 5/6/7 Trip Units - User Guide*
- *48940-312-01 - MicroLogic 5 and 6 Electronic Trip Units for PowerPacT H-, J-, and L-Frame Circuit Breakers - User Guide*

Address	Register	RW	X	Unit	Type	Range	Description
0x0D17	3352	R-WC	–	min	INT16U	5–60	Duration of the current demand calculation window, adjustable in steps of 1 minute. The factory setting is 15 minutes.
0x0D19	3354	R-WC	–	–	INT16U	0–5	Power demand calculation method (window type): 0 = sliding (factory setting) 2 = block 5 = synchronized to communication
0x0D1A	3355	R-WC	–	min	INT16U	5–60	Duration of the power demand calculation window, adjustable in steps of 1 minute. The factory setting is 15 minutes.

Nominal Voltage

The setup nominal voltage Vn display command (command code = 47245) configures the content of the nominal voltage register.

Address	Register	RW	X	Unit	Type	Range	Description
0x258F	9616	R-WC	1	V	INT16U	0–65535	Nominal voltage Vn. Factory setting = 400 V

Time-Stamped Information

General Description

The time-stamped information enables the user to know all the dates relative to important information such as previous protection settings and minimum/maximum values of currents, voltages, and system frequency.

The time-stamped information table describes:

- The previous protection setup parameters and corresponding dates
- The minimum and maximum values of voltage measurements and corresponding dates
- The maximum values of current measurements and corresponding dates
- The minimum and maximum system frequencies and corresponding dates
- The peak demand of current and power and corresponding dates

A read request of 100 registers is necessary to read the time-stamped previous protection registers (29600–29699).

Previous Long-Time Protection Setup

Address	Register	RW	X	Unit	Type	Range	Description
0x739F	29600	R	1	A	INT16U	–	Previous Ir pick-up value. The Ir range depends on the nominal current In.
0x73A0– 0x73A2	29601– 29603	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73A3	29604	R	1	ms	INT16U	500–16000	Previous tr time delay (distribution application) tr = 500, 1000, 2000, 4000, 8000, 16000 ms
0x73A4– 0x73A6	29605– 29607	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73A7	29608	R	1	–	INT16U	5–30	Motor class (motor application only) Possible values = 5, 10, 20, 30 s
0x73A8– 0x73AA	29609– 29611	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73AB	29612	R	–	–	INT16U	1–2	Previous cool fan setup (motor application only) 1 = auto, 2 =motor
0x73AC– 0x73AE	29613– 29615	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Short-Time Protection Setup

Address	Register	RW	X	Unit	Type	Range	Description
0x73AF	29616	R	10	–	INT16U	(1)	Previous Isd coefficient pick-up value
0x73B0– 0x73B2	29617– 29619	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73B3	29620	R	1	ms	INT16U	0–400	Previous tsd time delay tsd = 0, 100, 200, 300, 400 ms If tsd = 0 ms, then I^2t must be Off.

Address	Register	RW	X	Unit	Type	Range	Description
0x73B4– 0x73B6	29621– 29623	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73B7	29624	R	–	–	INT16U	0–1	Previous type of protection: 0 = I^2t On, 1 = I^2t Off
0x73B8– 0x73BA	29625– 29627	R	–	–	ULP DATE	–	Date and time of the previous setup.

(1) The Isd coefficient range depends on:
- The application:
  - For distribution application, the range is 15–100, adjustable in steps of 5.
  - For motor application, the range is 50–130, adjustable in steps of 5.
- The MicroLogic 5/6/7 trip unit rotary switch if it exists.

Previous Instantaneous Protection Setup

Address	Register	RW	X	Unit	Type	Range	Description
0x73BB	29628	R	10	–	INT16U	(1)	Previous Ii coefficient pick-up value
0x73BC– 0x73BE	29629– 29631	R	–	–	ULP DATE	–	Date and time of the previous setup.

(1) The Ii coefficient range depends on the circuit breaker size:
- For 100–160 A, the range is 15–150.
- For 250–400 A, the range is 15–120.
- For 630 A, the range is 15–110.

Previous Ground-Fault Protection Setup

Address	Register	RW	X	Unit	Type	Range	Description
0x73BF	29632	R	100	ms	INT16U	(1)	Previous Ig coefficient pick-up value.
0x73C0– 0x73C2	29633– 29635	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73C3	29636	R	1	ms	INT16U	0–400	Previous tg time delay tg = 0, 100, 200, 300, 400 ms
0x73C4– 0x73C6	29637– 29639	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73C7	29640	R	–	–	INT16U	0–1	Previous type of protection: 0 = I^2t On, 1 = I^2t Off
0x73C8– 0x73CA	29641– 29643	R	–	–	ULP DATE	–	Date and time of the previous setup.

(1) The Ig coefficient range depends on the nominal current In and the MicroLogic 5/6/7 trip unit rotary switch if it exists.

For example, 0 (protection off) or 0.40 In to In in steps of 0.05.

Previous Earth-Leakage Protection Setup

Address	Register	RW	X	Unit	Type	Range	Description
0x73CB	29644	R	1	mA	INT16U	–	Previous IΔn pick-up value. The IΔn depends on the nominal current In.
0x73CC–	29645–	R	–	–	ULP DATE	–	Date and time of the previous setup.

Address	Register	RW	X	Unit	Type	Range	Description
0x73CE	29647						
0x73CF	29648	R	1	ms	INT16U	0–1000	Previous tΔn time delay tΔn = 0, 60, 150, 500, 1000 ms If IΔn = 0.03 mA, then TΔn = 0 ms.
0x73D0– 0x73D2	29649– 29651	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Jam Protection Setup

The jam protection is available for motor application only.

Address	Register	RW	X	Unit	Type	Range	Description
0x73D3	29652	R	–	–	INT16U	0–2	Previous setup status: 0 = Off, 1 = On
0x73D4– 0x73D6	29653– 29655	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73D7	29656	R	10	–	INT16U	10–80	Previous Ijam coefficient pick-up value
0x73D8– 0x73DA	29657– 29659	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73DB	29660	R	1	s	INT16U	1–30	Previous tjam time delay
0x73DC– 0x73DE	29661– 29663	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Unbalance Protection Setup

The unbalance protection is available for motor application only.

Address	Register	RW	X	Unit	Type	Range	Description
0x73DF	29664	R	1	%	INT16U	10–40	Previous unbalance coefficient pick-up value
0x73E0– 0x73E2	29665– 29667	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73E3	29668	R	1	s	INT16U	1–10	Previous tunbal time delay
0x73E4– 0x73E6	29669– 29671	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Underload Protection Setup

The underload protection is available for motor application only.

Address	Register	RW	X	Unit	Type	Range	Description
0x73E7	29672	R	–	–	INT16U	0–2	Previous setup status: 0 = Off, 1 = On
0x73E8– 0x73EA	29673– 29675	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73EB	29676	R	100	–	INT16U	30–90	Previous Iunderload coefficient pick-up value
0x73EC–	29677–	R	–	–	ULP DATE	–	Date and time of the previous setup.

Address	Register	RW	X	Unit	Type	Range	Description
0x73EE	29679						
0x73EF	29680	R	1	s	INT16U	1–200	Previous tunderload time delay
0x73F0– 0x73F2	29681– 29683	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Long-Start Protection Setup

The long-start protection is available for motor application only.

Address	Register	RW	X	Unit	Type	Range	Description
0x73F3	29684	R	–	–	INT16U	0–2	Previous setup status: 0 = Off, 1 = On
0x73F4– 0x73F6	29685– 29687	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73F7	29688	R	10	–	INT16U	10–50	Previous Ilongstart coefficient pick-up value
0x73F8– 0x73FA	29689– 29691	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73FB	29692	R	1	s	INT16U	1–30	Previous tlongstart time delay
0x73FC– 0x73FE	29693– 29695	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Neutral Protection Setup

The neutral protection is only available when system type in register 3314 is 30 or 41 System Type, page 437.

Address	Register	RW	X	Unit	Type	Range	Description
0x73FF	29696	R	–	–	INT16U	0–3	Previous neutral coefficient pick-up value: 0 = Off 1 = 0.5 2 = 1.0 3 = OSN
0x7400– 0x7402	29697– 29699	R	–	–	ULP DATE	–	Date and time of the previous setup.

Minimum/Maximum V12 Voltage Measurements

A read request of 48 registers is necessary to read the time-stamped minimum/maximum values of voltage, current, and frequency registers (29780–29827).

Register = 0 if voltage < 25 V.

Address	Register	RW	X	Unit	Type	Range	Description
0x7453	29780	R	1	V	INT16U	0–850	Minimum of RMS phase-to-phase voltage V12
0x7454– 0x7456	29781– 29783	R	–	–	ULP DATE	–	Date and time.

Address	Register	RW	X	Unit	Type	Range	Description
0x7457	29784	R	1	V	INT16U	0–850	Maximum of RMS phase-to-phase voltage V12
0x7458– 0x745A	29785– 29787	R	–	–	ULP DATE	–	Date and time.

Minimum/Maximum V23 Voltage Measurements

Register = 0 if voltage < 25 V.

Address	Register	RW	X	Unit	Type	Range	Description
0x745B	29788	R	1	V	INT16U	0–850	Minimum of RMS phase-to-phase voltage V23
0x745C– 0x745E	29789– 29791	R	–	–	ULP DATE	–	Date and time.
0x745F	29792	R	1	V	INT16U	0–850	Maximum of RMS phase-to-phase voltage V23
0x7460– 0x7462	29793– 29795	R	–	–	ULP DATE	–	Date and time.

Minimum/Maximum V31 Voltage Measurements

Register = 0 if voltage < 25 V.

Address	Register	RW	X	Unit	Type	Range	Description
0x7463	29796	R	1	V	INT16U	0–850	Minimum of RMS phase-to-phase voltage V31
0x7464– 0x7466	29797– 29799	R	–	–	ULP DATE	–	Date and time.
0x7467	29800	R	1	V	INT16U	0–850	Maximum of RMS phase-to-phase voltage V31
0x7468– 0x746A	29801– 29803	R	–	–	ULP DATE	–	Date and time.

Maximum I1 Current Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x746B	29804	R	1	A	INT16U	0–20xIn	Maximum of RMS current on phase 1: I1
0x746C– 0x746E	29805– 29807	R	–	–	ULP DATE	–	Date and time.

Maximum I2 Current Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x746F	29808	R	1	A	INT16U	0–20xIn	Maximum of RMS current on phase 2: I2
0x7470– 0x7472	29809– 29811	R	–	–	ULP DATE	–	Date and time.

Maximum I3 Current Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x7473	29812	R	1	A	INT16U	0–20xIn	Maximum of RMS current on phase 3: I3
0x7474– 0x7476	29813– 29815	R	–	–	ULP DATE	–	Date and time.

Maximum IN Current Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x7477	29816	R	1	A	INT16U	0–20xIn	Maximum of RMS current on neutral: IN
0x7478– 0x747A	29817– 29819	R	–	–	ULP DATE	–	Date and time.

Minimum System Frequency

When the MicroLogic 5/6/7 trip unit cannot calculate the frequency, it returns Not Evaluated = 32768 (0x8000).

Address	Register	RW	X	Unit	Type	Range	Description
0x747B	29820	R	10	Hz	INT16U	150–4400	Minimum of system frequency
0x747C– 0x747E	29821– 29823	R	–	–	ULP DATE	–	Date and time.

Maximum System Frequency

When the MicroLogic 5/6/7 trip unit cannot calculate the frequency, it returns Not Evaluated = 32768 (0x8000).

Address	Register	RW	X	Unit	Type	Range	Description
0x747F	29824	R	10	Hz	INT16U	150–4400	Maximum of system frequency
0x7480– 0x7482	29825– 29827	R	–	–	ULP DATE	–	Date and time.

I1 Peak Demand Measurement

A read request of 20 registers is necessary to read the time-stamped peak demand of current and power (29828–29847).

Address	Register	RW	X	Unit	Type	Range	Description
0x7483	29828	R	1	A	INT16U	0–20xIn	I1 peak demand
0x7484– 0x7486	29829– 29831	R	–	–	ULP DATE	–	Date and time.

I2 Peak Demand Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x7487	29832	R	1	A	INT16U	0–20xIn	I2 peak demand
0x7488– 0x748A	29833– 29835	R	–	–	ULP DATE	–	Date and time.

I3 Peak Demand Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x748B	29836	R	1	A	INT16U	0–20xIn	I3 peak demand
0x748C– 0x748E	29837– 29839	R	–	–	ULP DATE	–	Date and time.

IN Peak Demand Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x748F	29840	R	1	A	INT16U	0–20xIn	IN peak demand
0x7490– 0x7492	29841– 29843	R	–	–	ULP DATE	–	Date and time.

P Peak Demand Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x7493	29844	R	10	kW	INT16	-30000– +30000	P peak demand
0x7494– 0x7496	29845– 29847	R	–	–	ULP DATE	–	Date and time.

Maintenance Indicators

Time of Use Counter

The time of use counter reports the time of use of the circuit breaker. The time of use is written in the EEPROM every hour. If the time of use counter reaches the maximum value 4 294 967 295 and a new time of use event occurs, the counter is reset to 0.

A read request of 2 registers is necessary to read the time of use counter.

Address	Register	RW	X	Unit	Type	Range	Description
0x749A–0x749B	29851–29852	R	1	Hour	INT32U	0–4 294 967 295	Time of use counter

Rate of Wear Counter

The rate of wear counter reports the percentage of the circuit breaker contact use.

Address	Register	RW	X	Unit	Type	Range	Description
0x749C	29853	R	1	%	INT16U	0–32766	Rate of wear contact 0% = The circuit breaker contact is new. > 100% = The circuit breaker contact must be changed.

Boot Counter

The boot counter reports the number of cold starts (power-up) and the number of warm starts (software reset of the MicroLogic 5/6/7 trip unit).

Address	Register	RW	X	Unit	Type	Range	Description
0x749D	29854	R	1	–	INT16U	0–32766	Boot counter

EEPROM Writing Counter

The EEPROM writing counter reports the number of storages of the energy measurement in the EEPROM. The energy measurement is written in the EEPROM every hour. If the EEPROM writing counter reaches the maximum value 4 294 967 295 and a new EEPROM writing event occurs, the EEPROM writing counter is reset to 0.

Address	Register	RW	X	Unit	Type	Range	Description
0x749E–0x749F	29855–29856	R	1	–	INT32U	0–4 294 967 295	Counter of EEPROM writing

Load Profile Counters

The load profile counters report the number of hours for each range of current in the MicroLogic 5/6/7 trip unit. If the load profile counters reach the maximum value 4 294 967 295 and a new load profile event occurs, the load profile counters are reset to 0.

A read request of 8 registers is necessary to read the load profile counters.

Address	Register	RW	X	Unit	Type	Range	Description
0x74B7– 0x74B8	29880– 29881	R	1	Hour	INT32U	0–4 294 967 295	Hours current was 0-49% of nominal range
0x74B9– 0x74BA	29882– 29883	R	1	Hour	INT32U	0–4 294 967 295	Hours current was 50-79% of nominal range
0x74BB– 0x74BC	29884– 29885	R	1	Hour	INT32U	0–4 294 967 295	Hours current was 80-89% of nominal range
0x74BD– 0x74BE	29886– 29887	R	1	Hour	INT32U	0–4 294 967 295	Hours current was 90-100% of nominal range

Temperature Profile Counters

The temperature profile counters report the number of hours for each range of temperature in the MicroLogic 5/6/7 trip unit. If the temperature profile counters reach the maximum value 4 294 967 295 and a new temperature profile event occurs, the temperature profile counters are reset to 0.

A read request of 12 registers is necessary to read the temperature profile counters.

Address	Register	RW	X	Unit	Type	Range	Description
0x74C1– 0x74C2	29890– 29891	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was < -30 °C (-22 °F)
0x74C3– 0x74C4	29892– 29893	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was in the -30–+59 °C range (22–1 38.2 °F)
0x74C5– 0x74C6	29894– 29895	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was in the +60–+74 °C range (140–165.2 °F)
0x74C7– 0x74C8	29896– 29897	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was in the +75–+89 °C range (167–192.2 °F)
0x74C9– 0x74CA	29898– 29899	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was in the +90–+99 °C range (194–210.2 °F)
0x74CB– 0x74CC	29900– 29901	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was > +100 °C (212 °F)

Protection Trips Counters

The protection trips counters report the number of protection trips for each type of protection: long-time, short-time, instantaneous, ground-fault, earth-leakage jam, unbalance, long-start, and underload protections.

The protection trips counters stop incrementing when they reach the maximum value 10000.

A read request of 9 registers is necessary to read the protection trips counters.

Address	Register	RW	X	Unit	Type	Range	Description
0x74D5	29910	R	1	–	INT16U	0–10000	Number of long-time protection trips
0x74D6	29911	R	1	–	INT16U	0–10000	Number of short-time protection trips
0x74D7	29912	R	1	–	INT16U	0–10000	Number of instantaneous protection trips

Address	Register	RW	X	Unit	Type	Range	Description
							(including integrated instantaneous protection, instantaneous with earth-leakage protection, and reflex protection)
0x74D8	29913	R	1	–	INT16U	0–10000	Number of ground-fault protection trips
0x74D9	29914	R	1	–	INT16U	0–10000	Number of earth-leakage protection trips
0x74DA	29915	R	1	–	INT16U	0–10000	Number of jam protection trips
0x74DB	29916	R	1	–	INT16U	0–10000	Number of unbalance protection trips
0x74DC	29917	R	1	–	INT16U	0–10000	Number of long-start protection trips
0x74DD	29918	R	1	–	INT16U	0–10000	Number of underload protection trips

Alarms Counters

The alarms counters report the number of occurrences of the alarms. When an alarm is configured, the associated counter is set to 0. The alarm counters stop incrementing when they reach the maximum value 10000.

A read request of 13 registers is necessary to read the alarms counters.

Address	Register	RW	X	Unit	Type	Range	Description
0x74F3	29940	R	1	–	INT16U	0–10000	Counter of user-defined alarm 201
0x74F4	29941	R	1	–	INT16U	0–10000	Counter of user-defined alarm 202
0x74F5	29942	R	1	–	INT16U	0–10000	Counter of user-defined alarm 203
0x74F6	29943	R	1	–	INT16U	0–10000	Counter of user-defined alarm 204
0x74F7	29944	R	1	–	INT16U	0–10000	Counter of user-defined alarm 205
0x74F8	29945	R	1	–	INT16U	0–10000	Counter of user-defined alarm 206
0x74F9	29946	R	1	–	INT16U	0–10000	Counter of user-defined alarm 207
0x74FA	29947	R	1	–	INT16U	0–10000	Counter of user-defined alarm 208
0x74FB	29948	R	1	–	INT16U	0–10000	Counter of user-defined alarm 209
0x74FC	29949	R	1	–	INT16U	0–10000	Counter of user-defined alarm 210
0x74FD	29950	R	1	–	INT16U	0–10000	Counter of pre-alarm Ir
0x74FE	29951	R	1	–	INT16U	0–10000	Counter of pre-alarm Ig
0x74FF	29952	R	1	–	INT16U	0–10000	Counter of pre-alarm IΔn

Maintenance Operation Counters

The maintenance operation counters report the number of some maintenance operations. The maintenance operation counters stop incrementing when they reach the maximum value 10000.

A read request of 7 registers is necessary to read the maintenance operation counters.

Address	Register	RW	X	Unit	Type	Range	Description
0x751B	29980	R	1	–	INT16U	0–10000	Counter of MicroLogic 5/6/7 trip unit locking pad activation
0x751C	29981	R	1	–	INT16U	0–10000	Counter of connections of the USB maintenance interface
0x751D	29982	R	1	–	INT16U	0–10000	Counter of ground-fault test operation (using MicroLogic 5/6/7 keypad only)
0x751E	29983	R	1	–	INT16U	0–10000	Counter of earth-leakage test operation
0x751F	29984	R	1	–	INT16U	0–10000	Counter of ZSI (Zone Selective Interlocking) test operation

Address	Register	RW	X	Unit	Type	Range	Description
0x7520	29985	R	1	–	INT16U	0–10000	Counter of numerical injection test operation
0x7521	29986	R	1	–	INT16U	0–10000	Counter of reset Firmware command

Miscellaneous

Current Date and Time

A read request of 3 registers is necessary to read the current date.

The set absolute time command (command code 769) configures the content of the current date registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x0BB7– 0x0BB9	3000– 3002	R-WC	–	–	ULP DATE	–	Current date and time

Temperature

Address	Register	RW	X	Unit	Type	Range	Description
0x2292	8851	R	1	°C	INT16	-30– +120	Temperature of the MicroLogic 5/6/7 trip unit

Time Remaining Until Long-Time Tripping

Time remaining until long-time tripping is evaluated every second. If another protection is tripped, then time remaining until long-time tripping continues to be evaluated.

Time remaining until long-time tripping = 32768 (0x8000) if:

- Long-time protection is already tripped, or
- Time remaining until long-time tripping is below 1 s, or
- No default is detected by long-time protection.

If time remaining until long-time tripping is > 7200 s, time remaining until long-time tripping = 7200 s.

Address	Register	RW	X	Unit	Type	Range	Description
0x22A0	8865	R	1	s	INT16U	1–7200	Time remaining until long-time tripping

Phase Rotation

Address	Register	RW	X	Unit	Type	Range	Description
0x22A7	8872	R	1	–	INT16U	0–1	0 = 123 phase sequence 1 = 132 phase sequence

Failure Status

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x72CD	29390	R	–	–	INT16U	–	–	Failure status
							0	Reserved
							1	STOP (internal failure) 0 = No internal failure

Address	Register	RW	X	Unit	Type	Range	Bit	Description
								1 = Internal failure
							2	ERROR (internal failure) 0 = No internal failure 1 = Internal failure
							3–15	Reserved

NOTE: In the case of a STOP event, it is mandatory to replace the MicroLogic 5/6/7 trip unit. In the case of an ERROR event, it is advised to replace the MicroLogic 5/6/7 trip unit (the core protection functions still work but it is preferable to replace the MicroLogic 5/6/7 trip unit).

MicroLogic 5/6/7 Trip Unit Rotary Switches

Address	Register	RW	X	Unit	Type	Range	Description
0x7525	29990	R	1	–	INT16U	1–9	Position of MicroLogic 5/6/7 trip unit rotary switch 1 (Ir)
0x7526	29991	R	1	–	INT16U	1–9	Position of MicroLogic 5/6/7 trip unit rotary switch 2 (Isd, Ig/IΔn)

MicroLogic 5/6/7 Trip Unit Locking Pad Status

Address	Register	RW	X	Unit	Type	Range	Description
0x7527	29992	R	1	–	INT16U	0–1	0 = MicroLogic 5/6/7 trip unit locking pad open 1 = MicroLogic 5/6/7 trip unit locking pad closed

Auxiliary 24 Vdc Power Supply

Address	Register	RW	X	Unit	Type	Range	Description
0x7528	29993	R	1	–	INT16U	0–1	0 = auxiliary 24 Vdc power supply is not present. 1 = auxiliary 24 Vdc power supply is present.

MicroLogic 5/6/7 Trip Unit LED

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x7534	30005	R	–	–	INT16U	–	–	MicroLogic 5/6/7 trip unit LED
							0	Ready LED 0 = not ready (LED is not blinking). 1 = ready (LED is blinking).
							1	Pre-alarm LED (distribution application only) 0 = pre-alarm is not active (LED is steady off).

Address	Register	RW	X	Unit	Type	Range	Bit	Description
								1 = pre-alarm is active (LED is steady on).
							2	Overload LED 0 = overload is not active (LED is steady off). 1 = overload is active (LED is steady on).
							3–15	Reserved

MicroLogic 5/6/7 Trip Unit Commands

What's in This Chapter

List of MicroLogic 5/6/7 Trip Unit Commands and Error Codes 455
MicroLogic 5/6/7 Trip Unit Protection Commands 456
Event Commands 461
Measurement Configuration Commands 462

List of MicroLogic 5/6/7 Trip Unit Commands and Error Codes

List of Commands

The following table lists the available MicroLogic 5/6/7 trip unit commands, their corresponding command codes and user profiles. Follow the command execution procedures.

Command	Command code	User profile
Long-time protection, page 456	45192	Administrator
Short-time protection, page 456	45193	Administrator
Instantaneous protection, page 457	45194	Administrator
Ground-fault protection, page 457	45195	Administrator
Earth-leakage protection, page 458	45196	Administrator
Neutral protection, page 458	45197	Administrator
Jam protection, page 458	45448	Administrator
Underload protection, page 459	45449	Administrator
Unbalance protection, page 459	45450	Administrator
Long-start protection, page 460	45451	Administrator
Acknowledge a latched output, page 461	46216	Administrator or Operator
Acknowledge a trip, page 461	46217	Administrator
Set up ENVT presence, page 462	46472	Administrator
Reset minimum/maximum, page 462	46728	Administrator or Operator
Start/stop synchronization, page 463	46729	Administrator or Operator
Power flow sign configuration, page 463	47240	Administrator
Power factor sign configuration, page 464	47241	Administrator
Energy accumulation mode configuration, page 464	47242	Administrator
Current demand configuration, page 465	47243	Administrator
Power demand configuration, page 465	47244	Administrator
Set up nominal voltage Vn display, page 465	47245	Administrator
Phase rotation, page 466	47246	Administrator

Error Codes

Error codes generated by MicroLogic 5/6/7 trip units are the generic error codes, page 64.

MicroLogic 5/6/7 Trip Unit Protection Commands

Long-Time Protection

The user can read the long-time protection parameters from registers 8754 to 8763 Long-Time Protection Parameters, page 432.

To set the long-time protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45192	Command code = **45192**
0x1F40	8001	–	–	INT16U	18	Number of parameters (bytes) = 18
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET-STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	A	INT16U	–	Ir pick-up value. The Ir range depends on the nominal current In and on the position of the MicroLogic 5/6/7 trip unit rotary switch 1 (Ir).
0x1F46	8007	1	ms	INT16U	500– 16000	tr time delay (distribution application only) tr = 500, 1000, 2000, 4000, 8000, 16000 ms
0x1F47	8008	–	–	INT16U	5–30	Motor class (motor application only) Possible values = 5, 10, 20, 30 s
0x1F48	8009	–	–	INT16U	1–2	Cool fan (motor application only) 1 = auto, 2 = motor

Short-Time Protection

The user can read the short-time protection parameters from registers 8764 to 8773 Short-Time Protection Parameters, page 432.

To set the short-time protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45193	Command code = **45193**
0x1F40	8001	–	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET-STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	10	–	INT16U	(1)	Isd coefficient, adjustable in steps of 5. Isd pick-up value = (Ir) x (Isd coefficient) / 10
0x1F46	8007	1	ms	INT16U	0–400	tsd time delay tsd= 0, 100, 200, 300, 400 ms If tsd = 0 ms, then I^2t must be Off.
0x1F47	8008	–	–	INT16U	0–1	Type of protection: 0 = I^2t On, 1 = I^2t Off For motor application, tsd = 0 ms and I^2t is Off (fixed values).
(1) For distribution application, the range is 15–100. For motor application, the range is 50–130.						

Instantaneous Protection

The user can read the instantaneous protection parameters from registers 8774 to 8783 Instantaneous Protection Parameters, page 433.

To set the instantaneous protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45194	Command code = **45194**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	10	–	INT16U	(1)	Ii coefficient, adjustable in steps of 5. Ii pick-up value = (In) x (Ii coefficient) / 10

(1) The Ii coefficient range depends on the circuit breaker size:

- for 100–160 A, the range is 15–150.
- for 250–400 A, the range is 15–120.
- for 630 A, the range is 15–110.

Ground-Fault Protection

The user can read the ground-fault protection parameters from registers 8784 to 8793 Ground-Fault Protection Parameters, page 433.

To set the ground-fault protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45195	Command code = **45195**
0x1F40	8001	–	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	100	–	INT16U	(1)	Ig coefficient, adjustable in steps of 5. The value is defined by the position of the MicroLogic 5/6/7 trip unit rotary switch 2 (Ig). Ig pick-up value = (In) x (Ig coefficient) / 100
0x1F46	8007	1	ms	INT16U	0–400	tg time delay tg = 0, 100, 200, 300, 400 ms If tg = 0 ms, then I^2t must be Off.
0x1F47	8008	–	–	INT16U	0–1	Type of protection: 0 = I^2t On, 1 = I^2t Off For motor application, tg = 0 ms and I^2t is Off (fixed values).

(1) The Ig coefficient depends on the sensor rating In and the MicroLogic 5/6/7 trip unit rotary switch if it exists.

For example, 0 (protection Off) or 0.40 In to In in steps of 0.05. The Ig coefficient cannot be set using the command interface when the MicroLogic 5/6/7 rotary switch position Ig is Off.

Earth-Leakage Protection

The user can read the earth-leakage protection parameters from registers 8794 to 8803 Earth-Leakage Protection Parameters, page 433.

To set the earth-leakage protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45196	Command code = **45196**
0x1F40	8001	–	–	INT16U	14	Number of parameters (bytes) = 14
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	mA	INT16U	0–FFFF	Reserved
0x1F46	8007	1	ms	INT16U	0–1000	tΔn time delay tΔn = 0, 60, 150, 500, 1000 ms If IΔn = 0.03 mA, then tΔn = 0 ms

Neutral Protection

The neutral protection is only available when system type in register 3314 is 30 or 41 System Type, page 437.

The user can read the neutral protection parameters from registers 8916 to 8919 Neutral Protection Parameters, page 435.

To set the neutral protection registers, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45197	Command code = **45197**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–3	Neutral coefficient pickup value 0 = Off 1 = 0.5 2 = 1.0 3 = OSN

Jam Protection

The jam protection is available for motor application only.

The user can read the jam protection parameters from registers 8900 to 8903 Jam Protection Parameters, page 434.

To set the jam protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45448	Command code = **45448**
0x1F40	8001	–	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Activation: 0 = Off, 1 = On
0x1F46	8007	10	–	INT16U	10–80	Ijam coefficient, adjustable in steps of 1. Ijam pick-up value = (Ir) x (Ijam coefficient) / 10
0x1F47	8008	1	s	INT16U	1–30	tjam time delay

Underload Protection

The underload protection is available for motor application only.

The user can read the underload protection parameters from registers 8908 to 8911 Underload Protection Parameters, page 434.

To set the underload protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45449	Command code = **45449**
0x1F40	8001	–	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Activation: 0 = Off, 1 = On
0x1F46	8007	100	–	INT16U	30–90	Iunderload coefficient, adjustable in steps of 1. Iunderload pick-up value = (Ir) x (Iunderload) / 100
0x1F47	8008	1	s	INT16U	1–200	tunderload time delay

Unbalance Protection

The unbalance protection is available for motor application only.

The user can read the unbalance protection parameters from registers 8904 to 8907 Unbalance Protection Parameters, page 434.

To set the unbalance protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45450	Command code = **45450**
0x1F40	8001	–	–	INT16U	14	Number of parameters (bytes) = 14
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)

Address	Register	X	Unit	Type	Range	Description
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	%	INT16U	10–40	Iunbal coefficient
0x1F46	8007	1	s	INT16U	1–10	tunbal time delay

Long-Start Protection

The long-start protection is available for motor application only.

The user can read the underload protection parameters from registers 8912 to 8915 Long-Start Protection Parameters, page 435.

To set the long-start protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45451	Command code = **45451**
0x1F40	8001	–	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Activation: 0 = Off, 1 = On
0x1F46	8007	10	–	INT16U	10–80	Ilongstart coefficient, adjustable in steps of 1. Ilongstart pick-up value = (Ir) x (Ilongstart coefficient) / 10
0x1F47	8008	1	s	INT16U	1–200	tlongstart time delay

Event Commands

Acknowledge a Latched Output

The user can read the SDx module outputs parameters from registers 9801 to 9810 Configuration of the SDx Module, page 436.

To acknowledge a latched output, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	46216	Command code = **46216**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	–	INT16U	1–2	1 = relay 1, 2 = relay 2

Acknowledge a Trip

To acknowledge a trip, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	46217	Command code = **46217**
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password

Measurement Configuration Commands

Set Up ENVT Presence

The user can read the ENVT (External Neutral Voltage Tap) presence parameters at register 3314. See System Type, page 437.

To set up ENVT presence, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	46472	Command code = **46472**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	0 = ENVT is not present. 1 = ENVT is present.

Reset Minimum/Maximum

The reset minimum/maximum command resets the minimum values of real-time measurements (registers 1300 to 1599) and the maximum values of real-time measurements (registers 1600 to 1899). See Minimum/Maximum Values of Real-Time Measurements, page 403.

The reset minimum/maximum command resets the energy measurements (registers 2000 to 2025). See Energy Measurements, page 405.

The reset minimum/maximum command resets the peak demand measurements (registers 2200 to 2237). See Demand Measurements, page 407.

The user can read the minimum and maximum values of current, voltage, and frequency measurements and the corresponding dates from registers 29780 to 29827. See Minimum/Maximum V12 Voltage Measurements, page 443.

The user can read the dates of the reset minimum/maximum command from registers 2900 to 2929. See Minimum/Maximum Measurements Reset Time, page 409.

To reset minimum/maximum values of measurements, the user must set up the command registers as follows:

Address	Register	Type	Range	Bit	Description
0x1F3F	8000	INT16U	46728	–	Command code = **46728**
0x1F40	8001	INT16U	12	–	Number of parameters (bytes) = 12
0x1F41	8002	INT16U	5121	–	Destination = 5121 (0x1401)
0x1F42	8003	INT16U	1	–	Security type of the command
0x1F43– 0x1F44	8004– 8005	OCTET STRING	–	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	INT16U	–	–	Reset minimum/maximum of metering variables: • To reset the metering variable, set the bit to 1. • To keep the current values, set the bit to 0.
				0	Reset minimum/maximum current (I1, I2, I3, IN, Imax, Ig, IΔn, Iavg, and Iunbal)

Address	Register	Type	Range	Bit	Description
				1	Reset minimum/maximum voltage (V12, V13, V23, V1N, V2N, V3N, VavgL-L, VavgL-N, and Vunbal)
				2	Reset minimum/maximum power (active power, reactive power, apparent power, and distortion power)
				3	Reset minimum/maximum power factor and cosϕ
				4	Reset minimum/maximum total harmonic distortion (THD)
				5	Reset peak of current demand
				6	Reset peak of active power, reactive power, and apparent power demand
				7	Reset minimum/maximum frequency
				8	Reset minimum/maximum thermal image (motor application only)
				9	Reset energy (active, reactive, apparent)
				10–15	Reserved

Start/Stop Synchronization

The start/stop synchronization command is used to start or stop the calculation of the current or power demand. The first command starts the calculation, the next command updates the value of current or power demand, and then restarts the calculation. The time period between 2 commands must be less than 1 hour.

To start/stop synchronization, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	46729	Command code = **46729**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	–	INT16U	–	Start/stop synchronization = 1

Power Flow Sign Configuration

The user can read the power flow sign configuration at register 3316 Power Flow Sign, page 438.

To set the power flow sign parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47240	Command code = **47240**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command

Address	Register	X	Unit	Type	Range	Description
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Power flow sign: 0 = the active power flows from upstream (top) to downstream (bottom) (factory setting). 1 = the active power flows from downstream (bottom) to upstream (top).

NOTE: The setting of the power flow sign can reset the content of the energy measurement registers excluding the cumulative energy measurements.

Power Factor Sign Configuration

The user can read the power factor sign configuration at register 3318 Power Factor Sign, page 438.

To set the power factor sign parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47241	Command code = **47241**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–2	Sign convention for the power factor and the fundamental power factor (cosϕ): 0 = IEC convention 2 = IEEE convention (factory setting)

Energy Accumulation Mode Configuration

The user can read the energy accumulation mode configuration at register 3324 Energy Accumulation Mode, page 438.

To set the energy accumulation mode parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47242	Command code = **47242**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Energy accumulation mode: 0 = absolute accumulation (factory setting) 1 = signed accumulation

Current Demand Configuration

The user can read the duration of the current demand calculation window at register 3352 Demand Time, page 438.

The user can read the current demand parameters from registers 2200 to 2207 Current Demand, page 407.

To start current demand, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47243	Command code = **47243**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	Min	INT16U	5–60	Duration of the current demand calculation window, adjustable in steps of 1. The factory setting is 15 minutes (sliding).

Power Demand Configuration

The user can read the power demand calculation method from registers 3354 to 3355 Demand Time, page 438.

The user can read the power demand parameters from registers 2224 to 2237 Active Power Demand, page 407.

To start power demand, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47244	Command code = **47244**
0x1F40	8001	–	–	INT16U	14	Number of parameters (bytes) = 14
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	Min	INT16U	0–5	Power demand calculation method (window type): 0 = sliding 2 = fixed 5 = synchronized to communication The factory setting is 0 (sliding).
0x1F46	8007	–	Min	INT16U	5–60	Duration of the power demand calculation window, adjustable in steps of 1. The factory setting is 15 minutes.

Set Up Nominal Voltage Vn Display

The user can read the nominal voltage at register 9616 Nominal Voltage, page 439.

To set the nominal voltage Vn display parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47245	Command code = **47245**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	V	INT16U	0–65535	Nominal voltage Vn (factory setting = 400 V)

Phase Rotation Configuration

The user can read the phase rotation at register 3315, page 437.

To set the phase rotation parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47246	Command code = **47546**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Phase rotation: 0 = I1, I2, I3 (factory setting) 1 = I1, I3, I2

BSCM Modbus SL/ULP Module Data for ComPacT NSX and PowerPacT H-, J-, and L-Frame Circuit Breakers

What's in This Part

BSCM Modbus SL/ULP Module Registers....468
BSCM Modbus SL/ULP Module Commands....477

BSCM Modbus SL/ULP Module Registers

What's in This Chapter

BSCM Modbus SL/ULP Module Identification 469
Circuit Breaker Status 472
Maintenance Indicators 474
Event History 475

BSCM Modbus SL/ULP Module Identification

Product Identification

Address	Register	RW	X	Unit	Type	Range	Description
0x4CD1	19666	R	–	–	INT16U	15149	Product identification = 15149 for the BSCM Modbus SL/ULP module

BSCM Modbus SL/ULP Module Identifier

The BSCM Modbus SL/ULP module serial number is composed of a maximum of 15 alphanumeric characters with the following format: PPYYWWDLLLNNNNN.

- PP = plant code
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- LLL = unique final assembly manufacturing line number or machine number within the plant (A–Z or 0–9).
- NNNNN= unique product number generated on the day of manufacture by the plant manufacturing line or the plant machine (00001–99999).

A read request of eight registers is necessary to read the BSCM Modbus SL/ULP module serial number.

Address	Register	RW	X	Unit	Type	Range	Description
0x4CC8	19657	R	–	–	OCTET STRING	–	‘PP’
0x4CC9	19658	R	–	–	OCTET STRING	05–99	‘YY’
0x4CCA	19659	R	–	–	OCTET STRING	01–53	‘WW’
0x4CCB	19660	R	–	–	OCTET STRING	1–7	‘D’
0x4CCC	19661	R	–	–	OCTET STRING	A–Z, 0–9	‘LLL’
0x4CCD	19662	R	–	–	OCTET STRING	00–99	‘NN’
0x4CCE	19663	R	–	–	OCTET STRING	01–99	‘NN’
0x4CCF	19664	R	–	–	OCTET STRING	01–99	‘N’ (the NULL character ends the serial number)

BSCM Modbus SL/ULP Module Identification (Both Modbus and ULP Architecture)

The following table is valid for the three modes of the BSCM Modbus SL/ULP module:

- Modbus SL only mode
- ULP only mode
- Modbus SL and ULP mode

Address	Register	RW	Unit	Type	Range	Description
0x4C2B–0x4C34	19500–19509	R-WC	–	OCTET STRING	–	User application name = ComPacT NSX (by default)
0x4C35–0x4C4A	19510–19531	–	–	–	–	Reserved
0x4C4B–0x4C8A	19532–19595	R	–	OCTET STRING	–	Vendor URL = https://www.se.com/
0x4C8B–0x4C9A	19596–19611	R	–	OCTET STRING	–	Product family = Gateway and server
0x4C9B–0x4CA2	19612–19619	R	–	OCTET STRING	–	Product range = ComPacT NSX
0x4CA3–0x4CAA	19620–19627	R	–	OCTET STRING	–	Product model = BSCM Modbus SL/ULP
0x4CAB–0x4CB2	19628–19635	R	–	OCTET STRING	–	Firmware version
0x4CB3–0x4CBC	19636–19645	R	–	OCTET STRING	–	Vendor name = Schneider Electric
0x4CBD–0x4CC6	19646–19655	R	–	OCTET STRING	–	Product code = LV434220
0x4CC7–0x4CD0	19656–19665	R	–	OCTET STRING	–	Serial number
0x4CD1	19666	R	–	INT16U	–	Product identifier = 15149 for BSCM Modbus SL/ULP
0x4CD2–0x4CDB	19667–19676	R	–	OCTET STRING	–	Hardware revision
0x4CDC–0x4CE5	19677–19686	R-WC	–	OCTET STRING	–	Product capability = Other (by default)
0x4CE6–0x4CF5	19687–19702	R-WC	–	OCTET STRING	–	Product user tag = My tags (by default)

BSCM Modbus SL/ULP Module Identification (Only Modbus Architecture)

The following table is valid for the two following modes:

- Modbus SL only mode.
- Modbus SL and ULP mode

Address	Register	RW	Unit	Type	Range	Description
0x2800–0x2809	10241–10250	R-WC	–	OCTET STRING	–	User application name = ComPacT NSX (by default)
0x280A–0x281F	10251–10272	–	–	–	–	Reserved
0x2D9D–0x2DDC	11678–11741	R	–	OCTET STRING	–	Vendor URL = https://www.se.com/
0x2DDE–0x2DED	11743–11758	R	–	OCTET STRING	–	Product family = Gateway and server

Address	Register	RW	Unit	Type	Range	Description
0x2DEE–0x2DF5	11759–11766	R	–	OCTET STRING	–	Product range = ComPacT NSX
0x2DF6–0x2DFD	11767–11774	R	–	OCTET STRING	–	Product model = BSCM Modbus SL/ULP
0x2DFE–0x2E05	11775–11782	R	–	OCTET STRING	–	Firmware version
0x2E2E–0x2E37	11823–11832	R	–	OCTET STRING	–	Vendor name = Schneider Electric
0x2E38–0x2E41	11833–11842	R	–	OCTET STRING	–	Product code = LV434220
0x2E5B–0x2E64	11868–11877	R	–	OCTET STRING	–	Serial number
0x2E7B	11900	R	–	INT16U	–	Product identifier = 15149 for BSCM Modbus SL/ULP
0x2E90–0x2E99	11921–11930	R	–	OCTET STRING	–	Hardware revision

Read Device Identification

The Read Device Identification function is used to access in a standardized manner the information required to identify a device. The description is made up of a set of objects (ASCII character strings).

A complete description of the Read Device Identification function is available at www.modbus.org.

The coding for the identification of the BSCM Modbus SL/ULP module is the following:

Name	Type	Description
Vendor name	OCTET STRING	‘Schneider Electric’ (18 characters)
Product code	OCTET STRING	LV434220
Firmware version	OCTET STRING	‘AAA.BBB.CCC’
Vendor URL	OCTET STRING	‘www.se.com’
Product name	OCTET STRING	BSCM Modbus SL/ULP (LV434220)
Model name	OCTET STRING	Communication module
User application name	OCTET STRING	ComPacT NSX (by default)

Circuit Breaker Status

Circuit Breaker Status

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x0232	563	R	–	–	INT16U	–	–	Circuit breaker status register
							0	OF input status 0 = The circuit breaker is open. 1 = The circuit breaker is closed.
							1	SD input status 0 = The circuit breaker is not tripped. 1 = The circuit breaker is tripped due to electrical fault, shunt trip or push-to-trip.
							2	SDE input status 0 = The circuit breaker is not tripped. 1 = The circuit breaker is tripped due to electrical fault (including ground-fault test and earth-leakage test).
							3–15	Reserved (forced to 0)

Communicating Motor Mechanism Status

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x0233	564	R	–	–	INT16U	–	–	Communicating motor mechanism status register
							0	Motor mechanism 0 = not available 1 = available
							1	Manu/auto mode 0 = manu 1 = auto
							2	Last command 0 = last command succeeded 1 = last command failed
							3	Enable automatic reset 0 = automatic reset is not enabled. 1 = automatic reset is enabled.
							4	Enable reset even if SDE 0 = reset is not enabled if the circuit breaker is tripped on electrical fault. 1 = reset is enabled even if the circuit breaker is tripped on electrical fault.
							5	Local/Remote mode selected in the FDM121 display menu. 0 = Remote mode (default value), the communicating motor mechanism is controlled through a Modbus command only. 1 = Local mode, the communicating motor mechanism is controlled through the FDM121 display menu only.

Address	Register	RW	X	Unit	Type	Range	Bit	Description
							6–15	Reserved (forced to 0)

Maintenance Indicators

General Description

The BSCM Modbus SL/ULP module has seven counters that help to manage ComPacT NSX and PowerPacT H-, J-, and L-frame circuit breakers.

The BSCM Modbus SL/ULP module counters have the following properties:

- All the counters are saved in non-volatile memory to prevent data loss in case of power loss.
- The cumulating OF counter is read only. It stops incrementing when it reaches the maximum value 4 294 967 295.
- The user can preset all counters (except the cumulating OF counter) to any value from 0 to 65535. The counters stop incrementing when they reach the maximum value 65535.
- The OF counter and close circuit breaker command counter have a threshold which can be set by the user, to any value from 0 to 65534.

  The factory setting is 5000. An alarm is generated when a counter reaches the threshold.

BSCM Modbus SL/ULP Module Counters

Address	Register	RW	X	Unit	Type	Range	Description
0x023A–0x023B	571–572	R	1	–	INT32U	0–4 294 967 295	Cumulating OF counter (non-resettable open to close counter)
0x023C	573	R-WC	1	–	INT16U	0–65535	OF counter (resettable open to close counter)
0x023D	574	R-WC	1	–	INT16U	0–65535	SD counter (Close to SD position)
0x023E	575	R-WC	1	–	INT16U	0–65535	SDE counter (Close to SDE position)
0x023F	576	R-WC	1	–	INT16U	0–65535	Open circuit breaker command counter
0x0240	577	R-WC	1	–	INT16U	0–65535	Close circuit breaker command counter
0x0241	578	R-WC	1	–	INT16U	0–65535	Reset circuit breaker command counter
0x0242–0x0243	579–580	–	–	–	–	–	Reserved
0x0244	581	R-WC	1	–	INT16U	0–65535	OF counter threshold The factory setting is 5000.
0x0245	582	R-WC	1	–	INT16U	0–65535	Close circuit breaker command counter threshold The factory setting is 5000.

Event History

General Description

The BSCM Modbus SL/ULP module event history registers describe the last 10 events. The BSCM Modbus SL/ULP module event format corresponds to a series of 10 records. Each record is composed of 5 registers describing one BSCM Modbus SL/ULP module event.

A read request of 5x(n) registers is necessary to read the last n BSCM Modbus SL/ULP module event records, where 5 is the number of registers for each event record.

For example, a read request of 5x3 = 15 registers is necessary to read the last 3 BSCM Modbus SL/ULP module event records of the BSCM Modbus SL/ULP module event history:

- The first 5 registers describe the first BSCM Modbus SL/ULP module event record (most recent event).
- The next 5 registers describe the second BSCM Modbus SL/ULP module event record.
- The last 5 registers describe the third BSCM Modbus SL/ULP module event record.

Address	Register	Description
0x0259	602	Event counter
0x025A–0x025E	603–607	Event record 1 (most recent event)
0x025F–0x0263	608–612	Event record 2
0x0264–0x0268	613–617	Event record 3
0x0269–0x026D	618–622	Event record 4
0x026E–0x0272	623–627	Event record 5
0x0273–0x0277	628–632	Event record 6
0x0278–0x027C	633–637	Event record 7
0x027D–0x0281	638–642	Event record 8
0x0282–0x0286	643–647	Event record 9
0x0287–0x028B	648–652	Event record 10 (oldest event)

Event Counter

The event counter is incremented when a new event is logged. If the counter reaches the maximum value 65535 and a new event is logged, the counter is reset to 0.

Address	Register	RW	X	Unit	Type	Range	Description
0x0259	602	R	1	–	INT16U	0–65535	BSCM Modbus SL/ULP module event counter

Event Record

The order and the description of the event record registers are the same as that of event record 1:

Event 1 (Most Recent Event)							
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**Description**
0x025A	603	R	1	–	INT16U	0–65535	BSCM Modbus SL/ULP module event identifier (see next paragraph)
0x025B–0x025D	604–606	R	–	–	ULP DATE	–	Date and time of event
0x025E	607	R	1	–	INT16U	1–2	Event status 1 = event occurrence 2 = event completion

Event Identifier

Event Identifier	Event
1024	SD contact change (occurrence = close to SD position)
1025	Threshold of OF counter is reached
1026	Threshold of close command counter is reached
1027	STOP (internal failure)
1028	ERROR (internal failure)
1029	OF contact change (occurrence = open to close position)
1030	SDE contact change (occurrence = close to SDE position)
1031	Manu/auto mode (occurrence = manu to auto position)
1040	Open command
1041	Close command
1042	Reset command

NOTE: In the case of a STOP event, it is mandatory to replace the BSCM Modbus SL/ULP module. In the case of an ERROR event, it is advised to replace the BSCM Modbus SL/ULP module (the core protection functions still work but it is preferable to replace the BSCM Modbus SL/ULP module).

BSCM Modbus SL/ULP Module Commands

What's in This Chapter

List of BSCM Modbus SL/ULP Module Commands and Error Codes 478
Circuit Breaker Control Commands 479
Counter Commands 482
Configuration Commands 484

List of BSCM Modbus SL/ULP Module Commands and Error Codes

List of Commands

The following table lists the available BSCM Modbus SL/ULP module commands, their corresponding command codes and user profiles. Follow the command execution procedures.

Command	Command code	User profile
Open circuit breaker	904	Administrator or Operator
Close circuit breaker	905	Administrator or Operator
Reset circuit breaker	906	Administrator or Operator
Enable/inhibit close order	910	Administrator or Operator
Enable/disable automatic reset	42636	Administrator
Enable/disable reset even if SDE	42637	Administrator
Preset counters	42638	Administrator
Set up thresholds	42639	Administrator
Get current time, page 484	768	No password required
Set absolute time, page 484	769	No password required
Read IMU name and location, page 485	1024	No password required
Write IMU name and location, page 486	1032	Administrator
Set validity duration of data, page 486	41868	Administrator, Services, Engineer, or Operator

Error Codes

Error codes generated by the BSCM Modbus SL/ULP module commands are returned in register 8021. In addition to generic error codes, the BSCM Modbus SL/ULP module commands generate the following error codes:

Error Code	Description
4363 (0x110B)	BSCM Modbus SL/ULP module is out of order.
4503 (0x1197)	Circuit breaker is tripped. It must be reset before the command.
4504 (0x1198)	Circuit breaker is already closed.
4505 (0x1199)	Circuit breaker is already open.
4506 (0x119A)	Circuit breaker is already reset.
4507 (0x119B)	Actuator is in manual mode. Remote commands are not allowed.
4508 (0x119C)	Actuator is not present.
4510 (0x119E)	A previous command is still in progress.
4511 (0x119F)	Reset command is forbidden when SDE is set.
4512 (0x11A0)	Inhibit close order is enabled.

Any other positive error code indicates an internal error.

Circuit Breaker Control Commands

Open Circuit Breaker

To open the circuit breaker with the communicating motor mechanism, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	904	Command code = 904
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Close Circuit Breaker

To close the circuit breaker with the communicating motor mechanism, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	905	Command code = 905
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Reset Circuit Breaker

To reset the circuit breaker with the communicating motor mechanism, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	906	Command code = 906
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Enable/Inhibit a Circuit Breaker Close Order

To enable or inhibit a close order of the circuit breaker with the communicating motor mechanism, set the command register as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	910	Command code = 910
0x1F40	8001	–	–	INT16U	13	Number of parameters (bytes) = 13
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	–	INT16U	1	• 0 = Enable close order • 1 = Inhibit close order
0x1F46	8007	–	–	INT16U	–	Origin of the command: 256 = command sent via communication interface (IFM or IFE)

Enable/Disable Automatic Reset

The user can read the automatic reset parameters at register 564 (bit 3), page 472.

To enable/disable automatic reset of the circuit breaker with the communicating motor mechanism, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42636	Command code = 42636
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	0 = automatic reset is not enabled. 1 = automatic reset is enabled.

Enable/Disable Reset even if SDE

The user can read the reset parameters at register 564 (bit 4), page 472.

To enable/disable reset of the circuit breaker with the communicating motor mechanism even if SDE, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42637	Command code = 42637
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command

Address	Register	X	Unit	Type	Range	Description
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	0 = reset is not enabled if SDE = 1. 1 = reset is enabled even if SDE = 1.

Counter Commands

Preset Counters

The user can read the values of the counters from registers 571 to 578, page 474.

To preset the counters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42638	Command code = 42638
0x1F40	8001	–	–	INT16U	22	Number of parameters (bytes) = 22
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1100)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	–	INT16U	0–65535	0–65534 = preset value of the OF counter 65535 = do not preset the OF counter
0x1F46	8007	1	–	INT16U	0–65535	0–65534 = preset value of the SD counter 65535 = do not preset the SD counter
0x1F47	8008	1	–	INT16U	0–65535	0–65534 = preset value of the SDE counter 65535 = do not preset the SDE counter
0x1F48	8009	1	–	INT16U	0–65535	0–65534 = preset value of the open circuit breaker command counter 65535 = do not preset the open circuit breaker command counter
0x1F49	8010	1	–	INT16U	0–65535	0–65534 = preset value of the close circuit breaker command counter 65535 = do not preset the close circuit breaker command counter
0x1F4A	8011	1	–	INT16U	0–65535	0–65534 = preset value of the reset circuit breaker command counter 65535 = do not preset the reset circuit breaker command counter

Set Up Thresholds

The user can read the values of the thresholds from registers 581 to 582, page 474.

To set up the thresholds, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42639	Command code = 42639
0x1F40	8001	–	–	INT16U	22	Number of parameters (bytes) = 22
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1100)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	–	INT16U	0–65535	0–65534 = value of the OF counter threshold 65535 = do not change the OF counter threshold
0x1F46	8007	1	–	INT16U	65535	65535 (no threshold is set up for the SD counter)
0x1F47	8008	1	–	INT16U	65535	65535 (no threshold is set up for the SDE counter)
0x1F48	8009	1	–	INT16U	65535	65535 (no threshold is set up for the open circuit breaker command counter)

Address	Register	X	Unit	Type	Range	Description
0x1F49	8010	1	–	INT16U	0–65535	0–65534 = value of the close circuit breaker command counter threshold 65535 = do not change close circuit breaker command counter threshold
0x1F4A	8011	1	–	INT16U	65535	65535 (no threshold is set up for the reset circuit breaker command counter)

Configuration Commands

Get Current Time

The get current time command is a non-intrusive command. The command is always enabled, even if the remote padlock parameter is set to **Disabled**.

To get the current time for all modules, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	768	Command code = 768
0x1F40	8001	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	INT16U	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The following registers contain the time data:

- Register 8023 holds the month in the MSB, the day in the LSB.
- Register 8024 holds the year offset in the MSB (add 2000 to get the year) and the hour in the LSB.
- Register 8025 holds the minutes in the MSB, the seconds in the LSB.
- Register 8026 holds the milliseconds.

Set Absolute Time

The set absolute time command is a non-intrusive command. The command is always enabled, even if the remote padlock parameter is set to **Disabled**.

To set the absolute time for all the IMU modules, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	769	Command code = 769
0x1F40	8001	–	INT16U	18	Number of parameters (bytes) = 18
0x1F41	8002	–	INT16U	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45	8006	–	INT16U	–	MSB = month (1–12) LSB = day in the month (1–31)
0x1F46	8007	–	INT16U	–	MSB = year (0–99, 0 meaning year 2000) LSB = hour (0–23)
0x1F47	8008	–	INT16U	–	MSB = minutes (0–59) LSB = seconds (0–59)
0x1F48	8009	ms	INT16U	0–999	Milliseconds (0–999)

In case of 24 Vdc power loss, the date and time counters are reset to January 1 2000. It is therefore mandatory to set absolute time for all the IMU modules after recovering the 24 Vdc power supply.

Furthermore, due to the clock drift of each IMU module, it is mandatory to set absolute time for all the IMU modules periodically. Recommended period is at least every 15 minutes.

Read IMU Name and Location

The FDM121 displays the first 14 characters of the IMU name.

To read the IMU name and location, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1024	Command code = 1024
0x1F40	8001	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	INT16U	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	–	17039489 = read IMU name (load 0x0104 into register 8006, 0x0081 into 8007) 17039490 = read IMU location (load 0x0104 into register 8006, 0x0082 into 8007)
0x1F47	8008	–	INT16U	2048	2048

The IMU name and location are returned to command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	1024	Last Command Code
0x1F54	8021	–	INT16U	–	Command status 0 = command succeeded Otherwise, command failed
0x1F55	8022	–	INT16U	–	Number of bytes returned (0 if command failed)
0x1F56	8023	–	OCTET STRING	–	If command succeeded MSB = first character of IMU name or location LSB = second character of IMU name or location
0x1F57–0x1F6D	8024–8046	–	OCTET STRING	–	Depends on the length of the IMU name or location and ends with the NULL character 0x00

Write IMU Name and Location

The IMU name and location can be read from registers 11801 to 11868.

The FDM121 displays the first 14 characters of the IMU name.

To write the IMU name and location, the user must set up the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1032	Command code = 1032
0x1F40	8001	–	INT16U	16–62	Number of parameters (bytes) = depends on the length of the IMU name or location (up to 46 characters)
0x1F41	8002	–	INT16U	0	Destination = 0 (0x0000)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command = Administrator user profile password
0x1F45–0x1F46	8006–8007	–	INT32U	–	17039489 = write IMU name (load 0x0104 into register 8006, 0x0081 into 8007) 17039490 = write IMU location (load 0x0104 into register 8006, 0x0082 into 8007)
0x1F47	8008	–	INT16U	2048	2048
0x1F48	8009	–	OCTET STRING	–	MSB = first character of the IMU name or location LSB = second character of the IMU name or location
0x1F49–0x1F5F	8010–8038	–	OCTET STRING	–	Depends on the length of the IMU name or location and ends with the NULL character 0x00

Set Validity Duration of Data

This command is used to set the validity duration of data in the standard and legacy datasets.

The validity duration of data can be read in a register .

To set the validity duration of data, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41868	Command code = 41868
0x1F40	8001	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	INT16U	769	Destination = 769 (0x0301)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator, Services, Engineer, or Operator user profile password
0x1F45	8006	s	INT16U	5–300 (in steps of 5 s)	Validity duration of data Factory setting: 10 s

BSCM Module Data for ComPacT NSX and PowerPacT H-, J-, and L-Frame Circuit Breakers

What's in This Part

BSCM Module Registers....488
BSCM Module Commands....495

BSCM Module Registers

What's in This Chapter

BSCM Module Identification 489
Circuit Breaker Status 490
Maintenance Indicators 492
Event History 493

BSCM Module Identification

Product Identification

Address	Register	RW	X	Unit	Type	Range	Description
0x0226	551	R	–	–	INT16U	15149	Product identification = 15149 for the BSCM module

BSCM Module Identifier

The BSCM module serial number is composed of a maximum of 11 alphanumeric characters with the following format: PPYYWWDnnnn.

- PP = plant code
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- nnnn = sequence number (0001–9999)

A read request of 6 registers is necessary to read the BSCM module serial number.

Address	Register	RW	X	Unit	Type	Range	Description
0x0227	552	R	–	–	OCTET STRING	–	'PP'
0x0228	553	R	–	–	OCTET STRING	05–99	'YY'
0x0229	554	R	–	–	OCTET STRING	01–53	'WW'
0x022A	555	R	–	–	OCTET STRING	1–7	'Dn'
0x022B	556	R	–	–	OCTET STRING	00–99	'nn'
0x022C	557	R	–	–	OCTET STRING	01–99	'n' (the NULL character ends the serial number)

Circuit Breaker Status

Circuit Breaker Status

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x0232	563	R	–	–	INT16U	–	A/E	–	Circuit breaker status register
								0	OF input status 0 = The circuit breaker is open. 1 = The circuit breaker is closed.
								1	SD input status 0 = The circuit breaker is not tripped. 1 = The circuit breaker is tripped due to electrical fault or shunt trip or push-to-trip.
								2	SDE input status 0 = The circuit breaker is not tripped on electrical fault. 1 = The circuit breaker is tripped due to electrical fault (including ground-fault test and earth-leakage test).
							–	3–15	Reserved (forced to 0)

Communicating Motor Mechanism Status

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x0233	564	R	–	–	INT16U	–	A/E	–	Communicating motor mechanism status register
								0	Motor mechanism 0 = not available 1 = available
								1	Manu/auto mode 0 = manu 1 = auto
								2	Last command 0 = last command succeeded 1 = last command failed
								3	Enable automatic reset 0 = automatic reset is not enabled. 1 = automatic reset is enabled.
								4	Enable reset even if SDE 0 = reset is not enabled if the circuit breaker is tripped on electrical fault. 1 = reset is enabled even if the circuit breaker is tripped on electrical fault.

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
								5	Local/Remote mode selected in the FDM121 display menu. 0 = Remote mode (default value), the communicating motor mechanism is controlled through a Modbus command only. 1 = Local mode, the communicating motor mechanism is controlled through the FDM121 display menu only.
							–	6–15	Reserved (forced to 0)

Maintenance Indicators

General Description

The BSCM module has seven counters that help to manage ComPacT NSX and PowerPacT H-, J-, and L-frame circuit breakers.

The BSCM module counters have the following properties:

- All the counters are saved in non-volatile memory to prevent data loss in case of power loss.
- The cumulating OF counter is read only. It stops incrementing when it reaches the maximum value 4 294 967 295.
- The user can preset all counters (except the cumulating OF counter) to any value from 0 to 65535. The counters stop incrementing when they reach the maximum value 65535.
- Tthe OF counter and close circuit breaker command counter have a threshold which can be set by the user, to any value from 0 to 65534.

  The factory setting is 5000. An alarm is generated when a counter reaches the threshold.

BSCM Module Counters

Address	Register	RW	X	Unit	Type	Range	Description
0x023A– 0x023B	571– 572	R	1	–	INT32U	0–4 294 967 295	Cumulating OF counter (non-resettable open to close counter)
0x023C	573	R-WC	1	–	INT16U	0–65535	OF counter (resettable open to close counter)
0x023D	574	R-WC	1	–	INT16U	0–65535	SD counter (Close to SD position)
0x023E	575	R-WC	1	–	INT16U	0–65535	SDE counter (Close to SDE position)
0x023F	576	R-WC	1	–	INT16U	0–65535	Open circuit breaker command counter
0x0240	577	R-WC	1	–	INT16U	0–65535	Close circuit breaker command counter
0x0241	578	R-WC	1	–	INT16U	0–65535	Reset circuit breaker command counter
0x0242– 0x0243	579–580	–	–	–	–	–	Reserved
0x0244	581	R-WC	1	–	INT16U	0–65535	OF counter threshold The factory setting is 5000.
0x0245	582	R-WC	1	–	INT16U	0–65535	Close circuit breaker command counter threshold The factory setting is 5000.

Event History

General Description

The BSCM module event history registers describe the last 10 events. The BSCM module event format corresponds to a series of 10 records. Each record is composed of 5 registers describing one BSCM module event.

A read request of 5x(n) registers is necessary to read the last n BSCM module event records, where 5 is the number of registers for each event record.

For example, a read request of 5x3 = 15 registers is necessary to read the last 3 BSCM module event records of the BSCM module event history:

- The first 5 registers describe the first BSCM module event record (most recent event).
- The next 5 registers describe the second BSCM module event record.
- The last 5 registers describe the third BSCM module event record.

Address	Register	Description
0x0259	602	Event counter
0x025A–0x025E	603–607	Event record 1 (most recent event)
0x025F–0x0263	608–612	Event record 2
0x0264–0x0268	613–617	Event record 3
0x0269–0x026D	618–622	Event record 4
0x026E–0x0272	623–627	Event record 5
0x0273–0x0277	628–632	Event record 6
0x0278–0x027C	633–637	Event record 7
0x027D–0x0281	638–642	Event record 8
0x0282–0x0286	643–647	Event record 9
0x0287–0x028B	648–652	Event record 10 (oldest event)

Event Counter

The event counter is incremented when a new event is logged. If the counter reaches the maximum value 65535 and a new event is logged, the counter is reset to 0.

Address	Register	RW	X	Unit	Type	Range	Description
0x0259	602	R	1	–	INT16U	0–65535	BSCM module event counter

Event Record

The order and the description of the event record registers are the same as that of event record 1:

Event 1 (Most Recent Event)							
Address	**Register**	**RW**	**X**	**Unit**	**Type**	**Range**	**Description**
0x025A	603	R	1	–	INT16U	0–65535	BSCM module event identifier (see next paragraph)
0x025B– 0x025D	604– 606	R	–	–	ULP DATE	–	Date and time of event
0x025E	607	R	1	–	INT16U	1–2	Event status 1 = event occurrence 2 = event completion

Event Identifier

Event Identifier	Event
1024	SD contact change (occurrence = close to SD position)
1025	Threshold of OF counter is reached
1026	Threshold of close command counter is reached
1027	STOP (internal failure)
1028	ERROR (internal failure)
1029	OF contact change (occurrence = open to close position)
1030	SDE contact change (occurrence = close to SDE position)
1031	Manu/auto mode (occurrence = manu to auto position)
1040	Open command
1041	Close command
1042	Reset command

NOTE: In the case of a STOP event, it is mandatory to replace the BSCM module. In the case of an ERROR event, it is advised to replace the BSCM module (the core protection functions still work but it is preferable to replace the BSCM module).

BSCM Module Commands

What's in This Chapter

List of BSCM Module Commands and Error Codes 496
Circuit Breaker Control Commands 497
Counter Commands 500

List of BSCM Module Commands and Error Codes

List of Commands

The following table lists the available BSCM module commands, their corresponding command codes and user profiles. Follow the command execution procedures .

Command	Command code	User profile
Open circuit breaker , page 497	904	Administrator or Operator
Close circuit breaker , page 497	905	Administrator or Operator
Reset circuit breaker , page 497	906	Administrator or Operator
Enable/inhibit close order , page 498	910	Administrator or Operator
Enable/disable automatic reset , page 498	42636	Administrator
Enable/disable reset even if SDE , page 498	42637	Administrator
Preset counters , page 500	42638	Administrator
Set up thresholds , page 500	42639	Administrator

Error Codes

Error codes generated by the BSCM module commands are returned in register 8021. In addition to generic error codes , BSCM commands generate the following error codes:

Error Code	Description
4363 (0x110B)	BSCM module is out of order.
4503 (0x1197)	Circuit breaker is tripped. It must be reset before the command.
4504 (0x1198)	Circuit breaker is already closed.
4505 (0x1199)	Circuit breaker is already open.
4506 (0x119A)	Circuit breaker is already reset.
4507 (0x119B)	Actuator is in manual mode. Remote commands are not allowed.
4508 (0x119C)	Actuator is not present.
4510 (0x119E)	A previous command is still in progress.
4511 (0x119F)	Reset command is forbidden when SDE is set.
4512 (0x11A0)	Inhibit close order is enabled.

Any other positive error code indicates an internal error.

Circuit Breaker Control Commands

Open Circuit Breaker

To open the circuit breaker, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	904	Command code = **904**
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Close Circuit Breaker

To close the circuit breaker, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	905	Command code = **905**
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Reset Circuit Breaker

To reset the circuit breaker, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	906	Command code = **906**
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Enable/Inhibit a Circuit Breaker Close Order

To enable or inhibit a close order of the circuit breaker, set the command register as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	910	Command code = **910**
0x1F40	8001	–	–	INT16U	13	Number of parameters (bytes) = 13
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	–	INT16U	1	• 0 = Enable close order • 1 = Inhibit close order
0x1F46	8007	–	–	INT16U	–	Origin of the command: 256 = command sent via communication interface (IFM or IFE)

Enable/Disable Automatic Reset

The user can read the automatic reset parameters at register 564 (bit 3).

To enable/disable automatic reset, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42636	Command code = **42636**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	0 = automatic reset is not enabled. 1 = automatic reset is enabled.

Enable/Disable Reset even if SDE

The user can read the reset parameters at register 564 (bit 4).

To enable/disable reset even if SDE, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42637	Command code = **42637**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	0 = reset is not enabled if SDE = 1. 1 = reset is enabled even if SDE = 1.

Counter Commands

Preset Counters

The user can read the values of the counters from registers 571 to 578, page 492.

To preset the counters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42638	Command code = **42638**
0x1F40	8001	–	–	INT16U	22	Number of parameters (bytes) = 22
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1100)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	–	INT16U	0–65535	0–65534 = preset value of the OF counter 65535 = do not preset the OF counter
0x1F46	8007	1	–	INT16U	0–65535	0–65534 = preset value of the SD counter 65535 = do not preset the SD counter
0x1F47	8008	1	–	INT16U	0–65535	0–65534 = preset value of the SDE counter 65535 = do not preset the SDE counter
0x1F48	8009	1	–	INT16U	0–65535	0–65534 = preset value of the open circuit breaker command counter 65535 = do not preset the open circuit breaker command counter
0x1F49	8010	1	–	INT16U	0–65535	0–65534 = preset value of the close circuit breaker command counter 65535 = do not preset the close circuit breaker command counter
0x1F4A	8011	1	–	INT16U	0–65535	0–65534 = preset value of the reset circuit breaker command counter 65535 = do not preset the reset circuit breaker command counter

Set Up Thresholds

The user can read the values of the thresholds from registers 581 to 582, page 492.

To set up the thresholds, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42639	Command code = **42639**
0x1F40	8001	–	–	INT16U	22	Number of parameters (bytes) = 22
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1100)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	–	INT16U	0–65535	0–65534 = value of the OF counter threshold 65535 = do not change the OF counter threshold
0x1F46	8007	1	–	INT16U	65535	65535 (no threshold is set up for the SD counter)
0x1F47	8008	1	–	INT16U	65535	65535 (no threshold is set up for the SDE counter)
0x1F48	8009	1	–	INT16U	65535	65535 (no threshold is set up for the open circuit breaker command counter)

Address	Register	X	Unit	Type	Range	Description
0x1F49	8010	1	–	INT16U	0–65535	0–65534 = value of the close circuit breaker command counter threshold 65535 = do not change close circuit breaker command counter threshold
0x1F4A	8011	1	–	INT16U	65535	65535 (no threshold is set up for the reset circuit breaker command counter)

IO Module Data

What's in This Part

IO Module Registers 503
IO Module Events 525
IO Module Commands 533

IO Module Registers

What's in This Chapter

Introduction....504
Digital Inputs....506
Digital Outputs....509
Hardware Setting....511
Digital Input and Output Status....513
IO Module Identification....514
Alarm Status....517
Applications....520
Analog Inputs....523

Introduction

This chapter describes the IO module registers.

Registers 13824 to 15719 are held by the IO 1.

Registers 16824 to 18719 are held by the IO 2:

- The registers of the parameters of IO 2 are equal to the registers of the parameters of IO 1 plus 3000.

  Example:

  - Register 14599 holds the digital input status register of the IO 1.
  - Register 17599 holds the digital input status register of the IO 2.
- The order of the registers is the same as that of the IO 1.
- The characteristics (access type, size, range, and unit) are the same as those of the registers of IO 1.
- Registers 15360 to 16109 containing the predefined application are specific to the IO 1 because they hold the predefined applications.

For more information about the IO module functions, refer to DOCA0055•• *IO – Input/Output Application Module for One Circuit Breaker – User Guide* in **Related Documents** at the beginning of this guide.

IO Module Register Table Format

IO module Modbus register tables have the following columns:

Address	Register	RW	Unit	Type	Range	Bit	Description

- **Address**: a 16-bit register address in hexadecimal. The address is data used in the Modbus frame.
- **Register**: a 16-bit register number in decimal (register = address + 1).
- **RW**: register read-write status
  - R: the register can be read by using Modbus functions
  - W: the register can be written by using Modbus functions
  - RW: the register can be read and written by using Modbus functions
  - RC: the register can be read by using the command interface
  - WC: the register can be written by using the command interface
- **Unit**: the unit the information is expressed in
- **Type**: the encoding data type (see data type description below)
- **Range**: the permitted values for this variable, usually a subset of what the format allows
- **Bit**: description of bit-level functions, where applicable
- **Description**: provides information about the register and restrictions that apply

IO Module Data Types

Data Types	Description	Range
INT16U	16-bit unsigned integer	0 to 65535
INT32U	32-bit unsigned integer	0 to 4 294 967 295

Data Types	Description	Range
INT64	64-bit signed integer	-9 223 372 036 854 775 808 to +9 223 372 036 854 775 807
FLOAT32	32-bit signed integer with a floating point	2^{-126} (1.0) to 2^{127} (2 - 2^{-23})
OCTET STRING	Text string	1 byte per character
ULP DATE	Date and time in ULP DATE format	–
DATETIME	Date and time in the IEC 60870-5 format	–

See detailed descriptions of the data types in the Appendix, page 580.

Digital Inputs

Digital Input Register Mapping

Each digital input description is made up of 80 registers.The order and the description of the digital inputs 2, 3, 4, 5, and 6 are the same as those of digital input 1.

IO Module	Digital Input Number	Digital Input Addresses	Digital Input Registers
IO 1	I1	0x3669–0x36B8	13930–14009
	I2	0x36B9–0x3708	14010–14089
	I3	0x3709–0x3758	14090–14169
	I4	0x3759–0x37A8	14170–14249
	I5	0x37A9–0x37F8	14250–14329
	I6	0x37F9–0x3848	14330–14409
IO 2	I1	0x4221–0x4270	16930–17009
	I2	0x4271–0x42C0	17010–17089
	I3	0x42C1–0x4310	17090–17169
	I4	0x4311–0x4360	17170–17249
	I5	0x4361–0x43B0	17250–17329
	I6	0x43B1–0x4400	17330–17409

Digital Input 1 Registers of IO 1

The order and the description of the digital input 1 registers of IO 2 are the same as those of IO 1:

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3669	13930	R	–	INT16U	–	–	Quality of each bit of register 13931: • 0 = Invalid • 1 = Valid
0x366A	13931	R	–	INT16U	–	0	Digital input status: • 0 = Off • 1 = On
						1	Digital input forced status: • 0 = Unforced • 1 = Forced
						2–15	Reserved
0x366B–0x366E	13932–13935	R	–	DATETIME	–	–	Timestamp for the last input transition: • Last rising edge if input is configured as NO (normally open contact) • Last falling edge if input is configured as NC (normally closed contact) Valid if input signal type is a normal digital input (not valid for pulse digital input).
0x366F–0x3670	13936–13937	–	–	–	–	–	Reserved
0x3671–0x3672	13938–13939	R	–	INT32U	0–4294967294	–	Input counter value This counter increments for each rising edge of the input.

Address	Register	RW	Unit	Type	Range	Bit	Description
							Valid if input signal type is normal digital input.
0x3673–0x3676	13940–13943	R	–	DATETIME	–	–	Timestamp for the last input change counter preset/reset Valid if input signal type is normal digital input.
0x3677–0x3678	13944–13945	R	–	INT32U	0–4294967294	–	Number of pulses received Valid if input signal type is pulse digital input.
0x3679–0x367C	13946–13949	R	–	INT64	–	–	Resettable value of consumption Value = pulse weight x number of pulses received Valid if input signal type is pulse digital input.
0x367D–0x3680	13950–13953	R	–	INT64	–	–	Accumulated non-resettable value of consumption Valid if input signal type is pulse digital input.
0x3681–0x3684	13954–13957	R	–	DATETIME	–	–	Timestamp of last resettable consumption value reset Valid if input signal type is pulse digital input.
0x3685–0x3686	13958–13959	R	W	FLOAT32	–	–	Power calculation Valid if • Input signal type is pulse digital input • the pulse input is from Energy pulse counter
0x3687–0x369E	13960–13983	R	–	OCTET STRING	–	–	Digital input identification coded over 45 ASCII characters(1)
0x369F–0x36A0	13984–13985	R	s	FLOAT32	0.003–1	–	Digital input 1 filter time
0x36A1	13986	R	–	INT16U	0–1	–	Input contact type(1) • 0 = NO (normally open contact, factory setting) • 1 = NC (normally close contact)
0x36A2	13987	R	–	INT16U	0–1	–	Input signal type(1) • 0 = normal digital input (factory setting) • 1 = pulse digital input
0x36A3	13988	R	–	INT16U	0–1	–	Pulse polarity(1) • 0 = low to high (factory setting) • 1 = high to low Valid if input signal type is pulse digital input.
0x36A4	13989	R	–	INT16U	1–4	–	Pulse unit(1) • 1 = Wh (Watt-hour, factory setting) • 2 = varh (Reactive Volt-Ampere hour) • 3 = VAh (Volt-Ampere hour) • 4 = m^3 (cubic meters) Valid if input signal type is pulse digital input.
0x36A5–0x36A6	13990–13991	R	–	FLOAT32	1–16777215	–	Pulse weight(1) (2)

Address	Register	RW	Unit	Type	Range	Bit	Description
							Valid if input signal type is pulse digital input. Factory setting = 1.0
0x36A7–0x36A8	13992–13993	R	–	INT32U	1–4294967294	–	Input counter threshold value(1) Valid if input signal type is normal digital input. Factory setting = 5000
0x36A9–0x36B8	13994–14009	–	–	–	–	–	Reserved

(1) Value set by using EcoStruxure Power Commission software.

(2) Examples:

- If each incoming pulse represents 125 kWh, and since consumption data must be expressed in watt-hours, the consumption pulse weight is 125,000.
- If each incoming pulse represents 1 US gallon, and since consumption data must be expressed in cubic meters, the consumption pulse weight is 0.003785.

Digital Outputs

Digital Output Register Mapping

Each digital output description is made up of 60 registers. The order and the description of the digital outputs 2 and 3 are the same as those of digital output 1.

IO Module	Digital Output Number	Digital Output Addresses	Digital Output Registers
IO 1	O1	0x3849–0x3884	14410–14469
	O2	0x3885–0x38C0	14470–14529
	O3	0x38C1–0x38FC	14530–14589
IO 2	O1	0x4401–0x443C	17410–17469
	O2	0x443D–0x4478	17470–17529
	O3	0x4479–0x44B4	17530–17589

Digital Output 1 Registers of IO 1

The order and the description of the digital output 1 registers of IO 2 are the same as those of IO 1:

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3849	14410	R	–	INT16U	–	–	Quality of each bit of register 14411: • 0 = Invalid • 1 = Valid
0x384A	14411	R-WC	–	INT16U	–	0	Reserved
						1	Digital output status: • 0 = OFF • 1 = ON
		R				2	Digital output forced status: • 0 = Unforced • 1 = Forced
						3–15	Reserved
0x384B–0x384E	14412–14415	R	–	DATETIME	–	–	Timestamp for the last output transition: • Last rising edge if output is configured as NO (normally open contact) • Last falling edge if output is configured as NC (normally closed contact)
0x384F–0x3850	14416–14417	–	–	–	–	–	Reserved
0x3851–0x3852	14418–14419	R	–	INT32U	1-4294967294	–	Output counter This counter increments for each rising edge of the output.
0x3853–0x3856	14420–14423	R	–	DATETIME	–	–	Timestamp of the last reset for the output counter
0x3857–0x386E	14424–14447	R	–	OCTET STRING	–	–	Digital output identification coded over 45 ASCII characters
0x386F	14448	R	–	INT16U	0–2	–	Output operating mode(1): • 0 = Non-latching (factory setting) • 1 = Latched • 2 = Time delayed non-latching
0x3870	14449	R	s	INT16U	0–65534	–	On time for time delayed non-latching mode value(1)

Address	Register	RW	Unit	Type	Range	Bit	Description
							The time for the output to remain energized when the output is in time delayed non-latching mode (Factory setting = 0)
0x3871	14450	R	–	INT16U	0–1	–	Output contact type(1): • 0 = NO (normally open, factory setting) • 1 = NC (normally close)
0x3872	14451	R	–	INT16U	0–2	–	Indicates On/Off state of the discrete output when any fall back condition occurs(1): • 0 = OFF (factory setting) • 1 = ON • 2 = Freeze
0x3873–0x3874	14452–14453	R	–	INT32U	1-4294967294	–	Output counter threshold value(1) Factory setting = 5000
0x3875	14454	R-WC	–	INT16U	0–2	–	Simple command for output(1): • 0 = No command • 1 = OFF • 2 = ON Valid if simple commands are enabled(2).
0x3876–0x3884	14455–14469	–	–	–	–	–	Reserved

(1) Value set using EcoStruxure Power Commission software.

(2) Simple commands are enabled by factory setting. The simple commands can be disabled by using the command Enable/Disable commands.

Hardware Setting

Addresses and Registers List

The following table describes the hardware settings addresses, and registers regarding the IO module.

IO Module	Addresses	Registers
IO 1	0x38FD–0x3902	14590–14595
IO 2	0x44B5–0x44BA	17590–17595

Hardware Setting Registers for IO 1

The order and the description of the hardware setting registers for IO 2 are the same as those of IO 1.

Address	Register	RW	Unit	Type	Range	Description
0x38FD	14590	R	–	INT16U	1–9	Application rotary switch current position: • 1 = position 1 • 2 = position 2 • 3 = position 3 • 4 = position 4 • 5 = position 5 • 6 = position 6 • 7 = position 7 • 8 = position 8 • 9 = position 9
0x38FE	14591	R	–	INT16U	0–1	Remote setup padlock position: • 0 = Unlock • 1 = Lock
0x38FF	14592	R	–	INT16U	0–1	Dip switch1 position: • 0 = IO 1 • 1 = IO 2
0x3900	14593	–	–	–	–	Reserved
0x3901	14594	R	–	INT16U	1–9	Last validated application set by the test button located on the front of the IO module: • 1 = position 1 • 2 = position 2 • 3 = position 3 • 4 = position 4 • 5 = position 5 • 6 = position 6 • 7 = position 7 • 8 = position 8 • 9 = position 9

Address	Register	RW	Unit	Type	Range	Description
0x3902	14595	R	–	INT16U	1–9	Last validated application set by EcoStruxure Power Commission software: • 1 = position 1 • 2 = position 2 • 3 = position 3 • 4 = position 4 • 5 = position 5 • 6 = position 6 • 7 = position 7 • 8 = position 8 • 9 = position 9
0x3903– 0x3904	14596– 14597	–	–	–	–	Reserved

Digital Input and Output Status

Addresses and Registers List

The following table describes the digital inputs and outputs status addresses, and registers regarding the IO module.

IO Module	Addresses	Registers
IO 1	0x3905–0x3908	14598–14601
IO 2	0x44BD–0x44C0	17598–17601

Digital Input and Output Status Registers for IO 1

The order and the description of the digital input and output status registers for IO 2 are the same as those of IO 1.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3905	14598	R	–	INT16U	–	–	Quality of each bit of register 14599: • 0 = Invalid • 1 = Valid
0x3906	14599	R	–	INT16U	–	–	Digital input status register: • Input status = 0 when input is OFF • Input status = 1 when input is ON
						0	I1 status
						1	I2 status
						2	I3 status
						3	I4 status
						4	I5 status
						5	I6 status
						6–15	Reserved
0x3907	14600	R	–	INT16U	–	–	Quality of each bit of register 14601: • 0 = Invalid • 1 = Valid
0x3908	14601	R–WC	–	INT16U	–	–	Digital output status register: • Output status = 0 when output is OFF • Output status = 1 when output is ON
						0	O1 status
						1	O2 status
						2	O3 status
						3–15	Reserved

IO Module Identification

Introduction

The order and the description of the IO module identification registers for IO 2 are the same as those of IO 1.

Addresses and Registers List

The following table describes the identification addresses, and registers regarding the IO module.

IO Module	Addresses	Registers
IO 1	0x392F–0x3982	14640–14723
IO 2	0x44E7–0x453A	17640–17723

IMU Identification

Identification of the IMU can be set by using EcoStruxure Power Commission software. When not programmed, the IMU identification registers return 0 (0x0000).

The FDM121 display displays the first 14 characters of the IMU name.

Address	Register	RW	Unit	Type	Range	Description
0x3931–0x3948	14642–14665	R	–	OCTET STRING	–	IMU name = up to 45 ASCII characters ended by the NULL character 0x00
0x3949–0x3960	14666–14689	R	–	OCTET STRING	–	IMU location = up to 45 ASCII characters ended by the NULL character 0x00

IO Hardware Revision

The hardware revision is an ASCII string using the format AAA.BBB.CCC with:

- AAA = major version (000-127)
- BBB = minor version (000-255)
- CCC = revision number (000-255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x3961–0x3966	14690–14695	R	–	OCTET STRING	–	Hardware revision

IO Module Firmware Version

The firmware version is an ASCII string using the format AAA.BBB.CCC with:

- AAA = major version (000-127)
- BBB = minor version (000-255)
- CCC = revision number (000-255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x3967–0x396C	14696–14701	R	–	OCTET STRING	–	Firmware version

Current Date and Time

Address	Register	RW	Unit	Type	Range	Description
0x396D–0x3970	14702–14705	R	–	DATETIME	–	Current date and time of the IO module in DATETIME format, set by using EcoStruxure Power Commission software.

Serial Number

The IO module serial number is composed of a maximum of 11 alphanumeric characters with the following format: PPYYWWDnnnn.

- PP = plant code
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- nnnn = production number of the device on the day (0001–9999)

A read request of 6 registers is necessary to read the IO module serial number.

Address	Register	RW	Unit	Type	Range	Description
0x3971–0x397A	14706-14715	R	–	OCTET STRING	–	Serial number
0x3971	14706	R	–	OCTET STRING	–	‘PP’
0x3972	14707	R	–	OCTET STRING	‘05’–‘99’	‘YY’
0x3973	14708	R	–	OCTET STRING	‘01’–‘53’	‘WW’
0x3974	14709	R	–	OCTET STRING	‘10’–‘79’	‘Dn’
0x3975	14710	R	–	OCTET STRING	‘00’–‘99’	‘nn’
0x3976	14711	R	–	OCTET STRING	‘0’–‘9’	‘n’ (the NULL character ends the serial number)

Manufacturing Date and Time

Address	Register	RW	Unit	Type	Range	Description
0x397B–0x397E	14716–14719	R	–	DATETIME	–	Manufacturing date and time

Product Identification

Address	Register	RW	Unit	Type	Range	Description
0x392F	14640	R	–	INT16U	15150	Product identification = 15150 for the IO module
0x3930	14641	–	–	–	–	Reserved

Address	Register	RW	Unit	Type	Range	Description
0x397F–0x3982	14720–14723	R	–	OCTET STRING	–	Product code = 'LV434063'
0x3D1C–0x3D3B	15645–15676	R–WC	–	OCTET STRING	–	User application name
0x3D3C–0x3D45	15677–15686	R	–	OCTET STRING	–	Vendor name = 'Schneider Electric'
0x3D46–0x3D4D	15687–15694	R	–	OCTET STRING	–	Product range: 'Enerlinx'
0x3D4E–0x3D5D	15695–15710	R	–	OCTET STRING	–	Device family: 'IO device'
0x3D5E–0x3D65	15711–15718	R	–	OCTET STRING	–	Product model

Alarm Status

Addresses and Registers List

The following table describes the alarm status addresses, and registers regarding the IO module.

IO Module	Addresses	Registers
IO 1	0x3989–0x39A6	14730–14759
IO 2	0x4541–0x455E	17730–17759

Generic Alarm Status for IO 1

The order and the description of the generic alarm status registers for IO 2 are the same as those of IO 1.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3989	14730	R	–	INT16U	–	–	Quality of each bit of register 14731: • 0 = Invalid • 1 = Valid
0x398A	14731	R	–	INT16U	–	–	IO module history format register
						0	ULP format
						1	TI086 format
						2–15	Reserved
0x398B	14732	R	–	INT16U	–	–	Quality of each bit of register 14733: • 0 = Invalid • 1 = Valid
0x398C	14733	R	–	INT16U	–	–	IO module command type Factory setting = 3, both write command mechanisms are enabled.
						0	1 = Complex commands
						1	1 = Simple commands Simple commands can be disabled by sending a command
						2–15	Reserved
0x398D–0x3992	14734–14739	–	–	–	–	–	Reserved
0x3993	14740	R	–	INT16U	–	–	Quality of each bit of register 14741: • 0 = Invalid • 1 = Valid
0x3994	14741	R	–	INT16U	–	–	IO module generic alarm 1 status register.
						0	IO module in STOP mode: IO module is not working and must be replaced.
						1	IO module in ERROR mode: IO module is working in degraded mode.
						2	Threshold overrun on I1 counter
						3	Threshold overrun on I2 counter
						4	Threshold overrun on I3 counter
						5	Threshold overrun on I4 counter
						6	Threshold overrun on I5 counter
						7	Threshold overrun on I6 counter

Address	Register	RW	Unit	Type	Range	Bit	Description
						8	Threshold overrun on O1 counter
						9	Threshold overrun on O2 counter
						10	Threshold overrun on O3 counter
						11	Switchboard temperature threshold 1 overrun
						12	Switchboard temperature threshold 2 overrun
						13	Switchboard temperature threshold 3 overrun
						14–15	Reserved
0x3995	14742	R	–	INT16U	–	–	Quality of each bit of register 14743: • 0 = Invalid • 1 = Valid
0x3996	14743	R	–	INT16U	–	–	IO module generic alarm 2 status register.
						0	User-defined input 1 alarm
						1	User-defined input 2 alarm
						2	User-defined input 3 alarm
						3	User-defined input 4 alarm
						4	User-defined input 5 alarm
						5	User-defined input 6 alarm
						6–15	Reserved

Cradle and Drawer Management Alarms for IO 1

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3997	14744	R	–	INT16U	–	–	Quality of each bit of register 14745: • 0 = Invalid • 1 = Valid
0x3998	14745	R	–	INT16U	–	–	Cradle management alarms register
						0	Cradle position discrepancy
						1	Disconnection of the circuit breaker from cradle is overdue.
						2	Cradle has reached its maximum number of operation
						3	Remaining service life of cradle is below alarm threshold
						4	New MicroLogic trip/control unit has been detected
						5–7	Reserved
						8	Drawer position discrepancy
						9–15	Reserved

Motor Alarms for IO 1

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3999	14746	R	–	INT16U	–	–	Quality of each bit of register 14747: • 0 = Invalid • 1 = Valid
0x399A	14747	R	–	INT16U	–	–	IO motor alarms
						0–15	Reserved

Miscellaneous Application Alarms for IO 1

Address	Register	RW	Unit	Type	Range	Bit	Description
0x399B	14748	R	–	INT16U	–	–	Quality of each bit of register 14749: • 0 = Invalid • 1 = Valid
0x399C	14749	R	–	INT16U	–	–	Other application alarms register
						0	Auxiliary contact of load contactor 1 is not closed.
						1	Auxiliary contact of load contactor 1 is not opened.
						2	MicroLogic A/E/P/H trip unit: Discrepancy between ERMS OFF order and ERMS ON order Other MicroLogic trip/control unit: Reserved
						3	MicroLogic X control unit: Dual settings 2–wire input discrepancy Other MicroLogic trip/control unit: Reserved
						4–15	Reserved
0x399D	14750	R	–	INT16U	–	–	Quality of each bit of register 14751: • 0 = Invalid • 1 = Valid
0x399E	14751	R	–	INT16U	–	–	Predefined input alarms register
						0	Earth-leakage trip signal contact (SDV)
						1	Control voltage presence contact
						2	Surge protection status contact
						3	Surge failure contact
						4	Switch-disconnector ON/OFF indication contact (OF)
						5	Fuse blown indication contact
						6	Emergency stop
						7	Switchboard temperature contact
						8	Switchboard ventilation contact
						9	Switchboard door contact
						10–15	Reserved
0x399F	14752	R	–	INT16U	–	–	Quality of each bit of register 14753: • 0 = Invalid • 1 = Valid
0x39A0	14753	R	–	INT16U	–	–	IO module discrepancy alarms register
						0	Critical hardware discrepancy
						1	Critical firmware discrepancy
						2	Non-critical hardware discrepancy
						3	Non-critical firmware discrepancy
						4–15	Reserved
0x39A1–0x39A6	14754–14759	–	–	–	–	–	Reserved

Applications

IO Application Status

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3927	14632	R	–	INT16U	–	0	Cradle application enabled or disabled: • 0 = Disabled • 1 = Enabled
						1–15	Reserved
0x3928	14633	R	–	INT16U	–	–	Quality of each bit of register 14632: • 0 = Invalid • 1 = Valid

Cradle Management

The table describes the registers related to the cradle management application performed by IO 1 (predefined or user defined application).

The registers 18300–18329 are related to the cradle management application performed by IO 2 (predefined or user defined application).

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3BC3	15300	R-RC	–	INT16U	–	–	Quality of each bit of register 15301: • 0 = Invalid • 1 = Valid
0x3BC4	15301	R-RC	–	INT16U	–	–	Cradle status
						0–7	Reserved
						8	Device in disconnected position (CD)
						9	Device in connected position (CE)
						10	Device in the test position (CT)
						11–15	Reserved
0x3BC5–0x3BC6	15302–15303	R-RC-WC	–	INT32U	0–65534	–	Cradle connected position counter This counter increments for each rising edge of the cradle connected position
0x3BC7–0x3BC8	15304–15305	R-RC-WC	–	INT32U	0–65534	–	Cradle disconnected position counter This counter increments for each rising edge of the cradle disconnected position
0x3BC9–0x3BCA	15306–15307	R-RC-WC	–	INT32U	0–65534	–	Cradle test position counter This counter increments for each rising edge of the cradle test position
0x3BCB–0x3BCE	15308–15311	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle connected position
0x3BCF–0x3BD2	15312–15315	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle disconnected position
0x3BD3–0x3BD6	15316–15319	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle test position
0x3BD7–0x3BD8	15320–15321	R-WC	s	INT32U	–	–	Operating time since last grease maintenance
0x3BD9–0x3BDA	15322–15323	R-WC	s	INT32U	–	–	Operating time since last move connected position

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3BDB	15324	R	–	INT16U	0-65534	–	Cradle contact regrease counter
0x3BDC–0x3BE0	15325–15329	–	–	–	–	–	Reserved

Drawer Management

The table describes the registers related to the Drawer management user-defined application performed by IO 1.

The registers 18330–18359 are related to the Drawer management user-defined application performed by IO 2.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3BE1	15330	R	–	INT16U	–	–	Quality of each bit of register 15331: 0 = Invalid 1 = Valid
0x3BE2	15331	R	–	INT16U	–	–	Drawer status
						0–7	Reserved
						8	Drawer in disconnected position
						9	Drawer in connected position
						10	Drawer in the test position
						11–15	Reserved
0x3BE3–0x3BE4	15332–15333	R	–	INT32U	–	–	Drawer connected position counter. This counter increments for each rising edge of the drawer connected position.
0x3BE5–0x3BE6	15334–15335	R	–	INT32U	–	–	Drawer disconnected position counter. This counter increments for each rising edge of the drawer disconnected position.
0x3BE7–0x3BE8	15336–15337	R	–	INT32U	–	–	Drawer test position counter. This counter increments for each rising edge of the drawer test position.
0x3BE9–0x3BEC	15338–15341	R	–	DATETIME	–	–	Timestamp of the last change for the drawer connected position.
0x3BED–0x3BF0	15342–15345	R	–	DATETIME	–	–	Timestamp of the last change for the drawer disconnected position.
0x3BF1–0x3BF4	15346–15349	R	–	DATETIME	–	–	Timestamp of the last change for the drawer test position.
0x3BF5–0x3BFE	15350–15359	–	–	–	–	–	Reserved

Light Control

The table describes the registers related to the Light control predefined application performed by IO 1.

The registers 18400–18409 are related to the Light control predefined application performed by IO 2.

Address	Register	RW	Unit	Type	Range	Description
0x3C27	15400	R	–	INT16U	0–1	Quality of register 15401: • 0 = Invalid • 1 = Valid (application is configured and running)
0x3C28	15401	R	–	INT16U	0–1	Light status: • 0 = Reset/OFF • 1 = Set/ON
0x3C29– 0x3C2A	15402– 15403	R	s	INT32U	0–54000	Remaining time in ON or OFF state (depending of the light status)
0x3C2B–	15404	R	–	INT16U	0–2	Light simple command(1): • 0 = No command • 1 = Light OFF • 2 = Light ON
0x3C2C– 0x3C30	15405– 15409	–	–	–	–	Reserved

(1) Simple commands are enabled by factory setting. The simple commands can be disabled by using the command Enable/Disable simple commands.

Load Control

The table describes the registers related to the Load control predefined application performed by IO 1.

The registers 18410–18419 are related to the Load control predefined application performed by IO 2.

Address	Register	RW	Unit	Type	Range	Description
0x3C31	15410	R	–	INT16U	0–1	Quality of register 15411: • 0 = Invalid • 1 = Valid (application is configured and running)
0x3C32	15411	R	–	INT16U	0–1	Load status: • 0 = Reset/OFF • 1 = Set/ON
0x3C33– 0x3C34	15412– 15413	R	s	INT32U	0–54000	Remaining time in ON or OFF state (depending of the load status)
0x3C35	15414	R	–	INT16U	0–2	Load simple command(1): • 0 = No command • 1 = Load OFF • 2 = Load ON
0x3C36– 0x3EEC	15415– 16109	–	–	–	–	Reserved

(1) Simple commands are enabled by factory setting. The simple commands can be disabled by using the command Enable/Disable simple commands.

Analog Inputs

Availability

Analog inputs are not available in IO modules with hardware version greater than or equal to V002.000.000, and firmware version greater than or equal to V003.005.003.

Analog Input Register Mapping

The following table describes the analog inputs and corresponding registers and addresses of the IO module.

IO Module	Analog Input Addresses	Analog Input Registers
IO 1	0x35FF–0x3668	13824–13929
IO 2	0x41B7–0x4220	16824–16929

Analog Input Registers of IO 1

The order and the description of the analog input registers of IO 2 are the same as those of IO 1.

Address	Register	RW	Unit	Type	Range	Description
0x35FF–0x3600	13824–13825	–	–	–	–	Reserved
0x3601–0x3602	13826–13827	R	°C	FLOAT32	-50–250	Analog input sensor Pt100 temperature value (updated once every 1 s)
0x3603	13828	R	–	INT16U	0–1	Data quality of the analog input • 0 = Valid • 1 = Invalid
0x3604	13829	–	–	–	–	Reserved
0x3605–0x3608	13830–13833	R	–	DATETIME	–	Timestamp of the last change of +/- 1 °C of the analog data value
0x3609–0x360C	13834–13837	–	–	–	–	Reserved
0x360D–0x360E	13838–13839	R	°C	FLOAT32	-50–250	Analog input Pt100 maximum value
0x360F–0x3610	13840–13841	R	°C	FLOAT32	-50–250	Analog input Pt100 minimum value
0x3611–0x3614	13842–13845	R	–	DATETIME	–	Timestamp of minimum value of analog input value recorded
0x3615–0x3618	13846–13849	R	–	DATETIME	–	Timestamp of maximum value of analog input value recorded
0x3619–0x361C	13850–13853	R	–	DATETIME	–	Timestamp of last reset of min/max values of analog input value recorded
0x361D–0x361E	13854–13855	R	–	INT32U	0–65534	Switchboard temperature threshold 1 counter This counter increments every time threshold 1 is exceeded.
0x361F–0x3620	13856–13857	R	–	INT32U	0–65534	Switchboard temperature threshold 2 counter This counter increments every time threshold 2 is exceeded.
0x3621–0x3622	13858–13859	R	–	INT32U	0–65534	Switchboard temperature threshold 3 counter This counter increments every time threshold 3 is exceeded.

Address	Register	RW	Unit	Type	Range	Description
0x3623–0x363A	13860–13883	R	–	OCTET STRING	–	Analog input identification coded over 45 ASCII characters(1)
0x363B	13884	R	–	INT16U	0–2	Analog input type(1) • 0 = Analog input is not valid (factory setting) • 1 = Not applicable • 2 = Pt100
0x363C	13885	–	–	–	–	Reserved
0x363D–0x363E	13886–13887	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 1 pick-up value (Pt100) (1) Factory setting = 50 °C
0x363F–0x3640	13888–13889	R	s	FLOAT32	1–3600	Switchboard temperature threshold 1 pick-up time delay (Pt100)(1) Factory setting = 10 s
0x3641–0x3642	13890–13891	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 1 drop-out value (Pt100)(1) Factory setting = 45 °C
0x3643–0x3644	13892–13893	R	s	FLOAT32	1–3600	Switchboard temperature threshold 1 drop-out time delay (Pt100)(1) Factory setting = 10 s
0x3645–0x3646	13894–13895	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 2 pick-up value (Pt100)(1) Factory setting = 60 °C
0x3647–0x3648	13896–13897	R	s	FLOAT32	1–3600	Switchboard temperature threshold 2 pick-up time delay (Pt100)(1) Factory setting = 10 s
0x3649–0x364A	13898–13899	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 2 drop-out value (Pt100)(1) Factory setting = 55 °C
0x364B–0x364C	13900–13901	R	s	FLOAT32	1–3600	Switchboard temperature threshold 2 drop-out time delay (Pt100)(1) Factory setting = 10 s
0x364D–0x364E	13902–13903	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 3 pick-up value (Pt100)(1) Factory setting = 70 °C
0x364F–0x3650	13904–13905	R	s	FLOAT32	1–3600	Switchboard temperature threshold 3 pick-up time delay (Pt100)(1) Factory setting = 10 s
0x3651–0x3652	13906–13907	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 3 drop-out value (Pt100)(1) Factory setting = 65 °C
0x3653–0x3654	13908–13909	R	s	FLOAT32	1–3600	Switchboard temperature threshold 3 drop-out time delay (Pt100)(1) Factory setting = 10 s
0x3655–0x3656	13910–13911	R	Ω	FLOAT32	200–650	Motor temperature sensor fault threshold
0x3657–0x3668	13912–13929	–	–	–	–	Reserved

(1) Value set using EcoStruxure Power Commission software.

IO Module Events

What's in This Chapter

Event History 526
IO Module Events and Alarms 528

Event History

General Description

The event history registers describe the last 100 events. The event history format corresponds to a series of 100 records. Each record is composed of 5 registers describing one event.

A read request of 5x(n) registers is necessary to read the last n event records, where 5 is the number of registers for each event record.

For example, a read request of 5x3 = 15 registers is necessary to read the last 3 event records of the event history:

- The first five registers describe the first event record (most recent event).
- The next five registers describe the second event record.
- The last five registers describe the third event record.

There are two event histories, 1 per IO module.

IO Module	Address	Register	Description
IO 1	0x39A7–0x39AB	14760–14764	Event record 1 (most recent event record)
	0x39AC–0x39B0	14765–14769	Event record 2
	0x39A7+5x(n-1)–0x39AB+5x(n-1)	14760+5x(n-1)–14764+5x(n-1)	Event record n
	0x3B96–0x3B9A	15255–15259	Event record 100
IO 2	0x455F–0x4563	17760–17764	Event record 1 (most recent event record)
	0x4564–0x4568	17765–17769	Event record 2
	0x455F+5x(n-1)–0x4563+5x(n-1)	17760+5x(n-1)–17764+5x(n-1)	Event record n
	0x474E–0x4752	18255–18259	Event record 100

NOTE: The event history of IO modules connected to a MasterPacT MTZ circuit breaker can be read also by using the Get events command, page 537.

Event Record

A block request of five registers is necessary to read an event record.The order and the description of the event record registers of IO 2 are the same as those of IO 1:

Event Record 1 (Most Recent Event Record)				
Register	**Address**	**RW**	**Type**	**Description**
0x39A7	14760	R	INT16U	Event code of IO 1 and IO 2, page 528
0x39A8–0x39AA	14761–14763	R	ULP DATE	Date and time of the event
0x39AB	14764	R	INT16U	Event type MSB = 0 (reserved) Event occurrence: LSB = 1 Event completion: LSB = 2

Alarm Definition

Alarms are specific events that need to be reset.

The reset mode of an alarm can be:

- Automatic: The alarm is reset automatically when the alarm is no more active.
- Manual: The alarm is reset manually with the Test/Reset pushbutton located on the front face of the IO module and when the alarm is no more active.
- Remote: The alarm is reset remotely with the Reset command sent via the communication and when the alarm is no more active.

Each alarm has a priority level that manages the alarm display on the FDM121 display:

- No priority = N/A (not affected)
- Low priority = 1. No alarm display on the FDM121 display
- Medium priority = 2. The FDM121 display LED is steady ON.
- High priority = 3. The FDM121 display LED blinks and a pop-up screen informs that the alarm has occurred.

IO Module Events and Alarms

IO 1 Events and Alarms

Code	Application	Description	Type	Priority	Reset Mode
1537 (0x0601)	General	IO1 Watchdog reset	Event	Medium	–
1538 (0x0602)	General	IO1 reset to factory setting	Event	Medium	–
1539 (0x0603)	General	IO1 failure (STOP mode)	Alarm	High	Manual or Remote
1540 (0x0604)	General	IO1 failure (ERROR mode)	Alarm	Medium	Manual or Remote
1541 (0x0605)	General	IO1 functional rotary switch position change	Event	Medium	–
1542 (0x0606)	General	IO1 setting locking pad rotary switch position change	Event	Medium	–
1543 (0x0607)	General	IO1 source address dip switch position change	Event	Medium	–
1552 (0x0610)	General	IO1 O1 rising edge (OFF/ON change)	Event	Low	–
1553 (0x0611)	General	IO1 O2 rising edge (OFF/ON change)	Event	Low	–
1554 (0x0612)	General	IO1 O3 rising edge (OFF/ON change)	Event	Low	–
1555 (0x0613)	General	IO1 I1 rising edge (OFF/ON change)	Event	Low	–
1556 (0x0614)	General	IO1 I2 rising edge (OFF/ON change)	Event	Low	–
1557 (0x0615)	General	IO1 I3 rising edge (OFF/ON change)	Event	Low	–
1558 (0x0616)	General	IO1 I4 rising edge (OFF/ON change)	Event	Low	–
1559 (0x0617)	General	IO1 I5 rising edge (OFF/ON change)	Event	Low	–
1560 (0x0618)	General	IO1 I6 rising edge (OFF/ON change)	Event	Low	–
1561 (0x0619)	General	IO1 threshold overrun on I1 counter	Alarm	Medium	Manual or Remote
1562 (0x061A)	General	IO1 threshold overrun on I2 counter	Alarm	Medium	Manual or Remote
1563 (0x061B)	General	IO1 threshold overrun on I3 counter	Alarm	Medium	Manual or Remote
1564 (0x061C)	General	IO1 threshold overrun on I4 counter	Alarm	Medium	Manual or Remote
1565 (0x061D)	General	IO1 threshold overrun on I5 counter	Alarm	Medium	Manual or Remote
1566 (0x061E)	General	IO1 threshold overrun on I6 counter	Alarm	Medium	Manual or Remote
1567 (0x061F)	General	IO1 threshold overrun on O1 counter	Alarm	Medium	Manual or Remote
1568 (0x0620)	General	IO1 threshold overrun on O2 counter	Alarm	Medium	Manual or Remote
1569 (0x0621)	General	IO1 threshold overrun on O3 counter	Alarm	Medium	Manual or Remote

Code	Application	Description	Type	Priority	Reset Mode
1570 (0x0622)	General	IO1 I1 unforced/forced change	Event	Low	–
1571 (0x0623)	General	IO1 I2 unforced/forced change	Event	Low	–
1572 (0x0624)	General	IO1 I3 unforced/forced change	Event	Low	–
1573 (0x0625)	General	IO1 I4 unforced/forced change	Event	Low	–
1574 (0x0626)	General	IO1 I5 unforced/forced change	Event	Low	–
1575 (0x0627)	General	IO1 I6 unforced/forced change	Event	Low	–
1576 (0x0628)	General	IO1 O1 unforced/forced change	Event	Low	–
1577 (0x0629)	General	IO1 O2 unforced/forced change	Event	Low	–
1578 (0x062A)	General	IO1 O3 unforced/forced change	Event	Low	–
1579 (0x062B)	User-defined input acquisition	IO1 user-defined input 1	Alarm	Medium	Manual or Remote
1580 (0x062C)	User-defined input acquisition	IO1 user-defined input 2	Alarm	Medium	Manual or Remote
1581 (0x062D)	User-defined input acquisition	IO1 user-defined input 3	Alarm	Medium	Manual or Remote
1582 (0x062E)	User-defined input acquisition	IO1 user-defined input 4	Alarm	Medium	Manual or Remote
1583 (0x062F)	User-defined input acquisition	IO1 user-defined input 5	Alarm	Medium	Manual or Remote
1584 (0x0630)	User-defined input acquisition	IO1 user-defined input 6	Alarm	Medium	Manual or Remote
1585 (0x0631)	Cooling system	IO1 switchboard temperature threshold 1 overrun	Alarm	Low	Auto
1586 (0x0632)	Cooling system	IO1 switchboard temperature threshold 2 overrun	Alarm	Medium	Manual or Remote
1587 (0x0633)	Cooling system	IO1 switchboard temperature threshold 3 overrun	Alarm	High	Manual or Remote

NOTE: The alarm exit priority is fixed in IO module firmware. The value is Low, when available.

IO 2 Events and Alarms

Code	Application	Description	Type	Priority	Reset Mode
1793 (0x0701)	General	IO2 watchdog reset	Event	Medium	–
1794 (0x0702)	General	IO2 reset to factory settings	Event	Medium	–
1795 (0x0703)	General	IO2 module failure (STOP mode)	Alarm	High	Manual or Remote
1796 (0x0704)	General	IO2 module failure (ERROR mode)	Alarm	Medium	Manual or Remote
1797 (0x0705)	General	IO2 functional rotary switch position change	Event	Medium	–
1798 (0x0706)	General	IO2 setting locking pad rotary switch position change	Event	Medium	–

Code	Application	Description	Type	Priority	Reset Mode
1799 (0x0707)	General	IO2 source address dip switch position change	Event	–	–
1808 (0x0710)	General	IO2 O1 rising edge (OFF/ON change)	Event	Low	–
1809 (0x0711)	General	IO2 O2 rising edge (OFF/ON change)	Event	Low	–
1810 (0x0712)	General	IO2 O3 rising edge (OFF/ON change)	Event	Low	–
1811 (0x0713)	General	IO2 I1 rising edge (OFF/ON change)	Event	Low	–
1812 (0x0714)	General	IO2 I2 rising edge (OFF/ON change)	Event	Low	–
1813 (0x0715)	General	IO2 I3 rising edge (OFF/ON change)	Event	Low	–
1814 (0x0716)	General	IO2 I4 rising edge (OFF/ON change)	Event	Low	–
1815 (0x0717)	General	IO2 I5 rising edge (OFF/ON change)	Event	Low	–
1816 (0x0718)	General	IO2 I6 rising edge (OFF/ON change)	Event	Low	–
1817 (0x0719)	General	IO2 threshold overrun on I1 counter	Alarm	Medium	Manual or Remote
1818 (0x071A)	General	IO2 threshold overrun on I2 counter	Alarm	Medium	Manual or Remote
1819 (0x071B)	General	IO2 threshold overrun on I3 counter	Alarm	Medium	Manual or Remote
1820 (0x071C)	General	IO2 threshold overrun on I4 counter	Alarm	Medium	Manual or Remote
1821 (0x071D)	General	IO2 threshold overrun on I5 counter	Alarm	Medium	Manual or Remote
1822 (0x071E)	General	IO2 threshold overrun on I6 counter	Alarm	Medium	Manual or Remote
1823 (0x071F)	General	IO2 threshold overrun on O1 counter	Alarm	Medium	Manual or Remote
1824 (0x0720)	General	IO2 threshold overrun on O2 counter	Alarm	Medium	Manual or Remote
1825 (0x0721)	General	IO2 threshold overrun on O3 counter	Alarm	Medium	Manual or Remote
1826 (0x0722)	General	IO2 I1 unforced/forced change	Event	Low	–
1827 (0x0723)	General	IO2 I2 unforced/forced change	Event	Low	–
1828 (0x0724)	General	IO2 I3 unforced/forced change	Event	Low	–
1829 (0x0725)	General	IO2 I4 unforced/forced change	Event	Low	–
1830 (0x0726)	General	IO2 I5 unforced/forced change	Event	Low	–
1831 (0x0727)	General	IO2 I6 unforced/forced change	Event	Low	–
1832 (0x0728)	General	IO2 O1 unforced/forced change	Event	Low	–
1833 (0x0729)	General	IO2 O2 unforced/forced change	Event	Low	–
1834 (0x072A)	General	IO2 O3 unforced/forced change	Event	Low	–

Code	Application	Description	Type	Priority	Reset Mode
1835 (0x072B)	User-defined input acquisition	IO2 user-defined input 1	Alarm	Medium	Manual or Remote
1836 (0x072C)	User-defined input acquisition	IO2 user-defined input 2	Alarm	Medium	Manual or Remote
1837 (0x072D)	User-defined input acquisition	IO2 user-defined input 3	Alarm	Medium	Manual or Remote
1838 (0x072E)	User-defined input acquisition	IO2 user-defined input 4	Alarm	Medium	Manual or Remote
1839 (0x072F)	User-defined input acquisition	IO2 user-defined input 5	Alarm	Medium	Manual or Remote
1840 (0x0730	User-defined input acquisition	IO2 user-defined input 6	Alarm	Medium	Manual or Remote
1841 (0x0731)	Cooling system	IO2 switchboard temperature threshold 1 overrun	Alarm	Low	Auto
1842 (0x0732)	Cooling system	IO2 switchboard temperature threshold 2 overrun	Alarm	Medium	Manual or Remote
1843 (0x0733)	Cooling system	IO2 switchboard temperature threshold 3 overrun	Alarm	High	Manual or Remote

NOTE: The alarm exit priority is fixed in IO firmware. The value is Low, when available.

IO 1 and IO 2 Events and Alarms

Code	Application	Description	Type	Priority	Reset Mode
2304 (0x0900)	Cradle management	Cradle position discrepancy	Alarm	Medium	Manual or Remote
2305 (0x0901)	Cradle management	Cradle connected contact change	Alarm	Low	Manual or Remote
2306 (0x0902)	Cradle management	Cradle disconnected contact change	Alarm	Low	Manual or Remote
2307 (0x0903)	Cradle management	Cradle test contact change	Alarm	Low	Manual or Remote
2308 (0x0904)	Cradle management	Remove device from cradle and put it back	Alarm	Medium	Manual or Remote
2309 (0x0905)	Cradle management	Cradle has reached its maximum number of operations	Alarm	High	Manual or Remote
2310 (0x0906)	Cradle management	Remaining service life of cradle is below alarm threshold	Alarm	Medium	Manual or Remote
2311 (0x0907)	Cradle management	New MicroLogic trip/control unit has been detected.	Alarm	High	Manual or Remote
2432 (0x0980	Drawer management	Drawer position discrepancy	Alarm	Medium	Manual or Remote
2560 (0x0A00)	Load control	Auxiliary contact of the load contactor 1 is not closed	Alarm	Medium	Manual or Remote
2561 (0x0A01)	Load control	Auxiliary contact of the load contactor 1 is not opened	Alarm	Medium	Manual or Remote
2816 (0x0B00)	Predefined input acquisition	Earth leakage trip signal contact (SDV)	Alarm	Medium	Manual or Remote
2817 (0x0B01)	Predefined input acquisition	Control voltage presence contact	Alarm	Medium	Manual or Remote
2818 (0x0B02)	Predefined input acquisition	Surge protection status contact	Alarm	Medium	Manual or Remote
2819 (0x0B03)	Predefined input acquisition	Surge failure contact	Alarm	Medium	Manual or Remote

Code	Application	Description	Type	Priority	Reset Mode
2820 (0x0B04)	Predefined input acquisition	Switch-disconnector ON/OFF indication contact (OF)	Alarm	Medium	Manual or Remote
2821 (0x0B05)	Predefined input acquisition	Fuse blown indication contact	Alarm	Medium	Manual or Remote
2822 (0x0B06)	Predefined input acquisition	Emergency stop	Alarm	High	Manual or Remote
2823 (0x0B07)	Cooling system	Switchboard temperature contact	Alarm	Medium	Manual or Remote
2824 (0x0B08)	Cooling system	Switchboard ventilation contact	Alarm	Medium	Manual or Remote
2825 (0x0B09)	Cooling system	Switchboard door contact	Alarm	Medium	Manual or Remote
3072 (0x0C00)	Protection settings	Discrepancy between ERMS OFF order and ERMS ON order (MasterPacT NT/NW, ComPacT NS, PowerPacT P- and R-frame only)	Alarm	High	Manual or Remote
3328 (0x0D00)	General	Critical hardware modules discrepancy	Alarm	High	Auto
3329 (0x0D01)	General	Critical firmware modules discrepancy	Alarm	High	Auto
3330 (0x0D02)	General	Non-critical hardware modules discrepancy	Alarm	Medium	Auto
3331 (0x0D03)	General	Non-critical firmware modules discrepancy	Alarm	Medium	Auto
3333 (0x0D05)	Dual settings	Dual settings 2-wire input discrepancy (MasterPacT MTZ with MicroLogic X control unit only)	Alarm	High	Auto

IO Module Commands

What's in This Chapter

List of IO Module Commands 534
Generic Commands 535
Application Commands 540

List of IO Module Commands

List of Commands

There are two types of command:

- Generic commands which work independently of the application selected.
- Application commands which are dedicated to an application. A command is only valid if the related application is configured.

The following table lists the available IO module commands, their corresponding application, command codes and user profiles. Follow the command execution procedures, page 61.

Application	Command	Command code	User profile
Generic	Change output state, page 535	1672	Administrator or Operator
Generic	Reset IO module alarms, page 535	41099	Administrator or Operator
Generic	Enable/Disable simple commands, page 535	41100	Administrator or Operator
Generic	Acknowledge latched output, page 536	41102	Administrator or Operator
Generic	Reset analog input minimum/maximum values, page 536	42890	Administrator or Operator
Generic	Get events, page 537	50560	No password required
Cradle and drawer management	Preset cradle/drawer counters, page 540	41352	Administrator or Operator
Cradle and drawer management	Preset cradle/drawer regrease timers, page 540	41353	Administrator or Operator
Light control	Light control, page 541	42120	Administrator or Operator
Load control	Load control, page 541	42376	Administrator or Operator
Pulse counter management	Preset input pulse counter, page 542	42888	Administrator or Operator
Cooling system	Preset switchboard temperature threshold counter, page 543	42889	Administrator or Operator

IO Module Error Codes

The error codes generated by the IO module are the generic error codes, page 64.

Generic Commands

Change Output State

The command is used to change the state of IO module digital outputs assigned as user-defined outputs using EcoStruxure Power Commission software.

To change the output state, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1672	Command code = **1672**
0x1F40	8001	–	INT16U	13	Number of parameters (bytes) = 13
0x1F41	8002	–	INT16U	–	Destination = • IO 1: 8193 (0x2001) • IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	INT16U	1–3	Output number • 1 = output 1 • 2 = output 2 • 3 = output 3
0x1F46	8007	–	INT16U	–	Value to set: • 0x0000 = Change output state to 0 (OFF) • 0x0100 = Change output state to 1 (ON)

Reset IO Module Alarm

The alarms can be read from the alarm status register, page 517.

To reset IO module alarms, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41099	Command code = **41099**
0x1F40	8001	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	INT16U	–	Destination = • IO 1: 8193 (0x2001) • IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Enable/Disable Simple Commands

To enable or disable the simple commands, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41100	Command code = **41100**
0x1F40	8001	–	INT16U	11	Number of parameters (bytes) = 11
0x1F41	8002	–	INT16U	–	Destination = • IO 1: 8193 (0x2001)

Address	Register	Unit	Type	Range	Description
					• IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	INT16U	–	MSB: Enable or disable: • 0 = Disable simple command • 1 = Enable simple command LSB: 0 (not used)

Acknowledge Latched Output

To acknowledge the latched output, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41102	Command code = **41102**
0x1F40	8001	–	INT16U	11	Number of parameters (bytes) = 11
0x1F41	8002	–	INT16U	–	Destination = • IO 1: 8193 (0x2001) • IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	INT16U	–	MSB: • 0x01 = Digital output relay 1 • 0x02 = Digital output relay 2 • 0x03 = Digital output relay 3 • 0xFF = Unlatch all digital output LSB: 0 (not used)

Reset Analog Input Minimum/Maximum Values

The analog input maximum and minimum values can be read from the analog input registers, page 523.

To reset the minimum/maximum analog input values, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	42890	Command code = **42890**
0x1F40	8001	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	INT16U	–	Destination = • IO 1: 8193 (0x2001) • IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Get Events Command

To get events, set the command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	50560	–	Command code = **50560**
0x1F40	8001	–	INT16U	27	–	Number of parameters (bytes) = 27
0x1F41	8002	–	INT16U	–	–	Destination = • IO 1: 8193 (0x2001) • IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	0	–	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	–	Password of the command = 0 (no password required)
0x1F45	8006	–	–	–	–	Reserved
0x1F46	8007	–	INT16U	0, 2	–	Requested get event method, page 538: • 0 = Most recent events • 2 = Events before and up to a sequence number
0x1F47–0x1F4A	8008–8011	–	–	–	–	Reserved
0x1F4B–0x1F4C	8012–8013	–	INT32U	–	–	Requested event sequence number (for method 2 only)
0x1F4D	8014	–	INT16U	–	–	Requested event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved

Events are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	50560	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: • 0 = Successful command • Other value = command with error, page 63
0x1F55	8022	–	INT16U	–	–	Number of bytes returned
0x1F56	8023	–	–	–	–	Reserved
0x1F57	8024	–	INT16U	0, 2	–	Responded get event method: • 0 = Most recent events • 2 = Events before and up to a sequence number
0x1F5E	8031	–	INT16U	–	–	Responded event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved
0x1F5F	8032	–	INT16U	–	–	MSB: Number of events returned
					–	LSB: Remaining events • 0 = No more events to get • 1 = More events to get

Address	Register	Unit	Type	Range	Bit	Description
0x1F60	8033	–	INT16U	1013-25630	–	First event code, page 528
0x1F61–0x1F64	8034–8037	–	DATETIME	–	–	Timestamp of the first event
0x1F65	8038	–	INT16U	–	–	Timestamp quality of the first event
0x1F66–0x1F67	8039–8040	–	INT32U	–	–	First event sequence number
0x1F68	8041	–	INT16U	–	–	MSB: First event status • 1 = Occurrence • 2 = Completion • 3 = Pulse LSB: Reserved
0x1F69	8042	–	–	–	–	Reserved
0x1F6A	8043	–	INT16U	–	–	First event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved
0x1F6B–0x1F75	8044–8054	–	INT16U	–	–	Characteristics of event 2 (same as event 1)
0x1F76–0x1F80	8055–8065	–	INT16U	–	–	Characteristics of event 3 (same as event 1)
0x1F81–0x1F8B	8066–8076	–	INT16U	–	–	Characteristics of event 4 (same as event 1)
0x1F8C–0x1F96	8077–8087	–	INT16U	–	–	Characteristics of event 5 (same as event 1)
0x1F97–0x1FA1	8088–8098	–	INT16U	–	–	Characteristics of event 6 (same as event 1)
0x1FA2–0x1FAC	8099–8109	–	INT16U	–	–	Characteristics of event 7 (same as event 1)
0x1FAD–0x1FB7	8110–8120	–	INT16U	–	–	Characteristics of event 8 (same as event 1)
0x1FB8–0x1FC2	8121–8131	–	INT16U	–	–	Characteristics of event 9 (same as event 1)
0x1FC3–0x1FCD	8132–8142	–	INT16U	–	–	Characteristics of event 10 (same as event 1)

Get Events Procedure

The command allows to get events by using one of the two following methods:

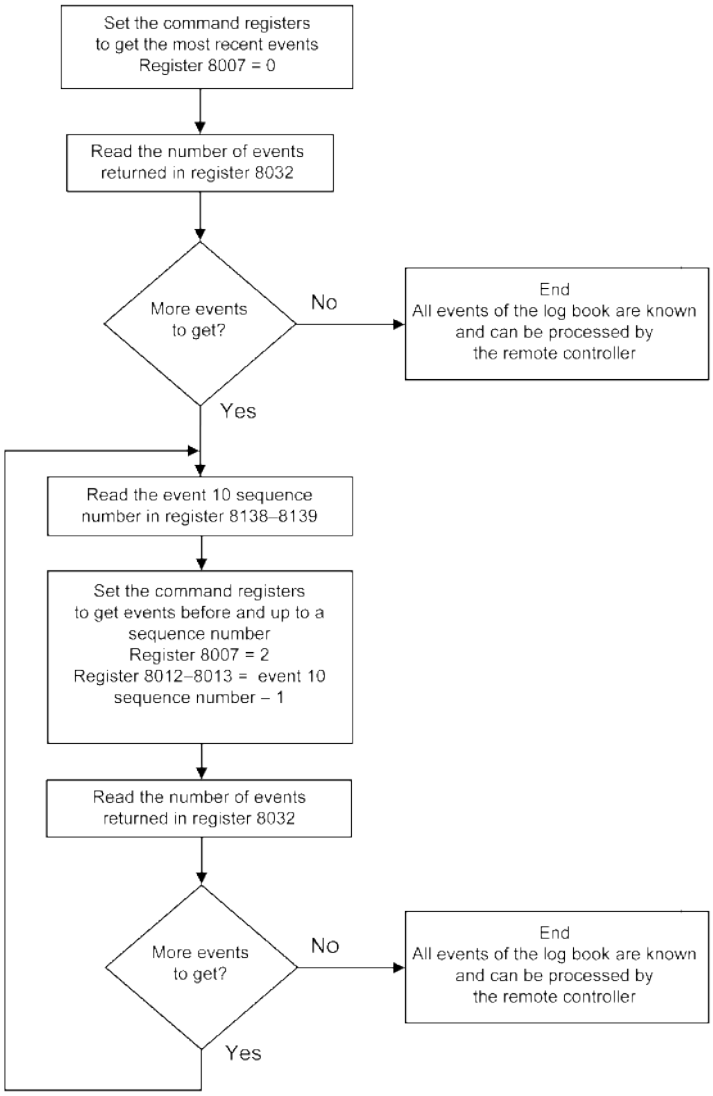
- get the most recent events
- get events before and up to an event sequence number. The event sequence number is an event identifier defined by the device, and is available among the event characteristics. It can be used to sort the events in chronological order.

The command allows to get 10 events maximum for one or several severity levels.

- To get the 10 most recent events, use the method “get the most recent events”.
- If there are more than 10 events, use the other method “get events before and up to an event sequence number” to get rest of the events.

Example: Read all events:

The following diagram shows the steps to follow to read all events recorded in the device:



Application Commands

Preset Cradle/Drawer Counters

The cradle/drawer counter values can be read from the cradle management registers, page 520.

To preset the cradle or drawer counters, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41352	Command code = **41352**
0x1F40	8001	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	INT16U	–	Destination = • IO 1: 8193 (0x2001) • IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	INT16U	0–65535	Connected counter reset/preset: • 0–65534 = preset value of the connected counter • 65535 (0xFFFF) = do not preset the connected counter
0x1F46	8007	–	INT16U	0–65535	Disconnected counter reset/preset: • 0–65534 = preset value of the disconnected counter • 65535 (0xFFFF) = do not preset the disconnected counter
0x1F47	8008	–	INT16U	0–65535	Test counter reset/preset: • 0–65534 = preset value of the test counter • 65535 (0xFFFF) = do not preset the test counter

Preset Regrease Timers

To preset regrease timers, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41353	Command code = **41353**
0x1F40	8001	–	INT16U	18	Number of parameters (bytes) = 18
0x1F41	8002	–	INT16U	–	Destination = • IO 1: 8193 (0x2001) • IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45–0x1F46	8006–8007	–	INT16U	–	Operating time since last grease maintenance • 0–157766400 = preset value of regrease timer counter • 4294967295 (0xFFFFFFFF) = No preset
0x1F47–0x1F48	8008–8009		INT32U	–	Operating time since last move in rack in position (delay from last disconnection) • 0–28944000 = preset value of remove timer • 4294967295 (0xFFFFFFFF) = No preset

Light Control

The light command status can be read from the light control registers, page 521.

To control the light, set the command registers as follows:

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	42120	–	Command code = **42120**
0x1F40	8001	–	INT16U	13	–	Number of parameters (bytes) = 13
0x1F41	8002	–	INT16U	–	–	Destination = IO 1: 8193 (0x2001)
0x1F42	8003	–	INT16U	1	–	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	INT16U	–	0–7	MSB of the time delay 1–54000 seconds (if bit 9 = 1) Any value 0-0xFFFF (if bit 9 = 0)
					8	• 0 = Light OFF • 1 = Light ON
					9	• 0 = without time delay • 1 = with time delay
					10–15	0 (not used)
0x1F46	8007	–	INT16U	–	0–7	0 (not used)
					8–15	LSB of the time delay 1–54000 seconds (if bit 9 = 1) Any value 0-0xFFFF (if bit 9 = 0)

Example: to send a command to switch on the light with a time delay of 1 hour (3600 s or **0x0E10** s), the command registers 8006 and 8007 must be set as follows:

- register 8006 = 0x03**0E**
- register 8007 = 0x**10**00

Load Control

The load command status can be read from the load control registers, page 522.

To control the load, set the command registers as follows:

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	42376	–	Command code = **42376**
0x1F40	8001	–	INT16U	13	–	Number of parameters (bytes) = 13
0x1F41	8002	–	INT16U	–	–	Destination = IO 1: 8193 (0x2001)
0x1F42	8003	–	INT16U	1	–	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	INT16U	–	0–7	MSB of the time delay 1–54000 seconds (if bit 9 = 1) Any value 0-0xFFFF (if bit 9 = 0)
					8	• 0 = Load OFF • 1 = Load ON

Address	Register	Unit	Type	Range	Bit	Description
					9	• 0 = without time delay • 1 = with time delay
					10–15	0 (not used)
0x1F46	8007	–	INT16U	–	0–7	0 (not used)
					8–15	LSB of the time delay 1–54000 seconds (if bit 9 = 1) Any value 0-0xFFFF (if bit 9 = 0)

Example: to send a command to turn on the load with a time delay of 30 minutes (1800 s or **0x0708** s), the command registers 8006 and 8007 must be set as follows:

- register 8006 = 0x03**07**
- register 8007 = 0x**08**00

Preset Input Pulse Counters

To preset pulse counters, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	42888	Command code = **42888**
0x1F40	8001	–	INT16U	34	Number of parameters (bytes) = 34 **NOTE:** The number of parameters corresponds to the number of bytes of the 17 registers 8001–8015 and 8022–8023. The bytes of the registers 8016–8021 are not counted as command parameters.
0x1F41	8002	–	INT16U	–	Destination = • IO 1: 8193 (0x2001) • IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45– 0x1F46	8006– 8007	–	INT32U	0–4294967295	I1 pulse counter reset/preset: • 0–4294967294 = preset value of the I1 pulse counter • 4294967295 (0xFFFFFFFF) = do not preset the I1 pulse counter
0x1F47– 0x1F48	8008– 8009	–	INT32U	0–4294967295	I2 pulse counter reset/preset: • 0–4294967294 = preset value of the I2 pulse counter • 4294967295 (0xFFFFFFFF) = do not preset the I2 pulse counter
0x1F49– 0x1F4A	8010– 8011	–	INT32U	0–4294967295	I3 pulse counter reset/preset: • 0–4294967294 = preset value of the I3 pulse counter • 4294967295 (0xFFFFFFFF) = do not preset the I3 pulse counter
0x1F4B– 0x1F4C	8012– 8013	–	INT32U	0–4294967295	I4 pulse counter reset/preset: • 0–4294967294 = preset value of the I4 pulse counter • 4294967295 (0xFFFFFFFF) = do not preset the I4 pulse counter
0x1F4D– 0x1F4E	8014– 8015	–	INT32U	0–4294967295	I5 pulse counter reset/preset:

Address	Register	Unit	Type	Range	Description
					• 0–4294967294 = preset value of the I5 pulse counter • 4294967295 (0xFFFFFFFF) = do not preset the I5 pulse counter
0x1F4F	8016	–	–	–	Must be set to 0 (factory setting).
0x1F50	8017	–	–	–	Must be set to 8019 (factory setting).
0x1F51	8018	–	–	–	Must be set to 8020 (factory setting).
0x1F52	8019	–	–	–	Must be set to 8021 (factory setting).
0x1F53	8020	–	–	–	Must be set to 0.
0x1F54	8021	–	–	–	Must be set to 0.
0x1F55– 0x1F56	8022– 8023	–	INT32U	0–4294967295	I6 pulse counter reset/preset: • 0–4294967294 = preset value of the I6 pulse counter • 4294967295 (0xFFFFFFFF) = do not preset the I6 pulse counter

Preset Switchboard Temperature Threshold Counters

To preset switchboard temperature threshold counters, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	42889	Command code = **42889**
0x1F40	8001	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	INT16U	–	Destination = • IO 1: 8193 (0x2001) • IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	INT16U	0–65535	Switchboard temperature threshold 1 counter reset/preset: • 0–65534 = preset value of the switchboard temperature threshold 1 counter • 65535 (0xFFFF) = do not preset the counter
0x1F46	8007	–	INT16U	0–65535	Switchboard temperature threshold 2 counter reset/preset: • 0–65534 = preset value of the switchboard temperature threshold 2 counter • 65535 (0xFFFF) = do not preset the counter
0x1F47	8008	–	INT16U	0–65535	Switchboard temperature threshold 3 counter reset/preset: • 0–65534 = preset value of the switchboard temperature threshold 3 counter • 65535 (0xFFFF) = do not preset the counter

IFM Communication Interface Data

What's in This Part

IFM Communication Interface Registers.....545
IFM Communication Interface Commands.....552

IFM Communication Interface Registers

What's in This Chapter

Introduction 546
IFM Communication Interface Identification 547
Modbus Network Parameters 550

Introduction

This chapter describes the Modbus registers 11744 to 12403 of an IFM communication interface.

IFM Register Table Format

IFM Modbus register tables have the following columns:

Address	Register	RW	Unit	Type	Range	Description

- **Address**: a 16-bit register address in hexadecimal. The address is data used in the Modbus frame.
- **Register**: a 16-bit register number in decimal (register = address + 1).
- **RW**: register read-write status
  - R: the register can be read by using Modbus functions
  - W: the register can be written by using Modbus functions
  - RW: the register can be read and written by using Modbus functions
  - RC: the register can be read by using the command interface
  - WC: the register can be written by using the command interface
- **Unit**: the unit the information is expressed in
- **Type**: the encoding data type (see data type description below)
- **Range**: the permitted values for this variable, usually a subset of what the format allows
- **Description**: provides information about the register and restrictions that apply

IFM Data Types

Data Types	Description	Range
INT16U	16-bit unsigned integer	0 to 65535
INT32U	32-bit unsigned integer	0 to 4 294 967 295
OCTET STRING	Text string	1 byte per character
DATETIME	Date and time in the IEC 60870-5 format	–

See detailed descriptions of the data types in the Appendix, page 580.

IFM Communication Interface Identification

IFM Communication Interface Firmware Version

The IFM communication interface firmware revision starts at register 11776 and has a maximum length of eight registers.

The firmware revision is an ASCII string using the format AAA.BBB.CCC with:

- AAA = major version (000–127)
- BBB = minor version (000–255)
- CCC = revision number (000–255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x2DDF–0x2DEE	11744–11759	R	–	OCTET STRING	–	Device family
0x2DEF–0x2DF6	11760–11767	R	–	OCTET STRING	–	Product range
0x2DF7–0x2DFE	11768–11775	R	–	OCTET STRING	–	Product model
0x2DFF–0x2E04	11776–11781	R	–	OCTET STRING	–	Firmware revision

Serial Number for IFM Communication Interface TRV00210 or STRV00210

The serial number of IFM communication interface TRV00210 or STRV00210 is composed of a maximum of 11 alphanumeric characters with the following format: PPYYWWDnnnn.

- PP = plant code
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- nnnn = production number of the device on the day (0001–9999)

A read request of six registers is necessary to read the IFM communication interface serial number.

Address	Register	RW	Unit	Type	Range	Description
0x2E07	11784	R	–	OCTET STRING	–	‘PP’
0x2E08	11785	R	–	OCTET STRING	‘05’–‘99’	‘YY’
0x2E09	11786	R	–	OCTET STRING	‘01’–‘53’	‘WW’
0x2E0A	11787	R	–	OCTET STRING	D: ‘1’–‘7’ n: ‘0’–‘9’	‘Dn’
0x2E0B	11788	R	–	OCTET STRING	‘00’–‘99’	‘nn’
0x2E0C	11789	R	–	OCTET STRING	‘0’–‘9’	‘n’ (the NULL character ends the serial number)

Serial Number for IFM Communication Interface LV434000

The serial number of IFM communication interface LV434000 is composed of a maximum of 17 alphanumeric characters with the following format: PPPPPPYYWWDLnnnn0.

- PPPPPP = plant code (example: BATAM plant code is 0000HL)
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- L = line or machine number (0-9 or a-z)
- nnnn = production number of the device on the day (0001–9999)

A read request of ten registers is necessary to read the IFM communication interface serial number.

Address	Register	RW	Unit	Type	Range	Description
0x2E5C-0x2E5E	11869-11871	R	–	OCTET STRING	–	'PPPPPP'
0x2E5F	11872	R	–	OCTET STRING	'05'–'99'	'YY'
0x2E60	11873	R	–	OCTET STRING	'01'–'53'	'WW'
0x2E61	11874	R	–	OCTET STRING	D: '1'–'7' L: '0'–'9' or 'a'–'z	'DL'
0x2E62	11875	R	–	OCTET STRING	'00'–'99'	'nn'
0x2E63	11876	R	–	OCTET STRING	'00'–'99'	'nn'
0x2E64-0x2E65	11877-11878	R	–	OCTET STRING	'0'	'0' (the NULL character ends the serial number)

Current Date and Time

Address	Register	RW	Unit	Type	Range	Description
0x2E73–0x2E76	11892–11895	R-WC	–	DATETIME	–	Current date and time in DATETIME format
0x2E77–0x2E78	11896–11897	R	Seconds	INT32U	0x00–0xFFFFFFFF	Number of seconds counted since last start

Product Identification

Address	Register	RW	Unit	Type	Range	Description
0x2E7C	11901	R	–	INT16U	–	Product identification = 15146 for the IFM communication interface

Hardware Revision for IFM Communication Interface LV434000

The hardware revision of IFM communication interface LV434000 starts at register 11922 and has a maximum length of ten registers.

The hardware revision is an ASCII string using the format AAA.BBB.CCC with:

- AAA = major version (000–127)

- BBB = minor version (000–255)
- CCC = revision number (000–255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x2E91–0x2E96	11922–11927	R	–	OCTET STRING	–	Hardware revision

Read Device Identification

The Read Device Identification function is used to access in a standardized manner the information required to identify a device. The description is made up of a set of objects (ASCII character strings).

A complete description of the Read Device Identification function is available at www.modbus.org.

The coding for the identification of the IFM communication interface is the following:

Name	Type	Description
Vendor name	OCTET STRING	'Schneider Electric' (18 characters)
Product code	OCTET STRING	'LV434000' or 'TRV00210' (1) or 'STRV00210'
Firmware version	OCTET STRING	'AAA.BBB.CCC' from IFM communication interface revision 002.002.000
Vendor URL	OCTET STRING	'https://www.se.com' (33 characters)
Product name	OCTET STRING	'ULP/Modbus SL communication interface module'
(1) Product code returns 'TRV00210-L' when IFM communication interface TRV00210 is loaded with IFM legacy firmware. For more information, refer to the *MasterPacT Modbus Legacy User Guide*.		

IMU Identification

Identification of the IMU can be set by using the EcoStruxure Power Commission software, page 22. When not programmed, the IMU identification registers return 0 (0x0000).

The FDM121 display displays the first 14 characters of the IMU name.

Address	Register	RW	Unit	Type	Range	Description
0x2801–0x2820	10242–10273	R-WC	–	OCTET STRING	–	User application name Maximum length is 64 characters.
0x2E18–0x2E2E	11801–11823	R	–	OCTET STRING	–	IMU name = up to 45 ASCII characters ended by the NULL character 0x00
0x2E2F–0x2E38	11824–11833	R	–	OCTET STRING	–	Vendor name = 'Schneider Electric'
0x2E39–0x2E42	11834–11843	R	–	OCTET STRING	–	Product Code = 'LV434000' or 'TRV00210' or 'STRV00210'
0x2E43–0x2E44	11844–11845	R	–	OCTET STRING	–	Reserved
0x2E45–0x2E5B	11846–11868	R	–	OCTET STRING	–	IMU location = up to 45 ASCII characters ended by the NULL character 0x00

Modbus Network Parameters

Modbus Locking Status

Address	Register	RW	Unit	Type	Range	Description
0x2E72	11891	R	–	INT16U	1–3	Modbus locking pad position • 1 = Modbus locking pad is on the locked position • 3 = Modbus locking pad is on the open position

Validity Duration of Data

Address	Register	RW	Unit	Type	Range	Description
0x306A	12395	R	s	INT16U	5–300 (in steps of 5 s)	Duration of validity of data in the dataset

Auto-Speed Sensing State

Address	Register	RW	Unit	Type	Range	Description
0x306E	12399	R	–	INT16U	0–1	Auto-Speed sensing state • 0 = Auto-Speed sensing is disabled • 1 = Auto-Speed sensing is enabled (factory setting)

Communication Interface Modbus Address

Address	Register	RW	Unit	Type	Range	Description
0x306F	12400	R	–	INT16U	1–99	Communication interface Modbus address

Modbus Parity

Address	Register	RW	Unit	Type	Range	Description
0x3070	12401	R	–	INT16U	1–3	Modbus parity • 1 = no parity (none) • 2 = even parity (factory setting) • 3 = odd parity

Modbus Baud Rate

Address	Register	RW	Unit	Type	Range	Description
0x3071	12402	R	–	INT16U	5–8	Modbus Baud rate • 5 = 4800 Baud • 6 = 9600 Baud • 7 = 19200 Baud (factory setting) • 8 = 38400 Baud

Number of Stop Bits

Address	Register	RW	Unit	Type	Range	Description
0x3072	12403	R	–	INT16U	0–5	Number of stop bits • 0 = no change • 1 = standard Modbus • 2 = 1/2 stop bit • 3 = 1 stop bit • 4 = 1 and 1/2 stop bit • 5 = 2 stop bits

IFM Communication Interface Commands

What's in This Chapter

List of IFM Communication Interface Commands 553
IFM Communication Interface Commands 554

List of IFM Communication Interface Commands

List of Commands

The following table lists the IFM communication interface commands, their corresponding command codes and user profiles. Follow the command execution procedures, page 61.

Command	Command code	User profile
Get current time, page 554	768	No password required
Set absolute time, page 554	769	No password required
Read IMU name and location, page 555	1024	No password required
Write user application name, page 556	1032	No password required
Set validity duration of data, page 556	41868	Administrator, Services, Engineer, or Operator

Error Codes

Error codes generated by the IFM communication interface are the generic error codes, page 64.

IFM Communication Interface Commands

Get Current Time

The get current time command is not hardware protected. When the arrow of the Modbus locking pad (located on the front panel of the IFM communication interface) points to the closed padlock, the get current time command is still enabled.

To get the current time for all modules, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	768	Command code = **768**
0x1F40	8001	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	INT16U	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The following registers contain the time data:

- Register 8023 holds the month in the MSB, the day in the LSB.
- Register 8024 holds the year offset in the MSB (add 2000 to get the year) and the hour in the LSB.
- Register 8025 holds the minutes in the MSB, the seconds in the LSB.
- Register 8026 holds the milliseconds.

Set Absolute Time

The set absolute time command is not hardware protected. When the arrow of the Modbus locking pad (located on the front panel of the IFM communication interface) points to the closed padlock, the set absolute time command is still enabled.

To set the absolute time for all the IMU modules, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	769	Command code = **769**
0x1F40	8001	–	INT16U	18	Number of parameters (bytes) = 18
0x1F41	8002	–	INT16U	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45	8006	–	INT16U	–	MSB = month (1–12) LSB = day in the month (1–31)
0x1F46	8007	–	INT16U	–	MSB = year (0–99, 0 meaning year 2000) LSB = hour (0–23)
0x1F47	8008	–	INT16U	–	MSB = minutes (0–59) LSB = seconds (0–59)
0x1F48	8009	ms	INT16U	0–999	Milliseconds (0–999)

In case of 24 Vdc power loss, the date and time counters are reset and will restart at January 1 2000. It is therefore mandatory to set absolute time for all the IMU modules after recovering the 24 Vdc power supply.

Furthermore, due to the clock drift of each IMU module, it is mandatory to set absolute time for all the IMU modules periodically. Recommended period is at least every 15 minutes.

Read IMU Name and Location

The FDM121 display displays the first 14 characters of the IMU name.

To read the IMU name and location, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1024	Command code = **1024**
0x1F40	8001	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	INT16U	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	–	17039489 = read IMU name (load 0x0104 into register 8006, 0x0081 into 8007) 17039490 = read IMU location (load 0x0104 into register 8006, 0x0082 into 8007)
0x1F47	8008	–	INT16U	2048	2048

The IMU name and location are returned to command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	1024	Last command code
0x1F54	8021	–	INT16U	–	Command status 0 = command succeeded Otherwise, command failed
0x1F55	8022	–	INT16U	–	Number of bytes returned (0 if command failed)
0x1F56	8023	–	OCTET STRING	–	If command succeeded MSB = first character of IMU name or location LSB = second character of IMU name or location
0x1F57–0x1F6D	8024–8046	–	OCTET STRING	–	Depends on the length of the IMU name or location and ends with the NULL character 0x00

Write User Application Name

The user application name can be read from registers 10242 to 10273.

The FDM121 display displays the first 14 characters of the IMU name.

To write the user application name, IMU name or IMU location set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1032	Command code = **1032**
0x1F40	8001	–	INT16U	–	Number of parameters (bytes) = depends on the length of the user application name (up to 46 characters)
0x1F41	8002	–	INT16U	0	Destination = 0 (0x0000)
0x1F42	8003	–	INT16U	0	Security type of the command: indicates if password is required
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	–	Write the user application name, IMU name or IMU location, depending on this value 17039366 = User application name (load 0x0104 into register 8006, 0x0006 into 8007) 17039489 = write IMU name (load 0x0104 into register 8006, 0x0081 into 8007) 17039490 = write IMU location (load 0x0104 into register 8006, 0x0082 into 8007)
0x1F47	8008	–	INT16U	2048	2048
0x1F48	8009	–	OCTET STRING	–	• MSB = First character of the user application name, IMU name or IMU location • LSB = Second character of the user application name, IMU name or IMU location
0x1F49–0x1F5F	8010–8038	–	OCTET STRING	–	Depends on the length of the user application name, IMU name or IMU location, and ends with the NULL character 0x00

Set Validity Duration of Data

This command is used to set the validity duration of data in the standard and legacy datasets.

The validity duration of data can be read in a register Validity Duration of Data, page 550.

To set the validity duration of data, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41868	Command code = 41868
0x1F40	8001	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	INT16U	769	Destination = 769 (0x0301)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator, Services, Engineer, or Operator user profile password
0x1F45	8006	s	INT16U	5–300 (in steps of 5 s)	Validity duration of data Factory setting: 10 s

IFE/EIFE Communication Interface Data

What's in This Part

IFE/EIFE Communication Interface Registers 558
IFE/EIFE Communication Interface Commands 570

IFE/EIFE Communication Interface Registers

What's in This Chapter

Introduction 559
IFE/EIFE Interface Identification and Status Registers 561
EIFE Interface Specific Registers 567
IP Network Parameters 569

Introduction

This chapter describes the Modbus registers 11744 to 12403 of an IFE/EIFE communication interface:

- 11744 to 12480: Modbus registers of IFE and EIFE communication interface
- 14744 to 15329: specific Modbus registers of EIFE communication interface only

For more information about IFE/EIFE communication interface functions, refer to the relevant document, page 12:

- DOCA0142•• *Enerlin'X IFE - Ethernet Interface for One Circuit Breaker - User Guide*
- DOCA0106•• *Enerlin'X EIFE - Embedded Ethernet Interface for One MasterPacT MTZ Drawout Circuit Breaker - User Guide*
- DOCA0084•• *Enerlin'X IFE - Ethernet Switchboard Server - User Guide*

IFE/EIFE Register Table Format

IFE/EIFE Modbus register tables have the following columns:

Address	Register	RW	Unit	Type	Range	Description

- **Address**: a 16-bit register address in hexadecimal. The address is data used in the Modbus frame.
- **Register**: a 16-bit register number in decimal (register = address + 1).
- **RW**: register read-write status
  - R: the register can be read by using Modbus functions
  - W: the register can be written by using Modbus functions
  - RW: the register can be read and written by using Modbus functions
  - RC: the register can be read by using the command interface
  - WC: the register can be written by using the command interface
- **Unit**: the unit the information is expressed in
- **Type**: the encoding data type (see data type description below)
- **Range**: the permitted values for this variable, usually a subset of what the format allows
- **Description**: provides information about the register and restrictions that apply

IFE/EIFE Data Types

Data Types	Description	Range
INT16U	16-bit unsigned integer	0 to 65535
INT16	16-bit signed integer	-32768 to +32767
INT32U	32-bit unsigned integer	0 to 4 294 967 295
INT32	32-bit signed integer	-2 147 483 648 to +2 147 483 647
FLOAT32	32-bit signed integer with a floating point	2^{-126} (1.0) to 2^{127} (2 - 2^{-23})
OCTET STRING	Text string	1 byte per character

Data Types	Description	Range
XDATE	Same as DATE with a fourth INT16U register for milliseconds information	–
DATETIME	Date and time in the IEC 60870-5 format	–

See detailed descriptions of the data types in the Appendix, page 580.

IFE/EIFE Interface Identification and Status Registers

IFE/EIFE Interface Firmware Version

The IFE/EIFE interface firmware version starts at register 11776 and has a maximum length of eight registers.

The firmware version is an ASCII string using the format AAA.BBB.CCC with:

- AAA = major version (000-127)
- BBB = minor version (000-255)
- CCC = revision number (000-255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x2DDF–0x2DEE	11744–11759	R	–	OCTET STRING	–	Device family
0x2DEF–0x2DF6	11760–11767	R	–	OCTET STRING	–	Product range
0x2DF7–0x2DFE	11768–11775	R	–	OCTET STRING	–	Product model
0x2DFF–0x2E04	11776–11781	R	–	OCTET STRING	–	Firmware version

IFE/EIFE Interface Hardware Revision

The IFE/EIFE interface hardware revision starts at register 11784 and has a maximum length of eight registers.

The hardware revision is an ASCII string using the format AAA.BBB.CCC with:

- AAA = major version (000-127)
- BBB = minor version (000-255)
- CCC = revision number (000-255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x2E07–0x2E0C	11784–11789	R	–	OCTET STRING	–	Hardware revision

IMU Identification

Identification of the IMU can be set by using EcoStruxure Power Commission software, page 22. When not programmed, the IMU identification registers return 0 (0x0000).

The FDM121 display displays the first 14 characters of the IMU name.

Address	Register	RW	Unit	Type	Range	Description
0x2801–0x2820	10242–10273	R-WC	–	OCTET STRING	–	User application name Device name used for acquiring the IP address using DHCP and also the friendly name on DPWS device discovery. **Example:** 'IFE-0A129F' Maximum length is 64 characters.
0x2E18–0x2E2E	11801–11823	R		OCTET STRING	–	IMU name (not available for MasterPacT MTZ circuit breakers with MicroLogic X/Xi control units)
0x2E2F–0x2E38	11824–11833	R	–	OCTET STRING	–	Vendor name = 'Schneider Electric' User application name set by using: • EcoStruxure Power Commission software • IFE webpages Device name used for acquiring the IP address using DHCP and also the friendly name on DPWS device discovery. **Example:** 'IFE-0A129F' Maximum length is 64 characters
0x2E39–0x2E42	11834–11843	R	–	OCTET STRING	–	Product code: • 'LV434001' or 'LV434010' = IFE-Ethernet com Modbus TCP/IP • 'LV434002' or 'LV434011' = IFE-Ethernet com Modbus TCP/IP client • 'LV851001' = EIFE Embedded Ethernet interface
0x2E43–0x2E44	11844–11845	–	–	–	–	Reserved
0x2E45–0x2E5B	11846–11868	R-RC-WC	–	OCTET STRING	–	IMU location (for MasterPacT NT/NW, ComPacT and PowerPacT only) = up to 45 ASCII characters ended by the NULL character 0x00

Locking Remote Control Commands

Remote control commands can be locked:

- On IFE interface or IFE server, with the locking pad on the front face
- On EIFE interface, by setting the intrusive command mode with EcoStruxure Power Commission software

Address	Register	RW	Unit	Type	Range	Description
0x2E72	11891	R	–	INT16U	1,3	Remote control commands: • 1 = Locked • 3 = Unlocked

Current Date and Time

Address	Register	RW	Unit	Type	Range	Description
0x2E73–0x2E76	11892–11895	R-WC	–	DATETIME	–	Current date and time in DATETIME format
0x2E77–0x2E78	11896–11897	R	Seconds	INT32U	0x00–0xFFFFFFFF	Number of seconds counted since last start

Product Identification

Address	Register	RW	Unit	Type	Range	Description
0x2E7C	11901	R	–	INT16U	17100–17101	Product identification: • 17100 for IFE Ethernet communication interface for one circuit breaker (‘LV434001’ or ‘LV434010’) • 17101 for IFE Ethernet switchboard server (‘LV434002’ or ‘LV434011’) • 17107 for EIFE embedded Ethernet interface (‘LV851001’)

Validity Duration of Data

Address	Register	RW	Unit	Type	Range	Description
0x306A	12395	R	s	INT16U	5–300 (in steps of 5 s)	Duration of validity of data in the dataset

Read Device Identification

The Read Device Identification function is used to access in a standardized manner the information required to identify a device. The description is made up of a set of objects (ASCII character strings).

A complete description of the Read Device Identification function is available at www.modbus.org.

The coding for the identification of the IFE/EIFE interface is the following:

Name	Type	Description
Vendor name	OCTET STRING	‘Schneider Electric’ (18 characters)
Product code	OCTET STRING	• 'LV434001' or 'LV434010' • 'LV434002' or 'LV434011' • ‘LV851001’ (EIFE)
Firmware version	OCTET STRING	‘AAA.BBB.CCC’
Vendor URL	OCTET STRING	‘www.se.com’ (26 characters)
Product name	OCTET STRING	• For IFE Ethernet communication interface for one circuit breaker (LV434001 or LV434010): ‘Ethernet interface for LV breakers’ • For IFE Ethernet switchboard server (LV434002 or LV434011): ‘Ethernet interface for LV breakers + gateway’ • For EIFE Ethernet interface (LV851001): ‘Embedded Ethernet interface for LV breakers’

Name	Type	Description
Family	OCTET STRING	'Gateway and server'
Range	OCTET STRING	'Enerlin'X'
Model	OCTET STRING	'IFE Ethernet interface', 'IFE/Gateway', or 'EIFE Ethernet interface'
Product ID	INT16U	Product ID of the core of IMU: • 17100 = IFE without gateway • 17101 = IFE with gateway • 17107 = EIFE

MAC Address of the IFE/EIFE Server

Address	Register	RW	Unit	Type	Range	Description
0x2E7D– 0x2E7F	11902– 11904	R	–	INT16U	–	MAC address of the IFE/EIFE interface coded over 3 registers (6 bytes) in hexadecimal. **Example:** The MAC address 00:80:F4:02:12:34 (or 00-80-F4-02-12-34) is coded in hexadecimal as follows: 0080F4021234 (0x00 0x80 0xF4 0x02 0x12 0x34).

Manufacturing Date and Time

Address	Register	RW	Unit	Type	Range	Description
0x2E89– 0x2E8C	11914– 11917	R	–	DATETIME	–	Manufacturing date and time

IFE Communication Interface Serial Number

The IFE interface and IFE server serial numbers are composed of a maximum of 11 alphanumeric characters with the following format: PPYYWWDnnnn.

- PP = plant code
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- nnnn = production number of the device on the day (0001–9999)

A read request of 6 registers is necessary to read the IFE interface and IFE server serial number.

Address	Register	RW	Unit	Type	Range	Description
0x02E91	11922	R	–	OCTET STRING	–	'PP'
0x02E92	11923	R	–	OCTET STRING	'05'–'99'	'YY'
0x02E93	11924	R	–	OCTET STRING	'01'–'53'	'WW'
0x02E94	11925	R	–	OCTET STRING	D: '1'–'7' n: '0'–'9'	'Dn'

Address	Register	RW	Unit	Type	Range	Description
0x02E95	11926	R	–	OCTET STRING	'00'–'99'	'nn'
0x02E96	11927	R	–	OCTET STRING	'0'–'9'	'n' (the NULL character ends the serial number)

EIFE Communication Interface Serial Number

The EIFE communication interface serial number is composed of a maximum of 16 alphanumeric characters with the following format: PPPPPPYYWWDLnnnn.

- PPPPPP = plant code
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- L = Line or machine number (0–9 or a–z)
- nnnn = production number of the device on the day (0001–9999)

A read request of 8 registers is necessary to read the EIFE interface serial number.

Address	Register	RW	Unit	Type	Range	Description
0x02E91–0x02E93	11922–11924	R	–	OCTET STRING	–	'PPPPPP'
0x02E94	11925	R	–	OCTET STRING	'05'–'99'	'YY'
0x02E95	11926	R	–	OCTET STRING	'01'–'53'	'WW'
0x02E96	11927	R	–	OCTET STRING	D: '1'–'7' L: '0'–'9' or 'a'–'z'	'DL'
0x02E97–0x02E98	11928–11929	R	–	OCTET STRING	'0000'–'9-999'	'nnnn'

Modbus Parameters of the IFE Server

These parameters are valid for the IFE switchboard server only.

Address	Register	RW	Unit	Type	Range	Description
0x306F	12400	R	–	INT16U	–	Modbus address of IFE server (always 255)
0x3070	12401	R	–	INT16U	1–3	Modbus parity: • 1 = no parity • 2 = even parity (factory setting) • 3 = odd parity
0x3071	12402	R	–	INT16U	5–8	Modbus Baud rate: • 5 = 4800 Baud • 6 = 9600 Baud • 7 = 19,200 Baud (factory setting) • 8 = 38,400 Baud
0x3072	12403	R	–	INT16U	1,3,5	Number of stop bits: • 1 = Auto (factory setting) • 3 = 1 stop bit • 5 = 2 stop bits

Time Synchronization

Address	Register	RW	Unit	Type	Range	Description
0x3098–0x30B7	12441–12472	R	–	OCTET STRING	–	The type of source use for time synchronization: • 'Auto–SNTP' • 'Manual–Modbus' • 'Manual–ULP' • 'Manual–Webpage'
0x30B8–0x30BB	12473–12476	R	–	DATETIME	–	Date and time of last time synchronization
0x30BC–0x30BD	12477–12478	R	s	FLOAT32	–	Time since last time synchronization
0x30BE	12479	R	–	INT16U	0–2	Status of automatic time synchronization: • 0 = SNTP disabled • 1 = SNTP failed • 2 = SNTP succeeded
0x30BF	12480	R	–	INT16	–	SNTP fails count

EIFE Interface Specific Registers

Cradle Alarms

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3997	14744	R	–	INT16U	–	–	Quality of each bit of register 14745: • 0 = Invalid • 1 = Valid
0x3998	14745	R	–	INT16U	–	–	Cradle management alarms register
						0	Cradle position discrepancy
						1	No racking-out operation for the last 11 months
						2	Cradle has reached its max number of operation
						3	Remaining service life of cradle is below alarm threshold
						4	New MicroLogic control unit has been detected
						5–15	Reserved

Cradle Management

The table describes the registers related to the Cradle management function performed by EIFE embedded Ethernet interface.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3BC3	15300	R-RC	–	INT16U	–	–	Quality of each bit of register 15301: • 0 = Invalid • 1 = Valid
0x3BC4	15301	R-RC	–	INT16U	–	–	Cradle status
						0–7	Reserved
						8	Device in disconnected position (CD)
						9	Device in connected position (CE)
						10	Device in the test position (CT)
						11–15	Reserved
0x3BC5–0x3BC6	15302–15303	R-RC-WC	–	INT32U	0–65534	–	Cradle connected position counter This counter increments for each rising edge of the cradle connected position
0x3BC7–0x3BC8	15304–15305	R-RC-WC	–	INT32U	0–65534	–	Cradle disconnected position counter This counter increments for each rising edge of the cradle disconnected position
0x3BC9–0x3BCA	15306–15307	R-RC-WC	–	INT32U	0–65534	–	Cradle test position counter This counter increments for each rising edge of the cradle test position
0x3BCB–0x3BCE	15308–15311	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle connected position
0x3BCF–0x3BD2	15312–15315	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle disconnected position
0x3BD3–0x3BD6	15316–15319	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle test position
0x3BD7–0x3BD8	15320–15321	R-WC	–	INT32U	–	–	Operating time since last grease maintenance

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3BD9–0x3BDA	15322–15323	R-WC	–	INT32U	–	–	Operating time since last move connected position
0x3BDB	15324	R	–	INT16U	0-65534	–	Cradle contact regrease counter
0x3BDC–0x3BE0	15325–15329	–	–	–	–	–	Reserved

IP Network Parameters

Network Parameters

Address	Register	RW	Unit	Type	Range	Description
0x27FF–0x2800	10240–10241	R	–	INT32	0–1	Network configuration mode: • 0 = IPv4 only • 1 = IPv4 and IPv6

IPv4 Parameters

Address	Register	RW	Unit	Type	Range	Description
0x2823–0x2824	10276–10277	R-WC	–	INT32U	0–2	IPv4 address acquisition mode, set by using the EcoStruxure Power Commission software: • 0 = Static • 1 = BootP • 2 = DHCP
0x2825–0x2826	10278–10279	R	–	INT32U	–	IPv4 address acquisition status: • 0 = IP acquisition successful • 1 = IP acquisition in progress • 2 = Acquired IP address is duplicated • 3 = Error in IP acquisition
0x2827–0x2828	10280–10281	R-WC	–	INT32U	–	IPv4 address of IFE/EIFE interface **Example:** 169.254.1.1 Register 10280 = 0xA9FE Register 10281 = 0x0101
0x2829–0x282A	10282–10283	R-WC	–	INT32U	–	IPv4 subnet mask **Example:** 255.255.0.0 Register 10282 = 0xFFFF Register 10283 = 0x0000
0x282B–0x282C	10284–10285	R-WC	–	INT32U	–	IPv4 default gateway address **Example:** 169.154.1.1 Register 10284 = 0xA9FE Register 10285 = 0x0101
0x282D–0x2846	10286–10311	–	–	–	–	Reserved

IFE/EIFE Communication Interface Commands

What's in This Chapter

List of IFE/EIFE Interface Commands 571
IFE/EIFE Interface Generic Commands 572
EIFE Interface Specific Commands 574

List of IFE/EIFE Interface Commands

The following tables list the IFE/EIFE interface commands, their corresponding command codes and user profiles. Follow the command execution procedures, page 61.

List of Commands for IFE/EIFE Interfaces

Command	Command code	User profile
Get current time, page 572	768	No password required
Set absolute time, page 572	769	No password required
Write user application name, page 573	1032	No password required
Set validity duration of the data, page 573	41868	Administrator, Services, Engineer, or Operator

List of Specific Commands for EIFE Interface

Command	Command code	User profile
Reset EIFE alarms, page 574	41099	Administrator or Operator
Preset cradle/drawer counters, page 574	41352	Administrator or Operator
Preset regrease timers, page 574	41353	Administrator or Operator
Get events, page 575	50560	No password required

Error Codes

Error codes generated by the IFE/EIFE interface are the generic error codes, page 64.

IFE/EIFE Interface Generic Commands

Get Current Time

The get current time command is not hardware protected. The get current time command is still enabled when the locking pad located on the front panel on the IFE/EIFE interface is in locked position.

To get the current time for all modules, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	768	Command code = **768**
0x1F40	8001	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	INT16U	8704	Destination = 8704 (0x2200)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)

The following registers contain the time data:

- Register 8023 holds the month in the MSB, the day in the LSB.
- Register 8024 holds the year offset in the MSB (add 2000 to get the year) and the hour in the LSB.
- Register 8025 holds the minutes in the MSB, the seconds in the LSB.
- Register 8026 holds the milliseconds.

Set Absolute Time

The set absolute time command is still enabled when the locking pad located on the front panel on the IFE/EIFE interface is in locked position.

To set the absolute time for all the IMU modules, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	769	Command code = **769**
0x1F40	8001	–	INT16U	18	Number of parameters (bytes) = 18
0x1F41	8002	–	INT16U	8704	Destination = 8704 (0x2200)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45-0x1F48	8006–8009	–	XDATE	–	Current date/time

NOTE: Date and time counter of IFE/EIFE interface without the RTC feature (LV434010, LV434011 or LV851001) is reset and will restart at January 1, 2000 in case of 24 Vdc power loss. It is therefore mandatory to set absolute time for all the IMU modules after recovering the 24 Vdc power supply.

Date and time counter of IFE interface with the RTC feature (LV434001 or LV434002) is not reset in case of power loss.

NOTE: If the IFE/EIFE interface is not configured in SNTP mode it is mandatory to set absolute time for all the IMU modules periodically, due to the clock drift of each IMU module. Recommended period is at least every 15 minutes.

Write User Application Name

The user application name can be read from registers 10242 to 10273 IMU Identification, page 562.

To write the user application name, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1032	Command code = **1032**
0x1F40	8001	–	INT16U	–	Number of parameters (bytes) = depends on the length of the user application name (up to 46 characters)
0x1F41	8002	–	INT16U	0	Destination = 0 (0x0000)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	–	17039366 = User application name (load 0x0104 into register 8006, 0x0081 into 8007)
0x1F46	8008	–	INT16U	2048	2048
0x1F48	8009	–	OCTET STRING	–	• MSB = First character of the user application name • LSB = Second character of the user application name
0x1F49–0x1F5F	8010–8038	–	OCTET STRING	–	Depends on the length of the user application name and ends with the NULL character 0x00

Set Validity Duration of Data

This command is used to set the validity duration of data in the standard and legacy datasets.

The validity duration of data can be read in a register Validity Duration of Data, page 563.

To set the validity duration of data, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41868	Command code = 41868
0x1F40	8001	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	INT16U	8705	Destination = 8705 (0x2201)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator, Services, Engineer, or Operator user profile password
0x1F45	8006	s	INT16U	5–300 (in steps of 5 s)	Validity duration of data Factory setting: 10 s

EIFE Interface Specific Commands

Reset EIFE Alarms

To reset EIFE interface alarms, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41099	Command code = **41099**
0x1F40	8001	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	INT16U	8705 (0x2201)	Destination = 8705 (0x2201)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Preset Cradle/Drawer Counters

To preset the cradle or drawer counters, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41352	Command code = **41352**
0x1F40	8001	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	INT16U	8705	Destination = 8705 (0x2201)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	INT16U	0–65535	Connected counter reset/preset: • 0–65534 = preset value of the connected counter • 65535 (0xFFFF) = do not preset the connected counter
0x1F46	8007	–	INT16U	0–65535	Disconnected counter reset/preset: • 0–65534 = preset value of the disconnected counter • 65535 (0xFFFF) = do not preset the disconnected counter
0x1F47	8008	–	INT16U	0–65535	Test counter reset/preset: • 0–65534 = preset value of the test counter • 65535 (0xFFFF) = do not preset the test counter

Preset Regrease Timers

To preset regrease timers, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41353	Command code = **41353**
0x1F40	8001	–	INT16U	18	Number of parameters (bytes) = 18
0x1F41	8002	–	INT16U	8705	Destination = 8705 (0x2201)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Address	Register	Unit	Type	Range	Description
0x1F45–0x1F46	8006–8007	–	INT16U	–	Operating time since last grease maintenance • 0–157766400 = preset value of regrease timer counter • 4294967295 (0xFFFFFFFF) = No preset
0x1F47–0x1F48	8008–8009		INT32U	–	Operating time since last move in rack in position (delay from last disconnection) • 0–28944000 = preset value of remove timer • 4294967295 (0xFFFFFFFF) = No preset

Get Events Command

To get events, set the command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	50560	–	Command code = **50560**
0x1F40	8001	–	INT16U	27	–	Number of parameters (bytes) = 27
0x1F41	8002	–	INT16U	8705 (0x2201)	–	Destination = 8705 (0x2201)
0x1F42	8003	–	INT16U	0	–	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	–	Password of the command = 0 (no password required)
0x1F45	8006	–	–	–	–	Reserved
0x1F46	8007	–	INT16U	0, 2	–	Requested get event method, page 577: • 0 = Most recent events • 2 = Events before and up to a sequence number
0x1F47–0x1F4A	8008–8011	–	–	–	–	Reserved
0x1F4B–0x1F4C	8012–8013	–	INT32U	–	–	Requested event sequence number (for method 2 only)
0x1F4D	8014	–	INT16U	–	–	Requested event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved

Events are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	50560	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: • 0 = Successful command • Other value = command with error, page 63
0x1F55	8022	–	INT16U	–	–	Number of bytes returned
0x1F56	8023	–	–	–	–	Reserved
0x1F57	8024	–	INT16U	0, 2	–	Responded event requested method: • 0 = Most recent events • 2 = Events before and up to a sequence number
0x1F5E	8031	–	INT16U	–	–	Responded event severity
					0–7	Reserved

Address	Register	Unit	Type	Range	Bit	Description
					8	Low
					9	Medium
					10	High
					11–15	Reserved
0x1F5F	8032	–	INT16U	–	–	MSB: Number of events returned
					–	LSB: Remaining events • 0 = No more events to get • 1 = More events to get
0x1F60	8033	–	INT16U	1013-25630	–	First event code, page 578
0x1F61–0x1F64	8034–8037	–	DATETIME	–	–	Timestamp of the first event
0x1F65	8038	–	INT16U	–	–	Timestamp quality of the first event
0x1F66–0x1F67	8039–8040	–	INT32U	–	–	First event sequence number
0x1F68	8041	–	INT16U	–	–	MSB: First event status • 1 = Occurrence • 2 = Completion • 3 = Pulse LSB: Reserved
0x1F69	8042	–	–	–	–	Reserved
0x1F6A	8043	–	INT16U	–	–	First event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved
0x1F6B–0x1F75	8044–8054	–	INT16U	–	–	Characteristics of event 2 (same as event 1)
0x1F76–0x1F80	8055–8065	–	INT16U	–	–	Characteristics of event 3 (same as event 1)
0x1F81–0x1F8B	8066–8076	–	INT16U	–	–	Characteristics of event 4 (same as event 1)
0x1F8C–0x1F96	8077–8087	–	INT16U	–	–	Characteristics of event 5 (same as event 1)
0x1F97–0x1FA1	8088–8098	–	INT16U	–	–	Characteristics of event 6 (same as event 1)
0x1FA2–0x1FAC	8099–8109	–	INT16U	–	–	Characteristics of event 7 (same as event 1)
0x1FAD–0x1FB7	8110–8120	–	INT16U	–	–	Characteristics of event 8 (same as event 1)
0x1FB8–0x1FC2	8121–8131	–	INT16U	–	–	Characteristics of event 9 (same as event 1)
0x1FC3–0x1FCD	8132–8142	–	INT16U	–	–	Characteristics of event 10 (same as event 1)

Get Events Procedure

The command allows to get events by using one of the two following methods:

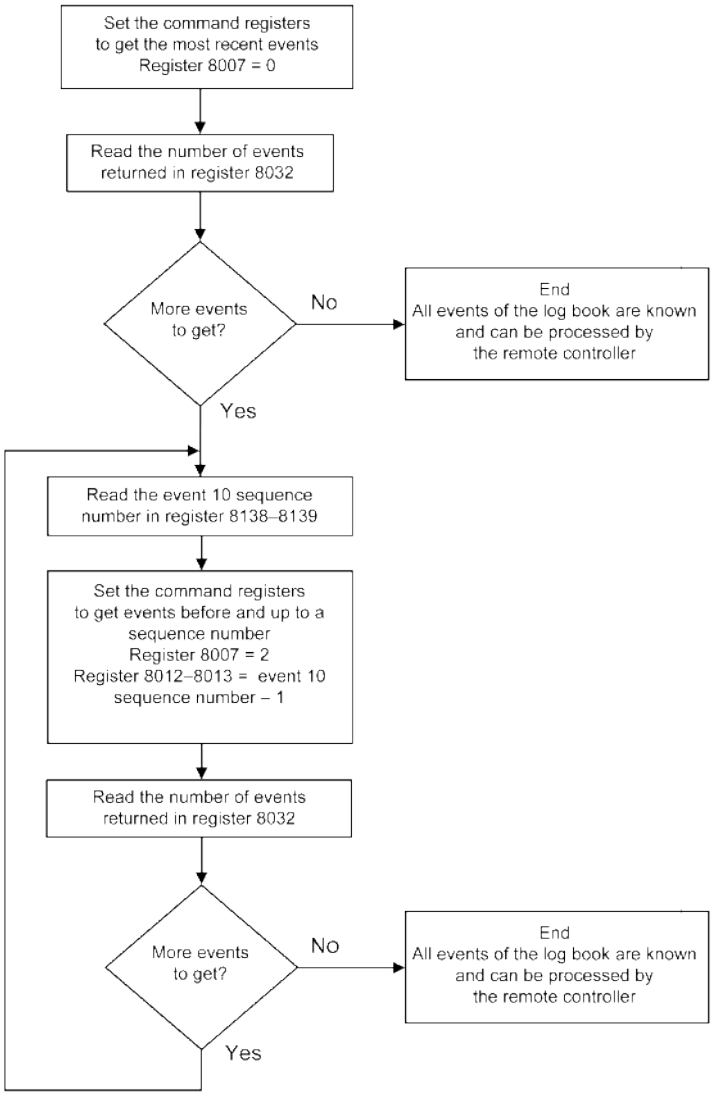
- get the most recent events
- get events before and up to an event sequence number. The event sequence number is an event identifier defined by the device, and is available among the event characteristics. It can be used to sort the events in chronological order.

The command allows to get 10 events maximum for one or several severity levels.

- To get the 10 most recent events, use the method “get the most recent events”.
- If there are more than 10 events, use the other method “get events before and up to an event sequence number” to get rest of the events.

Example: Read all events

The following diagram shows the steps to follow to read all events recorded in the device:



EIFE Interface Events

Event Code	Description
2304 (0x0900)	Cradle position discrepancy
2305 (0x0901)	Cradle connected contact change
2306 (0x0902)	Cradle disconnected contact change
2307 (0x0903)	Cradle test contact change
2308 (0x0904)	Remove device from cradle and put it back
2309 (0x0905)	Cradle has reached its maximum number of operations
2310 (0x0906)	Remaining service life of cradle is below alarm threshold
2311 (0x0907)	New MicroLogic control unit has been detected

Appendix

What's in This Part

Modbus Data Type Definitions 580

Modbus Data Type Definitions

Data Types per Device

The following table lists the Modbus data types available for each ULP device:

Data Type	MicroLogic control or trip unit type				BCM ULP module	BSCM module	EIFE/IFE Interface	IFM Interface	IO Module
	X	Active	A/E/P/H	5/6/7					
INT16U	✓	✓	✓	✓	✓	✓	✓	✓	✓
INT16	✓	✓	✓	✓	✓	–	✓	–	–
INT32U	✓	✓	✓	✓	✓	✓	✓	✓	✓
INT32	✓	–	✓	✓	–	–	✓	–	–
INT64U	✓	–	✓	–	–	–	–	–	–
INT64	✓	✓	✓	✓	–	–	–	–	✓
SFIXPT	–	–	✓	–	–	–	–	–	–
FLOAT32	✓	✓	✓	✓	–	–	✓	–	✓
OCTET STRING	✓	✓	✓	✓	✓	✓	✓	✓	✓
MOD10000	–	✓	✓	–	–	–	–	–	–
DATE	–	✓	✓	–	✓	–	–	–	–
XDATE	✓	✓	✓	–	✓	–	✓	–	–
DATETIME	✓	–	✓	✓	–	–	✓	✓	✓
ULP DATE	–	✓	✓	✓	✓	✓	–	–	✓

Notes

- The type column tells how many registers to read to get the variable. For instance INT16U requires reading one register, whereas INT32 requires reading 2 registers.
- Some variables must be read as a block of multiple registers, like the energy measurements. Reading the block partially results in an error.
- Reading from an undocumented register results in a Modbus exception, page 57.
- Numerical values are given in decimal. When it is useful to have the corresponding value in hexadecimal, it is shown as a C language type constant: 0xdddd. For example, the decimal value 123 is represented in hexadecimal as: 0x007B.
- For measures that depend on the presence of neutral as identified by register System Type, reading the value returns 32768 (0x8000) if not applicable. For each table where it occurs, it is explained in a footnote.
- Out of order and not applicable values depend on the data type.

  NOTE: As per legacy register implementation, some registers may display different out of order and not applicable values. For example, INT16U registers may return 32768 (0x8000) and INT32U may display 0x80000000.

Data Type	Out of Order and Not Applicable Values
INT16U	65535 (0xFFFF)
INT16	-32768 (0x8000)
INT32U	4294967295 (0xFFFFFFFF)

Data Type	Out of Order and Not Applicable Values
INT32	0x80000000
INT64U	0xFFFFFFFFFFFFFFFF
INT64	0x8000000000000000
FLOAT32	0xFFC00000

Big-Endian Format

INT32, INT32U, INT64, and INT64U variables are stored in big-endian format: the most significant register is transmitted first, the least significant register is transmitted at last place.

INT32, INT32U, INT64, and INT64U variables are made of INT16U variables.

The formulas to calculate the decimal value of these variables are:

- INT32: $(0\text{-bit31})x2^{31} + bit30x2^{30} + bit29x2^{29} + ...bit1x2^{1} + bit0x2^{0}$
- INT32U: $bit31x2^{31} + bit30x2^{30} + bit29x2^{29} + ...bit1x2^{1} + bit0x2^{0}$
- INT64: $(0\text{-bit63})x2^{63} + bit62x2^{62} + bit61x2^{61} + ...bit1x2^{1} + bit0x2^{0}$
- INT64U: $bit63x2^{63} + bit62x2^{62} + bit61x2^{61} + ...bit1x2^{1} + bit0x2^{0}$

Example 1:

The total active energy in the standard dataset is an INT64 variable coded in registers 32096 to 32099.

If the values in the registers are:

- register 32096 = 0
- register 32097 = 0
- register 32098 = 0x0017 or 23
- register 32099 = 0x9692 or 38546 as INT16U variable and -26990 as INT16 variable (use the INT16U value to calculate the value of the total active energy).

Then the total active energy is equal to $0x2^{48} + 0x2^{32} + 23x2^{16} + 38546x2^{0}$ = 1545874 Wh.

Example 2:

The reactive energy in the legacy dataset is an INT32 variable coded in registers 12052 to 12053.

If the values in the registers are:

- register 12052 = 0xFFF2 = 0x8000 + 0x7FF2 or 32754
- register 12053 = 0xA96E or 43374 as INT16U variable and -10606 as INT16 variable (use the INT16U value to calculate the value of the reactive energy).

Then the reactive energy is equal to $(0\text{-}1)x2^{31} + 32754x2^{16} + 43374x2^{0}$ = -874130 kvarh.

Quality of Bits in Registers

The quality of each bit of a register coded as INT16U data type as an enumeration of bits can be indicated in the register preceding the register.

Example:

The quality of each bit of the register 32001, circuit breaker status, is given in the preceding register, 32000.

The quality of the data corresponding to the bit 0 of register 32001, OF status indication contact, is given in the bit 0 of register 32000:

- bit 0 of register 32000 = quality of OF status indication
- bit 0 of register 32001 = OF status indication contact

If	Then
If bit 0 of register 32000 = 1 AND bit 0 of register 32001 = 0	The OF contact indicates that the device is open
If bit 0 of register 32000 = 1 AND bit 0 of register 32001 = 1	The OF contact indicates that the device is closed
If bit 0 of register 32000 = 0	The OF contact indication is invalid

Data Type: SFIXPT

The range value of this data type depends of the scale factor.

The following table presents examples of the range value evolution of the SFIXPT register according to the scale factor:

If the Scale Factor Is Equal to...	Then the Range Value Is Equal to...
1	-32768 to +32767
100	-327.68 to +327.67
1000	-32.768 to +32.767

Data Type: FLOAT32

Data type FLOAT32 is represented in the single precision IEEE 754 (IEEE standard for floating-point arithmetic). A value N is calculated as indicated below:

$N = (-1)^S \times 2^{E-127} \times (1+M)$

Coefficient	Stands for	Description	Number of Bits
S	Sign	Defines the sign of the value: 0 = positive 1 = negative	1 bit
E	Exponent	Excess 127 binary integer added. When 0 < E < 255, the actual exponent is: e = E - 127.	8 bits
M	Mantissa	Magnitude, normalized binary significant	23 bits

Example:

0 = 0 **00000000** 00000000000000000000000

-1.5 = 1 **01111111** 10000000000000000000000

with:

- S = 1
- **E = 01111111 = 127**
- M = 10000000000000000000000 = $1x2^{-1} + 0x2^{-2} +...+ 0x2^{-23} = 0.5$
- N = $(-1) \times 2^0 \times (1+0.5) = -1.5$

Data Type: MOD10000

MOD10000 corresponds to n + 1 registers in the INT16 format. Each register contains an integer from -9999 to 9999. A value V representing n + 1 registers in MOD10000 format is calculated as indicated below:

$V = sum(R[x] + R[x+1] \times 10000 + ... + R[x+n] \times 10000^{n})$, where R[x] is the value of the register number x.

For example, to calculate the active energy Ep coded in 4 registers:

- register 2000 = 123 so R[x = 2000] = 123
- register 2001 = 4567
- register 2002 = 89
- register 2003 = 0

So $Ep = R[2000] + R[2001] \times 10000^{1} + R[2002] \times 10000^{2} + R[2003] \times 10000^{3}$

$= 123 + 4567 \times 10000 + 89 \times 10000^{2} + 0$

= 8 945 670 123 kWh

Data Types: DATE and XDATE

This table presents DATE (registers 1 to 3) and XDATE (registers 1 to 4) data types:

Register	Type	Bit	Range	Description
1	INT16U	0–7	0x01–0x1F	Day
		8–15	0x01–0x0C	Month **NOTE:** only bits 8–14 are used for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame circuit breakers
		15	0–1	Quality of the date and time, for MasterPacT NT/NW, ComPacT NS and PowerPacT P- and R-frame circuit breakers. If bit 15 is set, the date and time may be incorrect. There are 2 possibilities: • no synchronization with the supervisor • loss of power
2	INT16U	0–7	0x00–0x17	Hours
		8–15	0x50–0xC7	Year • 0x50 (80) to 0x63 (99) correspond to years 1980 to 1999 • 0x64 (100) to 0xC7 (199) correspond to years 2000 to 2099 For example, 0x7D (125) corresponds to year 2025.
3	INT16U	0–7	0x00–0x3B	Seconds
		8–15	0x00–0x3B	Minutes
4	INT16U	0–15	0x0000–0x03E7	Complement in milliseconds (available only for XDATE format)

For example, if the current date of BCM ULP coded in 4 registers is:

- register 679 = 0x0513
- register 680 = 0x7D0A
- register 681 = 0x222E
- register 682 = 0x0358

Then the current date and time of the BCM ULP is 19/05/2025 (May 19 2025) at 10 hours, 34 minutes, 46 seconds, and 856 milliseconds.

Because:

- 0x0513
  - 0x05 = 5 (months)
  - 0x13 = 19 (days)
- 0x7D0A
  - 0x7D = 125 (years)
  - 0x0A = 10 (hours)
- 0x222E
  - 0x22 = 34 (minutes)
  - 0x2E = 46 (seconds)
- 0x0358 = 856 (milliseconds)

Data Type: DATETIME

DATETIME is a data type used to code date and time defined by the IEC 60870-5 standard.

Register	Type	Bit	Range	Description
1	INT16U	0–6	0x00–0x7F	Year: 0x00 (00) to 0x7F (127) correspond to years 2000 to 2127 For example, 0x19 (25) corresponds to year 2025.
		7–15	–	Reserved
2	INT16U	0–4	0x01–0x1F	Day
		5–7	–	Reserved
		8–11	0x00–0x0C	Month
		12–15	–	Reserved
3	INT16U	0–5	0x00–0x3B	Minutes
		6–7	–	Reserved
		8–12	0x00–0x17	Hours
		13–15	–	Reserved
4	INT16U	0–15	0x0000–0xEA5F	Milliseconds

Quality of DATETIME Timestamps

The quality of timestamps coded with the DATETIME data type can be indicated in the register following the 4 registers of the timestamp. In this case, the timestamp quality is coded as follows:

Bit	Description
0–11	Reserved
12	Externally synchronized: • 0 = Invalid • 1 = Valid
13	Synchronized: • 0 = Invalid • 1 = Valid

Bit	Description
14	Date and time is set: • 0 = Invalid • 1 = Valid
15	Reserved

Data Type: ULP DATE

ULP DATE is a data type used to code date and time. This table presents the ULP DATE data type.

Register	Type	Bit	Range	Description
1 2	INT32U	–	0x00000000– 0xFFFFFFFF	Number of seconds since January 1 2000
3	INT16U	–	–	Complement in milliseconds
		0–9	–	Encodes the milliseconds
		10–11	–	Not used
		12	0–1	IFM or IFE communication interface external synchronization status 0 = The communication interface has not been externally synchronized within the last 2 hours. 1 = The communication interface has been externally synchronized within the last 2 hours.
		13	0–1	ULP module internal synchronization status 0 = The ULP module has not been internally synchronized. 1 = The ULP module has been internally synchronized.
		14	0–1	Absolute date is set since last power on 0 = No 1 = Yes
		15	–	Reserved

ULP Date Counter

The date in ULP DATE format is counted in number of seconds since January 1 2000.

In case of a power loss for an IMU module, the time counter is reset and will restart at January 1 2000.

If an external synchronization occurs after a power loss, the time counter is updated and converts the synchronization date to the corresponding number of seconds since January 1 2000.

ULP Date Conversion Principle

To convert the date from number of seconds since January 1 2000 to current date, the following rules apply:

- 1 non-leap year = 365 days
- 1 leap year = 366 days

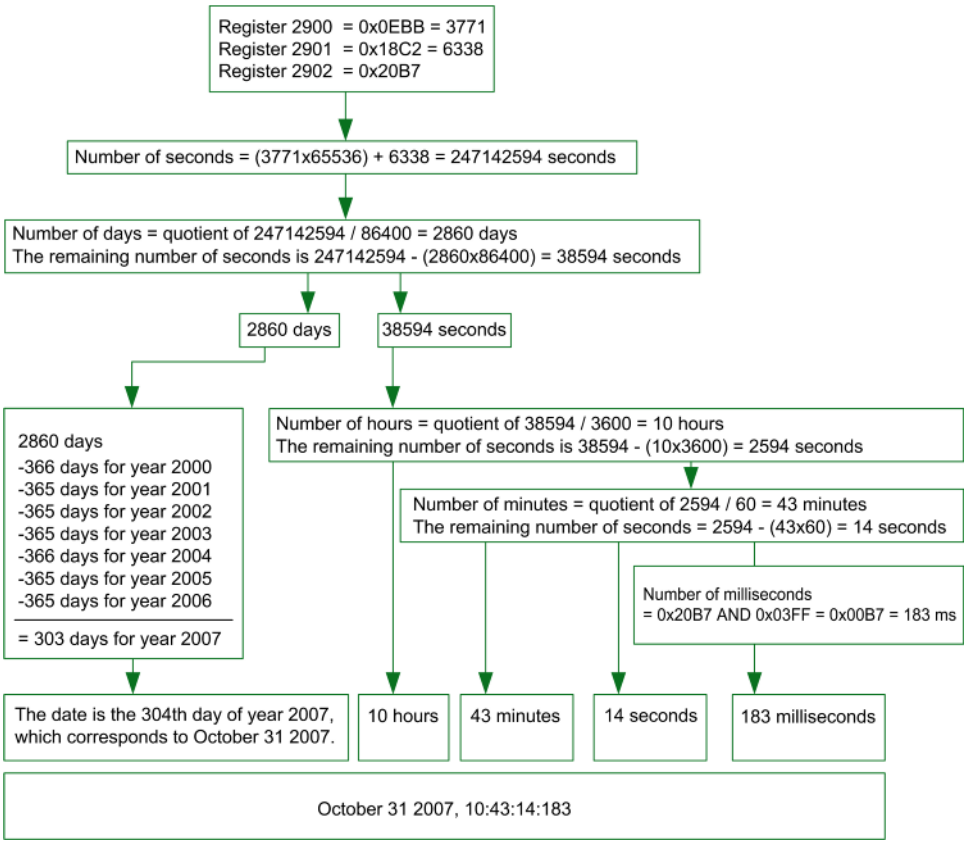
  Years 2000, 2004, 2008, 2012,...(multiple of 4) are leap years (except year 2100).
- 1 day = 86,400 seconds
- 1 hour = 3,600 seconds
- 1 minute = 60 seconds

The following table describes the steps to follow to convert the date from number of seconds since January 1 2000 to current date:

Step	Action
1	Calculate the number of seconds since January 1 2000: S = (content of register 1 x 65536) + (content of register 2)
2	Calculate the number of days since January 1 2000: D = integer value of the quotient of S / 86,400 Calculate the remaining number of seconds: s = S - (D x 86,400)
3	Calculate the number of days elapsed for the current year: d = D - (NL x 365) - (L x 366) with NL = number of non-leap years since year 2000 and L = number of leap years since year 2000
4	Calculate the number of hours: h = integer value of the quotient of s / 3600 Calculate the remaining number of seconds: s' = s - (h x 3600)
5	Calculate the number of minutes: m = integer value of the quotient of s' / 60 Calculate the remaining number of seconds: s'' = s' - (m x 60)
6	Calculate the number of milliseconds: ms = (content of register 3) AND 0x03FF
7	Result: • The current date is date = d + 1. • The current time is h:m:s'':ms

ULP Date Conversion Example

Registers 2900 and 2901 return the date in number of seconds since January 1 2000. Register 2902 returns the complement in ms with the quality of the date.



Schneider Electric
35 rue Joseph Monier
92500 Rueil Malmaison
France

+ 33 (0) 1 41 29 70 00

www.se.com

As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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