



## *User Guide*

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# ***MCi210***

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Part Number: 0478-0033-02  
Issue: 2



[www.controltechniques.com](http://www.controltechniques.com)

## **General Information**

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation or adjustment of the optional operating parameters of the equipment or from mismatching the variable speed drive with the motor.

The contents of this guide are believed to be correct at the time of printing. In the interests of a commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance, or the contents of the guide, without notice.

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## **Drive software version**

This product is supplied with the latest software version. If this drive is to be connected to an existing system or machine, all drive software versions should be verified to confirm the same functionality as drives of the same model already present. This may also apply to drives returned from a Control Techniques Service Centre or Repair Centre. If there is any doubt please contact the supplier of the product.

## **Environmental statement**

Control Techniques is committed to minimising the environmental impacts of its manufacturing operations and of its products throughout their life cycle. To this end, we operate an Environmental Management System (EMS) which is certified to the International Standard ISO 14001. Further information on the EMS, our Environmental Policy and other relevant information is available on request, or can be found at [www.greendrives.com](http://www.greendrives.com).

The electronic variable-speed drives manufactured by Control Techniques have the potential to save energy and (through increased machine/process efficiency) reduce raw material consumption and scrap throughout their long working lifetime. In typical applications, these positive environmental effects far outweigh the negative impacts of product manufacture and end-of-life disposal.

Nevertheless, when the products eventually reach the end of their useful life, they must not be discarded but should instead be recycled by a specialist recycler of electronic equipment. Recyclers will find the products easy to dismantle into their major component parts for efficient recycling. Many parts snap together and can be separated without the use of tools, while other parts are secured with conventional fasteners. Virtually all parts of the product are suitable for recycling.

Product packaging is of good quality and can be re-used. Large products are packed in wooden crates, while smaller products come in strong cardboard cartons which themselves have a high recycled fibre content. If not re-used, these containers can be recycled. Polythene, used on the protective film and bags for wrapping product, can be recycled in the same way. Control Techniques' packaging strategy prefers easily-recyclable materials of low environmental impact, and regular reviews identify opportunities for improvement.

When preparing to recycle or dispose of any product or packaging, please observe local legislation and best practice.

## **REACH legislation**

EC Regulation 1907/2006 on the Registration, Evaluation, Authorisation and restriction of Chemicals (REACH) requires the supplier of an article to inform the recipient if it contains more than a specified proportion of any substance which is considered by the European Chemicals Agency (ECHA) to be a Substance of Very High Concern (SVHC) and is therefore listed by them as a candidate for compulsory authorisation.

For current information on how this requirement applies in relation to specific Control Techniques products, please approach your usual contact in the first instance. Control Techniques position statement can be viewed at:

<http://www.controltechniques.com/REACH>

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# 1 Safety information

## 1.1 Warnings, Cautions and Notes



A **Warning** contains information, which is essential for avoiding a safety hazard.



A **Caution** contains information, which is necessary for avoiding a risk of damage to the product or other equipment.

### NOTE

A **Note** contains information, which helps to ensure correct operation of the product.

## 1.2 Electrical safety - general warning

The voltages used in the drive can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the drive.

Specific warnings are given at the relevant places in this User Guide.

## 1.3 System design and safety of personnel

The drive is intended as a component for professional incorporation into complete equipment or a system. If installed incorrectly, the drive may present a safety hazard.

The drive uses high voltages and currents, carries a high level of stored electrical energy, and is used to control equipment which can cause injury.

Close attention is required to the electrical installation and the system design to avoid hazards either in normal operation or in the event of equipment malfunction. System design, installation, commissioning/start-up and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and this User Guide carefully.

The STOP and SAFE TORQUE OFF functions of the drive do not isolate dangerous voltages from the output of the drive or from any external option unit. The supply must be disconnected by an approved electrical isolation device before gaining access to the electrical connections.

**With the sole exception of the SAFE TORQUE OFF function, none of the drive functions must be used to ensure safety of personnel, i.e. they must not be used for safety-related functions.**

Careful consideration must be given to the functions of the drive which might result in a hazard, either through their intended behavior or through incorrect operation due to a fault. In any application where a malfunction of the drive or its control system could lead to or allow damage, loss or injury, a risk analysis must be carried out, and where necessary, further measures taken to reduce the risk - for example, an over-speed protection device in case of failure of the speed control, or a fail-safe mechanical brake in case of loss of motor braking.

**The system designer is responsible for ensuring that the complete system is safe and designed correctly according to the relevant safety standards.**

## **1.4 Environmental limits**

Instructions regarding transport, storage, installation and use of the drive must be complied with, including the specified environmental limits. These instructions can be found in the relevant drive documentation. Drives must not be subjected to excessive physical force.

## **1.5 Access**

Drive access must be restricted to authorized personnel only. Safety regulations which apply at the place of use must be complied with.

## **1.6 Compliance with regulations**

The installer is responsible for complying with all relevant regulations, such as national wiring regulations, accident prevention regulations and electromagnetic compatibility (EMC) regulations. Particular attention must be given to the cross-sectional areas of conductors, the selection of fuses or other protection, and protective ground (earth) connections.

Instructions for achieving compliance with specific EMC standards may be found in the relevant drive documentation.

Within the European Union, all machinery in which this product is used must comply with the following directives:

2006/42/EC: Safety of machinery.

2004/108/EC: Electromagnetic Compatibility.

## **1.7 Adjusting parameters**

Some parameters have a profound effect on the operation of the drive. They must not be altered without careful consideration of the impact on the controlled system. Measures must be taken to prevent unwanted changes due to error or tampering.

## **1.8 Stored charge**

The drive contains capacitors which remain charged to a potentially lethal voltage after the AC supply has been disconnected. If the drive has been energized, the AC supply must be isolated for at least ten minutes before work may continue.

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## 2 Introduction

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### 2.1 MCi210 module

The MCi210 is a CoDeSys-based user-programmable option module for Unidrive M. It is an intelligent module that expands on the functionality of the Unidrive M by offering the following features:

- CoDeSys based user programming
- Digital I/O
- Timer Unit
- Onboard Ethernet (2 ports)
- File system

### 2.2 User programming

The MCi210 module is capable of running a CoDeSys program created by a user with the Machine Control Studio (MC Studio) software. It is an integrated development environment that supports all five of the programming languages of the IEC 61131-3 standard, including Structured Text (ST), Ladder Diagram (LD), Function Block Diagram (FBD), Sequential Function Chart (SFC) and Instruction List (IL). Continuous Function Chart (CFC) is also supported.

The user has a number of tasks available to them. These are documented below.

- Initial
- Freewheeling
- Clock0
- Clock1
- Clock2
- Clock3
- Position
- Event0
- Event1
- Event2
- Event3
- ErrorTask

The Freewheeling, Clock $n$  and Position tasks are cyclic tasks. The Clock $n$  and Position tasks will run at an interval set by the user in MC Studio. The Freewheeling task is the lowest priority task and will run when processor resource allows.

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## 2.3 Option module identification

Figure 2-1 MCI210 module



The MCI210 module can be identified by:

1. The label located on the topside of the option module.
2. The color coding across the front of the option module and the connector types.

MCI210: Moss green with two 8P8C (RJ45) connectors and a 6-way pluggable connector.

Figure 2-2 MCI210 label



1: Topside module label

2: Underside module label

## 2.4 Conventions used in this guide

The configuration of the host drive and System Integration option module is performed using menus and parameters. A menu is a logical collection of parameters that have similar functionality.

The MCI210 module contains a number of menus that are grouped by the slot number that the module is installed into.

The method used to determine the menu or parameter is as follows:

- Pr **S.mm.ppp** - signifies a module parameter, where S is the slot number that the module is installed in, mm is the module menu number and ppp is the parameter within that menu.
- Pr **mm.000** - signifies any drive menu and parameter number 00.

## 3 Mechanical installation

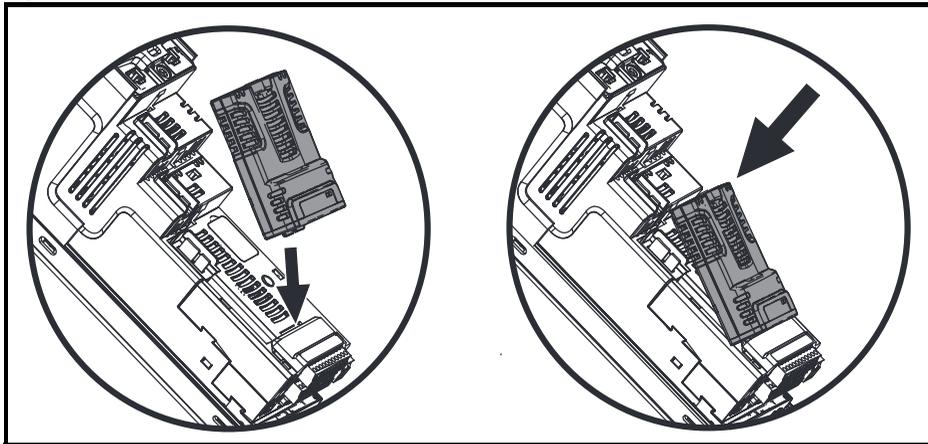


Before installing or removing an option module from any drive, ensure the AC supply has been disconnected for at least 10 minutes and refer to *Chapter 1 Safety information* on page 5. If using a DC bus supply ensure this is fully discharged before working on any drive or option module.

### 3.1 General Installation

The installation of an option module is illustrated in Figure 3-1.

**Figure 3-1 Option module installation**



#### 3.1.1 Installing the first option module

Option module slots must be used in the following order: slot 3, slot 2 and slot 1.

- Align the option module above the drive as shown
- Insert the option module tab into the slot on the drive
- Press down on the option module until it clicks into place

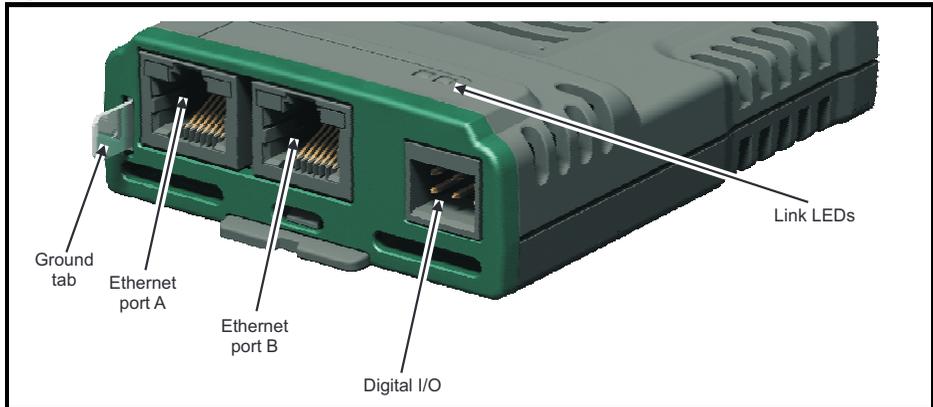
## 4 Electrical installation

### 4.1 MCi210 module information

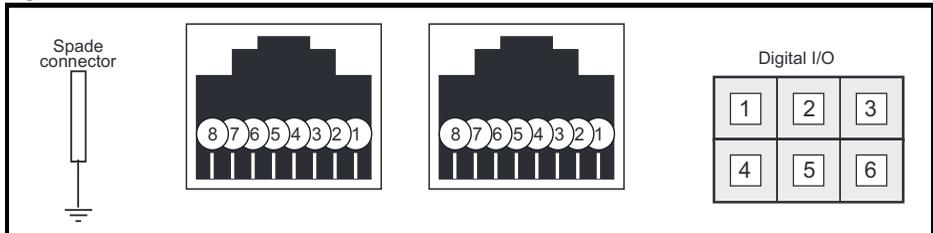
The MCi210 module provides two standard 8P8C (RJ45) UTP/STP (Un-shielded / Shielded Twisted Pair) connections to a 100 Mbps Ethernet network using an inbuilt switch. A grounding tab is provided for supplementary bonding of the 8P8C connectors. A link/activity indicator is provided for each of the Ethernet ports. The indicators are located on the top surface of the module.

The MCi210 module also provides a 6-way pluggable connector for digital inputs and outputs.

**Figure 4-1 MCi210**



**Figure 4-2 MCi210 Connections**



**Table 4-3 8P8C (RJ45) Ethernet port connector pin out**

Terminal	Description
1	Transmit +
2	Transmit -
3	Receive +
4	N/A
5	N/A
6	Receive -
7	N/A
8	N/A

**Table 4-4 6-way digital I/O pluggable connector pin out**

Terminal	Description
1	Digital input 1
2	Digital input 2
3	Digital input 3
4	Digital I/O 4
5	Digital output 5
6	0 V common

## 4.2 Ethernet

### 4.2.1 Isolation

The shells of the 8P8C (RJ45) Ethernet ports are isolated from 0V of the module and the drive.

The ground tab on the MCI210 module is not required for electrical safety and is available only to increase immunity from electrical noise.

### 4.2.2 Cabling

Standard UTP (unshielded twisted pair) or STP (shielded twisted pair) cables are supported. It is recommended that a minimum specification CAT5e is used in new installations.

The Ethernet interface on the module supports the 'Auto cross-over detection', therefore a cross-over cable is not required when connecting the Ethernet port on the module directly to the Ethernet port of a PC.

### 4.2.3 Link / activity indicators

Each Ethernet port has a corresponding link / activity indicator on the topside of the module as shown in Figure 4-1. Table 4-5 below details the different statuses of the indicators.

**Table 4-5 Ethernet link / activity indicator status**

Indicator status	Description
Off	Ethernet connection not detected
Solid green	Ethernet connection detected but no data
Flashing green	Ethernet connection detected and data flow

## 4.3 Digital I/O



The digital I/O circuits are isolated from the power circuits in the drive by basic insulation (single insulation) only. The installer must ensure that the external control circuits are insulated from human contact by at least one layer of insulation (supplementary insulation) rated for use at the AC supply voltage.



If the digital inputs or outputs are to be connected to other circuits classified as Safety Extra Low Voltage (SELV) (e.g. to a personal computer), an additional isolating barrier must be included in order to maintain the SELV classification.

The MCi210 is equipped with 3 digital inputs, 1 selectable digital input or output and 1 digital output. These inputs and outputs can be read to or controlled by the user program in the module.

The digital outputs are a positive logic arrangement with high side drivers only, such that they are at +24 V when active and can supply a total maximum 20 mA of current shared between the two outputs. When inactive they are effectively floating. The digital outputs are protected against short-circuit or overload. The trip threshold is 20 mA, and if tripped both outputs will be deactivated and the drive will show a "Slotx Error - Output overload" trip (where x indicates the slot number that module is installed in).

The digital I/O are controlled using menu 4 in the module. Refer to section 5.9 *Menu 4 - Digital I/O* on page 35 for more information.

### 4.3.1 Digital I/O specifications

<b>1</b>	<b>Digital Input 1</b>
<b>2</b>	<b>Digital Input 2</b>
<b>3</b>	<b>Digital Input 3</b>
<b>4</b>	<b>Digital I/O 4 (when configured as an input)</b>
Type	Positive logic IEC 61131-2
Maximum input voltage	±30 V
Switching threshold	9.5 V ±0.3 V
Load	>2 mA at 15 V

<b>4</b>	<b>Digital I/O 4 (when configured as an output)</b>
<b>5</b>	<b>Digital output 5</b>
Type	Positive logic
Output voltage	0 V to 24 V
Maximum output current	20 mA (from one output only or shared between both outputs)

<b>6</b>	<b>0 V common</b>
Common to the 0 V of the host drive	

# 5 Parameters

## 5.1 Overview

The MCI210 module holds two parameter databases; the MCI210 database and the database for the drive to which the module is installed.

The MCI210 database parameters can be accessed from the drive's keypad, a user program in the MCI210, PC Tools or a module in another slot of the drive. The notation S.mm.ppp is used to access these parameters where S is the slot number, mm is the menu number and ppp is the parameter number. For example, to access Pr **03.010** of an MCI210 installed in slot 2 of a drive from a module in slot 3 it will be accessed using Pr **2.3.010**.

The MCI210 module will also hold a copy of the host drive's database. At power up, if the database held in the MCI210 is different to that of the drive, the MCI210 will upload the drive's database and overwrite the stored database. If the two databases match the drive's database will not be uploaded.

A module that is powered up for the first time will not contain a drive database and therefore will always perform a drive database upload.

## 5.2 Menus

Table 5-1 below details each of the module's internal menus.

**Table 5-1 MCI210 Internal Menu descriptions**

Menu	Name	Description
<b>S.0</b>	MCI210 module information	Provides module information such as firmware version and serial number
<b>S.1</b>	User application	Allows the user program to be controlled and monitored
<b>S.2</b>	Ethernet configuration	Allows the Ethernet interface to be configured
<b>S.3</b>	Timer	Allows the timer unit to be controlled
<b>S.4</b>	Digital I/O	Allow the digital I/O to be controlled or monitored
<b>S.9</b>	Resources	Provides information regarding the resources of the Ethernet interface and module temperature
<b>S.10</b>	Easy mode cyclic data	Allows Ethernet cyclic data links to be configured
<b>S.11</b>	Synchronization	Allows the Ethernet based synchronization to be set-up and monitored
<b>S.15</b>	Modbus	Allow the Modbus protocol supported by the Ethernet interface to be set-up

Where S is the slot number that the module is installed in.

The module's menu 0 is also displayed in menu 15, 16 or 17 on the drive depending on which slot the module is installed in. MC Studio can be used to set up a custom or application menu for the module and if set up, the custom menu will be displayed in menu 25, 26 or 27 depending on which slot the module is installed in. Table 5-2 below shows the location of module's menu 0 and custom menu on the drive.

**Table 5-2 Module's menu 0 and custom menu locations on the drive**

Slot number	Module's Menu 0 location	Custom / Application menu location
1	15	25
2	16	26
3	17	27

### 5.3 Parameter save and restore

Any user-save parameters in the option module's internal menus are stored in non-volatile memory on the module and not in the drive. Therefore, if the module is moved to a different slot or to a different drive then any saved parameter values will follow the module. If a module is to be replaced, ensure that the parameter values for the module have been backed up before replacing it.

### 5.4 Remanent variables

The module supports both Retain and Persistent variables. Both of these types of variable allow values to be retained after a power-cycle or module reset, however there is a difference between Retain and Persistent variables.

The following table indicates the behaviour of all variable types:

Command	VAR	VAR RETAIN	VAR PERSISTENT
			VAR RETAIN PERSISTENT VAR PERSISTENT RETAIN
Reset warm	-	X	X
Reset cold	-	-	X
Reset origin	-	-	-
Online change	X	X	X
Reboot module	-	X	X

**Key:**

- X = Value is maintained
- = Value is initialized

RETAIN variables are declared in MC Studio as shown below:

```
VAR RETAIN
    iRem1 : INT; (* 1. Retain variable*)
END_VAR
```

PERSISTENT variables are declared in MC Studio as shown below:

```
VAR_GLOBAL PERSISTENT RETAIN
    iVarPers1 : DINT; (* 1. Persistent+Retain Variable Appl *)
    bVarPers : BOOL; (* 2. Persistent+Retain Variable Appl *)
END_VAR
```

### 5.4.1 Reset warm

A reset warm is performed from the MC Studio software and will reset only standard variables to their initialisation values.

### 5.4.2 Reset cold

A reset cold can be performed from the drive's keypad or MC Studio and will reset RETAIN and standard variables to their initialisation values.

### 5.4.3 Reset origin

This reset will reset all (including RETAIN and PERSISTENT) variables to their initialisation values and will erase the application on the module. This can only be performed from MC Studio.

## 5.5 Menu 0 - MCI210 Module information

Parameter		Range	Default	Type					
S.00.001	Module ID	0 to 65535		RO	Num	ND	NC	PT	
S.00.002	Software Version	00.00.00.00 to 99.99.99.99		RO	Num	ND	NC	PT	
S.00.003	Hardware Version	0.00 to 99.99		RO	Num	ND	NC	PT	
S.00.004	Serial Number LS	0 to 99999999		RO	Num	ND	NC	PT	
S.00.005	Serial Number MS	0 to 99999999		RO	Num	ND	NC	PT	
S.00.006	Module Status	Bootldr-Update (-2), Bootldr-Idle (-1), Initializing (0), OK (1), Config (2), Error (3)		RO	Txt	ND	NC	PT	
S.00.007	Reset Module	Off (0) or On (1)	Off (0)	RW	Bit		NC		
S.00.008	Default Module	Off (0) or On (1)	Off (0)	RW	Bit		NC		
S.00.009	Active Alarm Bits	0 to 1111111111111111		RO	Bin		NC		
S.00.010	Active IP Address	128.000.000.000 to 127.255.255.255		RO	IP		NC		
S.00.030	Slot Number Indicator	0 to 8		RO	Num	ND	NC	PT	
S.00.031	Slot Menu Number	0 to 255		RO	Num	ND	NC	PT	

RW	Read / Write	RO	Read only	Num	Number parameter	Bit	Bit parameter	Txt	Text string	Bin	Binary parameter	FI	Filtered
ND	No default value	NC	Not copied	PT	Protected parameter	RA	Rating dependent	US	User save	PS	Power-down save	DE	Destination
IP	IP address	Mac	Mac address										

S.00.001	Module ID		
Minimum	0	Maximum	65535
Default	310	Units	
Type	16 Bit Volatile	Update Rate	Power-up write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT, BU		

This parameter shows the Module ID. This is 310 for the MCI210 module.

<b>S.00.002</b>		<b>Software Version</b>	
Minimum	0 (Display: 00.00.00.00)	Maximum	999999 (Display: 99.99.99.99)
Default		Units	
Type	32 Bit Volatile	Update Rate	Power-up write
Display Format	Version Number	Decimal Places	0
Coding	RO, ND, NC, PT		

This parameter shows the Module firmware version in ww.xx.yy.zz format

<b>S.00.003</b>		<b>Hardware Version</b>	
Minimum	0.00	Maximum	99.99
Default		Units	
Type	16 Bit Volatile	Update Rate	Power-up write
Display Format	None	Decimal Places	2
Coding	RO, ND, NC, PT		

This parameter shows the hardware version of the module.

<b>S.00.004</b>		<b>Serial Number LS</b>	
Minimum	0	Maximum	99999999
Default		Units	
Type	32 Bit Volatile	Update Rate	Power-up write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT		

<b>S.00.005</b>		<b>Serial Number MS</b>	
Minimum	0	Maximum	99999999
Default		Units	
Type	32 Bit Volatile	Update Rate	Power-up write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT		

The module serial number is available as a pair of 32 bit values where *Serial Number LS* (**S.00.004**) provides the least significant 8 decimal digits and *Serial Number MS* (**S.00.005**) provides the most significant 8 decimal digits. The reconstructed serial number is  $((\mathbf{S.00.005} \times 100000000) + \mathbf{S.00.004})$ . For example serial number "0001234567898765" would be stored as **S.00.005** = 12345, **S.00.004** = 67898765.

<b>S.00.006</b>		<b>Module Status</b>	
Minimum	-2	Maximum	3
Default		Units	
Type	8 Bit Volatile	Update Rate	Background
Display Format	None	Decimal Places	0
Coding	RO, Txt, ND, NC, PT		

<b>Value</b>	<b>Text</b>	<b>Description</b>
-2	Bootldr - Update	The bootloader is performing a flash update.
-1	Bootldr - Idle	The bootloader is idle.
0	Initializing	The module is initializing
1	OK	Module is initialized with no errors present
2	Config	A configuration error has been detected
3	Error	An error has occurred preventing the module from running correctly

This parameter shows the status of the module.

<b>S.00.007</b>		<b>Reset Module</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit Volatile	Update Rate	Read every 200 ms
Display Format	None	Decimal Places	0
Coding	RW, NC		

When set the module performs a warm reset. When the reset has been performed and the module is performing its initialization routines the parameter will be cleared to zero.

**NOTE** The drive, and any other modules installed to the drive will not be affected by the reset.

<b>S.00.008</b>		<b>Default Module</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit Volatile	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, NC		

To default the module set this parameter to On (1) and perform a module reset. Once complete, this parameter will return to Off (0). Defaulting the module will cause it to return to its "Out of Box configuration" and any settings stored on the module will be returned to their default values. This will include any web page customizations, e-mail settings, etc.

Take care using this parameter as any configuration information will be irretrievably lost.

**NOTE** The password for the 'root' account is not reset back to default.

<b>S.00.009</b>		<b>Active Alarm Bits</b>	
Minimum	0 (Display: 0)	Maximum	65535 (Display:1111111111111111)
Default		Units	
Type	16 Bit Volatile	Update Rate	Background
Display Format	Binary	Decimal Places	0
Coding	RO, NC, BU		

<b>Bit</b>	<b>Alarm</b>
0	User Program
1	eCMP
2	Modbus
3	Ethernet/IP
4	Reserved
5	File System
6	Module Too Hot

This parameter displays the currently active alarms. Each bit represents an alarm as detailed in the table above.

<b>S.00.010</b>		<b>Active IP Address</b>	
Minimum	-2147483648 (Display: 128.0.0.0)	Maximum	2147483647 (Display: 127.255.255.255)
Default		Units	
Type	32 Bit Volatile	Update Rate	Background
Display Format	IP Address	Decimal Places	0
Coding	RO, NC, PT		

This parameter shows the active IP Address of the module.

<b>S.00.030</b>		<b>Slot Number Indicator</b>	
Minimum	0	Maximum	8
Default		Units	
Type	8 Bit Volatile	Update Rate	Written on power-up
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT, BU		

This parameter shows the slot number that the module is installed in.

S.00.031		Slot Menu Number	
Minimum	0	Maximum	255
Default		Units	
Type	8 Bit Volatile	Update Rate	Written on power-up
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT, BU		

This parameter shows the drive menu number associated with the slot that the module is installed in.

For example:

- If the module is installed in slot 1, this parameter will show 15.
- If the module is installed in slot 2, this parameter will show 16.
- If the module is installed in slot 3, this parameter will show 17.

## 5.6 Menu 1 - User Application

Parameter		Range	Default	Type					
S.01.001	Selected UCI Number	0 to 9	0	RW	Num	ND	NC	PT	
S.01.002	Active UCI Number	0 to 9		RO	Num	ND	NC	PT	
S.01.003	User Program Status	None (0), Stopped (1), Run (2), Error (3)		RO	Txt			PT	
S.01.004	Available CPU Resources	0 to 100 %		RO	Num	ND		PT	
S.01.013	Auto-run Enable	Off (0), or On (1)	On (1)	RW	Bit				US
S.01.014	Global Run-time Trip Enable	Off (0), or On (1)	Off (0)	RW	Bit				US
S.01.015	Disable Reset on trip Clear	Off (0), or On (1)	Off (0)	RW	Bit				US
S.01.017	Enable Out of Range Error	Off (0), or On (1)	Off (0)	RW	Bit				US
S.01.019	Save Retain Data Request	Off (0), or On (1)	Off (0)	RW	Bit		NC		
S.01.020	Power Down Retain Data Save	Disabled (0), UV (1), UV (no 24V) (2)	Disabled (0)	RW	Txt				US
S.01.021	Under Voltage State User Program Behaviour	P-S-R (0), S-S-CR-RU (1), S-S (2)	S-S-CR-RU (1)	RW	Txt				US
S.01.025	Reserved	0 to 2147483647	0	RW					
S.01.049	Run time error code	0 to 8448		RO	Num	ND		PT	
S.01.050	Run time error task ID	USER_TASK_INIT (0), USER_TASK_EVENT0 (1), USER_TASK_EVENT1 (2), USER_TASK_EVENT2 (3), USER_TASK_EVENT3 (4), USER_TASK_POS (5), USER_TASK_CLOCK0 (6), USER_TASK_CLOCK1 (7), USER_TASK_CLOCK2 (8), USER_TASK_CLOCK3 (9), USER_TASK_FWHEEL (10), TASK_UNKNOWN (11)		RO	Txt	ND		PT	

RW	Read / Write	RO	Read only	Num	Number parameter	Bit	Bit parameter	Txt	Text string	Bin	Binary parameter	FI	Filtered
ND	No default value	NC	Not copied	PT	Protected parameter	RA	Rating dependent	US	User save	PS	Power-down save	DE	Destination
IP	IP address	Mac	Mac address	SMP	Slot menu parameter								

<b>S.01.001</b>		<b>Selected UCI number</b>	
Minimum	0	Maximum	9
Default	0	Units	
Type	8 Bit Volatile	Update Rate	Read during initialization
Display Format	None	Decimal Places	0
Coding	RW, ND, NC, PT, BU		

This parameter specifies which User Customizable Image folder is currently selected and therefore which user program is launched when the module is initialized. The currently selected folder is used for any PC Tool downloads and may not be the same as the Active UCI Number.

This allows for multiple user programs / customizations to be stored in the option module. If the selected UCI has been changed the module must be reset for the new application to become active.

Please note the difference between the Selected UCI and the Active UCI (*Active UCI number (S.01.002)*). The Selected UCI is the image that the user wishes to be active after a module reset, the Active UCI displays the UCI image currently active.

<b>S.01.002</b>		<b>Active UCI number</b>	
Minimum	0	Maximum	9
Default		Units	
Type	8 Bit Volatile	Update Rate	Background write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT, BU		

This parameter indicates the currently active UCI. All user program control and state parameters and command relate to the Active UCI except for user program download via eCMP. This allows for downloading to one UCI folder while running from another.

Note the difference between the Selected UCI (*Selected UCI number (S.01.001)*) and the Active UCI. The Selected UCI is the image that the user wishes to be active after a module reset, the Active UCI displays the UCI image currently active.

<b>S.01.003</b>		<b>User Program Status</b>	
Minimum	0	Maximum	3
Default		Units	
Type	8 Bit Volatile	Update Rate	Background write
Display Format	None	Decimal Places	0
Coding	RO, Txt, ND, PT, BU		

This parameter indicates the status of a user program, if it is present. If no user program is present in the module then it will also indicate this.

If the status indicates a run-time error (3, Error) the user's Error task may be running otherwise the user program will have stopped.

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	None	No user program is present
1	Stopped	The user program is not running
2	Run	The user program is running
3	Error	Run-time error

If the module contains a user program this parameter displays its status otherwise it displays 0 (no program present).

<b>S.01.004</b>		<b>Available CPU Resources</b>	
Minimum	0	Maximum	100
Default		Units	%
Type	8 Bit Volatile	Update Rate	Written every 1 s
Display Format	None	Decimal Places	0
Coding	RO, ND, PT, BU		

This parameter is updated once per second and shows the average resource free (amount of CPU resources available for the user non-cyclic tasks) during that period. This parameter is not calculated synchronously with the cyclic task(s).

Cyclic tasks, with the exception of the freewheeling task, have a higher priority and will normally have a duration of less than one second so this parameter will give an indication of the average system free resource, but if cyclic tasks execute for more than one second without being rescheduled this parameter may show 0 % resource free, as during the most recent sample period the cyclic tasks took all of the system resource. This is normal.

This parameter is calculated only when the user program is running. When the user program is not running the parameter is set to 100 %.

<b>S.01.013</b>		<b>Auto-run enable</b>	
Minimum	0	Maximum	1
Default	1	Units	
Type	1 Bit User Save	Update Rate	Read during initialization
Display Format	None	Decimal Places	0
Coding	RW, NR, BU		

When set to 1 (On) the user program will start automatically on a module reset or at power up.

<b>S.01.014</b>		<b>Global run-time trip enable</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit User Save	Update Rate	Read during initialization
Display Format	None	Decimal Places	0
Coding	RW		

When set to 1 (On) the module may cause the drive to trip when a run-time error occurs.

<b>S.01.015</b>		<b><i>Disable reset on trip clear</i></b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit User Save	Update Rate	Background read
Display Format	None	Decimal Places	0
Coding	RW		

When this parameter is 0 the module will reset when a drive trip is cleared. When the parameter is set to On, the module will continue running (i.e. not reset) when a drive trip is cleared.

<b>S.01.017</b>		<b><i>Enable out of range error</i></b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	16 Bit Volatile	Update Rate	Background read
Display Format	None	Decimal Places	0
Coding	RW		

When this parameter is 0, and an out of range value is written to a parameter, then the value will be automatically limited to that parameter's maximum or minimum value.

When this parameter is 1, and an out of range value is written to a parameter, then a run-time error (code 44) will occur.

<b>S.01.019</b>		<b><i>Save retain data request</i></b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit Volatile	Update Rate	Read every 200 ms
Display Format	None	Decimal Places	0
Coding	RW, NC		

When set the module will save any retain data that the user has defined, up to a maximum of 2 kB. When the save is complete, the parameter will be cleared to zero. The save will be processed as a background task and will not affect any scheduled user tasks.

<b>S.01.020</b>		<b><i>Power down retain data save</i></b>	
Minimum	0	Maximum	2
Default	1	Units	
Type	8 Bit User Save	Update Rate	When Under Voltage is detected
Display Format	None	Decimal Places	0
Coding	RW, Txt, NC		

The parameter allows the user to define the action on the retain data when the drive enters under voltage state.

When set to 0 no action will be taken and the retain data will not be saved.

When set to 1 the retain data will be automatically saved when the drive enters the under voltage state.

When set to 2 the retain data will be automatically saved when the drive enters the under voltage state, but only if no 24 V backup supply is detected.

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	Disabled	Retain data not automatically saved
1	UV	Retain data automatically saved on under voltage
2	UV (no 24V)	Retain data saved on under voltage AND no 24 V backup supply detected

<b>S.01.021</b>		<b>Under voltage state user program behaviour</b>	
Minimum	0	Maximum	2
Default	1	Units	
Type	8 Bit User Save	Update Rate	Read when an Under Voltage is detected and <b>S.01.020</b> is set to a non-zero value
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	P-S-R	Pause-Save Data- Resume (User Program may trip due task overrun)
1	S-S-CR-RU	Stop-Save-ColdReset-RUn
2	S-S	Stop-Save

This parameter defines the user program behaviour when the module detects an Under Voltage (UV) state.

The action of save resistant / persistent data depends on parameter **S.01.020**.

<b>S.01.049</b>		<b>Run time error code</b>	
Minimum	0	Maximum	8448
Default	0	Units	
Type	16 Bit Volatile	Update Rate	Written every second
Display Format	None	Decimal Places	0
Coding	RO, ND, PT, BU		

This parameter displays the code for the currently active run-time error.

<b>S.01.050</b>		<b>Run time error task ID</b>	
Minimum	0	Maximum	11
Default	0	Units	
Type	8 Bit Volatile	Update Rate	Written every second
Display Format	None	Decimal Places	0
Coding	RO, Txt, ND, PT, BU		

<b>Value</b>	<b>Text</b>
0	USER_TASK_INIT
1	USER_TASK_EVENT0
2	USER_TASK_EVENT1
3	USER_TASK_EVENT2
4	USER_TASK_EVENT3
5	USER_TASK_POS
6	USER_TASK_CLOCK0
7	USER_TASK_CLOCK1
8	USER_TASK_CLOCK2
9	USER_TASK_CLOCK3
10	USER_TASK_FWHEEL
11	TASK_UNKNOWN

This parameter displays the task in error for the currently active run-time error.

## 5.7 Menu 2 - Ethernet configuration

Parameter		Range	Default	Type					
S.02.003	Network Status	Initializing (0), Links Down (1), DHCP In Progress (2), No Address (3), Ready (4), Active (5)		RO	Txt	ND	NC	PT	
S.02.004	Network Message Count	0 to 65535		RO	Num	ND	NC	PT	
S.02.005	DHCP Enable	Off (0) or On (1)	On (1)	RW	Bit				US
S.02.006	IP Address	000.000.000.000 to 255.255.255.255	192.168.001.100	RW	IP				US
S.02.007	Subnet Mask	000.000.000.000 to 255.255.255.255	255.255.255.000	RW	IP				US
S.02.008	Default Gateway	000.000.000.000 to 255.255.255.255	192.168.1.254	RW	IP				US
S.02.009	Primary DNS	000.000.000.000 to 255.255.255.255	000.000.000.000	RW	IP				US
S.02.010	Secondary DNS	000.000.000.000 to 255.255.255.255	000.000.000.000	RW	IP				US
S.02.011	MAC Address	00:00:00:00:00:00 to FF:FF:FF:FF:FF:FF		RO	Mac	ND	NC	PT	
S.02.020	Priority Protocol	None (0), Modbus TCP (1), Ethernet/IP (2)	0	RW	Txt				US
S.02.021	Web Server Enable	Off (0) or On (1)	On (1)	RW	Bit				US
S.02.022	Web Server Port	0 to 65535	80	RW	Num				US
S.02.023	Email Enable	Off (0) or On (1)	On (1)	RW	Bit				US
S.02.024	Ethernet MTU	158 to 1500	1500	RW	Num				US
S.02.025	Gateway Mode	Switch (0), Gateway (1), Strict Gateway (2)	Switch (0)	RW	Txt				US
S.02.030	VLAN Enable	Off (0) or On (1)	Off (0)	RW	Bit				US
S.02.031	VLAN ID	0 to 255	0	RW	Num				US

RW	Read / Write	RO	Read only	Num	Number parameter	Bit	Bit parameter	Txt	Text string	Bin	Binary parameter	FI	Filtered
ND	No default value	NC	Not copied	PT	Protected parameter	RA	Rating dependent	US	User save	PS	Power-down save	DE	Destination
IP	IP address	Mac	Mac address	SMP	Slot menu parameter								

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<b>S.02.003</b>		<b>Network Status</b>	
Minimum	0	Maximum	5
Default		Units	
Type	8 Bit Volatile	Update Rate	Written every second
Display Format	None	Decimal Places	0
Coding	RO, Txt, ND, NC, PT, BU		

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	Initializing	The network interface is being initialized
1	Links Down	No link connection has been detected on either of the Ethernet ports
2	DHCP In Progress	The module is attempting to obtain an IP Address, subnet mask, default gateway and DNS server addresses from a DHCP server
3	No Address	The module does not have an IP Address - either the user has not provided one manually or one could not be allocated via DHCP
4	Ready	The network interface has been successfully configured but no data is being received or transmitted
5	Active	The network interface is receiving or transmitting data

This parameter indicates the status of the network that the module is connected to.

<b>S.02.004</b>		<b>Network Message Count</b>	
Minimum	0	Maximum	65535
Default		Units	Messages/s
Type	16 Bit Volatile	Update Rate	Written every second
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT, BU		

The number of frames that the module is transmitting / receiving every second.

<b>S.02.005</b>		<b>DHCP Enable</b>	
Minimum	0	Maximum	1
Default	1	Units	
Type	1 Bit User Save	Update Rate	Background read
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter controls whether or not the module will attempt to use a Dynamic Host Configuration Protocol (DHCP) server to obtain an IP Address, subnet mask, default gateway and DNS servers.

When DHCP is enabled, the following parameters will become read-only immediately (no reset required):

*IP Address (S.02.006)*

*Subnet Mask (S.02.007)*

*Default Gateway (S.02.008)*

*Primary DNS (S.02.009)*

*Secondary DNS (S.02.010)*

<b>S.02.006</b>		<b>IP Address</b>	
Minimum	0 (Display: 0.0.0.0)	Maximum	4294967295 (Display: 255.255.255.255)
Default	3232235876 (Display: 192.168.1.100)	Units	
Type	32 Bit User Save	Update Rate	DHCP enabled : write on event; DHCP disabled : read on reset
Display Format	IP Address	Decimal Places	0
Coding	RW, BU		

This parameter controls and displays the IP Address of the module.

If DHCP is enabled (*DHCP Enable (S.02.005)*) this parameter becomes read-only and, until an IP Address is allocated to the module, will display 0.0.0.0.

If DHCP is disabled the module will initialize, on reset or power cycle, with the IP Address stored for the parameter.

<b>S.02.007</b>		<b>Subnet Mask</b>	
Minimum	0 (Display: 0.0.0.0)	Maximum	4294967295 (Display: 255.255.255.255)
Default	4294967040 (Display: 255.255.255.0)	Units	
Type	32 Bit User Save	Update Rate	DHCP enabled : write on event; DHCP disabled : read on reset
Display Format	IP Address	Decimal Places	0
Coding	RW, BU		

This parameter controls and displays the subnet mask of the module.

If DHCP is enabled (*DHCP Enable (S.02.005)*) this parameter becomes read-only and, until an IP Address is allocated to the module, will display 0.0.0.0.

If DHCP is disabled the module will initialize, on reset or power cycle, with the subnet mask stored for the parameter.

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<b>S.02.008</b>		<b>Default Gateway</b>	
Minimum	0 (Display: 0.0.0.0)	Maximum	4294967295 (Display: 255.255.255.255)
Default	3232236030 (Display: 192.168.1.254)	Units	
Type	32 Bit User Save	Update Rate	DHCP enabled: write on event; DHCP disabled: read on reset
Display Format	IP Address	Decimal Places	0
Coding	RW, BU		

This parameter controls and displays the default gateway of the module.

If DHCP is enabled (*DHCP Enable* (**S.02.005**)) this parameter becomes read-only and, until an IP Address is allocated to the module, will display 0.0.0.0.

If DHCP is disabled the module will initialize, on reset or power cycle, with the default gateway stored for the parameter.

<b>S.02.009</b>		<b>Primary DNS</b>	
Minimum	0 (Display: 0.0.0.0)	Maximum	4294967295 (Display:255.255.255.255)
Default	0 (Display: 0.0.0.0)	Units	
Type	32 Bit User Save	Update Rate	DHCP enabled: write on event; DHCP disabled: read on reset
Display Format	IP Address	Decimal Places	0
Coding	RW, BU		

The module can use this IP Address when it wishes to resolve the IP Address for a domain name. This parameter performs the same function as the Secondary DNS parameter (*Secondary DNS* (**S.02.010**)), however the address specified in this parameter will be tried first. Only when this address is unsuccessful will the Secondary DNS address be tried.

If DHCP is enabled (*DHCP Enable* (**S.02.005**)) this parameter becomes read-only and, until an IP Address is allocated to the module, will display 0.0.0.0.

If DHCP is disabled the module will initialize, on reset or power cycle, with the primary DNS address stored for the parameter.

<b>S.02.010</b>		<b>Secondary DNS</b>	
Minimum	0 (Display: 0.0.0.0)	Maximum	4294967295 (Display: 255.255.255.255)
Default	0 (Display: 0.0.0.0)	Units	
Type	32 Bit User Save	Update Rate	DHCP enabled: write on event; DHCP disabled: read on reset
Display Format	IP Address	Decimal Places	0
Coding	RW, BU		

The module can use this IP Address when it wishes to resolve the IP Address for a domain name. This parameter performs the same function as the Primary DNS parameter (*Primary DNS* (S.02.009)), however the address specified in this parameter will be tried only when the Primary DNS address is unsuccessful.

If DHCP is enabled (*DHCP Enable* (S.02.005)) this parameter becomes read-only and, until a secondary DNS address is allocated to the module, will display 0.0.0.0.

If DHCP is disabled the module will initialize, on reset or power cycle, with the secondary DNS address stored for the parameter.

<b>S.02.011</b>		<b>MAC Address</b>	
Minimum	0 (Display: 00:00:00:00:00:00)	Maximum	281474976710655 (Display: FF:FF:FF:FF:FF:FF)
Default		Units	
Type	64 Bit Volatile	Update Rate	Power-up write
Display Format	Mac Address	Decimal Places	0
Coding	RO, ND, NC, PT, BU		

This parameter shows the 48-bit MAC address of the module.

<b>S.02.020</b>		<b>Priority Protocol</b>	
Minimum	0	Maximum	2
Default	0	Units	
Type	8 Bit User Save	Update Rate	Background read
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

This parameter enables the selection of the fieldbus protocol to have priority over all other protocols. A tick period of 1 ms will be given to the highest priority fieldbus protocol, 5 ms to all other fieldbus protocols (equal priority).

If no fieldbus protocol has been selected to have priority over others, all protocols will have equal priority and a tick rate of 5 ms.

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	None	All protocols have equal priority
1	Modbus TCP	Modbus TCP has highest priority
2	Ethernet/IP	Ethernet/IP has highest priority

<b>S.02.021</b>		<b>Web Server Enable</b>	
Minimum	0	Maximum	1
Default	1	Units	
Type	1 Bit User Save	Update Rate	Background read
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter controls the running of the webserver on the module.

<b>S.02.022</b>		<b>Web Server Port</b>	
Minimum	0	Maximum	65535
Default	80	Units	
Type	16 Bit User Save	Update Rate	Read on module reset and HTTP_ENABLE
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter shows the web server port. This may be changed for added security.

<b>S.02.024</b>		<b>Ethernet MTU</b>	
Minimum	158	Maximum	1500
Default	1500	Units	Bytes
Type	16 Bit User Save	Update Rate	Read on module reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter specifies the MTU (Maximum Transmittable Unit) in bytes allowed by the Ethernet interface.

<b>S.02.025</b>		<b>Gateway Mode</b>	
Minimum	0	Maximum	2
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on module reset
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

<b>Value</b>	<b>Text</b>
0	Switch
1	Gateway
2	Strict Gateway

This parameter specifies the operation mode of the gateway. By default the gateway is disabled and the switch operates in normal switch mode, by enabling the gateway mode all packets are filtered by the module and prioritized before being forwarded on. In strict mode the gateway will drop packets from unsupported protocols.

<b>S.02.030</b>		<b>VLAN Enable</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit User Save	Update Rate	Background read
Display Format	None	Decimal Places	0
Coding	RW		

This parameter controls whether the module will use VLAN tagging.

When used in conjunction with *Drive VLAN ID (S.02.031)* network traffic from the interface will be tagged with the chosen VLAN identifier.

When default values for *Drive VLAN ID (S.02.031)* is set, enabling this parameter will add VLAN prioritization to all packets helping to ensure real-time packets are not delayed by those of lower priority. If disabled, prioritization will use the Diffserv field in IP traffic only, meaning non-IP traffic can still affect real-time IP traffic.

<b>S.02.031</b>		<b>Drive VLAN ID</b>	
Minimum	0	Maximum	255
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on module reset and VLAN_ENABLE
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter specifies the VLAN ID that the interface will be a member of. Any packets entering the switch without this VLAN ID will not be handled.

## 5.8 Menu 3 - Timer

Parameter		Range	Default	Type						
<b>S.03.001</b>	Timer Unit Control Word	000000000 to 1101111100	0000000000	RW	Bin					US
<b>S.03.002</b>	Timer Unit Status Word	000 to 111		RO	Bin	ND	NC			
<b>S.03.003</b>	Timer Unit Timer Counter	0 to 65535	0	RW	Num					
<b>S.03.004</b>	Timer Unit Wrap Around Limit	0 to 65535	0	RW	Num					US
<b>S.03.005</b>	Timer Unit Capture Cache	0 to 65535		RO	Num					

RW	Read / Write	RO	Read only	Num	Number parameter	Bit	Bit parameter	Txt	Text string	Bin	Binary parameter	FI	Filtered
ND	No default value	NC	Not copied	PT	Protected parameter	RA	Rating dependent	US	User save	PS	Power-down save	DE	Destination
IP	IP address	Mac	Mac address	SMP	Slot menu parameter								

<b>S.03.001</b>	<b>Timer Unit Control Word</b>			
Minimum	0 (Display: 0000000000)		Maximum	892 (Display: 1101111100)
Default	0 (Display: 0000000000)		Units	
Type	16 Bit User Save		Update Rate	Immediate
Display Format	Binary		Decimal Places	0
Coding	RW, BU			

This parameter is used to configure and control the Timer Unit.

The Timer Unit control word is a bit-mapped parameter, as shown in the table below:

Bit	Description
0 to 2	<p>Event Task Schedule: Selects the event task that will be scheduled when the Timer Event Flag (<i>Timer Unit Status Word (S.03.002) b0</i>) is set:</p> <ul style="list-style-type: none"> <li>• 0 = No Event task scheduled</li> <li>• 1 = Schedule Event0 task</li> <li>• 2 = Schedule Event1 task</li> <li>• 3 = Schedule Event2 task</li> <li>• 4 = Schedule Event3 task</li> </ul>
3	<p>Enable Timer:</p> <ul style="list-style-type: none"> <li>• 0 = Timer is disabled</li> <li>• 1 = Timer is enabled</li> </ul>
4	<p>Clock Source:</p> <ul style="list-style-type: none"> <li>• 0 = Internal clock</li> <li>• 1 = External clock provided on digital input (DigIn1 or DigIn2, b9 depending)</li> </ul>
5 to 6	<p>Internal Clock Rate:</p> <ul style="list-style-type: none"> <li>• 0 = 50 MHz</li> <li>• 1 = 12.5 MHz</li> <li>• 2 = 3.125 MHz</li> <li>• 3 = 0.78125 MHz</li> </ul>

Bit	Description
7 to 8	<p>Timer Mode:</p> <ul style="list-style-type: none"> <li>0 = Free Running Mode The selected clock drives the counter. The Timer Event Flag (<i>Timer Unit Status Word (S.03.002)</i> b0) is set on wraparound.</li> <li>1 = Capture Mode 1 The selected clock drives the counter. A rising edge transition on Digital Input 3 causes the current counter value to be latched into the Timer Capture Cache (<i>Timer Unit Capture Cache (S.03.005)</i>) parameter and the Timer Event Flag (<i>Timer Unit Status Word (S.03.002)</i> b0) is set. The counter then continues incrementing (the Timer Event Flag (<i>Timer Unit Status Word (S.03.002)</i> b0) is not set on wrap-around).</li> <li>2 = Capture Mode 2 The selected clock drives the counter. A falling edge transition on Digital Input 3 causes the current counter value to be latched into the Timer Capture Cache (<i>Timer Unit Capture Cache (S.03.005)</i>) parameter and the Timer Event Flag (<i>Timer Unit Status Word (S.03.002)</i> b0) is set. The counter then continues incrementing (the Timer Event Flag (<i>Timer Unit Status Word (S.03.002)</i> b0) is not set on wrap-around). Note: Every time the Timer Event Flag is set an event task will be scheduled if is configured (Bit 0-2). In Free Running Mode (Mode 0) this will only occurs when timer counter wraps around. In capture modes (Mode 1 and 2) this will only occurs when a rising or falling edge, respectively, is detected.</li> </ul>
9	<p>External Source Clock selection:</p> <ul style="list-style-type: none"> <li>0 = External clock provided on digital input 1 (<i>Digital Input 1 State (S.04.001)</i>)</li> <li>1 = External clock provided on digital input 2 (<i>Digital Input 2 State (S.04.002)</i>)</li> </ul>

S.03.002		<i>Timer Unit Status Word</i>	
Minimum	0 (Display: 000)	Maximum	7 (Display: 111)
Default		Units	
Type	8 Bit Volatile	Update Rate	Immediate
Display Format	Binary	Decimal Places	0
Coding	RO,ND,NC, BU		

This parameter displays the status of the module's Timer Unit. The following table details the status word bits.

Bit	Description
0	Timer Event Flag: <ul style="list-style-type: none"> <li>0 = No event has occurred</li> <li>1 = An event has occurred (see description for Timer Mode ((<i>Timer Unit Control Word</i> (S.03.001) bit 7 - bit 8). This flag will not be set if Event Task Schedule (<i>Timer Unit Control Word</i> (S.03.001) bit 0 - bit 2) is set to zero</li> </ul> Note: This bit is automatically cleared when the parameter is read.
1	Wrap-around flag: <ul style="list-style-type: none"> <li>0 = Wrap-around has not occurred</li> <li>1 = Counter wrap-around has occurred</li> </ul> Note: This bit is automatically cleared when the parameter is read.
2	Timer Enabled: <ul style="list-style-type: none"> <li>0 = Timer is disabled</li> <li>1 = Timer is enabled</li> </ul> Note: In case Register is configured the timer cannot be enabled.

S.03.003		<i>Timer Unit Timer Counter</i>	
Minimum	0	Maximum	65535
Default	0	Units	
Type	16 Bit Volatile	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter sets or displays the current Timer Unit value.

S.03.004		<i>Timer Unit Wrap Around Limit</i>	
Minimum	0	Maximum	65535
Default	0	Units	
Type	16 Bit User Save	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter sets the wrap-around limit for the Timer Unit. When the Timer Counter (*Timer Unit Timer Counter* (S.03.003)) reaches this value bit 0 of *Timer Unit Status Word* (S.03.002) will be set if the Timer Unit is configured to be in free running mode (see *Timer Unit Control Word* (S.03.001)).

<b>S.03.005</b>	<b>Timer Unit Capture Cache</b>		
Minimum	0	Maximum	65535
Default	0	Units	
Type	16 Bit Volatile	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RO, BU		

This parameter stores the Timer Unit value (*Timer Unit Timer Counter (S.03.003)*) on a rising or falling edge transition on the module's digital input 3 if the Timer Mode (as set in *Timer Unit Control Word (S.03.001)*) is configured in either capture mode 1 or capture mode 2.

## 5.9 Menu 4 - Digital I/O

Parameter		Range	Default	Type						
<b>S.04.001</b>	Digital Input 1 State	Off (0) or On (1)		RO	Bit	ND	NC	PT		
<b>S.04.002</b>	Digital Input 2 State	Off (0) or On (1)		RO	Bit	ND	NC	PT		
<b>S.04.003</b>	Digital Input 3 State	Off (0) or On (1)		RO	Bit	ND	NC	PT		
<b>S.04.004</b>	Digital Input / Output 4 State	Off (0) or On (1)		RO	Bit	ND	NC	PT		
<b>S.04.010</b>	Digital Output 5	Off (0) or On (1)	Off (0)	RW	Bit					
<b>S.04.011</b>	Digital Input/Output 4 Demand	Off (0) or On (1)	Off (0)	RW	Bit					
<b>S.04.020</b>	Digital Outputs State	00 to 11	00	RW	Bin					
<b>S.04.021</b>	Digital Input/Output 4 Direction	Off (0) or On (1)	Off (0)	RW	Bit					
<b>S.04.022</b>	Event Task Trigger	0 to 4		RO	Num	ND	NC	PT		

RW	Read / Write	RO	Read only	Num	Number parameter	Bit	Bit parameter	Txt	Text string	Bin	Binary parameter	FI	Filtered
ND	No default value	NC	Not copied	PT	Protected parameter	RA	Rating dependent	US	User save	PS	Power-down save	DE	Destination
IP	IP address	Mac	Mac address	SMP	Slot menu parameter								

<b>S.04.001</b>	<b>Digital Input 1 State</b>		
Minimum	0	Maximum	1
Default		Units	
Type	1 Bit Volatile	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT		

When read, this parameter will indicate the state of Digital Input 1. An inactive input (low) will give the value 0 and active input (high) will give 1.

<b>S.04.002</b>		<b>Digital Input 2 State</b>	
Minimum	0	Maximum	1
Default		Units	
Type	1 Bit Volatile	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT		

When read, this parameter will indicate the state of Digital Input 2. An inactive input (low) will give the value 0 and active input (high) will give 1.

<b>S.04.003</b>		<b>Digital Input 3 State</b>	
Minimum	0	Maximum	1
Default		Units	
Type	1 Bit Volatile	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT		

When read, this parameter will indicate the state of Digital Input 3. An inactive input (low) will give the value 0 and active input (high) will give 1.

<b>S.04.004</b>		<b>Digital Input/Output 4 State</b>	
Minimum	0	Maximum	1
Default		Units	
Type	1 Bit Volatile	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT		

When read, this parameter will indicate the state of Digital I/O 4. An inactive input (low) will give the value 0 and active input (high) will give 1.

When this terminal is configured as an output (using *Digital Input/Output 4 Direction (S.04.021)*), this parameter is still accessible and will indicate the state of the terminal not the requested output value e.g. if the user tries to set the output high, but, due to a wiring error, the output is being held low, this parameter will give the value 0.

<b>S.04.010</b>		<b>Digital Output 5 State</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit Volatile	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RW		

When written, this parameter will set the state of Digital Output 5. Setting to 0 will place the output low and setting to 1 will place the output high.

<b>S.04.011</b>		<b>Digital Input/Output 4 Demand</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit Volatile	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RW		

If Digital I/O 4 is configured as an output (*Digital Input/Output 4 Direction (S.04.021)*), writing to this parameter will set the state of Digital I/O 4. Setting to 0 will place the output low and setting to 1 will place the output high.

<b>S.04.020</b>		<b>Digital Outputs State</b>	
Minimum	0 (Display: 00)	Maximum	3 (Display: 11)
Default	0 (Display: 00)	Units	
Type	8 Bit Volatile	Update Rate	Immediate
Display Format	Binary	Decimal Places	0
Coding	RW, ND, NC, BU		

Bitmapped parameter that can be used to set Digital I/O 4 Digital Output 5. This parameter is effectively a combination of *Digital Output 5 (S.04.010)* and *Digital Input/Output 4 Demand (S.04.011)*.

<b>Bit</b>	<b>Description</b>
0	Used to control the state of Digital Output 5: <ul style="list-style-type: none"> <li>• 0 = Output set low</li> <li>• 1 = Output set high</li> </ul>
1	Used to control the state of Digital IO 4: <ul style="list-style-type: none"> <li>• 0 = Output set low</li> <li>• 1 = Output set high</li> </ul> This bit will only have an effect if digital input/output 4 is configured as an output ( <i>Digital Input/Output 4 Direction (S.04.021)</i> ).

<b>S.04.021</b>		<b>Digital Input/Output 4 Direction</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit Volatile	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RW		

Setting this parameter to 0 will configure Digital I/O 4 as an input. Setting it to 1 will configure it as an output.

<b>S.04.022</b>		<b>Event Task Trigger</b>	
Minimum	0	Maximum	4
Default		Units	
Type	16 Bit Volatile	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RO, ND, PT, BU		

Used to trigger an event task. When the event task has completed the parameter will be cleared to zero. The following table details the usage:

Value	Description
0	None
1	Trigger Event0
2	Trigger Event1
3	Trigger Event2
4	Trigger Event3

## 5.10 Menu 9 - Resources

Parameter	Range	Default	Type					
<b>S.09.001</b>	Cyclic Tx Links Free	0 to 255	RO	Num	ND	NC		
<b>S.09.002</b>	Cyclic Rx Links Free	0 to 255	RO	Num	ND	NC		
<b>S.09.003</b>	Fieldbus Links Free	0 to 255	RO	Num	ND	NC		
<b>S.09.004</b>	Cyclic Mappings Free	0 to 255	RO	Num	ND	NC		
<b>S.09.009</b>	Idle Task % Free	0 to 255 %	RO	Num	ND	NC		
<b>S.09.010</b>	Synchronous Task % Free	0 to 255 %	RO	Num	ND	NC		
<b>S.09.020</b>	Synchronous Task % Worst Free	0 to 255 %	RO	Num	ND	NC		
<b>S.09.030</b>	PCB Temperature	-128 to 127 °C	RO	Num	ND	NC		

RW	Read / Write	RO	Read only	Num	Number parameter	Bit	Bit parameter	Txt	Text string	Bin	Binary parameter	FI	Filtered
ND	No default value	NC	Not copied	PT	Protected parameter	RA	Rating dependent	US	User save	PS	Power-down save	DE	Destination
IP	IP address	Mac	Mac address	SMP	Slot menu parameter								

<b>S.09.001</b>		<b>Cyclic Tx Links Free</b>	
Minimum	0	Maximum	255
Defaultf		Units	
Type	8 Bit Volatile	Update Rate	Background write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, BU		

This parameter shows the number of available transmit cyclic links.

<b>S.09.002</b>		<b><i>Cyclic Rx Links Free</i></b>	
Minimum	0	Maximum	255
Default		Units	
Type	8 Bit Volatile	Update Rate	Background write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, BU		

This parameter shows the number of available receive cyclic links.

<b>S.09.003</b>		<b><i>Fieldbus Links Free</i></b>	
Minimum	0	Maximum	255
Default		Units	
Type	8 Bit Volatile	Update Rate	Background write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, BU		

This parameter shows the number of available transmit / receive process images for fieldbus protocols such as Ethernet/IP.

<b>S.09.004</b>		<b><i>Cyclic Mappings Free</i></b>	
Minimum	0	Maximum	255
Default		Units	
Type	8 Bit Volatile	Update Rate	Background write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, BU		

This parameter shows the number of available mappings in the system for use in cyclic links.

<b>S.09.009</b>		<b><i>Idle Task % Free</i></b>	
Minimum	0	Maximum	255
Default		Units	%
Type	8 Bit Volatile	Update Rate	Background write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, BU		

This parameter shows the current resource available for the idle task.

<b>S.09.010</b>		<b><i>Synchronous Task % Free</i></b>	
Minimum	0	Maximum	255
Default		Units	%
Type	8 Bit Volatile	Update Rate	Background write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, BU		

This parameter shows the current resource available for the synchronous task.

<b>S.09.020</b>		<b>Synchronous Task Worst % Free</b>	
Minimum	0	Maximum	255
Default		Units	%
Type	8 Bit Volatile	Update Rate	Background write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, BU		

This parameter shows the worst case free resource of the synchronous task.

<b>S.09.030</b>		<b>PCB Temperature</b>	
Minimum	-128	Maximum	127
Default		Units	°C
Type	8 Bit Volatile	Update Rate	Background write
Display Format	None	Decimal Places	0
Coding	RO, ND, NC		

This parameter displays the temperature, in Celsius, of the module's PCB.

## 5.11 Menu 10 - Easy mode cyclic data

Menu 10 provides an easy method to configure up to 3 transmit and 3 receive cyclic links.

The minimum parameters required to configure a transmit link or a receive link are specified in Table 5-3 and Table 5-4 below. In addition to these, each receive link can have its own timeout configured with an additional custom action.

The Easy Mode Cyclic Data links can be synchronous links by configuring

All easy mode transmit links will transmit using the message rate set in **S.10.004**. For greater control, advanced cyclic links can be used which allows individual link transmission rates.

**Table 5-3 Transmit link parameters**

Transmit Link	Profile	Link No	Source Parameter	Parameter Count	Type	IP Address
1	S.10.010	S.10.011	S.10.012	S.10.013	S.10.014	S.10.015
2	S.10.020	S.10.022	S.10.022	S.10.023	S.10.024	S.10.025
3	S.10.030	S.10.033	S.10.032	S.10.033	S.10.034	S.10.035

**Table 5-4 Receive link parameters**

Receive Link	Profile	Link No	Destination Parameter	Parameter Count	Type
1	S.10.040	S.10.041	S.10.042	S.10.043	S.10.044
2	S.10.050	S.10.051	S.10.052	S.10.053	S.10.054
3	S.10.060	S.10.061	S.10.062	S.10.063	S.10.064

The Easy Mode Cyclic Data links can be made synchronous links by setting a value in *Tx Link Maximum Network Delay* (**S.11.030**, **S.11.031** or **S.11.032**).

Parameter		Range	Default	Type					
S.10.001	Enable	Off (0) or On (1)	On (1)	RW	Bit				US
S.10.002	Reset	Off (0) or On (1)	Off (0)	RW	Bit				
S.10.003	Default	Off (0) or On (1)	Off (0)	RW	Bit				
S.10.004	Message Rate	0 to 100 ms	0 ms	RW	Num				US
S.10.010	Tx1 Link Profile	0 to 0	0	RW	Num				US
S.10.011	Tx1 Link Number	0 to 255	0	RW	Num				US
S.10.012	Tx1 Source Parameter	0 to 4.99.999	0	RW	SMP			PT	US
S.10.013	Tx1 Parameter Count	0 to 32	0	RW	Num				US
S.10.014	Tx1 Link Transmission Type	Unicast (0), Broadcast (1), Multicast1 (2), Multicast2 (3), Multicast3 (4), Multicast4 (5)	Unicast (0)	RW	Txt				US
S.10.015	Tx1 Destination Address	000.000.000.000 to 255.255.255.255	255.255.255.255	RW	IP				US
S.10.019	Tx1 Link Status	Invalid profile (-16), Invalid mapping (-15), Read only param (-14), Timeout (-8), In error (-7), Link num in use (-6), Not editable (-5), Invalid link num (-4), Invalid args (-3), Too many links (-2), Out of memory (-1), OK (0)		RO	Txt				
S.10.020	Tx2 Link Profile	0 to 0	0	RW	Num				US
S.10.021	Tx2 Link Number	0 to 255	0	RW	Num				US
S.10.022	Tx2 Source Parameter	0 to 4.99.999	0.000	RW	SMP			PT	US
S.10.023	Tx2 Parameter Count	0 to 32	0	RW	Num				US
S.10.024	Tx2 Link Transmission Type	Unicast (0), Broadcast (1), Multicast1 (2), Multicast2 (3), Multicast3 (4), Multicast4 (5)	Unicast (0)	RW	Txt				US
S.10.025	Tx2 Destination Address	000.000.000.000 to 255.255.255.255	255.255.255.255	RW	IP				US
S.10.029	Tx2 Link Status	Invalid profile (-16), Invalid mapping (-15), Read only param (-14), Timeout (-8), In error (-7), Link num in use (-6), Not editable (-5), Invalid link num (-4), Invalid args (-3), Too many links (-2), Out of memory (-1), OK (0)		RO	Txt				
S.10.030	Tx3 Link Profile	0 to 0	0	RW	Num				US
S.10.031	Tx3 Link Number	0 to 255	0	RW	Num				US
S.10.032	Tx3 Source Parameter	0 to 4.99.999	0.00.000	RW	SMP			PT	US
S.10.033	Tx3 Parameter Count	0 to 32	0	RW	Num				US
S.10.034	Tx3 Link Transmission Type	Unicast (0), Broadcast (1), Multicast1 (2), Multicast2 (3), Multicast3 (4), Multicast4 (5)	Unicast (0)	RW	Txt				US

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Parameter		Range	Default	Type					
S.10.035	Tx3 Destination Address	000.000.000.000 to 255.255.255.255	255.255.255.255	RW	IP				US
S.10.039	Tx3 Link Status	Invalid profile (-16), Invalid mapping (-15), Read only param (-14), Timeout (-8), In error (-7), Link num in use (-6), Not editable (-5), Invalid link num (-4), Invalid args (-3), Too many links (-2), Out of memory (-1), OK (0)		RO	Txt				
S.10.040	Rx1 Link Profile	0 to 0	0.000	RW	Num				US
S.10.041	Rx1 Link Number	0 to 255	0.000	RW	Num				US
S.10.042	Rx1 Destination Parameter	0 to 4.99.999	0.00.000	RW	SMP				US
S.10.043	Rx1 Parameter Count	0 to 32	0.000	RW	Num				US
S.10.044	Rx1 Source Type	Direct (0), Multicast1 (1), Multicast2 (2), Multicast3 (3), Multicast4 (4)	Direct (0)	RW	Txt				US
S.10.045	Rx1 Timeout	0 to 65535 ms	100 ms	RW	Num				US
S.10.046	Rx1 Timeout Action	Trip (0), Clear output (1), Hold last (2)	Trip (0)	RW	Txt				US
S.10.047	Rx1 Timeout Event Destination	This slot (0), Slot 1 (1), Slot 2 (2), Slot 3 (3), Slot 4 (4)	This slot (0)	RW	Txt				US
S.10.048	Rx1 Timeout Event Type	No event (0), Event (1), Event1 (2), Event2 (3), Event3 (4)	No event (0)	RW	Txt				US
S.10.049	Rx1 Link Status	Invalid profile (-16), Invalid mapping (-15), Read only param (-14), Timeout (-8), In error (-7), Link num in use (-6), Not editable (-5), Invalid link num (-4), Invalid args (-3), Too many links (-2), Out of memory (-1), OK (0)		RO	Txt				
S.10.050	Rx2 Link Profile	0 to 0	0.000	RW	Num				US
S.10.051	Rx2 Link Number	0 to 255	0.000	RW	Num				US
S.10.052	Rx2 Destination Parameter	0 to 4.99.999	0.00.000	RW	SMP				US
S.10.053	Rx2 Parameter Count	0 to 32	0.000	RW	Num				US
S.10.054	Rx2 Source Type	Direct (0), Multicast1 (1), Multicast2 (2), Multicast3 (3), Multicast4 (4)	Direct (0)	RW	Txt				US
S.10.055	Rx2 Timeout	0 to 65535 ms	100 ms	RW	Num				US
S.10.056	Rx2 Timeout Action	Trip (0), Clear output (1), Hold last (2)	Trip (0)	RW	Txt				US
S.10.057	Rx2 Timeout Event Destination	This slot (0), Slot 1 (1), Slot 2 (2), Slot 3 (3), Slot 4 (4)	This slot (0)	RW	Txt				US

Parameter		Range		Default		Type							
S.10.058	Rx2 Timeout Event Type	No event (0), Event (1), Event1 (2), Event2 (3), Event3 (4)		No event (0)		RW	Txt						US
S.10.059	Rx2 Link Status	Invalid profile (-16), Invalid mapping (-15), Read only param (-14), Timeout (-8), In error (-7), Link num in use (-6), Not editable (-5), Invalid link num (-4), Invalid args (-3), Too many links (-2), Out of memory (-1), OK (0)				RO	Txt						
S.10.060	Rx3 Link Profile	0 to 0		0.000		RW	Num						US
S.10.061	Rx3 Link Number	0 to 255		0.000		RW	Num						US
S.10.062	Rx3 Destination Parameter	0 to 4.99.999		0.00.000		RW	SMP						US
S.10.063	Rx3 Parameter Count	0 to 32		0.000		RW	Num						US
S.10.064	Rx3 Source Type	Direct (0), Multicast1 (1), Multicast2 (2), Multicast3 (3), Multicast4 (4)		Direct (0)		RW	Txt						US
S.10.065	Rx3 Timeout	0 to 65535 ms		100 ms		RW	Num						US
S.10.066	Rx3 Timeout Action	Trip (0), Clear output (1), Hold last (2)		Trip (0)		RW	Txt						US
S.10.067	Rx3 Timeout Event Destination	This slot (0), Slot 1 (1), Slot 2 (2), Slot 3 (3), Slot 4 (4)		This slot (0)		RW	Txt						US
S.10.068	Rx3 Timeout Event Type	No event (0), Event (1), Event1 (2), Event2 (3), Event3 (4)		No event (0)		RW	Txt						US
S.10.069	Rx3 Link Status	Invalid profile (-16), Invalid mapping (-15), Read only param (-14), Timeout (-8), In error (-7), Link num in use (-6), Not editable (-5), Invalid link num (-4), Invalid args (-3), Too many links (-2), Out of memory (-1), OK (0)				RO	Txt						

RW	Read / Write	RO	Read only	Num	Number parameter	Bit	Bit parameter	Txt	Text string	Bin	Binary parameter	FI	Filtered
ND	No default value	NC	Not copied	PT	Protected parameter	RA	Rating dependent	US	User save	PS	Power-down save	DE	Destination
IP	IP address	Mac	Mac address	SMP	Slot menu parameter								

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<b>S.10.001</b>		<b>Enable</b>	
Minimum	0	Maximum	1
Default	1	Units	
Type	1 Bit User Save	Update Rate	Background read
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter is used to enable the easy mode cyclic Data. If set to zero, the transmit and receive cyclic links will be disabled even if all the setup parameter are correctly configured.

<b>S.10.002</b>		<b>Reset</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit Volatile	Update Rate	Background read
Display Format	None	Decimal Places	0
Coding	RW		

This parameter is used to perform a warm reset of the easy mode cyclic data interface. This parameter will be automatically set to Off (0) when the reset has been completed.

This parameter must be set after any changes are made to the parameters in menu 10 to ensure that the changes take effect.

Setting this parameter will only effect menu 10 and does not affect the other menus or protocols supported by the module.

<b>S.10.003</b>		<b>Default</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit Volatile	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW		

This parameter allows all parameters in menu 10 to be defaulted to factory settings.

To default the parameters in menu 10, set this parameter to On (1) and then reset the menu by setting Reset (**S.10.002**) to On (1), or reset the module by setting Reset Module (**S.00.007**) to On (1). This parameter will be automatically set to Off (0) when the default operation has been completed.

<b>S.10.004</b>	<b>Message Rate</b>		
Minimum	0	Maximum	100
Default	0	Units	ms
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter defines the rate at which Easy Mode cyclic data will be transmitted in milliseconds. A value of zero disables the transmission of data.

<b>S.10.010</b>	<b>Tx1 Link Profile</b>		
<b>S.10.020</b>	<b>Tx2 Link Profile</b>		
<b>S.10.030</b>	<b>Tx3 Link Profile</b>		
Minimum	0	Maximum	0
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter is reserved to select the profile of predefined output mappings for the transmit link.

If this parameter is set to a non-zero value then *Tx Link Source Parameter* (**S.10.012**, **S.10.022** or **S.10.032**) and *Tx Link Parameter Count* (**S.10.013**, **S.10.023** or **S.10.033**) will become read-only with value of 0.

<b>S.10.011</b>	<b>Tx1 Link Number</b>		
<b>S.10.021</b>	<b>Tx2 Link Number</b>		
<b>S.10.031</b>	<b>Tx3 Link Number</b>		
Minimum	0	Maximum	255
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter is used to set the link number for the transmit link. This number should be unique for each transmit link.

<b>S.10.012</b>	<b><i>Tx1 Link Source Parameter</i></b>		
<b>S.10.022</b>	<b><i>Tx2 Link Source Parameter</i></b>		
<b>S.10.032</b>	<b><i>Tx3 Link Source Parameter</i></b>		
Minimum	0 (Display: 0.00.000)	Maximum	499999 (Display: 4.99.999)
Default	0 (Display: 0.00.000)	Units	
Type	32 Bit User Save	Update Rate	Read on reset
Display Format	Slot.Menu.Param	Decimal Places	0
Coding	RW, PT, BU		

This parameter sets the first source parameter for the transmit link.

If a profile has been selected in *Tx Link Profile* (**S.10.010**, **S.10.020** or **S.10.030**) then this parameter will become read-only with value of 0.

<b>S.10.013</b>	<b><i>Tx1 Link Parameter Count</i></b>		
<b>S.10.023</b>	<b><i>Tx2 Link Parameter Count</i></b>		
<b>S.10.033</b>	<b><i>Tx3 Link Parameter Count</i></b>		
Minimum	0	Maximum	32
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter is used to set the number of contiguous parameters for the transmit link.

If a profile has been selected in *Tx Link Profile* (**S.10.010**, **S.10.020** or **S.10.030**) then this parameter will become read-only with value of 0.

<b>S.10.014</b>	<b><i>Tx1 Link Transmission Type</i></b>		
<b>S.10.024</b>	<b><i>Tx2 Link Transmission Type</i></b>		
<b>S.10.034</b>	<b><i>Tx3 Link Transmission Type</i></b>		
Minimum	0	Maximum	5
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, TE, BU		

Value	Text	Description
0	Unicast	Link is unicast to the IP Address specified
1	Broadcast	Link is broadcast (255.255.255.255)
2	Multicast1	Link is multicast to the IP Address
3	Multicast2	Link is multicast to the IP Address
4	Multicast3	Link is multicast to the IP Address
5	Multicast4	Link is multicast to the IP Address

This parameter specifies the type of transmission for the transmit link.

<b>S.10.015</b>	<b><i>Tx1 Link Destination Address</i></b>		
<b>S.10.025</b>	<b><i>Tx2 Link Destination Address</i></b>		
<b>S.10.035</b>	<b><i>Tx3 Link Destination Address</i></b>		
Minimum	0 (Display: 0.0.0.0)	Maximum	4294967295 (Display: 255.255.255.255)
Default	0 (Display: 0.0.0.0)	Units	
Type	32 Bit User Save	Update Rate	Read on reset
Display Format	IP Address	Decimal Places	0
Coding	RW, BU		

This parameter specifies the IP Address of the destination device for the transmit link.

If *Tx Link Transmission Type* (**S.10.014**, **S.10.024** or **S.10.034**) is set to Unicast (0), then the IP Address of the destination device must be manually entered into this parameter.

If *Tx Link Transmission Type* (**S.10.014**, **S.10.024** or **S.10.034**) is set to either Broadcast (1) or Multicast1 (2) to Multicast4 (5), then this parameter will automatically display the appropriate address.

<b>S.10.019</b>	<b><i>Tx1 Link Status</i></b>		
<b>S.10.029</b>	<b><i>Tx2 Link Status</i></b>		
<b>S.10.039</b>	<b><i>Tx3 Link Status</i></b>		
Minimum	-16	Maximum	0
Default		Units	
Type	32 Bit User Save	Update Rate	Write on reset
Display Format	None	Decimal Places	0
Coding	RO, Txt		

Value	Text
-16	Invalid profile
-15	Invalid mapping
-14	Read only param
-13	-
-12	-
-11	-
-10	-
-9	-
-8	Timeout
-7	In error
-6	Link num in use
-5	Not editable
-4	Invalid link num
-3	Invalid args
-2	Too many links
-1	Out of memory
0	OK

This parameter shows status of transmit link if it has been configured. A reset of the menu by setting *Reset (S.10.002)* to On (1) is required for any changes to take effect.

<b>S.10.040</b>	<b>Rx1 Link Profile</b>		
<b>S.10.050</b>	<b>Rx2 Link Profile</b>		
<b>S.10.060</b>	<b>Rx3 Link Profile</b>		
Minimum	0	Maximum	0
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter is used to select the profile of predefined input mappings for the receive link.

If this parameter is set to a non-zero value then *Rx Link Destination Parameter (S.10.042, S.10.052 or S.10.062)* and *Rx Link Parameter Count (S.10.043, S.10.053 or S.10.063)* will become read-only with value of 0.

<b>S.10.041</b>	<b><i>Rx1 Link Number</i></b>		
<b>S.10.051</b>	<b><i>Rx2 Link Number</i></b>		
<b>S.10.061</b>	<b><i>Rx3 Link Number</i></b>		
Minimum	0	Maximum	255
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter is used to set the link number for the receive link.

<b>S.10.042</b>	<b><i>Rx1 Link Destination Parameter</i></b>		
<b>S.10.052</b>	<b><i>Rx2 Link Destination Parameter</i></b>		
<b>S.10.062</b>	<b><i>Rx3 Link Destination Parameter</i></b>		
Minimum	0 (Display: 0.00.000)	Maximum	499999 (Display: 4.99.999)
Default	0 (Display: 0.00.000)	Units	
Type	32 Bit User Save	Update Rate	Read on reset
Display Format	Slot.Menu.Param	Decimal Places	0
Coding	RW, BU		

This parameter sets the first destination parameter for the receive link.

If a profile has been selected in *Rx Link Profile* (**S.10.040**, **S.10.050** or **S.10.060**) then this parameter will become read-only with value of 0.

<b>S.10.043</b>	<b><i>Rx1 Link Parameter Count</i></b>		
<b>S.10.053</b>	<b><i>Rx2 Link Parameter Count</i></b>		
<b>S.10.063</b>	<b><i>Rx3 Link Parameter Count</i></b>		
Minimum	0	Maximum	32
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter is used to set the number of contiguous parameters for the receive link.

If a profile has been selected in *Rx Link Profile* (**S.10.040**, **S.10.050** or **S.10.060**) then this parameter will become read-only with value of 0.

<b>S.10.044</b>	<b><i>Rx1 Link Source Type</i></b>		
<b>S.10.054</b>	<b><i>Rx2 Link Source Type</i></b>		
<b>S.10.064</b>	<b><i>Rx3 Link Source Type</i></b>		
Minimum	0	Maximum	4
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

Value	Text	Description
0	Direct	Link is Unicast or Broadcast
1	Multicast1	Link is multicast to the IP Address
2	Multicast2	Link is multicast to the IP Address
3	Multicast3	Link is multicast to the IP Address
4	Multicast4	Link is multicast to the IP Address

This parameter specifies the type of transmission for the receive link.

<b>S.10.045</b>	<b><i>Rx1 Link Timeout</i></b>		
<b>S.10.055</b>	<b><i>Rx2 Link Timeout</i></b>		
<b>S.10.065</b>	<b><i>Rx3 Link Timeout</i></b>		
Minimum	0	Maximum	65535
Default	100	Units	ms
Type	16 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter specifies the watchdog timer for the receive link. If no cyclic data is received on the receive link the action taken will be determined by the setting in *Rx Timeout Action* (**S.10.046**, **S.10.056** or **S.10.066**).

**NOTE** It is good system design to allow for some message loss by setting the timeout duration to be greater than the transmit period by a factor of 2 or more.

<b>S.10.046</b>	<b><i>Rx1 Link Timeout Action</i></b>		
<b>S.10.056</b>	<b><i>Rx2 Link Timeout Action</i></b>		
<b>S.10.066</b>	<b><i>Rx3 Link Timeout Action</i></b>		
Minimum	0	Maximum	2
Default	0	Units	ms
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

Value	Text	Description
0	Trip	Trip drive with Slotx Error and sub-trip code yyy, where x is the slot number in which the module is installed.
1	Send flt values	Send configured fault values to the output parameters
2	Clear output	PLC output parameters will have their values set to zero

This parameter defines the action to be taken for a timeout on the receive link.

<b>S.10.047</b>	<b><i>Rx1 Link Timeout Event Destination</i></b>		
<b>S.10.057</b>	<b><i>Rx2 Link Timeout Event Destination</i></b>		
<b>S.10.067</b>	<b><i>Rx3 Link Timeout Event Destination</i></b>		
Minimum	0	Maximum	4
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

Value	Text	Description
0	This slot	Trigger module event in this slot
1	Slot 1	Trigger module event in slot 1
2	Slot 2	Trigger module event in slot 2
3	Slot 3	Trigger module event in slot 3
4	Slot 4	Trigger module event in slot 4

This parameter defines the slot in which an event will occur if a cyclic data timeout occurs on the receive link.

<b>S.10.048</b>	<b>Rx1 Link Timeout Event Type</b>		
<b>S.10.058</b>	<b>Rx2 Link Timeout Event Type</b>		
<b>S.10.068</b>	<b>Rx3 Link Timeout Event Type</b>		
Minimum	0	Maximum	4
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

Value	Text	Description
0	No Event	No event
1	Event	Trigger module event
2	Event1	Trigger module event 1
3	Event2	Trigger module event 2
4	Event3	Trigger module event 3

This parameter defines the event to trigger in the given destination, as specified in *Rx Timeout Event Destination* (**S.10.047**, **S.10.057** or **S.10.067**), if a cyclic data timeout occurs on the receive link.

<b>S.10.049</b>	<b>Rx1 Link Status</b>		
<b>S.10.059</b>	<b>Rx2 Link Status</b>		
<b>S.10.069</b>	<b>Rx3 Link Status</b>		
Minimum	-16	Maximum	0
Default		Units	
Type	8 Bit Volatile	Update Rate	Write on reset
Display Format	None	Decimal Places	0
Coding	RO, Txt		

Value	Text
-16	Invalid profile
-15	Invalid mapping
-14	Read only param
-13	-
-12	-
-11	-
-10	-
-9	-
-8	Timeout
-7	In error
-6	Link num in use
-5	Not editable

Value	Text
-4	Invalid link num
-3	Invalid args
-2	Too many links
-1	Out of memory
0	OK

This parameter shows status of receive link if it has been configured. A reset of the menu by setting Reset (**S.10.002**) to On (1) is required for any changes to take effect.

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## 5.12 Menu 11 - Synchronization

Parameter		Range	Default	Type					
S.11.001	Preferred Sync Master	0 to 4	1	RW	Num				US
S.11.002	Master Clock Domain	0 to 3	0	RW	Num				US
S.11.005	Grandmaster MAC Address	00:00:00:00:00:00 to FF:FF:FF:FF:FF:FF		RO	Mac	ND	NC	PT	
S.11.006	Synchronization Jitter From Grandmaster	-2147483648 to 2147483647 ns		RO	Num	ND	NC	PT	
S.11.007	Synchronization Jitter Threshold	10 to 4294967295 ns	1000 ns	RW	Num				US
S.11.008	Module Synchronized Flag	Off (0) or On (1)		RO	Bit				
S.11.009	Inhibit Drive Synchronization	Off (0) or On (1)	Off (0)	RW	Bit				US
S.11.010	PTP Date	00-00-00 to 31-12-99		RO	Date	ND	NC	PT	
S.11.011	PTP Time	00:00:00 to 23:59:59		RO	Time	ND	NC	PT	
S.11.013	Network Transport Layer Select	802.3 (0), UDP (1)	UDP (1)	RW	Txt				US
S.11.014	1 Step Clock Correction	Off (0) or On (1)	Off (0)	RW	Bit				US
S.11.015	PTP Delay Measurement Select	E2E DELAY (0), P2P DELAY (1)	P2P DELAY (1)	RW	Txt				US
S.11.016	PTP Sync Rate	-4 to 4	-2	RW	Num				US
S.11.020	Network Error Count	0 to 4294967295		RO	Num	ND	NC	PT	
S.11.030	Tx1 Link Maximum Network Delay	0 to 100 ms	0 ms	RW	Num				US
S.11.031	Tx2 Link Maximum Network Delay	0 to 100 ms	0 ms	RW	Num				US
S.11.032	Tx3 Link Maximum Network Delay	0 to 100 ms	0 ms	RW	Num				US
S.11.040	Rx1 Late Synchronization Frame Action	Off (0), Trip (1), Do not use (2), Use (3)	Off (0)	RW	Txt				US
S.11.041	Rx1 Late Synchronization Frame Destination	This slot (0), Slot 1 (1), Slot 2 (2), Slot 3 (3), Slot 4 (4)	This slot (0)	RW	Txt				US
S.11.042	Rx1 Late Synchronization Frame Event	No event (0), Event (1), Event1 (2), Event2 (3), Event3 (4)	No event (0)	RW	Txt				US
S.11.050	Rx2 Late Synchronization Frame Action	Off (0), Trip (1), Do not use (2), Use (3)	Off (0)	RW	Txt				US
S.11.051	Rx2 Late Synchronization Frame Destination	This slot (0), Slot 1 (1), Slot 2 (2), Slot 3 (3), Slot 4 (4)	This slot (0)	RW	Txt				US
S.11.052	Rx2 Late Synchronization Frame Event	No event (0), Event (1), Event1 (2), Event2 (3), Event3 (4)	No event (0)	RW	Txt				US
S.11.060	Rx3 Late Synchronization Frame Action	Off (0), Trip (1), Do not use (2), Use (3)	Off (0)	RW	Txt				US
S.11.061	Rx3 Late Synchronization Frame Destination	This slot (0), Slot 1 (1), Slot 2 (2), Slot 3 (3), Slot 4 (4)	This slot (0)	RW	Txt				US
S.11.062	Rx3 Late Synchronization Frame Event	No event (0), Event (1), Event1 (2), Event2 (3), Event3 (4)	No event (0)	RW	Txt				US

RW	Read / Write	RO	Read only	Num	Number parameter	Bit	Bit parameter	Txt	Text string	Bin	Binary parameter	Fl	Filtered
ND	No default value	NC	Not copied	PT	Protected parameter	RA	Rating dependent	US	User save	PS	Power-down save	DE	Destination
IP	IP address	Mac	Mac address	SMP	Slot menu parameter								

<b>S.11.001</b>		<b><i>Preferred Sync Master</i></b>	
Minimum	0	Maximum	4
Default	1	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This module will be preferred as the grandmaster over others with higher preferred values or none specified. A value of zero will ensure that the module will not become grandmaster (effectively turning this functionality off). If more than one module have the same preferred value only one will be chosen as the grandmaster using the IEEE 1588 BMC algorithm.

The parameter does not guarantee that the module will become grandmaster but a value of zero guarantees that the module will not become a grandmaster.

<b>S.11.002</b>		<b><i>Master Clock Domain</i></b>	
Minimum	0	Maximum	3
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter specifies the clock domain for the module to act as a grandmaster clock.

<b>S.11.005</b>		<b><i>Grandmaster MAC Address</i></b>	
Minimum	0 (Display: 00:00:00:00:00:00)	Maximum	18446744073709551615 (Display: FF:FF:FF:FF:FF:FF)
Default		Units	
Type	64 Bit Volatile	Update Rate	Background write
Display Format	Mac Address	Decimal Places	0
Coding	RW, ND, NC, PT, BU		

This parameter displays the MAC address, as a 64 bit hexadecimal value, of the synchronization grandmaster (if there is a grandmaster).

<b>S.11.006</b>		<b><i>Synchronization Jitter From Grandmaster</i></b>	
Minimum	-2147483648	Maximum	2147483647
Default		Units	ns
Type	32 Bit Volatile	Update Rate	Written every 500 ms
Display Format	None	Decimal Places	0
Coding	RW, ND, NC, PT		

This parameter displays the Synchronization jitter in nanoseconds. The value is filtered to be human readable.

<b>S.11.007</b>		<b><i>Synchronization Jitter Threshold</i></b>	
Minimum	10	Maximum	4294967295
Default	1000	Units	ns
Type	32 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter sets the application tolerable clock jitter in ns from the grandmaster. If *Synchronization Jitter From Grandmaster* (**S.11.006**) is within the tolerance the local clock is synchronized to the grandmaster and synchronized cyclic data links will be processed.

<b>S.11.008</b>		<b><i>Module Synchronized Flag</i></b>	
Minimum	0	Maximum	1
Default		Units	
Type	1 Bit Volatile	Update Rate	Written every 10 ms
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT		

The parameter displays the module's synchronization status. 1 = Synchronized, 0 = Not synchronized.

<b>S.11.009</b>		<b><i>Inhibit Drive Synchronization</i></b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit User Save	Update Rate	Immediate
Display Format	None	Decimal Places	0
Coding	RW		

This parameter controls whether the module synchronizes the OPT\_SYNC with the network grandmaster. A value of On (1) inhibits this.

<b>S.11.010</b>		<b>PTP Date</b>	
Minimum	0 (Display: 00-00-00)	Maximum	235959 (Display: 23:59:59)
Default		Units	
Type	32 Bit Volatile	Update Rate	Written every 500 ms
Display Format	Time	Decimal Places	0
Coding	RO, ND, NC, PT, BU		

This parameter displays the current date. If the module has no time source it will display the date based on its power-up date of 1st January 1970.

<b>S.11.011</b>		<b>PTP Time</b>	
Minimum	0 (Display: 00:00:00)	Maximum	235959 (Display: 23:59:59)
Default		Units	
Type	32 Bit Volatile	Update Rate	Written every 500 ms
Display Format	Time	Decimal Places	0
Coding	RO, ND, NC, PT, BU		

This parameter displays the current time. If the module has no time source it will display the date based on its power-up date of 00:00:00.

<b>S.11.013</b>		<b>Network Transport Layer Select</b>	
Minimum	0	Maximum	1
Default	1	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

<b>Value</b>	<b>Text</b>
0	802.3
1	UDP

This parameter selects the transport layer to use. 0 = Layer 2 Ethernet; 1 = UDP.

**NOTE** Layer 2 Ethernet packet sizes are smaller than the packet sizes of UDP.

<b>S.11.014</b>		<b>1 Step Clock Correction</b>	
Minimum	0	Maximum	1
Default	1	Units	
Type	1 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

This enables the clock to provide time information using a single event message. If disabled the clock will provide time information using the combination of an event message and a subsequent general message.

<b>S.11.015</b>		<b>PTP Delay Measurement Select</b>	
Minimum	0	Maximum	1
Default	1	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	E2E Delay	End-to-end delay
1	P2P Delay	Peer-to-peer delay

This parameter selects the delay measurement. 0 = End-to-end; 1 = Peer-to-peer

End-to-end is the delay mechanism between slave clocks and the master clock.

Peer-to-peer delay mechanism provides not only the PTP event transit time information, but also provides the corrections for the propagation delay of the link connected to the port receiving the PTP event message.

<b>S.11.016</b>		<b>PTP Sync Rate</b>	
Minimum	-4	Maximum	4
Default	-2	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW		

This parameter controls the rate at which PTP Sync frames are sent. The message rate is determined by raising 2 to the power of this parameter. E.g the default value of -2, results in four sync messages per second.

<b>S.11.020</b>	<b>Network Error Count</b>		
Minimum	0	Maximum	4294967295
Default		Units	
Type	32 Bit Volatile	Update Rate	Written every 500 ms
Display Format	None	Decimal Places	0
Coding	RO, ND, NC, PT, BU		

The parameter displays a count of network errors since start up. It can be used as an indication of a problem.

<b>S.11.030</b>	<b>Tx1 Link Maximum Network Delay</b>		
<b>S.11.031</b>	<b>Tx2 Link Maximum Network Delay</b>		
<b>S.11.032</b>	<b>Tx3 Link Maximum Network Delay</b>		
Minimum	0	Maximum	100
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, BU		

This defines the allowable network delay (in milliseconds) for the associated Easy mode cyclic link. A value of zero implies a non-synchronized link.

<b>S.11.040</b>	<b>Rx1 Link Late Synchronization Frame Action</b>		
<b>S.11.050</b>	<b>Rx2 Link Late Synchronization Frame Action</b>		
<b>S.11.060</b>	<b>Rx3 Link Late Synchronization Frame Action</b>		
Minimum	0	Maximum	3
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	Off	Link is not synchronized
1	Trip	Trip drive with Slotx Error and sub-trip code
2	Do not use	The data is ignored
3	Use	The data is used immediately

This parameter defines the action to be taken when a late synchronized frame is received.

<b>S.11.041</b>	<b><i>Rx1 Link Late Synchronization Frame Destination</i></b>		
<b>S.11.051</b>	<b><i>Rx2 Link Late Synchronization Frame Destination</i></b>		
<b>S.11.061</b>	<b><i>Rx3 Link Late Synchronization Frame Destination</i></b>		
Minimum	0	Maximum	4
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

<b><i>Value</i></b>	<b><i>Text</i></b>	<b><i>Description</i></b>
0	This slot	Trigger module event in this slot
1	Slot 1	Trigger module event in slot 1
2	Slot 2	Trigger module event in slot 2
3	Slot 3	Trigger module event in slot 3
4	Slot 4	Trigger module event in slot 4

This parameter defines the slot in which an event will occur if a late synchronized frame is received.

<b>S.11.042</b>	<b><i>Rx1 Link Late Synchronization Frame Event</i></b>		
<b>S.11.052</b>	<b><i>Rx2 Link Late Synchronization Frame Event</i></b>		
<b>S.11.062</b>	<b><i>Rx3 Link Late Synchronization Frame Event</i></b>		
Minimum	0	Maximum	4
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on reset
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

<b><i>Value</i></b>	<b><i>Text</i></b>	<b><i>Description</i></b>
0	No Event	No event
1	Event	Trigger module event
2	Event1	Trigger module event 1
3	Event2	Trigger module event 2
4	Event3	Trigger module event 3

The parameter defines the event to trigger in the given destination, as specified in *Rx Link Late Synchronization Frame Destination* (**S.11.041**, **S.11.051** or **S.11.061**), if a late synchronized frame is received.

## 5.13 Menu 15 - Modbus

Parameter		Range	Default	Type					
S.15.001	Enable	Off (0) or On (1)	On (1)	RW	Bit				US
S.15.002	Reset	Off (0) or On (1)	Off (0)	RW	Bit				
S.15.003	Default	Off (0) or On (1)		RW	Bit				
S.15.004	Modbus Configuration Error	No error (0), Port in use (1), Timeout event (2)		RO	Txt				
S.15.005	Modbus Listening Port	0 to 65535	502	RW	Num				
S.15.006	Maximum Connections	0 to 4	2	RW	Num				US
S.15.007	Maximum Priority Connections	0 to 4	1	RW	Num				US
S.15.008	Maximum Connections Per Client	1 to 4	2	RW	Num				US
S.15.009	Modbus Timeout	1 to 10000 ms	100 ms	RW	Num				US
S.15.010	Modbus Timeout Action	Trip (0), No action (1)	No action (1)	RW	Txt				US
S.15.011	Modbus Timeout Event Destination	This slot (0), Slot 1 (1), Slot 2 (2), Slot 3 (3), Slot 4 (4)	This slot (0)	RW	Txt				US
S.15.012	Modbus Timeout Event Type	No event (0), Event (1), Event1 (2), Event2 (3), Event3 (4)	No event (0)	RW	Txt				US
S.15.013	Modbus Resister Addressing Mode	Standard (0), Modified (1)	Standard (0)	RW	Txt				US
S.15.020	Priority Connection 1	000.000.000.000 to 255.255.255.255	000.000.000.000	RW	IP				US
S.15.021	Priority Connection 2	000.000.000.000 to 255.255.255.255	000.000.000.000	RW	IP				US
S.15.022	Priority Connection 3	000.000.000.000 to 255.255.255.255	000.000.000.000	RW	IP				US
S.15.023	Priority Connection 4	000.000.000.000 to 255.255.255.255	000.000.000.000	RW	IP				US

RW	Read / Write	RO	Read only	Num	Number parameter	Bit	Bit parameter	Txt	Text string	Bin	Binary parameter	FI	Filtered
ND	No default value	NC	Not copied	PT	Protected parameter	RA	Rating dependent	US	User save	PS	Power-down save	DE	Destination
IP	IP address	Mac	Mac address	SMP	Slot menu parameter								

S.15.001		<i>Enable</i>	
Minimum	0	Maximum	4
Default	1	Units	
Type	1 Bit User Save	Update Rate	Background read
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter is used to enable or disable Modbus master and slave functionality.

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<b>S.15.002</b>		<b>Reset</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit Volatile	Update Rate	Background read; written to 0 on initialization
Display Format	None	Decimal Places	0
Coding	RW		

This parameter is used to perform a warm reset of the protocol interface. When set and the protocol has reset, the parameter will be reset to zero (Off).

<b>S.15.003</b>		<b>Default</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit Volatile	Update Rate	Read on module reset, protocol interface reset or protocol enable
Display Format	None	Decimal Places	0
Coding	RW		

This parameter allows the protocol to be defaulted to factory settings. This includes all of the protocol features, configuration, mappings and stored objects.

<b>S.15.004</b>		<b>Modbus Configuration Error</b>	
Minimum	0	Maximum	2
Default		Units	
Type	8 Bit Volatile	Update Rate	Write on module reset, Modbus interface reset or Modbus interface enable
Display Format	None	Decimal Places	0
Coding	RO, Txt, ND, BU		

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	No error	No error
1	Port in use	Specified port is currently in use by another protocol
2	Timeout event	Timeout trigger event location is not valid

This parameter will indicate any Modbus configuration errors.

<b>S.15.005</b>		<b>Modbus Listening Port</b>	
Minimum	0	Maximum	65535
Default	502	Units	
Type	16 Bit User Save	Update Rate	MODBUS_THREAD_T CK_TIME
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter can be changed from its default port of 502, however it is the user's responsibility to ensure that a valid port is set.

<b>S.15.006</b>		<b>Maximum Connections</b>	
Minimum	0	Maximum	4
Default	2	Units	
Type	8 Bit User Save	Update Rate	Read on module reset, Modbus interface reset or Modbus interface enable
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter permits the user to specify the total number of connections that one or more clients can open with the module at any one time.

<b>S.15.007</b>		<b>Maximum Priority Connections</b>	
Minimum	0	Maximum	4
Default	2	Units	
Type	8 Bit User Save	Update Rate	Read on module reset, Modbus interface reset or Modbus interface enable
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter defines the how many of the maximum connections specified in Maximum Connections (**S.15.006**) can be configured as a priority connection. A connection is accepted into the priority connections pool if the client's IP address matches one of the values stored in parameters *Priority Connection 1* (**S.15.020**), *Priority Connection 2* (**S.15.021**), *Priority Connection 3* (**S.15.022**) or *Priority Connection 4* (**S.15.023**).

The priority connections are permanent and, once made will only be deleted at the request of the client or due to a communications error.

Any connections not in the priority connections pool are kept in the non-priority connections pool. If a client attempts to establish a priority connection and all available non-priority connections are in use, the non-priority connection that has not been used for the longest will be closed to make way for the new priority connection.

<b>S.15.008</b>		<b>Maximum Connections Per Client</b>	
Minimum	1	Maximum	4
Default	2	Units	
Type	8 Bit User Save	Update Rate	Read on module reset, Modbus interface reset or Modbus interface enable
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter defines the maximum number of connections that any one client can establish. This check is only performed on the connections in the priority connections pool.

<b>S.15.009</b>		<b>Modbus timeout</b>	
Minimum	1	Maximum	10000
Default	100	Units	ms
Type	16 Bit User Save	Update Rate	Read on module reset, Modbus interface reset or Modbus interface enable
Display Format	None	Decimal Places	0
Coding	RW, BU		

This parameter defines the time period in which the Modbus server must receive a message before any specified action (as defined in *Modbus timeout action* (**S.15.010**)) is performed. When the timeout occurs bit 1 in the module's alarm parameter (*Active Alarm Bits* (**S.00.009**)) will be set and the specified action will be performed.

The timeout is enabled when the server receives its first message.

<b>S.15.010</b>		<b>Modbus timeout action</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on module reset, Modbus interface reset or Modbus interface enable
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	Trip	Trip drive and raise error
1	No action	No action

Defines the action when no message is received within the time period specified in *Modbus timeout* (**S.15.009**).

<b>S.15.011</b>		<b>Modbus timeout event destination</b>	
Minimum	0	Maximum	4
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on module reset, Modbus interface reset or Modbus interface enable
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	This slot	Trigger module event in this slot
1	Slot 1	Trigger module event in slot 1
2	Slot 2	Trigger module event in slot 2
3	Slot 3	Trigger module event in slot 3
4	Slot 4	Trigger module event in slot 4

Defines the destination slot to trigger the event (defined by *Modbus timeout event type* (S.15.012)) when a timeout occurs.

<b>S.15.012</b>		<b>Modbus timeout event type</b>	
Minimum	0	Maximum	5
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on module reset, Modbus interface reset or Modbus interface enable
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	No event	No event
1	Trigger Event	Trigger module Event
2	Trigger Event 1	Trigger module Event 1
3	Trigger Event 2	Trigger module Event 2
4	Trigger Event 3	Trigger module Event 3
5	Trigger Event 4	Trigger module Event 4

Defines the event to trigger when a timeout occurs. *Modbus Timeout Event Destination* (S.15.011) must specify an appropriate consumer (slot option) of the event.

<b>S.15.013</b>		<b>Modbus register addressing mode</b>	
Minimum	0	Maximum	1
Default	0	Units	
Type	8 Bit User Save	Update Rate	Read on module reset, Modbus interface reset or Modbus interface enable
Display Format	None	Decimal Places	0
Coding	RW, Txt, BU		

<b>Value</b>	<b>Text</b>	<b>Description</b>
0	Standard	(mm x 100) + ppp - mm <= 162 and ppp <= 99
1	Modified	(mm x 256) + ppp - mm <= 63 and ppp <= 255

This parameter specifies the Modbus register addressing mode.

<b>S.15.020</b>		<b>Priority connection 1</b>	
Minimum	0 (Display: 0.0.0.0)	Maximum	4294967295 (Display: 255.255.255.255)
Default	0 (Display: 0.0.0.0)	Units	
Type	32 Bit User Save	Update Rate	Read on module reset, Modbus interface reset or Modbus interface enable
Display Format	IP Address	Decimal Places	0
Coding	RW, BU		

This parameter specifies an IP Address for a priority connection.

<b>S.15.021</b>		<b>Priority connection 2</b>	
Minimum	0 (Display: 0.0.0.0)	Maximum	4294967295 (Display: 255.255.255.255)
Default	0 (Display: 0.0.0.0)	Units	
Type	32 Bit User Save	Update Rate	Read on module reset, Modbus interface reset or Modbus interface enable
Display Format	IP Address	Decimal Places	0
Coding	RW, BU		

This parameter specifies an IP Address for a priority connection.

<b>S.15.022</b>		<b>Priority connection 3</b>	
Minimum	0 (Display: 0.0.0.0)	Maximum	4294967295 (Display: 255.255.255.255)
Default	0 (Display: 0.0.0.0)	Units	
Type	32 Bit User Save	Update Rate	Read on module reset, Modbus interface reset or Modbus interface enable
Display Format	IP Address	Decimal Places	0
Coding	RW, BU		

This parameter specifies an IP Address for a priority connection.

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## **6 Variable allocation menus**

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User program variables can be associated with a parameter to allow users to view variables on the drive's keypad or via comms. The parameters that can be associated are in the following menus and ranges.

Pr **70.000** to Pr **70.255**

Pr **71.000** to Pr **71.255**

Pr **72.000** to Pr **72.255**

Pr **73.000** to Pr **73.255**

Pr **74.000** to Pr **74.255**

Pr **75.000** to Pr **75.255**

# 7 Digital I/O

The MCi210 is equipped with three dedicated digital input terminals, one configurable digital input/output terminal and one dedicated digital output terminal.

The digital outputs are positive logic such that they are at 24 V when active and will supply up to 20 mA of current. The digital outputs are protected against short-circuit and overload. The trip threshold is 20 mA and if one trips both outputs will be deactivated.

The state of the inputs can be read using parameters S.04.001, S.04.002 and S.04.003 for the digital input 1, digital input 2 and digital input 3 terminals respectively.

Parameter S.004.004 will indicate the state of the digital I/O 4 terminal, regardless of whether it is configured as an input or output. It cannot be used to set the output. To set the digital I/O 4 terminal, when configured as an output, parameter S.04.011 should be used.

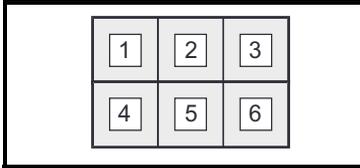
Parameter S.04.010 is used to set the state of the digital output 5 (dedicated output) terminal.

Parameter S.04.020 can also be used to set the state of the digital I/O 4 (bit 1) and digital output 5 (bit 0) terminals.

Event tasks can be configured to be run upon a digital input becoming active. This is configurable using parameter S.04.022.

See section 5.9 *Menu 4 - Digital I/O* on page 35 for further information.

**Figure 7-1 Digital I/O Connections**



**Table 7-1 6-way digital I/O pluggable connector pin out**

Terminal	Description
1	Digital input 1
2	Digital input 2
3	Digital input 3
4	Digital I/O 4
5	Digital Output 5
6	0 V common

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## 8 Timer

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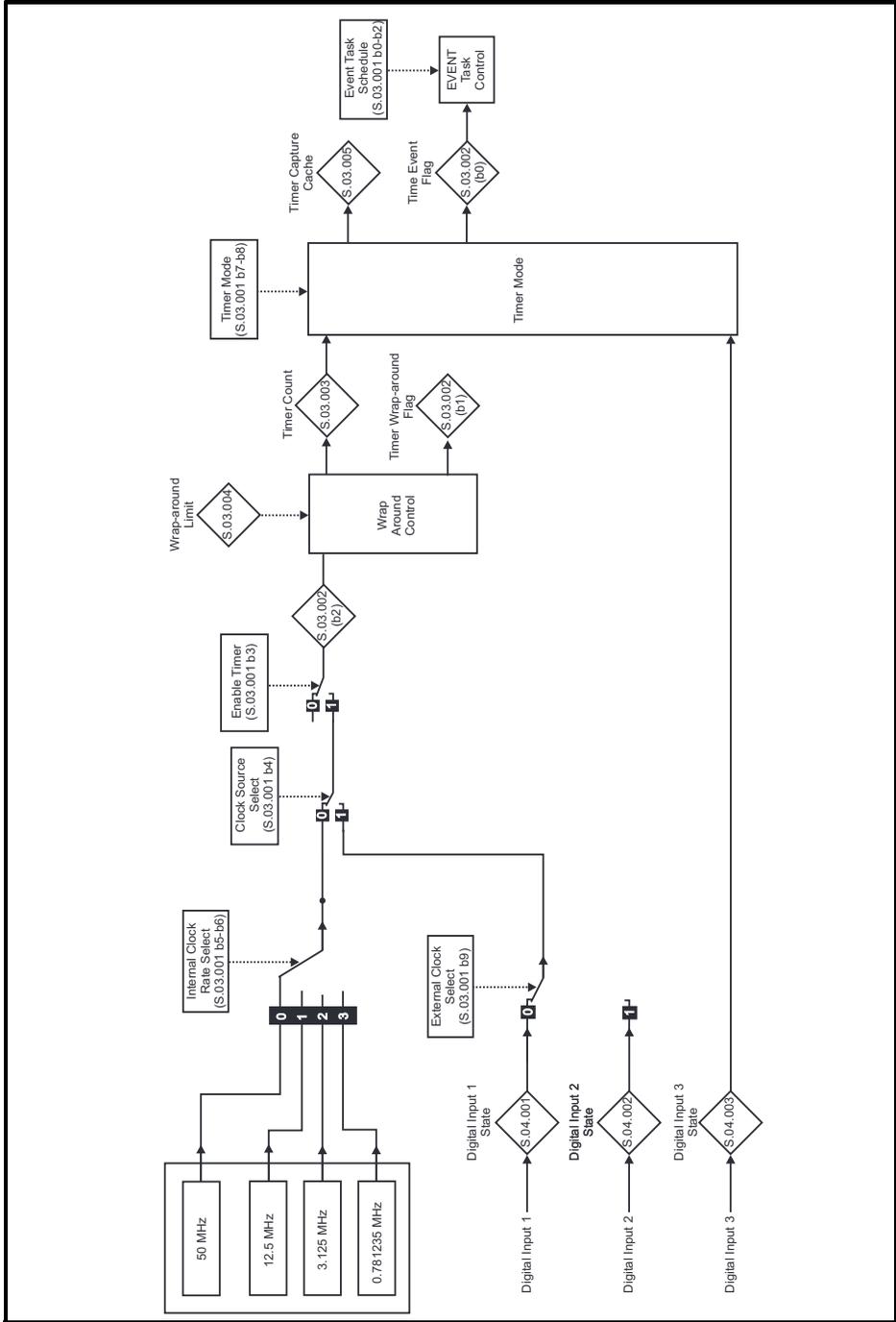
The MCI210 module offers timer functionality. The Timer Unit can be configured to be clocked from one of two digital inputs or the module's internal clock. When the internal clock is used, the frequency can be selected from four possible values; 50 MHz, 12.5 MHz, 3.125 MHz and 781.25 kHz.

Two modes of operation are supported; Free running mode or Capture mode. Capture mode allows the value of the Timer Unit counter to be captured using the module's digital input 3.

Event task triggering is also supported. One of four Event tasks may be configured to run on a Timer Event occurring. The Event will be either the capture of the counter value counter value rollover.

See section 5.8 *Menu 3 - Timer* on page 32 for further information.

Figure 8-1 Overview of the Timer Unit



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## **9 User programming**

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### **9.1 Machine Control Studio**

Machine Control Studio provides the development platform for MCI210. It is CoDeSys based Integrated Development Environment (IDE) compliant with IEC 61131-3 and allows the user to develop their MCI210 applications in a number of different languages including Structured Text (ST), Function Block Diagram (FBD), Ladder Diagrams (LD), Sequential Function Chart (SFC) and Instruction List (IL).

Machine Control Studio is specifically for use with MCI210 and Unidrive M onboard target and cannot be used to develop applications for other manufacturers' products.

# 10 Diagnostics

This chapter details the following:

- Run-time errors and trip codes
- Handling of run-time errors
- Ethernet network status
- Support

## 10.1 Run-time errors

A run-time error is an error which occurs in a specific operation of module. It can happen as a result of an error in the execution of the user's program (such as trying to write to a parameter that doesn't exist, or trying to divide a value by zero), a misconfiguration or a system error such as processor overload or watchdog time-out.

- The action taken when an error occurs may be one or more of the following:
- User program may be halted or prevented from starting
- Drive may be tripped on SlotX Error (where X is the slot number) with the sub-trip providing details of the exact fault.
- Drive may be tripped on another option module related trip.
- The ERROR task may be executed (if it exists).

Which of these occurs depends upon the type of error and the setting of the global run-time trip enable parameter Pr **S.01.014**.

## 10.2 Drive trip display codes

If the option module detects an error during operation, it will force a trip on the drive. However, the trip string displayed on the drive will only indicate which slot initiated the trip. The exact reason for the trip will be indicated in the drive trip code parameters (Pr **10.020** and Pr **10.070**).

The table below shows the possible trips that will be displayed on the drive when a problem is detected with the option module or when the option module initiates a trip.

**Table 10-1 Trip indications**

Trip	Description
<b>SlotX HF</b>	The drive has detected that an option module is present but is unable to communicate with it due to a hardware fault.
<b>SlotX Error</b>	User trip generated by the option module
<b>SlotX Not Fitted</b>	This trip will occur if a drive slot was previously configured with an option module but on power up, no option module was detected.
<b>SlotX Different</b>	This trip will occur if a drive slot was previously configured with an option module but on power up, a different option module was detected. Replacing the option module with another one of the same ID number will not initiate this trip. The trip will also occur if an option module is installed to a previously unused slot.

## 10.3 Run-time error codes

The *Run-time error code* parameter (Pr **S.01.049**) will show a text string describing the current module specific error condition. In certain conditions the drive will also be tripped. In these circumstances "SlotX Error" will be shown on the drive display along with the relevant sub-trip string.

**NOTE**

- "May" under Drive Trip indicates that the drive will only trip if the global run-time trip enable parameter is set
- "Not Run" under Program Halted indicates that the error occurs at initialization and the program will not be started.

**Table 10-2 Run-time error codes**

Value	Text	Trip Drive?	Halt User Program	Description
1	Param not exist	May	Yes	Parameter doesn't exist
2	Param read-only	May	Yes	Attempt to write to a read-only parameter
3	Param write-only	May	Yes	Attempt to read from a write-only parameter.
4	Param over range	May	Yes	Parameter value out of range. (User has written an illegal value to a parameter within their program.) If Pr <b>S.01.017</b> = 0 the value written will be automatically limited and no error will occur.
5	Param dec places	May	Yes	Invalid number of decimal places used.
6	Param type	May	Yes	Invalid parameter type used.
7	Param no 64-bit	May	Yes	No 64-bit parameter support.
8	Array bounds	May	Yes	Error in accessing an out of range index of an array.
9	Pointer alignmt	May	Yes	Error in the pointer alignment. The pointed address can't be accessed according to the pointer granularity.
10	Pointer address	May	Yes	Error in the pointer address. The pointed address is invalid or inaccessible from the user code.
11	DINT div err	May	Yes	Error in a DINT divisor. DINT divisor can't be 0.
12	LINT div err	May	Yes	Error in a LINT divisor. LINT divisor can't be 0.
13	LREAL div err	May	Yes	Error in a LREAL divisor. LREAL divisor can't be 0.
14	REAL div err	May	Yes	Error in a REAL divisor. REAL divisor can't be 0.
15	DINT range err	May	Yes	Error in DINT value range. The provided DINT value is out of the specified limits.
16	UDINT range err	May	Yes	Error in UDINT value range. The provided UDINT value is out of the specified limits.
17	User Requested	May	Yes	The user has requested to rise an error and trip the drive.
18	Watchdog err	May	Yes	Watchdog error. A user task has overrun.

### 10.3.1 Handling Run-Time Errors with the ERROR task

Certain run-time errors will cause the ERROR task to be invoked if it exists. This provides a convenient way to safely handle the error condition and take whatever action is necessary, such as a controlled stop of the system or signalling of an alarm.

When an ERROR task runs, all other tasks will have been stopped. Therefore the ERROR task has exclusive execution rights. Once the ERROR task has completed, the program ends and no other tasks operate.

**NOTE** Drive trips do not cause the ERROR task to run. Only certain user program errors do.

When the option module is reset (Pr **S.00.007** = On (1)), this will restart the user program (providing auto-run Pr **S.01.013**=1) and clear any drive trip. This reset action can be performed at any time, not just after a run-time error or in an ERROR task.

The task that caused a run-time error can be determined by reading Pr **S.01.050**.

## 10.4 Ethernet error codes

If the option module detects an Ethernet error during operation, it will force a SlotX Error trip on the drive with a sub trip string. Table 10-3 shows the possible Ethernet error codes and sub trip string.

**Table 10-3 Ethernet error codes**

Value	Sub trip string	Description
100	Link Loss	Network link has been lost
101	E/IP Timeout	An Ethernet/IP RPI timeout trip has occurred
102	E/IP Read Param	Invalid read consistency parameter, is parameter read only?
103	E/IP Write Param	Invalid write consistency parameter, is parameter read only?
104	E/IP Fault	An unexpected Ethernet/IP error has occurred
105	Modbus Timeout	The Modbus connection has timed out
106	Cyclic Timeout	Cyclic Rx link timeout
107	Cyclic RX Late	Cyclic Rx data was received late
108	INIT Switch	Ethernet switch initialization error
109	INIT PTP	IEEE1588 (Precision Time Protocol) initialization error
110	INIT Cyclic	Cyclic data initialization error
111	INIT Modbus	Modbus TCP initialization error
112	INIT SMTP	Email (SMTP) initialization error
113	INIT Ethernet/IP	Ethernet/IP initialization error
114	INIT TCP/IP	TCP/IP initialization error
115	Ethernet Failure	Ethernet controller initialization error
116	E/IP PLC IDLE	Ethernet/IP PLC Idle
117	Sync Task ORun	Synchronous task overrun

## 10.5 Module error codes

If the option module detects an internal error during operation, it will force a SlotX Error trip on the drive with a sub trip string. Table 10-4 shows the possible module error codes and sub trip string.

**Table 10-4 Module error codes**

Value	Sub trip string	Description
200	SW fault	Software fault
201	BG Orun	Background task overrun
202	FW invalid	Invalid firmware for hardware version
203	Drv unknown	Unknown drive type
204	Drv unsupported	Unsupported drive type
205	Mode unknown	Unknown mode
206	Mode unsupported	Unsupported mode
207	FLASH corrupt	Corrupted Non-volatile Flash
208	Dbase init	Database initialization error
209	FS init	File system initialization error
210	Memory alloc	Memory allocation error
211	Filesystem	File system error
212	Configuration	Configuration file error
213	Oht	Overheated
214	TO drv	The drive has not responded with the watchdog period
215	eCMP	eCMP comms failure
216	TO eCMP slot 1	Slot 1 eCMP timeout
217	TO eCMP slot 2	Slot 2 eCMP timeout
218	TO eCMP slot 3	Slot 3 eCMP timeout
219	TO eCMP slot 4	Slot 4 eCMP timeout
220	Output overload	Digital output overload
221	Factory Settings	Missing factory settings
222	Functional Test	Functional test failure
223	Config Restore	Configuration file restore error
224	Self Test Error	Power on self test error
225	Runtime Config	Runtime configuration error
226	Processor except	The processor has entered the exception state
227	Task Starvation	System task starvation
228	Runtime except	Runtime exception

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