EcoStruxure™ Control Expert

System Bits and Words Reference Manual

Original instructions

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Table of Contents

Safety Information

Important Information

NOTICE

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 be 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 (English version prevails):

- 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 actually 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 Book

At a Glance

Document Scope

This manual describes the EcoStruxure™ Control Expert system bits and words.

Validity Note

This documentation is valid for EcoStruxure™ Control Expert 15.0 or later.

Related Documents

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

You can download these technical publications and other technical information from our website at *www.schneider-electric.com/en/download*.

Product Related Information

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise are allowed to program, install, alter, and apply this product.

Follow all local and national safety codes and standards.

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

Chapter 1
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 ensure the homogeneity of their names in the different applications.

What Is in This Chapter?

This chapter contains the following topics:

System Bits Introduction

General

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

These bits can be tested in the user 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 terminal.

⚠ WARNING

UNEXPECTED APPLICATION BEHAVIOR

Do not use system objects (%Si, %SWi) as variable when they are not documented.

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

Description of System Bits %S0 to %S7

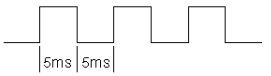
Detailed Description

Description of system bits %S0 to %S7:

<table>
<tr><th colspan="4">Bit
Symbol</th></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>Platforms</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes</td></tr>
<tr><td colspan="4">Normally on 0, this bit is set on 1 by:
● power restoral with loss of data (battery fault found)
● the user program
● the terminal
● a change of cartridge (PCMCIA on Premium and Quantum)

This bit is set to 1 during the first complete restored cycle of the PLC 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.
Safety restrictions:
M580 Safety: %S0 bit can be used only in process tasks and has no influence on SAFE task.

%S0 is not always set in the first scan of the PLC. If a signal set for every start of the PLC is needed, %S21 should be used instead.
For details on operating modes refer to:
● Premium, Quantum PLCs Operating Modes (see EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual).
● or Modicon M340 PLCs Operating Modes (see EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual).
● or BME P58 xxxx CPU Operating Modes (see Modicon M580, Hardware, Reference Manual).</td></tr>
</table>

Bit **Symbol**				
%S1 WARMSTART	Function	Warm restart		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Normally at 0, this bit is set to 1 by: ● power is restored with data save, ● the user program, ● the 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 PLC. If a signal set for every start of the PLC is needed, %S21 should be used instead.			
%S4 TB10MS	Function	Timebase 10 ms		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	An internal timer regulates the change in status of this bit. It is asynchronous in relation to the PLC cycle. Graph:  			
%S5 TB100MS	Function	Timebase 100 ms		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Same as %S4			

Bit **Symbol**				
%S6 TB1SEC	Function	Time base 1 s		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Same as %S4			
%S7 TB1MIN	Function	Time base 1 min		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Same as %S4			

Description of System Bits %S9 to %S13

Detailed Description

Description of system bits %S9 to %S13:

<table>
<tr><th colspan="2">Bit
Symbol</th><th colspan="3"></th></tr>
<tr><td rowspan="5">%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>Platforms</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: No
Momentum: No</td><td>Premium: Yes
Atrium: Yes</td></tr>
<tr><td colspan="4">Normally at 0, this bit is set to 1 by the program or the terminal:
● set to 1: sets the bit to 0 or maintains the current 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 an operating mode, outputs are in security mode state equal to 0 while the bit is set.

On Modicon M580: Only local inputs/outputs are affected by the %S9 bit.
On Modicon M580 Safety: This bit has no influence on safety output modules.
On Modicon Premium: If the configuration contains a TSX ESY 007 module, %S9 set to 1 will force to 0 all the outputs managed by the TSX ESY 007 module.</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>Platforms</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes</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 (e.g. non-compliant configuration, exchange fault, hardware fault, etc.). The %S10 bit is reset to 1 by the system when all the detected errors have disappeared.

NOTE: On M580 safety, not all possible detected errors relating to safety I/O modules are reported on bit %S10

NOTE: Detected network communication errors with remote devices are not reported on bit %S10.</td></tr>
</table>

⚠ CAUTION

UNEXPECTED APPLICATION BEHAVIOR - SPECIFIC VARIABLE BEHAVIOR

Manage detected network communication errors with remote devices with a method specific to each type of communication modules (NOM, NOE, NWM, CRA, CRP) or motion modules (MMS):

- communication function blocks status (if they are used)
- communication modules status (if they exist)

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

Bit **Symbol**				
%S11 WDG	Function	Watchdog overflow		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** 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	PLC in RUN		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This bit is set to 1 by the system when the PLC is in RUN. It is set to 0 by the system as soon as the PLC is no longer in RUN (STOP, INIT, etc.).			
%S13 1RSTSCANRUN	Function	First cycle after switching to RUN		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Switching the PLC 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:

Bit **Symbol**				
%S15 STRINGERROR	Function	Character string fault		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	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.			
%S16 IOERRTSK	Function	Task input/output fault		
	Initial State	1		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Normally set to 1, this bit is set to 0 by the system when a fault on an in-rack module or device on Fipio is detected (e.g. non-compliant configuration, exchange fault, hardware fault, etc.). This bit must be reset to 1 by the user. **NOTE:** Detected network communication errors with remote devices are not reported on bit %S16. **NOTE:** On M580 Safety, not all of the possible detected errors relating to safety I/O modules are reported on bit %S16.			

⚠ CAUTION

UNEXPECTED APPLICATION BEHAVIOR - SPECIFIC VARIABLE BEHAVIOR

Manage detected network communication errors with remote devices with a method specific to each type of communication modules (NOM, NOE, NWM, CRA, CRP) or motion modules (MMS):

- communication function blocks status (if they are used)
- communication modules status (if they exist)

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

Bit **Symbol**				
%S17 CARRY	Function	Rotate shift output		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** 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 system function blocks `S_SYST_READ_TASK_BIT_MX` and `S_SYST_RESET_TASK_BIT_MX`. For more information on safety system function blocks, refer to *EcoStruxure™ Control Expert, Safety, Block Library*.			
%S18 OVERFLOW	Function	Overflow or arithmetic error		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** 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-existnet step on a drum, • Stacking up of an already full register, emptying of an already empty register. There is only one case for which bit %S18 is not raised by the Modicon M340, Modicon M580, and Momentum PLCs 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 user program after each operation where there is a risk of overflow, then reset to 0 by the user 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.			

Bit **Symbol**				
%S19 OVERRUN	Function	Task period overrun (periodical scanning)		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Normally set to 0, this bit is set to 1 by the system in the event of a time period overrun (i.e. task execution time is greater than the period defined by the user in the configuration or programmed into the %SW word associated with the task). The user must reset this bit to 0. Each task manages its own %S19 bit. **NOTE:** On M580 Safety, information for SAFE task overrun is not available.			
%S20 INDEXOVF	Function	Index overflow		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	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 user 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.			

Bit **Symbol**				
%S21 1RST-TASKRUN	Function	First task cycle		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes

	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: The bit %S21 does not have the same meaning in Control Expert as in PL7.
	NOTE: In a M580 redundant system, at power-up, the very first task is executed while the CPU is in WAIT. It is only during the second cycle that the CPU might be PRIMARY. Therefore, the %S21 which is reflecting the first task, will always reflect the task executed while the CPU is in WAIT. According to the setting, not all the sections of this task will be executed (by default, only first section is executed while in WAIT) compared to when the CPU will be PRIMARY.
	Therefore the management of the first cycle when CPU is PRIMARY has to be done manually with application code.
	Example:
	`(* begining of program - first section *)`
	`IF %S21 THEN FIRST_CYCLE_PRIMARY_DONE:=0; END_IF;`
	...
	`(* end of program - last section *)`
	`IF ECPU_HSBY_1.LOCAL_HSBY_STS.RUN_PRIMARY THEN`
	`FIRST_CYCLE_PRIMARY_DONE:=1; END_IF;`
	NOTE: On M580 Safety, tested in the SAFE task, this bit 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 `SCOLD` output of the `S_SYST_STAT_MX` system function block.		

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		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Normally set to 1. The master task is deactivated when the user sets the bit to 0. The user code is no more 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		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Normally set to 1 when the user creates the task. The task is deactivated when the user sets 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		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Normally set to 1 when the user creates the task. The auxiliary task is deactivated when the user sets the bit to 0.			
%S33 AUX1ACT	Function	Activation/deactivation of the auxiliary task 1		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Normally set to 1 when the user creates the task. The auxiliary task is deactivated when the user sets the bit to 0.			

Bit **Symbol**				
%S34 AUX2ACT	Function	Activation/deactivation of the auxiliary task 2		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Normally set to 1 when the user creates the task. The auxiliary task is deactivated when the user sets the bit to 0.			
%S35 AUX3ACT	Function	Activation/deactivation of the auxiliary task 3		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Normally set to 1 when the user creates the task. The auxiliary task is deactivated when the user sets the bit to 0.			
%S36	Function	Outputs set to the fallback position on Ethernet I/O network		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	Requirements: **M580 CPU:** minimum OS 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 terminal: ● set to 1: sets the bit to 0 or maintains the current 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		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Normally set to 1. Events are inhibited when the user sets the bit to 0.			

Bit **Symbol**				
%S39 EVTOVR	Function	Saturation in event processing		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** 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. The user must reset this bit to 0.			
%S40 RACK0ERR	Function	Rack 0 input/output fault		
	Initial State	1		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	The %S40 bit is assigned to rack 0. Normally set to 1, this bit is set to 0 when a fault occurs on the rack's I/Os. In this case: ● the %S10 bit is set to 0, ● the I/O processor LED is on, ● the %Ir.m.c.Err module bit is set to 1. This bit is reset to 1 when the fault disappears. **NOTE:** On M580 safety, some, but not all, of the possible detected errors relating to safety I/O modules are reported.			
%S41 RACK1ERR	Function	Rack 1 input/output fault		
	Initial State	1		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Same as %S40 for rack 1.			
%S42 RACK2ERR	Function	Rack 2 input/output fault		
	Initial State	1		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Same as %S40 for rack 2.			

Bit **Symbol**				
%S43 RACK3ERR	Function	Rack 3 input/output fault		
	Initial State	1		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Same as %S40 for rack 3.			
%S44 RACK4ERR	Function	Rack 4 input/output fault		
	Initial State	1		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Same as %S40 for rack 4.			
%S45 RACK5ERR	Function	Rack 5 input/output fault		
	Initial State	1		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Same as %S40 for rack 5.			
%S46 RACK6ERR	Function	Rack 6 input/output fault		
	Initial State	1		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Same as %S40 for rack 6.			
%S47 RACK7ERR	Function	Rack 7 input/output fault		
	Initial State	1		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Same as %S40 for rack 7.			

Bit **Symbol**				
%S50 RTCWRITE	Function	Updating of time and date via words %SW50 to %SW53		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Normally set to 0, this bit is set to 1 or 0 by the program or the terminal: ● set to 0: update of system words %SW50 to %SW53 by the date and time supplied by the PLC 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	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This system-managed bit set to 1 indicates that the real-time clock is invalid or that its system words (%SW50 to %SW53) are meaningless. In this case the clock must be reset to the correct time.			
%S58 RTCSTIME	Function	Summer time indication		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	If the application is configured to support the adjust clock for daylight saving, this system-managed bit set to 1 indicates that the current date is in summer time.			
%S59 RTCTUNING	Function	Incremental update of the time and date via word %SW59		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Normally set to 0, this bit can be set to 1 or 0 by the program or the 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 current time (by increment).			

Description of System Bits %S62 to %S79

Detailed Description

Description of system bits %S62 to %S79:

<table>
<tr><th colspan="2">Bit
Symbol</th><th colspan="3"></th></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>Platforms</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: No
Momentum: No</td><td>Premium: No
Atrium: 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 EF. %S62 is updates after the signature write (EF call), when a card is inserted or ejectted, and when the CPU 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>Platforms</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: No
Momentum: No</td><td>Premium: No
Atrium: No</td></tr>
<tr><td colspan="4">This bit is used to ensure information consistency when a memory card is extracted from the CPU.
To do this, it is necessary to generate a rising edge on the bit %S65 before extracting the memory card.
On a rising edge detection, the card accessing LED turns off when the current accesses are finished (reading and writing of files, application saving). The CARDERR LED is unchanged.
Now the memory card can be extracted, the CARDERR LED remains or turns on.
When a memory card is inserted:
• the accessing LED turns on
• 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 PLC (using the power supply reset button)</td></tr>
</table>

Bit **Symbol**				
%S66 APPLIBCK	Function	Application backup		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** Yes	**Premium:** No **Atrium:** No
	This bit is set to 1 by the user to start a backup operation (transfer application from RAM to card). The system will detect 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. **Warning:** Before doing a new backup by setting bit %S66 to 1, you must test that bit %S66 has been set to 0 by the system (meaning that the previous backup has finished).Never use %S66 if it is set to 1. This may lead to a loss of data. Bit %S66 is particularly useful after replacement of initial value %S94 and save-parameters.			
%S67 PCMCIABAT0	Function	State of the application memory card battery		
	Initial State	–		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	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 Atriums, Premiums and Quantums (CPU 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 kept but the battery must be replaced following the predictive maintenance *(see Premium and Atrium using EcoStruxure™ Control Expert, Processors, racks and power supply modules, Implementation Manual)* procedure), ● set to 0: main battery voltage is sufficient (application always kept). **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 in the same condition.			
%S68 PLCBAT	Function	State of processor battery		
	Initial State	–		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	This bit is used to check 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.			

Bit **Symbol**				
%S75 PCMCIABAT1	Function	State of the data storage memory card battery		
	Initial State	–		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	This bit is used to monitor the main battery status when the memory card is in the **lower** PCMCIA slot. For Premium processors, %S75 is supported by the following processors: TSX P57 4••, TSX P57 5•• and TSX P57 6••. **NOTE:** For all others Premium processors, %S75 shows a low battery level only when the battery is already at a critical level. For Quantum processors, %S75 is supported by the following processors: 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 projects. %S75 is: ● set to 1 when the main battery voltage is low. The application is kept but the battery must be replaced following the predictive maintenance *(see Premium and Atrium using EcoStruxure™ Control Expert, Processors, racks and power supply modules, Implementation Manual)* procedure, ● set to 0 when the main battery voltage is sufficient (application always kept).		
%S76 DIAGBUFFCONF	Function	Configured diagnostics buffer		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This bit is set to 1 by the system when the diagnostics option has been configured – a diagnostics buffer for storage of errors found by diagnostics DFBs is then reserved. This bit is read-only.			
%S77 DIAGBUFFFULL	Function	Full diagnostics buffer		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This bit is set to 1 by the system when the buffer that receives errors from the diagnostics function blocks is full. This bit is read-only.			

Bit **Symbol**				
%S78 HALTIFERROR	Function	Stop in the event of error		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Normally at 0, this bit can be set to 1 by the user, to program a PLC stop on application fault: %S15, %S18,%S20. On M580 safety, it applies to both process tasks and the SAFE task. If the bit is set, for example if a %S18 overflow error rises, the SAFE task enters HALT state.			
%S79 MBFBCTRL	Function	Modbus forced bit control		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	This bit change the behavior of the Quantum Modbus server regarding forced bits: ● at 0 (default value), standard management: bit value is changed even if the bit is forced. ● if set to 1 by the user: 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 always updated, whatever 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		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** 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		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	This bit is used to change the request exchange mode with Mb+MBP100 PCMCIA. By default (value 0), the system sends a request to the card and will poll for a response in the next MAST cycle.This mode is recommended for a small MAST duration. When set to 1, the system sends a request to the card and waits for a response.This mode is recommended for a large MAST duration.			
%S83	Function	Quantum Hot Standby remains primary on ERIO loss		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes(1) **Momentum:** No	**Premium:** No **Atrium:** 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 only refer to %S84. The bit is used to change the behavior of Quantum Hot Standby in case of loss of last Ethernet RIO drop. ● When set to 0 (default value), if the last Quantum ERIO drop is lost, the primary goes offline and a switchover occurs. ● When set to 1, if the last Quantum ERIO drop is lost, 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 CPU to the standby CPU. See the table at the end of this page which describes the System states depending on the %S83 and %S84 values. *(see page 35)*			

Bit **Symbol**				
%S84	Function	Quantum Hot Standby remains primary on ERIO loss		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes(1) **Momentum:** No	**Premium:** No **Atrium:** No
		(1) Hot Standby only		
	This bit is used to modify the behavior of the Quantum Hot Standby system in case of loss of last Ethernet RIO drop. ● When set to 0 (default value), when the last Ethernet drop (Quantum Ethernet drop or X80 Ethernet drop) is lost, the primary goes offline and a switchover occurs. A manual action STOP -> RUN transition is needed to restart the system. ● When set to 1, when the last Ethernet drop is lost, 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 CPU to the standby CPU. See the table at the end of this page which describes the System states depending on the %S83 and %S84 values. *(see page 35)*		
%S88	Function	Quantum S908 RIO adapter swap over in M580 Architecture		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	In an M580 system with a redundant S908 network, this bit is used to force 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:** Check the status of the redundant Quantum S908 adapter before using the %S88. If the redundant Quantum S908 adapter is not healthy, the system will not perform the switchover even if the %S88 is set to 1.			
%S90 COMRFSH	Function	Refresh common words		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	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 terminal to check the common words exchange cycle.			

Bit **Symbol**				
%S91 LCKASYNREQ	Function	Lock asynchronous request		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	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 ensuring the data is read or written consistently. **Reminder**: the request server of the monitoring task is addressed via gate 7 (X-Way).			
%S92 EXCHGTIME	Function	Measurement mode of the communication function		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Normally set to 0, this bit can be set to 1 by the user 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		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Normally at 0, this bit can be set to 1 by the user to replace the initial values of the declared variables with a 'Save' attribute (e.g.: DFB variables) with the current 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 current 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:** This bit must be used with care: do not set this bit permanently to 1 and use the master task only. When used with the TSX MFP • or TSX MCP •flash PCMCIA memory the saving adjustment values is not available.			

⚠ CAUTION

APPLICATION UPLOAD NOT SUCCESSFUL

The bit %S94 must not be set to 1 during an upload.

If the bit %S94 is set to 1 then the upload may be impossible.

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

⚠ CAUTION

LOSS OF DATA

The bit %S94 must not be used with the TSX MFP • or the TSX MCP • flash PCMCIA memory. The function of this system bit is not available with this type of memory.

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

Bit **Symbol**				
%S96 BACKUPPROGOK	Function	Backup program OK		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	This bit is set to 0 or 1 by the system. ● Set to 0 when the card is missing or unusable (bad 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 CPU Internal Application RAM.			
%S97	Function	Backup program OK		
	Initial State	–		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** Yes	**Premium:** No **Atrium:** No
	This bit compares the application as executed in ram versus the internal backup saved to flash. Values are: ● 0: application backup not consistent. This state is obtained when application has been auto modified (saveparam or replace init 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 fail	Secondary CRP312 fail	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	–		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	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 master 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		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	This bit displays the status of the Error Correcting Code feature of M580 redundant CPUs: ● 0: ECC is enabled (default). ● 1: ECC is disabled. This bit %S109 is available on M580 redundant CPU firmware versions 2.50 and higher. ECC can be enabled and disabled using %SW150 *(see page 117)*.			
%S110	Function	Synchronize I/O-Bus		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** No **Momentum:** Yes	**Premium:** No **Atrium:** No
	When set = 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			

Bit **Symbol**				
%S111	Function	New I/O-Bus values		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** No **Momentum:** Yes	**Premium:** No **Atrium:** 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.			
%S117 ERIOERR	Function	RIO error on Ethernet I/O network		
	Initial State	–		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	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 I/O modules are reported. This bit is reset to 1 by the system when all the detected errors disappear. **NOTE:** This bit is set to 1 during the first cycle after a cold start.			
%S118 REMIOERR	Function	General remote I/O fault		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Normally set to 1, this bit is set to 0 by the system when a detected fault occurs 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 fault disappears. This bit is not updated if a detected error occurs on the other buses (DIO, ProfiBus, ASI).			

Bit **Symbol**				
%S119 LOCIOERR	Function	General in-rack I/O fault		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Normally set to 1, this bit is set to 0 by the system when a detected fault occurs on an I/O module placed in one of the racks. **NOTE:** On M580 safety, some but not all of the possible detected errors relating to safety I/O modules are reported. This bit is reset to 1 by the system when the detected fault disappears.			

Detected network communication errors with remote devices are not reported on bit %S119.

⚠ CAUTION

UNEXPECTED APPLICATION BEHAVIOR - SPECIFIC VARIABLE BEHAVIOR

Manage detected network communication errors with remote devices with a method specific to each type of communication modules (NOM, NOE, NWM, CRA, CRP) or motion modules (MMS):

- communication function blocks status (if they are used)
- communication modules status (if they exist)

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

Bit **Symbol**				
%S120 DIOERRPLC	Function	DIO bus fault (CPU)		
	Initial State	–		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	Normally set to 1, this bit is set to 0 by the system when a detected fault occurs on a device connected to the DIO bus managed by the Modbus Plus link built into the CPU. 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 correct remote bus with the bus number (RIO, DIO).			

Bit **Symbol**				
%S121 DIOERRNOM1	Function	DIO bus fault (NOE No. 1)		
	Initial State	–		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	Normally set to 1, this bit is set to 0 by the system when a detected fault occurs 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 correct remote bus with the bus number (RIO, DIO).			
%S122 DIOERRNOM2	Function	DIO bus fault (NOE No. 2)		
	Initial State	–		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	Normally set to 1, this bit is set to 0 by the system when a detected fault occurs 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 correct remote bus with the bus number (RIO, DIO).			
%S124	Function	Redundant power supply		
	Initial State	–		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** No	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	This bit is for the BMX rack and power supply able to support dual power supply: ● 1 = the CPU rack contains 2 power supplies with redundant capability, or the CPU rack does not support redundancy (such as rack with single power supply slot). ● 0 = the CPU rack contains 2 power supplies but redundancy is lost. For example there is only one power supply powered.			

Chapter 2
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 in order to ensure the homogeneity of their names in the different applications.

What Is in This Chapter?

This chapter contains the following sections:

Section 2.1
System Words %SW0 to %SW127

Subject of this Section

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

⚠ WARNING

UNEXPECTED APPLICATION BEHAVIOR

Do not use system objects (%Si, %SWi) as variable when they are not documented.

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

What Is in This Section?

This section contains the following topics:

Description of System Words %SW0 to %SW11

Introduction

NOTE: For M580 safety, the system word %SW4 *(see page 48)* has a specific meaning.

Detailed Description

Description of system words %SW0 to %SW11:

Word **Symbol**				
%SW0 MASTPERIOD	Function	Master task scanning period		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word is used to modify the period of the master task via the user program or via the 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.			
%SW1 FASTPERIOD	Function	FAST task scanning period		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	This word is used to modify the period of the FAST task via the user program or via the terminal. The period is expressed in milliseconds (1...255 ms). On a cold restart, it takes the value defined by the configuration.			
%SW2 AUX0PERIOD **%SW3** AUX1PERIOD	Function	Auxiliary task scanning period		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes(1) **Momentum:** No	**Premium:** Yes(2) **Atrium:** Yes
		(1) only on 140 CPU 6•• **(2)** only on TSX 57 5•• PLCs.		
	These words are used to modify the period of the tasks defined in the configuration, via the user program or via the terminal. The period is expressed in tens of ms (10 ms to 2.55 s).			

Word **Symbol**				
%SW4 AUX2PERIOD	Function	Auxiliary task scanning period		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No(3)	**Quantum:** Yes(1) **Momentum:** No	**Premium:** Yes(2) **Atrium:** Yes
		(1) only on 140 CPU 6•• **(2)** only on TSX 57 5•• PLCs. **(3)** %SW4 *(see page 48)* has a specific meaning.		
	The word is used to modify the period of the task defined in the configuration, via the user program or via the 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		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes(1) **Momentum:** No	**Premium:** Yes(2) **Atrium:** Yes
		(1) only on 140 CPU 6•• **(2)** only on TSX 57 5•• PLCs.		
	This word is used to modify the period of the task defined in the configuration, via the user program or via the terminal. The period is expressed in tens of ms (10 ms to 2.55 s).			
%SW6 **%SW7**	Function	IP Address		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** Yes	**Premium:** No **Atrium:** No
	These two words give the IP address of the CPU Ethernet port. Modification is not taken into account. These two words are set to 0 if the CPU does not have an Ethernet link.			

Word **Symbol**				
%SW8 TSKINHIBIN	Function	Acquisition of task input monitoring		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Normally set to 0, this bit can be set to 1 or 0 by the program or the 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 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:** 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 CPU Ethernet port is affected by %SW8 which is used to monitor the Inputs. Premium Legacy CPU Ethernet port is affected by %SW8 which is used to monitor the Outputs.		

Word Symbol				
%SW9 TSKINHIBOUT	Function	Monitoring of task output update		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Normally set to 0, this bit can be set to 1 or 0 by the program or the 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. ● %SW9.1 = 1 assigned to the FAST task; outputs relating to this task are no longer managed. ● %SW9.2 to 5 = 1 assigned to the AUX 0...3 tasks; outputs relating to these tasks are no longer managed. **On Modicon M340:** ● Inputs/outputs distributed via CANopen bus are not affected by the word %SW9. ● After an operating mode, outputs are in Security mode state equal to 0 while the bit is set. ● For IO scanning, the **Inputs** are monitored by %SW9.0. **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. **On Premium:** Premium High End CPU Ethernet port is affected by %SW9 which is used to monitor the Outputs. Premium Legacy CPU Ethernet port is affected by %SW9 which is used to monitor the Inputs.		

⚠ WARNING

UNEXPECTED APPLICATION BEHAVIOR - OUTPUTS DEACTIVATION

Before deactivating an Output, take into account its deactivation mode (fallback or maintain).

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

⚠ CAUTION
UNEXPECTED APPLICATION BEHAVIOR Before setting the %SW9 value to 1, ensure that the output behavior will remain appropriate: **On Premium/Atrium:** Module outputs located on the X Bus automatically switch to the configured mode (fallback or maintain). On the Fipio bus, certain devices do not manage fallback mode; then only maintain mode is possible. **On Quantum:** All outputs, as well as the local or remote rack (RIO) are maintained in the state that preceded the switch to 1 of the %SW9 bit corresponding to the task. The Distributed Inputs/Outputs (DIO) are not assigned by the system word %SW9. **Failure to follow these instructions can result in injury or equipment damage.**

Word **Symbol**				
%SW10 TSKINIT	Function	First cycle after cold start		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	If the value of the current 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	-		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** 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 PLCs is: 20...990 ms.			

M580 Safety Specific Function

Description of system word %SW4 for M580 safety:

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

Description of System Words %SW12 to %SW29

Introduction

NOTE: For M580 safety, system words %SW12 and %SW13 *(see page 52)* have a specific meaning.

Detailed Description

Description of system words %SW12 to %SW29:

Word **Symbol**				
%SW12 UTWPORTADDR	Function	Processor serial port address		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** No **M580 Safety:** No(1)	**Quantum:** No **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
		(1) %SW12 *(see page 55)* has a specific meaning.		
	For 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. **For Modicon M340:** Gives the Modbus slave address of the CPU serial port. Modification is not taken into account. Is 0 if the CPU does not have a Serial Port link. **For Momentum:** This word contains the slave address for serial channel 0.			
%SW13 XWAYNETWADDR	Function	Main address of the station		
	Initial State	254 (16#00FE)		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No(1)	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
		(1) %SW13 *(see page 55)* has a specific meaning.		
	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 (value of the micro-switches on the PCMCIA card).			
%SW14 OSCOMMVERS	Function	Commercial version of PLC processor		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word contains the current Operating System (OS) version of the PLC processor. **Example:** 16#0135 for V1.35			

Word **Symbol**				
%SW15 OSCOMMPATCH	Function	PLC processor patch version		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word contains the commercial version of the PLC processor patch. It is coded onto the least significant byte of the word. Coding: 0 = no patch, 1 = A, 2 = B... **Example:** 16#0003 corresponds to patch C.			
%SW16 OSINTVERS	Function	Internal firmware version number		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word contains the internal firmware version number in hexadecimal of the PLC processor firmware. **Example:** 16#0043 for ir 43			
%SW17 FLOATSTAT	Function	Error status on floating operation		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	When an error in a floating arithmetic operation is detected, bit %S18 is set to 1 and %S17 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 M340 or Quantum Safety PLCs). ● %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 = not used. This word is reset to 0 by the system on cold start, and also by the program for re-usage purposes.			

Word **Symbol**				
%SD18: **%SW18** and **%SW19** 100MSCOUNTER	Function	Absolute time counter		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** 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 is incremented systematically, even in STOP mode and equivalent states. However, times when the PLC is switched off are not taken into account, since the function is not linked to the real-time scheduler, but only to the real-time clock. %SD18 can be read by the user program or by the terminal. For Quantum safety PLC, knowing that the 2 processors must process exactly the same data, the value of %SD18 is updated at the beginning of the mast task, and then frozen during the application execution.			
%SD20: **%SW20** and **%SW21** MSCOUNTER	Function	Absolute time counter		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	For M340, M580, Momentum and Quantum PLCs %SD20 is incremented every one-thousandth of a second by the system (even when the PLC is in STOP, %SD20 is no longer incremented if the PLC is powered down). %SD20 can be read by the user program or by the terminal. %SD20 is reset on a cold start. %SD20 is not reset on a warm start. For Premium TSX P57 1•4M/2•4M/3•4M/C024M/024M and TSX PCI57 204M/354M PLCs, %SD20 is incremented by 5 every five-thousandth of a second by the system. For all the others Premium PLCs, %SD20 is time counter at 1 ms like Quantum and M340 PLCs.			
%SW23	Function	Rotary switch value		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** No **M580 Safety:** No	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	The least significant byte contains the Ethernet processor rotary switch. It can be read by the user program or by the terminal.			

Word Symbol				
%SW26	Function	Number of requests processed		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** Yes	**Premium:** No **Atrium:** No
	This system word allows to verify on server side the number of requests processed by PLC per second.			
%SW27 %SW28 %SW29	Function	System overhead time		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** Yes	**Premium:** No **Atrium:** 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 current cycle requests (communication, diagnostics). System overhead time = Mast Cycle Time - User code execution time. These can be read and written by the user program or by the terminal.			

M580 Safety Specific Function

Description of system words %SW12 and %SW13 for M580 safety:

Word Symbol		
%SW12	Function	M580 Safety Mode
	Initial State	–
	Indicates the operating mode of the Copro module: • 16#A501 = maintenance mode • 16#5AFE = safety mode **NOTE:** Any other value is interpreted as a detected error.	
%SW13	Function	M580 Safety Mode
	Initial State	–
	Indicates the operating mode of the CPU: • 16#501A = maintenance mode • 16#5AFE = safety mode **NOTE:** Any other value is interpreted as a detected error.	

Description of System Words %SW30 to %SW47

Introduction

NOTE: For M580 safety, system words %SW42 to %SW44 *(see page 55)* 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	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** –
	%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).			
%SW33 FASTCURRTIME **%SW34** FASTMAXTIME **%SW35** FASTMINTIME	Function	Fast task execution time		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** –
	%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).			

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 Stand By CPU.

Description of system words %SW36 to %SW47:

Word **Symbol**				
%SW36 AUX0CURRTIME **%SW37** AUX0MAXTIME **%SW38** AUX0MINTIME	Function	Auxiliary task (AUX0) execution time		
	Initial State	–		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** No	**Quantum:** Yes(1) **Momentum:** No	**Premium:** Yes(2) **Atrium:** –
		(1) Only on 140 CPU 6•• PLCs. **(2)** Only on TSX P57 5•• PLCs.		
	%SW36: These words indicate the execution time of the last cycle of the AUX0 task (in ms). **%SW37:** These words indicate the longest task execution time of the last cycle of the AUX0 task since the last cold start (in ms). **%SW38:** These words indicate 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	–		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** No	**Quantum:** Yes(1) **Momentum:** No	**Premium:** Yes(2) **Atrium:** –
		(1) Only on 140 CPU 6•• PLCs. **(2)** Only on TSX P57 5•• PLCs.		
	%SW39: These words indicate the execution time of the last cycle of the AUX1 task (in ms). **%SW40:** These words indicate the longest task execution time of the last cycle of the AUX1 task since the last cold start (in ms). **%SW41:** These words indicate the shortest task execution time of AUX1 task since the last cold start (in ms).			

Word Symbol				
%SW42 AUX2CURRTIME %SW43 AUX2MAXTIME %SW44 AUX2MINTIME	Function	Auxiliary task (AUX2) execution time		
	Initial State	–		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No(3)	**Quantum:** Yes(1) **Quantum Safety:** No **Momentum:** No	**Premium:** Yes(2) **Atrium:** –
		(1) Only on 140 CPU 6•• PLCs. **(2)** Only on TSX P57 5•• PLCs. **(3)** %SW42 to %SW44 *(see page 55)* have a specific meaning.		
	%SW42: These words indicate the execution time of the last cycle of the AUX2 task (in ms). **%SW43:** These words indicate the longest task execution time of the last cycle of the AUX2 task since the last cold start (in ms). **%SW44:** These words indicate the shortest task execution time of AUX2 task since the last cold start (in ms).			
%SW45 AUX3CURRTIME %SW46 AUX3MAXTIME %SW47 AUX3MINTIME	Function	Auxiliary task (AUX3) execution time		
	Initial State	–		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes(1) **Quantum Safety:** No **Momentum:** No	**Premium:** Yes(2) **Atrium:** –
		(1) Only on 140 CPU 6•• PLCs. **(2)** Only on TSX P57 5•• PLCs.		
	%SW45: These words indicate the execution time of the last cycle of the AUX3 task (in ms). **%SW46:** These words indicate the longest task execution time of the last cycle of the AUX3 task since the last cold start (in ms). **%SW47:** These words indicate the shortest task execution time of AUX3 task since the last cold start (in ms).			

M580 Safety Specific Function

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

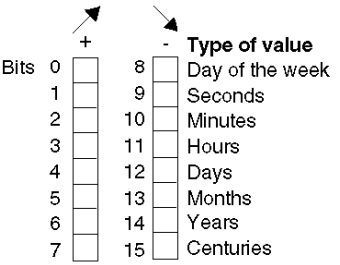
Word Symbol		
%SW42 SAFECURRTIME %SW43 SAFEMAXTIME %SW44 SAFEMINTIME	Function	M580 SAFE task execution time
	Initial State	–
	%SW42: These words indicate the execution time of the last cycle of the SAFE task (in ms). **%SW43:** These words indicate the longest task execution time of the last cycle of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

Description of System Words %SW48 to %SW69

Detailed Description

Description of system words %SW48 to %SW69:

<table>
<tr><th colspan="2">Word
Symbol</th><th colspan="4"></th></tr>
<tr><td rowspan="3">%SW48
IOEVTNB</td><td>Function</td><td colspan="4">Number of events</td></tr>
<tr><td>Initial State</td><td colspan="4">0</td></tr>
<tr><td>Platforms</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: No</td><td colspan="2">Premium: Yes
Atrium: Yes</td></tr>
<tr><td colspan="5">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 terminal
NOTE: Telegram is available only for Premium PLCs.</td></tr>
<tr><td rowspan="4">%SW49
DAYOFWEEK
%SW50
SEC
%SW51
HOURMIN
%SW52
MONTHDAY
%SW53
YEAR</td><td>Function</td><td colspan="4">Real-time clock function</td></tr>
<tr><td>Initial State</td><td colspan="4">–</td></tr>
<tr><td>Platforms</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td colspan="2">Premium: Yes
Atrium: Yes</td></tr>
<tr><td colspan="5">System words containing date and current time (in BCD):
• %SW49: day of the week:
○ 1 = Monday
○ 2 = Tuesday
○ 3 = Wednesday
○ 4 = Thursday
○ 5 = Friday
○ 6 = Saturday
○ 7 = Sunday
• %SW50: Seconds (16#SS00)
• %SW51: Hours and Minutes (16#HHMM)
• %SW52: Month and Day (16#MMDD)
• %SW53: Year (16#YYYY)
These words are managed by the system when the bit %S50 is set to 0.
These words can be written by the user program or by the terminal when the bit %S50 is set to 1.
For M580:
The current time is in UTC (Coordinated Universal Time). If a local time is needed, use the RRTC_DT function.</td></tr>
</table>

<table>
<tr><th colspan="5">Word
Symbol</th></tr>
<tr><td rowspan="5">%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>Platforms</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes</td></tr>
<tr><td colspan="4">System words containing date and time of the last power failure or PLC 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 terminal or the dedicated input.
❍ 2 = stop by watchdog (PLC task or SFC overrun).
❍ 4 = power outage or memory card lock operation.
❍ 5 = stop on hardware fault.
❍ 6 = stop on software fault. Details on the type of software fault are stored in %SW125.</td></tr>
<tr><td rowspan="3">%SW59
ADJDATETIME</td><td>Function</td><td colspan="3">Adjustment of current date</td></tr>
<tr><td>Initial State</td><td colspan="3">0</td></tr>
<tr><td>Platforms</td><td>M340: Yes
M580: Yes
M580 Safety: Yes</td><td>Quantum: Yes
Momentum: Yes</td><td>Premium: Yes
Atrium: Yes</td></tr>
<tr><td colspan="4">Contains two 8-bit series to adjust the current date.
The action is always performed on the rising edge of the bit.
This word is enabled by bit %S59=1.
In the following illustration, bits in the left column increment the value, and bits in the right column decrement the value:
 
</td></tr>
</table>

Word Symbol				
%SW60 HSBY_CMD	Function	Hot standby command register		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** No
	• For Premium platform, refer to chapter *Premium Hot Standby System Word description %SW60 to %SW65 (see page 68)*. • For Quantum platform, refer to chapter *Quantum Hot Standby System Word description %SW60 to %SW69. (see page 62)*			
%SW61 HSBY_STS	Function	Hot standby status register		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** No
	• For Premium platform, refer to chapter *Premium Hot Standby System Word description %SW60 to %SW65 (see page 68)*. • For Quantum platform, refer to chapter *Quantum Hot Standby System Word description %SW60 to %SW69. (see page 62)*			
%SW62 HSBY_REVERSE0 **%SW63** HSBY_REVERSE1 **%SW64** HSBY_REVERSE2 **%SW65** HSBY_REVERSE3	Function	Hot standby reverse transfer words		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** No
	• For Premium platform, refer to chapter *Premium Hot Standby System Word description %SW60 to %SW65 (see page 68)*. • For Quantum platform, refer to chapter *Quantum Hot Standby System Word description %SW60 to %SW69. (see page 62)*			
%SW66 CCOTF_STATUS	Function	Quantum: Status of an Ethernet I/O configuration change M580: CCOTF Status		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	Meaning of the bytes of the word %SW66 (XXYY): • Lower byte (YY): processing status • Higher byte (XX): detailed status **NOTE:** For detail meaning of the lower and higher bytes of the word %SW66, please 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 higher byte of the word is associated with the CCOTF detailed status codes 00 to FF (in hex):

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

XX: Higher byte (hex)	Quantum	M580
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	
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 unknown detected error	
29...3F	Reserved	
4C	Maximum CCOTF retries reached	CCOTF response time-out
4D	Invalid signature detected by CPU	Invalid event received
4E	For CPU: Detected error for communication to CRP	Reserved
4F	For CPU: IOPL error (build or swap)	Reserved
50	CRA received wrong 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	

XX: Higher byte (hex)	Quantum	M580
56	All 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	Unknown detected error	

Description of system words %SW67 to %SW69:

Word Symbol				
%SW67 TIME_STAMP_RECORDS	Function	Time stamping event number		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	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		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	For detail, refer to chapter *Quantum Hot Standby System Word description %SW60 to %SW69.* *(see page 62)*			
%SW69 HSBY_FW_MISMATCH	Function	Hot standby firmware mismatch register		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	For detail, refer to chapter *Quantum Hot Standby System Word description %SW60 to %SW69.* *(see page 62)*			

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

Detailed Description

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

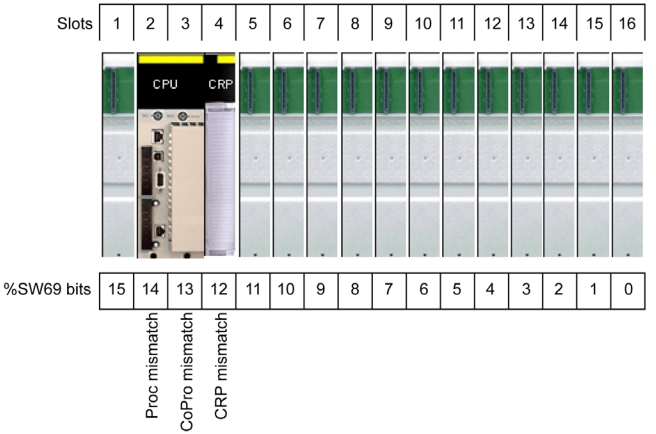
Word **Symbol**		
%SW60 HSB_CMD	Function	Quantum Hot Standby command register
	Initial State	0

Word Symbol	
	Different bits meaning of the word %SW60: ● %SW60.0 = 1 invalidates the commands entered in the display (keypad). ● %SW60.1: ❍ 0 sets PLC A to OFFLINE mode. ❍ 1 sets PLC A to ONLINE mode. ● %SW60.2: ❍ 0 sets PLC B to OFFLINE mode. ❍ 1 sets PLC B to ONLINE mode. **NOTE:** The primary CPU controller goes to RUN offline only if the secondary CPU is RUN standby. At startup of the secondary PLC, the secondary CPU 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 now operates as RUN primary. To finish the switchover, bits %SW60.1 and %SW60.2 must be set back to 1. This makes the offline CPU 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 CPU is forced to OFFLINE mode. ❍ 1 standby CPU operates normally 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. Take care that 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 swap. ❍ 1 no address-switch on Modbus port 1 during a primary swap.

Word Symbol		
%SW60 HSB_CMD	Function	Quantum Hot Standby command register
	Initial State	0
	Continued: ● %SW60.9: ❍ 0 address-switch on Modbus port 2 during a primary swap. ❍ 1 no address-switch on Modbus port 2 during a primary swap. ● %SW60.10: ❍ 0 address-switch on Modbus port 3 during a primary swap. ❍ 1 no address-switch on Modbus port 3 during a primary swap.	

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 PLC 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 PLC: ❍ %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 remote PLC is not accessible (switched off, no communication). ● %SW61.4: ❍ 0: The applications are identical on both PLCs. ❍ 1: The applications are not identical on both PLCs. ● %SW61.5: ❍ 0: The PLC is used as unit A. ❍ 1: The PLC is used as unit B. ● %SW61.6 indicates if the CPU-sync link between the 2 PLCs is valid: ❍ 0: The CPU-sync link is operating properly. The contents of bit 5 are significant. ❍ 1: The CPU-sync 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: CPUs, Ethernet copro, CRPs. ❍ 1: the 2 PLCs have at least one operating system version mismatch between the primary and standby: CPUs, Ethernet copro, CRPs. For details about the component mismatches, refer to %SW69. ● %SW61.8: ❍ 0: same copro OS versions. ❍ 1: different copro versions. ● %SW61.12: ❍ 0: Information given by bit 13 is not relevant. ❍ 1: Information given by bit 13 is valid.	

Word Symbol		
%SW61 HSB_STS	Function	Quantum Hot Standby status register
	Initial State	0
	Continued: ● %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 %SW63 HSBY_REVERSE1 %SW64 HSBY_REVERSE2 %SW65 HSBY_REVERSE3	Function	Hot Standby reverse transfer word
	Initial State	0
	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 processor to update the primary PLC. They may be read on the primary PLC and used in the Hot Standby application.	
%SW68 HSBY_APP_STATUS	Function	Hot Standby application status
	Initial State	0
	%SW68.1: Applications: ● 0: The applications are identical on both PLCs. ● 1: The applications are not identical on both PLCs. %SW68.4: Init values: ● 0: The Init values are the same on both PLCs. ● 1: The Init values are not the same on both PLCs. In this case, verify the optic fiber cables.	

Word Symbol		
%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 CPU, copro or Ethernet CRP. This word can handle the large 16-slots 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.  	

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 PLC A to OFFLINE mode. ❍ =1 sets PLC A to RUN mode. ● %SW60.2: ❍ =0 sets PLC B to OFFLINE mode. ❍ =1 sets PLC B to RUN mode. ● %SW60.4 OS Version Mismatch: ❍ =0 If OS Versions Mismatch with Primary, Standby goes to Offline mode. ❍ =1 If OS Versions Mismatch with Primary PLC, Standby stays in standby mode. Firmware OS Mismatch.This relate to main processor OS version, embedded copro OS version, monitored ETY OS version and enables a Hot Standby system to operate with different versions of the OS running on the Primary and Standby.	

Word **Symbol**		
%SW61 HSB_STS	Function	Premium Hot Standby status register
	Initial State	0
	Meaning of the different bits of the word %SW61.0 to %SW61.6: ● %SW61.0 and %SW61.1 Status of local PLC: ❍ %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 PLC: ❍ %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 PLC is not accessible (Power off, no communication). ● %SW61.4 is set=1: whenever 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 PLC with the lowest MAC address becomes PLC A. ❍ =1 the PLC with the highest MAC address becomes PLC B. ● %SW61.6: this bit indicates if the CPU-sync link between the two PLC is valid: ❍ %SW61.6 = 0: the CPU-sync link is valid.The content of bit 5 is significant. ❍ %SW61.6 = 1: the CPU-sync 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**			
Continued **%SW61** HSB_STS	Function	Premium Hot Standby status register	
	Initial State	0	
	Meaning of the different bits of the word %SW61.7 to %SW61.9 and %SW61.15: ● %SW61.7: this bit indicates if there is a Main Processor OS version mismatch between Primary and Standby: ❍ =0: no OS version firmware mismatch. ❍ =1: OS version mismatch. If OS version mismatch is not allowed in the command register (bit 4 = 0), the system will not work as redundant as soon as the fault is signaled. ● %SW61.8: this bit indicates if there is a COPRO OS version mismatch between Primary and Standby: ❍ =0: no COPRO OS version mismatch. ❍ =1: COPRO OS version mismatch. If OS version mismatch is not allowed in the command register (bit 4 = 0), the system will not work as redundant as soon as the fault is signaled. ● %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 doesn't have the minimum version. In this case, no Primary PLC could start. ● %SW61.10: this bit indicates if there is a Monitored ETY OS version mismatch between Primary and Standby: ❍ =0: no Monitored ETY OS version mismatch. ❍ =1: Monitored ETY OS version mismatch. If OS version mismatch is not allowed in the command register (bit 4 = 0), the system will not work as redundant as soon as the fault is signaled. ● %SW61.15: If %SW 61.15 is set = 1, the setting indicates that Ethernet Copro device is set up correctly and working.	
%SW62 HSBY_REVERSE0 **%SW63** HSBY_REVERSE1 **%SW64** HSBY_REVERSE2 **%SW65** HSBY_REVERSE3	Function	Premium Transfer word	
	Initial State	0	
	Platforms	**Premium:** Yes	**Atrium:** No
	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.		

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	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	System word containing the number of the week in the year: 1 to 52 (in BCD).			
%SW71 KEY_SWITCH	Function	Position of the switches on the Quantum front panel		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	This word provides the image of the positions of the switches on the front panel of the Quantum processor. 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. ● %SW71.3 to %SW71.7 and %SW71.11 to %SW71.15 are not used.			

Word **Symbol**				
%SW72	Function	Unity 984 Error Log		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Extended Math library (EMTH) detected error log errors (as LL984).			
	Bit / Function:			
	15 - 8: function code / EMTH sub-function (see below) 7 - 6: not used 4: integer/floating point conversion detected error 3: exponential function power too large 2: invalid floating point value or operation 1: floating point overflow 0: floating point underflow			
	Function code / EMTH sub-function:			
	16#01 / ADDDP 16#02 / SUBDP 16#03 / MULDP 16#04 / DIVDP 16#05 / SQRT 16#06 / SQRTP 16#07 / LOG 16#08 / ANLOG 16#09 / CNVIF 16#0A / ADDIF	16#0B / SUBIF 16#0C / MULIF 16#0D / DIVIF 16#0E / SUBFI 16#0F / DIVFI 16#10 / CMPIF 16#11 / CNVFI 16#12 / ADDFP 16#13 / SUBFP 16#14 / MULFP	16#15 / DIVFP 16#16 / CMPFP 16#17 / SQRFP 16#18 / CHSIN 16#19 / PI 16#1A / SINE 16#1B / COS 16#1C / TAN 16#1D / ARSIN 16#1E / ARCOS	16#1F / ARTAN 16#20 / CNVRD 16#21 / CNVDR 16#22 / POW 16#23 / EXP 16#24 / LNFP 16#25 / LOGFP 16#26 / ERLOG

Word **Symbol**				
%SW73 TS_DIAGNOS-TICS_FLAGS	Function	Time stamping diagnostics flags		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	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 currently reliable or if the initial synchronization has not been done since the time stamping module start. ● %SW73.2 = 1 (CLOCK_NOT_SYNC) when the time synchronization is lost while the time stamping module is running. ● %SW73.3 (BUFF_FULL) is buffer full indication: ❍ %SW73.3 = 1 when the buffer becomes 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 to %SW73.6 are reserved. ● %SW73.7 = 1 (SOE_UNCERTAIN) when events might be lost in the following sequence of events.			
%SW74	Function	Time stamping status		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	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 below the threshold **52** Buffer full synchronization started **53** Buffer full synchronization done ● Highest byte (bits 8...15): TS_BUF_FILLED_PCTAGE. Percentage of buffer filled (0...100). **NOTE:** The percentage of buffer filled includes the events read but not acknowledged.			

Word **Symbol**				
%SW75 TIMEREVTNB	Function	Timer-type event counter		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	This word contains the number of timer-type events in the queue. For Premium and Atrium, not available on the processors TSX 57 1•/2•/3•/4•/5•.			
%SW76 DLASTREG	Function	Diagnostics function: recording		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** 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.			
%SW77 DLASTDEREG	Function	Diagnostics function: non-recording		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** 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 error identifier is invalid. ● = 22 if the error has not been recorded.			
%SW78 DNBERRBUF	Function	Diagnostics function: number of errors		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Number of errors currently in the diagnostics buffer.			

Word Symbol				
%SW80 MSGCNT0	Function	Message management		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word is updated by the system, and can also be reset using %S80 *(see page 31)*. **For Premium:** Number of message sent by the system to the terminal port (Uni-Telway port). **For Modicon M340 and Momentum:** Number of message sent by the system to the terminal port (Modbus serial port). **For Quantum:** Number of Modbus messages sent by the system as client on all communication ports. **NOTE:** Modbus messages sent by the system as Master are not counted in this word.			
%SW81 MSGCNT1	Function	Message management		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word is updated by the system, and can also be reset using %S80 *(see page 31)*. **For Premium:** Number of message received by the system to the terminal port (Uni-Telway port). **For Modicon M340 and Momentum:** Number of message received by the system to the terminal port (Modbus serial port). **For Quantum:** Number of Modbus messages received by the system as client on all communication ports. **NOTE:** Modbus messages received as response to the requests sent by the system, as Master, are not counted in this word.			
%SW82 MSGCNT2	Function	Message management		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word is updated by the system, and can also be reset using %S80 *(see page 31)*. **For Premium and Atrium:** Number of messages sent by the system to the PCMCIA module. **For M340, Momentum and M580:** Number of Bridged messages of all types, properly routed. **For Quantum:** Number of Modbus messages sent or received on serial port 1, updated at 1 seconde period.			

Word **Symbol**				
%SW83 MSGCNT3	Function	Message management		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word is updated by the system, and can also be reset using %S80 *(see page 31)*. **For Premium and Atrium:** Number of messages received by the system from the PCMCIA module. **For M340, Momentum and M580:** Number of Bridged messages of all types, **not** properly routed. **For Quantum:** Number of Modbus messages sent or received on serial port 2, updated at 1 second period.			
%SW84 MSGCNT4	Function	Premium: Telegram management Modicon M340: Message management		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word is updated by the system, and can also be reset using %S80 *(see page 31)*. **For Premium:** Number of telegrams sent by the system. **For Quantum, M340, M580, and Momentum:** Number of messages sent to the USB port.			
%SW85 MSGCNT5	Function	Premium: Telegram management Modicon M340: Message management		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word is updated by the system, and can also be reset using %S80 *(see page 31)*. **For Premium:** Number of telegrams received by the system. **For Quantum, M340, M580, and Momentum:** Number of messages received by the USB port.			

Word **Symbol**				
%SW86 MSGCNT6	Function	Message management		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word is updated by the system, and can also be reset using %S80 *(see page 31)*. **For Premium and M580:** Number of messages refused by the system. **For Modicon M340 and 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 CPU to the remote Modbus client.			
%SW87 MSTSERVCNT	Function	Communication flow management		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Number of requests processed by synchronous server per master (MAST) task cycle. The requests processed may come from all communication ports (having access to the server Modbus/UNI-TE, each of them having its own limitation). This means also that requests from other clients, then communication EFs like IO Scanner, connected HMI and so on should be counted.			
%SW88 ASNSERVCNT	Function	Premium: Communication flow management Modicon M340, M580 and Momentum: HTTP requests received by the processor's Web server per second		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	For Premium: Number of requests processed by asynchronous server per master (MAST) task cycle. **For Modicon M340, M580 and Momentum:** Number of HTTP requests received by the processor's Web server per second.			

Word **Symbol**				
%SW89 APPSERVCNT	Function	Premium: Communication flow management Modicon M340 and M580:FTP requests received by the FTP server per second		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	For Premium: Number of requests processed by server functions (immediately) per master (MAST) task cycle. **For Modicon M340, and M580:** Number of FTP requests received by the FTP server per second.			

Word Symbol				
%SW90 MAXREQNB	Function	Maximum number of requests processed per master task cycle		
	Initial State	N		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	This word is used to set a maximum number of requests (all protocols included: UNI-TE, Modbus, and so on.) which can be processed by the server of the PLC per master task cycle. (Requests sent by the PLC as client are not concerned). The number of requests to be processed per cycle should take into account requests from all communication ports (having access to the server). This means that requests from other clients than communication EFs, like IO Scanner, connected HMI and so on should also be taken into account. The Word is initialized by the system with N (default value). If the value 0 is entered, it is the value N that is taken into account. If a value between 1 and minimum is entered, it is the minimum value that is taken into account. If a value greater than maximum is entered, it is maximum value that is taken into account. **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 model. **For M340 range:** • BMX P34 10••/20••: N = 8 (minimum 2, maximum 8 + 4 = 12) **For M580 range:** • BMX P58 10•0: N = 16 (minimum 2, maximum 16 + 4 = 20) • BMX P58 20•0: N = 24 (minimum 2, maximum 24 + 4 = 28) • BMX P58 30•0: N = 32 (minimum 2, maximum 32 + 4 = 36) • BMX P58 40•0: N = 40 (minimum 2, maximum 40 + 4 = 44) **For 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 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 Momentum range:** • 170 CBU 78 090/CBU 98 090: N = 4 (minimum 2, maximum 4 + 4 = 8) • 171 CBU 98 091: N = 8 (minimum 2, maximum 8 + 4 = 12)			

Word **Symbol**				
%SW91 and **%SW92**	Function	Function blocks message rates		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	• %SW91: Number of function blocks messages sent per second. • %SW92: Number of function block messages received per second. Can be read by the user program or by the terminal. These counters does not include other outgoing requests coming from an IO Scanner for example.			
%SW93	Function	Memory card file system erasing command & status		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	Can be read and written by the user program or the 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 the two following actions: • Use FTP: ❍ Before performing the erasing, save the web pages using FTP. ❍ After performing the erasing, reload the web pages via FTP. • Reinstall the firmware operating system of the processor. 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 turns to one after a successful erasing or clean up, then when the project is transferred to the PLC, %SW93.1 turns to zero. • %SW93.2 = 1, a rising edge starts the clean up operation.			

Word **Symbol**				
%SW94 and **%SW95**	Function	Application modification signature		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** Yes	**Premium:** No **Atrium:** 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 current value. ● saving the parameter command. They can be read by the user program or by the terminal.			
%SW96 CMDDIAGSAV-EREST	Function	Command and Diagnostic of Save and Restore		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** Yes	**Premium:** No **Atrium:** No
	This word is used to copy or delete the current value of %MW to or from internal flash memory *(see EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual)* and to give the action's status. It can be read by the user program or by the terminal: ● %SW96.0: Request to copy current value of %MW to internal Flash memory. Set to 1 by the user to request a save, and set to 0 by the system when a save is in progress. **NOTE:** You must stop the processor before copying via %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 an error on a save or restore operation (see %SW96.8 to %SW96.15 for error code definitions). ● %SW96.3 = 1 indicates that a restore operation is in progress. ● %SW96.4 may be set to 1 by the user to delete %MW area in internal Flash memory. ● %SW96.7 = 1 indicates that internal memory has valid %MW backup. %SW96.8 to %SW96.15 are 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.		

Word **Symbol**				
%SW97 CARDSTS	Function	Card status		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	Can be read by the user program or by the terminal. Indicates the status of the card. %SW97: ● 0000 = no error. ● 0001 = application backup or file write sent to a write-protected card. ● 0002 = card not recognized, or application backup damaged. ● 0003 = backup of the application requested, but no card available. ● 0004 = card access error, for example after a card has been removed not properly. ● 0005 = no file system present in the card, or file system not compatible. Use %SW93.0 to erase the card.			
%SW98	Function	CRP/CRA support of CCOTF (Configuration Change On The Fly) low status register		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	This words contains a bit string indicating at 1 that the corresponding CRP/CRA supports the CCOTF. The bit assignment is the following: ● %SW98.0 at 0, CRP doesn't support CCOTF, at 1 CRP supports CCOTF. ● %SW98.1 to %SW98.15: ❍ = 0, the drops 2 to 16 doesn't support CCOTF. ❍ = 1, the drops 2 to 16 support CCOTF. **NOTE:** Take care the Drop is powered, otherwise the CRA's bit is always equal to 0.			
%SW99	Function	CRA support of CCOTF (Configuration Change On The Fly) high status register		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	NOTE: This system word is also used for Premium module but has a different function (see below). This words contains a bit string indicating at 1 that the corresponding CRA supports the CCOTF. The bit assignment is the following: ● %SW99.0 to %SW99.15: ❍ = 0, the drops 17 to 32 doesn't support CCOTF. ❍ = 1, the drops 17 to 32 support CCOTF. **NOTE:** Take care the Drop is powered, otherwise the CRA's bit is always equal to 0.			

Word **Symbol**				
%SW99 INPUTADR/ SWAP	Function	Communication redundancy management		
	Initial State	0		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	NOTE: This system word is used for Quantum module but has a different function (see above). Word used to manage the redundancy of network modules. When a problem is detected on a communication module used to access a network number x (X-WAY), it is possible to 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 %SW117

Introduction

NOTE: For M580, system words %SW110 to %SW117 *(see page 87)* have a specific meaning.

Detailed Description

Description of system words %SW100 to %SW117:

Word **Symbol**				
%SW100 CCOTF_COUNT	Function	CCOTF counting status register		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	Meaning of the different bits of the word %SW100:XXYY ● For Quantum platforms: ❍ 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 M580 platforms: ❍ 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.		

Word Symbol				
%SW101 EIO_CCOTF_COUNT	Function	EIO CCOTF counting status register		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** No
	Meaning of the bytes of the word %SW101:XXYY ● For Quantum platforms: ❍ XX Reserved. ❍ YY increments each time an Ethernet I/O configuration changes. It is not changed on other types of application modifications ● For M580 platforms: ❍ XX Reserved. ❍ YY increments each time an Ethernet I/O configuration changes. **NOTE:** YY increments twice each time a change is performed on a redundant 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.			
%SW102	Function	Counter for the stored Quantum forced bits.		
	Initial State	0		
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** No **Atrium:** 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 can not be retrieved even if bits are unforced afterwards.			
%SW108 FORCEDIOIM	Function	Forced bit counting status register		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	Word %SW108: ● increments each time a discrete bit (%I,%Q, %M or DDDT) is forced. ● decrements each time a discrete bit is unforced.			

Word Symbol				
%SW109 FORCEDANA	Function	Forced analog channel counting status register		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Word %SW109: ● increment each time an analog channel is forced. ● decrement each time an analog channel is unforced. **NOTE:** For Quantum platform, limited to analog channels of Modicon M340 Analog Modules in remote I/O drops.			
%SW116 REMIOERR	Function	Fipio I/O error		
	Initial State	–		
	Platforms	**M340:** No **M580:** No **M580 Safety:** No	**Quantum:** No **Momentum:** No	**Premium:** Yes **Atrium:** Yes
	Normally set to 0, each bit for this word signifies the Fipio exchange status of the exchange in which it is being tested. This word is to be reset to 0 by the user. 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 fault (at least one device channel is indicating a fault). ● %SW116.8 = 1 to %SW116.15 = reserved on 0.			
%SW117	Function	The system word %SW117 contains the Quantum RIO status provided by the PLCSTAT DFB		
	Initial State	–		

Word Symbol				
	Platforms	**M340:** No **M580:** Yes **M580 Safety:** No	**Quantum:** No **Momentum:** No	**Premium:** No **Atrium:** No
	RIO_ERR_INIT_FAILED		0x0010	
	RIO_ERR_CRP_HOTSWAP		0x0020	
	RIO_ERR_DIAG_FAILED		0x0030	
	RIO_ERR_BAD_STATE		0x0040	
	RIO_ERR_WRONG_VERS		0x0050	
	RIO_ERR_BAD_TCOP		0x0060	
	RIO_ERR_CRP_COM_ERROR		0x0070	
	RIO_ERR_CRP_MODE		0x0080	
	RIO_ERR_CRP_TIMEOUT		0x0090	

M580 Specific Function

Description of system words %SW110 to %SW117 for M580:

Word Symbol		
%SW110 **%SW111** **%SW112** **%SW113** **%SW114** **%SW115** **%SW116**	Function	M580 CPU load
	Initial State	0
	• %SW110 is the CPU load used by the system for internal service. • %SW111 is the CPU load used by the MAST task. • %SW112 is the CPU load used by the FAST task. • %SW113 is the CPU load used by the SAFE task. • %SW114 is the CPU load used by the AUX0 task. • %SW115 is the CPU load used by the AUX1 task. • %SW116 is the total CPU load (sum of %SW110 to %SW115).	
%SW117	Function	Quantum RIO status provided by the PLCSTAT DFB

Description of System Words %SW124 to %SW127

Detailed Description

Description of system words %SW124 to %SW127:

Word **Symbol**				
%SW124 CPUERR	Function	Type of processor or system error		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	NOTE: Only used for support. The last type of system fault encountered is written into this word by the system (these codes are unchanged on a cold restart).			
%SW125 BLKERRTYPE	Function	Last fault detected		
	Initial State	–		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	The code of the last fault detected is given in this word. The following error codes cause the PLC to stop if %S78 is set to 1. %S15, %S18 and %S20 are always activated independently of %S78: ● 16#2258: execution of HALT instruction ● 16#DE87: calculation error on floating-point numbers (%S18, these errors are listed in the word %SW17) ● 16#DEB0: Watchdog overflow (%S11) ● 16#DEF0: division by 0 (%S18) ● 16#DEF1: character string transfer error (%S15) ● 16#DEF2: arithmetic error (%S18) ● 16#DEF3: index overflow (%S20) **NOTE:** The following codes 16#8xF4, 16#9xF4, and 16#DEF7 indicate an error on Sequence Function Chart (SFC). **NOTE:** The codes listed above is a non-exhaustive list.			

Word **Symbol**				
%SW126 ERRADDR0 **%SW127** ERRADDR1	Function	Blocking error instruction address		
	Initial State	0		
	Platforms	**M340:** Yes **M580:** Yes **M580 Safety:** Yes	**Quantum:** Yes **Momentum:** Yes	**Premium:** Yes **Atrium:** Yes
	NOTE: Only used for support. Address of the instruction that generated the application blocking error. For 16 bit processors, TSX P57 1••/2••: ● %SW126 contains the offset for this address. ● %SW127 contains the segment number for this address. For 32 bit processors: ● %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.			

Section 2.2
Premium/Atrium-specific System Words

Subject of this Section

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

⚠ WARNING

UNEXPECTED APPLICATION BEHAVIOR

Do not use system objects (%Si, %SWi) as variable when they are not documented.

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

What Is in This Section?

This section contains the following topics:

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	Faulty Fipio connection point
	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 a fault on this connection point. For a non-configured connection point, the corresponding bit is always 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

⚠ CAUTION

UNINTENDED SYSTEM BEHAVIOR

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

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

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 by the user, 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 BA must be stopped then restarted.	

Word **Symbol**		
%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: ● 16#00: the function does not exist (no Fipio application). ● 16#70: the function has been initialized but is not operational (in STOP). ● 16#F0: the function is currently being executed normally (in RUN).	

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 resent
	Initial State	0
	This word indicates the number of messages resent 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 faults
	Initial State	0
	Each bit is set to 1 by the system, and reset to 0 by the user. 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. receiving MAC.
- 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 a fault which occurs when the transmitter is currently 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 a fault whereby the transmitter is controlling the line for longer than the maximum set operating limit. This fault is caused, for example, by deterioration of the modulator, or by a faulty data link layer.
- bit 7 = "undercurrent fault": corresponds to a fault whereby the transmitter generates, when solicited, a current weaker than the minimum set operating limit. This fault 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 unknown 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 faults
	Initial State	0
	Each bit is set to 1 by the system and reset to 0 by the user. 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 will generate a collision fault (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 currently 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 always less than 24.	
%SW160 to %SW167 PREMRACK0 to PREMRACK7	Function	Operating status of the PLC 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 faulty, and set to 1 if the module is operating correctly. **Example:** %SW163.5 = 0 The module located in slot 5 of rack 3 is faulty.	

Section 2.3
Quantum-specific System Words

Subject of this Section

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

⚠ WARNING
UNEXPECTED APPLICATION BEHAVIOR Do not use system objects (%Si, %SWi) as variable when they are not documented. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

What Is in This Section?

This section contains the following topics:

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•• ••• PLCs:

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	

Word **Symbol**		
%SW139 BW_GLBD_IOS	Function	Global Data and IO Scanning service load
	Initial State	0
	The Least Significant Byte of this word measures the percentage of load relating to IO Scanning. The Most Significant Byte of this word measures 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 measures the percentage of load relating to messaging. The Most Significant Byte of this word measures 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.	
%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	Coprocessor version
	Initial State	0
	This word codes the coprocessor version for 140 CPU 671 60, 140 CPU 672 61, 140 CPU 672 60 and 140 CPU 678 61 PLCs. The version is displayed in hexadecimal format.	

Word **Symbol**		
%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 ● Bit 2: 0 = half duplex mode, 1 = full duplex ● Bit 3 = 0 ● 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 ● 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 all modules in the drop are operating correctly. %SW152.0: Drop No. 1. %SW152.1: Drop No. 2. ..... %SW153.14: Drop No. 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 No. 1. %SW160.1: device No. 2. ..... %SW167.15: device No. 128. **Note:** These system words are only available for Quantum coprocessors, 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 well subscribed. %SW168.0: SUB ID No. 1. %SW168.1: SUB ID No. 2. ..... %SW171.15: SUB ID No. 64.	
%SW172 and **%SW173** ERIO_CONNECT_STATUS	Function	Standalone and Hot Standby Primary 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 PLC and the Drop is not operating correctly. It is set to 1 if the connection is operating correctly. %SW172.0: Drop No. 1. %SW172.1: Drop No. 2. ..... %SW173.14: Drop No. 31. **NOTE:** In a Hot Standby system, these are for the Primary CPU.	
%SW176 and **%SW177** SDBY_ERIO_CONNECT_STATUS	Function	Hot Standby 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 No. 1. %SW176.1: Drop No. 2. ..... %SW177.14: Drop No. 31. **NOTE:** In a Hot Standby system, these are for the Standby CPU. They are not significant in a Standalone PLC.	

Description of Quantum-specific System Words %SW180 to %SW764

Detailed Description

Description of system words %SW180 to %SW764:

<table>
<tr><th colspan="3">Word
Symbol</th></tr>
<tr><td rowspan="3">%SW180 to
%SW339
IOHEALTHij
i=1...32, j=1...5</td><td>Function</td><td>Health bits of the PLC modules (Including Hot Standby CPUs)</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 PLC local racks: main rack for %SW180 and extension rack for %SW181.
Words %SW182 and %SW183 are associated with the Standby PLC: main rack for %SW182 and extension rack for %SW183.

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

NOTE: Safety Hot Standby systems don’t have extension racks so they do not use SW181 and %SW183 system words.

%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.
● %SW336: module health bits of the S908 drop 32, rack 2.
● %SW337 module health bits of the S908 drop 32, rack 3.
● %SW338 module health bits of the S908 drop 32, rack 4.
● %SW339 module health bits of the S908 drop 32, rack 5.

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.

NOTE: Extension racks are not used in Safety PLCs, only the PLCs main rack system words (%SW180, %SW185, %SW190...%SW335) are available in Safety PLCs.</td></tr>
</table>

Word Symbol		
%SW340 MB+DIOSLOT	Function	Slot number of the processor with Modbus+ link
	Initial State	–
	Slot number of the processor 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 PLCs.	
%SW341 to %SW404 MB+IOHEALTHi i=1...64	Function	Operating status of the distributed station modules of the first DIO network
	Initial State	–
	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 faulty, 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 faulty. **NOTE:** For modules 140 CRA 2•• ••• the value of this bit is not significant, and is always set to 0. **NOTE:** These words are not available on safety PLCs and Quantum Ethernet I/O DIO network.	
%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 PLCs.	

Word Symbol		
%SW406 to %SW469 NOM1DIO-HEALTHi 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 faulty, 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 faulty. **NOTE:** For modules 14 CRA 2•• ••• the value of this bit is not significant, and is always set to 0. **NOTE:** These words are not available on safety PLCs 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 PLCs.	
%SW471 to %SW534 NOM2DIO-HEALTHi 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 faulty, 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 faulty. **NOTE**: For modules 140 CRA 2•• ••• the value of this bit is not significant, and is always set to 0. **NOTE:** These words are not available on safety PLCs and Quantum Ethernet I/O DIO network.	

Word Symbol		
%SW535 RIOERRSTAT	Function	RIO error on start-up
	Initial State	–
	This word stores the start-up error code. This word is always set to 0 when the system is running; in the event of error, the PLC does not start up, 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	–
	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	

Word Symbol		
%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 = lost communications counter. ❍ %SW542.7 to %SW542.0 = retry totalizer counter. **NOTE:** If the cable A is disconnected from the Standby PLC, standby status remains active. So the Primary PLC takes into account standby PLC, 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 PLCs 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, all modules are operating correctly. ❍ %SW545.14 to %SW545.8 = unused, always set to 0. ❍ %SW545.7 to %SW545.0 = number of times the module has appeared defective; 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.	

Word **Symbol**		
%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 = lost communications counter. ❍ %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.	

Word Symbol		
%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.

Section 2.4
Modicon M340-specific System Words

Description of Modicon M340-specific System Words %SW138 to %SW163

Detailed Description

⚠ WARNING

UNEXPECTED APPLICATION BEHAVIOR

Do not use system objects (%Si, %SWi) as variables when they are not documented.

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

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:

Word **Symbol**		
%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 CPU (from CPU firmware V2.4). Configuring State RAM allows the Modbus server to access the %I area (for all input bit operations) and the %IW area (for all 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.	

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

You must set the values of the 4 system words %SW138, %SW139, %SW140 and %SW141 using the “Initial value” mechanism.

Do not use programming code to set the values.

Otherwise, when using the `PLC init` command or setting %S0 to 1 or downloading an application, the 4 system words are set to `0000` and the behavior of Modbus server is wrong.

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

Description of system words %SW142 to %SW167:

Word **Symbol**		
%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 concerns device at node address 1. ● bit 1 of %SW142 concerns device at node address 2. ● ... ● bit15 of %SW145 concerns device at node address 64. Bit values: ● If the bit is at 0 and device not present, then an error is raised. ● If the bit is at 1 and device not present, then no error is raised. **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 CPU OS.	
%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 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 CPU OS.	

Word **Symbol**		
%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 normal rack, referenced by only one %SWi.	

Section 2.5
Modicon M580-specific System Words

Content of this Section

This section describes the system words %SW132 to %SW640, that are specificly used in M580 PACs.

⚠ WARNING

UNEXPECTED APPLICATION BEHAVIOR

Do not use system objects (%Si, %SWi) as variable when they are documented.

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

What Is in This Section?

This section contains the following topics:

Description of Modicon M580-specific System Words %SW128 to %SW167

Detailed Description

Description of system words %SW128 to %SW141:

Word **Symbol**		
%SW132 to **%SW134**	Function	MAC address
	Initial State	0
	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	
%SW135 to **%SW137**	Function	Serial number
	Initial State	0
	These words contain the serial number of the M580 PLC (correspond to the S/N 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 - forder number (on 5 digit)	
%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.	

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION You must set the values of the 2 system words %SW139 and %SW141 using the “Initial value” mechanism. Do not use programming code to set the values. Otherwise, when using the `PLC init` command or setting %S0 to 1 or downloading an application, the 2 system words are set to `0000` and the behavior of Modbus server is wrong. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Description of system words %SW146 to %SW167:

Word **Symbol**		
%SW146 and **%SW147**	Function	SD card serial number
	Initial State	0
	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 protect an application against duplication.	
%SW148	Function	ECC error counter
	Initial State	0
	This word contains the number of bits in error in DDR, detected and fixed by the ECC.	
%SW150	Function	Management of Error Correcting Code (ECC)
	Initial State	0
	Used to enable/disable ECC: ● To disable ECC: write the value 16#DECC to %SW150. **NOTE:** Because ECC is enabled by default, you will need to re-write the value 16#DECC to %SW150 after a cold start, caused either by pressing the RESET button or by application logic. ● To enable ECC: write an value other than 16#DECC to %SW150, cycle power to the CPU, or press the RESET button. **NOTE:** ● The status of ECC is displayed in %S109 *(see page 36)*. ● %SW150 is valid only for M580 redundant CPUs (BMEH58xxxx) with firmware version 2.50 and higher. %SW150 has no effect on standalone CPUs. ● In a redundant CPU system, the value of %SW150 is transferred from the primary to the standby PAC.	

Word **Symbol**		
%SW151	Function	Multiple ECC error counter
	Initial State	0
	This counter is incremented each time a multiple ECC error occurs. %SW151 is valid only for M580 CPUs with firmware version 2.50 and higher. This counter cannot be reset.	
%SW160 to **%SW167** PREMRACK0 to PREMRACK7	Function	Detected errors for racks 0 to 7
	Initial State	–
	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 normal rack, referenced by only one %SWi.	
%SW171	Function	Fast task state indication
	Initial State	–
	State of the FAST task: ● 0: No FAST task exists ● 1: Stop ● 2: Run (all process tasks are in the Run state) ● 3: Breakpoint ● 4: Halt	
%SW173	Function	MAST task state indication
	Initial State	–
	State of the MAST task: ● 0: No MAST task exists ● 1: Stop ● 2: Run ● 3: Breakpoint ● 4: Halt	

Word Symbol		
%SW174	Function	AUX0 task state indication
	Initial State	–
	NOTE: Only for standalone PLC. State of the AUX0 task: ● 0: No AUX0 task exists ● 1: Stop ● 2: Run ● 3: Breakpoint ● 4: Halt	
%SW175	Function	AUX1 task state indication
	Initial State	–
	NOTE: Only for standalone PLC. State of the AUX1 task: ● 0: No AUX1 task exists ● 1: Stop ● 2: Run ● 3: Breakpoint ● 4: Halt	

Description of Modicon M580-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
	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. ● %SW336: module health bits of the S908 drop 32, rack 2. ● %SW337 module health bits of the S908 drop 32, rack 3. ● %SW338 module health bits of the S908 drop 32, rack 4. ● %SW339 module health bits of the S908 drop 32, rack 5. **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	–
	This word stores the start-up error code. This word is always set to 0 when the system is running; in the event of error, the CRP does not start up, 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	–
	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 char 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	–
	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 char length ❍ %SW541.8 to %SW541.15 and %SW541.3 are unused	

Word **Symbol**		
%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 = lost communications counter. ❍ %SW542.7 to %SW542.0 = retry totalizer counter. **NOTE:** If the cable A is disconnected from the Standby PLC, standby status remains active. So the Primary PLC takes into account standby PLC, 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.	
%SW548 to **%SW640** MODUNHEALTHi IOERRCNTi IORETRYi i=2...32	Function	S908 Drops communication status
	Initial State	–
	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 = lost communications counter. ❍ %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.	

Section 2.6
Modicon M580 Safety-specific System Words

Description of Modicon M580 Safety-specific System Words

Detailed Description

⚠ WARNING
UNEXPECTED APPLICATION BEHAVIOR Do not use system objects (%Si, %SWi) as variable when they are documented. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Description of system words:

Word **Symbol**		
%SW128	Function	Force time synchronization for Safety IO
	Initial State	-
	With CPU firmware version earlier than 3.20, force time synchronization between internal NTP time and SAFE time into the safe IO modules and SAFE CPU task: ● Value change from 16#1AE5 to 16#E51A forces synchronization. ● Other sequences and values do not force synchronization.	
%SW142	Function	Safety Copro FW version
	Initial State	-
	Contains the safety Copro firmware version in 4 digits BCD. For example, firmware version 21.42 corresponds to %SW142 = 16#2142.	
%SW152	Function	NTP CPU time status
	Initial State	-
	Status of the NTP CPU time, updated by Ethernet communication module over the X Bus backplane via the optional forced time synchronization feature: ● 0: The CPU time is not refreshed by the Ethernet communications module. ● 1: The CPU time is refreshed by the Ethernet communications module.	

Word **Symbol**		
%SW169	Function	Safety application ID
	Initial State	–
	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 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` *(see EcoStruxure™ Control Expert, Safety, Block Library)*.	
%SW172	Function	State of the SAFE task
	Initial State	–
	State of the SAFE task: ● 0: No SAFE task exists ● 1: Stop ● 2: Run ● 3: Breakpoint ● 4: Halt	

Section 2.7
Momentum-specific System Words

Description of Momentum-specific System Words %SW128 to %SW152

Detailed Description

⚠ WARNING
UNEXPECTED APPLICATION BEHAVIOR Do not use system objects (%Si, %SWi) as variable when they are not documented. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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

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, signifying the network position of the module that cannot be reached. For example, a value of 8 indicates a detected communications failure in accessing the eighth module on the network. ● %SW132.15: ❍ %SW132.15 = 0 indicates a detected general communication stoppage; 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 processors 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 processors with 2 serial ports, for example the 171 CBU 78090.	

Word Symbol		
%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 processors 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 processors 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 processors with an Ethernet port, for example the 171 CBU 98090 and 171 CBU 98091.	
%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 processors with an Ethernet port, for example the 171 CBU 98090 and 171 CBU 98091.	

Word **Symbol**		
%SW148	Function	ETH services status
	Initial State	0
	%SW148: FDR client status: ● 0 = not initialized ● 1 = IP initialized ● 2 = Reserved ● 3 = link ETH down ● 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.	

Index

Symbols

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