EcoStruxure™ Control Expert

System Bits and Words

Reference Manual

Original instructions

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www.se.com

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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.

Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠WARNING

UNGUARDED EQUIPMENT

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

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

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

Start-up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check are made and that enough time is allowed to perform complete and satisfactory testing.

⚠WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

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

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

Operation and Adjustments

The following precautions are from the NEMA Standards Publication ICS 7.1-1995:

(In case of divergence or contradiction between any translation and the English original, the original text in the English language will prevail.)

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer’s instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer’s instructions and the machinery used with the electrical equipment.
- Only those operational adjustments required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Document

Document Scope

The document describes the system bits and system words used in EcoStruxure Control Expert for Modicon controllers, detailing their functions, behaviors, and interactions within automation applications.

It explains how these internal indicators support controller operation, task management, communication processes, diagnostics, real-time clock handling, memory management, and hardware status monitoring.

The document covers multiple controller families, including Modicon M340, Modicon M580, Modicon Premium, Modicon Atrium, Modicon Quantum, and Modicon Momentum, highlighting specific features for each platform.

It also provides references to related documentation, configuration considerations, and implementation guidelines for consistent and efficient use of system variables across automation projects.

Validity Note

This documentation has been updated for the release of EcoStruxure Control Expert 16.4.

Product Related Information

⚠WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA) or equivalent risk analysis of your application and apply preventive and detective controls before implementation.
- Provide a fallback state for undesired control events or sequences.
- Provide separate or redundant control paths wherever required.
- Supply appropriate parameters, particularly for limits.
- Review the implications of transmission delays and take actions to mitigate them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.[1]
- Test each implementation of a system for proper operation before placing it into service.

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

[1]For additional information, refer to NEMA ICS 1.1 (latest edition), Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control and to NEMA ICS 7.1 (latest edition), Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems or their equivalent governing your particular location.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Follow all local and national safety codes and standards.

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

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration..

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

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

Refer to *Modicon Controller Platform Cybersecurity, User Guide*.

Available Languages of the Document

The information contained herein is available in these languages:

- English (EIO0000002135)
- French (EIO0000002136)
- German (EIO0000002137)

- Spanish (EIO0000002139)
- Italian (EIO0000002138)
- Chinese (EIO0000002140)

NOTE: After clicking one of the above download links, you may need to select your country before you can download the document.

Related Documents

Title of documentation	Reference number
EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual	35006144K01000 (ENG) 35006145K0100 (FRE) 35006146K0100 (GER) 35013361K0100 (ITA) 35006147K0100 (SPA) 35013362 (CHS)
EcoStruxure™ Control Expert, Operating Modes	33003101 (ENG) 33003102 (FRE) 33003103 (GER) 33003696 (ITA) 33003104 (SPA) 33003697 (CHS)
Modicon M580, Hardware, Reference Manual	EIO0000001578 (English), EIO0000001579 (French), EIO0000001580 (German), EIO0000001582 (Italian), EIO0000001581 (Spanish), EIO0000001583 (Chinese)
Modicon M340, Controllers, Setup Guide	35012676 (ENG) 35012677 (FRE) 35013351 (GER) 35013352 (ITA) 35013353 (SPA) 35013354 (CHS)
Quantum using EcoStruxure™ Control Expert, Hardware Reference Manual	35010529 (ENG) 35010530 (FRE) 35010531 (GER) 35013975 (ITA) 35010532 (SPA) 35012184 (CHS)
Premium and Atrium using EcoStruxure™ Control Expert, Processors, racks and power supply modules, Implementation Manual	35010524 (ENG) 35010525 (FRE) 35006162 (GER) 35012772 (ITA) 35006163 (SPA) 35012773 (CHS)
EcoStruxure™ Control Expert, Communication, Block Library	33002527 (ENG) 33002528 (FRE) 33002529 (GER) 33003682 (ITA) 33002530 (SPA) 33003683 (CHS)
Modicon Controller Platform Cybersecurity, User Guide	EIO0000001999 (ENG) EIO0000002001 (FRE) EIO0000002000 (GER) EIO0000002002 (ITA) EIO0000002003 (SPA) EIO0000002004 (CHS)
EcoStruxure™ Control Expert, Safety, Block Library	QGH60275 (ENG) QGH60278 (FRE) QGH60279 (GER) QGH60280 (ITA) QGH60281 (SPA) QGH60282 (CHS)

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Information on Non-Inclusive or Insensitive Terminology

As a responsible, inclusive company, Schneider Electric is constantly updating its communications and products that contain non-inclusive or insensitive terminology. However, despite these efforts, our content may still contain terms that are deemed inappropriate by some customers.

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in the information contained herein, or that appear in or on the products themselves, are generally derived from the terms or definitions of international standards.

In the area of functional safety systems, drives and general automation, this may include, but is not limited to, terms such as *safety*, *safety function*, *safe state*, *fault*, *fault reset*, *malfunction*, *failure*, *error*, *error message*, *dangerous*, etc.

Among others, these standards include:

Standard	Description
IEC 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2023	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2020	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design
IEC 62061:2021	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2021	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

In addition, terms used in the present document may tangentially be used as they are derived from other standards such as:

Standard	Description
IEC 60034 series	Rotating electrical machines
IEC 61800 series	Adjustable speed electrical power drive systems
IEC 61158 series	Digital data communications for measurement and control – Fieldbus for use in industrial control systems

Finally, the term *zone of operation* may be used in conjunction with the description of specific hazards, and is defined as it is for a *hazard zone* or *danger zone* in the *Machinery Directive* (*2006/42/EC*) and *ISO 12100:2010*.

NOTE: The aforementioned standards may or may not apply to the specific products cited in the present documentation. For more information concerning the individual standards applicable to the products described herein, see the characteristics tables for those product references.

System Bits

Subject of this Chapter

This chapter describes the system bits of Control Expert language.

NOTE: The symbols, associated with each bit object or system word, mentioned in the descriptive tables of these objects, are not implemented as standard in the software, but can be entered using the data editor. They are proposed in order to help ensure the homogeneity of their names in the different applications.

System Bits Introduction

General

The Modicon M340, Modicon M580, Modicon M580 Safety, Premium, Atrium, Quantum, and Momentum controllers use %Si system bits which indicate the state of the controller, or they can be used to control how it operates.

These bits can be tested in the application program to detect any functional development requiring a set processing procedure.

Some of these bits must be reset to their initial or normal state by the program. However, the system bits that are reset to their initial or normal state by the system must not be reset by the program or by the programming/data terminal.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Do not use undocumented system objects (%Si, %SWi) in your program nor write to them in data tables.

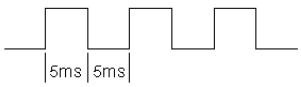
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Description of System Bits %S0 to %S7

Detailed Description

Description of system bits %S0 to %S7:

<table>
<tr><td colspan="5">Bit
Symbol</td></tr>
<tr><td rowspan="4">%S0
COLDSTART</td><td>Function</td><td colspan="3">Cold start</td></tr>
<tr><td>Initial State</td><td colspan="3">1 (1 cycle)</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">Normally on 0, this bit is set to 1 by:
• power restored with loss of data (battery error detected)
• the application program
• the programming/data terminal
• a change of cartridge (PCMCIA on Premium and Quantum)
This bit is set to 1 during the first complete restored cycle of the controller either in RUN or in STOP mode. It is reset to 0 by the system before the following cycle.
To detect the first cycle in run after cold start, refer to %SW10.
NOTE: For M580 Safety controllers, %S0 bit can be used only in PROCESS tasks and has no effect on SAFE tasks.
%S0 is not always set in the first scan of the controller. If a signal set for every start of the controller is needed, use %S21 instead.
For details on operating modes refer to:
• Premium, Quantum PLCs Operating Modes (see EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual)
• Modicon M340 PLCs Operating Modes (see EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual)
• BMEP58•••• Controller Operating Modes (see Modicon M580, Hardware, Reference Manual)</td></tr>
<tr><td rowspan="4">%S1
WARMSTART</td><td>Function</td><td colspan="3">Warm restart</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">Normally at 0, this bit is set to 1 by:
• power restored with data save,
• the application program,
• the programming/data terminal,
It is reset to 0 by the system at the end of the first complete cycle and before the outputs are updated.
%S1 is not always set in the first scan of the controller. If a signal set for every start of the controller is needed, use %S21 instead.</td></tr>
</table>

Bit **Symbol**				
%S4 TB10MS	Function	Timebase 10 ms		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	An internal timer regulates the change in status of this bit. It is asynchronous in relation to the controller cycle. Graph:  			
%S5 TB100MS	Function	Timebase 100 ms		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Same as %S4			
%S6 TB1SEC	Function	Time base 1 s		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Same as %S4			
%S7 TB1MIN	Function	Time base 1 min		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Same as %S4			

Description of System Bits %S9 to %S13

Detailed Description

Description of system bits %S9 to %S13:

<table>
<tr><td colspan="5">Bit
Symbol</td></tr>
<tr><td rowspan="4">%S9
OUTDIS</td><td>Function</td><td colspan="3">Outputs set to the fallback position on all buses</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: No
Momentum: No</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: No</td></tr>
<tr><td colspan="4">Normally at 0, this bit is set to 1 by the program or the programming/data terminal:
• set to 1: sets the bit to 0 or maintains the present value depending on the chosen configuration (X bus, Fipio, AS-i, etc.).
• set to 0: outputs are updated normally.
NOTE: The system bit acts directly on the physical outputs and not on the image bits of the outputs.
On Modicon M340:
• Inputs/outputs distributed via CANopen bus are not affected by the %S9 bit.
• Ethernet I/O scanner and Global Data are affected by the %S9 bit.
• After a restart, outputs are set to 0 while the bit is set to 1.
On Modicon M580: Only local inputs/outputs are affected by the %S9 bit.
On Modicon M580 Safety: This bit has no influence on safety-related output modules.
On Modicon Premium: If the configuration contains a TSX ESY 007 module, %S9 set to 1 will force all outputs managed by the TSX ESY 007 module to 0.</td></tr>
<tr><td rowspan="4">%S10
IOERR</td><td>Function</td><td colspan="3">Global I/O detected error</td></tr>
<tr><td>Initial State</td><td colspan="3">1</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: No</td></tr>
<tr><td colspan="4">Normally at 1, this bit is set to 0 when an error on an in-rack module or device on a network is detected (for example, non-compliant configuration, exchange error, hardware error, etc.). The %S10 bit is reset to 1 by the system when all detected errors are resolved.
NOTE:
• On M580 Safety, not all possible detected errors relating to safety-related I/O modules are reported in this system bit.
• Detected network communication errors with remote devices are not reported on bit %S10.
⚠WARNING
UNINTENDED EQUIPMENT OPERATION
Manage detected network communication errors with remote devices with a method specific to each type of communication module (NOM, NOE, NWM, CRA, CRP) or motion module (MMS).
Failure to follow these instructions can result in death, serious injury, or equipment damage.
Communication modules (NOM, NOE, NWM, CRA, CRP) or motion modules (MMS) use function blocks to retrieve communication status:
• communication function blocks status (if they are used)
• communication modules status (if they exist)</td></tr>
</table>

Bit **Symbol**				
%S11 WDG	Function	Watchdog overflow		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally at 0, this is set to 1 by the system as soon as the task execution time becomes greater than the maximum execution time (i.e. the watchdog) declared in the task properties. **NOTE:** On M580 Safety, this bit takes into account an overrun on SAFE task.			
%S12 PLCRUNNING	Function	Controller in RUN		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	This bit is set to 1 by the system when the controller is in RUN. It is set to 0 by the system as soon as the controller is no longer in RUN (STOP, INIT, etc.).			
%S13 1RSTSCANRUN	Function	First cycle after switching to RUN		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Switching the controller from STOP mode to RUN mode (including after a cold start with automatic start in run) is indicated by setting system bit %S13 to 1. This bit is reset to 0 at the end of the first cycle of the MAST task in RUN mode.			

Description of System Bits %S15 to %S21

Detailed Description

NOTE: These system bits have a specific value for each task (Mast, Fast, Aux0, ...).

Description of system bits %S15 to %S21:

<table>
<tr><td colspan="5">Bit
Symbol</td></tr>
<tr><td rowspan="4">%S15
STRINGERROR</td><td>Function</td><td colspan="3">Character string error</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">Normally set to 0, this bit is set to 1 when the destination zone for a character string transfer is not of sufficient size (including the number of characters and the end of string character) to receive this character string.
The application stops in error state if the %S78 bit has been to set to 1.
This bit must be reset to 0 by the application.</td></tr>
<tr><td rowspan="4">%S16
IOERRTSK</td><td>Function</td><td colspan="3">Task input/output error</td></tr>
<tr><td>Initial State</td><td colspan="3">1</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: No</td></tr>
<tr><td colspan="4">Normally set to 1, this bit is set to 0 by the system when an error on an in-rack module or device on Fipio is detected (for example, non-compliant configuration, exchange error, hardware error, etc.).
This bit must be manually reset to 1.
NOTE:
• Detected network communication errors with remote devices are not reported on bit %S16.
• On M580 Safety, not all of the possible detected errors relating to safety-related I/O modules are reported in this system bit.
⚠WARNING
UNINTENDED EQUIPMENT OPERATION
Manage detected network communication errors with remote devices with a method specific to each type of communication module (NOM, NOE, NWM, CRA, CRP) or motion modules (MMS).
Failure to follow these instructions can result in death, serious injury, or equipment damage.
Communication modules (NOM, NOE, NWM, CRA, CRP) or motion modules (MMS) use function blocks to retrieve communication status:
• communication function blocks status (if they are used)
• communication modules status (if they exist)</td></tr>
</table>

Bit **Symbol**				
%S17 CARRY	Function	Rotate shift output		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally at 0. During a rotate shift operation, this bit takes the state of the outgoing bit. **NOTE:** On M580 Safety, this bit related to the execution SAFE task, is accessible in PROCESS program code via the safety-related system function blocks `S_SYST_READ_TASK_BIT_MX` and `S_SYST_RESET_TASK_BIT_MX`. For more information on safety-related system function blocks, refer to *EcoStruxure™ Control Expert, Safety, Block Library*.			
%S18 OVERFLOW	Function	Overflow or arithmetic error		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally set to 0, this bit is set to 1 in the event of a capacity overflow if there is: • a result greater than + 32 767 or less than - 32 768, in integer (INT), • result greater than + 65 535 or less than 0, in unsigned integer (UINT), • a result greater than + 2 147 483 647 or less than - 2 147 483 648, in double integer (DINT), • result greater than +4 294 967 295 or less than 0, in double unsigned integer (UDINT), • real values outside limits, • division by 0, • the square root of a negative number, • Forcing to a non-existent step on a drum, • Stacking up of an already full register, or emptying of an already empty register. **NOTE:** There is one case for which bit %S18 is not raised by the Modicon M340, Modicon M580, and Momentum controllers when real values are outside limits. It is only if denormalized operands or some operations which generate denormalized results are used (gradual underflow). It must be tested by the application program after each operation where there is a risk of overflow, then manually reset to 0 if there is indeed an overflow. When the %S18 bit switches to 1, the application stops in error state if the %S78 bit has been to set to 1.			
%S19 OVERRUN	Function	Task period overrun (periodical scanning)		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally set to 0, this bit is set to 1 by the system in the event of a time period overrun (for example, task execution time is greater than the period defined in the configuration or programmed into the %SW word associated with the task). Reset this bit to 0. Each task manages its own %S19 bit. **NOTE:** On M580 Safety, information for SAFE task overrun is not available.			

<table>
<tr><td colspan="5">Bit
Symbol</td></tr>
<tr><td rowspan="3">%S20
INDEXOVF</td><td>Function</td><td colspan="3">Index overflow</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td></td><td colspan="4">Normally set to 0, this bit is set to 1 when the address of the indexed object becomes less than 0 or exceeds the number of objects declared in the configuration.
In this case, it is as if the index were equal to 0.
It must be tested by the application program after each operation where there is a risk of overflow, then reset to 0 if there is indeed an overflow.
When the %S20 bit switches to 1, the application stops in error state if the %S78 bit has been to set to 1.</td></tr>
<tr><td rowspan="3">%S21
1RSTTASKRUN</td><td>Function</td><td colspan="3">First task cycle</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td></td><td colspan="4">Tested in a task (Mast, Fast, Aux0, Aux1, Aux2 Aux3), the bit %S21 indicates the first cycle of this task, including after a cold start with automatic start in run and a warm start. %S21 is set to 1 at the start of the cycle and reset to zero at the end of the cycle.
NOTE: In an M580 redundant system, at power-up, the very first task is executed while the controller is in WAIT. It is only during the second cycle that the controller might be PRIMARY. Therefore, the %S21 which is reflecting the first task, always reflects the task executed while the controller is in WAIT. According to the setting, not all the sections of this task are executed (by default, only first section is executed while in WAIT) compared to when the controller is PRIMARY.
Therefore the management of the first cycle when controller is PRIMARY has to be done manually with application code.
Example:
<code>(* begining of program - first section *)</code>
<code>IF %S21 THEN FIRST_CYCLE_PRIMARY_DONE:=0; END_IF;</code>
...
<code>(* end of program - last section *)</code>
<code>IF ECPU_HSBY_1.LOCAL_HSBY_STS.RUN_PRIMARY THEN FIRST_CYCLE_PRIMARY_DONE:=1; END_IF;</code>
NOTE: When tested in the SAFE task, this bit on M580 Safety indicates the first cycle of this task. It is set to 1 at the start of the cycle and reset to 0 at the end of the cycle. The first cycle of the task status can be read using the <code>SCOLD</code> output of the <code>S_SYST_STAT_MX</code> system function block.</td></tr>
</table>

Description of System Bits %S30 to %S59

Detailed Description

Description of system bits %S30 to %S59:

Bit **Symbol**				
%S30 MASTACT	Function	Activation/deactivation of the master task		
	Initial State	1		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally set to 1. The master task is deactivated when you set the bit to 0. The user code is no longer executed. This bit is taken into consideration by the system at the end of each MAST task cycle. In state RAM mode, the discrete and the analog inputs are not refreshed when this bit is reset.			
%S31 FASTACT	Function	Activation/deactivation of the fast task		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally set to 1 when you create the task. The task is deactivated when you set the bit to 0. In state RAM mode, the discrete and the analog inputs are not refreshed when this bit is reset.			
%S32 AUX0ACT	Function	Activation/deactivation of the auxiliary task 0		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally set to 1 when you create the task. The auxiliary task is deactivated when you set the bit to 0.			
%S33 AUX1ACT	Function	Activation/deactivation of the auxiliary task 1		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally set to 1 when you create the task. The auxiliary task is deactivated when you set the bit to 0.			
%S34 AUX2ACT	Function	Activation/deactivation of the auxiliary task 2		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally set to 1 when you create the task. The auxiliary task is deactivated when you set the bit to 0.			

Bit **Symbol**				
%S35 AUX3ACT	Function	Activation/deactivation of the auxiliary task 3		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally set to 1 when you create the task. The auxiliary task is deactivated when you set the bit to 0.			
%S36	Function	Outputs set to the fallback position on Ethernet I/O network		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: Yes
	Requirements: **M580 controller**: minimum firmware version 2.80 **BM• CRA adapter module**: minimum firmware version V2.40 Only outputs on RIO drops with BM• CRA adapter modules are affected by the %S36 bit. Normally at 0, this bit is set to 1 by the program or the programming/data terminal: • set to 1: sets the bit to 0 or maintains the present value depending on the chosen configuration. • set to 0: outputs are updated normally. **NOTE:** The system bit acts directly on the physical outputs and not on the image bits of the outputs.			
%S38 ACTIVEVT	Function	Enabling/inhibition of events		
	Initial State	1		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally set to 1. Events are inhibited when you set the bit to 0.			
%S39 EVTOVR	Function	Saturation in event processing		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	This bit is set to 1 by the system to indicate that one or more events cannot be processed following saturation of the queues. Reset this bit to 0.			

Bit **Symbol**				
%S40 RACK0ERR	Function	Rack 0 input/output error		
	Initial State	1		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	The %S40 bit is assigned to rack 0. Normally set to 1, this bit is set to 0 when an error is detected on the rack I/Os. In this case: • The %S10 bit is set to 0. • The I/O LED on the controller is on. • The %Ir.m.c.Err module bit is set to 1. This bit is reset to 1 when the error is resolved. **NOTE:** On M580 Safety, some, but not all, of the possible detected errors relating to safety-related I/O modules are reported in this system bit.			
%S41 RACK1ERR	Function	Rack 1 input/output error		
	Initial State	1		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	Same as %S40 for rack 1.			
%S42 RACK2ERR	Function	Rack 2 input/output error		
	Initial State	1		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	Same as %S40 for rack 2.			
%S43 RACK3ERR	Function	Rack 3 input/output error		
	Initial State	1		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	Same as %S40 for rack 3.			
%S44 RACK4ERR	Function	Rack 4 input/output error		
	Initial State	1		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	Same as %S40 for rack 4.			
%S45 RACK5ERR	Function	Rack 5 input/output error		
	Initial State	1		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	Same as %S40 for rack 5.			

Bit **Symbol**				
%S46 RACK6ERR	Function	Rack 6 input/output error		
	Initial State	1		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	Same as %S40 for rack 6.			
%S47 RACK7ERR	Function	Rack 7 input/output error		
	Initial State	1		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	Same as %S40 for rack 7.			
%S50 RTCWRITE	Function	Updating of time and date via words %SW50 to %SW53		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	Normally set to 0, this bit is set to 1 or 0 by the program or the programming/data terminal: • set to 0: update of system words %SW50 to %SW53 by the date and time supplied by the controller real-time clock. • set to 1: system words %SW50 to %SW53 are no longer updated, therefore making it possible to modify them. • The switch from 1 to 0 updates the real-time clock with the values entered in words %SW50 to %SW53.			
%S51 RTCERR	Function	Time loss in real time clock		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	This system-managed bit set to 1 indicates that the real-time clock system words (%SW50 to %SW53) are not valid. In this case, manually reset the clock to the correct time.			
%S58 RTCSTIME	Function	Summer time indication		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	If the application is configured to support the adjustment of the clock for daylight saving, this system-managed bit set to 1 indicates that the date is in summer time.			
%S59 RTCTUNING	Function	Incremental update of the time and date via word %SW59		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	Normally set to 0, this bit can be set to 1 or 0 by the program or the programming/data terminal: • set to 0: the system does not manage the system word %SW59, • set to 1: the system manages edges on word %SW59 to adjust the date and time (by increment).			

Description of System Bits %S62 to %S79

Detailed Description

Description of system bits %S62 to %S79:

<table>
<tr><td colspan="5">Bit
Symbol</td></tr>
<tr><td rowspan="4">%S62
CARDVAL</td><td>Function</td><td colspan="3">Valid card signature</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: No
Momentum: No</td><td>Premium: No
Atrium: No
PLC Simulator: No</td></tr>
<tr><td colspan="4">This bit is set to 1 if the SD card contains a valid signature area.
NOTE: The validity does not include the value of user signature.
The signature can be written using an elementary function (EF). Bit %S62 is updated after the signature write (EF call), when a card is inserted or extracted, and when the controller starts.</td></tr>
<tr><td rowspan="4">%S65
CARDIS</td><td>Function</td><td colspan="3">Memory card disable</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: No
Momentum: No</td><td>Premium: No
Atrium: No
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">This bit is used to help ensure information consistency when a memory card is extracted from the controller.
NOTICE
LOSS OF DATA
Generate a rising edge on bit %S65 before extracting the memory card.
Failure to follow these instructions can result in equipment damage.
On a rising edge detection, the card accessing LED turns off when the ongoing accesses are finished (reading and writing of files, application saving). The CARDERR LED is unchanged.
Then, the memory card can be extracted, the CARDERR LED is unchanged or illuminates.
When a memory card is inserted:
• the accessing LED illuminates
• the CARDERR LED shows the memory card status
• %S65 remains unchanged
%S65 must reset to 0 to allow rising edge detection.
NOTE: If a rising edge is generated on the bit and the memory card is not extracted, resetting the bit to 0 does not make the memory card accessible.
To make the memory card accessible again either:
• extract and re-insert the memory card
• re-initialize the controller (using the power supply reset button)</td></tr>
</table>

<table>
<tr><td colspan="5">Bit
Symbol</td></tr>
<tr><td rowspan="4">%S66
APPLIBCK</td><td>Function</td><td colspan="3">Application backup</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: No
Momentum: Yes</td><td>Premium: No
Atrium: No
PLC Simulator: No</td></tr>
<tr><td colspan="4">Manually set this bit to 1 to start a backup operation (transfer application from RAM to card). The system detects the rising edge to start the backup. The state of this bit is polled by the system every second. A backup takes place only if the application in RAM is different from the one in the card.

This bit is set to 0 by the system when the backup is finished.

NOTICE
LOSS OF DATA
Verify that bit %S66 is set to 0 before you try to set it to 1.
Failure to follow these instructions can result in equipment damage.

Bit %S66 is particularly useful after replacement of initial value %S94 and save-parameters.</td></tr>
<tr><td rowspan="4">%S67
PCMCIABAT0</td><td>Function</td><td colspan="3">State of the application memory card battery</td></tr>
<tr><td>Initial State</td><td colspan="3">–</td></tr>
<tr><td>Controllers</td><td>M340: No
M580: No
M580 Safety: No</td><td>Quantum: Yes
Momentum: No</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: No</td></tr>
<tr><td colspan="4">This bit is used to monitor the status of the main battery when the memory card is in the upper PCMCIA slot. This applies to Atrium and Premium controllers and to Quantum controllers of reference 140 CPU 671 60/60S, 140 CPU 672 61, 140 CPU 672 60, 140 CPU 651 60/60S, 140 CPU 652 60 and 140 CPU 651 50:
• set to 1: main voltage battery is low. The application is maintained, but you must replace the batteries in the PCMCIA memory card by following the instructions "Changing the Batteries of a PCMCIA Memory Card procedure" in the Premium and Atrium using EcoStruxure™ Control Expert, Processors, racks and power supply modules, Implementation Manual.
• set to 0: main battery voltage is sufficient
NOTE: With “blue” PCMCIAs (PV>=04), bit %S67 is not set to 1 when main battery is absent, though with “green“ PCMCIAs (PV<04), bit %S67 is set to 1 under the same conditions.</td></tr>
<tr><td rowspan="4">%S68
PLCBAT</td><td>Function</td><td colspan="3">State of controller battery</td></tr>
<tr><td>Initial State</td><td colspan="3">–</td></tr>
<tr><td>Controllers</td><td>M340: No
M580: No
M580 Safety: No</td><td>Quantum: Yes
Momentum: No</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">This bit is used to verify the operating state of the backup battery for saving data and the program in RAM.
• set to 0: battery present and operational.
• set to 1: battery missing or non-operational.</td></tr>
</table>

Bit **Symbol**				
%S75 PCMCIABAT1	Function	State of the data storage memory card battery		
	Initial State	–		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	This bit is used to monitor the main battery status when the memory card is in the **lower** PCMCIA slot. For Premium controllers, %S75 is supported by the following references: TSX P57 4••, TSX P57 5•• and TSX P57 6••. **NOTE:** For other Premium controllers, %S75 shows a low battery level when the battery is already at a critical level. For Quantum controllers, %S75 is supported by the following references: 140 CPU 672 61*, 140 CPU 672 60*, 140 CPU 671 60/60S*, 140 CPU 651 60/60S*, 140 CPU 652 60, and 140 CPU 651 50. * Data stored on a memory card in slot B is not processed in safety-related projects. %S75 is: • set to 1: main voltage battery is low. The application is maintained, but you must replace the batteries in the PCMCIA memory card by following the instructions "Changing the Batteries of a PCMCIA Memory Card procedure" in the *Premium and Atrium using EcoStruxure™ Control Expert, Processors, racks and power supply modules, Implementation Manual*. • set to 0: main battery voltage is sufficient		
%S76 DIAGBUFFCONF	Function	Configured diagnostics buffer		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	This bit is set to 1 by the system when the diagnostics option has been configured – a diagnostics buffer for storage of detected errors found by diagnostics DFBs is then reserved. This bit is read-only.			
%S77 DIAGBUFFFULL	Function	Full diagnostics buffer		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	This bit is set to 1 by the system when the buffer that receives detected errors from the diagnostics function blocks is full. This bit is read-only.			
%S78 HALTIFERROR	Function	Stop in the event of a detected error		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally at 0, you can manually set this bit to 1 to program a controller stop on application detected error: % S15, %S18,%S20. On M580 Safety, it applies to the PROCESS task and the SAFE task. If the bit is set, for example if a %S18 overflow error rises, the SAFE task enters HALT state.			

Bit **Symbol**				
%S79 MBFBCTRL	Function	Modbus forced bit control		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	This bit changes the behavior of the Quantum Modbus server regarding forced bits: • at 0 (default value), bit value is changed even if the bit is forced. • if manually set to 1: write bits request on forced bits do not change their value. There is no error in the response of the request. As other accesses, the history bit is updated, regardless of the forcing state.			

Description of System Bits %S80 to %S97

Detailed Description

Description of system bits %S80 to %S97:

Bit **Symbol**				
%S80 RSTMSGCNT	Function	Reset message counters		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally set to 0, this bit can be set to 1 to reset the message counters %SW80 to %SW86.			
%S82	Function	MB+PCMCIA polling adjust		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	This bit is used to modify the request exchange mode with Mb+MBP100 PCMCIA. By default (value 0), the system sends a request to the card and polls for a response in the next MAST cycle. This mode is used for a short MAST duration. When set to 1, the system sends a request to the card and waits for a response. This mode is used for a long MAST duration.			
%S83	Function	Quantum Hot Standby remains primary on ERIO communication interruption		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes(1) **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
		(1) Hot Standby only		
	NOTE: This bit is used in a configuration where both S908 RIO and Ethernet RIO drops are used. For configuration with Ethernet RIO drops exclusively, refer to %S84. The bit is used to change the behavior of Quantum Hot Standby if communications are interrupted with the last Ethernet RIO drop. • When set to 0 (default value), if the last Quantum ERIO drop is incommunicable, the primary goes offline and a switchover occurs. • When set to 1, if there is an interruption of communication with the last Quantum ERIO drop, the primary remains primary as long as S908 drops are present. If no more S908 drops are present, then the primary goes offline and a switchover occurs. %S83 value is automatically transferred from the primary controller to the standby controller. See the table at the end of this page which describes the System states depending on the %S83 and %S84 values, page 33.			

Bit **Symbol**				
%S84	Function	Quantum Hot Standby remains primary on ERIO communication interruption.		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes(1) **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
		(1) Hot Standby only		
	This bit is used to modify the behavior of the Quantum Hot Standby system in case of communication interruption with last Ethernet RIO drop. • When set to 0 (default value), if the last Ethernet drop (Quantum Ethernet drop or X80 Ethernet drop) is incommunicable, the primary goes offline and a switchover occurs. A manual action STOP -> RUN transition is needed to restart the system. • When set to 1, if there is an interruption of communication with the last Ethernet drop, the primary remains primary as long as S908 drops are present. If no more S908 drops are present, then the primary goes offline and a switchover occurs. %S84 value is automatically transferred from the primary controller to the standby controller. See the table at the end of this page which describes the System states depending on the %S83 and %S84 values, page 33.		
%S88	Function	Quantum S908 RIO adapter switchover in an M580 Architecture		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	In an M580 system with a redundant S908 network, this bit is used to request a Quantum S908 RIO adapter switchover. By default the value is 0. When set to 1, the system assigns the I/O management over the S908 network to the other Quantum S908 RIO adapter module. The bit is reset automatically by the system. **NOTE:** Verify the status of the redundant Quantum S908 adapter before using the %S88. If the redundant Quantum S908 adapter is not healthy, the system does not perform the switchover even if the %S88 is set to 1.			
%S90 COMRFSH	Function	Refresh common words		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	Normally set to 0, this bit is set to 1 on receiving common words from another network station. This bit can be set to 0 by the program or the programming/data terminal to verify the common words exchange cycle.			
%S91 LCKASYNREQ	Function	Lock asynchronous request		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	When this bit is set to 1, the asynchronous communication requests processed in the monitoring task are entirely executed without interruption from the other MAST or FAST tasks, thus helping to ensure that data is read or written consistently. **NOTE:** The request server of the monitoring task is addressed via gate 7 (X-Way).			

Bit Symbol				
%S92 EXCHGTIME	Function	Measurement mode of the communication function		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	Normally set to 0, you can manually set this bit to 1 to set communication functions to performance measurement mode. The communication functions time-out parameter (see EcoStruxure™ Control Expert, Communication, Block Library) (in the management table) then displays the round trip exchange time in milliseconds. When resetting %S92 to return to the initial mode, the user application must reinitialize the value of the time-out parameter. **NOTE:** The communication functions are executed with a time base of 100 ms.			
%S94 SAVECURRVAL	Function	Saving adjustment values		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Normally at 0, you can manually set this bit to 1 to replace the initial values of the declared variables with a 'Save' attribute (for example, DFB variables) with the present values. The system resets the bit %S94 to 0 when the replacement has been made. For Modicon M340, on a %S94 rising edge, the internal RAM and the memory card content are different (%S96 = 0 and the CARDERR LED is on). On cold start, the values are replaced by the most recent initial values only if a save to memory card function (Backup Save or %S66 rising edge) was done. For M580 Safety, it does not apply to SAFE variables. the SAFE initial values are not modifiable by the activation of this bit. **NOTE:** Set this bit only in the master task. When used with the TSX MFP • or TSX MCP • flash PCMCIA memory the saving adjustment values is not available. If the bit %S94 is set to *1*, the upload of an application may be interrupted or impossible. ***NOTICE*** **APPLICATION UPLOAD NOT SUCCESSFUL** Do not set bit %S94 to 1 during an upload. **Failure to follow these instructions can result in equipment damage.** The function of this system bit is not available with certain type of memory. ***NOTICE*** **LOSS OF DATA** Do not use bit %S94 with the TSX MFP • or the TSX MCP • flash PCMCIA memory. **Failure to follow these instructions can result in equipment damage.**			

Bit **Symbol**				
%S96 BACKUPPROGOK	Function	Backup program OK		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: Yes
	This bit is set to 0 or 1 by the system. • Set to 0 when the card is missing or unusable (incorrect format, unrecognized type, etc.), or the card content is inconsistent with Internal Application RAM. • Set to 1 when the card is correct and the application is consistent with controller Internal Application RAM.			
%S97	Function	Backup program OK		
	Initial State	–		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: Yes	**Premium**: No **Atrium**: No **PLC Simulator**: No
	This bit compares the application as executed in RAM versus the internal backup saved to the flash memory card. Values are: • 0: application backup not consistent. This state is obtained when application has been auto modified (saveparam or replace initial value) and not saved using %S66. • 1: application backup is consistent.			

Mixing the %S83 and %S84 bits

Mixing the two system bits leads to the following Hot Standby operating mode matrix:

%S83	%S84	Hybrid	Loss of last Ethernet drop	Primary CRP312 inoperable	Standby CRP312 inoperable	Loss of optic link
0	0	No	Offline/Offline	Offline/Primary	Primary/Offline	Primary/Offline
0	0	Yes	Offline/Offline	Offline/Primary	Primary/Offline	Primary/Offline
0	1	No	Primary/Standby	Offline/Primary	Primary/Offline	Primary/Offline
0	1	Yes	Primary/Standby	Offline/Primary	Primary/Offline	Primary/Offline
1	0	No	Offline/Offline	Offline/Primary	Primary/Offline	Primary/Offline
1	0	Yes	Primary/Standby	Offline/Primary	Primary/Standby	Primary/Offline
1	1	No	Primary/Standby	Offline/Primary	Primary/Offline	Primary/Offline
1	1	Yes	Primary/Standby	Offline/Primary	Primary/Standby	Primary/Offline

Description of System Bits %S100 to %S124

Detailed Description

Description of system bits %S100 to %S124:

Bit **Symbol**				
%S100 PROTTERINL	Function	Protocol on terminal port		
	Initial State	–		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	This bit is set to 0 or 1 by the system according to the state of the INL/DPT shunt on the console. • if the shunt is missing (%S100=0), then the primary Uni-Telway protocol is used, • if the shunt is present (%S100=1) then the protocol used is the one indicated by the application configuration.			
%S109 ECC Status	Function	State of Error Correcting Code (ECC)		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	This bit displays the status of the Error Correcting Code feature of M580 redundant controllers: • 0: ECC is enabled (default). • 1: ECC is disabled. This bit %S109 is available on M580 redundant controller firmware versions 2.50 and greater. ECC can be enabled and disabled using %SW150, page 94.			
%S110	Function	Synchronize I/O-Bus		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: No **Momentum**: Yes	**Premium**: No **Atrium**: No **PLC Simulator**: No
	When set to *1*, this bit enables the MAST task to be synchronized with IB-S cycle. The MAST task waits for the end of data cycle at each scan. Values: • 0 = not synchronized • 1 = synchronized			
%S111	Function	New I/O-Bus values		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: No **Momentum**: Yes	**Premium**: No **Atrium**: No **PLC Simulator**: No
	This bit indicates when new values have been sent or received on the IO-Bus, when the MAST task is not synchronized (%S110=0). It is set to: • 0 by the system at beginning of MAST cycle when image memory contains same values as previous cycle • 1 by the system at beginning of MAST cycle when image memory contains new values.			

<table>
<tr><td colspan="5">Bit
Symbol</td></tr>
<tr><td rowspan="4">%S117
ERIOERR</td><td>Function</td><td colspan="3">RIO error on Ethernet I/O network</td></tr>
<tr><td>Initial State</td><td colspan="3">–</td></tr>
<tr><td>Controllers</td><td>M340: No
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: No</td><td>Premium: No
Atrium: No
PLC Simulator: No</td></tr>
<tr><td colspan="4">Normally set to 1, this bit is set to 0 by the system when a detected error occurs in a device on the Ethernet RIO.
NOTE: On M580 Safety, some but not all of the possible detected errors relating to safety-related I/O modules are reported in this system bit.
This bit is reset to 1 by the system when the detected errors are resolved.
NOTE: This bit is set to 1 during the first cycle after a cold start.</td></tr>
<tr><td rowspan="4">%S118
REMIOERR</td><td>Function</td><td colspan="3">General remote I/O error</td></tr>
<tr><td>Initial State</td><td colspan="3">–</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: No
M580 Safety: No</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: No</td></tr>
<tr><td colspan="4">Normally set to 1, this bit is set to 0 by the system when an error is detected on a device connected to the RIO (Fipio for Premium or S908 drop for Quantum) remote input/output bus.
This bit is reset to 1 by the system when the detected error is resolved.
This bit is not updated if a detected error occurs on the other buses (DIO, ProfiBus, ASI).</td></tr>
<tr><td rowspan="4">%S119
LOCIOERR</td><td>Function</td><td colspan="3">General in-rack I/O error</td></tr>
<tr><td>Initial State</td><td colspan="3">–</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: No</td></tr>
<tr><td colspan="4">Normally set to 1, this bit is set to 0 by the system when an error is detected on an I/O module placed in one of the racks.
This bit is reset to 1 by the system when the detected error is resolved.
NOTE:
• On M580 Safety, some but not all of the possible detected errors relating to safety-related I/O modules are reported in this system bit.
• Detected network communication errors with remote devices are not reported on bit %S119.
⚠WARNING
UNINTENDED EQUIPMENT OPERATION
Manage detected network communication errors with remote devices with a method specific to each type of communication module (NOM, NOE, NWM, CRA, CRP) or motion module (MMS).
Failure to follow these instructions can result in death, serious injury, or equipment damage.
Communication modules (NOM, NOE, NWM, CRA, CRP) or motion modules (MMS) use function blocks to retrieve communication status:
• communication function blocks status (if they are used)
• communication modules status (if they exist)</td></tr>
</table>

Bit **Symbol**				
%S120 DIOERRPLC	Function	DIO bus error (controller)		
	Initial State	–		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	Normally set to 1, this bit is set to 0 by the system when an error is detected on a device connected to the DIO bus managed by the Modbus Plus link built into the controller. In the **Diagnostic** viewer, some information are available (if the entry is selected) to clarify detected error type on the bus. This information can identify the remote bus with the bus number (RIO, DIO).			
%S121 DIOERRNOM1	Function	DIO bus error (NOE 1)		
	Initial State	–		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	Normally set to 1, this bit is set to 0 by the system when an error is detected on a device connected to the DIO bus managed by the first 140 NOE 2•• module. In the **Diagnostic** viewer, some information are available (if the entry is selected) to clarify the detected error type on the bus. This information can identify the remote bus with the bus number (RIO, DIO).			
%S122 DIOERRNOM2	Function	DIO bus error (NOE 2)		
	Initial State	–		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	Normally set to 1, this bit is set to 0 by the system when an error is detected on a device connected to the DIO bus managed by the second 140 NOE 2•• module. In the **Diagnostic** viewer, some information are available (if the entry is selected) to clarify the detected error type on the bus. This information can identify the remote bus with the bus number (RIO, DIO).			
%S124	Function	Redundant power supply		
	Initial State	–		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: No	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	This bit is for the BMX rack and power supply able to support dual power supply: • 1 = the controller rack contains 2 power supplies with redundant capability. • 0 = the controller rack contains 2 power supplies but redundancy is lost. For example there is only one power supply energized. **NOTE:** If the rack does not support redundant power supplies, %S124 is set to *1*.			

System Words

Subject of this Chapter

This chapter describes the system words of Control Expert language.

NOTE: The symbols, associated with each bit object or system word, mentioned in the descriptive tables of these objects, are not implemented as standard in the software, but can be entered using the data editor. They are proposed to help ensure the homogeneity of their names in the different applications.

System Words %SW0 to %SW127

Subject of this Section

This section describes the system words %SW0 to %SW127.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Do not use undocumented system objects (%Si, %SWi) in your program nor write to them in data tables.

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

Description of System Words %SW0 to %SW11

Introduction

NOTE: For M580 Safety, the system word %SW4, page 42 has a specific meaning.

Detailed Description

Description of system words %SW0 to %SW11:

<table>
<tr><td colspan="5">Word
Symbol</td></tr>
<tr><td rowspan="4">%SW0
MASTPERIOD</td><td>Function</td><td colspan="3">Master task scanning period</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">This word is used to modify the period of the master task via the application program or via the programming/data terminal.
The period is expressed in ms (1...255 ms)
%SW0=0 in cyclic operation.
On a cold restart: it takes the value defined by the configuration.</td></tr>
<tr><td rowspan="4">%SW1
FASTPERIOD</td><td>Function</td><td colspan="3">FAST task scanning period</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: No</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">This word is used to modify the period of the FAST task via the application program or via the programming/data terminal.
The period is expressed in milliseconds (1...255 ms).
On a cold restart, it takes the value defined by the configuration.</td></tr>
<tr><td rowspan="5">%SW2
AUX0PERIOD
%SW3
AUX1PERIOD</td><td>Function</td><td colspan="3">Auxiliary task scanning period</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td rowspan="2">Controllers</td><td>M340: No
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes(1)
Momentum: No</td><td>Premium: Yes(2)
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td colspan="3">(1) only on 140 CPU 6••
(2) only on TSX 57 5•• controllers.</td></tr>
<tr><td colspan="4">These words are used to modify the period of the tasks defined in the configuration, via the application program or via the programming/data terminal.
The period is expressed in tens of ms (10 ms to 2.55 s).</td></tr>
</table>

Word **Symbol**				
%SW4 AUX2PERIOD	Function	Auxiliary task scanning period		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No(3)	**Quantum**: Yes(1) **Momentum**: No	**Premium**: Yes(2) **Atrium**: Yes **PLC Simulator**: Yes
		(1) only on 140 CPU 6•• **(2)** only on TSX 57 5•• controllers. **(3)** %SW4, page 42 has a specific meaning.		
	The word is used to modify the period of the task defined in the configuration, via the application program or via the programming/data terminal. The period is expressed in tens of ms (10 ms to 2.55 s).			
%SW5 AUX3PERIOD	Function	Auxiliary task scanning period		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes(1) **Momentum**: No	**Premium**: Yes(2) **Atrium**: Yes **PLC Simulator**: Yes
		(1) only on 140 CPU 6•• **(2)** only on TSX 57 5•• controllers.		
	This word is used to modify the period of the task defined in the configuration, via the application program or via the programming/data terminal. The period is expressed in tens of ms (10 ms to 2.55 s).			
%SW6 **%SW7**	Function	IP Address		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: Yes	**Premium**: No **Atrium**: No **PLC Simulator**: No
	These two words give the IP address of the controller Ethernet port. Modification is not taken into account. These two words are set to 0 if the controller does not have an Ethernet port.			

<table>
<tr><td colspan="5">Word
Symbol</td></tr>
<tr><td rowspan="4">%SW8
TSKINHIBIN</td><td>Function</td><td colspan="3">Acquisition of task input monitoring</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: No</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: No</td></tr>
<tr><td colspan="4">Normally set to 0, this word can be set to 1 or 0 by the program or the programming/data terminal.
It inhibits the input acquisition phase of each task:
• %SW8.0 = 1 inhibits the acquisition of inputs relating to the MAST task.
• %SW8.1 = 1 inhibits the acquisition of inputs relating to the FAST task.
• %SW8.2 to 8.5 = 1 inhibits the acquisition of inputs relating to the AUX 0...3 tasks.
On Modicon M340:
CANopen IO are not affected by the word %SW8.
On Modicon M580/M580 Safety:
DIO and EIO are not affected by the word %SW8.
On Quantum:
DIO and EIO are not affected by the word %SW8.
On Premium:
Premium High End controller Ethernet port is affected by %SW8 which is used to monitor the inputs.
Premium Legacy controller Ethernet port is affected by %SW8 which is used to monitor the outputs.</td></tr>
</table>

<table>
<tr><td colspan="4">Word
Symbol</td></tr>
<tr><td rowspan="3">%SW9
TSKINHIBOUT</td><td>Function</td><td colspan="3">Monitoring of task output update</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: No</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: No</td></tr>
<tr><td colspan="4">Normally set to 0, this word can be set to 1 or 0 by the program or the programming/data terminal.

Inhibits the output updating phase of each task:
• %SW9.0 = 1 assigned to the MAST task; outputs relating to this task are no longer managed and assume their fallback state.
• %SW9.1 = 1 assigned to the FAST task; outputs relating to this task are no longer managed and assume their fallback state.
• %SW9.2 to 9.5 = 1 assigned to the AUX 0...3 tasks; outputs relating to these tasks are no longer managed and assume their fallback state.
On Modicon M340:
• Inputs/outputs distributed via CANopen bus are not affected by the word %SW9.
• For IO scanning, neither the outputs nor the inputs are updated with %SW9.0 set to 1.
On Modicon M580:

DIO and EIO are not affected by the word %SW9.

On Quantum:
• DIO and EIO are not affected by the word %SW9.
• Local and remote rack outputs are held at their value at the time of setting the bit (maintain last value).
On Premium:
• Premium High End controller Ethernet port is affected by %SW9 which is used to monitor the outputs.
• Premium Legacy controller Ethernet port is affected by %SW9 which is used to monitor the inputs.
On Premium/Atrium:

Module outputs located on the X Bus automatically switch to the configured fallback state. On the FIPIO bus, certain devices do not manage fallback state; instead, outputs are held at their value at the time of setting the bit (maintain last value).

⚠WARNING
UNINTENDED EQUIPMENT OPERATION
Before forcing the state of outputs using the system word %SW9, take into account its effect on the running application.
Failure to follow these instructions can result in death, serious injury, or equipment damage.</td></tr>
</table>

Word **Symbol**				
%SW10 TSKINIT	Function	First cycle after cold start		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	If the value of the task bit is set to 0, this means that the task is performing its first cycle after a cold start: • %SW10.0: assigned to the MAST task. • %SW10.1: assigned to the FAST task. • %SW10.2 to 5: assigned to the AUX 0...3 tasks.			
%SW11 WDGVALUE	Function	Watchdog duration		
	Initial State	-		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Reads the duration of the watchdog. The duration is expressed in milliseconds (10...1500 ms). This word cannot be modified. **NOTE:** The duration range in Quantum Safety controllers is: 20...990 ms.			

M580 Safety Specific System Word

Description of system word %SW4 for M580 Safety:

Word **Symbol**		
%SW4	Function	SAFE task scanning period
	Initial State	0
	Controllers	**M580 Safety**
	The word is used to read the period of the SAFE task defined in the configuration. The period is not modifiable.	

The system word %SW4 for M580 Safety is supported by PLC Simulator.

Description of System Words %SW12 to %SW29

Detailed Description

Description of system words %SW12 to %SW29:

Word **Symbol**				
%SW12 UTWPORTADDR	Function	Controller serial port address or **Safety** mode		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: No **M580 Safety**: Yes	**Quantum**: No **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes, for Modicon M580 Safety applications
	For Modicon M340: Modbus server address of the controller serial port. Modification is not taken into account. Set to 0 if the controller does not have a Serial Port link. **For Modicon M580 Safety**: Indicates the operating mode of the coprocessor: • A501 hex = **Maintenance** mode • 5AFE hex = **Safety** mode **NOTE:** Any other value is interpreted as an error. **For Modicon Momentum**: This word contains the slave address for serial channel 0. **For Modicon Premium**: Uni-Telway address of terminal port (in slave mode) as defined in the configuration and loaded into this word on cold start. The modification of the value of this word is not taken into account by the system.			
%SW13 XWAYNETWADDR	Function	Main address of the station or **Safety** mode		
	Initial State	254 (00FE hex)		
	Controllers	**M340**: No **M580**: No **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes, for Modicon M580 Safety applications
	For Modicon M340, Modicon M580, Modicon Quantum, Modicon Momentum, Modicon Premium, Modicon Atrium: This word indicates the following for the main network (Fipway or Ethway): • the station number (least significant byte) from 0 to 127 • the network number (most significant byte) from 0 to 63 **NOTE:** These values correspond to the settings of the micro-switches on the PCMCIA card. **For Modicon M580 Safety**: Indicates the operating mode of the controller: • 501A hex = **Maintenance** mode • 5AFE hex = **Safety** mode **NOTE:** Any other value is interpreted as an error.			
%SW14 OSCOMMVERS	Function	Controller firmware version		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	This word contains the firmware version of the controller. **Example:** 0135 hex for V1.35			

Word **Symbol**				
%SW15 OSCOMMPATCH	Function	Controller patch version		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	This word contains the commercial version of the controller patch. This value is encoded in the word's least significant byte. Coding: 0 = no patch, 1 = A, 2 = B... **Example:** 0003 hex corresponds to patch C.			
%SW16 OSINTVERS	Function	Internal firmware version number		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	This field contains the internal version number of the controller firmware, encoded in hexadecimal. **Example:** 0043 hex for IR 43			
%SW17 FLOATSTAT	Function	Detected error status on floating operation		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	When an error in a floating arithmetic operation is detected, bit %S18 is set to 1 and %SW17 error status is updated according to the following coding: • %SW17.0 = Invalid operation / result is not a number. • %SW17.1 = Denormalized operand / result is acceptable (flag not managed by Modicon M580, Modicon M580 Safety, Modicon M340 or Modicon Quantum) controllers. • %SW17.2 = Division by 0 / result is infinity. • %SW17.3 = Overflow / result is infinity. • %SW17.4 = Underflow / result is 0. • %SW17.5 to %SW17.15 = Reserved. This word is reset to 0 by the system on cold start, and also by the program for re-usage purposes.			
%SD18: **%SW18** and **%SW19** 100MSCOUNTER	Function	Absolute time counter		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	%SW18 represents the least significant bytes and %SW19 the most significant bytes of the double word %SD18, which is incremented by the system every one-tenth of a second. %SD18 increments continuously, including in **STOP** mode and equivalent states. However, periods when the controller is powered off are not counted, because this function is driven by the real-time clock and not by the real-time scheduler. The application program or the programming/data terminal can read %SD18. **For Modicon Quantum Safety controllers**: Since both controllers must process exactly the same data, the value of %SD18 is updated at the start of the **MAST** task and then frozen for the duration of the application execution			

Word **Symbol**				
%SD20: **%SW20** and **%SW21** MSCOUNTER	Function	Absolute time counter		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	For Modicon M340, Modicon M580, Modicon Momentum, and Modicon Quantum controllers: %SD20 is incremented every 1 ms by the system (even when the controller is in **STOP**, %SD20 is no longer incremented if the controller is de-energized). The application program or the programming/data terminal can read this system word. %SD20 is reset on a cold start. %SD20 is not reset on a warm start. %SD20 is incremented by five every 5 ms by the system for the Modicon Premium controllers: • TSXP571•4M • TSXP572•4M • TSXP573•4M • TSXP57C024M • TSXP57024M • TSXPCI57204M • TSXPCI57354M **For other Modicon Premium controllers**: %SD20 functions as a 1 ms time counter, as it does on Modicon Quantum and Modicon M340 controllers.			
%SW23	Function	Rotary switch value		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: No **M580 Safety**: No	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	The least significant byte contains the Ethernet controller rotary switch. The application program or the programming/data terminal can read this system word.			
%SW26	Function	Number of requests processed		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: Yes	**Premium**: No **Atrium**: No **PLC Simulator**: No
	This system word allows the server to verify the number of requests processed by the controller per second.			
%SW27 **%SW28** **%SW29**	Function	System overhead time		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: Yes	**Premium**: No **Atrium**: No **PLC Simulator**: No
	• %SW27 is the last system overhead time. • %SW28 contains the maximum system overhead time. • %SW29 contains the minimum system overhead time. The system overhead time depends on the configuration (number of I/O...) and on the cycle requests (communication, diagnostics). System overhead time = Mast Cycle Time - User code execution time. The application program or the programming/data terminal can read these system words.			

Description of System Words %SW30 to %SW47

Introduction

NOTE: For M580 Safety, system words %SW42 to %SW44, page 48 have a specific meaning.

Detailed Description

Description of system words %SW30 to %SW35:

Word **Symbol**				
%SW30 MASTCURRTIME **%SW31** MASTMAXTIME **%SW32** MASTMINTIME	Function	Master task execution time		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: – **PLC Simulator**: Yes
	%SW30: This word indicates the execution time of the last master task cycle (in ms). **%SW31**: This word indicates the longest master task execution time since the last cold start (in ms). **%SW32**: This word indicates the shortest master task execution time since the last cold start (in ms). **NOTE:** Execution time is the time elapsed between the start (input acquisition) and the end (output update) of a scanning period. This time includes the processing of event tasks, the fast task, and the processing of console requests. In a Quantum HSBY configuration, %SW30, %SW31 and %SW32 include the time of CoPro Data exchange between Primary and Standby controller.		
%SW33 FASTCURRTIME **%SW34** FASTMAXTIME **%SW35** FASTMINTIME	Function	Fast task execution time		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: – **PLC Simulator**: Yes
	%SW33: This word indicates the execution time of the last fast task cycle (in ms). **%SW34**: This word indicates the longest fast task execution time since the last cold start (in ms). **%SW35**: This word indicates the shortest fast task execution time since the last cold start (in ms).			

Description of system words %SW36 to %SW47:

Word **Symbol**				
%SW36 AUX0CURRTIME **%SW37** AUX0MAXTIME **%SW38** AUX0MINTIME	Function	Auxiliary task (AUX0) execution time		
	Initial State	–		
	Controllers	**M340**: No **M580**: Yes(1) **M580 Safety**: Yes(2)	**Quantum**: Yes(3) **Momentum**: No	**Premium**: Yes(4) **Atrium**: – **PLC Simulator**: Yes
		(1) Only on BME P58 •••• controllers. **(2)** Only on BME P58 ••••S controllers. **(3)** Only on 140 CPU 6•• controllers. **(4)** Only on TSX P57 5•• controllers.		
	%SW36: This word indicates the execution time of the last cycle of the AUX0 task (in ms). **%SW37**: This word indicates the longest task execution time of the last cycle of the AUX0 task since the last cold start (in ms). **%SW38**: This word indicates the shortest task execution time of AUX0 task since the last cold start (in ms).			
%SW39 AUX1CURRTIME **%SW40** AUX1MAXTIME **%SW41** AUX1MINTIME	Function	Auxiliary task (AUX1) execution time		
	Initial State	–		
	Controllers	**M340**: No **M580**: Yes(1) **M580 Safety**: Yes(2)	**Quantum**: Yes(3) **Momentum**: No	**Premium**: Yes(4) **Atrium**: – **PLC Simulator**: Yes
		(1) Only on BME P58 •••• controllers. **(2)** Only on BME P58 ••••S controllers. **(3)** Only on 140 CPU 6•• controllers. **(4)** Only on TSX P57 5•• controllers.		
	%SW39: This word indicates the execution time of the last cycle of the AUX1 task (in ms). **%SW40**: This word indicates the longest task execution time of the last cycle of the AUX1 task since the last cold start (in ms). **%SW41**: This word indicates the shortest task execution time of AUX1 task since the last cold start (in ms).			
%SW42 AUX2CURRTIME **%SW43** AUX2MAXTIME **%SW44** AUX2MINTIME	Function	Auxiliary task (AUX2) execution time		
	Initial State	–		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No(3)	**Quantum**: Yes(1) **Quantum Safety**: No **Momentum**: No	**Premium**: Yes(2) **Atrium**: – **PLC Simulator**: Yes
		(1) Only on 140 CPU 6•• controllers. **(2)** Only on TSX P57 5•• controllers. **(3)** %SW42 to %SW44, page 48 have a specific meaning.		
	%SW42: This word indicates the execution time of the last cycle of the AUX2 task (in ms). **%SW43**: This word indicates the longest task execution time of the last cycle of the AUX2 task since the last cold start (in ms). **%SW44**: This word indicates the shortest task execution time of AUX2 task since the last cold start (in ms).			

Word **Symbol**				
%SW45 AUX3CURRTIME **%SW46** AUX3MAXTIME **%SW47** AUX3MINTIME	Function	Auxiliary task (AUX3) execution time		
	Initial State	–		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes(1) **Quantum Safety**: No **Momentum**: No	**Premium**: Yes(2) **Atrium**: – **PLC Simulator**: Yes
		(1) Only on 140 CPU 6•• controllers. **(2)** Only on TSX P57 5•• controllers.		
	%SW45: This word indicates the execution time of the last cycle of the AUX3 task (in ms). **%SW46**: This word indicates the longest task execution time of the last cycle of the AUX3 task since the last cold start (in ms). **%SW47**: This word indicates the shortest task execution time of AUX3 task since the last cold start (in ms).			

M580 Safety Specific System Words

Description of system words %SW42 to %SW44 for M580 Safety:

Word **Symbol**		
%SW42 SAFECURRTIME **%SW43** SAFEMAXTIME **%SW44** SAFEMINTIME	Function	M580 SAFE task execution time
	Initial State	–
	%SW42: This word indicates the execution time of the last cycle of the SAFE task (in ms). **%SW43**: This word indicates the longest task execution time of the last cycle of the SAFE task since the last cold start (in ms). **%SW44**: This word indicates the shortest task execution time of SAFE task since the last cold start (in ms).	

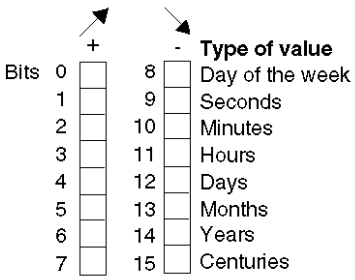
The system words %SW42 to %SW44 for M580 Safety are supported by PLC Simulator.

Description of System Words %SW48 to %SW69

Detailed Description

Description of system words %SW48 to %SW69:

<table>
<tr><td colspan="5">Word
Symbol</td></tr>
<tr><td rowspan="3">%SW48
IOEVTNB</td><td>Function</td><td colspan="3">Number of events</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: No</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">This word indicates the IO events and telegram number processed since the last cold start. This word can be written by the program or the programming/data terminal.
NOTE: Telegram is available only for Premium controllers.</td></tr>
<tr><td rowspan="4">%SW49
DAYOFWEEK
%SW50
SEC
%SW51
HOURMIN
%SW52
MONTHDAY
%SW53
YEAR</td><td>Function</td><td colspan="3">Real-time clock function</td></tr>
<tr><td>Initial State</td><td colspan="3">–</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">System words containing date and time (in BCD):
• %SW49: day of the week:
◦ 1 = Monday
◦ 2 = Tuesday
◦ 3 = Wednesday
◦ 4 = Thursday
◦ 5 = Friday
◦ 6 = Saturday
◦ 7 = Sunday
• %SW50: Seconds (SS00 hex)
• %SW51: Hours and Minutes (HHMM hex)
• %SW52: Month and Day (MMDD hex)
• %SW53: Year (YYYY hex)
These words are managed by the system when the bit %S50 is set to 0.
These words can be written by the application program or by the programming/data terminal when the bit %S50 is set to 1.
For M580:
The time is in UTC (Coordinated Universal Time). If a local time is needed, use the RRTC_DT function.</td></tr>
</table>

<table>
<tr><td colspan="5">Word
Symbol</td></tr>
<tr><td rowspan="4">%SW54
STOPSEC
%SW55
STOPHM
%SW56
STOPMD
%SW57
STOPYEAR
%SW58
STOPDAY</td><td>Function</td><td colspan="3">Real-time clock function on last stop</td></tr>
<tr><td>Initial State</td><td colspan="3">–</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">System words containing date and time of the last power interruption or controller stop (in Binary Coded Decimal):
%SW54: Seconds (00SS)
%SW55: Hours and Minutes (HHMM)
%SW56: Month and Day (MMDD)
%SW57: Year (YYYY)
%SW58: the most significant byte contains the day of the week (1 for Monday through to 7 for Sunday), and the least significant byte contains the code for the last stop:
1 = change from RUN to STOP by the programming/data terminal or the dedicated input.
2 = stop by watchdog (controller task or SFC overrun).
4 = power outage or memory card lock operation.
5 = stop on hardware error.
6 = stop on software error. Details on the type of software error are stored in %SW125.</td></tr>
<tr><td rowspan="4">%SW59
ADJDATETIME</td><td>Function</td><td colspan="3">Adjustment of date and time</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: No</td></tr>
<tr><td colspan="4">Contains two 8-bit series to adjust the date and time.
This word is enabled by bit %S59=1.
The action is always performed on the rising edge of the bit.
In the following illustration, bits in the left column increment the value, and bits in the right column decrement the value:

</td></tr>
<tr><td rowspan="4">%SW60
HSBY_CMD</td><td>Function</td><td colspan="3">Hot standby command register</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: No
M580: No
M580 Safety: No</td><td>Quantum: Yes
Momentum: No</td><td>Premium: Yes
Atrium: No
PLC Simulator: No</td></tr>
<tr><td colspan="4">For Premium controllers, refer to chapter Premium Hot Standby System Word description %SW60 to %SW65, page 58.
For Quantum controllers, refer to chapter Quantum Hot Standby System Word description %SW60 to %SW69, page 54.</td></tr>
</table>

Word **Symbol**				
%SW61 HSBY_STS	Function	Hot standby status register		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: No **PLC Simulator**: No
	• For Premium controllers, refer to chapter *Premium Hot Standby System Word description %SW60 to %SW65*, page 58. • For Quantum controllers, refer to chapter *Quantum Hot Standby System Word description %SW60 to %SW69*, page 54.			
%SW62 HSBY_REVERSE0 **%SW63** HSBY_REVERSE1 **%SW64** HSBY_REVERSE2 **%SW65** HSBY_REVERSE3	Function	Hot standby reverse transfer words		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: No **PLC Simulator**: No
	• For Premium controllers, refer to chapter *Premium Hot Standby System Word description %SW60 to %SW65*, page 58. • For Quantum controllers, refer to chapter *Quantum Hot Standby System Word description %SW60 to %SW69*, page 54.			
%SW66 CCOTF_STATUS	Function	Quantum: Status of an Ethernet I/O configuration change M580: CCOTF Status		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	Meaning of the bytes of the word %SW66 (XXYY): • Lower byte (YY): processing status • Upper byte (XX): detailed status **NOTE:** For detail meaning of the lower and upper bytes of the word %SW66, refer to the tables below.			

YY: The lower byte of the word is associated with the CCOTF processing status codes 00 to 05 (in hex):

YY: Lower byte (hex)	**Quantum**	**M580**
00	Idle	
01	In progress	
02	Completed	
03	Did not complete, but can recover	
04	Did not complete, cannot recover	
05	Did not complete, CCOTF was rejected by the Drop	

XX: The upper byte of the word is associated with the CCOTF detailed status codes 00 to FF (in hex):

XX: Upper byte (hex)	**Quantum**	**M580**
00	Idle	
01	Request length invalid	
02	Request header invalid	

XX: Upper byte (hex)	Quantum	M580
03	Request descriptor invalid	
04	Request signature invalid	
05	Request server invalid	
06	FDR server invalid	
07	Header request ID invalid	
08	Header drop ID invalid	
09	Header device name invalid	
0A	Descriptor length invalid	
0B	Descriptor RTE invalid	
0C	Descriptor offset invalid	
0D	Signature length invalid	
0E	Signature data invalid	
0F	Signature count invalid	
10	FDR IP invalid	
11	FDR subnet mask invalid	
12	FDR gateway invalid	
13	EIP CID invalid	
14	EIP device number invalid	
15	EIP IP invalid	
16	EIP vender ID invalid	
17	EIP product type invalid	
18	EIP product code invalid	
19	EIP time-out invalid	
1A	EIP OT RPI invalid	
1B	EIP TO RPI invalid	
1C	EIP path invalid	
1D	Process succeed	
1E	Process busy	
1F	Drop does not exist	
20	Drop already exists	
21	Drop not reachable	
22	Process device manager detected error	
23	Process FDR builder detected error	
24	Process FDR server detected error	
25	Process EIP scanner detected error	
26	Process EIP signature mismatch	
27	Process EIP connection rejected	
28	Process indeterminable detected error	
29...3F	Reserved	
4C	Maximum CCOTF retries reached	CCOTF response time-out
4D	Invalid signature detected by controller	Invalid event received
4E	For controller: Detected error for communication to CRP	Reserved

XX: Upper byte (hex)	Quantum	M580
4F	For controller: IOPL error (build or switchover)	Reserved
50	CRA received communication parameter detected error	
51	FDR server did not respond	
52	Detected error when downloading PRM file from server	
53	CRA downloaded a zero size file from FDR server	
54	Invalid configuration in PRM (for example, invalid CRC, invalid configuration or signature mismatch: managed by MC)	
55	PRM download time-out	
56	Other detected errors (for example, CCOTF count difference between new and old configuations is greater than 1)	
57	Reserved	CRA internal detected error
58...FE	Reserved	
FF	Indeterminable detected error	

Description of system words %SW67 to %SW69:

Word **Symbol**				
%SW67 TIME_STAMP_RECORDS	Function	Time stamping event number		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: Yes
	This word contains the number of time stamp records available in the module local buffer. **NOTE:** The events read but not acknowledged are not included.			
%SW68 HSBY_APP_STATUS	Function	Hot Standby application status		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	For detail, refer to chapter *Quantum Hot Standby System Word description %SW60 to %SW69*, page 54.			
%SW69 HSBY_FW_MISMATCH	Function	Hot standby firmware mismatch register		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	For detail, refer to chapter *Quantum Hot Standby System Word description %SW60 to %SW69*, page 54.			

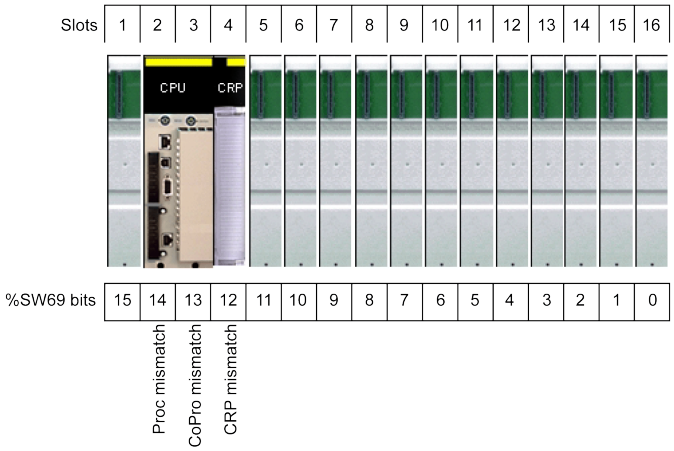
Specific Description of Hot Standby Quantum System Words %SW60 to %SW69

Detailed Description

Description of the Quantum Hot standby system words %SW60 to %SW69:

Word **Symbol**		
%SW60 HSB_CMD	Function	Quantum Hot Standby command register
	Initial State	0
	Different bits meaning of the word %SW60: • %SW60.0 = 1 invalidates the commands entered in the display (keypad). • %SW60.1: ◦ 0 sets controller A to OFFLINE mode. ◦ 1 sets controller A to ONLINE mode. • %SW60.2: ◦ 0 sets controller B to OFFLINE mode. ◦ 1 sets controller B to ONLINE mode. **NOTE:** The primary controller goes to RUN offline only if the standby controller is RUN standby. At startup of the standby controller, the standby controller goes to online mode (RUN standby) only if both bits %SW60.1 and %SW60.2 are set to 1 (regardless of A/B assignment). If bits %SW60.1 and %SW60.2 are set to 0 simultaneously, a switchover occurs: ◦ Primary controller goes RUN offline, and ◦ Standby controller then operates as RUN primary. To complete the switchover, bits %SW60.1 and %SW60.2 must be set back to 1. This makes the offline controller going back to online mode (Run standby). The OFFLINE/ONLINE mode controlled by the %SW60.1 and %SW60.2 bits is not linked to the LCD Keypad ONLINE/OFFLINE mode (see Quantum using EcoStruxure™ Control Expert, Hardware, Reference Manual). • %SW60.3: ◦ 0 If an application mismatch is detected, standby controller is set to OFFLINE mode. ◦ 1 standby controller operates without exception even if a mismatch occurs. • %SW60.4: ◦ 0 authorizes an update of the firmware only after the application has stopped. ◦ 1 authorizes an update of the firmware without the application stopping. • %SW60.5: ◦ 0 no action (default). ◦ 1 request for an application transfer from the primary to the standby. **NOTE:** Modifying %SW60.5 by application and requiring simultaneously a transfer by Keypad (see Quantum using EcoStruxure™ Control Expert, Hot Standby System, User Manual) could lead to some issues (no transfer or transfer retry). • %SW60.8: ◦ 0 address-switch on Modbus port 1 during a primary switchover. ◦ 1 no address-switch on Modbus port 1 during a primary switchover. • %SW60.9: ◦ 0 address-switch on Modbus port 2 during a primary switchover. ◦ 1 no address-switch on Modbus port 2 during a primary switchover. • %SW60.10: ◦ 0 address-switch on Modbus port 3 during a primary switchover. ◦ 1 no address-switch on Modbus port 3 during a primary switchover.	

Word **Symbol**		
%SW61 HSB_STS	Function	Quantum Hot Standby status register
	Initial State	0
	Meaning of the different bits of the word %SW61: • %SW61.0 and %SW61.1 controller operating mode bits: ◦ %SW61.1 = 0, %SW61.0 = 1: OFFLINE mode. ◦ %SW61.1 = 1, %SW61.0 = 0: primary mode. ◦ %SW61.1 = 1, %SW61.0 = 1: secondary mode (Standby). • %SW61.2 and %SW61.3 operating mode bits from the other controller: ◦ %SW61.3 = 0, %SW61.2 = 1: OFFLINE mode. ◦ %SW61.3 = 1, %SW61.2 = 0: primary mode. ◦ %SW61.3 = 1, %SW61.2 = 1: secondary mode (Standby). ◦ %SW61.3 = 0, %SW61.2 = 0: The secondary controller is not accessible (switched off, no communication). • %SW61.4: ◦ 0: The applications are identical on both controllers. ◦ 1: The applications are not identical on both controllers. • %SW61.5: ◦ 0: The controller is used as controller A. ◦ 1: The controller is used as controller B. • %SW61.6 indicates if the controller-synchronization link between the two controllers is valid: ◦ 0: The controller-synchronization link is operating properly. The contents of bit 5 are significant. ◦ 1: The controller-synchronization link is not valid. In this case, the contents of the bit 5 is not significant because the comparison of the 2 MAC addresses cannot be performed. • %SW61.7: ◦ 0: the operating system versions are the same in both the primary and standby: controllers, Ethernet CoPro, CRPs. ◦ 1: the two controllers have at least one operating system version mismatch between the primary and standby: controllers, Ethernet CoPro, CRPs. For details about the component mismatches, refer to %SW69. • %SW61.8: ◦ 0: same CoPro firmware versions. ◦ 1: different CoPro firmware versions. • %SW61.12: ◦ 0: Information given by bit 13 is not relevant. ◦ 1: Information given by bit 13 is valid. • %SW61.13: ◦ 0: NOE address set to IP. ◦ 1: NOE address set to IP + 1. • %SW61.15: ◦ 0: Hot Standby not activated. ◦ 1: Hot Standby activated.	
%SW62 HSBY_REVERSE0	Function	Hot Standby reverse transfer word
	Initial State	0
%SW63 HSBY_REVERSE1 **%SW64** HSBY_REVERSE2 **%SW65** HSBY_REVERSE3	These 4 words are modified in the Hot Standby MAST task in first section of the user application program. They are then transferred automatically from the standby controller to update the primary controller. They may be read on the primary controller and used in the Hot Standby application.	

Word **Symbol**		
%SW68 HSBY_APP_STATUS	Function	Hot Standby application status
	Initial State	0
	%SW68.1: Applications: • 0: The applications are identical on both controllers. • 1: The applications are not identical on both controllers. %SW68.4: Initial values: • 0: The initial values are the same on both controllers. • 1: The initial values are not the same on both controllers. In this case, verify the optic fiber cables.	
%SW69 HSBY_FW_MISMATCH	Function	Hot Standby firmware mismatch register
	Initial State	0
	Each bit of this word indicates the results of the comparison of firmware levels between primary and standby main rack slots that contain the same controller, CoPro, or Ethernet CRP. This word can handle the large 16-slot racks; if smaller racks are used the excess bits are not valid. For example, if 8-slot racks are used, only the first 8 bits of the word are valid. For the 16 bits: • If a bit = 0, the primary and standby components have the same firmware versions. • If a bit = 1, the primary and standby components have different firmware versions. **NOTE:** Bits 0 to 15 correspond to rack positions 16 to 1.  	

The system words %SW60 to %SW69 for Quantum Hot standby are not supported by PLC Simulator.

Specific Description of Hot Standby Premium System Words %SW60 to %SW65

Detailed Description

Description of system words %SW60 to %SW65 on Premium Hot Standby:

Word **Symbol**		
%SW60 HSB_CMD	Function	Premium Hot Standby command register
	Initial State	0
	Meaning of the different bits of the word %SW60: • %SW60.1: ◦ =0 sets controller A to OFFLINE mode. ◦ =1 sets controller A to RUN mode. • %SW60.2: ◦ =0 sets controller B to OFFLINE mode. ◦ =1 sets controller B to RUN mode. • %SW60.4 firmware Version Mismatch: ◦ =0 If firmware Versions Mismatch with Primary, Standby goes to Offline mode. ◦ =1 If firmware Versions Mismatch with Primary controller, Standby stays in standby mode. This relates to main controller firmware version, embedded CoPro firmware version, monitored ETY firmware version and enables a Hot Standby system to operate with different versions of the firmware running on the Primary and Standby.	
%SW61 HSB_STS	Function	Premium Hot Standby status register
	Initial State	0
	Meaning of the different bits of the word %SW61.0 to %SW61.15: • %SW61.0 and %SW61.1 Status of local controller: ◦ %SW61.1 = 0 and %SW61.0 = 1: OFFLINE mode. ◦ %SW61.1 = 1 and %SW61.0 = 0: Primary mode. ◦ %SW61.1 = 1 and %SW61.0 = 1: Standby mode. • %SW61.2 and %SW61.3 Status of remote controller: ◦ %SW61.3 = 0 and %SW61.2 = 1: OFFLINE mode. ◦ %SW61.3 = 1 and %SW61.2 = 0: Primary mode. ◦ %SW61.3 = 1 and %SW61.2 = 1: Standby mode. ◦ %SW61.3 = 0 and %SW61.2 = 0: the remote controller is not accessible (Power off, no communication). • %SW61.4 =1: a logic mismatch is detected between the Primary and Standby controllers. • %SW61.5 is set to 0 or 1 depending on the Ethernet CoPro MAC address: ◦ =0 the controller with the lowest MAC address becomes controller A. ◦ =1 the controller with the highest MAC address becomes controller B. • %SW61.6: this bit indicates if the controller-synchronization link between the two controllers is valid: ◦ %SW61.6 = 0: the controller-synchronization link is valid. The content of bit 5 is significant. ◦ %SW61.6 = 1: the controller-synchronization link is not valid. In this case, the contents of the bit 5 is not significant because the comparison of the two MAC addresses cannot be performed.	

Word **Symbol**		
%SW61 HSB_STS	Function	Premium Hot Standby status register
	Initial State	0
	• %SW61.7: this bit indicates if there is a Main controller firmware version mismatch between Primary and Standby: ◦ =0: no firmware version mismatch. ◦ =1: firmware version mismatch. If firmware version mismatch is not allowed in the command register (bit 4 = 0), the system does not work as redundant as soon as the error is detected. • %SW61.8: this bit indicates if there is a CoPro firmware version mismatch between Primary and Standby: ◦ =0: no CoPro firmware version mismatch. ◦ =1: CoPro firmware version mismatch. If firmware version mismatch is not allowed in the command register (bit 4 = 0), the system does not work as redundant as soon as the error is detected. • %SW61.9: this bit indicates if at least one ETY module does not have the minimum version: ◦ =0: all the ETY modules have the minimum version. ◦ =1: at least one ETY module does not have the minimum version. In this case, no Primary controller could start. • %SW61.10: this bit indicates if there is a Monitored ETY firmware version mismatch between Primary and Standby: ◦ =0: no Monitored ETY firmware version mismatch. ◦ =1: Monitored ETY firmware version mismatch. If firmware version mismatch is not allowed in the command register (bit 4 = 0), the system does not work as redundant as soon as the error is detected. • %SW61.15: If %SW 61.15 is set = 1, the setting indicates that Ethernet CoPro device is set up correctly and operational.	
%SW62 HSBY_REVERSE0 **%SW63** HSBY_REVERSE1 **%SW64** HSBY_REVERSE2 **%SW65** HSBY_REVERSE3	Function	Premium Transfer word
	Initial State	0
	These four words are reverse registers reserved for the Reverse Transfer process. These four reverse registers can be written to the application program (first section) of the Standby controller and are transferred at each scan to the Primary controller.	

The system words %SW60 to %SW65 for Premium Hot Standby are not supported by PLC Simulator.

Description of System Words %SW70 to %SW99

Detailed Description

Description of system words %SW70 to %SW99:

Word **Symbol**				
%SW70 WEEKOFYEAR	Function	Real-time clock function		
	Initial State	—		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	System word containing the number of the week in the year: 1 to 52 (in BCD time format).			
%SW71 KEY_SWITCH	Function	Position of the switches on the Modicon Quantum front panel		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: Yes
	This word contains the image of the switch positions located on the front panel of the Modicon Quantum controller. This word is updated automatically by the system: • %SW71.0 = 1 switch in the "Memory protected" position. • %SW71.1 = 1 switch in the "STOP" position. • %SW71.2 = 1 switch in the "START" position. • %SW71.8 = 1 switch in the "MEM" position. • %SW71.9 = 1 switch in the "ASCII" position. • %SW71.10 = 1 switch in the "RTU" position. **NOTE:** %SW71.3 to %SW71.7 and %SW71.11 to %SW71.15 are reserved.			

<table>
<tr><td colspan="5">Word
Symbol</td></tr>
<tr><td rowspan="11">%SW72</td><td>Function</td><td colspan="3">Unity 984 Detected Log Error</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: No
M580 Safety: No</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: No</td></tr>
<tr><td colspan="4">Extended Math library (EMTH) detected log errors (as LL984).</td></tr>
<tr><td colspan="4">Bit / Function:</td></tr>
<tr><td colspan="4">0: floating point underflow
1: floating point overflow
2: invalid floating point value or operation
3: exponential function power too large
4: integer/floating point conversion detected error
6 - 7: reserved
8 - 15: function code / EMTH sub-function</td></tr>
<tr><td colspan="4">Function code / EMTH sub-function:</td></tr>
<tr><td>01 hex / ADDDP
02 hex / SUBDP
03 hex / MULDP
04 hex / DIVDP
05 hex / SQRT
06 hex / SQRTP
07 hex / LOG
08 hex / ANLOG
09 hex / CNVIF
0A hex / ADDIF</td><td>0B hex / SUBIF
0C hex / MULIF
0D hex / DIVIF
0E hex / SUBFI
0F hex / DIVFI
10 hex / CMPIF
11 hex / CNVFI
12 hex / ADDFP
13 hex / SUBFP
14 hex / MULFP</td><td>15 hex / DIVFP
16 hex / CMPFP
17 hex / SQRFP
18 hex / CHSIN
19 hex / PI
1A hex / SINE
1B hex / COS
1C hex / TAN
1D hex / ARSIN
1E hex / ARCOS</td><td>1F hex / ARTAN
20 hex / CNVRD
21 hex / CNVDR
22 hex / POW
23 hex / EXP
24 hex / LNFP
25 hex / LOGFP
26 hex / ERLOG</td></tr>
<tr><td rowspan="4">%SW73
TS_
DIAGNOSTICS_
FLAGS</td><td>Function</td><td colspan="3">Time stamping diagnostics flags</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: No
M580: Yes
M580 Safety: Yes</td><td>Quantum: No
Momentum: No</td><td>Premium: No
Atrium: No
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">This word provides diagnostics information about the time stamped events source:
• %SW73.0 = 1 (TIME_VALID) when time is valid and clock is synchronized (%SW73.1 = 0 and %SW73.2 = 0)
• %SW73.1 = 1 (CLOCK_FAILURE) when the time source of the sending device is not valid or if the initial synchronization has not been performed since the time stamping module was commissioned.
• %SW73.2 = 1 (CLOCK_NOT_SYNC) when the time synchronization is inoperable while the time stamping module is running.
• %SW73.3 (BUFF_FULL) is buffer full indication:
◦ %SW73.3 = 1 when the buffer is full.
◦ %SW73.3 = 0 when the percentage of buffer fill is below the threshold.
NOTE: As long as the %SW73.3 = 1, no event is written in the FIFO.
• %SW73.4 = 1 (TIME_CATCHUP) indicates the time stamping module is in catch up mode. This occurs when the internal time in the time stamping module is ahead of the time in the external clock. For more information on catch up mode, refer to the topic Time Synchronization (section Time Synchronization when the System is Running) in the System Time Stamping, User Guide.
• %SW73.5 to %SW73.6 are reserved.
• %SW73.7 = 1 (SOE_UNCERTAIN) when events might be unrecognized in the following sequence of events.
NOTE: This word is valid in the System Time Stamping mode only; it is not valid in the Applicative Time Stamping mode.</td></tr>
</table>

Word **Symbol**				
%SW74	Function	Time stamping status		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: Yes
	Meaning of the bytes of the word %SW74: • Lowest byte (bits 0...7): TS_EVENTS_STATE. Reports the main state of the time stamping event service (for debugging). The byte value (in hex) is described below: **00**: Power on **10**: Initial, configuration is valid **20**: Wait for client (OFS/SCADA) **31**: Values synchronization requested and waiting for buffer below the threshold **32**: Values synchronization started **33**: Values synchronization done **40**: Detection of events in progress **51**: Buffer full, synchronization requested and waiting for buffer to drop below the threshold **52**: Buffer full, synchronization started **53**: Buffer full, synchronization done • High byte (bits 8...15): TS_BUF_FILLED_PCTAGE. Percentage of buffer used (0...100). **NOTE:** The percentage of buffer used includes the events read but not acknowledged.			
%SW75 TIMEREVTNB	Function	Timer-type event counter		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	This word contains the number of timer-type events in the queue. **For Modicon Premium and Modicon Atrium**: It is not available on the TSX 57 1•/2•/3•/4•/5• controllers. The purpose of this counter is to detect if the timer event execution is delayed. This value can only be checked within the event program because events continue to execute as long as the counter is non-zero. Lower-priority tasks read this value as zero.			
%SW76 DLASTREG	Function	Diagnostics function: recording		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Result of the last registration: • = 0 if the recording was successful. • = 1 if the diagnostics buffer has not been configured. • = 2 if the diagnostics buffer is full.			

Word **Symbol**				
%SW77 DLASTDEREG	Function	Diagnostics function: non-recording		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Result of the last de-registration: • = 0 if the non-recording was successful. • = 1 if the diagnostics buffer has not been configured. • = 21 if the detected error identifier is invalid. • = 22 if the detected error has not been recorded.			
%SW78 DNBERRBUF	Function	Diagnostics function: number of detected errors		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Number of detected errors in the diagnostics buffer.			
%SW79 ERRWARMSTART	Function	Diagnostics function: kernel start type		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: No **M580 Safety**: No	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	It indicates the code of the kernel start type. 0 (HOT_START): Warm Start 1 (ERR_SYST): Initialization after a detected software lock error 2 (HARD_WDG): Start after a detected hardware lock error not caused by the routine klCpuFail 3 (INVALID_CONTEXT) : Pwf area containing an invalid OS context (Cold Start) 4 (ASK_STP_APPLI_PENDING): askStopAppli flag is pending: ex initalization after an OS download **NOTE:** The system word %SW79 is available for Modicon M340 controller version 03.70 and any subsequent supporting version(s).			
%SW80 MSGCNT0	Function	Message management		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	This word is updated by the system, and can also be reset using %S80, page 30. **For Modicon M340 and Modicon Momentum:** Number of messages sent by the system to the terminal port (Modbus serial port). **For Modicon Quantum:** Number of Modbus messages sent by the system as client on the various communication ports. **NOTE:** Modbus messages sent by the system as Master are not counted in this word. **For Modicon Premium:** Number of messages sent by the system to the terminal port (Uni-Telway port).			

Word **Symbol**				
%SW81 MSGCNT1	Function	Message management		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	This word is updated by the system, and can also be reset using %S80, page 30. **For Modicon M340 and Modicon Momentum:** Number of messages received by the system from the terminal port (Modbus serial port). **For Modicon Quantum:** Number of Modbus messages received by the system as client on the various communication ports. **NOTE:** Modbus messages received as response to the requests sent by the system as Master are not counted in this word. **For Modicon Premium:** Number of messages received by the system from the terminal port (Uni-Telway port).			
%SW82 MSGCNT2	Function	Message management		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	This word is updated by the system, and can also be reset using %S80, page 30. **For Modicon M340, Modicon M580 and Modicon Momentum:** Number of Bridged messages of all types, correctly routed. **For Modicon Quantum:** Number of Modbus messages sent or received on serial port 1, updated at 1 second intervals. **For Modicon Premium and Modicon Atrium:** Number of messages sent by the system to the PCMCIA module.			
%SW83 MSGCNT3	Function	Message management		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	This word is updated by the system, and can also be reset using %S80, page 30. **For Modicon M340, Modicon M580 and Modicon Momentum:** Number of Bridged messages of all types, not correctly routed. **For Modicon Quantum:** Number of Modbus messages sent or received on serial port 2, updated at 1 second intervals. **For Modicon Premium and Modicon Atrium:** Number of messages received by the system from the PCMCIA module.			
%SW84 MSGCNT4	Function	Message management or Telegram management		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	This word is updated by the system, and can also be reset using %S80, page 30. **For Modicon M340, Modicon M580, Modicon M580 Safety, and Modicon Momentum:** Number of messages sent to the USB port. **For Modicon Premium and Modicon Atrium:** Number of telegrams sent by the system.			

Word **Symbol**				
%SW85 MSGCNT5	Function	Message management or Telegram management		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	This word is updated by the system, and can also be reset using %S80, page 30. **For Modicon M340, Modicon M580, Modicon M580 Safety, and Modicon Momentum:** Number of messages received by the USB port. **For Modicon Premium and Modicon Atrium:** Number of telegrams received by the system.			
%SW86 MSGCNT6	Function	Message management		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	This word is updated by the system, and can also be reset using %S80, page 30. **For Modicon M340 and Modicon Momentum:** Number of messages refused by the system, not treated because of lack of resources. For example, if the message is refused by Modbus Server, then it corresponds to Modbus exception messages sent by the controller to the remote Modbus client. **For Modicon M580, Modicon M580 Safety, Modicon Premium, Modicon Atrium:** Number of telegrams/messages refused by the system.			
%SW87 MSTSERVCNT	Function	Communication flow management		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Number of requests processed by synchronous server per master (MAST) task cycle. Requests processed by the controller may come from any communication port with access to the Modbus/UNI-TE server, noting that each port has its own constraints. Consequently, requests issued by external clients, in addition to communication EFs such as the I/O scanner or connected HMIs, must also be considered.			
%SW88 ASNSERVCNT	Function	HTTP requests received by the Web server of the controller per second or HTTPS requests received by the Web server of the controller per secondor Communication flow management		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	For Modicon M340, Modicon Momentum: Number of HTTP requests received by the Web server of the controller per second **For Modicon Premium and Modicon Atrium:** Number of requests processed by asynchronous server per master (MAST) task cycle. **For Modicon M580, Modicon M580 Safety and Modicon M580 hot standby:** Number of HTTPS requests received by the Web server of the controller per second. **NOTE:** HTTPS is available for Modicon M580 controller modules with version 04.40 and any subsequent supporting version(s).			

<table>
<tr><td colspan="5">Word
Symbol</td></tr>
<tr><td rowspan="4">%SW89
APPSERVCNT</td><td>Function</td><td colspan="3">FTP requests received by the FTP server per second or Communication flow management</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: No
Momentum: No</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: No</td></tr>
<tr><td colspan="4">For Modicon M340, Modicon M580, Modicon M580 Safety: Number of FTP requests received by the FTP server per second.

For Modicon Premium and Modicon Atrium: Number of server-function requests processed immediately during each MAST task cycle.</td></tr>
<tr><td rowspan="4">%SW90
MAXREQNB</td><td>Function</td><td colspan="3">Maximum number of requests processed per master task cycle</td></tr>
<tr><td>Initial State</td><td colspan="3">N</td></tr>
<tr><td>Controllers</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes
PLC Simulator: Yes</td></tr>
<tr><td colspan="4">This word defines the maximum number of requests (all protocols, including UNI-TE and Modbus) that the controller’s server is allowed to process during a single MAST task cycle. Requests sent by the controller acting as a client are not affected by this limit

Requests processed by the controller per cycle may come from any communication port with access to the server. Consequently, requests issued by external clients, in addition to communication EFs such as the I/O scanner or connected HMIs, must also be considered.

The system initializes this word with the default value N. If the value 0 is entered, the default value N is applied. If a value between 1 and the minimum allowed value is entered, the minimum value is used. If a value greater than the maximum allowed value is entered, the maximum value is applied.

NOTE: Requests may come from various modules or embedded communication ports. The communication exchange capacity of each port is limited, therefore the maximum request value set in %SW90 might not be reached.

This number of requests must be between a minimum and a maximum (defined as N+4) depending on the reference.

For Modicon M340 range: BMXP3410••/BMXP3420••: N = 8 (minimum 2, maximum 8 + 4 = 12)
For Modicon M580 range:
• BMEP5810•0:N = 16 (minimum 2, maximum 16 + 4 = 20)
• BMEP5820•0: N = 24 (minimum 2, maximum 24 + 4 = 28)
• BMEP5830•0: N = 32 (minimum 2, maximum 32 + 4 = 36)
• BMEP5840•0: N = 40 (minimum 2, maximum 40 + 4 = 44)
• BMEP5850•0: N = 48 (minimum 2, maximum 48 + 4 = 52)
• BMEP5860•0: N = 64 (minimum 2, maximum 64 + 4 = 68)
• BMEH5820•0: N = 24 (minimum 2, maximum 24 + 4 = 28)
• BMEH5840•0: N = 40 (minimum 2, maximum 40 + 4 = 44)
• BMEH5860•0: N = 64 (minimum 2, maximum 64 + 4 = 68)
For Modicon Premium range:
• TSX 57 0•/1•: N = 4 (minimum 2, maximum 4 + 4 = 8)
• TSX 57 2•: N = 8 (minimum 2, maximum 8 + 4 = 12)
• TSX 57 3•: N = 12 (minimum 2, maximum 12 + 4 = 16)
• TSX 57 4•/5•: N = 16 (minimum 2, maximum 16 + 4 = 20)
For Modicon Quantum range:
• 140 CPU 31••/43••/53••/: N = 10 (minimum 5, maximum 10 + 4 = 14)
• 140 CPU 6••: N = 20 (minimum 5, maximum 20 + 4 = 24)
For Modicon Momentum range:
• 170CBU78090/170CBU98090: N = 4 (minimum 2, maximum 4 + 4 = 8)
• 171CBU98091: N = 8 (minimum 2, maximum 8 + 4 = 12)</td></tr>
</table>

Word **Symbol**				
%SW91 and **%SW92**	Function	Function blocks message rates		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	• %SW91: Number of function blocks messages sent per second. • %SW92: Number of function block messages received per second. Can be read by the application program or by the programming/data terminal. These counters do not include other outgoing requests coming from an IO Scanner for example.			
%SW93	Function	Memory card file system erasing command & status		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: Yes
	Can be read and written by the application program or the programming/data terminal. This word is used by the customer to erase or clean up the memory card. The erasing operation deletes the web pages. To recover them, perform one of these actions: • Use FTP: ◦ Before performing the erasing, save the web pages using FTP. ◦ After performing the erasing, reload the web pages using FTP. • Reinstall the firmware operating system of the controller. The clean up operation deletes the content of the data storage directory. Erasing or clean up is possible only in Stop mode: • %SW93.0 = 1, a rising edge starts the erasing operation. • %SW93.1 gives the file system status after an erasing or a clean up operation request: ◦ %SW93.1 = 0, invalid file system or command under progress. ◦ %SW93.1 = 1, valid file system. **NOTE:** %SW93.1 default value is 0. %SW93.1 is set to 1 after a successful erasing or clean up. Then, when the project is transferred to the controller, %SW93.1 is set to 0. • %SW93.2 = 1, a rising edge starts the clean up operation.			
%SW94 and **%SW95**	Function	Application modification signature		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: Yes	**Premium**: No **Atrium**: No **PLC Simulator**: No
	These two words contain a 32-bit value that changes at every application modification except when: • updating upload information. • replacing the initial value with the present value. • saving the parameter command. They can be read by the application program or by the programming/data terminal.			

Word **Symbol**				
%SW96 CMDDIAGSAVEREST	Function	Command and Diagnostic of Save and Restore		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: Yes	**Premium**: No **Atrium**: No **PLC Simulator**: Yes
	This word is used to copy or delete the value of %MW to or from the internal flash memory (see EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual) and to give the action status. It can be read by the application program or by the programming/data terminal: • %SW96.0: Request to copy the value of %MW to the internal Flash memory. Set to 1 manually to request a save, and set to 0 by the system when a save is in progress. **NOTE:** You must stop the controller before copying using %SW96.0. • %SW96.1 is set to 1 by the system when a save is finished, and set to 0 by the system when a save is in progress. • %SW96.2 = 1 indicates a detected error on a save or restore operation (see %SW96.8 to %SW96.10 for error code definitions). • %SW96.3 = 1 indicates that a restore operation is in progress. • %SW96.4 may be manually set to 1 to delete %MW area in internal Flash memory. • %SW96.7 = 1 indicates that internal memory has valid %MW backup. %SW96.8 to %SW96.10 are detected error codes when %SW96.2 is set to 1: • %SW96.9 = 1 indicates that the saved %MW number is less than the configured number. • %SW96.8 = 1 and %SW96.9 = 1 means that the saved %MW number is greater than the configured number. • %SW96.8 = 1, %SW96.9 = 1 and %SW96.10 = 1 indicates a detected write error in internal flash memory.		
%SW97 CARDSTS	Function	Card status		
	Initial State	–		
	Controllers	**M340**: Yes (values 0000 ... 0005 only) **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: Yes
	Can be read by the application program or by the programming/data terminal. Indicates the status of the card. • 0000 = a Schneider Electric SD card is present and no error is detected. • 0001 = application backup or file write sent to a write-protected card. • 0002 = card not recognized (for example, for Modicon M580, a Modicon M340 SD card instead of Modicon M580 SD card, or a camera card or a desktop or laptop SD card) or application backup corrupted. • 0003 = backup of the requested application but no card available. • 0004 = SD card not correctly removed or SD card access error detected. • 0005 = no file system present in the card, or file system not compatible. Use %SW93.0 to erase the card. • 0006 = application on the SD card is different than the application in the controller. • 0007 = SD card has been correctly removed. No SD card inserted. • 0015 = SD card protection is enabled. SD card cannot be accessed when protection is active. For more information about operating modes on SD Card and %SW97 Related Values, refer to “Manage Data Integrity Checks” in the Modicon Controller Platform Cybersecurity, User Guide.		
%SW98	Function	CRP/CRA support of Configuration Change On The Fly (CCOTF) low status register		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	This word contains a bit string indicating at 1 that the corresponding CRP/CRA supports the CCOTF. This is the bit assignment: • %SW98.0 at 0, CRP does not support CCOTF, at 1 CRP supports CCOTF. • %SW98.1 to %SW98.15: ◦ = 0, the drops 2 to 16 do not support CCOTF. ◦ = 1, the drops 2 to 16 support CCOTF. **NOTE:** When the drop is de-energized, this bit is at 0.			

Word **Symbol**				
%SW99	Function	CRA support of Configuration Change On The Fly (CCOTF) high status register		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: Yes **Momentum**: No	**Premium**: No* **Atrium**: No **PLC Simulator**: No
	*This system word is also used for Modicon Premium modules but has a different function (see below). This word contains a bit string indicating at 1 that the corresponding CRA supports the CCOTF. The bit assignment for %SW99.0 to %SW99.15 is: • = 0, the drops 17 to 32 do not support CCOTF. • = 1, the drops 17 to 32 support CCOTF. **NOTE:** When the drop is de-energized, this bit is at 0.			
%SW99 INPUTADR/SWAP	Function	Communication redundancy management		
	Initial State	0		
	Controllers	**M340**: No **M580**: No **M580 Safety**: No	**Quantum**: No* **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
	*This system word is used for Modicon Quantum modules but has a different function (see above). Word used to manage the redundancy of network modules. When an error is detected on a communication module used to access a network number x (X-WAY), switch to another communication module (connected to the same network) by entering the network number in the %SW99 word. %SW99 is reset to 0 by the system.			

Description of System Words %SW100 to %SW120

Introduction

NOTE: For M580, system words %SW110 to %SW116, page 72 have a specific meaning.

Detailed Description

Description of system words %SW100 to %SW120:

Word **Symbol**				
%SW100 CCOTF_COUNT	Function	CCOTF counting status register		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	Meaning of the different bits of the word %SW100:XXYY • For Modicon Quantum controllers: ◦ XX increments each time an I/O configuration is done in RUN state in an S908 RIO drop. ◦ YY increments each time an I/O configuration is done in RUN state in the local rack. It is not changed on other types of application modifications **NOTE:** On a RUN-to-STOP mode transition, %SW100 is reset to 0. • For Modicon M580 controllers: ◦ XX Reserved ◦ YY increments each time an I/O configuration is done in the local rack. It is not changed on other types of application modifications **NOTE:** On a cold-start, warm-start or application download, %SW100 is reset to 0. **NOTE:** When a byte reaches its maximum value of 255, the counter is set to 1.			
%SW101 EIO_CCOTF_COUNT	Function	EIO CCOTF counting status register		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	Meaning of the bytes of the word %SW101:XXYY • For Modicon Quantum controllers: ◦ XX Reserved. ◦ YY increments each time an Ethernet I/O configuration changes. It is not changed on other types of application modifications • For Modicon M580 controllers: ◦ XX Reserved. ◦ YY increments each time an Ethernet I/O configuration changes. **NOTE:** YY increments twice each time a modification is performed on a redundant Modicon Quantum S908 remote drop. It is not changed on other types of application modifications **NOTE:** On a cold-start, warm-start or application download, %SW101 is reset to 0.			

Word **Symbol**				
%SW102	Function	Counter for the stored Modicon Quantum forced bits.		
	Initial State	0		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	Each forced bit address is stored in a table which is limited to 1024 entries. The word %SW102 contains the number of bits stored in the table. **NOTE:** It is possible to force more bits than the limit of the table (1024). In this case %SW108 is greater than %SW102 and the complete list of forced bits cannot be retrieved even if bits are unforced afterwards.			
%SW108 FORCEDIOIM	Function	Forced bit counting status register		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Word %SW108: • increments each time a discrete bit (%I,%Q, %M or DDDT) is forced. • decrements each time a discrete bit is unforced.			
%SW109 FORCEDANA	Function	Forced analog channel counting status register		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	Word %SW109: • increment each time an analog channel is forced. • decrement each time an analog channel is unforced. **NOTE:** For Modicon Quantum controllers, limited to analog channels of Modicon M340 Analog Modules in remote I/O drops.			
%SW116 REMIOERR	Function	Fipio I/O error		
	Initial State	–		
	Controllers	**M340**: No **M580**: No(1) **M580 Safety**: No(1)	**Quantum**: No **Momentum**: No	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: No
		(1) %SW116, page 72 has a specific meaning.		
	Normally set to 0, each bit for this word signifies the Fipio exchange status of the exchange in which it is being tested. Manually reset this word to 0. More details on bits of word %SW116: • %SW116.0 = 1, explicit exchange error (variable has not been exchanged on the bus). • %SW116.1 = 1, time-out on an explicit exchange (no reply at the end of time-out). • %SW116.2 = 1, maximum number of explicit exchanges achieved at the same time. • %SW116.3 = 1, a frame is invalid. • %SW116.4 = 1, the length of frame received is greater than the length that was declared. • %SW116.5 = reserved on 0. • %SW116.6 = 1, a frame is invalid, or an agent is initializing. • %SW116.7 = 1, absence of a configured device. • %SW116.8 = 1, channel error (at least one device channel is indicating an error). • %SW116.9 to %SW116.15 = reserved on 0.			

Word **Symbol**				
%SW117	Function	The system word %SW117 contains the Modicon Quantum RIO status provided by the PLCSTAT DFB		
	Initial State	–		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: No	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: Yes
	• 0010 hex = RIO_ERR_INIT_FAILED • 0020 hex = RIO_ERR_CRP_HOTSWAP • 0030 hex = RIO_ERR_DIAG_FAILED • 0040 hex = RIO_ERR_BAD_STATE • 0050 hex = RIO_ERR_WRONG_VERS • 0060 hex = RIO_ERR_BAD_TCOP • 0070 hex = RIO_ERR_CRP_COM_ERROR • 0080 hex = RIO_ERR_CRP_MODE • 0090 hex = RIO_ERR_CRP_TIMEOUT			
%SW120 SDCARD	Function	Modicon M580 SD card diagnostic		
	Initial State	–		
	Controllers	**M340**: No **M580**: Yes **M580 Safety**: Yes	**Quantum**: No **Momentum**: No	**Premium**: No **Atrium**: No **PLC Simulator**: No
	• 1 = No error detected (SDCARD_OK) • 0 = No SD card inserted (SDCARD_NO_CARD_INSERTED) • - 1 = The SD card has been removed improperly (SDCARD_ERR_BAD_EXTRACTING) • - 2 = No file system present in the SD card, or file system not compatible (SDCARD_ERR_BAD_FILE_SYSTEM) • - 3 = The SD card is write-protected (SDCARD_ERR_WRITE_PROTECTED) • - 4 = Other generic detected error (SDCARD_ERR_BAD_SDC) • - 5 = Incorrect application backup (SDCARD_ERR_BAD_MEDIUM) • - 6 = There is a lack of memory (SDCARD_ERR_MEM_MISSING) • - 7 = Detected error in the signature of the application backup (SDCARD_ERR_ROB_SIGNATURE) • - 8 = The application backup is corrupted (SDCARD_ERR_RETRIEVE_APPLI) • - 9 = The SD card reference is not compatible (SDCARD_CHECK_ID_ERR_COMPAT_MODEL) • - 10 = The SD card is not a Schneider Electric offer (SDCARD_CHECK_ID_ERR_SIGNATURE) • - 11 = The SD card is not a Schneider Electric offer (SDCARD_CHECK_ID_ERR_DECIPHER) • - 12 = The SD card is not a Schneider Electric offer (SDCARD_CHECK_ID_ERR_READ)		

Modicon M580 and Modicon M580 Safety Specific System Words

Description of system words %SW110 to %SW116 for Modicon M580 and Modicon M580 Safety:

Word **Symbol**		
%SW110 **%SW111** **%SW112** **%SW113** **%SW114** **%SW115** **%SW116**	Function	Modicon M580 controller load
	Initial State	0
	• %SW110 is the controller load used by the system for internal service. • %SW111 is the controller load used by the MAST task. • %SW112 is the controller load used by the FAST task. • %SW113 is the controller load used by the SAFE task. • %SW114 is the controller load used by the AUX0 task. • %SW115 is the controller load used by the AUX1 task. • %SW116 is the total controller load (sum of %SW110 to %SW115), with a maximum limit of 100% and a recommended threshold below 80% for periodic tasks.	

The system words %SW110 to %SW116 for Modicon M580 and Modicon M580 Safety are supported by PLC Simulator.

Description of System Words %SW124 to %SW127

Detailed Description

Description of system words %SW124 to %SW127:

Word **Symbol**				
%SW124 CPUERR	Function	Type of controller or system error		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	NOTE: Only used for support. The last type of detected system error is written into this word by the system (these codes are unchanged on a cold restart).			
%SW125 BLKERRTYPE	Function	Last detected error		
	Initial State	–		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	The code of the last detected error is given in this word. The following error codes cause the controller to stop if %S78 is set to 1. %S15, %S18 and %S20 are activated independently of %S78: • 2258 hex: execution of HALT instruction • DE87 hex: calculation error on floating-point numbers (%S18, these errors are listed in the word %SW17) • DEB0 hex: Watchdog overflow (%S11) • DEF0 hex: division by 0 (%S18) • DEF1 hex: character string transfer error (%S15) • DEF2 hex: arithmetic error (%S18) • DEF3 hex: index overflow (%S20) **NOTE:** The following codes 8xF4 hex, 9xF4 hex, and DEF7 hex indicate an error on Sequence Function Chart (SFC). **NOTE:** The codes listed above is a non-exhaustive list.			
%SW126 ERRADDR0 **%SW127** ERRADDR1	Function	Blocking error instruction address		
	Initial State	0		
	Controllers	**M340**: Yes **M580**: Yes **M580 Safety**: Yes	**Quantum**: Yes **Momentum**: Yes	**Premium**: Yes **Atrium**: Yes **PLC Simulator**: Yes
	NOTE: Only used for support. Address of the instruction that generated the application blocking error. For 16-bit controllers, TSX P57 1••/2••: • %SW126 contains the offset for this address. • %SW127 contains the segment number for this address. For 32-bit controllers: • %SW126 contains the least significant word for this address. • %SW127 contains the most significant word for this address. For a system STOP due a watchdog overflow: • %SW126 contains the number of the MAST task with the overflow. • %SW127 contains the value of the MAST task with the overflow.			

Premium/Atrium Specific System Words

Subject of this Section

This section describes the system words %SW128 to %SW167 for Premium and Atrium controllers.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Do not use undocumented system objects (%Si, %SWi) in your program nor write to them in data tables.

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

The system words %SW128 to %SW167 in your program, or write to them in data tables.

Description of Premium/Atrium Specific System Words %SW128 to %SW143

Detailed Description

Description of system words %SW128 to SW143:

Word **Symbol**		
%SW128...143 ERRORCNXi where i = 0 to 15	Function	connection point FIPIO error
	Initial State	0
	Each bit in this group of words indicates the state of a device connected to the FIPIO bus. Normally set to 1, the presence of a 0 in one of these bits indicates the occurrence of an error on this connection point. For a non-configured connection point, the corresponding bit is set to 1.	

Table showing correspondence between word bits and connection point address:

	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
%SW128	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
%SW129	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
%SW130	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
%SW131	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
%SW132	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
%SW133	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
%SW134	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
%SW135	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
%SW136	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
%SW137	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
%SW138	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
%SW139	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
%SW140	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
%SW141	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
%SW142	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
%SW143	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

Description of Premium/Atrium Specific System Words %SW144 to %SW146

Detailed Description

Description of system words %SW144 to %SW146:

Word **Symbol**		
%SW144 BAOPMOD	Function	Fipio bus arbiter function operating mode
	Initial State	0
	This system word is used to start and stop the bus arbiter function and the producer / consumer function. It can modify the starting, automatic and manual modes of the bus in the event of a stop. • %SW144.0: ◦ = 1: producer / consumer function in RUN. ◦ = 0: producer / consumer function in STOP (no variables are exchanged on the bus). • %SW144.1: ◦ = 1: bus arbiter is in RUN 0. ◦ = 0: bus arbiter is in STOP (no variables or message scanning is carried out on the bus). • %SW144.2: ◦ = 1: automatic start in the event of an automatic bus stop. ◦ = 0: manual start in the event of an automatic bus stop. • %SW144.3 to %SW144.15 reserved, %SW144.3 = 1, %SW144.4 to %SW144.15 = 0.	
%SW145 BAPARAM	Function	Modification of Fipio Bus Arbiter Parameters
	Initial State	0
	The bits are set to 1 manually and reset to 0 by the system when initialization has been carried out: • %SW145.0 = 1: modification of the priority of the bus arbiter; the most significant byte for this system word contains the value of the priority of the bus arbiter which is to be applied to the bus. • %SW145.1 and %SW145.2 are reserved. • %SW145.3 to %SW145.7 reserved on 0. • %SW145.8 to %SW145.15: this byte contains the value which is applied to the bus, according to the value of bit 0. These parameters can be modified when the bus arbiter is in RUN, but for them to be taken into account by the application, the bus arbiter must be stopped then restarted.	
%SW146 BASTATUS	Function	Fipio bus arbiter function display
	Initial State	0
	The least significant byte indicates the status of the producer / consumer function. The most significant byte indicates the status of the bus arbiter function. Byte value: • 00 hex: the function does not exist (no Fipio application). • 70 hex: the function has been initialized but is not operational (in STOP). • F0 hex: the function is being executed (in RUN).	

⚠WARNING

UNINTENDED SYSTEM OPERATION

Modifying the %SW144 and %SW145 system words can cause the controller to stop.

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

Description of Premium/Atrium Specific System Words %SW147 to %SW152

Detailed Description

Description of system words %SW147 to %SW152:

Word **Symbol**		
%SW147 TCRMAST	Function	MAST network cycle time
	Initial State	0
	A value which is not zero indicates (in ms) the value of the MAST task network cycle time (TCRMAST).	
%SW148 TCRFAST	Function	FAST network cycle time
	Initial State	0
	A value which is not zero indicates (in ms) the value of the first FAST task network cycle time (TCRFAST).	
%SW150 NBFRSENT	Function	Number of frames sent
	Initial State	0
	This word indicates the number of frames sent by the Fipio channel manager.	
%SW151 NBFRREC	Function	Number of frames received
	Initial State	0
	This word indicates the number of frames received by the Fipio channel manager.	
%SW152 NBRESENTMSG	Function	Number of messages re-sent
	Initial State	0
	This word indicates the number of messages re-sent by the Fipio channel manager.	

Description of Premium/Atrium Specific System Word %SW153

Detailed Description

Description of system word %SW153:

Word **Symbol**		
%SW153 FipioERR0	Function	List of Fipio channel manager errors
	Initial State	0
	Each bit is set to 1 by the system, and reset to 0 manually. See the list below.	

Description of the Bits

- bit 0 = "overrun station fault": corresponds to loss of a MAC symbol while receiving – this is linked to the receiver reacting too slowly.
- bit 1 = "message refusal fault": indicates that a message with acknowledgment was refused, or that it was not acknowledged in the first place.
- bit 2 = "interrupt variable refusal fault".
- bit 3 = "underrun station fault": corresponds to the station being unable to respect transfer speed on the network.
- bit 4 = "physical layer fault": corresponds to a prolonged transmission absence in the physical layer.
- bit 5 = "non-echo fault": corresponds to an error that is detected when the transmitter is sending, with a transmission current in the operating range, and when at the same time there is detection of an absence of signal on the same channel.
- bit 6 = "talking fault": corresponds to an error whereby the transmitter is controlling the line for longer than the maximum set operating limit. This error is caused, for example, by deterioration of the modulator, or by an erroneous data link layer.
- bit 7 = "undercurrent fault": corresponds to an error whereby the transmitter generates, when solicited, a current weaker than the minimum set operating limit. This error is caused by increased line impedance (e.g. open line, etc.).
- bit 8 = "pierced frame fault": indicates that a pause has been received in the frame body, after identifying a delimiter at the start of the frame, and before identifying a delimiter at the end of the frame. The appearance of a pause in normal operating conditions takes place after a delimiter has been identified at the end of a frame.
- bit 9 = "Receiving frame CRC fault": indicates that the CRC calculated on a normally received frame and the CRC contained within this frame have different values.
- bit 10 = "Receiving frame code fault": indicates that certain symbols, belonging exclusively to delimitation sequences at the start and end of frames, have been received within the body of the frame.
- bit 11 = "received frame length fault": more than 256 bytes have been received for the frame body.
- bit 12 = "unknown frame type received": within the frame body, the first byte identifies the type of frame link. A set number of frame types are defined in the WorldFip standard link protocol. Any other code found within a frame is therefore an indeterminable frame type.

- bit 13 = "a truncated frame has been received": a frame section is recognized by a sequence of symbols delimiting the end of the frame, while the destination station awaits the arrival of a delimiter sequence for the start of the frame.
- bit 14 = "unused, non-significant value".
- bit 15 = "unused, non-significant value"

Description of Premium/Atrium Specific System Word %SW154

Detailed Description

Description of system word %SW154:

Word **Symbol**		
%SW154 FipioERR1	Function	List of Fipio channel manager errors
	Initial State	0
	Each bit is set to 1 by the system and reset to 0 manually. See the list below.	

Description of the Bits

- bit 0 = "aperiodic sequence time-out": indicates that the messages or aperiodic variables window has overflowed its limit within an elementary cycle of the macro-cycle.
- bit 1 = "refusal of messaging request": indicates that the message queue is saturated - for the time being the bus arbiter is in no position to latch onto nor to comply with a request.
- bit 2 = "urgent update command refused": indicates that the queue for urgent aperiodic variables exchange requests is saturated - for the time being the bus arbiter is in no position to latch onto nor to comply with a request.
- bit 3 = "non-urgent update command refused": indicates that the queue for non-urgent aperiodic variable exchange requests is saturated - for the time being the bus arbiter is in no position to latch onto nor to comply with a request.
- bit 4 = "pause fault": the bus arbiter has not detected any bus activity during a time period larger than the standardized WorldFip time period.
- bit 5 = "a network collision has occurred on identifier transmission": indicates activity on the network during theoretical pause periods. Between a transmission and awaiting a reply from the bus arbiter, there should be nothing circulating on the bus. If the bus arbiter detects activity, it generates a collision error (for example, when several arbiters are active at the same time on the bus).
- bit 6 = "bus arbiter overrun fault": indicates a conflict on accessing the bus arbiter station memory.
- bit 7 = "unused, non-significant value".
- bit 8 to bit 15 = reserved on 0.

Description of Premium/Atrium Specific System Words %SW155 to %SW167

Detailed Description

Description of system words %SW155 to %SW167:

Word **Symbol**		
%SW155 NBEXPLFIP	Function	Number of explicit exchanges on Fipio
	Initial State	0
	Number of explicit exchanges being processed on Fipio, carried out by instructions (READ_STS, REA_PARAM, etc.). Also takes into account the explicit exchanges carried out by requests (READ_IO_OBJECT, WRITE_IO_OBJECT, etc.) **NOTE:** The number of explicit exchanges is less than 24.	
%SW160 to % SW167 PREMRACK0 to PREMRACK7	Function	Operating status of the I/O modules
	Initial State	0
	The words %SW160 to %SW167 are respectively associated with racks 0 to 7. Bits 0 to 15 of each of these words are associated with the modules located in positions 0 to 15 of these racks. The bit is set to 0 if the module is detected as in error, and set to 1 if the module is operating correctly. **Example:** %SW163.5 = 0 The module located in slot 5 of rack 3 is detected as in error.	

Quantum Specific System Words

Subject of this Section

This section describes the system words %SW128 to %SW702 for Quantum controllers.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Do not use undocumented system objects (%Si, %SWi) in your program nor write to them in data tables.

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

The system words %SW128 to %SW702 for Quantum are not supported by PLC Simulator.

Description of Quantum Specific System Words %SW128 to %SW177

Detailed Description

Description of system words %SW128 to %SW177; these words are active on Quantum 140 CPU 6•• ••• controllers:

Word **Symbol**		
%SW128 NB_P502_CNX	Function	Number of connections open
	Initial State	0
	The Most Significant Byte of this word indicates the number of TCP connections open on the Ethernet link TCP/IP port 502.	
%SW129 NB_DENIED_CNX	Function	Number of connections refused
	Initial State	0
	This word indicates the number of TCP connections refused on the Ethernet link TCP/IP port 502.	
%SW130 NB_P502_REF	Function	Number of messages refused
	Initial State	0
	This word indicates the number of TCP messages refused on the Ethernet link TCP/IP port 502.	
%SW132 and **%SW133** NB_SENT_MSG	Function	Number of messages sent
	Initial State	0
	This double word %SD132 indicates the number of messages sent on the Ethernet link TCP/IP port 502.	
%SW134 and **%SW135** NB_RCV_MSG	Function	Number of messages received
	Initial State	0
	This double word %SD134 indicates the number of messages received on the Ethernet link TCP/IP port 502.	
%SW136 NB_IOS_CNX	Function	Number of devices scanned
	Initial State	0
	This word indicates the number of devices scanned on the Ethernet link TCP/IP port 502.	
%SW137 NB_IOS_MSG	Function	Number of IO Scanning messages received
	Initial State	0
	This word indicates the number of messages received per second from the IO Scanning service on the Ethernet link TCP/IP port 502.	
%SW138 GLBD_ERROR	Function	Global Data coherence error
	Initial State	0
	Global Data coherence error	
%SW139 BW_GLBD_IOS	Function	Global Data and IO Scanning service load
	Initial State	0
	The Least Significant Byte of this word indicates the percentage of load relating to IO Scanning. The Most Significant Byte of this word indicates the percentage of load relating to Global Data.	
%SW140 BW_OTHER_MSG	Function	Load for messaging service and other services
	Initial State	0
	The Least Significant Byte of this word indicates the percentage of load relating to messaging. The Most Significant Byte of this word indicates the percentage of load relating to other services.	
%SW141 and **%SW142** IP_ADDR	Function	IP Address
	Initial State	0
	This double word %SD141 receives the IP address of the Ethernet link.	

Word **Symbol**		
%SW143 and **%SW144** IP_NETMASK	Function	IP subnetwork mask
	Initial State	0
	This double word %SD143 receives the subnetwork mask of the Ethernet link.	
%SW145 and **%SW146** IP_GATEWAY	Function	Default Ethernet gateway address
	Initial State	0
	This double word %SD145 receives the address of the default Ethernet gateway.	
%SW147 to **%SW149** MAC_ADDR1 to 3	Function	MAC Addresses
	Initial State	0
	The words %SW147, %SW148, %SW149 code the addresses MAC 1, MAC 2 and MAC 3 respectively.	
%SW150	Function	CoPro version
	Initial State	0
	This word codes the CoPro version for 140 CPU 671 60, 140 CPU 672 61, 140 CPU 672 60 and 140 CPU 678 61 controllers. The version is displayed in hexadecimal format.	
%SW151 BOARD_STS	Function	Status of Ethernet link
	Initial State	0
	This word codes the status of the Ethernet link: • Bit 0 = 0 if the Ethernet link is stopped • Bit 1 = 0 (reserved) • Bit 2: 0 = half duplex mode, 1 = full duplex • Bit 3 = 0 (reserved) • Bits 4 to 11: = 7 for Quantum, = 6 for Hot Standby Quantum • Bit 12: 0 = 10 Mbits link, 1 = 100 Mbits link • Bit 13: 0 = 10/100Base-TX link (twisted pair) • Bit 14: 0 (reserved) • Bit 15: 0 = Ethernet link inactive, 1 = Ethernet link active	
%SW152 to **%SW153** ERIO_DROP_ERROR	Function	Detected EIO Drop error status
	Initial State	–
	The bits of words %SW152 to %SW153 are associated with the detected Ethernet RIO Drop status. The bit is set to 0 if at least one I/O module in the drop has a detected error. It is set to 1 if the modules in the drop are operating correctly. %SW152.0: Drop 1. %SW152.1: Drop 2. ..... %SW153.14: Drop 31.	
%SW160 to **%SW167** REFRESH_IO	Function	Device operating status determined by IO scanning
	Initial State	–
	The bits of words %SW160 to %SW167 are associated with devices that have been IO scanned. The bit is set to 0 if the device has a detected error. It is set to 1 if the device is operating correctly. %SW160.0: device 1. %SW160.1: device 2. ..... %SW167.15: device 128. **NOTE:** These system words are only available for Quantum CoPro controllers, and are unavailable for NOE modules.	

Word **Symbol**		
%SW168 to **%SW171** VALID_GD	Function	Operating status of Global Data
	Initial State	–
	The bits of words %SW168 to %SW171 are associated with Global Data. The bit is set to 0 if the device has a detected error or it is the Published data. It is set to 1 if the subscribed Global Data is correctly subscribed. %SW168.0: SUB ID 1. %SW168.1: SUB ID 2. ..... %SW171.15: SUB ID 64.	
%SW172 and **%SW173** ERIO_CONNECT_STATUS	Function	Standalone and Hot Standby Primary Controllers Detected Ethernet IO Communications Drop error status
	Initial State	–
	The bits of words %SW172 and %SW173 are associated with the Ethernet RIO Drop connection status. The bit is set to 0 if the connection between the controller and the Drop is not operating correctly. It is set to 1 if the connection is operating correctly. %SW172.0: Drop 1. %SW172.1: Drop 2. ..... %SW173.14: Drop 31. **NOTE:** In a Hot Standby system, these are for the Primary controller.	
%SW176 and **%SW177** SDBY_ERIO_CONNECT_STATUS	Function	Hot Standby Controller Detected Ethernet IO Communications Drop error status
	Initial State	–
	The bits of words %SW176 and %SW177 are associated with Ethernet RIO Drop connection status. The bit is set to 0 if the connection is not operating correctly. It is set to 1 if the connection is operating correctly. %SW176.0: Drop 1. %SW176.1: Drop 2. ..... %SW177.14: Drop 31. **NOTE:** In a Hot Standby system, these are for the Standby controller. They are not significant in a standalone controller or a primary controller.	

Description of Quantum Specific System Words %SW180 to %SW764

Detailed Description

Description of system words %SW180 to %SW764:

<table>
<tr><td rowspan="3">%SW180 to %SW339

IOHEALTHij

i=1...32, j=1...5</td><td>Function</td><td>Health bits of the I/O modules (including Hot Standby controller)</td></tr>
<tr><td>Initial State</td><td>0</td></tr>
<tr><td colspan="2">Words %SW180 and %SW181 are associated with the Standalone or Primary controller local racks: main rack for %SW180 and extension rack for %SW181.

Words %SW182 and %SW183 are associated with the Standby controller: main rack for %SW182 and extension rack for %SW183.

NOTE: SW182 and %SW183 are not used in a Standalone controller.

NOTE: Extension racks are not used in Safety controllers; only the controller’s main rack system words (%SW180, %SW185, %SW190...%SW335) are available in Safety controllers.

%SW184 is reserved.

Words %SW185 to %SW339 are associated with drops 2 to 32. Each drop has 5 words assigned to the main and up to four configured extension racks:
• %SW185: module health bits of the S908 drop 2, rack 1 (main).
• %SW186: module health bits of the S908 drop 2, rack 2 (extension).
• %SW187 module health bits of the S908 drop 2, rack 3 (extension).
• %SW188 module health bits of the S908 drop 2, rack 4 (extension).
• %SW189 module health bits of the S908 drop 2, rack 5 (extension).
• ...
• %SW335: module health bits of the S908 drop 32, rack 1 (main).
• %SW336: module health bits of the S908 drop 32, rack 2 (extension).
• %SW337 module health bits of the S908 drop 32, rack 3 (extension).
• %SW338 module health bits of the S908 drop 32, rack 4 (extension).
• %SW339 module health bits of the S908 drop 32, rack 5 (extension).
NOTE: The Quantum drops support only two racks and system words for rack 3, 4, and 5 are not used. The 800 Series I/O drops support up to five racks.
Bits 0 to 15 of each of these words are associated with the modules located in positions 16 to 1 of these racks.

The bit equals 0 if the module is inoperative and equals 1 if the module is operating correctly.

Example: %SW185.5 = 0: the module located in drop 2, main rack, slot 11 is inoperative.

NOTE: Modules 140 XBE 100 00 (see Quantum using EcoStruxure™ Control Expert, Hardware, Reference Manual) require a special management.</td></tr>
<tr><td rowspan="3">%SW340

MB+DIOSLOT</td><td>Function</td><td>Slot number of the module with Modbus+ link</td></tr>
<tr><td>Initial State</td><td>–</td></tr>
<tr><td colspan="2">Slot number of the module with the built-in Modbus+ link for connection to the first DIO network. The slot number is coded from 0 to 15.

NOTE: This word is not available on Quantum safety controllers.</td></tr>
<tr><td rowspan="3">%SW341 to %SW404

MB+IOHEALTHi

i=1...64</td><td>Function</td><td>Operating status of the distributed station modules of the first DIO network</td></tr>
<tr><td>Initial State</td><td>–</td></tr>
<tr><td colspan="2">The words %SW341 to %SW404 are associated with the distributed stations (DIO): 64 words associated with the 64 DIO stations of the first network:
• %SW341: operating status of the station 1 modules.
• %SW342: operating status of the station 2 modules.
• ...
• %SW404: operating status of the station 64 modules.
Bits 0 to 15 of each of these words are associated with the modules located in positions 16 to 1 of these stations.

The bit is set to 0 if the module is detected as in error and set to 1 if the module is operating correctly.

Example: %SW362.5 = 0: The module located in station 22 slot 11 of the first DIO network is detected as in error.

NOTE: For modules 140 CRA 2•• •••, the value of this bit is not significant, and is set to 0.

NOTE: These words are not available on safety controllers and Quantum Ethernet I/O DIO network.</td></tr>
</table>

%SW405 NOM1DIOSLOT	Function	Slot number of the first interface module of the DIO network
	Initial State	–
	Slot number of module 140 NOM 2•• •• for connection to the second DIO network. The slot number is coded from 0 to 15. **NOTE:** This word is not available on Quantum safety controllers.	
%SW406 to **%SW469** NOM1DIOHEALTHi i=1...64	Function	Operating status of the distributed station modules of the second DIO network
	Initial State	–
	The words %SW406 to %SW469 are associated with the distributed stations (DIO): 64 words associated with the 64 DIO stations of the second network: • %SW406: operating status of the station 1 modules. • %SW407: operating status of the station 2 modules. • ... • %SW469: operating status of the station 64 modules. Bits 0 to 15 of each of these words are associated with the modules located in positions 16 to 1 of these stations. The bit is set to 0 if the module is detected as in error and set to 1 if the module is operating correctly. **Example:** %SW412.5 = 0: The module located in station 7 slot 11 of the second DIO network is detected as in error. **NOTE:** For modules 14 CRA 2•• •••, the value of this bit is not significant, and is set to 0. **NOTE:** These words are not available on safety controllers and Quantum Ethernet I/O DIO network.	
%SW470 NOM2DIOSLOT	Function	Slot number of the second interface module of the DIO network
	Initial State	–
	Slot number of module 140 NOM 2•• •• for connection to the third DIO network. The slot number is coded from 0 to 15. **NOTE:** This word is not available on Quantum safety controllers.	
%SW471 to **%SW534** NOM2DIOHEALTHi i=1...64	Function	Operating status of the distributed station modules of the third DIO network
	Initial State	–
	The words %SW471 to %SW534 are associated with the distributed stations (DIO): 64 words associated with the 64 DIO stations of the third network: • %SW471: operating status of the station 1 modules. • %SW472: operating status of the station 2 modules. • ... • %SW534: operating status of the station 64 modules. Bits 0 to 15 of each of these words are associated with the modules located in positions 16 to 1 of these stations. The bit is set to 0 if the module is detected as in error and set to 1 if the module is operating correctly. **Example:** %SW520.5 = 0: The module located in station 86 slot 11 of the third DIO network is detected as in error. **NOTE:** • For modules 140 CRA 2•• ••• the value of this bit is not significant, and is set to 0. • These words are not available on safety controllers and Quantum Ethernet I/O DIO network.	

%SW535 RIOERRSTAT	Function	RIO error on start-up
	Initial State	–
	This word stores the start-up error code. This word is set to 0 when the system is running; in the event of a detected error, the controller does not start, but generates a stop status code. 01: I/O assignment length 02: Remote I/O link number 03: Number of stations in the I/O assignment 04: I/O assignment checksum 10: Length of the station descriptor 11: I/O station number 12: Station autonomy time 13: ASCII port number 14: Number of station modules 15: Station already configured 16: Port already configured 17: More than 1024 output points 18: More than 1024 input points 20: Module slot address 21: Module rack address 22: Number of output bytes 23: Number of input bytes 25: First reference number 26: Second reference number 28: Internal bits outside the 16 bit range 30: Unpaired odd output module 31: Unpaired odd input module 32: Unpaired odd module reference 33: Reference 1x after register 3x 34: Reference of dummy module already used 35: Module 3x is not a dummy module 36: Module 4x is not a dummy module	
%SW536 CAERRCNT1 **%SW537** CAERRCNT2 **%SW538** CAERRCNT3	Function	Communication status on cable A
	Initial State	–
	The words %SW536 to %SW538 are the communication error words on cable A. • %SW536: ◦ most significant byte: counts framing errors ◦ least significant byte: counts overruns of the DMA receiver. • %SW537: ◦ most significant byte: counts receiver errors ◦ least significant byte: counts incorrect station receptions. • %SW538: ◦ %SW538.15 = 1, short frame ◦ %SW538.14 = 1, no end-of-frame ◦ %SW538.3 = 1, CRC error ◦ %SW538.2 = 1, alignment error ◦ %SW538.1 = 1, overrun error ◦ %SW538.13 to %SW538.4 and %SW538.0 are unused	

%SW539 CBERRCNT1 **%SW540** CBERRCNT2 **%SW541** CBERRCNT3	Function	Communication status on cable B
	Initial State	–
	The words %SW539 to %SW541 are the communication error words on cable B. • %SW539: ◦ most significant byte: counts framing errors. ◦ least significant byte: counts overruns of the DMA receiver. • %SW540: ◦ most significant byte: counts receiver errors. ◦ least significant byte: counts incorrect station receptions. • %SW541: ◦ %SW541.15 = 1, short frame ◦ %SW541.14 = 1, no end-of-frame ◦ %SW541.3 = 1, CRC error ◦ %SW541.2 = 1, alignment error ◦ %SW541.1 = 1, overrun error ◦ %SW541.13 to %SW541.4 and %SW541.0 are unused	
%SW542 GLOBERRCNT0 **%SW543** GLOBERRCNT1 **%SW544** GLOBERRCNT2	Function	Global communication status
	Initial State	–
	The words %SW542 to %SW544 are the global communication error words. • %SW542: displays the global communication status: ◦ %SW542.15 = 1, communication operating correctly. ◦ %SW542.14 = 1, communication on cable A operating correctly. ◦ %SW542.13 = 1, communication on cable B operating correctly. ◦ %SW542.11 to %SW542.8 = communications counter not valid. ◦ %SW542.7 to %SW542.0 = retry totalizer counter. **NOTE:** If the cable A is disconnected from the Standby controller, standby status remains active. So the Primary controller takes into account standby controller, but instead of showing %SW542.14 = 0, the Primary %SW542.14 toggles between 0 and 1. • %SW543: is the global error totalizer counter for cable A: ◦ most significant byte: counts the errors detected. ◦ least significant byte: counts "non-responses". • %SW544: is the global error totalizer counter for cable B: ◦ most significant byte: counts the errors detected. ◦ least significant byte: counts "non-responses".	
%SW545 MODUNHEALTH1 **%SW546** IOERRCNT1 **%SW547** IORETRY1	Function	Status of the local station
	Initial State	–
	For the controllers where station 1 is reserved for local input/outputs, the status words %SW545 to %SW547 are used in the following way: • %SW545: status of the local station: ◦ %SW545.15 = 1, the modules are operating correctly. ◦ %SW545.14 to %SW545.8 = unused, set to 0. ◦ %SW545.7 to %SW545.0 = number of times the module has appeared in error; the counter loops back at 255. • %SW546: this is used as a counter for 16-bit input/output bus errors. • %SW547: this is used as a counter for 16-bit input/output bus repetitions.	

%SW548 to **%SW640** MODUNHEALTHi IOERRCNTi IORETRYi i=2...32	Function	Status of decentralized stations
	Initial State	–
	The words %SW548 to %SW640 are used to describe the status of the decentralized stations. 3 status words are used for each station: • %SW548: displays the global communication status for station 2: ◦ %SW548.15 = 1, communication operating correctly. ◦ %SW548.14 = 1, communication on cable A operating correctly. ◦ %SW548.13 = 1, communication on cable B operating correctly. ◦ %SW548.11 to %SW548.8 = communications counter not valid. ◦ %SW548.7 to %SW548.0 = retry totalizer counter. • %SW549: is the global error totalizer counter for cable A station 2: ◦ most significant byte: counts the errors detected. ◦ least significant byte: counts "non-responses". • %SW550: is the global error totalizer counter for cable B station 2: ◦ most significant byte: counts the errors detected. ◦ least significant byte: counts "non-responses". The words: • %SW551 to %SW553 are assigned to station 3. • %SW554 to %SW556 are assigned to station 4. • ... • %SW638 to %SW640 are assigned to station 32.	
%SW641 to **%SW702** ERIO_MOD_HEALTH	Function	Ethernet RIO Module Health bit status
	Initial State	0
	The words %SW641 to %SW702 are the Quantum Ethernet I/O module health bits: %SW641: health bits of the modules on rack 1, drop 1. %SW641: • rack 0 in BMX CRA 312 •0 drop 1. • rack 1 in 140 CRA 312 00 drop 1. %SW642: • rack 1 in BMX CRA 312 •0 drop 1. • rack 2 in 140 CRA 312 00 drop 1. **NOTE:** for BMX CRA 312 •0 • Rack 0 is the main rack. • Rack 1 is the extension rack. ... %SW701: • rack 0 in BMX CRA 312 •0 drop 31. • rack 1 in 140 CRA 312 00 drop 31. %SW702: • rack 1 in BMX CRA 312 •0 drop 31. • rack 2 in 140 CRA 312 00 drop 31. Bits 0 to 15 of each of these words are associated with the modules located in positions: • 16 to 1 of the 140 CRA 312 00 Drop module. • 15 to 0 of the BMX CRA 312 •0 Drop module. The bit is set to 0 if the module has a detected error. It is set to 1 if the module is operating correctly. **NOTE:** For BMX CRA 312 •0 drops the power supply health bit is not significant.	

NOTE: %SW703 to **%SW764** are reserved by the system.

Modicon M340 Specific System Words

Contents of this Section

This section describes the system words %SW138 to %SW163 for Modicon M340 controllers.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Do not use undocumented system objects (%Si, %SWi) in your program nor write to them in data tables.

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

The system words %SW138 to %SW163 for M340 are not supported by PLC Simulator.

Description of Modicon M340 Specific System Words %SW138 to %SW163

Detailed Description

These system words allow shifting memory addresses for a Modbus Server (see EcoStruxure™ Control Expert, Operating Modes) by applying an offset on the located memory addresses. This feature allows having the same mapping addresses from external Modbus accesses between a Modicon M340 located addresses and other devices in which located addresses do not start from address 0. The value contained in those system words corresponds to the Modbus server offset, the base address.

Description of system words %SW138 to %SW141:

%SW138 and **%SW140**	Function	Modbus objects base
	Initial State	–
	Base addresses for `%I` (discrete input) and `%IW` (input register) **NOTE:** The base addresses for %I and %IW are not used when State RAM is configured in the controller (from controller firmware V2.4). Configuring State RAM allows the Modbus server to access the %I area (for the input bit operations) and the %IW area (for the input word operations). Examples: • %SW140 contains `1000`. When the Modbus server receives a `Read Input Registers` request (code 04) with starting address equal to `0000`, it returns values from `%MW1000`. • %SW138 contains `0001`. When the Modbus server receives a `Read Discrete Inputs` request (code 02) with starting address equal to `0000`, it returns values from `%M1`.	
%SW139 and **%SW141**	Function	Modbus objects base
	Initial State	–
	Base addresses for `%M` (coil address) and `%MW` (holding register) The base address is the number of `%M` or `%MW` which corresponds to Modbus address 0000. When you set the values of %SW139 and %SW141, do not use the programming code. Otherwise, when using the `PLC init` command, setting %S0 to 1 or downloading an application, these system words are set to `0000` and Modbus server has unintended behavior.	

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Set the values of system words %SW138, %SW139, %SW140 and %SW141 using the “Initial value” mechanism.

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

Description of system words %SW142 to %SW167:

%SW142 to **%SW145**	Function	CANopen device deactivate
	Initial State	–
	Inhibit the I/O error raised by the system when a configured device on the CANopen bus is not present. This inhibition can be managed with 4 system words %SW142, %SW143, %SW144 and %SW145. These system words implement a bit list indicating CANopen node error to inhibit: • bit 0 of %SW142 is for device at node address 1. • bit 1 of %SW142 is for device at node address 2. • ... • bit15 of %SW145 is for device at node address 64. Bit values: • If the bit is at 0 and device not present, then an error is detected. • If the bit is at 1 and device not present, then no error is detected. **NOTE:** The default value is 0. **NOTE:** This inhibition can be performed on the fly, but in order for it to be taken into account, the CANopen Master must be reset (by setting bit 5 of the output word, %QW0.0.2.0 to 1). **NOTE:** The system words %SW142 to %SW145 are available since SV 2.1 of the controller firmware.	
%SW146 and **%SW147**	Function	SD card serial number
	Initial State	–
	Those 2 system words contain the unique SD card serial number (32bits). If there is not an SD card or an unrecognized SD card, the 2 system words are set to 0. This information can be used to help protect an application (see Modicon M340, Processors, Setup Manual) against duplication. **NOTE:** The system words %SW146 and %SW147 are available since SV 2.1 of the controller firmware.	
%SW150 to **%SW154**	Function	CANopen SDO abort code
	Initial State	–
	Informations concerning the last SDO abort transfer: • %SW150: Low word of the SDO abort code. • %SW151: High word of the SDO abort code. • %SW152: Node number of the SDO transfer. • %SW153: Index number of the SDO transfer. • %SW154: Sub-index number of the SDO transfer.	
%SW160 to **%SW163** `PREMRACK0` to `PREMRACK3`	Function	Detected errors for racks 0 to 3
	Initial State	–
	Words %SW160 to %SW163 are associated, respectively, to racks 0 to 3. Bits 0 to 15 of each of these words are associated with the modules located in positions 0 to 15 of these racks. The bit is at 0 if the module has a detected error, and at 1 if the module is operating correctly. **Example:** %SW163.5 = 0, the module located in position 5 on rack 3 has a detected error. In case of half racks, 2 contiguous half racks make a complete rack, referenced by a single %SWi.	

Modicon M580 Specific System Words

Content of this Section

This section describes the system words %SW128 to %SW640, that are used only in M580 and M580 Safety controllers.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Do not use undocumented system objects (%Si, %SWi) in your program nor write to them in data tables.

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

The system words %SW128 to %SW640 for M580 are not supported by PLC Simulator.

Description of Modicon M580 and Modicon M580 Safety Specific System Words %SW128 to %SW176

Detailed Description

Description of system words %SW128 to %SW176:

Word **Symbol**		
%SW128	Function	Force time synchronization for safety-related IO modules
	Initial State	-
	Controllers	Modicon M580 Safety
	With controller firmware version earlier than 3.20, to force time synchronization between internal NTP time and SAFE time into the safety-related IO modules and SAFE controller task: • Value change from 1AE5 hex to E51A hex forces synchronization. • Other sequences and values do not force synchronization.	
%SW130	Function	Auto-reboot management
	Initial State	0
	Controllers	Modicon M580 and Modicon M580 Safety
	This system word can be used to: • Read the FPGA version for Modicon M580 and Modicon M580 Safety. • Set the auto-reboot feature for Modicon M580. The bits of this system word are as follows: • bit 0: ◦ 1 enables Modicon M580 auto-reboot if the controller becomes non-operational ◦ 0 disables Modicon M580 auto-reboot. **NOTE:** Bit 0 (auto-reboot) is automatically reset to 0 after an INIT. • bits 1...3: unused • bits 4...15: version of the FPGA **NOTE:** Auto-reboot feature is available for FPGA versions 1.6 and any subsequent supporting version(s). For example: • FPGA 1.5: %SW130 = 0x1050 • FPGA 1.6 + auto-reboot inactive: %SW130 = 0x1060 • FPGA 1.6 + auto-reboot active: %SW130 = 0x1061 During an auto-reboot, the outputs enter fallback state. After auto-reboot the controller enters STOP state and: • Outputs in the local rack are de-energized. • Outputs in remote racks enter fallback state. **⚠WARNING** **UNINTENDED EQUIPMENT OPERATION** Design your system so that de-energized local rack outputs do not create a hazard. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**	
%SW132 to **%SW134**	Function	MAC address
	Initial State	0
	Controllers	Modicon M580 and Modicon M580 Safety
	These words contain the following data: • %SW132: the MAC address - high bytes • %SW133: the MAC address - middle bytes • %SW134: the MAC address - low bytes Example @MAC = AA-BB-CC-DD-EE-FF • %SW132 = AABB hex • %SW133 = CCDD hex • %SW134 = EEFF hex	

Word **Symbol**		
%SW135 to **%SW137**	Function	Serial number
	Initial State	0
	Controllers	Modicon M580 and Modicon M580 Safety
	These words contain the serial number of Modicon M580 (they correspond to the serial number written on the module itself): • %SW135: the serial number - high bytes • %SW136: the serial number - middle bytes • %SW137: the serial number - low bytes Example: SN21143512345 • %SW135: 21 - factory code • %SW136: 1435 - year (14) and week (35) • %SW137: 12345 - order number (on 5 digit)	
%SW139 and **%SW141**	Function	Modbus objects base
	Initial State	–
	Controllers	Modicon M580 and Modicon M580 Safety
	Base addresses for `%M` (coil address) and `%MW` (holding register) The base address is the number of `%M` or `%MW` which corresponds to Modbus address 0000. When you set the values of %SW139 and %SW141, do not use the programming code. Otherwise, when using the `PLC init` command, setting %S0 to 1 or downloading an application, these system words are set to `0000` and Modbus server has an unintended behavior.	

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Set the values of system words %SW139 and %SW141 using the “Initial value” mechanism.

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

Word **Symbol**		
%SW142	Function	Safety CoPro firmware version
	Initial State	-
	Controllers	Modicon M580 Safety
	Contains the Safety CoPro firmware version in 4 digits in binary coded decimal. For example, firmware version 21.42 corresponds to %SW142 = 2142 hex.	
%SW146 and **%SW147**	Function	SD card serial number
	Initial State	0
	Controllers	Modicon M580 and Modicon M580 Safety
	Those system words contain the unique SD card serial number (32 bits). In case the SD card is not recognized or is missing, these system words are set to 0. This information can be used to help protect an application against duplication.	

Word **Symbol**		
%SW148	Function	Error Correcting Code (ECC) error counter
	Initial State	0
	Controllers	Modicon M580 and Modicon M580 Safety
	This word contains the number of bits in error in DDR detected and fixed by the Error Correcting Code (ECC).	
%SW150	Function	Management of Error Correcting Code (ECC)
	Initial State	0
	Controllers	Modicon M580 and Modicon M580 Safety
	This word can be used to enable or disable Error Correcting Code (ECC): • To disable Error Correcting Code (ECC), write the value DECC hex to %SW150. **NOTE:** Because Error Correcting Code (ECC) is enabled by default, you need to re-write the value DECC hex to %SW150 after a cold start, caused either by pressing the RESET button or by application logic. • To enable Error Correcting Code (ECC), write a value other than DECC hex to %SW150, cycle power the controller, or press the RESET button. **NOTE:** • The status of Error Correcting Code (ECC) is displayed in %S109, page 34. • %SW150 is valid for Modicon M580 redundant controllers (BMEH58xxxx) with firmware version 2.50 or any subsequent supporting version(s). %SW150 has no effect on standalone controllers. • The value of %SW150 is transferred from the primary to the standby controller.	
%SW151	Function	Multiple ECC error counter
	Initial State	0
	Controllers	Modicon M580 and Modicon M580 Safety
	This counter is incremented each time a multiple ECC error is detected. %SW151 is valid for Modicon M580 controllers with firmware version 2.50 or any subsequent supporting version(s). This counter cannot be reset.	
%SW152	Function	NTP controller time status
	Initial State	-
	Controllers	Modicon M580 Safety
	The status of the NTP controller time, updated by Ethernet communication module over the X-Bus backplane though the optional forced time synchronization feature is the following: • 0: The controller time is not refreshed by the Ethernet communications module. • 1: The controller time is refreshed by the Ethernet communications module. **NOTE:** This word is supported by Modicon M580 Safety controllers up to version 3.10.	
%SW160 to **%SW167** PRE-MRACK0 to PRE-MRACK7	Function	Detected errors for racks 0 to 7
	Initial State	–
	Controllers	Modicon M580 and Modicon M580 Safety
	Words %SW160 to %SW167 are associated respectively to racks 0 to 7. Bits 0 to 15 of each of these words are associated with the modules located in positions 0 to 15 of these racks. The bit is at 0 if the module has a detected error, and at 1 if the module is operating correctly. Example: %SW163.5 = 0, the module located in position 5 on rack 3 has a detected error. In case of half racks, 2 contiguous half racks make a complete rack, referenced by a single %SWi.	

Word **Symbol**		
%SW169	Function	Safety application ID
	Initial State	–
	Controllers	Modicon M580 Safety
	Contains an ID of the safety code part of the application. The ID is automatically modified when the SAFE application code is modified. **NOTE:** • If the SAFE application code has been changed and a **Build Changes** command has been executed since the previous **Rebuild All** command (thereby changing the Safety application ID), execution of a **Rebuild All** command may again change the Safety application ID. • The SAFE program unique identifier can be read using the `SAID` output of the system function block `S_SYST_STAT_MX`. For more information, refer to EcoStruxure™ Control Expert, Safety Block Library.	
%SW171	Function	Fast task state indication
	Initial State	–
	Controllers	Modicon M580 and Modicon M580 Safety
	State of the FAST task: • 0: No FAST task exists • 1: Stop • 2: Run (the process tasks are in Run state) • 3: Breakpoint • 4: Halt	
%SW172	Function	State of the SAFE task
	Initial State	–
	Controllers	Modicon M580 Safety
	State of the SAFE task: • 0: No SAFE task exists • 1: Stop • 2: Run • 3: Breakpoint • 4: Halt	
%SW173	Function	MAST task state indication
	Initial State	–
	Controllers	Modicon M580 and Modicon M580 Safety
	State of the MAST task: • 1: Stop • 2: Run • 3: Breakpoint • 4: Halt	

Word **Symbol**		
%SW174	Function	AUX0 task state indication
	Initial State	–
	Controllers	Modicon M580 and Modicon M580 Safety
	State of the AUX0 task: • 0: No AUX0 task exists • 1: Stop • 2: Run • 3: Breakpoint • 4: Halt **NOTE:** This word is valid for standalone controllers.	
%SW175	Function	AUX1 task state indication
	Initial State	–
	Controllers	Modicon M580 and Modicon M580 Safety
	State of the AUX1 task: • 0: No AUX1 task exists • 1: Stop • 2: Run • 3: Breakpoint • 4: Halt **NOTE:** This word is valid for standalone controllers.	
%SW176	Function	Forced bit counting status for program-SAFE variables
	Initial State	0
	Controllers	Modicon M580 Safety
	Forced bit counting status for program-SAFE variables: • Increments each time a discrete bit is forced. • Decrements each time a discrete bit is unforced.	

Description of M580 and M580 Safety Specific System Words %SW185 to %SW640

Detailed Description

Description of system words %SW185 to %SW640:

Word **Symbol**		
%SW185 to **%SW339** IOHEALTHij i=1...32, j=1...5	Function	Health bits of the S908 drops
	Initial State	0
	Controllers	M580 and M580 Safety
	Words %SW185 to %SW339 are associated with drops 2 to 32. Each drop has 5 words assigned to the main and up to four configured extension racks: • %SW185: module health bits of the S908 drop 2, rack 1 (main). • %SW186: module health bits of the S908 drop 2, rack 2 (extension). • %SW187 module health bits of the S908 drop 2, rack 3 (extension). • %SW188 module health bits of the S908 drop 2, rack 4 (extension). • %SW189 module health bits of the S908 drop 2, rack 5 (extension). • ... • %SW335: module health bits of the S908 drop 32, rack 1 (main). • %SW336: module health bits of the S908 drop 32, rack 2 (extension). • %SW337 module health bits of the S908 drop 32, rack 3 (extension). • %SW338 module health bits of the S908 drop 32, rack 4 (extension). • %SW339 module health bits of the S908 drop 32, rack 5 (extension). **NOTE:** The Quantum drops support only two racks and system words for rack 3, 4, and 5 are not used. The 800 Series I/O drops support up to five racks. Bits 0 to 15 of each of these words are associated with the modules located in positions 16 to 1 of these racks. The bit equals 0 if the module is inoperative and equals 1 if the module is operating correctly. **Example:** %SW185.5 = 0: the module located in S908 drop 2, main rack, slot 11 is inoperative. **NOTE:** Modules 140 XBE 100 00 (see Quantum using EcoStruxure™ Control Expert, Hardware, Reference Manual) require a special management.	

Word **Symbol**		
%SW535 RIOERRSTAT	Function	CRP error on start-up
	Initial State	–
	Controllers	M580 and M580 Safety
	This word stores the start-up error code. This word is set to 0 when the system is running; in the event of a detected error, the CRP does not start, but generates a stop status code. 01: I/O assignment length 02: Remote I/O link number 03: Number of stations in the I/O assignment 04: I/O assignment checksum 10: Length of the station descriptor 11: I/O station number 12: Station autonomy time 13: ASCII port number 14: Number of station modules 15: Station already configured 16: Port already configured 17: More than 1024 output points 18: More than 1024 input points 20: Module slot address 21: Module rack address 22: Number of output bytes 23: Number of input bytes 25: First reference number 26: Second reference number 28: Internal bits outside the 16-bit range 30: Unpaired odd output module 31: Unpaired odd input module 32: Unpaired odd module reference 33: Reference 1x after register 3x 34: Reference of dummy module already used 35: Module 3x is not a dummy module 36: Module 4x is not a dummy module	

Word **Symbol**		
%SW536 CAERRCNT1 **%SW537** CAERRCNT2 **%SW538** CAERRCNT3	Function	Communication status on cable A
	Initial State	–
	Controllers	M580 and M580 Safety
	The words %SW536 to %SW538 are the communication error words on cable A. • %SW536: ◦ most significant byte: counts framing errors ◦ least significant byte: counts overruns of the DMA receiver. • %SW537: ◦ most significant byte: counts receiver errors ◦ least significant byte: counts incorrect station receptions. • %SW538: ◦ %SW538.0 = 1, short frame ◦ %SW538.1 = 1, CRC error ◦ %SW538.2 = 1, alignment error ◦ %SW538.4 = 1, abort ◦ %SW538.5 to %SW538.7 = residual character length ◦ %SW538.8 to %SW538.15 and %SW538.3 are unused	
%SW539 CBERRCNT1 **%SW540** CBERRCNT2 **%SW541** CBERRCNT3	Function	Communication status on cable B
	Initial State	–
	Controllers	M580 and M580 Safety
	The words %SW539 to %SW541 are the communication error words on cable B. • %SW539: ◦ most significant byte: counts framing errors. ◦ least significant byte: counts overruns of the DMA receiver. • %SW540: ◦ most significant byte: counts receiver errors. ◦ least significant byte: counts incorrect station receptions. • %SW541: ◦ %SW541.0 = 1, short frame ◦ %SW541.1 = 1, CRC error ◦ %SW541.2 = 1, alignment error ◦ %SW541.4 = 1, abort ◦ %SW541.5 to %SW541.7 = residual character length ◦ %SW541.8 to %SW541.15 and %SW541.3 are unused	
%SW542 GLOBERRCNT0 **%SW543** GLOBERRCNT1 **%SW544** GLOBERRCNT2	Function	Global communication status
	Initial State	–
	Controllers	M580 and M580 Safety
	The words %SW542 to %SW544 are the global communication error words. • %SW542: displays the global communication status: ◦ %SW542.15 = 1, communication operating correctly. ◦ %SW542.14 = 1, communication on cable A operating correctly. ◦ %SW542.13 = 1, communication on cable B operating correctly. ◦ %SW542.11 to %SW542.8 = communications counter not valid. ◦ %SW542.7 to %SW542.0 = retry totalizer counter. **NOTE:** If the cable A is disconnected from the Standby controller, standby status remains active. So the Primary controller takes into account standby controller, but instead of showing %SW542.14 = 0, the Primary %SW542.14 toggles between 0 and 1. • %SW543: is the global error totalizer counter for cable A: ◦ most significant byte: frame detected error counter. ◦ least significant byte: no response counter. • %SW544: is the global error totalizer counter for cable B: ◦ most significant byte: frame detected error counter. ◦ least significant byte: no response counter.	

Word **Symbol**		
%SW548 to **%SW640** MODUNHEALTHi IOERRCNTi IORETRYi i=2...32	Function	S908 Drops communication status
	Initial State	–
	Controllers	M580 and M580 Safety
	The words %SW548 to %SW640 are used to describe the communication status of the S908 drops. 3 status words are used for each drops: • %SW548: displays the global communication status for drop 2: ◦ %SW548.15 = 1, communication operating correctly. ◦ %SW548.14 = 1, communication on cable A operating correctly. ◦ %SW548.13 = 1, communication on cable B operating correctly. ◦ %SW548.11 to %SW548.8 = communications counter not valid. ◦ %SW548.7 to %SW548.0 = retry totalizer counter. • %SW549: is the global error totalizer counter for cable A drop 2: ◦ most significant byte: frame detected error counter. ◦ least significant byte: no response counter. • %SW550: is the global error totalizer counter for cable B drop 2: ◦ most significant byte: frame detected error counter. ◦ least significant byte: no response counter. The words: • %SW551 to %SW553 are assigned to S908 drop 3. • %SW554 to %SW556 are assigned to S908 drop 4. • ... • %SW638 to %SW640 are assigned to S908 drop 32.	

Momentum Specific System Words

Contents of this Section

This section describes the system words %SW128 to %SW152 for Momentum controllers.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Do not use undocumented system objects (%Si, %SWi) in your program nor write to them in data tables.

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

The system words %SW128 to %SW152 for Momentum are not supported by PLC Simulator.

Description of Momentum Specific System Words %SW128 to %SW152

Detailed Description

Description of system words %SW128 to %SW152 on Momentum controllers:

Word `Symbol`		
%SW128 and **%SW129**	Function	I/O-Bus module health
	Initial State	0
	%SW128.0 is module #1 health; %SW129.15 is module #32 health. If a health bit is set to: • 0 = the module is not healthy or the module is not configured. • 1 = the module is healthy.	
%SW132	Function	I/O compatibility detected error status
	Initial State	0
	NOTE: The content of this word is significant only if %S118 is set to 1. Meaning of the different bits of the word %SW132.0 to %SW132.15: • %SW132.0 to %SW132.14: These bits contain a value from 1 to 64, indicating the network position of the module that cannot be reached. For example, a value of 8 indicates a detected communications error in accessing the eighth module on the network. • %SW132.15: ◦ %SW132.15 = 0 indicates a detected general communication interruption; for example: no power to the module or a break in its input cable. ◦ %SW132.15 = 1 indicates that communication is possible, but the I/O bus ID received from the module does not match the module type contained in the configuration for that position.	

Word **Symbol**		
%SW134	Function	I/O-Bus detected error
	Initial State	0
	Meaning of the values of the word %SW134: • 0 = no error detected • 1 = module ID mismatch • 2 = I/O base detected error • 3 = missing modules or extra module • 4 = bus exchange detected error • 5 = bus cable incorrectly connected **NOTE:** %SW134 stores the last detected error. The system does not automatically reset this word to 0 when the cause of the detected error no longer exists. You need to set this word to 0 after resolving the cause of the detected error.	
%SW135	Function	Local I/O detected error
	Initial State	0
	Meaning of the values of the word %SW135: • 0 = no error detected • 1 = read local I/O base ID detected error • 2 = I/O base ID does not match the application configuration • 3 = I/O base detected errors **NOTE:** %SW135 stores the last detected error. The system does not automatically reset this word to 0 when the cause of the detected error no longer exists. You need to set this word to 0 after resolving the cause of the detected error.	
%SW137	Function	Modbus slave address - serial port 2
	Initial State	0
	Read-only system word containing the Modbus slave address for serial port number 2. **NOTE:** Applies to Momentum controllers with 2 serial ports, for example the **171 CBU 78090**.	
%SW138	Function	Messages transmitted - serial port 2
	Initial State	0
	Read-only system word containing the number of messages transmitted to serial port number 2. **NOTE:** Applies to Momentum controllers with 2 serial ports, for example the **171 CBU 78090**.	
%SW139	Function	Messages received - serial port 2
	Initial State	0
	Read-only system word containing the number of messages received by serial port number 2. **NOTE:** Applies to Momentum controllers with 2 serial ports, for example the **171 CBU 78090**.	
%SW141 and **%SW142**	Function	IP netmask
	Initial State	0
	These words contain the following data: • %SW141: the IP subnet mask - low octets • %SW142: the IP subnet mask - high octets **NOTE:** Applies to Momentum controllers with an Ethernet port, for example the **171 CBU 98090** and **171 CBU 98091**.	
%SW143 and **%SW144**	Function	IP gateway
	Initial State	0
	These words contain the following data: • %SW143: the IP subnet mask - low octets • %SW144: the IP subnet mask - high octets **NOTE:** Applies to Momentum controllers with an Ethernet port, for example the **171 CBU 98090** and **171 CBU 98091**.	

Word **Symbol**		
%SW145 to **%SW147**	Function	MAC address
	Initial State	0
	These words contain the following data: • %SW145: the MAC address - low octets • %SW146: the MAC address - middle octets • %SW147: the MAC address - high octets **NOTE:** Applies to Momentum controllers with an Ethernet port, for example the **171 CBU 98090** and **171 CBU 98091**.	
%SW148	Function	ETH services status
	Initial State	0
	%SW148: FDR client status: • 0 = not initialized • 1 = IP initialized • 2 = Reserved • 3 = link ETH inoperable • 4 = duplicate IP detected • 5 = waiting for server • 6 = no configuration, or configuration detected error	
%SW151 and **%SW152**	Function	ETH open connection number
	Initial State	0
	These words contain the following data: • %SW151: the number of open connections in server mode. • %SW152: the number of open connections in client mode.	

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