PacT Series

ComPacT NSX – Modbus Communication

User Guide

PacT Series offers world-class circuit breakers and switches.

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Schneider Electric

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Safety Information

Important Information

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

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

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

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

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

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

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

Please Note

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

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

About the Document

Document Scope

The aim of this guide is to provide users, installers, and maintenance personnel with the technical information needed to operate the Modbus protocol on:

- ComPacT™ NSX100-630 circuit breakers and switch-disconnectors.
- ComPacT™ NSX100-1200 DC circuit breakers and switch-disconnectors.

Validity Note

This document is valid for:

- ComPacT NSX100-630 circuit breakers
  - ◦ With the BSCM Modbus SL/ULP module
  - ◦ And/or with MicroLogic™ 5, 6, or 7 trip unit.
- ComPacT NSX100-630 switch-disconnectors with the BSCM Modbus SL/ULP module
- ComPacT NSX100-1200 DC circuit breakers and switch-disconnectors with the BSCM Modbus SL/ULP module

And connected

- Either to an RS-485 serial line Modbus network using:
  - ◦ An IFM Modbus SL communication interface for one circuit breaker
  - ◦ Or a BSCM Modbus SL/ULP module and a Modbus SL hub
- Or to an Ethernet network using:
  - ◦ An IFE Ethernet communication interface for one circuit breaker
  - ◦ Or an IFE Ethernet switchboard server

This document describes the registers and commands available for the IMU modules with the following firmware version

IMU module	Part number	Firmware version
MicroLogic 5 and 6 trip units	–	≥ V001.003.000
MicroLogic 7 trip unit	–	≥ V002.001.001
IO module	LV434063	≥ V003.004.005
BSCM Modbus SL/ULP module	LV434220	≥ V001.000.000
IFM communication interface	LV434000	≥ V003.001.012
IFE Ethernet communication interface	LV434001	≥ V004.007.000
	LV434010	
IFE Server	LV434002	≥ V003.016.000
	LV434011	

Online Information

The information contained in this guide is likely to be updated at any time. Schneider Electric strongly recommends that you have the most recent and up-to-date version available on www.se.com/ww/en/download.

The technical characteristics of the devices described in this guide also appear online. To access the information online, go to the Schneider Electric home page at www.se.com.

General Cybersecurity Information

In recent years, the growing number of networked machines and production plants has seen a corresponding increase in the potential for cyber threats, such as unauthorized access, data breaches, and operational disruptions. You must, therefore, consider all possible cybersecurity measures to help protect assets and systems against such threats.

To help keep your Schneider Electric products secure and protected, it is in your best interest to implement the cybersecurity best practices as described in the Cybersecurity Best Practices document.

Schneider Electric provides additional information and assistance:

- Subscribe to the Schneider Electric security newsletter.

- Visit the Cybersecurity Support Portal web page to:

  ◦ Find Security Notifications.

  ◦ Report vulnerabilities and incidents.

- Visit the Schneider Electric Cybersecurity and Data Protection Posture web page to:

  ◦ Access the cybersecurity posture.

  ◦ Learn more about cybersecurity in the cybersecurity academy.

  ◦ Explore the cybersecurity services from Schneider Electric.

Product Related Cybersecurity Information

> ## ⚠ WARNING
>
> **POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY**
>
> - Change default passwords at first use to help prevent unauthorized access to device settings, controls, and information.
> - Disable unused ports/services and default accounts to help minimize pathways for malicious attackers.
> - Place networked devices behind multiple layers of cyber defenses (such as firewalls, network segmentation, and network intrusion detection and protection).
> - Use cybersecurity best practices (for example, least privilege, separation of duties) to help prevent unauthorized exposure, loss, modification of data and logs, or interruption of services.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

For more information, refer to *MasterPacT, ComPacT, PowerPacT - Cybersecurity Guide*, page 10.

Environmental Data

For product compliance and environmental information, refer to the Schneider Electric Environmental Data Program.

Available Languages of the Document

The document is available in these languages:

- English (DOCA0213EN), original language
- Spanish (DOCA0213ES)
- French (DOCA0213FR)
- Chinese (DOCA0213ZH)

Related Documents

Title of Documentation	Reference Number
ComPacT NSX Circuit Breakers and Switch-Disconnectors - User Guide	DOCA0187EN DOCA0187ES DOCA0187FR DOCA0187ZH
ComPacT NSX MicroLogic 5/6/7 Trip Units - User Guide	DOCA0188EN DOCA0188ES DOCA0188FR DOCA0188ZH
ComPacT NSX DC Circuit Breakers and Switch-Disconnectors - User Guide	DOCA0186EN DOCA0186ES DOCA0186FR DOCA0186ZH
ULP (Universal Logic Plug) System - User Guide	DOCA0093EN DOCA0093ES DOCA0093FR DOCA0093ZH
Enerlin'X IO Input/Output Application Module for One Circuit Breaker - User Guide	DOCA0055EN DOCA0055ES DOCA0055FR DOCA0055ZH
Enerlin'X IFE - Ethernet Switchboard Server - User Guide	DOCA0084EN DOCA0084ES DOCA0084FR DOCA0084ZH
Enerlin'X IFE - Ethernet Interface for One Circuit Breaker - User Guide	DOCA0142EN DOCA0142ES DOCA0142FR DOCA0142ZH
MasterPacT, ComPacT, PowerPacT - Cybersecurity Guide	DOCA0122EN DOCA0122ES DOCA0122FR DOCA0122ZH
Enerlin'X IO Input/Output Application Module for One Circuit Breaker - Instruction Sheet	HRB49217
Enerlin'X IFE - Ethernet Interface / Ethernet Server - Instruction Sheet	QGH13473
Enerlin'X IFM - Modbus SL Interface for One Circuit Breaker - Instruction Sheet	NVE85393
BSCM Modbus SL/ULP Module - Instruction Sheet	PKR1891407

To find documents online, visit the Schneider Electric download center (www.se.com/ww/en/download/).

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Modbus Communication with ComPacT NSX Circuit Breakers

What's in This Part

Introduction

What's in This Chapter

PacT Series Master Range

Future-proof your installation with Schneider Electric's low-voltage and medium-voltage PacT Series. Built on legendary Schneider Electric innovation, the PacT Series comprises world-class circuit breakers, switches, residual current devices and fuses, for all standard and specific applications. Experience robust performance with PacT Series within the EcoStruxure-ready switchgear, from 16 to 6300 A in low-voltage and up to 40.5 kV in medium-voltage.

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 Modbus client communication channel.

The circuit breakers can be connected to:

- An RS-485 serial line network with Modbus protocol using dedicated interfaces such as:
  - The BSCM Modbus SL/ULP module and the Modbus SL hub.
  - The IFM Modbus SL communication interface for one circuit breaker.
- An Ethernet network with Modbus TCP/IP protocol using dedicated interfaces such as:
  - The IFE Ethernet communication interface for one circuit breaker.
  - The IFE Ethernet switchboard server.

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 (IMU) (type of circuit breaker, of MicroLogic trip unit, 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 or MicroLogic trip unit) and external ULP modules (IO module) connected to one communication interface is called an intelligent modular unit (IMU).

An IMU is composed around a circuit breaker from the following ranges:

• MasterPacT MTZ circuit breakers

• MasterPacT NT/NW circuit breakers

• ComPacT NS 630b–1600 circuit breakers

• ComPacT NS 1600b–3200 circuit breakers

• PowerPacT P- and R- frame circuit breakers

• ComPacT NSX circuit breakers

• PowerPacT H-,J-, and L- frame circuit breakers

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 or PowerPacT P- and R- Frame with BCM ULP Module and MicroLogic Trip Unit	ComPacT NSX or PowerPacT H-, J-, and L- Frame with BSCM Modbus SL/ULP Module and/or MicroLogic Trip Unit
IFE Ethernet communication interface for one circuit breaker	LV434001 LV434010	✓	✓	✓
IFE Ethernet switchboard server	LV434002 LV434011	✓	✓	✓
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 communication interface for one circuit breaker	TRV00210 STRV00210	–	✓	✓
IFM Modbus SL communication interface for one circuit breaker	LV434000	✓	✓	✓
BSCM Modbus SL/ULP module	LV434220	–	–	✓

ULP Module	Part Number	MasterPacT MTZ with ULP Port Module and MicroLogic Control Unit	MasterPacT NT/NW or ComPacT NS or PowerPacT P- and R-Frame with BCM ULP Module and MicroLogic Trip Unit	ComPacT NSX or PowerPacT H-, J-, and L-Frame with BSCM Modbus SL/ULP Module and/or MicroLogic Trip Unit
FDM121 front display module for one circuit breaker	TRV00121 STRV00121	✓	✓	✓
IO input/output application module for one circuit breaker	LV434063	✓	✓	✓

For more information on the ULP System and its components, refer to *ULP System User Guide*, page 10.

Communication Architecture
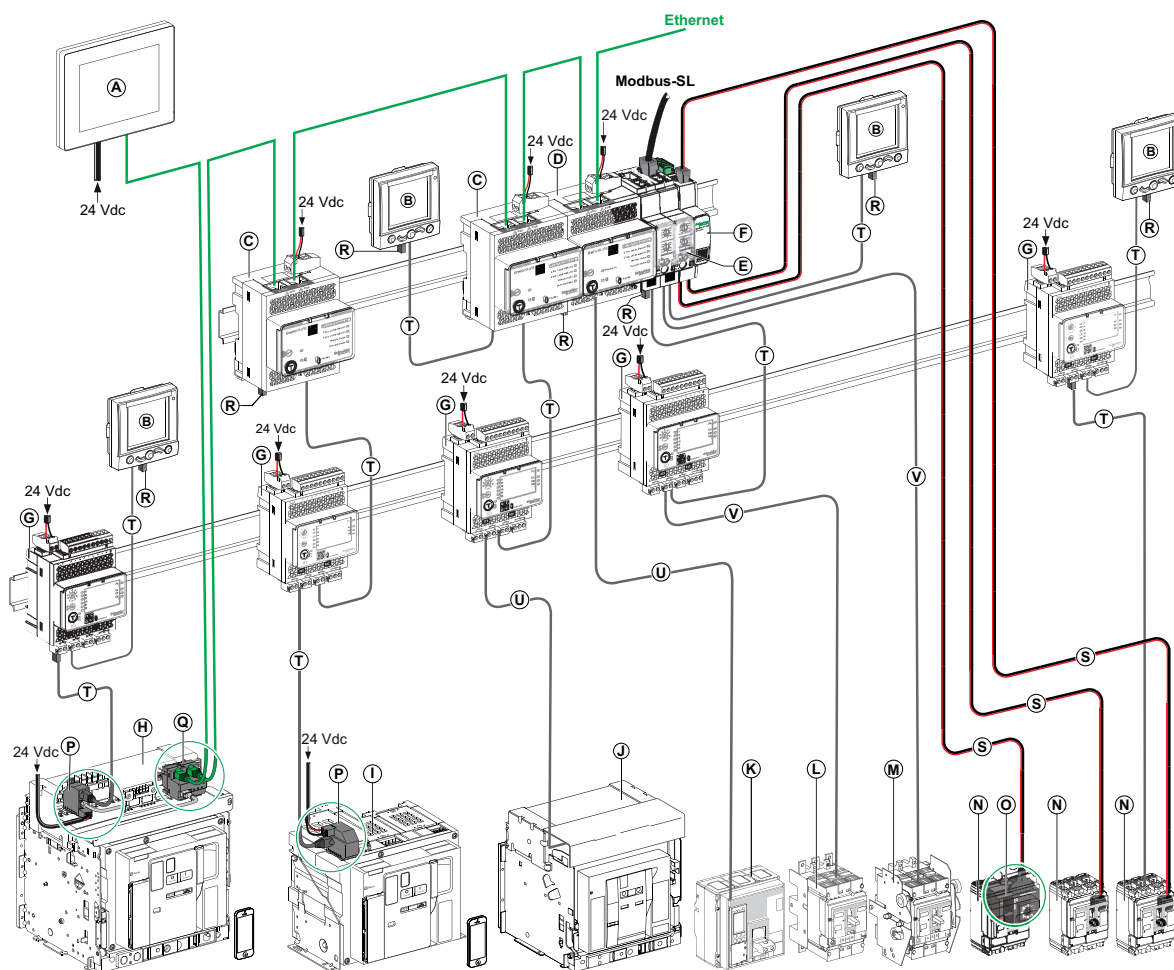
A FDM128 Ethernet display for eight devices

B FDM121 front display module for one circuit breaker

C IFE Ethernet communication interface for one circuit breaker

D IFE Ethernet switchboard server

E IFM Modbus SL communication interface for one circuit breaker

F Modbus SL hub

G IO input/output application module for one circuit breaker

H MasterPacT MTZ1 or MTZ2/ MTZ3 drawout circuit breaker

I MasterPacT MTZ1 or MTZ2/ MTZ3 fixed circuit breaker

J MasterPacT NT/NW circuit breaker

K ComPacT NS/PowerPacT M-,P,- and R-frame circuit breaker

L ComPacT NSX plug-in circuit breaker

M ComPacT NSX withdrawable circuit breaker

N ComPacT NSX fixed circuit breaker

O BSCM Modbus SL/ULP module

P ULP port module

Q EIFE Embedded Ethernet Interface for one MasterPacT MTZ drawout circuit breaker

R ULP line termination

S Modbus SL cord (LV434221, LV434222, or LV434223)

T RJ45 ULP cord

U Circuit breaker BCM ULP cord

V NSX cord

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 communication interface. For example, FDM128 Ethernet display for eight devices, supervisor, PLC, BMS, SCADA system, and so on, are remote controllers.

For the description of Modbus registers and commands, refer to the *Modbus Communication Guides*.

EcoStruxure Power Commission Software

Overview

EcoStruxure Power Commission 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.

EcoStruxure Power Commission 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 by a yellow highlighter. This indicates the difference between the project and device values, and hence provides a system consistency during the operation and maintenance phase.

EcoStruxure Power Commission software enables the configuration of the following circuit breakers, modules, and accessories:

Circuit breaker ranges	Modules	Accessories
MasterPacT MTZ circuit breakers	• MicroLogic X control unit • Communication interface modules: IFM interface, IFE interface, IFE server, and EIFE interface • ULP modules: IO module, FDM121 display[1]	M2C output module
• MasterPacT NT/NW circuit breakers • ComPacT NS circuit breakers • PowerPacT P- and R-frame circuit breakers	• MicroLogic trip units • Communication interface modules: BCM module, CCM module, BCM ULP module, IFM interface, IFE interface, and IFE server • ULP modules: IO module, FDM121 display[1]	M2C and M6C output modules
• ComPacT NSX circuit breakers • PowerPacT H-, J- and L-frame circuit breakers	• MicroLogic trip units[2] • Communication interface modules: BSCM module and BSCM Modbus SL/ULP module, IFM interface, IFE interface, and IFE server • ULP modules: IO module, FDM121 display[1]	SDTAM and SDx output modules
(1) For FDM121 display, only the firmware and language download are supported.		
(2) EcoStruxure Power Commission software version 2.20 and later must be used to configure: • MicroLogic 5/6 trip units with firmware version 001.005.001 and later • MicroLogic 7 trip units with firmware version 002.002.000 and later		

For more information, refer to the *EcoStruxure Power Commission Online Help*.

Click here to download the latest version of EcoStruxure Power Commission software.

Key Features

EcoStruxure Power Commission software performs the following actions for the supported devices and modules:

• Create projects by device discovery

• Save the project in the EcoStruxure Power Commission cloud for reference

• 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 test report
- View the communication architecture between the devices in a graphical representation
- View the measurements, logs, and maintenance information
- Export Waveform Capture on Trip Event (WFC)
- View the status of device and IO module
- View the alarm details
- Buy, install, remove, or retrieve the Digital Modules
- Check the system firmware compatibility status
- Update to the latest device firmware
- Perform force trip and automatic trip curve tests

BSCM Modbus SL/ULP Module

What's in This Chapter

Introduction

The BSCM Modbus SL/ULP module with commercial reference LV434220 is a Breaker Status Control Module that can be used to communicate data via:

- Modbus Serial Line communication network
- ULP communication network

Use the BSCM Modbus SL/ULP module with:

- ComPacT NSX circuit breakers equipped with:
  - ◦ Thermal-magnetic trip units
  - ◦ MicroLogic electronic trip units
- ComPacT NSX DC circuit breakers equipped with thermal-magnetic trip units
- ComPacT NSX switch-disconnectors

    NOTE: The BSCM Modbus SL/ULP module cannot be installed in a ComPacT NSX400K circuit breaker.

The following data is exchanged:

- OF and SDE circuit breaker stated from the BSCM Modbus SL/ULP module
- SD circuit breaker state from SD auxiliary contact for BSCM Modbus SL/ULP module or NSX cord (if present)
- Control instructions for the communicating motor mechanism (if present): opening, closing, and resetting
- Information to assist the operator: storage of the last 10 events

When connected to a MicroLogic 5, 6, or 7 trip unit, the BSCM Modbus SL/ULP module gives access to the MicroLogic data.

The BSCM Modbus SL/ULP module can be used in the following modes:

- Modbus SL only mode
- Modbus SL and ULP mode
- ULP only mode

BSCM Modbus SL Only Mode

In Modbus SL only mode, the BSCM Modbus SL/ULP module is used to connect the ComPacT NSX circuit breaker to the Modbus Serial Line communication network by using a Modbus SL hub with commercial reference LV434224. To read the SD status on the BSCM Modbus SL/ULP module, use the SD auxiliary contact for BSCM Modbus SL/ULP module with commercial reference LV434210.

BSCM Modbus SL and ULP Mode

In Modbus SL and ULP mode, the BSCM Modbus SL/ULP module is used to connect the ComPacT NSX circuit breaker to:

- The Modbus Serial Line communication network via a Modbus SL hub
- ULP modules such as IO module 1, IO module 2, FDM121 display via NSX cord

BSCM ULP Only Mode

In ULP only mode, the BSCM Modbus SL/ULP module is not used as a Modbus SL communication interface.

It is used to connect the ComPacT NSX circuit breaker to ULP modules such as IFM or IFE communication interface, via ULP communication network using NSX

cord. Other accessories, such as the IO module and the FDM121 display can also be connected to the same ULP communication network.

For system voltages greater than 480 Vac or 480 Vdc, and less than or equal to 690 Vac or 690 Vdc, this is the only BSCM Modbus SL/ULP module mode allowed, using insulated NSX cord with commercial reference LV434204.

The BSCM Modbus SL/ULP module with commercial reference LV434220 in ULP only mode replaces the BSCM module with commercial reference LV434205.

It is recommended to use the BSCM Modbus SL/ULP module in ULP only mode only with withdrawable and plug-in circuit breakers.

Hardware Description

General Description
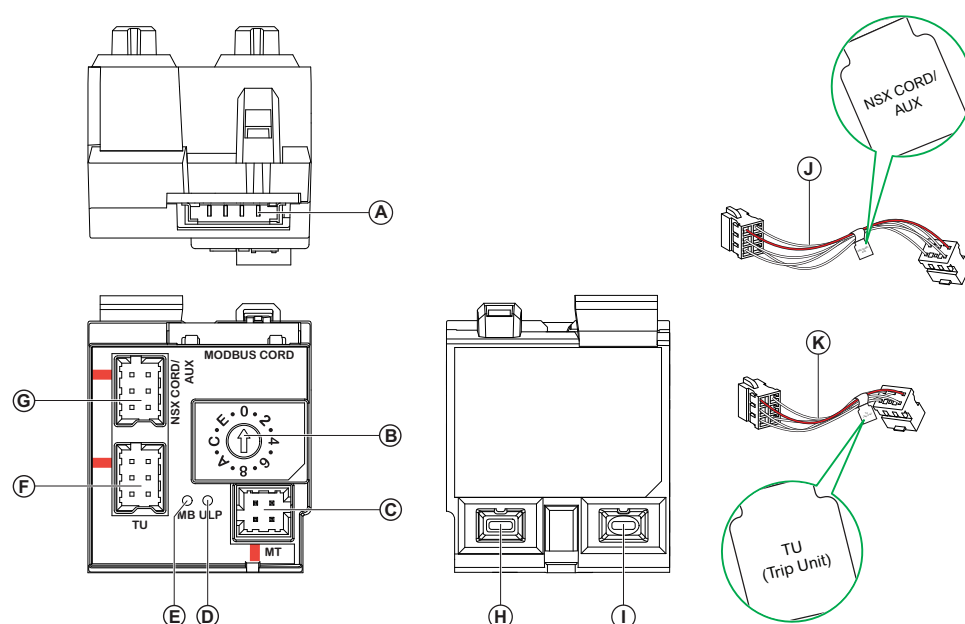
A. Port for BSCM Modbus SL cord

B. Modbus address selector rotary switch

C. Port for motor mechanism: used to transmit the status of the communicating motor mechanism, and to control the communicating motor mechanism

D. ULP status LED

E. Modbus status LED

F. Port for MicroLogic trip units

G. Port for NSX cord or auxiliary contact

H. OF status

I. SDE status

J. NSX cord / Auxiliary contact connecting cable: used to transmit communication network and state of SD auxiliary contact for BSCM Modbus SL/ULP module through the microswitch on the NSX cord. The NSX cord goes in the SD slot instead of the auxiliary contact.

K. MicroLogic trip unit connecting cable: used to transmit communication network, only with MicroLogic 5, 6, or 7 trip units

For information on installation, consult the instruction sheet available on Schneider Electric website: PKR1891407 *ComPacT NSX100–630 – BSCM Modbus SL/ULP*.

24 Vdc Power Supply

The BSCM Modbus SL/ULP module must always be supplied with 24 Vdc:

• When connected in Modbus SL only mode and in Modbus SL and ULP mode: by using the Modbus SL hub with commercial reference LV434224 or the IFM or IFE communication interface stacked with the Modbus SL hub.

• When connected in ULP only mode: by using the ULP accessories.

Modbus Address Rotary Switch

The Modbus address rotary switch is used to set the BSCM Modbus address and parameters.

For more information, refer to Configuring the BSCM Modbus Address and Parameters, page 31.

Modbus Status LED

The Modbus Serial Line LED color on the BSCM Modbus SL/ULP module is white.
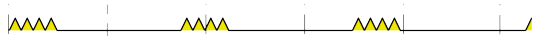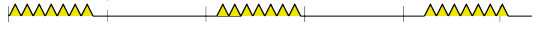
The LED status is as follows:

- Off: The Modbus Serial Line communication network is disabled.
- On steady: The Modbus Serial Line communication network is enabled.
- Blinking: The Modbus Serial Line communication is ongoing.

ULP Status LED

The ULP LED indicates the state of the BSCM Modbus SL/ULP module, even in Modbus SL only mode.

The ULP LED color on the BSCM Modbus SL/ULP module is yellow.

ULP LED	Mode	Action
1 s	Nominal	None
Conflict	Conflict	Remove extra ULP module
1.5 s	Degraded	Replace the BSCM Modbus SL/ULP module at the next maintenance operation
Test	Test	None
1.5 s	Non-critical firmware discrepancy	Upgrade firmware at the next maintenance operation
Non-critical hardware	Non-critical hardware discrepancy	Replace the BSCM Modbus SL/ULP module at the next maintenance operation
Configuration	Configuration discrepancy	Install missing features
Critical firmware	Critical firmware discrepancy	Use EcoStruxure Power Commission software to check the firmware and hardware compatibility and follow the recommended actions
Critical hardware	Critical hardware discrepancy	
Stop	Stop	Replace the BSCM Modbus SL/ULP module
Power off	Power off	Check power supply

Schematics with ComPacT NSX Circuit Breakers

General Description

Depending on the BSCM Modbus SL/ULP module mode used, the user must connect the BSCM Modbus SL/ULP module using one of the following configurations:

• Connection of the BSCM Modbus SL/ULP module to the Modbus SL hub

• Connection of the BSCM Modbus SL/ULP module to an IFM or IFE communication interface

For more information, refer to *ULP System User Guide*, page 10.

BSCM Modbus SL Only Mode

In Modbus SL only mode, the BSCM Modbus SL/ULP module is used to connect the ComPacT NSX circuit breaker to the Modbus Serial Line communication network by using a Modbus SL hub with commercial reference LV434224. To read the SD status on the BSCM Modbus SL/ULP module, use the SD auxiliary contact for BSCM Modbus SL/ULP module with commercial reference LV434210.

The figure below illustrates an example of the BSCM Modbus SL/ULP module in Modbus SL only mode.
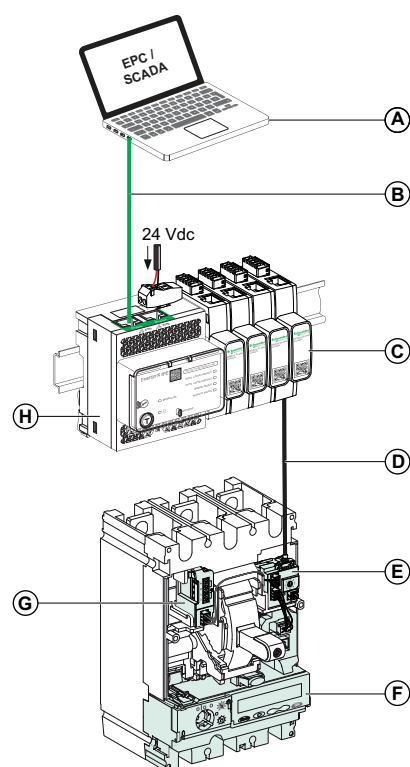
A. Modbus TCP client

B. Ethernet cable

C. Modbus SL hub (LV434224)

D. Modbus SL cord (LV434221, LV434222, or LV434223)

E. BSCM Modbus SL/ULP module (LV434220)

F. MicroLogic 5, 6, or 7 trip unit

G. SD auxiliary contact for BSCM Modbus SL/ULP module (LV434210)

H. IFE Ethernet switchboard server (LV434002)

BSCM Modbus SL and ULP Mode

In Modbus SL and ULP mode, the BSCM Modbus SL/ULP module is used to connect the ComPacT NSX circuit breaker to:

- The Modbus Serial Line communication network via a Modbus SL hub

- ULP modules such as IO module 1, IO module 2, FDM121 display via NSX cord

  NOTE: Connection to an IFM or IFE communication interface used as a ULP module is not possible in this mode. If you connect to an IFM or IFE communication interface as a ULP module, the Modbus connection via the Modbus SL hub is not operational any more.

The power to the BSCM Modbus SL/ULP module, to the connected ULP modules and to the MicroLogic 5, 6, or 7 trip unit is provided by the Modbus SL hub. The Modbus SL hub can be powered directly by the terminal block connector or through the stacking connector.

The figure below illustrates an example of the BSCM Modbus SL/ULP module in Modbus SL and ULP mode.
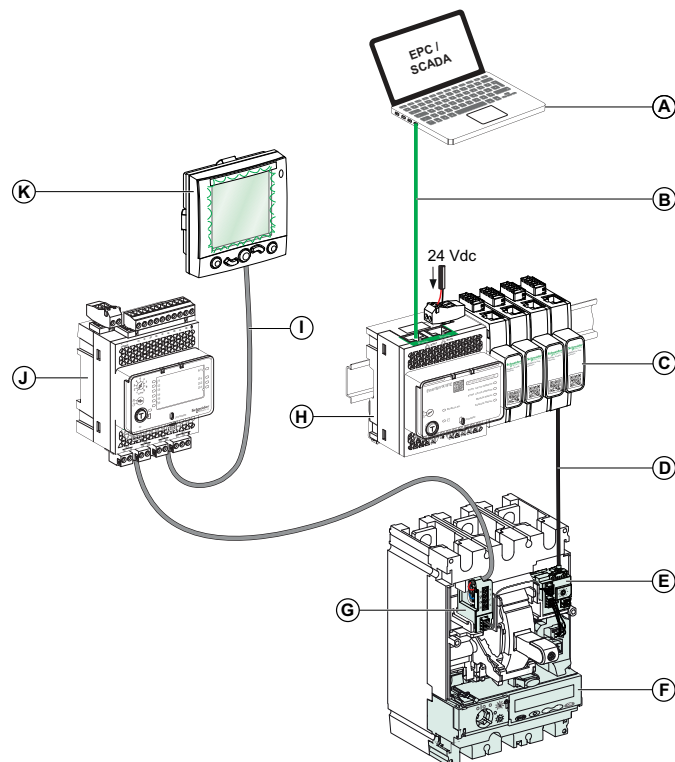
A. Modbus TCP client

B. Ethernet cable

C. Modbus SL hub (LV434224)

D. Modbus SL cord (LV434221, LV434222, or LV434223)

E. BSCM Modbus SL/ULP module (LV434220)

F. MicroLogic 5, 6, or 7 trip unit

G. NSX cord (LV434200, LV434201, LV434202, or LV434204)

H. IFE Ethernet switchboard server (LV434002)

I. ULP cord (LV434195, LV434196, LV434197, or LV434198)

J. IO module (LV434063)

K. FDM121 display (TRV00121)

BSCM ULP Only Mode

In ULP only mode, the BSCM Modbus SL/ULP module is used to connect the ComPacT NSX circuit breaker to ULP modules such as IFM or IFE communication interface, via ULP communication network using NSX cord. Other ULP modules such as the IO module and the FDM121 display can also be connected to the same ULP communication network.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- If the system voltage is greater than 480 Vac or 480 Vdc, and less than or equal to 690 Vac or 690 Vdc, ULP only mode is the only BSCM Modbus SL/ULP module mode allowed, using insulated NSX cord with commercial reference LV434204.

- It is forbidden to use the BSCM Modbus SL/ULP module or the insulated NSX cord for system voltages greater than 690 Vac or 690 Vdc.

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

The ULP only mode is recommended to connect plug-in or withdrawable ComPacT NSX circuit breakers to a communication network, by using an IFM or IFE communication interface.

The BSCM Modbus SL/ULP module with commercial reference LV434220 in ULP only mode replaces the BSCM module with commercial reference LV434205.

The figure below illustrates an example of the BSCM Modbus SL/ULP module in ULP only mode.
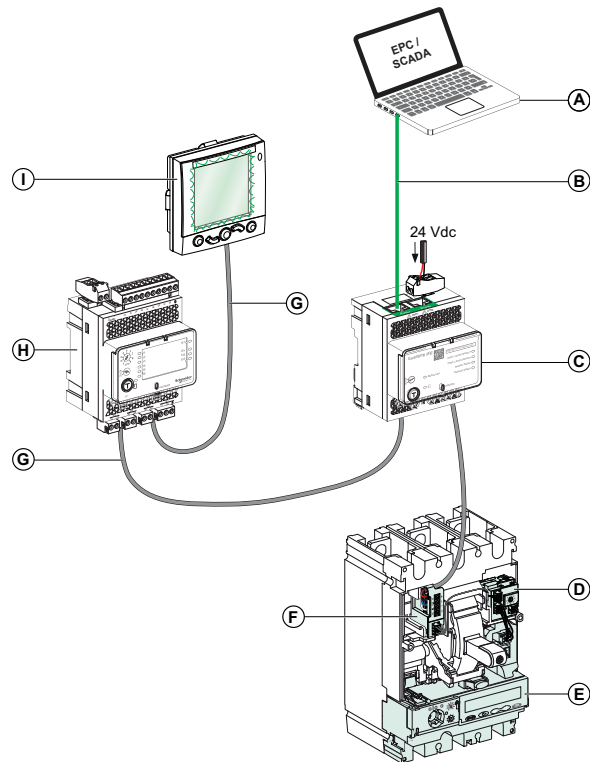
A. Modbus TCP client

B. Ethernet cable

C. IFE Ethernet interface for one circuit breaker (LV434001) or IFE Ethernet switchboard server (LV434002)

D. BSCM Modbus SL/ULP module (LV434220)

E. MicroLogic 5, 6, or 7 trip unit

F. NSX cord (LV434200, LV434201, LV434202, or LV434204)

G. ULP cord (LV434195, LV434196, LV434197, or LV434198)

H. IO module (LV434063)

I. FDM121 display (TRV00121)

Configuration

To configure the BSCM Modbus SL/ULP module, use a PC running EcoStruxure Power Commission (EPC) software and connected to the Service Interface, to an IFE communication interface or to a Panel Server.

With EPC software, you can configure:

- The Modbus parameters of the BSCM Modbus SL/ULP module.

- The maximum number of times the circuit breaker can open and close.

- The maximum number of times the communicating motor mechanism can close.

- The reset mode of the communicating motor mechanism.

- The firmware update.

- The Modbus address.

Configuring the BSCM Modbus Address

In Modbus SL only mode and in Modbus SL and ULP mode, configure the BSCM Modbus address by using the Modbus address rotary switch on the front face of the BSCM Modbus SL/ULP module:

- By default, the Modbus address rotary switch is set on position 0. Modbus address rotary switch position 0 corresponds to BSCM Modbus address 99 by default. Modbus address rotary switch position 0 allows you to set the BSCM Modbus address from 1 to 99 by using:

    ◦ EcoStruxure Power Commission software

    ◦ The MicroLogic 5 or 6 display.

- Modbus address rotary switch positions 1 to D correspond to BSCM Modbus addresses 1 to 13. If the BSCM Modbus address is set from 1 to 13 by using the Modbus address rotary switch, the BSCM Modbus address cannot be set by using EcoStruxure Power Commission software or the MicroLogic 5 or 6 display.

    NOTE: Modbus address rotary switch positions E and F are not operational and reserved for future use.

For more information about configuration of the BSCM Modbus address, refer to:

- *ComPacT NSX100–630 – BSCM Modbus SL/ULP Instruction Sheet*, page 10

- *ComPacT NSX MicroLogic 5/6/7 Electronic Trip Units - User Guide*, page 10

Configuring the BSCM Modbus Parameters

The Modbus parameters of the BSCM Modbus SL/ULP module can be configured by using the following interfaces:

- The Modbus address rotary switch on the BSCM Modbus SL/ULP module

- The MicroLogic 5 or 6 display

- EcoStruxure Power Commission (EPC) software

The following table indicates which interface can be used to set each parameter:

Parameters	Value	Factory setting	Set on the BSCM Modbus SL/ULP module	Set on the MicroLogic 5 or 6 trip unit	Set on EPC software
Remote padlock	• Enabled • Disabled	Disabled	–	–	✓
Address	1–99	99	✓ (1)	✓	✓
Baud rate	• 4800 • 9600 • 19200 • 38400 • Auto (2)	19200	–	✓	✓
Parity	• None • Odd • Even	Even	–	✓	✓
Stop bit	• 1 • 2	1	–	–	✓
Modbus SL Auto Go Activation	• Enabled • Disabled	Enabled	–	✓ (2)	✓
(1) The Modbus address can be set from 1 to 13 only.					
(2) To activate the Modbus SL Auto Go function by using the MicroLogic 5 or 6 trip unit, set the Baud rate to Auto.					

NOTE: In ULP only mode, the setting of the BSCM Modbus parameters is not required.

Remote Padlock

The user can enable or disable remote control commands to be sent over the Modbus network to the BSCM Modbus SL/ULP module itself, and to the other modules of the IMU. There is no physical padlock button. Use the remote padlock parameter available in EcoStruxure Power Commission software.

For more information, refer to EcoStruxure Power Commission Online Help.

Modbus SL Auto Go Function

If the Modbus SL Auto Go function is enabled, the BSCM Modbus SL/ULP module automatically detects the communication network speed and parity. The Auto-Speed sensing algorithm tests the available Baud rates and parities and automatically detects the Modbus Serial Line communication network parameters. The Modbus client must send at least 36 frames on the Modbus Serial Line communication network in order to allow the Auto-Speed sensing algorithm to work.

The transmission format is binary with one start bit, eight data bits, and one stop bit in case of even or odd parity, or two stop bits in case of no parity.

If the Auto-Speed sensing algorithm does not detect the network parameters, it is recommended to follow this procedure:

Step	Action
1	Send a **Read Multiple Register** request (function code 0x03) to the server, using the server ID of the BSCM Modbus SL/ULP module, at any address and for any number of registers.
2	Send this request at least 36 times.

NOTE: If the network speed or parity is changed after the BSCM Modbus SL/ULP module has automatically detected these settings, the BSCM Modbus SL/ULP module must be restarted (power off/power on) in order to detect the new network parameters.

Configuring the Communicating Motor Mechanism

⚠ **CAUTION**
HAZARD OF REPEATED CLOSING ON ELECTRICAL FAULT
Reconfiguring of the BSCM Modbus SL/ULP module must be done only by qualified electrical personnel.
Failure to follow these instructions can result in injury or equipment damage.

By default, the communicating motor mechanism can be reset only locally and automatic reset is disabled. To authorize remote reset, the reset mode of the communicating motor mechanism can be configured by using:

- The EcoStruxure Power Commission software
- The communication network

One of the following remote reset modes can be selected:

- **Enable Reset even if SDE** to authorize resetting of the mechanism using the communication network even after an electrical fault trip.
- **Enable Automatic Reset** to authorize automatic resetting after tripping by the MN, MX trip release, or push-to-trip button.
- **Enable Reset even if SDE** and **Enable Automatic Reset** to authorize automatic resetting even after an electrical fault trip.

Communication Test

The user can test the communication between all the ULP modules connected to the BSCM Modbus SL/ULP module. There is no physical button. Connect to EcoStruxure Power Commission software and click the **Locate** button to launch the communication test between all the ULP modules connected to the BSCM Modbus SL/ULP module for 15 seconds.

During the test, all the ULP modules keep working normally.

IFM Communication Interface

What's in This Chapter

Introduction

Overview

The IFM Modbus SL communication interface for one circuit breaker enables an intelligent modular unit (IMU) with a ComPacT, PowerPacT, or MasterPacT circuit breaker, to be connected to a two-wire Modbus SL RS-485 serial line Modbus network. Each circuit breaker has its own IFM communication interface and a corresponding Modbus address.

Types of IFM Communication Interface

The part number of the IFM communication interface is LV434000. The IFM communication interface part number LV434000 completely replaces the IFM communication interface with part number TRV00210 or STRV00210.

> **NOTE:**
> - The IFM communication interface data for the IFM communication interface with part number LV434000 is the same as for the IFM communication interface with part number TRV00210 or STRV00210.
> - The IFM communication interfaces with part number TRV00210 or STRV00210 are not compatible with MasterPacT MTZ circuit breakers.

IFM Communication Interface Features

The main features of IFM communication interface are:
- Single Modbus serial line interface provided in
  - RJ45 connector interface
  - Stacking connection interface
- HMI rotary dials for address settings and padlock option
- Pushbutton for test functionality

Hardware Description

General Description
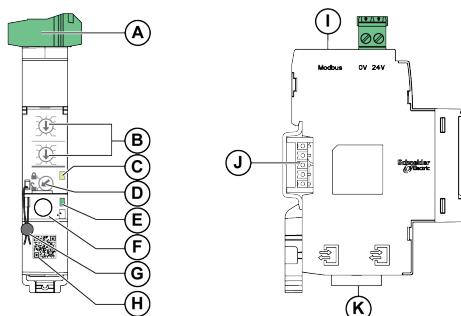
A 24 Vdc power supply terminal block

B Modbus address rotary switches

C Modbus traffic status LED

D Modbus locking pad

E ULP status LED

F Test button

G Mechanical lock

H QR code to product information

I RJ45 Modbus-SL port

J Stacking accessory connection (TRV00217, optional)

K 2 RJ45 ULP ports

For information on installation, consult the instruction sheet available on Schneider Electric website: NVE85393.

Mounting

The IFM communication interface is a DIN rail mounting device. The stacking accessory enables the interconnection of several IFM communication interfaces without additional wiring.

24 Vdc Power Supply

The IFM communication interface must always be supplied with 24 Vdc:

- IFM communication interfaces stacked to an IFE server are supplied by the IFE server and it is not necessary to supply them separately.

- If IFM communication interfaces are stacked without IFE server, only one of the IFM communication interfaces must be supplied with 24 Vdc.

- A single IFM communication interface must be supplied with 24 Vdc.
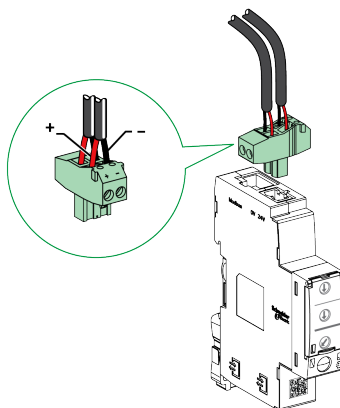
It is recommended to use a UL listed/UL recognized limited voltage/limited current or a class 2 power supply with a 24 Vdc, 3 A maximum.

NOTE: For 24 Vdc power supply connection, use copper conductors only.

Modbus Address Rotary Switches

The IFM communication interface bears the Modbus address of the IMU to which it is connected. For more information regarding the IMU, refer to DOCA0093•• *ULP System User Guide*, page 10.

Define the Modbus address using the two address rotary switches on the front panel of the IFM communication interface.

The address range is 1 to 99. Do not to use the address 0, because it is reserved for broadcasting commands.

The IFM communication interface is initially configured with address 99.

Example of the configuration of the address rotary switches for address 21:
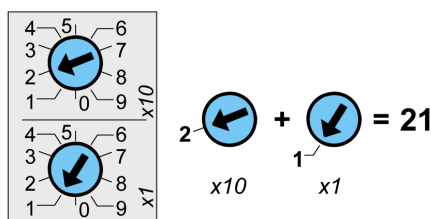
Modbus Traffic Status LED

The Modbus traffic status LED provides information about the traffic transmitted or received by the IMU over the Modbus network.

- When the Modbus address rotary switches are on value 0, the yellow LED is steady ON.
- When the Modbus address rotary switches are on value anywhere from 1 to 99, the yellow LED is ON during the transmission and reception of messages, OFF otherwise.

Modbus Locking Pad

The Modbus locking pad on the front panel of the IFM communication interface enables or disables remote control commands to be sent over the Modbus network to the IFM communication interface itself, and to the other modules of the 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 commands that are enabled even if the arrow points to the closed padlock are the Set Absolute Time and Get Current Time commands.

NOTE: For IFM communication interface servers connected to an IFE Ethernet switchboard server, the locking pad of the IFE communication interface does not disable the remote control commands in IFM communication interface.

Test Button
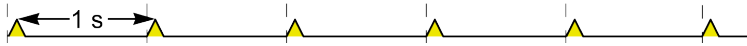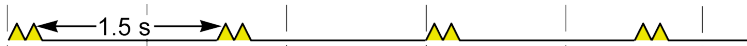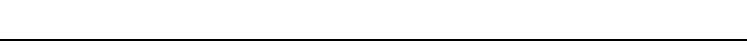
The test button tests the connection between all the ULP modules connected to the IFM communication interface.
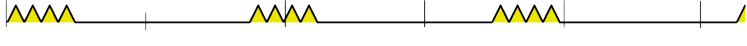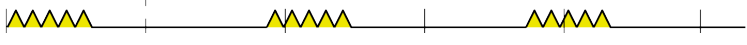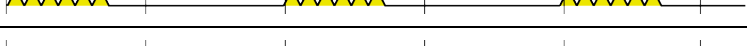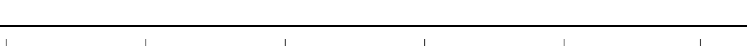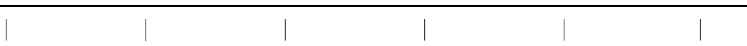
Pressing the test button launches the connection test for 15 seconds.

During the test, all the ULP modules keep working normally.

ULP Status LED

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

ULP status LED	Mode	Action
	Nominal	None
	Conflict	Remove extra ULP module
	Degraded	Replace IFM communication interface at the next maintenance operation
	Test	None
	Non-critical firmware discrepancy	Use EcoStruxure Power Commission software to check the firmware and

ULP status LED	Mode	Action
	Non-critical hardware discrepancy	hardware compatibility and follow the recommended actions.
	Configuration discrepancy	Install missing features
	Critical firmware discrepancy	Use EcoStruxure Power Commission software to check the firmware and hardware compatibility and follow the recommended actions.
	Critical hardware discrepancy	
	Stop	Replace IFM communication interface.
	Power off	Check power supply

Schematics With ComPacT NSX Circuit Breakers

General Description

Depending on the type of circuit breaker used, the user must connect the IFM communication interface using one of the following configurations:

• Connection of the IFM communication interface to the MicroLogic 5, 6 or 7 trip unit.

• Connection of the IFM communication interface to the BSCM Modbus SL/ULP module.

• Connection of the IFM communication interface to the BSCM Modbus SL/ULP module and the MicroLogic 5, 6 or 7 trip unit.

For more information, refer to DOCA0093•• *ULP System User Guide*, page 10.

ULP Connection

All connection configurations require the NSX cord or the insulated NSX cord.

⚠⚠ **DANGER**
HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH
• It is forbidden to use the NSX cords LV434200, LV434201, or LV434202 if the system voltage is greater than 480 Vac or 480 Vdc.
• It is mandatory to use the insulated NSX cord LV434204 if the system voltage is greater than 480 Vac or 480 Vdc, and less than or equal to 690 Vac or 690 Vdc,
Failure to follow these instructions will result in death or serious injury.

NOTICE
HAZARD OF EQUIPMENT DAMAGE
• The RJ45 ports of IFM communication interface are for ULP modules only.
• Any other use can damage the IFM communication interface or the device connected to the IFM communication interface.
• To check if an ULP module is compatible with the RJ45 ports of IFM communication interface, refer to DOCA0093•• *ULP System User Guide*, page 10.
Failure to follow these instructions can result in equipment damage.

When the second ULP RJ45 connector is not used, it must be closed with an ULP line termination:
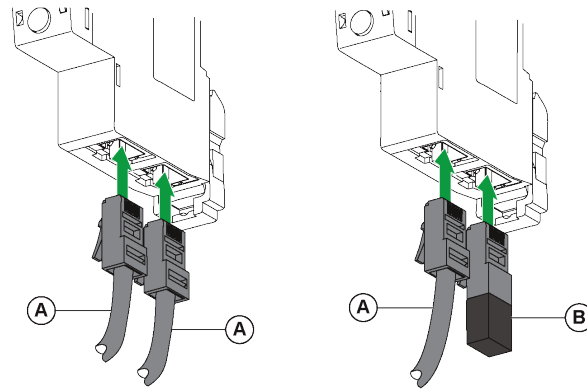
A NSX cord or RJ45 ULP cord

B ULP line termination

Connection of the IFM Communication Interface to the MicroLogic 5, 6 or 7 Trip Unit
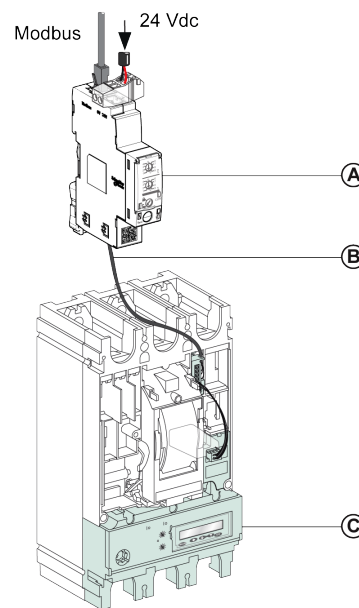
A IFM Modbus SL communication interface for one circuit breaker

B NSX cord

C MicroLogic 5, 6 or 7 trip unit

Connection of the IFM Communication Interface to the BSCM Modbus SL/ULP Module
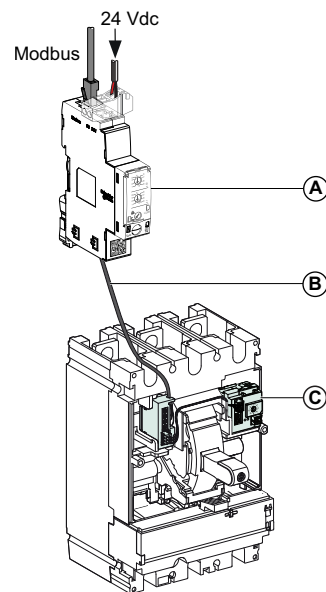
A IFM Modbus SL communication interface for one circuit breaker

B NSX cord

C BSCM Modbus SL/ULP module

Connection of the IFM Communication Interface to the BSCM Modbus SL/ULP Module and to the MicroLogic 5, 6 or 7 Trip Unit
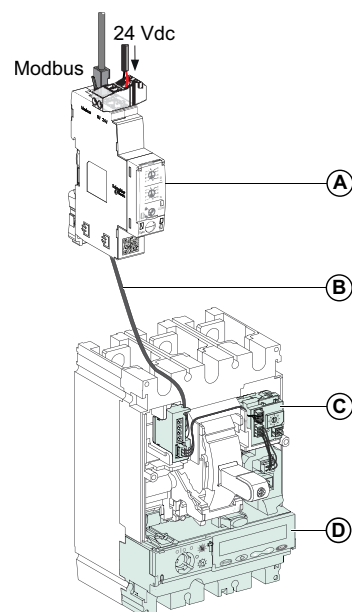
A IFM Modbus SLL communication interface for one circuit breaker

B NSX cord

C BSCM Modbus SL/ULP module

D MicroLogic 5, 6 or 7 trip unit

Connection of the IFM Communication Interface to a Circuit Breaker for System Voltage Greater Than 480 Vac or 480 Vdc

> ## ⚡⚠ DANGER
>
> **HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**
>
> - It is forbidden to use the insulated NSX cord for system voltages greater than 690 Vac or 690 Vdc.
> - It is mandatory to use the insulated NSX cord LV434204 if the system voltage is greater than 480 Vac or 480 Vdc, and less than or equal to 690 Vac or 690 Vdc.
>
> **Failure to follow these instructions will result in death or serious injury.**
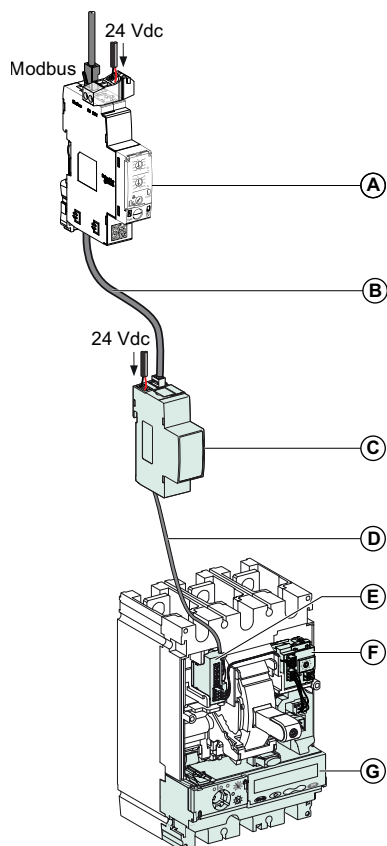
A IFM Modbus SL communication interface for one circuit breaker

B RJ45 ULP cable

C Insulated ULP

D Insulated ULP

E BSCM Modbus SL/ULP module

F Connector for ComPacT NSX internal connection

Configuration

General Description

Two configurations of the IFM communication interface are available:

- Automatic configuration (Auto-Speed sensing ON, factory setting): when connected to the Modbus network, the IFM communication interface automatically detects the network parameters.

- Personalized configuration (Auto-Speed sensing OFF): the user can personalize the network parameters using EcoStruxure Power Commission software, page 20.

Automatic Configuration

The Modbus server address is defined by the two address rotary switches on the front panel of the IFM communication interface. When connected to the Modbus serial line network, the IFM communication interface automatically detects the network speed and parity. The Auto-Speed sensing algorithm tests the available Baud rates and parities and automatically detects the Modbus Serial Line communication network parameters. The Modbus client must send at least 25 frames on the Modbus network in order to allow the Auto-Speed sensing algorithm to work.

The transmission format is binary with one start bit, eight data bits, one stop bit in case of even or odd parity, and two stop bits in case of no parity.

If the Auto-Speed sensing algorithm does not detect the network parameters, it is recommended to follow this procedure:

Step	Action
1	Set up the IFM communication interface to Modbus address 1, page 38.
2	Send a **Read Multiple Register** request (function code 0x03) to server 1, at any address and for any number of registers.
3	Send this request at least 25 times.

NOTE: If the network speed or parity is changed after the IFM communication interface has automatically detected these settings, the IFM communication interface must be restarted (power off/power on) in order to detect the new network parameters.

Personalized Configuration

The Modbus server address is defined by the two address rotary switches on the front panel of the IFM communication interface.

Disable the Auto-Speed sensing option and set the following Modbus Serial Line communication network parameters with EcoStruxure Power Commission software, page 20:

- Baud rate: 4800, 9600, 19200, and 38400 Baud.

- Parity: Even, odd, and none (it is possible to select one stop bit or two stop bits in case of no parity).

  NOTE: It is not possible to change the Modbus address or the status of the locking pad with EcoStruxure Power Commission software.

Communication Test

To test the serial line communication on the various circuit breakers, it is recommended to use EcoStruxure Power Commission software, page 20.

If a PC running EcoStruxure Power Commission (EPC) software and connected on the Modbus network is able to read data from the IMU, the communication is established. Refer to the *EcoStruxure Power Commission Online Help*.

IFE Communication Interface

What's in This Chapter

Introduction

Overview

The IFE communication interface enables an intelligent modular unit (IMU) with a ComPacT, PowerPacT or MasterPacT circuit breaker to be connected to an Ethernet network. Each circuit breaker has its own IFE communication interface and a corresponding IP address.

Types of IFE Communication Interface

There are two types of the IFE communication interface:

- IFE Ethernet communication interface for one circuit breaker, with part number LV434001

  This type of IFE communication interface is an Ethernet interface for ComPacT, PowerPacT and MasterPacT circuit breakers.

  NOTE: The IFE communication interface with part number LV434001 completely replaces the IFE communication interface with part number LV434010. The LV434001 comes with the real time clock (RTC) feature and allows ULP connections up to 20 m (65.6 ft). The part number LV434010 had a theoretical limitation of 5 m (16.4 ft) over the lifetime of the IFE communication interface.

- IFE Ethernet switchboard server, with part number LV434002

  This type of IFE communication interface is an Ethernet interface for ComPacT, PowerPacT, and MasterPacT circuit breakers and a server for Modbus SL (serial line) connected devices.

  NOTE: The IFE server with part number LV434002 completely replaces the IFE server with part number LV434011. The LV434002 comes with the real time clock (RTC) feature and allows ULP connections up to 20 m (65.6 ft). The part number LV434011 had a theoretical limitation of 5 m (16.4 ft) over the lifetime of the IFE server.

IFE Communication Interface Features

The main features of IFE communication interface are:

- Dual Ethernet port for simple daisy chain connection
- Device profile web service for discovery of the IFE communication interface on the local area network (LAN)
- ULP compliant for location of the IFE communication 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 LV434002)
- Embedded setup webpages
- Embedded monitoring webpages
- Embedded control webpages
- Built-in email alarm notification for circuit breaker connected to IFE communication interface.

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

Hardware Description

Description
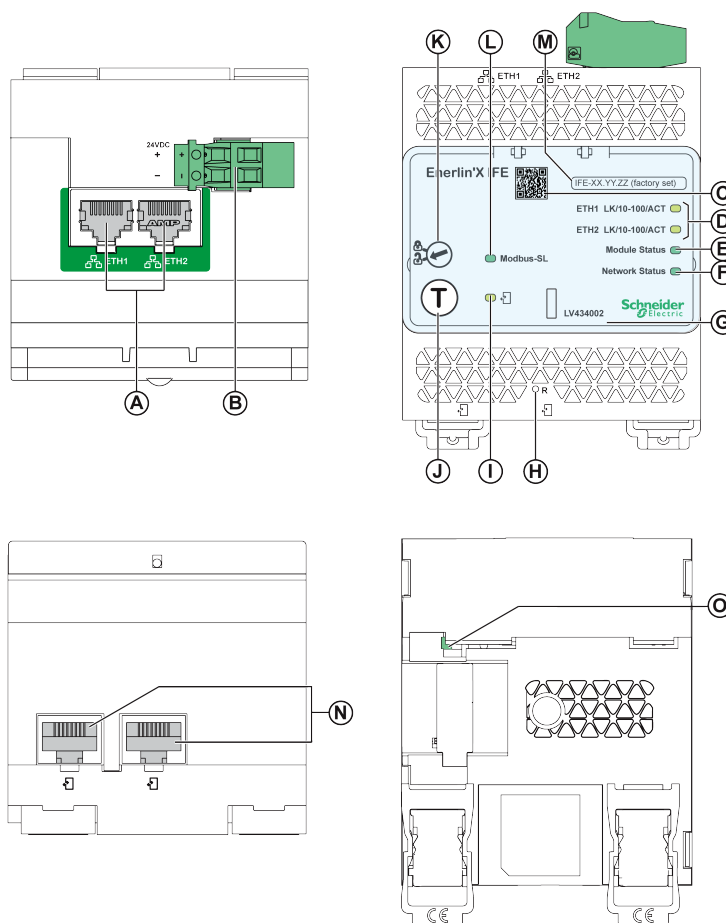
A Ethernet 1 and Ethernet 2 RJ45 communication ports

B 24 Vdc power supply terminal block

C QR code to product information

D Ethernet communication LEDs

E Module status LED

F Network status LED

G Sealable transparent cover

H Reset button

I ULP status LED

J Test button (accessible even with closed cover)

K Locking pad

L Modbus traffic status LED (IFE server only)

M Device name label

N Two RJ45 ULP ports

O Grounding connection

For information on installation, consult the instruction sheet available on the Schneider Electric website: QGH13473.

Mounting

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

NOTE: The stacking feature is available only for the IFE server with the part number LV434002.

24 Vdc Power Supply

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

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

NOTE: For 24 Vdc power supply connection, use copper conductors only.
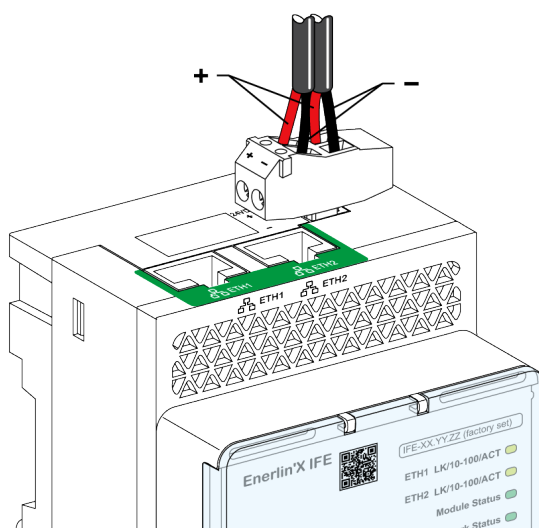
Ethernet Communication LEDs

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 communication interface status.

LED Indication	Status Description	Action
OFF	No power	None
Steady green	IFE communication 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 communication interface firmware corrupted	Contact your local Schneider Electric service team for support.
Blinking red (500 ms ON, 500 ms OFF)	IFE communication interface in degraded mode	Replace ULP module at the next maintenance operation.
Steady red	IFE communication interface out of service	None
Blinking green/red (1 s green, 1 s red)	Firmware update 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 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 communication interface (part number LV434001).

Modbus Address

The IFE communication 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 communication interface enables or disables the ability to send the remote control commands over the Ethernet network to the IFE communication interface, and to the other modules of the IMU.
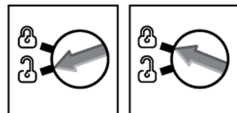
- If the arrow points to the open padlock (factory setting), remote control commands are enabled.

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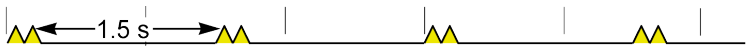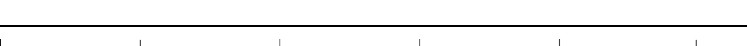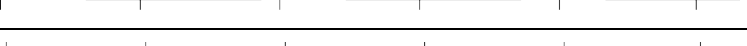
Time Range	Function
1–5 s	Tests the connection between all the ULP modules for 15 s.
10–15 s	Activates the hidden configuration mode. **NOTE:** The hidden configuration is not activated if the button is pressed for more than 15 s.

Reset Button

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

ULP Status LED

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

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

Schematics with ComPacT NSX Circuit Breakers

General Description

Depending on the configuration of the ComPacT NSX circuit breaker, connect the IFE communication interface to the circuit breaker using one of the following configurations:

- Connection of the IFE communication interface to the MicroLogic 5, 6 or 7 trip unit

- Connection of the IFE communication interface to the BSCM Modbus SL/ULP module

- Connection of the IFE communication interface to the BSCM Modbus SL/ULP module and to the MicroLogic 5, 6 or 7 trip unit

For more information, refer to DOCA0093•• *ULP System User Guide*, page 10.

ULP Connection

All connection configurations require the NSX cord or the insulated NSX cord.

| ⚡⚠ DANGER |
|---|
| **HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH** |
| • It is forbidden to use the NSX cords LV434200, LV434201, or LV434202 if the system voltage is greater than 480 Vac or 480 Vdc. |
| • It is mandatory to use the insulated NSX cord LV434204 if the system voltage is greater than 480 Vac or 480 Vdc, and less than or equal to 690 Vac or 690 Vdc, |
| **Failure to follow these instructions will result in death or serious injury.** |

NOTICE
HAZARD OF EQUIPMENT DAMAGE
• Never connect an Ethernet device to a RJ45 ULP port.
• The RJ45 ULP ports of IFE interface are for ULP modules only.
• Any other use can damage the IFE interface or the device connected to the IFE interface.
• To check if a ULP module is compatible with the RJ45 ULP ports of IFE interface, refer to DOCA0093•• *ULP System User Guide*, page 10.
Failure to follow these instructions can result in equipment damage.

When the second RJ45 ULP port is not used, it must be closed with an ULP line termination.
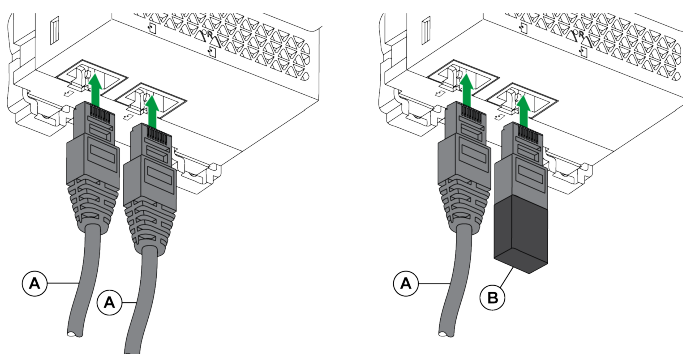
A NSX cord or RJ45 ULP cord

B ULP line termination

Connection of the IFE Communication Interface to the MicroLogic 5, 6 or 7 Trip Unit
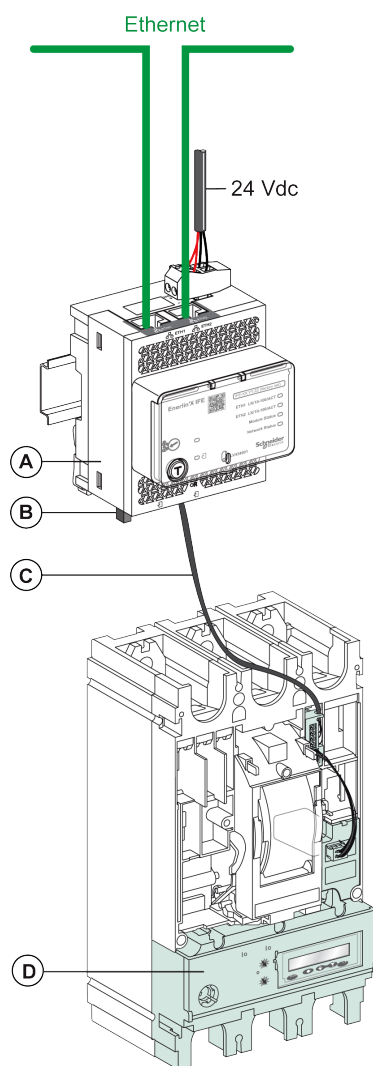
A IFE Ethernet communication interface for one circuit breaker

B ULP line termination

C NSX cord

D MicroLogic 5, 6 or 7 trip unit

Connection of the IFE Communication Interface to the BSCM Modbus SL/ULP Module
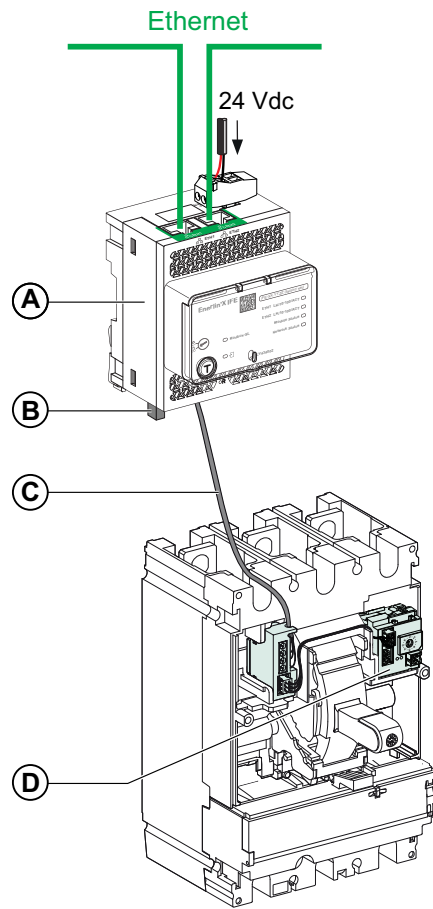
A IFE Ethernet communication interface for one circuit breaker

B ULP line termination

C NSX cord

D BSCM Modbus SL/ULP module

Connection of the IFE Communication Interface to the BSCM Modbus SL/ULP Module and to the MicroLogic 5, 6 or 7 Trip Unit
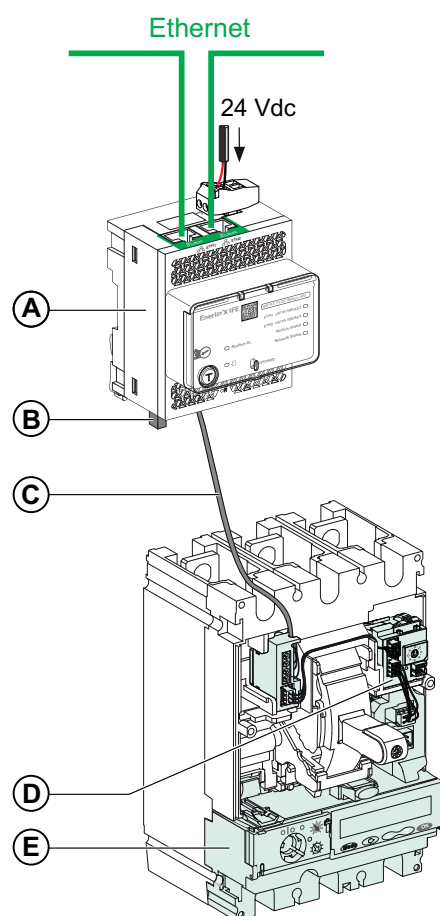
A IFE Ethernet communication interface for one circuit breaker

B ULP line termination

C NSX cord

D BSCM Modbus SL/ULP module

E MicroLogic 5, 6 or 7 trip unit

Connection of the IFE Communication Interface to a Circuit Breaker for System Voltage Greater Than 480 Vac or 480 Vdc

> ⚠⚠ **DANGER**
>
> **HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**
>
> - It is forbidden to use the insulated NSX cord for system voltages greater than 690 Vac or 690 Vdc.
> - It is mandatory to use the insulated NSX cord LV434204 if the system voltage is greater than 480 Vac or 480 Vdc, and less than or equal to 690 Vac or 690 Vdc.
>
> **Failure to follow these instructions will result in death or serious injury.**
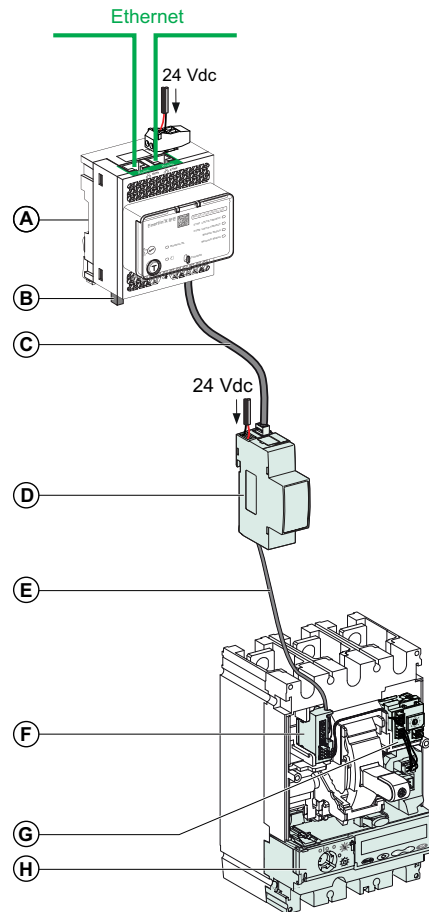
A IFE Ethernet communication interface for one circuit breaker

B ULP line termination

C RJ45 ULP cord

D Insulated ULP

E Insulated ULP

F Connector for ComPacT NSX internal connection

G BSCM Modbus SL/ULPmodule

H MicroLogic 5, 6 or 7 trip unit

Modbus Protocol with ComPacT NSX Circuit Breakers

What's in This Part

Modbus Client-Server Principle

Overview

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

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

Characteristics of the Client-Server Principle

The client-server principle is characterized as follows:

• Only 1 client is connected to the network at a time.

• Only the client can initiate communication and send requests to the servers.

• The client can address each server individually using its specific address or all servers simultaneously using address 0.

• The servers can only send replies to the client.

• The servers cannot initiate communication, either to the client or to other servers.

Client-Server Communication Modes

The Modbus protocol can exchange information using 2 communication modes:

• Unicast mode
• Broadcast mode

Unicast Mode

In unicast mode, the client addresses a server using the specific address of the server. The server processes the request then replies to the client.
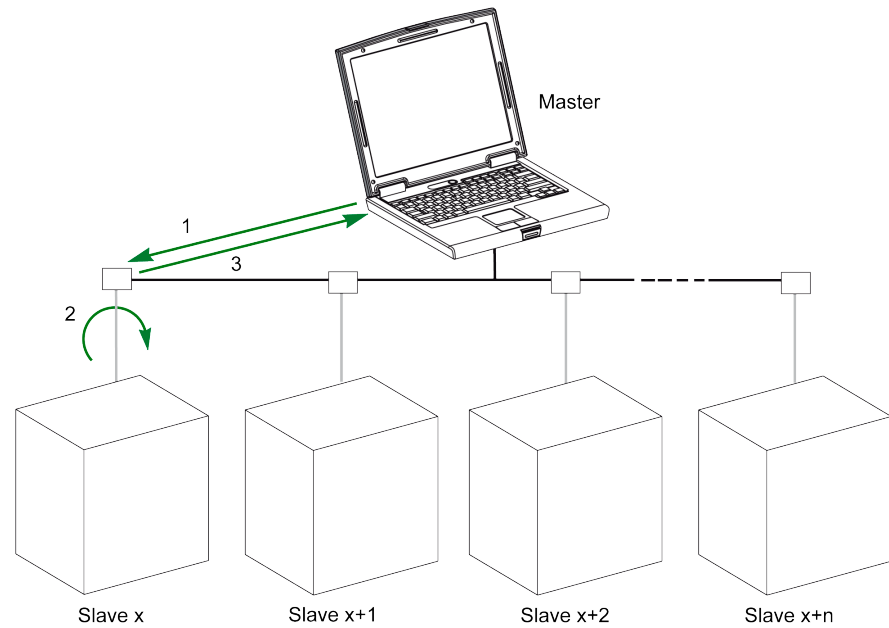
1 Request

2 Process

3 Reply

Broadcast Mode

The client can also address all servers using address 0. This type of exchange is called broadcasting. The servers do not reply to broadcasting messages.
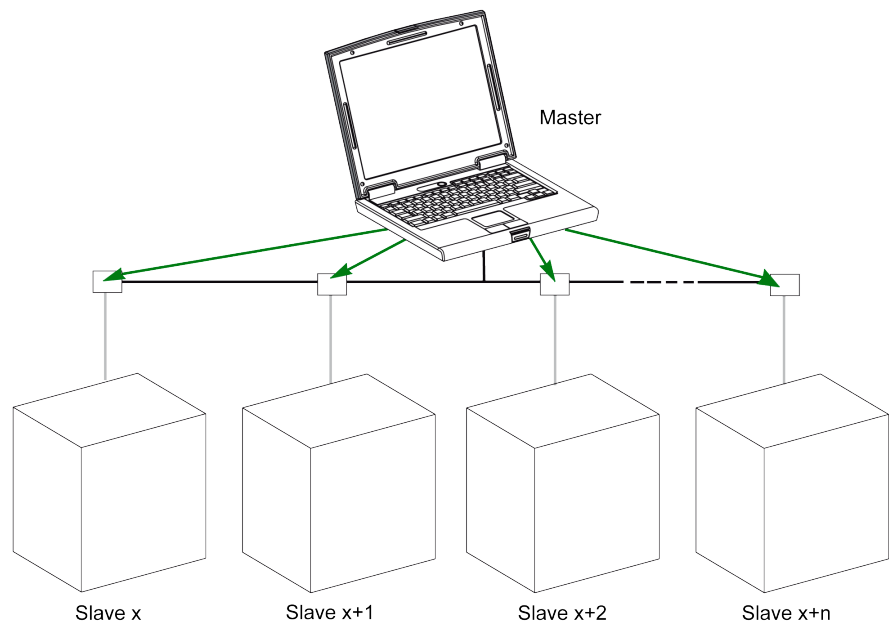
Response Time

The response time Tr is the time needed by a server to respond to a request sent by the client:
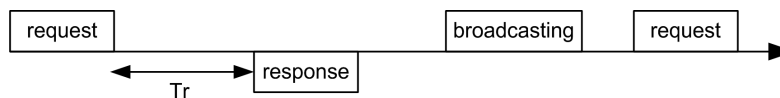
Values with the Modbus protocol:

• 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, MasterPacT NT/NW, ComPacT NS, and ComPacT NSX 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	Server number	1 byte	Destination of the request • 0: Broadcasting (all servers concerned) • 1–247: Unique destination
2	Function codes	1 byte or 2 bytes	Refer to function codes description, page 65
3	Data	n registers	Request or reply data **NOTE:** Number of registers n is limited to 52 with MasterPacT MicroLogic E trip unit.
4	Check	2 bytes	CRC16 (to check transmission errors)

Modbus Programming Recommendations

Read Register Recommendations

The registers of the IMU modules are available through Modbus communication in:

- Dataset registers (standard and/or legacy datasets)
- Device registers:
  - MicroLogic registers
  - IO module registers
  - IFM communication interface registers
  - IFE communication interface registers

To read the registers:

- First read the registers that are available in datasets.
  - Standard dataset is recommended because it contains more data in a data format that allows a better accuracy.
  - Legacy dataset is used only for legacy equipments.
- Then read the data that is not available in datasets in the device registers.

The benefit of datasets is that the most useful information of each IMU module is collected in one table that can be read with two or three read requests. Each module updates the values in the dataset registers on a regular basis.

The response time of requests to dataset registers is shorter than the response time of requests to device registers. Therefore, it is recommended to read the dataset registers instead of device registers, to improve the overall performance of the communication system.

Register Update

The values in the registers are updated in two different ways:

- The measurement values are updated periodically, with a fixed refreshment rate.
- The other values are updated when the value is changed.

Type of Registers	Register Update
Identification	Triggered by device replacement
Settings	Triggered by setting change
Measurement	Periodically, with fixed refreshment rate
• Real-time measurements	Every 1 s
• Demand values of real-time measurements	Every 1 s
• Harmonic values	Every 3 s
• Energy measurements	Every 5 s
• Peak values of demand values of real-time measurements	Every 5 s
• Minimum and maximum values of real-time measurements	Every 5 s
Maintenance and diagnostic	Triggered by data change
Events	Triggered by event detection
IO status	Triggered by status change

The refreshment rate of values is the same for the dataset registers and the device registers.

Use the refreshment rate to optimize the performance of the communication between the remote controller and the IMU modules.

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 server
43 (0x2B)	15 (0x0F)	Get date and time	Read the date and time of the server

NOTE: Number of registers n is limited to 52 with MasterPacT MicroLogic E trip unit.

Read Register Example

The following table shows how to read the rms current on phase 1 (I1) in register 1016. The address of register 1016 is 1016 - 1 = 1015 = 0x03F7. The Modbus address of the Modbus server is 47 = 0x2F.

Client Request		Server Reply	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x2F	Modbus server address	0x2F
Function code	0x03	Function code	0x03
Address of the register to read (MSB)	0x03	Data length in bytes	0x02
Address of the register to read (LSB)	0xF7	Register value (MSB)	0x02
Number of registers (MSB)	0x00	Register value (LSB)	0x2B
Number of registers (LSB)	0x01	CRC (MSB)	0xXX
CRC (MSB)	0xXX	CRC (LSB)	0xXX
CRC (LSB)	0xXX	–	

The content of register 1016 (address 0x03F7) is 0x022B = 555. Therefore, the rms current on phase 1 (I1) is 555 A.

Get Date and Time Example

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

Client Request		Server Reply	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x2F	Modbus server 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 server. The Modbus address of the Modbus server 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 server address = 0) to set the date and time of all Modbus servers.

Client Request		Server Reply	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x2F	Modbus server 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 servers without battery is not refreshed anymore. It is therefore mandatory to set date and time for all Modbus servers after recovering the 24 Vdc power supply.

Furthermore, due to the clock drift of each Modbus server, it is mandatory to set date and time for all Modbus servers 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 but when using a MasterPacT MicroLogic A or E trip unit, it is recommended to have n lower or equal to 21.

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.

Read Scattered Holding Register Example

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

Client Request		Server Reply	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x2F	Modbus server 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
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 client gives the transmission number in the request. The server 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 server

NOTE: Number of registers n is limited to 52 with MasterPacT MicroLogic E trip units.

Diagnostic Functions

The following diagnostic functions are available:

Function Code	Subfunction Code	Name	Description
8 (0x08)	–	Diagnostic	Manage diagnostic counters
8 (0x08)	10 (0x0A)	Clear counters and diagnostic register	Reset all diagnostic counters
8 (0x08)	11 (0x0B)	Return bus message counter	Read the counter of correct bus messages managed by the server
8 (0x08)	12 (0x0C)	Return bus communication error counter	Read the counter of incorrect bus messages managed by the server
8 (0x08)	13 (0x0D)	Return bus exception error counter	Read the counter of exception responses managed by the server
8 (0x08)	14 (0x0E)	Return server message counter	Read the counter of messages sent to the server
8 (0x08)	15 (0x0F)	Return server no response counter	Read the counter of broadcast messages
8 (0x08)	16 (0x10)	Return server negative acknowledge counter	Read the counter of messages sent to the server but not answered because of the Negative Acknowledge exception code 07
8 (0x08)	17 (0x11)	Return server busy counter	Read the counter of messages sent to the server but not answered because of the Server Device Busy exception code 06
8 (0x08)	18 (0x12)	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 server
2	Bus communication error counter	Counter of incorrect bus messages managed by the server
3	Server exception error counter	Counter of exception responses managed by the server and incorrect broadcast messages
4	Server message counter	Counter of messages sent to the server
5	Server no response counter	Counter of broadcast messages
6	Server negative acknowledge counter	Counter of messages sent to the server but not answered because of the Negative Acknowledge exception code 07
7	Server busy count	Counter of messages sent to the server but not answered because of the Server 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 client or a server can result from data processing errors. One of the following events can occur after a request from the client:

- If the server receives the request from the client without a communication error and can handle the request correctly, it returns a normal response.

- If the server does not receive the request from the client due to a communication error, it does not return a response. The client program eventually processes a timeout condition for the request.

- If the server receives the request from the client but detects a communication error, it does not return a response. The client program eventually processes a timeout condition for the request.

- If the server receives the request from the client without a communication error, but cannot handle it (for example, the request is to read a register that does not exist), the server returns an exception response to inform the client of the nature of the error.

Exception Frame

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

Field	Definition	Size	Description
1	Server 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	Check	2 bytes	CRC16 (to check transmission errors)

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 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 server. The server may be in the wrong state to process a specific request.
02 (0x02)	Illegal data address	The data address received by the server is not an authorized address for the server.
03 (0x03)	Illegal data value	The value in the request data field is not an authorized value for the server.
04 (0x04)	Server device failure	The server fails to perform a requested action because of an unrecoverable error.
05 (0x05)	Acknowledge	The server accepts the request but needs a long time to process it.

Exception Code	Name	Description
06 (0x06)	Server device busy	The server is busy processing another command. The client must send the request once the server is available.
07 (0x07)	Negative acknowledgment	The server cannot perform the programming request sent by the client.
08 (0x08)	Memory parity error	The server 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 server is not present on the network.

Illegal Data Address

This 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 EcoStruxure Power Commission software.

Write Protection

General Description

> ### ⚠ WARNING
>
> **HAZARD OF NUISANCE TRIPPING OR FAILURE TO TRIP**
>
> Protection setting adjustments must be done by qualified 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 hardware protected, page 39 and software protected.

Software Protection

To prevent an inadvertent change to the MicroLogic 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 user profile password scheme

This combination is called the command interface. Failure to conform to these results in an error code and the operation is not performed. The hardware protection has always precedence over the software protection.

Password Management

General Description

Remote access to data on MicroLogic trip units and the ULP modules of the IMU is protected by password. Remote access includes:

- The communication network
- EcoStruxure Power Commission software
- FDM128 display
- IFE webpages

The following four profiles are defined for remote access. Each IMU has a different password for each user profile.

- Administrator
- Services
- Engineer
- Operator

The Administrator password is required to write the settings to the MicroLogic trip unit and the ULP modules of the IMU using EcoStruxure Power Commission software, page 20.

Each intrusive command via the command interface is assigned to one or several user profiles, and protected by the corresponding user profile password. The password for each intrusive command is indicated in the description of the command.

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

Default Passwords

⚠ **WARNING**
POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY
Change default passwords at first use to help prevent unauthorized access to device settings, controls, and information.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

The default password for each user profile is as follows:

User profile	Default password
Administrator	'0000' = 0x30303030
Services	'1111' = 0x31313131
Engineer	'2222' = 0x32323232
Operator	'3333' = 0x33333333

Changing a Password

A password can be changed with EcoStruxure Power Commission software, page 20.

Entering the current password for a given user profile is required to change the password of this user profile. Entering the Administrator password enables you to change the password of any user profile.

A password is composed of exactly 4 ASCII characters. It is case-sensitive and the allowed characters are:

- Digits from 0 to 9
- Letters from a to z
- Letters from A to Z

Passwords of the IMU

The MicroLogic trip unit and the ULP modules of the IMU must be protected by the same passwords for each user profile.

When using EcoStruxure Power Commission software to modify a password, the password gets modified in the MicroLogic trip unit and the ULP modules of the IMU.

It is compulsory to assign the current IMU passwords to the new module in the IMU, in case of:

- Addition of a new ULP module in the IMU.
- Replacement of the MicroLogic trip unit or one of the ULP module of the IMU.

Use EcoStruxure Power Commission software to modify the passwords of the new module to the current IMU passwords.

Example: Addition of an IO module in an IMU with a MicroLogic trip unit and an IFE communication interface.

- The IMU has user-defined passwords for each user profile.
- The IO module has the default passwords for each user profile.

Use EcoStruxure Power Commission software to replace the default passwords of the IO module by the user-defined passwords of the IMU for each user profile.

Password Reset

In case that the Administrator password of the (IMU) is lost or forgotten, the password can be reset to the default password with EcoStruxure Power Commission software, page 20 and the support of the Schneider Electric Customer Care Center.

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 BSCM Modbus SL/ULP module, the remote control commands are enabled when the remote padlock parameter is set to **Enabled** by using EcoStruxure Power Commission software, page 20.

  ◦ With the IFM communication interface, the remote control commands are enabled when the locking pad on the IFM communication interface is in the open position.

  ◦ With the IFE communication interface, the remote control commands are enabled when the locking pad on the IFE communication 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 EcoStruxure Power Commission software, page 20.

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

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).
4	Read the command code 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 is not correct (insufficient user rights). • If LSB = 0, then the command is executed with no errors.

NOTE: The Modbus application will wait for the complete execution of one command before sending its next command. In case of no response, the Modbus application can resend the command. In this case, the first command will be aborted automatically.

Command Diagram

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

Step 1	Load buffer
Step 2	Write buffer (starting at register 8000)
Step 3	Read command status register 8021 — Register 8021 = 3? — Yes (loop back to Step 3) / No
Step 4	Read command code register 8020 — Register 8020 = Command code entered in register 8000 at step 2? — No (loop back) / Yes
Step 5	Register 8021 = 0? — Yes: Command executed with no errors. Depending on the command: • Check the number of bytes returned (register 8022) • Check the data buffer (registers 8023...8149). No: Command failed. Command status register 8021: • MSB = address of the module that generates the error • LSB = error identifier

Command Data Structure

The command interface uses registers 8000 to 8149:

• The input parameters of a command are written in registers 8000 to 8015. The registers 8016 to 8019 are reserved.

• The data returned after command execution are written in registers 8020 to 8149.

The input parameters of a command are detailed in the following table:

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.

Address	Register	Description	Comments
0x1F41	8002	Destination	A constant value provided for each command. Factory setting: 0x0000
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 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).

The data returned after command execution are detailed in the following table:

Address	Register	Description	Comments
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 is in progress, the command status is 3.

When the command generates an error, the command status register contains:
• LSB: The error code
• MSB: 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)	USB maintenance interface
2 (0x02)	FDM121 ULP display for one circuit breaker
3 (0x03)	IFM Modbus SL communication interface for one circuit breaker
17 (0x11)	BSCM module or BSCM Modbus SL/ULP module for ComPacT NSX
18 (0x12)	BCM ULP circuit breaker communication module for MasterPacT NT/NW and ComPacT NS
20 (0x14)	MicroLogic trip unit of ComPacT NSX
21 (0x15)	MicroLogic control unit of MasterPacT MTZ

Module Address	Module
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 communication interface for one circuit breaker • IFE Ethernet switchboard server

NOTE: The MicroLogic trip units of MasterPacT NT/NW and ComPacT NS circuit breakers do not have an IMU module address.

Result of the Command

The following table lists the codes corresponding to the result of the command.

Code	Description
0 (0x00)	Successful command
1 (0x01)	Insufficient user rights (incorrect password)
2 (0x02)	Access violation (IFM locking pad is locked, page 39 or, IFE locking pad is locked, page 51 or intrusive command mode is locked).
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
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

Code	Description
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
174 (0xAE)	Session key is invalid
175 (0xAF)	Out of session scope
176 (0xB0)	Session is already opened
177 (0xB1)	No session is open
178 (0xB2)	No valid setting was submitted
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 version. When a command described in the guide is not implemented in an IMU module that has an old firmware version, the command status is returned with the error code 19 (0x13), command is not supported.

You can update the firmware of the IMU modules by using EcoStruxure Power Commission software.

Command Examples

Open Circuit Breaker

The following table details the steps to perform in the client remote device to send a remote command to the BSCM Modbus SL/ULP module 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 4353 (0x1101), 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 of the Administrator or Operator 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 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 the MicroLogic trip unit to reset the minimum/maximum energy measurements. 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 5121 (0x1401), 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 of the Administrator or Operator 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 requests that the energy measurement minimum/maximum 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 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 the IFM communication interface to read the date and time. 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 768 (0x0300), the destination. This value is a constant for the command. It is provided in the command description. NOTE: Load into word2 the value 8704 (0x2200) for IFE communication interface as destination. • 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:

Step	Action
	• 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 client synchronizes the IFM or IFE communication interface, or the BSCM Modbus SL/ULP module in Modbus SL only mode and in Modbus SL and ULP mode.

2. Internal synchronization:

    • If the BSCM Modbus SL/ULP module is in ULP only mode, the IFM or IFE communication interface synchronizes all ULP modules connected in the IMU, including the BSCM Modbus SL/ULP module.

    • If the BSCM Modbus SL/ULP module is in Modbus SL only mode or in Modbus SL and ULP mode, the BSCM Modbus SL/ULP module synchronizes all ULP modules connected in the IMU.

External Synchronization

There are three ways to externally synchronize the IFM or IFE communication interface or the BSCM Modbus SL/ULP module in Modbus SL only mode or in Modbus SL and ULP mode:

• Manually with EcoStruxure Power Commission software, page 20.

• By programming of the Modbus client using:

    ◦ Either the Modbus function set date and time: Function code 43-16 , page 67.

    ◦ Or the set absolute time command through the IFM or IFE communication interface, or through the BSCM Modbus SL/ULP module.

• Automatically:

    ◦ With IFE communication interface configured as SNTP mode.

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

> **NOTE:** It is recommended to update the date and time of serial devices such as the IFM communication interface or the BSCM Modbus SL/ULP module periodically, by using the IFE communication interface webpages.

Internal Synchronization

The date and time is received from:

• The IFM communication interface

• Or the IFE communication interface

• Or the BSCM Modbus SL/ULP module, in Modbus SL only mode or Modbus SL and ULP mode

The date and time is broadcast to all the ULP modules connected in the IMU.

History Mechanism

General Description

The Modbus history registers enable the user to track the occurrence of specific events and their corresponding dates.

4 event histories are available:

- Alarm history: The alarm history format corresponds to a series of 10 records. Each record is composed of 5 registers describing one alarm. See Alarm History, page 154.

- Trip history: The trip history format corresponds to a series of 17 records. Each record is composed of 7 registers describing one trip. See Trip History, page 156.

- Maintenance operation history: The maintenance operation history format corresponds to a series of 10 records. Each record is composed of 5 registers describing one maintenance operation. See Maintenance Operation History, page 161.

- BSCM Modbus SL/ULP module event history: The BSCM Modbus SL/ULP module event history format corresponds to a series of 10 records. Each record is composed of 5 registers describing one BSCM Modbus SL/ULP module event. See Event History, page 213.

History Mechanism

Each event is time-stamped using the ULP DATE format, page 90.

When the history is full, the oldest event record is discarded to make room for the most recent event record, which is pushed to the top of the history.

The records are ordered in decreasing occurrence time, the most recent occurrence is in the first record.

The following tables describe the history mechanism for a 10-record history format:

Before event E

Record	1	2	3	4	5	6	7	8	9	10
Event	E-1 (most recent event)	E-2	E-3	E-4	E-5	E-6	E-7	E-8	E-9	E-10 (oldest event)

After event E

Record	1	2	3	4	5	6	7	8	9	10
Event	E (most recent event)	E-1	E-2	E-3	E-4	E-5	E-6	E-7	E-8	E-9 (oldest event)

After event E, event E-10 is lost.

History Reading

A read request is necessary to read a history record (see Modbus function read n input words, function code = 4, in Read Functions, page 65). For example, a read request of 5 registers is necessary to read the most recent alarm record of the alarm history format (see Alarm History, page 154).

Furthermore, to read the last n records of a history format, a read request of (m) x (n) registers is necessary, where m is the number of registers that compose the record.

For example, a read request of 7 x 3 = 21 registers is necessary to read the most recent 3 trip records of the trip history format (see Trip History, page 156):

• The first 7 registers describe the first record of the trip history format (most recent trip).

• The next 7 registers describe the second record of the trip history format.

• The last 7 registers describe the third record of the trip history format.

When not used, history registers return 32768 (0x8000).

Modbus Registers Tables

General Description

The following chapters describe the Modbus registers of the MicroLogic trip unit and the Modbus registers of the modules connected to it. These registers provide information that can be read, like electrical measures, protection configuration, and monitoring information. The command interface enables the user to modify these registers in a controlled way.

The presentation rules of the Modbus registers are as follows:

- The registers are grouped according to the module they relate to:
  - MicroLogic 5, 6, and 7 Trip Unit Registers, page 135
  - BSCM Modbus SL/ULP Module Registers, page 206
  - BSCM Module Registers, page 226
  - IO Module Registers, page 241
  - IFM Communication Interface Registers, page 278
  - IFE Communication Interface Registers, page 290

- For each module, the registers are grouped in tables of logically related information. The tables are presented in increasing address.

- For each module, the commands are described separately:
  - MicroLogic 5, 6, and 7 Trip Unit Commands, page 192
  - BSCM Modbus SL/ULP Module Commands, page 215
  - BSCM Module Commands, page 233
  - IO Module Commands, page 269
  - IFM Communication Interface Commands, page 284
  - IFE Communication Interface Commands, page 297

To find a register, refer to the ordered list of the registers, page 302.

Table Format

Register tables have the following columns:

Address	Register	RW	X	Unit	Type	Range	Description

- **Address**: A 16-bit register address in hexadecimal. The address is data used in the Modbus frame.
- **Register**: A16-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

- **X**: The scale factor. A scale of 10 means that the register contains the value multiplied by 10. So, the real value is the value in the register divided by 10.

  Example:

  The unit is Hz and the scale factor is 10.

  If the register returns 503, this means that the system frequency is

  503/10 = 50.3 Hz.

- **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
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
DATETIME	Date and time in the IEC 60870-5 format , page 89	–
ULP DATE	Date and time in ULP DATE format , page 90	–

Big-Endian Format

INT32, 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.

INT32, INT32U, INT64, and INT64U variables are made of INT16U variables.

The formulas to calculate the decimal value of these variables are:

- INT32: $(0-bit31) \times 2^{31} + bit30 \times 2^{30} + bit29 \times 2^{29} + ...bit1 \times 2^{1} + bit0 \times 2^{0}$
- INT32U: $bit31 \times 2^{31} + bit30 \times 2^{30} + bit29 \times 2^{29} + ...bit1 \times 2^{1} + bit0 \times 2^{0}$
- INT64: $(0-bit63) \times 2^{63} + bit62 \times 2^{62} + bit61 \times 2^{61} + ...bit1 \times 2^{1} + bit0 \times 2^{0}$
- INT64U: $bit63 \times 2^{63} + bit62 \times 2^{62} + bit61 \times 2^{61} + ...bit1 \times 2^{1} + bit0 \times 2^{0}$

Example 1:

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

If the values in the registers are:

- Register 32096 = 0
- Register 32097 = 0

- Register 32098 = 0x0017 or 23

- Register 32099 = 0x9692 or 38546 as INT16U variable and -26990 as INT16 variable (use the INT16U value to calculate the value of the total active energy).

Then the total active energy is equal to $0 \times 2^{48} + 0 \times 2^{32} + 23 \times 2^{16} + 38546 \times 2^{0}$ = 1545874 Wh.

Example 2:

The reactive energy in the legacy dataset is an INT32 variable coded in registers 12052 to 12053.

If the values in the registers are:

- Register 12052 = 0xFFF2 = 0x8000 + 0x7FF2 or 32754

- Register 12053 = 0xA96E or 43374 as INT16U variable and -10606 as INT16 variable (use the INT16U value to calculate the value of the reactive energy).

Then the reactive energy is equal to $(0-1) \times 2^{31} + 32754 \times 2^{16} + 43374 \times 2^{0}$ = -874130 kVARh.

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** 0000000000000000000000

-1.5 = 1 **01111111** 1000000000000000000000000

with:

- S = 1

- **E = 01111111 = 127**

- M = 10000000000000000000000 = $1 \times 2^{-1} + 0 \times 2^{-2} + ... + 0 \times 2^{-23}$ = 0.5

- N = $(-1) \times 2^{0} \times (1+0.5)$ = -1.5

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

Data Type: ULP DATE

ULP DATE is a data type used to code date and time. This table presents the ULP DATE data type.

Register	Type	Bit	Range	Description
1 2	INT32U	–	0x00000000–0xFFFFFFFF	Number of seconds since January 1 2000
3	INT16U	–	–	Complement in milliseconds
		0–9	–	Encodes the milliseconds
		10–11	–	Not used
		12	0–1	IFM or IFE communication interface external synchronization status 0 = The communication interface has not been externally synchronized within the last 2 hours. 1 = The communication interface has been externally synchronized within the last 2 hours.
		13	0–1	ULP module internal synchronization status 0 = The ULP module has not been internally synchronized. 1 = The ULP module has been internally synchronized.
		14	0–1	Absolute date is set since last power on 0 = No 1 = Yes
		15	–	Reserved

ULP Date Counter

The date in ULP DATE format is counted in number of seconds since January 1 2000.

In case of a power loss for an IMU module, the time counter is reset to January 1 2000.

If an external synchronization occurs after a power loss, the time counter is updated and converts the synchronization date to the corresponding number of seconds since January 1 2000.

ULP Date Conversion Principle

To convert the date from number of seconds since January 1 2000 to current date, the following rules apply:

- 1 non-leap year = 365 days
- 1 leap year = 366 days

  Years 2000, 2004, 2008, 2012,...(multiple of 4) are leap years (except year 2100).

- 1 day = 86,400 seconds
- 1 hour = 3,600 seconds
- 1 minute = 60 seconds

The following table describes the steps to follow to convert the date from number of seconds since January 1 2000 to current date:

Step	Action
1	Calculate the number of seconds since January 1 2000: S = (content of register 1 x 65536) + (content of register 2)
2	Calculate the number of days since January 1 2000: D = integer value of the quotient of S / 86,400 Calculate the remaining number of seconds: s = S - (D x 86,400)
3	Calculate the number of days elapsed for the current year: d = D - (NL x 365) - (L x 366) with NL = number of non-leap years since year 2000 and L = number of leap years since year 2000
4	Calculate the number of hours: h = integer value of the quotient of s / 3600 Calculate the remaining number of seconds: s' = s - (h x 3600)
5	Calculate the number of minutes: m = integer value of the quotient of s' / 60 Calculate the remaining number of seconds: s'' = s' - (m x 60)
6	Calculate the number of milliseconds: ms = (content of register 3) AND 0x03FF
7	Result: • The current date is date = d + 1. For example, if d = 303, the current date corresponds to the 304th day of the year, which corresponds to October 31 2007. • The current time is h:m:s'':ms

ULP Date Conversion Example

Registers 2900 and 2901 return the date in number of seconds since January 1 2000. Register 2902 returns the complement in ms with the quality of the date.

```
Register 2900  = 0x0EBB = 3771
Register 2901  = 0x18C2 = 6338
Register 2902  = 0x20B7
```

Number of seconds = (3771x65536) + 6338 = 247142594 seconds

Number of days = quotient of 247142594 / 86400 = 2860 days
The remaining number of seconds is 247142594 - (2860x86400) = 38594 seconds

2860 days   38594 seconds

```
2860 days
-366 days for year 2000
-365 days for year 2001
-365 days for year 2002
-365 days for year 2003
-366 days for year 2004
-365 days for year 2005
-365 days for year 2006
────────────────────────
= 303 days for year 2007
```

Number of hours = quotient of 38594 / 3600 = 10 hours
The remaining number of seconds is 38594 - (10x3600) = 2594 seconds

Number of minutes = quotient of 2594 / 60 = 43 minutes
The remaining number of seconds = 2594 - (43x60) = 14 seconds

Number of milliseconds
= 0x20B7 AND 0x03FF = 0x00B7 = 183 ms

The date is the 304th day of year 2007, which corresponds to October 31 2007.

10 hours   43 minutes   14 seconds   183 milliseconds

October 31 2007, 10:43:14:183

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. Refer to Modbus Exception Codes, page 70.

- 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 neutral as identified by register 3314, page 175, 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.

    NOTE: As per legacy register implementation, some registers may display different out of order and not applicable values. For example, INT16U registers may return 32768 (0x8000) and INT32U may display 0x80000000.

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

Dataset

What's in This Part

Standard Dataset

What's in This Chapter

Standard Dataset

Description

The standard dataset contains the most useful information of each IMU module in one convenient table. The standard dataset is available in the registers 32000 to 32341. It can be read with three read requests.

Each IMU module updates the values in the dataset registers on a regular basis.

The response time of requests to standard dataset registers is shorter than the response time of requests to device registers. Therefore, it is recommended to read the standard dataset registers instead of device registers, to improve the overall performance of the system Modbus Programming Recommendations, page 63.

The standard dataset can be used with:

• The IFE Ethernet communication interface for one circuit breaker
• The IFE Ethernet switchboard server
• The IFM Modbus SL communication interface for one circuit breaker
• The BSCM Modbus SL/ULP module

Modbus Registers

Table of Standard Dataset 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 Dataset Common Registers, page 102.

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

Table Format

Register tables have the following columns:

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

• **Address**: A16-bit register address in hexadecimal. The address is the data used in the Modbus frame.

• **Register**: A16-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.

• **A/E**: Types of ComPact or ComPacT NSX MicroLogic trip unit for which the register is available.

  ◦ Type A (Ammeter): Current measurements for ComPact NSX circuit breakers only.

  ◦ Type E (Energy): Current, voltage, power, and energy measurements for ComPact or ComPacT NSX circuit breakers.

- **A/E/P/H**: Types of MasterPacT NT/NW and ComPacT NS MicroLogic trip 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 circuit breakers.
- **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})

Big-Endian Format

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

INT64 and INT64U variables are made of INT16U variables.

The formulas to calculate the decimal value of these variables are:
- INT64: $(0\text{-}bit63)\text{x}2^{63} + bit62\text{x}2^{62} + bit61\text{x}2^{61} + ...bit1\text{x}2^{1} + bit0\text{x}2^{0}$
- INT64U: $bit63\text{x}2^{63} + bit62\text{x}2^{62} + bit61\text{x}2^{61} + ...bit1\text{x}2^{1} + bit0\text{x}2^{0}$

Example:

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

If the values in the registers are:
- Register 32096 = 0
- Register 32097 = 0
- Register 32098 = 70 (0x0046) 0x0017 or 23
- Register 32099 = 2105 (0x0839) 0x9692 or 38546 as INT16U variable and -26990 as INT16 variable (use the INT16U value to calculate the value of the total active energy).

Then the total active energy is equal to $0\text{x}2^{48} + 0\text{x}2^{32} + 23\text{x}2^{16} + 38546\text{x}2^{0}$ = 1545874 Wh.

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 = $1 \times 2^{-1} + 0 \times 2^{-2} + ... + 0 \times 2^{-23} = 0.5$
- 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 server is 255 = 0xFF.

Request from the Client		Response from the Server	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0xFF	Modbus server 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 Dataset Common Registers

Since there are more than 125 registers in the standard dataset, 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 server 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 server 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 server is 255 = 0xFF.

Request from the Client		Response from the Server	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0xFF	Modbus server 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
–	–	–	0xXX
–	–	Value of register 32123 (MSB)	0xXX
–	–	Value of register 32123 (LSB)	0xXX
–	–	CRC (MSB)	0xXX
–	–	CRC (LSB)	0xXX

Standard Dataset 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	–	A/E	A/E/P/H	X	–	Quality of each bit of register 32001, page 99: • 0 = Invalid • 1 = Valid
0x7D00	32001	R	–	INT16U	–	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.
						–	–	–	6–14	Reserved
						A/E	A/E/P/H	–	15	Data availability If this bit is set at 1, all other bits of the register are not significant.

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
						–	–	–	11–14	Reserved
						A/E	A/E/P/H	–	15	Data availability If this bit is set at 1, all other bits of the register are not significant.
0x7D03	32004	R	–	INT16U	–	A/E	A/E/P/H	X	–	Quality of each bit of register 32005: • 0 = Invalid • 1 = Valid
0x7D04	32005	R	–	INT16U	–	A/E	A/E/P/H	X	–	IO2 module status
									0	Digital input 1 status:

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
										• 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
								−	9–14	Reserved
								−	15	Data availability If this bit is set at 1, all other bits of the register are not significant.

Tripping Cause

The tripping cause register provides information about the cause of the trip for the standard 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 trip units for ComPacT NSX circuit breakers, the tripping cause bit is reset by pressing the key OK (keypad of the MicroLogic trip unit) twice (validation and confirmation).

- For MicroLogic A/E/P/H trip 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.

- For MicroLogic X control units for MasterPacT MTZ circuit breakers, the tripping cause bit is reset by pressing the test/reset button (located beside the trip cause LEDs on the MicroLogic X control unit). Press and hold the button for 3 to 15 seconds to reset all the trip causes.

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
0x7D06	32007	R	−	INT16U	−	A/E	A/E/P/H	X		Tripping cause for the standard protection functions
						A/E	A/E/P/H	X	0	Long-time protection Ir
						A/E	A/E/P/H	X	1	Short-time protection Isd
						A/E	A/E/P/H	X	2	Instantaneous protection Ii
						A/E	A/E/P/H	X	3	Ground-fault protection Ig
						E	A/P/H	X	4	Earth-leakage protection IΔn
						A/E	A/E/P/H	X	5	Integrated instantaneous protection (SELLIM and DIN/ DINF)
						A/E	−	X	6	Internal failure (STOP)
						−	A/E	−		Other protections
						−	P/H	−		Internal failure (temperature)
						−	A/E/P/H	−	7	Internal failure (overvoltage)
						−	P/H	X	8	Other protection (see register 32009)
						−	−	−	9	Reserved
						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	X	5	Undervoltage
						−	P/H	X	6	Overvoltage
						−	P/H	−	7	Voltage unbalance
						−	P/H	−	8	Overpower
						−	P/H	X	9	Reverse power
						−	P/H	X	10	Underfrequency
						−	P/H	X	11	Overfrequency
						−	P/H	−	12	Phase rotation

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

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
						–	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
						E	P/H	–	1	Earth-leakage alarm
						–	–	–	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	–	X	0	Long-time protection time pre-alarm (PAL Ir)
						E	–	–	1	Earth-leakage protection pre-alarm (PAL IΔn)
						–	–	X		Earth-leakage alarm[1]
						A/E	–	–	2	Ground-fault protection pre-alarm (PAL Ig)
						–	–	X		Ground-fault alarm[2]
						–	–	–	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	–	P/H	–	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

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
						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
(1) Value available on MicroLogic 7.0 X control unit only when the Digital Module ANSI 51N/51G Ground-fault alarm is installed.										
(2) Value available on MicroLogic 2.0 X, 3.0 X, 5.0 X, and 6.0 X control units only when the Digital Module ANSI 51N/51G Ground-fault alarm is installed.										

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	A	FLOAT32	–	A/E	A/E/P/H	X	Maximum of RMS current of phases 1, 2, 3 and N (most loaded phase) [3]
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	–	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 7.0 X.									
(3) Value reset with the reset minimum/maximum command.									

Maximum Current Values

Maximum current values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7D29–0x7D2A	32042–32043	R	A	FLOAT32	–	A/E	A/E/P/H	X	Maximum RMS current on phase 1
0x7D2B–0x7D2C	32044–32045	R	A	FLOAT32	–	A/E	A/E/P/H	X	Maximum RMS current on phase 2
0x7D2D–0x7D2E	32046–32047	R	A	FLOAT32	–	A/E	A/E/P/H	X	Maximum RMS current on phase 3
0x7D2F–0x7D30	32048–32049	R	A	FLOAT32	–	A/E	A/E/P/H	X	Maximum RMS current on the neutral[1]
0x7D31–0x7D32	32050–32051	R	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

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
									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 trip 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 [1]

(1) This value can be reset with the reset minimum/maximum command.

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]

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
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[2]
0x7D63–0x7D66	32100–32103	R	VARh	INT64	–	E	E/P/H[1]	X	Total reactive energy[2]
0x7D67–0x7D6A	32104–32107	R	Wh	INT64U	–	E	P/H	X	Total active energy delivered (into the load, counted positively)[2]
0x7D6B–0x7D6E	32108–32111	R	Wh	INT64U	–	E	P/H	X	Total active energy received (out of the load, counted negatively)[2]
0x7D6F–0x7D72	32112–32115	R	VARh	INT64U	–	E	P/H	X	Total reactive energy delivered (into the load, counted positively)[2]
0x7D73–0x7D76	32116–32119	R	VARh	INT64U	–	E	P/H	X	Total reactive energy received (out of the load, counted negatively)[2]
0x7D77–0x7D7A	32120–32123	R	VAh	INT64U	–	E	–	X	Total apparent energy[2]
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 trip unit.

(2) Value reset with the reset energies command.

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

Maximum power values can be reset with the reset minimum/maximum command.

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

Maximum average values can be reset with the reset minimum/maximum command.

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	–	E	E/P/H	X	Current demand value on phase 1: I1 Dmd
0x7D9D– 0x7D9E	32158– 32159	R	A	FLOAT32	–	E	E/P/H	X	Current demand value on phase 2: I2 Dmd
0x7D9F– 0x7DA0	32160– 32161	R	A	FLOAT32	–	E	E/P/H	X	Current demand value on phase 3: I3 Dmd
0x7DA1– 0x7DA2	32162– 32163	R	A	FLOAT32	–	E	E/P/H	X	Current demand value on the neutral: IN Dmd[1]
(1) Value available when system type register returns 30 or 41.									

Power Demand Values

- For the block window, the demand value is updated at the end of the window.
- For the sliding window,
  - If window duration is configured for less or equal to 15 minutes, the demand value is updated every 15 seconds
  - If window duration is configured for more than 15 minutes, the demand value is updated every 1 minute.

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

Current Peak Demand Values

Current peak demand values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7DA9– 0x7DAA	32170– 32171	R	A	FLOAT32	–	–	–	X	Current peak demand value on phase 1: I1 dmd max
0x7DAB– 0x7DAC	32172– 32173	R	A	FLOAT32	–	–	–	X	Current peak demand value on phase 2: I2 dmd max
0x7DAD– 0x7DAE	32174– 32175	R	A	FLOAT32	–	–	–	X	Current peak demand value on phase 3: I3 dmd max
0x7DAF– 0x7DB0	32176– 32177	R	A	FLOAT32	–	–	–	X	Current peak demand value on the neutral: IN dmd max[1]
(1) Value available when system type register returns 30 or 41.									

Power Peak Demand Values

Power peak demand values are updated every 15 seconds. Power peak demand values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7DB1–0x7DB2	32178–32179	R	W	FLOAT32	–	–	–	X	Total active power peak demand: P dmd max
0x7DB3–0x7DB4	32180–32181	R	VAR	FLOAT32	–	–	–	X	Total reactive power peak demand: Q dmd max
0x7DB5–0x7DB6	32182–32183	R	VA	FLOAT32	–	–	–	X	Total apparent power peak demand: S dmd max

Maximum Ground and Earth-Leakage Current Values

Maximum ground and earth-leakage current values can be reset with the reset minimum/maximum command.

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	–	E	–	X	Maximum earth-leakage current[1]
0x7DBB–0x7DC0	32188–32193	–	–	–	–	–	–	–	Reserved
(1) Value available with MicroLogic 7.									

Maximum Voltage Values

Maximum voltage values can be reset with the reset minimum/maximum command.

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

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x7DD5–0x7DD6	32214–32215	R	–	FLOAT32	–	E	H	X	Fundamental power factor on phase 1 (cosϕ1)[1][2]
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	0–2	E	H	X	Total harmonic distortion (THD) of current on phase 3 compared to the fundamental
0x7DEF–0x7DF0	32240–32241	R	–	FLOAT32	0–2	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

Maximum power factor can be reset with the reset minimum/maximum command.

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	–	A/E	A/E/P/H	X	–	Quality of each bit of register 32341: • 0 = Invalid • 1 = Valid
0x7E54	32341	R	–	INT16U	–	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
						–	–	–	2–15	Reserved

Legacy Dataset

What's in This Chapter

Legacy Dataset

Description

The legacy dataset contains the most useful information of each IMU module in one convenient table. The legacy dataset is available in the registers 12000 to 12200. It can be read with two read requests.

Each IMU module updates the values in the dataset registers on a regular basis.

The response time of requests to legacy dataset registers is shorter than the response time of requests to device registers. Therefore, it is recommended to read the legacy dataset registers instead of device registers, to improve the overall performance of the system Modbus Programming Recommendations, page 63.

NOTE:

- The legacy dataset is compatible with legacy versions of the MicroLogic trip unit for ComPacT NSX, PowerPacT H-, J-, and L-Frame, ComPacT NS, PowerPacT P- and R-frame or MasterPacT NT/NW circuit breaker. For this reason, data read directly in the Modbus registers is organized in a different way than in the standard dataset.

- For new applications, it is recommended to use the standard dataset instead of the legacy dataset.

Modbus Registers

Table of Legacy Dataset 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 12000.

This compact table of 114 registers can be read with a single Modbus request.

It contains the following information:

• Circuit breaker status

• Tripping causes

• Real-time values of main measurements: current, voltage, power, energy, total harmonic distortion

The content of this table of registers is detailed in Legacy Dataset Common Registers, page 122.

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

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: 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.

• **A/E**: Types of ComPact or ComPacT NSX MicroLogic trip unit for which the register is available.

  ◦ Type A (Ammeter): Current measurements for ComPact NSX circuit breakers only.

  ◦ Type E (Energy): Current, voltage, power, and energy measurements for ComPacT or ComPacT NSX circuit breakers.

- **A/E/P/H**: Types of MasterPacT NT/NW and ComPacT NS MicroLogic trip 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 circuit breakers when the Modbus legacy dataset Digital Module is purchased and installed on the MicroLogic X control unit.

- **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

Big-Endian Format

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

INT32 and INT32U variables are made of INT16U variables.

The formulas to calculate the decimal value of these variables are:

- INT32: $(0\text{-bit}31) \times 2^{31} + \text{bit}30 \times 2^{30} + \text{bit}29 \times 2^{29} + ...\text{bit}1 \times 2^{1} + \text{bit}0 \times 2^{0}$
- INT32U: $\text{bit}31 \times 2^{31} + \text{bit}30 \times 2^{30} + \text{bit}29 \times 2^{29} + ...\text{bit}1 \times 2^{1} + \text{bit}0 \times 2^{0}$

Example:

The reactive energy in the legacy dataset is an INT32 variable coded in registers 12052 to 12053.

If the values in the registers are:

- Register 12052 = 0xFFF2 = 0x8000 + 0x7FF2 or 32754
- Register 12053 = 0xA96E or 43374 as INT16U variable and -10606 as INT16 variable (use the INT16U value to calculate the value of the reactive energy).

Then the reactive energy is equal to $(0-1) \times 2^{31} + 32754 \times 2^{16} + 43374 \times 2^{0} = -874130$ kVARh.

Readout Examples

Readout Example of a Modbus Register

The table below shows how to read the rms current on phase 1 (I1) in register 12016.

- The address of register 12016 equals 12016 - 1 = 12015 = 0x2EEF.
- The Modbus address of the Modbus server is 47 = 0x2F.

Request from the Client		Response from the Server	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x2F	Modbus server address	0x2F
Function code	0x03	Function code	0x03
Address of register to be read (MSB)	0x2E	Data length in bytes	0x02
Address of register to be read (LSB)	0xEF	Register value (MSB)	0x02
Number of registers (MSB)	0x00	Register value (LSB)	0x2B
Number of registers (LSB)	0x01	CRC (MSB)	0xXX
CRC (MSB)	0xXX	CRC (LSB)	0xXX
CRC (LSB)	0xXX	–	–

The content of register 12016 (address 0x2EEF) is 0x022B = 555.

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

Readout Example of the Table of Legacy Dataset Common Registers

The table below shows how to read the table of legacy dataset common registers. This table starts at register 12000 and consists of 113 registers.

- The address of register 12000 = 0x2EDF.
- The table length is 113 registers = 0x71.
- The number of bytes is 113x2 = 226 bytes = 0xE2.
- The Modbus address of the server is 47 = 0x2F.

Request from the Client		Response from the Server	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x2F	Modbus server address	0x2F
Function code	0x03	Function code	0x03
Address of the first register to be read (MSB)	0x2E	Data length in bytes	0xE2
Address of the first register to be read (LSB)	0xDF	Value of register 12000 (MSB)	0xXX
Number of registers (MSB)	0x00	Value of register 12000 (LSB)	0xXX
Number of registers (LSB)	0x71	Value of register 12001 (MSB)	0xXX
CRC (MSB)	0xXX	Value of register 12001 (LSB)	0xXX
CRC (LSB)	0xXX	–	0xXX
–	–	–	0xXX
–	–	Value of register 12112 (MSB)	0xXX
–	–	Value of register 12112 (LSB)	0xXX

Request from the Client		Response from the Server	
Field Name	**Example**	**Field Name**	**Example**
−	−	CRC (MSB)	0xXX
−	−	CRC (LSB)	0xXX

Legacy Dataset Common Registers

Circuit Breaker Status Register

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x2EDF	12000	R	–	INT16U	–	A/E	A/E/P/H	X	–	Validity of each bit in the circuit breaker status register.
0x2EE0	12001	R	–	INT16U	–	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 NT/NW 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 ComPacT NS circuit breaker.
						–	–	–	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 ComPacT NS circuit breaker.
						–	A/E/P/H	X	6	Distinction between ComPacT NS and MasterPacT NT/NW 0 = ComPacT NS 1 = MasterPacT NT/NW
						–	–	–	7–14	Reserved

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
						A/E	−	X	15	Data availability
										If this bit is set at 1, all other bits of the register are not significant.

IO Status Registers

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x2EE1	12002	R	−	INT16U	−	A/E	A/E/P/H	X	−	Status IO 1
									0	Input 1 status • 0 = Off • 1 = On
									1	Input 2 status • 0 = Off • 1 = On
									2	Input 3 status • 0 = Off • 1 = On
									3	Input 4 status • 0 = Off • 1 = On
									4	Input 5 status • 0 = Off • 1 = On
									5	Input 6 status • 0 = Off • 1 = On
									6	Output 1 status • 0 = Off • 1 = On
									7	Output 2 status • 0 = Off • 1 = On
									8	Output 3 status • 0 = Off • 1 = On
									9–14	Reserved
									15	Data availability If this bit is set at 1, all other bits of the register are not significant.
0x2EE2	12003	R	−	INT16U	−	A/E	A/E/P/H	X	−	Status IO 2
									0	Input 1 status • 0 = Off • 1 = On
									1	Input 2 status • 0 = Off • 1 = On
									2	Input 3 status • 0 = Off • 1 = On

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
									3	Input 4 status • 0 = Off • 1 = On
									4	Input 5 status • 0 = Off • 1 = On
									5	Input 6 status • 0 = Off • 1 = On
									6	Output 1 status • 0 = Off • 1 = On
									7	Output 2 status • 0 = Off • 1 = On
									8	Output 3 status • 0 = Off • 1 = On
									9–14	Reserved
									15	Data availability If this bit is set at 1, all other bits of the register are not significant.

Tripping Cause

The tripping cause register provides information about the cause of the trip for the standard 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 trip units for ComPacT NSX circuit breakers, the tripping cause bit is reset by pressing the OK key (keypad of the MicroLogic trip unit) twice (validation and confirmation).

- For MicroLogic A/E/P/H trip 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.

- For MicroLogic X control units for MasterPacT MTZ circuit breakers, the tripping cause bit is reset by pressing the test/reset button (located beside the trip cause LEDs on the MicroLogic X control unit). Press and hold the button for 3 to 15 seconds to reset all the trip causes.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x2EE3	12004	R	–	INT16U	–	A/E	A/E/P/H	X	–	Tripping cause for the standard protection functions
						A/E	A/E/P/H	X	0	Long-time protection Ir
						A/E	P/H	X	1	Short-time protection Isd
						–	A/E	X	1	Short-time protection Isd or Instantaneous protection Ii
						A/E	P/H	X	2	Instantaneous protection Ii
						A/E	A/E/P/H	X	3	Ground-fault protection Ig
						E	A/P/H	X	4	Earth-leakage protection IΔn
						A/E	A/E/P/H	X	5	Integrated instantaneous protection for:

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
										• MasterPacT NT06L1, NT08L1, NT10L1, and equivalent ComPacT NS • ComPacT NSX
						A/E	–	X	6	Internal failure (STOP)
						–	A/E	–		Other protections or integrated instantaneous protection
						–	P/H	–		Internal failure (temperature)
						–	A/E/P/H	–	7	Internal failure (overvoltage)
						–	P/H	X	8	Other protection (see register 12005)
						E	–	–	9	Instantaneous with earth-leakage protection 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	X	15	If this bit is at 1, bits 0 to 14 are not valid.
0x2EE4	12005	R	–	INT16U	–	–	P/H	X	–	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	X	5	Undervoltage
						–	P/H	X	6	Overvoltage
						–	P/H	–	7	Voltage unbalance
						–	P/H	–	8	Overpower
						–	P/H	X	9	Reverse power
						–	P/H	X	10	Underfrequency
						–	P/H	X	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	X	15	If this bit is at 1, bits 0 to 14 are not valid.
0x2EE5–0x2EE6	12006–12007	–	–	–	–	–	–	–	–	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
0x2EE7	12008	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.
0x2EE8	12009	R	–	INT16U	–	–	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.
0x2EE9	12010	R	–	INT16U	–	–	P/H	–	–	Continuation of the previous register
						–	P/H	–	0	Ground-fault alarm
						E	P/H	–	1	Earth-leakage alarm
						–	–	–	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
0x2EEA	12011	R	–	INT16U	–	A/E	–	X	–	Pre-alarm register
						A/E	–	X	0	Long-time protection time pre-alarm (PAL Ir)
						E	–	–	1	Earth-leakage protection pre-alarm (PAL IΔn)
						–	–	X		Earth-leakage alarm[1]
						A/E	–	–	2	Ground-fault protection pre-alarm (PAL Ig)

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
						–	–	X		Ground-fault alarm[2]
						–	–	–	3–14	Reserved
						A/E	–	X	15	If this bit is at 1, bits 0 to 14 are not valid.
0x2EEB	12012	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.
0x2EEC–0x2EEE	12013–12015	–	–	–	–	–	–	–	–	Reserved

(1) Value available on MicroLogic 7.0 X control unit only when the Digital Module ANSI 51N/51G Ground-fault alarm is installed.

(2) Value available on MicroLogic 2.0 X, 3.0 X, 5.0 X, and 6.0 X control units only when the Digital Module ANSI 51N/51G Ground-fault alarm is installed.

Current

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2EEF	12016	R	A	INT16U	0–32767	A/E	A/E/P/H	X	RMS current on phase 1: I1
0x2EF0	12017	R	A	INT16U	0–32767	A/E	A/E/P/H	X	RMS current on phase 2: I2
0x2EF1	12018	R	A	INT16U	0–32767	A/E	A/E/P/H	X	RMS current on phase 3: I3
0x2EF2	12019	R	A	INT16U	0–32767	A/E	A/E/P/H	X	RMS current on the neutral: IN [1]
0x2EF3	12020	R	A	INT16U	0–32767	A/E	A/E/P/H	X	Maximum of I1, I2, I3, and IN
0x2EF4	12021	R	%Ig	INT16U	0–32767	A/E	A/E/P/H	X	Ground-fault current Ig [2]
0x2EF5	12022	R	%IΔn	INT16U	0–32767	E	A/P/H	X	Earth-leakage current IΔn [3]

(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral current transformer (ENCT).

(2) This value is only available:

• For MasterPacT MTZ MicroLogic 6.0 X control units, expressed as %Ig pick-up

• For MasterPacT NT/NW and ComPacT NS MicroLogic 6.0 trip units, expressed as %Ig pick-up

• For ComPacT NSX MicroLogic 6.2 and 6.3 trip units, expressed as %Ig pick-up

(3) This value is only available:

• For MasterPacT MTZ MicroLogic 7.0 X control units, expressed as %IΔn pick-up

• For MasterPacT NT/NW and ComPacT NS MicroLogic 7.0 trip units, expressed as %IΔn pick-up

• For ComPacT NSX MicroLogic 7.2 and 7.3 trip units, expressed as %IΔn pick-up

Maximum Current Values

Maximum current values can be reset with the reset minimum/maximum command.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2EF6	12023	R	A	INT16U	0–32767	A/E	A/E/P/H	X	Maximum RMS current on phase 1: I1
0x2EF7	12024	R	A	INT16U	0–32767	A/E	A/E/P/H	X	Maximum RMS current on phase 2: I2
0x2EF8	12025	R	A	INT16U	0–32767	A/E	A/E/P/H	X	Maximum RMS current on phase 3: I3
0x2EF9	12026	R	A	INT16U	0–32767	A/E	A/E/P/H	X	Maximum RMS current on the neutral: IN [1]
0x2EFA	12027	R	A	INT16U	0–32767	A/E	A/E/P/H	X	Maximum RMS current out of the 4 previous registers
0x2EFB	12028	R	%Ig	INT16U	0–32767	A/E	A/E/P/H	X	Maximum ground-fault current Ig [2]
0x2EFC	12029	R	%IΔn	INT16U	0–32767	E	A/P/H	X	Maximum earth-leakage current [3]

(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral current transformer (ENCT).

(2) This value is only available:

- For MasterPacT MTZ MicroLogic 6.0 X control units, expressed as %Ig pick-up
- For MasterPacT NT/NW and ComPacT NS MicroLogic 6.0 trip units, expressed as %Ig pick-up
- For ComPacT NSX MicroLogic 6.2 and 6.3 trip units, expressed as %Ig pick-up

(3) This value is only available:

- For MasterPacT MTZ MicroLogic 7.0 X control units, expressed as %IΔn pick-up
- For MasterPacT NT/NW and ComPacT NS MicroLogic 7.0 trip units, expressed as %IΔn pick-up
- For ComPacT NSX MicroLogic 7.2 and 7.3 trip units, expressed as %IΔn pick-up

Voltage

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2EFD	12030	R	V	INT16U	0–1200	E	E/P/H	X	RMS phase-to-phase voltage V12
0x2EFE	12031	R	V	INT16U	0–1200	E	E/P/H	X	RMS phase-to-phase voltage V23
0x2EFF	12032	R	V	INT16U	0–1200	E	E/P/H	X	RMS phase-to-phase voltage V31
0x2F00	12033	R	V	INT16U	0–1200	E	E/P/H	X	RMS phase-to-neutral voltage V1N [1]
0x2F01	12034	R	V	INT16U	0–1200	E	E/P/H	X	RMS phase-to-neutral voltage V2N [1]
0x2F02	12035	R	V	INT16U	0–1200	E	E/P/H	X	RMS phase-to-neutral voltage V3N [1]

(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral voltage transformer (ENVT).

Frequency

When the MicroLogic trip unit cannot calculate the frequency, it returns Not applicable = 32768 (0x8000).

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2F03	12036	R	0.1 Hz	INT16U	400–600	E	P/H	X	Frequency
0x2F04	12037	R	0.1 Hz	INT16U	400–600	E	P/H	X	Maximum frequency [1]

(1) This value can be reset with the reset minimum/maximum command.

Power

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2F05	12038	R	0.1 kW	INT16	-32767–+32767	E	E/P/H	X	Active power on phase 1: P1 [1] [2]
0x2F06	12039	R	0.1 kW	INT16	-32767–+32767	E	E/P/H	X	Active power on phase 2: P2 [1] [2]
0x2F07	12040	R	0.1 kW	INT16	-32767–+32767	E	E/P/H	X	Active power on phase 3: P3 [1] [2]
0x2F08	12041	R	0.1 kW	INT16	-32767–+32767	E	E/P/H	X	Total active power: Ptot [2]
0x2F09	12042	R	0.1 kVAR	INT16	-32767–+32767	E	E/P/H	X	Reactive power on phase 1: Q1 [1] [2]
0x2F0A	12043	R	0.1 kVAR	INT16	-32767–+32767	E	E/P/H	X	Reactive power on phase 2: Q2 [1] [2]
0x2F0B	12044	R	0.1 kVAR	INT16	-32767–+32767	E	E/P/H	X	Reactive power on phase 3: Q3 [1] [2]
0x2F0C	12045	R	0.1 kVAR	INT16	-32767–+32767	E	E/P/H	X	Total reactive power: Qtot [2]
0x2F0D	12046	R	0.1 kVA	INT16U	0–32767	E	E/P/H	X	Apparent power on phase 1: S1 [1]
0x2F0E	12047	R	0.1 kVA	INT16U	0–32767	E	E/P/H	X	Apparent power on phase 2: S2 [1]
0x2F0F	12048	R	0.1 kVA	INT16U	0–32767	E	E/P/H	X	Apparent power on phase 3: S3 [1]
0x2F10	12049	R	0.1 kVA	INT16U	0–32767	E	E/P/H	X	Total apparent power: Stot

(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral current transformer (ENCT).

(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, the least significant second.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2F11–0x2F12	12050–12051	R	kWh	INT32	-1 999 999 999– +1 999 999 999	E	E/P/H	X	Active energy: Ep [1]
0x2F13–0x2F14	12052–12053	R	kVARh	INT32	-1 999 999 999– +1 999 999 999	E	E/P/H	X	Reactive energy: Eq [1]
0x2F15–0x2F16	12054–12055	R	kWh	INT32U	0–1 999 999 999	E	P/H	X	Active energy counted positively: EpIn

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2F17–0x2F18	12056–12057	R	kWh	INT32U	0–1 999 999 999	E	P/H	X	Active energy counted negatively: EpOut
0x2F19–0x2F1A	12058–12059	R	kVARh	INT32U	0–1 999 999 999	E	P/H	X	Reactive energy counted positively: EqIn
0x2F1B–0x2F1C	12060–12061	R	kVARh	INT32U	0–1 999 999 999	E	P/H	X	Reactive energy counted negatively: EqOut
0x2F1D–0x2F1E	12062–12063	R	kVAh	INT32U	0–1 999 999 999	E	E/P/H	X	Total apparent energy: Es
0x2F1F–0x2F20	12064–12065	R	kWh	INT32U	0–1 999 999 999	E	–	X	Active energy counted positively (non-resettable): EpIn
0x2F21–0x2F22	12066–12067	R	kWh	INT32U	0–1 999 999 999	E	–	X	Active energy counted negatively (non-resettable): EpOut
0x2F23–0x2F2E	12068–12079	–	–	–	–	–	–	–	Reserved
(1) This value is always positive with MicroLogic E trip units for MasterPacT NT/NW and ComPacT NS circuit breakers.									

IMPORTANT: For the BSCM Modbus SL/ULP module with firmware version 001.000.000, the energy values of registers from 12054 to 12067 are incorrect. These values were expressed in Wh, VARh, VAh instead of kWh, kVARh, and kVAh respectively.

To view the correct energy values, It is recommended to update the firmware of BSCM Modbus SL/ULP module to the latest version.

The following table displays the example of correct and incorrect energy values for registers:

Register	Description	Incorrect Value with Firmware Version 001.000.000	Correct Value with Firmware Version ≥ 001.001.000	Unit
12054–12055	Active energy counted positively: EpIn	0	0	kWh
12056–12057	Active energy counted negatively: EpOut	32000	32	kWh
12058–12059	Reactive energy counted positively: EqIn	20000	20	kVARh
12060–12061	Reactive energy counted negatively: EqOut	166000	166	kVARh
12062–12063	Total apparent energy: Es	150000	150	kVAh
12064–12065	Active energy counted positively (non-resettable): EpIn	0	0	kWh
12066–12067	Active energy counted negatively (non-resettable): EpOut	159000	159	kWh

Current Demand Values

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2F2F	12080	R	A	INT16U	0–32767	E	E/P/H	X	Current demand value on phase 1: I1 Dmd
0x2F30	12081	R	A	INT16U	0–32767	E	E/P/H	X	Current demand value on phase 2: I2 Dmd
0x2F31	12082	R	A	INT16U	0–32767	E	E/P/H	X	Current demand value on phase 3: I3 Dmd

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2F32	12083	R	A	INT16U	0–32767	E	E/P/H	X	Current demand value on the neutral: IN Dmd [1]
(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral current transformer (ENCT).									

Power Demand Values

- For the block window, the demand value is updated at the end of the window.
- For the sliding window,
  - If window duration is configured for less or equal to 15 minutes, the demand value is updated every 15 seconds
  - If window duration is configured for more than 15 minutes, the demand value is updated every 1 minute.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2F33	12084	R	0.1 kW	INT16U	0–32767	E	E/P/H	X	Total active power demand: P Dmd
0x2F34	12085	R	0.1 kVAR	INT16U	0–32767	E	P/H	X	Total reactive power demand: Q Dmd
0x2F35	12086	R	0.1 kVA	INT16U	0–32767	E	P/H	X	Total apparent power demand: S Dmd
0x2F36–0x2F38	12087–12089	–	–	–	–	–	–	–	Reserved

Maximum Voltage Values

Maximum voltage values can be reset with the reset minimum/maximum command.

Register = 0 if the voltage < 25 V.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2F39	12090	R	V	INT16U	0–1200	E	E/P/H	X	Maximum RMS phase-to-phase voltage V12
0x2F3A	12091	R	V	INT16U	0–1200	E	E/P/H	X	Maximum RMS phase-to-phase voltage V23
0x2F3B	12092	R	V	INT16U	0–1200	E	E/P/H	X	Maximum RMS phase-to-phase voltage V31
0x2F3C	12093	R	V	INT16U	0–1200	E	E/P/H	X	Maximum RMS phase-to-neutral voltage V1N [1]
0x2F3D	12094	R	V	INT16U	0–1200	E	E/P/H	X	Maximum RMS phase-to-neutral voltage V2N [1]
0x2F3E	12095	R	V	INT16U	0–1200	E	E/P/H	X	Maximum RMS phase-to-neutral voltage V3N [1]
(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral voltage transformer (ENVT).									

Power Factor

The sign for the fundamental power factor (cosϕ) depends on the MicroLogic configuration.

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2F3F	12096	R	0.01	INT16	-100–+100	E	E/P/H	X	Power factor on phase 1: PF1 [1]
0x2F40	12097	R	0.01	INT16	-100–+100	E	E/P/H	X	Power factor on phase 2: PF2 [1]
0x2F41	12098	R	0.01	INT16	-100–+100	E	E/P/H	X	Power factor on phase 3: PF3 [1]
0x2F42	12099	R	0.01	INT16	-100–+100	E	E/P/H	X	Total power factor: PF
0x2F43	12100	R	0.01	INT16	-100–+100	E	H	X	Fundamental power factor on phase 1: cosϕ1 [1]
0x2F44	12101	R	0.01	INT16	-100–+100	E	H	X	Fundamental power factor on phase 2: cosϕ2 [1]
0x2F45	12102	R	0.01	INT16	-100–+100	E	H	X	Fundamental power factor on phase 3: cosϕ3 [1]
0x2F46	12103	R	0.01	INT16	-100–+100	E	H	X	Total fundamental power factor: cosϕ
(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral voltage transformer (ENVT).									

Total Harmonic Distortion (THD)

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2F47	12104	R	0.1 %	INT16U	0–5000	E	H	X	Total harmonic distortion of V12 compared to the fundamental
0x2F48	12105	R	0.1 %	INT16U	0–5000	E	H	X	Total harmonic distortion of V23 compared to the fundamental
0x2F49	12106	R	0.1 %	INT16U	0–5000	E	H	X	Total harmonic distortion of V31 compared to the fundamental
0x2F4A	12107	R	0.1 %	INT16U	0–5000	E	H	X	Total harmonic distortion of V1N compared to the fundamental [1]
0x2F4B	12108	R	0.1 %	INT16U	0–5000	E	H	X	Total harmonic distortion of V2N compared to the fundamental [1]
0x2F4C	12109	R	0.1 %	INT16U	0–5000	E	H	X	Total harmonic distortion of V3N compared to the fundamental [1]
0x2F4D	12110	R	0.1 %	INT16U	0–5000	E	H	X	Total harmonic distortion of I1 compared to the fundamental
0x2F4E	12111	R	0.1 %	INT16U	0–5000	E	H	X	Total harmonic distortion of I2 compared to the fundamental
0x2F4F	12112	R	0.1 %	INT16U	0–5000	E	H	X	Total harmonic distortion of I3 compared to the fundamental
0x2F50	12113	R	0.1 %	INT16U	0–5000	E	H	X	Total harmonic distortion of total current compared to the fundamental
(1) This value cannot be accessed for motor applications and in cases of three-pole circuit breakers without external neutral voltage transformer (ENVT).									

Counters

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Description
0x2F7F	12160	R	–	INT16U	0–32766	A/E	A/E/P/H	X	Trip counter
0x2F80	12161	R	–	INT16U	0–32766	A/E	A/E/P/H	X	Counter of alarms with priority level = 3 (high)
0x2F81	12162	R	–	INT16U	0–32766	A/E	A/E/P/H	X	Counter of alarms with priority level = 2 (medium)
0x2F82	12163	R	–	INT16U	0–32766	A/E	A/E/P/H	X	Counter of alarms with priority level = 1 (low)

Miscellaneous

Address	Register	RW	Unit	Type	Range	A/E	A/E/P/H	X	Bit	Description
0x2F83	12164	R	–	INT16U	–	A/E	A/E/P/H	X	–	Validity of the breaker close inhibit
									0	Validity of the breaker close inhibit by IO module
									1	Validity of the breaker close inhibit by remote controller
									2–15	Reserved
0x2F84	12165	R	–	INT16U	–	A/E	A/E/P/H	X	–	Status of the breaker close inhibit
									0	Status of the breaker close inhibit by IO module
									1	Status of the breaker close inhibit by remote controller
									2–15	Reserved
0x2F85–0x2FA7	12166–12200	–	–	–	–	–	–	–	–	Reserved

MicroLogic 5, 6, and 7 Trip Unit Data for ComPacT NSX Circuit Breakers

What's in This Part

MicroLogic 5, 6, and 7 Trip Unit Registers

What's in This Chapter

Real-Time Measurements

General Description

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

- Voltage and voltage unbalance
- Current and current unbalance
- Active, reactive, apparent, and distortion power
- Reactive power with harmonic
- Power factor and fundamental power factor
- Frequency
- THD (total harmonic distortion)

Voltage

Register = 0 if voltage < 25 V.

Address	Register	RW	X	Unit	Type	Range	Description
0x03E7	1000	R	1	V	INT16U	0–850	RMS phase-to-phase voltage V12
0x03E8	1001	R	1	V	INT16U	0–850	RMS phase-to-phase voltage V23
0x03E9	1002	R	1	V	INT16U	0–850	RMS phase-to-phase voltage V31
0x03EA	1003	R	1	V	INT16U	0–850	RMS phase-to-neutral voltage V1N [1]
0x03EB	1004	R	1	V	INT16U	0–850	RMS phase-to-neutral voltage V2N [1]
0x03EC	1005	R	1	V	INT16U	0–850	RMS phase-to-neutral voltage V3N [1]
0x03ED	1006	R	1	V	INT16U	0–850	Arithmetic mean of V12, V23, and V31: $(V12 + V23 + V31) / 3 = V_{avg}$ L-L
0x03EE	1007	R	1	V	INT16U	0–850	Arithmetic mean of V1N, V2N, and V3N: $(V1N + V2N + V3N) / 3 = V_{avg}$ L-N [1]
0x0478	1145	R	1	V	INT16U	0–850	Vmax: maximum of V12, V23, and V31 [2]
0x0479	1146	R	1	V	INT16U	0–850	Vmin: minimum of V12, V23, and V31 [2]

(1) This value is not available for motor application and not accessible when the system type in register 3314 is 30 or 31. Refer to System Type, page 175.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 200.

Voltage Unbalance

Address	Register	RW	X	Unit	Type	Range	Description
0x03EF	1008	R	10	%	INT16U	-1000–+1000	V12 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages
0x03F0	1009	R	10	%	INT16U	-1000–+1000	V23 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages
0x03F1	1010	R	10	%	INT16U	-1000–+1000	V31 phase-to-phase voltage unbalance in relation to the arithmetic mean of phase-to-phase voltages
0x03F2	1011	R	10	%	INT16U	-1000–+1000	V1N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages [1]

Address	Register	RW	X	Unit	Type	Range	Description
0x03F3	1012	R	10	%	INT16U	-1000–+1000	V2N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages [1]
0x03F4	1013	R	10	%	INT16U	-1000–+1000	V3N phase-to-neutral voltage unbalance in relation to the arithmetic mean of phase-to-neutral voltages [1]
0x03F5	1014	R	10	%	INT16U	-1000–+1000	Maximum phase-to-phase voltage unbalance value of registers 1008, 1009, and 1010 [2]
0x03F6	1015	R	10	%	INT16U	-1000–+1000	Maximum phase-to-neutral voltage unbalance value of registers 1011, 1012, and 1013 [1][2]

(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 175.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 200.

Current

Address	Register	RW	X	Unit	Type	Range	Description
0x03F7	1016	R	1	A	INT16U	0–20xIn	RMS current on phase 1: I1
0x03F8	1017	R	1	A	INT16U	0–20xIn	RMS current on phase 2: I2
0x03F9	1018	R	1	A	INT16U	0–20xIn	RMS current on phase 3: I3
0x03FA	1019	R	1	A	INT16U	0–20xIn	RMS current on the neutral: IN [1]
0x03FB	1020	R	1	A	INT16U	0–20xIn	Maximum of I1, I2, I3, and IN [2]
0x03FC	1021	R	1	%Ig	INT16U	0–20xIn	Ground-fault current
0x03FD	1022	R	1	mA	INT16U	0–20xIn	Earth-leakage current
0x0401	1026	R	1	A	INT16U	0–20xIn	Minimum of I1, I2, and I3 [2]
0x0402	1027	R	1	A	INT16U	0–20xIn	Arithmetic mean of I1, I2, and I3: (I1 + I2 + I3) / 3 = I_{avg}

(1) This value is not available for motor application and when the system type in register 3314 is 31 or 40. Refer to System Type, page 175.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 200.

Current Unbalance

Address	Register	RW	X	Unit	Type	Range	Description
0x0403	1028	R	10	%	INT16	-1000–+1000	I1 current unbalance in relation to the arithmetic mean of the phase currents
0x0404	1029	R	10	%	INT16	-1000–+1000	I2 current unbalance in relation to the arithmetic mean of the phase currents
0x0405	1030	R	10	%	INT16	-1000–+1000	I3 current unbalance in relation to the arithmetic mean of the phase currents
0x0406	1031	R	10	%	INT16	-1000–+1000	IN current unbalance in relation to the arithmetic mean of the phase current [1]
0x0407	1032	R	10	%	INT16	-1000–+1000	Maximum current unbalance of registers 1028, 1029, and 1030 [2]

(1) This value is not available for motor application and when the system type in register 3314 is 31 or 40. Refer to System Type, page 175.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 200.

Active Power

The flow sign of the active power depends on the configuration of register 3316. Refer to Power Flow Sign, page 176.

Address	Register	RW	X	Unit	Type	Range	Description
0x0409	1034	R	10	kW	INT16	-10000–+10000	Active power on phase 1: P1 [1]
0x040A	1035	R	10	kW	INT16	-10000–+10000	Active power on phase 2: P2 [1]
0x040B	1036	R	10	kW	INT16	-10000–+10000	Active power on phase 3: P3 [1]
0x040C	1037	R	10	kW	INT16	-30000–+30000	Total active power: Ptot
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 175.							

Reactive Power

The flow sign of the reactive power depends on the configuration of register 3316 , page 176.

Address	Register	RW	X	Unit	Type	Range	Description
0x040D	1038	R	10	kVAR	INT16	-10000–+10000	Reactive power on phase 1: Q1 [1]
0x040E	1039	R	10	kVAR	INT16	-10000–+10000	Reactive power on phase 2: Q2 [1]
0x040F	1040	R	10	kVAR	INT16	-10000–+10000	Reactive power on phase 3: Q3 [1]
0x0410	1041	R	10	kVAR	INT16	-30000–+30000	Total reactive power: Qtot
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 175.							

Apparent Power

Address	Register	RW	X	Unit	Type	Range	Description
0x0411	1042	R	10	kVAR	INT16	0–10000	Apparent power on phase 1: S1 [1]
0x0412	1043	R	10	kVAR	INT16	0–10000	Apparent power on phase 2: S2 [1]
0x0413	1044	R	10	kVAR	INT16	0–10000	Apparent power on phase 3: S3 [1]
0x0414	1045	R	10	kVAR	INT16	0–30000	Total apparent power: Stot
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 175.							

Power Factor

The sign of the power factor depends on the configuration of register 3318 , page 176.

Address	Register	RW	X	Unit	Type	Range	Description
0x0415	1046	R	100	–	INT16	-100–+100	Power factor on phase 1: PF1 [1]
0x0416	1047	R	100	–	INT16	-100–+100	Power factor on phase 2: PF2 [1]
0x0417	1048	R	100	–	INT16	-100–+100	Power factor on phase 3: PF3 [1]
0x0418	1049	R	100	–	INT16	-100–+100	Total power factor: PF
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 175.							

Fundamental Power Factor (cosφ)

The sign of the fundamental power factor (cosϕ) depends on the configuration of register 3318 , page 176.

Address	Register	RW	X	Unit	Type	Range	Description
0x0419	1050	R	100	–	INT16	-100–+100	Fundamental power factor on phase 1: cosϕ 1 [1]
0x041A	1051	R	100	–	INT16	-100–+100	Fundamental power factor on phase 2: cosϕ 2 [1]
0x041B	1052	R	100	–	INT16	-100–+100	Fundamental power factor on phase 3: cosϕ 3 [1]
0x041C	1053	R	100	–	INT16	-100–+100	Total fundamental power factor: cosφ
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 175.							

Frequency

When the MicroLogic trip unit cannot calculate the frequency, it returns Not Evaluated = 32768 (0x8000).

Address	Register	RW	X	Unit	Type	Range	Description
0x041D	1054	R	10	Hz	INT16U	150–4400	System frequency: F

Fundamental Reactive Power

The flow sign of the reactive power depends on the configuration of register 3316 , page 176.

Address	Register	RW	X	Unit	Type	Range	Description
0x0437	1080	R	10	kVAR	INT16	-10000–+10000	Fundamental reactive power on phase 1: Q1 Fund [1]
0x0438	1081	R	10	kVAR	INT16	-10000–+10000	Fundamental reactive power on phase 2: Q2 Fund [1]
0x0439	1082	R	10	kVAR	INT16	-10000–+10000	Fundamental reactive power on phase 3: Q3 Fund [1]
0x043A	1083	R	10	kVAR	INT16	-10000–+10000	Total fundamental reactive power: Qtot Fund
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 175.							

Distortion Power

Address	Register	RW	X	Unit	Type	Range	Description
0x043F	1088	R	10	kVAR	INT16U	0–10000	Distortion power on phase 1: D1 [1]
0x0440	1089	R	10	kVAR	INT16U	0–10000	Distortion power on phase 2: D2 [1]
0x0441	1090	R	10	kVAR	INT16U	0–10000	Distortion power on phase 3: D3 [1]
0x0442	1091	R	10	kVAR	INT16U	0–10000	Total distortion power: Dtot
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 175.							

Total Harmonic Distortion (THD)

Address	Register	RW	X	Unit	Type	Range	Description
0x0443	1092	R	10	%	INT16U	0–32766	Total harmonic distortion of V12 in relation to the fundamental
0x0444	1093	R	10	%	INT16U	0–32766	Total harmonic distortion of V23 in relation to the fundamental
0x0445	1094	R	10	%	INT16U	0–32766	Total harmonic distortion of V31 in relation to the fundamental
0x0446	1095	R	10	%	INT16U	0–32766	Total harmonic distortion of V1N in relation to the fundamental [1]
0x0447	1096	R	10	%	INT16U	0–32766	Total harmonic distortion of V2N in relation to the fundamental [1]
0x0448	1097	R	10	%	INT16U	0–32766	Total harmonic distortion of V3N in relation to the fundamental [1]
0x0449	1098	R	10	%	INT16U	0–32766	Total harmonic distortion of I1 in relation to the fundamental
0x044A	1099	R	10	%	INT16U	0–32766	Total harmonic distortion of I2 in relation to the fundamental
0x044B	1100	R	10	%	INT16U	0–32766	Total harmonic distortion of I3 in relation to the fundamental
(1) This value is not available for motor application and when the system type in register 3314 is 30 or 31. Refer to System Type, page 175.							

Thermal Image of Motor

Address	Register	RW	X	Unit	Type	Range	Description
0x0477	1144	R	1	%	INT16U	0–32766	Ith image

Minimum/Maximum Values of Real-Time Measurements

Minimum/Maximum Measurements Rule

Minimum and maximum measurements take into account the absolute value of real-time measurements. Therefore the following rule applies:

0<10<200<-400<600<-3800.

In this case:

- The minimum value = 0

- The maximum value = -3800

  NOTE: This rule does not apply for the power factor (PF) and for the fundamental power factor (cosϕ):

  - PFmax (or cosϕ max.) is obtained for the smallest positive value of PF (or cosϕ).

  - PFmin (or cosϕ min.) is obtained for the highest negative value of PF (or cosϕ).

The reset minimum/maximum command (command code = 46728) can reset the content of the minimum/maximum real-time measurement registers.

Minimum of Real-Time Measurements

Registers 1300 to 1599 hold the minimum values of real-time metering parameters:

- The register of the minimum value of a real-time metering parameter is equal to the register of the real-time metering parameter plus 300.

  Examples:

  - Register 1300 holds the minimum value of the phase-to-phase voltage V12 (register 1000).

  - Register 1316 holds the minimum value of the current on phase 1 (register 1016).

- The order of the registers is the same as that of the real-time metering variables.

- The scale factors of the minimum values are the same as those of the real-time metering parameters.

- The minimum values of unbalance current and unbalance voltage are not available.

- The minimum values of Imin (register 1026), Vmax (register 1145), and Vmin (register 1146) are not available.

Maximum of Real-Time Measurements

Registers 1600 to 1899 hold the maximum values of real-time metering parameters:

- The register of the maximum value of a real-time metering parameter is equal to the register of the real-time metering parameter plus 600.

  Examples

  - Register 1600 holds the maximum value of the phase-to-phase voltage V12 (register 1000).

  - Register 1616 holds the maximum value of the current on phase 1 (register 1016).

- The order of the registers is the same as that of the real-time metering variables.

- The scale factors of the maximum values are the same as those of the real-time metering parameters.

- The maximum values of Imin (register 1026), Vmax (register 1145), and Vmin (register 1146) are not available.

Energy Measurements

General Description

The energy measurements are refreshed every second. Energy measurements are saved every hour in the non-volatile memory of the MicroLogic trip unit.

Energy measurements include:

- Active energy Ep

- Reactive energy Eq

- Apparent energy Es

- Active energy counted positively (EpIn) or negatively (EpOut), according to the configuration of register 3316 Power Flow Sign, page 176.

- Reactive energy counted positively (EqIn) or negatively (EqOut), according to the configuration of register 3316 Power Flow Sign, page 176.

- Active energy and reactive energy are accumulated according to the configuration of register 3324 (absolute mode by factory setting) Energy Accumulation Mode, page 176.

The reset minimum/maximum command (command code = 46728) can reset the content of the energy measurement registers, cumulative energy measurements excepted.

> **NOTE:** The power flow sign configuration command (command code =47240) can reset the content of the energy measurement registers excluding the cumulative energy measurements.

Energy Registers

Energies are stored in big-endian format: The most significant word is transmitted first and the least significant second.

Examples:

If Ep = 7589 kWh, then:

- Register 2000 = 0 (0x0000)

- Register 2001 = 7589 (0x1DA5)

If Ep = 4,589,625 kWh, then:

- Register 2000 = 70 (0x0046)

- Register 2001 = 2105 (0x0839)

4589625 = 70x65536 + 2105

Address	Register	RW	X	Unit	Type	Range	Description
0x07CF– 0x07D0	2000– 2001	R	1	kWh	INT32	-1 999 999 999–+1 999 999 999	Active energy: Ep
0x07D3– 0x07D4–	2004– 2005	R	1	kVARh	INT32	-1 999 999 999–+1 999 999 999	Reactive energy: Eq
0x07D7– 0x07D8	2008– 2009	R	1	kWh	INT32	0–1 999 999 999	Active energy counted positively: EpIn
0x07DB– 0x07DC	2012– 2013	R	1	kWh	INT32	0–1 999 999 999	Active energy counted negatively: EpOut
0x07DF– 0x07E0	2016– 2017	R	1	kVARh	INT32	0–1 999 999 999	Reactive energy counted positively: EqIn
0x07E3– 0x07E4	2020– 2021	R	1	kVARh	INT32	0–1 999 999 999	Reactive energy counted negatively: EqOut

Address	Register	RW	X	Unit	Type	Range	Description
0x07E7– 0x07E8	2024– 2025	R	1	kVAh	INT32	0–1 999 999 999	Apparent energy: Es
0x07EB– 0x07EC	2028– 2029	R	1	kWh	INT32	0–1 999 999 999	Cumulative active energy counted positively (cannot be reset): EpIn
0x07ED– 0x07EE	2030– 2031	R	1	kWh	INT32	0–1 999 999 999	Cumulative active energy counted negatively (cannot be reset): EpOut

Demand Measurements

General Description

Demand registers include:

- Current demand
- Active, reactive, and apparent power demand

The window duration of current demand depends on the configuration of register 3352. Refer to Demand Time, page 176.

The window duration and the window type of power demand depend on the configuration of registers 3354 and 3355. Refer to Demand Time, page 176.

The demand measurements are refreshed every minute with the sliding window type.

The demand measurements are refreshed at the end of the window interval with the block window type.

Current Demand

Address	Register	RW	X	Unit	Type	Range	Description
0x0897	2200	R	1	A	INT16U	0–20xIn	Current demand on phase 1: I1 Dmd
0x0898	2201	R	1	A	INT16U	0–20xIn	Current demand on phase 2: I2 Dmd
0x0899	2202	R	1	A	INT16U	0–20xIn	Current demand on phase 3: I3 Dmd
0x089A	2203	R	1	A	INT16U	0–20xIn	Current demand on the neutral: IN Dmd [1]
0x089B	2204	R	1	A	INT16U	0–20xIn	Maximum of current demand on phase 1: I1 Peak Dmd [2]
0x089C	2205	R	1	A	INT16U	0–20xIn	Maximum of current demand on phase 2: I2 Peak Dmd [2]
0x089D	2206	R	1	A	INT16U	0–20xIn	Maximum of current demand on phase 3: I3 Peak Dmd [2]
0x089E	2207	R	1	A	INT16U	0–20xIn	Maximum of current demand on the neutral: IN Peak Dmd [1] [2]

(1) This value is not available when the system type in register 3314 is 31 or 40. Refer to System Type, page 175.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 200.

Active Power Demand

Address	Register	RW	X	Unit	Type	Range	Description
0x08AF	2224	R	10	kW	INT16	-30000–+30000	Total active power demand: P Dmd [1]
0x08B0	2225	R	10	kW	INT16	-30000–+30000	Maximum of total active power demand: P Peak Dmd [2]

(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every minute.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 200.

Reactive Power Demand

Address	Register	RW	X	Unit	Type	Range	Description
0x08B5	2230	R	10	kVAR	INT16	-30000–+30000	Total reactive power demand: Q Dmd [1]
0x08B6	2231	R	10	kVAR	INT16	-30000–+30000	Maximum of total reactive power demand: Q Peak Dmd [2]

(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every minute.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 200.

Apparent Power Demand

Address	Register	RW	X	Unit	Type	Range	Description
0x08BB	2236	R	10	kVA	INT16	0–30000	Total apparent power demand: S Dmd [1]
0x08BC	2237	R	10	kVA	INT16	0–30000	Maximum of total apparent power demand: S Peak Dmd [2]

(1) For the block window type, this value is updated at the end of the window interval. For the sliding window type, the value is updated every minute.

(2) This value can be reset with the reset minimum/maximum command. Refer to Reset Minimum/Maximum, page 200.

Minimum/Maximum Measurements Reset Time

Overview

The minimum/maximum measurements reset time registers enable the user to know all the dates relative to the last reset minimum/maximum command.

The reset minimum/maximum command (command code 46728) can reset the content of the minimum/maximum measurements registers.

A read request of 30 registers is necessary to read the minimum/maximum measurements reset time.

Minimum/Maximum Measurements Reset Time

Address	Register	RW	X	Unit	Type	Range	Description
0x0B53–0x0B55	2900–2902	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum current , page 90
0x0B56–0x0B58	2903–2905	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum voltage.
0x0B59–0x0B5B	2906–2908	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum power (P, Q, S).
0x0B5C–0x0B5E	2909–2911	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum power factor and cosϕ.
0x0B5F–0x0B61	2912–2914	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum total harmonic distortion.
0x0B62–0x0B64	2915–2917	R	–	–	ULP DATE	–	Date and time of reset of peak current demand.
0x0B65–0x0B67	2918–2920	R	–	–	ULP DATE	–	Date and time of reset of peak active, reactive, and apparent power demand.
0x0B68–0x0B6A	2921–2923	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum frequency.
0x0B6B–0x0B6D	2924–2926	R	–	–	ULP DATE	–	Date and time of reset of minimum/maximum thermal image of motor.
0x0B6E–0x0B70	2927–2929	R	–	–	ULP DATE	–	Date and time of reset of energy (active, reactive, and apparent).

MicroLogic Trip Unit Identification

Serial Number

The MicroLogic trip unit 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 MicroLogic trip unit serial number.

Address	Register	RW	X	Unit	Type	Range	Description
0x21FB	8700	R	–	–	OCTET STRING	–	'PP'
0x21FC	8701	R	–	–	OCTET STRING	'05'–'99'	'YY'
0x21FD	8702	R	–	–	OCTET STRING	'01'–'52'	'WW'
0x21FE	8703	R	–	–	OCTET STRING	D: '1'–'7' n: '0'–'9'	'Dn'
0x21FF	8704	R	–	–	OCTET STRING	'00'–'99'	'nn'
0x2200	8705	R	–	–	OCTET STRING	'0'–'9'	'n' (the NULL character ends the serial number)

Hardware Revision

For MicroLogic trip units with firmware revision up to V1.2.1, the hardware revision is an integer.

Address	Register	RW	X	Unit	Type	Range	Description
0x2204	8709	R	–	–	INT16U	0–15	Hardware revision of the MicroLogic trip unit.

For MicroLogic trip units with firmware revision greater than or equal to V1.2.2, 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	X	Unit	Type	Range	Description
0x2212–0x2217	8723-8728	R	–	–	OCTET STRING	–	Hardware revision of the MicroLogic trip unit.

Product Identification

Address	Register	RW	X	Unit	Type	Range	Description
0x220B	8716	R	–	–	INT16U	15143–15145	Product identification: • 15143 = distribution application, type A • 15144 = distribution application, type E • 15145 = motor application, type E

Protection Type

Address	Register	RW	X	Unit	Type	Range	Description
0x2223	8740	R	–	–	OCTET STRING	52–73	MicroLogic trip unit protection type: • For ComPacT NSX100/250: '52' = LSI '62' = LSIG '72' = LSIV • For ComPacT NSX400/630: '53' = LSI '63' = LSIG '73' = LSIV

Metering Type

Address	Register	RW	X	Unit	Type	Range	Description
0x2224	8741	R	–	–	OCTET STRING	E	MicroLogic trip unit metering type E

Application

Address	Register	RW	X	Unit	Type	Range	Description
0x222A	8747	R	–	–	INT16U	1–2	Application: 1 = distribution 2 = motor

Standard

Address	Register	RW	X	Unit	Type	Range	Description
0x222B	8748	R	–	–	INT16U	1–3	Standard: 1 = UL 2 = IEC 3 = JIS

Range Variant

Address	Register	RW	X	Unit	Type	Range	Description
0x222C	8749	R	–	–	INT16U	1–4	1 = ComPact NSX 2 = PowerPact H-, J-, and L-Frame 3 = ComPacT NSX – New generation 4 = PowerPacT H-, J-, and L-Frame – New generation

Nominal Current

Address	Register	RW	X	Unit	Type	Range	Description
0x222D	8750	R	1	A	INT16U	0–8000	Circuit breaker nominal current In

Pole

Address	Register	RW	X	Unit	Type	Range	Description
0x222E	8751	R	–	–	INT16U	0–1	0 = 3-pole 1 = 4-pole

16 Hz 2/3

Address	Register	RW	X	Unit	Type	Range	Description
0x222F	8752	R	–	–	INT16U	0–1	0 = not a 16 Hz 2/3 MicroLogic trip unit application 1 = 16 Hz 2/3 MicroLogic trip unit application

Firmware Revision

For MicroLogic trip units with firmware revision up to V1.2.1, the firmware revision is an ASCII string using the format VXXX.YYY.ZZZ with:

- XXX = major version (001-999)

- YYY = minor version (001-999)

- ZZZ = revision number (001-999)

Address	Register	RW	X	Unit	Type	Range	Description
0x7529–0x752D	29994–29998	R	–	–	OCTET STRING	–	Firmware revision of the MicroLogic trip unit.

For MicroLogic trip units with firmware revision greater than or equal to V1.2.2, 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	X	Unit	Type	Range	Description
0x220C–0x2211	8717–8722	R	–	–	OCTET STRING	–	Firmware revision of the MicroLogic trip unit.

Part Number

The MicroLogic part number starts with the character C and has the format, CxxPTEyyy.

A read request of 5 registers is necessary to read the MicroLogic trip unit part number.

For example, the commercial reference of ComPacT NSX100/250 MicroLogic 5.2E is C1035E100.

Address	Register	RW	X	Unit	Type	Range	Description
0x752F	30000	R	–	–	OCTET STRING	–	Example: 'C1'
0x7530	30001	R	–	–	OCTET STRING	–	Example: '03'
0x7531	30002	R	–	–	OCTET STRING	–	Example: '5E'
0x7532	30003	R	–	–	OCTET STRING	–	Example: '10'
0x7533	30004	R	–	–	OCTET STRING	–	Example: '0'

Status

Alarms Status

The alarms status register indicates the current status of the alarms:

- Alarm bit = 0: Alarm is not active.
- Alarm bit = 1: Alarm is active.

The following table describes the values for each bit of the alarm status register:

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x1647	5704	R	–	–	INT16U	–	–	Alarm status
							0	User-defined alarm 201
							1	User-defined alarm 202
							2	User-defined alarm 203
							3	User-defined alarm 204
							4	User-defined alarm 205
							5	User-defined alarm 206
							6	User-defined alarm 207
							7	User-defined alarm 208
							8	User-defined alarm 209
							9	User-defined alarm 210
							10	Long-time protection Ir pre-alarm (PAL Ir)
							11	Earth-leakage protection IΔn pre-alarm (PAL IΔn)
							12	Ground-fault protection Ig pre-alarm (PAL Ig)
							13–15	Reserved

SDx Module Status

The SDx module status register indicates the status and the validity of the SDx outputs (2 outputs maximum):

- Status bit = 0: The output is open.
- Status bit = 1: The output is closed.
- Validity bit = 0: The output status is unknown.
- Validity bit = 1: The output status is known.

The following table describes the values for each bit of the SDx module status register:

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x2298	8857	R	–	–	INT16U	–	–	SDx module status
							0	Status of output 1
							1	Status of output 2
							2–7	Reserved
							8	Validity of output 1
							9	Validity of output 2
							10–15	Reserved

Trip Status

The trip status register indicates the current status of the trip:

- Trip bit = 0: Trip is not active.
- Trip bit = 1: Trip is active.

The following table describes the values for each bit of the trip status register:

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x270F	10000	R	–	–	INT16U	–	–	Trip status
							0	Long-time protection Ir
							1	Short-time protection Isd
							2	Instantaneous protection Ii
							3	Ground-fault protection Ig
							4	Earth-leakage protection IΔn
							5	Integrated instantaneous protection
							6	Trip unit internal failure (STOP)
							7	Instantaneous with earth-leakage protection
							8	Unbalance motor protection Iunbal
							9	Jam motor protection Ijam
							10	Underload motor protection Iunderload
							11	Long-start motor protection Ilongstart
							12	Reflex tripping protection
							13–15	Reserved

Alarm History

General Description

The alarm history registers describe the last 10 alarms. The alarm history format corresponds to a series of 10 records. Each record is composed of 5 registers describing one alarm.

The alarm history registers return 32768 (0x8000) when they are not used.

Record Number

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

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

- The first 5 registers describe the first alarm record (most recent alarm).
- The next 5 registers describe the second alarm record.
- The last 5 registers describe the third alarm record.

Address	Register	Description
0x1663–0x1667	5732–5736	Alarm record 1 (most recent alarm)
0x1668–0x166C	5737–5741	Alarm record 2
0x166D–0x1671	5742–5746	Alarm record 3
0x1672–0x1676	5747–5751	Alarm record 4
0x1677–0x167B	5752–5756	Alarm record 5
0x167C–0x1680	5757–5761	Alarm record 6
0x1681–0x1685	5762–5766	Alarm record 7
0x1686–0x168A	5767–5771	Alarm record 8
0x168B–0x168F	5772–5776	Alarm record 9
0x1690–0x1694	5777–5781	Alarm record 10 (oldest alarm)

Alarm Record

A read request of 5 registers is necessary to read an alarm record.

The order and the description of the alarm records registers are the same as that of the alarm record 1:

Alarm Record 1 (Most Recent Alarm)							
Address	Register	RW	X	Unit	Type	Range	Description
0x1663	5732	R	1	–	INT16U	0–65535	Alarm code (see next paragraph)
0x1664–0x1666	5733–5735	R	–	–	ULP DATE	–	Date and time of alarm , page 90
0x1667	5736	R	1	–	INT16U	1–2	Event type MSB = 0 (reserved) Event occurrence: LSB = 1 Event completion: LSB = 2

Alarm Codes

Alarm Code	Description
201 (0x00C8)	User-defined alarm 201
202 (0x00C9)	User-defined alarm 202
203 (0x00CA)	User-defined alarm 203
204 (0x00CB)	User-defined alarm 204
205 (0x00CC)	User-defined alarm 205
206 (0x00CD)	User-defined alarm 206
207 (0x00CE)	User-defined alarm 207
208 (0x00CF)	User-defined alarm 208
209 (0x00D0)	User-defined alarm 209
210 (0x00D1)	User-defined alarm 210
1013 (0x03F4)	Long-time protection Ir pre-alarm (PAL Ir)
1014 (0x03F5)	Ground-fault protection Ig pre-alarm (PAL Ig)
1015 (0x03F6)	Earth-leakage protection IΔn pre-alarm (PAL IΔn)
The list of the predefined alarms from which the user can choose the 10 user-defined alarms is available at User-Defined Alarms, page 166.	

Trip History

General Description

The trip history registers describe the last 17 trips. The trip history format corresponds to a series of 17 records. Each record is composed of 7 registers describing one trip.

The trip history registers return 32768 (0x8000) when they are not used.

Trip Record Number

A read request of 7x(n) registers is necessary to read the last n trip records, where 7 is the number of registers for each trip record.

For example, a read request of 7 x 4 = 28 registers is necessary to read the last 4 trip records of the trip history:

- The first 7 registers describe the first trip record (most recent trip).
- The next 7 registers describe the second trip record.
- The last 7 registers describe the third trip record.
- The last 7 registers describe the fourth trip record.

Address	Register	Description
0x238B–0x2391	9100–9106	Trip record 1 (most recent trip)
0x2392–0x2398	9107–9113	Trip record 2
0x2399–0x239F	9114–9120	Trip record 3
0x23A0–0x23A6	9121–9127	Trip record 4
0x23A7–0x23AD	9128–9134	Trip record 5
0x23AE–0x23B4	9135–9141	Trip record 6
0x23B5–0x23BB	9142–9148	Trip record 7
0x23BC–0x23C2	9149–9155	Trip record 8
0x23C3–0x23C9	9156–9162	Trip record 9
0x23CA–0x23D0	9163–9169	Trip record 10
0x23D1–0x23D7	9170–9176	Trip record 11
0x23D8–0x23DE	9177–9183	Trip record 12
0x23DF–0x23E5	9184–9190	Trip record 13
0x23E6–0x23EC	9191–9197	Trip record 14
0x23ED–0x23F3	9198–9204	Trip record 15
0x23F4–0x23FA	9205–9211	Trip record 16
0x23FB–0x2401	9212–9218	Trip record 17 (oldest trip)

Trip Record

A read request of 7 registers is necessary to read a trip record.

The order and the description of the trip record registers are the same as that of the trip record 1:

Trip Record 1 (Most Recent Trip)							
Address	Register	RW	X	Unit	Type	Range	Description
0x238B	9100	R	1	–	INT16U	0–65535	Trip code (see next paragraph)
0x238C– 0x238E	9101– 9103	R	–	–	ULP DATE	–	Date and time of event (trip or acknowledge , page 90
0x238F	9104	R	1	–	INT16U	1–2	Event type MSB = 0 (reserved) Event occurrence: LSB = 1 Event completion: LSB = 2
0x2390	9105	R	1	–	INT16U	0–5	Faulty phase 0 = failure (no faulty phase) 1 = phase 1 2 = phase 2 3 = phase 3 4 = phase N 5 = phase 1 2 3 (motor application, ground-fault, earth-leakage)
0x2391	9106	R	1	A	INT16U	0–65535	Interrupted current (peak) [1]
(1) Measurement depends on the application:							
• For electrical distribution application, the interrupted current is measured when a trip occurs, due to the long-time protection, the short-time protection, or the instantaneous protection.							
• For motor-feeder application, the interrupted current is measured when a trip occurs, due to the short-time protection.							
• In case of other trip types, the interrupted current is not measured and the value recorded is 65535 (0xFFFF).							

Trip Codes

Trip Code	Description
1000 (0x03E8)	Long-time protection Ir
1001 (0x03E9)	Short-time protection Isd
1002 (0x03EA)	Instantaneous protection Ii
1003 (0x03EB)	Ground-fault protection Ig
1004 (0x03EC)	Earth-leakage protection IΔn
1005–1009 (0x03ED–0x03F1)	Reserved
1010 (0x03F2)	Integrated instantaneous protection
1011 (0x03F3)	STOP (trip unit internal failure)
1012 (0x03F4)	Instantaneous with earth-leakage protection
1013–1031 (0x03F5–0x0407)	Reserved
1032 (0x0408)	Unbalance motor protection
1033 (0x0409)	Jam motor protection
1034 (0x040A)	Underload motor protection

Trip Code	Description
1035 (0x040B)	Long-start motor protection
1036 (0x040C)	Reflex tripping protection

Earth-Leakage Test History

General Description

The earth-leakage test history registers describe the last 10 earth-leakage tests performed on a MicroLogic 7 trip unit. The earth-leakage test history format corresponds to a series of 10 records. Each record is composed of 5 registers describing one earth-leakage test.

The earth-leakage test history registers return 32768 (0x8000) when they are not used.

Earth-Leakage Test Number

A read request of 5 x n registers is necessary to read the last n earth-leakage test records, where 5 is the number of registers for each earth-leakage test record.

For example, a read request of 5 x 2 = 10 registers is necessary to read the last 2 earth-leakage test records of the earth-leakage test history:

- The first 5 registers describe the first earth-leakage test record (most recent earth-leakage test).
- The last 5 registers describe the second earth-leakage test record.

Address	Register	Description
0x7593–0x7597	30100-30104	Earth-leakage test record (most recent earth-leakage test)
0x7598–0x759C	30105–30109	Earth-leakage test record 2
0x759D–0x75A1	30110–30114	Earth-leakage test record 3
0x75A2–0x75A6	30115–30119	Earth-leakage test record 4
0x75A7–0x75AB	30120–30124	Earth-leakage test record 5
0x75AC–0x75B0	30125–30129	Earth-leakage test record 6
0x75B1–0x75B5	30130–30134	Earth-leakage test record 7
0x75B6–0x75BA	30135–30139	Earth-leakage test record 8
0x75BB–0x75BF	30140–30144	Earth-leakage test record 9
0x75C0–0x75C4	30145–30149	Earth-leakage test record 10 (oldest earth-leakage test)

Earth-Leakage Test Record

A read request of 5 registers is necessary to read a earth-leakage test record.

The order and the description of the earth-leakage test record registers are the same as that of the earth-leakage test record 1:

Earth-Leakage Test Record 1 (Most Recent Earth-Leakage Test)							
Address	Register	RW	X	Unit	Type	Range	Description
0x7593	30100	R	1	–	INT16U	0–65535	Earth-leakage test code (see next section.)
0x7594– 0x7596	30101– 30103	R	–	–	ULP DATE	–	Date and time of earth-leakage test. , page 90
0x7597	30104	R	–	–	INT16U	0–1	Test status • 0: test succeeded • 1: test failed

Earth-Leakage Test Codes

Earth-Leakage Test Code	Description
5162 (0x142A)	Earth-leakage test by button
5163 (0x142B)	Earth-leakage test by HMI

Maintenance Operation History

General Description

The maintenance operation history registers describe the last 10 maintenance operations. The maintenance operation history format corresponds to a series of 10 records. Each record is composed of 5 registers describing one maintenance operation.

The maintenance operation history registers return 32768 (0x8000) when they are not used.

Maintenance Operation Number

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

For example, a read request of 5 x 2 = 10 registers is necessary to read the last 2 maintenance operation records of the maintenance operation history:

- The first 5 registers describe the first maintenance operation record (most recent maintenance operation).
- The last 5 registers describe the second maintenance operation record.

Address	Register	Description
0x733B–0x733F	29500–29504	Maintenance operation record 1 (most recent maintenance operation)
0x7340–0x7344	29505–29509	Maintenance operation record 2
0x7345–0x7349	29510–29514	Maintenance operation record 3
0x734A–0x734E	29515–29519	Maintenance operation record 4
0x734F–0x7353	29520–29524	Maintenance operation record 5
0x7354–0x7358	29525–29529	Maintenance operation record 6
0x7359–0x735D	29530–29534	Maintenance operation record 7
0x735E–0x7362	29535–29539	Maintenance operation record 8
0x7363–0x7367	29540–29544	Maintenance operation record 9
0x7368–0x736C	29545–29549	Maintenance operation record 10 (oldest maintenance operation)

Maintenance Operation Record

A read request of 5 registers is necessary to read a maintenance operation record.

The order and the description of the maintenance operation record registers are the same as that of the maintenance operation record 1:

Maintenance Operation Record 1 (Most Recent Maintenance Operation)							
Address	Register	RW	X	Unit	Type	Range	Description
0x733B	29500	R	1	–	INT16U	0–65535	Maintenance operation code (see next paragraph)
0x733C– 0x733E	29501– 29503	R	–	–	ULP DATE	–	Date and time of maintenance operation , page 90
0x733F	29504	–	–	–	–	–	Reserved

Maintenance Operation Codes

Maintenance Operation Code	Description
2000 (0x07D0)	Push to trip test (with USB maintenance interface)
2001 (0x07D1)	Ground-fault inhibition
2002 (0x07D2)	Reserved
2003 (0x07D3)	Start numerical injection test
2004 (0x07D4)	End numerical injection test
2005 (0x07D5)	Ground-fault test
2006 (0x07D6)	Earth-leakage test
2007 (0x07D7)	Start alarm test
2008 (0x07D8)	End alarm test
2009 (0x07D9)	Start long-time protection
2010 (0x07DA)	End long-time protection
2011 (0x07DB)	Start short-time protection
2012 (0x07DC)	End short-time protection
2013 (0x07DD)	Start instantaneous protection
2014 (0x07DE)	Stop instantaneous protection
2015 (0x07DF)	Start integrated instant protection
2016 (0x07E0)	Stop integrated instant protection
2017 (0x07E1)	Start unbalance protection
2018 (0x07E2)	Stop unbalance protection
2019 (0x07E3)	Start ground-fault protection
2020 (0x07E4)	Stop ground-fault protection
2021 (0x07E5)	Start earth-leakage protection
2022 (0x07E6)	Stop earth-leakage protection
2023 (0x07E7)	Start thermal memory
2024 (0x07E8)	Stop thermal memory
2025 (0x07E9)	Start connection with USB maintenance interface
2026 (0x07EA)	Stop connection with USB maintenance interface
2027 (0x07EB)	Turn rotary wheel 1
2028 (0x07EC)	Turn rotary wheel 2
2029 (0x07ED)	Locking pad open
2030 (0x07EE)	Locking pad closed
2031 (0x07EF)	ZSI test
2032 (0x07F0)	Reserved
2033 (0x07F1)	Reset software
2034 (0x07F2)	Reset minimum/maximum of current measurements
2035 (0x07F3)	Reset minimum/maximum of voltage measurements
2036 (0x07F4)	Reset minimum/maximum of power measurements
2037 (0x07F5)	Reset minimum/maximum of power factor measurements
2038 (0x07F6)	Reset minimum/maximum of total harmonic distortion measurements
2039 (0x07F7)	Reset maximum of current demand measurement

Maintenance Operation Code	Description
2040 (0x07F8)	Reset maximum of power demand (active, reactive, and apparent)
2041 (0x07F9)	Reset minimum/maximum of frequency measurement
2042 (0x07FA)	Reset minimum/maximum of thermal image measurements
2043 (0x07FB)	Reset energy measurements
2044 (0x07FC)	Reset energy counter
2045 (0x07FD)	Phase rotation setting

Pre-Alarms

General Description

EcoStruxure Power Commission software, page 20 enables the configuration of the following 3 pre-alarms:

- Long-time protection pre-alarm (PAL Ir)

- Ground-fault protection pre-alarm (PAL Ig)

- Earth-leakage protection pre-alarm (PAL IΔn)

Each alarm has a corresponding alarm code:

- PAL Ir = 1013

- PAL Ig = 1014

- PAL IΔn = 1015

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 the user that the alarm is active.

For more information regarding the relationship between alarm priority and FDM121 display, refer to DOCA0188•• *ComPacT NSX MicroLogic 5/6/7 Trip Units – User Guide*, page 10.

The pre-alarms registers describe the settings of the pre-alarms:

Address	Register	Description
0x19F9–0x1A02	6650–6659	Long-time protection pre-alarm (PAL Ir)
0x1A03–0x1A0C	6660–6669	Ground-fault protection pre-alarm (PAL Ig)
0x1A0D–0x1A16	6670–6679	Earth-leakage protection pre-alarm (PAL IΔn)

Long-Time Protection Pre-Alarm (PAL Ir)

A read request of 10 registers is necessary to read the long-time protection pre-alarm parameters.

Address	Register	RW	X	Unit	Type	Range	Description
0x19F9	6650	R	–	–	INT16U	–	The MSB gives the activity of the alarm: 0 = On, 1 = Off. The factory setting is 0 (On). The LSB gives the priority of the alarm: N/A, 1, 2, or 3. The factory setting is 2 (medium priority).
0x19FA	6651	–	–	–	–	–	Reserved
0x19FB	6652	R	1	%	INT16	[1]	% of Ir pick-up value. The factory setting is 90.
0x19FC	6653	–	–	–	–	–	Reserved
0x19FD	6654	R	1	s	INT16U	1	Pick-up time delay (fixed to 1 s)
0x19FE	6655	R	1	%	INT16	[1]	% of Ir drop-out value. The factory setting is 85.
0x19FF	6656	–	–	–	–	–	Reserved
0x1A00	6657	R	1	s	INT16U	1	Drop-out time delay (fixed to 1 s)

Address	Register	RW	X	Unit	Type	Range	Description
0x1A01–0x1A02	6658–6659	–	–	–	–	–	Reserved

(1) For distribution application, the range is 40–100. For motor application, the range is 10–95.

Ground-Fault Protection Pre-Alarm (PAL Ig)

A read request of 10 registers is necessary to read the ground-fault protection pre-alarm parameters.

Address	Register	RW	X	Unit	Type	Range	Description
0x1A03	6660	R	–	–	INT16U	–	The MSB gives the activity of the alarm: 0 = On, 1 = Off. The factory setting is 0 (On). The LSB gives the priority of the alarm: N/A, 1, 2, or 3. The factory setting is 2 (medium priority).
0x1A04	6661	–	–	–	–	–	Reserved
0x1A05	6662	R	1	%	INT16	40–100	% of Ig pick-up value. The factory setting is 90.
0x1A06	6663	–	–	–	–	–	Reserved
0x1A07	6664	R	1	s	INT16U	1	Pick-up time delay (fixed to 1 s)
0x1A08	6665	R	1	%	INT16	40–100	% of Ig drop-out value. The factory setting is 85.
0x1A09	6666	–	–	–	–	–	Reserved
0x1A0A	6667	R	1	s	INT16U	1	Drop-out time delay (fixed to 1 s)
0x1A0B–0x1A0C	6668–6669	–	–	–	–	–	Reserved

Earth-Leakage Protection Pre-Alarm (PAL IΔn)

A read request of 10 registers is necessary to read the earth-leakage protection pre-alarm parameters.

Address	Register	RW	X	Unit	Type	Range	Description
0x1A0D	6670	R	–	–	INT16U	–	The MSB gives the activity of the alarm: 0 = On, 1 = Off. The factory setting is 0 (On). The LSB gives the priority of the alarm: N/A, 1, 2, or 3. The factory setting is 2 (medium priority).
0x1A0E	6671	–	–	–	–	–	Reserved
0x1A0F	6672	R	1	%	INT16	50–80	% of IΔn pick-up value. The factory setting is 90.
0x1A10	6673	–	–	–	–	–	Reserved
0x1A11	6674	R	1	s	INT16U	1	Pick-up time delay (fixed to 1 s)
0x1A12	6675	R	1	%	INT16	50–80	% of IΔn drop-out value. The factory setting is 85.
0x1A13	6676	–	–	–	–	–	Reserved
0x1A14	6677	R	1	s	INT16U	1	Drop-out time delay (fixed to 1 s)
0x1A15–0x1A16	6678–6679	–	–	–	–	–	Reserved

User-Defined Alarms

General Description

EcoStruxure Power Commission software, page 20 enables the configuration of 10 user-defined alarms that can be chosen from a list of 150 predefined alarms.

Each user-defined alarm has a corresponding user-defined alarm number (201–210) and a corresponding alarm code (see next paragraph).

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 the user the alarm is active.

For more information regarding the relationship between alarm priority and FDM121 display, refer to DOCA0188•• *ComPacT NSX MicroLogic 5/6/7 Trip Units – User Guide*, page 10.

The settings of the 10 user-defined alarms are in the user-defined alarms registers:

Address	Register	Description
0x1A71–0x1A7C	6770–6781	User-defined alarm 201
0x1A7D–0x1A88	6782–6793	User-defined alarm 202
0x1A89–0x1A94	6794–6805	User-defined alarm 203
0x1A95–0x1AA0	6806–6817	User-defined alarm 204
0x1AA1–0x1AAC	6818–6829	User-defined alarm 205
0x1AAD–0x1AB8	6830–6841	User-defined alarm 206
0x1AB9–0x1AC4	6842–6853	User-defined alarm 207
0x1AC5–0x1AD0	6854–6865	User-defined alarm 208
0x1AD1–0x1ADC	6866–6877	User-defined alarm 209
0x1ADD–0x1AE8	6878–6889	User-defined alarm 210

User-Defined Alarm Record

A read request of 12 registers is necessary to read a user-defined alarm record.

The order and the description of the user-defined alarms records are the same as that of user-defined alarm record 1:

User-Defined Alarm 201							
Address	Register	RW	X	Unit	Type	Range	Description
0x1A71	6770	R	–	–	INT16U	–	The MSB gives the activity of the alarm: 0 = On, 1 = Off. The factory setting is 1 (Off). The LSB gives the priority of the alarm: N/A, 1, 2, or 3. The factory setting is N/A (no priority).
0x1A72	6771	R	–	–	INT16U	–	Measurement identifier [1]
0x1A73	6772	–	–	–	–	–	Reserved
0x1A74	6773	R	1	[2]	INT16	-32767– +32767	Threshold pick-up value. The factory setting is 0.
0x1A75	6774	–	–	–	–	–	Reserved

User-Defined Alarm 201

Address	Register	RW	X	Unit	Type	Range	Description
0x1A76	6775	R	1	s	INT16U	0–3000	Pick-up time delay. The factory setting is 0.
0x1A77	6776	R	1	(2)	INT16	-32767– +32767	Threshold drop-out value. The factory setting is 0.
0x1A78	6777	–	–	–	–	–	Reserved
0x1A79	6778	R	1	s	INT16	0–3000	Drop-out time delay. The factory setting is 0.
0x1A7A	6779	R	–	–	INT16U	0–3	Operator: 0: ≥, 1: ≤, 2: =, 3: I ≥ I
0x1A7B	6780	R	–	–	INT16U	1–1919	Alarm code, page 167
0x1A7C	6781	–	–	–	–	–	Reserved

(1) The value of the measurement identifier is the register number of the measurement. For example, the measurement identifier of current on phase 1 (I1) is 1016.

(2) The unit of the threshold depends on the measurement identifier. For example, if the measurement identifier is I1, then the unit is A.

Predefined Alarms Codes

The following table describes the list of predefined alarms and corresponding codes from which the user can choose the 10 user-defined alarms and configure them with EcoStruxure Power Commission software.

Alarm Code	Alarm Description
1 (0x0000)	Overcurrent instantaneous phase 1
2 (0x0001)	Overcurrent instantaneous phase 2
3 (0x0002)	Overcurrent instantaneous phase 3
4 (0x0003)	Overcurrent instantaneous neutral
5 (0x0004)	Ground-fault current
6 (0x0005)	Undercurrent instantaneous phase 1
7 (0x0006)	Undercurrent instantaneous phase 2
8 (0x0007)	Undercurrent instantaneous phase 3
9 (0x0008)	Overcurrent unbalance phase 1
10 (0x0009)	Overcurrent unbalance phase 2
11 (0x000A)	Overcurrent unbalance phase 3
12 (0x000B)	Overvoltage (phase 1 to neutral)
13 (0x000C)	Overvoltage (phase 2 to neutral)
14 (0x000D)	Overvoltage (phase 3 to neutral)
15 (0x000E)	Undervoltage (phase 1 to neutral)
16 (0x000F)	Undervoltage (phase 2 to neutral)
17 (0x0010)	Undervoltage (phase 3 to neutral)
18 (0x0011)	Overvoltage unbalance (phase 1 to neutral)
19 (0x0012)	Overvoltage unbalance (phase 2 to neutral)
20 (0x0013)	Overvoltage unbalance (phase 3 to neutral)
21 (0x0014)	Over total apparent power
22 (0x0015)	Over total active power
23 (0x0016)	Over total active reverse power
24 (0x0017)	Over total reactive power

Alarm Code	Alarm Description
25 (0x0018)	Over total reactive reverse power
26 (0x0019)	Under total apparent power
27 (0x001A)	Under total active power
28 (0x001B)	Reserved
29 (0x001C)	Under total reactive power
30 (0x001D)	Reserved
31 (0x001E)	Leading power factor (IEEE)
32 (0x001F)	Reserved
33 (0x001E)	Leading or lagging power factor (IEC)
34 (0x0021)	Lagging power factor (IEEE)
35 (0x0022)	Over total harmonic distortion current phase 1
36 (0x0023)	Over total harmonic distortion current phase 2
37 (0x0024)	Over total harmonic distortion current phase 3
38 (0x0025)	Over total harmonic distortion voltage (phase 1 to neutral)
39 (0x0026)	Over total harmonic distortion voltage (phase 2 to neutral)
40 (0x0027)	Over total harmonic distortion voltage (phase 3 to neutral)
41 (0x0028)	Over total harmonic distortion voltage (phase 1– 2)
42 (0x0029)	Over total harmonic distortion voltage (phase 2– 3)
43 (0x002A)	Over total harmonic distortion voltage (phase 3– 1)
44–53 (0x002B–0x0034)	Reserved
54 (0x0035)	Earth-leakage current
55 (0x0036)	Overcurrent (average)
56 (0x0037)	Over maximum current (I1, I2, I3, or neutral)
57 (0x0038)	Undercurrent instantaneous neutral
58–59 (0x0039–0x003A)	Reserved
60 (0x003B)	Undercurrent (average)
61 (0x003C)	Overcurrent demand phase 1
62 (0x003D)	Overcurrent demand phase 2
63 (0x003E)	Overcurrent demand phase 3
64 (0x003F)	Overcurrent demand neutral
65 (0x0040)	Under minimum current (I1, I2, or I3)
66 (0x0041)	Undercurrent demand phase 1
67 (0x0042)	Undercurrent demand phase 2
68 (0x0043)	Undercurrent demand phase 3
69 (0x0044)	Undercurrent demand neutral
70 (0x0045)	Over maximum current unbalance (I1, I2, or I3)
71 (0x0046)	Overvoltage (phase 1– 2)
72 (0x0047)	Overvoltage (phase 2– 3)
73 (0x0048)	Overvoltage (phase 3– 1)
74 (0x0049)	Reserved
75 (0x004A)	Overvoltage (average)
76 (0x004B)	Undervoltage (phase 1– 2)

Alarm Code	Alarm Description
77 (0x004C)	Undervoltage (phase 2– 3)
78 (0x004D)	Undervoltage (phase 3– 1)
79 (0x004E)	Over maximum voltage
80 (0x004F)	Undervoltage (average)
81 (0x0050)	Under minimum voltage
82 (0x0051)	Over maximum voltage unbalance (phases to neutral)
83–85 (0x0052–0x0054)	Reserved
86 (0x0055)	Overvoltage unbalance (phase 1– 2)
87 (0x0056)	Overvoltage unbalance (phase 2– 3)
88 (0x0057)	Overvoltage unbalance (phase 3– 1)
89 (0x0058)	Over maximum voltage unbalance
90 (0x0059)	Phase sequence
91 (0x005A)	Reserved
92 (0x005B)	Under frequency
93 (0x005C)	Over frequency
94–98 (0x005D–0x0061)	Reserved
99 (0x0062)	Over active power demand
100–120 (0x0063–0x0077)	Reserved
121 (0x0078)	Leading cosϕ (IEEE)
122 (0x0079)	Reserved
123 (0x007A)	Leading or lagging cosϕ (IEC)
124 (0x007B)	Lagging cosϕ (IEEE)
125 (0x007C)	Overcurrent thermal image motor
126 (0x007D)	Undercurrent thermal image motor
127–140 (0x007E–0x008B)	Reserved
141 (0x008C)	Overcurrent maximum demand phase 1
142 (0x008D)	Overcurrent maximum demand phase 2
143 (0x008E)	Overcurrent maximum demand phase 3
144 (0x008F)	Overcurrent maximum demand neutral
145 (0x0090)	Lead
146 (0x0091)	Lag
147 (0x0092)	Quadrant 1
148 (0x0093)	Quadrant 2
149 (0x0094)	Quadrant 3
150 (0x0095)	Quadrant 4
151–255 (0x0096–0x00FE)	Reserved
256 (0x00FF)	Contact wear

Protection Parameters

Long-Time Protection Parameters

A read request of 10 registers is necessary to read the long-time protection parameters.

The long-time protection command (command code = 45192) configures the content of the long-time protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x2231	8754	R	–	–	INT16U	1–2	Status: 1 = On, 2 = Inhibit
0x2232	8755	–	–	–	–	–	Reserved
0x2233	8756	R-WC	1	A	INT16U	–	Ir pick-up value. The Ir range depends on the nominal current In.
0x2234	8757	–	–	–	–	–	Reserved
0x2235	8758	R-WC	1	ms	INT16U	500–16000	tr time delay (distribution application) tr = 500, 1000, 2000, 4000, 8000, 16000 ms
0x2236	8759	R-WC	1	s	INT16U	5–30	Motor class (motor application only) Possible values = 5, 10, 20, 30 s
0x2237	8760	–	–	–	–	–	Reserved
0x2238	8761	R-WC	1	–	INT16U	1–2	Cool fan (motor application only) 1 = auto, 2 = motor
0x2239–0x223A	8762–8763	–	–	–	–	–	Reserved

Short-Time Protection Parameters

A read request of 10 registers is necessary to read the short-time protection parameters.

The short-time protection command (command code = 45193) configures the content of the short-time protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x223B	8764	R	–	–	INT16U	1–2	Status: 1 = On, 2 = Inhibit
0x223C	8765	R-WC	–	–	INT16U	0–1	Type of protection: 0 = I^2t On, 1 = I^2t Off. For motor application, tsd = 30 ms and I^2t is Off (fixed values).
0x223D	8766	R-WC	10	–	INT16U	(1)	Isd coefficient, adjustable in steps of 5
0x223E	8767	R	1	A	INT16U	–	Isd pick-up value = (Ir) x (Isd coefficient) / 10
0x223F	8768	R-WC	1	ms	INT16U	0–400	tsd time delay tsd = 0, 30, 100, 200, 300, 400 ms If tsd = 0 ms, then I^2t must be Off.
0x2240–0x2244	8769–8773	–	–	–	–	–	Reserved
(1) For distribution application, the range is 15–100. For motor application, the range is 50–130.							

Instantaneous Protection Parameters

A read request of 10 registers is necessary to read the instantaneous protection parameters.

The instantaneous protection command (command code = 45194) configures the content of the instantaneous protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x2245	8774	R	–	–	INT16U	1–2	Status: 1 = On, 2 = Inhibit
0x2246	8775	–	–	–	–	–	Reserved
0x2247	8776	R-WC	10	–	INT16U	(1)	Ii coefficient, adjustable in steps of 5
0x2248	8777	R	1	A	INT16U	–	Ii pick-up value = (In) x (Ii coefficient) / 10
0x2249–0x224E	8778–8783	–	–	–	–	–	Reserved

(1) The Ii coefficient range depends on the circuit breaker size:
- For 100–160 A, the range is 15–150.
- For 250–400 A, the range is 15–120.
- For 630 A, the range is 15–110.

Ground-Fault Protection Parameters

A read request of 10 registers is necessary to read the ground-fault protection parameters.

The ground-fault protection command (command code = 45195) configures the content of the ground-fault protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x224F	8784	R	–	–	INT16U	0–2	Status: 0 = Off, 1 = On, 2 = Inhibit
0x2250	8785	R-WC	–	–	INT16U	0–1	Type of protection: 0 = I^{2}t On, 1 = I^{2}t Off For motor application, tg = 0 ms and I^{2}t is Off (fixed values).
0x2251	8786	R-WC	100	–	INT16U	–	Ig coefficient, adjustable in steps of 5
0x2252	8787	R	1	A	INT16U	–	Ig pick-up value = (In) x (Ig coefficient) / 100 If ground-fault protection is set to Off, Ig pick-up value = In.
0x2253	8788	R-WC	1	ms	INT16U	0–400	tg time delay tg = 0, 100, 200, 300, 400 ms. If tg = 0 ms, then I^{2}t must be Off.
0x2254–0x2258	8789–8793	–	–	–	–	–	Reserved

Earth-Leakage Protection Parameters

A read request of 10 registers is necessary to read the earth-leakage protection parameters.

The earth-leakage protection command (command code = 45196) configures the content of the earth-leakage protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x2259	8794	R	–	–	INT16U	0–2	Status: 0 = Off, 1 = On, 2 = Inhibit
0x225A	8795	–	–	–	–	–	Reserved
0x225B	8796	R	1	mA	INT16U	–	Earth-leakage current IΔn. The IΔn range depends on the nominal current In.
0x225C	8797	–	–	–	–	–	Reserved
0x225D	8798	R-WC	1	ms	INT16U	0–1000	tΔn time delay tΔn = 0, 60, 150, 500, 1000 ms If IΔn = 0.03 mA, then tΔn = 0 ms.
0x225E– 0x2262	8799– 8803	–	–	–	–	–	Reserved

Jam Protection Parameters

A read request of 4 registers is necessary to read the jam protection parameters.

The jam protection is available for motor application only. The jam protection command (command code = 45448) configures the content of the jam protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x22C3	8900	R-WC	–	–	INT16U	0–1	Status: 0 = Off, 1 = On
0x22C4	8901	R-WC	10	–	INT16U	10–80	Ijam coefficient, adjustable in steps of 1
0x22C5	8902	R	1	A	INT16U	–	Ijam pick-up value = (Ir) x (Ijam coefficient) / 10
0x22C6	8903	R-WC	1	s	INT16U	1–30	tjam time delay

Unbalance Protection Parameters

A read request of 4 registers is necessary to read the unbalance protection parameters.

The unbalance protection is available for motor application only. The unbalance protection command (command code = 45450) configures the content of the unbalance protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x22C7	8904	R	–	–	INT16U	0–2	Status: 0 = Off, 1 = On, 2 = Inhibit
0x22C8	8905	R-WC	1	%	INT16U	10–40	Iunbal coefficient
0x22C9	8906	R-WC	1	s	INT16U	1–10	tunbal time delay
0x22CA	8907	–	–	–	–	–	Reserved

Underload Protection Parameters

A read request of 4 registers is necessary to read the underload protection parameters.

The underload protection is available for motor application only. The underload protection command (command code = 45449) configures the content of the underload protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x22CB	8908	R-WC	–	–	INT16U	0–1	Status: 0 = Off, 1 = On
0x22CC	8909	R-WC	100	–	INT16U	30–90	Iunderload coefficient, adjustable in steps of 1
0x22CD	8910	R	1	A	INT16U	–	Iunderload pick-up value = (Ir) x (Iunderload) / 100
0x22CE	8911	R-WC	1	s	INT16U	1–200	tunderload time delay

Long-Start Protection Parameters

A read request of 4 registers is necessary to read the long-start protection parameters.

The long-start protection is available for motor application only. The long-start protection command (command code = 45451) configures the content of the long-start protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x22CF	8912	R-WC	–	–	INT16U	0–1	Status: 0 = Off, 1 = On
0x22D0	8913	R-WC	10	–	INT16U	10–80	Ilongstart coefficient, adjustable in steps of 1
0x22D1	8914	R	1	A	INT16U	–	Ilongstart pick-up value = (Ir) x (Ilongstart coefficient) / 10
0x22D2	8915	R-WC	1	s	INT16U	1–200	tlongstart time delay

Neutral Protection Parameters

The neutral protection is only available when system type in register 3314 is 30 or 41 .

A read request of 4 registers is necessary to read the neutral protection parameters.

The neutral protection command (command code = 45197) configures the content of the neutral protection registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x22D3	8916	R	–	–	INT16U	0–2	Status: 0 = Off, 1 = On, 2 = Inhibit [1]
0x22D4	8917	R-WC	–	–	INT16U	0–3	Neutral coefficient pickup value 0 = Off 1 = 0.5 2 = 1.0 3 = OSN
0x22D5	8918	R	1	A	INT16U	0–32766	Ir pick-up value
0x22D6	8919	R	1	A	INT16U	0–32766	Isd pick-up value
(1) For 40 A IEC and 60 A UL circuit breakers, the user cannot set up the neutral coefficient pickup value to 0.5.							

Thermal Memory Inhibit Parameter

Address	Register	RW	X	Unit	Type	Range	Description
0x22E1	8930	R	–	–	INT16U	1–2	Status: 1 = On, 2 = Inhibit

Configuration of the SDx Module

Output 1

A read request of 3 registers is necessary to read the output 1 parameters.

The user can check the status and the validity of output 1 at register 8857, page 152.

Address	Register	RW	X	Unit	Type	Range	Description
0x2648	9801	R	1	–	INT16U	0–4	Output mode 0 = normal mode 1 = latched mode 2 = time delayed mode 3 = closed forced mode 4 = open forced mode
0x2649	9802	R	1	s	INT16U	1–360	Delay (if the output mode is set to 2). The factory setting is 1 s.
0x264A	9803	R	1	–	INT16U	0–65535	Alarm identifier (201–210, 1013, 1014, 1015). The alarm identifier is set to 0 if there is no alarm.

Output 2

A read request of 3 registers is necessary to read the output 2 parameters.

The user can check the status and the validity of output 2 at register 8857, page 152.

Address	Register	RW	X	Unit	Type	Range	Description
0x264F	9808	R	1	–	INT16U	0–4	Output mode 0 = normal mode 1 = latched mode 2 = time delayed mode 3 = closed forced mode 4 = open forced mode
0x2650	9809	R	1	s	INT16U	1–360	Delay (if the output mode is set to 2). The factory setting is 1 s.
0x2651	9810	R	1	–	INT16U	0–65535	Alarm identifier (201–210, 1013, 1014, 1015). The alarm identifier is set to 0 if there is no alarm.

Measurement Parameters

System Type

The setup ENVT (External Neutral Voltage Tap) presence command (command code = 46472) configures the content of the system type register.

Address	Register	RW	X	Unit	Type	Range	Description
0x0CF1	3314	R-WC	–	–	INT16U	30–41	System type

Determining system type:

If...	Then...	Result
the system type 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 type 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 type 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 type 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.

Quadrant Total

Address	Register	RW	X	Unit	Type	Range	Description
0x08C1	2242	R	–	–	INT16U	1–4	Quadrant total
0x08C2	2243	R	–	–	INT16U	0–1	0 = lead 1 = lag

Phase Rotation

The phase rotation setting command (command code = 47246) configures the content of the phase rotation register.

NOTE: The phase rotation setting command is only available for the MicroLogic 5 and 6 trip units.

Address	Register	RW	X	Unit	Type	Range	Description
0X0CF2	3315	R-WC	–	–	INT16U	0–1	Phase rotation: 0 = I1, I2, I3 1 = I1, I3, I2

Power Flow Sign

The power flow sign command (command code = 47240) configures the content of the power flow sign register.

Address	Register	RW	X	Unit	Type	Range	Description
0x0CF3	3316	R-WC	–	–	INT16U	0–1	Power flow sign: 0 = the active power flows from upstream (top) to downstream (bottom) (factory setting). 1 = the active power flows from downstream (bottom) to upstream (top).

Power Factor Sign

The power factor sign configuration command (command code = 47241) configures the content of the power factor sign register.

Address	Register	RW	X	Unit	Type	Range	Description
0x0CF5	3318	R-WC	–	–	INT16U	0–2	Sign convention for the power factor and the fundamental power factor (cosϕ): 0 = IEC convention 2 = IEEE convention (factory setting)

Energy Accumulation Mode

The energy accumulation mode configuration command (command code = 47242) configures the content of the energy accumulation mode register.

Address	Register	RW	X	Unit	Type	Range	Description
0x0CFB	3324	R-WC	–	–	INT16U	0–1	Energy accumulation mode: 0 = absolute accumulation (factory setting) Ep = EpIn + EpOut Eq = EqIn + EqOut 1 = signed accumulation Ep = EpIn – EpOut Eq = EqIn – EqOut

Demand Time

The current demand configuration command (command code 47243) configures the content of register 3352.

The power demand configuration command (command code 47244) configures the content of registers 3354 and 3355.

For more information regarding the demand calculation method, refer to DOCA0188•• *ComPacT NSX MicroLogic 5/6/7 Trip Units – User Guide*, page 10.

Address	Register	RW	X	Unit	Type	Range	Description
0x0D17	3352	R-WC	–	min	INT16U	5–60	Duration of the current demand calculation window, adjustable in steps of 1 minute. The factory setting is 15 minutes.
0x0D19	3354	R-WC	–	–	INT16U	0–5	Power demand calculation method (window type): 0 = sliding (factory setting) 2 = block 5 = synchronized to communication
0x0D1A	3355	R-WC	–	min	INT16U	5–60	Duration of the power demand calculation window, adjustable in steps of 1 minute. The factory setting is 15 minutes.

Nominal Voltage

The setup nominal voltage Vn display command (command code = 47245) configures the content of the nominal voltage register.

Address	Register	RW	X	Unit	Type	Range	Description
0x258F	9616	R-WC	1	V	INT16U	0–65535	Nominal voltage Vn. Factory setting = 400 V

Time-Stamped Information

General Description

The time-stamped information enables the user to know all the dates relative to important information such as previous protection settings and minimum/maximum values of currents, voltages, and system frequency.

The time-stamped information table describes:

* The previous protection setup parameters and corresponding dates
* The minimum and maximum values of voltage measurements and corresponding dates
* The maximum values of current measurements and corresponding dates
* The minimum and maximum system frequencies and corresponding dates
* The peak demand of current and power and corresponding dates

A read request of 100 registers is necessary to read the time-stamped previous protection registers (29600–29699).

Previous Long-Time Protection Setup

Address	Register	RW	X	Unit	Type	Range	Description
0x739F	29600	R	1	A	INT16U	–	Previous Ir pick-up value. The Ir range depends on the nominal current In.
0x73A0– 0x73A2	29601– 29603	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73A3	29604	R	1	ms	INT16U	500– 16000	Previous tr time delay (distribution application) tr = 500, 1000, 2000, 4000, 8000, 16000 ms
0x73A4– 0x73A6	29605– 29607	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73A7	29608	R	1	–	INT16U	5–30	Motor class (motor application only) Possible values = 5, 10, 20, 30 s
0x73A8– 0x73AA	29609– 29611	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73AB	29612	R	–	–	INT16U	1–2	Previous cool fan setup (motor application only) 1 = auto, 2 =motor
0x73AC– 0x73AE	29613– 29615	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Short-Time Protection Setup

Address	Register	RW	X	Unit	Type	Range	Description
0x73AF	29616	R	10	–	INT16U	[1]	Previous Isd coefficient pick-up value
0x73B0– 0x73B2	29617– 29619	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73B3	29620	R	1	ms	INT16U	0–400	Previous tsd time delay tsd = 0, 100, 200, 300, 400 ms If tsd = 0 ms, then I²t must be Off.

Address	Register	RW	X	Unit	Type	Range	Description
0x73B4– 0x73B6	29621– 29623	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73B7	29624	R	–	–	INT16U	0–1	Previous type of protection: 0 = I²t On, 1 = I²t Off
0x73B8– 0x73BA	29625– 29627	R	–	–	ULP DATE	–	Date and time of the previous setup.

(1) The Isd coefficient range depends on:
- The application:
  - ◦ For distribution application, the range is 15–100, adjustable in steps of 5.
  - ◦ For motor application, the range is 50–130, adjustable in steps of 5.
- The MicroLogic trip unit rotary switch if it exists.

Previous Instantaneous Protection Setup

Address	Register	RW	X	Unit	Type	Range	Description
0x73BB	29628	R	10	–	INT16U	(1)	Previous Ii coefficient pick-up value
0x73BC– 0x73BE	29629– 29631	R	–	–	ULP DATE	–	Date and time of the previous setup.

(1) The Ii coefficient range depends on the circuit breaker size:
- For 100–160 A, the range is 15–150.
- For 250–400 A, the range is 15–120.
- For 630 A, the range is 15–110.

Previous Ground-Fault Protection Setup

Address	Register	RW	X	Unit	Type	Range	Description
0x73BF	29632	R	100	ms	INT16U	(1)	Previous Ig coefficient pick-up value.
0x73C0– 0x73C2	29633– 29635	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73C3	29636	R	1	ms	INT16U	0–400	Previous tg time delay tg = 0, 100, 200, 300, 400 ms
0x73C4– 0x73C6	29637– 29639	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73C7	29640	R	–	–	INT16U	0–1	Previous type of protection: 0 = I²t On, 1 = I²t Off
0x73C8– 0x73CA	29641– 29643	R	–	–	ULP DATE	–	Date and time of the previous setup.

(1) The Ig coefficient range depends on the nominal current In and the MicroLogic trip unit rotary switch if it exists.

For example, 0 (protection off) or 0.40 In to In in steps of 0.05.

Previous Earth-Leakage Protection Setup

Address	Register	RW	X	Unit	Type	Range	Description
0x73CB	29644	R	1	mA	INT16U	–	Previous IΔn pick-up value. The IΔn depends on the nominal current In.
0x73CC–	29645–	R	–	–	ULP DATE	–	Date and time of the previous setup.

Address	Register	RW	X	Unit	Type	Range	Description
0x73CE	29647						
0x73CF	29648	R	1	ms	INT16U	0–1000	Previous tΔn time delay tΔn = 0, 60, 150, 500, 1000 ms If IΔn = 0.03 mA, then TΔn = 0 ms.
0x73D0– 0x73D2	29649– 29651	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Jam Protection Setup

The jam protection is available for motor application only.

Address	Register	RW	X	Unit	Type	Range	Description
0x73D3	29652	R	–	–	INT16U	0–2	Previous setup status: 0 = Off, 1 = On
0x73D4– 0x73D6	29653– 29655	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73D7	29656	R	10	–	INT16U	10–80	Previous Ijam coefficient pick-up value
0x73D8– 0x73DA	29657– 29659	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73DB	29660	R	1	s	INT16U	1–30	Previous tjam time delay
0x73DC– 0x73DE	29661– 29663	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Unbalance Protection Setup

The unbalance protection is available for motor application only.

Address	Register	RW	X	Unit	Type	Range	Description
0x73DF	29664	R	1	%	INT16U	10–40	Previous unbalance coefficient pick-up value
0x73E0– 0x73E2	29665– 29667	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73E3	29668	R	1	s	INT16U	1–10	Previous tunbal time delay
0x73E4– 0x73E6	29669– 29671	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Underload Protection Setup

The underload protection is available for motor application only.

Address	Register	RW	X	Unit	Type	Range	Description
0x73E7	29672	R	–	–	INT16U	0–2	Previous setup status: 0 = Off, 1 = On
0x73E8– 0x73EA	29673– 29675	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73EB	29676	R	100	–	INT16U	30–90	Previous Iunderload coefficient pick-up value
0x73EC–	29677–	R	–	–	ULP DATE	–	Date and time of the previous setup.

Address	Register	RW	X	Unit	Type	Range	Description
0x73EE	29679						
0x73EF	29680	R	1	s	INT16U	1–200	Previous tunderload time delay
0x73F0– 0x73F2	29681– 29683	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Long-Start Protection Setup

The long-start protection is available for motor application only.

Address	Register	RW	X	Unit	Type	Range	Description
0x73F3	29684	R	–	–	INT16U	0–2	Previous setup status: 0 = Off, 1 = On
0x73F4– 0x73F6	29685– 29687	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73F7	29688	R	10	–	INT16U	10–50	Previous Ilongstart coefficient pick-up value
0x73F8– 0x73FA	29689– 29691	R	–	–	ULP DATE	–	Date and time of the previous setup.
0x73FB	29692	R	1	s	INT16U	1–30	Previous tlongstart time delay
0x73FC– 0x73FE	29693– 29695	R	–	–	ULP DATE	–	Date and time of the previous setup.

Previous Neutral Protection Setup

The neutral protection is only available when system type in register 3314 is 30 or 41 System Type, page 175.

Address	Register	RW	X	Unit	Type	Range	Description
0x73FF	29696	R	–	–	INT16U	0–3	Previous neutral coefficient pick-up value: 0 = Off 1 = 0.5 2 = 1.0 3 = OSN
0x7400– 0x7402	29697– 29699	R	–	–	ULP DATE	–	Date and time of the previous setup.

Minimum/Maximum V12 Voltage Measurements

A read request of 48 registers is necessary to read the time-stamped minimum/maximum values of voltage, current, and frequency registers (29780–29827).

Register = 0 if voltage < 25 V.

Address	Register	RW	X	Unit	Type	Range	Description
0x7453	29780	R	1	V	INT16U	0–850	Minimum of RMS phase-to-phase voltage V12
0x7454– 0x7456	29781– 29783	R	–	–	ULP DATE	–	Date and time.

Address	Register	RW	X	Unit	Type	Range	Description
0x7457	29784	R	1	V	INT16U	0–850	Maximum of RMS phase-to-phase voltage V12
0x7458– 0x745A	29785– 29787	R	–	–	ULP DATE	–	Date and time.

Minimum/Maximum V23 Voltage Measurements

Register = 0 if voltage < 25 V.

Address	Register	RW	X	Unit	Type	Range	Description
0x745B	29788	R	1	V	INT16U	0–850	Minimum of RMS phase-to-phase voltage V23
0x745C– 0x745E	29789– 29791	R	–	–	ULP DATE	–	Date and time.
0x745F	29792	R	1	V	INT16U	0–850	Maximum of RMS phase-to-phase voltage V23
0x7460– 0x7462	29793– 29795	R	–	–	ULP DATE	–	Date and time.

Minimum/Maximum V31 Voltage Measurements

Register = 0 if voltage < 25 V.

Address	Register	RW	X	Unit	Type	Range	Description
0x7463	29796	R	1	V	INT16U	0–850	Minimum of RMS phase-to-phase voltage V31
0x7464– 0x7466	29797– 29799	R	–	–	ULP DATE	–	Date and time.
0x7467	29800	R	1	V	INT16U	0–850	Maximum of RMS phase-to-phase voltage V31
0x7468– 0x746A	29801– 29803	R	–	–	ULP DATE	–	Date and time.

Maximum I1 Current Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x746B	29804	R	1	A	INT16U	0–20xIn	Maximum of RMS current on phase 1: I1
0x746C– 0x746E	29805– 29807	R	–	–	ULP DATE	–	Date and time.

Maximum I2 Current Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x746F	29808	R	1	A	INT16U	0–20xIn	Maximum of RMS current on phase 2: I2
0x7470– 0x7472	29809– 29811	R	–	–	ULP DATE	–	Date and time.

Maximum I3 Current Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x7473	29812	R	1	A	INT16U	0–20xIn	Maximum of RMS current on phase 3: I3
0x7474– 0x7476	29813– 29815	R	–	–	ULP DATE	–	Date and time.

Maximum IN Current Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x7477	29816	R	1	A	INT16U	0–20xIn	Maximum of RMS current on neutral: IN
0x7478– 0x747A	29817– 29819	R	–	–	ULP DATE	–	Date and time.

Minimum System Frequency

When the MicroLogic trip unit cannot calculate the frequency, it returns Not Evaluated = 32768 (0x8000).

Address	Register	RW	X	Unit	Type	Range	Description
0x747B	29820	R	10	Hz	INT16U	150–4400	Minimum of system frequency
0x747C– 0x747E	29821– 29823	R	–	–	ULP DATE	–	Date and time.

Maximum System Frequency

When the MicroLogic trip unit cannot calculate the frequency, it returns Not Evaluated = 32768 (0x8000).

Address	Register	RW	X	Unit	Type	Range	Description
0x747F	29824	R	10	Hz	INT16U	150–4400	Maximum of system frequency
0x7480– 0x7482	29825– 29827	R	–	–	ULP DATE	–	Date and time.

I1 Peak Demand Measurement

A read request of 20 registers is necessary to read the time-stamped peak demand of current and power (29828–29847).

Address	Register	RW	X	Unit	Type	Range	Description
0x7483	29828	R	1	A	INT16U	0–20xIn	I1 peak demand
0x7484– 0x7486	29829– 29831	R	–	–	ULP DATE	–	Date and time.

I2 Peak Demand Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x7487	29832	R	1	A	INT16U	0–20xIn	I2 peak demand
0x7488–0x748A	29833–29835	R	–	–	ULP DATE	–	Date and time.

I3 Peak Demand Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x748B	29836	R	1	A	INT16U	0–20xIn	I3 peak demand
0x748C–0x748E	29837–29839	R	–	–	ULP DATE	–	Date and time.

IN Peak Demand Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x748F	29840	R	1	A	INT16U	0–20xIn	IN peak demand
0x7490–0x7492	29841–29843	R	–	–	ULP DATE	–	Date and time.

P Peak Demand Measurement

Address	Register	RW	X	Unit	Type	Range	Description
0x7493	29844	R	10	kW	INT16	-30000–+30000	P peak demand
0x7494–0x7496	29845–29847	R	–	–	ULP DATE	–	Date and time.

Maintenance Indicators

Time of Use Counter

The time of use counter reports the time of use of the circuit breaker. The time of use is written in the EEPROM every hour. If the time of use counter reaches the maximum value 4 294 967 295 and a new time of use event occurs, the counter is reset to 0.

A read request of 2 registers is necessary to read the time of use counter.

Address	Register	RW	X	Unit	Type	Range	Description
0x749A–0x749B	29851–29852	R	1	Hour	INT32U	0–4 294 967 295	Time of use counter

Rate of Wear Counter

The rate of wear counter reports the percentage of the circuit breaker contact use.

Address	Register	RW	X	Unit	Type	Range	Description
0x749C	29853	R	1	%	INT16U	0–32766	Rate of wear contact 0% = The circuit breaker contact is new. > 100% = The circuit breaker contact must be changed.

Boot Counter

The boot counter reports the number of cold starts (power-up) and the number of warm starts (software reset of the MicroLogic trip unit).

Address	Register	RW	X	Unit	Type	Range	Description
0x749D	29854	R	1	–	INT16U	0–32766	Boot counter

EEPROM Writing Counter

The EEPROM writing counter reports the number of storages of the energy measurement in the EEPROM. The energy measurement is written in the EEPROM every hour. If the EEPROM writing counter reaches the maximum value 4 294 967 295 and a new EEPROM writing event occurs, the EEPROM writing counter is reset to 0.

Address	Register	RW	X	Unit	Type	Range	Description
0x749E–0x749F	29855–29856	R	1	–	INT32U	0–4 294 967 295	Counter of EEPROM writing

Load Profile Counters

The load profile counters report the number of hours for each range of current in the MicroLogic trip unit. If the load profile counters reach the maximum value 4 294 967 295 and a new load profile event occurs, the load profile counters are reset to 0.

A read request of 8 registers is necessary to read the load profile counters.

Address	Register	RW	X	Unit	Type	Range	Description
0x74B7–0x74B8	29880–29881	R	1	Hour	INT32U	0–4 294 967 295	Hours current was 0-49% of nominal range
0x74B9–0x74BA	29882–29883	R	1	Hour	INT32U	0–4 294 967 295	Hours current was 50-79% of nominal range
0x74BB–0x74BC	29884–29885	R	1	Hour	INT32U	0–4 294 967 295	Hours current was 80-89% of nominal range
0x74BD–0x74BE	29886–29887	R	1	Hour	INT32U	0–4 294 967 295	Hours current was 90-100% of nominal range

Temperature Profile Counters

The temperature profile counters report the number of hours for each range of temperature in the MicroLogic trip unit. If the temperature profile counters reach the maximum value 4 294 967 295 and a new temperature profile event occurs, the temperature profile counters are reset to 0.

A read request of 12 registers is necessary to read the temperature profile counters.

Address	Register	RW	X	Unit	Type	Range	Description
0x74C1–0x74C2	29890–29891	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was < -30 °C (-22 °F)
0x74C3–0x74C4	29892–29893	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was in the -30–+59 °C range (22–1 38.2 °F)
0x74C5–0x74C6	29894–29895	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was in the +60–+74 °C range (140–165.2 °F)
0x74C7–0x74C8	29896–29897	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was in the +75–+89 °C range (167–192.2 °F)
0x74C9–0x74CA	29898–29899	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was in the +90–+99 °C range (194–210.2 °F)
0x74CB–0x74CC	29900–29901	R	1	Hour	INT32U	0–4 294 967 295	Hours temperature was > +100 °C (212 °F)

Protection Trips Counters

The protection trips counters report the number of protection trips for each type of protection: long-time, short-time, instantaneous, ground-fault, earth-leakage jam, unbalance, long-start, and underload protections.

The protection trips counters stop incrementing when they reach the maximum value 10000.

A read request of 9 registers is necessary to read the protection trips counters.

Address	Register	RW	X	Unit	Type	Range	Description
0x74D5	29910	R	1	–	INT16U	0–10000	Number of long-time protection trips
0x74D6	29911	R	1	–	INT16U	0–10000	Number of short-time protection trips
0x74D7	29912	R	1	–	INT16U	0–10000	Number of instantaneous protection trips

Address	Register	RW	X	Unit	Type	Range	Description
							(including integrated instantaneous protection, instantaneous with earth-leakage protection, and reflex protection)
0x74D8	29913	R	1	–	INT16U	0–10000	Number of ground-fault protection trips
0x74D9	29914	R	1	–	INT16U	0–10000	Number of earth-leakage protection trips
0x74DA	29915	R	1	–	INT16U	0–10000	Number of jam protection trips
0x74DB	29916	R	1	–	INT16U	0–10000	Number of unbalance protection trips
0x74DC	29917	R	1	–	INT16U	0–10000	Number of long-start protection trips
0x74DD	29918	R	1	–	INT16U	0–10000	Number of underload protection trips

Alarms Counters

The alarms counters report the number of occurrences of the alarms. When an alarm is configured, the associated counter is set to 0. The alarm counters stop incrementing when they reach the maximum value 10000.

A read request of 13 registers is necessary to read the alarms counters.

Address	Register	RW	X	Unit	Type	Range	Description
0x74F3	29940	R	1	–	INT16U	0–10000	Counter of user-defined alarm 201
0x74F4	29941	R	1	–	INT16U	0–10000	Counter of user-defined alarm 202
0x74F5	29942	R	1	–	INT16U	0–10000	Counter of user-defined alarm 203
0x74F6	29943	R	1	–	INT16U	0–10000	Counter of user-defined alarm 204
0x74F7	29944	R	1	–	INT16U	0–10000	Counter of user-defined alarm 205
0x74F8	29945	R	1	–	INT16U	0–10000	Counter of user-defined alarm 206
0x74F9	29946	R	1	–	INT16U	0–10000	Counter of user-defined alarm 207
0x74FA	29947	R	1	–	INT16U	0–10000	Counter of user-defined alarm 208
0x74FB	29948	R	1	–	INT16U	0–10000	Counter of user-defined alarm 209
0x74FC	29949	R	1	–	INT16U	0–10000	Counter of user-defined alarm 210
0x74FD	29950	R	1	–	INT16U	0–10000	Counter of pre-alarm Ir
0x74FE	29951	R	1	–	INT16U	0–10000	Counter of pre-alarm Ig
0x74FF	29952	R	1	–	INT16U	0–10000	Counter of pre-alarm IΔn

Maintenance Operation Counters

The maintenance operation counters report the number of some maintenance operations. The maintenance operation counters stop incrementing when they reach the maximum value 10000.

A read request of 7 registers is necessary to read the maintenance operation counters.

Address	Register	RW	X	Unit	Type	Range	Description
0x751B	29980	R	1	–	INT16U	0–10000	Counter of MicroLogic trip unit locking pad activation
0x751C	29981	R	1	–	INT16U	0–10000	Counter of connections of the USB maintenance interface
0x751D	29982	R	1	–	INT16U	0–10000	Counter of ground-fault test operation (using MicroLogic keypad only)
0x751E	29983	R	1	–	INT16U	0–10000	Counter of earth-leakage test operation
0x751F	29984	R	1	–	INT16U	0–10000	Counter of ZSI (Zone Selective Interlocking) test operation

Address	Register	RW	X	Unit	Type	Range	Description
0x7520	29985	R	1	–	INT16U	0–10000	Counter of numerical injection test operation
0x7521	29986	R	1	–	INT16U	0–10000	Counter of reset Firmware command

Miscellaneous

Current Date and Time

A read request of 3 registers is necessary to read the current date.

The set absolute time command (command code 769) configures the content of the current date registers.

Address	Register	RW	X	Unit	Type	Range	Description
0x0BB7– 0x0BB9	3000– 3002	R-WC	–	–	ULP DATE	–	Current date and time

Temperature

Address	Register	RW	X	Unit	Type	Range	Description
0x2292	8851	R	1	°C	INT16	-30– +120	Temperature of the MicroLogic trip unit

Time Remaining Until Long-Time Tripping

Time remaining until long-time tripping is evaluated every second. If another protection is tripped, then time remaining until long-time tripping continues to be evaluated.

Time remaining until long-time tripping = 32768 (0x8000) if:

- Long-time protection is already tripped, or
- Time remaining until long-time tripping is below 1 s, or
- No default is detected by long-time protection.

If time remaining until long-time tripping is > 7200 s, time remaining until long-time tripping = 7200 s.

Address	Register	RW	X	Unit	Type	Range	Description
0x22A0	8865	R	1	s	INT16U	1–7200	Time remaining until long-time tripping

Phase Rotation

Address	Register	RW	X	Unit	Type	Range	Description
0x22A7	8872	R	1	–	INT16U	0–1	0 = 123 phase sequence 1 = 132 phase sequence

Failure Status

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x72CD	29390	R	–	–	INT16U	–	–	Failure status
							0	Reserved
							1	STOP (internal failure) 0 = No internal failure

Address	Register	RW	X	Unit	Type	Range	Bit	Description
								1 = Internal failure
							2	ERROR (internal failure)
								0 = No internal failure
								1 = Internal failure
							3–15	Reserved

NOTE: In the case of a STOP event, it is mandatory to replace the MicroLogic trip unit. In the case of an ERROR event, it is advised to replace the MicroLogic trip unit (the core protection functions still work but it is preferable to replace the MicroLogic trip unit).

MicroLogic Trip Unit Rotary Switches

Address	Register	RW	X	Unit	Type	Range	Description
0x7525	29990	R	1	–	INT16U	1–9	Position of MicroLogic trip unit rotary switch 1 (Ir)
0x7526	29991	R	1	–	INT16U	1–9	Position of MicroLogic trip unit rotary switch 2 (Isd, Ig/IΔn)

MicroLogic Trip Unit Locking Pad Status

Address	Register	RW	X	Unit	Type	Range	Description
0x7527	29992	R	1	–	INT16U	0–1	0 = MicroLogic trip unit locking pad open
							1 = MicroLogic trip unit locking pad closed

Auxiliary 24 Vdc Power Supply

Address	Register	RW	X	Unit	Type	Range	Description
0x7528	29993	R	1	–	INT16U	0–1	0 = auxiliary 24 Vdc power supply is not present.
							1 = auxiliary 24 Vdc power supply is present.

MicroLogic Trip Unit LED

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x7534	30005	R	–	–	INT16U	–	–	MicroLogic trip unit LED
							0	Ready LED
								0 = not ready (LED is not blinking).
								1 = ready (LED is blinking).
							1	Pre-alarm LED (distribution application only)
								0 = pre-alarm is not active (LED is steady off).

Address	Register	RW	X	Unit	Type	Range	Bit	Description
								1 = pre-alarm is active (LED is steady on).
							2	Overload LED
								0 = overload is not active (LED is steady off).
								1 = overload is active (LED is steady on).
							3–15	Reserved

MicroLogic 5, 6, and 7 Trip Unit Commands

What's in This Chapter

List of MicroLogic Trip Unit Commands and Error Codes

List of Commands

The following table lists the available MicroLogic trip unit commands, their corresponding command codes and user profiles. Follow the command execution procedures, page 75.

Command	Command code	User profile
Long-time protection, page 194	45192	Administrator
Short-time protection, page 194	45193	Administrator
Instantaneous protection, page 195	45194	Administrator
Ground-fault protection, page 195	45195	Administrator
Earth-leakage protection, page 196	45196	Administrator
Neutral protection, page 196	45197	Administrator
Jam protection, page 196	45448	Administrator
Underload protection, page 197	45449	Administrator
Unbalance protection, page 197	45450	Administrator
Long-start protection, page 198	45451	Administrator
Acknowledge a latched output, page 199	46216	Administrator or Operator
Acknowledge a trip, page 199	46217	Administrator
Set up ENVT presence, page 200	46472	Administrator
Reset minimum/maximum, page 200	46728	Administrator or Operator
Start/stop synchronization, page 201	46729	Administrator or Operator
Power flow sign configuration, page 201	47240	Administrator
Power factor sign configuration, page 202	47241	Administrator
Energy accumulation mode configuration, page 202	47242	Administrator
Current demand configuration, page 203	47243	Administrator
Power demand configuration, page 203	47244	Administrator
Set up nominal voltage Vn display, page 203	47245	Administrator
Phase rotation, page 204	47246	Administrator

Error Codes

Error codes generated by MicroLogic trip units are the generic error codesResult of the Command, page 78.

MicroLogic Trip Unit Protection Commands

Long-Time Protection

The user can read the long-time protection parameters from registers 8754 to 8763 Long-Time Protection Parameters, page 170.

To set the long-time protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45192	Command code = **45192**
0x1F40	8001	–	–	INT16U	18	Number of parameters (bytes) = 18
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET-STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	A	INT16U	–	Ir pick-up value. The Ir range depends on the nominal current In and on the position of the MicroLogic trip unit rotary switch 1 (Ir).
0x1F46	8007	1	ms	INT16U	500–16000	tr time delay (distribution application only) tr = 500, 1000, 2000, 4000, 8000, 16000 ms
0x1F47	8008	–	–	INT16U	5–30	Motor class (motor application only) Possible values = 5, 10, 20, 30 s
0x1F48	8009	–	–	INT16U	1–2	Cool fan (motor application only) 1 = auto, 2 = motor

Short-Time Protection

The user can read the short-time protection parameters from registers 8764 to 8773 Short-Time Protection Parameters, page 170.

To set the short-time protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45193	Command code = **45193**
0x1F40	8001	–	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET-STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	10	–	INT16U	(1)	Isd coefficient, adjustable in steps of 5. Isd pick-up value = (Ir) x (Isd coefficient) / 10
0x1F46	8007	1	ms	INT16U	0–400	tsd time delay tsd= 0, 100, 200, 300, 400 ms If tsd = 0 ms, then I²t must be Off.
0x1F47	8008	–	–	INT16U	0–1	Type of protection: 0 = I²t On, 1 = I²t Off For motor application, tsd = 0 ms and I²t is Off (fixed values).
(1) For distribution application, the range is 15–100. For motor application, the range is 50–130.						

Instantaneous Protection

The user can read the instantaneous protection parameters from registers 8774 to 8783 .

To set the instantaneous protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45194	Command code = **45194**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	10	–	INT16U	(1)	Ii coefficient, adjustable in steps of 5. Ii pick-up value = (In) x (Ii coefficient) / 10
(1) The Ii coefficient range depends on the circuit breaker size: • for 100–160 A, the range is 15–150. • for 250–400 A, the range is 15–120. • for 630 A, the range is 15–110.						

Ground-Fault Protection

The user can read the ground-fault protection parameters from registers 8784 to 8793 .

To set the ground-fault protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45195	Command code = **45195**
0x1F40	8001	–	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	100	–	INT16U	(1)	Ig coefficient, adjustable in steps of 5. The value is defined by the position of the MicroLogic trip unit rotary switch 2 (Ig). Ig pick-up value = (In) x (Ig coefficient) / 100
0x1F46	8007	1	ms	INT16U	0–400	tg time delay tg = 0, 100, 200, 300, 400 ms If tg = 0 ms, then I²t must be Off.
0x1F47	8008	–	–	INT16U	0–1	Type of protection: 0 = I²t On, 1 = I²t Off For motor application, tg = 0 ms and I²t is Off (fixed values).
(1) The Ig coefficient depends on the sensor rating In and the MicroLogic trip unit rotary switch if it exists. For example, 0 (protection Off) or 0.40 In to In in steps of 0.05. The Ig coefficient cannot be set using the command interface when the MicroLogic rotary switch position Ig is Off.						

Earth-Leakage Protection

The user can read the earth-leakage protection parameters from registers 8794 to 8803 Earth-Leakage Protection Parameters, page 171.

To set the earth-leakage protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45196	Command code = **45196**
0x1F40	8001	–	–	INT16U	14	Number of parameters (bytes) = 14
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	mA	INT16U	0–FFFF	Reserved
0x1F46	8007	1	ms	INT16U	0–1000	tΔn time delay tΔn = 0, 60, 150, 500, 1000 ms If IΔn = 0.03 mA, then tΔn = 0 ms

Neutral Protection

The neutral protection is only available when system type in register 3314 is 30 or 41 System Type, page 175.

The user can read the neutral protection parameters from registers 8916 to 8919 Neutral Protection Parameters, page 173.

To set the neutral protection registers, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45197	Command code = **45197**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–3	Neutral coefficient pickup value 0 = Off 1 = 0.5 2 = 1.0 3 = OSN

Jam Protection

The jam protection is available for motor application only.

The user can read the jam protection parameters from registers 8900 to 8903 Jam Protection Parameters, page 172.

To set the jam protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45448	Command code = **45448**
0x1F40	8001	–	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Activation: 0 = Off, 1 = On
0x1F46	8007	10	–	INT16U	10–80	Ijam coefficient, adjustable in steps of 1. Ijam pick-up value = (Ir) x (Ijam coefficient) / 10
0x1F47	8008	1	s	INT16U	1–30	tjam time delay

Underload Protection

The underload protection is available for motor application only.

The user can read the underload protection parameters from registers 8908 to 8911 Underload Protection Parameters, page 172.

To set the underload protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45449	Command code = **45449**
0x1F40	8001	–	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Activation: 0 = Off, 1 = On
0x1F46	8007	100	–	INT16U	30–90	Iunderload coefficient, adjustable in steps of 1. Iunderload pick-up value = (Ir) x (Iunderload) / 100
0x1F47	8008	1	s	INT16U	1–200	tunderload time delay

Unbalance Protection

The unbalance protection is available for motor application only.

The user can read the unbalance protection parameters from registers 8904 to 8907 Unbalance Protection Parameters, page 172.

To set the unbalance protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45450	Command code = **45450**
0x1F40	8001	–	–	INT16U	14	Number of parameters (bytes) = 14
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)

Address	Register	X	Unit	Type	Range	Description
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	%	INT16U	10–40	Iunbal coefficient
0x1F46	8007	1	s	INT16U	1–10	tunbal time delay

Long-Start Protection

The long-start protection is available for motor application only.

The user can read the underload protection parameters from registers 8912 to 8915 Long-Start Protection Parameters, page 173.

To set the long-start protection parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	45451	Command code = **45451**
0x1F40	8001	–	–	INT16U	16	Number of parameters (bytes) = 16
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Activation: 0 = Off, 1 = On
0x1F46	8007	10	–	INT16U	10–80	Ilongstart coefficient, adjustable in steps of 1. Ilongstart pick-up value = (Ir) x (Ilongstart coefficient) / 10
0x1F47	8008	1	s	INT16U	1–200	tlongstart time delay

Event Commands

Acknowledge a Latched Output

The user can read the SDx module outputs parameters from registers 9801 to 9810 Configuration of the SDx Module, page 174.

To acknowledge a latched output, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	46216	Command code = **46216**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	–	INT16U	1–2	1 = relay 1, 2 = relay 2

Acknowledge a Trip

To acknowledge a trip, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	46217	Command code = **46217**
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password

Measurement Configuration Commands

Set Up ENVT Presence

The user can read the ENVT (External Neutral Voltage Tap) presence parameters at register 3314. See System Type, page 175.

To set up ENVT presence, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	46472	Command code = **46472**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	0 = ENVT is not present. 1 = ENVT is present.

Reset Minimum/Maximum

The reset minimum/maximum command resets the minimum values of real-time measurements (registers 1300 to 1599) and the maximum values of real-time measurements (registers 1600 to 1899). See Minimum/Maximum Values of Real-Time Measurements, page 141.

The reset minimum/maximum command resets the energy measurements (registers 2000 to 2025). See Energy Measurements, page 143.

The reset minimum/maximum command resets the peak demand measurements (registers 2200 to 2237). See Demand Measurements, page 145.

The user can read the minimum and maximum values of current, voltage, and frequency measurements and the corresponding dates from registers 29780 to 29827. See Minimum/Maximum V12 Voltage Measurements, page 181.

The user can read the dates of the reset minimum/maximum command from registers 2900 to 2929. See Minimum/Maximum Measurements Reset Time, page 147.

To reset minimum/maximum values of measurements, the user must set up the command registers as follows:

Address	Register	Type	Range	Bit	Description
0x1F3F	8000	INT16U	46728	–	Command code = **46728**
0x1F40	8001	INT16U	12	–	Number of parameters (bytes) = 12
0x1F41	8002	INT16U	5121	–	Destination = 5121 (0x1401)
0x1F42	8003	INT16U	1	–	Security type of the command
0x1F43– 0x1F44	8004– 8005	OCTET STRING	–	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	INT16U	–	–	Reset minimum/maximum of metering variables: • To reset the metering variable, set the bit to 1. • To keep the current values, set the bit to 0.
				0	Reset minimum/maximum current (I1, I2, I3, IN, Imax, Ig, IΔn, Iavg, and Iunbal)

Address	Register	Type	Range	Bit	Description
				1	Reset minimum/maximum voltage (V12, V13, V23, V1N, V2N, V3N, VavgL-L, VavgL-N, and Vunbal)
				2	Reset minimum/maximum power (active power, reactive power, apparent power, and distortion power)
				3	Reset minimum/maximum power factor and cosϕ
				4	Reset minimum/maximum total harmonic distortion (THD)
				5	Reset peak of current demand
				6	Reset peak of active power, reactive power, and apparent power demand
				7	Reset minimum/maximum frequency
				8	Reset minimum/maximum thermal image (motor application only)
				9	Reset energy (active, reactive, apparent)
				10–15	Reserved

Start/Stop Synchronization

The start/stop synchronization command is used to start or stop the calculation of the current or power demand. The first command starts the calculation, the next command updates the value of current or power demand, and then restarts the calculation. The time period between 2 commands must be less than 1 hour.

To start/stop synchronization, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	46729	Command code = **46729**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	–	INT16U	–	Start/stop synchronization = 1

Power Flow Sign Configuration

The user can read the power flow sign configuration at register 3316 Power Flow Sign, page 176.

To set the power flow sign parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47240	Command code = **47240**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command

Address	Register	X	Unit	Type	Range	Description
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Power flow sign: 0 = the active power flows from upstream (top) to downstream (bottom) (factory setting). 1 = the active power flows from downstream (bottom) to upstream (top).

NOTE: The setting of the power flow sign can reset the content of the energy measurement registers excluding the cumulative energy measurements.

Power Factor Sign Configuration

The user can read the power factor sign configuration at register 3318 Power Factor Sign, page 176.

To set the power factor sign parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47241	Command code = **47241**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–2	Sign convention for the power factor and the fundamental power factor (cosφ): 0 = IEC convention 2 = IEEE convention (factory setting)

Energy Accumulation Mode Configuration

The user can read the energy accumulation mode configuration at register 3324 Energy Accumulation Mode, page 176.

To set the energy accumulation mode parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47242	Command code = **47242**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Energy accumulation mode: 0 = absolute accumulation (factory setting) 1 = signed accumulation

Current Demand Configuration

The user can read the duration of the current demand calculation window at register 3352 Demand Time, page 176.

The user can read the current demand parameters from registers 2200 to 2207 Current Demand, page 145.

To start current demand, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47243	Command code = **47243**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	Min	INT16U	5–60	Duration of the current demand calculation window, adjustable in steps of 1. The factory setting is 15 minutes (sliding).

Power Demand Configuration

The user can read the power demand calculation method from registers 3354 to 3355 Demand Time, page 176.

The user can read the power demand parameters from registers 2224 to 2237 Active Power Demand, page 145.

To start power demand, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47244	Command code = **47244**
0x1F40	8001	–	–	INT16U	14	Number of parameters (bytes) = 14
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	Min	INT16U	0–5	Power demand calculation method (window type): 0 = sliding 2 = fixed 5 = synchronized to communication The factory setting is 0 (sliding).
0x1F46	8007	–	Min	INT16U	5–60	Duration of the power demand calculation window, adjustable in steps of 1. The factory setting is 15 minutes.

Set Up Nominal Voltage Vn Display

The user can read the nominal voltage at register 9616 Nominal Voltage, page 177.

To set the nominal voltage Vn display parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47245	Command code = **47245**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	V	INT16U	0–65535	Nominal voltage Vn (factory setting = 400 V)

Phase Rotation Configuration

The user can read the phase rotation at register 3315, .

To set the phase rotation parameters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	47246	Command code = **47546**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	5121	Destination = 5121 (0x1401)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	Phase rotation: 0 = I1, I2, I3 (factory setting) 1 = I1, I3, I2

BSCM Modbus SL/ULP Module Data for ComPacT NSX Circuit Breakers

What's in This Part

BSCM Modbus SL/ULP Module Registers

What's in This Chapter

BSCM Modbus SL/ULP Module Identification

Product Identification

Address	Register	RW	X	Unit	Type	Range	Description
0x4CD1	19666	R	–	–	INT16U	15149	Product identification = 15149 for the BSCM Modbus SL/ULP module

BSCM Modbus SL/ULP Module Identifier

The BSCM Modbus SL/ULP module serial number is composed of a maximum of 15 alphanumeric characters with the following format: PPYYWWDLLLNNNNN.

- PP = plant code
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- LLL = unique final assembly manufacturing line number or machine number within the plant (A–Z or 0–9).
- NNNNN= unique product number generated on the day of manufacture by the plant manufacturing line or the plant machine (00001–99999).

A read request of eight registers is necessary to read the BSCM Modbus SL/ULP module serial number.

Address	Register	RW	X	Unit	Type	Range	Description
0x4CC8	19657	R	–	–	OCTET STRING	–	'PP'
0x4CC9	19658	R	–	–	OCTET STRING	05–99	'YY'
0x4CCA	19659	R	–	–	OCTET STRING	01–53	'WW'
0x4CCB	19660	R	–	–	OCTET STRING	1–7	'D'
0x4CCC	19661	R	–	–	OCTET STRING	A–Z, 0–9	'LLL'
0x4CCD	19662	R	–	–	OCTET STRING	00–99	'NN'
0x4CCE	19663	R	–	–	OCTET STRING	01–99	'NN'
0x4CCF	19664	R	–	–	OCTET STRING	01–99	'N' (the NULL character ends the serial number)

BSCM Modbus SL/ULP Module Identification (Both Modbus and ULP Architecture)

The following table is valid for the three modes of the BSCM Modbus SL/ULP module:

- Modbus SL only mode
- ULP only mode
- Modbus SL and ULP mode

Address	Register	RW	Unit	Type	Range	Description
0x4C2B–0x4C34	19500–19509	R-WC	–	OCTET STRING	–	User application name = ComPacT NSX (by default)
0x4C35–0x4C4A	19510–19531	–	–	–	–	Reserved
0x4C4B–0x4C8A	19532–19595	R	–	OCTET STRING	–	Vendor URL = https://www.se.com/
0x4C8B–0x4C9A	19596–19611	R	–	OCTET STRING	–	Product family = Gateway and server
0x4C9B–0x4CA2	19612–19619	R	–	OCTET STRING	–	Product range = ComPacT NSX
0x4CA3–0x4CAA	19620–19627	R	–	OCTET STRING	–	Product model = BSCM Modbus SL/ULP
0x4CAB–0x4CB2	19628–19635	R	–	OCTET STRING	–	Firmware revision
0x4CB3–0x4CBC	19636–19645	R	–	OCTET STRING	–	Vendor name = Schneider Electric
0x4CBD–0x4CC6	19646–19655	R	–	OCTET STRING	–	Product code = LV434220
0x4CC7–0x4CD0	19656–19665	R	–	OCTET STRING	–	Serial number
0x4CD1	19666	R	–	INT16U	–	Product identifier = 15149 for BSCM Modbus SL/ULP
0x4CD2–0x4CDB	19667–19676	R	–	OCTET STRING	–	Hardware revision
0x4CDC–0x4CE5	19677–19686	R-WC	–	OCTET STRING	–	Product capability = Other (by default)
0x4CE6–0x4CF5	19687–19702	R-WC	–	OCTET STRING	–	Product user tag = My tags (by default)

BSCM Modbus SL/ULP Module Identification (Only Modbus Architecture)

The following table is valid for the two following modes:

- Modbus SL only mode.
- Modbus SL and ULP mode

Address	Register	RW	Unit	Type	Range	Description
0x2800–0x2809	10241–10250	R-WC	–	OCTET STRING	–	User application name = ComPacT NSX (by default)
0x280A–0x281F	10251–10272	–	–	–	–	Reserved
0x2D9D–0x2DDC	11678–11741	R	–	OCTET STRING	–	Vendor URL = https://www.se.com/
0x2DDE–0x2DED	11743–11758	R	–	OCTET STRING	–	Product family = Gateway and server

Address	Register	RW	Unit	Type	Range	Description
0x2DEE–0x2DF5	11759–11766	R	–	OCTET STRING	–	Product range = ComPacT NSX
0x2DF6–0x2DFD	11767–11774	R	–	OCTET STRING	–	Product model = BSCM Modbus SL/ULP
0x2DFE–0x2E05	11775–11782	R	–	OCTET STRING	–	Firmware revision
0x2E2E–0x2E37	11823–11832	R	–	OCTET STRING	–	Vendor name = Schneider Electric
0x2E38–0x2E41	11833–11842	R	–	OCTET STRING	–	Product code = LV434220
0x2E5B–0x2E64	11868–11877	R	–	OCTET STRING	–	Serial number
0x2E7B	11900	R	–	INT16U	–	Product identifier = 15149 for BSCM Modbus SL/ULP
0x2E90–0x2E99	11921–11930	R	–	OCTET STRING	–	Hardware revision

Read Device Identification

The Read Device Identification function is used to access in a standardized manner the information required to identify a device. 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 BSCM Modbus SL/ULP module is the following:

Name	Type	Description
Vendor name	OCTET STRING	'Schneider Electric' (18 characters)
Product code	OCTET STRING	LV434220
Firmware revision	OCTET STRING	'XXX.YYY.ZZZ'
Vendor URL	OCTET STRING	'www.se.com'
Product name	OCTET STRING	BSCM Modbus SL/ULP (LV434220)
Model name	OCTET STRING	Communication module
User application name	OCTET STRING	ComPacT NSX (by default)

Circuit Breaker Status

Circuit Breaker Status

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x0232	563	R	–	–	INT16U	–	–	Circuit breaker status register
							0	OF input status 0 = The circuit breaker is open. 1 = The circuit breaker is closed.
							1	SD input status 0 = The circuit breaker is not tripped. 1 = The circuit breaker is tripped due to electrical fault, shunt trip or push-to-trip.
							2	SDE input status 0 = The circuit breaker is not tripped. 1 = The circuit breaker is tripped due to electrical fault (including ground-fault test and earth-leakage test).
							3–15	Reserved (forced to 0)

Communicating Motor Mechanism Status

Address	Register	RW	X	Unit	Type	Range	Bit	Description
0x0233	564	R	–	–	INT16U	–	–	Communicating motor mechanism status register
							0	Motor mechanism 0 = not available 1 = available
							1	Manu/auto mode 0 = manu 1 = auto
							2	Last command 0 = last command succeeded 1 = last command failed
							3	Enable automatic reset 0 = automatic reset is not enabled. 1 = automatic reset is enabled.
							4	Enable reset even if SDE 0 = reset is not enabled if the circuit breaker is tripped on electrical fault. 1 = reset is enabled even if the circuit breaker is tripped on electrical fault.
							5	Local/Remote mode selected in the FDM121 display menu. 0 = Remote mode (default value), the communicating motor mechanism is controlled through a Modbus command only. 1 = Local mode, the communicating motor mechanism is controlled through the FDM121 display menu only.

Address	Register	RW	X	Unit	Type	Range	Bit	Description
							6–15	Reserved (forced to 0)

Maintenance Indicators

General Description

The BSCM Modbus SL/ULP module has seven counters that help to manage the ComPacT NSX circuit breaker.

The BSCM Modbus SL/ULP module counters have the following properties:

- All the counters are saved in non-volatile memory to prevent data loss in case of power loss.

- The cumulating OF counter is read only. It stops incrementing when it reaches the maximum value 4 294 967 295.

- The user can preset all counters (except the cumulating OF counter) to any value from 0 to 65535. The counters stop incrementing when they reach the maximum value 65535.

- The OF counter and close circuit breaker command counter have a threshold which can be set by the user, to any value from 0 to 65534.

  The factory setting is 5000. An alarm is generated when a counter reaches the threshold.

BSCM Modbus SL/ULP Module Counters

Address	Register	RW	X	Unit	Type	Range	Description
0x023A–0x023B	571–572	R	1	–	INT32U	0–4 294 967 295	Cumulating OF counter (non-resettable open to close counter)
0x023C	573	R-WC	1	–	INT16U	0–65535	OF counter (resettable open to close counter)
0x023D	574	R-WC	1	–	INT16U	0–65535	SD counter (Close to SD position)
0x023E	575	R-WC	1	–	INT16U	0–65535	SDE counter (Close to SDE position)
0x023F	576	R-WC	1	–	INT16U	0–65535	Open circuit breaker command counter
0x0240	577	R-WC	1	–	INT16U	0–65535	Close circuit breaker command counter
0x0241	578	R-WC	1	–	INT16U	0–65535	Reset circuit breaker command counter
0x0242–0x0243	579–580	–	–	–	–	–	Reserved
0x0244	581	R-WC	1	–	INT16U	0–65535	OF counter threshold The factory setting is 5000.
0x0245	582	R-WC	1	–	INT16U	0–65535	Close circuit breaker command counter threshold The factory setting is 5000.

Event History

General Description

The BSCM Modbus SL/ULP module event history registers describe the last 10 events. The BSCM Modbus SL/ULP module event format corresponds to a series of 10 records. Each record is composed of 5 registers describing one BSCM Modbus SL/ULP module event.

A read request of 5x(n) registers is necessary to read the last n BSCM Modbus SL/ULP module 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 BSCM Modbus SL/ULP module event records of the BSCM Modbus SL/ULP module event history:

- The first 5 registers describe the first BSCM Modbus SL/ULP module event record (most recent event).
- The next 5 registers describe the second BSCM Modbus SL/ULP module event record.
- The last 5 registers describe the third BSCM Modbus SL/ULP module event record.

Address	Register	Description
0x0259	602	Event counter
0x025A–0x025E	603–607	Event record 1 (most recent event)
0x025F–0x0263	608–612	Event record 2
0x0264–0x0268	613–617	Event record 3
0x0269–0x026D	618–622	Event record 4
0x026E–0x0272	623–627	Event record 5
0x0273–0x0277	628–632	Event record 6
0x0278–0x027C	633–637	Event record 7
0x027D–0x0281	638–642	Event record 8
0x0282–0x0286	643–647	Event record 9
0x0287–0x028B	648–652	Event record 10 (oldest event)

Event Counter

The event counter is incremented when a new event is logged. If the counter reaches the maximum value 65535 and a new event is logged, the counter is reset to 0.

Address	Register	RW	X	Unit	Type	Range	Description
0x0259	602	R	1	–	INT16U	0–65535	BSCM Modbus SL/ULP module event counter

Event Record

The order and the description of the event record registers are the same as that of event record 1:

Event 1 (Most Recent Event)							
Address	Register	RW	X	Unit	Type	Range	Description
0x025A	603	R	1	–	INT16U	0–65535	BSCM Modbus SL/ULP module event identifier (see next paragraph)
0x025B–0x025D	604–606	R	–	–	ULP DATE	–	Date and time of event , page 90
0x025E	607	R	1	–	INT16U	1–2	Event status 1 = event occurrence 2 = event completion

Event Identifier

Event Identifier	Event
1024	SD contact change (occurrence = close to SD position)
1025	Threshold of OF counter is reached
1026	Threshold of close command counter is reached
1027	STOP (internal failure)
1028	ERROR (internal failure)
1029	OF contact change (occurrence = open to close position)
1030	SDE contact change (occurrence = close to SDE position)
1031	Manu/auto mode (occurrence = manu to auto position)
1040	Open command
1041	Close command
1042	Reset command

NOTE: In the case of a STOP event, it is mandatory to replace the BSCM Modbus SL/ULP module. In the case of an ERROR event, it is advised to replace the BSCM Modbus SL/ULP module (the core protection functions still work but it is preferable to replace the BSCM Modbus SL/ULP module).

BSCM Modbus SL/ULP Module Commands

What's in This Chapter

List of BSCM Modbus SL/ULP Module Commands and Error Codes

List of Commands

The following table lists the available BSCM Modbus SL/ULP module commands, their corresponding command codes and user profiles. Follow the command execution procedures, page 75.

Command	Command code	User profile
Open circuit breaker, page 217	904	Administrator or Operator
Close circuit breaker, page 217	905	Administrator or Operator
Reset circuit breaker, page 217	906	Administrator or Operator
Enable/inhibit close order, page 218	910	Administrator or Operator
Enable/disable automatic reset, page 218	42636	Administrator
Enable/disable reset even if SDE, page 218	42637	Administrator
Preset counters, page 220	42638	Administrator
Set up thresholds, page 220	42639	Administrator
Get current time, page 222	768	No password required
Set absolute time, page 222	769	No password required
Read IMU name and location, page 223	1024	No password required
Write IMU name and location, page 224	1032	Administrator
Set validity duration of data, page 224	41868	Administrator, Services, Engineer, or Operator

Error Codes

Error codes generated by the BSCM Modbus SL/ULP module commands are returned in register 8021. In addition to generic error codes, page 78, the BSCM Modbus SL/ULP module commands generate the following error codes:

Error Code	Description
4363 (0x110B)	BSCM Modbus SL/ULP module is out of order.
4503 (0x1197)	Circuit breaker is tripped. It must be reset before the command.
4504 (0x1198)	Circuit breaker is already closed.
4505 (0x1199)	Circuit breaker is already open.
4506 (0x119A)	Circuit breaker is already reset.
4507 (0x119B)	Actuator is in manual mode. Remote commands are not allowed.
4508 (0x119C)	Actuator is not present.
4510 (0x119E)	A previous command is still in progress.
4511 (0x119F)	Reset command is forbidden when SDE is set.
4512 (0x11A0)	Inhibit close order is enabled.

Any other positive error code indicates an internal error.

Circuit Breaker Control Commands

Open Circuit Breaker

To open the circuit breaker with the communicating motor mechanism, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	904	Command code = 904
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Close Circuit Breaker

To close the circuit breaker with the communicating motor mechanism, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	905	Command code = 905
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Reset Circuit Breaker

To reset the circuit breaker with the communicating motor mechanism, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	906	Command code = 906
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Enable/Inhibit a Circuit Breaker Close Order

To enable or inhibit a close order of the circuit breaker with the communicating motor mechanism, set the command register as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	910	Command code = 910
0x1F40	8001	–	–	INT16U	13	Number of parameters (bytes) = 13
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	–	INT16U	1	• 0 = Enable close order • 1 = Inhibit close order
0x1F46	8007	–	–	INT16U	–	Origin of the command: 256 = command sent via communication interface (IFM or IFE)

Enable/Disable Automatic Reset

The user can read the automatic reset parameters at register 564 (bit 3), page 210.

To enable/disable automatic reset of the circuit breaker with the communicating motor mechanism, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42636	Command code = 42636
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	0 = automatic reset is not enabled. 1 = automatic reset is enabled.

Enable/Disable Reset even if SDE

The user can read the reset parameters at register 564 (bit 4), page 210.

To enable/disable reset of the circuit breaker with the communicating motor mechanism even if SDE, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42637	Command code = 42637
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command

Address	Register	X	Unit	Type	Range	Description
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	0 = reset is not enabled if SDE = 1. 1 = reset is enabled even if SDE = 1.

Counter Commands

Preset Counters

The user can read the values of the counters from registers 571 to 578, page 212.

To preset the counters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42638	Command code = 42638
0x1F40	8001	–	–	INT16U	22	Number of parameters (bytes) = 22
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1100)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	–	INT16U	0–65535	0–65534 = preset value of the OF counter 65535 = do not preset the OF counter
0x1F46	8007	1	–	INT16U	0–65535	0–65534 = preset value of the SD counter 65535 = do not preset the SD counter
0x1F47	8008	1	–	INT16U	0–65535	0–65534 = preset value of the SDE counter 65535 = do not preset the SDE counter
0x1F48	8009	1	–	INT16U	0–65535	0–65534 = preset value of the open circuit breaker command counter 65535 = do not preset the open circuit breaker command counter
0x1F49	8010	1	–	INT16U	0–65535	0–65534 = preset value of the close circuit breaker command counter 65535 = do not preset the close circuit breaker command counter
0x1F4A	8011	1	–	INT16U	0–65535	0–65534 = preset value of the reset circuit breaker command counter 65535 = do not preset the reset circuit breaker command counter

Set Up Thresholds

The user can read the values of the thresholds from registers 581 to 582, page 212.

To set up the thresholds, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42639	Command code = 42639
0x1F40	8001	–	–	INT16U	22	Number of parameters (bytes) = 22
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1100)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	–	INT16U	0–65535	0–65534 = value of the OF counter threshold 65535 = do not change the OF counter threshold
0x1F46	8007	1	–	INT16U	65535	65535 (no threshold is set up for the SD counter)
0x1F47	8008	1	–	INT16U	65535	65535 (no threshold is set up for the SDE counter)
0x1F48	8009	1	–	INT16U	65535	65535 (no threshold is set up for the open circuit breaker command counter)

Address	Register	X	Unit	Type	Range	Description
0x1F49	8010	1	–	INT16U	0–65535	0–65534 = value of the close circuit breaker command counter threshold 65535 = do not change close circuit breaker command counter threshold
0x1F4A	8011	1	–	INT16U	65535	65535 (no threshold is set up for the reset circuit breaker command counter)

Configuration Commands

Get Current Time

The get current time command is a non-intrusive command. The command is always enabled, even if the remote padlock parameter is set to **Disabled**.

To get the current time for all modules, set the command registers as follows:

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	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 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 a non-intrusive command. The command is always enabled, even if the remote padlock parameter is set to **Disabled**.

To set the absolute time for all the IMU modules, set the command registers as follows:

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	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45	8006	–	INT16U	–	MSB = month (1–12) LSB = day in the month (1–31)
0x1F46	8007	–	INT16U	–	MSB = year (0–99, 0 meaning year 2000) LSB = hour (0–23)
0x1F47	8008	–	INT16U	–	MSB = minutes (0–59) LSB = seconds (0–59)
0x1F48	8009	ms	INT16U	0–999	Milliseconds (0–999)

In case of 24 Vdc power loss, the date and time counters are reset to January 1 2000. It is therefore mandatory to set absolute time for all the IMU modules after recovering the 24 Vdc power supply.

Furthermore, due to the clock drift of each IMU module, it is mandatory to set absolute time for all the IMU modules periodically. Recommended period is at least every 15 minutes.

Read IMU Name and Location

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

To read the IMU name and location, set the command registers as follows:

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	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
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 are returned to command registers as follows:

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	–	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 with the NULL character 0x00

Write IMU Name and Location

The IMU name and location can be read from registers 11801 to 11868.

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

To write the IMU name and location, the user must set up the command registers as follows:

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	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command = Administrator user profile password
0x1F45–0x1F46	8006–8007	–	INT32U	–	17039489 = write IMU name (load 0x0104 into register 8006, 0x0081 into 8007) 17039490 = write IMU location (load 0x0104 into register 8006, 0x0082 into 8007)
0x1F47	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 with the NULL character 0x00

Set Validity Duration of Data

This command is used to set the validity duration of data in the standard and legacy datasets.

The validity duration of data can be read in a register

To set the validity duration of data, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41868	Command code = 41868
0x1F40	8001	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	INT16U	769	Destination = 769 (0x0301)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator, Services, Engineer, or Operator user profile password
0x1F45	8006	s	INT16U	5–300 (in steps of 5 s)	Validity duration of data Factory setting: 10 s

BSCM Module Data for ComPacT NSX Circuit Breakers

What's in This Part

BSCM Module Registers

What's in This Chapter

BSCM Module Identification

Product Identification

Address	Register	RW	X	Unit	Type	Range	Description
0x0226	551	R	–	–	INT16U	15149	Product identification = 15149 for the BSCM module

BSCM Module Identifier

The BSCM 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 BSCM module serial number.

Address	Register	RW	X	Unit	Type	Range	Description
0x0227	552	R	–	–	OCTET STRING	–	'PP'
0x0228	553	R	–	–	OCTET STRING	05–99	'YY'
0x0229	554	R	–	–	OCTET STRING	01–53	'WW'
0x022A	555	R	–	–	OCTET STRING	1–7	'Dn'
0x022B	556	R	–	–	OCTET STRING	00–99	'nn'
0x022C	557	R	–	–	OCTET STRING	01–99	'n' (the NULL character ends the serial number)

Circuit Breaker Status

Circuit Breaker Status

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x0232	563	R	–	–	INT16U	–	A/E	–	Circuit breaker status register
								0	OF input status 0 = The circuit breaker is open. 1 = The circuit breaker is closed.
								1	SD input status 0 = The circuit breaker is not tripped. 1 = The circuit breaker is tripped due to electrical fault or shunt trip or push-to-trip.
								2	SDE input status 0 = The circuit breaker is not tripped on electrical fault. 1 = The circuit breaker is tripped due to electrical fault (including ground-fault test and earth-leakage test).
							–	3–15	Reserved (forced to 0)

Communicating Motor Mechanism Status

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
0x0233	564	R	–	–	INT16U	–	A/E	–	Communicating motor mechanism status register
								0	Motor mechanism 0 = not available 1 = available
								1	Manu/auto mode 0 = manu 1 = auto
								2	Last command 0 = last command succeeded 1 = last command failed
								3	Enable automatic reset 0 = automatic reset is not enabled. 1 = automatic reset is enabled.
								4	Enable reset even if SDE 0 = reset is not enabled if the circuit breaker is tripped on electrical fault. 1 = reset is enabled even if the circuit breaker is tripped on electrical fault.

Address	Register	RW	X	Unit	Type	Range	A/E	Bit	Description
								5	Local/Remote mode selected in the FDM121 display menu. 0 = Remote mode (default value), the communicating motor mechanism is controlled through a Modbus command only. 1 = Local mode, the communicating motor mechanism is controlled through the FDM121 display menu only.
							−	6–15	Reserved (forced to 0)

Maintenance Indicators

General Description

The BSCM module has 7 counters that help to manage the ComPacT NSX circuit breaker.

The BSCM module counters have the following properties:

- All the counters are saved in non-volatile memory to prevent data loss in case of power loss.
- The cumulating OF counter is read only. It stops incrementing when it reaches the maximum value 4 294 967 295.
- The user can preset all counters (except the cumulating OF counter) to any value from 0 to 65535. The counters stop incrementing when they reach the maximum value 65535.
- Tthe OF counter and close circuit breaker command counter have a threshold which can be set by the user, to any value from 0 to 65534.

  The factory setting is 5000. An alarm is generated when a counter reaches the threshold.

BSCM Module Counters

Address	Register	RW	X	Unit	Type	Range	Description
0x023A– 0x023B	571– 572	R	1	–	INT32U	0–4 294 967 295	Cumulating OF counter (non-resettable open to close counter)
0x023C	573	R-WC	1	–	INT16U	0–65535	OF counter (resettable open to close counter)
0x023D	574	R-WC	1	–	INT16U	0–65535	SD counter (Close to SD position)
0x023E	575	R-WC	1	–	INT16U	0–65535	SDE counter (Close to SDE position)
0x023F	576	R-WC	1	–	INT16U	0–65535	Open circuit breaker command counter
0x0240	577	R-WC	1	–	INT16U	0–65535	Close circuit breaker command counter
0x0241	578	R-WC	1	–	INT16U	0–65535	Reset circuit breaker command counter
0x0242– 0x0243	579–580	–	–	–	–	–	Reserved
0x0244	581	R-WC	1	–	INT16U	0–65535	OF counter threshold The factory setting is 5000.
0x0245	582	R-WC	1	–	INT16U	0–65535	Close circuit breaker command counter threshold The factory setting is 5000.

Event History

General Description

The BSCM module event history registers describe the last 10 events. The BSCM module event format corresponds to a series of 10 records. Each record is composed of 5 registers describing one BSCM module event.

A read request of 5x(n) registers is necessary to read the last n BSCM module 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 BSCM module event records of the BSCM module event history:

- The first 5 registers describe the first BSCM module event record (most recent event).
- The next 5 registers describe the second BSCM module event record.
- The last 5 registers describe the third BSCM module event record.

Address	Register	Description
0x0259	602	Event counter
0x025A–0x025E	603–607	Event record 1 (most recent event)
0x025F–0x0263	608–612	Event record 2
0x0264–0x0268	613–617	Event record 3
0x0269–0x026D	618–622	Event record 4
0x026E–0x0272	623–627	Event record 5
0x0273–0x0277	628–632	Event record 6
0x0278–0x027C	633–637	Event record 7
0x027D–0x0281	638–642	Event record 8
0x0282–0x0286	643–647	Event record 9
0x0287–0x028B	648–652	Event record 10 (oldest event)

Event Counter

The event counter is incremented when a new event is logged. If the counter reaches the maximum value 65535 and a new event is logged, the counter is reset to 0.

Address	Register	RW	X	Unit	Type	Range	Description
0x0259	602	R	1	–	INT16U	0–65535	BSCM module event counter

Event Record

The order and the description of the event record registers are the same as that of event record 1:

Event 1 (Most Recent Event)							
Address	Register	RW	X	Unit	Type	Range	Description
0x025A	603	R	1	–	INT16U	0–65535	BSCM module event identifier (see next paragraph)
0x025B– 0x025D	604– 606	R	–	–	ULP DATE	–	Date and time of event , page 90
0x025E	607	R	1	–	INT16U	1–2	Event status 1 = event occurrence 2 = event completion

Event Identifier

Event Identifier	Event
1024	SD contact change (occurrence = close to SD position)
1025	Threshold of OF counter is reached
1026	Threshold of close command counter is reached
1027	STOP (internal failure)
1028	ERROR (internal failure)
1029	OF contact change (occurrence = open to close position)
1030	SDE contact change (occurrence = close to SDE position)
1031	Manu/auto mode (occurrence = manu to auto position)
1040	Open command
1041	Close command
1042	Reset command

NOTE: In the case of a STOP event, it is mandatory to replace the BSCM module. In the case of an ERROR event, it is advised to replace the BSCM module (the core protection functions still work but it is preferable to replace the BSCM module).

BSCM Module Commands

What's in This Chapter

List of BSCM Module Commands and Error Codes

List of Commands

The following table lists the available BSCM module commands, their corresponding command codes and user profiles. Follow the command execution procedures , page 75.

Command	Command code	User profile
Open circuit breaker , page 235	904	Administrator or Operator
Close circuit breaker , page 235	905	Administrator or Operator
Reset circuit breaker , page 235	906	Administrator or Operator
Enable/inhibit close order , page 236	910	Administrator or Operator
Enable/disable automatic reset , page 236	42636	Administrator
Enable/disable reset even if SDE , page 236	42637	Administrator
Preset counters , page 238	42638	Administrator
Set up thresholds , page 238	42639	Administrator

Error Codes

Error codes generated by the BSCM module commands are returned in register 8021. In addition to generic error codes , page 78, BSCM commands generate the following error codes:

Error Code	Description
4363 (0x110B)	BSCM module is out of order.
4503 (0x1197)	Circuit breaker is tripped. It must be reset before the command.
4504 (0x1198)	Circuit breaker is already closed.
4505 (0x1199)	Circuit breaker is already open.
4506 (0x119A)	Circuit breaker is already reset.
4507 (0x119B)	Actuator is in manual mode. Remote commands are not allowed.
4508 (0x119C)	Actuator is not present.
4510 (0x119E)	A previous command is still in progress.
4511 (0x119F)	Reset command is forbidden when SDE is set.
4512 (0x11A0)	Inhibit close order is enabled.

Any other positive error code indicates an internal error.

Circuit Breaker Control Commands

Open Circuit Breaker

To open the circuit breaker, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	904	Command code = **904**
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Close Circuit Breaker

To close the circuit breaker, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	905	Command code = **905**
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Reset Circuit Breaker

To reset the circuit breaker, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	906	Command code = **906**
0x1F40	8001	–	–	INT16U	10	Number of parameters (bytes) = 10
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password

Enable/Inhibit a Circuit Breaker Close Order

To enable or inhibit a close order of the circuit breaker, set the command register as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	910	Command code = **910**
0x1F40	8001	–	–	INT16U	13	Number of parameters (bytes) = 13
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator or Operator user profile password
0x1F45	8006	–	–	INT16U	1	• 0 = Enable close order • 1 = Inhibit close order
0x1F46	8007	–	–	INT16U	–	Origin of the command: 256 = command sent via communication interface (IFM or IFE)

Enable/Disable Automatic Reset

The user can read the automatic reset parameters at register 564 (bit 3), page 228.

To enable/disable automatic reset, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42636	Command code = **42636**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	0 = automatic reset is not enabled. 1 = automatic reset is enabled.

Enable/Disable Reset even if SDE

The user can read the reset parameters at register 564 (bit 4), page 228.

To enable/disable reset even if SDE, set the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42637	Command code = **42637**
0x1F40	8001	–	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1101)
0x1F42	8003	–	–	INT16U	1	Security type of the command

Address	Register	X	Unit	Type	Range	Description
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	–	–	INT16U	0–1	0 = reset is not enabled if SDE = 1. 1 = reset is enabled even if SDE = 1.

Counter Commands

Preset Counters

The user can read the values of the counters from registers 571 to 578, page 230.

To preset the counters, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42638	Command code = **42638**
0x1F40	8001	–	–	INT16U	22	Number of parameters (bytes) = 22
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1100)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	–	INT16U	0–65535	0–65534 = preset value of the OF counter 65535 = do not preset the OF counter
0x1F46	8007	1	–	INT16U	0–65535	0–65534 = preset value of the SD counter 65535 = do not preset the SD counter
0x1F47	8008	1	–	INT16U	0–65535	0–65534 = preset value of the SDE counter 65535 = do not preset the SDE counter
0x1F48	8009	1	–	INT16U	0–65535	0–65534 = preset value of the open circuit breaker command counter 65535 = do not preset the open circuit breaker command counter
0x1F49	8010	1	–	INT16U	0–65535	0–65534 = preset value of the close circuit breaker command counter 65535 = do not preset the close circuit breaker command counter
0x1F4A	8011	1	–	INT16U	0–65535	0–65534 = preset value of the reset circuit breaker command counter 65535 = do not preset the reset circuit breaker command counter

Set Up Thresholds

The user can read the values of the thresholds from registers 581 to 582, page 230.

To set up the thresholds, the user must set up the command registers as follows:

Address	Register	X	Unit	Type	Range	Description
0x1F3F	8000	–	–	INT16U	42639	Command code = **42639**
0x1F40	8001	–	–	INT16U	22	Number of parameters (bytes) = 22
0x1F41	8002	–	–	INT16U	4353	Destination = 4353 (0x1100)
0x1F42	8003	–	–	INT16U	1	Security type of the command
0x1F43– 0x1F44	8004– 8005	–	–	OCTET STRING	–	Password of the command: Administrator user profile password
0x1F45	8006	1	–	INT16U	0–65535	0–65534 = value of the OF counter threshold 65535 = do not change the OF counter threshold
0x1F46	8007	1	–	INT16U	65535	65535 (no threshold is set up for the SD counter)
0x1F47	8008	1	–	INT16U	65535	65535 (no threshold is set up for the SDE counter)
0x1F48	8009	1	–	INT16U	65535	65535 (no threshold is set up for the open circuit breaker command counter)

Address	Register	X	Unit	Type	Range	Description
0x1F49	8010	1	–	INT16U	0–65535	0–65534 = value of the close circuit breaker command counter threshold 65535 = do not change close circuit breaker command counter threshold
0x1F4A	8011	1	–	INT16U	65535	65535 (no threshold is set up for the reset circuit breaker command counter)

IO Module Data for ComPacT NSX Circuit Breakers

What's in This Part

IO Module Registers

What's in This Chapter

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.

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

Address	Register	RW	Unit	Type	Range	Description
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
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 EcoStruxure Power Commission 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	–	–	Quality of each bit of register 13931: • 0 = Invalid • 1 = Valid
0x366A	13931	R	–	INT16U	–	0	Digital input status: • 0 = Off • 1 = On
						1	Digital input forced status: • 0 = Unforced • 1 = Forced
						2–15	Reserved
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.

Address	Register	RW	Unit	Type	Range	Bit	Description
							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.
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.
0x36A5–0x36A6	13990–13991	R	–	FLOAT32	1–16777215	–	Pulse weight[1] [2] Valid if input signal type is pulse digital input.

Address	Register	RW	Unit	Type	Range	Bit	Description
							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 EcoStruxure Power Commission 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	Reserved
						1	Digital output status: • 0 = OFF • 1 = ON
		R				2	Digital output forced status: • 0 = Unforced • 1 = Forced
						3–15	Reserved
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]

Address	Register	RW	Unit	Type	Range	Bit	Description
							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)
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-WC	–	INT16U	0–2	–	Simple command for output[1]: • 0 = No command • 1 = OFF • 2 = ON Valid if simple commands are enabled[2].
0x3876– 0x3884	14455– 14469	–	–	–	–	–	Reserved

(1) Value set using EcoStruxure Power Commission 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

Address	Register	RW	Unit	Type	Range	Description
0x3902	14595	R	–	INT16U	1–9	Last validated application set by EcoStruxure Power Commission 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	−	−	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
						6–15	Reserved
0x3907	14600	R	−	INT16U	−	−	Quality of each bit of register 14601: • 0 = Invalid • 1 = Valid
0x3908	14601	R–WC	−	INT16U	−	−	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
						3–15	Reserved

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

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

The FDM121 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 EcoStruxure Power Commission 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 = production number of the device on the day (0001–9999)

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

Address	Register	RW	Unit	Type	Range	Description
0x3971–0x397A	14706-14715	R	–	OCTET STRING	–	Serial number
0x3971	14706	R	–	OCTET STRING	–	'PP'
0x3972	14707	R	–	OCTET STRING	'05'–'99'	'YY'
0x3973	14708	R	–	OCTET STRING	'01'–'53'	'WW'
0x3974	14709	R	–	OCTET STRING	'10'–'79'	'Dn'
0x3975	14710	R	–	OCTET STRING	'00'–'99'	'nn'
0x3976	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

Address	Register	RW	Unit	Type	Range	Description
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 = 'Schneider Electric'
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	ULP format
						1	TI086 format
						2–15	Reserved
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
						2–15	Reserved
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

Address	Register	RW	Unit	Type	Range	Bit	Description
						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
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	Disconnection of the circuit breaker from cradle is overdue.
						2	Cradle has reached its maximum number of operation
						3	Remaining service life of cradle is below alarm threshold
						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	
						3	Reserved
						4–15	Reserved
0x399D	14750	R	–	INT16U	–	–	Quality of each bit of register 14751: • 0 = Invalid • 1 = Valid
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	Cradle application enabled or disabled: • 0 = Disabled • 1 = Enabled
						1–15	Reserved
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 application performed by IO 1 (predefined or user defined application).

The registers 18300–18329 are related to the cradle management application performed by IO 2 (predefined or user defined application).

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
						0–7	Reserved
						8	Device in disconnected position (CD)
						9	Device in connected position (CE)
						10	Device in the test position (CT)
						11–15	Reserved
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	s	INT32U	–	–	Operating time since last grease maintenance
0x3BD9–0x3BDA	15322–15323	R-WC	s	INT32U	–	–	Operating time since last move connected position

Address	Register	RW	Unit	Type	Range	Bit	Description
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 18330–18359 are related to the Drawer management user-defined application performed by IO 2.

Address	Register	RW	Unit	Type	Range	Bit	Description
0x3BE1	15330	R	−	INT16U	−	−	Quality of each bit of register 15331: 0 = Invalid 1 = Valid
0x3BE2	15331	R	−	INT16U	−	−	Drawer status
						0–7	Reserved
						8	Drawer in disconnected position
						9	Drawer in connected position
						10	Drawer in the test position
						11–15	Reserved
0x3BE3–0x3BE4	15332–15333	R	−	INT32U	−	−	Drawer connected position counter. This counter increments for each rising edge of the drawer connected position.
0x3BE5–0x3BE6	15334–15335	R	−	INT32U	−	−	Drawer disconnected position counter. This counter increments for each rising edge of the drawer disconnected position.
0x3BE7–0x3BE8	15336–15337	R	−	INT32U	−	−	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.

The registers 18400–18409 are related to the Light control predefined application performed by IO 2.

Address	Register	RW	Unit	Type	Range	Description
0x3C27	15400	R	–	INT16U	0–1	Quality 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	R	–	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.

The registers 18410–18419 are related to the Load control predefined application performed by IO 2.

Address	Register	RW	Unit	Type	Range	Description
0x3C31	15410	R	–	INT16U	0–1	Quality 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.						

IO Module Events

What's in This Chapter

Event History

General Description

The event history registers describe the last 100 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

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, page 264
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 pushbutton 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	IO1 Watchdog reset	Event	Medium	–
1538 (0x0602)	General	IO1 reset to factory setting	Event	Medium	–
1539 (0x0603)	General	IO1 failure (STOP mode)	Alarm	High	Manual or Remote
1540 (0x0604)	General	IO1 failure (ERROR mode)	Alarm	Medium	Manual or Remote
1541 (0x0605)	General	IO1 functional rotary switch position change	Event	Medium	–
1542 (0x0606)	General	IO1 setting locking pad rotary switch position change	Event	Medium	–
1543 (0x0607)	General	IO1 source address dip switch position change	Event	Medium	–
1552 (0x0610)	General	IO1 O1 rising edge (OFF/ON change)	Event	Low	–
1553 (0x0611)	General	IO1 O2 rising edge (OFF/ON change)	Event	Low	–
1554 (0x0612)	General	IO1 O3 rising edge (OFF/ON change)	Event	Low	–
1555 (0x0613)	General	IO1 I1 rising edge (OFF/ON change)	Event	Low	–
1556 (0x0614)	General	IO1 I2 rising edge (OFF/ON change)	Event	Low	–
1557 (0x0615)	General	IO1 I3 rising edge (OFF/ON change)	Event	Low	–
1558 (0x0616)	General	IO1 I4 rising edge (OFF/ON change)	Event	Low	–
1559 (0x0617)	General	IO1 I5 rising edge (OFF/ON change)	Event	Low	–
1560 (0x0618)	General	IO1 I6 rising edge (OFF/ON change)	Event	Low	–
1561 (0x0619)	General	IO1 threshold overrun on I1 counter	Alarm	Medium	Manual or Remote
1562 (0x061A)	General	IO1 threshold overrun on I2 counter	Alarm	Medium	Manual or Remote
1563 (0x061B)	General	IO1 threshold overrun on I3 counter	Alarm	Medium	Manual or Remote
1564 (0x061C)	General	IO1 threshold overrun on I4 counter	Alarm	Medium	Manual or Remote
1565 (0x061D)	General	IO1 threshold overrun on I5 counter	Alarm	Medium	Manual or Remote
1566 (0x061E)	General	IO1 threshold overrun on I6 counter	Alarm	Medium	Manual or Remote
1567 (0x061F)	General	IO1 threshold overrun on O1 counter	Alarm	Medium	Manual or Remote
1568 (0x0620)	General	IO1 threshold overrun on O2 counter	Alarm	Medium	Manual or Remote
1569 (0x0621)	General	IO1 threshold overrun on O3 counter	Alarm	Medium	Manual or Remote

Code	Application	Description	Type	Priority	Reset Mode
1570 (0x0622)	General	IO1 I1 unforced/forced change	Event	Low	–
1571 (0x0623)	General	IO1 I2 unforced/forced change	Event	Low	–
1572 (0x0624)	General	IO1 I3 unforced/forced change	Event	Low	–
1573 (0x0625)	General	IO1 I4 unforced/forced change	Event	Low	–
1574 (0x0626)	General	IO1 I5 unforced/forced change	Event	Low	–
1575 (0x0627)	General	IO1 I6 unforced/forced change	Event	Low	–
1576 (0x0628)	General	IO1 O1 unforced/forced change	Event	Low	–
1577 (0x0629)	General	IO1 O2 unforced/forced change	Event	Low	–
1578 (0x062A)	General	IO1 O3 unforced/forced change	Event	Low	–
1579 (0x062B)	User-defined input acquisition	IO1 user-defined input 1	Alarm	Medium	Manual or Remote
1580 (0x062C)	User-defined input acquisition	IO1 user-defined input 2	Alarm	Medium	Manual or Remote
1581 (0x062D)	User-defined input acquisition	IO1 user-defined input 3	Alarm	Medium	Manual or Remote
1582 (0x062E)	User-defined input acquisition	IO1 user-defined input 4	Alarm	Medium	Manual or Remote
1583 (0x062F)	User-defined input acquisition	IO1 user-defined input 5	Alarm	Medium	Manual or Remote
1584 (0x0630)	User-defined input acquisition	IO1 user-defined input 6	Alarm	Medium	Manual or Remote
1585 (0x0631)	Cooling system	IO1 switchboard temperature threshold 1 overrun	Alarm	Low	Auto
1586 (0x0632)	Cooling system	IO1 switchboard temperature threshold 2 overrun	Alarm	Medium	Manual or Remote
1587 (0x0633)	Cooling system	IO1 switchboard temperature threshold 3 overrun	Alarm	High	Manual or Remote

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	IO2 watchdog reset	Event	Medium	–
1794 (0x0702)	General	IO2 reset to factory settings	Event	Medium	–
1795 (0x0703)	General	IO2 module failure (STOP mode)	Alarm	High	Manual or Remote
1796 (0x0704)	General	IO2 module failure (ERROR mode)	Alarm	Medium	Manual or Remote
1797 (0x0705)	General	IO2 functional rotary switch position change	Event	Medium	–
1798 (0x0706)	General	IO2 setting locking pad rotary switch position change	Event	Medium	–

Code	Application	Description	Type	Priority	Reset Mode
1799 (0x0707)	General	IO2 source address dip switch position change	Event	–	–
1808 (0x0710)	General	IO2 O1 rising edge (OFF/ON change)	Event	Low	–
1809 (0x0711)	General	IO2 O2 rising edge (OFF/ON change)	Event	Low	–
1810 (0x0712)	General	IO2 O3 rising edge (OFF/ON change)	Event	Low	–
1811 (0x0713)	General	IO2 I1 rising edge (OFF/ON change)	Event	Low	–
1812 (0x0714)	General	IO2 I2 rising edge (OFF/ON change)	Event	Low	–
1813 (0x0715)	General	IO2 I3 rising edge (OFF/ON change)	Event	Low	–
1814 (0x0716)	General	IO2 I4 rising edge (OFF/ON change)	Event	Low	–
1815 (0x0717)	General	IO2 I5 rising edge (OFF/ON change)	Event	Low	–
1816 (0x0718)	General	IO2 I6 rising edge (OFF/ON change)	Event	Low	–
1817 (0x0719)	General	IO2 threshold overrun on I1 counter	Alarm	Medium	Manual or Remote
1818 (0x071A)	General	IO2 threshold overrun on I2 counter	Alarm	Medium	Manual or Remote
1819 (0x071B)	General	IO2 threshold overrun on I3 counter	Alarm	Medium	Manual or Remote
1820 (0x071C)	General	IO2 threshold overrun on I4 counter	Alarm	Medium	Manual or Remote
1821 (0x071D)	General	IO2 threshold overrun on I5 counter	Alarm	Medium	Manual or Remote
1822 (0x071E)	General	IO2 threshold overrun on I6 counter	Alarm	Medium	Manual or Remote
1823 (0x071F)	General	IO2 threshold overrun on O1 counter	Alarm	Medium	Manual or Remote
1824 (0x0720)	General	IO2 threshold overrun on O2 counter	Alarm	Medium	Manual or Remote
1825 (0x0721)	General	IO2 threshold overrun on O3 counter	Alarm	Medium	Manual or Remote
1826 (0x0722)	General	IO2 I1 unforced/forced change	Event	Low	–
1827 (0x0723)	General	IO2 I2 unforced/forced change	Event	Low	–
1828 (0x0724)	General	IO2 I3 unforced/forced change	Event	Low	–
1829 (0x0725)	General	IO2 I4 unforced/forced change	Event	Low	–
1830 (0x0726)	General	IO2 I5 unforced/forced change	Event	Low	–
1831 (0x0727)	General	IO2 I6 unforced/forced change	Event	Low	–
1832 (0x0728)	General	IO2 O1 unforced/forced change	Event	Low	–
1833 (0x0729)	General	IO2 O2 unforced/forced change	Event	Low	–
1834 (0x072A)	General	IO2 O3 unforced/forced change	Event	Low	–

Code	Application	Description	Type	Priority	Reset Mode
1835 (0x072B)	User-defined input acquisition	IO2 user-defined input 1	Alarm	Medium	Manual or Remote
1836 (0x072C)	User-defined input acquisition	IO2 user-defined input 2	Alarm	Medium	Manual or Remote
1837 (0x072D)	User-defined input acquisition	IO2 user-defined input 3	Alarm	Medium	Manual or Remote
1838 (0x072E)	User-defined input acquisition	IO2 user-defined input 4	Alarm	Medium	Manual or Remote
1839 (0x072F)	User-defined input acquisition	IO2 user-defined input 5	Alarm	Medium	Manual or Remote
1840 (0x0730	User-defined input acquisition	IO2 user-defined input 6	Alarm	Medium	Manual or Remote
1841 (0x0731)	Cooling system	IO2 switchboard temperature threshold 1 overrun	Alarm	Low	Auto
1842 (0x0732)	Cooling system	IO2 switchboard temperature threshold 2 overrun	Alarm	Medium	Manual or Remote
1843 (0x0733)	Cooling system	IO2 switchboard temperature threshold 3 overrun	Alarm	High	Manual or Remote

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

IO 1 and IO 2 Events and Alarms

Code	Application	Description	Type	Priority	Reset Mode
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	Cradle has reached its maximum number of operations	Alarm	High	Manual or Remote
2310 (0x0906)	Cradle management	Remaining service life of cradle is below alarm threshold	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

Code	Application	Description	Type	Priority	Reset Mode
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	Critical hardware modules discrepancy	Alarm	High	Auto
3329 (0x0D01)	General	Critical firmware modules discrepancy	Alarm	High	Auto
3330 (0x0D02)	General	Non-critical hardware modules discrepancy	Alarm	Medium	Auto
3331 (0x0D03)	General	Non-critical firmware modules discrepancy	Alarm	Medium	Auto

IO Module Commands

What's in This Chapter

List of IO Module Commands

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 user profiles. Follow the command execution procedures, page 75.

Application	Command	Command code	User profile
Generic	Change output state, page 271	1672	Administrator or Operator
Generic	Reset IO module alarms, page 271	41099	Administrator or Operator
Generic	Enable/Disable simple commands, page 271	41100	Administrator or Operator
Generic	Acknowledge latched output, page 272	41102	Administrator or Operator
Generic	Reset analog input minimum/maximum values, page 272	42890	Administrator or Operator
Cradle and drawer management	Preset cradle/drawer counters, page 273	41352	Administrator or Operator
Cradle and drawer management	Preset cradle/drawer regrease timers, page 273	41353	Administrator or Operator
Light control	Light control, page 274	42120	Administrator or Operator
Load control	Load control, page 274	42376	Administrator or Operator
Pulse counter management	Preset input pulse counter, page 275	42888	Administrator or Operator
Cooling system	Preset switchboard temperature threshold counter, page 276	42889	Administrator or Operator

IO Module Error Codes

The error codes generated by the IO module are the generic error codes Result of the Command, page 78.

Generic Commands

Change Output State

The command is used to change the state of IO module digital outputs assigned as user-defined outputs using EcoStruxure Power Commission software.

To change the output state, set the command registers as follows:

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: Administrator or Operator user profile password
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)

Reset IO Module Alarm

The alarms can be read from the alarm status register, page 255.

To reset IO module alarms, set the command registers as follows:

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: Administrator or Operator user profile password

Enable/Disable Simple Commands

To enable or disable the simple commands, set the command registers as follows:

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 =

Address	Register	Unit	Type	Range	Description
					• 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: Administrator or Operator user profile password
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 as follows:

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: Administrator or Operator user profile password
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 registers, page 242.

To reset the minimum/maximum analog input values, set the command registers as follows:

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: Administrator or Operator user profile password

Application Commands

Preset Cradle/Drawer Counters

The cradle/drawer counter values can be read from the cradle management registers, page 258.

To preset the cradle or drawer counters, set the command registers as follows:

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: Administrator or Operator user profile password
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 as follows:

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: Administrator or Operator user profile password
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, page 259.

To control the light, set the command registers as follows:

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
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	–	Password of the command: Administrator or Operator user profile password
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, page 260.

To control the load, set the command registers as follows:

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: Administrator or Operator user profile password
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)

Address	Register	Unit	Type	Range	Bit	Description
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 as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	42888	Command code = **42888**
0x1F40	8001	–	INT16U	34	Number of parameters (bytes) = 34 **NOTE:** The number of parameters corresponds to the number of bytes of the 17 registers 8001–8015 and 8022–8023. The bytes of the registers 8016–8021 are not counted as command parameters.
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: Administrator or Operator user profile password
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	8016	–	–	–	Must be set to 0 (factory setting).
0x1F50	8017	–	–	–	Must be set to 8019 (factory setting).
0x1F51	8018	–	–	–	Must be set to 8020 (factory setting).
0x1F52	8019	–	–	–	Must be set to 8021 (factory setting).
0x1F53	8020	–	–	–	Must be set to 0.

Address	Register	Unit	Type	Range	Description
0x1F54	8021	–	–	–	Must be set to 0.
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 as follows:

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: Administrator or Operator user profile password
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

IFM Communication Interface Data for ComPacT NSX Circuit Breakers

What's in This Part

IFM Communication Interface Registers

What's in This Chapter

IFM Communication Interface Identification

IFM Communication Interface Firmware Revision

The IFM communication interface firmware revision starts at register 11776 and has a maximum length of eight registers.

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
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

Serial Number for IFM Communication Interface TRV00210 or STRV00210

The serial number of IFM communication interface TRV00210 or STRV00210 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 = production number of the device on the day (0001–9999)

A read request of six registers is necessary to read the IFM communication interface serial number.

Address	Register	RW	Unit	Type	Range	Description
0x2E07	11784	R	–	OCTET STRING	–	'PP'
0x2E08	11785	R	–	OCTET STRING	'05'–'99'	'YY'
0x2E09	11786	R	–	OCTET STRING	'01'–'53'	'WW'
0x2E0A	11787	R	–	OCTET STRING	D: '1'–'7' n: '0'–'9'	'Dn'
0x2E0B	11788	R	–	OCTET STRING	'00'–'99'	'nn'
0x2E0C	11789	R	–	OCTET STRING	'0'–'9'	'n' (the NULL character ends the serial number)

Serial Number for IFM Communication Interface LV434000

The serial number of IFM communication interface LV434000 is composed of a maximum of 17 alphanumeric characters with the following format: PPPPPPYYWWDLnnnn0.

- PPPPPP = plant code (example: BATAM plant code is 0000HL)
- YY = year of fabrication (05–99)
- WW = week of fabrication (01–53)
- D = day of fabrication (1–7)
- L = line or machine number (0-9 or a-z)
- nnnn = production number of the device on the day (0001–9999)

A read request of ten registers is necessary to read the IFM communication interface serial number.

Address	Register	RW	Unit	Type	Range	Description
0x2E5C-0x2E5E	11869-11871	R	–	OCTET STRING	–	'PPPPPP'
0x2E5F	11872	R	–	OCTET STRING	'05'–'99'	'YY'
0x2E60	11873	R	–	OCTET STRING	'01'–'53'	'WW'
0x2E61	11874	R	–	OCTET STRING	D: '1'–'7' L: '0'–'9' or 'a'–'z'	'DL'
0x2E62	11875	R	–	OCTET STRING	'00'–'99'	'nn'
0x2E63	11876	R	–	OCTET STRING	'00'–'99'	'nn'
0x2E64-0x2E65	11877-11878	R	–	OCTET STRING	'0'	'0' (the NULL character ends the serial number)

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	0x00–0xFFFFF-FFF	Number of seconds counted since last start

Product Identification

Address	Register	RW	Unit	Type	Range	Description
0x2E7C	11901	R	–	INT16U	–	Product identification = 15146 for the IFM communication interface

Hardware Revision for IFM Communication Interface LV434000

The hardware revision of IFM communication interface LV434000 starts at register 11922 and has a maximum length of ten 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
0x2E91–0x2E96	11922–11927	R	–	OCTET STRING	–	Hardware revision

Read Device Identification

The Read Device Identification function is used to access in a standardized manner the information required to identify a device. 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 IFM communication interface is the following:

Name	Type	Description
Vendor name	OCTET STRING	'Schneider Electric' (18 characters)
Product code	OCTET STRING	'LV434000' or 'TRV00210' (1) or 'STRV00210'
Firmware revision	OCTET STRING	'XXX.YYY.ZZZ' from IFM communication interface revision 002.002.000
Vendor URL	OCTET STRING	'https://www.se.com' (33 characters)
Product name	OCTET STRING	'ULP/Modbus SL communication interface module'
(1) Product code returns 'TRV00210-L' when IFM communication interface TRV00210 is loaded with IFM legacy firmware. For more information, refer to the *MasterPacT Modbus Legacy User Guide*.		

Modbus Network Parameters

Modbus Locking Status

Address	Register	RW	Unit	Type	Range	Description
0x2E72	11891	R	–	INT16U	1–3	Modbus locking pad position • 1 = Modbus locking pad is on the locked position • 3 = Modbus locking pad is on the open position

Validity Duration of Data

Address	Register	RW	Unit	Type	Range	Description
0x306A	12395	R	s	INT16U	5–300 (in steps of 5 s)	Duration of validity of data in the dataset

Auto-Speed Sensing State

Address	Register	RW	Unit	Type	Range	Description
0x306E	12399	R	–	INT16U	0–1	Auto-Speed sensing state • 0 = Auto-Speed sensing is disabled • 1 = Auto-Speed sensing is enabled (factory setting)

Communication Interface Modbus Address

Address	Register	RW	Unit	Type	Range	Description
0x306F	12400	R	–	INT16U	1–99	Communication interface Modbus address

Modbus Parity

Address	Register	RW	Unit	Type	Range	Description
0x3070	12401	R	–	INT16U	1–3	Modbus parity • 1 = no parity (none) • 2 = even parity (factory setting) • 3 = odd parity

Modbus Baud Rate

Address	Register	RW	Unit	Type	Range	Description
0x3071	12402	R	–	INT16U	5–8	Modbus Baud rate • 5 = 4800 Baud • 6 = 9600 Baud • 7 = 19200 Baud (factory setting) • 8 = 38400 Baud

Number of Stop Bits

Address	Register	RW	Unit	Type	Range	Description
0x3072	12403	R	–	INT16U	0–5	Number of stop bits • 0 = no change • 1 = standard Modbus • 2 = 1/2 stop bit • 3 = 1 stop bit • 4 = 1 and 1/2 stop bit • 5 = 2 stop bits

IFM Communication Interface Commands

What's in This Chapter

List of IFM Communication Interface Commands

List of Commands

The following table lists the IFM communication interface commands, their corresponding command codes and user profiles. Follow the command execution procedures accordingly.

Command	Command code	User profile
Get current time, page 286	768	No password required
Set absolute time, page 286	769	No password required
Read IMU Name and Location, page 287	1024	No password required
Write user application name, page 287	1032	No password required
Set Validity Duration of Data, page 288	41868	Administrator, Services, Engineer, or Operator

Error Codes

Error codes generated by the IFM communication interface are the generic error codes, page 78.

IFM Communication Interface Commands

Get Current Time

The get current time command is not hardware protected. When the arrow of the Modbus locking pad (located on the front panel of the IFM communication interface) points to the closed padlock, the get current time command is still enabled.

To get the current time for all modules, set the command registers as follows:

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	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 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 not hardware protected. When the arrow of the Modbus locking pad (located on the front panel of the IFM communication interface) points to the closed padlock, the set absolute time command is still enabled.

To set the absolute time for all the IMU modules, set the command registers as follows:

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	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45	8006	–	INT16U	–	MSB = month (1–12) LSB = day in the month (1–31)
0x1F46	8007	–	INT16U	–	MSB = year (0–99, 0 meaning year 2000) LSB = hour (0–23)
0x1F47	8008	–	INT16U	–	MSB = minutes (0–59) LSB = seconds (0–59)
0x1F48	8009	ms	INT16U	0–999	Milliseconds (0–999)

In case of 24 Vdc power loss, the date and time counters are reset to January 1 2000. It is therefore mandatory to set absolute time for all the IMU modules after recovering the 24 Vdc power supply.

Furthermore, due to the clock drift of each IMU module, it is mandatory to set absolute time for all the IMU modules periodically. Recommended period is at least every 15 minutes.

Read IMU Name and Location

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

To read the IMU name and location, set the command registers as follows:

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	768	Destination = 768 (0x0300)
0x1F42	8003	–	INT16U	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
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 are returned to command registers as follows:

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	–	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 with the NULL character 0x00

Write User Application Name

The user application name can be read from registers 10242 to 10273.

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

To write the user application name, set the command registers as follows:

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)

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 = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	–	17039366 = User application name (load 0x0104 into register 8006, 0x0081 into 8007)
0x1F47	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 with the NULL character 0x00

Set Validity Duration of Data

This command is used to set the validity duration of data in the standard and legacy datasets.

The validity duration of data can be read in a register Validity Duration of Data, page 282.

To set the validity duration of data, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41868	Command code = 41868
0x1F40	8001	–	INT16U	12	Number of parameters (bytes) = 12
0x1F41	8002	–	INT16U	769	Destination = 769 (0x0301)
0x1F42	8003	–	INT16U	1	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	–	Password of the command: Administrator, Services, Engineer, or Operator user profile password
0x1F45	8006	s	INT16U	5–300 (in steps of 5 s)	Validity duration of data Factory setting: 10 s

IFE Communication Interface Data for ComPacT NSX Circuit Breakers

What's in This Part

IFE Communication Interface Registers

What's in This Chapter

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 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
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 EcoStruxure Power Commission software, page 20. When not programmed, the IMU identification registers return 0 (0x0000).

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

Address	Register	RW	Unit	Type	Range	Description
0x2801–0x2820	10242–10273	R-WC	–	OCTET STRING	–	User application name Device name used for acquiring the IP address using DHCP and also the friendly name on DPWS device discovery. **Example:** 'IFE-0A129F' Maximum length is 64 characters.

Address	Register	RW	Unit	Type	Range	Description
0x2E2F–0x2E38	11824–11833	R	–	OCTET STRING	–	Vendor name = 'Schneider Electric'
0x2E39–0x2E42	11834–11843	R	–	OCTET STRING	–	Product code: • 'LV434001' or 'LV434010' = IFE-Ethernet com Modbus TCP/IP • 'LV434002' or 'LV434011' = IFE-Ethernet com Modbus TCP/IP client • 'LV851001' = EIFE Embedded Ethernet interface
0x2E43–0x2E44	11844–11845	–	–	–	–	Reserved

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 communication interface for one circuit breaker ('LV434001' or 'LV434010') • 17101 for IFE Ethernet switchboard server ('LV434002' or 'LV434011') • 17107 for EIFE embedded Ethernet interface ('LV851001')

Validity Duration of Data

Address	Register	RW	Unit	Type	Range	Description
0x306A	12395	R	s	INT16U	5–300 (in steps of 5 s)	Duration of validity of data in the dataset

Read Device Identification

The Read Device Identification function is used to access in a standardized manner the information required to identify a device. 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	• 'LV434001' or 'LV434010' • 'LV434002' or 'LV434011' • 'LV851001' (EIFE)
Firmware revision	OCTET STRING	'XXX.YYY.ZZZ'
Vendor URL	OCTET STRING	'www.se.com' (26 characters)
Product name	OCTET STRING	• For IFE Ethernet communication interface for one circuit breaker (LV434001 or LV434010): 'Ethernet interface for LV breakers' • For IFE Ethernet switchboard server (LV434002 or 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

IFE Communication Interface Serial Number

The IFE communication 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 = production number of the device on the day (0001–9999)

A read request of 6 registers is necessary to read the IFE communication 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)

EIFE Interface Serial Number

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

- PPPPPP = 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 (0–9 or a–z)
- nnnn = production number of the device on the day (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	–	'PPPPPP'
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: '0'–'9' or 'a'–'z'	'DL'
0x02E97–0x02E98	11928–11929	R	–	OCTET STRING	'0000'–'9-999'	'nnnn'

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
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 succeeded
0x30BF	12480	R	–	INT16	–	SNTP fails count

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

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 EcoStruxure Power Commission 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 communication 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

IFE Communication Interface Commands

What's in This Chapter

List of IFE/EIFE Interface Commands

List of Commands for IFE/EIFE Interfaces

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

Command	Command code	User profile
Get current time, page 299	768	No password required
Set absolute time, page 299	769	No password required
Write user application name, page 299	1032	No password required
Set validity duration of the data, page 300	41868	Administrator, Services, Engineer, or Operator

List of Specific Commands for EIFE Interface

The following table lists the EIFE interface commands, their corresponding command codes and user profiles. Follow the command execution procedures, page 75.

Command	Command code	User profile
Reset EIFE alarms	41099	Administrator or Operator
Preset cradle/drawer counters	41352	Administrator or Operator
Preset regrease timers	41353	Administrator or Operator
Get events	50560	No password required

Error Codes

Error codes generated by the IFE/EIFE interface are the generic error codes Result of the Command, page 78.

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 as follows:

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 of the command = 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 as follows:

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 of the command = 0 (no password required)
0x1F45-0x1F48	8006–8009	–	XDATE	–	Current date/time

NOTE: The date and time counters are reset to 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.

Write User Application Name

The user application name can be read from registers 10242 to 10273 IMU Identification, page 291.

To write the user application name, set the command registers as follows:

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	0	Security type of the command
0x1F43–0x1F44	8004–8005	–	OCTET STRING	0	Password of the command = 0 (no password required)
0x1F45–0x1F46	8006–8007	–	INT32U	–	17039366 = User application name (load 0x0104 into register 8006, 0x0081 into 8007)
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 with the NULL character 0x00

Set Validity Duration of Data

This command is used to set the validity duration of data in the standard and legacy datasets.

The validity duration of data can be read in a register Validity Duration of Data, page 292.

To set the validity duration of data, set the command registers as follows:

Address	Register	Unit	Type	Range	Description
0x1F3F	8000	–	INT16U	41868	Command code = 41868
0x1F40	8001	–	INT16U	12	Number of parameters (bytes) = 12
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: Administrator, Services, Engineer, or Operator user profile password
0x1F45	8006	s	INT16U	5–300 (in steps of 5 s)	Validity duration of data Factory setting: 10 s

Appendices

What's in This Part

Introduction

The appendix lists the Modbus registers by ascending order, with cross references to the corresponding pages of the manual.

Cross References to Modbus Registers for ComPacT NSX

What's in This Chapter

Introduction

The cross references table gives the list of Modbus registers in ascending order, with cross references to the corresponding pages of the guide.

Cross References to Modbus Registers

General Description

The following table gives cross references to the Modbus registers used by the communication modules. The registers are listed in ascending order.

Cross References Table

Address	Register	Module	Description	Page
0x0226	551	BSCM Modbus SL/ULP module	Product identification	Product Identification, page 207
0x0227–0x022C	552–557	BSCM Modbus SL/ULP module	BSCM Modbus SL/ULP module identifier	BSCM Modbus SL/ULP Module Identifier, page 207
0x0232	563	BSCM Modbus SL/ULP module	Circuit breaker status	Circuit Breaker Status, page 210
0x0233	564	BSCM Modbus SL/ULP module	Communicating motor mechanism status	BSCM Modbus SL/ULP Module Counters, page 212
0x023A–0x0245	571–582	BSCM Modbus SL/ULP module	BSCM Modbus SL/ULP module counters	Event Record, page 214
0x0259–0x028B	602-652	BSCM Modbus SL/ULP module	BSCM Modbus SL/ULP module event history	Event History, page 213
0x03E7–0x03EE	1000–1007	MicroLogic	Voltage (real-time measurements)	Voltage, page 136
0x03EF–0x03F6	1008–1015	MicroLogic	Voltage unbalance (real-time measurements)	Voltage Unbalance, page 136
0x03F7–0x0402	1016–1027	MicroLogic	Current (real-time measurements)	Current, page 137
0x0403–0x0407	1028–1032	MicroLogic	Current unbalance (real-time measurements)	Current Unbalance, page 137
0x0409–0x040C	1034–1037	MicroLogic	Active power (real-time measurements)	Active Power, page 138
0x040D–0x0410	1038–1041	MicroLogic	Reactive power (real-time measurements)	Reactive Power , page 138
0x0411–0x0414	1042–1045	MicroLogic	Apparent power (real-time measurements)	Apparent Power, page 138
0x0415–0x0418	1046–1049	MicroLogic	Power factor (real-time measurements)	Power Factor, page 138
0x0419–0x041C	1050–1053	MicroLogic	Fundamental power factor (real-time measurements)	Fundamental Power Factor (cosφ), page 139
0x041D	1054	MicroLogic	Frequency (real-time measurements)	Frequency, page 139
0x0437–0x043A	1080–1083	MicroLogic	Fundamental reactive power (real-time measurements)	Fundamental Reactive Power, page 139
0x043F–0x0442	1088–1091	MicroLogic	Distortion power (real-time measurements)	Distortion Power, page 139
0x0443–0x044B	1092–1100	MicroLogic	Total harmonic distortion (THD) (real-time measurements)	Total Harmonic Distortion (THD), page 140
0x0477	1144	MicroLogic	Thermal image of motor (real-time measurements)	Thermal Image of Motor, page 140
0x0478–0x0479	1145–1146	MicroLogic	Voltage (real-time measurements)	Voltage, page 136
0x0513–0x0522	1300–1315	MicroLogic	Voltage (minimum of real-time measurement)	Minimum of Real-Time Measurements, page 141

Address	Register	Module	Description	Page
0x0523–0x0533	1316–1332	MicroLogic	Current (minimum of real-time measurement)	Minimum of Real-Time Measurements, page 141
0x07CF–0x07EE	2000–2031	MicroLogic	Energy measurements	General Description, page 143
0x0897–0x08BC	2200–2237	MicroLogic	Demand measurements	Current Demand, page 145
0x08C1–0x08C2	2242–2243	MicroLogic	Quadrant total	Quadrant Total, page 175
0x0B53–0x0B70	2900–2929	MicroLogic	Minimum/maximum measurements reset time	Minimum/Maximum Measurements Reset Time, page 147
0x0BB7–0x0BB9	3000–3002	MicroLogic	Current date and time	Current Date and Time, page 189
0x0CF1	3314	MicroLogic	System type	System Type, page 175
0x0CF3	3316	MicroLogic	Power flow sign	Power Flow Sign, page 176
0x0CF5	3318	MicroLogic	Power factor sign	Power Factor Sign, page 176
0x0CFB	3324	MicroLogic	Energy accumulation mode	Energy Accumulation Mode, page 176
0x0D17–0x0D1A	3352–3355	MicroLogic	Demand time	Demand Time, page 176
0x1647	5704	MicroLogic	Alarms status	Alarms Status, page 152
0x1663–0x1694	5732–5781	MicroLogic	Alarm history	Alarm Record, page 154
0x19F9–0x1A02	6650–6659	MicroLogic	Long-time protection pre-alarm	Long-Time Protection Pre-Alarm (PAL Ir), page 164
0x1A03–0x1A0C	6660–6669	MicroLogic	Ground-fault protection pre-alarm	Ground-Fault Protection Pre-Alarm (PAL Ig), page 165
0x1A0D–0x1A16	6670–6679	MicroLogic	Earth-leakage protection pre-alarm	Earth-Leakage Protection Pre-Alarm (PAL IΔn), page 165
0x1A71–0x1AE8	6770–6889	MicroLogic	User-defined alarms	User-Defined Alarms, page 166
0x1F3F–0x1FD4	8000–8149	MicroLogic	Command interface	Command Interface, page 75
0x21FB–0x2200	8700–8705	MicroLogic	Serial number	Serial Number, page 148
0x220B	8716	MicroLogic	Product identification	Product Identification, page 149
0x2212	8723	MicroLogic	Hardware revision	Hardware Revision, page 148
0x2223	8740	MicroLogic	Protection type	Protection Type, page 149
0x2224	8741	MicroLogic	Metering type (A, E)	Metering Type, page 149
0x222A	8747	MicroLogic	Application	Application, page 149
0x222B	8748	MicroLogic	Standard	Standard, page 149
0x222D	8750	MicroLogic	Nominal current	Nominal Current, page 150
0x222E	8751	MicroLogic	Pole	Pole, page 150

Address	Register	Module	Description	Page
0x222F	8752	MicroLogic	16 Hz 2/3	16 Hz 2/3, page 150
0x2231–0x223A	8754–8763	MicroLogic	Long-time protection	Long-Time Protection Parameters, page 170
0x223B–0x2244	8764–8773	MicroLogic	Short-time protection	Short-Time Protection Parameters, page 170
0x2245–0x224E	8774–8783	MicroLogic	Instantaneous protection	Instantaneous Protection Parameters, page 171
0x224F–0x2258	8784–8793	MicroLogic	Ground-fault protection	Ground-Fault Protection Parameters, page 171
0x2259–0x2262	8794–8803	MicroLogic	Earth leakage protection	Earth-Leakage Protection Parameters, page 171
0x2292	8851	MicroLogic	Temperature	Temperature, page 189
0x2298	8857	MicroLogic	SDx module status	SDx Module Status, page 152
0x22A0	8865	MicroLogic	Time remaining until long-time tripping	Time Remaining Until Long-Time Tripping, page 189
0x22A7	8872	MicroLogic	Phase rotation	Phase Rotation, page 189
0x22C3–0x22C6	8900–8903	MicroLogic	Jam protection	Jam Protection Parameters, page 172
0x22C7–0x22CA	8904–8907	MicroLogic	Unbalance protection	Unbalance Protection Parameters, page 172
0x22CB–0x22CE	8908–8911	MicroLogic	Underload protection	Underload Protection Parameters, page 172
0x22CF–0x22D2	8912–8915	MicroLogic	Long-start protection	Long-Start Protection Parameters, page 173
0x22D3–0x22D6	8916–8919	MicroLogic	Neutral protection	Neutral Protection Parameters, page 173
0x22E1	8930	MicroLogic	Thermal memory inhibition	Thermal Memory Inhibit Parameter, page 173
0x238B–0x2401	9100–9218	MicroLogic	Trip history	Trip History, page 156
0x258F	9616	MicroLogic	Nominal voltage Vn	Nominal Voltage, page 177
0x2648–0x2651	9801–9810	MicroLogic	SDx module outputs	Configuration of the SDx Module, page 174
0x270F	10000	MicroLogic	Trip status	Trip Status, page 153
0x27FF–0x29FE	10240–11751	IFE communication interface	IP network parameters	IP Network Parameters, page 296
0x2DFF–0x2E06	11776–11783	IFE communication interface	Firmware revision	IFM Communication Interface Firmware Revision , page 279

Address	Register	Module	Description	Page
0x2DFF–0x2E06	11776–11783	IFE communication interface	Firmware revision	IFE/EIFE Interface Firmware Revision , page 291
0x2E07–0x2E0C	11784–11789	IFE communication interface	Serial number	Serial Number for IFM Communication Interface TRV00210 or STRV00210, page 279
0x2E07–0x2E0C	11784–11789	IFE communication interface	Hardware revision	IFE/EIFE Interface Hardware Revision , page 291
0x2E18–0x2E2E	11801–11823	IFE communication interface	IMU name	Read IMU Name and Location, page 287
0x2E18–0x2E2E	11801–11823	IFE communication interface	IMU name	IMU Identification, page 291
0x2E45–0x2E5B	11846–11868	IFE communication interface	IMU location	Read IMU Name and Location, page 287
0x2E45–0x2E5B	11846–11868	IFE communication interface	IMU location	IMU Identification, page 291
0x2E72	11891	IFE communication interface	Modbus locking pad position	Modbus Locking Status, page 282
0x2E72	11891	IFE communication interface	Locking pad position	Locking Pad Position, page 292
0x2E77–0x2E7A	11896–11899	IFE communication interface	Current date and time	Current Date and Time, page 292
0x2E7C	11901	IFM communication interface	Product identification	Product Identification, page 280
0x2E7C	11901	IFE communication interface	Product identification	Product Identification, page 292
0x2E7D–0x02E7F	11902–11904	IFE communication interface	IFE communication interface MAC address	MAC Address of the IFE/EIFE Server, page 293
0x2E89–0x2E8C	11914–11917	IFE communication interface	Manufacturing date and time	Manufacturing Date and Time, page 293
0x2E91–0x02E9A	11922–11931	IFE communication interface	Serial number	IFE Communication Interface Serial Number, page 294
0x2EDF–0x2F82	12000–12163	IFM communication interface	Legacy dataset	Legacy Dataset Common Registers, page 122
0x2EDF–0x2F84	12000–12165	IFE communication interface	Legacy dataset	Legacy Dataset Common Registers, page 122
0x306E	12399	IFM communication interface	Auto-Speed sensing state	Auto-Speed Sensing State, page 282
0x306F	12400	IFM communication interface	IFM communication interface Modbus address	Communication Interface Modbus Address, page 282
0x306F	12400–12403	IFE communication interface	IFE communication interface Modbus parameters	Modbus Parameters of the IFE Server, page 295
0x3070	12401	IFM communication interface	Modbus parity	Modbus Parity, page 282
0x3071	12402	IFM communication interface	Modbus Baud rate	Modbus Baud Rate, page 282
0x3072	12403	IFM communication interface	Number of stop bits	Number of Stop Bits, page 283
0x35FF–0x3668	13824–13929	IO module	Analog input of IO 1	Analog Inputs, page 242

Address	Register	Module	Description	Page
0x3669–0x3848	13930–14409	IO module	Digital input of IO 1	Digital Inputs, page 244
0x3849–0x38FC	14410–14589	IO module	Digital output of IO 1	Digital Outputs, page 247
0x38FD–0x3902	14590–14595	IO module	Hardware setting of IO 1	Hardware Setting, page 249
0x3905–0x3908	14598–14601	IO module	Digital input and output status of IO 1	Digital Input and Output Status, page 251
0x392F–0x3976	14640–14711	IO module	IO 1 identification	IO Module Identification, page 252
0x3989–0x39A4	14730–14759	IO module	Alarm and status of IO 1	Alarm Status, page 255
0x3BC3–0x3BE0	15300–15329	IO module	Cradle management	Cradle Management, page 258
0x3BE1–0x3BFE	15330–15359	IO module	Drawer management	Drawer Management, page 259
0x3C27–3C30	15400–15409	IO module	Light control	Light Control, page 259
0x3C31–3EEC	15410–16109	IO module	Load control	Load Control, page 260
0x41B8–0x4220	16824–16929	IO module	Analog input of IO 2	Analog Inputs, page 242
0x4221–0x4400	16930–17409	IO module	Digital input of IO 2	Digital Inputs, page 244
0x4401–0x44B4	17410–17589	IO module	Digital output of IO 2	Digital Outputs, page 247
0x44B5–0x44BA	17590–17595	IO module	Hardware setting of IO 2	Hardware Setting, page 249
0x44BD–0x44C0	17598–17601	IO module	Digital input and output status of IO 2	Digital Input and Output Status, page 251
0x44E7–0x452F	17640–17711	IO module	IO 2 identification	IO Module Identification, page 252
0x4541–0x455E	17730–17759	IO module	Alarm and status of IO 2	Alarm Status, page 255
0x72CD	29390	MicroLogic	Failure status	Failure Status, page 189
0x733B–0x733F	29500–29504	MicroLogic	Maintenance operation record	Maintenance Operation Record, page 161
0x733B–0x736C	29500–29549	MicroLogic	Maintenance operation number	Maintenance Operation Number, page 161
0x739F–0x73AE	29600–29615	MicroLogic	Previous long-time protection setup	Previous Long-Time Protection Setup, page 178
0x73AF–0x73BA	29616–29627	MicroLogic	Previous short-time protection setup	Previous Short-Time Protection Setup, page 178
0x73BB–0x73BE	29628–29631	MicroLogic	Previous instantaneous protection setup	Previous Instantaneous Protection Setup, page 179
0x73BF–0x73CA	29632–29643	MicroLogic	Previous ground-fault protection setup	Previous Ground-Fault Protection Setup, page 179

Address	Register	Module	Description	Page
0x73CB–0x73D2	29644–29651	MicroLogic	Previous earth-leakage protection setup	Previous Earth-Leakage Protection Setup, page 179
0x73D3–0x73DE	29652–29663	MicroLogic	Previous jam protection setup	Previous Jam Protection Setup, page 180
0x73DF–0x73E6	29664–29671	MicroLogic	Previous unbalance protection setup	Previous Unbalance Protection Setup, page 180
0x73E6–0x73F2	29672–29683	MicroLogic	Previous underload protection setup	Previous Underload Protection Setup, page 180
0x73F3–0x73FE	29684–29695	MicroLogic	Previous long-start protection setup	Previous Long-Start Protection Setup, page 181
0x73FF–0x7402	29696–29699	MicroLogic	Previous neutral protection setup	Previous Neutral Protection Setup, page 181
0x7453–0x745A	29780–29787	MicroLogic	Minimum/maximum V12 voltage measurements	Minimum/Maximum V12 Voltage Measurements, page 181
0x745B–0x7462	29788–29795	MicroLogic	Minimum/maximum V23 voltage measurements	Minimum/Maximum V23 Voltage Measurements, page 182
0x7463–0x746A	29796–29803	MicroLogic	Minimum/maximum V31 voltage measurements	Minimum/Maximum V31 Voltage Measurements, page 182
0x746B–0x746E	29804–29807	MicroLogic	Maximum I1 current measurement	Maximum I1 Current Measurement, page 182
0x746F–0x7472	29808–29811	MicroLogic	Maximum I2 current measurement	Maximum I2 Current Measurement, page 182
0x7473–0x7476	29812–29815	MicroLogic	Maximum I3 current measurement	Maximum I3 Current Measurement, page 183
0x7477–0x747A	29816–29819	MicroLogic	Maximum IN current measurement	Maximum IN Current Measurement, page 183
0x747B–0x747E	29820–29823	MicroLogic	Minimum system frequency	Minimum System Frequency, page 183
0x747F–0x7482	29824–29827	MicroLogic	Maximum system frequency	Maximum System Frequency, page 183
0x7483–0x7486	29828–29831	MicroLogic	I1 peak demand measurement	I1 Peak Demand Measurement, page 183
0x7487–0x748A	29832–29835	MicroLogic	I2 peak demand measurement	I2 Peak Demand Measurement, page 184
0x748B–0x748E	29836–29839	MicroLogic	I3 peak demand measurement	I3 Peak Demand Measurement, page 184
0x748F–0x7492	29840–29843	MicroLogic	IN peak demand measurement	IN Peak Demand Measurement, page 184
0x7493–0x7496	29844–29847	MicroLogic	P peak demand measurement	P Peak Demand Measurement, page 184
0x749A–0x749B	29851–29852	MicroLogic	Time of use counter	Time of Use Counter, page 185

Address	Register	Module	Description	Page
0x749C	29853	MicroLogic	Rate of wear counter	Rate of Wear Counter, page 185
0x749D	29854	MicroLogic	Boot counter	Boot Counter, page 185
0x749E–0x749F	29885–29886	MicroLogic	EEPROM writing counter	EEPROM Writing Counter, page 185
0x74B7–0x74BE	29880–29887	MicroLogic	Load profile counters	Load Profile Counters, page 185
0x74C1–0x74CC	29890–29901	MicroLogic	Temperature profile counters	Temperature Profile Counters, page 186
0x74D5–0x74DD	29910–29918	MicroLogic	Protection trips counters	Protection Trips Counters, page 186
0x74F3–0x74FF	29940–29952	MicroLogic	Alarms counters	Alarms Counters, page 187
0x751B–0x7520	29980–29985	MicroLogic	Maintenance operation counters	Maintenance Operation Counters, page 187
0x7525–0x7526	29990–29991	MicroLogic	MicroLogic trip unit rotary switches	MicroLogic Trip Unit Rotary Switches, page 190
0x7527	29992	MicroLogic	MicroLogic trip unit locking pad status	MicroLogic Trip Unit Locking Pad Status, page 190
0x7528	29993	MicroLogic	Auxiliary 24 Vdc power supply	Auxiliary 24 Vdc Power Supply, page 190
0x7529–0x752D	29994–29998	MicroLogic	Firmware revision	Firmware Revision, page 150
0x752F–0x7532	30000–30003	MicroLogic	Part number	Part Number, page 151
0x7534	30005	MicroLogic	MicroLogic trip unit LED	MicroLogic Trip Unit LED, page 190
0x7CFF–0x7EFE	32000–32335	IFE communication interface	Standard dataset	Standard Dataset Common Registers, page 102

As standards, specifications, and design change from time to time, please ask for confirmation
of the information given in this publication.

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