PowerLogic T500 Substation Controller

PowerLogic HU280

User Manual

BQT7944901-04
07/2025



Schneider Electric

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Table of Contents

Foreword 5
- Safety Information 5
- EU Directives 6
- UKCA Directives 6
- Safety Instructions 6
- About the Document 6

Product Description 12
- Introduction 12
- Available Module Types 12
- Internal Architecture using Backplane 12
- Baseline Software Platform 15
  - coreDb – Real-Time Database (RTDB) 15
  - Devices 17
  - Software Tools 18
- PowerLogic HU280 Module 19
  - PowerLogic HU280 Interfaces and Functions 19
  - Operation Control 20
  - PowerLogic HU280 Module Configuration 20
  - PowerLogic HU280 Module Synchronization 20
  - PowerLogic HU280 Module Communication 21
  - I/O Acquisition 21
  - Cybersecurity 21
- PowerLogic Ring 23

Installation 25
- Handling Modules 25
- Location of Modules in the Backplane 25
- PowerLogic HU280 Module Location 25
- Power Supply and Grounding 27
- Assembling Modules 28
- PowerLogic HU280 Module Redundancy 30
  - Communication Channels 31
  - Switching Modes 31
- Redundancy Architectures 33
  - Two PowerLogic HU280 Modules in the Same Backplane 33
  - Two PowerLogic HU280 Modules in Different Backplanes 34
  - Dual System 35
- Wiring 36
  - Serial Communications 36
  - Ethernet Communication 39
  - IRIG-B Input and Watchdog Output 41

Getting Started 43

Software Upgrade 45

Technical Specifications 50

Glossary 55

Foreword

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.

EU Directives

This equipment complies with the following Directives of the European Parliament and of the Council:

- EMC Directive 2014/30/EU
- LVD Directive 2014/35/EU
- RoHS Directive 2015/863/EU

UKCA Directives

UK Regulation:

- The Electromagnetic Compatibility Regulations SI 2016 No. 1091
- The Electrical Equipment (Safety) Regulations SI 2016 No. 1101
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 SI 2012 No. 3032

Safety Instructions

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, CSA Z462, NFC 18–510 and UTE C18–510–1.
- This unit must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplies of this unit before working on or inside the unit.
- Always use a properly rated voltage sensing device to confirm that power is off.
- To open a live current transformer secondary circuit, turn off the primary side of the transformer and short-circuit the transformer secondary circuit.
- Set all devices, doors, and covers before turning on power to this unit.

Failure to follow these instructions will result in death or serious injury.

About the Document

Document Scope

This manual provides information for the assembly, wiring, configuration and maintenance of the PowerLogic HU280 module (part number EMS72000).

Document Revision History

Document reference-revision	Release date	Modifications
BQT7944901-04	07/2025	• Addition of details about SNMP manager, page 17 • Addition of login information, page 43 for user and SecurityAdmin. • Additions in Hardware Specifications, page 50
BQT7944901-03	03/2025	• Product related cybersecurity information is gathered in the *About the document* topic • Addition of a Notice about accessibility loss • Addition of details about SNMP device, page 17 • Modification related to medium press on the HU280 reset button • Addition of a Note, page 20 related to PTP synchronization source • Addition of a Notice about Ethernet communication • Addition of compatibility details of SFP devices, page 51 in Hardware specifications
BQT7944901-02	01/2025	• Addition of a safety message and information for Cybersecurity • Addition of TSV device, page 17 • Edition of Ethernet Communication, page 39 • Additions in Software Upgrade, page 45 • Additions in Technical Specifications, page 50
BQT7944901-01	07/2024	• Addition of a safety message and information for Cybersecurity • Minor addition of information for Interfaces and Functions, page 19
BQT7944901-00	04/2024	Creation

Conformity

The PowerLogic HU280 module and all components have been developed in accordance to the requirements for a quality management system, complying with the ISO 9001:2015 Norm.

T500 Range Products

Configuration tool	Easergy Builder
Expansion modules	XS280 — T500 serial port expansion
I/O modules	AI160 — T500 16x analog input module AX160 — T500 combined analog module (8 inputs + 4 ouputs) DI180 — T500 32 x digital inputs DO180 — T500 16x relay outputs DO280 — T500 32x transistor outputs

Power supply modules	PS280 — T500 backplane power supply
Backplanes	BP260/N4 — T500 4 slot wall-mounted backplane BP260/N9 — T500 9 slot wall-mounted backplane BP270/N8 — T500 dual 4 slot rack-mounted backplane BP270/N9 — T500 9 slot rack-mounted backplane

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

Cyber threats are part of the digital world of communicating products. The PowerLogic™ HU280 module is concerned about possible cyber security issues and offers different features to users to manage the Cyber security and reduce the risks.

⚠WARNING

HAZARD OF POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, SAFETY, AND CONFIDENTIALITY

- Change default passwords/passcodes to help prevent unauthorized access to device settings and information. Implement strong authentication controls, with high complexity passwords.
- Disable unused ports/services and default accounts where possible, to minimize pathways for malicious attacks.
- Place networked devices behind multiple layers of cyber defenses (such as firewall, 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, interruption of services, unintended operation, or potentially damaging the infrastructure or injuring operating people.

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

NOTICE

HAZARD OF ACCESSIBILITY LOSS

- Setup a security policy and procedure to back up the security administrator user account.
- Do not share a single user account with multiple users. Set one user account associated to roles and rights per user.

Failure to follow these instructions can result in loss of access to the device.

NOTE: In the event of loosing access to the device, the device must be returned to your respective Schneider Electric branch office.

Potential Risks and Compensating Controls

NOTICE

HAZARD OF UNAUTHORIZED ACCESS

Failure to follow these instructions can result in equipment damage.

- **Insecure protocols**

  Modbus, DNP3, IEC 60870-5-101, IEC60870-5-104, IEC 61850 (IEC 61850 MMS (Manufacturing Message Specification) and IEC 61850 GOOSE (Generic Object Oriented System Event)) protocols, and some IT protocols (SNTP, DHCP, GPS) are insecure. If a malicious user gained access to your network, transmitted information could be disclosed or subject to tampering.

  This device provides TCP version for some protocols. On those protocols TLS usage is an option in the device configuration. List of protocols with the security capabilities mentioned above:

  - IEC 60870-5-104
  - DNP3
  - Modbus

  For transmitting data over an internal network, physically or logically segment the network and restrict access using standard controls such as firewalls and in particular IP Table allowlists.

  For transmitting data over an external network, encrypt protocol transmissions over all external connections using an encrypted tunnel, TLS wrapper or a similar solution.

- **Enclosure**

  The physical integrity of the installation must be ensured by the end user. Physical access to the PowerLogic HU280 module and the operational area must be restricted.

- **Port hardening**

  Schneider Electric recommends to carry out the following actions:

  - Firewall: use the IP allowlist to limit external accesses to known devices.
  - Port configuration: disable unused physical ports.

Refer to Port Hardening, page 22 for details.

The product is constantly evolving and encryption of relevant communication channels is planned in upcoming releases. Contact your SE branch office or field service representative for more information about cyber security features on the T500 platform.

NOTE: Schneider Electric regularly posts security notifications with information on vulnerabilities and patches that it receives from its partners at the U.S. Department of Homeland Security's ICS-CERT and United States Computer Emergency Readiness Team (US-CERT), other ISACs, and cybersecurity firms, among others. These updates are designed to fix known vulnerabilities and are encouraged for any Internet-connected device. You can also subscribe to our newsletter to receive security notifications.

NOTICE
HAZARD OF CYBERSECURITY BREACH Report a cybersecurity matter on a Schneider Electric product or solution via the Report a cybersecurity vulnerability page. **Failure to follow these instructions can result in equipment damage.**

Related Documents

Product	Title of documentation	Reference number
PowerLogic HU280 module	Installation Guide	PKR6248701
PowerLogic HU280 module	EoLi Instructions	BQT7944902
PowerLogic T500 Platform	User Manual	BQT7944801
webApp Maintenance and Monitoring Tool	User Manual	BQT7944802
PowerLogic T500 webUI	User Manual	BQT7944803
Easergy Builder	User Manual	SE-S856-MSS
EcoStruxure™ Cybersecurity Admin Expert	User Manual	CAE/ENUM/B4.1
AI160 module	User Manual	BQT7988301
AX160 module	User Manual	BQT7988401
XS280 module	User Manual	BQT7988501
DI180 module	User Manual	BQT7945101
DO180 module	User Manual	BQT7945201
DO280 module	User Manual	BQT7945301

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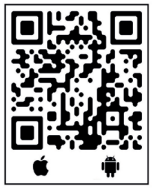
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Product Description

Introduction

The PowerLogic T500 range is a complete set of devices provided by Schneider Electric for real-time control applications and substation automation.

It meets the following requirements:

- Cost-efficiency, minimum downtime, and compliance with electrical safety, electromagnetic compatibility and environmental standards.
- Safety and reliability requirements for power, gas, water, residual water supply, etc.
- Centralized monitoring and control of geographically-distributed systems which support hierarchical data acquisition and redundant networks.
- Local monitoring and control with data sharing capabilities of plant-distributed devices.
- Quick troubleshooting by means of programmable automation execution.
- Modular design. All Input/Output, CPU, power supply and communication modules have an identical format, sharing the same enclosure.

Available Module Types

The PowerLogic T500 range is a modular portfolio composed of following modules:

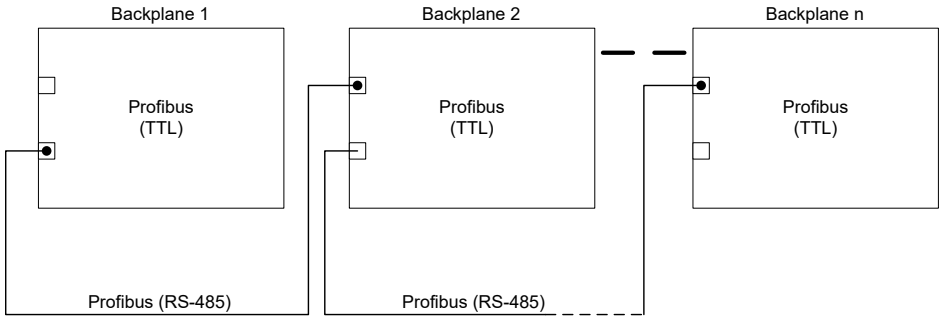
- The **Head Unit**: powerful CPU module (PowerLogic HU280) with large memory processing capabilities, fast-ethernet and fiber optic interfaces.
- The **Serial Communication** modules used to extend the communication capability of the CPU : XS280
- The **Power Supply** module, with the following options:
  - One or two PS280 modules
  - One or two external power supplies
- **Input/Output** modules used for analog and digital signals:
  - AI160
  - AX160
  - DI180
  - DO180
  - DO280
- **Backplanes and chassis**: frame used to support the other modules, by providing additional functions. Two backplane models are available:
  - BP260 backplane, with 4 and 9 slots
  - BP270 chassis, with 2x4 and 9 slots
- **Terminal blocks for Input/Output modules**

Internal Architecture using Backplane

The communication with the input/ouput modules is established by the backplane. Each backplane includes a multifunctional bus (Profibus TTL) that provides the power and intercommunication requirements. This bus is designed to be tolerant to power and communication interruptions. Additionally, a Profibus RS-485 is included to support backplane expansion.

The figure below shows schematically the situation of both buses in the system:

Profibus TTL and Profibus RS-485

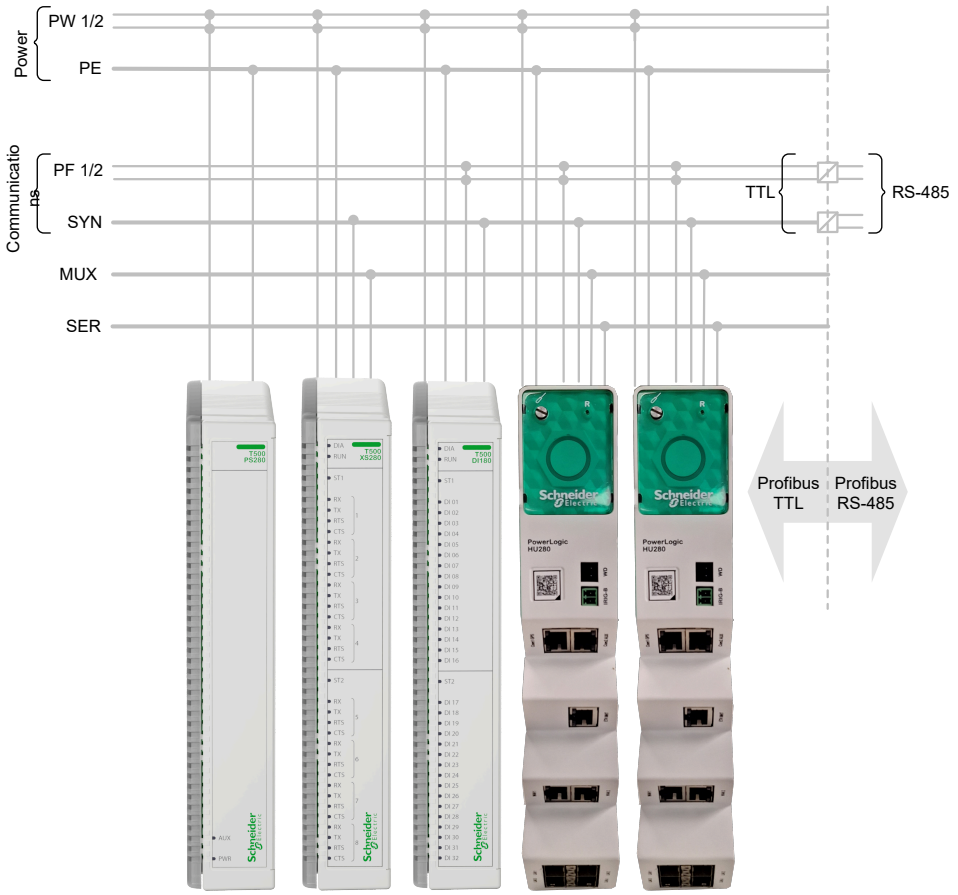


These buses integrate the following bus lines:

- **Profibus TTL**:
  - **PE** - Protective earth ground
  - **PW1/2** - Power bus (primary and redundant)
  - **PF1/2 (TTL)** - Primary and redundant Profibus TTL buses
  - **MUX** - Serial data bus for communication with the XS280 module
  - **SYN (TTL)** - Bus for synchronization of the modules (Pulse Per Second or PPS)
  - **SER** - Serial bus for synchronization between redundant CPU modules
- **Profibus RS-485**:
  - **PF1/2 (485)** - Primary and redundant Profibus RS-485 buses
  - **SYN (485)** - Bus RS-485 for synchronization of the modules (PPS)

The figure below shows the buses available in the backplane:

Buses in a backplane



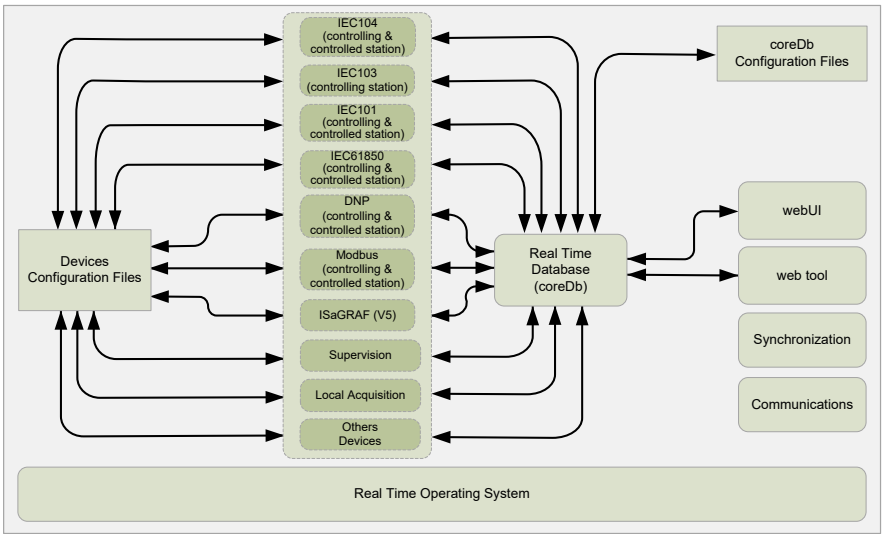
Baseline Software Platform

The baseline software platform of Schneider Electric consists of:

- Real-time operating system (RTOS): LinuxRT
- Real-time applications and configuration files (XML format)
- Software tools: configuration, local and remote maintenance, supervision and monitoring

The following figure shows the various applications included in the software platform, as well as additional applications that implement new devices or protocols to upgrade the configuration tool.

Baseline software platform



The operating system abstracts the hardware from the software applications and manages the applications in real-time. It integrates the basic protocols to access the PowerLogic HU280 module or the T500 substation controller and manages multiple users.

The core element is the real-time database coreDb, around which the other elements are developed.

Main Elements of the Baseline Software Platform

The baseline software platform has the following main elements:

- coreDB - real-time DataBase (RTDB)
- Devices
- Software tools

coreDb – Real-Time Database (RTDB)

The coreDb is the real-time database that stores the following information PowerLogic HU280:

- Information acquired from the devices
- Status of the PowerLogic HU280 and I/O modules

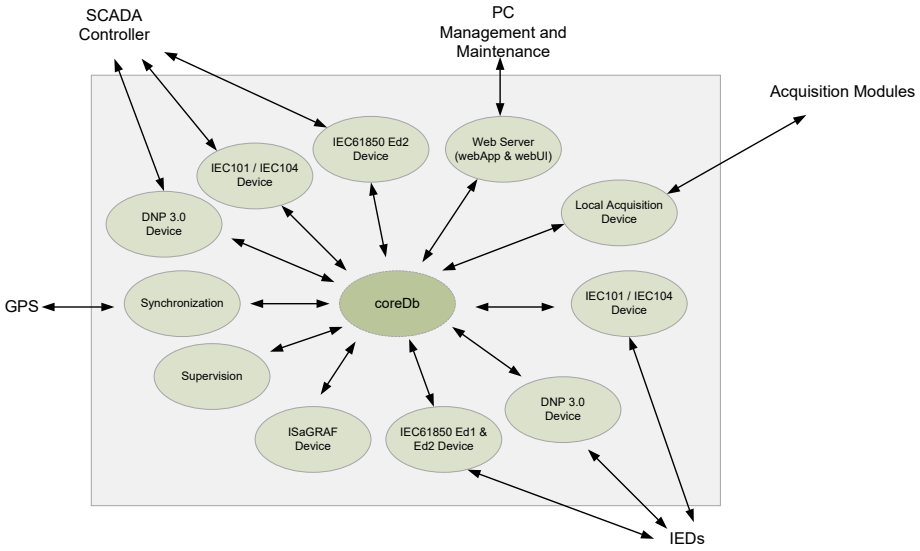
The coreDb also links the acquisition signals to the communication protocol signals. This database is generated in the PowerLogic HU280 by using the configuration information.

The information from the devices is processed, stored in the real-time database, and then linked to the communication protocols signals of the PowerLogic HU280, whose function is to transfer the information to the primary device.

The coreDb can also receive information from a logic, which can be implemented by a third-party software such as ISaGRAF® or within the database itself with a formula type - internal device.

For more information about this functionality, refer to the Easergy Builder user manual, page 10.

Relation between coreDb and other applications



The following concepts are related to coreDb:

- **Device Controller** (also referred to as controller): real-time application that accesses coreDb. Each controller acts as a producer and/or consumer of information managed by coreDb.
- **Point:** each register of coreDb is a point. A point can be included in the table **Status**, **Analog**, **Command** or **Setpoint**

  These internal tables present the following differences:

  - Depending on the **point type**: the status and command tables support integer values, whereas setpoint and analog tables manage floating values.
  - Depending on the **treatment of the point**: the status and analog points can be locked or reset to initial values, whereas the other two signal types cannot. All types of signal retain values in a non-volatile memory.
- **Device:** a set of I/O points that share a common source/destination. A typical example of a device is an IED that communicates with the PowerLogic HU280, or the representation of a SCADA exchanging information acquired or generated by the PowerLogic HU280. A device is always associated to a type of controller.
- **Source:** origin of the value of a coreDb data point.

  For **Command** and **SetPoint** tables, data points can have more than one source, in one or several devices.

  For **Status** and **Analog** tables, data point can only have one source.
- **Destination:** target of the value of a coreDb data point. You can configure coreDb data points to have several different destinations (in one or several devices).
- **Coordinate:** point identification within a device. It is unique for each point and has a different structure for each controller. It is described in detail in the appropriate manual of each controller.

- **Configuration Plugin:** specific configuration plugins extend the PowerLogic T500 configuration tool application to configure device controllers.

  You can modify the configuration of each controller and device using the appropriate plugin. When the database is completely configured, the files with the new information can be generated and transferred to the PowerLogic HU280, where they are processed by the software on startup.

The coreDb database performs the real-time management of PowerLogic HU280 points. This real-time database is associated with data produced and consumed by the device controllers.

Devices

Each type of device keeps a list of its associated points, identified by unique labels. These labels allow the identification of each device point unequivocally as the source or destination of a coreDb data point.

Each point is a piece of information produced (or consumed) by a device. Within a single device, the point identifiers (coordinates) are unique and cannot be used by two different points.

PowerLogic T500 configuration tool supports the following device configuration plugins:

- DNP 3.0 client and server
- Formula
- IEC101 client and server
- IEC104 client and server
- IEC103 client
- IEC61850 client Ed1
- IEC61850 Ed2 client and server
- ISAGRAF5
- local acquisition
- MODBUS client and server (with several profiles)
- SNMP manager v1, v2c, and v3, SNMP agent v3
- SOE (Sequence of Events management)
- TSV (Terminal Server)
- webUI

TSV is used for transparent connections between TCP client channels and serial server channels.

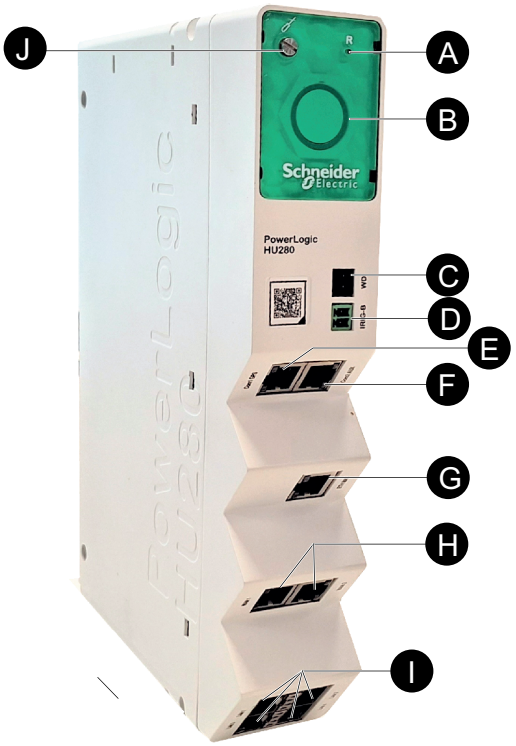
Software Tools

- **Easergy Builder**: engineering tool for the RTU OFFLINE configuration. It allows to include and adapt the different functions of the RTU to the system where it is integrated.
- **CAE**: engineering tool to define the security policy and assign roles to users. It allows the definition of a series of rights and responsibilities in the system for authorized users. It defines who, what, when and how to perform tasks according to the Role-Based Access Configurations (RBAC) model. It is a software tool that needs to be installed on a PC.
- **webApp**: web tool for online maintenance and monitoring of the RTU. Using the configuration defined in Easergy Builder and loaded in the RTU, you can refer and/or change some parameters through the web server. Unlike Easergy Builder, webApp does not allow adding new features. Only the parameters included in the configuration can be changed.
- **ESM**: EcoStruxure™ System Management tool that provides an Inventory Baseline Management (IBM) software, capable to perform maintenance on connected equipment, in an heterogeneous solution with a focus on cybersecurity:
  - Data Management: storage and backup while tracking the evolution of Firmware, Configuration, Setting Files and Documentation.
  - Manages firmware and configuration upload.
  - Monitors real-time changes firmware and configuration version for connected devices.
  - Cybersecurity: manages Role-Based Access Configurations for Schneider Electric devices.
  - Collects Syslogs from Schneider Electric connected devices.
- **webUI**: web-based graphical substation user interface. This tool can be used in two different environments:
  - webUI (run-time): web tool running in the RTU, used to monitor and control the information using screens previously designed by the user with the configuration tool.
  - webUI Add-on: edition tool included in Easergy Builder for creating and editing customized webUI screens. It is used to design new screens for the configuration loaded into the RTU or also modify the information displayed in those already available.

PowerLogic HU280 Module

PowerLogic HU280 Interfaces and Functions

PowerLogic HU280 Interfaces Description



The PowerLogic HU280 module includes a reset button located at the upper part to reinitialize the PowerLogic HU280 module.

A. Reset button with 3 functions:
   - Short press (1 s): reboots the device (software reset).
   - Medium press (3 s): factory reset. It restores the default values: network and configuration. It requires confirmation (second press 0-3 s). Users are not restored to factory status with medium press.
   - Long press (6 s): resets the hardware.

   To understand the light signals while pressing the reset button, refer to PowerLogic Ring, page 23.

B. PowerLogic Ring providing indication of the PowerLogic HU280 state. Refer to PowerLogic Ring, page 23.

C. Watchdog output connector to indicate to external equipment that the PowerLogic HU280 is running correctly. Refer to Watchdog - WD Output, page 42.

D. IRIG-B connector used for synchronization. Refer to IRIG-B Input, page 42.

E. COM1 GPS 38,400 bauds RS-232/485 port with RJ45 connector. Refer to Serial Communication, page 36. COM1 has the possibility to be connected to GPS.

F. COM2 AUX 38,400 bauds RS-232/485 port with RJ45 connector. Refer to Serial Communication, page 36.

G. ETH MNT 10/100 Mbps port with RJ45 connector for maintenance purpose. Refer to Ethernet Communication - Station/General Ports, page 39.

H. WAN 1 and 2: 2 ports 10/100 Mbps port with RJ45 connectors to connect to SCADA/DCS or Cloud services. Refer to Ethernet Communication - Station/General Ports, page 39.

I. LAN 1, 2, 3 and 4: 4 x 100/1000 Mbps Ethernet ports with SFP connectors to connect to station bus devices. Refer to Ethernet Communication - Station/ General Ports, page 39.

J. Screw to fasten the module to the backplane.

Operation Control

The PowerLogic HU280 module controls its own operation, as well as the redundant CPU (if any) and the connected I/O modules, through the backplane:

- Operation mode monitoring includes:
  - Hardware and software watchdog monitoring CPU and I/O state.
  - Diagnostic information about PowerLogic HU280 module status through LED indicators and log file.
- Interface with the operator through the webApp, WebUI and PowerLogic T500 configuration tool.
- Firmware upgrade via webApp and EcoStruxure System Management tool.

Refer to Software Upgrade, page 45.

PowerLogic HU280 Module Configuration

The PowerLogic HU280 module maintains and manages the information of the real-time database (coreDb). In this database, the I/O signals are related to the communication protocols signals.

The configuration of the PowerLogic HU280 module is based on XML files that are generated with the PowerLogic T500 configuration tool. These XML files are generated on a PC and sent to PowerLogic HU280 module via webApp.

Refer to BQT7944802 webApp – Maintenance and Monitoring Tool User Manual.

PowerLogic HU280 Module Synchronization

Two different synchronization sources can be used. In the case of two sources, the priority level is defined with a primary and a secondary source. If both sources are active, only the primary source synchronizes the system.

NOTE: If the primary source is available, it is used to synchronize the PowerLogic HU280 module. Otherwise, the secondary source is used.

The available synchronization sources are the following:

- **GPS**: a GPS connected to COM1 serial port.
- **SNTP**: the synchronization module includes a SNTP client and server, which can be used to synchronize from a network SNTP clock or as a time reference for other modules.
- **Protocol**: most control protocols can be used as synchronization source of the system.
- **PTP**: as indicated in the IEEE-1588 standard, a PTP primary device can synchronize other PTP devices (secondary devices) through one or several Ethernet interfaces. PowerLogic HU280 module can operate as PTP server to synchronize other devices connected to the Station Bus.

  NOTE: PTP over HSR is not a supported use case.
- **IRIG-B**: you can configure the PowerLogic HU280 synchronization module as an IRIG-B server and/or client. The compatible formats are: IRIG-B002, IRIG-B003, IRIG-B006 and IRIG-B007.

If the synchronization source is not configured, the manual synchronization via webApp is created by default.

PowerLogic HU280 Module Communication

PowerLogic HU280 module supports the following communication protocols:

- IEC101 client and server
- IEC103 client
- IEC104 client and server
- DNP 3.0 client and server
- Modbus client and server
- IEC61850 client, Edition 1 and 2
- IEC61850 server, Edition 2
- TSV (Terminal Server device)

I/O Acquisition

The PowerLogic HU280 module manages the information exchange with the I/O modules. This information is sent from the acquisition module to the PowerLogic HU280 module through the Profibus internal bus available in the backplane.

The software in the PowerLogic HU280 module has the following features:

- Access to the processing of I/O information, which offers added value to the information from field.
- Access to the internal bus to exchange information with the I/O modules.

Cybersecurity

The PowerLogic HU280 module is supplied with a standard security policy, complemented with the definition of an RBAC model (Role-Based Access Control). This model is defined and managed through a special tool, CAE (EcoStruxure™ Cybersecurity Admin Expert).

Access Control

Role Based Access Control (RBAC) is a tool used to define user access. RBAC is an alternative to traditional Mandatory Access Control (MAC) and Discretionary Access Control (DAC).

RBAC model manages access based on roles. A role is a collection of rights. A user has the rights defined by his/her role and rights inherited from the role hierarchy.

RBAC can be defined using one of the following possibilities:

- defined with the webApp and stored locally in PowerLogic HU280 module
- defined centrally through CAE tool, then transmitted and stored locally in PowerLogic HU280 module

  Refer to CAE/ENUM/B4.1 Cybersecurity Admin Expert User Manual for details.
- defined centrally on a central Radius/LDAP server

Authentication of any user trying to connect can be achieved in the following ways:

- based on local RBAC
- based on central RBAC through interrogation of Radius/LDAP Server then local RBAC
- based on local RBAC then central RBAC through interrogation of Radius/LDAP Server

For more information about the security features in the HU280, contact Schneider Electric to access the HU280 Cybersecurity Guide, which requires the signing of a Non-Disclosure Agreement (NDA).

Certificate Management

PowerLogic HU280 includes a physical Trusted Platform Module (TPM) device which is used to securely store private keys of certificates.

If a certificate is installed through webApp by **SecurityAdmin** user role, the private key of the certificate is securely saved in the TPM device. The certificate is used for Transport Layer Security (TLS).

The following PowerLogic HU280 protocols are over TLS:

- LDAP
- Syslog
- HTTPS
- CAE
- TCP channels for SCADA communications protocols (IEC104, DNP3) (configurable)

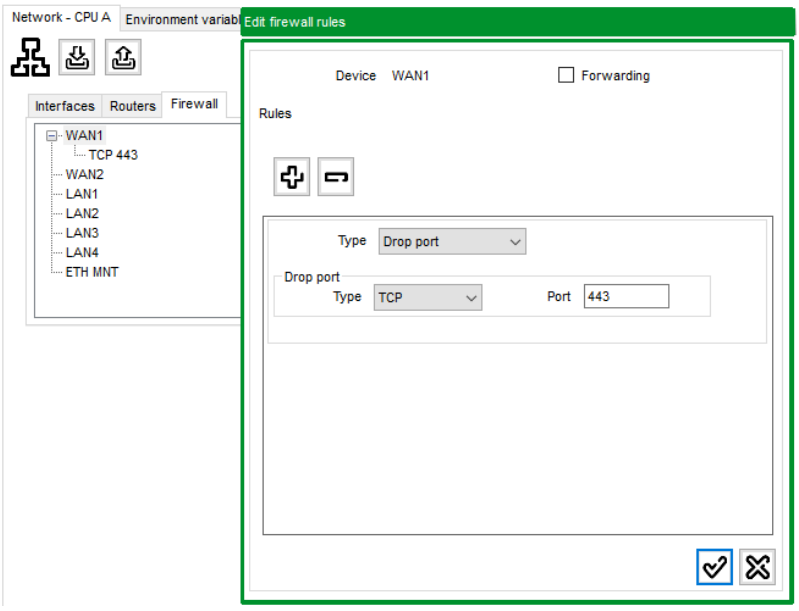
For more information about the security features in the HU280, contact Schneider Electric to access the HU280 Cybersecurity Guide, which requires the signing of a Non-Disclosure Agreement (NDA).

Port Hardening

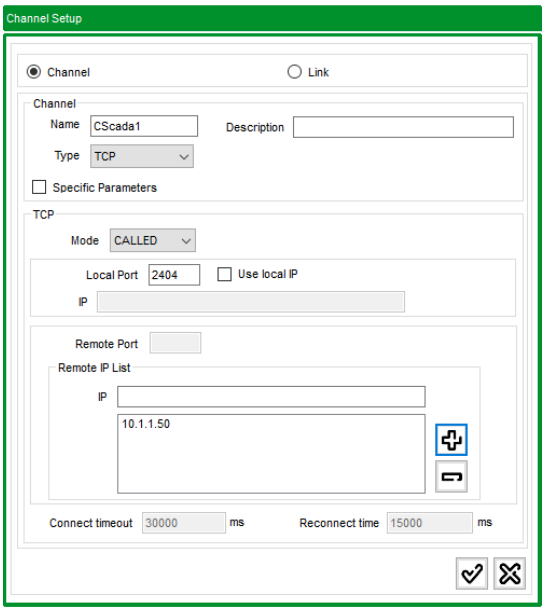
Device hardening is the process of configuring settings to strengthen security on devices. It involves password management, access control, disable unused physical ports, logical ports, protocols and services. Port hardening consists in hardening selectively each individual port, both physically and logically.

The following general rules apply:

- The logical (TCP/UDP) ports that are not used by the PowerLogic HU280 module are closed; there is no need to drop them explicitly.
- Some protocols and associated logical ports are activated per default (for example HTTPS). User can drop each port on each interface through Firewall drop port functionality in the configuration tool. To know the list of logical ports activated per default, refer to the HU280 Cybersecurity Guide, which requires the signing of a Non-Disclosure Agreement.



- TCP/UDP SCADA protocol ports are closed by default, except if a called TCP communication channel has been created.
- When creating a communication channel, restrict the IP interface on which the channel will operate by selecting **LocalPort** and the associated IP address in the PowerLogic T500 configuration tool.



PowerLogic Ring

The PowerLogic ring provides information related to the product states.

Ring color	Led	Ring behavior	Description of indications and actions
None		Off	Device unpowered.
Yellow		Spinning	Loading application and configuration.
		Fixed	Application loaded with invalid configuration.
Yellow and Green		Flashing	HOT device with deteriorated communication links.
Green		Flashing	STANDBY device in **REMOTE** mode.
		Fixed	HOT device in **REMOTE** mode.
Blue		Flashing	STANDBY device in **LOCAL** mode.

Ring color	Led	Ring behavior	Description of indications and actions
		Fixed	HOT device in **LOCAL** mode.
Purple		Regressing countdown	Waiting for user confirmation of factory reset by pressing reset button again (0 – 3 s).
		Slow flashing	Press the **RESET** button 1 s for software reset.
		Fast flashing	Press the **RESET** button 3 s to initiate factory reset.
Red		Fixed	Hardware or application non-operational.
		Fixed faded	Device powered, software not running.

Installation

Handling Modules

Electrostatic discharges may damage semi-conductive devices within the module.

NOTICE
HAZARD OF ELECTROSTATIC DISCHARGE • Handle the module from the front side, as far as possible from the backplane connectors. • Do not touch the pins of the backplane connector. • Keep the module in its antistatic bag or packaging box, when unused. **Failure to follow these instructions can result in equipment damage.**

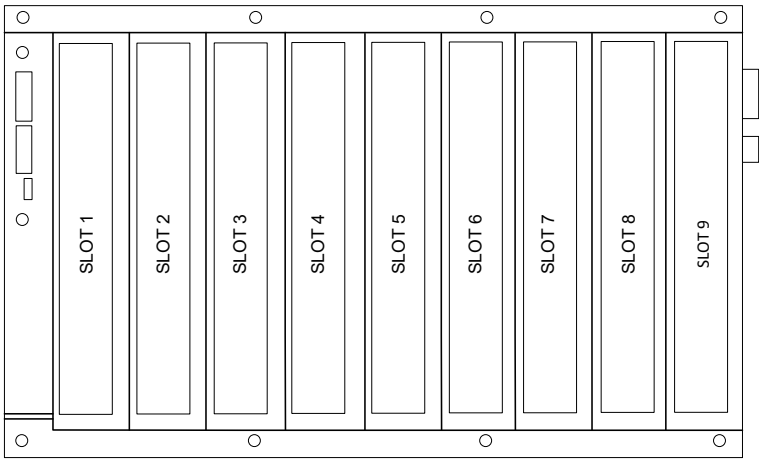
Location of Modules in the Backplane

All modules must be always installed in vertical position.

When using a power supply such as the PS280 module, it must be in slot 1 (left-hand side).

In power supply redundancy configurations, slot 1 and slot 2 must be reserved and available for the 2 power supply modules.

Backplane positions



PowerLogic HU280 Module Location

NOTICE
HAZARD OF NOISE AND HEAT The modules must be grouped to minimize the adverse effects caused by noise and heat. **Failure to follow these instructions can result in equipment damage.**

Insert the PowerLogic HU280 module as far as possible from the the PS280 modules.

Recommended position for PowerLogic HU280 module: slot 9 or slot 4 if a 4-slot backplane is used. Slot 1 is the leftmost one.



If the system has PowerLogic HU280 module redundancy, both modules must be put together in slots 8 and 9 of a 9-slot backplane, or in slots 3 and 4 in a 4-slot backplane.

Interconnection with Other Equipment

The HU280 incorporates Safety Extra Low Voltage (SELV) circuits across all its communication ports. To sustain the performance in accordance with the specifications outlined in the IEC 60255 standard (chapter 8.5), it is essential that the ports of the external equipment to which they are connected to also adhere to the SELV requirements.

Power Supply and Grounding

NOTICE

HAZARD OF TERMINAL DAMAGE OR INCORRECT POWER SUPPLY

- Use appropriate tightening torques as indicated in the Installation Guide.
- Supply power to the PowerLogic HU280 module with one or two PS280 modules/external power supplies.
- When using an external power supply, the voltage input for the backplane is 5.4 Vdc. The external voltage input is not protected against overvoltage nor polarity inversion, so an incorrect wiring or an incorrect adjustment of the supply voltage could damage electronic parts.

Failure to follow these instructions can result in equipment damage.

The PowerLogic HU280 module is powered up through the backplane, which can be powered by the PS280 module, by an external power supply or by a redundant power supply configuration.

The PowerLogic HU280 module is powered by the backplane and the backplane is powered by a power supply. There are several options:

- Option 1: one PS280 power supply module
- Option 2: one external power supply
- Option 3: two PS280 power supply modules
- Option 4: two external power supplies

PS280 Power Supply

If a PS280 power supply is used, install it in position 1 (backplane slot 1 left-hand side).

The PS280 module is hot-swappable without altering the right behavior of the other devices in case a redundant PS280 module is connected.

In redundant power supply configurations, slot 1 and slot 2 are reserved for the two power supply modules.

Auxiliary Power Supply

When using auxiliary power supplies, make sure that the power supply meets the power consumption of the installed modules. The external power supply must comply with reinforced insulation, overvoltage category III and pollution degree 2 for a rated voltage of 300 V, in accordance with the IEC 60255-27 standard.

PowerLogic HU280 and Processing Requirements

The consumption of one PowerLogic HU280 module is maximum 15 W. Refer to the user manual of each installed module to check the specific consumption of your installation.

An internal supercapacitor is in charge of maintaining the RTC active. The minimum retention time is one week.

Grounding

The PowerLogic HU280 module is connected to the protective earth ground through the backplane or the chassis.

NOTICE

HAZARD OF IMPROPER INSTALLATION

- A dedicated connection between the backplane/chassis and protective earth ground must be installed.
- The section of the wire connection must be defined. The correct sizing must be aligned with the certification tests.

Failure to follow these instructions can result in equipment damage.

Assembling Modules

Modules can be installed in a 19-inches chassis (482 mm) (BP270) or a wall-mounted backplane (BP260).

To mount the module in the backplane, follow the instructions below:

1. Switch off the power supply. Switch off all power supplies in case of redundancy configuration.
2. Mount the module at the required position. If you are using a wall-mounted backplane, verify that the rear rails are properly mounted using the pre-drilled holes on the backplane.
3. Firmly press the module for a proper fit of the connector. Check that the module is correctly mounted to the backplane base.
4. Fix the module using the screw located at the top.

⚠CAUTION

INADEQUATE EQUIPMENT OPERATION

- Ensure that the PowerLogic HU280 module is installed correctly.
- Check the ring color and behavior to check the module status.

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

The following image shows two modules inserted in a backplane. The module on the left is incorrectly installed. Correct the module installation before use even if the module appears to be functional.

Incorrect installation of a module:



PowerLogic HU280 Module Redundancy

PowerLogic HU280 Module Status

Together with the backplanes (BP260 and BP270), the PowerLogic HU280 module supports various redundancy architectures.

To control the various redundancy architectures, each PowerLogic HU280 in a redundant system can be in one of three different status:

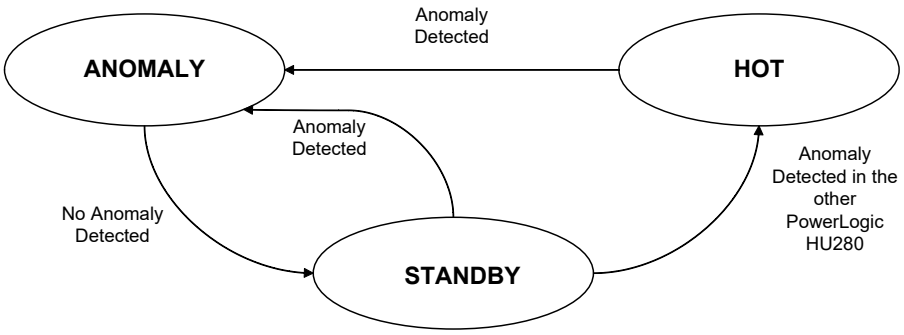
- ANOMALY: the PowerLogic HU280 module needs to reboot.

  The user can define the ANOMALY condition with Formula or ISaGRAF to set the value of the supervision signal DOINGWELL.
- STANDBY: the PowerLogic HU280 module does not currently control the system, but is ready to take control.
- HOT: the PowerLogic HU280 module is actively controlling the system.

  NOTE: Redundancy of PowerLogic HU280 module with SM_CPU866e from Saitel DP platform is not contemplated.

Transition between HOT, STANDBY and ANOMALY Status

The transition between HOT, STANDBY and ANOMALY status is managed for each PowerLogic HU280 module of a redundant system as follows:



The PowerLogic HU280 module switches to the ANOMALY status when an anomaly is detected while being in HOT or STANDBY status. An anomaly can be caused by:

- an invalid configuration
- the supervision signal DOINGWELL set to 0

The user can customize the logic to set the DOINGWELL supervision signal to 0 with Formula or ISaGRAF. Refer to SE-S856–MSS Easergy Builder User Manual for more information.

Any transition to the ANOMALY status requires a reboot of the system.

Once the cause of the anomaly is removed or resolved, the PowerLogic HU280 module switches to the STANDBY status. It switches to the HOT status when the PowerLogic HU280 module that is currently in the HOT status detects an anomaly and switches to the ANOMALY status.

The various redundancy architectures are based on different factors:

- **Physical location**: both PowerLogic HU280 modules can be installed in the following ways:
  - both PowerLogic HU280 modules are installed one after the other in the same backplane.
  - the two PowerLogic HU280 modules are installed in different backplanes.

- **Communication channels**: PowerLogic HU280 manages the switching mechanism that can be configured to perform through various communication channels. Refer to Communication Channels, page 31.
- **Switching mode**: both COLD and HOT data switching modes are possible. In COLD switching data mode, the database of the STANDBY device is not updated with the HOT device database, but it only updates when the switching mechanism is triggered. In the HOT switching data mode, the STANDBY device is constantly updating its database with values from the HOT device.

The baseline software platform allows the configuration of multiple IP addresses associated with the HOT PowerLogic HU280 module. These IP addresses are dynamically assigned to allow PowerLogic HU280 modules in redundant systems to communicate with each other and use the same IP address after switching.

Communication Channels

The switching mechanism is managed by the PowerLogic HU280 modules using the RCAP (Redundancy Control Asymmetric Protocol), which is a Schneider Electric proprietary protocol.

This protocol is used to manage the switching of the redundant PowerLogic HU280 modules using a communication channel that can also be redundant. The communication channels to manage the switching mechanism can be:

- Ethernet: the communication is established using an IP address through an Ethernet port.
- Serial: the PowerLogic HU280 modules communicate through one of the serial ports. Refer to Redundancy Wiring (Serial ports), page 38.
- Communication through the backplane: only available when the two PowerLogic HU280 modules are installed in the same backplane. The backplane includes a dedicated high speed serial channel so that the PowerLogic HU280 modules communicate.

Switching Modes

Two switching modes are possible:

- COLD Data mode – Decoupled data: the database values and the supervision points are not synchronized in both PowerLogic HU280.
- HOT Data mode – Shared data: the STANDBY device is constantly updating its database with the values from the HOT device.

For both switching modes, the two PowerLogic HU280 modules should have the same configuration and the Environment Variable **SLOT** set to A and B respectively.

COLD Data Mode

There is no data transfer between the two PowerLogic HU280 modules.

While being in STANDBY status, the PowerLogic HU280 does not update the database. Then, when it switches to HOT status, the PowerLogic HU280 initializes the database with default values.

This switching mode has the advantage to considerably improve availability so that maintenance, database modifications and test tasks can be performed on the STANDBY PowerLogic HU280, without disturbing the system performance.

HOT Data Mode

Under HOT Data mode, a high-speed communication channel (Ethernet or through the backplane) is used between the two PowerLogic HU280 modules to synchronize the STANDBY database with the HOT database.

When switching is performed, the new HOT PowerLogic HU280 starts with the updated values.

The update is performed by exception, that is, only exchanging values of the points which have changed, except after a reset, when the entire database is updated.

The information shared by the two PowerLogic HU280 modules is exclusively related to the coreDb points.

The data, which is shared by the two PowerLogic HU280 modules, is exclusively related to coreDb points. Internal data about the device controllers is not shared, which can cause some information to be lost after a switchover. Examples of the data that is not shared are the commands sent by exception using protocols like IEC101 or IEC104. In the case of IEC 61850, if the option **ActiveStandby** is enabled, the HU280 continues operating with external devices, but the information is not updated in coreDb, so the STANDBY HU280 is not aware of that activity after a switchover.

ISaGRAF and the supervision device controllers are independently executed in both PowerLogic HU280 modules. Then, the points with sources in the supervision or ISaGRAF controllers are not shared between the two PowerLogic HU280 modules.

The PowerLogic HU280 modules can start the execution at different times. Consequently, the ISaGRAF sequential program can show different status in the PowerLogic HU280 modules. If the synchronization of the status between the two programs is required, implement the synchronization in the program with ISaGRAF variables that are mapped to the coreDb signals.

Redundancy Architectures

Two PowerLogic HU280 Modules in the Same Backplane

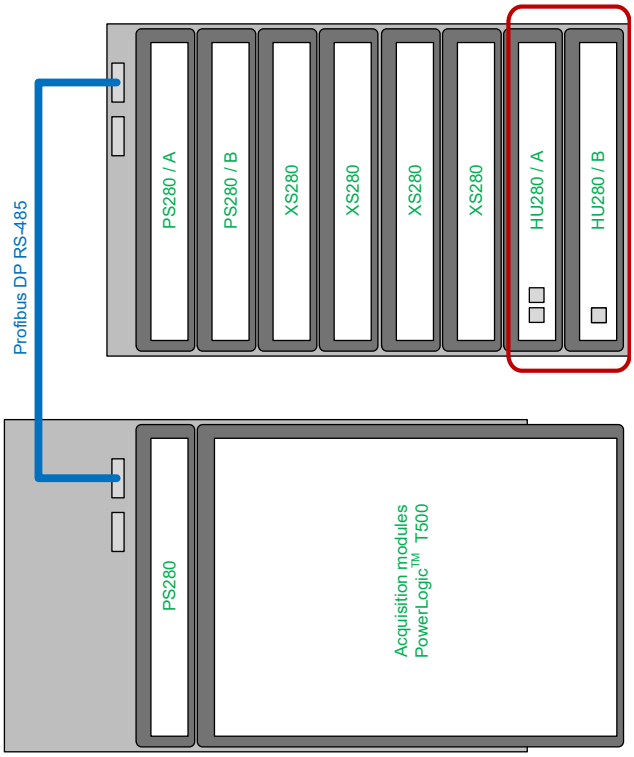
Two PowerLogic HU280 modules in the same backplane is the simplest redundant configuration as it makes the best possible use of the features of the backplanes (BP260 and BP270). This configuration allows the two PowerLogic HU280 modules to share:

- the PowerLogic XS280 communication modules
- the acquisition modules

If two PowerLogic HU280 modules are installed in the same backplane, use the specific high-speed lines in the backplane or the dedicated communication links (Ethernet or serial) to set up the switching mecanism. This configuration allows the HOT and the COLD data switching modes. Refer to Switching Modes, page 31.

The disadvantage of this configuration is that an abnormal behavior detected in the backplane (such as an issue with the power supply) affects both PowerLogic HU280 modules that are located in the backplane.

Example of two PowerLogic HU280 modules in the same backplane



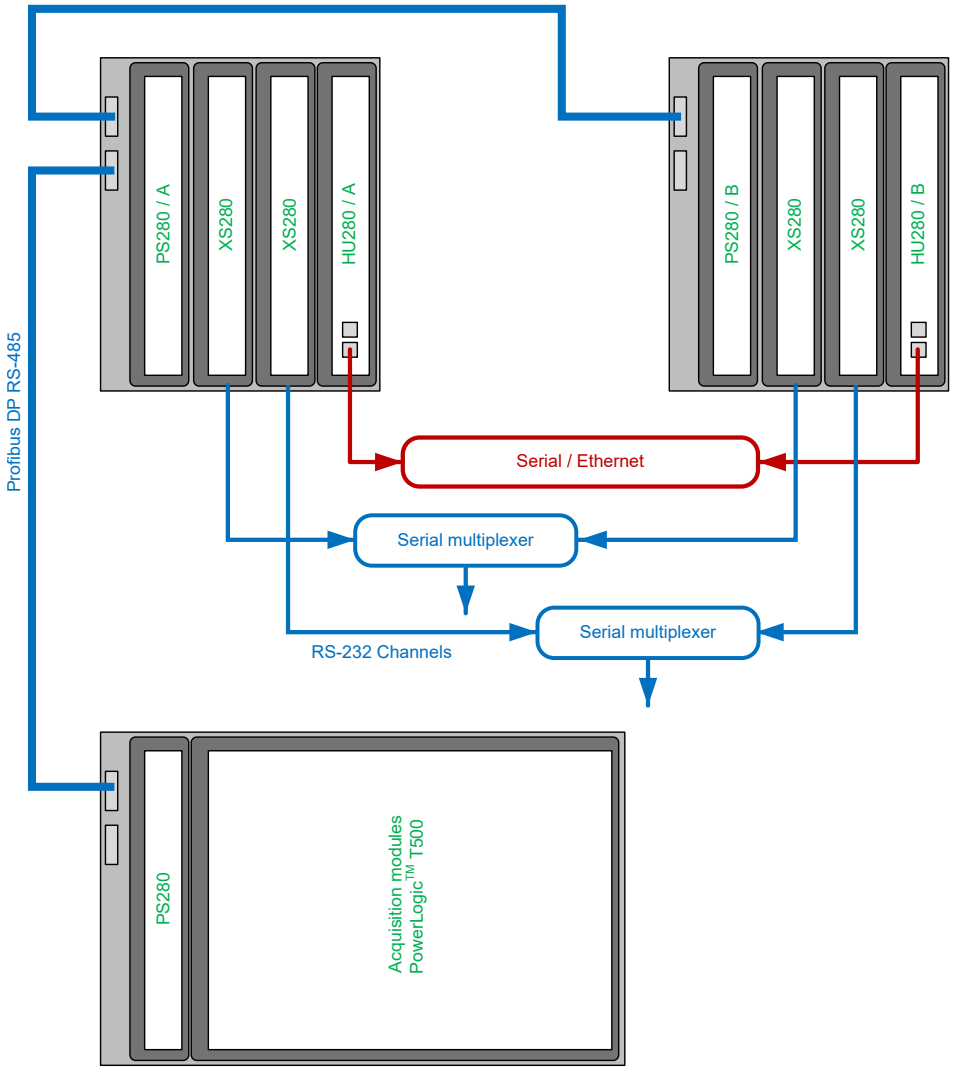
Two PowerLogic HU280 Modules in Different Backplanes

An additional backplane is required for this configuration. The PowerLogic XS280 communication modules cannot communicate with the PowerLogic HU280 module if they are not on the same backplane. Therefore, the PowerLogic XS280 communication modules must also be duplicated in this configuration.

The two PowerLogic HU280 modules manage the switching mechanism that occurs between them, using a dedicated communication link (Ethernet or serial). This configuration allows the HOT and the COLD data switching modes. Refer to Switching Modes, page 31.

The advantage of this configuration is that an abnormal behavior detected in the backplane (such as an issue with the power supply) does not affect the entire system.

Example of two PowerLogic HU280 modules in different backplanes



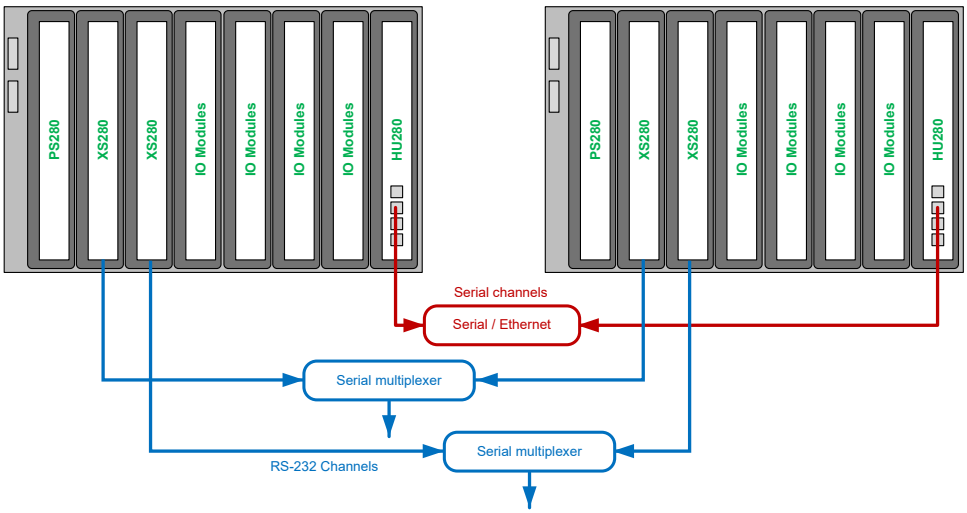
Dual System

The system duality is done to maximize the system availability. Duality means that all the system elements are duplicated. This is the typical configuration of data hubs and communication front-ends.

Two PowerLogic HU280 modules that are installed in different backplanes are associated with a specific number of communication and acquisition modules. This configuration allows the HOT and the COLD data switching modes. Refer to Switching Modes, page 31.

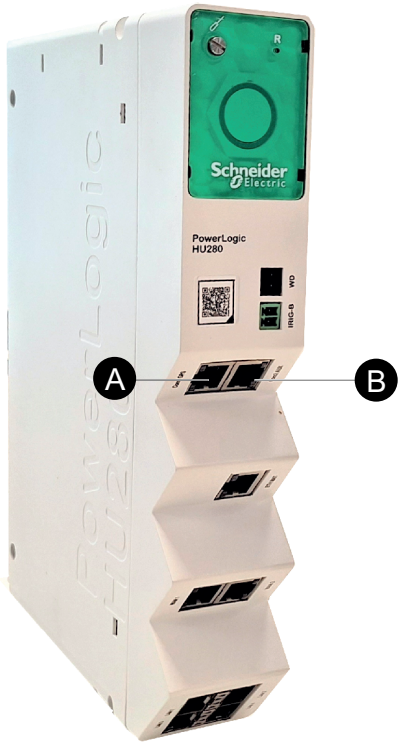
The communication channels could be multiplexed by using an external logic device.

Example of two PowerLogic HU280 modules in a dual system



Wiring

Serial Communications



A. COM1: RS-232/485 port for general purpose communications. This port can also be used to connect the GPS.

B. COM2: RS-232/485 port for general purpose communications. This port supports asynchronous communications.

Refer to RS-232/485 Communication Wiring, page 36.

The COM ports are functionally isolated up to level of 1 kVrms.

RS-232/485 Communication Wiring

NOTICE
HAZARD OF INCORRECT WIRING • Check that the cable connected to each COMx port is correct. • Use identification tags on the cables to avoid mistakes. **Failure to follow these instructions can result in equipment damage.**

COM1 and COM2 ports are two isolated serial ports on the front side of the HU280; they are used for general purpose communications.

Connector type: standard RJ45

Supported maximal speed rate: 38400 bauds

RS-232 Communication Port

COM 1 supports:

- Full modem control
- Asynchronous isolated communications

COM1 can receive a pulse per second signal (PPS) through pin 7, so it can be used as the GPS input, if required. The input PPS signal must be valid for RS-232 levels. The validated GPS devices to be connected to the COM1 port are GPS35 (Garmin) and GPS16 (Garmin).

Some GPS devices do not allow the use of the PPS signal. This operation mode implies that the synchronization accuracy is lower. It can produce a deviation of up to 10 ms in the generation of the signal.

NOTE: When using a GPS synchronization device, wire the PPS signal to achieve the highest accuracy in the synchronization.

COM 1	Description	I/O
1	CTS (Clear To Send)	Input
2	DTR (Data Terminal Ready)	Output
3	Tx (Data transmission)	Output
4	GND (Ground)	–
5		–
6	Rx (Data Reception)	Input
7	DCD (Data Carrier Detect) or DSR (Data Set Ready)	Input
8	RTS (Request To Send)	Output

COM 2 supports:

- partial modem control
- asynchronous isolated communications

COM 2	Description	I/O
1	CTS (Clear To Send)	Input
2	Not connected	–
3	Tx (Data transmission)	Output
4	GND (Ground)	–
5		–
6	Rx (Data Reception)	Input
7	Not connected	–
8	RTS (Request To Send)	Output

RS-485 Communication Port

When COM1/COM2 are used as RS-485 communication port, the recommendations for the cables are the following:

- Resistance: < 100 Ω/km
- Section: 0.22 mm² (24 AWG)
- Characteristic impedance: 120 Ω
- Maximum length: 1,200 m
- Shielded twisted pair

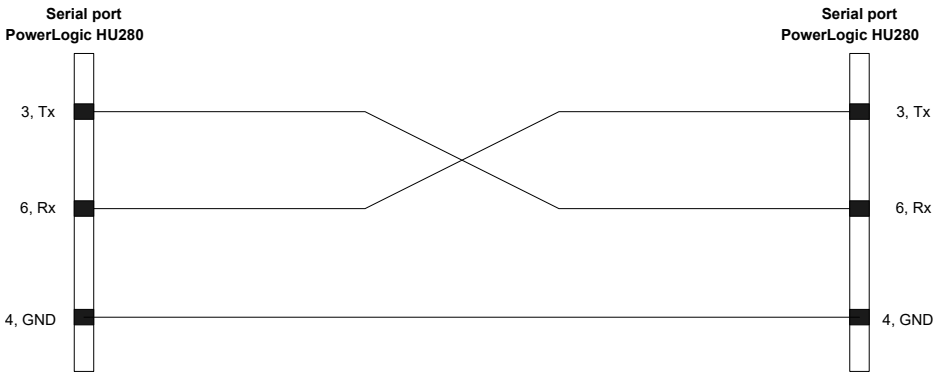
COM 1 / COM 2	Description
1	Not connected
2	Not connected
3	Y/A
4	GND (Ground)
5	
6	Not connected
7	Not connected
8	Z/B

NOTE: Note that A and B naming convention depends on the manufacturer. Check the naming convention of the connected product manufacturer.

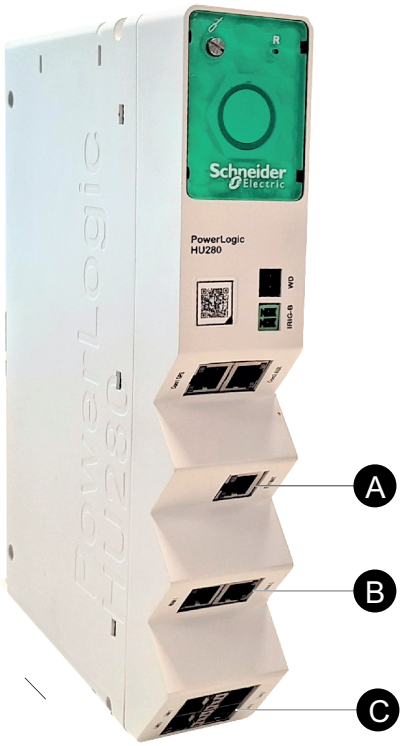
Redundancy Wiring (Serial ports)

In redundant systems, you can interconnect both PowerLogic HU280 modules using serial ports with the following pinout:

Cable description for redundancy



Ethernet Communication



A. ETH MNT 10/100 Mbps port with RJ45 connector for maintenance purpose:
   - Software upgrades
   - Configurations
   - Troubleshooting

B. WAN 1 and 2: 2 ports 10/100 Mbps port with RJ45 connectors
   - To connect to SCADA or DCS upstream control centers
   - For PowerLogic HU280 redundancy (arbitration and data exchange)

   Refer to Redundancy Architectures, page 33.

C. LAN 1, 2, 3 and 4: 4 x 100/1000 Mbps Ethernet ports with SFP connectors to connect to the devices in the station, such as:
   - Power Meters
   - Protection IEDs
   - Remote I/O
   - Merging Units
   - Local HMI

The ports are also used for redundancy (arbitration and data exchange).

Several types of network redundancy mechanisms are allowed, depending on the ports configuration. PRP (Parallel Redundancy Protocol), HSR (Highly available Seamless Redundancy) and BOND (Linux bonding devices) protocols allow using two physical ports as a unique logical port, with the same MAC address and IP address.

IMPORTANT: The maximum speed for LAN1, 2, 3 and 4 ports when working in PRP or HSR mode is 100 Mbps.

NOTICE

HAZARD OF LOSS OF DATA

Use 100 Mbps SFP connectors or set the speed of the network to 100 Mbps when working in HSR/PRP mode.

Failure to follow these instructions can result in data loss or delay in the transmission of urgent data.

The following redundancy ports configurations are allowed:

- PRP1 (WAN1-WAN2)
- PRP2 (LAN1-LAN2)
- PRP3 (LAN3-LAN4)
- HSR1 (WAN1-WAN2)
- HSR2 (LAN1-LAN2)
- HSR3 (LAN3-LAN4)
- BOND1 (WAN1-WAN2)
- BOND2 (LAN1-LAN2)
- BOND3 (LAN3-LAN4)

  NOTE: If a PRP, HSR or BOND interface is defined, the associated LAN or WAN port is not able to be defined and vice versa.

It is recommended to use Ethernet cable categories 5 and 5e for all the ports.

VLAN (Virtual Local Area Network) functionality is supported for all physical Ethernet devices: ETH MNT, WAN 1, WAN 2, LAN 1, LAN 2, LAN 3, LAN 4.

VLAN is not supported for redundant Ethernet devices (PRP, HSR and BOND). With VLAN functionality, users are able to set IP addresses in several Virtual Local Area Networks.

Ethernet Ports Characteristics

Ethernet ports support from 10 to 1000 Mbps.

- WAN ports: Fast-Ethernet communication ports using copper. They allow 10Base-T (Ethernet), 100Base-TX (Fast-Ethernet).
- LAN ports: Gigabit-Ethernet communication ports transceiver over SFP (Small Form Factor Pluggable) type.
  - Copper ports: they allow 10Base-T (Ethernet), 100Base-TX (Fast-Ethernet) and 1000Base-T (Gigabit-Ethernet) communications.
  - Fiber optic ports: they allow 100FX (Fast-Ethernet) and 1000Base-LX (Gigabit-Ethernet) communications.

⚠WARNING

HAZARD OF EYE DAMAGE AND BLINDNESS

Never look into the end of the fiber optic.

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

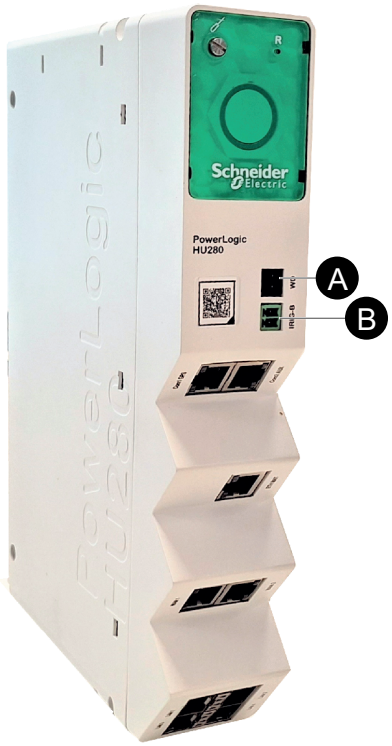
NOTICE
HAZARD OF IMPROPER EQUIPMENT OPERATION • Use only Schneider Electric approved optical transceiver components. • Never replace the optical transceiver components with unauthorized manufactured parts. **Failure to follow these instructions can result in equipment damage.**

Use an optical power meter to determine the operation or signal level of the device.

If an electrical-to-optical converter is used, make sure that it can manage the character idle state capability (when the fiber optic cable interface is "Light off").

Specific care should be taken with the bending radius of the fibers. The use of optical shunts is not recommended as they can decrease the communication performance of the transmission path lifetime.

IRIG-B Input and Watchdog Output



A. Watchdog output for supervision. Refer to Watchdog - WD Output, page 42.

B. IRIG-B input for synchronization of modules. Refer to IRIG-B Input, page 42.

IRIG-B Input

PowerLogic HU280 module includes an input terminal for IRIG-B signal (non-modulated TTL - 5V) that can be used for synchronization.

The input impedance is 600 Ω.

This terminal must be wired as follows:



The module can be configured as IRIG-B client or server.

The supported standards are 200-04, 002, 003, 006 and 007 codes.

Watchdog - WD Output

PowerLogic HU280 module integrates a watchdog mechanism used to indicate the external equipment that the PowerLogic HU280 is running correctly.

The output terminal, identified as WD, implements a normally closed relay (48 V max and 200 mA) that opens, based on a supervision signal defined in coreDb (**FAIL_RTU**).

This output is designed to report to another local IED (Intelligent Electronic Device) installed in the same cabinet with wiring less than 3 m.

NOTE: The WD output is not a field output.

Getting Started

PowerLogic HU280 is provided with a basic configuration, that will help to get started with the system. The required information to access to the CPU is the following one:

Factory Default IP Addresses

Default IP addresses

Port	IP address	Mask
WAN1	10.1.1.1	255.255.255.0
WAN2	192.168.1.1	255.255.255.0
LAN1	192.168.2.1	255.255.255.0
LAN2	192.168.3.1	255.255.255.0
LAN3	192.168.4.1	255.255.255.0
LAN4	192.168.5.1	255.255.255.0
ETH MNT	192.168.6.1	255.255.255.0

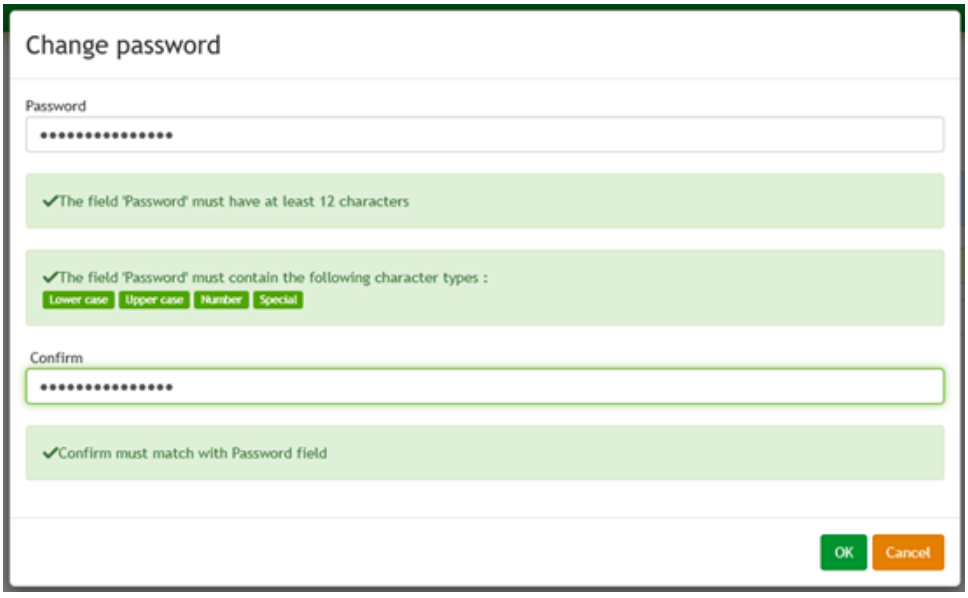
Default users

User role	Password	Description
SecurityAdmin	AAAAAAAA	This user can define and modify the security policy and user roles.

Upon first login, the user is prompted to create a new password that meets the following requirements:

- Both upper case and lower case letters
- At least one number
- At least one special character
- A minimum length of 12 characters

Since the default password is not aligned with previous requirements, it cannot be reused.



When working with the PowerLogic HU280 module, the user needs to prepare the working environment, which means installing the adequate tools and making the software files available, in case the CPU needs to be upgraded.

It is strongly recommended the security administrator uses the **SecurityAdmin** to:

- Create a backup SECADM role user
- Create the required users assigned to the required roles

There are certain tasks that the user must be familiar with before using PowerLogic T500 platform, such as:

- Installing and using Easergy Builder. Refer to SE-S856-MSS Easergy Builder User Manual for detailed information about the use of Easergy Builder.
- Using webApp. Refer to BQT7944802 webApp User Manual for more information about the use of the web server.
- Operating the PowerLogic T500 modules. Refer to the user manual of each installed module for more information about the wiring, configuration, and use of other PowerLogic T500 modules.
- Using webUI. Refer to BQT7944803 webUI User Manual for more information about the use of the web server.

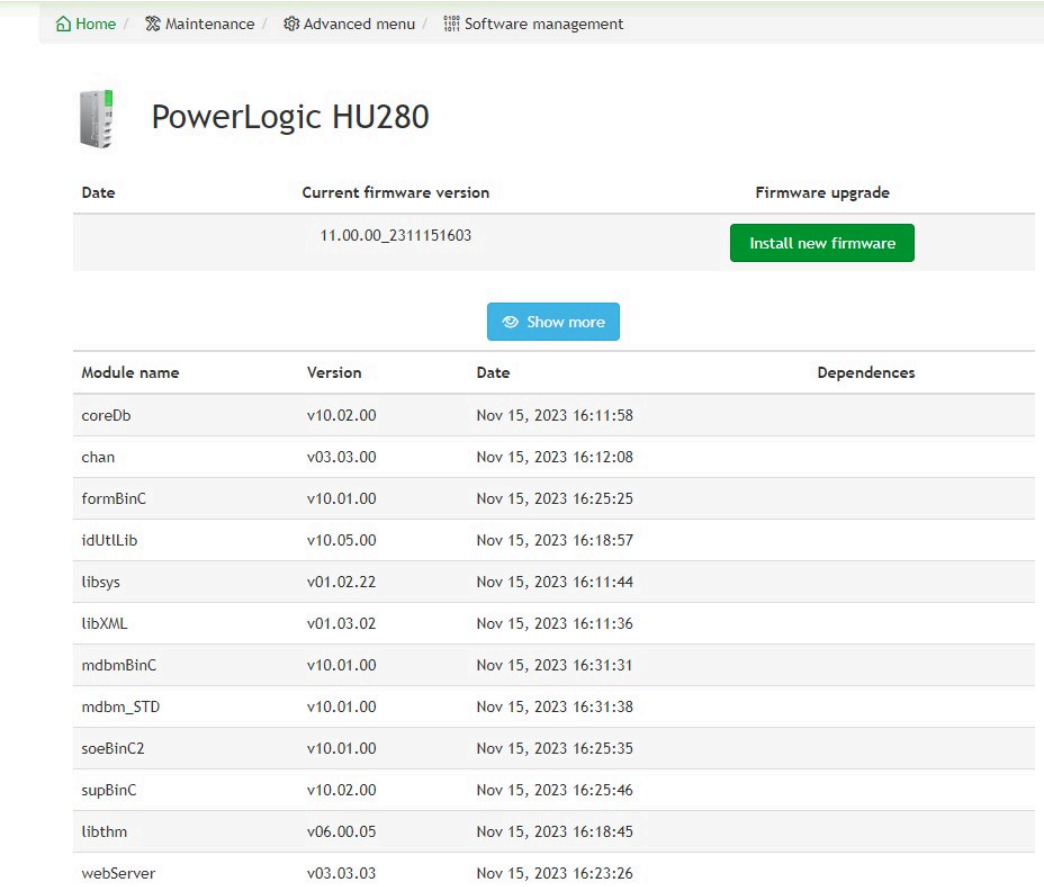
Software Upgrade

The software upgrade can be perfomed using the webApp tool. To access webApp, type **https://<CPU IP address>** in the browser navigation bar. Refer to BQT7944802 webApp User Manual for more information about how to access the webApp.

The software upgrade can be perfomed using the webApp tool. To access webApp, type **https://<CPU IP address>** in the browser navigation bar. Refer to *BQT7944802 webApp User Manual* for more information about how to access the webApp.

Select **Maintenance > Software** to upgrade the software version. The software current version is shown on the **Home** page and on the **Software management** page:

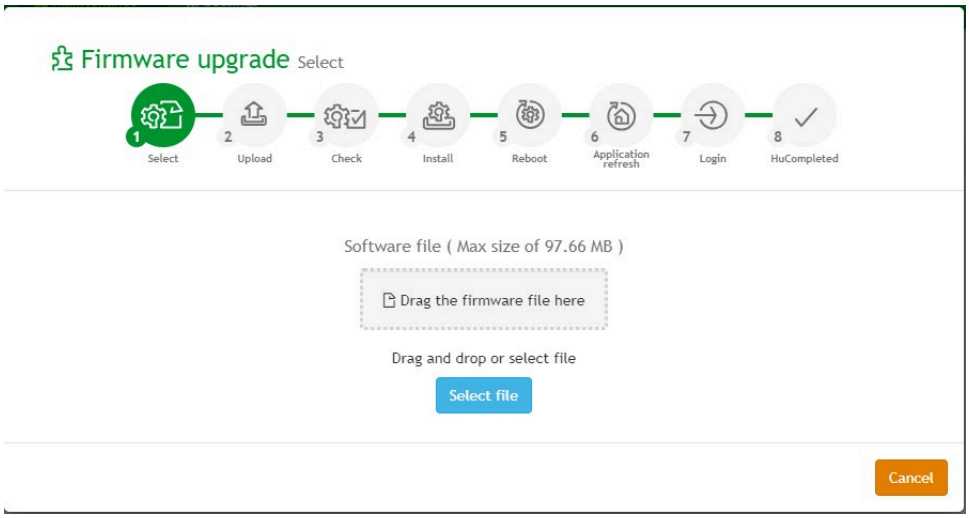
Firmware in the RTU



Step 1 / Select

Click the **Install new firmware** button. A window appears showing the firmware upgrade steps.

Firmware upgrade - Step 1

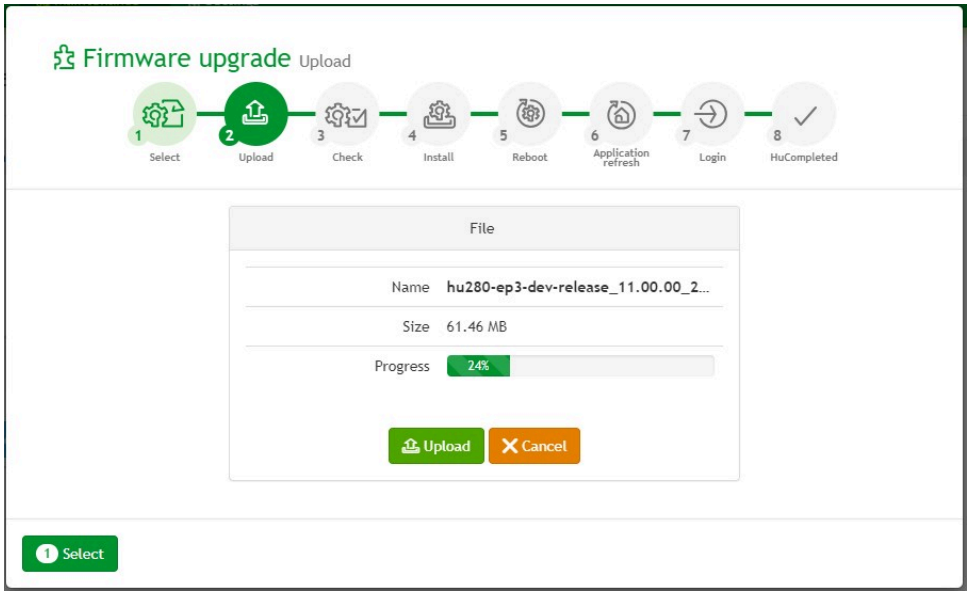


Click **Select file** button and select the compressed file `tar.gz` or drag it where indicated. The file `tar.gz` must be available on the PC connected to the web server. Contact Schneider Electric technical support to obtain this file.

Step 2 / Upload

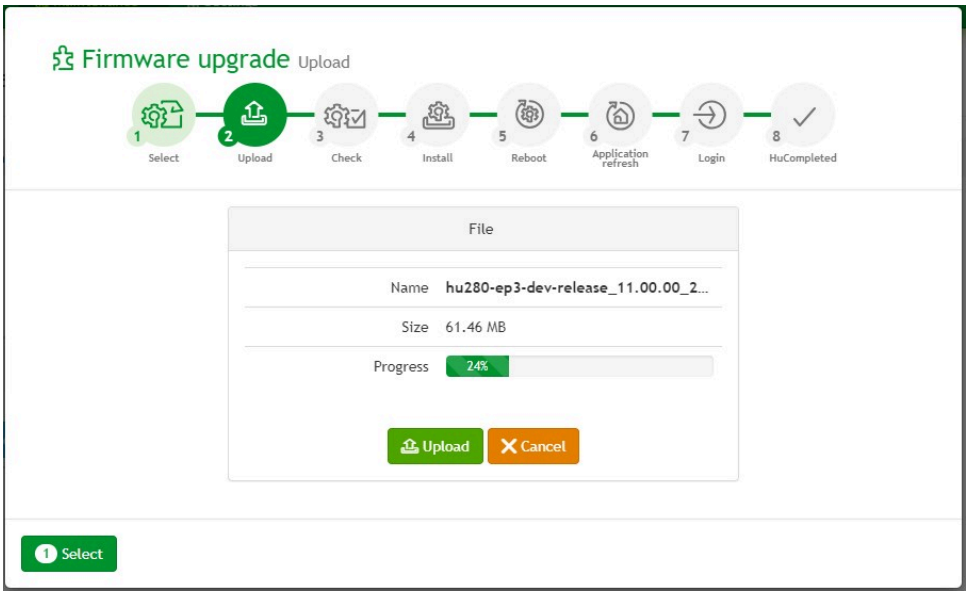
Click **Upload** button to upload the file.

Firmware upgrade - Step 2



The upload progress is indicated as a percentage in a progress bar on the screen.

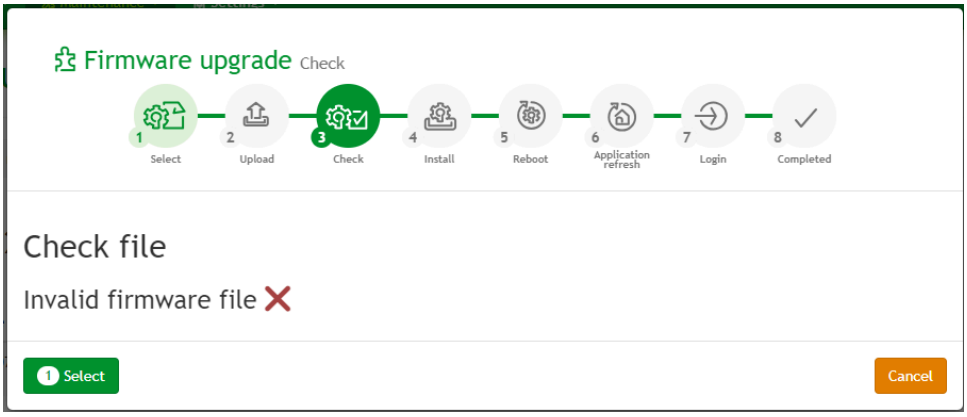
Firmware upload progress



Step 3 / Check

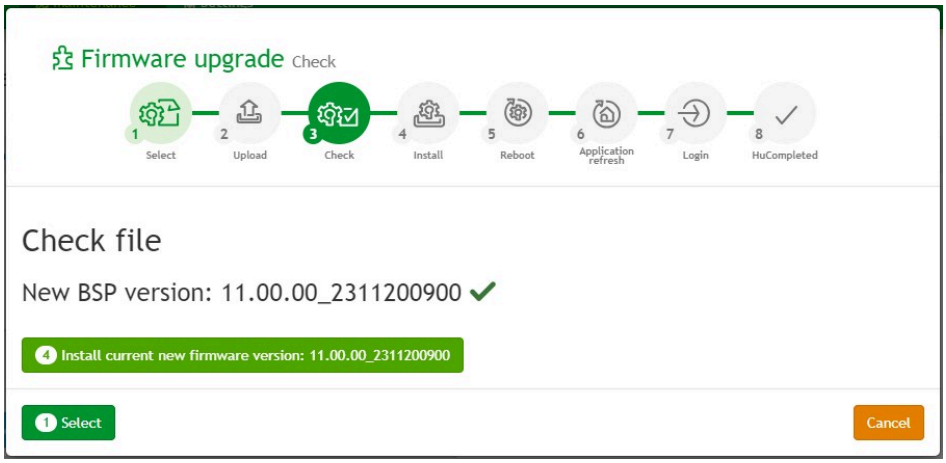
After uploading the file, the file is checked. If the checking process is unsuccessful, a red cross appears next to the text **NewBspVer**.

Unsuccessful checking process



If the checking process is successful, click the new green **Install current new firmware version** button. The rest of the process is automatic.

Firmware upgrade - Step 3

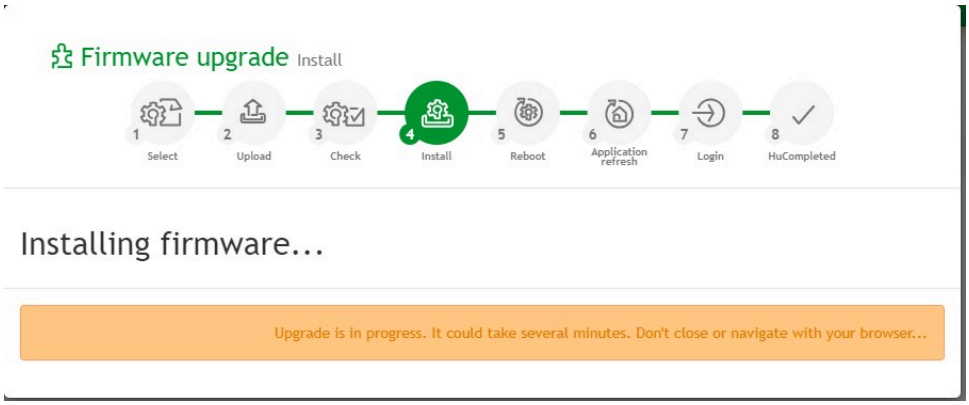


Step 4 / Install

NOTICE
HAZARD OF LOSS OF DATA During this process do not close the browser nor navigate in another tab. The tracking of this process is lost and you cannot log in until the new firmware is fully installed. **Failure to follow these instructions can result in equipment damage.**

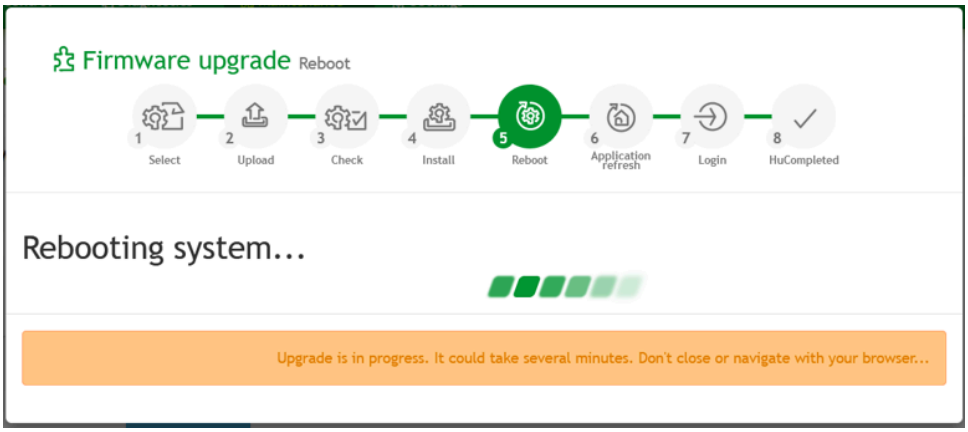
The new firmware is installed and runs after rebooting the RTU.

Firmware upgrade - Step 4



Step 5 / Reboot

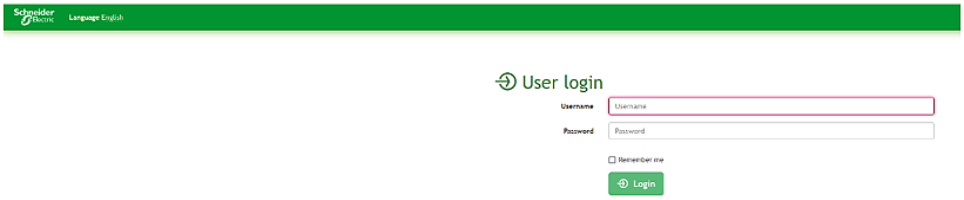
Firmware upgrade - Step 5



Step 6 / Login

After the rebooting step, the login is prompted.

Firmware upgrade - Step 6



Firmware and Configuration Management

In the case the system performing in an invalid state, a software watchdog resets the device to return it to a known state. The device reset is recorded in both the Syslog and Cyber Security log.

The watchdog can reset the device up to 5 times, then the reset is disabled.

In the case the reset is disabled, do one of the following actions:

- If there is access to webApp: search for the debug info through webApp to report the issue and to apply another configuration.
- If there is no access to webApp: perform a factory reset, page 19. Once set to factory default mode, access to webApp and follow instructions just above.

The PowerLogic HU280 does not allow invalid configurations. PowerLogic HU280 manages configurations in the following way: PowerLogic HU280 always have a backup of the last firmware image that was loaded successfully. When the firmware is updated, the boot loader tries to launch the new firmware.

- If the firmware load is successful: the firmware new version overwrites the stored backup firmware for later use.
- If the firmware load is not successful: the backed-up firmware version is restored.

This protects the booting process in case of the installation of an improper firmware.

Technical Specifications

Main

Specification	Description
Range	PowerLogic™
Product name	PowerLogic HU280
Device short name	HU280
Product or component type	Communication gateway

Installation

Specification	Description
Type of installation	Indoor and outdoor (inside a protected cabinet)
Cabinet specifications	Ventilated metallic cabinet Mechanic resistance IK08 Fire resistance V-1 or V-0 Outdoor cabinet minimum recommended IP65
Fixing Mode	With screws Only vertical orientation
Maximum relative humidity	95%
Ambient air temperature for storage	-40 °C to 85 °C
Ambient air temperature for operation	-40 °C to 70 °C
Pollution degree	PD2
Overvoltage category	CAT-II
Maximum operation altitude	2000 m
Dimensions	Height 244 mm Width 44 mm Depth 180 mm
Weight	1200 g
Lifting and transport	For installation in cabinets with weight >18 kg follow the cabinet manufacturer instructions.

Hardware Specifications

Specification	Description
Maximum power consumption	15 W
Processor name	ARM Cortex-A53 quad core at 1.1 GHz ARM Cortex-M4 at 400 MHz
Real-time clock	Built-in clock Clock drift +/-2 ppm from 0 °C to 40 °C Clock drift +/-3.5 ppm from 40 °C to 85 °C

Specification	Description
Communication port support	4 x Gbps Ethernet ports SFP 100/1000 Mbps 3 x 10/100 Base-T RJ45 ports 2 x RS232/485 RJ45 serial ports
Validated SFP devices	**Copper SFPs:** COHERENT: • FCLF8520P2BTL (compatible with the Gigabit Ethernet and 1000Base-T standards as specified in IEEE Std 802.3) • FCLF8521P2BTL (compatible with the Gigabit Ethernet and 1000Base-T standards as specified in IEEE Std 802.3) • FCLF8522P2BTL (compatible with the Gigabit Ethernet and 1000Base-T standards as specified in IEEE Std 802.3) 6COM: • 6C-SFP-F (100Base-TX Copper SFP Transceiver) • 6C-SFP-T (1000Base-T Copper SFP Transceiver) **Fiber SFPs:** AVAGO/BROADCOM: • HFBR-57E5APZ (50/125 µm and 62.5/125 µm multimode fiber. Compatible with 100Base-FX version of IEEE Std 802.3u) COHERENT: • FTLF1318P3BTL (9/125 µm single mode fiber. Compatible with Gigabit Ethernet as specified in IEEE Std 802.3)
Memory capacity	32 GB eMMC 4 GB RAM DDR4 (Future use) Up to 32 GB for Secure Digital (SD) and Secure Digital High Capacity (SDHC) UHS-I
IP Degree of protection	IP20 conforming to IEC 60529
IK Degree of protection	IK07 conforming to IEC 62235
Conformal coating	AVR80 DS65 (acrylic base)

Software Specifications

Specifications	Description
Communication port protocol	IEC/BS 61850 client/server DNP3 serial and TCP client/server IEC/BS 60870-5-101 client/server IEC/BS 60870-5-104 client/server IEC/BS 60870-5-103 client Modbus serial and TCP client/server
Cybersecurity	Role-Based Access Control TPM secure storage Certificate management Secure boot Encryption engine Firmware signature Security log

Specifications	Description
Encryption algorithms	AES (Advanced Encryption Standard) 3DES MD5/SHA RSA/ECC Single-pass authentication encryption
Communication service	TLS DHCP client Syslog Protocol RADIUS client LDAP client Web server (HTTPS)
Data recording	Event logs Sequence of events Alarms
Time Synchronization protocols	IRIG-B GPS PTP IEEE1588 SNTP
Functionality provided by web applications	Device identification Device status Data monitoring and control Events log TCP / Serial traces System log Clock management Firmware management Configuration management User management Certificate management Cybersecurity log Customizable HMI screens including Single Line Diagram
Programming language	ST (Structured text) IL (Instruction list) LD (Ladder) FBD (Function block diagram) SFC (Sequential function chart) Calculation Formula

Packaging

Specification	Description
Number of Units in Package 1	1
Package 1 Height	8.5 cm
Package 1 Width	23 cm
Package 1 Length	31 cm
Package 1 Weight	1.366 kg

Standard Compliance

Directive / Test	Identification	Details
CE Mark and UKCA Mark		
Low Voltage Directive (LVD)	2014/35/EU	CE Mark Directive
	SI 2016 Nº 1101	UKCA Mark Directive
Electromagnetic Compatibility (EMC)	2014/30/EU	CE Mark Directive
	SI 2016 Nº 1091	UKCA Mark Directive
RoHS	2011/65/EU	CE Mark Directive
	Regulations 2012 and SI 2012 Nº 3032	UKCA Mark Directive
WEEE	2012/19/UE	CE and UKCA Mark Directive
Drop tests		
Drop test	IEC 60068-2-31:2008 ISO 4180:2019	60 cm (with packaging)
EMC - Emission tests (Aligned with IEC/BS 61850-3 and IEC/BS 60255-26)		
Radiated emission. EF measure	CISPR 32:2015+A1:2019	30 MHz to 6 GHz
Continuous conducted emission	CISPR 32:2015+A1:2019	0.15 MHz to 30 MHz
EMC - Immunity tests (Aligned with IEC/BS 61850-3 and IEC/BS 60255-26)		
Radiated RF Electromagnetic field immunity test	IEC 61000-4-3:2020	80 – 3000 MHz, AM 1 KHz Prof: 80%, 10 V/m 80 – 2700 MHz, AM 1 kHz Prof: 80%, 10 V/m 27 – 6000 MHz, AM 1 kHz Prof: 80%, 3 V/m
Immunity to conducted disturbances, induced by radiofrequency fields	IEC 61000-4-6:2013	Range A; 150 kHz - 80 MHz, AM 1 kHz Prof: 80%, 10 Vrms Range B: 27 ± 0.135 MHz, AM 1 kHz Prof: 80%, 10 V/m, 10 s
Electrical fast transient / burst immunity test	IEC 61000-4-4:2012	±4 kV, 5 kHz
Surges immunity test	IEC 61000-4-5:2014+A1:2017	± 0.5,kV ±1 kV, ±2 kV (Symmetrical coupling) ±0.5 kV, ±1 kV, ±2 kV, ±4 kV (Asymmetrical coupling)
Damped oscillatory wave	IEC 61000-4-18:2019	1 kV (1 MHz) for differential mode 2.5 kV (1 MHz) for common mode
Power frequency magnetic field immunity test	IEC 61000-4-8:2009	50 Hz, 100 A/m continuous 50 Hz, 1000 A/m for 1s
Electrostatic discharge immunity test	IEC 61000-4-2:2008	±2 kV; ±4 kV, ±8 kV (Direct and indirect contact discharge) ±2 kV; ±4 kV; ±8 kV, ±15 kV (Air discharge)
DC Voltage dips, short interruptions and voltage variations	IEC 61000-4-29:2000	10 ms voltage dips 0% Criteria A 200 ms voltage dips 40% 500 ms voltage dips 70% 5000 ms voltage dips 100%
DC supply voltage –Ramp up Ramp down	IEC 61000-4-17:1999 +A1:2001 +A2:2008	Shut-down ramp duration: 60 s Power off duration: 5 min Start-up ramp duration: 60 s
Mains frequency voltage	IEC 61000-4-16:2015	30 V continuous perturbation 300 V 1s
Ripple on DC input power port	IEC 61000-4-17:1999 +A1:2001 +A2:2009	15% Un, 100 Hz 10% Un, 100 Hz

Directive / Test	Identification	Details
Impulse magnetic field	IEC 61000-4-9:2016	Level 5, 1000 A/m peak, pulse 1,2/50µs and 8/20µs
Damped oscillatory magnetic field	IEC 61000-4-10:2016	Level 5, 100 A/m peak, 0.1 MHz and 1 MHz
Electrical safety		
Aligned with all requirements.	IEC/BS 60255-27:2013	–
	IEC/BS 61010-1:2010	–
Environmental tests		
Cold test	IEC 60068-2-1:2007	Test Ad (-40 ºC / 16 h) Test Ab (-40 ºC / 96 h)
Dry heat test	IEC 60068-2-2:2007	Test Bd (+70 ºC / 16 h) Test Bb (+70 ºC / 96 h)
Damp heat, cyclic test	IEC 60068-2-30:2005	+25 ºC/+55 ºC / 95% RH / 6 cycles (24 h)
Damp heat steady state test	IEC 60068-2-78:2001	Test Cab (93 ± 3) % / +40 °C / 10 days
Change of temperature	IEC 60068-2-14:2009	Test Nb -40 ºC / +70 ºC / 1 ºC/min / 3 h / 5 cycles
Flowing mixed gas corrosion test	IEC 60068-2-60:2015 IEC 60721-3-3:2002	3C3 concentrations **Method 1:** • SO_2: 0.5 ppm • H_2S: 0.1 ppm **Method 4:** • SO_2: 1.85 ppm • H_2S: 2.1 ppm • Cl_2: 0.1 ppm • NO_2: 1.56 ppm According to IEC60721-3-3:2002
Mechanical tests (BP270 chassis mounting)		
Vibration (sinusoidal)	IEC 60068-2-6:2008 IEC 60255-21-1:1996	Test Fc Section 1
Shock and bump	IEC 60068-2-27:2011 IEC 60255-21-2:1996	Test Ea and guidance Section 2
Seismic tests	IEC 60255-21-3:1996	Section 3

Glossary

A

AES: Advanced Encrypion Standard.

AI160: PowerLogic T500 analog input module.

AX160: PowerLogic T500 analog input/output module.

B

BIN controller: This relates to the different system data acquisition and processing application software that has access to the CoreDB database. Each BIN controller acts as a producer and/or consumer of data managed by CoreDB.

BIN: This is a set of Input/Output (I/O) signals with a common source. They may relate, for example, to the representation of an IED that communicates with the T500 RTU, or the representation of a SCADA system that receives or generates information acquired or generated on the platform.

BP260: PowerLogic T500 backplane.

BP270: PowerLogic T500 chassis.

C

CAE: Cybersecurity Administrator Expert. The CAE is a tool for organizing the T500 security policy and defining system access restrictions and user rights.

CoreDB: CoreDB is a real-time RTU database that helps ensure the RTU signals are managed in real-time.

CPU: Central Processing Unit.

CTS: Clear To Send.

D

DCS: Distributed Control System.

DHCP: Dynamic Host Configuration Protocol. A network protocol for ensuring that station IP parameters are automatically configured via automatic IP address allocation.

DI180: PowerLogic T500 digital input module.

DI: Digital Input.

DM: Differential Mode.

DO180: PowerLogic T500 digital output module with relays.

DO280: PowerLogic T500 digital output module with transistors.

DO: Digital Output.

DTR: Data Terminal Ready.

E

Easergy Builder: Easergy Builder is the official configuration tool for T500 equipment. This tool can be used to configure all the advanced RTU functions (for example, database, protocol addressing, events) and to carry out maintenance tasks on the equipment.

ESM: EcoStruxure™ System Management. Advanced data management tool for power automation systems to manage system configuration and security baseline.

F

FBD: Function Block Diagram.

H

HMI: Human Machine Interface.

HTTP: Hyper Text Transfer Protocol. Client-server communication protocol developed for the World Wide Web. HTTPS (where S = Secure) is the secure variant of HTTP using SSL or TLS protocols.

I

IEC: International Electrotechnical Commission. The international standards organization for the fields of electricity, electronics, electromagnetic compatibility, nanotechnology, and related technologies. It complements the International Organization for Standardization (ISO), which is responsible for other fields.

IED: Intelligent Electronic Device.

IEEE: Institute of Electrical and Electronics Engineers. The IEEE is a professional association comprising members from the fields of electrical engineering, information technology, telecommunications, etc. The organization's mission is to advance knowledge in the field of electrical engineering and publish associated standards and other texts written by its members.

IL: Instruction List.

IP: Internet Protocol.

L

LAN: Local Area Network.

LDAP: Lightweight Directory Access Protocol.

LD: Ladder.

LED: Light Emitting Diode.

LV: Low Voltage.

M

MD5: Message-Digest Algorithm.

Module: Hardware device comprising a functional component of the T500 (for example, DI180, DO180, and PS280 are modules on the T500).

MUX: Serial data bus for communication with the XS280 module.

MV: Medium Voltage.

N

NDA: Non-Disclosure Agreement.

P

PC: Personal Computer.

PE: Protective Earth Ground.

PF1/2 (485): Primary and redundant Profibus RS-485 buses.

PF1/2 (TTL): Primary and redundant Profibus TTL buses.

PS280: PowerLogic T500 power supply.

PTP: Precision Time Protocol.

PW1/2: Power bus (primary and redundant).

R

RCAP: Redundancy Control Asymmetric Protocol: used to manage switching of redundant head units.

RMS: Root Mean Square.

RS: Serial link.

RTC: Real-Time Clock: system date and time.

RTDB: Real-Time DataBase.

RTOS: Real-Time Operating System.

RTS: Request To Send.

RTU: Remote Terminal Unit.

S

SCADA: Supervisory Control And Data Acquisition.

SELV: Safety Extra Low Voltage.

SFC: Sequential Function Chart.

SHA: Secure Hashing Algorithm.

SNTP: Simple Network Time Protocol.

SOE: Sequence Of Events. This relates to saving and storing events and signal changes in the RTU that manages the data in real-time.

ST: Stuctured Text.

SYN (485): Bus RS-485 for synchronization of the modules (PPS).

SYN (TTL): Bus for synchronization of the modules (Pulse Per Second or PPS).

T

TCP or TCP/IP: Transmission Control Protocol/Internet Protocol. Set of protocols used to transfer data on the Internet.

TLS: Transport Security Layer.

TPM: Trusted Platform Module.

TSV: Terminal Server.

U

UDP: User Datagram Protocol. Connectionless transport layer communication protocol for the TCP/IP model.

V

VAC: Voltage of Alternate Current.

VDC: Voltage of Direct Current.

VLAN: Virtual Local Area Network.

W

WAN: Wide Area Network.

webApp: Web tool for online maintenance and monitoring of the RTU.

webUI: Advanced tool for the design and operation of a local web-based substation user interface.

X

XS280: PowerLogic T500 serial communication module.

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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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