

# Enerlin'X IO

## Input/Output Application Module for One UL Circuit Breaker User Guide

05/2019



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## Important Information

### NOTICE

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



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



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

### **DANGER**

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

### **WARNING**

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

### **CAUTION**

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

### **NOTICE**

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designated to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at this own expense.

# About the Book



## At a Glance

### Document Scope

This guide describes the IO input/output application module for one circuit breaker and its functionalities. It helps to set the predefined applications and provides characteristics, wiring diagrams, and installation to set up the IO module.

### Validity Note

This guide is valid for the IO module for use with Masterpact NT/NW, PowerPact P- and R-frame, and PowerPact H-, J-, and L-frame circuit breakers.

### Online Information

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3	If you entered a reference, go to the <b>Product Datasheets</b> search results and click on the reference that interests you. If you entered the name of a product range, go to the <b>Product Ranges</b> search results and click on the product range that interests you.
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### Related Documents

Title of Documentation	Reference Number
Enerlin'X IO - Input/Output Application Module for One Circuit Breaker - Instruction Sheet	<a href="#">HRB4921Z</a>
Enerlin'X IO - Input/Output Application Module for One Circuit Breaker - Release Notes	<a href="#">DOCA0149EN</a>
ULP System (UL Standard) - User Guide	<a href="#">0602IB1503</a> (EN) <a href="#">0602IB1504</a> (ES) <a href="#">0602IB1505</a> (FR) <a href="#">0602IB1506</a> (ZH)
Enerlin'X FDM121 - Front Display Module for One Circuit Breaker - User Guide	<a href="#">DOCA0088EN</a> <a href="#">DOCA0088ES</a> <a href="#">DOCA0088FR</a> <a href="#">DOCA0088ZH</a>

Title of Documentation	Reference Number
Enerlin'X FDM128 - Ethernet Display for Eight Devices - User Guide	<a href="#">DOCA0037EN</a> <a href="#">DOCA0037ES</a> <a href="#">DOCA0037FR</a> <a href="#">DOCA0037ZH</a>
Enerlin'X IFE - Ethernet Interface for One Circuit Breaker - User Guide	<a href="#">0602IB1801EN</a> <a href="#">0602IB1801ES</a> <a href="#">0602IB1801FR</a> <a href="#">0602IB1801ZH</a>
Enerlin'X IFE - Ethernet Switchboard Server - User Guide	<a href="#">1040IB1401</a> (EN) <a href="#">1040IB1402</a> (ES) <a href="#">1040IB1403</a> (FR) <a href="#">1040IB1404</a> (ZH)
Enerlin'X EIFE - Embedded Ethernet Interface for One Masterpact MTZ Drawout Circuit Breaker - User Guide	<a href="#">DOCA0106EN</a> <a href="#">DOCA0106ES</a> <a href="#">DOCA0106FR</a> <a href="#">DOCA0106ZH</a>
PowerPact H-, J-, and L-Frame Circuit Breakers - User Guide	<a href="#">48940-313</a> (EN, ES, FR)
PowerPact H-, J-, and L-Frame Micrologic 5 or 6 Trip Units - User Guide	<a href="#">48940-312</a> (EN, ES, FR)
PowerPact H-, J-, and L-Frame Modbus Communication Guide	<a href="#">0611IB1302</a> (EN) <a href="#">0611IB1303</a> (ES) <a href="#">0611IB1304</a> (FR) <a href="#">0611IB1305</a> (ZH)
Masterpact NT Circuit Breakers and Switch - User Guide	<a href="#">0613IB1209</a> (EN, ES, FR)
Masterpact NW Circuit Breakers and Switch - User Guide	<a href="#">0613IB1204</a> (EN, ES, FR)
PowerPact P-Frame - Installation Guide	<a href="#">48049-148</a> (EN)
PowerPact Drawout P-Frame - Installation Guide	<a href="#">48049-336</a> (EN)
PowerPact R-Frame - Installation Guide	<a href="#">48049-243</a> (EN)
Micrologic A and E Trip Units - User Guide	<a href="#">48049-136</a> (EN, ES, FR)
Micrologic P Trip Units - User Guide	<a href="#">48049-137</a> (EN, ES, FR)
Micrologic H Trip Units - User Guide	<a href="#">48049-330</a> (EN, ES, FR)
Masterpact NT/NW and PowerPact P- and R-Frame Modbus Communication Guide	<a href="#">0613IB1313</a> (EN) <a href="#">0613IB1314</a> (ES) <a href="#">0613IB1315</a> (FR) <a href="#">0613IB1316</a> (ZH)
Masterpact MTZ1 Circuit Breakers and Switch-Disconnectors - User Guide	<a href="#">0614IB1702EN</a> <a href="#">0614IB1702ES</a> <a href="#">0614IB1702FR</a> <a href="#">0614IB1702ZH</a>
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Masterpact MTZ Micrologic X Control Unit - User Guide	<a href="#">DOCA0102EN</a> <a href="#">DOCA0102ES</a> <a href="#">DOCA0102FR</a> <a href="#">DOCA0102ZH</a>
Masterpact MTZ Modbus Communication Guide	<a href="#">DOCA0105EN</a> <a href="#">DOCA0105ES</a> <a href="#">DOCA0105FR</a> <a href="#">DOCA0105ZH</a>

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# Chapter 1

## IO Module Presentation

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### What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Introduction	12
Intelligent Modular Unit	15
Hardware Description	19
Predefined Applications	22
EcoStruxure Power Commission Software	23
Digital Inputs	25
Digital Outputs	28
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## Introduction

### Description

The IO input/output application module for one circuit breaker (or IO module) is part of an ULP system with built-in functionalities and applications.

The IO module is a component of the ULP system and is compliant with the ULP system specifications.

The IO module part number is LV434063.

The ranges of UL circuit breakers compatible with the IO module are:

- Masterpact™ MTZ circuit breaker
- Masterpact™ NW circuit breaker
- Masterpact™ NT circuit breaker
- PowerPact™ R-frame circuit breaker
- PowerPact™ P-frame circuit breaker
- PowerPact™ H-, J-, and L-frame circuit breaker

**NOTE:** Two IO modules can be connected in the same ULP network used in one intelligent modular unit (IMU).

### IO Module Resources

The IO module resources are:

- Six digital inputs that are self powered for either NO or NC dry contact or pulse counter.
- Three digital outputs that are bistable relays (5 A maximum).
- One analog input for Pt100 temperature sensor.

### Predefined Applications

Predefined applications add new functions to the intelligent modular unit (IMU): *(see page 15)*

- Selection by the application rotary switch on the IO module, defining the application with a predefined input/output assignment and wiring diagram.
- No additional setting by the customer is required.

The resources not assigned to the predefined application are available for additional user-defined applications.

### List of Predefined Applications

Application Rotary Switch Position	Predefined Application	Description
1	Cradle management <i>(see page 38)</i>	Monitors the position of the circuit breaker in the cradle.
2	Circuit breaker operation <i>(see page 43)</i>	Controls the opening and closing of the circuit breaker by using the control mode (local or remote) and the inhibit close order.
3	Cradle management and Energy Reduction Maintenance Setting (ERMS) <i>(see page 49)</i>	Monitors the position of the circuit breaker in the cradle and monitors the position of inputs and controls the ERMS mode of the circuit breaker.
4	Light and load control <i>(see page 53)</i>	Controls the light and load application.
5–8	Spare	–
9	Custom <i>(see page 58)</i>	Performs the user-defined applications with the IO module.

**NOTE:** In the case of two IO modules connected in the IMU:

- Both IO modules can be set to perform the predefined application 9
- Both IO modules cannot be set to perform the same predefined application 1 to 8.

The consistency of the configuration of both IO modules is checked. If the configuration of both IO modules is not correct, both IO modules are in configuration discrepancy mode.

## User-Defined Applications

User-defined applications are processed by the IO module in addition to the predefined applications selected.

The user-defined applications are available on the IO module depending on:

- The predefined applications selected.
- The IO module resources (inputs and outputs) not used by the predefined application.

The resources required by user-defined applications are assigned using the EcoStruxure Power Commission software (*see page 23*). These resources must be assigned after each change of the predefined application.

## List of User-Defined Applications

The following table provides the list of user-defined applications available according to the predefined applications selected with the application rotary switch on the IO module.

Function	User-Defined Applications	Predefined Application Selected									
		1	2	3	4	5	6	7	8	9 (IO1)	9 (IO2)
Protection	Energy Reduction Maintenance Settings (ERMS) ( <i>see page 61</i> )	✓	–	–	✓	–	–	–	–	✓	✓
	Dual settings ( <i>see page 62</i> )	✓	–	✓	✓	–	–	–	–	✓	✓
	Inhibit optional protection ( <i>see page 64</i> )	✓	✓	✓	✓	–	–	–	–	✓	✓
Control	Enable/inhibit close order ( <i>see page 66</i> )	✓	–	✓	✓	–	–	–	–	✓	✓
	User-defined output ( <i>see page 68</i> )	✓	✓	✓	✓	–	–	–	–	✓	✓
Energy Management	Energy counter reset ( <i>see page 70</i> )	✓	–	✓	✓	–	–	–	–	✓	✓
	User-defined pulse counters ( <i>see page 71</i> )	✓	–	✓	✓	–	–	–	–	✓	✓
✓ = user-defined application available – = user-defined application not available											

Function	User-Defined Applications	Predefined Application Selected										
		1	2	3	4	5	6	7	8	9 (IO1)	9 (IO2)	
Monitoring	Cradle management <i>(see page 73)</i>	✓	-	✓	-	-	-	-	-	-	-	✓
	Drawer management <i>(see page 74)</i>	-	-	-	-	-	-	-	-	-	✓	✓
	Cooling system <i>(see page 76)</i>	✓	-	✓	✓	-	-	-	-	-	✓	✓
	Predefined input acquisition <i>(see page 80)</i>	✓	-	✓	✓	-	-	-	-	-	✓	✓
	User-defined input acquisition <i>(see page 81)</i>	✓	-	✓	✓	-	-	-	-	-	✓	✓
	Input indicator <i>(see page 82)</i>	✓	✓	✓	✓	-	-	-	-	-	✓	✓
	Threshold overrun of input counter indicator <i>(see page 83)</i>	✓	✓	✓	✓	-	-	-	-	-	✓	✓
	Breaker status indicator <i>(see page 84)</i>	✓	✓	✓	✓	-	-	-	-	-	✓	✓
	Maintenance indicator <i>(see page 85)</i>	✓	✓	✓	✓	-	-	-	-	-	✓	✓
	Trip indicator <i>(see page 86)</i>	✓	✓	✓	✓	-	-	-	-	-	✓	✓
	Alarm indicator <i>(see page 88)</i>	✓	✓	✓	✓	-	-	-	-	-	✓	✓
	Pre-alarm indicator <i>(see page 89)</i>	✓	✓	✓	✓	-	-	-	-	-	✓	✓
	User-defined alarm indicator <i>(see page 90)</i>	✓	✓	✓	✓	-	-	-	-	-	✓	✓
Multi-event group indicator <i>(see page 91)</i>	✓	✓	-	✓	-	-	-	-	-	✓	✓	
✓ = user-defined application available - = user-defined application not available												

## Intelligent Modular Unit

### Definition

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

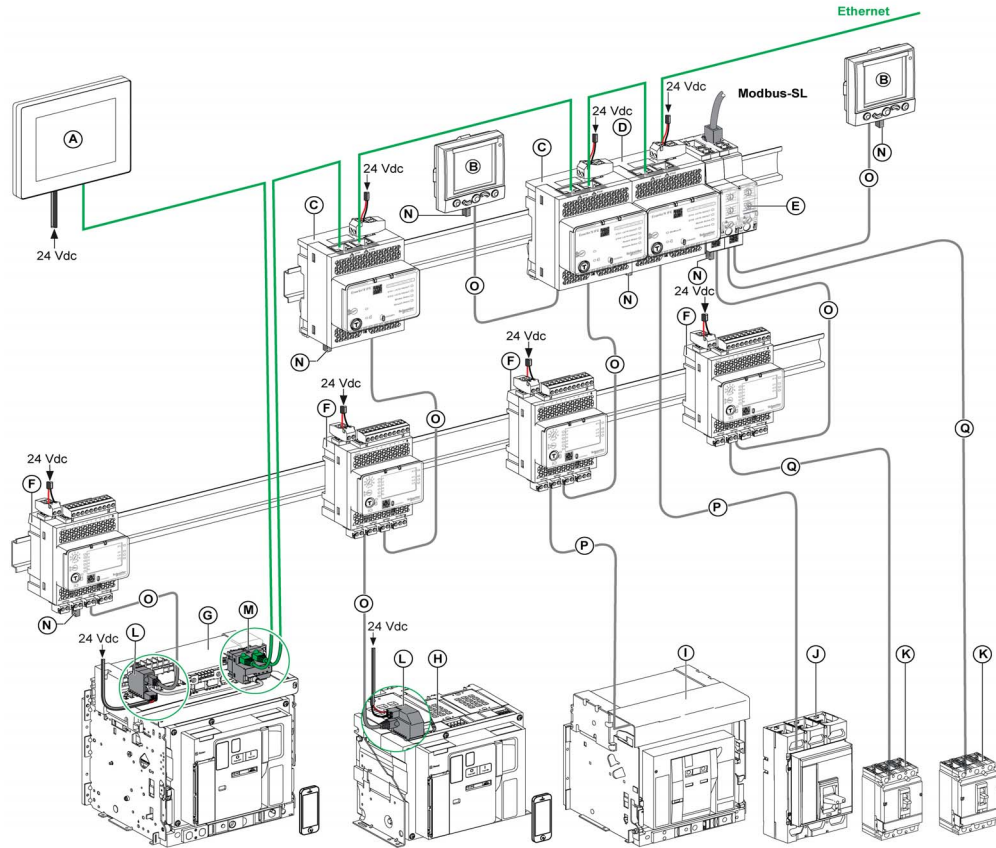
The circuit breaker with its internal communicating components (Micrologic control unit) and external ULP modules (IO module) connected to one communication interface is called an intelligent modular unit (IMU).

### ULP Modules Per Circuit Breaker Range

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

ULP Module	Part Number	Masterpact MTZ with ULP Port Module and Micrologic Control Unit	Masterpact NT/NW or PowerPact P- and R-frame with BCM ULP Module and Micrologic Control Unit	PowerPact H-, J-, and L-frame with BSCM Module and/or Micrologic Trip Unit
IFE Ethernet 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 interface for one circuit breaker	STRV00210	–	✓	✓
IFM Modbus-SL interface for one circuit breaker	LV434000	✓	✓	✓
FDM121 front display module for one circuit breaker	STRV00121	–	✓	✓
IO input/output application module for one circuit breaker	LV434063	✓	✓	✓
USB maintenance interface	STRV00911	–	✓	✓

Communication Architecture



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

Component Part Numbers

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

Product	Description	Part Number
IFM Modbus-SL interface for one circuit breaker	With 5-pin connector	STRV00210
IFM Modbus-SL interface for one circuit breaker	With RJ45 port	LV434000
IFE Ethernet interface for one circuit breaker	–	LV434001
IFE Ethernet switchboard server	–	LV434002
EIFE Embedded Ethernet interface for one Masterpact MTZ drawout circuit breaker	–	LV851001



Product	Description	Part Number
Kit EIFE for one Masterpact MTZ1 drawout circuit breaker	–	LV851100SP
Kit EIFE for one Masterpact MTZ2/MTZ3 drawout circuit breaker	–	LV851200SP
ULP port module for Masterpact MTZ2/MTZ3 fixed circuit breaker	–	LV850061SP
ULP port module for Masterpact MTZ2/MTZ3 drawout circuit breaker	–	LV850062SP
ULP port module for Masterpact MTZ1 fixed circuit breaker	–	LV850063SP
ULP port module for Masterpact MTZ1 drawout circuit breaker	–	LV850064SP
Stacking accessory	Ten stacking accessories	TRV00217
BCM ULP circuit breaker communication module	–	33106
BSCM circuit breaker status control module	–	S434205
NSX cord plus BSCM module	L = 1.3 m (4.27 ft)	S434201BS
	L = 3 m (9.84 ft)	S434202BS
	L = 4.5 m (14.7 ft)	S434304BS
NSX cord for system voltage greater than 480 Vac plus BSCM module	L = 1.3 m (4.27 ft), V > 480 Vac	S434204BS
	L = 3 m (9.84 ft), V > 480 Vac	S434303BS
	L = 4.5 m (14.7 ft), V > 480 Vac	S434305BS
IO input/output application module for one circuit breaker	–	LV434063
FDM121 front display module for one circuit breaker	–	STRV00121
Surface-mounting accessory	–	TRV00128
Maintenance case with USB interface	USB maintenance interface, 24 Vdc external power supply unit, and associated cables	STRV00910
USB maintenance interface	–	STRV00911
NSX cord	L = 1.3 m (4.27 ft)	S434201
	L = 3 m (9.84 ft)	S434202
	L = 4.5 m (14.7 ft)	S434304
NSX cord for system voltage greater than 480 Vac	L = 1.3 m (4.27 ft), U > 480 Vac (cord with female RJ45 connector)	S434204
	L = 3 m (9.84 ft), U > 480 Vac	S434303
	L = 4.5 m (14.7 ft), U > 480 Vac	S434305
Circuit breaker BCM ULP cord	L = 0.35 m (1.15 ft)	LV434195
	L = 1.3 m (4.26 ft)	LV434196
	L = 3 m (9.84 ft)	LV434197
RJ45 male/male ULP cord	L = 0.3 m (0.98 ft), ten cords	TRV00803
	L = 0.6 m (1.97 ft), ten cords	TRV00806
	L = 1 m (3.28 ft), five cords	TRV00810
	L = 2 m (6.56 ft), five cords	TRV00820
	L = 3 m (9.84 ft), five cords	TRV00830
	L = 5 m (16.40 ft), five cords	TRV00850
RJ45 female/female connector	Ten RJ45 female/female connectors	TRV00870
ULP line termination	Ten ULP line terminations	TRV00880
Two-wire RS 485 isolated repeater module	–	TRV00211
Modbus line termination	Two Modbus cable terminations with impedance of 120 $\Omega$ + 1 nF	VW3A8306RC

Product	Description	Part Number
Modbus cable for IFM interface with 5-pin connector	Belden: 7 mm (0.27 in.) diameter shielded cable with two twisted pairs	3084A
	Belden: 9.6 mm (0.38 in.) diameter (recommended) shielded cable with two twisted pairs	7895A
	Cable with two twisted pairs without shielding drain wire	50965
RJ45 male/male Modbus-SL cable	L = 0.3 m (0.98 ft)	VW3A8306R03
	L = 1 m (3.28 ft)	VW3A8306R10
	L = 3 m (9.84 ft)	VW3A8306R30
T-junction RJ45 Modbus	L = 0.3 m (0.98 ft)	VW3A8306TF03
	L = 1 m (3.28 ft)	VW3A8306TF10
24 Vdc power supply	24/30 Vdc-24 Vdc-1 A-overvoltage category IV	685823
	48/60 Vdc-24 Vdc-1 A-overvoltage category IV	685824
	100/125 Vdc-24 Vdc-1 A-overvoltage category IV	685825
	110/130 Vac-24 Vdc-1 A-overvoltage category IV	685826
	200/240 Vac-24 Vdc-1 A-overvoltage category IV	685827
	380/415 Vac-24 Vdc-1 A-overvoltage category IV	685829
	100/500 Vac-24 Vdc-3 A-overvoltage category II	ABL8RPS24030

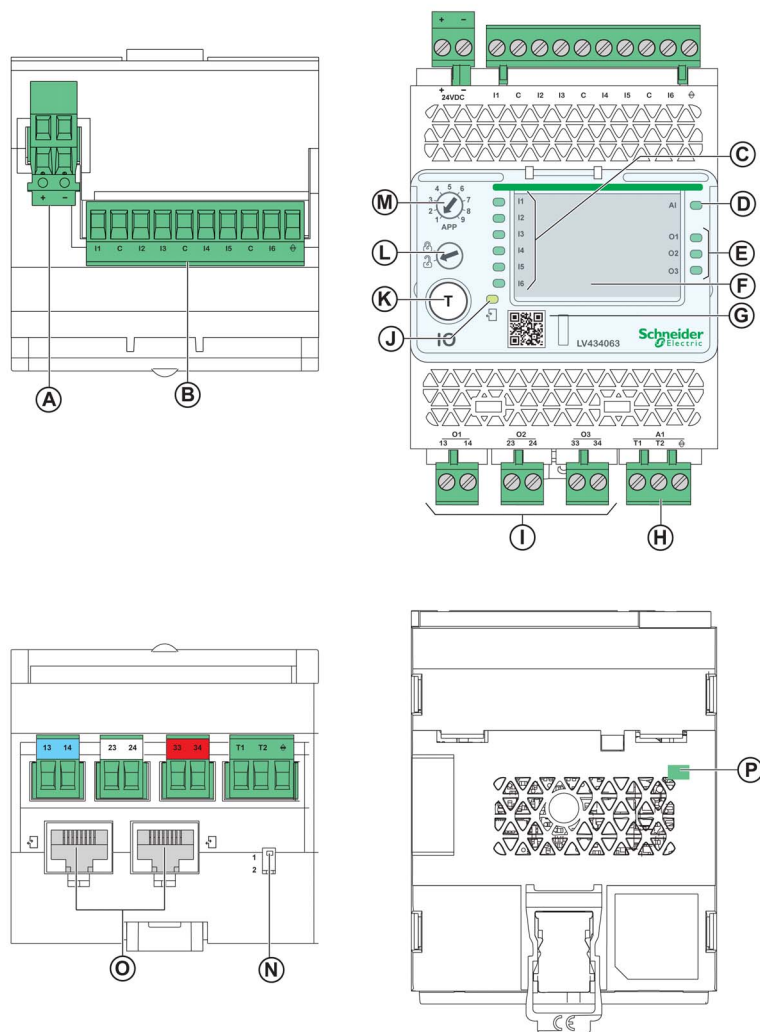
### Remote Controller

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

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

## Hardware Description

### Description



- A** 24 Vdc power supply terminal block
- B** Digital input terminal block: six inputs, three commons, and one shield
- C** Six input status LEDs
- D** Analog input status LED
- E** Three output status LEDs
- F** I/O identification labels
- G** Sealable transparent cover
- H** Analog input terminal block
- I** Digital output terminal block
- J** ULP status LED
- K** Test/reset button (accessible with cover closed)
- L** Setting locking pad
- M** Application rotary switch: 1 to 9
- N** Switch for IO module addressing (IO module 1 or IO module 2)
- O** Two RJ45 ULP ports
- P** Grounding connection

## Mounting

The IO module mounts on a DIN rail.

## 24 Vdc Power Supply

The IO module must always be supplied with 24 Vdc.

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

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

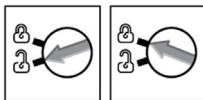
## Application Rotary Switch

The application rotary switch enables the selection of a predefined application. It has nine positions and each position is assigned to a predefined application. The factory-set position of the switch is predefined as application 1.



## Setting Locking Pad

The setting locking pad on the front panel of the IO module enables the setting of the IO module by the EcoStruxure Power Commission software ([see page 23](#)).



- If the arrow points to the open padlock (factory setting), loading of the configuration file from the EcoStruxure Power Commission software is allowed.
- If the arrow points to the closed padlock, loading of the configuration file from the EcoStruxure Power Commission software is not allowed.

## Test/Reset Button

The test/reset button has three functions, according to how long the button is pressed.



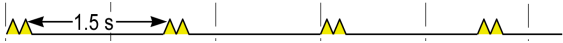
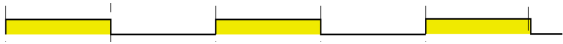
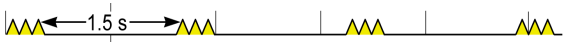

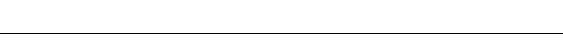



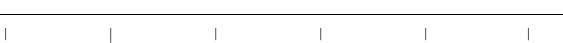
Time Range	Function
0.25–1s	Reset the alarms in manual reset mode
1–5 s	Test the ULP modules connected in the IMU
5–15 s	Validate the application selected through the application rotary switch.

## Analog Input Status LED

LED Indication	Status Description
Steady OFF	Open circuit or no signal
Blinking LED 1 s ON, 1 s OFF	Short circuit
Steady Green	Analog input signal activity

## ULP Status LED


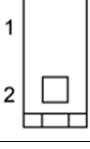
The ULP Status LED describes the mode of the ULP module.

ULP Status LED	Mode	Action
	Nominal	None
	Conflict	Remove modules with duplicate function
	Degraded	Replace IO module at the next maintenance operation
	Test	None
	Non-critical firmware discrepancy	Use the EcoStruxure Power Commission software to check the firmware and hardware compatibility and follow the recommended actions. Update module firmware if necessary ( <a href="#">see page 36</a> ).
	Non-critical hardware discrepancy	
	Configuration discrepancy	Install missing features
	Critical firmware discrepancy	Use the EcoStruxure Power Commission software to check the firmware and hardware compatibility and follow the recommended actions. Update module firmware if necessary ( <a href="#">see page 36</a> ).
	Critical hardware discrepancy	
	Stop	Replace IO module
	Power OFF	Check power supply

For more information, refer to Troubleshooting ([see page 94](#)).

## Switch for IO Module Addressing (IO Module 1 or IO Module 2)

When two IO modules are connected in the same ULP network used in one IMU, the two IO modules are differentiated by the position of the DIP switch located on the bottom of the IO module:

Switch Position	Description
	DIP switch on position 1 for IO module 1 (factory setting)
	DIP switch on position 2 for IO module 2

The consistency of the configuration of both IO modules is checked. If the DIP switch of both IO modules is in the same position, an IO module in ERROR mode alarm is generated.

## Predefined Applications

### Introduction

Changing the application rotary switch position does not change the application. After changing the application,

- the wiring must be checked or changed according to the application.
- the resources required by user-defined applications must be re-assigned using the EcoStruxure Power Commission software.

### WARNING

#### DISCREPANCY BETWEEN IO MODULE WIRING AND APPLICATION

DO NOT change the position of the application rotary switch during the operation.

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

### Predefined Application Selection Procedure

Step	Action	LED Status
1	Rotate the application rotary switch. <b>NOTE:</b> Even though the application rotary switch is rotated, the selected predefined application is still the same.	Input and output LEDs blink: 1 s ON, 1 s OFF.
2	Press the test/reset button for 5 to 15 s. The predefined application corresponding to the application rotary switch is selected.	Input and output LEDs stop blinking. The LEDs indicate the status of the inputs and outputs.
3	Check the IO module wiring for the new application.	-
4	Re-assign the resources required by user-defined applications by using the EcoStruxure Power Commission software.	-

## EcoStruxure Power Commission Software

### Overview

EcoStruxure™ Power Commission is the new name of Ecoeach software.

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 devices, modules, and accessories:

Device Ranges	Modules	Accessories
Masterpact MTZ circuit breakers	<ul style="list-style-type: none"> <li>Micrologic X control unit</li> <li>Communication interface modules: IFM interface, IFE interface, IFE server, and EIFE interface</li> <li>ULP modules: IO module</li> </ul>	M2C output module
<ul style="list-style-type: none"> <li>Masterpact NT/NW circuit breakers</li> <li>PowerPact P- and R-Frame circuit breakers</li> </ul>	<ul style="list-style-type: none"> <li>Micrologic trip units</li> <li>Communication interface modules: BCM module, CCM module, BCM ULP module, IFM interface, IFE interface, and IFE server</li> <li>ULP modules: IO module, FDM121 display <sup>(1)</sup></li> </ul>	M2C and M6C output modules
PowerPact H-, J-, and L-frame circuit breakers	<ul style="list-style-type: none"> <li>Micrologic trip units</li> <li>Communication interface modules: BSCM module, IFM interface, IFE interface, and IFE server</li> <li>ULP modules: IO module, FDM121 display <sup>(1)</sup></li> </ul>	SDTAM and SDx output modules

(1) For FDM121 display, only the firmware and language download are supported.

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

EcoStruxure Power Commission software is available at [www.schneider-electric.com](http://www.schneider-electric.com)

## 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



## Digital Inputs

### Definition

An IO module has six digital inputs. The digital inputs assigned to a predefined application are pre-configured and cannot be modified.

The remaining available inputs can be configured separately using the EcoStruxure Power Commission software (*see page 23*).

### Digital Input Types

There are two types of digital inputs:

- normal digital inputs, used to record the state of a normally open or normally closed external contact.
- pulse digital inputs, used to count pulses delivered by a metering device.

Each digital input can be configured using the EcoStruxure Power Commission software.

**NOTE:** It is not possible to assign the same function to one of the inputs of IO module 1 and the same input of IO module 2.

### Normal Digital Input Parameters

The following parameters can be set with the EcoStruxure Power Commission software. The input signal type must be set to normal.

Description	Setting Range	Factory Settings
Input signal type	<ul style="list-style-type: none"> <li>• 0 (Normal digital input)</li> <li>• 1 (Pulse digital input)</li> </ul>	Normal
Input contact type	<ul style="list-style-type: none"> <li>• NO (Normally open contact)</li> <li>• NC (Normally closed contact)</li> </ul>	NO
Counter threshold	1–4294967294	5000

### Digital Input Contact Type

The contact type of the normal digital inputs available for user-defined applications can be configured using the EcoStruxure Power Commission software (*see page 23*) as:

- normally open contact (NO)
- normally close contact (NC)

### Normal Digital Input Counters

A counter is linked to each normal digital input. The counter is incremented on each rising edge of the linked input.

The digital input counters have the following properties:

- The counters are saved in non-volatile memory to prevent data loss in case of power loss.
- The counters can be reset from the IFE or EIFE webpages.
- The counter stops counting after reaching 4294967294.
- A threshold is associated to each counter. The counter threshold can be of any value ranging from 1 to 4294967294. The factory setting is 5000.
- An alarm is generated when a counter reaches the threshold.
- A digital output can be assigned to any threshold overrun on input counter.

### Digital Input Forcing

For maintenance reasons, it is possible to force the state of the digital inputs.

This action can be performed with:

- the FDM121 display
- the EcoStruxure Power Commission software

## Digital Input Events

The following events are generated by the digital inputs. For more information on IO module events, refer to Events and Alarms ([see page 31](#)).

Code IO1	Code IO2	Description	Type	Priority	Reset
1555 (0x0613)	1811 (0x0713)	Input 1 rising edge (NO contact) or falling edge (NC contact)	Event	NA	NA
1556 (0x0614)	1812 (0x0714)	Input 2 rising edge (NO contact) or falling edge (NC contact)	Event	NA	NA
1557 (0x0615)	1813 (0x0715)	Input 3 rising edge (NO contact) or falling edge (NC contact)	Event	NA	NA
1558 (0x0616)	1814 (0x0716)	Input 4 rising edge (NO contact) or falling edge (NC contact)	Event	NA	NA
1559 (0x0617)	1815 (0x0717)	Input 5 rising edge (NO contact) or falling edge (NC contact)	Event	NA	NA
1560 (0x0618)	1816 (0x0718)	Input 6 rising edge (NO contact) or falling edge (NC contact)	Event	NA	NA
1561 (0x0619)	1817 (0x0719)	Threshold overrun on input 1 counter	Alarm	Medium	Manual or remote
1562 (0x061A)	1818 (0x071A)	Threshold overrun on input 2 counter	Alarm	Medium	Manual or remote
1563 (0x061B)	1819 (0x071B)	Threshold overrun on input 3 counter	Alarm	Medium	Manual or remote
1564 (0x061C)	1820 (0x071C)	Threshold overrun on input 4 counter	Alarm	Medium	Manual or remote
1565 (0x061D)	1821 (0x071D)	Threshold overrun on input 5 counter	Alarm	Medium	Manual or remote
1566 (0x061E)	1822 (0x071E)	Threshold overrun on input 6 counter	Alarm	Medium	Manual or remote
1570 (0x0622)	1826 (0x0722)	Input 1 not forced / forced change	Event	NA	NA
1571 (0x0623)	1827 (0x0723)	Input 2 not forced / forced change	Event	NA	NA
1572 (0x0624)	1828 (0x0724)	Input 3 not forced / forced change	Event	NA	NA
1573 (0x0625)	1829 (0x0725)	Input 4 not forced / forced change	Event	NA	NA
1574 (0x0626)	1830 (0x0726)	Input 5 not forced / forced change	Event	NA	NA
1575 (0x0627)	1831 (0x0727)	Input 6 not forced / forced change	Event	NA	NA

## Pulse Input

The maximum number of allowed user-defined pulse inputs are six, with one or two IO modules. All the inputs can be configured as a pulse input using the EcoStruxure Power Commission software ([see page 23](#)). Also, the pulse rate, pulse polarity, and the pulse unit can be configured using the EcoStruxure Power Commission software. A pulse counter is activated when the corresponding digital input of IO module 1 or IO module 2 is configured as a pulse input.

For example, if I2 on IO module 1 is set as a pulse input, I2 on IO module 2 cannot be set as a pulse input. If I3 on IO module 2 is set as a pulse input, I3 on IO module 1 cannot be set as a pulse input.

The minimum pulse width is 40 ms.

### Pulse Digital Input Parameters

The following parameters can be set with the EcoStruxure Power Commission software. The input signal type must be set to pulse.

Description	Setting Range	Factory Settings
Input signal type	<ul style="list-style-type: none"> <li>● Normal</li> <li>● Pulse</li> </ul>	Normal
Pulse polarity	<ul style="list-style-type: none"> <li>● Low to high (rising edge of the pulse)</li> <li>● High to low (falling edge of the pulse)</li> </ul>	Low to high
Pulse unit	<ul style="list-style-type: none"> <li>● Active energy: Wh</li> <li>● Reactive energy: VARh</li> <li>● Apparent energy: VAh</li> <li>● Volume: cubic-meter</li> </ul>	Wh
Pulse weight	0 to 16777215	1

The pulse weight must be calculated according to the characteristics of the pulses delivered by the meter.

Examples:

- If each pulse delivered by an active energy meter corresponds to 10 KWh, and the pulse unit is set to Wh, the pulse weight must be set to 10,000 (Wh).
- If each pulse delivered by a volume meter corresponds to 125 liters, and the pulse unit is set to m<sup>3</sup>, the pulse weight must be set to 0.125 m<sup>3</sup>.
- If each pulse delivered by a volume meter corresponds to 1 gallon, and the pulse unit is set to m<sup>3</sup>, the pulse weight must be set to 0.003785 m<sup>3</sup>.

## Digital Outputs

### Definition

An IO module has three digital outputs (bistable relay). The digital outputs assigned to a predefined application are pre-configured and cannot be modified.

The other available outputs can be configured separately using the EcoStruxure Power Commission software (*see page 23*).

### Digital Output Contact Type

The outputs used in the user-defined application can be configured as NO or NC contacts:

- normally open contact (NO)
- normally closed contact (NC)

### Digital Output Forcing

For maintenance reasons, it is possible to force the state of the digital outputs.

This action can be performed with:

- the FDM121 display
- the EcoStruxure Power Commission software

### Output Operating Mode

The operating mode of the digital outputs is assigned by the EcoStruxure Power Commission software, and can be set to:

- Non-latching operating mode (factory setting)
- Latching operating mode
- Time-delayed operating mode

Operating Mode	Alarm Status	Output Status
Non-latching	Activated	Activated
	Deactivated	Deactivated
Latching	Activated	Activated
	Deactivated	Activate as long as the output has not been acknowledged.
Time delayed non-latching	Activated	Activated for the time set with the the EcoStruxure Power Commission software
	Deactivated	Deactivated immediately after time delay set by using the EcoStruxure Power Commission software is over

#### NOTE:

- If the output contact type is configured as NO (normally open),
  - the status is activated when the output state is HIGH.
  - the status is deactivated when the output state is LOW.
- If the output contact type is configured as NC (normally close),
  - the status is activated when the output state is LOW.
  - the status is deactivated when the output state is HIGH.

### Digital Output Counters

A counter is linked to each digital output. The counter is incremented for each change in the output.

The digital output counters have the following properties:

- The counters are saved in non-volatile memory to prevent data loss in case of power loss.
- The counters can be reset from the IFE or EIFE webpages.
- The counter stops counting after reaching 4294967294.

- A threshold is associated to each counter. A threshold can be set to any value from 1 to 429467294. The factory setting is 5000.
- An alarm is generated when a counter reaches the threshold.

### Digital Output Events

The following events are generated by the digital outputs. For more information on IO module events, refer to Events and Alarms (*see page 31*).

Code IO1	Code IO2	Description	Type	Priority	Reset
1552 (0x0610)	1808 (0x0710)	Output 1 rising edge (NO contact) or falling edge (NC contact)	Event	NA	NA
1553 (0x0611)	1809 (0x0711)	Output 2 rising edge (NO contact) or falling edge (NC contact)	Event	NA	NA
1554 (0x0612)	1810 (0x0712)	Output 3 rising edge (NO contact) or falling edge (NC contact)	Event	NA	NA
1567 (0x061F)	1823 (0x071F)	Threshold overrun on output 1 counter	Alarm	Medium	Manual or remote
1568 (0x0620)	1824 (0x0720)	Threshold overrun on output 2 counter	Alarm	Medium	Manual or remote
1569 (0x0621)	1825 (0x0721)	Threshold overrun on output 3 counter	Alarm	Medium	Manual or remote
1576 (0x0628)	1832 (0x0728)	Output 1 not forced / forced change	Event	NA	NA
1577 (0x0629)	1833 (0x0729)	Output 2 not forced / forced change	Event	NA	NA
1578 (0x062A)	1834 (0x072A)	Output 3 not forced / forced change	Event	NA	NA

### Fallback Positions

The digital bistable relay output is configured to a predefined fallback position after the detection of a specific operating event.

The different fallback positions are:

- OFF: the relay output turns OFF
- ON: the relay output turns ON
- Freeze: the relay output stays in the same position

The fallback position of each digital output is configured using the EcoStruxure Power Commission software.

The fallback position is initiated as soon as the IO module detects one of the specific operating events listed below:

- IO module watchdog
- ULP communication interruption
- 24 Vdc power loss
- Firmware upgrade

For the applications listed in the below table, the fallback position of the digital outputs assigned to the application cannot be modified.

Application	Fallback Position
ERMS	OFF
Breaker operation	OFF
Light control	Freeze
Load control	OFF
User-defined output	OFF

## Analog Input

### Definition

An IO module has one analog input. The analog input assigned to a predefined application is preconfigured and cannot be modified.

In user-defined application, the analog input can be assigned using the EcoStruxure Power Commission software (*see page 23*).

### Analog Input Type

The Pt100 sensor is the only analog input type, which is used to record and monitor the temperature inside the switchboard.

### Pt100 Status

The IO module detects an open-circuit or short circuit condition of the analog input.

For more information, refer to Analog Input Status LED (*see page 20*).

Detection Function	Pt100 Value	Accuracy
Open-circuit detection	>195 $\Omega$	$\pm 10\%$
Short-circuit detection	< 10 $\Omega$	$\pm 5\%$

## Events and Alarms

### Definitions

An event is digital data changing state or any incident detected by the IO module. Events are time stamped and logged in the IO module event history.

Event codes are displayed on the FDM121 display and are used to identify the type of event or alarm.

The IO module event history contains the last 100 time-stamped events.

It can be accessed from:

- the FDM121 display
- the FDM128 display using the Ethernet communication network
- a remote controller using the communication network.

**NOTE:** The FDM121 displays only the last 20 time-stamped events of the IO module event history.

The event can be:

- system events, generated by the IO module.
- IO module events, generated by the digital inputs and outputs.
- functional events, generated by the application or functions performed by the IO module.

An alarm is a type of event that requires a specific attention from the user.

### Alarm Reset Mode

Each alarm is latched and must be reset.

There are three reset modes:

- Auto reset mode: the alarm is reset automatically when the alarm condition disappears.
- Manual reset mode: the alarm is reset using the test/reset button for 0.25–1 second on the IO module.
- Remote reset mode: the alarm is reset by a remote controller using the communication network with the reset IO alarms command.

For more information, refer to the *Modbus Communication Guides* ([see page 7](#)).

### Alarm Priority Level

Each alarm is given a priority level:

- High priority
- Medium priority
- Low priority

The alarm priority level is predefined.

Alarm indication on the FDM121 display or FDM128 display depends on the alarm priority level.

For more information, refer to the following user guides ([see page 7](#)):

- *FDM121 Front Display Module for One Circuit Breaker User Guide*
- *FDM128 Ethernet Display for Eight Devices User Guide*

## System Events

### List of System Events

The following events are generated by IO module 1 or IO module 2.

Code IO1	Code IO2	Description	Type	Priority	Reset
1537 (0x0601)	1793 (0x0701)	Watchdog reset	Event	N/A	N/A
1539 (0x0603)	1795 (0x0703)	IO module in STOP mode	Alarm	High	Manual or remote
1540 (0x0604)	1796 (0x0704)	IO module in ERROR mode	Alarm	Medium	Manual or remote
1541 (0x0605)	1797 (0x0705)	Application rotary switch position change	Event	N/A	N/A
1542 (0x0606)	1798 (0x0706)	Setting locking pad rotary switch position change	Event	N/A	N/A
1543 (0x0607)	1799 (0x0707)	Source address DIP switch position change	Event	N/A	N/A
3328 (0x0D00)	3328 (0x0D00)	Critical hardware modules discrepancy	Alarm	High	Auto
3329 (0x0D01)	3329 (0x0D01)	Critical firmware modules discrepancy	Alarm	High	Auto
3330 (0x0D02)	3330 (0x0D02)	Non-critical hardware modules discrepancy	Alarm	Medium	Auto
3331 (0x0D03)	3331 (0x0D03)	Non-critical firmware modules discrepancy	Alarm	Medium	Auto

### Watchdog Reset

The watchdog reset is a firmware reset where the IO module restarts itself after detection of an IO module processing time-out.

### IO Module in STOP Mode

The IO module in STOP mode alarm is generated when the IO module is out of service. Replace the IO module.

### IO Module in ERROR Mode

IO module in ERROR mode alarm is generated when the IO module detects that the EEPROM memory is corrupted. Replace the IO module at the next maintenance operation.

### Application Rotary Switch Position Change

The application rotary switch is located on the front face of the IO module. Each time the position of the application rotary switch is changed from one application to another application, an event is generated.

### Setting Locking Pad Rotary Switch Position Change

The setting locking pad is located on the front face of the IO module. Each time the position of the setting locking pad is changed, an event is generated.

### Source Address DIP Switch Position Change

The source address DIP switch is located on the bottom of the IO module. Each time the position of the DIP switch is changed, an event is generated.

### Critical Hardware Modules Discrepancy

The IO module detects a hardware discrepancy between the modules of the IMU that requires an immediate action. Use the EcoStruxure Power Commission software to check the hardware compatibility of the IMU modules and follow the recommended actions.

### Critical Firmware Modules Discrepancy

The IO module detects a firmware discrepancy between the modules of the IMU that requires an immediate action. Use the EcoStruxure Power Commission software to check the firmware compatibility of the IMU modules and follow the recommended actions. Update module firmware if necessary (*see page 36*).



**Non-Critical Hardware Modules Discrepancy**

The IO module detects a hardware discrepancy between the modules of the IMU that requires a non-urgent action. Use the EcoStruxure Power Commission software to check the hardware compatibility of the IMU modules and follow the recommended actions.

**Non-Critical Firmware Modules Discrepancy**

The IO module detects a firmware discrepancy between the modules of the IMU that requires a non-urgent action. Use the EcoStruxure Power Commission software to check the firmware compatibility of the IMU modules and follow the recommended actions. Update module firmware if necessary (*see page 36*).

## Technical Characteristics

### Environmental Characteristics

Characteristic		Value
Conforming to standards		<ul style="list-style-type: none"> <li>IEC/EN 60947-1</li> <li>IACS E10</li> </ul>
		<ul style="list-style-type: none"> <li>UL508</li> <li>UL60950</li> </ul>
		IACS E10
Certification		CE, cULus, EAC and FCC marking
Ambient temperature	Storage	-40 to +85 °C (-40 to +185 °F)
	Operation	-25 to +70 °C (-13 to +158 °F)
Protective treatment		ULV0, conforming to IEC/EN 60068-2-30
Pollution		Level 3

### Mechanical Characteristics

Characteristic		Value
Shock resistance		Conforming to IEC 60068-2-27 15 g/11 ms, 1/2 sinusoidal
Resistance to sinusoidal vibrations		Conforming to IEC/EN 60068-2-6

### Electrical Characteristics

Characteristics		Value
Power supply		24 Vdc, -20%/+10% (19.2–26.4 Vdc)
Consumption	Typical	24 Vdc, 100 mA at 20 °C (68 °F)
	Maximum with ULP	19.2 Vdc, 130 mA at 60 °C (140 °F)

### Physical Characteristics

Characteristic		Value
Dimensions		72 x 115 x 71 mm (2.83 x 4.52 x 2.79 in)
Mounting		DIN rail
Weight		229.5 g (0.51 lb)
Degree of protection of the installed module		<ul style="list-style-type: none"> <li>On the front panel (wall-mounted enclosure): IP4x</li> <li>IO module parts: IP3x</li> <li>Connectors: IP2x</li> </ul>
Connections		Screw type terminal blocks

### 24 Vdc Power Supply Characteristics

It is recommended to use an 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.

For more information, refer to the *ULP System User Guide* ([see page 7](#)).

### Digital Inputs Characteristics

Characteristic	Value
Digital input type	Self powered digital input with current limitations as per IEC 61131-2 type 2 standards (7 mA)
Input limit values at state 1 (close)	19.8–25.2 Vdc
	6.1–8.8 mA
Input limit values at state 0 (open)	0–19.8 Vdc
	0 mA
Maximum cable length	10 m (33 ft) <b>NOTE:</b> For a length between 10 m (33 ft) and 300 m (1,000 ft), it is mandatory to use a shielded twisted cable. The shield cable is connected to the functional ground of the IO module.

### Digital Outputs Characteristics

Characteristic	Value
Digital output type	Bistable relay
Rated load	5 A at 250 Vac
Rated carry current	5 A
Maximum switching voltage	380 Vac, 125 Vdc
Maximum switch current	5 A
Maximum switching power	1250 VA, 150 W
Minimum permissible load	10 mA at 5 Vdc
Contact resistance	30 mΩ
Maximum operating frequency	<ul style="list-style-type: none"> <li>● 18000 operations/hr (mechanical)</li> <li>● 1800 operations/hr (electrical)</li> </ul>
Digital output relay protection	External fuse of 5 A or less
Maximum cable length	10 m (33 ft)

### Analog Inputs Characteristics

The IO module analog input can be connected to a Pt100 temperature sensor.

Characteristic	Values	
Range	-30 to 200 °C	-22 to 392 °F
Accuracy	<ul style="list-style-type: none"> <li>● ± 2 °C from -30 to 20 °C</li> <li>● ± 1 °C from 20 to 140 °C</li> <li>● ± 2 °C from 140 to 200 °C</li> </ul>	<ul style="list-style-type: none"> <li>● ± 3.6 °F from -22 to 68 °F</li> <li>● ± 1.8 °F from 68 to 284 °F</li> <li>● ± 3.6 °F from 284 to 392 °F</li> </ul>
Refresh interval	5 seconds	5 seconds

## Firmware Update

### Description

Use the latest version of EcoStruxure Power Commission software for all firmware updates. For more information on IO module firmware versions, refer to *Enerlin'X IO Module Firmware Release Note (see page 7)*.

### DANGER

#### LOSS OF DATA

Backup the data log files before updating the firmware.

The data log entries of the IO module may be lost when the IO module firmware is updated.

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

After updating the firmware of one device in the IMU, use the latest version of EcoStruxure Power Commission software to check the firmware compatibility between the IMU devices. The **Firmware Update** table helps you to diagnose and identify all discrepancy issues between the IMU devices. This table also provides the recommended actions relevant to the detected discrepancies.

### Checking the Firmware Version

You can find the firmware version of the devices in the IMU by using EcoStruxure Power Commission software, refer to the *EcoStruxure Power Commission Online Help*.

### Updating the Firmware Using EcoStruxure Power Commission Software

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

The EcoStruxure Power Commission software is available at [www.schneider-electric.com](http://www.schneider-electric.com).

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# Chapter 2

## IO Module Predefined Applications

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### What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Application 1: Cradle Management	38
Application 2: Breaker Operation	43
Application 3: Cradle Management and Energy Reduction Maintenance Setting	49
Application 4: Light and Load Control	53
Application 9: Custom	58

## Application 1: Cradle Management

### Presentation

The cradle management application is used to:

- record and check the position of drawout circuit breakers in the cradle.
- provide information about the preventive maintenance actions.
- notify the remote controller about the position of the drawout circuit breaker.

**NOTE:** When the circuit breaker is detected as being in the disconnected position, the remote controller quits polling the Micrologic trip unit. If the remote controller does not quit polling, the remote controller receives the time-out response as long as the circuit breaker is disconnected.

The cradle information is available on:

- the FDM121 display
- the FDM128 display using the Ethernet communication network
- a remote controller using the communication network
- the IFE webpages

The monitoring from a remote controller using the communication network requires a communication interface module (IFM or IFE interface).

**NOTE:** The cradle management application for Masterpact MTZ circuit breakers is performed by the EIFE interface, not by the IO module. For more information, refer to the *EIFE Embedded Ethernet Interface User Guide* (see page 7).

### Compatible Devices

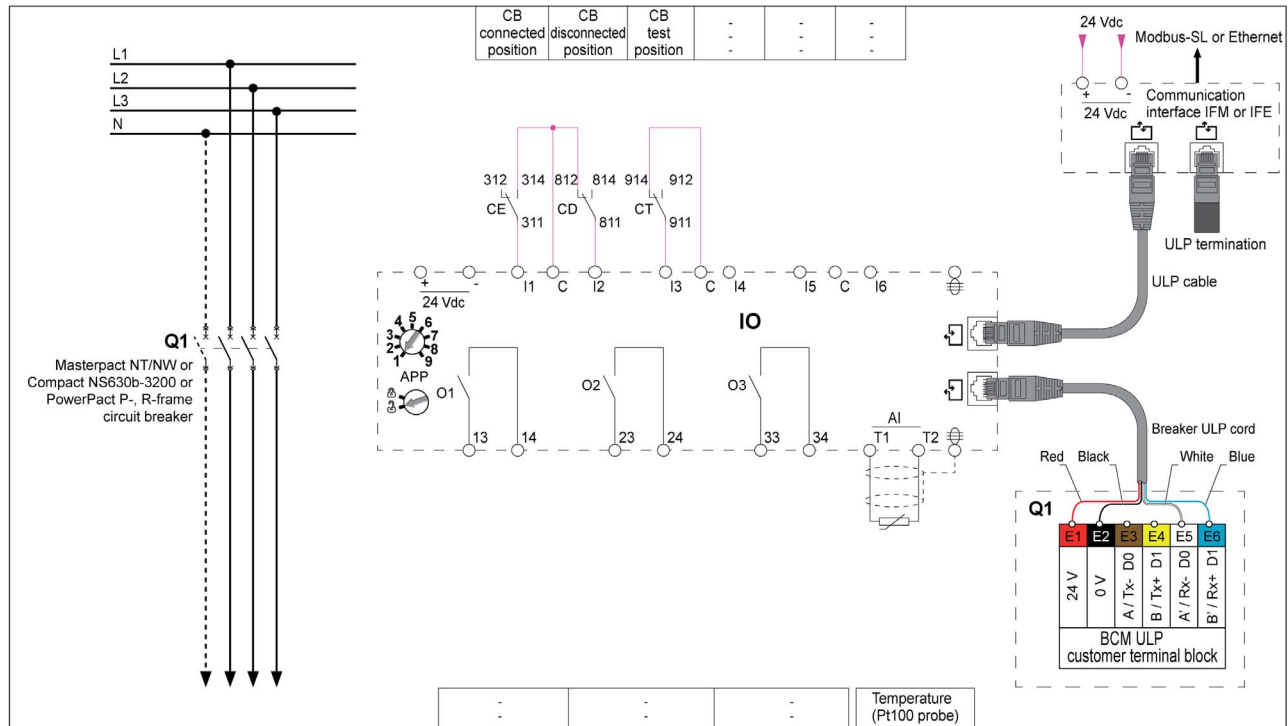
Range	Minimum Hardware Configuration Required
<ul style="list-style-type: none"> <li>• Masterpact NT circuit breaker</li> <li>• Masterpact NW circuit breaker</li> <li>• PowerPact P-frame circuit breaker</li> </ul>	<ul style="list-style-type: none"> <li>• Drawout circuit breaker + BCM ULP module with firmware version 4.1.0 and above</li> <li>• Drawout switch + BCM ULP module with firmware version 4.1.0 and above</li> </ul>
PowerPact H-, J-, and L-frame circuit breaker	<ul style="list-style-type: none"> <li>• Drawout circuit breaker + BSCM module with firmware version 2.2.7 and above</li> <li>• Drawout circuit breaker + Micrologic 5 or 6 trip unit with firmware version 1.0.0 and above</li> <li>• Drawout switch + BSCM module with firmware version 2.2.7 and above</li> </ul>

### Input/Output Assignment

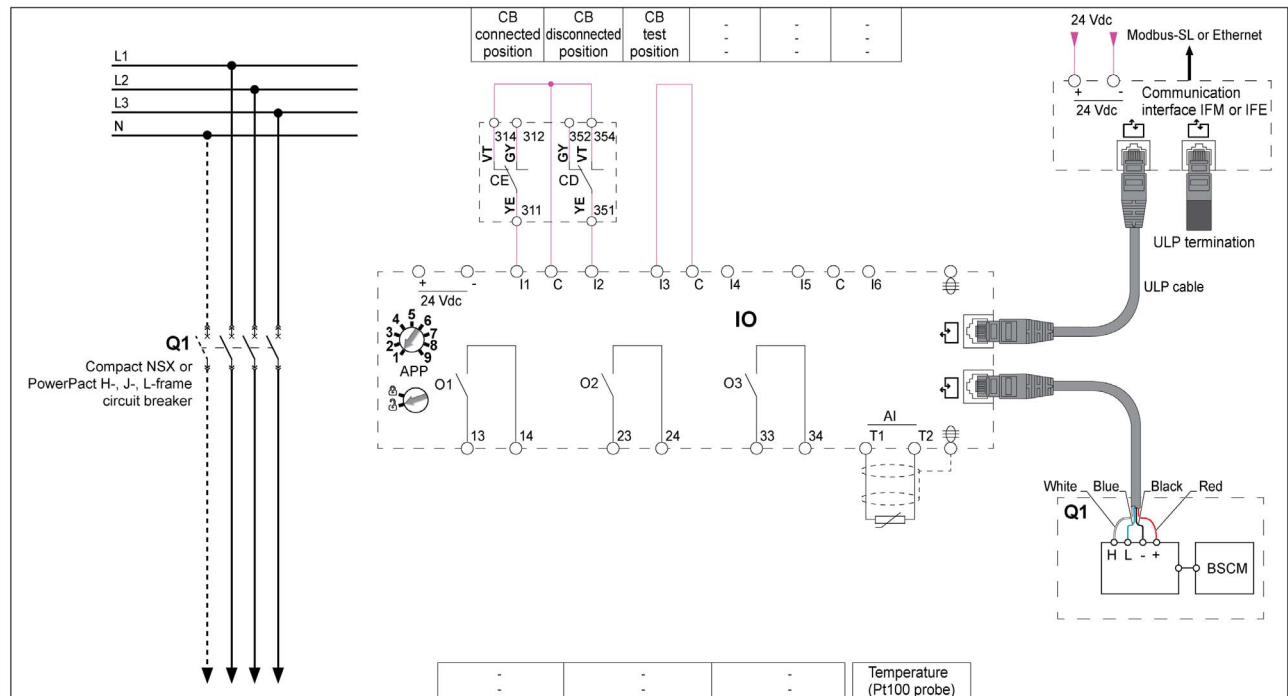
Input	Assignment
I1	Cradle connected position contact (CE)
I2	Cradle disconnected position contact (CD)
I3	Cradle test position contact (CT) <b>NOTE:</b> For PowerPact H-, J-, and L-frame devices: <ul style="list-style-type: none"> <li>• the cradle test position contact is not applicable.</li> <li>• I3 must be always wired to have I3=1.</li> </ul>
I4, I5, I6	Available
AI	Pt100 temperature sensor

Output	Assignment
O1, O2, O3	Available <b>NOTE:</b> The outputs can be assigned to the cradle position status with the EcoStruxure Power Commission software. For more information, refer to the user-defined applications (see page 73).

Wiring Diagram for Masterpact NT/NW and PowerPact P-Frame



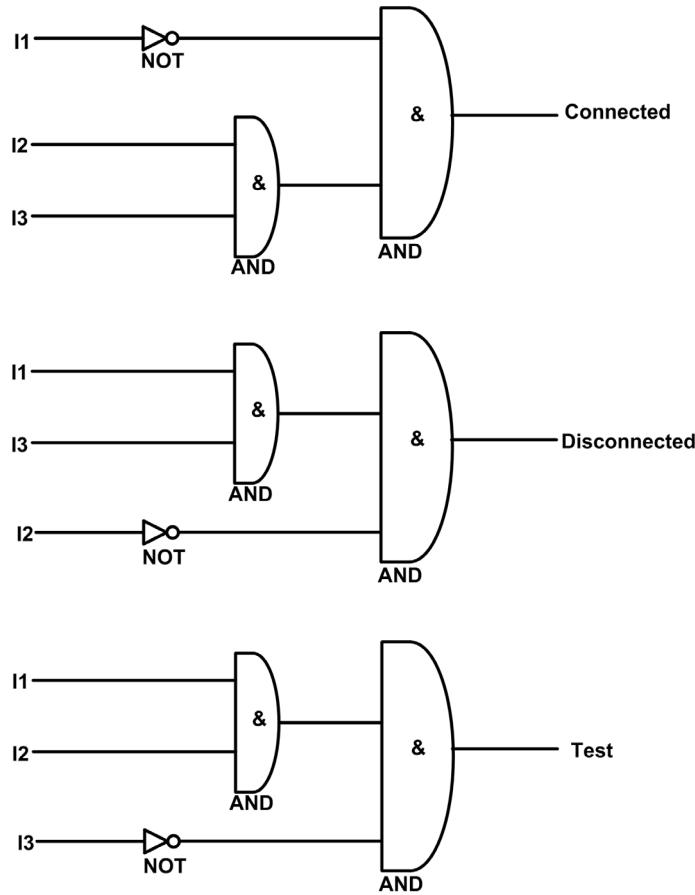
Wiring Diagram for PowerPact H-, J-, and L-Frame



### Cradle Position Status

The cradle position status is defined from the status of the digital inputs I1, I2, and I3:

- cradle in connected position (I1=0, I2=1, I3=1)
- cradle in disconnected position (I1=1, I2=0, I3=1)
- cradle in test position (I1=1, I2=1, I3=0)



I1	Cradle connected position contact (CE)
I2	Cradle disconnected position contact (CD)
I3	Cradle test position contact (CT)
Connected	Cradle is in connected position
Disconnected	Cradle is in disconnected position
Test	Cradle is in test position

### Cradle Position Counters

The cradle position counters are:

- Cradle connected position counter
- Cradle disconnected position counter
- Cradle test position counter

A counter is linked to each cradle position state. The counter is incremented each time the linked state is activated.

The cradle position counters have the following properties:

- The counters are saved in non-volatile memory to prevent data loss in case of power loss.
- The counters are incremented from 0 to 65534.



## Application Events

The following events are generated by the application. For more information on IO module events, refer to Events and Alarms (*see page 31*).

Code	Description	Type	Priority	Reset
2304 (0x0900)	Cradle position discrepancy	Alarm	Medium	Manual or remote
2305 (0x0901)	Cradle connected contact change	Event	No	N/A
2306 (0x0902)	Cradle disconnected contact change	Event	No	N/A
2307 (0x0903)	Cradle test contact change	Event	No	N/A
2308 (0x0904)	Disconnection of the circuit breaker from cradle is overdue	Alarm	Medium	Manual or remote
2309 (0x0905)	Cradle has reached its maximum number of operations	Alarm	High	Manual or remote
2310 (0x0906)	Remaining service life of the cradle is below alarm threshold	Alarm	Medium	Manual or remote
2311 (0x0907)	New Micrologic trip unit has been detected	Alarm	High	Manual or remote

### Cradle Position Discrepancy Alarm

The IO module detects the cradle position discrepancy and generates an alarm when the cradle position contacts indicate that the circuit breaker is not in one of the allowable positions, connected, disconnected, or test.

Recommended action: check the status of the cradle position contacts, wiring to the IO module and the inputs of IO module.

### Cradle Position Events

A time-stamped event is generated for each change on a cradle position state to record the date and time of each cradle operation.

### Disconnection of the Circuit Breaker from Cradle is Overdue

The alarm is generated after 11 months without disconnecting the circuit breaker, to remind the user to operate the cradle at least once in every year by moving the circuit breaker from connected position to disconnected position and from disconnected position to connected position.

Recommended action: disconnect the circuit breaker from the cradle and connect it back.

### Cradle has Reached Its Maximum number of operations

The cradle is designed to be connected 500 times and must be replaced before that number is reached. The alarm is generated when the cradle connected position counter reaches 450.

Recommended action: replace the cradle. Contact Schneider Electric service personnel for any assistance.

### Remaining Service Life of Cradle is Below Alarm Threshold

Regrease the cradle and clusters. The cradle needs a comprehensive check-up when:

- the cradle is in operation for five years,
- or the cradle position counter reaches 250.

Recommended action: plan to replace the cradle. Contact Schneider Electric service personnel for any assistance.

### New Micrologic Detection Alarm

A time-stamped alarm is generated when the IO module detects that the Micrologic trip unit of the circuit breaker has been replaced. The detection is based on the Micrologic trip unit serial number.

### Time-Stamped Information

The following time-stamped information is recorded:

- Last connection of the cradle
- Last disconnection of the cradle
- Last cradle in test position

The stamped information can be read by a remote controller using the communication network.

## Application 2: Breaker Operation

### Presentation

The application is used to control the opening and closing of the device.

The application takes into account:

- Control mode selection (local or remote), defined by the control mode selector switch wired on a digital input.

**NOTE:** When IO module is used with application 2 Breaker operation, the control mode of the device (local or remote) is defined only by the control mode selector switch wired on a digital input of the IO module, and cannot be changed by a remote controller using the communication network or by the FDM121 display.

- Local opening and closing orders issued from:
  - the local push-buttons wired on digital inputs.
  - the local FDM121 display.
- Remote opening and closing orders issued from:
  - a remote PLC outputs wired on digital inputs.
  - a remote controller using the communication network.
  - IFE or EIFE webpages.
- COM and IO inhibit close order issued from:
  - the local selector switch wired on a digital input.
  - a remote controller using the communication network.

### WARNING

#### RESTRICTED CLOSING INHIBITION

Do not use the inhibit close order to lock the device in open position.

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

The inhibit close order inhibits only the close orders issued from the IO module, FDM121 display, and a remote controller. The close orders issued from the front face button or BPFE, or from pushbutton directly connected to XF voltage release are not inhibited.

The close order can be inhibited either by a local command from the IO module or by a remote command from the remote controller.

After the close order has been inhibited locally, it has to be enabled by the local command from the IO module.

After the close order has been inhibited remotely, it has to be enabled by the remote command from the remote controller.

After the close order has been inhibited locally and remotely, it has to be enabled by the local command from the IO module and by the remote command from the remote controller.

The remote control orders issued from a remote controller using the communication network requires a communication interface module (IFM or IFE or EIFE interface):

- BCM ULP module commands, refer to the *Masterpact NT/NW and PowerPact P- and R-Frame Modbus Communication Guide* ([see page 7](#)).
- BSCM module commands, refer to the *PowerPact H-, J-, and L-Frame Modbus Communication Guide* ([see page 7](#)).

## Compatible Devices

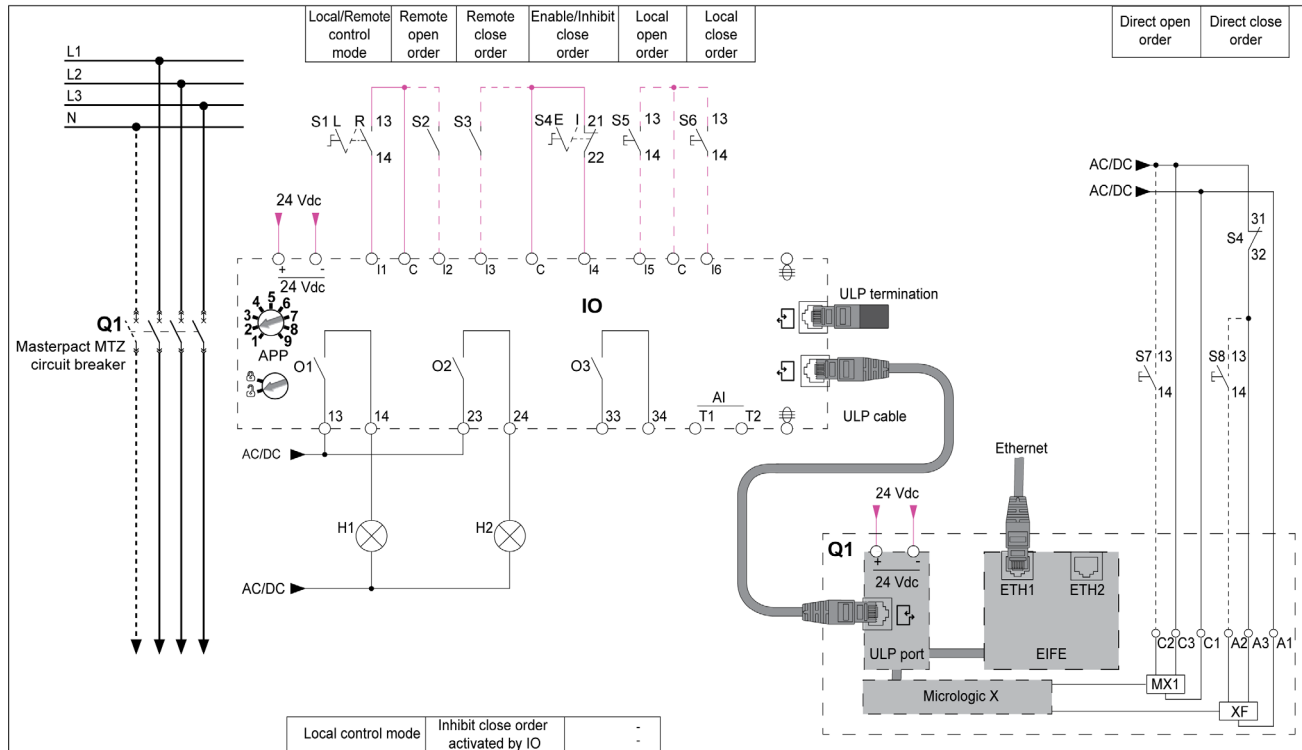
Range	Minimum Hardware Configuration Required
Masterpact MTZ circuit breaker	<ul style="list-style-type: none"> <li>Fixed or drawout circuit breaker + Micrologic X control unit + ULP port module + MX and XF communicating voltage releases</li> </ul>
<ul style="list-style-type: none"> <li>Masterpact NT circuit breaker</li> <li>Masterpact NW circuit breaker</li> <li>PowerPact P-frame circuit breaker</li> </ul>	<ul style="list-style-type: none"> <li>Fixed or drawout circuit breaker + BCM ULP module with firmware version 4.1.0 and above + MX and XF communicating voltage releases or communicating motor operator</li> <li>Fixed or drawout switch + BCM ULP module with firmware version 4.1.0 and above + MX and XF communicating voltage releases or communicating motor operator</li> </ul>
PowerPact H-, J-, and L-frame circuit breaker	<ul style="list-style-type: none"> <li>Fixed or drawout circuit breaker + BSCM module with firmware version 2.2.7 and above + communicating motor operator</li> <li>Fixed or drawout switch + BSCM module with firmware version 2.2.7 and above + communicating motor operator</li> </ul>

## Input/Output Assignment

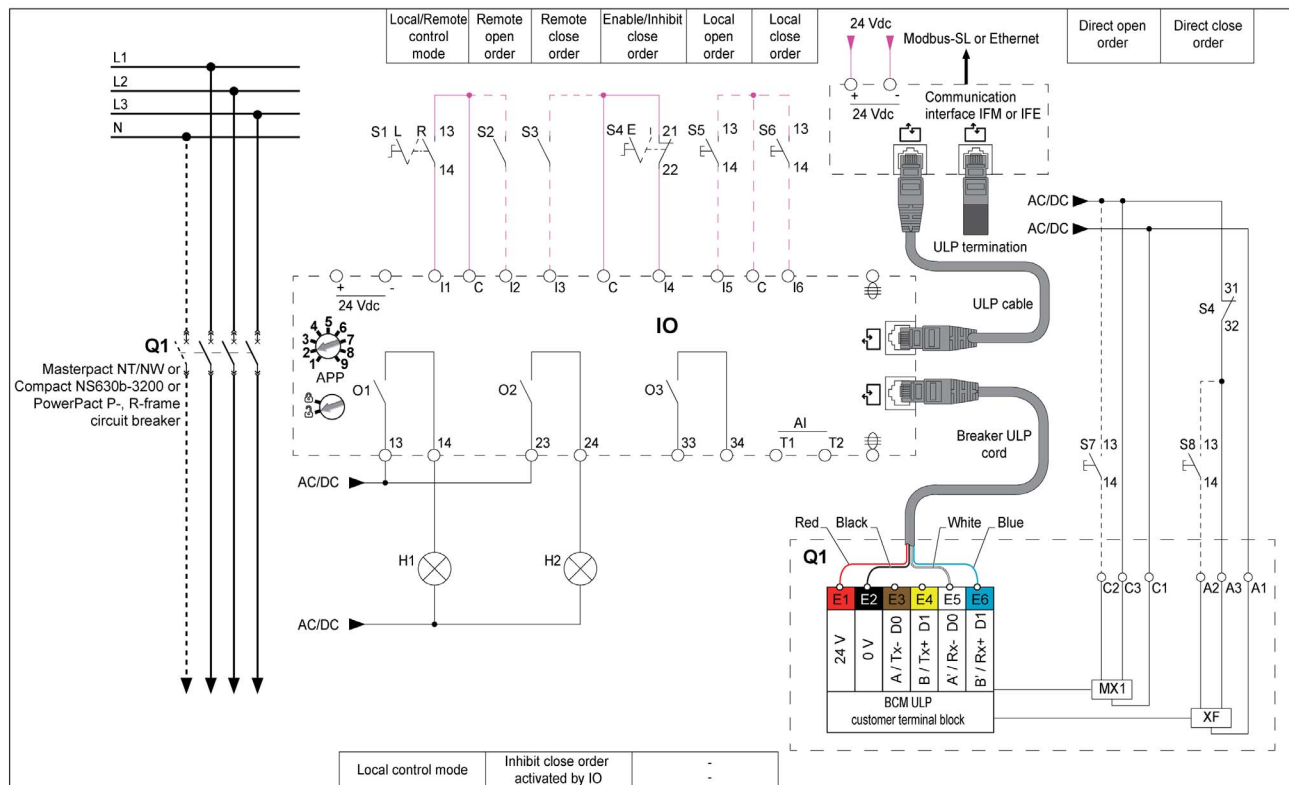
Input	Assignment
I1	Local(0)/Remote(1) control mode. If the input is not wired, the IMU is in local mode (I1=0). If there is a control mode selector switch, it is recommended to wire I1 to have I1=1.
I2	Remote open order
I3	Remote close order
I4	Inhibit(0)/Enable(1) close order. If the input is not wired, close order is inhibited (I4=0).
I5	Local open order
I6	Local close order
AI	Available

Output	Assignment
O1	Local control mode
O2	Inhibit close order activated by IO module
O3	Available

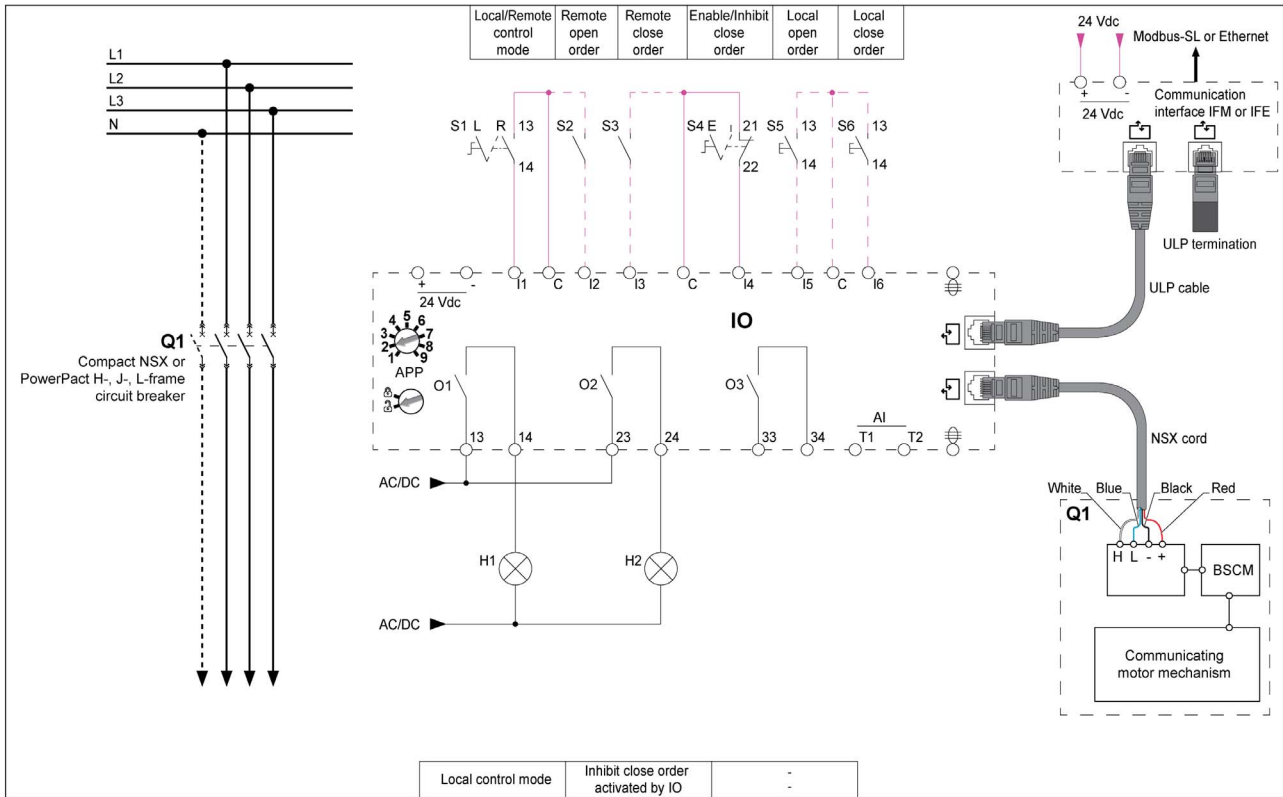
Wiring Diagram with Masterpact MTZ Circuit Breaker



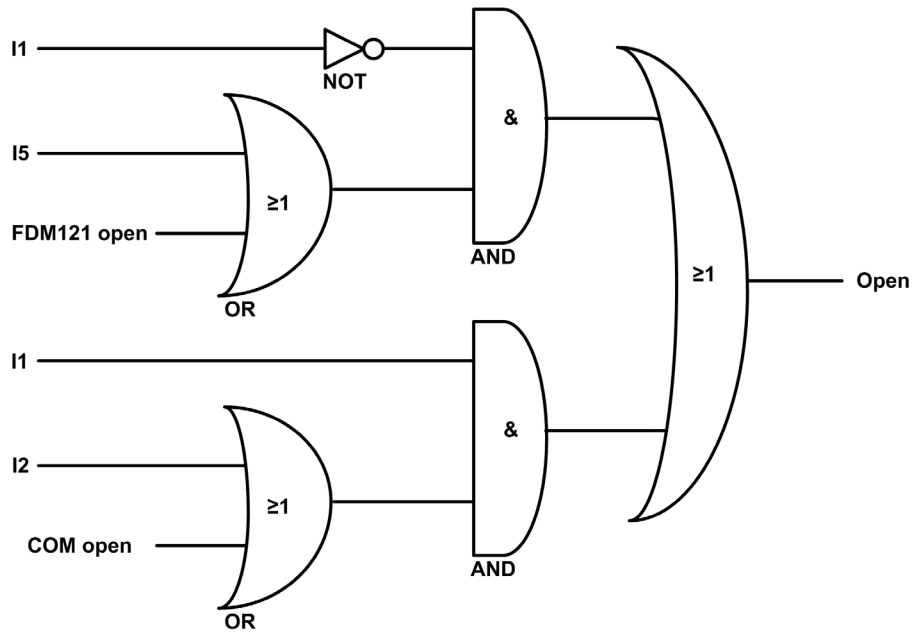
Wiring Diagram with Masterpact NT/NW and PowerPact P- and R-Frame Circuit Breaker



Wiring Diagram with PowerPact H-, J-, and L-Frame Circuit Breaker



Device Open Command



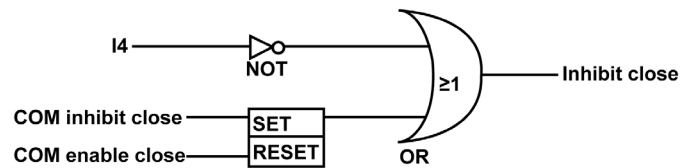
I1	Local(0)/Remote(1) control mode
I2	Remote open order
I5	Local open order
FDM121 open	Open order from local FDM121 display
COM open	Open order from a remote controller using the communication network
Open	Device open command to: <ul style="list-style-type: none"> <li>• communicating motor operator to open PowerPact H-, J-, and L-frame devices.</li> <li>• MX communicating voltage releases to open Masterpact NT/NW, or PowerPact P-Frame devices.</li> </ul>

**NOTE:** The pulse width of the close orders must be set to minimum one second.

### Masterpact MTZ, Masterpact NT/NW, and PowerPact P- and R-Frame Circuit Breakers Direct Open Order

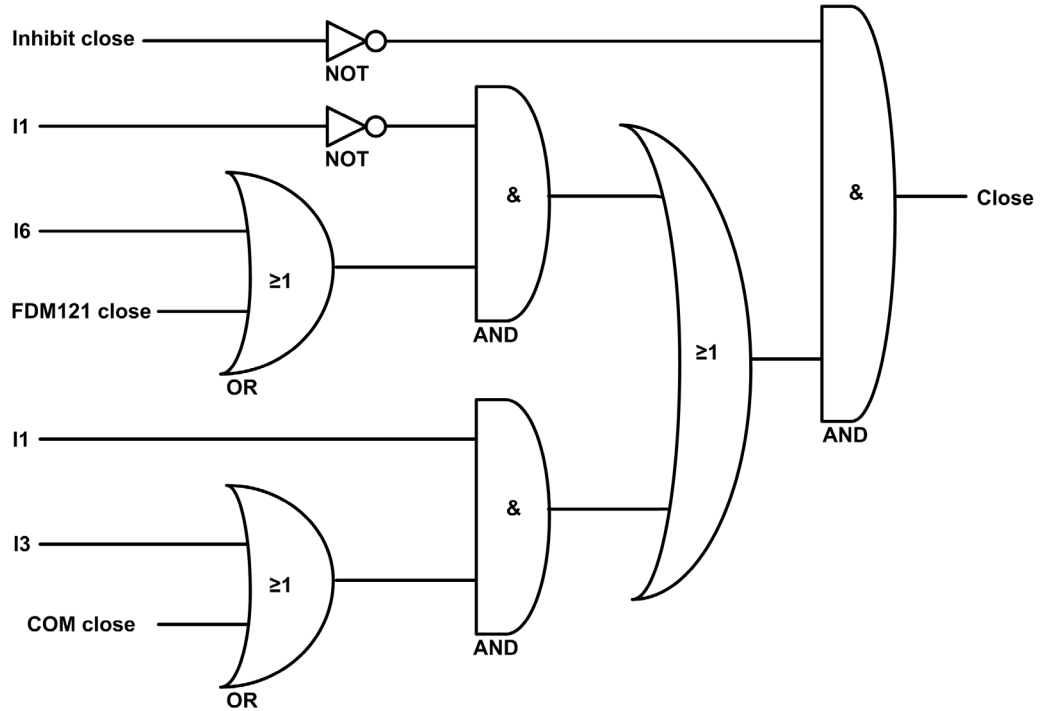
On Masterpact MTZ, Masterpact NT/NW, and PowerPact P- and R-frame devices, an open order command can be wired directly to the MX communicating voltage releases to open the device, without taking into account the control mode or the data processed by the IO module.

### Inhibit Close Order



I4	Inhibit(0)/Enable(1) close order
COM inhibit close	Inhibit close order from a remote controller using the communication network
COM enable close	Enable close order from a remote controller using the communication network
Inhibit close	Close order is inhibited(1) or enabled(0)

**Device Close Command**



Inhibit close	Close order inhibited(1) or enabled(0)
I1	Local(0)/Remote(1) control mode
I3	Remote close order
I6	Local close order
FDM121 close	Close order from the local FDM121 display
COM close	Close order from a remote controller using the communication network
Close	Device close command to: <ul style="list-style-type: none"> <li>communicating motor operator to close the PowerPact device.</li> <li>XF communicating voltage releases to close Masterpact NT/NW or PowerPact P-Frame devices.</li> </ul>

**NOTE:** The pulse width of the close orders must be set to minimum one second.

**Masterpact MTZ, Masterpact NT/NW, and PowerPact P-Frame Circuit Breakers Direct Close Order**

On Masterpact MTZ, Masterpact NT/NW and PowerPact P-Frame devices, a direct close order can be wired directly to the XF communicating voltage release to close the devices.

This close order:

- is not inhibited by the close inhibit order
- does not take into account the control mode or the data processed by IO module



## Application 3: Cradle Management and Energy Reduction Maintenance Setting

### Presentation

Application 3 is the combination of two functions:


- The cradle management function, with the same features as the predefined application 1 (*see page 38*).
- The energy reduction maintenance setting function described here in detail.

### Energy Reduction Maintenance Setting Function

The energy reduction maintenance setting (ERMS) function is compatible only with the Masterpact NT/NW and PowerPact P- and R-frame circuit breakers. It allows the selection of the Micrologic P and H trip unit settings: Normal and ERMS mode.

This application is used to reduce the instantaneous (Ii) protection settings in order to trip as fast as possible when a fault occurs. The factory setting for Ii protection in ERMS mode is 2xIn. This protection parameter can be modified using the EcoStruxure Power Commission software (*see page 23*).

The ERMS mode is in the OFF state if the Ii setting is less than the ERMS setting.

 <b>DANGER</b>
<p><b>HAZARD OF ARC FLASH</b></p> <ul style="list-style-type: none"> <li>• DO NOT change the Micrologic P/H trip unit setting while in ERMS mode.</li> <li>• Seal the transparent cover of the Micrologic P and H trip unit when using the ERMS mode.</li> </ul> <p><b>Failure to follow these instructions will result in death or serious injury.</b></p>

If any of the basic protection settings using the rotary dial is modified on the Micrologic trip unit while in ERMS mode, the Micrologic trip unit switches immediately to the normal mode. The Micrologic trip unit returns automatically to the ERMS mode after 5 seconds.

The selection of the normal or ERMS mode is made by a selector switch connected to two inputs. When the ERMS mode is engaged, ERMS is displayed on the display of the Micrologic trip unit and a pilot light connected to output O3 is in the ON state.

The locking pad of the communication interface module (IFM or IFE interface) must be in the UNLOCK position (padlock open) while performing the energy reduction maintenance setting (ERMS).

The parameter **ACCESS PERMIT** in the COM setup/Remote setting menu on the display of the Micrologic trip unit must be set on **YES** for **IMU** without IFM/IFE interface.

This is based on the following behavior:

- **IMU with IFM/IFE interface**
  - **Setting access permit parameter:**  
The access permit parameter can be changed only from IFE/IFM interface using the LOCK/UNLOCK dial.
  - **Behavior:**  
ERMS ON and OFF orders are executed even if the access permit parameter is set as **NO**.
- **IMU without IFM/IFE interface**
  - **Setting access permit parameter:**  
The access permit parameter can be changed only from the display of the Micrologic trip unit.
  - **Behavior:**  
ERMS ON and OFF orders are not executed if the access permit parameter is set as **NO**.

**NOTE:** The ERMS ON and OFF orders are executed only when the access parameter is set to **YES** and the passcode in the Micrologic trip unit is set to **0000**.

For more information, refer to the following user guides (*see page 7*):

- Micrologic P Trip Units - User Guide
- Micrologic H Trip Units - User Guide

Compatible Devices

Range	Minimum Hardware Configuration Required
<ul style="list-style-type: none"> <li>Masterpact NT circuit breaker</li> <li>Masterpact NW circuit breaker</li> <li>PowerPact P-frame circuit breaker</li> <li>PowerPact R-frame circuit breaker</li> </ul>	Fixed or drawout circuit breaker + BCM ULP module with firmware version 4.1.0 and above + Micrologic P trip unit with firmware version Plogic-2013AN or v8282 and above or Micrologic H trip unit with firmware version Hlogic-2013AN or v8282 and above

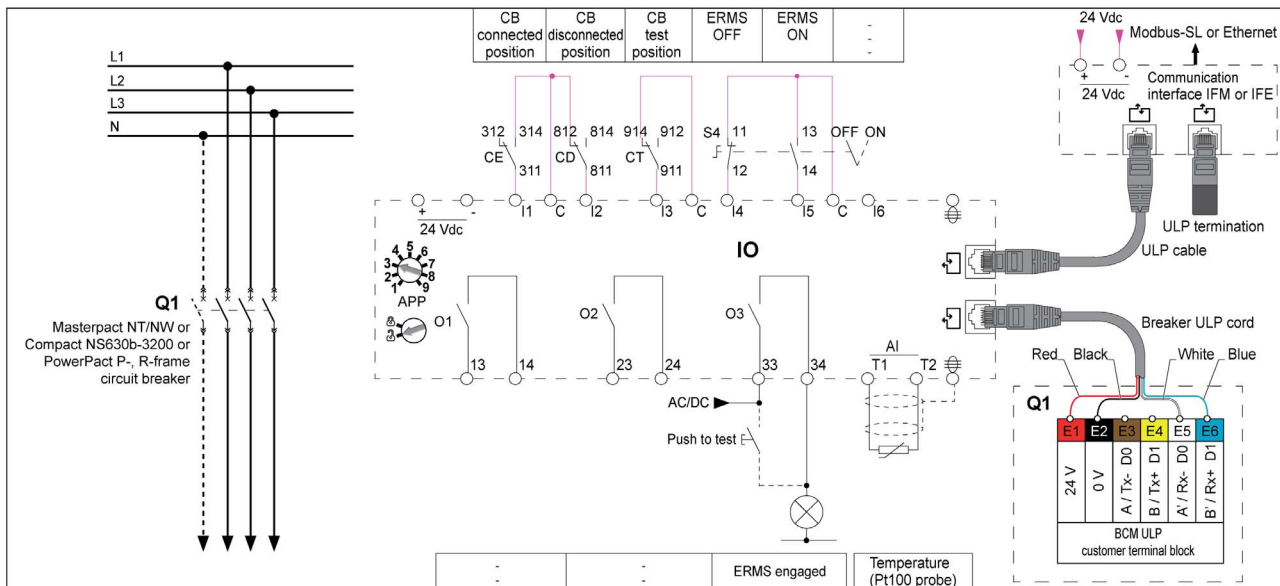
Input/Output Assignment

Input	Assignment
I1	Cradle connected position contact (CE)
I2	Cradle disconnected position contact (CD)
I3	Cradle test position contact (CT)
I4	Energy reduction maintenance setting OFF order
I5	Energy reduction maintenance setting ON order
I6	Available <b>NOTE:</b> The outputs can be assigned to the cradle position status with the EcoStruxure Power Commission software. For more information, refer to the user-defined applications ( <a href="#">see page 59</a> ).
AI	Pt100 temperature sensor

Output	Assignment
O1, O2	Available <b>NOTE:</b> The outputs can be assigned to the cradle position status with the EcoStruxure Power Commission software. For more information, refer to the user-defined applications ( <a href="#">see page 73</a> ).
O3	Energy reduction maintenance setting engaged

**NOTE:** Switch off the ERMS from the active module (IO module 1 or IO module 2) before changing the ERMS assignments. For example, when ERMS is assigned to IO module 1 and you want to assign ERMS inputs to IO module 2, then switch off the ERMS in IO module 1 and then assign ERMS inputs to IO module 2.

Wiring Diagram



### ERMS Mode Engaged

A digital output is assigned to indicate that the ERMS mode is engaged. This output relay is closed in the ERMS mode.

ERMS may be activated after a short delay due to internal controls in the system. Ensure that the output 3 (O3) of IO module is ON, and Micrologic HMI displays ERMS before operating the equipment.

### Cradle Management Events

The events generated by the cradle management function are the same as the events generated by the Application 1 (*see page 38*).

### ERMS Events

The following alarm is generated by the ERMS function. For more information on IO module events, refer to Events and Alarms (*see page 31*).

Code	Description	Type	Priority	Reset
3072 (0x0C00)	Discrepancy with ERMS orders	Alarm	Medium	Manual or remote
3073 (0x0C01)	ERMS setting inconsistency	Alarm	High	Auto
3074 (0x0C02)	ERMS engaged for more than 24 hours	Alarm	High	Auto

**NOTE:** The alarms 3073 and 3074 are generated by BCM ULP module.

### Discrepancy with ERMS Orders

The IO module detects the ERMS order discrepancy and generates an alarm when I4 and I5 are 1 or when I4 and I5 are 0.

When the alarm is generated while ERMS mode is engaged, it is necessary to reset the alarm in order to switch off the ERMS mode.

When the alarm is generated while ERMS mode is not engaged, it is necessary to reset the alarm in order to switch on the ERMS mode.

Recommended action: check wiring from the circuit breaker to the IO module and the inputs of the IO module.

### ERMS Setting Inconsistency

This event is generated in ERMS mode when the ERMS setting (I<sub>ERMS</sub>) is set above the I<sub>i</sub> protection setting of trip unit.

Recommended action: check the ERMS setting (I<sub>ERMS</sub>).

### ERMS Engaged for More Than 24 Hours

A maintenance operation requiring switching the I<sub>i</sub> protection settings in ERMS mode normally lasts for no more than a few hours. Therefore, when the ERMS mode is engaged for more than 24 hours, an event is generated to remind the user to switch the I<sub>i</sub> protection settings back in normal mode.

Recommended action: disengage ERMS by selector switch.

## Application 4: Light and Load Control

### Presentation

- The light-control application is used to switch the lights on and off remotely. The lights are controlled by an impulse relay. The switch order can be either delayed or not.
- The load-control application is used to switch the loads on and off remotely. The loads are controlled by a contactor. The switch order can be either delayed or not.

The light and load orders are issued from:

- the local FDM121 display.
- the local push-buttons (S1, S2...) connected to the impulse relay (light control).
- a remote controller using the communication network.
- the IFE or EIFE webpages, only when the IO module is connected to a circuit breaker.

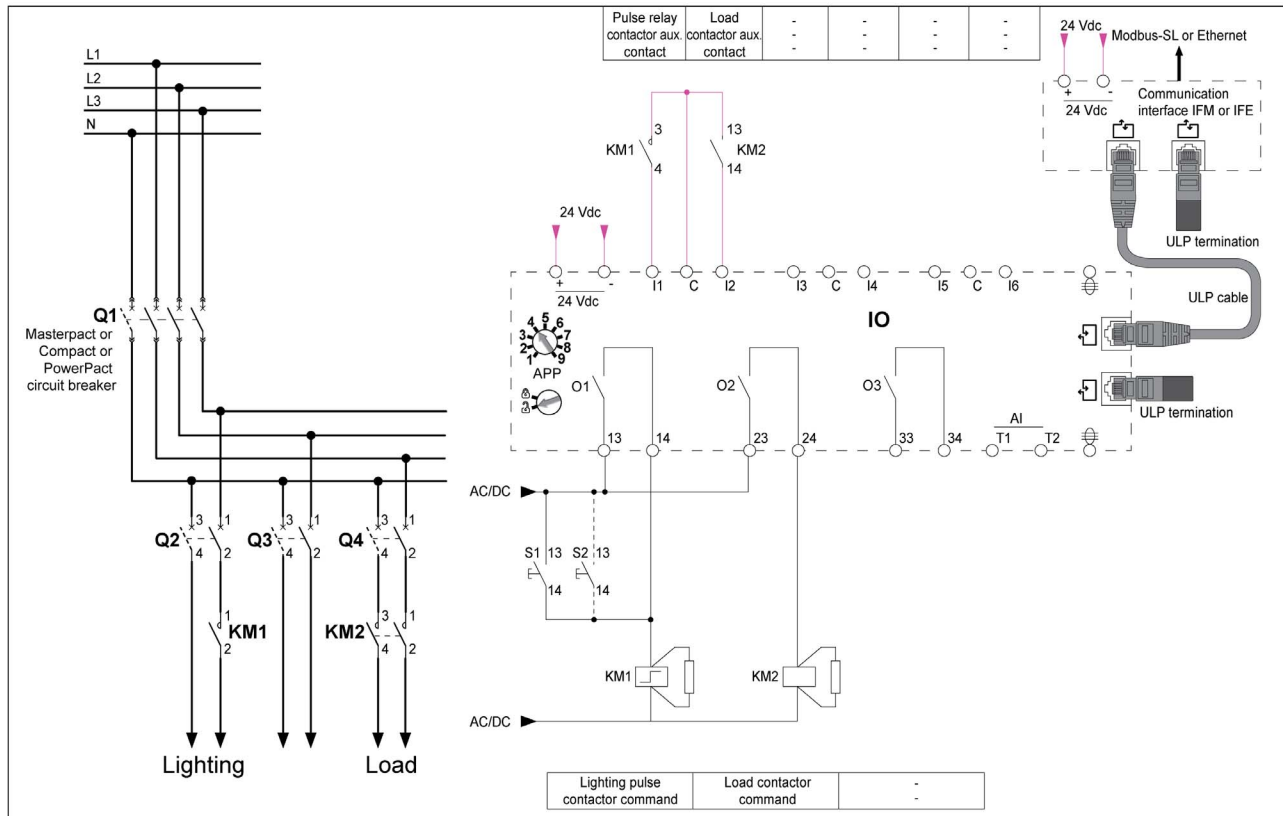
The orders issued from a remote controller using the communication network correspond to IO module commands. These orders require a communication interface module (IFM or IFE or EIFE interface).

### Input/Output Assignment

Input	Assignment
I1	Lighting pulse relay feedback
I2	Load contactor feedback
I3, I4, I5, I6	Available
AI	Available

Output	Assignment
O1	Lighting pulse relay command
O2	Load contactor command
O3	Available

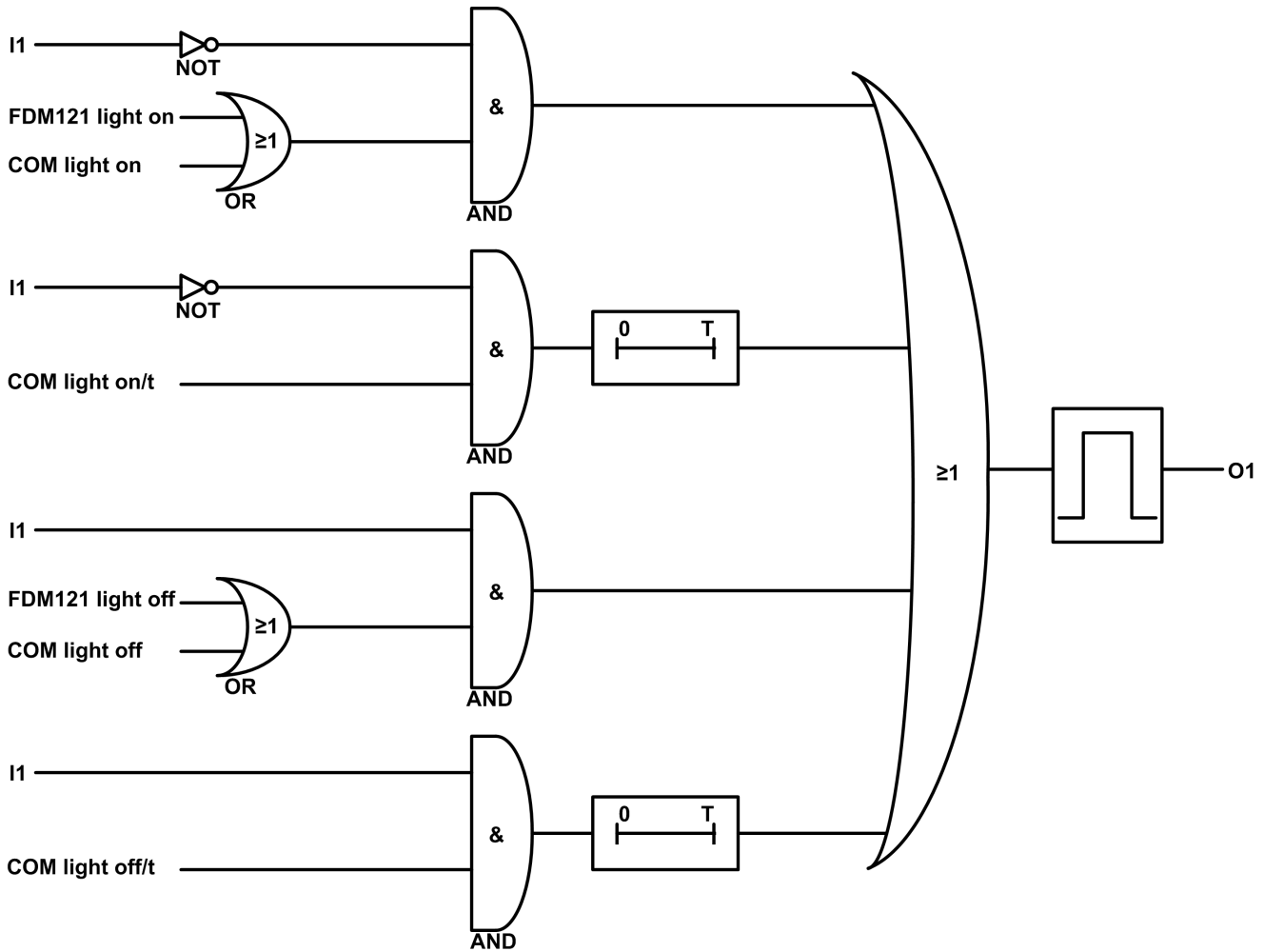
Wiring Diagram



**Light Control Block Diagram**

The light is controlled by an impulse relay. The relay is switched off and on after receiving a command pulse delivered by the IO module or local push-buttons.

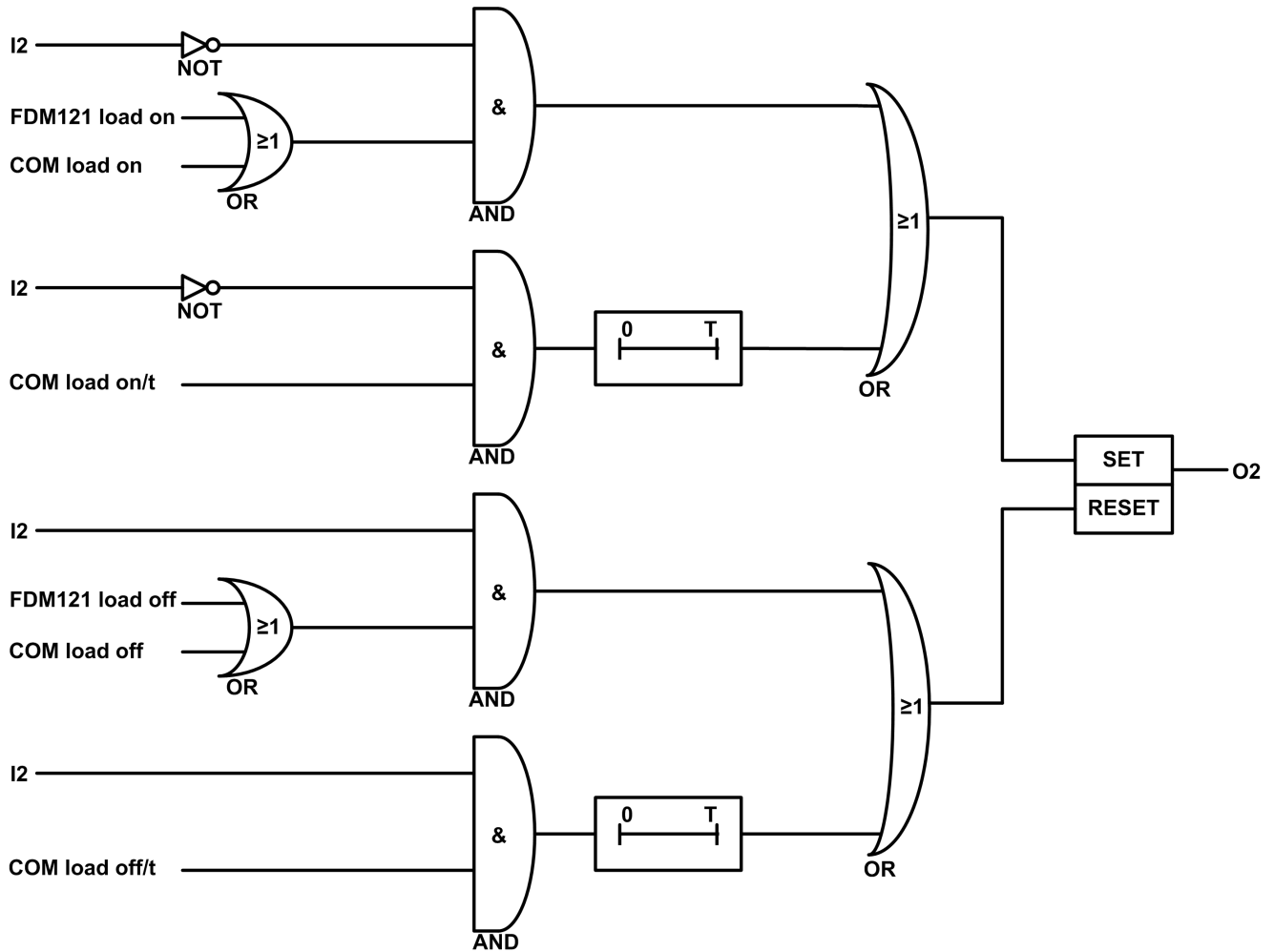
The delayed switching order specifies the waiting time in seconds before execution of the order by the IO module.



I1	Lighting impulse relay feedback
FDM121 light on	Instantaneous light switch on order from the FDM121 display
COM light on	Instantaneous light switch on order from a remote controller using the communication network
COM light on/t	Delayed light switch on order with t seconds delay from a remote controller using the communication network
FDM121 light off	Instantaneous light switch off order from the FDM121 display
COM light off	Instantaneous light switch off order from a remote controller using the communication network
COM light off/t	Delayed light switch off order with t seconds delay from a remote controller using the communication network
O1	Lighting impulse relay command

### Load Control Block Diagram

The load is controlled by a contactor. The contactor is switched on and off by the IO module. The delayed switching order specifies the waiting time in seconds before execution of the order by the IO module.



I2	Load contactor feedback
FDM121 load on	Instantaneous load switch on order from the FDM121 display
COM load on	Instantaneous load switch on order from a remote controller using the communication network
COM load on/t	Delayed load switch on order with t seconds delay from a remote controller using the communication network
FDM121 load off	Instantaneous load switch off order from the FDM121 display
COM load off	Instantaneous load switch off order from a remote controller using the communication network
COM load off/t	Delayed load switch off order with t seconds delay from a remote controller using the communication network
O2	Load contactor command

**Application Events**

The following events are generated by the application. For more information on IO module events, refer to Events and Alarms (*see page 31*).

Code	Description	Type	Priority	Reset
2560 (0x0A00)	Aux contact of the load contactor 1 is not closed	Alarm	Medium	Manual or remote
2561 (0x0A01)	Aux contact of the load contactor 1 is not opened	Alarm	Medium	Manual or remote

Recommended action: check operation of the load and the inputs/outputs of the IO module.



## Application 9: Custom

### Presentation

The custom application is used to perform user-defined applications with the IO modules.

The user-defined applications performed by the IO modules require prior configuration using the EcoStruxure Power Commission software (*see page 23*).

### User-Defined Applications

The user-defined applications are categorized according to:

- Protection functions
- Control functions
- Energy management functions
- Monitoring functions

Each user-defined application is described in IO Module User-Defined Applications (*see page 59*).

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# Chapter 3

## IO Module User-Defined Applications

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### What Is in This Chapter?

This chapter contains the following sections:

Section	Topic	Page
3.1	Protection Functions	60
3.2	Control Functions	65
3.3	Energy Management Functions	69
3.4	Monitoring Functions	72

## Section 3.1

### Protection Functions

---

#### What Is in This Section?

This section contains the following topics:

Topic	Page
Energy Reduction Maintenance Setting (ERMS)	61
Dual Settings	62
Inhibit Optional Protection	64

## Energy Reduction Maintenance Setting (ERMS)

### Presentation

The energy reduction maintenance setting (ERMS) user-defined application has the same features and generates the same events as the ERMS function of predefined application 3 (*see page 49*).

### Compatible Devices

Range	Minimum Hardware Configuration Required
<ul style="list-style-type: none"> <li>● Masterpact NT circuit breaker</li> <li>● Masterpact NW circuit breaker</li> <li>● PowerPact P-frame circuit breaker</li> <li>● PowerPact R-frame circuit breaker</li> </ul>	Fixed or drawout circuit breaker + BCM ULP module with firmware version 4.1.0 and above + Micrologic P trip unit with firmware version Plogic-2013AN or v8282 and above or Micrologic H trip unit with firmware version Hlogic-2013AN or v8282 and above.

### Input/Output Assignments

The tables below list the possible assignment of the digital inputs and outputs, according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
ERMS OFF order	I4	–	–	I4	–	–	–	–	I4
ERMS ON order	I5	–	–	I5	–	–	–	–	I5

Outputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
ERMS engaged	O3	–	–	O3	–	–	–	–	O3

## Dual Settings

### Presentation

The dual settings function is compatible only with Masterpact MTZ circuit breaker.

The dual settings function consists of two groups of protection settings - group A and group B.

You can switch from one group to another group under certain operating conditions. A typical application is to adjust short-circuit protection when the circuit breaker can be supplied by two sources with different short-circuit currents. For example, the circuit breaker is supplied by either the grid or a generator.

According to the type of Micrologic X control unit, the dual settings function is supported by the following protections:

- Long-time overcurrent protection
- Short-time overcurrent protection
- Instantaneous overcurrent protection
- Ground-fault protection

#### NOTE:

- At any time, only one group can be active.
- Dual settings is OFF as the factory setting of the device.
- When dual settings is ON and controlled by the IO module, protections run group A or group B, as determined by the IO module input. Settings of group A are equal to dual setting OFF settings.

There are two modes to switch the dual settings from group A to group B and the opposite way. They differ in the fallback position if the connection failure occurs.

- Two wire mode (fallback = stick to current group)
- Single wire mode (fallback = enforce group A)

Using EcoStruxure Power Commission software ([see page 23](#)), you can determine whether the dual settings can be controlled by using the IO module, and in which mode (single wire or two wire mode).

The device able to select the active group are:

- the IO module, through a digital input
- the Micrologic X control unit, by setting on the display screen
- a remote controller, by sending a setting command using the communication network

The Masterpact MTZ circuit breaker accepts group change commands from IO module only if it is configured so.

### Compatible Devices

Range	Minimum Hardware Configuration Required
Masterpact MTZ circuit breaker	Fixed or drawout circuit breaker + Micrologic X control unit + ULP port module

### Input/Output Assignments

The following tables list the possible assignment of the digital inputs and outputs, according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Dual settings A order (two wire mode)	I5	–	–	I5	–	–	–	–	I5
Dual settings B order (two wire mode)	I6	–	–	I6	–	–	–	–	I6
Dual settings switch order (single wire mode)	I6	–	I6	I6	–	–	–	–	I6

Outputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Dual settings B selected	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3

**NOTE:**

- When dual settings switch order is selected, then the dual settings A order and dual settings B order is not allowed.
- You must use I5 and I6 for two wire control and only I6 for single wire control.
- Dual settings B selected output can be configured even if dual setting inputs are not configured in the IO module.

**Dual Settings Selection**

The active setting group is defined from the status of the digital inputs I5 and/or I6:

- In two wire mode:
  - I5=1 and I6=0: setting group A active
  - I5=0 and I6=1: setting group B active

**NOTE:** When I5=I6=1 or I5=I6=0, a discrepancy alarm is generated and the setting group active before the detection of the discrepancy remains active.

- In single wire mode:
  - I6=0: setting group A active
  - I6=1: setting group B active

**Application Events**

The following event is generated by the application. For more information on IO module events, refer to Events and Alarms (*see page 31*).

Code	Description	Type	Priority	Reset
3333 (0x0D05)	Dual settings 2-wire input discrepancy (Masterpact MTZ only)	Alarm	High	Auto

Recommended action: check wiring from the circuit breaker to the IO module and the inputs of the IO module.

## Inhibit Optional Protection

### Presentation

The inhibit optional protection function is compatible only with Masterpact MTZ circuit breaker.

The function is used to inhibit the following optional protection functions of the Micrologic X control unit:

- Undervoltage protections ANSI 27-1 and ANSI 27-2
- Overvoltage protections ANSI 59-1 and ANSI 59-2
- Reverse active power protection ANSI 32P
- Underfrequency protection ANSI 81U
- Overfrequency protection ANSI 81O

The function inhibits the Micrologic X optional protection functions with their inhibition parameter set to ON. For more information, refer to the *Masterpact MTZ Micrologic X Control Unit - User Guide* (see page 7).

The digital input used to inhibit the Micrologic X optional protection functions can be assigned using the EcoStruxure Power Commission software (see page 23).

### Compatible Devices

Range	Minimum Hardware Configuration Required
Masterpact MTZ circuit breaker	Fixed or drawout circuit breaker + Micrologic X control unit with optional protection Digital Modules installed + ULP port module

### Input/Output Assignments

The table below lists the possible assignment of the digital inputs and outputs according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Enable/Disable inhibition of the optional protections • I=0: Inhibition disabled • I=1: Inhibition enabled	I4-I6	–	I6	I3-I6	–	–	–	–	I1-I6

---

## Section 3.2

### Control Functions

---

#### What Is in This Section?

This section contains the following topics:

Topic	Page
Enable/Inhibit Close Order	66
User-Defined Output	68



## Enable/Inhibit Close Order

### Presentation

The application is used to inhibit the close order of the device in local or remote control mode.

The application takes into account an inhibit close order issued from:

- the local selector switch wired on a digital input.
- the remote controller using the communication network.

### WARNING

#### RESTRICTED CLOSING INHIBITION

Do not use the inhibit close order to lock the device in open position.

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

The inhibit close order inhibits only the close orders issued from the IO module, the FDM121 display, and a remote controller. The close orders issued from the front face button and BPFE, or from pushbutton directly connected to XF voltage release are not inhibited.

The close order can be inhibited either by a local command from the IO module or by a remote command from the remote controller.

When the close order has been inhibited locally, it can only be enabled by the local command from the IO module.

When the close order has been inhibited remotely, it can only be enabled by the remote command from the remote controller.

When the close order has been inhibited locally and remotely, it can only be enabled by the local command from the IO module and by the remote command from the remote controller.

### Compatible Devices

Range	Minimum Hardware Configuration Required
Masterpact MTZ circuit breaker	Fixed or drawout circuit breaker + Micrologic X control unit + ULP port module + XF communicating voltage release
<ul style="list-style-type: none"> <li>• Masterpact NT circuit breaker</li> <li>• Masterpact NW circuit breaker</li> <li>• PowerPact P-frame circuit breaker</li> </ul>	<ul style="list-style-type: none"> <li>• Fixed or drawout circuit breaker + BCM ULP module with firmware version 4.1.0 and above + XF communicating voltage release or communicating motor mechanism</li> <li>• Fixed or drawout switch + BCM ULP module with firmware version 4.1.0 and above + XF communicating voltage release or communicating motor mechanism</li> </ul>
PowerPact H-, J-, and L-frame circuit breaker	<ul style="list-style-type: none"> <li>• Fixed or drawout circuit breaker + BSCM module with firmware version 2.2.7 and above + communicating motor operator</li> <li>• Fixed or drawout switch + BSCM module with firmware version 2.2.7 and above + communicating motor operator</li> </ul>

## Input/Output Assignment

The tables below list the possible assignment of the digital inputs and outputs, according to the predefined application selected on the IO module:

Input	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Enable/Inhibit close order: ● I=0: inhibit close order ● I=1: enable close order	I4-I6	-	I6	I3-I6	-	-	-	-	I1-I6

Output	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Inhibit close order activated by IO Module: ● O=0: close order is enabled ● O=1: close order is inhibited	O1-O3	-	O1, O2	O3	-	-	-	-	O1-O3

## User-Defined Output

### Presentation

The user-defined output allows the control of any of the digital outputs. The orders are issued from:

- a remote controller using a communication network.
- the IFE or EIFE webpages, only when the IO module is connected to a circuit breaker.

The time response between the order coming from the communication module and the physical activation of the output is greater than 500 ms.

It is possible to force and unforce the output with any type of assignment.

The orders issued from a remote controller using the communication network corresponds to IO module commands. These orders require a communication interface module (IFM or IFE or EIFE interface).

The user-defined output can be assigned using the EcoStruxure Power Commission software.

The operating mode of the user-defined output is non-latching.

### Input/Output Assignment

The table below lists the possible assignment of the digital outputs, according to the predefined application selected on the IO module:

Output	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
User-defined output	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3

---

## Section 3.3

### Energy Management Functions

---

#### What Is in This Section?

This section contains the following topics:

Topic	Page
Energy Counter Reset	70
User-Defined Pulse Counters	71

## Energy Counter Reset

### Presentation

The energy counter reset is used to reset the IO module user-defined pulse counters. The energy counter reset order can be activated by:

- a push-button connected to an IO module digital input, the counters are reset when input is 1.
- a remote controller or the FDM128 display using the communication network.
- the IFE or EIFE webpages, only when the IO module is connected to a circuit breaker.

The order issued from a remote controller or the FDM128 display using the communication network corresponds to IO module command. This order requires a communication interface module (IFM or IFE or EIFE interface).

### Input/Output Assignment

The table below lists the possible assignment of the digital inputs according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Energy counter reset: I=1 resets the energy counters	I4-I6	-	I6	I3-I6	-	-	-	-	I1-I6

## User-Defined Pulse Counters

### Presentation

Pulse counters are used to calculate the total and partial consumption of energy or the total and partial volume measured by a metering device with a pulse output:

- Energy meters: measuring active, reactive, or apparent energy
- Volume meters: measuring volumes in cubic-meters

The pulse output of the metering device must be wired to an IO module digital input, configured as a pulse digital input (*see page 25*).

Each pulse counter calculates:

- The total consumption, not a resettable value.
- The partial consumption, a resettable value indicating the consumption since the last reset.

The partial counters can be displayed on:

- the FDM121 display.
- the IFE or EIFE webpages, only when the IO module is connected to a circuit breaker.
- a remote controller using the communication network.

The partial consumption can be reset from:

- the energy counter reset input (*see page 70*)
- a remote controller using the communication network.
- the EcoStruxure Power Commission software (*see page 23*).

The date and time of the last reset of the partial consumption is recorded.

If the pulse counter calculates active energy, the instantaneous active power is also calculated.

The consumption values are saved in non-volatile memory to prevent a data loss if there is a power loss.

The monitoring from a remote controller using the communication network requires a communication interface module (IFM or IFE or EIFE interface).

### Input/Output Assignment

The table below lists the possible assignment of the digital inputs, according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Pulse counter on input 1	–	–	–	–	–	–	–	–	11
Pulse counter on input 2	–	–	–	–	–	–	–	–	12
Pulse counter on input 3	–	–	–	13	–	–	–	–	13
Pulse counter on input 4	14	–	–	14	–	–	–	–	14
Pulse counter on input 5	15	–	–	15	–	–	–	–	15
Pulse counter on input 6	16	–	16	16	–	–	–	–	16

---

## Section 3.4

### Monitoring Functions

---

#### What Is in This Section?

This section contains the following topics:

Topic	Page
Cradle Management	73
Drawer Management	74
Cooling System	76
Predefined Input Acquisition	80
User-Defined Input Acquisition	81
Input Indicator	82
Threshold Overrun of Input Counter Indicator	83
Breaker Status Indicator	84
Maintenance Indicator	85
Trip Indicator	86
Alarm Indicators	88
Pre-Alarm Indicators	89
User-Defined Alarm Indicator	90
Multi-Event Group Indicator	91

## Cradle Management

### Presentation

The cradle management application is performed by the predefined application 1 (*see page 38*). In addition, the user-defined application allows the assignment of the cradle position to available digital outputs for local indication.

**NOTE:** The cradle and the drawer applications cannot be configured together.

### Compatible Devices

Range	Minimum Hardware Configuration Required
<ul style="list-style-type: none"> <li>Masterpact NT circuit breaker</li> <li>Masterpact NW circuit breaker</li> <li>PowerPact P-frame circuit breaker</li> </ul>	<ul style="list-style-type: none"> <li>Drawout circuit breaker + BCM ULP module with firmware version 4.1.0 and above</li> <li>Drawout switch + BCM ULP module with firmware version 4.1.0 and above</li> </ul>
PowerPact H-, J-, and L-frame circuit breaker	<ul style="list-style-type: none"> <li>Drawout circuit breaker + BSCM module with firmware version 2.2.7 and above</li> <li>Drawout circuit breaker + Micrologic 5 or 6 trip unit with firmware version 1.0.0 and above</li> <li>Drawout switch + BSCM module with firmware version 2.2.7 and above</li> </ul>

### Input/Output Assignment

The tables below list the possible assignment of the digital inputs and outputs, according to the predefined application selected in the IO module:

Inputs	Predefined Application Selected									
	1	2	3	4	5	6	7	8	9 (IO1)	9 (IO2)
Cradle connected position contact (CE)	I1	–	I1	–	–	–	–	–	–	I1
Cradle disconnected position contact (CD)	I2	–	I2	–	–	–	–	–	–	I2
Cradle test position contact (CT)	I3	–	I3	–	–	–	–	–	–	I3

**NOTE:** For PowerPact H-, J-, and L-frame devices:

- the cradle test position contact is not applicable.
- I3 must be always wired to have I3=1.

Outputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Cradle connected position status	O1, O2, O3	O3	O1, O2	O3	–	–	–	–	O1, O2, O3
Cradle disconnected position status	O1, O2, O3	O3	O1, O2	O3	–	–	–	–	O1, O2, O3
Cradle test position status	O1, O2, O3	O3	O1, O2	O3	–	–	–	–	O1, O2, O3



## Drawer Management

### Presentation

The drawer management application is used to record and check the position of drawout drawers.

The monitoring from a remote controller using the communication network requires a communication interface module (IFM or IFE interface).

**NOTE:**

- The cradle and the drawer applications cannot be configured together.
- The drawer management application is not available for drawout Masterpact MTZ circuit breakers equipped with EIFE interface.

### Input/Output Assignment

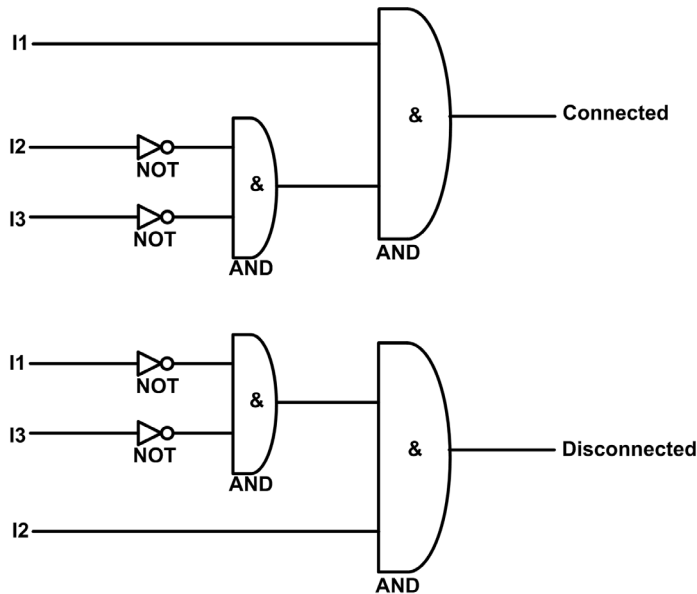
The table below lists the possible assignment of the digital inputs, according to the predefined application selected on the IO module:

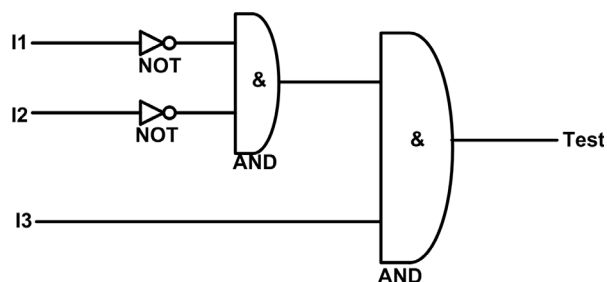
Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Drawer connected position contact (CE)	-	-	-	-	-	-	-	-	I1
Drawer disconnected position contact (CD)	-	-	-	-	-	-	-	-	I2
Drawer test position contact (CT)	-	-	-	-	-	-	-	-	I3

### Drawer Position Status

The drawer position status is defined from the status of the digital inputs I1, I2, and I3.

- Drawer in connected position (I1=1, I2=0, I3=0)
- Drawer in disconnected position (I1=0, I2=1, I3=0)
- Drawer in test position (I1=0, I2=0, I3=1)





I1	Drawer connected position contact (CE)
I2	Drawer disconnected position contact (CD)
I3	Drawer test position contact (CT)
Connected	Drawer is in connected position
Disconnected	Drawer is in disconnected position
Test	Drawer is in test position

### Drawer Position Counters

The drawer position counters are:

- Drawer connected position counter
- Drawer disconnected position counter
- Drawer test position counter

A counter is linked to each drawer position state. The counter is incremented on each rising edge of the linked state.

The drawer position counters have the following properties:

- The counters are saved in non-volatile memory to prevent a data loss if there is a power loss.
- The counters are incremented from 0 to 65534.
- The counters can be preset to any value from 0 to 65534 using the FDM121 display.

### Application Events

The following event is generated by the application. For more information on IO module events, refer to Events and Alarms ([see page 31](#)).

Code	Description	Type	Priority	Reset
2432 (0X980)	Drawer position discrepancy	Alarm	Medium	Manual or Remote

### Drawer Position Discrepancy Alarm

The IO module detects any drawer position discrepancy and generates an alarm when the drawer position contacts indicate that the drawer is not in one of the possible positions, connected, disconnected, test, or none of the positions.

Recommended action: check the status of the drawer position contacts, wiring to the IO module and the inputs of the IO module.

## Cooling System

### Presentation

The cooling system application is used to record the events related to the switchboard environment:

- Events related to switchboard states, connected on digital inputs.
- Events related to the temperature measured by Pt100 sensors, connected to analog inputs. These events can be assigned to digital outputs for local signalization.

The temperatures measured by the Pt100 sensors can be displayed on:

- the FDM121 display.
- the IFE or EIFE webpages, only when the IO module is connected to a circuit breaker.
- a remote controller or a FDM128 display using the communication network, only when the IO module is connected to a circuit breaker.

### Input/Output Assignment for Switchboard Contact Acquisition

The switchboard contacts connected to the digital inputs must be normally-closed contacts. The falling edge of one input generates an event.

The table below lists the possible assignment of the digital inputs, according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Switchboard temperature contact	I4-I6	–	I6	I3-I6	–	–	–	–	I1-I6
Switchboard ventilation contact	I4-I6	–	I6	I3-I6	–	–	–	–	I1-I6
Switchboard door contact	I4-I6	–	I6	I3-I6	–	–	–	–	I1-I6

### Input/Output Assignment for Switchboard Temperature Control

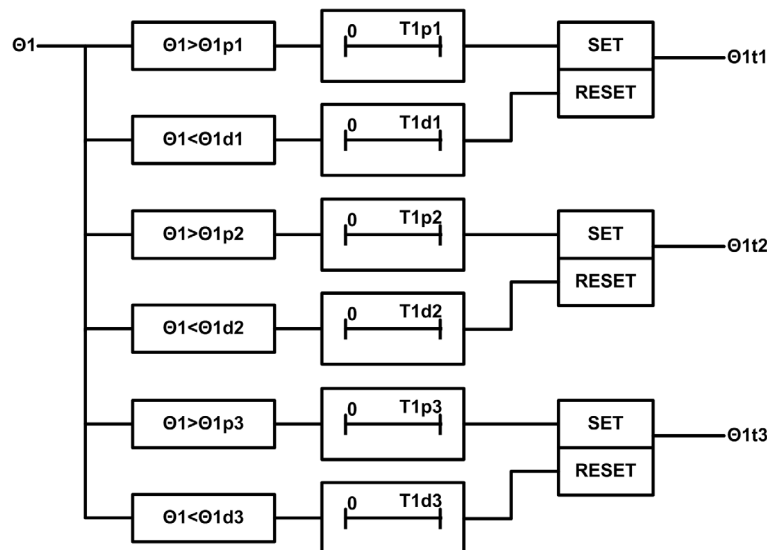
The analog input of each IO module can be assigned to the measure of temperature using a Pt100 sensor:

- The analog input of IO module1 can be assigned to a Pt100 sensor called temperature sensor 1.
- The analog input of IO module 2 can be assigned to a Pt100 sensor called temperature sensor 2.

The table below lists the possible assignment of the digital outputs, according to the predefined application selected on the IO module:

Outputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Temperature sensor 1 threshold 1 overrun	O1-O3	O3	O1, O2	O3	–	–	–	–	O1-O3
Temperature sensor 1 threshold 2 overrun	O1-O3	O3	O1, O2	O3	–	–	–	–	O1-O3
Temperature sensor 1 threshold 3 overrun	O1-O3	O3	O1, O2	O3	–	–	–	–	O1-O3
Temperature sensor 2 threshold 1 overrun	O1-O3	O3	O1, O2	O3	–	–	–	–	O1-O3
Temperature sensor 2 threshold 2 overrun	O1-O3	O3	O1, O2	O3	–	–	–	–	O1-O3
Temperature sensor 2 threshold 3 overrun	O1-O3	O3	O1, O2	O3	–	–	–	–	O1-O3

## Temperature Sensor 1 Processing



$\Theta_1$	Temperature measured by Pt100 sensor 1 connected to IO module 1 analog input
$\Theta_{1p1}$	Temperature sensor 1 threshold 1 pick-up value
$T_{1p1}$	Temperature sensor 1 threshold 1 pick-up delay
$\Theta_{1d1}$	Temperature sensor 1 threshold 1 drop-out value
$T_{1d1}$	Temperature sensor 1 threshold 1 drop-out delay
$\Theta_{1t1}$	Temperature sensor 1 threshold 1 overrun
$\Theta_{1p2}$	Temperature sensor 1 threshold 2 pick-up value
$T_{1p2}$	Temperature sensor 1 threshold 2 pick-up delay
$\Theta_{1d2}$	Temperature sensor 1 threshold 2 drop-out value
$T_{1d2}$	Temperature sensor 1 threshold 2 drop-out delay
$\Theta_{1t2}$	Temperature sensor 1 threshold 2 overrun
$\Theta_{1p3}$	Temperature sensor 1 threshold 3 pick-up value
$T_{1p3}$	Temperature sensor 1 threshold 3 pick-up delay
$\Theta_{1d3}$	Temperature sensor 1 threshold 3 drop-out value
$T_{1d3}$	Temperature sensor 1 threshold 3 drop-out delay
$\Theta_{1t3}$	Temperature sensor 1 threshold 3 overrun

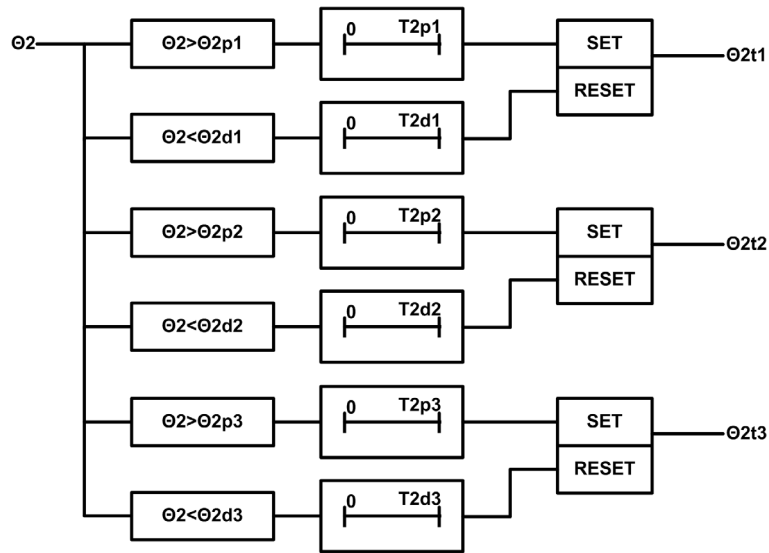
## Temperature Sensor 1 Parameters

The following parameters can be set using the EcoStruxure Power Commission software (*see page 23*).

	Description	Setting Range	Factory Setting
$\Theta_{1p1}$	Temperature sensor 1 threshold 1 pick-up value	-50–250 °C (-122–482 °F)	50 °C (122 °F)
$T_{1p1}$	Temperature sensor 1 threshold 1 pick-up delay	1–3600 s	10 s
$\Theta_{1d1}$	Temperature sensor 1 threshold 1 drop-out value	-50–250 °C (-122–482 °F)	45 °C (113 °F)
$T_{1d1}$	Temperature sensor 1 threshold 1 drop-out delay	1–3600 s	10 s
$\Theta_{1p2}$	Temperature sensor 1 threshold 2 pick-up value	-50–250 °C (-122–482 °F)	60 °C (140 °F)
$T_{1p2}$	Temperature sensor 1 threshold 1 pick-up delay	1–3600 s	10 s
$\Theta_{1d2}$	Temperature sensor 1 threshold 2 drop-out value	-50–250 °C (-122–482 °F)	55 °C (131 °F)

	Description	Setting Range	Factory Setting
T1d2	Temperature sensor 1 threshold 2 drop-out delay	1–3600 s	10 s
Θ1p3	Temperature sensor 1 threshold 3 pick-up value	-50–250 °C (-122–482 °F)	70 °C (158 °F)
T1p3	Temperature sensor 1 threshold 3 pick-up delay	1–3600 s	10 s
Θ1d3	Temperature sensor 1 threshold 3 drop-out value	-50–250 °C (-122–482 °F)	65 °C (149 °F)
T1d3	Temperature sensor 1 threshold 3 drop-out delay	1–3600 s	10 s

### Temperature Sensor 2 Processing



Θ2	Temperature measured by Pt100 sensor 2 connected to IO module 2 analog input
Θ2p1	Temperature sensor 2 threshold 1 pick-up value
T2p1	Temperature sensor 2 threshold 1 pick-up delay
Θ2d1	Temperature sensor 2 threshold 1 drop-out value
T2d1	Temperature sensor 2 threshold 1 drop-out delay
Θ2t1	Temperature sensor 2 threshold 1 overrun
Θ2p2	Temperature sensor 2 threshold 2 pick-up value
T2p2	Temperature sensor 2 threshold 2 pick-up delay
Θ2d2	Temperature sensor 2 threshold 2 drop-out value
T2d2	Temperature sensor 2 threshold 2 drop-out delay
Θ2t2	Temperature sensor 2 threshold 2 overrun
Θ2p3	Temperature sensor 2 threshold 3 pick-up value
T2p3	Temperature sensor 2 threshold 3 pick-up delay
Θ2d3	Temperature sensor 2 threshold 3 drop-out value
T2d3	Temperature sensor 2 threshold 3 drop-out delay
Θ2t3	Temperature sensor 2 threshold 3 overrun

## Temperature Sensor 2 Parameters

The following parameters can be set using the EcoStruxure Power Commission software (*see page 23*).

	Description	Setting Range	Factory Setting
Θ2p1	Temperature sensor 2 threshold 1 pick-up value	-50–250 °C (-122–482 °F)	50 °C (133 °F)
T2p1	Temperature sensor 2 threshold 1 pick-up delay	1–3600 s	10 s
Θ2d1	Temperature sensor 2 threshold 1 drop-out value	-50–250 °C (-122–482 °F)	45 °C (133 °F)
T2d1	Temperature sensor 2 threshold 1 drop-out delay	1–3600 s	10 s
Θ2p2	Temperature sensor 2 threshold 2 pick-up value	-50–250 °C (-122–482 °F)	60 °C (140 °F)
T2p2	Temperature sensor 2 threshold 1 pick-up delay	1–3600 s	10 s
Θ2d2	Temperature sensor 2 threshold 2 drop-out value	-50–250 °C (-122–482 °F)	55 °C (131 °F)
T2d2	Temperature sensor 2 threshold 2 drop-out delay	1–3600 s	10 s
Θ2p3	Temperature sensor 2 threshold 3 pick-up value	-50–250 °C (-122–482 °F)	70 °C (158 °F)
T2p3	Temperature sensor 2 threshold 3 pick-up delay	1–3600 s	10 s
Θ2d3	Temperature sensor 2 threshold 3 drop-out value	-50–250 °C (-122–482 °F)	65 °C (149 °F)
T2d3	Temperature sensor 2 threshold 3 drop-out delay	1–3600 s	10 s

## Application Events

The following events are generated by the application. For more information on the IO module events, refer to Events and Alarms (*see page 31*).

Code IO1	Code IO2	Description	Type	Priority	Reset
2823 (0x0B07)	2823 (0x0B07)	Switchboard temperature contact	Alarm	Medium	Manual or remote
2824 (0x0B08)	2824 (0x0B08)	Switchboard ventilation contact	Alarm	Medium	Manual or remote
2825 (0x0B09)	2825 (0x0B09)	Switchboard door contact	Alarm	Medium	Manual or remote
1585 (0x0631)	1841 (0x0731)	Switchboard temperature threshold 1	Alarm	Low	Auto
1586 (0x0632)	1842 (0x0732)	Switchboard temperature threshold 2	Alarm	Medium	Manual or remote
1587 (0x0633)	1843 (0x0733)	Switchboard temperature threshold 3	Alarm	High	Manual or remote

## Predefined Input Acquisition

### Presentation

The IO module can acquire predefined indications delivered by external devices through digital inputs for signalization purposes: the status of the input with its predefined description is displayed on FDM121 display.

The predefined indications that can be assigned to digital inputs are listed in the following table. Each change of state of a predefined input generates an event. For more information on the IO module events, refer to Events and Alarms (*see page 31*).

Code	Predefined Indication	Type	Priority	Reset
2816 (0x0B00)	Ground-leakage trip signal contact	Alarm	Medium	Manual or remote
2817 (0x0B01)	Control voltage presence contact	Alarm	Medium	Manual or remote
2818 (0x0B02)	Surge protection status contact	Alarm	Medium	Manual or remote
2819 (0x0B03)	Surge failure contact	Alarm	Medium	Manual or remote
2820 (0x0B04)	Switch ON/OFF indication contact (OF)	Alarm	Medium	Manual or remote
2821 (0x0B05)	Fuse blown indication contact	Alarm	Medium	Manual or remote
2822 (0x0B06)	Emergency stop	Alarm	High	Manual or remote

### Input/Output Assignment

The table below lists the possible assignment of the digital inputs, according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Predefined input	I4-I6	-	I6	I3-I6	-	-	-	-	I1-I6

## User-Defined Input Acquisition

### Presentation

The IO module can acquire user-defined indications delivered by external devices through digital inputs. The status of the input is displayed on the FDM121 display. The indication description can be entered using the EcoStruxure Power Commission software (*see page 23*).

Each change of state of a user-defined input generates an event. For more information on the IO module events, refer to Events and Alarms (*see page 31*).

Code IO1	Code IO2	Description	Type	Priority	Reset
1579 (0x062B)	1835 (0x072B)	User-defined input 1	Alarm	Medium	Manual or remote
1580 (0x062C)	1836 (0x072C)	User-defined input 2	Alarm	Medium	Manual or remote
1581 (0x062D)	1837 (0x072D)	User-defined input 3	Alarm	Medium	Manual or remote
1582 (0x062E)	1838 (0x072E)	User-defined input 4	Alarm	Medium	Manual or remote
1583 (0x062F)	1839 (0x072F)	User-defined input 5	Alarm	Medium	Manual or remote
1584 (0x0630)	1840 (0x0730)	User-defined input 6	Alarm	Medium	Manual or remote

### Input/Output Assignment

The table below lists the possible assignment of the digital inputs, according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
User-defined input 1	–	–	–	–	–	–	–	–	I1
User-defined input 2	–	–	–	–	–	–	–	–	I2
User-defined input 3	–	–	–	I3	–	–	–	–	I3
User-defined input 4	I4	–	–	I4	–	–	–	–	I4
User-defined input 5	I5	–	–	I5	–	–	–	–	I5
User-defined input 6	I6	–	I6	I6	–	–	–	–	I6

**NOTE:** If two IO modules are connected in the IMU, only one user-defined input can be assigned for each input number. For example, if user-defined input is assigned to Input 3 of IO1, we cannot assign the same user-defined input to Input 3 of IO2.



## Input Indicator

### Presentation

The input indicator application is used to control the digital output according to the status of a digital input, for local indication of the input status.

Any digital input of one of the IO modules can be assigned to an available digital output of one of the IO modules. The input indicator can be assigned using the EcoStruxure Power Commission software.

### Input/Output Assignment

The table below lists the possible assignment of the digital outputs, according to the predefined application selected on the IO module:

Outputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
IO1 inputs I1 to I6	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
IO2 inputs I1 to I6	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3

## Threshold Overrun of Input Counter Indicator

### Presentation

The input counter threshold overrun event can be assigned to the digital outputs for local indication. The input counter threshold overrun output can be configured using the EcoStruxure Power Commission software.

### Input/Output Assignment

The table below lists the possible assignment of the digital outputs, according to the predefined application selected on the IO module:

Outputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
IO1 input I1 counter overrun to input I6 counter overrun	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
IO2 input I1 counter overrun to input I6 counter overrun	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3

## Breaker Status Indicator

### Presentation

The following device status can be assigned to the digital outputs for local indication:

- Position indicator status (OF)
- Trip indicator status (SD)

**NOTE:** The trip indicator status is available only with circuit breaker.

- Electrical trip indicator status (SDE)
- Ready to close status (PF)

**NOTE:** The ready to close (PF) status is available only with Masterpact MTZ, Masterpact NT/NW, and PowerPact P- and R-frame devices.

The circuit breaker status can be configured to the IO module digital output for local indication using the EcoStruxure Power Commission software.

### Compatible Devices

Range	Minimum Hardware Configuration Required
Masterpact MTZ circuit breaker	Fixed or drawout circuit breaker + Micrologic X control unit + ULP port module
<ul style="list-style-type: none"> <li>• Masterpact NT circuit breaker</li> <li>• Masterpact NW circuit breaker</li> <li>• PowerPact P-frame circuit breaker</li> <li>• PowerPact R-frame circuit breaker</li> </ul>	<ul style="list-style-type: none"> <li>• Fixed or drawout circuit breaker + BCM ULP module with firmware version 4.1.0 and above</li> <li>• Fixed or drawout switch + BCM ULP module with firmware version 4.1.0 and above</li> </ul>
PowerPact H-, J-, and L-frame circuit breaker	<ul style="list-style-type: none"> <li>• Fixed or drawout circuit breaker + BSCM module with firmware version 2.2.7 and above</li> <li>• Fixed or drawout switch + BSCM module with firmware version 2.2.7 and above</li> </ul>

### Input/Output Assignment

The following table lists the possible assignment of the digital outputs, according to the predefined application selected on the IO module:

Outputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Position indicator status (OF)	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
Trip indicator status (SD)	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
Electrical trip indicator status (SDE)	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
Ready-to-close status (PF)	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3

## Maintenance Indicator

### Presentation

On Masterpact NW circuit breakers, the contact wear alarm can be assigned to an available digital output for local indication.

The maintenance indicators can be configured using the EcoStruxure Power Commission software.

**NOTE:** On PowerPact H-, J-, and L-frame circuit breakers, the contact wear alarm can be assigned to an available digital output for local indication as one of the 10 user-defined contact alarms. For more information, refer to the user-defined Alarm Indicator (*see page 90*).

### Compatible Devices

Range	Minimum Hardware Configuration Required
Masterpact MTZ circuit breaker	Fixed or drawout circuit breaker + Micrologic X control unit + ULP port module
Masterpact NW circuit breaker	Fixed or drawout circuit breaker + BCM ULP module with firmware version 4.1.0 and above + Micrologic P or H trip unit

### Input/Output Assignment

The table below lists the possible assignment of the digital outputs, according to the predefined application selected on the IO module:

Outputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Contact wear alarm	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3

## Trip Indicator

### Presentation

Trip event can be assigned to an available digital output for local indication. The trip events that can be assigned to a digital output depend on the circuit breaker. The trip indicator can be configured using the EcoStruxure Power Commission software.

### Compatible Devices

Range	Minimum Hardware Configuration Required	Note
Masterpact MTZ circuit breaker	Fixed or drawout circuit breaker + Micrologic X control unit + ULP port module	Device 1
<ul style="list-style-type: none"> <li>● Masterpact NT circuit breaker</li> <li>● Masterpact NW circuit breaker</li> </ul>	Fixed or drawout circuit breaker + BCM ULP module with firmware version 4.1.0 and above + Micrologic A or E trip unit with firmware version 1.0.3 and above	Device 2
<ul style="list-style-type: none"> <li>● PowerPact P-frame circuit breaker</li> <li>● PowerPact R-frame circuit breaker</li> </ul>	Fixed or drawout circuit breaker + BCM ULP module with firmware version 4.1.0 and above + Micrologic P or H trip unit with firmware version 1.0.3 and above	Device 3
PowerPact H-, J-, L- and R frame circuit breaker	Fixed or drawout circuit breaker + Micrologic 5 trip unit with firmware version 1.0.3 and above	Device 4
	Fixed or drawout circuit breaker + Micrologic 6 trip unit with firmware version 1.0.3 and above	Device 5
	Fixed or drawout circuit breaker + Micrologic 6 EM trip unit with firmware version 1.0.3 and above	Device 6

### Trip Indicators

Trip	Compatible Masterpact MTZ Devices <sup>(1)</sup>	Compatible Masterpact NT/NW or PowerPact P- and R-Frame Devices <sup>(1)</sup>	Compatible PowerPact H-, J-, and L-Frame Devices <sup>(1)</sup>
Long-time protection I <sub>r</sub>	Device 1	Devices 2 and 3	Devices 4, 5, and 6
Short-time protection I <sub>sd</sub>	Device 1	Devices 2 and 3	Devices 4, 5, and 6
Instantaneous protection I <sub>i</sub>	Device 1	Devices 2 and 3	Devices 4, 5, and 6
Ground-fault protection I <sub>g</sub>	Device 1	Devices 2 and 3	Devices 4, 5, and 6
Ground-leakage protection I $\Delta$ <sub>n</sub>	Device 1	Devices 2 and 3	Device 4
Integrated instantaneous protection	Device 1	Devices 2 and 3	Devices 4, 5, and 6
Trip unit in STOP mode	–	–	Devices 4, 5, and 6
Instantaneous with ground-fault protection	–	–	Device 5
Instantaneous with ground-leakage protection	Device 1	–	–
Reflex tripping protection	–	–	Devices 4, 5, and 6
Unbalance motor protection	–	–	Device 6
Jam motor protection	–	–	Device 6
Underload motor protection	–	–	Device 6
Long start motor protection	–	–	Device 6
Unbal protection	–	Device 3	–
I1 Max protection	–	Device 3	–
I2 Max protection	–	Device 3	–
I3 Max protection	–	Device 3	–
IN Max protection	–	Device 3	–
V <sub>min</sub> protection	–	Device 3	–
V <sub>max</sub> protection	–	Device 3	–
Vunbal protection	–	Device 3	–
Reverse power protection	–	Device 3	–
<b>(1)</b> See definitions in Compatible Devices ( <a href="#">see page 86</a> )			

Trip	Compatible Masterpact MTZ Devices <sup>(1)</sup>	Compatible Masterpact NT/NW or PowerPact P- and R-Frame Devices <sup>(1)</sup>	Compatible PowerPact H-, J-, and L-Frame Devices <sup>(1)</sup>
Fmin protection	–	Device 3	–
Fmax protection	–	Device 3	–
Phase rotation	–	Device 3	–
Multi-trip indication (OR of the available trip event)	–	Devices 2 and 3	Devices 4, 5, and 6
<b>(1)</b> See definitions in Compatible Devices <i>(see page 86)</i>			

### Input/Output Assignment

The table below lists the possible assignment of the digital outputs, according to the predefined application selected on the IO module:

Outputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Trip	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3

## Alarm Indicators

### Presentation

Alarms can be assigned to an available digital output for local indication on:

- Masterpact MTZ circuit breaker with Micrologic X control unit
- Masterpact NT/NW, or PowerPact P- and R-frame circuit breaker with Micrologic A/E/P/H trip unit

The alarm that can be assigned to a digital output depends on the Micrologic trip unit. The alarm indicator can be configured using the EcoStruxure Power Commission software (*see page 23*).

Alarm	Compatible Micrologic Trip Units
Ground-fault alarm	Micrologic 5 trip unit
Ground-leakage alarm	Micrologic 6 trip unit

For more information, refer to the *PowerPact H-, J-, and L-Frame Micrologic 5 or 6 Trip Units User Guide* (*see page 7*).

### Compatible Devices

Range	Minimum Hardware Configuration Required
Masterpact MTZ circuit breaker	Fixed or drawout circuit breaker + Micrologic X control unit with Ground-fault alarm Digital Module installed + ULP port module
<ul style="list-style-type: none"> <li>• Masterpact NT circuit breaker</li> <li>• Masterpact NW circuit breaker</li> <li>• PowerPact M-frame circuit breaker</li> <li>• PowerPact R-frame circuit breaker</li> </ul>	Fixed or drawout circuit breaker + Micrologic A/E/P/H trip unit + BCM ULP module with firmware version 4.1.0 and above

### Input/Output Assignment

The table below lists the possible assignment of the digital outputs, according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Alarm	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3

## Pre-Alarm Indicators

### Presentation

On a PowerPact H-, J-, and L-frame circuit breaker with Micrologic 5 or 6 trip unit, pre-alarms can be assigned to an available digital output for local indication. The pre-alarms that can be assigned to a digital output depend on the Micrologic trip unit. The pre-alarm indicator can be configured using the EcoStruxure Power Commission software (*see page 23*).

Pre-Alarm	Compatible Micrologic Trip Units
Long-time protection I <sub>r</sub> pre-alarm (PAL I <sub>r</sub> )	Micrologic 5 or 6 trip unit
Ground-fault protection I <sub>g</sub> pre-alarm (PAL I <sub>g</sub> )	Micrologic 5 trip unit
Ground-fault protection I $\Delta$ <sub>n</sub> pre-alarm (PAL I $\Delta$ <sub>n</sub> )	Micrologic 6 trip unit

For more information, refer to the *PowerPact H-, J-, and L-Frame Micrologic 5 or 6 Trip Units User Guide* (*see page 7*).

### Compatible Devices

Range	Minimum Hardware Configuration Required
PowerPact H-, J-, and L-frame circuit breakers	Fixed or drawout circuit breaker + Micrologic 5 or 6 trip unit

### Input/Output Assignment

The table below lists the possible assignment of the digital outputs, according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Pre-alarm	O1-O3	O3	O1, O2	O3	-	-	-	-	O1-O3



## User-Defined Alarm Indicator

### Presentation

On PowerPact H-, J-, and L-frame circuit breakers with Micrologic 5 or 6 trip units, ten alarms can be assigned to an available digital output for local indication.

The alarm indicator can be configured using the EcoStruxure Power Commission software ([see page 23](#)).

For more information, refer to the *PowerPact H-, J-, and L-Frame Micrologic 5 or 6 Trip Units User Guide* ([see page 7](#)).

### Compatible Devices

Range	Minimum Hardware Configuration Required
PowerPact H-, J-, and L-frame circuit breakers	Fixed or drawout circuit breaker + Micrologic 5 or 6 trip unit

### Input/Output Assignment

The table below lists the possible assignment of the digital outputs, according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
User-defined alarm 1	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
User-defined alarm 2	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
User-defined alarm 3	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
User-defined alarm 4	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
User-defined alarm 5	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
User-defined alarm 6	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
User-defined alarm 7	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
User-defined alarm 8	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
User-defined alarm 9	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3
User-defined alarm 10	O1–O3	O3	O1, O2	O3	–	–	–	–	O1–O3

## Multi-Event Group Indicator

### Presentation

On Masterpact MTZ circuit breakers with Micrologic X control units, eight multi-event group can be assigned to an available digital output for local indication.

The multi-event group indicator can be configured using the EcoStruxure Power Commission software (*see page 23*).

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

### Compatible Devices

Range	Minimum Hardware Configuration Required
Masterpact MTZ circuit breaker	Fixed or drawout circuit breaker + Micrologic X control unit + ULP port module

### Input/Output Assignment

The following table lists the possible assignment of the digital outputs, according to the predefined application selected on the IO module:

Inputs	Predefined Application Selected								
	1	2	3	4	5	6	7	8	9
Multi-events Group 1	O1-O3	O3	O1-O2	O3	-	-	-	-	O1-O3
Multi-events Group 2	O1-O3	O3	O1-O2	O3	-	-	-	-	O1-O3
Multi-events Group 3	O1-O3	O3	O1-O2	O3	-	-	-	-	O1-O3
Multi-events Group 4	O1-O3	O3	O1-O2	O3	-	-	-	-	O1-O3
Multi-events Group 5	O1-O3	O3	O1-O2	O3	-	-	-	-	O1-O3
Multi-events Group 6	O1-O3	O3	O1-O2	O3	-	-	-	-	O1-O3
Multi-events Group 7	O1-O3	O3	O1-O2	O3	-	-	-	-	O1-O3
Multi-events Group 8	O1-O3	O3	O1-O2	O3	-	-	-	-	O1-O3



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# Chapter 4

## Troubleshooting

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### What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Troubleshooting	94
Schneider Electric Green Premium™ Ecolabel	96

## Troubleshooting

### Description

Symptoms	Cause	Action
Cradle management application is enabled and it is not working as expected	EIFE is connected in IMU	<ul style="list-style-type: none"> <li>● Check if ULP LED has a blinking pattern (<i>see page 23</i>)</li> <li>● Check if the right application is selected</li> <li>● Use EIFE interface to perform the cradle management application</li> </ul>
IO module applications are not working as expected	Application is not validated	<ul style="list-style-type: none"> <li>● Check if all the input and output LEDs have the blinking pattern</li> <li>● Check the application rotary switch position</li> <li>● Press the Test/reset button for 5 to 15 seconds to validate the application</li> </ul>
	System configuration is not correct	<ul style="list-style-type: none"> <li>● Check if ULP LED has a blinking pattern (<i>see page 23</i>)</li> <li>● Check if there is any hardware or firmware discrepancy with the EcoStruxure Power Commission software (<i>see page 23</i>) and follow the instructions. For details, refer to <i>Compatibility Matrix</i> in <i>RSU Online Help</i>.</li> </ul>
	ULP wiring is not correct	<ul style="list-style-type: none"> <li>● Press the Test/reset button for 1 to 5 seconds on the IO module to check all ULP modules are properly wired on IMU system</li> <li>● Follow the instructions as per the EcoStruxure Power Commission software (<i>see page 23</i>)</li> </ul>
	Digital input and digital output wiring is not correct	Force the state of the input and output with the EcoStruxure Power Commission software to check the wiring.
Digital output is not working	Wiring issue	<ul style="list-style-type: none"> <li>● Check the digital output LED status</li> <li>● Check if a digital output is forced or not</li> <li>● Check if a digital output is assigned with any other assignment</li> <li>● If still not working, contact Schneider Electric service personnel</li> </ul>
	Configuration issue	<ul style="list-style-type: none"> <li>● Check if the right application is selected</li> <li>● Check the output assignment using the EcoStruxure Power Commission software</li> </ul>
	Digital output is damaged	<ul style="list-style-type: none"> <li>● Check the number of digital output operations counter</li> <li>● Replace the IO module if threshold is crossed</li> </ul>
Digital input is not working	Wiring issue	<ul style="list-style-type: none"> <li>● Check the digital input LED status</li> <li>● Check if a digital input is forced or not</li> <li>● Check if a digital input is assigned with the pulse input</li> </ul>
	Configuration issue	<ul style="list-style-type: none"> <li>● Check if the right application is selected</li> <li>● Check if the debounce setting of the digital input is correct</li> </ul>
Pt100 is not working	Configuration issue	<ul style="list-style-type: none"> <li>● Check the analog input LED status</li> <li>● Check if the correct IO module application is selected</li> <li>● Check if an analog input is configured to Pt100</li> <li>● Check the ULP LED status for degraded blinking pattern ULP LED (<i>see page 21</i>)</li> </ul>
	Wiring issue	<ul style="list-style-type: none"> <li>● Check the analog input LED status</li> <li>● Switch off and switch on the module</li> </ul>
	Wrong Pt100 sensor	Check if the right Pt100 is connected

Symptoms	Cause	Action
IO module is in degraded mode, according to the ULP LED ( <i>see page 21</i> )	Configuration file transfer aborted from the EcoStruxure Power Commission software	Reload the configuration file with the correct assignments
IO module is in configuration discrepancy mode, according to the ULP LED ( <i>see page 21</i> )	Duplicate assignments within the same IO module	Check the application assignments with the EcoStruxure Power Commission software
	Duplicate predefined application 1 to 8 across the two IO modules	Modify the predefined application assigned to one of the IO modules
	Duplicate input/output assignments across the two IO modules	Check the input/output assignments with the EcoStruxure Power Commission software
	Cradle management and drawer management applications are configured together	Configure only one of the applications, cradle management, and drawer management, with the EcoStruxure Power Commission software
Switching on to ERMS mode is not possible	Discrepancy with ERMS order alarm is active	Reset the alarm
	Inconsistency of the ERMS setting	Check and modify the ERMS setting
Switching off the ERMS mode is not possible	Discrepancy with ERMS order alarm is active	Reset the alarm
	Inconsistency of the ERMS setting	Check and modify the ERMS setting
Closing the circuit breaker is not possible either locally or remotely	Inhibit close order is activated by the IO module	Enable the close order from the IO module.
	Inhibit close order is activated by a remote controller using the communication network	Enable the close order from the remote controller.

## Schneider Electric Green Premium™ Ecolabel

### Description

Green Premium by Schneider Electric is a label that allows you to develop and promote an environmental policy while preserving your business efficiency. This ecolabel is compliant with up-to-date environmental regulations.



### Accessing Green Premium

Green Premium data on labeled products can be accessed online through any of the following ways:

- By navigating to the [Green Premium](#) page on the Schneider Electric website.
- By flashing the QR code displayed in the following image:



### Checking Products Through the Schneider Electric Website

To check the environmental criteria of a product using a PC or smartphone, follow these steps:

Step	Action
1	From <a href="http://www.schneider-electric.com">www.schneider-electric.com</a> , select <b>Support</b> → <b>Additional Links</b> → <b>Green Premium Eco Label</b> .
2	Click <b>Find Green Premium Products</b> to open the search tool webpage.
3	Fill in the fields: <ul style="list-style-type: none"> <li>• Enter the commercial reference or product range of the product to search for.</li> <li>• Optional: Enter the manufacturing date code of the product with format <b>YYWW</b>. By default, this field is filled with the date of the search.</li> </ul>
4	To search for several products simultaneously, click the <b>Add product</b> button, and then fill in the fields.
5	Click <b>Check product(s)</b> to generate a report of the environmental criteria available for the products with the entered commercial references.

### Environmental Criteria

The Green Premium ecolabel provides documentation on the following criteria about the environmental impact of the products:

- RoHs: European Union Restriction of Hazardous Substances (RoHS) directive.
- REACH: European Union Registration, Evaluation, Authorization, and Restriction of Chemicals regulation.
- PEP: Product Environmental Profile.
- EoLI: End of Life Instructions.

### RoHs

Schneider Electric products are subject to RoHS requirements at a worldwide level, even for the many products that are not required to comply with the terms of the regulation. Compliance certificates are available for products that fulfill the criteria of this European initiative, which aims to eliminate hazardous substances.

### REACH

Schneider Electric applies the strict REACH regulation on its products at a worldwide level, and discloses extensive information concerning the presence of SVHC (Substances of Very High Concern) in all of these products.

**PEP**

Schneider Electric publishes complete set of environmental data, including carbon footprint and energy consumption data for each of the life cycle phases on all of its products, in compliance with the ISO 14025 PEP ecopassport program. PEP is especially useful for monitoring, controlling, saving energy, and/or reducing carbon emissions.

**EoLI**

These instructions provide:

- Recyclability rates for Schneider Electric products.
- Guidance to mitigate personnel hazards during the dismantling of products and before recycling operations.
- Part identification for recycling or for selective treatment, to mitigate environmental hazards/incompatibility with standard recycling processes.











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*As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.*

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