Masterpact MTZ
Modbus Communication Guide

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

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

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

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

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Safety Information

Important Information

NOTICE

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

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

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

PLEASE NOTE

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

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

About the Book

At a Glance

Document Scope

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

- Masterpact™ MTZ1 circuit breakers from 630 to 1600 A
- Masterpact™ MTZ2 circuit breakers from 800 to 4000 A
- Masterpact™ MTZ3 circuit breakers from 4000 to 6300 A

Validity Note

This document is valid for Masterpact MTZ1/MTZ2/MTZ3 circuit breakers with a Micrologic X control unit and connected to an Ethernet network using:

- an IFE Ethernet interface for one circuit breaker
- an IFE Ethernet switchboard server or
- an EIFE embedded Ethernet interface for one Masterpact MTZ drawout circuit breaker

Related Documents

Title of Documentation	Reference Number
Masterpact MTZ1 Circuit Breakers and Switch-Disconnectors - User Guide	DOCA0100EN DOCA0100ES DOCA0100FR DOCA0100ZH
Masterpact MTZ2/MTZ3 Circuit Breakers and Switch-Disconnectors - User Guide	DOCA0101EN DOCA0101ES DOCA0101FR DOCA0101ZH
ULP (Universal Logic Plug) System - User Guide	DOCA0093EN DOCA0093ES DOCA0093FR DOCA0093ZH
IFE Ethernet Interface for One Circuit Breaker - User Guide	DOCA0084EN DOCA0084ES DOCA0084FR DOCA0084ZH
IFE Ethernet Interface for One Circuit Breaker - Instruction Sheet	HRB49218
EIFE Embedded Ethernet Interface for One Masterpact MTZ Drawout Circuit Breaker - User Guide	DOCA0106EN DOCA0106FR DOCA0106ES DOCA0106ZH
EIFE Embedded Ethernet Interface for One Masterpact MTZ Drawout Circuit Breaker - Instruction Sheet	NVE23550

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Chapter 1
Modbus Communication with Masterpact MTZ

What Is in This Chapter?

This chapter contains the following sections:

Section 1.1
Introduction

What Is in This Section?

This section contains the following topics:

Description

Modbus Communication

The Modbus communication option enables Schneider Electric low voltage circuit breakers to be connected to a supervisor or to any other device with a master Modbus communication channel.

The Modbus communication option is available for the Masterpact MTZ circuit breakers with the Micrologic X control unit and the ULP port module.

The Masterpact MTZ circuit breakers can be connected to an Ethernet network with Modbus TCP/IP protocol using an Ethernet interface:

- the IFE Ethernet interface for one circuit breaker
- the IFE Ethernet switchboard server
- the EIFE embedded Ethernet interface for Masterpact MTZ drawout circuit breaker

Access to Functions

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

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

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

Intelligent Modular Unit

Definition

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

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

ULP Modules Per Circuit Breaker Range

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

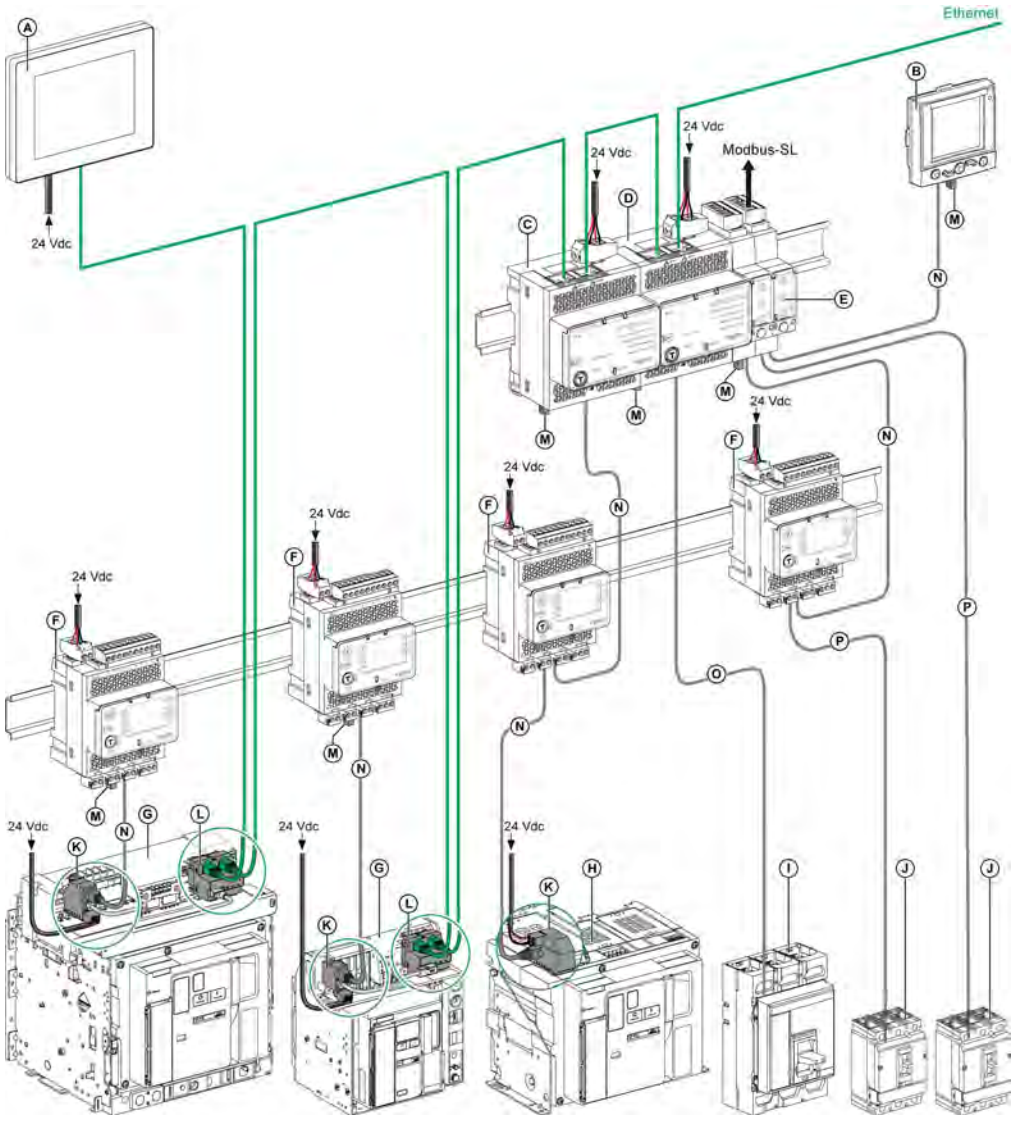
ULP Module	Part Number	Masterpact MTZ with ULP Port Module and Micrologic Control Unit	Masterpact NT/NW or Compact NS with BCM ULP Module and Micrologic Control Unit	Compact NSX with BSCM Module and/or Micrologic Trip Unit
IFE Ethernet interface for one circuit breaker	LV434010	✓ (1)	✓	✓
IFE Ethernet switchboard server	LV434011	✓ (1)	✓	✓
EIFE Embedded Ethernet interface for one Masterpact MTZ drawout circuit breaker	LV851001	✓	–	–
Spare part kit EIFE for one Masterpact MTZ1 drawout circuit breaker	LV851100SP	✓	–	–
Spare part kit EIFE for one Masterpact MTZ2/MTZ3 drawout circuit breaker	LV851200SP	✓	–	–
IFM Modbus-SL interface for one circuit breaker	TRV00210	–	✓	✓
FDM121 ULP display for one circuit breaker	TRV00121	–	✓	✓
IO input/output application module for one circuit breaker	LV434063	✓	✓	✓
UTA maintenance module	TRV00911	–	✓	✓

(1) ULP total network length is temporarily limited to a maximum of 5 meters (16.4 ft) for the following device combinations:

- Masterpact MTZ fixed version and IFE interface (LV434010 or LV434011)
- Masterpact MTZ fixed version and IFE interface (LV434010 or LV434011) and one IO module (LV434063)
- Masterpact MTZ fixed version and IFE interface (LV434010 or LV434011) and two IO modules (LV434063)

The limitation will be removed with the IFE interface with hardware version higher than 4.0.0.

Communication Architecture



A FDM128 Ethernet display for eight devices
B FDM121 ULP display for one circuit breaker
C IFE Ethernet interface for one circuit breaker
D IFE Ethernet switchboard server
E IFM Modbus-SL interface for one circuit breaker
F IO input/output application module for one circuit breaker
G Masterpact MTZ1 or MTZ2/MTZ3 drawout circuit breaker
H Masterpact MTZ1 or MTZ2/MTZ3 fixed circuit breaker
I Compact NS circuit breaker
J Compact NSX circuit breaker
K ULP port module
L EIFE Embedded Ethernet Interface for one Masterpact MTZ drawout circuit breaker
M ULP termination
N RJ45 male/male ULP cord
O Circuit breaker BCM ULP cord
P NSX cord

Component Part Numbers

The following table lists the part numbers for the components of the ULP system for the circuit breaker:

Product	Description	Part Number
IFM Modbus-SL interface for one circuit breaker	–	TRV00210
IFE Ethernet interface for one circuit breaker	–	LV434010
IFE Ethernet switchboard server	–	LV434011

Product	Description	Part Number
EIFE Embedded Ethernet interface for one Masterpact MTZ drawout circuit breaker	–	LV851001
Kit EIFE for one Masterpact MTZ1 drawout circuit breaker	–	LV851100SP
Kit EIFE for one Masterpact MTZ2/MTZ3 drawout circuit breaker	–	LV851200SP
ULP port module for Masterpact MTZ2/MTZ3 fixed circuit breaker	–	LV850061SP
ULP port module for Masterpact MTZ2/MTZ3 drawout circuit breaker	–	LV850062SP
ULP port module for Masterpact MTZ1 fixed circuit breaker	–	LV850063SP
ULP port module for Masterpact MTZ1 drawout circuit breaker	–	LV850064SP
Stacking accessory	Ten stacking accessories	TRV00217
BCM ULP circuit breaker communication module	–	33106
BSCM circuit breaker status control module	–	LV434205
IO input/output application module for one circuit breaker	–	LV434063
FDM121 ULP display for one circuit breaker	–	TRV00121
Surface-mounting accessory	–	TRV00128
UTA maintenance module	–	TRV00911
NSX cord	L = 0.35 m (1.15 ft)	LV434200
	L = 1.3 m (4.27 ft)	LV434201
	L = 3 m (9.84 ft)	LV434202
Circuit breaker BCM ULP cord	L = 0.35 m (1.15 ft)	LV434195
	L = 1.3 m (4.26 ft)	LV434196
	L = 3 m (9.84 ft)	LV434197
Insulated ULP module and circuit breaker ULP cord for system voltage greater than 480 Vac	L = 1.3 m (4.26 ft), U > 480 Vac (cord with female socket)	LV434204
RJ45 male/male ULP cord	L = 0.3 m (0.98 ft), ten cords	TRV00803
	L = 0.6 m (1.97 ft), ten cords	TRV00806
	L = 1 m (3.28 ft), five cords	TRV00810
	L = 2 m (6.56 ft), five cords	TRV00820
	L = 3 m (9.84 ft), five cords	TRV00830
	L = 5 m (16.40 ft), five cords	TRV00850
RJ45 female/female connector	Ten RJ45 female/female connectors	TRV00870
ULP line termination	Ten ULP terminations	TRV00880
Two-wire RS 485 isolated repeater module	–	TRV00211
Modbus line termination	Two Modbus cable terminations with impedance of 120 Ω + 1 nF	VW3A8306DRC
Modbus cable	Belden: 7 mm (0.27 in.) diameter shielded cable with two twisted pairs	3084 A
	Belden: 9.6 mm (0.38 in.) diameter (recommended) shielded cable with two twisted pairs	7895 A
	Cable with two twisted pairs without shielding drain wire	50965

Product	Description	Part Number
24 Vdc power supply	24/30 Vdc-24 Vdc-1 A-overvoltage category IV	54440
	48/60 Vdc-24 Vdc-1 A-overvoltage category IV	54441
	100/125 Vdc-24 Vdc-1 A-overvoltage category IV	54442
	110/130 Vac-24 Vdc-1 A-overvoltage category IV	54443
	200/240 Vac-24 Vdc-1 A-overvoltage category IV	54444
	380/415 Vac-24 Vdc-1 A-overvoltage category IV	54445
	100/500 Vac-24 Vdc-3 A-overvoltage category II	ABL8RPS24030

Remote Controller

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

Ecoreach Software

Overview

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

The Ecoreach software automatically discovers the smart devices and allows you to add the devices for an easy configuration. You can generate comprehensive reports as part of Factory Acceptance Test and Site Acceptance Test to replace your heavy manual work. Additionally, when the panels are under operation, any change of settings made can be easily identified and hence provides a system consistency during the operation and maintenance phase.

The Ecoreach software enables the configuration of the Masterpact MTZ devices with:

- Micrologic X control unit
- Communication interface modules: IFE interface and EIFE interface
- IO application modules
- M2C output module

For more information, refer to the *Ecoreach Online Help*.

The Ecoreach software is available at *www.schneider-electric.com*.

Key Features

The Ecoreach software performs the following actions for the supported devices and modules:

- Create projects by device discovery
- Safe repository of projects in Ecoreach cloud
- Upload settings to the device and download settings from the device
- Compare the settings between the project and the device
- Perform control actions in a secured way
- Generate and print the device settings report
- Perform a communication wiring test on the entire project and generate and print the test reports
- View the communication architecture between the devices in a graphical representation
- View the measurements, logs, and maintenance information
- Export Waveform capture
- View the status of device and IO module
- Check the system firmware compatibility status
- Upgrade to the latest device firmware
- Buy, install, or remove the Digital Modules

Section 1.2
IFE Ethernet Interfaces

What Is in This Section?

This section contains the following topics:

Introduction

Overview

The IFE interface enables an intelligent modular unit (IMU), for example a fixed Masterpact™ MTZ , or Masterpact™ NT/NW or Compact™ NSX circuit breaker to be connected to an Ethernet network. Each circuit breaker has its own IFE interface and a corresponding IP address.

Types of IFE Interface

There are two part numbers of the IFE interface:

- LV434010 - IFE Ethernet interface for one circuit breaker
  This type of IFE interface is an Ethernet interface for Compact™, PowerPact™, and Masterpact™ circuit breakers.
- LV434011 - IFE Ethernet switchboard server
  This type of IFE interface is an Ethernet interface for Compact, PowerPact, and Masterpact circuit breakers and a server for Modbus-SL (serial line) connected devices.

IFE Interface Features

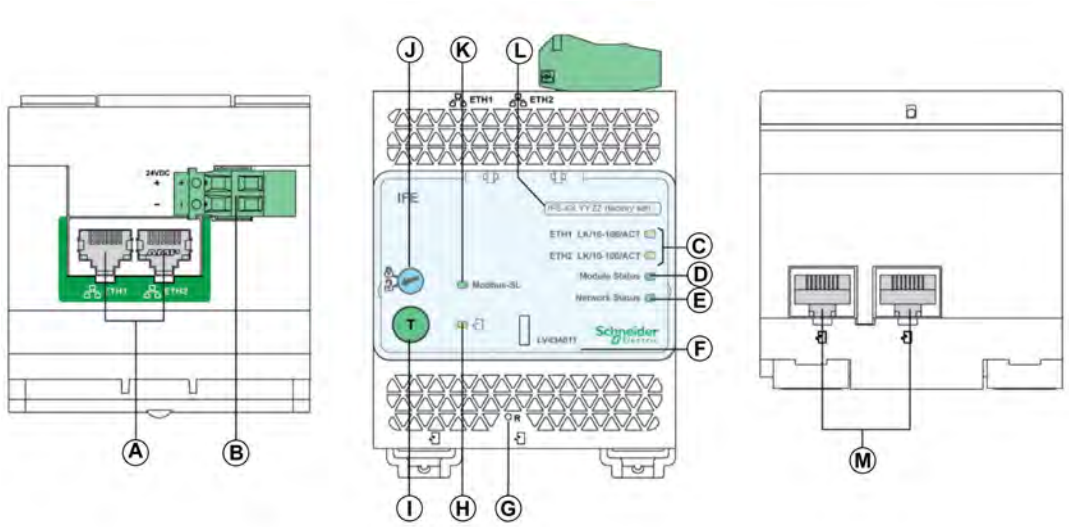
The main features of IFE interface are:

- Dual Ethernet port for simple daisy chain connection
- Device profile web service for discovery of the IFE interface on the local area network (LAN)
- ULP compliant for location of the IFE interface in the switchboard
- Ethernet interface for Compact, PowerPact, and Masterpact circuit breakers
- Server for Modbus-SL connected devices (only for the IFE server with the part number LV434011)
- Embedded setup webpages
- Embedded monitoring webpages
- Embedded control webpages
- Built-in email alarm notification

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

Hardware Description

Description



A Ethernet 1 and Ethernet 2 RJ45 communication ports
B 24 Vdc power supply terminal block
C Ethernet communication LEDs
D Module status LED
E Network status LED
F Sealable transparent cover
G Reset button
H ULP status LED
I Test button (accessible cover closed)
J Locking pad
K Modbus traffic status LED (IFE server only)
L Device name label
M Two RJ45 ULP ports

Mounting

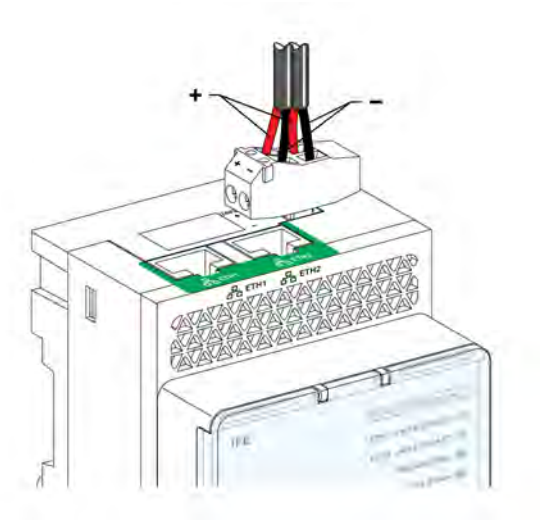
The IFE interface mounts on a DIN rail. The stacking accessory enables the connection of several IFM interfaces to an IFE server without additional wiring.

NOTE: The stacking feature is available only for the IFE server with the part number LV434011.

24 Vdc Power Supply

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

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



Ethernet Communication LEDs

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

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

Module Status LED

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

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

Network Status LED

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

LED Indication	Status Description
OFF	No power or no IP address
Steady green	Valid IP address
Steady red	Duplicated IP address

LED Indication	Status Description
Blinking green/red (250 ms green, 250 ms red)	Self test in progress
Steady amber	Error in IP configuration

Modbus Serial Line Traffic LED

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

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

NOTE: The LED is OFF on the IFE interface (part number LV434010).

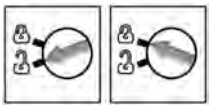
Modbus Address

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

The Modbus address is 255 and cannot be changed.

Locking Pad

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



- If the arrow points to the open padlock (factory setting), remote control commands are enabled.
- If the arrow points to the closed padlock, remote control commands are disabled.
  The only remote control command that is enabled even if the arrow points to the closed padlock is the set absolute time command.

Test Button

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

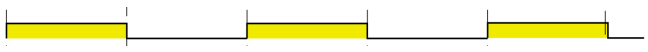
Time Range	Function
1–5 s	Tests the connection between all the ULP modules for 15 seconds.
10–15 s	Activates the hidden configuration mode for 5 minutes. **NOTE:** The hidden configuration is not activated if the button is pressed for more than 15 seconds.

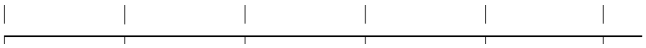
Reset Button

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

ULP LED

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

ULP LED	Mode	Action
	Nominal	None
	Conflict	Remove extra ULP module
	Degraded	Replace ULP module at the next maintenance operation
	Test	None
	Non-critical firmware discrepancy	Upgrade firmware at the next maintenance operation
	Non-critical hardware discrepancy	Replace ULP module at the next maintenance operation

ULP LED	Mode	Action
	Configuration discrepancy	Install missing features
	Critical firmware discrepancy	Upgrade firmware
	Critical hardware discrepancy	Replace ULP module
	Stop	Replace ULP module
	Power OFF	Check power supply

Schematics With Masterpact MTZ Circuit Breakers

Description

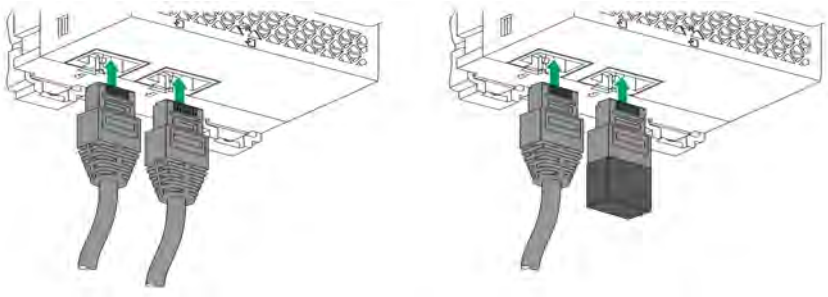
The IFE interface is connected to the Masterpact MTZ circuit breaker through its ULP port module.

ULP Connection

NOTICE
HAZARD OF EQUIPMENT DAMAGE ● The IFE RJ45 ports are for ULP modules only. ● Any other use can damage the IFE or the device connected to the IFE. ● To check if a ULP module is compatible with the IFE's RJ45 ports, refer to the *ULP System User Guide*. **Failure to follow these instructions can result in equipment damage.**

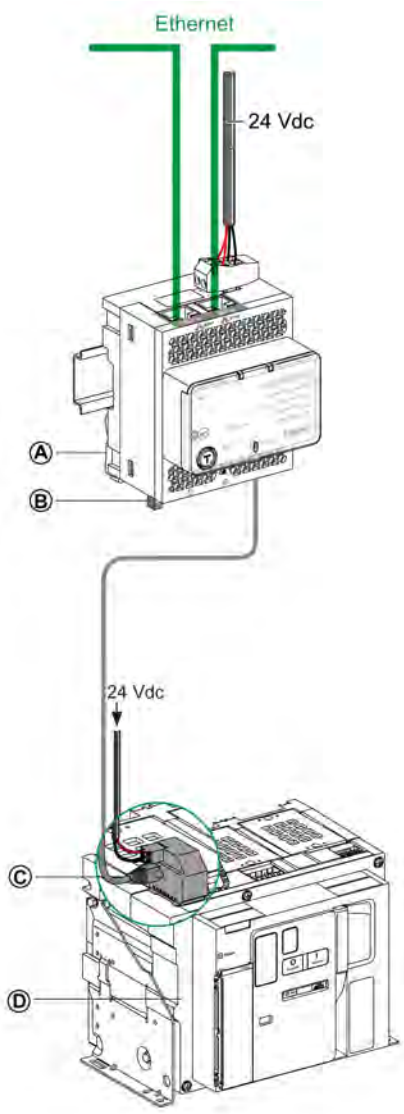
All connection configurations require the RJ45 male/male ULP cord.

When the second ULP RJ45 port is not used, it must be closed with a ULP terminator.



Connection of the IFE Interface to a Masterpact MTZ Circuit Breaker

Connect the IFE interface to the ULP port module on a Masterpact MTZ circuit breaker by using the ULP cord. The total length of the ULP cord between the ULP port module and the IFE interface is limited to 5 m (16.4 ft).



A IFE Ethernet interface for one circuit breaker
B ULP termination
C ULP port module
D Masterpact MTZ circuit breaker

Section 1.3
EIFE Ethernet Interface for Drawout Circuit Breaker

What Is in This Section?

This section contains the following topics:

Introduction

Overview

The EIFE interface enables one Masterpact™ MTZ drawout circuit breaker to be connected to an Ethernet network.

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

- Cradle connected
- Cradle disconnected
- Cradle test position

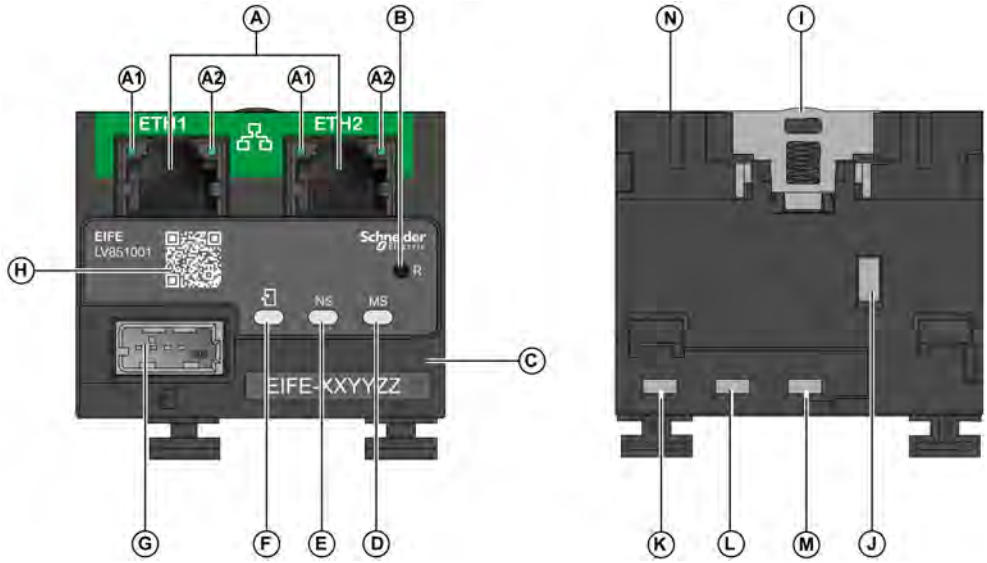
EIFE Interface Features

The main features of EIFE interface are:

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

Hardware Description

Description



A Two RJ45 Ethernet ports
A1 OFF: 10 Mbps
Steady green: 100 Mbps
A2 Steady green: link
Blinking green: activity
B IP reset button
C Device identification label
D Module status LED
E Network status LED
F ULP status LED
G USB mode ULP port
H QR code to product information
I DIN clip
J Grounding connection
K CT limit switch
L CE limit switch
M CD limit switch
N MAC ID

Mounting

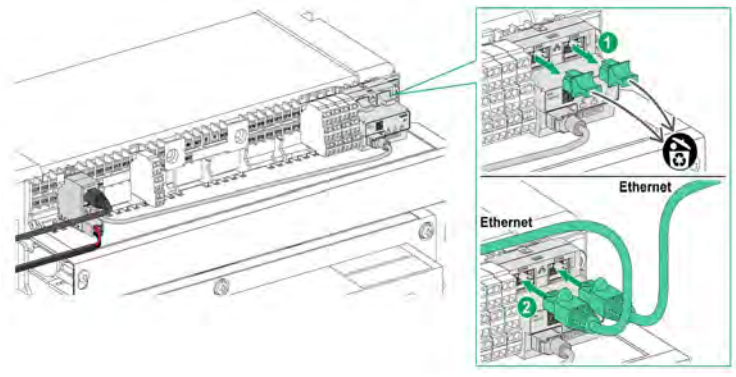
The EIFE interface is embedded in the cradle of the Masterpact MTZ circuit breaker.

24 Vdc Power Supply

The EIFE interface is powered by the ULP port module.

For more information, refer to the *ULP System User Guide*.

Ethernet Connection



Module Status LED

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

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

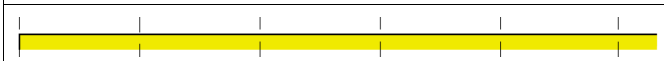
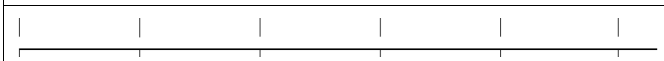
Network Status LED

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

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

ULP Status LED

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

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

Intrusive Command Mode

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

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

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

Reset Button

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

Cradle Position Contacts

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

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

Chapter 2
Modbus Protocol with Masterpact MTZ

What Is in This Chapter?

This chapter contains the following topics:

Modbus Master-Slave Principle

Overview

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

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

Characteristics of the Master-Slave Principle

The master-slave principle is characterized as follows:

- Only 1 master is connected to the network at the same time.
- Only the master can initiate communication and send requests to the slaves.
- The master can address each slave individually using its specific address or all slaves simultaneously using address 0.
- The slaves can only send replies to the master.
- The slaves cannot initiate communication, neither to the master nor to other slaves.

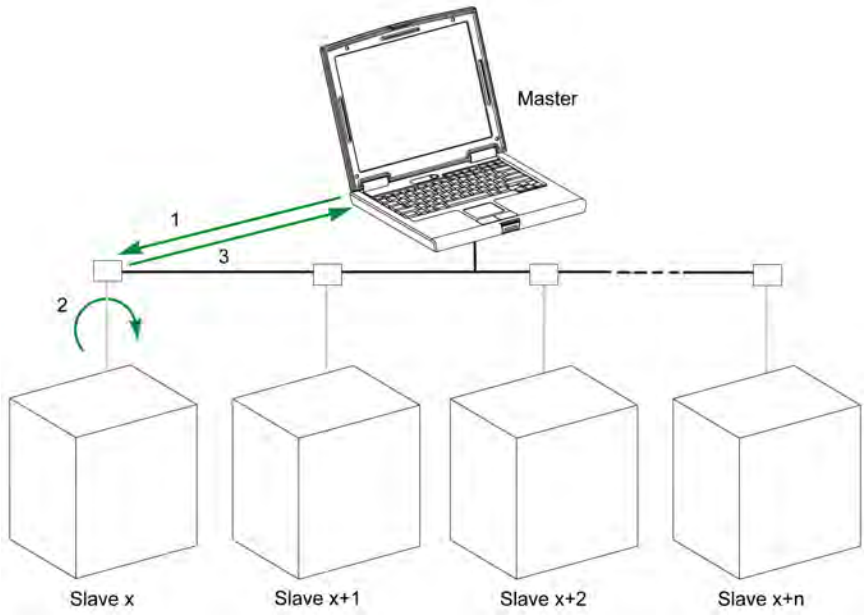
Master-Slave Communication Modes

The Modbus protocol can exchange information using 2 communication modes:

- unicast mode
- broadcast mode

Unicast Mode

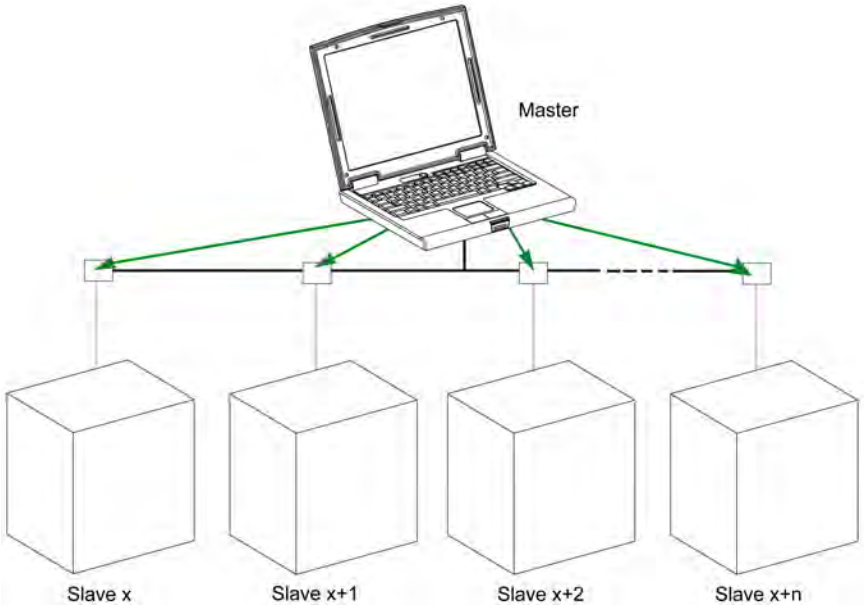
In unicast mode, the master addresses a slave using the specific address of the slave. The slave processes the request then replies to the master.



1 Request
2 Process
3 Reply

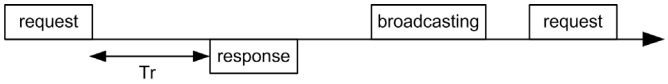
Broadcast Mode

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



Response Time

The response time Tr is the time needed by a slave to respond to a request sent by the master:



Values with the Modbus protocol:

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

Data Exchange

The Modbus protocol uses 2 types of data:

- Single bit
- Register (16 bits)

Masterpact MTZ circuit breakers support registers only.

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

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

Registers and Addresses

The address of register number n is n-1. The tables detailed in the following parts of this document provide both register numbers (in decimal format) and corresponding addresses (in hexadecimal format). For example, the address of register number 12000 is 0x2EDF (11999).

Frames

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

Field	Definition	Size	Description
1	Slave number	1 byte	Destination of the request ● 0: Broadcasting (all slaves concerned) ● 1–247: Unique destination ● 248–255: Reserved
2	Function codes	1 byte	Refer to function codes description *(see page 35)*
3	Data	n registers	Request or reply data
4	CRC error checking	2 bytes	CRC16 (to check the content of the entire transmission message)

Modbus Functions

General Description

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

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

Read Functions

The following read functions are available:

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

Read Register Example

The following table shows how to read the RMS current on phase 1 (I1) in registers 21037 and 21038. The address of register 21037 is 21037 - 1 = 21036 = 0x522C. The Modbus address of the Modbus slave is 47 = 0x2F.

Master Request		Slave Reply	
Field Name	**Example**	**Field Name**	**Example**
Modbus slave address	0x2F	Modbus slave address	0x2F
Function code	0x03	Function code	0x03
Address of the register to read (MSB)	0x52	Data length in bytes	0x04
Address of the register to read (LSB)	0x2C	Register 1 value (MSB)	0x44
Number of registers (MSB)	0x00	Register 1 value (LSB)	0x0A
Number of registers (LSB)	0x02	Register 2 value (MSB)	0xC0
CRC (MSB)	0xXX	Register 2 value (LSB)	0x00
CRC (LSB)	0xXX	CRC (MSB)	0xXX
–		CRC (LSB)	0xXX

The content of registers 21037 and 21038 in FLOAT32 is 0x440AC000. Therefore, the RMS current on phase 1 (I1) is 555.00 A.

Get Date and Time Example

The following table shows how to get the date and time of a Modbus slave.The Modbus address of the Modbus slave is 47 = 0x2F.

Master Request		Slave Reply	
Field Name	**Example**	**Field Name**	**Example**
Modbus slave address	0x2F	Modbus slave address	0x2F
Function code	0x2B	Function code	0x2B
Subfunction code	0x0F	Subfunction code	0x0F
Reserved	0x00	Reserved	0x00
–	–	Date and time	Refer to the DATETIME data type.

Set Date and Time Example

The following table shows how to set date and time of a Modbus slave. The Modbus address of the Modbus slave is 47 = 0x2F, the new date is October 2, 2014, and the new time is 2:32:03:500 p.m.

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

Master Request		Slave Reply	
Field Name	**Example**	**Field Name**	**Example**
Modbus slave address	0x2F	Modbus slave address	0x2F
Function code	0x2B	Function code	0x2B
Subfunction code	0x10	Subfunction code	0x10
Reserved1	0x00	Reserved1	0x00
Not used	0x00	Not used	0x00
Year = 2014	0x0E	Year = 2014	0x0E
Month = October	0x0A	Month = October	0x0A
Day Of Month = 2	0x02	Day Of Month = 2	0x02
Hour = 14	0x0E	Hour = 14	0x0E
Minutes = 32	0x20	Minutes = 32	0x20
3 sec. 500 ms	0x0DAC	3 sec. 502 ms	0x0DAE

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

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

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

Scattered Holding Register Read Function

The scattered holding register read function is available:

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

The maximum value for n is 100.

The scattered holding register read function enables the user to:

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

Scattered Holding Register Read Example

The following table shows how to read the addresses of the register 664 (address 0x0297) and register 666 (address 0x0299) of a Modbus slave. The Modbus address of the Modbus slave is 47 = 0x2F.

Master Request		Slave Reply	
Field Name	**Example**	**Field Name**	**Example**
Modbus slave address	0x2F	Modbus slave address	0x2F
Function code	0x64	Function code	0x64
Data length in bytes	0x06	Data length in bytes	0x06
Subfunction code	0x04	Subfunction code	0x04
Transmission number(1)	0xXX	Transmission number(1)	0xXX
Address of first register to read (MSB)	0x02	Value of the first register read (MSB)	0x12
Address of first register to read (LSB)	0x97	Value of the first register read (LSB)	0x0A
Address of second register to read (MSB)	0x02	Value of the second register read (MSB)	0x74
(1) The master gives the transmission number in the request. The slave returns the same number in the reply.			

Master Request		Slave Reply	
Field Name	**Example**	**Field Name**	**Example**
Address of second register to read (LSB)	0x99	Value of the second register read (LSB)	0x0C
CRC (MSB)	0xXX	CRC (MSB)	0xXX
CRC (LSB)	0xXX	CRC (LSB)	0xXX
(1) The master gives the transmission number in the request. The slave returns the same number in the reply.			

Write Functions

The following write functions are available:

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

Diagnostic Functions

The following diagnostic functions are available:

Function Code	Subfunction Code (2 bytes)	Name	Description
8 (0x08)	10 (0x000A)	Clear counters and diagnostic register	Reset all diagnostic counters
8 (0x08)	11 (0x000B)	Return bus message counter	Read the counter of correct bus messages managed by the slave
8 (0x08)	12 (0x000C)	Return bus communication error counter	Read the counter of incorrect bus messages managed by the slave
8 (0x08)	13 (0x000D)	Return bus exception error counter	Read the counter of exception responses managed by the slave
8 (0x08)	14 (0x000E)	Return slave message counter	Read the counter of messages sent to the slave
8 (0x08)	15 (0x000F)	Return slave no response counter	Read the counter of broadcast messages
8 (0x08)	16 (0x0010)	Return slave negative acknowledge counter	Read the counter of messages sent to the slave but not answered because of the Negative Acknowledge exception code 07
8 (0x08)	17 (0x0011)	Return slave busy counter	Read the counter of messages sent to the slave but not answered because of the Slave Device Busy exception code 06
8 (0x08)	18 (0x0012)	Return bus overrun counter	Read the counter of incorrect bus messages due to overrun errors
11 (0x0B)	–	Get communication event counter	Read Modbus event counter

Diagnostic Counters

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

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

Counters Reset

The diagnostic counters are reset to 0 when:

- the maximum value 65535 is reached
- they are reset by a Modbus command (function code 8, sub-function code 10)
- the power supply is lost
- the communication parameters are modified.

Modbus Exception Codes

Exception Responses

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

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

Exception Frame

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

Field	Definition	Size	Description
1	Slave number	1 byte	Destination of the request ● 1–247: Unique destination
2	Exception function code	1 byte	Request function code + 128 (0x80)
3	Exception code	n bytes	See next paragraph
4	CRC error checking	2 bytes	CRC16 (to check the content of the entire transmission messages)

Exception Codes

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

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

The following table describes the exception codes handled by the circuit breaker:

Exception Code	Name	Description
01 (0x01)	Illegal function	The function code received in the request is not an authorized action for the slave. The slave may be in the wrong state to process a specific request.
02 (0x02)	Illegal data address	The data address received by the slave is not an authorized address for the slave.
03 (0x03)	Illegal data value	The value in the request data field is not an authorized value for the slave.
04 (0x04)	Slave device failure	The slave fails to perform a requested action because of an unrecoverable error.
05 (0x05)	Acknowledge	The slave accepts the request but needs a long time to process it.
06 (0x06)	Slave device busy	The slave is busy processing another command. The master must send the request once the slave is available.
07 (0x07)	Negative acknowledgment	The slave cannot perform the programming request sent by the master.
08 (0x08)	Memory parity error	The slave detects a parity error in the memory when attempting to read extended memory.
10 (0x0A)	Gateway path unavailable	The gateway is overloaded or not correctly configured.
11 (0x0B)	Gateway target device failed to respond	The slave is not present on the network.

Illegal Data Address

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

You can upgrade the firmware of the IMU modules by using the Ecoreach software.

Write Protection

General Description

⚠ WARNING

HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP

Protection setting adjustments must be done only by trained electrical personnel.

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

Remote modifications of Modbus registers can either be dangerous to personnel near the circuit breaker or can cause equipment damage if the protection settings are altered.Therefore, remote control commands are protected by password or by configuration *(see page 42)*.

Software Protection

To prevent an inadvertent change to the Micrologic control unit configuration, remote modifications of the Modbus registers are protected by both of the following:

- a robust data structure and a set of dedicated Modbus registers
- a multi-level password scheme

The software protection of the write function is performed by the command interface. In case of incorrect write request, an error code is returned and the operation is not performed. The hardware protection has always precedence over the software protection.

Password Management

General Description

4 passwords are defined, each one corresponding to a level.

A level is assigned to a role:
- Levels 1, 2, and 3 are used for general-purpose roles, like an operator role.
- Level 4 is the administrator level. The administrator level is required to write the settings to the Micrologic control units using the Ecoreach software *(see page 16)*.

Each intrusive command via the command interface is protected by a password. The password level for each intrusive command is indicated in the description of the command.

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

Initial Passwords

The password values set in factory are:

Password Level	Factory Setting
Level 1	'1111' = 0x31313131
Level 2	'2222' = 0x32323232
Level 3 (operator level)	'3333' = 0x33333333
Level 4 (administrator level)	'0000' = 0x30303030

Password Modification

Passwords can be modified with the Ecoreach software *(see page 16)*.

Passwords are composed of exactly 4 ASCII characters. They are case-sensitive and the allowed characters are:
- digits from 0 to 9
- letters from a to z
- letters from A to Z

Password Reset

It is possible to reset the passwords to their factory settings with the Ecoreach software *(see page 16)* and the support of the Schneider Electric Customer Care Center.

It is necessary to reset the passwords in the following 3 cases:
- When a password is forgotten.
- When a new module is added in the IMU: for example, an IO module.
- When a faulty module is replaced in the IMU.

Command Interface

General Description

The command interface is used to:
- send remote commands
- send remote control commands

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

Remote control commands are intrusive commands and can either be dangerous to personnel near the circuit breaker or can cause equipment damage if the protection settings are altered. Therefore, remote control commands are:
- protected by password where a password is required in the command
- protected by configuration:
  - with the IFE interface, the remote control commands are enabled when the locking pad on the IFE interface is in the open position.
  - with the EIFE interface, the remote control commands are enabled when the intrusive command mode is unlocked by EIFE configuration using the Ecoreach software *(see page 16)*.

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

NOTE: In case of a multimaster Modbus application, one application must wait for the complete execution of one command before sending its next command.

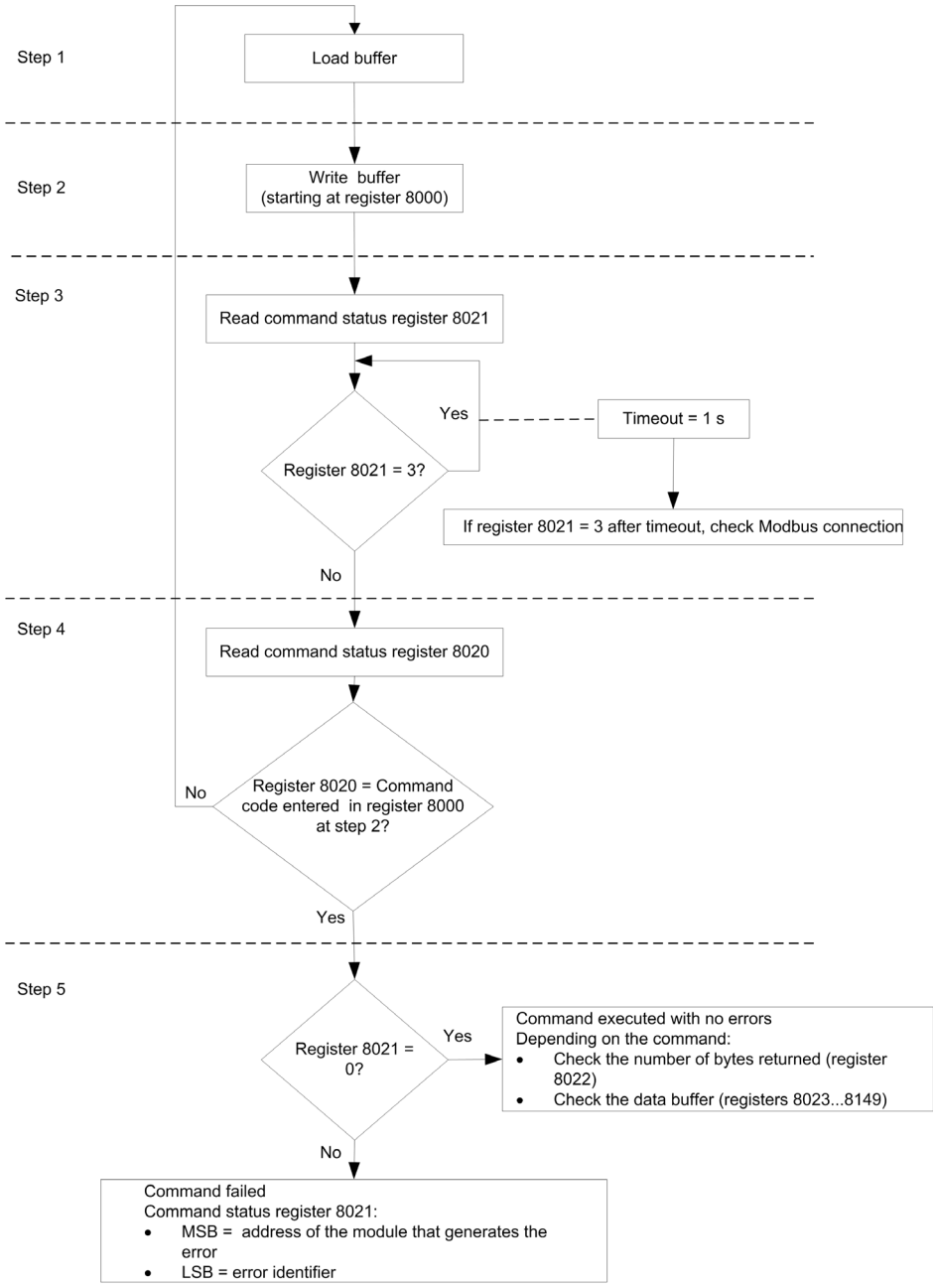
Executing a Command

Follow these steps to execute a command:

Step	Action
1	Load a buffer.
2	Write this buffer with a write request (Modbus function 16) starting at register 8000.
3	Read the command status register 8021, and wait while its content shows that the command is still in progress (0x0003). If the command status does not change after a timeout (1 s), check the Modbus connection.
4	Read the command status register 8020: ● If content of register 8020 is the command code entered in register 8000 at step 2, go to next step. ● If content of register 8020 is different from the command code entered in register 8000 at step 2, restart at step 1.
5	Read the error code in the LSB of register 8021: ● If LSB ≠ 0, then the command failed. Check the error code to understand the cause (see next paragraph). For example, if register 8021 returns 4609 (0x1201), then the error code is 1, which means that the password level is not correct (insufficient user rights). ● If LSB = 0, then the command is executed with no errors.

Command Diagram

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



Command Data Structure

The command data structure is defined as a set of values written in registers 8000 to 8149.

The 3 main areas are:

- Input parameters: registers 8000 to 8015
  The command-specific parameters are in registers 8006 to 8015.
- Command status: register 8021
- Returned values: registers 8022 to 8149

Address	Register	Description	Comments
0x1F3F	8000	Command code	Writing at this register triggers the command using the parameters in the following registers.
0x1F40	8001	Parameter length	Number of bytes used for the parameters including this one (from 10 to 30). This value is provided for each command.
0x1F41	8002	Destination	A constant value provided for each command. Factory setting: 0x0000

Address	Register	Description	Comments
0x1F42	8003	Security type	A constant value provided for each command: ● 0 for non-intrusive commands not protected by password ● 1 for intrusive commands protected by a password
0x1F43 0x1F44	8004 8005	Password	The password is composed of 4 ASCII bytes. The password level to use depends on the command. This information is provided for each command.
0x1F45–0x1F4E	8006–8015	Additional parameters	Additional parameters define how the command is performed. Some commands have no additional parameters.
0x1F4F	8016	Reserved	Must be set to 0 (factory setting).
0x1F50	8017	Reserved	Must be set to 8019 (factory setting).
0x1F51	8018	Reserved	Must be set to 8020 (factory setting).
0x1F52	8019	Reserved	Must be set to 8021 (factory setting).
0x1F53	8020	Last command code	When the command has been executed, it holds the last command code.
0x1F54	8021	Command status	When the command exits the busy state, it holds the completion code.
0x1F55	8022	Data buffer size	Number of bytes returned.
0x1F56–0x1FD4	8023–8149	Data buffer	Returned values. It is empty if the previous register is 0.

Command Status

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

When the command generates error, the command status register contains the error code and the address of the module that generates the error.

Module Returning the Command Result

The following table lists the addresses of the modules:

Module Address	Module
1 (0x01)	UTA maintenance module
2 (0x02)	FDM121 ULP display for one circuit breaker
3 (0x03)	IFM Modbus-SL interface for one circuit breaker
17 (0x11)	BSCM circuit breaker status control module for Compact NSX
18 (0x12)	BCM ULP circuit breaker communication module for Masterpact NT/NW and Compact NS
20 (0x14)	Micrologic control unit of Compact NSX
21 (0x15)	Micrologic control unit of Masterpact MTZ
32 (0x20)	IO input/output application module 1 for one circuit breaker
33 (0x21)	IO input/output application module 2 for one circuit breaker
34 (0x22)	● IFE Ethernet interface for one circuit breaker ● IFE Ethernet switchboard server ● EIFE embedded Ethernet interface for one Masterpact MTZ circuit breaker

NOTE: The Micrologic control units of Masterpact NT/NW and Compact NS circuit breakers do not have an IMU module address.

Result of the Command

The codes listed in the following table are generic. If a module or a command generates specific result codes, they are described after the corresponding command.

Code	Description
0 (0x00)	Successful command
1 (0x01)	Insufficient user rights (incorrect password)
2 (0x02)	Access violation (IFE locking pad is locked *(see page 21)* or EIFE intrusive command mode is locked) *(see page 29)*
3 (0x03)	Unable to perform a read access
4 (0x04)	Unable to perform a write access
5 (0x05)	Unable to execute service (IFM locking pad locked)
6 (0x06)	Not enough memory

Code	Description
7 (0x07)	Allocated memory is too small
8 (0x08)	Resource is not available
9 (0x09)	Resource does not exist
10 (0x0A)	Resource already exists
11 (0x0B)	Resource is out of order
12 (0x0C)	Access out of available memory
13 (0x0D)	String is too long
14 (0x0E)	Buffer is too small
15 (0x0F)	Buffer is too big
16 (0x10)	Input argument is out of range
17 (0x11)	Requested security level is not supported
18 (0x12)	Requested component is not supported
19 (0x13)	Command is not supported
20 (0x14)	Input argument has an unsupported value
21 (0x15)	Internal error during command
22 (0x16)	Timeout during command
23 (0x17)	Checksum error during command
24 (0x18)	Unsupported destination
151 (0x97)	Circuit breaker tripped, reset before commands
152 (0x98)	Circuit breaker already closed
153 (0x99)	Circuit breaker already open
154 (0x9A)	Circuit breaker already reset
155 (0x9B)	Actuator in manual mode
156 (0x9C)	Actuator not present
157 (0x9D)	Bad ASIC configuration
158 (0x9E)	Previous command in progress
159 (0x9F)	Reset command forbidden
160 (0xA0)	Inhibit mode on
169 (0xA9)	Already in asked state
170 (0xAA)	Unable to preset counters
171 (0xAB)	Output command rejected, already assigned
172 (0xAC)	Emitter not allowed to perform the command
173 (0xAD)	Mode not relevant with requested command
180 (0xB4)	Wireless component not started
190 (0xBE)	Read and get an invalid value
191 (0xBF)	License is not installed

Command Not Supported

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

You can upgrade the firmware of the IMU modules by using the Ecoreach software.

Command Examples

Open Circuit Breaker

The following table details the steps to perform in the master remote device to send a remote control command to open the circuit breaker. The command itself has no parameters.

Step	Action
1	Load a buffer of 20 registers, word0 to word19. ● Load into word0 the value 904, the code corresponding to the open circuit breaker command. ● Load into word1 the value 10, the length of the input parameters. The command itself has no parameters, 10 is the length of the fixed part. ● Load into word2 the value 5377 (0x1501), the destination. This value is a constant for the command. It is provided in the command description. ● Load into word3 the value 1. ● Load into word4 and word5 the 4 ASCII bytes for the level 3 or level 4 password. Assuming this password is 'ABcd', load 16706 (0x4142) into word #4 and 25444 (0x6364) into word #5. ● Load into word6 to word16 the value 0. ● Load into word17 the value 8019, a command setup constant. ● Load into word18 the value 8020, a command setup constant. ● Load into word19 the value 8021, a command setup constant.
2	Write this buffer with a write request (Modbus function 16) of 20 registers, starting at register 8000.
3	Read the command status register 8021, and wait while its content shows that the command is still in progress (0x0003). If the command status does not change after a timeout (1 s), check the Modbus connection.
4	Read the command status register 8020: ● If content of register 8020 is the command code entered in register 8000 at step 2, go to next step. ● If content of register 8020 is different from the command code entered in register 8000 at step 2, restart at step 1.
5	Read the error code in the LSB of register 8021: ● If LSB ≠ 0, then the command failed. Check the error code to understand the cause (see next paragraph). For example, if register 8021 returns 4609 (0x1201), then the error code is 1, which means that the password level is not correct (insufficient user rights). ● If LSB = 0, then the command was executed with no errors.

Reset Energy Measurements

The following table details the steps to perform to send a command to reset the energy measurements *(see page 126)*. The command itself has one parameter.

Step	Action
1	Load a buffer of 20 registers, word0 to word19. ● Load into word0 the value 46728, the code corresponding to the reset minimum/maximum command. ● Load into word1 the value 12, the length of the input parameters. The command itself has one parameter, add 2 bytes to 10 which is the length of the fixed part. ● Load into word2 the value 5377 (0x1501), the destination. This value is a constant for the command. It is provided in the command description. ● Load into word3 the value 1. ● Load into word4 and word5 the 4 ASCII bytes for the level 3 or level 4 password. Assuming this password is 'Pw57', load 20599 (0x5077) into word #4 and 13623 (0x3537) into word #5. ● Load into word6 the value 512 (bit 9 set to one). This value requires all energy measurements to be reset. ● Load into word7 to word16 the value 0. ● Load into word17 the value 8019, a command setup constant. ● Load into word18 the value 8020, a command setup constant. ● Load into word19 the value 8021, a command setup constant.
2	Write this buffer with a write request (Modbus function 16) of 20 registers, starting at register 8000.
3	Read the command status register 8021, and wait while its content shows that the command is still in progress (0x0003). If the command status does not change after a timeout (1 s), check the Modbus connection.
4	Read the command status register 8020: ● If content of register 8020 is the command code entered in register 8000 at step 2, go to next step. ● If content of register 8020 is different from the command code entered in register 8000 at step 2, restart at step 1.
5	Read the error code in the LSB of register 8021: ● If LSB ≠ 0, then the command failed. Check the error code to understand the cause (see next paragraph). For example, if register 8021 returns 4609 (0x1201), then the error code is 1, which means that the password level is not correct (insufficient user rights). ● If LSB = 0, then the command was executed with no errors.

Read Date and Time

The following table details the steps to perform to send a command to read the date and time *(see page 135)*. The command itself has no parameters.The date and time are returned in a buffer.

Step	Action
1	Load a buffer of 20 registers, word0 to word19. ● Load into word0 the value 768, the code corresponding to the read date/time command. ● Load into word1 the value 10, the length of the input parameters. The command itself has no parameters, the length is the length of the fixed part which is 10. ● Load into word2 the value 5377 (0x1501), the destination. This value is a constant for the command. It is provided in the command description. ● Load into word3 the value 0. ● Load into word4 and word5 the value 0x0000 (no password required). ● Load into word6 to word16 the value 0. ● Load into word17 the value 8019, a command setup constant. ● Load into word18 the value 8020, a command setup constant. ● Load into word19 the value 8021, a command setup constant.
2	Write this buffer with a write request (Modbus function 16) of 20 registers, starting at register 8000.
3	Read the command status register 8021, and wait while its content shows that the command is still in progress (0x0003). If the command status does not change after a timeout (1 s), check the Modbus connection.
4	Read the command status register 8020: ● If content of register 8020 is the command code entered in register 8000 at step 2, go to next step. ● If content of register 8020 is different from the command code entered in register 8000 at step 2, restart at step 1.
5	Read the error code in the LSB of register 8021: ● If LSB ≠ 0, then the command failed. Check the error code to understand the cause (see next paragraph). For example, if register 8021 returns 783 (0x030F), then the error code is 15 (0x0F), which means that the input argument is out of range (too many parameters). ● If LSB = 0, then the command was executed with no errors.
6	If there were no errors, read the data buffer length in register 8022. Its value must be 8 for this command.
7	In the data buffer: ● register 8023 holds the month in the MSB, the day in the LSB. ● register 8024 holds the year offset in the MSB (add 2000 to get the year) and the hour in the LSB. ● register 8025 holds the minutes in the MSB, the seconds in the LSB. ● register 8026 holds the milliseconds.

Date Management

Introduction

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

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

1. External synchronization: The Modbus master synchronizes the Micrologic X control unit, IFE or EIFE Ethernet interface.
2. Internal synchronization: The Micrologic X control unit, IFE or EIFE Ethernet interface synchronizes all ULP modules connected in the IMU.

External Synchronization

There are several ways to externally synchronize the Micrologic X control unit, IFE or EIFE Ethernet interface:

- Manually:
  - with the Ecoreach software *(see page 16)*.
  - on the Micrologic X display screen, at **Home → Configuration → General → Date & Time**.
- Automatically with the Modbus master using:
  - either the Modbus set date and time request, function code 43 (0x2B) and subfunction code 16 (0x10). The Modbus request is broadcasted to several communication interfaces to synchronize them or to one specific communication interface,
  - or the set absolute time command to the Micrologic X control unit, IFE or EIFE interface using the command interface.

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

Internal Synchronization

When the Micrologic X control unit, IFE or EIFE Ethernet interface receives the date and time, it broadcasts the date and time to all the ULP modules connected in the IMU.

Modbus Registers Tables

General Description

The following chapters describe the Modbus registers of the Micrologic control unit and the Modbus registers of the modules connected to it. These registers provide information that can be read, such as electrical measures, and monitoring information. The command interface enables modification of these registers in a controlled way.

The presentation rules of the Modbus registers are as follows:

- For each module, the registers are grouped in tables of logically related information, according to the module they relate to:
  - Micrologic control unit *(see page 80)*
  - IO module *(see page 142)*
  - IFE or EIFE Ethernet interface *(see page 180)*
- For some modules, the files are described separately.
- For each module, the commands are described separately:
  - Micrologic control unit *(see page 102)*
  - IO module *(see page 168)*
  - IFE or EIFE Ethernet interface *(see page 187)*

To find a register, use the ordered list of the registers with a cross reference to the page where these registers are described.

Table Format

Register tables have the following columns:

Address	Register	RW	Unit	Type	Range	Bit	Description

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

Data Types

Data Types	Description	Range
INT16U	16-bit unsigned integer	0 to 65535
INT16	16-bit signed integer	-32768 to +32767
INT32U	32-bit unsigned integer	0 to 4 294 967 295
INT32	32-bit signed integer	-2 147 483 648 to +2 147 483 647
INT64U	64-bit unsigned integer	0 to 18 446 744 073 709 600 000
INT64	64-bit signed integer	-9 223 372 036 854 775 808 to +9 223 372 036 854 775 807
FLOAT32	32-bit signed integer with a floating point	2^{-126} (1.0) to 2^{127} (2 - 2^{-23})
OCTET STRING	Text string	1 byte per character
XDATE	Date and time of ULP modules	–
DATETIME	Date and time in the IEC 60870-5 format	–

Big-Endian Format

INT32 and INT32U, INT64 and INT64U variables are stored in big-endian format: the most significant register is transmitted first, the least significant register is transmitted at last place.

Example

The total active energy is an INT64 variable coded in registers 32096 to 32099.

If
- register 32096 = 0
- register 32097 = 0
- register 32098 = 70 (0x0046)
- register 32099 = 2105 (0x0839)

then the total active energy is equal to 4 589 625 Wh = $0x2^{48}$ + $0x2^{32}$ + $70x2^{16}$ + $2105x2^{0}$

Data Type: FLOAT32

Data type FLOAT32 is represented in the single precision IEEE 754 (IEEE standard for floating-point arithmetic). A value N is calculated as indicated below:

$N = (-1)^{S} \times 2^{E-127} \times (1+M)$

Coefficient	Stands for	Description	Number of Bits
S	Sign	Defines the sign of the value: 0 = positive 1 = negative	1 bit
E	Exponent	Excess 127 binary integer added. When 0 < E < 255, the actual exponent is: e = E - 127.	8 bits
M	Mantissa	Magnitude, normalized binary significant	23 bits

Example:

0 = 0 **00000000** 00000000000000000000000

-1.5 = 1 **01111111** 10000000000000000000000

with:
- S = 1
- **E = 01111111 = 127**
- M = 10000000000000000000000 = $1x2^{-1}$ + $0x2^{-2}$ +...+ $0x2^{-23}$ = 0.5
- N = (-1) x 2^{0} x (1+0.5) = -1.5

Data Type: XDATE

XDATE is a data type used to code date and time defined by the ULP modules.

Register	Type	Bit	Range	Description
1	INT16U	0–7	0x01–0x1F	Day
		8–15	0x01–0x0C	Month
2	INT16U	0–7	0x00–0x17	Hours
		8–15	0x50–0xC7	Year • 0x50 (80) to 0x63 (99) correspond to years 1980 to 1999 • 0x64 (100) to 0xC7 (199) correspond to years 2000 to 2099 For example, 0x70 (112) corresponds to year 2012.
3	INT16U	0–7	0x00–0x3B	Seconds
		8–15	0x00–0x3B	Minutes
4	INT16U	0–15	0x0000–0x03E7	Complement in milliseconds

Data Type: DATETIME

DATETIME is a data type used to code date and time defined by the IEC 60870-5 standard.

Register	Type	Bit	Range	Description
1	INT16U	0–6	0x00–0x7F	Year: 0x00 (00) to 0x7F (127) correspond to years 2000 to 2127 For example, 0x0D (13) corresponds to year 2013.
		7–15	–	Reserved
2	INT16U	0–4	0x01–0x1F	Day
		5–7	–	Reserved
		8–11	0x00–0x0C	Month
		12–15	–	Reserved
3	INT16U	0–5	0x00–0x3B	Minutes
		6–7	–	Reserved
		8–12	0x00–0x17	Hours
		13–15	–	Reserved
4	INT16U	0–15	0x0000–0xEA5F	Milliseconds

Quality of DATETIME Timestamps

The quality of timestamps coded with the DATETIME data type can be indicated in the register following the 4 registers of the timestamp. In this case, the timestamp quality is coded as follows:

Bit	Description
0–11	Reserved
12	Externally synchronized: ● 0 = Invalid ● 1 = Valid
13	Synchronized: ● 0 = Invalid ● 1 = Valid
14	Date and time is set: ● 0 = Invalid ● 1 = Valid
15	Reserved

Quality of Bits in Registers

The quality of each bit of a register coded as INT16U data type as an enumeration of bits can be indicated in the register preceding the register.

Example:

The quality of each bit of the register 32001, circuit breaker status, is given in the preceding register, 32000.

The quality of the data corresponding to the bit 0 of register 32001, OF status indication contact, is given in the bit 0 of register 32000:

- bit 0 of register 32000 = quality of OF status indication
- bit 0 of register 32001 = OF status indication contact

If	Then
If bit 0 of register 32000 = 1 AND bit 0 of register 32001 = 0	The OF contact indicates that the device is open
If bit 0 of register 32000 = 1 AND bit 0 of register 32001 = 1	The OF contact indicates that the device is closed
If bit 0 of register 32000 = 0	The OF contact indication is invalid

Notes

- The type column tells how many registers to read to get the variable. For instance INT16U requires reading one register, whereas INT32 requires reading 2 registers.
- Some variables must be read as a block of multiple registers, like the energy measurements. Reading the block partially results in an error.
- Reading from an undocumented register results in a Modbus exception *(see page 39)*.

- Numerical values are given in decimal. When it is useful to have the corresponding value in hexadecimal, it is shown as a C language type constant: 0xdddd. For example, the decimal value 123 is represented in hexadecimal as 0x007B.
- For measures that depend on the presence of a neutral as identified by register 3314, reading the value returns 32768 (0x8000) if not applicable. For each table where it occurs, it is explained in a footnote.
- Out of order and not applicable values depend on the data type.

Data Type	Out of Order and Not Applicable Values
INT16U	65535 (0xFFFF)
INT16	-32768 (0x8000)
INT32U	4294967295 (0xFFFFFFFF)
INT32	0x80000000
INT64U	0xFFFFFFFFFFFFFFFF
INT64	0x8000000000000000
FLOAT32	0xFFC00000

Chapter 3
Data-Set

What Is in This Chapter?

This chapter contains the following topics:

Standard Data-Set

Description

The standard data-set is a global entity that collects the most useful information of each IMU module in one convenient table.

The benefit is that in one location there is up-to-date information with three read requests. Each module moves the data on a regular basis so that the structure is refreshed with current values.

The standard data-set can be used with IFE or EIFE interface only.

The standard data-set is defined in the 32000 to 32435 register range.

Modbus Registers

Table of Standard Data-Set Common Registers

The main information needed for remote supervision of a Compact NSX, Compact NS, Masterpact NT/NW or Masterpact MTZ circuit breaker is contained in the table of common registers starting at register 32000.

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

It contains the following information:
- Circuit breaker status
- Tripping causes
- Real-time values of main measurements: current, voltage, power, and energy

The content of this table of registers is detailed in Standard Data-Set Common Registers *(see page 59)*.

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

Measurement Update Period

The update period for the common registers of the standard data-set is:
- One second for the following measurements:
  - Voltage and voltage unbalance
  - Current and current unbalance
  - Active, reactive, apparent, and distortion power
  - Reactive power with harmonics
  - Power factor and fundamental power factor
  - Frequency
- Five seconds for the following measurements:
  - Energy
  - Minimum and maximum real-time measurement values
  - Total harmonic distortion (THD)

Table Format

Register tables have the following columns:

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

- **Address**: a 16-bit register address in hexadecimal. The address is the data used in the Modbus frame.
- **Register**: a 16-bit register number in decimal (register = address + 1).
- **RW**: register read-write status
  - R: read-only access
  - RW: read access and write access using Modbus functions
  - RWC: read access and write access using the command interface
- **Unit**: the unit the information is expressed in.
- **Type**: the encoding data type (see data type description below).
- **Range**: the permitted values for this variable, usually a subset of what the format allows.
- **A/E**: types of Compact NSX Micrologic trip unit for which the register is available.
  - Type A (Ammeter): current measurements
  - Type E (Energy): current, voltage, power, and energy measurements
- **A/E/P/H**: types of Masterpact NT/NW and Compact NS Micrologic control unit for which the register is available.
  - Type A (Ammeter): current measurements
  - Type E (Energy): current, voltage, power, and energy measurements
  - Type P (Power): current, voltage, power, energy measurements, and advanced protection
  - Type H (Harmonics): current, voltage, power, energy, energy quality measurements, and advanced protection
- **X**: register available in the Micrologic X control unit for Masterpact MTZ
- **Description**: provides information about the register and restrictions that apply.

Data Types

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

Data Type: FLOAT32

Data type FLOAT32 is represented in the single precision IEEE 754 (IEEE standard for floating-point arithmetic). A value N is calculated as indicated below:

$N = (-1)^S \times 2^{E-127} \times (1+M)$

Coefficient	Stands for	Description	Number of Bits
S	Sign	Defines the sign of the value: 0 = positive 1 = negative	1 bit
E	Exponent	Excess 127 binary integer added. When 0 < E < 255, the actual exponent is: e = E - 127.	8 bits
M	Mantissa	Magnitude, normalized binary significant	23 bits

Example:

0 = 0 **00000000** 00000000000000000000000

-1.5 = 1 **01111111** 10000000000000000000000

with:

- S = 1
- **E = 01111111 = 127**
- M = 10000000000000000000000 = $1x2^{-1} + 0x2^{-2} +...+ 0x2^{-23} = 0.5$
- N = $(-1) \times 2^0 \times (1+0.5) = -1.5$

Quality of Bits in Registers

The quality of each bit of a register coded as INT16U data type as an enumeration of bits can be indicated in the register preceding the register.

Example:

The quality of each bit of the register 32001, circuit breaker status, is given in the preceding register, 32000.

The quality of the data corresponding to the bit 0 of register 32001, OF status indication contact, is given in the bit 0 of register 32000:

- bit 0 of register 32000 = quality of OF status indication
- bit 0 of register 32001 = OF status indication contact

If	Then
If bit 0 of register 32000 = 1 AND bit 0 of register 32001 = 0	The OF contact indicates that the device is open
If bit 0 of register 32000 = 1 AND bit 0 of register 32001 = 1	The OF contact indicates that the device is closed
If bit 0 of register 32000 = 0	The OF contact indication is invalid

Readout Examples

Readout Example of a Modbus Register

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

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

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

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

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

Readout Example of the Table of Standard Data-Set Common Registers

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

Request to read registers 32000 to 32123:

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

Request to read registers 32124 to 32241:

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

Request to read registers 32340 to 32435:

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

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

Request from the Master		Response from the Slave	
Field Name	**Example**	**Field Name**	**Example**
–	–	–	0xXX
–	–	Value of register 32123 (MSB)	0xXX
–	–	Value of register 32123 (LSB)	0xXX
–	–	CRC (MSB)	0xXX
–	–	CRC (LSB)	0xXX

Standard Data-Set Common Registers

Circuit Breaker Status Register

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7CFF	32000	R	–	INT16U	0–1	A/E	A/E/P/H	X	–	Quality of each bit of register 32001 *(see page 56)*: ● 0 = Invalid ● 1 = Valid
0x7D00	32001	R	–	INT16U	0–1	A/E	A/E/P/H	X	–	Circuit breaker status register
						A/E	A/E/P/H	X	0	OF status indication contact ● 0 = The circuit breaker is open. ● 1 = The circuit breaker is closed.
						A/E	A/E/P/H	X	1	SD trip indication contact ● 0 = Circuit breaker is not tripped. ● 1 = Circuit breaker is tripped due to electrical fault, shunt trip, or push-to-trip. Bit always equal to 0 for Masterpact and Compact NS circuit breakers with motor mechanism.
						A/E	A/E/P/H	X	2	SDE fault trip indication contact ● 0 = Circuit breaker is not tripped on electrical fault. ● 1 = Circuit breaker is tripped due to electrical fault (including ground-fault test and earth-leakage test).
						–	A/E/P/H	X	3	CH spring charged contact (only with Masterpact) ● 0 = Spring discharged ● 1 = Spring charged Bit always equal to 0 for Masterpact and Compact NS circuit breakers with motor mechanism.
						–	–	–	4	Reserved
						–	A/E/P/H	X	5	PF ready to close contact (only with Masterpact) ● 0 = Not ready to close ● 1 = Ready to close Bit always equal to 0 for Masterpact and Compact NS circuit breakers with motor mechanism.
						–	–	–	6–15	Reserved

IO Status Registers

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7D01	32002	R	–	INT16U	–	A/E	A/E/P/H	X	–	Quality of each bit of register 32003: ● 0 = Invalid ● 1 = Valid
0x7D02	32003	R	–	INT16U	–	A/E	A/E/P/H	X	–	IO1 module and M2C status
						A/E	A/E/P/H	X	0	Digital input 1 status: ● 0 = Off ● 1 = On
						A/E	A/E/P/H	X	1	Digital input 2 status: ● 0 = Off ● 1 = On
						A/E	A/E/P/H	X	2	Digital input 3 status: ● 0 = Off ● 1 = On
						A/E	A/E/P/H	X	3	Digital input 4 status: ● 0 = Off ● 1 = On
						A/E	A/E/P/H	X	4	Digital input 5 status: ● 0 = Off ● 1 = On
						A/E	A/E/P/H	X	5	Digital input 6 status: ● 0 = Off ● 1 = On
						A/E	A/E/P/H	X	6	Digital output 1 status: ● 0 = Off ● 1 = On
						A/E	A/E/P/H	X	7	Digital output 2 status: ● 0 = Off ● 1 = On
						A/E	A/E/P/H	X	8	Digital output 3 status: ● 0 = Off ● 1 = On
						–	–	X	9	Digital M2C output 1 status: ● 0 = Off ● 1 = On
						–	–	X	10	Digital M2C output 2 status: ● 0 = Off ● 1 = On
						–	–	–	11–15	Reserved
0x7D03	32004	R	–	INT16U	–	A/E	A/E/P/H	X	–	Quality of each bit of register 32005: ● 0 = Invalid ● 1 = Valid

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7D04	32005	R	–	INT16U	–	A/E	A/E/P/H	X	–	IO2 module status
									0	Digital input 1 status: ● 0 = Off ● 1 = On
									1	Digital input 2 status: ● 0 = Off ● 1 = On
									2	Digital input 3 status: ● 0 = Off ● 1 = On
									3	Digital input 4 status: ● 0 = Off ● 1 = On
									4	Digital input 5 status: ● 0 = Off ● 1 = On
									5	Digital input 6 status: ● 0 = Off ● 1 = On
									6	Digital output 1 status: ● 0 = Off ● 1 = On
									7	Digital output 2 status: ● 0 = Off ● 1 = On
									8	Digital output 3 status: ● 0 = Off ● 1 = On
						–	–	–	9–15	Reserved

Tripping Cause

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

- For Micrologic A/E trip units for Compact NSX circuit breakers, the tripping cause bit is reset by pressing the key OK (keypad of the Micrologic A/E trip unit) twice (validation and confirmation).
- For Micrologic A/E/P/H control units for Masterpact NT/NW and Compact NS circuit breakers, the tripping cause bit is reset as soon as the circuit-breaker is closed again.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7D05	32006	R	–	INT16U	–	A/E	A/E/P/H	–	–	Quality of each bit of register 32007: ● 0 = Invalid ● 1 = Valid

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7D06	32007	R	–	INT16U	–	A/E	A/E/P/H	–		Tripping cause for the basic protection functions
						A/E	A/E/P/H	–	0	Long-time protection Ir
						A/E	A/E/P/H	–	1	Short-time protection Isd
						A/E	A/E/P/H	–	2	Instantaneous protection Ii
						A/E	A/E/P/H	–	3	Ground-fault protection Ig
						A/E	A/P/H	–	4	Earth-leakage protection (Vigi module) IΔn
						A/E	A/E/P/H	–	5	Integrated instantaneous protection
						A/E	–	–	6	Internal failure (STOP)
						–	A/E	–		Other protections
						–	P/H	–		Internal failure (temperature)
						–	A/E/P/H	–	7	Internal failure (overvoltage)
						–	P/H	–	8	Other protection (see register 32008)
						A/E	–	–	9	Instantaneous with earth-leakage protection (Vigi module) on the trip unit
						E	–	–	10	Unbalance motor protection
						E	–	–	11	Jam motor protection
						E	–	–	12	Underload motor protection
						E	–	–	13	Long-start motor protection
						A/E	–	–	14	Reflex tripping protection
						A/E	A/E/P/H	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D07	32008	R	–	INT16U	–	–	P/H	–		Quality of each bit of register 32009: ● 0 = Invalid ● 1 = Valid
0x7D08	32009	R	–	INT16U	–	–	P/H	–	–	Tripping causes for the advanced protection functions
						–	P/H	–	0	Current unbalance
						–	P/H	–	1	Overcurrent on phase 1
						–	P/H	–	2	Overcurrent on phase 2
						–	P/H	–	3	Overcurrent on phase 3
						–	P/H	–	4	Overcurrent on Neutral
						–	P/H	–	5	Undervoltage
						–	P/H	–	6	Overvoltage
						–	P/H	–	7	Voltage unbalance
						–	P/H	–	8	Overpower
						–	P/H	–	9	Reverse power
						–	P/H	–	10	Underfrequency
						–	P/H	–	11	Overfrequency
						–	P/H	–	12	Phase rotation
						–	P/H	–	13	Load shedding based on current
						–	P/H	–	14	Load shedding based on power
						–	P/H	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D09–0x7D0C	32010–32013	–	–	–	–	–	–	–	–	Reserved

Overrun of the Protection Setpoints

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

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7D0D	32014	R	–	INT16U	–	A/E	P/H	–	–	Quality of each bit of register 32015: ● 0 = Invalid ● 1 = Valid
0x7D0E	32015	R	–	INT16U	–	A/E	P/H	–	–	Overrun of the standard protection setpoints
						A/E	P/H	–	0	Long-time protection pick-up
						–	–	–	1–14	Reserved
						A/E	P/H	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D0F	32016	R	–	INT16U	–	A/E	P/H	–	–	Quality of each bit of register 32017: ● 0 = Invalid ● 1 = Valid
0x7D10	32017	R	–	INT16U	–	A/E	P/H	–	–	Overrun of the advanced protection setpoints
						–	P/H	–	0	Current unbalance
						–	P/H	–	1	Maximum current on phase 1
						–	P/H	–	2	Maximum current on phase 2
						–	P/H	–	3	Maximum current on phase 3
						–	P/H	–	4	Maximum current on the neutral
						–	P/H	–	5	Minimum voltage
						–	P/H	–	6	Maximum voltage
						–	P/H	–	7	Voltage unbalance
						–	P/H	–	8	Maximum power
						–	P/H	–	9	Reverse power
						–	P/H	–	10	Minimum frequency
						–	P/H	–	11	Maximum frequency
						–	P/H	–	12	Phase rotation
						–	P/H	–	13	Load shedding based on the current
						–	P/H	–	14	Load shedding based on the power
						–	P/H	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D11	32018	R	–	INT16U	–	–	P/H	–	–	Quality of each bit of register 32019: ● 0 = Invalid ● 1 = Valid
0x7D12	32019	R	–	INT16U	–	–	P/H	–	–	Advanced protection settings extended
						–	P/H	–	0	Ground-fault alarm
						–	P/H	–	1	Earth-leakage alarm (Vigi module)
						–	–	–	2–14	Reserved
						–	P/H	–	15	If this bit is at 1, bits 0 to 14 are not valid.

Alarms

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

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7D13	32020	R	–	INT16U	–	A/E	–	–	–	Quality of each bit of register 32021: ● 0 = Invalid ● 1 = Valid
0x7D14	32021	R	–	INT16U	–	A/E	–	–	–	Pre-alarm extended register
						A/E	–	–	0	Long-time protection time pre-alarm (PAL Ir)
						A/E	–	–	1	Earth-leakage protection pre-alarm (Vigi module) (PAL IΔn)
						A/E	–	–	2	Ground-fault protection pre-alarm (PAL Ig)
						–	–	–	3–14	Reserved
						A/E	–	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D15	32022	R	–	INT16U	–	A/E	–	–	–	Quality of each bit of register 32023: ● 0 = Invalid ● 1 = Valid
0x7D16	32023	R	–	INT16U	–	A/E	–	–	–	Register of user-defined alarms
						A/E	–	–	0	User-defined alarm 201
						A/E	–	–	1	User-defined alarm 202
						A/E	–	–	2	User-defined alarm 203
						A/E	–	–	3	User-defined alarm 204
						A/E	–	–	4	User-defined alarm 205
						A/E	–	–	5	User-defined alarm 206
						A/E	–	–	6	User-defined alarm 207
						A/E	–	–	7	User-defined alarm 208
						A/E	–	–	8	User-defined alarm 209
						A/E	–	–	9	User-defined alarm 210
						–	–	–	10–14	Reserved
						A/E	–	–	15	If this bit is at 1, bits 0 to 14 are not valid.
0x7D17–0x7D1A	32024–32027	–	–	–	–	–	–	–	–	Reserved

Current

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

(1) Value available when system type register returns 30 or 41.
(2) Value available with Micrologic 7.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7D25–0x7D26	32038–32039	R	–	FLOAT32	–	A/E	A/E/P/H	X	Current ratio on ground (Ig setting ratio)
0x7D27–0x7D28	32040–32041	R	–	FLOAT32	–	A/E	A/P/H	X	Current ratio on earth-leakage (IΔn setting ratio)(2)
(1) Value available when system type register returns 30 or 41. (2) Value available with Micrologic 7.									

Maximum Current Values

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7D29–0x7D2A	32042–32043	R–RC	A	FLOAT32	–	A/E	A/E/P/H	X	Maximum RMS current on phase 1
0x7D2B–0x7D2C	32044–32045	R–RC	A	FLOAT32	–	A/E	A/E/P/H	X	Maximum RMS current on phase 2
0x7D2D–0x7D2E	32046–32047	R–RC	A	FLOAT32	–	A/E	A/E/P/H	X	Maximum RMS current on phase 3
0x7D2F–0x7D30	32048–32049	R–RC	A	FLOAT32	–	A/E	A/E/P/H	X	Maximum RMS current on the neutral(1)
0x7D31–0x7D32	32050–32051	R–RC	A	FLOAT32	–	A/E	A/E/P/H	X	This is the highest (i.e. maximum) maximum current value since this measurement was last reset. The measurement looks at all 3 currents, MaxI1, MaxI2, MaxI3 and MaxIN and keeps track of the highest value of any of them over time.
0x7D33–0x7D36	32052–32055	–	–	–	–	–	–	–	Reserved
(1) Value available when system type register returns 30 or 41.									

Voltage

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

Frequency

When the Micrologic control unit cannot calculate the frequency, it returns Not applicable = 0xFFC00000.

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

Power

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

(1) Value available when system type register returns 40 or 41.
(2) The sign for the active and reactive power depends on the configuration of:
- register 3316 for Compact NSX, Compact NS and Masterpact NT/NW circuit breakers.
- register 8405 for Masterpact MTZ circuit breakers.

Energy

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

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

(1) This value is always positive with Masterpact Micrologic E control unit.

Average Values

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

Maximum Power Values

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

Maximum Average Values

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

Ground and Earth-Leakage Current

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

Current Demand Values

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7D9B–0x7D9C	32156–32157	R	A	FLOAT32	0.0–32767.0	E	E/P/H	–	Current demand value on phase 1: I1 Dmd
0x7D9D–0x7D9E	32158–32159	R	A	FLOAT32	0.0–32767.0	E	E/P/H	–	Current demand value on phase 2: I2 Dmd
0x7D9F–0x7DA0	32160–32161	R	A	FLOAT32	0.0–32767.0	E	E/P/H	–	Current demand value on phase 3: I3 Dmd
0x7DA1–0x7DA2	32162–32163	R	A	FLOAT32	0.0–32767.0	E	E/P/H	–	Current demand value on the neutral: IN Dmd(1)
(1) Value available when system type register returns 30 or 41.									

Power Demand Values

When the window is a fixed type, this value is updated at the end of the window. For the sliding type, the value is updated every 15 seconds.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7DA3–0x7DA4	32164–32165	R	W	FLOAT32	0.0–32767000.0	E	E/P/H	–	Total active power demand: P Dmd
0x7DA5–0x7DA6	32166–32167	R	VAR	FLOAT32	0.0–32767000.0	E	P/H	–	Total reactive power demand: Q Dmd
0x7DA7–0x7DA8	32168–32169	R	VA	FLOAT32	0.0–32767000.0	E	P/H	–	Total apparent power demand: S Dmd
0x7DA9–0x7DB6	32170–32183	–	–	–	–	–	–	–	Reserved

Maximum Ground and Earth-Leakage Current Values

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

(1) Value available with Micrologic 7.

Maximum Voltage Values

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7DC1–0x7DC2	32194–32195	R	V	FLOAT32	41.6–2250	E	E/P/H	X	Maximum RMS phase-to-phase voltage V12
0x7DC3–0x7DC4	32196–32197	R	V	FLOAT32	41.6–2250	E	E/P/H	X	Maximum RMS phase-to-phase voltage V23
0x7DC5–0x7DC6	32198–32199	R	V	FLOAT32	41.6–2250	E	E/P/H	X	Maximum RMS phase-to-phase voltage V31
0x7DC7–0x7DC8	32200–32201	R	V	FLOAT32	24–1500	E	E/P/H	X	Maximum RMS phase-to-neutral voltage V1N(1)
0x7DC9–0X7DCA	32202–32203	R	V	FLOAT32	24–1500	E	E/P/H	X	Maximum RMS phase-to-neutral voltage V2N(1)
0x7DCB–0x7DCC	32204–32205	R	V	FLOAT32	24–1500	E	E/P/H	X	Maximum RMS phase-to-neutral voltage V3N(1)

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

Power Factor

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7DCD–0x7DCE	32206–32207	R	–	FLOAT32	–	E	E/P/H	X	Power factor on phase 1(1)
0x7DCF–0x7DD0	32208–32209	R	–	FLOAT32	–	E	E/P/H	X	Power factor on phase 2(1)
0x7DD1–0x7DD2	32210–32211	R	–	FLOAT32	–	E	E/P/H	X	Power factor on phase 3(1)
0x7DD3–0x7DD4	32212–32213	R	–	FLOAT32	–	E	E/P/H	X	Total power factor
0x7DD5–0x7DD6	32214–32215	R	–	FLOAT32	–	E	H	X	Fundamental power factor on phase 1 (cosϕ1)(1)(2)

(1) Value available when system type register returns 40 or 41.
(2) The sign for the fundamental power factor (cosϕ) depends on the configuration:
- register 3318 for Compact NSX, Compact NS and Masterpact NT/NW circuit breakers.
- register 8404 for Masterpact MTZ circuit breakers.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7DD7–0x7DD8	32216–32217	R	–	FLOAT32	–	E	H	X	Fundamental power factor on phase 2 (cosϕ2)(1)(2)
0x7DD9–0x7DDA	32218–32219	R	–	FLOAT32	–	E	H	X	Fundamental power factor on phase 3 (cosϕ3)(1)(2)
0x7DDB–0x7DDC	32220–32221	R	–	FLOAT32	–	E	H	X	Total fundamental power factor(2)
(1) Value available when system type register returns 40 or 41. (2) The sign for the fundamental power factor (cosϕ) depends on the configuration: ● register 3318 for Compact NSX, Compact NS and Masterpact NT/NW circuit breakers. ● register 8404 for Masterpact MTZ circuit breakers.									

Total Harmonic Distortion (THD)

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7DDD–0x7DDE	32222–32223	R	–	FLOAT32	0–2	E	H	X	Total harmonic distortion (THD) of phase-to phase voltage V12 compared to the fundamental
0x7DDF–0x7DE0	32224–32225	R	–	FLOAT32	0–2	E	H	X	Total harmonic distortion (THD) of phase-to phase voltage V23 compared to the fundamental
0x7DE1–0x7DE2	32226–32227	R	–	FLOAT32	0–2	E	H	X	Total harmonic distortion (THD) of phase-to phase voltage V31 compared to the fundamental
0x7DE3–0x7DE4	32228–32229	R	–	FLOAT32	0–2	E	H	X	Total harmonic distortion (THD) of phase-to-neutral voltage V1N compared to the fundamental (1)
0x7DE5–0x7DE6	32230–32231	R	–	FLOAT32	0–2	E	H	X	Total harmonic distortion (THD) of phase-to-neutral voltage V2N compared to the fundamental (1)
0x7DE7–0x7DE8	32232–32233	R	–	FLOAT32	0–2	E	H	X	Total harmonic distortion (THD) of phase-to-neutral voltage V3N compared to the fundamental (1)
0x7DE9–0x7DEA	32234–32235	R	–	FLOAT32	0–2	E	H	X	Total harmonic distortion (THD) of current on phase 1 compared to the fundamental
0x7DEB–0x7DEC	32236–32237	R	–	FLOAT32	0–2	E	H	X	Total harmonic distortion (THD) of current on phase 2 compared to the fundamental
0x7DED–0x7DEE	32238–32239	R	–	FLOAT32	0.0–500.0	E	H	X	Total harmonic distortion (THD) of current on phase 3 compared to the fundamental
0x7DEF–0x7DF0	32240–32241	R	–	FLOAT32	0.0–500.0	E	H	X	Average of 3 phase current Total harmonic distortions (THD) compared to the fundamental
(1) Value available when system type register returns 40 or 41.									

Maximum Power Factor

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

Inhibit Close Order

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

Micrologic X Tripping Cause

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7E56–0x7E57	32343–32344	R	–	INT32U	–	–	–	X	–	Alarm change counter
0x7E58	32345	R	–	INT16U	0–1	–	–	X	–	Quality of each bit of register 32346: ● 0 = Invalid ● 1 = Valid
0x7E59	32346	R	–	INT16U	0–1	–	–	X	1	Alarm status synthesis: ● 0 = No active alarms ● 1 = At least one alarm is active
0x7E5A–0x7E72	32347–32371	R	–	INT16U	0–565	–	–	X	–	Quality of each bit of registers 32372-32396: ● 0 = Invalid ● 1 = Valid
0x7E73	32372	R	–	INT16U	0–1	–	–	X	0	Ir trip
									1	Isd trip
									2	Ii trip
									3	Ig trip
									4	IΔn trip
									5	Ultimate self-protection trip (SELLIM)
									6	Internal failure trip
									7	Reserved
									8	Ultimate self-protection trip (DIN/DINF)
									9	IΔn/Ig test trip
									10–15	Reserved
0x7E74–0x7E76	32373–32375	–	–	–	–	–	–	–	0–15	Reserved

Micrologic X Protection Data

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7E77	32376	R	–	INT16U	0–1	–	–	X	0	Ir start (I > 105% Ir)
									1	Isd start
									2	Ig start
									3	IΔn start
									4	Ultimate self-protection (SELLIM) operate
									5–7	Reserved
									8	Ultimate self-protection (DIN/DINF) operate
									9–15	Reserved
0x7E78	32377	–	–	–	–	–	–	–	0–15	Reserved
0x7E79	32378	R	–	INT16U	0–1	–	–	X	0	Ir operate
									1	Isd operate
									2	Ii operate
									3	Ig operate
									4	IΔn operate
									5–15	Reserved
0x7E7A–0x7E7B	32379–32380	–	–	–	–	–	–	–	0–15	Reserved
0x7E7C	32381	R	–	INT16U	0–1	–	–	X	0	Thermal memory reset order
									1	Ir prealarm (I > 90% Ir)
									2–10	Reserved
									11	B curve active
									12–15	Reserved

Micrologic X Opening/Closing Release Data

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7E7D	32382	R	–	INT16U	0–1	–	–	X	0	Reserved
									1	CB moved from close to open position
									2	CB moved from open to close position
									3	Reserved
									4	Closing release activation
									5	Reserved
									6	Opening release activation
									7	Reserved
									8	Manual mode enabled
									9	Local mode enabled
									10	Closing inhibited by communication
									11	Closing inhibited by wired input
									12	Reserved
									13	Alarm reset
									14	M2C output 1 is forced
									15	M2C output 2 is forced
0x7E7E	32383	–	–	–	–	–	–	–	0–15	Reserved

Micrologic X Maintenance Data

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7E7F	32384	R	–	INT16U	0–1	–	–	X	0	Protection settings change by display enabled
									1	Protection settings changed by display
									2	Protection settings changed by Bluetooth/USB/IFE
									3	Loss of IFE module
									4	Loss of IO1 module
									5	Loss of IO2 module
									6	Configuration mismatch between IO and control unit
									7–15	Reserved
0x7E80	32385	R	–	INT16U	0–1	–	–	X	0–2	Reserved
									3	Control unit in upgrade mode
									4	Digital module License expires in 30 days
									5	Digital module License expires in 20 days
									6	Digital module License expires in 10 days
									7	Control unit firmware upgrade failed
									8	Digital module license installed
									9	Digital module license uninstalled
									10	Digital module license expired
									11	Digital module license rejected
									12–13	Reserved
									14	Date and time set
									15	Remote protection settings change enabled
0x7E81	32386	R	–	INT16U	0–1	–	–	X	0	USB port connected
									1	Bluetooth communication enabled
									2–15	Reserved

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7E82	32387	R	–	INT16U	0–1	–	–	X	0	Control unit in test mode
									1	Injection test in progress
									2	Test aborted by user
									3	ZSI test in progress
									4	Reserved
									5	Control unit self test major malfunction
									6	Reserved
									7	Internal current sensor disconnected
									8	External neutral current sensor disconnected
									9	Earth leakage (Vigi) sensor disconnected
									10	Reserved
									11	Protection reset to default setting if rebooted
									12	Reserved
									13	Error reading sensor plug
									14	Reserved
									15	Control unit factory configuration error
0x7E83	32388	R	–	INT16U	0–1	–	–	X	0	Replace battery
									1	NFC malfunction
									2–5	Reserved
									6	Display screen or wireless malfunction 1
									7	Display screen or wireless malfunction 2
									8	Display screen or wireless malfunction 3
									9	Reserved
									10	Bluetooth malfunction
									11–13	Reserved
									14	Minor control unit malfunction corrected
									15	Reserved

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7E84	32389	R	–	INT16U	0–1	–	–	X	0	IΔn/Ig test trip failed
									1	IΔn/Ig test button pressed
									2	Protection settings no longer accessible error 1
									3	Protection settings no longer accessible error 2
									4	Protection settings no longer accessible error 3
									5	Protection settings no longer accessible error 4
									6	Protection settings no longer accessible error 5
									7	Control unit self test minor malfunction 1
									8	Control unit self test minor malfunction 2
									9	Control unit self test minor malfunction 3
									10	Control unit self test minor malfunction 4
									11	Control unit self test minor malfunction 5
									12	Metering malfunction 1
									13	Metering malfunction 2
									14	Metering malfunction 3
									15	Reserved
0x7E85	32390	R	–	INT16U	0–1	–	–	X	0	Critical hardware module discrepancy
									1	Critical firmware module discrepancy
									2	Non-critical hardware module discrepancy
									3	Non-critical firmware module discrepancy
									4	Address conflict between modules
									5	Firmware discrepancy within control unit
									6–10	Reserved
									11	Events in history log have been erased
									12–15	Reserved

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7E86	32391	R	–	INT16U	0–1	–	–	X	0	Contact wear is above 60%. Check contacts.
									1	Contact wear is above 95%. Plan for replacement.
									2	Contacts 100% worn out. CB needs to be replaced.
									3	Less than 20% CB operation remaining
									4	CB has reached the max number of operations.
									5	MX1 opening release malfunction. (Release autotest result) Release needs to be replaced.
									6	MX1 opening release is no longer detected.
									7	XF closing release malfunction. (Release autotest result) Release needs to be replaced.
									8	XF closing release no longer detected.
									9	MX2/MN opening release malfunction. (Release autotest result) Release needs to be replaced.
									10	MX2/MN opening release no longer detected.
									11	MCH charging operations above threshold
									12	MCH has reached the max number of operations
									13–15	Reserved
0x7E87	32392	R	–	INT16U	0–1	–	–	X	0	Reset min/max currents
									1	Reset min/max voltages
									2	Reset min/max power
									3	Reset min/max frequency
									4	Reset min/max harmonics
									5	Reset min/max power factor
									6–7	Reserved
									8	Reset energy counters
									9–15	Reserved
0x7E88–0x7EB0	32393–32433	–	–	–	–	–	–	–	–	Reserved

Micrologic X Protection Function Status

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x7EB1	32434	R	–	INT16U	0–1	–	–	X	–	Quality of each bit of register 32435: ● 0 = Invalid ● 1 = Valid
0x7EB2	32435	R	–	INT16U	0–1	–	–	X	0	Long time over current protection trip start: ● 0 = Off ● 1 = On
									1	Short time over current protection trip start: ● 0 = Off ● 1 = On
									2	Instantaneous over current protection start: ● 0 = Off ● 1 = On
									3	Start ground fault protection: ● 0 = Off ● 1 = On
									4	Start earth leakage protection start: ● 0 = Off ● 1 = On
									5	Ultimate self protection SELLIM start: ● 0 = Off ● 1 = On
									6–7	Reserved
									8	Ultimate self protection DIN/DINF start: ● 0 = Off ● 1 = On

Extended Data-Set Common Registers

Minimum Values of Real Time Measurements

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x88B8–0x88B9	35001–35002	R	A	FLOAT32	–	–	–	X	Minimum RMS current on phase 1
0x88BA–0x88BB	35003–35004	R	A	FLOAT32	–	–	–	X	Minimum RMS current on phase 2
0x88BC–0x88BD	35005–35006	R	A	FLOAT32	–	–	–	X	Minimum RMS current of phase 3
0x88BE–0x88BF	35007–35008	R	A	FLOAT32	–	–	–	X	Minimum RMS current on neutral
0x88C0–0x88C1	35009–35010	R	A	FLOAT32	–	–	–	X	Minimum RMS current on ground
0x88C2–0x88C3	35011–35012	R	A	FLOAT32	–	–	–	X	Minimum of RMS current on earth leakage
0x88C4–0x88C5	35013–35014	R	V	FLOAT32	–	–	–	X	Minimum RMS phase-to-phase voltage V12
0x88C6–0x88C7	35015–35016	R	V	FLOAT32	–	–	–	X	Minimum RMS phase-to-phase voltage V23
0x88C8–0x88C9	35017–35018	R	V	FLOAT32	–	–	–	X	Minimum RMS phase-to-phase voltage V31
0x88CA–0x88CB	35019–35020	R	V	FLOAT32	–	–	–	X	Minimum RMS phase-to-neutral voltage V1N
0x88CC–0x88CB	35021–35022	R	V	FLOAT32	–	–	–	X	Minimum RMS phase-to-neutral voltage V2N
0x88CE–0x88CF	35023–35024	R	V	FLOAT32	–	–	–	X	Minimum RMS phase-to-neutral voltage V3N
0x88D0–0x88D1	35025–35026	R	Hz	FLOAT32	–	–	–	X	Minimum frequency
0x88D2–0x88D3	35027–35028	R	W	FLOAT32	–	–	–	X	Minimum total active power
0x88D4–0x88D5	35029–35030	R	VAr	FLOAT32	–	–	–	X	Minimum total reactive power
0x88D6–0x88D7	35031–35032	R	VA	FLOAT32	–	–	–	X	Minimum total apparent power
0x88D8–0x88D9	35033–35034	R	A	FLOAT32	–	–	–	X	Minimum of average of 3 phase RMS currents
0x88DA–0x88DB	35035–35036	R	V	FLOAT32	–	–	–	X	Minimum of average of 3 RMS phase-to-phase voltages
0x88DC–0x88DD	35037–35038	R	V	FLOAT32	–	–	–	X	Minimum of average of 3 RMS phase-to-neutral voltages
0x88DE–0x88DF	35039–35040	R	–	FLOAT32	–	–	–	X	Minimum total power factor
0x88E0–0x894F	35041–35152	–	–	–	–	–	–	–	Reserved

Timestamp of Reset Actions

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x8968–0x896B	35177–35180	R	–	DATETIME	–	–	–	X	Timestamp of last reset of accumulated energy
0x896C–0x896F	35181–35184	R	–	DATETIME	–	–	–	X	Timestamp of reset of minimum and maximum RMS current
0x8970–0x8973	35185–35188	R	–	DATETIME	–	–	–	X	Timestamp of reset of minimum and maximum RMS voltage

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x8974–0x8977	35189–35192	R	–	DATETIME	–	–	–	X	Timestamp of reset of minimum and maximum power
0x8978–0x897B	35193–35196	R	–	DATETIME	–	–	–	X	Timestamp of reset of minimum and maximum power factor and cos Φ
0x897C–0x897F	35197–35200	R	–	DATETIME	–	–	–	X	Timestamp of reset of minimum and maximum frequency

Diagnostic Data

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x8980	35201	R	–	INT16U	0–3	–	–	X	Overall system health state: ● 0 = Not evaluated ● 1 = Ok ● 2 = Warning ● 3 = Malfunction
0x8981–0x8982	35202–35203	R	–	FLOAT32	–	–	–	X	Breaker remaining service life ratio: ● 0 = End of typical service life of the breaker ● 1 = New breaker
0x8983–0x8984	35204–35205	R	–	INT32U	–	–	–	X	Total number of operations (opening operation counter)
0x8985–0x8986	35206–35207	R	–	INT32U	–	–	–	X	Number of total trips in operation

Chapter 4
Micrologic Control Unit Data for Masterpact MTZ

What Is in This Chapter?

This chapter contains the following sections:

Section 4.1
Micrologic Control Unit Registers

What Is in This Section?

This section contains the following topics:

Tripping Data

Tripping Cause

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E56–0x7E57	32343–32344	R	–	INT32U	–	–	Alarm change counter
0x7E58	32345	R	–	INT16U	0–1	–	Quality of each bit of register 32346: ● 0 = Invalid ● 1 = Valid
0x7E59	32346	R	–	INT16U	0–1	1	Alarm status synthesis: ● 0 = No active alarms ● 1 = At least one alarm is active
0x7E5A–0x7E72	32347–32371	R	–	INT16U	0–565	–	Quality of each bit of registers 32372-32396: ● 0 = Invalid ● 1 = Valid
0x7E73	32372	R	–	INT16U	0–1	0	Ir trip
						1	Isd trip
						2	Ii trip
						3	Ig trip
						4	IΔn trip
						5	Ultimate self-protection trip (SELLIM)
						6	Internal failure trip
						7	Reserved
						8	Ultimate self-protection trip (DIN/DINF)
						9	IΔn/Ig test trip
						10–15	Reserved
0x7E74–0x7E76	32373–32375	–	–	–	–	0–15	Reserved

Protection Data

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E77	32376	R	–	INT16U	0–1	0	Ir start (I > 105% Ir)
						1	Isd start
						2	Ig start
						3	IΔn start
						4	Ultimate self-protection (SELLIM) operate
						5–7	Reserved
						8	Ultimate self-protection (DIN/DINF) operate
						9–15	Reserved
0x7E78	32377	–	–	–	–	0–15	Reserved
0x7E79	32378	R	–	INT16U	0–1	0	Ir operate
						1	Isd operate
						2	Ii operate
						3	Ig operate
						4	IΔn operate
						5–15	Reserved
0x7E7A–0x7E7B	32379–32380	–	–	–	–	0–15	Reserved

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E7C	32381	R	–	INT16U	0–1	0	Thermal memory reset order
						1	Ir prealarm (I > 90% Ir)
						2–10	Reserved
						11	B curve active
						12–15	Reserved

Last Trip Event

Address	Register	RW	Unit	Type	Range	Bit	Description
0x0227	552	R	–	INT16U	25600–25630	–	Last trip event code: ● 25600 (0x6400) = Ir trip event ● 25601 (0x6401) = Isd trip event ● 25602 (0x6402) = Ii trip event ● 25603 (0x6403) = Ig trip event ● 25604 (0x6404) = Ivigi trip event ● 25606 (0x6406) = Ultimate self protection trip event (SELLIM) ● 25607 (0x6407) = Internal failure event ● 25629 (0x641D) = Ultimate self protection trip event (DIN/DINF) ● 25630 (0x641E) = Ground test and vigi test trip event
0x0228–0x022B	553-556	R	–	DATETIME	–	–	Timestamp of last trip event
0x022C	557	R	–	INT16U	–	–	Timestamp quality of last trip event
0x022D	558	–	–	–	–	–	Reserved
0x022E	559	R	–	INT16U	–	–	Quality of each bit of registers 560 *(see page 51)*: ● 0 = Invalid ● 1 = Valid
0x022F	560	R	–	INT16U	–	–	Last trip event origin electrical fault: ● 0 = Inactive ● 1 = Active
						0	Fault on phase 1
						1	Fault on phase 2
						2	Fault on phase 3
						3	Fault on neutral
0x0230	561	–	–	–	–	–	Reserved

ZSI Status Before Last Trip

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

Settings of Protection Responsible of the Last Trip

The settings of the protection responsible of the last trip are recorded in the following registers:

Address	Register	RW	Unit	Type	Range	Description
0x0233	564	R	–	INT16U	1–128	Last trip event active setting group: ● 1 = Setting group A ● 2 = Setting group B ● 128 = Fallback settings
0x0234–0x0235	565–566	R	A	FLOAT32	–	Generic protection last parameter 1
0x0236–0x0237	567–568	R	A	FLOAT32	–	Generic protection last parameter 2
0x0238–0x0239	569–570	R	s	FLOAT32	–	Generic protection last parameter 3
0x023A–0x023B	571–572	R	s	FLOAT32	–	Generic protection last parameter 4
0x023C	573	R	–	INT16U	–	Generic protection last parameter 5
0x023D	574	R	–	INT16U	–	Generic protection last parameter 6

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

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

Interrupted Current

Address	Register	RW	Unit	Type	Range	Description
0x023E–0x023F	575–576	R	A	FLOAT32	–	Last interrupted current on phase 1 (peak)
0x0240–0x0241	577–578	R	A	FLOAT32	–	Last interrupted current on phase 2 (peak)
0x0242–0x0243	579–580	R	A	FLOAT32	–	Last interrupted current on phase 3 (peak)
0x0244–0x0245	581–582	R	A	FLOAT32	–	Last interrupted current on neutral (peak)
0x0246–0x0247	583–584	R	A	FLOAT32	–	Last interrupted ground current (peak)
0x0248–0x0249	585–586	R	A	FLOAT32	–	Last interrupted earth leakage current (peak)

Measurement Before Last Trip

Address	Register	RW	Unit	Type	Range	Description
0x024A–0x024B	587–588	R	A	FLOAT32	–	RMS current of phase 1 before last trip
0x024C–0x024D	589–590	R	A	FLOAT32	–	RMS current of phase 2 before last trip
0x024E–0x024F	591–592	R	A	FLOAT32	–	RMS current of phase 3 before last trip
0x0250–0X0251	593–594	R	A	FLOAT32	–	RMS current of neutral before last trip
0x0252–0x253	595–596	R	A	FLOAT32	–	RMS current of ground fault before last trip
0x0254–0x0255	597–598	R	A	FLOAT32	–	Current earth leakage before last trip
0x0256–0x0257	599–600	R	V	FLOAT32	–	RMS phase-to-phase voltage V12 before last trip
0x0258–0x0259	601–602	R	V	FLOAT32	–	RMS phase-to-phase voltage V23 before last trip
0x025A–0x025B	603–604	R	V	FLOAT32	–	RMS phase-to-phase voltage V31 before last trip
0x025C–0x025D	605–606	R	Hz	FLOAT32	–	Frequency before last trip
0x025E–0x025F	607–608	R	V	FLOAT32	–	Voltage unbalance V12 before last trip
0x0260–0x0261	609–610	R	V	FLOAT32	–	Voltage unbalance V23 before last trip
0x0262–0x0263	611–612	R	V	FLOAT32	–	Voltage unbalance V31 before last trip
0x0264–0x0265	613–614	R	A	FLOAT32	–	Current unbalance 1 before last trip
0x0266–0x0267	615–616	R	A	FLOAT32	–	Current unbalance 2 before last trip
0x0268–0x0269	617–618	R	A	FLOAT32	–	Current unbalance 3 before last trip

Circuit Breaker Data

Circuit Breaker Status Register

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7CFF	32000	R	–	INT16U	0–1	–	Quality of each bit of register 32001 *(see page 51)*: ● 0 = Invalid ● 1 = Valid
0x7D00	32001	R	–	INT16U	0–1	–	Circuit breaker status register
						0	OF status indication contact ● 0 = The circuit breaker is open. ● 1 = The circuit breaker is closed.
						1	SD trip indication contact ● 0 = Circuit breaker is not tripped. ● 1 = Circuit breaker is tripped due to electrical fault, shunt trip, or push-to-trip. Bit always equal to 0 for Masterpact and Compact NS circuit breakers with motor mechanism.
						2	SDE fault trip indication contact ● 0 = Circuit breaker is not tripped on electrical fault. ● 1 = Circuit breaker is tripped due to electrical fault (including ground-fault test and earth-leakage test).
						3	CH spring charged contact (only with Masterpact) ● 0 = Spring discharged ● 1 = Spring charged Bit always equal to 0 for Masterpact and Compact NS circuit breakers with motor mechanism.
						4	Reserved
						5	PF ready to close contact (only with Masterpact) ● 0 = Not ready to close ● 1 = Ready to close Bit always equal to 0 for Masterpact and Compact NS circuit breakers with motor mechanism.
						6–15	Reserved

Inhibit Close Order

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

Opening/Closing Release Data

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E64– 0x7E65	32357- 32358	R	–	INT16	–	–	Quality of each bit of registers 32382-32383: ● 0 = Invalid ● 1 = Valid
0x7E66– 0x7E65	32359- 32371	R	–	INT16	–	–	Quality of each bit of registers 32384-32396 *(see page 98)*.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E73–0x7E76	32372-32375	R	–	INT16	–	–	Tripping cause *(see page 81)*
0x7E77–0x7E7C	32376-32381	R	–	INT16	–	–	Protection data *(see page 81)*
0x7E7D	32382	R	–	INT16U	0–1	0	Reserved
						1	CB moved from close to open position
						2	CB moved from open to close position
						3	Reserved
						4	Closing release activation
						5	Reserved
						6	Opening release activation
						7	Reserved
						8	Manual mode enabled
						9	Local mode enabled
						10	Closing inhibited by communication
						11	Closing inhibited by wired input
						12	Reserved
						13	Alarm reset
						14	M2C output 1 is forced
						15	M2C output 2 is forced
0x7E7E	32383	–	–	–	–	0–15	Reserved

Remote Control Settings

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

Alarm Status

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

Circuit Breaker Characteristics

System Settings

Address	Register	RW	Unit	Type	Range	Bit	Description
0x1FD8–0x1FD9	8153–8154	R	V	FLOAT32	208–1000	–	Rated voltage
0x1FDA–0x1FDB	8155–8156	R	A	FLOAT32	100–8000	–	Rated current
0x1FDC	8157	–	–	–	–	–	Reserved
0x1FDD	8158	R	–	INT16U	0–1	–	Rated frequency: ● 0 = 50 Hz ● 1 = 60 Hz
0X1FDE–0x1FE0	8159–8161	–	–	–	–	–	Reserved
0x1FE1	8162	R	–	INT16U	0–1	–	Number of poles: ● 0 = 3 poles ● 1 = 4 poles
0x1FE2	8163	R	–	INT16U	30–41	–	System type (see detailed description below): ● 30 = 4CT 3VT ● 31 = 3CT 3VT ● 40 = 3CT 4VT ● 41 = 4CT 4VT
0x1FE3–0x1FE4	8164–8165	R	V	FLOAT32	1000–1250	–	VT primary voltage
0x1FE5–0x1FE6	8166–8167	R	V	FLOAT32	100–690	–	VT secondary voltage
0x1FE7–0x1FEA	8168–8171	R-WC	–	DATETIME	–	–	Current date/time of the source.

System type detailed description:

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

Hardware Revision

The hardware revision is an ASCII string using the format XXX.YYY.ZZZ with:
- XXX = major version (000–127)
- YYY = minor version (000–255)
- ZZZ = revision number (000–255)

The NULL character ends the revision number.

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

Protection Type

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

Application Type

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

Circuit Breaker Standard

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

Firmware Revision

The firmware revision is an ASCII string using the format XXX.YYY.ZZZ with:
- XXX = major version (000–127)
- YYY = minor version (000–255)
- ZZZ = revision number (000–255)

The NULL character ends the revision number.

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

Measurement Settings

Address	Register	RW	Unit	Type	Range	Description
0x20D1	8402	R-WC	–	INT16U	0–1	External neutral voltage sensor: ● 0 = Not available ● 1 = Available
0x20D2	8403	R-WC	–	INT16U	0–1	External neutral current sensor: ● 0 = Not available ● 1 = Available
0x20D3	8404	R-WC	–	INT16U	0, 2	Power factor sign convention: ● 0 = IEC ● 2 = IEEE
0x20D4	8405	R-WC	–	INT16U	0–1	Power sign: ● 0 = Direct ● 1 = Inverted
0x20D5	8406	–	–	–	–	Reserved
0x20D6	8407	R-WC	–	INT16U	0–1	Energy accumulation mode: ● 0 = Absolute ● 1 = Signed
0x20D7	8408	R	–	INT16U	0–1	Power calculation method: ● 0 = Vectorial ● 1 = Arithmetic

Device Identification

Address	Register	RW	Unit	Type	Range	Description
0x20D9	8410	R	–	INT16U	–	Internal identifier of the product:: ● 17120 = Micrologic X
0x20DA–0x20E3	8411–8420	R	–	OCTET STRING	–	Vendor name: Schneider Electric
0x20E4–0x2123	8421–8484	R	–	OCTET STRING	–	Vendor URL
0x2124–0x212D	8485–8492	R	–	OCTET STRING	–	Product range: Micrologic
0x212C–0x2132	8493–8500	R	–	OCTET STRING	–	Product model
0x2134–0x213B	8501–8508	R	–	OCTET STRING	–	Product code
0x213C–0x2148	8509–8521	R	–	OCTET STRING	–	Serial number
0x2149–0x2168	8522–8553	R-WC	–	OCTET STRING	–	User application name
0x2169–0x2178	8554–8569	R	–	OCTET STRING	–	Main capability of device
0x2179	8570	–	–	–	–	Reserved
0x217A–0x2181	8571–8578	R	–	OCTET STRING	–	Product range: Masterpact MTZ
0x2182–0x219A	8579–8603	–	–	–	–	Reserved
0x219B–0x21AA	8604–8619	R	–	OCTET STRING	–	Device family: Circuit breaker

Real-Time Measurements

General Description

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

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

Voltage

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

Average Voltage

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

Voltage Unbalance

Address	Register	RW	Unit	Type	Range	Description
0x5220–0x5221	21025–21026	R	–	FLOAT32	–	Phase-to-phase V12 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x5222–0x5223	21027–21028	R	–	FLOAT32	–	Phase-to-phase V23 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x5224–0x5225	21029–21030	R	–	FLOAT32	–	Phase-to-phase V31 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x5226–0x5227	21031–21032	R	–	FLOAT32	–	Phase-to-neutral V1N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages(1)
(1) Value available when system type register returns 40 or 41.						

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

Current

Address	Register	RW	Unit	Type	Range	Description
0x7D1B–0x7D1C	32028–32029	R	A	FLOAT32	–	RMS current on phase 1
0x7D1D–0x7D1E	32030–32031	R	A	FLOAT32	–	RMS current on phase 2
0x7D1F–0x7D20	32032–32033	R	A	FLOAT32	–	RMS current on phase 3
0x7D21–0x7D22	32034–32035	R	A	FLOAT32	–	RMS current of neutral(1)
0x7D23–0x7D24	32036–32037	R	A	FLOAT32	–	Maximum of RMS current of phases 1, 2, 3, N (Most loaded phase)
0x7D25–0x7D26	32038–32039	R	-	FLOAT32	–	Current ratio on ground (Ig setting ratio)
0x7D27–0x7D28	32040–32041	R	-	FLOAT32	–	Current ratio on earth-leakage (IΔn setting ratio)(2)
(1) Value available when system type register returns 30 or 41. (2) Value available with Micrologic 7.						

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

Current Unbalance

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

Average Values

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

Frequency

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

Active Power

The flow sign of the active power depends on the configuration of register 8405 *(see page 89)*.

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

Reactive Power

The flow sign of the reactive power depends on the configuration of register 8405 *(see page 89)*.

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

Apparent Power

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

Power Factor

The sign of the power factor depends on the configuration of register 8404 *(see page 89)*:

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

Fundamental Power Factor (cos ϕ)

The sign of the fundamental power factor (cos ϕ) depends on the configuration of register 8404 *(see page 89)*:

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

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

Address	Register	RW	Unit	Type	Range	Description
0x7DDD–0x7DDE	32222–32223	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-phase voltage V12 compared to the fundamental
0x7DDF–0x7DE0	32224–32225	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-phase voltage V23 in compared to the fundamental
0x7DE1–0x7DE2	32226–32227	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-phase voltage V31 in compared to the fundamental
0x7DE3–0x7DE4	32228–32229	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-neutral voltage V1N in compared to the fundamental(1)
0x7DE5–0x7DE6	32230–32231	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-neutral voltage V2N in compared to the fundamental(1)
0x7DE7–0x7DE8	32232–32233	R	–	FLOAT32	–	Total harmonic distortion (THD) of phase-to-neutral voltage V3N in compared to the fundamental(1)
0x528C–0x528D	21133–21134	R	–	FLOAT32	–	Average of 3 phase-to-phase voltage Total Harmonic Distortions (THD) compared to the fundamental average
0x528E–0x528F	21135–21136	R	–	FLOAT32	–	Average of 3 phase-to-neutral voltage Total Harmonic Distortions (THD) compared to the fundamental
(1) Value available when system type register returns 40 or 41.						

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

Address	Register	RW	Unit	Type	Range	Description
0x5290–0x5291	21137–21138	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-phase voltage V12 compared to the RMS voltage
0x5292–0x5293	21139–21140	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-phase voltage V23 compared to the RMS voltage
0x5294–0x5295	21141–21142	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-phase voltageV31 compared to the RMS voltage
0x5296–0x5297	21143–21144	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-neutral voltageV1N compared to the RMS voltage(1)
0x5298–0x5299	21145–21146	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-neutral voltageV2N compared to the RMS voltage(1)
0x529A–0x529B	21147–21148	R	–	FLOAT32	–	Total harmonic distortion (thd) of phase-neutral voltageV3N compared to the RMS voltage(1)
0x529C–0x529D	21149–21150	R	–	FLOAT32	–	Average of 3 phase-to-phase voltage total harmonic distortions (thd) compared to the RMS voltage
0x529E–0x529F	21151–21152	R	–	FLOAT32	–	Average of 3 phase-to-neutral voltage total harmonic distortions (thd) compared to the RMS voltage
(1) Value available when system type register returns 40 or 41.						

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

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

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

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

Address	Register	RW	Unit	Type	Range	Description
0x52B0–0x52B1	21169–21170	R	–	FLOAT32	–	Total harmonic distortion (thd) of current on neutral compared to the RMS current(1)
0x52B2–0x52B3	21171–21172	R	–	FLOAT32	–	Average of 3 phase current total harmonic distortions (thd) compared to the RMS current
(1) Value available when system type register returns 30 or 41.						

Miscellaneous

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

Minimum and Maximum Values of Real-Time Measurements

Maximum Current and Voltage Unbalance

Address	Register	RW	Unit	Type	Range	Description
0x5318–0x5319	21273–21274	R	–	FLOAT32	–	Maximum of 3 phase current unbalances
0x531A–0x531B	21275–21276	R	–	FLOAT32	–	Maximum of 3 phase-to-phase voltage unbalances
0x531C–0x531D	21277–21278	R	–	FLOAT32	-100–100	Maximum of 3 phase-to-neutral voltage unbalances

Energy Measurements

Active, Reactive, and Apparent Energy

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

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

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

Ampere x Hour

Address	Register	RW	Unit	Type	Range	Description
0x56C2–0x56C3	22211–22212	R	A	FLOAT32	–	Amp x hour on phase 1
0x56C4–0x56C5	22213–22214	R	A	FLOAT32	–	Amp x hour on phase 2
0x56C6–0x56C7	22215–22216	R	A	FLOAT32	–	Amp x hour on phase 3
0x56C8–0x56C9	22217–22218	R	A	FLOAT32	–	Amp x hour on neutral

Maintenance and Diagnostic Data

Contact Wear

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

Maintenance Data

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E66-0x7E72	32359-32371	R	–	INT16	–	–	Quality of each bit of registers 32384-32396: ● 0 = Invalid ● 1 = Valid
0x7E73-0x7E76	32372-32375	R	–	INT16	–	–	Tripping cause *(see page 81)*
0x7E77-0x7E7C	32376-32381	R	–	INT16	–	–	Protection data *(see page 81)*
0x7E7D-0x7E7E	32382-32383	R	–	INT16	–	–	Opening/Closing release data *(see page 85)*
0x7E7F	32384	R	–	INT16U	0–1	0	Protection settings change by display enabled
						1	Protection settings changed by display
						2	Protection settings changed by Bluetooth/USB/IFE
						3	Loss of IFE module
						4	Loss of IO1 module
						5	Loss of IO2 module
						6	Configuration mismatch between IO and control unit
						7–15	Reserved
0x7E80	32385	R	–	INT16U	0–1	0–2	Reserved
						3	Control unit in upgrade mode
						4	Digital module License expires in 30 days
						5	Digital module License expires in 20 days
						6	Digital module License expires in 10 days
						7	Control unit firmware upgrade failed
						8	Digital module license installed
						9	Digital module license uninstalled
						10	Digital module license expired
						11	Digital module license rejected
						12–13	Reserved
						14	Date and time set
						15	Remote protection settings change enabled
0x7E81	32386	R	–	INT16U	0–1	0	USB port connected
						1	Bluetooth communication enabled
						2–15	Reserved

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E82	32387	R	–	INT16U	0–1	0	Control unit in test mode
						1	Injection test in progress
						2	Test aborted by user
						3	ZSI test in progress
						4	Reserved
						5	Control unit self test major malfunction
						6	Reserved
						7	Internal current sensor disconnected
						8	External neutral current sensor disconnected
						9	Earth leakage (Vigi) sensor disconnected
						10	Reserved
						11	Protection reset to default setting if rebooted
						12	Reserved
						13	Error reading sensor plug
						14	Reserved
						15	Control unit factory configuration error
0x7E83	32388	R	–	INT16U	0–1	0	Replace battery
						1	NFC malfunction
						2–5	Reserved
						6	Display screen or wireless malfunction 1
						7	Display screen or wireless malfunction 2
						8	Display screen or wireless malfunction 3
						9	Reserved
						10	Bluetooth malfunction
						11–13	Reserved
						14	Minor control unit malfunction corrected
						15	Reserved
0x7E84	32389	R	–	INT16U	0–1	0	IΔn/Ig test trip failed
						1	IΔn/Ig test button pressed
						2	Protection settings no longer accessible error 1
						3	Protection settings no longer accessible error 2
						4	Protection settings no longer accessible error 3
						5	Protection settings no longer accessible error 4
						6	Protection settings no longer accessible error 5
						7	Control unit self test minor malfunction 1
						8	Control unit self test minor malfunction 2
						9	Control unit self test minor malfunction 3
						10	Control unit self test minor malfunction 4
						11	Control unit self test minor malfunction 5
						12	Metering malfunction 1
						13	Metering malfunction 2
						14	Metering malfunction 3
						15	Reserved

Address	Register	RW	Unit	Type	Range	Bit	Description
0x7E85	32390	R	–	INT16U	0–1	0	Critical hardware module discrepancy
						1	Critical firmware module discrepancy
						2	Non-critical hardware module discrepancy
						3	Non-critical firmware module discrepancy
						4	Address conflict between modules
						5	Firmware discrepancy within control unit
						6–10	Reserved
						11	Events in history log have been erased
						12–15	Reserved
0x7E86	32391	R	–	INT16U	0–1	0	Contact wear is above 60%. Check contacts.
						1	Contact wear is above 95%. Plan for replacement.
						2	Contacts 100% worn out. CB needs to be replaced.
						3	Less than 20% CB operation remaining
						4	CB has reached the max number of operations.
						5	MX1 opening release malfunction. (Release autotest result) Release needs to be replaced.
						6	MX1 opening release is no longer detected.
						7	XF closing release malfunction. (Release autotest result) Release needs to be replaced.
						8	XF closing release no longer detected.
						9	MX2/MN opening release malfunction 1. (Release autotest result) Release needs to be replaced.
						10	MX2/MN opening release no longer detected.
						11	MCH charging operations above threshold
						12	MCH has reached the max number of operations
						13–15	Reserved
0x7E87	32392	R	–	INT16U	0–1	0	Reset min/max currents
						1	Reset min/max voltages
						2	Reset min/max power
						3	Reset min/max frequency
						4	Reset min/max harmonics
						5	Reset min/max power factor
						6–7	Reserved
						8	Reset energy counters
						9–15	Reserved
0x7E88–0x7EB0	32393–32433	–	–	–	–	–	Reserved

Diagnostic Data

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

Section 4.2
Micrologic Control Unit Commands

What Is in This Section?

This section contains the following topics:

List of Micrologic Control Unit Commands and Error Codes

List of Commands

The Micrologic control unit commands are performed by the command interface *(see page 42)*. They are grouped by their functions and types:

- Protection get commands *(see page 104)*
- Measurement get commands *(see page 112)*
- Measurement set and reset commands *(see page 126)*
- Diagnostic commands *(see page 127)*
- Measurement settings set or reset commands *(see page 132)*
- Circuit breaker operation set commands *(see page 133)*
- Micrologic X get and set commands *(see page 135)*

In the Micrologic control unit registers:

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

Error Codes

Error codes generated by Micrologic control units are the generic error codes *(see page 44)*.

Protection Get Commands

List of Commands

The following table lists the available Micrologic control unit commands, their corresponding command codes, and password levels:

Command	Command code	Password level
Get long time over current protection settings	48768	No password required
Get short time over current protection settings	48769	No password required
Get instantaneous protection settings	48770	No password required
Get ground fault protection settings	48771	No password required
Get earth leakage protection settings	48772	No password required
Get neutral settings	48773	No password required
Get ZSI configuration parameters	49025	No password required
Get dual setting	49536	No password required
Get active setting group	49537	No password required

Get Long Time Over Current Protection settings

To get the long time over current protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	48768	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	0	Password of the command (no password required)
0x1F45	8006	–	INT16U	–	MSB: 0 LSB: Requested setting group ● 0 = Current setting group ● 1 = Setting group A ● 2 = Setting group B

The long time over current protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	48768	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	52	–	Number of bytes returned
0x1F56	8023	–	INT16U	–	–	MSB: Requested setting group ● 0 = Current setting group ● 1 = Setting group A ● 2 = Setting group B LSB: Responded setting group ● 1 = Setting group A ● 2 = Setting group B ● 128 = Fallback setting
0x1F57	8024	–	INT16U	–	–	MSB: Long time over current protection mode ● 0 = Off ● 1 = On (tripping) LSB: Long time over current protection supported ● 0 = Not supported ● 1 = Supported
0x1F58-0x1F5B	8025-8028	–	DATETIME	–	–	Timestamp of last change of long time over current protection mode

Address	Register	Unit	Type	Range	Bit	Description
0x1F5C	8029	–	INT16U	-	–	Timestamp quality of last change of long time over current protection mode
0x1F5D-0x1F60	8030-8033	–	DATETIME	–	–	Timestamp of last change of any parameter of the long time over current protection function
0x1F61	8034	–	INT16U	-	–	Timestamp quality of last change of any parameter of the long time over current protection function
0x1F62-0x1F63	8035-8036	–	FLOAT32	–	–	Long time over current protection threshold coefficient high limit
0x1F64-0x1F65	8037-8038	s	FLOAT32	–	–	Long time over current protection time delay high limit
0x1F66	8039	–	INT16U	1	–	MSB: 0 LSB: Long time over current protection curve ● 1 = Inverse time (I^2t = ON)
0x1F67-0x1F68	8040-8041	A	FLOAT32	–	–	Long time over current protection threshold
0x1F69-0x1F6A	8042-8043	s	FLOAT32	–	–	Long time over current protection time delay
0x1F6B-0x1F6F	8044-8048	–	–	–	–	Reserved

Get Short Time Over Current Protection Settings

To get the short time over current protection settings, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	48769	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	0	Password of the command (no password required)
0x1F45	8006	–	INT16U	–	MSB: 0 LSB: Requested setting group ● 0 = Current setting group ● 1 = Setting group A ● 2 = Setting group B

The short time over current protection settings are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	48769	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	52	–	Number of bytes returned
0x1F56	8023	–	INT16U	–	–	MSB: Requested setting group ● 0 = Current setting group ● 1 = Setting group A ● 2 = Setting group B LSB: Responded setting group ● 1 = Setting group A ● 2 = Setting group B ● 128 = Fallback setting
0x1F57	8024	–	INT16U	–	–	MSB: Short time over current protection mode ● 0 = Off ● 1 = On (tripping) LSB: Short time over current protection supported ● 0 = Not supported ● 1 = Supported

Address	Register	Unit	Type	Range	Bit	Description
0x1F58-0x1F5B	8025-8028	–	DATETIME	–	–	Timestamp of last change of short time over current protection mode
0x1F5C	8029	–	INT16U	-	–	Timestamp quality of last change of short time over current protection mode
0x1F5D-0x1F60	8030-8033	–	DATETIME	–	–	Timestamp of last change of any parameter of the short time over current protection function
0x1F61	8034	–	INT16U	–	–	Timestamp quality of last change of any parameter of the short time over current protection function.
0x1F62-0x1F63	8035-8036	–	FLOAT32	–	–	Short time over current protection threshold coefficient high limit
0x1F64-0x1F65	8037-8038	s	FLOAT32	–	–	Short time over current protection time delay high limit
0x1F66	8039	–	INT16U	–	–	MSB: 0 LSB: Short time over current protection curve ● 0 = Definite time (I^2t = OFF) ● 1 = Inverse time (I^2t = ON)
0x1F67-0x1F68	8040-8041	–	FLOAT32	–	–	Short time over current protection threshold coefficient
0x1F69-0x1F6A	8042-8043	s	FLOAT32	–	–	Short time over current protection time delay
0x1F6B-0x1F6F	8044-8048	–	–	–	–	Reserved

Get Instantaneous Protection Settings

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	48770	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	0	Password of the command (no password required)
0x1F45	8006	–	INT16U	–	MSB: 0 LSB: Requested setting group ● 0 = Current setting group ● 1 = Setting group A ● 2 = Setting group B

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	48770	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	40	–	Number of bytes returned
0x1F56	8023	–	INT16U	–	–	MSB: Requested setting group ● 0 = Current setting group ● 1 = Setting group A ● 2 = Setting group B LSB: Responded setting group ● 1 = Setting group A ● 2 = Setting group B ● 128 = Fallback setting

Address	Register	Unit	Type	Range	Bit	Description
0x1F57	8024	–	INT16U	–	–	MSB: Instantaneous over current protection mode ● 0 = Off ● 1 = On (tripping) LSB: Instantaneous over current protection function supported ● 0 = Not supported ● 1 = Supported
0x1F58-0x1F5B	8025-8028	–	DATETIME	–	–	Timestamp of last change of instantaneous over current protection mode
0x1F5C	8029	–	INT16U	–	–	Timestamp quality of last change of instantaneous over current protection mode
0x1F5D-0x1F60	8030-8033	–	DATETIME	–	–	Timestamp of last change of any parameter of the instantaneous over current protection mode
0x1F61	8034	–	INT16U	–	–	Timestamp quality of last change of any parameter of the instantaneous over current protection function
0x1F62-0x1F63	8035-8036	–	FLOAT32	–	–	Instantaneous over current protection threshold coefficient high limit
0x1F64-0x1F65	8037-8038	–	FLOAT32	–	–	Instantaneous over current protection threshold coefficient
0x1F66	8039	–	INT16U	–	–	MSB: 0 LSB: Instantaneous over current protection time delay mode: ● 0 = Standard ● 1 = Fast
0x1F67-0x1F69	8040-8042	–	–	–	–	Reserved

Get Ground Fault Protection Settings

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	48771	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	0	Password of the command (no password required)
0x1F45	8006	–	INT16U	–	MSB: 0 LSB: Requested setting group ● 0 = Current setting group ● 1 = Setting group A ● 2 = Setting group B

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	48771	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	52	–	Number of bytes returned

Address	Register	Unit	Type	Range	Bit	Description
0x1F56	8023	–	INT16U	–	–	MSB: Requested setting group ● 0 = Current setting group ● 1 = Setting group A ● 2 = Setting group B LSB: Responded setting group ● 1 = Setting group A ● 2 = Setting group B ● 128 = Fallback setting
0x1F57	8024	–	INT16U	–	–	MSB: Ground fault protection mode ● 0 = Off ● 1 = On (tripping) LSB: Ground fault protection function supported ● 0 = Not supported ● 1 = Supported
0x1F58-0x1F5B	8025-8028	–	DATETIME	–	–	Timestamp of last change of ground fault protection mode
0x1F5C	8029	–	INT16U	-	–	Timestamp quality of last change of ground fault protection mode
0x1F5D-0x1F60	8030-8033	–	DATETIME	–	–	Timestamp of last change of any parameter of the ground fault protection function
0x1F61	8034	–	INT16U	–	–	Timestamp quality of last change of any parameter of the ground fault protection function
0x1F62-0x1F63	8035-8036	–	FLOAT32	–	–	Ground fault protection threshold coefficient high limit
0x1F64-0x1F65	8037-8038	s	FLOAT32	–	–	Ground fault protection time delay high limit
0x1F66	8039	–	INT16U	–	–	MSB: 0 LSB: Ground fault protection curve ● 0 = Definite time (I^2t = OFF) ● 1 = Inverse time (I^2t = ON)
0x1F67-0x1F68	8040-8041	A	FLOAT32	–	–	Ground fault protection threshold
0x1F69-0x1F6A	8042-8043	s	FLOAT32	–	–	Ground fault protection time delay
0x1F6B-0x1F6F	8044-8048	–	–	–	–	Reserved

Get Earth Leakage Protection Settings

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	48772	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	0	Password of the command (no password required)
0x1F45	8006	–	–	–	Reserved

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	48772	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	48	–	Number of bytes returned

Address	Register	Unit	Type	Range	Bit	Description
0x1F56	8023	–	–	–	–	Reserved
0x1F57	8024	–	INT16U	–	–	MSB: Earth leakage protection mode ● 0 =Off ● 1 = On LSB: Earth leakage function supported ● 0 = Not supported ● 1 = Supported
0x1F58-0x1F5B	8025-8028	–	DATETIME	–	–	Timestamp of last change of earth leakage protection mode
0x1F5C	8029	–	INT16U	–	–	Timestamp quality of last change of earth leakage protection mode
0x1F5D-0x1F60	8030-8033	–	DATETIME	–	–	Timestamp of last change of any parameter of the earth leakage protection function
0x1F61	8034	–	INT16U	–	–	Timestamp quality of last change of any parameter of the earth leakage protection function
0x1F62-0x1F63	8035-8036	–	FLOAT32	–	–	Earth leakage protection threshold coefficient high limit
0x1F64-0x1F65	8037-8038	s	FLOAT32	–	–	Earth leakage protection time delay high limit
0x1F66-0x1F67	8039-8040	A	FLOAT32	–	–	Earth leakage protection threshold
0x1F68-0x1F69	8041-8042	s	FLOAT32	0.06, 0.15, 0.23, 0.35, 0.80	–	Earth leakage protection time delay
0x1F6A-0x1F6D	8043-8046	–	–	–	–	Reserved

Get Neutral Settings

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	48773	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	0	Password of the command (no password required)

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	48773	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	28	–	Number of bytes returned
0x1F56	8023	–	INT16U	–	–	MSB: Neutral protection mode ● 0 = Off ● 1 = On LSB: Neutral protection function supported ● 0 = Not supported ● 1 = Supported
0x1F57-0x1F5A	8024-8027	–	DATETIME	–	–	Timestamp of last change of neutral protection mode
0x1F5B	8028	–	INT16U	–	–	Timestamp quality of last change of neutral protection mode

Address	Register	Unit	Type	Range	Bit	Description
0x1F5C-0x1F5F	8029-8032	–	DATETIME	–	–	Timestamp of last change of any parameter of the neutral protection function
0x1F60	8033	–	INT16U	–	–	Timestamp quality of last change of any parameter of the neutral protection function
0x1F61	8034	–	INT16U	0–3	–	MSB: 0 LSB: Neutral protection type ● 0 = OFF ● 1 = 0.5 ● 2 = 1.0 ● 3 = Oversized
0x1F62-0x1F63	8035-8036	A	FLOAT32	–	–	Long time over current protection threshold

Get ZSI Configuration Parameter

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

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

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	49025	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	24	–	Number of bytes returned
0x1F56	8023	–	INT16U	–	–	MSB: ZSI configuration mode: ● 0 = Off ● 1 = On (tripping) LSB: ZSI configuration function supported ● 0 = Not supported ● 1 = Supported
0x1F57-0x1F5A	8024-8027	–	DATETIME	–	–	Timestamp of last change of ZSI configuration mode
0x1F5B	8028	–	INT16U	–	–	Timestamp quality of last change of ZSI configuration mode.
0x1F5C-0x1F5F	8029-8032	–	DATETIME	–	–	Timestamp of last change of any parameter of the ZSI configuration
0x1F60	8033	–	INT16U	–	–	Timestamp quality of last change of any parameter of the ZSI configuration
0x1F61	8034	–	INT16U	0-2	–	ZSI protection selection: ● 0 = Short time ● 1 = Ground / Earth leakage ● 2 = All

Get Dual Setting

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49536	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command

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

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

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49536	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	6	Number of bytes returned
0x1F56	8023	–	INT16U	–	MSB: Setting group control block mode ● 0 = Off ● 1 = On LSB: Setting group control block operating behavior ● 0 = Local ● 1 = IO module (1 wire) ● 2 = IO module (2 wires) ● 3 = Remote
0x1F57-0x1F58	8024-8025	–	–	–	Reserved

Get Active Setting Group

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49537	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	0	Password of the command (no password required)

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	49537	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	12	–	Number of bytes returned
0x1F56	8023	–	INT16U	–	–	MSB: Active setting group ● 0 = Invalid, the selection of the active setting group is in progress ● 1 = Valid LSB: Active setting group ● 1 = Setting group A ● 2 = Setting group B
0x1F57-0x1F5A	8024-8027	–	DATETIME	–	–	Timestamp of last active setting group change
0x1F5B	8028	–	INT16U	–	–	Timestamp quality of last active setting group change

Measurement Get Commands

List of Commands

The following table lists the available Micrologic control unit commands, their corresponding command codes, and password levels:

Command	Command code	Password level
Get energy per phase	49280	No password required
Get minimum/maximum values	49281	No password required

Get Energy Per Phase

To get the energy per phase, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49280	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command (no password required)

NOTE: The Micrologic X control unit will return:

- 0x1513 (command not supported) in the command status register if the energy per phase cannot be calculated (3-pole circuit breaker without ENVT)
- 0x15BF (license is not installed) in the command status register if the energy per phase digital module is not installed in the Micrologic X control unit.

The energy per phase is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49280	Last command code
0x1F54	8021	–	INT16U	0–180	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	240	Number of bytes returned
0x1F56–0x1F59	8023–8026	Wh	INT64	–	Active energy delivered on phase 1 (into the load, counted positively)
0x1F5A–0x1F5D	8027–8030	Wh	INT64	–	Active energy received on phase 1 (out of the load, counted negatively)
0x1F5E–0x1F61	8031–8034	Wh	INT64	–	Total active energy delivered on phase 1 (not resettable)
0x1F62–0x1F65	8035–8038	Wh	INT64	–	Total active energy received on phase 1 (not resettable)
0x1F66–0x1F69	8039–8042	Wh	INT64	–	Active energy delivered on phase 2 (into the load, counted positively)
0x1F6A–0x1F6D	8043–8046	Wh	INT64	–	Active energy received on phase 2 (out of the load, counted negatively)
0x1F6E–0x1F71	8047–8050	Wh	INT64	–	Total active energy delivered on phase 2 (not resettable)
0x1F72–0x1F75	8051–8054	Wh	INT64	–	Total active energy received on phase 2 (not resettable)
0x1F76–0x1F79	8055–8058	Wh	INT64	–	Active energy delivered on phase 3 (into the load, counted positively)
0x1F77–0x1F7A	8059–8062	Wh	INT64	–	Active energy received on phase 3 (out of the load, counted negatively)
0x1F7E–0x1F81	8063–8066	Wh	INT64	–	Total active energy delivered on phase 3 (not resettable)
0x1F82–0x1F85	8067–8070	Wh	INT64	–	Total active energy received on phase 3 (not resettable)

Address	Register	Unit	Type	Range	Description
0x1F86–0x1F89	8071–8074	VArh	INT64	–	Reactive energy delivered on phase 1 (into the load, counted positively)
0x1F8A–0x1F8D	8075–8078	VArh	INT64	–	Reactive energy received on phase 1 (out of the load, counted negatively)
0x1F8E–0x1F91	8079–8082	VArh	INT64	–	Total reactive energy delivered on phase 1 (not resettable)
0x1F92–0x1F95	8083–8086	VArh	INT64	–	Total reactive energy received on phase 1(not resettable)
0x1F96–0x1F99	8087–8090	VArh	INT64	–	Reactive energy delivered on phase 2 (into the load, counted positively)
0x1F9A–0x1F9D	8091–8094	VArh	INT64	–	Reactive energy received on phase 2 (out of the load, counted negatively)
0x1F9E–0x1FA1	8095–8098	VArh	INT64	–	Total reactive energy delivered on phase 2 (not resettable)
0x1FA2–0x1FA5	8099–8102	VArh	INT64	–	Total reactive energy received on phase 2 (not resettable)
0x1FA6–0x1FA9	8103–8106	VArh	INT64	–	Reactive energy delivered on phase 3 (into the load, counted positively)
0x1FAA–0x1FAD	8107–8110	VArh	INT64	–	Reactive energy received on phase 3 (out of the load, counted negatively)
0x1FAE–0x1FB1	8111–8114	VArh	INT64	–	Total reactive energy delivered on phase 3 (not resettable)
0x1FB2–0x1FB5	8115–8118	VArh	INT64	–	Total reactive energy received on phase 3 (not resettable)
0x1FB6–0x1FB9	8119–8122	VAh	INT64	–	Apparent energy on phase 1
0x1FBA–0x1FBD	8123–8126	VAh	INT64	–	Cumulative apparent energy on phase 1 (not resettable)
0x1FBE–0x1FC1	8127–8130	VAh	INT64	–	Apparent energy on phase 2
0x1FC2–0x1FC5	8131–8134	VAh	INT64	–	Cumulative apparent energy on phase 2 (not resettable)
0x1FC6–0x1FC9	8135–8138	VAh	INT64	–	Apparent energy on phase 3
0x1FCA–0x1FCD	8139–8142	VAh	INT64	–	Cumulative apparent energy on phase 3 (not resettable)

Get Minimum/Maximum Values

The same command is used to get the following minimum/maximum values, according to the requested values, coded in register 8006:

- Minimum current
- Minimum voltage
- Minimum power
- Minimum power factor
- Minimum THD and thd
- Minimum frequency
- Maximum current
- Maximum voltage
- Maximum power
- Maximum power factor
- Maximum THD and thd
- Maximum frequency

To get the minimum and maximum values, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49281	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command

Address	Register	Unit	Type	Range	Description
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command (no password required)
0x1F45	8006	–	INT16U	–	Requested min– max values: ● 0= Read minimum current ● 1= Read minimum voltage ● 2 = Read minimum power ● 3 = Read minimum power factor ● 4 = Read minimum THD and thd ● 7 = Read minimum frequency ● 256 = Read maximum current ● 257 = Read maximum voltage ● 258 = Read maximum power ● 259 = Read maximum power factor ● 260 = Read maximum THD and thd ● 263 = Read maximum frequency

The response to this request depends on the value to read, and is described further specifically.

Response to Get Minimum Current

The minimum current is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	156	Number of bytes returned
0x1F56	8023	–	INT16U	0	Responded min-max values (0 = Read minimum current)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum RMS current
0x1F5B	8028	–	INT16U	12	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	A	FLOAT32	–	Minimum RMS current on phase 1
0x1F5E–0x1F61	8031–8034	–	DATETIME	–	Timestamp of minimum RMS current on phase 1
0x1F62–0x1F63	8035–8036	A	FLOAT32	–	Minimum RMS current on phase 2
0x1F64–0x1F67	8037–8040	–	DATETIME	–	Timestamp of minimum RMS current on phase 2
0x1F68–0x1F69	8041–8042	A	FLOAT32	–	Minimum RMS current on phase 3
0x1F6A–0x1F6D	8043–8046	–	DATETIME	–	Timestamp of minimum RMS current on phase 3
0x1F6E–0x1F6F	8047–8048	A	FLOAT32	–	Minimum RMS current on neutral
0x1F70–0x1F73	8049–8052	–	DATETIME	–	Timestamp of minimum RMS current on neutral
0x1F74–0x1F75	8053–8054	A	FLOAT32	–	This is the lowest (i.e. minimum) current value since this measurement was last reset. The measurement looks at all 3 currents, Min I 1, Min I 2, and Min I 3 and keeps track of the lowest value of any of them over time
0x1F76–0x1F79	8055–8058	–	DATETIME	–	Timestamp of minimum of RMS current of phases 1, 2, 3 (Least loaded phase)
0x1F7A–0x1F7B	8059–8060	A	FLOAT32	–	Minimum RMS current on ground
0x1F7C–0x1F7F	8061–8064	–	DATETIME	–	Timestamp of minimum RMS current on ground
0x1F80–0x1F85	8065–8070	–	–	–	Reserved

Address	Register	Unit	Type	Range	Description
0x1F86–0x1F87	8071–8072	A	FLOAT32	–	Minimum of average of 3 phase RMS currents
0x1F88–0x1F8B	8073–8076	–	DATETIME	–	Timestamp of minimum of average of 3 phase RMS currents
0x1F8C–0x1FA3	8077–8100	–	–	–	Reserved

Response to Get Minimum Voltage

The minimum voltage is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	0–180	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	228	Number of bytes returned
0x1F56	8023	–	INT16U	1	Responded min-max values (1 = Read minimum voltage)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum RMS voltage
0x1F5B	8028	–	INT16U	18	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	V	FLOAT32	–	Minimum RMS phase-to-phase voltage V12
0x1F5E–0x1F61	8031–8034	–	DATE IME	–	Timestamp of minimum RMS phase-to-phase voltage V12
0x1F62–0x1F63	8035–8036	V	FLOAT32	–	Minimum RMS phase-to-phase voltage V23
0x1F64–0x1F67	8037–8040	–	DATETIME	–	Timestamp of minimum RMS phase-to-phase voltage V23
0x1F68–0x1F69	8041–8042	V	FLOAT32	–	Minimum RMS phase-to-phase voltage V31
0x1F6A–0x1F6D	8043–8046	–	DATETIME	–	Timestamp of minimum RMS phase-to-phase voltage V31
0x1F6E–0x1F6F	8047–8048	V	FLOAT32	–	Minimum RMS phase-to-neutral voltage V1N
0x1F70–0x1F73	8049–8052	–	DATETIME	–	Timestamp of minimum RMS phase-to-neutral voltage V1N
0x1F74–0x1F75	8053–8054	V	FLOAT32	–	Minimum RMS phase-to-neutral voltage V2N
0x1F76–0x1F79	8055–8058	–	DATETIME	–	Timestamp of minimum RMS phase-to-neutral voltage V2N
0x1F7A–0x1F7B	8059–8060	V	FLOAT32	–	Minimum RMS phase-to-neutral voltage V3N
0x1F7C–0x1F7F	8061–8064	–	DATETIME	–	Timestamp of minimum RMS phase-to-neutral voltage V3N
0x1F80–0x1F81	8065–8066	V	FLOAT32	–	Minimum of average of 3 RMS phase-to-phase voltages
0x1F82–0x1F85	8067–8070	–	DATETIME	–	Timestamp of minimum of average of 3 RMS phase-to-phase voltages
0x1F86–0x1F87	8071–8072	V	FLOAT32	–	Minimum of average of 3 RMS phase-to-neutral voltages
0x1F88–0x1F8B	8073–8076	–	DATETIME	–	Timestamp of minimum of average of 3 RMS phase-to-neutral voltages
0x1F8C–0x1F8D	8077–8078	V	FLOAT32	–	Minimum of RMS phase-to-phase voltages V12, V23, and V31

Address	Register	Unit	Type	Range	Description
0x1F8E–0x1F91	8079–8082	–	DATETIME	–	Timestamp of minimum of RMS phase-to-phase voltages V12, V23, and V31
0x1F92–0x1F93	8083–8084	V	FLOAT32	–	Minimum of RMS phase-to-neutral voltages V1N, V2N, and V3N
0x1F94–0x1F97	8085–8088	–	DATETIME	–	Timestamp of minimum of RMS phase-to-neutral voltages V1N, V2N, and V3N
0x1F98–0x1FC8	8089–8136	–	–	–	Reserved

Response to Get Minimum Power

The minimum power is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	156	Number of bytes returned
0x1F56	8023	–	INT16U	2	Responded min-max values (2 = Read minimum power)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum power
0x1F5B	8028	–	INT16U	12	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	W	FLOAT32	–	Minimum active power of phase 1
0x1F5E–0x1F61	8031–8034	–	DATETIME	–	Timestamp of minimum active power on phase 1
0x1F62–0x1F63	8035–8036	W	FLOAT32	–	Minimum active power of phase 2
0x1F64–0x1F67	8037–8040	–	DATETIME	–	Timestamp of minimum active power on phase 2
0x1F68–0x1F69	8041–8042	W	FLOAT32	–	Minimum active power of phase 3
0x1F6A–0x1F6D	8043–8046	–	DATETIME	–	Timestamp of minimum active power on phase 3
0x1F6E–0x1F6F	8047–8048	W	FLOAT32	–	Minimum total active power
0x1F70–0x1F73	8049–8052	–	DATETIME	–	Timestamp of minimum total active power
0x1F74–0x1F75	8053–8054	VAr	FLOAT32	–	Minimum reactive power on phase 1
0x1F76–0x1F79	8055–8058	–	DATETIME	–	Timestamp of minimum reactive power on phase 1
0x1F7A–0x1F7B	8059–8060	VAr	FLOAT32	–	Minimum reactive power on phase 2
0x1F7C–0x1F7F	8061–8064	–	DATETIME	–	Timestamp of minimum reactive power on phase 2
0x1F80–0x1F81	8065–8066	VAr	FLOAT32	–	Minimum reactive power on phase 3
0x1F82–0x1F85	8067–8070	–	DATETIME	–	Timestamp of minimum reactive power on phase 3
0x1F86–0x1F87	8071–8072	VAr	FLOAT32	–	Minimum total reactive power
0x1F88–0x1F8B	8073–8076	–	DATETIME	–	Timestamp of minimum total reactive power
0x1F8C–0x1F8D	8077–8078	VA	FLOAT32	–	Minimum apparent power on phase 1
0x1F8E–0x1F91	8079–8082	–	DATETIME	–	Timestamp of minimum apparent power on phase 1

Address	Register	Unit	Type	Range	Description
0x1F92–0x1F93	8083–8084	VA	FLOAT32	–	Minimum apparent power on phase 2
0x1F94–0x1F97	8085–8088	–	DATETIME	–	Timestamp of minimum apparent power on phase 2
0x1F98–0x1F99	8089–8090	VA	FLOAT32	–	Minimum apparent power on phase 3
0x1F9A–0x1F9D	8091–8094	–	DATETIME	–	Timestamp of minimum apparent power on phase 3
0x1F9E–0x1F9F	8095–8096	VA	FLOAT32	–	Minimum total apparent power
0x1FA0–0x1FA3	8097–8100	–	DATETIME	–	Timestamp of minimum total apparent power

Response to Get Minimum Power Factor

The minimum power factor is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	108	Number of bytes returned
0x1F56	8023	–	INT16U	3	Responded min-max values (3 = Read minimum power factor)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum power factor and cosφ
0x1F5B	8028	–	INT16U	8	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	–	FLOAT32	–	Minimum power factor on phase 1
0x1F5E–0x1F61	8031–8034	–	DATETIME	–	Timestamp of minimum power factor on phase 1
0x1F62–0x1F63	8035–8036	–	FLOAT32	–	Minimum power factor on phase 2
0x1F64–0x1F67	8037–8040	–	DATETIME	–	Timestamp of minimum power factor on phase 2
0x1F68–0x1F69	8041–8042	–	FLOAT32	–	Minimum power factor on phase 3
0x1F6A–0x1F6D	8043–8046	–	DATETIME	–	Timestamp of minimum power factor on phase 3
0x1F6E–0x1F6F	8047–8048	–	FLOAT32	–	Minimum total power factor
0x1F70–0x1F73	8049–8052	–	DATETIME	–	Timestamp of minimum total power factor
0x1F74–0x1F75	8053–8054	–	FLOAT32	–	Minimum fundamental power factor on phase 1 (cos φ1)
0x1F76–0x1F79	8055–8058	–	DATETIME	–	Timestamp of minimum fundamental power factor on phase 1 (cos φ1)
0x1F7A–0x1F7B	8059–8060	–	FLOAT32	–	Minimum fundamental power factor on phase 2 (cos φ2)
0x1F7C–0x1F7F	8061–8064	–	DATETIME	–	Timestamp of minimum fundamental power factor on phase 2 (cos φ2)

Address	Register	Unit	Type	Range	Description
0x1F80–0x1F81	8065–8066	–	FLOAT32	–	Minimum fundamental power factor on phase 3 (cos φ3)
0x1F82–0x1F85	8067–8070	–	DATETIME	–	Timestamp of minimum fundamental power factor on phase 3 (cos φ3)
0x1F86–0x1F87	8071–8072	–	FLOAT32	–	Minimum total fundamental power factor (cos φ)
0x1F88–0x1F8B	8073–8076	–	DATETIME	–	Timestamp of minimum total fundamental power factor (cos φ)

Response to Get Minimum THD and thd

The minimum THD and thd is returned to command registers in the following way:

Address	Registers	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	108	Number of bytes returned
0x1F56	8023	–	INT16U	4	Responded min-max values (4 = Read minimum THD and thd)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum THD or thd
0x1F5B	8028	–	INT16U	8	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	–	FLOAT32	–	Minimum of average of 3 phase-to-phase voltage total harmonic distortions (THD) compared to the fundamental average
0x1F5E–0x1F61	8031–8034	–	DATETIME	–	Timestamp of minimum of average of 3 phase-to-phase voltage total harmonic distortions (THD) compared to the fundamental
0x1F62–0x1F63	8035–8036	–	FLOAT32	–	Minimum of average of 3 phase-to-neutral voltage Total Harmonic Distortions (THD) compared to the fundamental
0x1F64–0x1F67	8037–8040	–	DATETIME	–	Timestamp of minimum of average of 3 phase-to-neutral voltage Total Harmonic Distortions (THD) compared to the fundamental
0x1F68–0x1F69	8041–8042	–	FLOAT32	–	Minimum of average of 3 phase-to-phase voltage total harmonic distortions (thd) compared to the RMS voltage
0x1F6A–0x1F6D	8043–8046	–	DATETIME	–	Timestamp of minimum of average of 3 phase-to-phase voltage total harmonic distortions (thd) compared to the RMS voltage
0x1F6E–0x1F6F	8047–8048	–	FLOAT32	–	Minimum of average of 3 phase-to-neutral voltage total harmonic distortions (compared to the RMS voltage) since last reset
0x1F70–0x1F73	8049–8052	–	DATETIME	–	Timestamp of minimum of average of 3 phase-to-neutral voltage total harmonic distortions (thd) compared to the RMS voltage
0x1F74–0x1F75	8053–8054	–	FLOAT32	–	Minimum Total Harmonic Distortion (THD) of current on neutral compared to the fundamental
0x1F76–0x1F79	8055–8058	–	DATETIME	–	Timestamp of minimum Total Harmonic Distortion (THD) of current on neutral compared to the fundamental
0x1F7A–0x1F7B	8059–8060	–	FLOAT32	–	Minimum of average of 3 phase current Total Harmonic Distortions (THD) compared to the fundamental
0x1F7C–0x1F7F	8061–8064	–	DATETIME	–	Timestamp of minimum of average of 3 phase current Total Harmonic Distortions (THD) compared to the fundamental
0x1F80–0x1F81	8065–8066	–	FLOAT32	–	Minimum total harmonic distortion (thd) of current on neutral compared to the RMS current

Address	Registers	Unit	Type	Range	Description
0x1F82–0x1F85	8067–8070	–	DATETIME	–	Timestamp of minimum total harmonic distortion (thd) of current on neutral compared to the RMS current
0x1F86–0x1F87	8071–8072	–	FLOAT32	–	Minimum of average of 3 phase current total harmonic distortions (thd) compared to the RMS current
0x1F88–0x1F8B	8073–8076	–	DATETIME	–	Timestamp of minimum of average of 3 phase current total harmonic distortion (thd) compared to the RMS current

Response to Get Minimum Frequency

The minimum frequency is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	24	Number of bytes returned
0x1F56	8023	–	INT16U	7	Responded min-max values (7 = Read minimum frequency)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum frequency
0x1F5B	8028	–	INT16U	1	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	Hz	FLOAT32	–	Minimum frequency
0x1F5E–0x1F61	8031–8034	–	DATETIME	–	Timestamp of minimum frequency

Response to Get Maximum Current

The maximum current is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	156	Number of bytes returned
0x1F56	8023	–	INT16U	256	Responded min-max values (256 = Read maximum current)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum RMS current
0x1F5B	8028	–	INT16U	12	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	A	FLOAT32	–	Maximum RMS current on phase 1
0x1F5E–0x1F61	8031–8034	–	DATETIME	–	Timestamp of maximum RMS current on phase 1
0x1F62–0x1F63	8035–8036	A	FLOAT32	–	Maximum RMS current on phase 2
0x1F64–0x1F67	8037–8040	–	DATETIME	–	Timestamp of maximum RMS current on phase 2
0x1F68–0x1F69	8041–8042	A	FLOAT32	–	Maximum RMS current on phase 3
0x1F6A–0x1F6D	8043–8046	–	DATETIME	–	Timestamp of maximum RMS current on phase 3
0x1F6E–0x1F6F	8047–8048	A	FLOAT32	–	Maximum RMS current on neutral
0x1F70–0x1F73	8049–8052	–	DATETIME	–	Timestamp of maximum RMS current on neutral

Address	Register	Unit	Type	Range	Description
0x1F74–0x1F75	8053–8054	A	FLOAT32	–	This is the highest (i.e. maximum) current value since this measurement was last reset. The measurement looks at all 4 currents, Max I1, Max I2, Max I3, Max IN and keeps track of the highest value of any of them over time
0x1F76–0x1F79	8055–8058	–	DATETIME	–	This is the date/time of the highest (i.e. maximum) current value since this measurement was last reset. The measurement looks at all 4 currents, Max I 1, Max I 2, Max I 3, and Max I n.
0x1F7A–0x1F7B	8059–8060	A	FLOAT32	–	Maximum RMS current on ground
0x1F7C–0x1F7F	8061–8064	–	DATETIME	–	Timestamp of maximum RMS current on ground
0x1F80–0x1F81	8065–8066	A	FLOAT32	–	Maximum RMS current on earth leakage
0x1F82–0x1F85	8067–8070	–	DATETIME	–	Timestamp of maximum RMS current on earth leakage
0x1F86–0x1F87	8071–8072	A	FLOAT32	–	Maximum of average of 3 phase RMS currents
0x1F88–0x1F8B	8073–8076	–	DATETIME	–	Timestamp of maximum of average of 3 phase RMS currents
0x1F8C–0x1F8D	8077–8078	–	FLOAT32	–	Maximum phase 1 current unbalance with respect to the average of 3 phase RMS currents
0x1F8E–0x1F91	8079–8082	–	DATETIME	–	Timestamp of maximum phase 1 current unbalance with respect to the average of 3 phase RMS currents
0x1F92–0x1F93	8083–8084	–	FLOAT32	–	Maximum phase 2 current unbalance with respect to the average of 3 phase RMS currents
0x1F94–0x1F97	8085–8088	–	DATETIME	–	Timestamp of maximum phase 2 current unbalance with respect to the average of 3 phase RMS currents
0x1F98–0x1F99	8089–8090	–	FLOAT32	–	Maximum phase 3 current unbalance with respect to the average of 3 phase RMS currents
0x1F9A–0x1F9D	8091–8094	–	DATETIME	–	Timestamp of maximum phase 3 current unbalance with respect to the average of 3 phase RMS currents
0x1F9E–0x1F9F	8095–8096	–	FLOAT32	–	Maximum of maximum of 3 phase current unbalances
0x1FA0–0x1FA3	8097–8100	–	DATETIME	–	Timestamp of maximum of maximum of 3 phase current unbalances

Response to Get Maximum Voltage

The maximum voltage is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	0–180	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	228	Number of bytes returned
0x1F56	8023	–	INT16U	257	Responded min-max values (257 = Read maximum voltage)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum RMS voltage
0x1F5B	8028	–	INT16U	18	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	V	FLOAT32	–	Maximum RMS phase-to-phase voltage V12
0x1F5E–0x1F61	8031–8034	–	DATE IME	–	Timestamp of maximum RMS phase-to-phase voltage V12
0x1F62–0x1F63	8035–8036	V	FLOAT32	–	Maximum RMS phase-to-phase voltage V23
0x1F64–0x1F67	8037–8040	–	DATETIME	–	Timestamp of maximum RMS phase-to-phase voltage V23

Address	Register	Unit	Type	Range	Description
0x1F68–0x1F69	8041–8042	V	FLOAT32	–	Maximum RMS phase-to-phase voltage V31
0x1F6A–0x1F6D	8043–8046	–	DATETIME	–	Timestamp of maximum RMS phase-to-phase voltage V31
0x1F6E–0x1F6F	8047–8048	V	FLOAT32	–	Maximum RMS phase-to-neutral voltage V1N
0x1F70–0x1F73	8049–8052	–	DATETIME	–	Timestamp of maximum RMS phase-to-neutral voltage V1N
0x1F74–0x1F75	8053–8054	V	FLOAT32	–	Maximum RMS phase-to-neutral voltage V2N
0x1F76–0x1F79	8055–8058	–	DATETIME	–	Timestamp of maximum RMS phase-to-neutral voltage V2N
0x1F7A–0x1F7B	8059–8060	V	FLOAT32	–	Maximum RMS phase-to-neutral voltage V3N
0x1F7C–0x1F7F	8061–8064	–	DATETIME	–	Timestamp of maximum RMS phase-to-neutral voltage V3N
0x1F80–0x1F81	8065–8066	V	FLOAT32	–	Maximum of average of 3 RMS phase-to-phase voltages
0x1F82–0x1F85	8067–8070	–	DATETIME	–	Timestamp of maximum of average of 3 RMS phase-to-phase voltages
0x1F86–0x1F87	8071–8072	V	FLOAT32	–	Maximum of average of 3 RMS phase-to-neutral voltages
0x1F88–0x1F8B	8073–8076	–	DATETIME	–	Timestamp of maximum of average of 3 RMS phase-to-neutral voltages
0x1F8C–0x1F8D	8077–8078	V	FLOAT32	–	Maximum of RMS phase-to-phase voltages V12, V23, and V31
0x1F8E–0x1F91	8079–8082	–	DATETIME	–	Timestamp of maximum of RMS phase-to-phase voltages V12, V23, and V31
0x1F92–0x1F93	8083–8084	V	FLOAT32	–	Maximum of RMS phase-to-neutral voltages V1N, V2N, and V3N
0x1F94–0x1F97	8085–8088	–	DATETIME	–	Timestamp of maximum of RMS phase-to-neutral voltages V1N, V2N, and V3N
0x1F98–0x1F99	8089–8090	–	FLOAT32	–	Maximum phase-to-phase V12 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x1F9A–0x1F9D	8091–8094	–	DATETIME	–	Timestamp of maximum phase-to-phase V12 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x1F9E–0x1F9F	8095–8096	–	FLOAT32	–	Maximum phase-to-phase V23 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x1FA0–0x1FA3	8097–8100	–	DATETIME	–	Timestamp of maximum phase-to-phase V23 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x1FA5–0x1FA5	8101–8102	–	FLOAT32	–	Maximum phase-to-phase V31 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x1FA6–0x1FA9	8103–8106	–	DATETIME	–	Timestamp of maximum phase-to-phase V31 voltage unbalance with respect to the average of 3 phase-to-phase RMS voltages
0x1FAA–0x1FAB	8107–8108	–	FLOAT32	–	Maximum of 3 phase-to-phase voltage unbalances
0x1FAC–0x1FAF	8109–8112	–	DATETIME	–	Timestamp of maximum of 3 phase-to-phase voltage unbalances
0x1FB0–0x1FB1	8113–8114	–	FLOAT32	–	Maximum phase-to-neutral V1N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages
0x1FB2–0x1FB5	8115–8118	–	DATETIME	–	Timestamp of maximum phase-to-neutral V1N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages

Address	Register	Unit	Type	Range	Description
0x1FB6–0x1FB7	8119–8120	–	FLOAT32	–	Maximum phase-to-neutral V2N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages
0x1FB8–0x1FBB	8121–8124	–	DATETIME	–	Timestamp of maximum phase-to-neutral V2N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages
0x1FBC–0x1FBD	8125–8126	–	FLOAT32	–	Maximum phase-to-neutral V3N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages
0x1FBE–0x1FC1	8127–8130	–	DATETIME	–	Timestamp of maximum phase-to-neutral V3N voltage unbalance with respect to the average of 3 phase-to-neutral RMS voltages
0x1FC2–0x1FC3	8131–8132	–	FLOAT32	–	Maximum of maximum of 3 phase-to-neutral voltage unbalances
0x1FC4–0x1FC7	8133–8136	–	DATETIME	–	Timestamp of maximum of maximum of 3 phase-to-neutral voltage unbalances

Response to Get Maximum Power

The maximum power is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	156	Number of bytes returned
0x1F56	8023	–	INT16U	258	Responded min-max values (258 = Read maximum power)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum power
0x1F5B	8028	–	INT16U	12	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	W	FLOAT32	–	Maximum active power of phase 1
0x1F5E–0x1F61	8031–8034	–	DATETIME	–	Timestamp of maximum active power on phase 1
0x1F62–0x1F63	8035–8036	W	FLOAT32	–	Maximum active power of phase 2
0x1F64–0x1F67	8037–8040	–	DATETIME	–	Timestamp of maximum active power on phase 2
0x1F68–0x1F69	8041–8042	W	FLOAT32	–	Maximum active power of phase 3
0x1F6A–0x1F6D	8043–8046	–	DATETIME	–	Timestamp of maximum active power on phase 3
0x1F6E–0x1F6F	8047–8048	W	FLOAT32	–	Maximum total active power
0x1F70–0x1F73	8049–8052	–	DATETIME	–	Timestamp of maximum total active power
0x1F74–0x1F75	8053–8054	VAr	FLOAT32	–	Maximum reactive power on phase 1
0x1F76–0x1F79	8055–8058	–	DATETIME	–	Timestamp of maximum reactive power on phase 1
0x1F7A–0x1F7B	8059–8060	VAr	FLOAT32	–	Maximum reactive power on phase 2
0x1F7C–0x1F7F	8061–8064	–	DATETIME	–	Timestamp of maximum reactive power on phase 2
0x1F80–0x1F81	8065–8066	VAr	FLOAT32	–	Maximum reactive power on phase 3
0x1F82–0x1F85	8067–8070	–	DATETIME	–	Timestamp of maximum reactive power on phase 3

Address	Register	Unit	Type	Range	Description
0x1F86–0x1F87	8071–8072	VAr	FLOAT32	–	Maximum total reactive power
0x1F88–0x1F8B	8073–8076	–	DATETIME	–	Timestamp of maximum total reactive power
0x1F8C–0x1F8D	8077–8078	VA	FLOAT32	–	Maximum apparent power on phase 1
0x1F8E–0x1F91	8079–8082	–	DATETIME	–	Timestamp of maximum apparent power on phase 1
0x1F92–0x1F93	8083–8084	VA	FLOAT32	–	Maximum apparent power on phase 2
0x1F94–0x1F97	8085–8088	–	DATETIME	–	Timestamp of maximum apparent power on phase 2
0x1F98–0x1F99	8089–8090	VA	FLOAT32	–	Maximum apparent power on phase 3
0x1F9A–0x1F9D	8091–8094	–	DATETIME	–	Timestamp of maximum apparent power on phase 3
0x1F9E–0x1F9F	8095–8096	VA	FLOAT32	–	Maximum total apparent power
0x1FA0–0x1FA3	8097–8100	–	DATETIME	–	Maximum total apparent power

Response to Get Maximum Power Factor

The maximum power factor is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	108	Number of bytes returned
0x1F56	8023	–	INT16U	259	Responded min-max values (259 = Read maximum power factor)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum power factor and cosφ
0x1F5B	8028	–	INT16U	8	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	–	FLOAT32	–	Maximum power factor on phase 1
0x1F5E–0x1F61	8031–8034	–	DATETIME	–	Timestamp of maximum power factor on phase 1
0x1F62–0x1F63	8035–8036	–	FLOAT32	–	Maximum active power factor of phase 2
0x1F64–0x1F67	8037–8040	–	DATETIME	–	Timestamp of maximum active power factor on phase 2
0x1F68–0x1F69	8041–8042	–	FLOAT32	–	Maximum power factor on phase 3
0x1F6A–0x1F6D	8043–8046	–	DATETIME	–	Timestamp of maximum power factor on phase 3
0x1F6E–0x1F6F	8047–8048	–	FLOAT32	–	Maximum total power factor
0x1F70–0x1F73	8049–8052	–	DATETIME	–	Timestamp of maximum total power factor
0x1F74–0x1F75	8053–8054	–	FLOAT32	–	Maximum fundamental power factor on phase 1 (cos φ1)
0x1F76–0x1F79	8055–8058	–	DATETIME	–	Timestamp of maximum fundamental power factor on phase 1 (cos φ1)
0x1F7A–0x1F7B	8059–8060	–	FLOAT32	–	Maximum fundamental power factor on phase 2 (cos φ2)

Address	Register	Unit	Type	Range	Description
0x1F7C–0x1F7F	8061–8064	–	DATETIME	–	Timestamp of maximum fundamental power factor on phase 2 (cos φ2)
0x1F80–0x1F81	8065–8066	–	FLOAT32	–	Maximum fundamental power factor on phase 3 (cos φ3)
0x1F82–0x1F85	8067–8070	–	DATETIME	–	Timestamp of maximum fundamental power factor on phase 3 (cos φ3)
0x1F86–0x1F87	8071–8072	–	FLOAT32	–	Maximum total fundamental power factor (cos φ)
0x1F88–0x1F8B	8073–8076	–	DATETIME	–	Timestamp of maximum total fundamental power factor (cos φ)

Response to Get Maximum THD and thd

The maximum THD and thd is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	108	Number of bytes returned
0x1F56	8023	–	INT16U	260	Responded min–max values (260 = Read maximum THD and thd)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum THD or thd
0x1F5B	8028	–	INT16U	8	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	–	FLOAT32	–	Maximum of average of 3 phase-to-phase voltage Total Harmonic Distortions (THD) compared to the fundamental
0x1F5E–0x1F61	8031–8034	–	DATETIME	–	Timestamp of maximum of average of 3 phase-to-phase voltage total harmonic distortions (THD) compared to the fundamental
0x1F62–0x1F63	8035–8036	–	FLOAT32	–	Maximum of average of 3 phase-to-neutral voltage Total Harmonic Distortions (THD) compared to the fundamental
0x1F64–0x1F67	8037–8040	–	DATETIME	–	Timestamp of maximum of average of 3 phase-to-neutral voltage Total Harmonic Distortions (THD) compared to the fundamental
0x1F68–0x1F69	8041–8042	–	FLOAT32	–	Maximum of average of 3 phase-to-phase voltage total harmonic distortions (thd) compared to the RMS voltage
0x1F6A–0x1F6D	8043–8046	–	DATETIME	–	Timestamp of maximum of average of 3 phase-to-phase voltage total harmonic distortions (thd) compared to the RMS voltage
0x1F6E–0x1F6F	8047–8048	–	FLOAT32	–	Maximum of average of 3 phase-to-neutral voltage total harmonic distortions (thd) compared to the RMS voltage
0x1F70–0x1F73	8049–8052	–	DATETIME	–	Timestamp of maximum of average of 3 phase-to-neutral voltage total harmonic distortions (thd) compared to the RMS voltage
0x1F74–0x1F75	8053–8054	–	FLOAT32	–	Maximum Total Harmonic Distortion (THD) of current on neutral compared to the fundamental
0x1F76–0x1F79	8055–8058	–	DATETIME	–	Timestamp of maximum Total Harmonic Distortion (THD) of current on neutral compared to the fundamental
0x1F7A–0x1F7B	8059–8060	–	FLOAT32	–	Maximum of average of 3 phase current Total Harmonic Distortions (THD) compared to the fundamental
0x1F7C–0x1F7F	8061–8064	–	DATETIME	–	Timestamp of maximum of average of 3 phase current Total Harmonic Distortions (THD) compared to the fundamental
0x1F80–0x1F81	8065–8066	–	FLOAT32	–	Maximum total harmonic distortion (thd) of current on neutral compared to the RMS current

Address	Register	Unit	Type	Range	Description
0x1F82–0x1F85	8067–8070	–	DATETIME	–	Timestamp of maximum total harmonic distortion (thd) of current on neutral compared to the RMS current
0x1F86–0x1F87	8071–8072	–	FLOAT32	–	Maximum of average of 3 phase current total harmonic distortions (thd) compared to the RMS current
0x1F88–0x1F8B	8073–8076	–	DATETIME	–	Timestamp of maximum of average of 3 phase current total harmonic distortions (thd) compared to the RMS current

Response to Get Maximum Frequency

The maximum frequency is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49281	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	24	Number of bytes returned
0x1F56	8023	–	INT16U	263	Responded min-max values (263 = Read maximum frequency)
0x1F57–0x1F5A	8024–8027	–	DATETIME	–	Timestamp of reset of minimum and maximum frequency
0x1F5B	8028	–	INT16U	1	Number of metering values returned
0x1F5C–0x1F5D	8029–8030	Hz	FLOAT32	–	Maximum frequency
0x1F5E–0x1F61	8031–8034	–	DATETIME	–	Timestamp of maximum frequency

Measurement Set and Reset Commands

List of Commands

The following table lists the available Micrologic control unit commands, their corresponding command codes, and password levels:

Command	Command code	Password level
Reset minimum/maximum values and energies	46728	Level 3 or 4

Reset Minimum/Maximum Values and Energies

To get the minimum and maximum values, use the get minimum/maximum values command *(see page 113)*.

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	46728	–	Requested command code
0x1F40	8001	–	INT16U	12	–	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	–	Destination of the command
0x1F42	8003	–	INT16U	1	–	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	–	Password of the command: Level 3 or 4 password ● For level 3, factory setting = 3333 = 0x33333333 ● For level 4, factory setting = 0000 = 0x30303030
0x1F45	8006	–	INT16U	–	0	Reset min-max current
					1	Reset min-max voltage
					2	Reset min-max power
					3	Reset min-max power factor and cosφ
					4	Reset min-max THD (% fund)
					5–6	Reserved
					7	Reset min-max Hz
					8	Reserved
					9	Reset all energies
					10–15	Reserved

Diagnostic Get Commands

List of Commands

The following table lists the available Micrologic control unit commands, their corresponding command codes, and password levels:

Command	Command code	Password level
Get coil information	49793	No password required
Get health state	49794	No password required
Get trip counters in operation	49795	No password required
Get trip counters in test mode	49796	No password required
Get trip counters in manual test mode	49797	No password required
Get motor charging operation information	49798	No password required
Get breaker durability	51328	No password required
Get operating times	51329	No password required

Get Coil Information

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49793	Requested command code
0x1F40	8001	–	INT16U	11	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command (no password required)
0x1F45	8006	–	INT16U	–	MSB: Requested coil identification: ● 1 = MX1 slot ● 2 = XF slot ● 3 = MN/MX2 slot LSB: 0 (not used)

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	49793	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	4	–	Number of bytes returned
0x1F56	8023	–	INT16U	1–3	–	MSB: Responded coil identification: ● 1 = MX1 (opening voltage release) ● 2 = XF (closing voltage release) ● 3 = MN (opening undervoltage release) or MX2 (opening voltage release) LSB: 0 (not used)

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

Get Health State

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	49794	Requested command code
0x1F40	8001	–	INT16U	14	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43-0x1F44	8004-8005	–	OCTET STRING	0	Password of the command (no password required)

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	49794	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	6	–	Number of bytes returned
0x1F56-0x1F57	8023-8024	–	–	–	–	–
0x1F58	8025	–	INT16U	0-3	–	MSB: Overall system health state ● 0 = Not evaluated ● 1 = Ok ● 2 = Warning ● 3 = Malfunction LSB: Reserved

Get Trip Counters in Operation

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

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

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

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49795	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	24	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	INT32U	–	Number of total trips in operation
0x1F58–0x1F59	8025–8026	–	INT32U	–	Number of long time trips in operation
0x1F5A–0x1F5B	8027–8028	–	INT32U	–	Number of short time trips in operation
0x1F5C–0x1F5D	8029–8030	–	INT32U	–	Number of instantaneous trips in operation
0x1F5E–0x1F5F	8031–8032	–	INT32U	–	Number of ground/earth leakage fault trips in operation
0x1F60–0x1F61	8033-8034	–	INT32U	–	Number of other trips in operation

Get Trip Counters in Test Mode

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

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

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

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49796	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	12	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	INT32U	–	Number of total trips in test mode
0x1F58–0x1F5B	8025–8028	–	DATETIME	–	Date/Time of last trip in test mode

Get Trip Counters in Manual Test Mode

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

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

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

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49797	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	12	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	INT32U	–	Number of total trips in manual test mode
0x1F58–0x1F5B	8025–8028	–	DATETIME	–	Date/Time of last trip in manual test mode

Get Motor Charging Operation Information

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

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

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

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	49798	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	8	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	INT32U	–	Motor charging operation counter
0x1F58–0x1F59	8025–8026	s	FLOAT32	–	Motor last charging time after closing

Get Breaker Durability

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	51328	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command (no password required)

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

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51328	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	28	Number of bytes returned
0x1F56–0x1F57	8023–8024	–	INT32U	–	Total number of operations (opening operation counter)
0x1F58–0x1F59	8025–8026	–	INT32U	–	Number of operation with load › 0.4 In
0x1F5A–0x1F5B	8027–8028	–	FLOAT32	–	Breaker remaining service life ratio: ● 0 = End of typical service life of the breaker ● 1 = Breaker is new
0x1F5C–0x1F63	8029–8036	–	–	–	Reserved

Get Operating Times

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

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

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

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	51329	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	8	Number of bytes returned
0x1F56–0x1F57	8023–8024	s	INT32U	–	Time of use
0x1F58–0x1F59	8025–8026	s	INT32U	–	Operating time with load

Measurement Settings Set Commands

List of Commands

The following table lists the available Micrologic control unit commands, their corresponding command codes, and password levels:

Command	Command code	Password level
Set power flow sign configuration	47240	Level 4
Set power factor sign convention	47241	Level 4
Set energy accumulation mode	47242	Level 4

Set Power Flow Sign Configuration

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	47240	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Level 4 password (factory setting = 0000 = 0x30303030)
0x1F45	8006	–	INT16U	0–1	Power sign ● 0 = Direct or P+ = the active power flows from upstream (top) to downstream (bottom) (factory setting) ● 1 = Inverted or P– = the active power flows from downstream (bottom) to upstream (top)

Set Power Factor Sign Convention

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	47241	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Level 4 password (factory setting = 0000 = 0x30303030)
0x1F45	8006	–	INT16U	0, 2	Power factor sign convention: ● 0 = IEC ● 2 = IEEE (factory setting)

Set Energy Accumulation Mode

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	47242	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Level 4 password (factory setting = 0000 = 0x30303030)
0x1F45	8006	–	INT16U	0–1	Energy accumulation mode: ● 0 = Absolute (factory setting) ● 1 = Signed

Circuit Breaker Operation Set Commands

List of Commands

The following table lists the available Micrologic control unit commands, their corresponding command codes, and password levels:

Command	Command code	Password level
Open circuit breaker	904	Level 3 or 4
Close circuit breaker	905	Level 3 or 4
Set close breaker inhibition	910	Level 3 or 4

Open Circuit Breaker

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	904	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Level 3 or 4 password: ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333

NOTE: After use of the open circuit breaker command, check that the circuit breaker is open in register 32001 *(see page 59)*.

Close Circuit Breaker

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	905	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Level 3 or 4 password: ● For level 3, factory setting = 3333 = 0x33333333 ● For level 4, factory setting = 0000 = 0x30303030

NOTE: After use of the close circuit breaker command, check that the circuit breaker is closed in register 32001 *(see page 59)*.

Set Close Breaker Inhibition

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	910	Requested command code
0x1F40	8001	–	INT16U	13	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43-0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Level 3 or 4 password: ● For level 3, factory setting = 3333 = 0x33333333 ● For level 4, factory setting = 0000 = 0x30303030

Address	Register	Unit	Type	Range	Description
0x1F45	8006	–	INT16U	0–1	Close breaker inhibited by communication: ● 0 = Enable close order ● 1 = Inhibit close order
0x1F46	8007	–	INT16U	1	Origin of the command: ● 1 = close breaker enable/inhibit command from remote controller using the communication network

Micrologic X Get Commands

List of Commands

The following table lists the available Micrologic control unit commands, their corresponding command codes, and password levels:

Command	Command code	Password level
Get date time	768	No password required
Get all events	50560	No password required
Get list of applications	50816	No password required
Get application details	50817	No password required

Get Date Time

To set the date and time of the Micrologic X control unit, use the set date time command *(see page 140)*.

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	768	Requested command code
0x1F40	8001	–	INT16U	10	Number of parameters of the command
0x1F41	8002	–	INT16U	5376 (0x1500)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command (no password required)

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

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	768	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	8	Number of bytes returned
0x1F56–0x1F59	8023–8026	–	XDATE	–	Current date/time of the source

Get All Events

The command allows to get 10 events maximum, logged in one or several event logs. To get more than 10 events, several commands are necessary.

There are three methods to get events:
- get the 10 last events
- get all events logged after a date
- get all events from an event sequence number

The event sequence number is an event identifier defined by the Micrologic X control unit, and available among the event characteristics.

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	50560	–	Requested command code
0x1F40	8001	–	INT16U	27	–	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	–	Destination of the command
0x1F42	8003	–	INT16U	0	–	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	–	Password of the command (no password required)

Address	Register	Unit	Type	Range	Bit	Description
0x1F45	8006	–	INT16U	1–255	–	Requested event log
					0	Trip
					1	Protection
					2	Diagnostic
					3	Metering
					4	Configuration
					5	Operation
					6	Communication
					7–15	Reserved
0x1F46	8007	–	INT16U	0–2	–	Requested get event method: ● 0 = 10 last events ● 1 = Events after a date ● 2 = Events from a sequence number
0x1F47–0x1F4A	8008–8011	–	DATETIME	–	–	Requested event date time (for method 1 only)
0x1F4B–0x1F4C	8012–8013	–	INT32U	–	–	Requested event sequence number (for method 2 only)
0x1F4D	8014	–	INT16U	–	–	Requested event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved

Events are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	50560	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	–	–	Number of bytes returned
0x1F56	8023	–	INT16U	1–255	–	Responded event log
					0	Trip
					1	Protection
					2	Diagnostic
					3	Metering
					4	Configuration
					5	Operation
					6	Communication
					7–15	Reserved
0x1F57	8024	–	INT16U	0-2	–	Responded get event method: ● 0 = 10 last events ● 1 = Events after a date ● 2 = Events from a sequence number
0x1F5E	8031	–	INT16U	–	–	Responded event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved

Address	Register	Unit	Type	Range	Bit	Description
0x1F5F	8032	–	–	0–10	–	MSB: Number of events returned
				0–1	–	LSB: Remaining events ● 0 = No more events to get ● 1 = More events to get
0x1F60	8033	–	INT16U	1013-25630	–	First event code *(see page 197)*
0x1F61–0x1F64	8034–8037	–	DATETIME	–	–	Timestamp of the first event
0x1F65	8038	–	INT16U	–	–	Timestamp quality of the first event
0x1F66–0x1F67	8039–8040	–	INT32U	–	–	First event sequence number
0x1F68	8041	–	INT16U	–	–	MSB: First event status ● 1 = Occurrence ● 2 = Completion ● 3 = Pulse LSB: Reserved
0x1F69	8042	–	INT16U	1–255	–	First event log book
					0	Trip
					1	Protection
					2	Diagnostic
					3	Metering
					4	Configuration
					5	Operation
					6	Communication
					7–15	Reserved
0x1F6A	8043	–	INT16U	–	–	First event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved
0x1F6B–0x1F75	8044–8054	–	INT16U	–	–	Characteristics of event 2 (same as event 1)
0x1F76–0x1F80	8055–8065	–	INT16U	–	–	Characteristics of event 3 (same as event 1)
0x1F81–0x1F8B	8066–8076	–	INT16U	–	–	Characteristics of event 4 (same as event 1)
0x1F8C–0x1F96	8077–8087	–	INT16U	–	–	Characteristics of event 5 (same as event 1)
0x1F97–0x1FA1	8088–8098	–	INT16U	–	–	Characteristics of event 6 (same as event 1)
0x1FA2–0x1FAC	8099–8109	–	INT16U	–	–	Characteristics of event 7 (same as event 1)
0x1FAD–0x1FB7	8110–8120	–	INT16U	–	–	Characteristics of event 8 (same as event 1)
0x1FB8–0x1FC2	8121–8131	–	INT16U	–	–	Characteristics of event 9 (same as event 1)
0x1FC3–0x1FCD	8132–8142	–	INT16U	–	–	Characteristics of event 10 (same as event 1)

Get List of Applications

To get the list of applications of the Micrologic X control unit, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	50816	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command (no password required)
0x1F45–0x1F46	8006	–	INT16U	0	MSB: Requested apps filter: ● 0 = All apps ● 1 = Built-in apps ● 2 = Add-on apps
					LSB: Apps licensing ● 0 = All (license needed and license not needed) ● 1 = License needed ● 2 = License not needed

The list of applications of the Micrologic X control unit is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	50816	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	–	Number of bytes returned
0x1F56	8023	–	INT16U	–	MSB: Requested apps filter: ● 0 = All apps ● 1 = Built-in apps ● 2 = Add-on apps
					LSB: Apps licensing ● 0 = All (license needed and license not needed) ● 1 = License needed ● 2 = License not needed
0x1F57	8024	–	INT16U	0–4	Number of apps returned
0x1F58	8025	–	INT16U	1, 2, 4, 5	First application firmware identifier entry: ● 1 = Waveform capture on trip event ● 2 = Energy per phase ● 4 = Power restoration assistant ● 5 = Masterpact operation assistant
0x1F59	8026	–	INT16U	–	Second application firmware identifier entry
0x1F5A	8027	–	INT16U	–	Third application firmware identifier entry
0x1F5B	8028	–	INT16U	–	Fourth application firmware identifier entry

Get Application Details

To get the application details of the Micrologic X control unit, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	50817	Requested command code
0x1F40	8001	–	INT16U	12	Number of parameters of the command
0x1F41	8002	–	INT16U	5377 (0x1501)	Destination of the command
0x1F42	8003	–	INT16U	0	Security type of the command

Address	Register	Unit	Type	Range	Description
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	0	Password of the command (no password required)
0x1F45– 0x1F46	8006	–	INT16U	1, 2, 4, 5	Requested apps entry: ● 1 = Waveform capture on trip event ● 2 = Energy per phase ● 4 = Power restoration assistant ● 5 = Masterpact operation assistant

The application details of the Micrologic X control unit is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	50817	Last command code
0x1F54	8021	–	INT16U	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	124	Number of bytes returned
0x1F56	8023	–	INT16U	1, 2, 4, 5	Responded apps entry: ● 1 = Waveform capture on trip event ● 2 = Energy per phase ● 4 = Power restoration assistant ● 5 = Masterpact operation assistant
0x1F57– 0x1F5E	8024– 8031	–	OCTET STRING	–	Apps product code (commercial reference)
0x1F5F– 0x1F86	8032– 8071	–	OCTET STRING	–	Application model name
0x1F87– 0x1F8C	8072– 8077	–	OCTET STRING	–	Application firmware revision
0x1F8D	8078	–	–	–	Reserved
0x1F8E	8079	–	INT16U	–	MSB: Application license type ● 0 = No license installed ● 1 = Temporary license installed ● 2 = Permanent license installed
					LSB: Application activation ● 0 = Off ● 1 = On
0x1F8F	8080	Days	INT16U	–	Application license remaining days
0x1F90– 0x1F93	8081– 8084	–	–	–	Reserved

Micrologic X Set Commands

List of Commands

The following table lists the available Micrologic control unit commands, their corresponding command codes, and password levels:

Command	Command code	Password level
Set Date Time	769	Level 4
Set user application name	1032	Level 4

Set Date Time

To get the date and time of the Micrologic X control unit, use the get date time command *(see page 135)*.

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

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	769	Requested command code
0x1F40	8001	–	INT16U	18	Number of parameters of the command
0x1F41	8002	–	INT16U	5376 (0x1500)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Level 4 password (factory setting = 0000 = 0x30303030)
0x1F45–0x1F48	8006–8009	–	XDATE	–	Current date/time of the source

Set User Application Name

The user application name is available in registers 8522-8553 *(see page 89)*.

To set the user application name, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1032	Requested command code
0x1F40	8001	–	INT16U	–	Number of parameters (bytes) = depends on the length of user application name (up to 46 characters)
0x1F41	8002	–	INT16U	5376 (0x1500)	Destination of the command
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Level 4 password (factory setting = 0000 = 0x30303030)
0x1F45–0x1F46	8006–8007	–	INT32U	–	Requested string label name: ● 17039366 = User application name
0x1F47	8008	–	INT16U	–	Requested language label name : ● 2048 = system default language
0x1F48	8009	–	OCTET STRING	–	● MSB = First character of the user application name ● LSB = Second character of the user application name
0x1F49–0x1F5F	8010–8038	–	OCTET STRING	–	Depends on the length of the user application name and ends by the NULL character 0x00

Chapter 5
IO Data for Masterpact MTZ

What Is in This Chapter?

This chapter contains the following sections:

Section 5.1
IO Module Registers

Introduction

This section describes the IO module registers.

Registers 13824 to 15719 are held by the IO 1.

Registers 16824 to 18719 are held by the IO 2:

- The registers of the parameters of IO 2 are equal to the registers of the parameters of IO 1 plus 3000.
  Example:
  - Register 14599 holds the digital input status register of the IO 1.
  - Register 17599 holds the digital input status register of the IO 2.
- The order of the registers is the same as that of the IO 1.
- The characteristics (access type, size, range, and unit) are the same as those of the registers of IO 1.
- Registers 15360 to 16109 containing the predefined application are specific to the IO 1 because they hold the predefined applications.

What Is in This Section?

This section contains the following topics:

Analog Inputs

Analog Input Register Mapping

The following table describes the analog inputs and corresponding registers and addresses of the IO module.

IO Module	Analog Input Addresses	Analog Input Registers
IO 1	0x35FF–0x3668	13824–13929
IO 2	0x41B7–0x4220	16824–16929

Analog Input Registers of IO 1

The order and the description of the analog input registers of IO 2 are the same as those of IO 1.

Address	Register	RW	Unit	Type	Range	Description
0x35FF–0x3600	13824–13825	–	–	–	–	Reserved
0x3601–0x3602	13826–13827	R	°C	FLOAT32	-50–250	Analog input sensor Pt100 temperature value (updated once every 1 s)
0x3603	13828	R	–	INT16U	0–1	Data quality of the analog input ● 0 = Valid ● 1 = Invalid
0x3604	13829	–	–	–	–	Reserved
0x3605–0x3608	13830–13833	R	–	DATETIME	–	Timestamp of the last change of +/- 1 °C of the analog data value
0x3609–0x360C	13834–13837	–	–	–	–	Reserved
0x360D–0x360E	13838–13839	R	°C	FLOAT32	-50–250	Analog input Pt100 maximum value
0x360F–0x3610	13840–13841	R	°C	FLOAT32	-50–250	Analog input Pt100 minimum value
0x3611–0x3614	13842–13845	R	–	DATETIME	–	Timestamp of minimum value of analog input value recorded
0x3615–0x3618	13846–13849	R	–	DATETIME	–	Timestamp of maximum value of analog input value recorded
0x3619–0x361C	13850–13853	R	–	DATETIME	–	Timestamp of last reset of min/max values of analog input value recorded
0x361D–0x361E	13854–13855	R	–	INT32U	0–65534	Switchboard temperature threshold 1 counter This counter increments every time threshold 1 is exceeded.
0x361F–0x3620	13856–13857	R	–	INT32U	0–65534	Switchboard temperature threshold 2 counter This counter increments every time threshold 2 is exceeded.
0x3621–0x3622	13858–13859	R	–	INT32U	0–65534	Switchboard temperature threshold 3 counter This counter increments every time threshold 3 is exceeded.
0x3623–0x363A	13860–13883	R	–	OCTET STRING	–	Analog input identification coded over 45 ASCII characters(1)
0x363B	13884	R	–	INT16U	0–2	Analog input type(1) ● 0 = Analog input is not valid (factory setting) ● 1 = Not applicable ● 2 = Pt100
0x363C	13885	–	–	–	–	Reserved
0x363D–0x363E	13886–13887	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 1 pick-up value (Pt100) (1) Factory setting = 50 °C
0x363F–0x3640	13888–13889	R	s	FLOAT32	1–3600	Switchboard temperature threshold 1 pick-up time delay (Pt100)(1) Factory setting = 10 s
(1) Value set using the Ecoreach software.						

Address	Register	RW	Unit	Type	Range	Description
0x3641–0x3642	13890–13891	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 1 drop-out value (Pt100)(1) Factory setting = 45 °C
0x3643–0x3644	13892–13893	R	s	FLOAT32	1–3600	Switchboard temperature threshold 1 drop-out time delay (Pt100)(1) Factory setting = 10 s
0x3645–0x3646	13894–13895	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 2 pick-up value (Pt100)(1) Factory setting = 60 °C
0x3647–0x3648	13896–13897	R	s	FLOAT32	1–3600	Switchboard temperature threshold 2 pick-up time delay (Pt100)(1) Factory setting = 10 s
0x3649–0x364A	13898–13899	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 2 drop-out value (Pt100)(1) Factory setting = 55 °C
0x364B–0x364C	13900–13901	R	s	FLOAT32	1–3600	Switchboard temperature threshold 2 drop-out time delay (Pt100)(1) Factory setting = 10 s
0x364D–0x364E	13902–13903	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 3 pick-up value (Pt100)(1) Factory setting = 70 °C
0x364F–0x3650	13904–13905	R	s	FLOAT32	1–3600	Switchboard temperature threshold 3 pick-up time delay (Pt100)(1) Factory setting = 10 s
0x3651–0x3652	13906–13907	R	°C	FLOAT32	-50–250	Switchboard temperature threshold 3 drop-out value (Pt100)(1) Factory setting = 65 °C
0x3653–0x3654	13908–13909	R	s	FLOAT32	1–3600	Switchboard temperature threshold 3 drop-out time delay (Pt100)(1) Factory setting = 10 s
0x3655–0x3656	13910–13911	R	Ω	FLOAT32	200–650	Motor temperature sensor fault threshold
0x3657–0x3668	13912–13929	–	–	–	–	Reserved
(1) Value set using the Ecoreach software.						

Digital Inputs

Digital Input Register Mapping

Each digital input description is made up of 80 registers.The order and the description of the digital inputs 2, 3, 4, 5, and 6 are the same as those of digital input 1.

IO Module	Digital Input Number	Digital Input Addresses	Digital Input Registers
IO 1	I1	0x3669–0x36B8	13930–14009
	I2	0x36B9–0x3708	14010–14089
	I3	0x3709–0x3758	14090–14169
	I4	0x3759–0x37A8	14170–14249
	I5	0x37A9–0x37F8	14250–14329
	I6	0x37F9–0x3848	14330–14409
IO 2	I1	0x4221–0x4270	16930–17009
	I2	0x4271–0x42C0	17010–17089
	I3	0x42C1–0x4310	17090–17169
	I4	0x4311–0x4360	17170–17249
	I5	0x4361–0x43B0	17250–17329
	I6	0x43B1–0x4400	17330–17409

Digital Input 1 Registers of IO 1

The order and the description of the digital input 1 registers of IO 2 are the same as those of IO 1:

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3669	13930	R	–	INT16U	0–1	–	Quality of each bit of register 13931: ● 0 = Invalid ● 1 = Valid
0x366A	13931	R	–	INT16U	0–1	0	Digital input status: ● 0 = Off ● 1 = On
						1	Digital input forced status: ● 0 = Unforced ● 1 = Forced
0x366B–0x366E	13932–13935	R	–	DATETIME	–	–	Timestamp for the last input transition: ● Last rising edge if input is configured as NO (normally open contact) ● Last falling edge if input is configured as NC (normally closed contact) Valid if input signal type is a normal digital input (not valid for pulse digital input).
0x366F–0x3670	13936–13937	–	–	–	–	–	Reserved
0x3671–0x3672	13938–13939	R	–	INT32U	0-4294967294	–	Input counter value This counter increments for each rising edge of the input. Valid if input signal type is normal digital input.
0x3673–0x3676	13940–13943	R	–	DATETIME	–	–	Timestamp for the last input change counter preset/reset Valid if input signal type is normal digital input.

(1) Value set by using the Ecoreach software.
(2) Examples:
- If each incoming pulse represents 125 kWh, and since consumption data must be expressed in watt-hours, the consumption pulse weight is 125,000.
- If each incoming pulse represents 1 US gallon, and since consumption data must be expressed in cubic meters, the consumption pulse weight is 0.003785.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3677–0x3678	13944–13945	R	–	INT32U	0-4294967294	–	Number of pulses received Valid if input signal type is pulse digital input.
0x3679–0x367C	13946–13949	R	–	INT64	–	–	Resettable value of consumption Value = pulse weight x number of pulses received Valid if input signal type is pulse digital input.
0x367D–0x3680	13950–13953	R	–	INT64	–	–	Accumulated non-resettable value of consumption Valid if input signal type is pulse digital input.
0x3681–0x3684	13954–13957	R	–	DATETIME	–	–	Timestamp of last resettable consumption value reset Valid if input signal type is pulse digital input.
0x3685–0x3686	13958–13959	R	W	FLOAT32	–	–	Power calculation Valid if ● Input signal type is pulse digital input ● the pulse input is from Energy pulse counter
0x3687–0x369E	13960–13983	R	–	OCTET STRING	–	–	Digital input identification coded over 45 ASCII characters(1)
0x369F–0x36A0	13984–13985	R	s	FLOAT32	0.003-1	–	Digital input 1 filter time
0x36A1	13986	R	–	INT16U	0–1	–	Input contact type(1) ● 0 = NO (normally open contact, factory setting) ● 1 = NC (normally close contact)
0x36A2	13987	R	–	INT16U	0–1	–	Input signal type(1) ● 0 = normal digital input (factory setting) ● 1 = pulse digital input
0x36A3	13988	R	–	INT16U	0–1	–	Pulse polarity(1) ● 0 = low to high (factory setting) ● 1 = high to low Valid if input signal type is pulse digital input.
0x36A4	13989	R	–	INT16U	1–4	–	Pulse unit(1) ● 1 = Wh (Watt-hour, factory setting) ● 2 = VARh (Reactive Volt-Ampere hour) ● 3 = VAh (Volt-Ampere hour) ● 4 = m^3 (cubic meters) Valid if input signal type is pulse digital input.

(1) Value set by using the Ecoreach software.
(2) Examples:
- If each incoming pulse represents 125 kWh, and since consumption data must be expressed in watt-hours, the consumption pulse weight is 125,000.
- If each incoming pulse represents 1 US gallon, and since consumption data must be expressed in cubic meters, the consumption pulse weight is 0.003785.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x36A5–0x36A6	13990–13991	R	–	FLOAT32	1–16777215	–	Pulse weight(1) (2) Valid if input signal type is pulse digital input. Factory setting = 1.0
0x36A7–0x36A8	13992–13993	R	–	INT32U	1-4294967294	–	Input counter threshold value(1) Valid if input signal type is normal digital input. Factory setting = 5000
0x36A9–0x36B8	13994–14009	–	–	–	–	–	Reserved

(1) Value set by using the Ecoreach software.
(2) Examples:
- If each incoming pulse represents 125 kWh, and since consumption data must be expressed in watt-hours, the consumption pulse weight is 125,000.
- If each incoming pulse represents 1 US gallon, and since consumption data must be expressed in cubic meters, the consumption pulse weight is 0.003785.

Digital Outputs

Digital Output Register Mapping

Each digital output description is made up of 60 registers. The order and the description of the digital outputs 2 and 3 are the same as those of digital output 1.

IO Module	Digital Output Number	Digital Output Addresses	Digital Output Registers
IO 1	O1	0x3849–0x3884	14410–14469
	O2	0x3885–0x38C0	14470–14529
	O3	0x38C1–0x38FC	14530–14589
IO 2	O1	0x4401–0x443C	17410–17469
	O2	0x443D–0x4478	17470–17529
	O3	0x4479–0x44B4	17530–17589

Digital Output 1 Registers of IO 1

The order and the description of the digital output 1 registers of IO 2 are the same as those of IO 1:

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3849	14410	R	–	INT16U	–	–	Quality of each bit of register 14411: ● 0 = Invalid ● 1 = Valid
0x384A	14411	R-WC	–	INT16U	0–1	1	Digital output status: ● 0 = OFF ● 1 = ON
		R				2	Digital output forced status: ● 0 = Unforced ● 1 = Forced
0x384B–0x384E	14412–14415	R	–	DATETIME	–	–	Timestamp for the last output transition: ● Last rising edge if output is configured as NO (normally open contact) ● Last falling edge if output is configured as NC (normally closed contact)
0x384F–0x3850	14416–14417	–	–	–	–	–	Reserved
0x3851–0x3852	14418–14419	R	–	INT32U	1-4294967294	–	Output counter This counter increments for each rising edge of the output.
0x3853–0x3856	14420–14423	R	–	DATETIME	–	–	Timestamp of the last reset for the output counter
0x3857–0x386E	14424–14447	R	–	OCTET STRING	–	–	Digital output identification coded over 45 ASCII characters
0x386F	14448	R	–	INT16U	0–2	–	Output operating mode(1): ● 0 = Non-latching (factory setting) ● 1 = Latched ● 2 = Time delayed non-latching
0x3870	14449	R	s	INT16U	0–65534	–	On time for time delayed non-latching mode value(1) The time for the output to remain energized when the output is in time delayed non-latching mode (Factory setting = 0)
0x3871	14450	R	–	INT16U	0–1	–	Output contact type(1): ● 0 = NO (normally open, factory setting) ● 1 = NC (normally close)

(1) Value set using the Ecoreach software.
(2) Simple commands are enabled by factory setting. The simple commands can be disabled by using the command Enable/Disable commands.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3872	14451	R	–	INT16U	0–2	–	Indicates On/Off state of the discrete output when any fall back condition occurs(1): ● 0 = OFF (factory setting) ● 1 = ON ● 2 = Freeze
0x3873–0x3874	14452–14453	R	–	INT32U	1-4294967294	–	Output counter threshold value(1) Factory setting = 5000
0x3875	14454	R	–	INT16U	0–2	–	Simple command for output(1): ● 0 = No command ● 1 = OFF ● 2 = ON Valid if simple commands are enabled.
0x3876–0x3884	14455–14469	–	–	–	–	–	Reserved

(1) Value set using the Ecoreach software.
(2) Simple commands are enabled by factory setting. The simple commands can be disabled by using the command Enable/Disable commands.

Hardware Setting

Addresses and Registers List

The following table describes the hardware settings addresses, and registers regarding the IO module.

IO Module	Addresses	Registers
IO 1	0x38FD–0x3902	14590–14595
IO 2	0x44B5–0x44BA	17590–17595

Hardware Setting Registers for IO 1

The order and the description of the hardware setting registers for IO 2 are the same as those of IO 1.

Address	Register	RW	Unit	Type	Range	Description
0x38FD	14590	R	–	INT16U	1–9	Application rotary switch current position: ● 1 = position 1 ● 2 = position 2 ● 3 = position 3 ● 4 = position 4 ● 5 = position 5 ● 6 = position 6 ● 7 = position 7 ● 8 = position 8 ● 9 = position 9
0x38FE	14591	R	–	INT16U	0–1	Remote setup padlock position: ● 0 = Unlock ● 1 = Lock
0x38FF	14592	R	–	INT16U	0–1	Dip switch1 position: ● 0 = IO 1 ● 1 = IO 2
0x3900	14593	–	–	–	–	Reserved
0x3901	14594	R	–	INT16U	1–9	Last validated application set by the test button located on the front of the IO module: ● 1 = position 1 ● 2 = position 2 ● 3 = position 3 ● 4 = position 4 ● 5 = position 5 ● 6 = position 6 ● 7 = position 7 ● 8 = position 8 ● 9 = position 9
0x3902	14595	R	–	INT16U	1–9	Last validated application set by the Ecoreach software: ● 1 = position 1 ● 2 = position 2 ● 3 = position 3 ● 4 = position 4 ● 5 = position 5 ● 6 = position 6 ● 7 = position 7 ● 8 = position 8 ● 9 = position 9
0x3903–0x3904	14596–14597	–	–	–	–	Reserved

Digital Input and Output Status

Addresses and Registers List

The following table describes the digital inputs and outputs status addresses, and registers regarding the IO module.

IO Module	Addresses	Registers
IO 1	0x3905–0x3908	14598–14601
IO 2	0x44BD–0x44C0	17598–17601

Digital Input and Output Status Registers for IO 1

The order and the description of the digital input and output status registers for IO 2 are the same as those of IO 1.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3905	14598	R	–	INT16U	–	–	Quality of each bit of register 14599: ● 0 = Invalid ● 1 = Valid
0x3906	14599	R	–	INT16U	0–1	–	Digital input status register: ● Input status = 0 when input is OFF ● Input status = 1 when input is ON
						0	I1 status
						1	I2 status
						2	I3 status
						3	I4 status
						4	I5 status
						5	I6 status
0x3907	14600	R	–	INT16U	–	-	Quality of each bit of register 14601: ● 0 = Invalid ● 1 = Valid
0x3908	14601	R–WC	–	INT16U	0–1	–	Digital output status register: ● Output status = 0 when output is OFF ● Output status = 1 when output is ON
						0	O1 status
						1	O2 status
						2	O3 status

IO Module Identification

Introduction

The order and the description of the IO module identification registers for IO 2 are the same as those of IO 1.

Addresses and Registers List

The following table describes the identification addresses, and registers regarding the IO module.

IO Module	Addresses	Registers
IO 1	0x392F–0x3982	14640–14723
IO 2	0x44E7–0x453A	17640–17723

IMU Identification (For Masterpact NT/NW, Compact NS and Compact NSX Only)

Identification of the IMU can be set by using the Ecoreach software. When not programmed, the IMU identification registers return 0 (0x0000).

The FDM121 display displays the first 14 characters of the IMU name.

Address	Register	RW	Unit	Type	Range	Description
0x3931–0x3948	14642–14665	R	–	OCTET STRING	–	IMU name = up to 45 ASCII characters ended by the NULL character 0x00
0x3949–0x3960	14666–14689	R	–	OCTET STRING	–	IMU location = up to 45 ASCII characters ended by the NULL character 0x00

IO Hardware Revision

The hardware revision is an ASCII string using the format XXX.YYY.ZZZ with:

- XXX = major version (000–127)
- YYY = minor version (000–255)
- ZZZ = revision number (000–255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x3961–0x3966	14690–14695	R	–	OCTET STRING	–	Hardware revision

IO Module Firmware Revision

The firmware revision is an ASCII string using the format XXX.YYY.ZZZ with:

- XXX = major version (000–127)
- YYY = minor version (000–255)
- ZZZ = revision number (000–255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x3967–0x396C	14696–14701	R	–	OCTET STRING	–	Firmware revision

Current Date and Time

Address	Register	RW	Unit	Type	Range	Description
0x396D–0x3970	14702–14705	R	–	DATETIME	–	Current date and time of the IO module in DATETIME format, set by using the Ecoreach software.

Serial Number

The IO module serial number is composed of a maximum of 11 alphanumeric characters with the following format: PPYYWWDnnnn.

- PP = plant code
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- nnnn = sequence number (0001–9999)

A read request of 6 registers is necessary to read the IO module serial number.

Address	Register	RW	Unit	Type	Range	Description
0x03971–0x397A	14706-14715	R	–	OCTET STRING	–	Serial number
(0x03971)	14706	R	–	OCTET STRING	–	'PP'
(0x03972)	14707	R	–	OCTET STRING	'05'–'99'	'YY'
(0x03973)	14708	R	–	OCTET STRING	'01'–'53'	'WW'
(0x03974)	14709	R	–	OCTET STRING	'10'–'79'	'Dn'
(0x03975)	14710	R	–	OCTET STRING	'00'–'99'	'nn'
(0x03976)	14711	R	–	OCTET STRING	'0'–'9'	'n' (the NULL character ends the serial number)

Manufacturing Date and Time

Address	Register	RW	Unit	Type	Range	Description
0x397B–0x397E	14716–14719	R	–	DATETIME	–	Manufacturing date and time

Product Identification

Address	Register	RW	Unit	Type	Range	Description
0x392F	14640	R	–	INT16U	15150	Product identification = 15150 for the IO module
0x3930	14641	–	–	–	–	Reserved
0x397F–0x3982	14720–14723	R	–	OCTET STRING	–	Product code = LV434063
0x3D1C–0x3D3B	15645–15676	R–WC	–	OCTET STRING	–	User application name
0x3D3C–0x3D45	15677–15686	R	–	OCTET STRING	–	Vendor name
0x3D46–0x3D4D	15687–15694	R	–	OCTET STRING	–	Product range: Enerlinx
0x3D4E–0x3D5D	15695–15710	R	–	OCTET STRING	–	Device family: IO device
0x3D5E–0x3D65	15711–15718	R	–	OCTET STRING	–	Product model

Alarm Status

Addresses and Registers List

The following table describes the alarm status addresses, and registers regarding the IO module.

IO Module	Addresses	Registers
IO 1	0x3989–0x39A6	14730–14759
IO 2	0x4541–0x455E	17730–17759

Generic Alarm Status for IO 1

The order and the description of the generic alarm status registers for IO 2 are the same as those of IO 1.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3989	14730	R	–	INT16U	–	–	Quality of each bit of register 14731: ● 0 = Invalid ● 1 = Valid
0x398A	14731	R	–	INT16U	–	–	IO module history format register
						0	Compact NSX format
						1	TI086 format
0x398B	14732	R	–	INT16U	–	–	Quality of each bit of register 14733: ● 0 = Invalid ● 1 = Valid
0x398C	14733	R	–	INT16U	–	–	IO module command type Factory setting = 3, both write command mechanisms are enabled.
						0	1 = Complex commands
						1	1 = Simple commands Simple commands can be disabled by sending a command
0x398D–0x3992	14734–14739	–	–	–	–	–	Reserved
0x3993	14740	R	–	INT16U	–	–	Quality of each bit of register 14741: ● 0 = Invalid ● 1 = Valid
0x3994	14741	R	–	INT16U	–	–	IO module generic alarm 1 status register.
						0	IO module in STOP mode: IO module is not working and must be replaced.
						1	IO module in ERROR mode: IO module is working in degraded mode.
						2	Threshold overrun on I1 counter
						3	Threshold overrun on I2 counter
						4	Threshold overrun on I3 counter
						5	Threshold overrun on I4 counter
						6	Threshold overrun on I5 counter
						7	Threshold overrun on I6 counter
						8	Threshold overrun on O1 counter
						9	Threshold overrun on O2 counter
						10	Threshold overrun on O3 counter
						11	Switchboard temperature threshold 1 overrun
						12	Switchboard temperature threshold 2 overrun
						13	Switchboard temperature threshold 3 overrun
						14–15	Reserved
0x3995	14742	R	–	INT16U	–	–	Quality of each bit of register 14743: ● 0 = Invalid ● 1 = Valid

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3996	14743	R	–	INT16U	–	–	IO module generic alarm 2 status register.
						0	User-defined input 1 alarm
						1	User-defined input 2 alarm
						2	User-defined input 3 alarm
						3	User-defined input 4 alarm
						4	User-defined input 5 alarm
						5	User-defined input 6 alarm
						6–15	Reserved

Cradle and Drawer Management Alarms for IO 1

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3997	14744	R	–	INT16U	–	–	Quality of each bit of register 14745: ● 0 = Invalid ● 1 = Valid
0x3998	14745	R	–	INT16U	–	–	Cradle management alarms register
						0	Cradle position discrepancy
						1	Remove device from cradle and put it back
						2	Design life of the cradle Replacement of the cradle has to be performed within 6 months
						3	Regrease cradle and disconnecting contact clusters to be performed by qualified maintenance staff
						4	New Micrologic control unit has been detected
						5–7	Reserved
						8	Drawer position discrepancy
						9–15	Reserved

Motor Alarms for IO 1

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3999	14746	R	–	INT16U	–	–	Quality of each bit of register 14747: ● 0 = Invalid ● 1 = Valid
0x399A	14747	R	–	INT16U	–	–	IO motor alarms
						0–15	Reserved

Miscellaneous Application Alarms for IO 1

Address	Register	RW	Unit	Type	Range	Bit	Description
0x399B	14748	R	–	INT16U	–	–	Quality of each bit of register 14749: ● 0 = Invalid ● 1 = Valid
0x399C	14749	R	–	INT16U	–	–	Other application alarms register
						0	Auxiliary contact of load contactor 1 is not closed.
						1	Auxiliary contact of load contactor 1 is not opened.
						2	Discrepancy with ERMS OFF order and ERMS ON order (Masterpact NT/NW and Compact NS only)
						3	Dual settings 2-wire input discrepancy (Masterpact MTZ only)
						4–15	Reserved
0x399D	14750	R	–	INT16U	–	–	Quality of each bit of register 14751: ● 0 = Invalid ● 1 = Valid

Address	Register	RW	Unit	Type	Range	Bit	Description
0x399E	14751	R	–	INT16U	–	–	Predefined input alarms register
						0	Earth-leakage trip signal contact (SDV)
						1	Control voltage presence contact
						2	Surge protection status contact
						3	Surge failure contact
						4	Switch-disconnector ON/OFF indication contact (OF)
						5	Fuse blown indication contact
						6	Emergency stop
						7	Switchboard temperature contact
						8	Switchboard ventilation contact
						9	Switchboard door contact
						10–15	Reserved
0x399F	14752	R	–	INT16U	–	–	Quality of each bit of register 14753: ● 0 = Invalid ● 1 = Valid
0x39A0	14753	R	–	INT16U	–	–	IO module discrepancy alarms register
						0	Critical hardware discrepancy
						1	Critical firmware discrepancy
						2	Non-critical hardware discrepancy
						3	Non-critical firmware discrepancy
						4–15	Reserved
0x39A1– 0x39A6	14754– 14759	–	–	–	–	–	Reserved

Applications

IO Application Status

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3927	14632	R	–	INT16U	0–1	0	Cradle application enabled or disabled: ● 0 = Disabled ● 1 = Enabled
0x3928	14633	R	–	INT16U	–	–	Quality of each bit of register 14632: ● 0 = Invalid ● 1 = Valid

Cradle Management

The table describes the registers related to the Cradle management predefined application performed by IO 1. The registers related to the Cradle management user-defined application performed by IO 2 are available in registers 18300–18329.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3BC3	15300	R-RC	–	INT16U	–	–	Quality of each bit of register 15301: ● 0 = Invalid ● 1 = Valid
0x3BC4	15301	R-RC	–	INT16U	–	–	Cradle status
						8	Device in disconnected position (CD)
						9	Device in connected position (CE)
						10	Device in the test position (CT)
0x3BC5– 0x3BC6	15302– 15303	R-RC-WC	–	INT32U	0–65534	–	Cradle connected position counter This counter increments for each rising edge of the cradle connected position
0x3BC7– 0x3BC8	15304– 15305	R-RC-WC	–	INT32U	0–65534	–	Cradle disconnected position counter This counter increments for each rising edge of the cradle disconnected position
0x3BC9– 0x3BCA	15306– 15307	R-RC-WC	–	INT32U	0–65534	–	Cradle test position counter This counter increments for each rising edge of the cradle test position
0x3BCB– 0x3BCE	15308– 15311	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle connected position
0x3BCF– 0x3BD2	15312– 15315	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle disconnected position
0x3BD3– 0x3BD6	15316– 15319	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle test position
0x3BD7– 0x3BD8	15320– 15321	R-WC	–	INT32U	–	–	Operating time since last grease maintenance
0x3BD9– 0x3BDA	15322– 15323	R-WC	–	INT32U	–	–	Operating time since last move connected position
0x3BDB	15324	R	–	INT16U	0-65534	–	Cradle contact regrease counter
0x3BDC– 0x3BE0	15325– 15329	–	–	–	–	–	Reserved

Drawer Management

The table describes the registers related to the Drawer management user-defined application performed by IO 1. The registers related to the Drawer management user-defined application performed by IO 2 are available in registers 18330–18359.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3BE1	15330	R	–	INT16U	0–1	–	Quality of each bit of register 15331: 0 = Invalid 1 = Valid
0x3BE2	15331	R	–	INT16U	1–4	–	Drawer status
						8	Drawer in disconnected position
						9	Drawer in connected position
						10	Drawer in the test position
0x3BE3– 0x3BE4	15332– 15333	R	–	INT32U	0–65534	–	Drawer connected position counter. This counter increments for each rising edge of the drawer connected position.
0x3BE5– 0x3BE6	15334– 15335	R	–	INT32U	0–65534	–	Drawer disconnected position counter. This counter increments for each rising edge of the drawer disconnected position.
0x3BE7– 0x3BE8	15336– 15337	R	–	INT32U	0–65534	–	Drawer test position counter. This counter increments for each rising edge of the drawer test position.
0x3BE9– 0x3BEC	15338– 15341	R	–	DATETIME	–	–	Timestamp of the last change for the drawer connected position.
0x3BED– 0x3BF0	15342– 15345	R	–	DATETIME	–	–	Timestamp of the last change for the drawer disconnected position.
0x3BF1– 0x3BF4	15346– 15349	R	–	DATETIME	–	–	Timestamp of the last change for the drawer test position.
0x3BF5– 0x3BFE	15350– 15359	–	–	–	–	–	Reserved

Light Control

The table describes the registers related to the Light control predefined application performed by IO 1.

Address	Register	RW	Unit	Type	Range	Description
0x3C27	15400	R	–	INT16U	0–1	Quality of each bit of register 15401: ● 0 = Invalid ● 1 = Valid (application is configured and running)
0x3C28	15401	R	–	INT16U	0–1	Light status: ● 0 = Reset/OFF ● 1 = Set/ON
0x3C29– 0x3C2A	15402– 15403	R	s	INT32U	0–54000	Remaining time in ON or OFF state (depending of the light status)
0x3C2B–	15404	RW	–	INT16U	0–2	Light simple command(1): ● 0 = No command ● 1 = Light OFF ● 2 = Light ON
0x3C2C– 0x3C30	15405– 15409	–	–	–	–	Reserved

(1) Simple commands are enabled by factory setting. The simple commands can be disabled by using the command Enable/Disable simple commands.

Load Control

The table describes the registers related to the Load control predefined application performed by IO 1.

Address	Register	RW	Unit	Type	Range	Description
0x3C31	15410	R	–	INT16U	0–1	Quality of each bit of register 15411: ● 0 = Invalid ● 1 = Valid (application is configured and running)
0x3C32	15411	R	–	INT16U	0–1	Load status: ● 0 = Reset/OFF ● 1 = Set/ON
0x3C33–0x3C34	15412–15413	R	s	INT32U	0–54000	Remaining time in ON or OFF state (depending of the load status)
0x3C35	15414	R	–	INT16U	0–2	Load simple command(1): ● 0 = No command ● 1 = Load OFF ● 2 = Load ON
0x3C36–0x3EEC	15415–16109	–	–	–	–	Reserved

(1) Simple commands are enabled by factory setting. The simple commands can be disabled by using the command Enable/Disable simple commands.

Section 5.2
IO Module Events

What Is in This Section?

This section contains the following topics:

Event History

General Description

The event history registers describe the last 100 encountered events. The event history format corresponds to a series of 100 records. Each record is composed of 5 registers describing one event.

A read request of 5x(n) registers is necessary to read the last n event records, where 5 is the number of registers for each event record.

For example, a read request of 5x3 = 15 registers is necessary to read the last 3 event records of the event history:

- The first five registers describe the first event record (most recent event).
- The next five registers describe the second event record.
- The last five registers describe the third event record.

There are two event histories, 1 per IO module.

IO Module	Address	Register	Description
IO 1	0x39A7–0x39AB	14760–14764	Event record 1 (most recent event record)
	0x39AC–0x39B0	14765–14769	Event record 2
	0x39A7+5x(n-1)–0x39AB+5x(n-1)	14760+5x(n-1)–14764+5x(n-1)	Event record n
	0x3B96–0x3B9A	15255–15259	Event record 100
IO 2	0x455F–0x4563	17760–17764	Event record 1 (most recent event record)
	0x4564–0x4568	17765–17769	Event record 2
	0x455F+5x(n-1)–0x4563+5x(n-1)	17760+5x(n-1)–17764+5x(n-1)	Event record n
	0x474E–0x4752	18255–18259	Event record 100

NOTE: The event history of IO modules connected to a Masterpact MTZ circuit breaker can be read also by using the Get all events command *(see page 172)*.

Event Record

A block request of five registers is necessary to read an event record.The order and the description of the event record registers of IO 2 are the same as those of IO 1:

Event Record 1 (Most Recent Event Record)				
Register	**Address**	**RW**	**Type**	**Description**
0x39A7	14760	R	INT16U	Event code of IO 1 and IO 2 *(see page 162)*
0x39A8– 0x39AA	14761– 14763	R	ULP DATE	Date and time of the event
0x39AB	14764	R	INT16U	Event type MSB = 0 (reserved) Event occurrence: LSB = 1 Event completion: LSB = 2

Alarm Definition

Alarms are specific events that need to be reset.

The reset mode of an alarm can be:

- automatic: the alarm is reset automatically when the alarm is no more active.
- manual: the alarm is reset manually with the Test/Reset push button located on the front face of the IO module and when the alarm is no more active.
- remote: the alarm is reset remotely with the Reset command sent via the communication and when the alarm is no more active.

Each alarm has a priority level that manages the alarm display on the FDM121 display:

- no priority = N/A (not affected)
- low priority = 1. No alarm display on the FDM121 display
- medium priority = 2. The FDM121 display LED is steady ON.
- high priority = 3. The FDM121 display LED blinks and a pop-up screen informs that the alarm has occurred.

IO Module Events and Alarms

IO 1 Events and Alarms

Code	Application	Description	Type	Priority	Reset Mode
1537 (0x0601)	General	Watchdog reset	Event	Medium	–
1538 (0x0602)	General	IO module reset to factory setting	Event	Medium	–
1539 (0x0603)	General	IO module failure (STOP mode)	Alarm	High	Manual or Remote
1540 (0x0604)	General	IO module failure (ERROR mode)	Alarm	Medium	Manual or Remote
1541 (0x0605)	General	Functional rotary switch position change	Event	Medium	–
1542 (0x0606)	General	Setting locking pad rotary switch position change	Event	Medium	–
1543 (0x0607)	General	Source address dip switch position change	Event	Medium	–
1552 (0x0610)	General	O1 rising edge (OFF/ON change)	Event	Low	–
1553 (0x0611)	General	O2 rising edge (OFF/ON change)	Event	Low	–
1554 (0x0612)	General	O3 rising edge (OFF/ON change)	Event	Low	–
1555 (0x0613)	General	I1 rising edge (OFF/ON change)	Event	Low	–
1556 (0x0614)	General	I2 rising edge (OFF/ON change)	Event	Low	–
1557 (0x0615)	General	I3 rising edge (OFF/ON change)	Event	Low	–
1558 (0x0616)	General	I4 rising edge (OFF/ON change)	Event	Low	–
1559 (0x0617)	General	I5 rising edge (OFF/ON change)	Event	Low	–
1560 (0x0618)	General	I6 rising edge (OFF/ON change)	Event	Low	–
1561 (0x0619)	General	Threshold overrun on I1 counter	Alarm	Medium	Manual or Remote
1562 (0x061A)	General	Threshold overrun on I2 counter	Alarm	Medium	Manual or Remote
1563 (0x061B)	General	Threshold overrun on I3 counter	Alarm	Medium	Manual or Remote
1564 (0x061C)	General	Threshold overrun on I4 counter	Alarm	Medium	Manual or Remote
1565 (0x061D)	General	Threshold overrun on I5 counter	Alarm	Medium	Manual or Remote
1566 (0x061E)	General	Threshold overrun on I6 counter	Alarm	Medium	Manual or Remote
1567 (0x061F)	General	Threshold overrun on O1 counter	Alarm	Medium	Manual or Remote
1568 (0x0620)	General	Threshold overrun on O2 counter	Alarm	Medium	Manual or Remote
1569 (0x0621)	General	Threshold overrun on O3 counter	Alarm	Medium	Manual or Remote
1570 (0x0622)	General	I1 unforced / forced change	Event	Low	–
1571 (0x0623)	General	I2 unforced / forced change	Event	Low	–

Code	Application	Description	Type	Priority	Reset Mode
1572 (0x0624)	General	I3 unforced / forced change	Event	Low	–
1573 (0x0625)	General	I4 unforced / forced change	Event	Low	–
1574 (0x0626)	General	I5 unforced / forced change	Event	Low	–
1575 (0x0627)	General	I6 unforced / forced change	Event	Low	–
1576 (0x0628)	General	O1 unforced / forced change	Event	Low	–
1577 (0x0629)	General	O2 unforced / forced change	Event	Low	–
1578 (0x062A)	General	O3 unforced / forced change	Event	Low	–
1579 (0x062B)	User-defined input acquisition	User-defined input 1	Alarm	Medium	Manual or Remote
1580 (0x062C)	User-defined input acquisition	User-defined input 2	Alarm	Medium	Manual or Remote
1581 (0x062D)	User-defined input acquisition	User-defined input 3	Alarm	Medium	Manual or Remote
1582 (0x062E)	User-defined input acquisition	User-defined input 4	Alarm	Medium	Manual or Remote
1583 (0x062F)	User-defined input acquisition	User-defined input 5	Alarm	Medium	Manual or Remote
1584 (0x0630)	User-defined input acquisition	User-defined input 6	Alarm	Medium	Manual or Remote
1585 (0x0631)	Cooling system	Switchboard temperature threshold 1 overrun	Alarm	Low	Auto
1586 (0x0632)	Cooling system	Switchboard temperature threshold 2 overrun	Alarm	Medium	Manual or Remote
1587 (0x0633)	Cooling system	Switchboard temperature threshold 3 overrun	Alarm	High	Manual or Remote
2304 (0x0900)	Cradle management	Cradle position discrepancy	Alarm	Medium	Manual or Remote
2305 (0x0901)	Cradle management	Cradle connected contact change	Alarm	Low	Manual or Remote
2306 (0x0902)	Cradle management	Cradle disconnected contact change	Alarm	Low	Manual or Remote
2307 (0x0903)	Cradle management	Cradle test contact change	Alarm	Low	Manual or Remote
2308 (0x0904)	Cradle management	Remove device from cradle and put it back	Alarm	Medium	Manual or Remote
2309 (0x0905)	Cradle management	Design life of the cradle Replacement of the cradle has to be performed within 6 months.	Alarm	High	Manual or Remote
2310 (0x0906)	Cradle management	Regrease cradle and disconnecting-contact clusters to be performed by qualified maintenance staff	Alarm	Medium	Manual or Remote
2311 (0x0907)	Cradle management	New Micrologic control unit has been detected.	Alarm	High	Manual or Remote
2432 (0x0980)	Drawer management	Drawer position discrepancy	Alarm	Medium	Manual or Remote
2560 (0x0A00)	Load control	Auxiliary contact of the Load contactor 1 is not closed	Alarm	Medium	Manual or Remote
2561 (0x0A01)	Load control	Auxiliary contact of the Load contactor 1 is not opened	Alarm	Medium	Manual or Remote
2816 (0x0B00)	Predefined input acquisition	Earth-leakage trip signal contact (SDV)	Alarm	Medium	Manual or Remote

Code	Application	Description	Type	Priority	Reset Mode
2817 (0x0B01)	Predefined input acquisition	Control voltage presence contact	Alarm	Medium	Manual or Remote
2818 (0x0B02)	Predefined input acquisition	Surge protection status contact	Alarm	Medium	Manual or Remote
2819 (0x0B03)	Predefined input acquisition	Surge failure contact	Alarm	Medium	Manual or Remote
2820 (0x0B04)	Predefined input acquisition	Switch-disconnector ON/OFF indication contact (OF)	Alarm	Medium	Manual or Remote
2821 (0x0B05)	Predefined input acquisition	Fuse blown indication contact	Alarm	Medium	Manual or Remote
2822 (0x0B06)	Predefined input acquisition	Emergency stop	Alarm	High	Manual or Remote
2823 (0x0B07)	Cooling system	Switchboard temperature contact	Alarm	Medium	Manual or Remote
2824 (0x0B08)	Cooling system	Switchboard ventilation contact	Alarm	Medium	Manual or Remote
2825 (0x0B09)	Cooling system	Switchboard door contact	Alarm	Medium	Manual or Remote
3072 (0x0C00)	Protection Settings	Discrepancy with ERMS OFF order and ERMS ON order (Masterpact NT/NW and Compact NS only)	Alarm	High	Manual or Remote
3328 (0x0D00)	General	Module in critical hardware discrepancy mode	Alarm	High	Auto
3329 (0x0D01)	General	Module in critical firmware discrepancy mode	Alarm	High	Auto
3330 (0x0D02)	General	Module in non-critical hardware discrepancy mode	Alarm	Medium	Auto
3331 (0x0D03)	General	Module in non-critical firmware discrepancy mode	Alarm	Medium	Auto
3333 (0x0D05)	Dual Settings	Dual settings 2-wire input discrepancy (Masterpact MTZ only)	Alarm	High	Auto

NOTE: The alarm exit priority is fixed in IO module firmware. The value is Low, when available.

IO 2 Events and Alarms

Code	Application	Description	Type	Priority	Reset Mode
1793 (0x0701)	General	Watchdog reset	Event	Medium	–
1794 (0x0702)	General	IO module reset to factory settings	Event	Medium	–
1795 (0x0703)	General	IO module failure (STOP mode)	Alarm	High	Manual or Remote
1796 (0x0704)	General	IO module failure (ERROR mode)	Alarm	Medium	Manual or Remote
1797 (0x0705)	General	Functional rotary switch position change	Event	Medium	–
1798 (0x0706)	General	Setting locking pad rotary switch position change	Event	Medium	–
1799 (0x0707)	General	Source address dip switch position change	Event	–	–
1808 (0x0710)	General	O1 rising edge (OFF/ON change)	Event	Low	–
1809 (0x0711)	General	O2 rising edge (OFF/ON change)	Event	Low	–
1810 (0x0712)	General	O3 rising edge (OFF/ON change)	Event	Low	–
1811 (0x0713)	General	I1 rising edge (OFF/ON change)	Event	Low	–

Code	Application	Description	Type	Priority	Reset Mode
1812 (0x0714)	General	I2 rising edge (OFF/ON change)	Event	Low	–
1813 (0x0715)	General	I3 rising edge (OFF/ON change)	Event	Low	–
1814 (0x0716)	General	I4 rising edge (OFF/ON change)	Event	Low	–
1815 (0x0717)	General	I5 rising edge (OFF/ON change)	Event	Low	–
1816 (0x0718)	General	I6 rising edge (OFF/ON change)	Event	Low	–
1817 (0x0719)	General	Threshold overrun on I1 counter	Alarm	Medium	Manual or Remote
1818 (0x071A)	General	Threshold overrun on I2 counter	Alarm	Medium	Manual or Remote
1819 (0x071B)	General	Threshold overrun on I3 counter	Alarm	Medium	Manual or Remote
1820 (0x071C)	General	Threshold overrun on I4 counter	Alarm	Medium	Manual or Remote
1821 (0x071D)	General	Threshold overrun on I5 counter	Alarm	Medium	Manual or Remote
1822 (0x071E)	General	Threshold overrun on I6 counter	Alarm	Medium	Manual or Remote
1823 (0x071F)	General	Threshold overrun on O1 counter	Alarm	Medium	Manual or Remote
1824 (0x0720)	General	Threshold overrun on O2 counter	Alarm	Medium	Manual or Remote
1825 (0x0721)	General	Threshold overrun on O3 counter	Alarm	Medium	Manual or Remote
1826 (0x0722)	General	I1 unforced / forced change	Event	Low	–
1827 (0x0723)	General	I2 unforced / forced change	Event	Low	–
1828 (0x0724)	General	I3 unforced / forced change	Event	Low	–
1829 (0x0725)	General	I4 unforced / forced change	Event	Low	–
1830 (0x0726)	General	I5 unforced / forced change	Event	Low	–
1831 (0x0727)	General	I6 unforced / forced change	Event	Low	–
1832 (0x0728)	General	O1 unforced / forced change	Event	Low	–
1833 (0x0729)	General	O2 unforced / forced change	Event	Low	–
1834 (0x072A)	General	O3 unforced / forced change	Event	Low	–
1835 (0x072B)	User-defined input acquisition	User-defined input 1	Alarm	Medium	Manual or Remote
1836 (0x072C)	User-defined input acquisition	User-defined input 2	Alarm	Medium	Manual or Remote
1837 (0x072D)	User-defined input acquisition	User-defined input 3	Alarm	Medium	Manual or Remote
1838 (0x072E)	User-defined input acquisition	User-defined input 4	Alarm	Medium	Manual or Remote
1839 (0x072F)	User-defined input acquisition	User-defined input 5	Alarm	Medium	Manual or Remote
1840 (0x0730)	User-defined input acquisition	User-defined input 6	Alarm	Medium	Manual or Remote

Code	Application	Description	Type	Priority	Reset Mode
1841 (0x0731)	Cooling system	Switchboard temperature threshold 1 for IO 2	Alarm	Low	Auto
1842 (0x0732)	Cooling system	Switchboard temperature threshold 2 for IO 2	Alarm	Medium	Manual or Remote
1843 (0x0733)	Cooling system	Switchboard temperature threshold 3 for IO 2	Alarm	High	Manual or Remote
2304 (0x0900)	Cradle management	Cradle position discrepancy	Alarm	Medium	Manual or Remote
2305 (0x0901)	Cradle management	Cradle connected contact change	Alarm	Low	Manual or Remote
2306 (0x0902)	Cradle management	Cradle disconnected contact change	Alarm	Low	Manual or Remote
2307 (0x0903)	Cradle management	Cradle test contact change	Alarm	Low	Manual or Remote
2308 (0x0904)	Cradle management	Remove device from cradle and put it back	Alarm	Medium	Manual or Remote
2309 (0x0905)	Cradle management	Design life of the cradle Replacement of the cradle has to be performed within 6 months.	Alarm	High	Manual or Remote
2310 (0x0906)	Cradle management	Regrease cradle and disconnecting-contact clusters to be performed by qualified maintenance staff	Alarm	Medium	Manual or Remote
2311 (0x0907)	Cradle management	New Micrologic control unit has been detected.	Alarm	High	Manual or Remote
2432 (0x0980)	Drawer management	Drawer position discrepancy	Alarm	Medium	Manual or Remote
2560 (0x0A00)	Load control	Auxiliary contact of the load contactor 1 is not closed	Alarm	Medium	Manual or Remote
2561 (0x0A01)	Load control	Auxiliary contact of the load contactor 1 is not opened	Alarm	Medium	Manual or Remote
2816 (0x0B00)	Predefined input acquisition	Earth leakage trip signal contact (SDV)	Alarm	Medium	Manual or Remote
2817 (0x0B01)	Predefined input acquisition	Control voltage presence contact	Alarm	Medium	Manual or Remote
2818 (0x0B02)	Predefined input acquisition	Surge protection status contact	Alarm	Medium	Manual or Remote
2819 (0x0B03)	Predefined input acquisition	Surge failure contact	Alarm	Medium	Manual or Remote
2820 (0x0B04)	Predefined input acquisition	Switch-disconnector ON/OFF indication contact (OF)	Alarm	Medium	Manual or Remote
2821 (0x0B05)	Predefined input acquisition	Fuse blown indication contact	Alarm	Medium	Manual or Remote
2822 (0x0B06)	Predefined input acquisition	Emergency stop	Alarm	High	Manual or Remote
2823 (0x0B07)	Cooling system	Switchboard temperature contact	Alarm	Medium	Manual or Remote
2824 (0x0B08)	Cooling system	Switchboard ventilation contact	Alarm	Medium	Manual or Remote
2825 (0x0B09)	Cooling system	Switchboard door contact	Alarm	Medium	Manual or Remote
3072 (0x0C00)	Protection settings	Discrepancy with ERMS OFF order and ERMS ON order (Masterpact NT/NW and Compact NS only)	Alarm	High	Manual or Remote
3328 (0x0D00)	General	Module in Critical Hardware discrepancy mode	Alarm	High	Auto
3329 (0x0D01)	General	Module in Critical Firmware discrepancy mode	Alarm	High	Auto

Code	Application	Description	Type	Priority	Reset Mode
3330 (0x0D02)	General	Module in Non-critical Hardware discrepancy mode	Alarm	Medium	Auto
3331 (0x0D03)	General	Module in Non-critical Firmware discrepancy mode	Alarm	Medium	Auto
3333 (0x0D05)	Dual Settings	Dual settings 2-wire input discrepancy (Masterpact MTZ only)	Alarm	High	Auto

NOTE: The alarm exit priority is fixed in IO firmware. The value is Low, when available.

Section 5.3
IO Module Commands

What Is in This Section?

This section contains the following topics:

List of IO Module Commands and Error Codes

List of Commands

There are two types of command:

- generic commands which work independently of the application selected.
- application commands which are dedicated to an application. A command is only valid if the related application is configured.

The following table lists the available IO module commands, their corresponding application, command codes and password levels. Refer to the appropriate procedure to write a command.

Application	Command	Command Code	Password Level
Generic	Change output state	1672	Level 3 or 4
Generic	Preset input counter	41096	Level 3 or 4
Generic	Preset output counter	41097	Level 3 or 4
Generic	Reset IO module alarms	41099	Level 3 or 4
Generic	Enable/Disable simple commands	41100	Level 3 or 4
Generic	Acknowledge latched output	41102	Level 3 or 4
Generic	Reset analog input minimum/maximum values	42890	Level 3 or 4
Generic	Get all events (for Masterpact MTZ only)	50560	No password
Cradle and drawer management	Preset cradle/drawer counters	41352	Level 3 or 4
Cradle and drawer management	Preset cradle/drawer regrease timers	41353	Level 3 or 4
Light control	Light control	42120	Level 3 or 4
Load control	Load control	42376	Level 3 or 4
Pulse counter management	Preset input pulse counter	42888	Level 3 or 4
Cooling system	Preset switchboard temperature threshold counter	42889	Level 3 or 4

IO Module Error Codes

In addition to generic error codes, the IO module commands generate the following error codes returned in the LSB of register 8021:

Error Code	Description
169 (0xA9)	Already in the asked state (valid only for change output state, light, and load commands)
170 (0xAA)	Unable to preset the counters
171 (0xAB)	Output command rejected since output is being assigned to predefined applications **NOTE:** The output to be controlled must be assigned with the assignment User-defined output.

Any other positive error code means an internal error.

Generic Commands

Change Output State

To change the output state, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1672	Command code = **1672**
0x1F40	8001	–	INT16U	13	Number of parameters (bytes) = 13
0x1F41	8002	–	INT16U	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45	8006	–	INT16U	1–3	Output number ● 1 = output 1 ● 2 = output 2 ● 3 = output 3
0x1F46	8007	–	INT16U	–	Value to set: ● 0x0000 = Change output state to 0 (OFF) ● 0x0100 = Change output state to 1 (ON)

Preset Input Counters

The digital inputs counter values can be read from the digital input record *(see page 145)*.

To reset or preset input counters, set the command registers in the following way::

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41096	Command code = **41096**
0x1F40	8001	–	INT16U	34	Number of parameters (bytes) = 34
0x1F41	8002	–	INT16U	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45– 0x1F46	8006– 8007	–	INT32U	0–4294967295	I1 counter reset/preset: ● 0–4294967294 = preset value of the I1 counter ● 4294967295 (0xFFFFFFFF) = do not preset the I1 counter
0x1F47– 0x1F48	8008– 8009	–	INT32U	0–4294967295	I2 counter reset/preset: ● 0–4294967294 = preset value of the I2 counter ● 4294967295 (0xFFFFFFFF) = do not preset the I2 counter
0x1F49– 0x1F4A	8010– 8011	–	INT32U	0–4294967295	I3 counter reset/preset: ● 0–4294967294 = preset value of the I3 counter ● 4294967295 (0xFFFFFFFF) = do not preset the I3 counter
0x1F4B– 0x1F4C	8012– 8013	–	INT32U	0–4294967295	I4 counter reset/preset: ● 0–4294967294 = preset value of the I4 counter ● 4294967295 (0xFFFFFFFF) = do not preset the I4 counter

Address	Register	Unit	Type	Range	Description
0x1F4D– 0x1F4E	8014– 8015	–	INT32U	0–4294967295	I5 counter reset/preset: ● 0–4294967294 = preset value of the I5 counter ● 4294967295 (0xFFFFFFFF) = do not preset the I5 counter
0x1F55– 0x1F56	8022– 8023	–	INT32U	0–4294967295	I6 counter reset/preset: ● 0–4294967294 = preset value of the I6 counter ● 4294967295 (0xFFFFFFFF) = do not preset the I6 counter

Preset Output Counters

To reset or preset output counters, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41097	Command code = **41097**
0x1F40	8001	–	INT16U	22	Number of parameters (bytes) = 22
0x1F41	8002	–	INT16U	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45– 0x1F46	8006– 8007	–	INT32U	0–4294967295	O1 counter reset/preset: ● 0–4294967294 = preset value of the O1 change counter ● 4294967295 (0xFFFFFFFF) = do not preset the O1 counter
0x1F47– 0x1F48	8008– 8009	–	INT32U	0–4294967295	O2 counter reset/preset: ● 0–4294967294 = preset value of the O2 counter ● 4294967295 (0xFFFFFFFF) = do not preset the O2 counter
0x1F49– 0x1F4A	8010– 8011	–	INT32U	0–4294967295	O3 counter reset/preset: ● 0–4294967294 = preset value of the O3 counter ● 4294967295 (0xFFFFFFFF) = do not preset the O3 counter

Reset IO Module Alarm

The alarms can be read from the alarm status register *(see page 154)*.

To reset IO module alarms, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41099	Command code = **41099**
0x1F40	8001	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	INT16U	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333

Enable/Disable Simple Commands

To enable or disable the simple commands, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41100	Command code = **41100**
0x1F40	8001	–	INT16U	11	Number of parameters (bytes) = 11
0x1F41	8002	–	INT16U	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command

Address	Register	Unit	Type	Range	Description
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45	8006	–	INT16U	–	MSB: Enable or disable: ● 0 = Disable simple command ● 1 = Enable simple command LSB: 0 (not used)

Acknowledge Latched Output

To acknowledge the latched output, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41102	Command code = **41102**
0x1F40	8001	–	INT16U	11	Number of parameters (bytes) = 11
0x1F41	8002	–	INT16U	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45	8006	–	INT16U	–	MSB: ● 0x01 = Digital output relay 1 ● 0x02 = Digital output relay 2 ● 0x03 = Digital output relay 3 ● 0xFF = Unlatch all digital output LSB: 0 (not used)

Reset Analog Input Minimum/Maximum Values

The analog input maximum and minimum values can be read from the analog input record *(see page 143)*.

To reset the minimum/maximum analog input values, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	42890	Command code = **42890**
0x1F40	8001	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	INT16U	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333

Get All Events (For Masterpact MTZ Only)

The command allows to get 10 events maximum. To get more than 10 events, several commands are necessary.

There are two methods to get events:
- get the 10 last events
- get all events from an event sequence number

The event sequence number is an event identifier defined by the IO module, and available among the event characteristics.

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	50560	–	Command code = **50560**
0x1F40	8001	–	INT16U	27	–	Number of parameters (bytes) = 27
0x1F41	8002	–	INT16U	–	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	0	–	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	–	Password of the command (no password required)
0x1F45	8006	–	–	–	–	Reserved
0x1F46	8007	–	INT16U	0, 2	–	Requested get event method: ● 0 = 10 last events ● 2 = Events from a sequence number
0x1F47– 0x1F4A	8008–8011	–	–	–	–	Reserved
0x1F4B– 0x1F4C	8012–8013	–	INT32U	–	–	Requested event sequence number (for method 2 only)
0x1F4D	8014	–	INT8U	–	–	Requested event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved

Events are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	50560	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	–	–	Number of bytes returned
0x1F56	8023	–	–	–	–	Reserved
0x1F57	8024	–	INT16U	0, 2	–	Responded get event method: ● 0 = 10 last events ● 2 = Events from a sequence number
0x1F5E	8031	–	INT16U	–	–	Responded event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved
0x1F5F	8032	–	–	–	–	MSB: Number of events returned
					–	LSB: Remaining events ● 0 = No more events to get ● 1 = More events to get
0x1F60	8033	–	INT16U	1013- 25630	–	First event code *(see page 162)*
0x1F61– 0x1F64	8034–8037	–	DATETIME	–	–	Timestamp of the first event
0x1F65	8038	–	INT16U	–	–	Timestamp quality of the first event
0x1F66– 0x1F67	8039–8040	–	INT32U	–	–	First event sequence number

Address	Register	Unit	Type	Range	Bit	Description
0x1F68	8041	–	INT16U	–	–	MSB: First event status ● 1 = Occurrence ● 2 = Completion ● 3 = Pulse LSB: Reserved
0x1F69	8042	–	–	–	–	Reserved
0x1F6A	8043	–	INT16U	–	–	First event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved
0x1F6B–0x1F75	8044–8054	–	INT16U	–	–	Characteristics of event 2 (same as event 1)
0x1F76–0x1F80	8055–8065	–	INT16U	–	–	Characteristics of event 3 (same as event 1)
0x1F81–0x1F8B	8066–8076	–	INT16U	–	–	Characteristics of event 4 (same as event 1)
0x1F8C–0x1F96	8077–8087	–	INT16U	–	–	Characteristics of event 5 (same as event 1)
0x1F97–0x1FA1	8088–8098	–	INT16U	–	–	Characteristics of event 6 (same as event 1)
0x1FA2–0x1FAC	8099–8109	–	INT16U	–	–	Characteristics of event 7 (same as event 1)
0x1FAD–0x1FB7	8110–8120	–	INT16U	–	–	Characteristics of event 8 (same as event 1)
0x1FB8–0x1FC2	8121–8131	–	INT16U	–	–	Characteristics of event 9 (same as event 1)
0x1FC3–0x1FCD	8132–8142	–	INT16U	–	–	Characteristics of event 10 (same as event 1)

Application Commands

Preset Cradle/Drawer Counters

The cradle/drawer counter values can be read from the cradle management record *(see page 157)*.

To preset the cradle or drawer counters, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41352	Command code = **41352**
0x1F40	8001	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	INT16U	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45	8006	–	INT16U	0–65535	Connected counter reset/preset: ● 0–65534 = preset value of the connected counter ● 65535 (0xFFFF) = do not preset the connected counter
0x1F46	8007	–	INT16U	0–65535	Disconnected counter reset/preset: ● 0–65534 = preset value of the disconnected counter ● 65535 (0xFFFF) = do not preset the disconnected counter
0x1F47	8008	–	INT16U	0–65535	Test counter reset/preset: ● 0–65534 = preset value of the test counter ● 65535 (0xFFFF) = do not preset the test counter

Preset Regrease Timers

To preset regrease timers, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41353	Command code = **41353**
0x1F40	8001	–	INT16U	18	Number of parameters (bytes) = 18
0x1F41	8002	–	INT16U	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45– 0x1F46	8006–8007	–	INT16U	–	Operating time since last grease maintenance ● 0–157766400 = preset value of regrease timer counter ● 4294967295 (0xFFFFFFFF) = No preset
0x1F47– 0x1F48	8008–8009		INT32U	–	Operating time since last move in rack in position (delay from last disconnection) ● 0–28944000 = preset value of remove timer ● 4294967295 (0xFFFFFFFF) = No preset

Light Control

The light command status can be read from the light control registers *(see page 158)*.

To control the light, set the command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	42120	–	Command code = **42120**
0x1F40	8001	–	INT16U	13	–	Number of parameters (bytes) = 13
0x1F41	8002	–	INT16U	–	–	Destination = IO 1: 8193 (0x2001)
0x1F42	8003	–	INT16U	1	–	Security type of the command

Address	Register	Unit	Type	Range	Bit	Description
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45	8006	–	INT16U	–	–	MSB: State
					0	● 0 = Light OFF ● 1 = Light ON
					1	● 0 = without time delay ● 1 = with time delay
					–	LSB = Timer (MSB) 1–54000 seconds (if bit 1 in set state) Any value 0-0xffff (if bit 1 in reset state)
0x1F46	8007	–	INT16U	–	–	MSB = Timer (LSB) 1 to 54000 seconds (if bit 1 is in set state) Any value 0-0xffff (if bit 1 is in reset state) LSB = 0 (not used)

Load Control

The load command status can be read from the load control registers *(see page 159)*.

To control the load, set the command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	42376	–	Command code = **42376**
0x1F40	8001	–	INT16U	13	–	Number of parameters (bytes) = 13
0x1F41	8002	–	INT16U	–	–	Destination = IO 1: 8193 (0x2001)
0x1F42	8003	–	INT16U	1	–	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45	8006	–	INT16U	–	–	MSB: State
					0	● 0 = Load OFF ● 1= Load ON
					1	● 0 = without time delay ● 1= with time delay
					–	LSB = Timer (MSB) 1–54000 seconds (if bit 1 in set state) Any value 0-0xffff (if bit 1 in reset state)
0x1F46	8007	–	INT16U	–	–	MSB = Timer (LSB) 1–54000 seconds (if bit 1 in set state) Any value 0-0xffff (if bit 1 in reset state)
					–	LSB = 0 (not used)

Preset Input Pulse Counters

To preset pulse counters, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	42888	Command code = **42888**
0x1F40	8001	–	INT16U	34	Number of parameters (bytes) = 34
0x1F41	8002	–	INT16U	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333

Address	Register	Unit	Type	Range	Description
0x1F45– 0x1F46	8006– 8007	–	INT32U	0–4294967295	I1 pulse counter reset/preset: ● 0–4294967294 = preset value of the I1 pulse counter ● 4294967295 (0xFFFFFFFF) = do not preset the I1 pulse counter
0x1F47– 0x1F48	8008– 8009	–	INT32U	0–4294967295	I2 pulse counter reset/preset: ● 0–4294967294 = preset value of the I2 pulse counter ● 4294967295 (0xFFFFFFFF) = do not preset the I2 pulse counter
0x1F49– 0x1F4A	8010– 8011	–	INT32U	0–4294967295	I3 pulse counter reset/preset: ● 0–4294967294 = preset value of the I3 pulse counter ● 4294967295 (0xFFFFFFFF) = do not preset the I3 pulse counter
0x1F4B– 0x1F4C	8012– 8013	–	INT32U	0–4294967295	I4 pulse counter reset/preset: ● 0–4294967294 = preset value of the I4 pulse counter ● 4294967295 (0xFFFFFFFF) = do not preset the I4 pulse counter
0x1F4D– 0x1F4E	8014– 8015	–	INT32U	0–4294967295	I5 pulse counter reset/preset: ● 0–4294967294 = preset value of the I5 pulse counter ● 4294967295 (0xFFFFFFFF) = do not preset the I5 pulse counter
0x1F4F– 0x1F54	8016– 8021	–	–	–	Reserved
0x1F55– 0x1F56	8022– 8023	–	INT32U	0–4294967295	I6 pulse counter reset/preset: ● 0–4294967294 = preset value of the I6 pulse counter ● 4294967295 (0xFFFFFFFF) = do not preset the I6 pulse counter

Preset Switchboard Temperature Threshold Counters

To preset switchboard temperature threshold counters, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	42889	Command code = **42889**
0x1F40	8001	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	INT16U	–	Destination = ● IO 1: 8193 (0x2001) ● IO 2: 8449 (0x2101)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3, or 4 password ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45	8006	–	INT16U	0–65535	Switchboard temperature threshold 1 counter reset/preset: ● 0–65534 = preset value of the switchboard temperature threshold 1 counter ● 65535 (0xFFFF) = do not preset the counter
0x1F46	8007	–	INT16U	0–65535	Switchboard temperature threshold 2 counter reset/preset: ● 0–65534 = preset value of the switchboard temperature threshold 2 counter ● 65535 (0xFFFF) = do not preset the counter
0x1F47	8008	–	INT16U	0–65535	Switchboard temperature threshold 3 counter reset/preset: ● 0–65534 = preset value of the switchboard temperature threshold 3 counter ● 65535 (0xFFFF) = do not preset the counter

Chapter 6
IFE/EIFE Data for Masterpact MTZ

What Is in This Chapter?

This chapter contains the following sections:

Section 6.1
IFE/EIFE Interface Registers

What Is in This Section?

This section contains the following topics:

IFE/EIFE Interface Identification and Status Registers

IFE/EIFE Interface Firmware Revision

The IFE/EIFE interface firmware revision starts at register 11776 and has a maximum length of eight registers.

The firmware revision is an ASCII string using the formatz XXX.YYY.ZZZ with:
- XXX = major version (000–127)
- YYY = minor version (000–255)
- ZZZ = revision number (000–255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x2DDF–0x2DEE	11744–11759	R	–	OCTET STRING	–	Device family
0x2DEF–0x2DF6	11760–11767	R	–	OCTET STRING	–	Product range
0x2DF7–0x2DFE	11768–11775	R	–	OCTET STRING	–	Product model
0x2DFF–0x2E04	11776–11781	R	–	OCTET STRING	–	Firmware revision

IFE/EIFE Interface Hardware Revision

The IFE/EIFE interface hardware revision starts at register 11784 and has a maximum length of eight registers.

The hardware revision is an ASCII string using the format XXX.YYY.ZZZ with:
- XXX = major version (000–127)
- YYY = minor version (000–255)
- ZZZ = revision number (000–255)

The NULL character ends the revision number.

Address	Register	RW	Unit	Type	Range	Description
0x2E07–0x2E0C	11784–11789	R	–	OCTET STRING	–	Hardware revision

IMU Identification

Identification of the IMU can be set by using the Ecoreach software. When not programmed, the IMU identification registers return 0 (0x0000).

Address	Register	RW	Unit	Type	Range	Description
0x2E18–0x2E2E	11801–11823	R		OCTET STRING	–	IMU name (for Masterpact NT/NW, Compact NS and Compact NSX only)
0x2E2F–0x2E38	11824–11833	R	–	OCTET STRING	–	Vendor name
0x2E39–0x2E42	11834–11843	R	–	OCTET STRING	–	Product code: ● LV434010 = IFE-Ethernet com Modbus TCP/IP ● LV434011 = IFE-Ethernet com Modbus TCP/IP master ● LV851001 = EIFE Embedded Ethernet interface
0x2E43–0x2E44	11844–11845	–	–	–	–	Reserved
0x2E45–0x2E5B	11846–11868	R-RC-WC	–	OCTET STRING	–	IMU location (for Masterpact NT/NW, Compact NS and Compact NSX only) = up to 45 ASCII characters ended by the NULL character 0x00

Locking Pad Position

Address	Register	RW	Unit	Type	Range	Description
0x2E72	11891	R	–	INT16U	1,3	Locking pad position ● 1 = locking pad is in the locked position ● 3 = locking pad is in the unlocked position

Current Date and Time

Address	Register	RW	Unit	Type	Range	Description
0x2E73–0x2E76	11892–11895	R-WC	–	DATETIME	–	Current date and time in DATETIME format
0x2E77–0x2E78	11896–11897	R	Seconds	INT32U	0x00–0xFFFFFFFF	Number of seconds counted since last start

Product Identification

Address	Register	RW	Unit	Type	Range	Description
0x2E7C	11901	R	–	INT16U	17100–17101	Product identification: ● 17100 for IFE Ethernet interface for one circuit breaker (LV434010) ● 17101 for IFE Ethernet switchboard server (LV434011) ● 17107 for EIFE embedded Ethernet interface (LV851001)

Read Device Identification

The Read Device Identification function is used to access in a standardized manner the information required to identify a device clearly. The description is made up of a set of objects (ASCII character strings).

A complete description of the Read Device Identification function is available at *www.modbus.org*.

The coding for the identification of the IFE/EIFE interface is the following:

Name	Type	Description
Vendor name	OCTET STRING	'Schneider Electric' (18 characters)
Product code	OCTET STRING	● LV434010 or LV434011 (IFE) ● LV851001 (EIFE)
Firmware revision	OCTET STRING	'XXX.YYY.ZZZ'
Vendor URL	OCTET STRING	'www.schneider-electric.com' (26 characters)
Product name	OCTET STRING	● For IFE Ethernet interface for one circuit breaker (LV434010): 'Ethernet interface for LV breakers' ● For IFE Ethernet switchboard server (LV434011): 'Ethernet interface for LV breakers + gateway' ● For EIFE Ethernet interface (LV851001): 'Embedded Ethernet interface for LV breakers'
Family	OCTET STRING	Gateway and server
Range	OCTET STRING	Enerlin'X
Model	OCTET STRING	IFE Ethernet interface, IFE/Gateway, or EIFE Ethernet interface
Product ID	INT16U	Product ID of the core of IMU: ● 17100 = IFE without gateway ● 17101 = IFE with gateway ● 17107 = EIFE

MAC Address of the IFE/EIFE Server

Address	Register	RW	Unit	Type	Range	Description
0x2E7D–0x2E7F	11902–11904	R	–	INT16U	–	MAC address of the IFE/EIFE interface coded over 3 registers (6 bytes) in hexadecimal. **Example:** The MAC address 00:80:F4:02:12:34 (or 00-80-F4-02-12-34) is coded in hexadecimal as follows: 0080F4021234 (0x00 0x80 0xF4 0x02 0X12 0x34).

Manufacturing Date and Time

Address	Register	RW	Unit	Type	Range	Description
0x2E89–0x2E8C	11914–11917	R	–	DATETIME	–	Manufacturing date and time

Serial Number

The IFE interface serial number is composed of a maximum of 11 alphanumeric characters with the following format: PPYYWWDnnnn.

- PP = plant code
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- nnnn = sequence number (0001–9999)

A read request of 6 registers is necessary to read the IFE interface serial number.

Address	Register	RW	Unit	Type	Range	Description
0x02E91	11922	R	–	OCTET STRING	–	'PP'
0x02E92	11923	R	–	OCTET STRING	'05'–'99'	'YY'
0x02E93	11924	R	–	OCTET STRING	'01'–'53'	'WW'
0x02E94	11925	R	–	OCTET STRING	D: '1'–'7' n: '0'–'9'	'Dn'
0x02E95	11926	R	–	OCTET STRING	'00'–'99'	'nn'
0x02E96	11927	R	–	OCTET STRING	'0'–'9'	'n' (the NULL character ends the serial number)

The EIFE interface serial number is composed of a maximum of 16 alphanumeric characters with the following format: nnnnnnYYWWDLxxxx.

- nnnnnn = plant code
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- L = Line or machine number (alphanumeric)
- xxxx = unique number of built product (0001–9999)

A read request of 8 registers is necessary to read the EIFE interface serial number.

Address	Register	RW	Unit	Type	Range	Description
0x02E91–0x02E93	11922–11924	R	–	OCTET STRING	–	'nnnnnn'
0x02E94	11925	R	–	OCTET STRING	'05'–'99'	'YY'
0x02E95	11926	R	–	OCTET STRING	'01'–'53'	'WW'
0x02E96	11927	R	–	OCTET STRING	D: '1'–'7' L: 'Alphanumeric'	'DL'
0x02E97–0x02E98	11928–11929	R	–	OCTET STRING	'0000'–'9999'	'xxxx'

Modbus Parameters of the IFE Server

These parameters are valid for the IFE switchboard server only.

Address	Register	RW	Unit	Type	Range	Description
0x306F	12400	R	–	INT16U	–	Modbus address of IFE server (always 255)
0x3070	12401	R	–	INT16U	1–3	Modbus parity: ● 1 = no parity ● 2 = even parity (factory setting) ● 3 = odd parity

Address	Register	RW	Unit	Type	Range	Description
0x3071	12402	R	–	INT16U	5–8	Modbus Baud rate: ● 5 = 4800 Baud ● 6 = 9600 Baud ● 7 = 19,200 Baud (factory setting) ● 8 = 38,400 Baud
0x3072	12403	R	–	INT16U	1,3,5	Number of stop bits: ● 1 = Auto (factory setting) ● 3 = 1 stop bit ● 5 = 2 stop bits

Time Synchronization

Address	Register	RW	Unit	Type	Range	Description
0x3098–0x30B7	12441–12472	R	–	OCTET STRING	–	The type of source use for time synchronization: ● Auto–SNTP ● Manual–Modbus ● Manual–ULP ● Manual–Webpage
0x30B8–0x30BB	12473–12476	R	–	DATETIME	–	Date and time of last time synchronization
0x30BC–0x30BD	12477–12478	R	s	FLOAT32	–	Time since last time synchronization
0x30BE	12479	R	–	INT16U	0–2	Status of automatic time synchronization: ● 0 = SNTP disabled ● 1 = SNTP failed ● 2 = SNTP succeded
0x30BF	12480	R	–	INT16	–	SNTP fails count

EIFE Interface Specific Registers

Cradle Alarms

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3997	14744	R	–	INT16U	–	–	Quality of each bit of register 14745: ● 0 = Invalid ● 1 = Valid
0x3998	14745	R	–	INT16U	–	–	Cradle management alarms register
						0	Cradle position discrepancy
						1	Remove device from cradle and put it back
						2	Design life of the cradle Replacement of the cradle has to be performed within 6 months
						3	Regrease cradle and disconnecting contact clusters to be performed by qualified maintenance staff
						4	New Micrologic control unit has been detected
						5–15	Reserved

Cradle Management

The table describes the registers related to the Cradle management function performed by EIFE embedded Ethernet interface.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3BC3	15300	R-RC	–	INT16U	–	–	Quality of each bit of register 15301: ● 0 = Invalid ● 1 = Valid
0x3BC4	15301	R-RC	–	INT16U	–	–	Cradle status
						8	Device in disconnected position (CD)
						9	Device in connected position (CE)
						10	Device in the test position (CT)
0x3BC5– 0x3BC6	15302– 15303	R-RC-WC	–	INT32U	0–65534	–	Cradle connected position counter This counter increments for each rising edge of the cradle connected position
0x3BC7– 0x3BC8	15304– 15305	R-RC-WC	–	INT32U	0–65534	–	Cradle disconnected position counter This counter increments for each rising edge of the cradle disconnected position
0x3BC9– 0x3BCA	15306– 15307	R-RC-WC	–	INT32U	0–65534	–	Cradle test position counter This counter increments for each rising edge of the cradle test position
0x3BCB– 0x3BCE	15308– 15311	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle connected position
0x3BCF– 0x3BD2	15312– 15315	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle disconnected position
0x3BD3– 0x3BD6	15316– 15319	R-RC	–	DATETIME	–	–	Timestamp of the last change for the cradle test position
0x3BD7– 0x3BD8	15320– 15321	R-WC	–	INT32U	–	–	Operating time since last grease maintenance
0x3BD9– 0x3BDA	15322– 15323	R-WC	–	INT32U	–	–	Operating time since last move connected position
0x3BDB	15324	R	–	INT16U	0-65534	–	Cradle contact regrease counter
0x3BDC– 0x3BE0	15325– 15329	–	–	–	–	–	Reserved

IP Network Parameters

Network Parameters

Address	Register	RW	Unit	Type	Range	Description
0x27FF–0x2800	10240–10241	R	–	INT32	0–1	Network configuration mode: ● 0 = IPv4 only ● 1 = IPv4 and IPv6
0x2801–0x2820	10242–10273	R-WC	–	OCTET STRING	–	User application name set by using: ● the Ecoreach software ● the IFE/EIFE webpages ● the Masterpact MTZ Mobile App (Masterpact MTZ only) Device Name used for acquiring the IP addressing using DHCP and also the friendly name on DPWS device discovery. **Example:** IFE-0A129F Maximum length is 64 characters.
0x2821–0x2822	10274–10275	–	–	–	–	Reserved

IPv4 Parameters

Address	Register	RW	Unit	Type	Range	Description
0x2823–0x2824	10276–10277	R-WC	–	INT32U	0–2	IPv4 address acquisition mode, set by using the Ecoreach software: ● 0 = Static ● 1 = BootP ● 2 = DHCP
0x2825–0x2826	10278–10279	R	–	INT32U	–	IPv4 address acquisition status: ● 0 = IP acquisition successful ● 1 = IP acquisition in progress ● 2 = Acquired IP address is duplicated ● 3 = Error in IP acquisition
0x2827–0x2828	10280–10281	R-WC	–	INT32U	–	IPv4 address of IFE/EIFE interface **Example:** 169.254.1.1 Register 10280 = 0xA9FE Register 10281 = 0x0101
0x2829–0x282A	10282–10283	R-WC	–	INT32U	–	IPv4 subnet mask **Example:** 255.255.0.0 Register 10282 = 0xFFFF Register 10283 = 0x0000
0x282B–0x282C	10284–10285	R-WC	–	INT32U	–	IPv4 default gateway address **Example:** 169.154.1.1 Register 10284 = 0xA9FE Register 10285 = 0x0101
0x282D–0x2846	10286–10311	–	–	–	–	Reserved

Section 6.2
IFE/EIFE Interface Commands

What Is in This Section?

This section contains the following topics:

List of IFE/EIFE Interface Commands and Error Codes

List of Commands for IFE/EIFE Interfaces

The following table lists the IFE/EIFE interface commands, their corresponding command codes and password levels. Follow the command execution procedures accordingly.

Command	Command Code	Password Level
Get current time	768	No password required
Set absolute time	769	No password required
Read IMU name and location (for Masterpact NT/NW, Compact NS and Compact NSX only)	1024	No password required
Write IMU name and location (for Masterpact NT/NW, Compact NS and Compact NSX only)	1032	Level 4
Write user application name (for Masterpact MTZ only)	1032	Level 4

List of Specific Commands for EIFE Interface

The following table lists the EIFE interface commands, their corresponding command codes and password levels. Follow the command execution procedures accordingly.

Command	Command Code	Password Level
Reset EIFE alarms	41099	No password required
Preset cradle/drawer counters	41352	No password required
Preset regrease time	41353	Level 3 or 4
Get all events	50560	No password required

Error Codes

Error codes generated by the IFE/EIFE interface are the generic error codes.

IFE/EIFE Interface Generic Commands

Get Current Time

The get current time command is not hardware protected. The get current time command is still enabled when the locking pad located on the front panel on the IFE/EIFE interface is in locked position.

To get the current time for all modules, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	768	Command code = **768**
0x1F40	8001	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	INT16U	8704	Destination = 8704 (0x2200)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	0	Password = 0 (no password required)

The following registers contain the time data:

- Register 8023 holds the month in the MSB, the day in the LSB.
- Register 8024 holds the year offset in the MSB (add 2000 to get the year) and the hour in the LSB.
- Register 8025 holds the minutes in the MSB, the seconds in the LSB.
- Register 8026 holds the milliseconds.

Set Absolute Time

The set absolute time command is still enabled when the locking pad located on the front panel on the IFE/EIFE interface is in locked position.

To set the absolute time for all the IMU modules, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	769	Command code = **769**
0x1F40	8001	–	INT16U	18	Number of parameters (bytes) = 18
0x1F41	8002	–	INT16U	8704	Destination = 8704 (0x2200)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43– 0x1F44	8004–8005	–	OCTET STRING	0	Password = 0 (no password required)
0x1F45-0x1F48	8006–8009	–	XDATE	–	Current date/time

NOTE:

- For Masterpact NT/NW, Compact NS and Compact NSX circuit breakers, date and time counter is reset and will restart at January 1, 2000 in case of 24 Vdc power loss. It is therefore mandatory to set absolute time for all the IMU modules after recovering the 24 Vdc power supply.
- For Masterpact MTZ circuit breakers, date and time counter is reset and will restart at January 1, 2000 when the internal battery of the Micrologic X control unit is removed, if the control unit has no other power supply.

NOTE: If the IFE/EIFE interface is not configured in SNTP mode it is mandatory to set absolute time for all the IMU modules periodically, due to the clock drift of each IMU module. Recommended period is at least every 15 minutes.

Read IMU Name and Location (For Masterpact NT/NW, Compact NS and Compact NSX Only)

To read the IMU name and location, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1024	Command code = **1024**
0x1F40	8001	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	INT16U	8704	Destination = 8704 (0x2200)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password = 0 (no password required)

Address	Register	Unit	Type	Range	Description
0x1F45– 0x1F46	8006– 8007	–	INT32U	–	• 17039489 = read IMU name (load 0x0104 into register 8006, 0x0081 into 8007) • 17039490 = read IMU location (load 0x0104 into register 8006, 0x0082 into 8007)
0x1F47	8008	–	INT16U	2048	2048

The IMU name and location is returned to command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F53	8020	–	INT16U	1024	Last command code
0x1F54	8021	–	INT16U	–	Command status: • 0 = command succeeded • Otherwise = command failed
0x1F55	8022	–	INT16U	–	Number of bytes returned (0 if command failed)
0x1F56	8023	–	OCTET STRING	8704	If command succeeded: • MSB = first character of IMU name or location • LSB = second character of IMU name or location
0x1F57– 0x1F6D	8024–8046	–	OCTET STRING	–	Depends on the length of the IMU name or location and ends by the NULL character 0x00

Write IMU Name and Location (For Masterpact NT/NW, Compact NS and Compact NSX Only)

The IMU name and location can be read from registers 11801 to 11868 *(see page 181)*.

To write the IMU name and location, set the command registers the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1032	Command code = **1032**
0x1F40	8001	–	INT16U	16–62	Number of parameters (bytes) = depends on the length of the IMU name or location (up to 46 characters)
0x1F41	8002	–	INT16U	0	Destination = 0 (0x0000)
0x1F42	8003	–	INT16U	1	1
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Level 4 password (factory setting = ‘0000’ = 0x30303030)
0x1F45– 0x1F46	8006– 8007	–	INT32U	–	• 17039489 = User application name (load 0x0104 into register 8006, 0x0081 into 8007) • 17039490 = IMU location (load 0x0104 into register 8006, 0x0082 into 8007)
0x1F46	8008	–	INT16U	2048	2048
0x1F48	8009	–	OCTET STRING	–	• MSB = First character of the IMU name or location • LSB = Second character of the IMU name or location
0x1F49– 0x1F5F	8010– 8038	–	OCTET STRING	–	Depends on the length of the IMU name or location and ends by the NULL character 0x00

Write User Application Name (For Masterpact MTZ Only)

The user application name can be read from registers 10242 to 10273 *(see page 186)*.

To write the user application name, set the command registers the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	1032	Command code = **1032**
0x1F40	8001	–	INT16U	–	Number of parameters (bytes) = depends on the length of the user application name (up to 46 characters)
0x1F41	8002	–	INT16U	0	Destination = 0 (0x0000)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Level 4 password (factory setting = ‘0000’ = 0x30303030)
0x1F45– 0x1F46	8006– 8007	–	INT32U	–	17039489 = User application name (load 0x0104 into register 8006, 0x0081 into 8007)

Address	Register	Unit	Type	Range	Description
0x1F46	8008	–	INT16U	2048	2048
0x1F48	8009	–	OCTET STRING	–	• MSB = First character of the user application name • LSB = Second character of the user application name
0x1F49–0x1F5F	8010–8038	–	OCTET STRING	–	Depends on the length of the user application name and ends by the NULL character 0x00

EIFE Interface Specific Commands

Reset EIFE Alarms

To reset EIFE interface alarms, set the command registers in the following way::

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41099	Command code = **41099**
0x1F40	8001	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	INT16U	8705 (0x2201)	Destination = 8705 (0x2201)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3 or 4 ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333

Preset Cradle/Drawer Counters

To preset the cradle or drawer counters, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41352	Command code = **41352**
0x1F40	8001	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	INT16U	8705	Destination = 8705 (0x2201)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	OCTET STRING	–	Password of the command: Level 3 or 4 ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45	8006	–	INT16U	0–65535	Connected counter reset/preset: ● 0–65534 = preset value of the connected counter ● 65535 (0xFFFF) = do not preset the connected counter
0x1F46	8007	–	INT16U	0–65535	Disconnected counter reset/preset: ● 0–65534 = preset value of the disconnected counter ● 65535 (0xFFFF) = do not preset the disconnected counter
0x1F47	8008	–	INT16U	0–65535	Test counter reset/preset: ● 0–65534 = preset value of the test counter ● 65535 (0xFFFF) = do not preset the test counter

Preset Regrease Timers

To preset regrease timers, set the command registers in the following way:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41353	Command code = **41353**
0x1F40	8001	–	INT16U	18	Number of parameters (bytes) = 18
0x1F41	8002	–	INT16U	8705	Destination = 8705 (0x2201)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	STRING	–	Password of the command: Level 3 or 4 ● For level 4, factory setting = 0000 = 0x30303030 ● For level 3, factory setting = 3333 = 0x33333333
0x1F45– 0x1F46	8006–8007	–	INT16U	–	Operating time since last grease maintenance ● 0–157766400 = preset value of regrease timer counter ● 4294967295 (0xFFFFFFFF) = No preset
0x1F47– 0x1F48	8008–8009		INT32U	–	Operating time since last move in rack in position (delay from last disconnection) ● 0–28944000 = preset value of remove timer ● 4294967295 (0xFFFFFFFF) = No preset

Get All Events

The command allows to get 10 events maximum. To get more than 10 events, several commands are necessary.

There are two methods to get events:
- get the 10 last events
- get all events from an event sequence number

The event sequence number is an event identifier defined by the EIFE interface, and available among the event characteristics.

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

Address	Register	Unit	Type	Range	Bit	Description
0x1F3F	8000	–	INT16U	50560	–	Command code = **50560**
0x1F40	8001	–	INT16U	27	–	Number of parameters (bytes) = 27
0x1F41	8002	–	INT16U	8705 (0x2201)	–	Destination = 8705 (0x2201)
0x1F42	8003	–	INT16U	0	–	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	–	Password of the command (no password required)
0x1F45	8006	–	–	–	–	Reserved
0x1F46	8007	–	INT16U	0, 2	–	Requested get event method:: ● 0 = 10 last events ● 2 = Events from a sequence number
0x1F47–0x1F4A	8008–8011	–	–	–	–	Reserved
0x1F4B–0x1F4C	8012–8013	–	INT32U	–	–	Requested event sequence number (for method 2 only)
0x1F4D	8014	–	INT8U	–	–	Requested event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved

Events are returned to command registers in the following way:

Address	Register	Unit	Type	Range	Bit	Description
0x1F53	8020	–	INT16U	50560	–	Last command code
0x1F54	8021	–	INT16U	–	–	Command status: ● 0 = Successful command ● Other value = command with error *(see page 44)*
0x1F55	8022	–	INT16U	–	–	Number of bytes returned
0x1F56	8023	–	–	–	–	Reserved
0x1F57	8024	–	INT16U	0, 2	–	Responded event requested method: ● 0 = 10 last events ● 2 = Events from a sequence number
0x1F5E	8031	–	INT16U	–	–	Responded event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved
0x1F5F	8032	–	–	–	–	MSB: Number of events returned
					–	LSB: Remaining events ● 0 = No more events to get ● 1 = More events to get
0x1F60	8033	–	INT16U	1013-25630	–	First event code *(see page 194)*

Address	Register	Unit	Type	Range	Bit	Description
0x1F61–0x1F64	8034–8037	–	DATETIME	–	–	Timestamp of the first event
0x1F65	8038	–	INT16U	–	–	Timestamp quality of the first event
0x1F66–0x1F67	8039–8040	–	INT32U	–	–	First event sequence number
0x1F68	8041	–	INT16U	–	–	MSB: First event status ● 1 = Occurrence ● 2 = Completion ● 3 = Pulse LSB: Reserved
0x1F69	8042	–	–	–	–	Reserved
0x1F6A	8043	–	INT16U	–	–	First event severity
					0–7	Reserved
					8	Low
					9	Medium
					10	High
					11–15	Reserved
0x1F6B–0x1F75	8044–8054	–	INT16U	–	–	Characteristics of event 2 (same as event 1)
0x1F76–0x1F80	8055–8065	–	INT16U	–	–	Characteristics of event 3 (same as event 1)
0x1F81–0x1F8B	8066–8076	–	INT16U	–	–	Characteristics of event 4 (same as event 1)
0x1F8C–0x1F96	8077–8087	–	INT16U	–	–	Characteristics of event 5 (same as event 1)
0x1F97–0x1FA1	8088–8098	–	INT16U	–	–	Characteristics of event 6 (same as event 1)
0x1FA2–0x1FAC	8099–8109	–	INT16U	–	–	Characteristics of event 7 (same as event 1)
0x1FAD–0x1FB7	8110–8120	–	INT16U	–	–	Characteristics of event 8 (same as event 1)
0x1FB8–0x1FC2	8121–8131	–	INT16U	–	–	Characteristics of event 9 (same as event 1)
0x1FC3–0x1FCD	8132–8142	–	INT16U	–	–	Characteristics of event 10 (same as event 1)

EIFE Interface Events

Event Code	Description
2304 (0x0900)	Cradle position discrepancy
2305 (0x0901)	Cradle connected contact change
2306 (0x0902)	Cradle disconnected contact change
2307 (0x0903)	Cradle test contact change
2308 (0x0904)	Remove device from cradle and put it back
2309 (0x0905)	Cradle replacement within 6 months
2310 (0x0906)	Regrease cradle to be performed
2311 (0x0907)	New Micrologic control unit has been detected

Appendices

Appendix A
Micrologic X Events

Event List

Event Characteristics

The events are listed according to the history in which they are logged.

Each event is defined by the following characteristics:

- User message: message displayed on Ecoreach software.
- Code: event code in decimal and hexadecimal.
- Type: not customizable
  - On/off: occurrence/completion event.
  - Instant: instantaneous event.
- Latched:
  - Yes: the event is latched and the user must reset the event status.
  - No: the event is unlatched.

  NOTE: The latched status of events marked (1) in the following tables can be customized with Ecoreach software.
- Activity:
  - Enabled: the event is enabled by default.
  - Disabled: the event is disabled by default.

  NOTE: The activity of events marked (1) in the following tables can be customized with Ecoreach software.
- Severity:
  - High severity trips and events.
  - Medium severity events.
  - Low severity events.

Trip Events

Code	User message	History	Type	Latched	Activity	Severity
25600 (0x6400)	Ir trip	Trip	Instant	Yes	Enabled	High
25601 (0x6401)	Isd trip	Trip	Instant	Yes	Enabled	High
25602 (0x6402)	Ii trip	Trip	Instant	Yes	Enabled	High
25603 (0x6403)	Ig trip	Trip	Instant	Yes	Enabled	High
25604 (0x6404)	IΔn trip	Trip	Instant	Yes	Enabled	High
25606 (0x6406)	Ultimate self-protection trip (SELLIM)	Trip	Instant	Yes	Enabled	High
25607 (0x6407)	Internal failure trip	Trip	Instant	Yes	Enabled	High
25629 (0x641D)	Ultimate self-protection trip (DIN/DINF)	Trip	Instant	Yes	Enabled	High
25630 (0x641E)	IΔn / Ig test trip	Trip	Instant	Yes	Enabled	High

Protection Events

Code	User message	History	Type	Latched	Activity	Severity
25373 (0x0631D)	Ultimate self-protection (DIN/DINF) operate	Protection	On/off	No	Enabled	Medium
25350 (0x6306)	Ultimate self-protection (SELLIM) operate	Protection	On/off	No	Enabled	Medium
3857 (0x0F11)	Thermal memory reset order	Protection	Instant	No(1)	Enabled	Low
1013 (0x03F5)	Ir prealarm (I>90%Ir)	Protection	On/off	No	Enabled(1)	Medium
25088 (0x6200)	Ir start (I>105%Ir)	Protection	On/off	No(1)	Enabled	Medium
25344 (0x6300)	Ir operate	Protection	On/off	No	Enabled	Medium
25089 (0x6201)	Isd start	Protection	On/off	No(1)	Enabled	Low
25345 (0x6301)	Isd operate	Protection	On/off	No	Enabled	Medium
25346 (0x6302)	Ii operate	Protection	On/off	No	Enabled	Medium
25091 (0x6203)	Ig start	Protection	On/off	No(1)	Enabled	Low
25347 (0x6303)	Ig operate	Protection	On/off	No	Enabled	Medium
25092 (0x6204)	IΔn start	Protection	On/off	No	Enabled	Low
25348 (0x6304)	IΔn operate	Protection	On/off	No	Enabled	Medium
4864 (0x1300)	B curve active	Protection	On/off	No	Enabled	Low
4873 (0x1309)	Protection settings change by display enabled	Protection	On/off	No(1)	Enabled	Low
4874 (0x130A)	Remote protection settings change enabled	Protection	On/off	No(1)	Enabled	Low
4352 (0x1100)	Protection settings changed by display	Protection	Instant	No(1)	Enabled	Low
4360 (0x1108)	Protection changed by Bluetooth/USB/IFE	Protection	Instant	No(1)	Enabled	Medium
(1) Customizable with Ecoreach software.						

Diagnostic Events

Code	User message	History	Type	Latched	Activity	Severity
4384 (0x1120)	Loss of IO1 module	Diagnostic	Instant	Yes	Enabled(1)	Medium
4385 (0x1121)	Loss of IO2 module	Diagnostic	Instant	Yes	Enabled(1)	Medium
4386 (0x1122)	Loss of IFE module	Diagnostic	Instant	Yes	Enabled(1)	Medium
4866 (0x1302)	Control unit in test mode	Diagnostic	On/off	No	Enabled	Low
4867 (0x1303)	Injection test in progress	Diagnostic	On/off	No	Enabled	Low
4868 (0x1304)	Test aborted by user	Diagnostic	Instant	No	Enabled	Low
5120 (0x1400)	Control unit self test major malfunction	Diagnostic	On/off	No	Enabled	High
(1) Customizable with Ecoreach software.						

Code	User message	History	Type	Latched	Activity	Severity
5122 (0x1402)	Internal current sensor disconnected	Diagnostic	On/off	No	Enabled	High
5123 (0x1403)	External neutral current sensor disconnected	Diagnostic	On/off	No	Enabled	High
5128 (0x1408)	Earth leakage (Vigi) sensor disconnected	Diagnostic	On/off	No	Enabled	High
5168 (0x1430)	Protection reset to default setting if rebooted !	Diagnostic	On/off	No	Enabled	High
5135 (0x140F)	Protection settings no longer accessible error 1	Diagnostic	On/off	No	Enabled	Medium
5236 (0x1474)	Protection settings no longer accessible error 2					
5237 (0x1475)	Protection settings no longer accessible error 3					
5238 (0x1476)	Protection settings no longer accessible error 4					
5239 (0x1477)	Protection settings no longer accessible error 5					
5127 (0x1407)	Control unit self test minor malfunction 1	Diagnostic	On/off	No	Enabled	Low/Medium
5232 (0x1470)	Control unit self test minor malfunction 2					
5233 (0x1471)	Control unit self test minor malfunction 3					
5234 (0x1472)	Control unit self test minor malfunction 4					
5235 (0x1473)	Control unit self test minor malfunction 5					
5137 (0x1411)	Metering malfunction 1	Diagnostic	On/off	No	Enabled	Low/Medium
5240 (0x1478)	Metering malfunction 2					
5241 (0x1479)	Metering malfunction 3					
5138 (0x1412)	NFC malfunction	Diagnostic	On/off	No	Enabled(1)	Medium
5130 (0x0140A)	Display screen or wireless malfunction 1	Diagnostic	On/off	No	Enabled	Low/Medium
5242 (0x147A)	Display screen or wireless malfunction 2					
5243 (0x147B)	Display screen or wireless malfunction 3					
5154 (0x1422)	Bluetooth malfunction	Diagnostic	On/off	No	Enabled(1)	Medium
5171 (0x1433)	Replace battery	Diagnostic	On/off	No	Enabled(1)	Medium
5174 (0x1436)	Minor control unit malfunction corrected	Diagnostic	Instant	No	Enabled	Medium
5129 (0x1409)	Error reading sensor plug	Diagnostic	On/off	No	Enabled	High
3338 (0x0D0A)	Control unit factory configuration error	Diagnostic	On/off	No	Enabled	High
3328 (0x0D00)	Critical hardware modules discrepancy	Diagnostic	On/off	No	Enabled	Medium
3329 (0x0D01)	Critical firmware modules discrepancy	Diagnostic	On/off	No	Enabled	Medium
(1) Customizable with Ecoreach software.						

Code	User message	History	Type	Latched	Activity	Severity
3330 (0x0D02)	Non-critical hardware modules discrepancy	Diagnostic	On/off	No	Enabled	Medium
3331 (0x0D03)	Non-critical firmware modules discrepancy	Diagnostic	On/off	No	Enabled	Medium
3336 (0x0D08)	Address conflict between modules	Diagnostic	On/off	No	Enabled	Medium
3337 (0x0D09)	Firmware discrepancy within control unit	Diagnostic	On/off	No	Enabled	Medium
5139 (0x1413)	IΔn/Ig test trip failed	Diagnostic	Instant	No	Enabled	High
5162 (0x142A)	IΔn/Ig test button pressed	Diagnostic	Instant	No	Enabled	Low
4869 (0x1305)	ZSI test in progress	Diagnostic	Instant	No	Enabled	Low
5184 (0x1440)	Contact wear is above 60%. Check contacts	Diagnostic	On/off	No	Enabled(1)	Medium
5185 (0x1441)	Contact wear is above 95%. Plan for replacement	Diagnostic	On/off	No	Enabled(1)	Medium
5186 (0x1442)	Contact wear 100% worn out. CB needs to be replaced.	Diagnostic	On/off	No	Enabled	High
5187 (0x1443)	Less than 20% CB operation remaining	Diagnostic	On/off	No	Enabled(1)	Medium
5188 (0x1444)	CB has reached the max number of operations	Diagnostic	Instant	No	Enabled(1)	High
5216 (0x1460)	MX1 opening release malfunction	Diagnostic	On/off	No	Enabled	Medium
5217 (0x1461)	MX1 opening release no longer detected	Diagnostic	On/off	No	Disabled(1)	Medium
5200 (0x1450)	MCH charging operations above threshold	Diagnostic	On/off	No	Enabled(1)	Medium
5201 (0x1451)	MCH has reached the max number of operations	Diagnostic	On/off	No	Enabled(1)	High
5218 (0x1462)	XF closing release malfunction	Diagnostic	On/off	No	Enabled	Medium
5219 (0x1463)	XF closing release no longer detected	Diagnostic	On/off	No(1)	Disabled(1)	Medium
5220 (0x1464)	MX2 / MN opening release malfunction	Diagnostic	On/off	No	Enabled	Medium
5221 (0x1465)	MX2 / MN opening release no longer detected	Diagnostic	On/off	No	Disabled(1)	Medium
5173 (0x1435)	Events in history log have been erased	Diagnostic	Instant	No	Enabled	Low
(1) Customizable with Ecoreach software.						

Metering Events

Code	User message	History	Type	Latched	Activity	Severity
3858 (0x0F12)	Reset Min/Max currents	Metering	Instant	No(1)	Enabled	Low
3859 (0x0F13)	Reset Min/Max voltages	Metering	Instant	No(1)	Enabled	Low
3860 (0x0F14)	Reset Min/Max power	Metering	Instant	No(1)	Enabled	Low
3861 (0x0F15)	Reset Min/Max frequency	Metering	Instant	No(1)	Enabled	Low
(1) Customizable with Ecoreach software.						

Code	User message	History	Type	Latched	Activity	Severity
3862 (0x0F16)	Reset Min/Max harmonics	Metering	Instant	No(1)	Enabled	Low
3863 (0x0F17)	Reset Min/Max power factor	Metering	Instant	No(1)	Enabled	Low
3864 (0x0F18)	Reset energy counters	Metering	Instant	No(1)	Enabled	Low
(1) Customizable with Ecoreach software.						

Operation Events

Code	User message	History	Type	Latched	Activity	Severity
4096 (0x1000)	CB moved from close to open position	Operation	Instant	No(1)	Enabled(1)	Low
4097 (0x1001)	CB moved from open to close position	Operation	Instant	No(1)	Enabled(1)	Low
1041 (0x0411)	Closing order release activation	Operation	Instant	No	Enabled(1)	Low
1040 (0x0410)	Opening order release activation	Operation	Instant	No	Enabled(1)	Low
4098 (0x1002)	Manual mode enabled	Operation	On/off	No	Enabled	Low
4100 (0x1004)	Local mode enabled	Operation	On/off	No	Enabled	Low
4106 (0x1008)	Closing inhibited by communication	Operation	On/off	No	Enabled	Low
4105 (0x1009)	Closing inhibited by wired input	Operation	On/off	No	Enabled	Low
4875 (0x130B)	M2C output 1 is forced	Operation	On/off	No	Enabled	Low
4876 (0x130C)	M2C output 2 is forced	Operation	On/off	No	Enabled	Low
4871 (0x1307)	Alarm reset	Operation	Instant	No	Enabled	Low
(1) Customizable with Ecoreach software.						

Configuration Events

Code	User message	History	Type	Latched	Activity	Severity
4096 (0x1000)	Configuration mismatch between IO and control unit	Configuration	On/off	No	Enabled	Medium
4395 (0x112B)	Control unit in upgrade mode	Configuration	On/off	No	Enabled	Low
4396 (0x112C)	Control unit firmware upgrade failed	Configuration	Instant	No	Enabled	Medium
4359 (0x1107)	Date and time set	Configuration	Instant	No(1)	Enabled	Low
4400 (0x1130)	Digital module license installed	Configuration	Instant	No	Enabled	Low
4401 (0x1131)	Digital module license uninstalled	Configuration	Instant	No	Enabled	Low

Communication Events

Code	User message	History	Type	Latched	Activity	Severity
4865 (0x1301)	USB port connected	Communication	On/off	No	Enabled	Low
5161 (0x1429)	Bluetooth communication enabled	Communication	On/off	No	Enabled(1)	Low
(1) Customizable with Ecoreach software.						

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