

- X s: device operations will be delayed by X seconds

The setting is in eSetup Easergy Pro/**DIGITAL CB/MCMx00 configuration**.

CB operation

Open CB

PowerLogic P5 manages the MX1 or MX2/MN coils to open the circuit breaker.

CB is allowed to open when CB is in closed status.

CB status is shown in MIMIC or in eSetup Easergy Pro/**DIGITAL CB/MCMx00 operation/Circuit breaker operation**. If the symbol of CB status is "?", it means the intermediate (00) state or the bad (11) state, depends on the communication status of EOS-MCM100. If the communication status is online, the CB is in intermediate (00) state, otherwise the CB state is in bad (11) state.

In the local mode of PowerLogic P5, CB can be opened through MIMIC by push button, CB status will be updated if the operation succeeds.

In the remote mode of PowerLogic P5, the open order can be sent through Modbus TCP and IEC61850 client.

Close CB

PowerLogic P5 controls the XF coil to close the CB. CB is allowed to close when CB is in open status.

CB status is shown in MIMIC or in eSetup Easergy Pro/**DIGITAL CB/MCMx00 operation/Circuit breaker operation**.

In the local mode of PowerLogic P5, CB can be closed through MIMIC by push button, CB status will be updated if the operation succeeds.

In the remote mode of PowerLogic P5, the close order can be sent through Modbus TCP and IEC61850 client.

Truck operation

Truck control

PowerLogic P5 can rack in/rack out truck if it is motorised with motor.

Truck is allowed to rack in when it is in racked-out and circuit breaker is open, vice versa.

Truck status is shown in MIMIC or in eSetup Easergy Pro/**DIGITAL CB/MCMx00 operation/MSWx operation** (x equals to 1 to 4). If the symbol of truck status is "?", it means the intermediate (00) state or the bad (11) state, depends on the communication status of EOS-MCMx00. If the communication status is online, the truck is in intermediate (00) state, otherwise the truck is in bad (11) state.

In the local mode of PowerLogic P5, the rack in or rack out truck can be made through MIMIC by push button, truck status will be updated if the operation succeeds.

In the remote mode of PowerLogic P5, the rack in/rack out order can be sent through Modbus TCP and IEC61850 client.

Rack in and rack out truck

Control of the rack in/rack out of truck is set in **eSetup Easergy Pro/CONTROL/Objects**, in the sections **Control object x**, x equals to 1 to 6. The following setting are to be made:

- Object open DI: select *MSW_y open*,
- Object close DI: select *MSW_y closed*,
- Object DO for MCMx00 control: select *MSW_y*,
where y equals 1 to 4.

Disconnecter operation

PowerLogic P5 can open/close disconnector if it is motorised with motor.

Disconnecter is allowed to open when it is in closed status and vice versa.

Disconnecter status is shown in MIMIC or in eSetup Easergy Pro/**DIGITAL CB/MCMx00 operation/MSW_x operation** (x equals to 1 to 4). If the symbol of disconnector status is "?", it means the intermediate (00) state or the bad (11) state, depends on the communication status of EOS-MCMx00. If the communication status is online, the disconnector is in intermediate (00) state, otherwise the disconnector is in bad (11) state.

In the local mode of PowerLogic P5, the open or close of disconnector can be made through MIMIC by push button, truck status will be updated if the operation succeeds.

In the remote mode of PowerLogic P5, the open/close order can be sent through Modbus TCP and IEC61850 client.

Open and Close of disconnector

Control of the Open and Close of disconnector is set in **eSetup Easergy Pro/CONTROL/Objects**, in the sections **Control object x**, x equals to 1 to 6. The following setting are to be made:

- Object open DI: select *MSW_y open*,
- Object close DI: select *MSW_y closed*,
- Object DO for MCMx00 control: select *MSW_y*,
where y equals 1 to 4.

Earthing Switch(ES) operation

The Earthing Switch can be controlled through PowerLogic P5 when it operates with motor.

ES is allowed to open when it is in closed status and vice versa.

ES status is shown in MIMIC or in eSetup Easergy Pro/**DIGITAL CB/MCMx00 operation/MSW_x operation** (x equals to 1 to 4). If the symbol of ES status is "?", it means the intermediate (00) state or the bad (11) state, depends on the communication status of EOS-MCMx00. If the communication status is online, the ES is in intermediate (00) state, otherwise the ES is in bad (11) state.

In the local mode of PowerLogic P5, the open/close of ES can be made through MIMIC by push button, ES status will be updated if the operation succeeds.

In the remote mode of PowerLogic P5, the open/close order can be sent through Modbus TCP and IEC61850 client.

Open and Close Earthing Switch

Control of the Open and Close of Earthing Switch is set in **eSetup Easergy Pro/CONTROL/Objects**, in the sections **Control object x**, x equals to 1 to 6. The following setting are to be made:

- Object open DI: select *MSW_y open*,
- Object close DI: select *MSW_y closed*,

- Object DO for MCMx00 control: select *MSW_y*, where *y* equals 1 to 4.

Control operation diagnostics

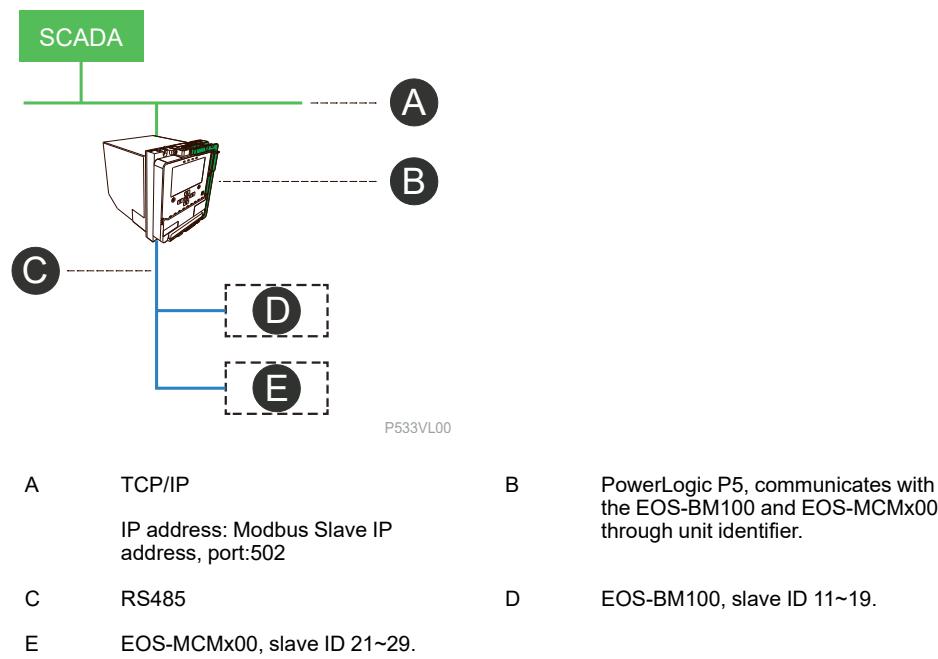
PowerLogic P5 displays the reason in case of forbidden operation or sequence order. The status can be checked through eSetup Easergy Pro/**DIGITAL CB/MCMx00 operation**.

Modbus gateway functions

PowerLogic P5 serves in a gateway mode by which the EcoStruxure Power Operation (EPO)/Power Monitoring Expert (PME) can communicate with EOS-BM100 and EOS-MCMx00 through Modbus TCP. In case of the protocols Digital CB and Modbus slave are both configured, PowerLogic P5 will work in gateway mode automatically.

When PowerLogic P5 works in gateway mode, the network architecture is as in the following figure:

Figure 364 - Modbus gateway network architecture



Any SCADA system communicate with PowerLogic P5 by TCP/IP, meantime, PowerLogic P5 is the node of communicating with EOS-BM100 and EOS-MCMx00 through serial Modbus.

In gateway mode, function codes 03, 04, 05 (EOS-MCMx00), 06, 16 are defined for communicating with EOS-BM100 and EOS-MCMx00, other function codes will be treated as illegal.

Diagnostics functions

System consistency and integrity

PowerLogic P5 makes auto-test and consistency verification to make self-test of integrity with the configuration. In case of abnormal situation found, it will generate warning for user to solve the issue.

The main checks are:

- Zigbee sensors commissioning and radio frequency communication quality
 - Communication link between devices
- A system alarm will be raised in case of fault/error detected.

Internal failure

PowerLogic P5 collects internal failure from EOS-BM100 and EOS-MCMx00. The events are created correspondingly.

Current transformer supervision (ANSI 60)

Description

The Current Transformer Supervision (CTS) feature is used to detect failure of one or more phase current inputs to the protection relay. Failure of a phase CT or an open circuit of the interconnecting wiring can result in:

- Incorrect operation of current protection functions
- Risks of unexpected CT secondary voltages generated

Three operation modes can be selected:

- 3I only

If the magnitude of one phase current is below 1% I_{nom} , while the magnitude of the other two phase currents is within 0.05 - 1.2 I_{nom} and the angle between them is 110° - 130°, the function issues a fast alarm after 20 ms and a delayed alarm after the operation delay has elapsed.

When the minimum value of magnitude of the three phase currents exceeds 0.1 I_{nom} or CTS reset input is activated, the alarm will be reset.

- IN & VN

If neutral current exceeds the pick-up value and the neutral voltage is less than the pick-up value, the function issues a fast alarm immediately and a delayed alarm after the operation delay has elapsed.

The alarm will be reset when IN drops below 95% of the neutral current pick-up value or VN is higher than 103% of the neutral voltage pick-up value or CTS reset input is activated.

- Both

CT failure is detected if one of the above modes is fulfilled.

CTS provides 2 signals: Fast Alarm and Latched Alarm after settable operate delay.

Both CTS signals are provided with a fix reset time of 100 ms.

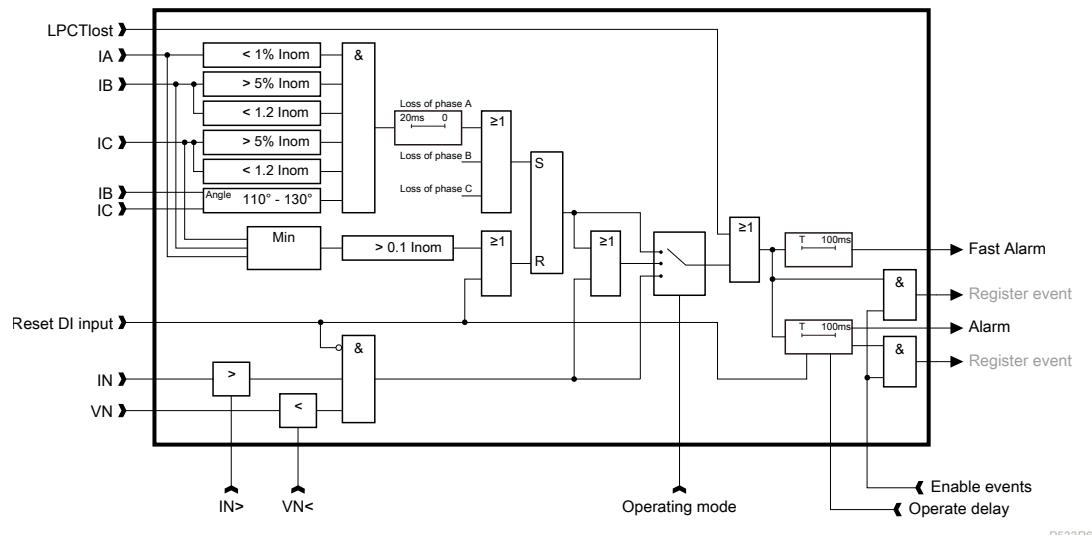
The function is inactive if only 2 phase current sensors are connected (2 CT mode). It is recommended for the user to decrease the maintenance interval for the current sensors in this mode.

In addition to supervising the phase current inputs, the CT supervision function (CTS) also provides supervision of the physical connection of LPCT. If the physical connection of any LPCT is lost, an "LPCT connection loss" alarm will be issued. Please note in this case all the three phase current measurements are lost.

With transformer differential protection P5T30 two CTS elements are available with a fix link to the measured currents of one end (CTS-1 to end 1, CTS-2 to end 2).

Block diagram

Figure 365 - Block diagram of the current transformer supervision function



Characteristics

Table 195 - Settings and characteristics of the current transformer supervision function (ANSI 60)

Settings/characteristics (description/label)	Values
Neutral current IN> / IN<	
Setting range	0.08...4.00 pu ¹⁶⁷
Resolution	0.01 pu ¹⁶⁷
Accuracy	±3%
Reset ratio	95% ± 2%
CT input selection¹⁶⁸	
Setting range	CT-1 is fixed for CT supervision 1, CT-2 is fixed for CT supervision 2.
Neutral voltage VN< / VN<	
Setting range	0.01...0.30 pu ¹⁶⁹
Resolution	0.01 pu ¹⁶⁹
Accuracy	±3%
Reset ratio	103% ± 2%
Operate delay / Operate delay	
Setting range	0.04...10.00 s
Resolution	0.01 s
Accuracy	±1% or ±30 ms at IN and VN
Characteristic times	
Disengaging time	< 160 ms

167. Inom

168. Available for P5T30 only.

168. Available to

Table 195 - Settings and characteristics of the current transformer supervision function (ANSI 60) (Continued)

Settings/characteristics (description/label)	Values
CTS operating mode	
Options	3I only; IN&VN; Both
CTS reset input	
Options	Any available DI/VI/F-button
Delayed CTS on event	
Options	Enable; Disable
Delayed CTS off event	
Options	Enable; Disable
Fast CTS on event	
Options	Enable; Disable
Fast CTS off event	
Options	Enable; Disable
Settings of CTS	
Enable CTS	On/Off
$I_1 >$	0.05...4.00 Inom
I_2/I_1 low	5%...100%
I_2/I_1 high	5%...100%
Operate delay	0.00...10.00 s

Table 196 - Measured values of CT

Parameter	Unit	Description
Max. of IA IB IC	A	Maximum value of phase currents
Min. of IA IB IC	A	Minimum value of phase currents
IN.calc	A	IN calculated value
Measured VN	V	Measured neutral voltage
Calculated VN	V	Calculated neutral voltage

Voltage transformer supervision (ANSI 60)

Description

The PowerLogic P5 protection relay supervises the voltage transformers (VTs) wiring between the connector A terminals and the sensors. If there is a fuse in the voltage transformer circuitry, the blown fuse helps prevent or distorts the voltage measurement. Therefore, an alarm should be issued. Furthermore, in some applications, protection functions using voltage signals should be blocked to avoid false tripping such as:

- Earth/ground fault overvoltage and directional earth/ground fault overcurrent using calculated neutral voltage
- Phase undervoltage or negative sequence overvoltage
- Directional overcurrent
- Power

The Voltage Transformer Supervision (VTS) function detects the loss of one or several phase voltage inputs using various well known methods:

- The detection of the presence of negative sequence voltage and the absence of negative sequence current. The negative sequence voltage V_2 and the negative sequence current I_2 are calculated. If V_2 exceeds the $V_2>$ setting and at the same time, I_2 is less than the $I_2<$ setting, the function issues an alarm after the operation delay has elapsed. This criterion is meaningful only when a reasonable minimum current is flowing, i.e. if the maximum phase current is greater than the minimum current setting $I>(min)$.
- This function detects the loss of all three voltages under load conditions when current inputs are available. If three phase voltages are dropped to a value below 30% pu ($1 \text{ pu} = \sqrt{3} \times V_{\text{prim.nom}}$), at the same time the maximum phase current is below the maximum load current and above the minimum load current, VTS fast block signal will be activated. Minimum load current is ground charging capacitive current, which should be above line current without load.
- Digital input (DI) for indicating miniature circuit breaker (MCB open) position
- The VT supervision function (VTS) also provides supervision of the physical connections of the three phase LPVTs. If the physical connection of any phase LPVT is lost, an internal "LPVT loss" signal will be accepted to immediately trigger the VTS function.

If according to above conditions a loss of voltage is detected, immediately a "VTS fast block" signal is issued, intended for instantaneous blocking of voltage dependent functions to help prevent maloperation. A further "VTS alarm" signal will be issued after a settable time delay to help prevent unnecessary alarming upon spurious VTS operation.

- In case that the "Enable VN compare" is set to On, "Delta_VN>" is used to compare the magnitude difference between two neutral voltages.

VT supervision will reset when all the following conditions are satisfied:

- Negative sequence voltage V_2 is less than $V_2>$ setting.
- Maximum phase to phase voltage is greater than 30% pu ($1 \text{ pu} = \sqrt{3} \times V_{\text{prim.nom}}$).
- MCB input resets.
- LPVT loss input resets.

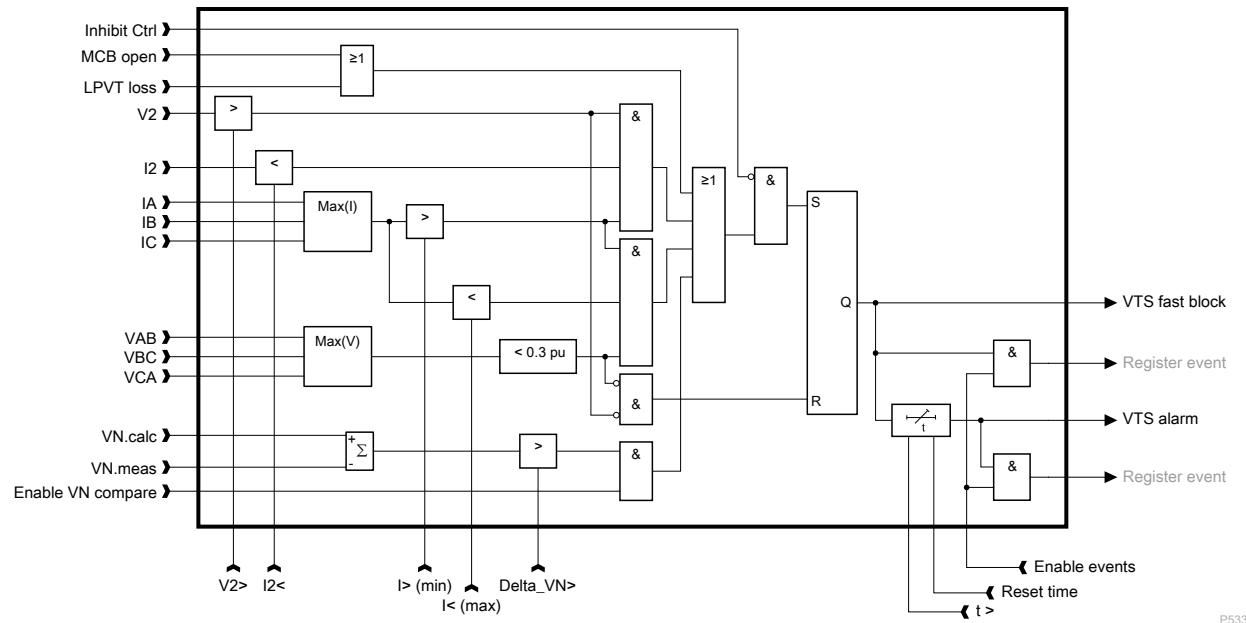
When the VT failure condition is not satisfied for 10 s, the "VTS alarm" will be reset.

In addition, the VTS function can be blocked by inhibit control function.

NOTE: For PowerLogic P5V20's VTS function, only MCB input is available.

Block diagram

Figure 366 - Block diagram of the voltage transformer supervision function



P533OPB

Characteristics

Table 197 - Settings and characteristics of the voltage transformer supervision function (ANSI 60)

Settings/characteristics (description/label)	Values
Enable VTS	
Options	Off/On
V2> setting/V2>	
Setting range	0.02...2.00 pu ¹⁷⁰
Resolution	0.1
Accuracy	±2% or ± 0.2 V (secondary), whichever is bigger
I2< setting/I2<	
Setting range	0.02...2.00 pu ¹⁷¹
Resolution	0.01
Accuracy	±2% or 0.02 pu ¹⁷¹ , whichever is bigger
Operate delay/Operate delay	
Setting range	0.00...60.00 s
Resolution	0.02 s
Accuracy	±1% or ±10 ms, whichever is bigger
DI for MCB position/MCB	
Options	Selection of one digital input (DI)
Inhibit ctrl/InhCtrl	

170. $\sqrt{3} \times V_{nom}$
171. I_{nom}

Table 197 - Settings and characteristics of the voltage transformer supervision function (ANSI 60) (Continued)

Settings/characteristics (description/label)	Values
Options	Selection of one input (DI; VI)
I>(min) setting/I>(min)	
Setting range	0.02...1.00 pu ¹⁷²
Resolution	0.01 pu ¹⁷²
Accuracy	±1% or 0.02 pu ¹⁷²
I<(max) setting/I<(max)	
Setting range	0.10...20.00 pu ¹⁷²
Resolution	0.01 pu ¹⁷²
Accuracy	±1% or 0.02 pu ¹⁷² , whichever is bigger
V<	
Value	30% pu ¹⁷³ , fixed
Accuracy	±1% or ± 0.1 V (secondary), whichever is bigger
Enable VN compare	
Options	Off/On
Delta_VN>	
Setting range	0.05...1.00 pu ¹⁷³
Resolution	0.01 pu ¹⁷³
Accuracy	±2% or ± 0.2 V (secondary), whichever is bigger
Reset time (fixed)	
Value	10 s
Accuracy	30 ms
Characteristic times	
Reset time	< 30 ms
Setting group/SetGrp	
Number	1

172. Inom

173. $\sqrt{3} \times V_{nom}$

PowerLogic P5 and bay condition monitoring

In order to provide a basic indication about the IED and bay condition, a user scalable signaling “Protection active” is provided with PowerLogic P5.

The prerequisite for this feature is that the PowerLogic P5 must be in the normal operational state (not blocked by any defect, detected by internal self-monitoring).

The configuration can be found in the **Control** menu/**Good condition** sub-menu.

Table 198 - Settings and characteristics of the good condition function

Settings/ characteristics	Description
Global trip	A trip issued by the protection function (except arc detection)
Any output latched	Any latched trip which still needs to be reset by the user
Auto reclosing in progress	A definite trip or ends up with an unsuccessful reclosing
Motor start inhibition	Motor start inhibition is present due to excessive number of motor starts (if this feature is enabled).

The user can select one or more of the above settings as the conditions to trigger the signaling “Protection active”. When any signal from the selected setting(s) is presented, the status of **Good condition** changes to *Protection active*, otherwise the status is in idle state.

The signaling can be used:

- For local indication via LED, for example: to increase the awareness of the PowerLogic P5 and bay condition prior to any local operation
- For local or remote indication via outputs
- As the blocking condition in object control, for example: to help prevent dangerous bay open/close commands while the status changes to *Protection active*
- For remote information by logging related event(s)

Maintenance

The PowerLogic P5 protection relays together with their extension units, communication accessories, arc-flash detection sensors and cabling, require maintenance in work according to their specification. Keep a record of the maintenance actions. The maintenance can include, but is not limited to, the following actions.

Safety instructions

This page contains important safety instructions that must be followed precisely before attempting to install, repair, service or maintain electrical equipment. Carefully read and follow the safety instructions described below.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- NEVER work alone.
- Turn off all power supplying this equipment before working on or inside it. Consider all sources of power, including the possibility of backfeeding.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Do not power a withdrawn mobile part of the PowerLogic P5 protection relay with voltage > 24 V. Put back the withdrawable part in the fixed part before powering it on.

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

DANGER

FIRE HAZARD

If you are authorised to withdraw the relay:

- Disconnect the power supply before removing or replacing a module or the withdrawable part of the protection relay.
- Never touch electronics parts (risk of damage due to electrostatic discharge).
- Before replacing the withdrawable part, clean all debris and contaminants from the case, the withdrawable part, and the connectors.
- In case of module or withdrawable part replacement, perform the commissioning operations before using the protection relay.
- Apply proper tightening torque to all wire connections.

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

CAUTION

LOSS OF DEVICE CONFIGURATION

Never plug in or draw out the communication modules while the PowerLogic P5 protection relay is in service.

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

Self-monitoring

Watchdog relay

The PowerLogic P5 protection relays are equipped as standard with a watchdog relay (digital output 4 in slot B). This is a changeover relay which is kept permanently in the on-position by the PowerLogic P5 protection relay. In the event of protection relay failure, or if the auxiliary power supply fails, the watchdog relay reverts to the off-position.

Maintenance/Test LED

The PowerLogic P5 protection relay has gone into the fallback position following detection by the embedded self-tests of the failure of one of its internal components. In this case, the PowerLogic P5 protection relay is no longer

operational. This  LED may light up when the protection relay is energised during all the start phase of the PowerLogic P5 protection relay (for about 60 seconds). This is normal and does not indicate any internal failure. When the start phase of the protection relay is completed, the LED is off if no internal failure is detected.

Purpose of the self-tests

The PowerLogic P5 protection relay runs a series of self-diagnostic tests for hardware and software in boot sequence and also performs runtime check. These self-tests detect any failure and can avoid random PowerLogic P5 protection relay behaviour. The main aim is to avoid an unwanted tripping or failure to trip in the event that it occurs on the power system or on the equipment to protect.

The PowerLogic P5 protection relay can detect two types of internal failure:

- A major failure when the protection functions cannot be processed properly or can initiate an unwanted trip. In this case, The PowerLogic P5 protection relay goes into the fallback position:
 - The output relays stay in current status, and goes to default position after the device is rebooted.
 - Watchdog relay (DO4 contact output on slot B) goes into the off-position.
 - The  LED,  LED, and the configurable LEDs are off.
 - The **ON** LED, on the local panel, is on.
 - The  LED on the local panel is on.
 - A message is displayed on the local panel: it allows Schneider Electric to make a diagnosis.
 - The communication is inoperative
 - The communication with eSetup Easergy Pro is inactive depending on the type of internal failure.

- A minor defect, is a malfunction of components (hardware or firmware) which is not used directly by protection functions (namely, memory, used for logging emergency events, communication channels, etc.). It shall not result in loss of PowerLogic P5 protection relay operability.
 - The output relays stay in their current status.
 - Watchdog relay (DO4 contact output on slot B) stays energised.
 - The  LED,  LED, and configurable LEDs stay in their current positions.
 - The  LED, on the local panel, is on.
 - The  LED on the local panel is off.
 - An alarm message is displayed on the local panel to highlight the origin of the issue.  Press the  key to remove the message (the alarm message is logged in the Alarm message list).
 - The communication is still operational depending on the type of the internal failure.
 - The communication with eSetup Easergy Pro, on the local panel is active depending on the type of internal failure.

List of self-tests

The self-tests are described in the table below.

Table 199 - List of self-tests

Name	Description	Execution period	Fallback position
Hardware configuration test	Checking if the actual hardware configuration matches to the product model number	On energisation	YES
Power supply test	External power supply check	On energisation and during operation	YES
	Internal power supply check if key microchips are supplied with correct voltage	During operation	YES
Main processor test	Microcontroller's watchdog monitoring	During operation	YES
	Monitoring of MCU temperature	On energisation and during operation	YES
Internal drivers (FPGA)	Initialization FPGA code checks	On energisation	YES
	Monitoring of FPGA data	During operation	NO
EEPROM memory test	Microcontroller checks of EEPROM information	On energisation and during operation	YES
NOR Flash memory test	Microcontroller checks of code in NOR flash	On energisation	YES
NAND flash memory test	Microcontroller checks of NAND flash usage	On energisation	YES
DDRAM memory test	Microcontroller checks correct access to DRAM	On energisation and during operation	YES
DDRAM partition monitoring	Microcontroller checks different partitions sizes	During operation	NO
Back up memory test	Check the information in the backup memory is correct	During operation	NO

Table 199 - List of self-tests (Continued)

	Check if the backup memory content is valid	On energisation	NO
Internal bus test	Check internal bus operation is correct	On energisation and during operation	YES
Display and graphic libraries	Check if the software components are correct	During operation	NO
RTD presence (MET148-2)	Check the RTD is on bus	During operation	NO
Firmware (system and application) and setting consistency	Check application file is in line with hardware and firmware	On energisation	NO
	Check firmware matches to the settings	During operation	NO
Digital inputs test	Check digital input circuits are correct	On energisation and during operation	YES
Digital outputs test	Check digital output circuits are correct	On energisation and during operation	YES
Test of the analog input module software components	Check the presence of analogue module	On energisation	YES
	Check the analog sampling is correct	During operation	NO
Calibration coefficient validity test	Check the calibration coefficients data are correct	On energisation	NO
	Check calibration coefficients validity vs. conditions	During operation	NO
Test of detection of loss of the clock (RTC)	Check the clock of RTC is correct	On energisation	NO, Back to default time stamp
Measurement and protection execution monitoring	Check the continuity of task execution	During operation	NO
Software execution test	Detection of operating system processing errors	On energisation and during operation	YES
	Check of continuity of execution of periodic tasks	On energisation and during operation	YES
Reset detection	Detection of resets of all kinds of root causes	On energisation and during operation	YES

Backup memory

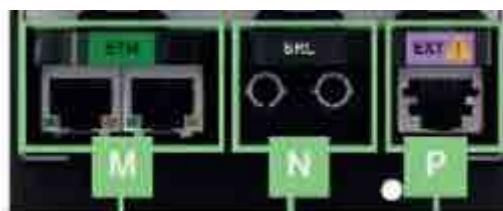
The PowerLogic P5 protection relay has an optional feature of a removable back up memory. This feature provides a mechanism for storing the product settings and other related information separately to the removable part of PowerLogic P5.

The memory allows quick, restoration of settings should there be a need to exchange the withdrawable part. As a result, the mobile part can be replaced and back in service in a matter of minutes.

The optional back up memory is included in the extension module that can be installed in Slot P. The extension module ensures as well the connection with external accessories like RTD module for temperature measurement or IRIG-B module for time synchronisation. There are two types of extension modules:

Extension module	Commercial reference
Extension module and backup memory (EXT) marked with letter H in the model number or available separately	REL51034
Extension module and backup memory with wireless (Zigbee) receiver (EXR) marked with letter W in the model number or available separately	REL51044

Figure 367 - The optional extension module (slot P) that includes the back-up memory



The backup memory stores the following information:

- Settings
- Event and alarm history
- Disturbance recordings
- Product serial number
- Model number
- Persistent data included Thermal value, Running Hours, Accumulated energy etc.
- Language file

NOTE: The PowerLogic P5 access information such as passwords and users are not stored in the backup.

Two versions of the information are held in the backup memory together with a verification CRC.

This allows one of the copies to be written and verified before erasing the second thus keeping the integrity of the data stored even if there are any power interruptions during the write process.

NOTE: There is always one valid backup version with CRC check in the backup memory even when new backup is in progress.

Automatic storage

The PowerLogic P5 automatically stores all settings, events and disturbance recordings at 2AM local time every day.

As indicated above the secured process means that the memory can not be corrupted as the save is verified before previous data is overwritten.

NOTE: Due to this unique feature the important data and settings are always secured locally and not based on any remote storage on a control system.

Manual storage of settings

In addition to the daily automatic storage, the settings can be stored to the memory at any time by choosing the command from the local panel HMI.

To save the settings manually:

1. Press the  key to enter the main menu and then select the **Device/Test** icon using the arrow keys.
2. Press the  key to enter the **Device/Test** sub menu.
3. Select the **Back-up** option using the  key and press .
4. Press , select **Man. Trig** and then press .

```
Backup Memory 1/2
Trigger backup memory
Status           Idle
Man. Trig      -
```

5. Press the  key to select **On**.
6. The status shows **Busy**; when the storage is complete the status goes back to **Idle**.

Replacement of the withdrawable part

Should there be a need to replace the withdrawable part, the back-up memory provides a simple and quick mechanism to bring the protection relay back into service.

Power the unit down and extract the moving part using the green handle. If the removable part is secured with screws please follow the installation instructions (Unscrewing the front face locking screws, page 55) to remove the screws. Press the lock on the handle upwards and pull the handle. Insert the new unit with a matching model number and push the handle back to its original position and install back the screws.

After re-powering the module, the following “New backup content found” notification appears.

New backup content found.

2020-07-17 14:22:36
VOL.300.103
P5F30-EACB-IBBEH-AABC

Compatible

 Ignore

 Restore

Choose what happens with the back up memory.

Press the  key to keep the information in the back up memory or the  button to discard and help prevent the pop up occurring again.

NOTE: This action does not restore the settings. Follow the ‘Restore from Backup memory’ process described below.

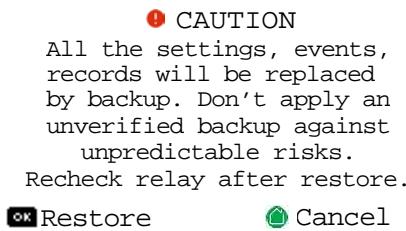
Restore from backup memory

The settings can be restored from the backup memory at any time by choosing the command from the front HMI.

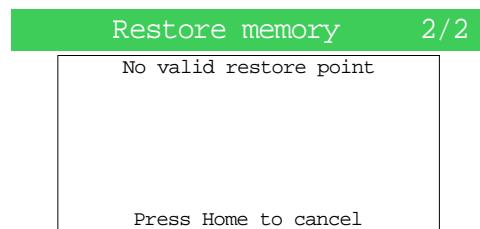
To restore the settings manually:

1. Press the  key to access the main menu and then select **Device/Test** by using the arrow keys.
2. Press the  key to enter the **Device/Test** sub menu.
3. Press the  key to select the **Back-up** option and then press .
4. Press the  key to enter the second setting page **Restore Memory** and then press .
5. Press the  key to select the **Trig restore memory** parameter and then press .
6. Press the  key to select **On**.

The PowerLogic P5 shows the following notification window:



7. Press the  key to accept restore.
- If the stored file is incompatible with the hardware, “No valid restore point” notification is displayed.



- If the file is compatible and PowerLogic P5 is connected to eSetup Easergy Pro, the device requires a manual restart when the screen indicates “RESTART”.



- If the file is compatible and there is no connection, PowerLogic P5 reboots automatically.
- 8. Following the reboot, the file in the back up memory is verified before restoring the settings. Press  to accept restore.
- 9. In the next step the files are copied and verified.
- 10. When the files are restored successfully, press .
- 11. The PowerLogic P5 protection relay reboots and the restore is completed.
- 12. After reboot the “New backup content found” notification might pop-up again, press the  key to help prevent repetition of restore.

Restore process confirmation

The restore process can be confirmed from the local panel HMI.

1. Select the second screen in the **Back-up** sub menu by pressing the  key.

The screen does not display any information while restoring is in progress.

2. When restoring is completed, the device information appears on the screen.

The **Compliance check** parameter shows status “Checking” for a short while and changes to “True” after a successful restoring process.

Restore memory 2/2

Update	-
Firmware	-
Ref.	-
Compliance check	-
Manual restore	-

Restore memory 2/2

Update	2020-06-02 15:07:24
Firmware	V01.300.101
Ref.	P5U20-AABB-CABAH-AABB
Compliance check	True
Manual restore	-

Preventive maintenance

The PowerLogic P5 protection relay requires maintenance in order for it to work according to the specification.

⚠ WARNING

UNEXPECTED SYSTEM OPERATION

Carry out periodic system testing as per the testing recommendation in this manual or if the protection system scheme has been changed.

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

Introduction

To obtain the maximum availability of the installation, it is essential to help ensure that the PowerLogic P5 protection relay is operational at any times.

The PowerLogic P5 protection relay's internal self-tests, the watchdog relay, and the  LED alert the user in the event of internal protection relay failure. Nevertheless, elements outside the PowerLogic P5 protection relay are not subject to these self-tests and it is therefore necessary to carry out regular preventive maintenance.

Check the PowerLogic P5 protection relay visually and pay attention to dirty components, loose wire connections, damaged wiring, user interface screen and LEDs, and other mechanical connections.

Then, to perform maintenance, carry out all the recommended commissioning tests.

First test all the digital inputs and outputs involved in tripping the circuit breaker. A test of the complete chain including the circuit breaker is also recommended.

The software setting tool, eSetup Easergy Pro, is especially useful during maintenance tests and procedures.


HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSAZ462.
- The arc fault detection system is not a substitute for proper PPE when working on or near equipment being monitored by the system.
- Information on this product is offered as a tool for conducting arc-flash hazard analysis. It is intended for use only by qualified persons who are knowledgeable about power system studies, power distribution equipment, and equipment installation practices. It is not intended as a substitute for the engineering judgement and adequate review necessary for such activities.
- Only qualified personnel is allowed to install and service this equipment. Read this entire set of instructions and check the technical characteristics of the device before performing such work.
- Perform wiring according to national standards (NEC) and any requirements specified by the customer.
- Observe any separately marked notes and warnings.
- NEVER work alone.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume all circuits are live until they are completely de-energised, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of back feeding.
- Always use a properly rated voltage sensing relay to ensure that all power is off.
- The equipment must be properly grounded.
- Connect the device's protective ground to functional earth according to the connection diagrams presented in this document.
- Do not open the device. It contains no user-serviceable parts.
- Install all devices, doors and covers before turning on the power to this device.

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

Intervention frequency

Test the PowerLogic P5 protection relay periodically according to the end user's safety instructions and national safety instructions or law.

The necessary time between visual inspections and functional checks depends on the installation operating conditions. Generally, we recommend to carry out periodic checks or tests every four (4) years. In corrosive or harsh offshore environments, functional testing should be carried out more often; we recommend every three (3) years.

For the testing procedures, see Commissioning, page 156.

The table below summarises the recommended frequency of interventions.

Test	Periodicity
User interface check	1 year
Relay health check	4 years
Date and time synchronisation check	4 years
Wiring and connections check	4 years
Analogue inputs operation check	4 years

Test	Periodicity
Digital inputs wiring and operation check	4 years
Digital outputs wiring and operation check	4 years
Arc-flash detection system check	3 years

Preventive maintenance tasks

User interface test

The LED and display unit test is used to check that each LED on the local panel and in each segment of the display is working correctly.

To perform the test, press and hold down the menu selection key. After 2 seconds, all LEDs on the local panel and all segments of the display light up.

Protection relay health check

⚠ CAUTION

LOSS OF DEVICE CONFIGURATION

- Never plug in or draw out the communication modules while the PowerLogic P5 protection relay is in service.
- Check and make sure that the communication module is locked.

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

The health check includes the following tasks:

- Check that the different currents and voltages measured by the PowerLogic P5 protection relay are appropriate for the load being powered.
- Check that the PowerLogic P5 protection relay  LED is off and no maintenance message displayed on the local panel.
- Check the health of boards and modules with eSetup Easergy Pro (**Device info** view of the **Device/Test** menu)

Date and time synchronisation check

Check date and time synchronisation (modify date and time setting and wait for date and time synchronisation).

Inspection of the rear panel

Check that the connections, including the earth/ground terminal and the CT connections, are tight and free from corrosion.

If the CT connections are not tightened properly, this generates excessive heat rise which can lead to the destruction of connector A and the CTs.

Wiring and connection check

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Use the appropriate (3 or 4-terminal) copper jumper for common connections.
- After cabling, protect the rear connector A with the two protective caps.

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

Check the wiring connections in the rear panel: for the type of screws, screwdriver to be used, and torque (see Installation, page 42).

In addition to the periodic wiring and connections check, a thermal measurement with thermal camera is recommended to make visible any warm points of the installation so that loose connections could be detected and corrected before a real issue occurs.

Check the earth/ground connections (two ends).

Place back the two protective caps (connector A) before powering on the PowerLogic P5 protection relay.

Analogue input operation check

Check current transformers (CTs/LPCTs), voltage transformers (VTs/LPVTs), earth/ground fault current CTs, and, if used, core balanced CTs connection:

- Cable(s) (and group of cables) in the middle of the CT.
- Voltage cable shielding.
- Check that measured analogue values and angles are compliant on the local panel.

Digital input wiring and operation check

Check digital inputs statuses (in Control menu on the local panel and in the **Digital Inputs** view of the **Control** menu in eSetup Easergy Pro). Check that physical inputs states are correct, according to normal input configuration and wirings.

Digital output wiring and operation check

Check the digital outputs operation:

- If accessible, check physical digital outputs position (continuity tester).
- Check digital outputs statuses (in the Control menu on the local panel display and in the **Relays** view of the **Device/Test** menu in eSetup Easergy Pro).

Checking the trip chain

Check regularly that the complete trip chain, from the CTs to the PowerLogic P5 protection relay and through to the trip coil, is always operational.

The complete protection chain is validated during the simulation of a fault that causes tripping of the switchgear by the PowerLogic P5 protection relay.

Simply testing one function can demonstrate that the whole system is working correctly, provided it has been installed correctly.

To validate the complete protection chain, proceed as follows:

1. Select one of the protection functions that trips the switchgear.

2. Depending on the function(s) selected, inject a current or a voltage corresponding to a fault and note whether the switchgear trips.

Arc-flash detection system maintenance

DANGER

UNEXPECTED SYSTEM OPERATION

- If the arc-flash detection unit is no longer supplied with power or is in permanent non-operational state, the protection functions are no longer active and all the output contacts are dropped out.
- To detect a power-off or a permanent fault state, connect the watchdog (SF) output contact to a monitoring device such as SCADA or DCS.

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

Keep record of the maintenance actions performed for the system.

The maintenance can include but is not limited to:

- visual inspection
- periodic testing
- hardware cleaning
- sensor condition and positioning check
- checking the obstruction of sensors

Hardware cleaning

Pay special attention to help ensure that the device, its extension units and sensors do not become dirty.

DANGER

UNEXPECTED SYSTEM OPERATION

- Do not use any type of solvents or gasoline to clean the device, sensors or cables.
- When cleaning the sensor, make sure that the cleaning solution does not contact anything other than the sensor.

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

- If cleaning is required, wipe out dirt from the device.
- Use a dry cleaning cloth or equivalent together with mild soapy water to clean any residues from the light sensor.

Sensor condition and positioning check

Always check that the sensor positioning remains as it was originally designed after:

- commissioning
- sensor replacement
- modification procedure
- cleaning
- arc-flash fault
- periodic testing

Check for obstruction of the sensors.

Troubleshooting

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSAZ462.
- The arc fault detection system is not a substitute for proper PPE when working on or near equipment being monitored by the system.
- Information on this product is offered as a tool for conducting arc-flash hazard analysis. It is intended for use only by qualified persons who are knowledgeable about power system studies, power distribution equipment, and equipment installation practices. It is not intended as a substitute for the engineering judgement and adequate review necessary for such activities.
- Only qualified personnel is allowed to install and service this equipment. Read this entire set of instructions and check the technical characteristics of the device before performing such work.
- Perform wiring according to national standards (NEC) and any requirements specified by the customer.
- Observe any separately marked notes and warnings.
- NEVER work alone.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume all circuits are live until they are completely de-energised, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of back feeding.
- Always use a properly rated voltage sensing relay to ensure that all power is off.
- The equipment must be properly grounded.
- Connect the device's protective ground to functional earth according to the connection diagrams presented in this document.
- Do not open the device. It contains no user-serviceable parts.
- Install all devices, doors and covers before turning on the power to this device.

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

Troubleshooting assistance

The PowerLogic P5 is a withdrawable protection relay. The faulty protection relay can be removed from its outer case without disconnecting the wires from the terminals. This allows to quickly replace a protection relay, provided that the spare part is available.

The replacement of a protection relay is done with the following steps:

1. Perform a diagnostic check on the protection relay:
 - The status of the watchdog relay (DO4 contact relay on slot B)
 - The status of the "!" and "⚡" LEDs as well as the configurable LEDs
 - The **ON** LED and the "🔑" LED on the local panel
 - The messages displayed on the local panel
 - The alarm list and maintenance file downloaded with eSetup Easergy Pro

2. Check the compatibility of the spare part: the labels on the fixed and the withdrawable parts are the same.
3. Recover the configuration from the backup memory (optional) and restart of the new protection relay, following the instructions displayed on the local panel.

The PowerLogic P5 is a modular protection relay. The modules that can be replaced individually are:

- The communication modules
- The extension modules with back-up memory

Identification of the modules can be accessed:

- From the local panel of the PowerLogic P5 protection relay (in the Device/ Test menu)
- From eSetup Easergy Pro (Boards view of the Device/test menu)
- From the web server and the EcoStruxure Power Device application

Troubleshooting the PowerLogic P5

If nothing happens when the PowerLogic P5 protection relay is switched on, troubleshoot the device according to Troubleshooting a protection relay that shows no signs of energising, page 627 below:

Table 200 - Troubleshooting a protection relay that shows no signs of energising

LED Indication	Possible Causes	Actions
All LEDs are off. Nothing displayed on the screen.	Connector B not plugged in.	Plug in the connector B.
	Connector B inverted with another connector: <ul style="list-style-type: none"> • Connector C for PowerLogic P5 x20 • Connector C, D, E for PowerLogic P5 x30 	Put connectors in the correct position. Check the connector is identified according to the slot.
	Auxiliary power absent	Check the auxiliary power level (see label on the side of the device)
	Polarity reversed on terminals	Check that the + polarity is on terminal 19 and the - polarity is on terminal 20 for DC power.
	Internal failure	Change the active part.

If a maintenance message is displayed, troubleshoot the device according to Troubleshooting a protection relay according to maintenance messages, page 627 below:

Table 201 - Troubleshooting a protection relay according to maintenance messages

Message information	Possible Causes	Actions
Maintenance message with: Module ID = 3 Error type = -7	Mismatch between hardware configuration and product model number.	Check the model number on fixed part with model number on the withdrawable. 1st five characters after the application reference should be the same: P5xx0- AAAA -Axxxx-xxxx
Maintenance message with: Module ID = 3 Error type = -5 Completed by one of these references: • 3CT-CSH	Hardware failure detected on the fixed part (slot A) when the PowerLogic P5 protection relay is powered on. The message specifies the board impacted by the defect.	Change the fix part of the PowerLogic P5 protection relay with the equivalent one.

Table 201 - Troubleshooting a protection relay according to maintenance messages (Continued)

Message information	Possible Causes	Actions
<ul style="list-style-type: none"> • 3CT-4VT-CSH • 5CT • 5CT-4VT • 4VT • LPCT-LPVT 		
Maintenance message with: Module ID = 3 Error type = -5 Completed by one of these references: <ul style="list-style-type: none"> • 6DI-4DO • ARC-FLASH • CPU P5x20 • CPU P5x30 • PSU30H-DI-DO • PSU30L-DI-DO • PSU20-DI-DO 	Hardware failure detected on the withdrawable part when the PowerLogic P5 protection relay is powered on. The message specifies the board impacted by the defect.	Change the withdrawable part of the PowerLogic P5 protection relay with the same model number.
Alarm message completed by one of these references: <ul style="list-style-type: none"> • EXTENSION-BKUP • COM SRL RS485 • COM SRL FO • COM ETH 2TP-M (on slot M) • COM ETH 2FO-M (on slot M) • COM ETH 2TP-L (on slot L) • COM ETH HSR/PRP RS485 module 2TP • COM ETH HSR/PRP RS485 module 2FO 	Hardware failure detected on the optional boards when the PowerLogic P5 protection relay is powered on.	Check that the hardware resources are equivalent or exceeds those used in the configuration file.
Message appears during a reboot of the PowerLogic P5 protection relay. The boot is not complete and the following message is displayed: - Firmware not complete (in English only)	Major issue on the CPU board of the PowerLogic P5 protection relay.	Change the withdrawable part of the PowerLogic P5 protection relay with the same model number.
Alarm message completed by the reference: MET148-2	MET148-2 loose connection	Check the MET148-2 module is well connected to the Extension and backup memory board. See Troubleshooting the MET148-2 module, page 631 for more information.
CT supervision Alarm message	Connection issue from CT/ LPCT transformer to the PowerLogic P5 protection relay	Check the connection from MV transformer to the analogue input of the PowerLogic P5 protection relay. Switch off/switch on the protection relay. If the failure is persistent, change the rack of the PowerLogic P5 protection relay
VT supervision Alarm message	Connection issue from MV transformer to the PowerLogic P5 protection relay	Check the connection from MV transformer to the analogue input of the PowerLogic P5 protection relay. For LPVT, check if the three LPVTs are connected on the LPVT hub. Switch off/switch on the protection relay.

Table 201 - Troubleshooting a protection relay according to maintenance messages (Continued)

Message information	Possible Causes	Actions
		If the failure is persistent, change the rack of the PowerLogic P5 protection relay.
Alarm message completed by "RTD x Open Circuit Fault On" or by: "RTD x Short Circuit Fault On", where x is the number of the RTD	The RTD number x on the MET148-2 module is disconnected or short-circuited.	As the message is common to the RTD channels of the MET148-2 module, go to the temperature measurement display screen to determine which RTD is affected by the defect. Measurement displayed: <ul style="list-style-type: none">• Tx.x = -**** = RTD disconnected (T > 205 °C (401 °F))• Tx.x = **** = RTD short-circuited (T < -35 °C (-31 °F)) Then check the connection of RTDs.
Alarm message "Incompatible hardware or firmware version, operation stopped"	Incompatible firmware or hardware versions	Check the firmware or hardware version.
Maintenance message with: Module ID = 17 Error type = -1	CS certificate expired or CS configuration potentially inconsistent	Please contact Schneider Electric Customer Care Center.

Recover failed device

In case of the PowerLogic P5 can not start normally, or been stuck in failed mode, you can recover the failed device with eSetup Easergy Pro:

1. Disconnect the power supply of P5.
2. Connect P5 to the laptop with eSetup Easergy Pro installed by USB cable to make firmware upgrade in low power mode.
3. Launch eSetup Easergy Pro, click on the **Tools** button on the **menu bar**, then click on **Recover failed device**.

Troubleshooting the communication modules

	Possible Causes	Actions
Loose of communication during operation	Change of parameters (PowerLogic P5 protection relay, Scada), connection issue, hardware issue	For Ethernet board, check the traffic with the leds embedded on the RJ45 connectors. Check all the information and parameters at scada level. Check all the parameters at the PowerLogic P5 protection relay level. Check all intermediate devices (switches, etc.) installed between Scada and the PowerLogic P5 protection relay. Check the connections. Replace the communication board.
Alarm message completed by "Slot x board is missing"	The communication board on slot X is missing.	Complete the configuration with the right communication option.
Alarm message completed by "Slot x is not configured"	There is a communication board on Slot x, but the model number is not configured.	Configure the model number with the right option.
Alarm message completed by "Slot x mismatch"	There is a communication board on Slot x, but its model number does not match the existing one in the system configuration.	In order to match the communication board and the model number, take one of the following corrective measures: <ul style="list-style-type: none"> Change the communication board Configure the right model number

Troubleshooting arc-flash system

This table describes some common problems in the arc-flash system and how they can be solved.

Messages	Possible Causes	Actions
The trip signal does not reach the circuit breaker.	Faulty trip circuit wiring.	Check that the wiring of the trip circuit is not faulty.
The protection does not trip even when a sufficient light signal is provided.	The protection needs both light and current information to trip.	Check the dip switch configuration. The protection may be configured to require both the light and current condition to trip.
Faulty sensor wiring detected by the self-supervision.	Loose sensor wire.	Check the sensor wiring. The sensor wire may have loosened in the terminal blocks.
Error message indicating blocked sensor channel.	Light pulse to the arc-flash sensor is too long.	Check that the light pulse to the arc-flash sensor is not too long. If light is supplied to the arc-flash sensor for more than three seconds, the self-supervision function activates and switches the light sensor channel to daylight blocking mode, and the sensor channel is blocked. Remove the light source to reset the blocked channel.

Troubleshooting the MET148-2 module

LED Indication	Possible Causes	Actions
MET148-2 green and red LEDs off	Fault wiring	RJ45 plugs of CCA77x cords clipped correctly into sockets.
MET148-2 green LED on. MET148-2 red LED off.	No response from the MET148-2 module.	<p>Check the position of the module number selection jumper:</p> <ul style="list-style-type: none"> • MET1 for first MET148-2 module (temperatures T1 to T8) • MET2 for second MET148-2 module (temperatures T9 to T16). • If the jumper position needs to be changed, reboot the MET148-2 module (by disconnecting and reconnecting the interconnection cord). • Change the extension module.
MET148-2 red LED flashing.	Faulty wiring, MET148-2 powered but loss of dialogue with base unit.	<p>Check module connections:</p> <ul style="list-style-type: none"> • RJ45 plugs of CCA77x cords clipped correctly into sockets. • If the MET148-2 module is the last in the chain, check that the line terminating jumper is in the Rc position. In all other cases, check that the jumper is in the position marked 
MET148-2 red LED on.	<p>More than 3 remote modules connected.</p> <p>MET148-2 module internal failure.</p>	<p>Remove a remote module.</p> <p>Change MET148-2 module.</p>

Troubleshooting the Digital Circuit Breaker monitoring

Table 202 - List of Digital Circuit Breaker troubleshooting

Fault	Possible Causes	Actions
Paired CL110 not found	CL110 with fault.	Press power on button of CL110 for 10 s to restart the sensor.
Mass pair succeed, but few CL110/ TH110 not paired	Few sensors not successfully paired.	Try again pair operation for the sensors not paired.
CL110 low battery	Battery installed inside CL110 is exhausted.	Install a new CL110 and pair with P5.
CL110 lost	Been stolen or other reason.	Install a new CL110 and pair with P5.
Connection with EOS-BM100/ EOS-MCMx00 not stable	RJ45 cable may not be firmly connected.	Check the RJ45 plug and the cable.

Table 202 - List of Digital Circuit Breaker troubleshooting (Continued)

Fault	Possible Causes	Actions
EOS-BM100/EOS-MCMx00 connected and configured, but in eSetup Easergy Pro/ Digital CB/Module configuration , the Status of EOS-BM100/EOS-MCMx00 is <i>Offline</i> .	Modbus slave ID setting incorrect	Check and ensure the Modbus slave ID setting of EOS-BM100/EOS-MCMx00: <ul style="list-style-type: none"> • 11~19 for EOS-BM100 module • 21~29 for EOS-MCMx00 module
Zigbee sensor restore failed	<ul style="list-style-type: none"> • The Zigbee network status is not OK. • Backup-ed data in EOS-BM100 with error. • The Zigbee sensor to be restored is not on line. • The Zigbee sensors to be restored makes the number of paired Zigbee sensors exceeds 18 and the sensors to be restored are not mapped. 	Configure the pairing operation manually.

Firmware upgrade

NOTE: This section applies to firmware upgrade operation only. For firmware downgrade, please contact Schneider Electric Customer Care Center.

From time to time it may be necessary to upgrade the firmware of your PowerLogic P5. There could be a number of reasons for this, new functionality, security patches or correction of product behaviour.

The firmware upgrade feature of the PowerLogic P5 protection relay provides the possibility for the user to upgrade the application firmware themselves through eSetup Easergy Pro.

Upgrading the firmware requires the eSetup Easergy Pro software to be connected to the device to be upgraded. This can be done either through the mini-USB port on the local panel or one of the rear Ethernet ports.

You must also have access to the zip file containing the firmware version you wish to upgrade to. This file typically has the format PowerLogic-P5-firmware-Vxx.xxx.xxx.zip. Please contact Schneider Electric Customer Care Center to get the package.

Please be aware that the contents of this file must come from Schneider Electric and the firmware signature will be checked to help ensure that it has come from a genuine source before the product is updated.

NOTICE

RISK OF DATA LOSS

- Save your configuration files, disturbance records and events before starting the firmware upgrade.
- After the firmware upgrade is complete, the operator needs to first connect to the device and retrieve all configurations through eSetup Easergy Pro, open the saved file, and then select the **Copy all to DEVICE** option from the **File** menu.
- The operator needs to rebuild the logics and matrix.
- The operator needs to reload the second language package.

Failure to follow these instructions will result in loss of all configurations, disturbance records and events.

NOTE: Since the Digital CB protocol will be un-configured by default after the firmware upgrade, to avoid lost of Digital Circuit Breaker configurations, please backup the configurations to .epz file before upgrading and write the configurations back after the upgrade is done.

The process for upgrading the firmware on the PowerLogic P5 protection relay is as follows:

1. Connect the laptop that runs eSetup Easergy Pro to the PowerLogic P5 protection relay and log in with "InstallerLevel".
2. Open the main menu from the top-left corner of the application, select the **Update firmware...** option, and then select the new firmware package from the folder where you saved the package.
3. The application performs the following operations before starting the upgrade:
 - a. Check User's rights
 - b. Checking firmware package
4. If every check is passed, the application gets ready to upgrade the firmware and prompts the user to confirm. Click **OK** to confirm and the application will reboot the device, and after that the new firmware will take effect.
5. After rebooted, a message *Firmware update successful* will be displayed in alarm list.

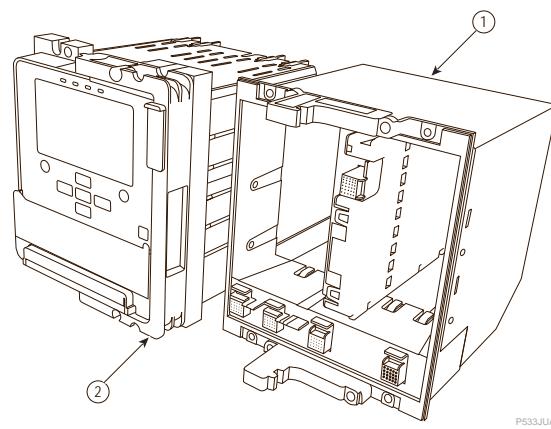
Replacing the PowerLogic P5 protection relay

The PowerLogic P5 is a withdrawable protection relay. It is made up of the following two parts (The fixed and withdrawable parts of the PowerLogic P5 protection relay, page 634):

- A rack ① including the CT/VT and LPCT/LPVT modules (fixed part). The CT/VT and LPCT/LPVT inputs are isolated and fixed. When the device is withdrawn, CTs remain connected.
- A withdrawable part ② which contains all the electronics (including the I/O board, CPU board and power supply).

The withdrawability is realised by unlocking and pulling out the green handle on the local panel.

Figure 368 - The fixed and withdrawable parts of the PowerLogic P5 protection relay



- ① Fixed rack
- ② Withdrawable part

To limit the time of interventions for maintenance reasons, the faulty protection relay can be removed without disconnecting the wires or the connections. This allows to quickly replace an PowerLogic P5 protection relay, provided that the spare part is available.

The spare withdrawable part must be compatible with the one which is replaced. The compatibility rules are as follows:

- The spare part must have the same hardware resources
- The spare part must have the same product model number
- The spare part must have the same major software version

To avoid any unintended withdrawing, and for security reasons, the removable part is fixed to the rack by 3 screws for PowerLogic P5 x20 and 4 screws for PowerLogic P5 x30 protection relays.

The procedure for replacing the PowerLogic P5 protection relay is as follows:

Diagnosis for replacement

For the diagnostic of the protection relay, check the following:

- The status of the watchdog relay (DO4 contact relay on slot B)
- The status of the LED and LED, and the configurable LEDs
- The and LEDs on the local panel

- The Alarm list and Maintenance file to checked and downloaded with eSetup Easergy Pro

Preliminary operations

NOTE: If the PowerLogic P5 protection relay is still working, do not hesitate to save configuration, settings and parameters to the back-up memory of the extension module (optional) if it is available in the protection relay. For saving (backup), go to the backup view of the Device/Test menu on the local panel.

1. Power off the PowerLogic P5 protection relay.
2. Unscrew the 3 screws on PowerLogic P5 x20 (or 4 for PowerLogic P5 x30) that fix the local panel to the relay outer case. Refer to Unscrewing the front face locking screws, page 55.

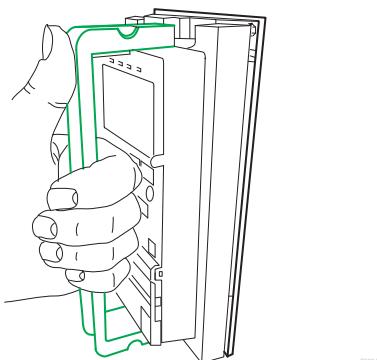
Screws	3 screws mounted on PowerLogic P5x20; 4 screws mounted on PowerLogic P5x30
Tools	(-) 6.5 mm (1/4 in.) or (+) PZ2 screwdriver (Digital torque screwdriver for installing)

3. Push upward the handle lock that locks the device handle.
4. Close the shutter of the local panel if it is open.

Removal

1. Using the device handle, pull the withdrawable part of the protection relay to detach it from the outer case (pull the device handle from the top and bottom when side access is difficult).

Figure 369 - Pulling the withdrawable part by its handle



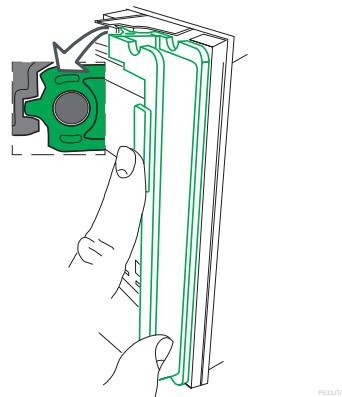
2. Extract the withdrawable part of the protection relay, using your both hands to help ensure a secure grip.
3. Check the model numbers on both the withdrawable part and the outer case.

Installation

1. Before replacing the module:
 - For compatibility of the spare part, check that the identification on the labels on the fixed and the withdrawable parts are the same.
 - Visually check the cleanliness and state of the rear connectors (rear part and lower part).
2. With the device handle fully open, insert the withdrawable (spare) part gently into the fixed part.

3. Push down the handle to lock the withdrawable part. The lock tab on the handle locks the handle to the local panel automatically.

Figure 370 - Locking the withdrawable part by the handle



4. For highly vibrating environment, put in place the screws (3 for PowerLogic P5 x20 and 4 for PowerLogic P5 x30) for locking the local panel to the relay case.

Tools	<ul style="list-style-type: none">• Screws removed in the preliminary operation• (-) 6.5 mm (1/4 in.) or (+) PZ2 screwdriver
Tightening torque	1 N · m (8.85 lb-in)

NOTE: The screws are not mandatory for the installation of the spare part, but recommended for security reasons.

Subsequent operations

After installing the PowerLogic P5 protection relay, perform the following operations if necessary:

1. Switch on the PowerLogic P5 protection relay and check the relay operation. Check the model number (from the Device/Test menu on the local panel) and compare it with the associated model number displayed in eSetup Easergy Pro.
2. If an extension module with backup memory is available on the PowerLogic P5 protection relay, update the device configuration.
3. For recovery of the configuration from the backup memory (optional) and restart of the new protection relay, follow the instructions displayed on the local panel.

Change a communication module

⚠ CAUTION

LOSS OF DEVICE CONFIGURATION

- Never plug in or draw out the communication modules while the PowerLogic P5 protection relay is in service.
- Check and make sure that the communication module is locked.

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

The PowerLogic P5 is a modular protection relay; The modules which can be replaced individually are:

- The communication modules
- The external modules

Identification of the module can be accessed:

- From the local panel of the PowerLogic P5 protection relay (**Device Info** menu)
- From eSetup Easergy Pro (**Device Info** view of the **Device/Test** menu)
- From the web server and the EcoStruxure Power Device application

Preliminary operation

Before changing a communication module:

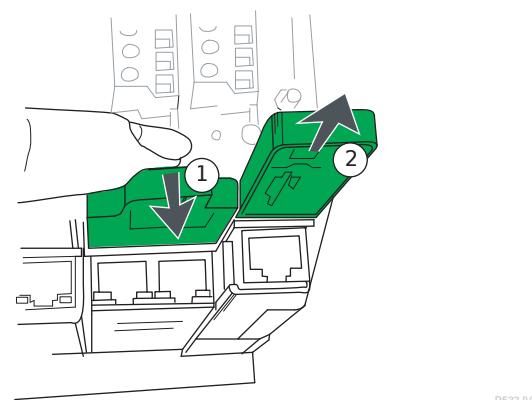
1. Power off the PowerLogic P5 protection relay.
2. Check if there is enough space (> 15 cm or 6 in.) in the rear and lower part of the case to extract the modules. If not possible, remove the case from its support.

Removal

The module can be easily removed from the PowerLogic P5 protection relay:

1. Push down the locking tab ①.
2. Gently pull the communication module forward ②.

Figure 371 - Removing the communication module



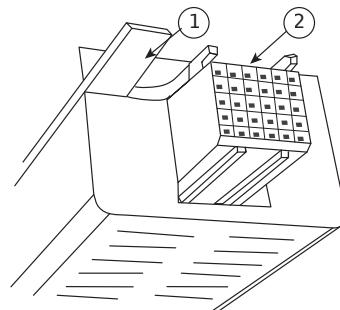
P533JVA

Installation

Install the module according to the following steps:

1. Before replacing the module, check visually the front plate ① and the connector ②.

Figure 372 - Front plate and connector of the communication module



PS33JWA

2. Insert the module into its location.
3. Gently push the module to the front plate until it locks (a click is heard when the locking tab is locked).

Subsequent operation

After installing the module:

1. Check that the module is locked (visual check).
2. Switch on the PowerLogic P5 protection relay and verify that the module has been detected:
 - On the local panel, enter the **Home** menu/**Device/Test** sub-menu and check this in the **Board** menu item.
 - With eSetup Easergy Pro see the **Device/Test** menu/**Device Info** sub-menu.

Return for expert assessment

To return the PowerLogic P5 protection relay for expert assessment, use the original packaging if possible.

If the full product is returned, the active part must be installed in the fix part and properly fixed with screws.

The PowerLogic P5 protection relay must be returned accompanied by its settings sheet and the following information:

- Name and address of the initiator
- PowerLogic P5 protection relay type and serial number
- Date of the incident
- Detailed description of the incident
- LED status and message displayed at the time of the incident
- List of stored events

Maintenance of Digital Circuit Breaker

Firmware upgrade of EOS-BM100

Launch the upgrade process

To launch the process of EOS-BM100 firmware upgrade, please follow the steps listed below:

1. Connect the laptop that with eSetup Easergy Pro installed to the PowerLogic P5, launch eSetup Easergy Pro and log in with "InstallerLevel".
2. In **DIGITAL CB** tab page, click the **Update firmware** on the top right, a dialog box will pop up.
3. In the dialog box **Update module firmware**, make selections as follows:
 - In the section of **Select file**, click on **Browse** button to select the firmware file (.sedp format).
 - After selected firmware file, two options of .bin files will be displayed for selection:
 - The file name contains "ssbl" is for boot loader.
 - The file name contains "firmware" is for application.
 - In the section of **Module information**:
 - in **Module** drop down list, select the module type *BM100*.
 - in **FileType** drop down list, select the type of firmware file, the selections are *Bootloader* for selected .bin file contains "ssbl" and *Application* for selected .bin file contains "firmware".

After made the above selections in the dialog box, click on **Update** button to start the firmware upgrade process. A bar of **Upgrade process** shows the status of the upgrade.

NOTE: The normal communication between PowerLogic P5 and EOS-BM100 module (including polling alarms/status/measurements, writing settings) will be paused when the firmware upgrade is in progress.

Backup and restore of EOS-BM100/EOS-MCMx00

Backup is an additional copy of data that can be used for restoring and recovery purposes. It covers settings directly or indirectly modified by the user. A backup is put in place to avoid permanent data loss and to ensure the integrity of stored

data, it means user can get back to a previous version and build up the data correctly if current data are found to be in error.

Possible reasons of backup are faulty device replacement, restoring the same device and massive commissioning.

The backup and restore processes are made by eSetup Easergy Pro with the account of *InstallerLevel*. If the logged-in account is not *InstallerLevel*, the software will prompt to switch account.

Backup

First, save .epz file, please follow the listed operations:

1. Connect PowerLogic P5 to the laptop with eSetup Easergy Pro installed and launch eSetup Easergy Pro, login with *InstallerLevel*.
2. In eSetup Easergy Pro, click on **COMMUNICATION** menu tab, then click on **Protocol configuration**. Under Serial port, select *Digital CB* in the drop down selection of **Remote port protocol**.
3. After PowerLogic P5 reboot, go to **Digital CB** menu tab, click on **Module configuration**, enable BM100/MCMx00 in the list.
4. From the tool bar of eSetup Easergy Pro, click soft disk icon  or the small triangle at right to **Save** or **Save as...** the .epz file.

Then make the backup:

1. Open the .epz file you have saved in eSetup Easergy Pro.
2. In **Digital CB** menu tab, section BM100 **configuration** or **MCMx00 configuration**, click the **Backup...** button on top at right of the interface.
3. In the pop-up window **Backup module settings**, click on **Browse** button to select folder for the backup.
4. In **Module information** frame, type in a label in the input box besides **Label** to tag the backup file. The label shall be composed by not more than 32 alphanumeric characters. Label can be empty.
5. If **Encrypted settings** is enabled, twice of password input is requested to double confirm. The password shall compliant with the following rules:
 - Length of password: 6 to 32 characters.
 - The password is a combination of upper-case and lower-case alphanumeric characters and special characters. Special characters include !#\$%&'()*+,-./;,<=>?@[^_`{}~
 - If **Encrypted settings** is not enabled indicating no password required.
6. Click on **Backup** button.

NOTE: Errors or warnings during backup process will be reported in eSetup Easergy Pro.

Restore

You can write back the configuration to EOS-BM100/EOS-MCMx00 module through eSetup Easergy Pro. Please ensure PowerLogic P5 is connected to laptop and the eSetup Easergy Pro is launched. Please make the following operations:

1. Save and open .epz file.

2. In Digital CB menu tab, click on the **Open file** button of the tool bar to open the .epz file you have saved. After file opened:
 - a. In **Digital CB** menu tab, click on **Restore...** button on top at right of the interface. There will be a popup window with the warning text "Restoring the module settings...Do you want to proceed?", click **Yes** to continue or **No** to cancel.
 - b. In the pop-up window, click on the **Browse** button to find the backup file.
 - c. If you have enabled Encrypted settings, you will have to input password.
 - d. Click on **Restore** button to restore the backup file.

NOTE: Errors or warnings during restore process will be reported in eSetup Easergy Pro.

After the backup file is restored, please write the changes to PowerLogic P5:

1. Switch to **FILE** view of eSetup Easergy Pro, click on the small triangle of the **File** button, select **Copy all to DEVICE**, the changes will be copied to device.
2. Switch to **DEVICE** view, click on the small triangle of the **Write** button, select **Write changes**, the restored configuration will be written to EOS-BM100/EOS-MCMx00.

Restore the Zigbee connection

In the following cases, the connection to Zigbee sensors will have to be restored:

- The Zigbee board is replaced
- Update of PowerLogic P5 firmware
- PowerLogic P5 is replaced.

The Zigbee board is replaced

After the Zigbee board is replaced by a new Zigbee board, the connection between the new Zigbee board and the Zigbee sensors will be restored by PowerLogic P5 automatically, so that the Zigbee sensors will be connected to the new Zigbee board without manual configuration.

Update of PowerLogic P5 firmware

During the update of firmware, PowerLogic P5 will restore the configuration of the connections with Zigbee sensors, the connection to the sensors will not be lost after the firmware update.

It is also possible to backup and restore the configuration through eSetup Easergy Pro, please follow the steps of Backup and restore the Zigbee connection manually, page 642.

PowerLogic P5 is replaced

Since the device is replaced, the Zigbee connection will have to be restored from the backup-ed .epz file to the new PowerLogic P5 device. Therefore the followed operations have to be made before and after replacing the PowerLogic P5:

1. Before replacing: save the configuration to .epz file to backup.
2. After replacing: restore the configuration from the saved .epz file to the new PowerLogic P5.

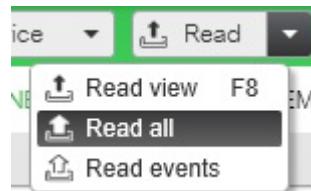
The backup and restore are made through eSetup Easergy Pro, please follow the steps of Backup and restore the Zigbee connection manually, page 642.

Backup and restore the Zigbee connection manually

To backup the Zigbee connection:

1. Connect PowerLogic P5 to the laptop with eSetup Easergy Pro installed, launch eSetup Easergy Pro and login.
2. In eSetup Easergy Pro, click the **Read** button on the tool bar, then click on **Read view** or **Read all** in the dropdown list.

Figure 373 - Read button and dropdown list

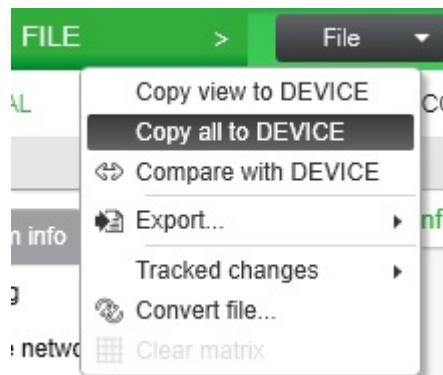


3. After read in, click the soft disk icon or the small triangle at right to **Save** or **Save as...** the .epz file.
4. The Zigbee connection is backup-ed to the .epz file.

To restore the Zigbee connection:

1. Connect PowerLogic P5 to the laptop with eSetup Easergy Pro installed, launch eSetup Easergy Pro and login.
2. In eSetup Easergy Pro, click the **Open file** button on the tool bar, select to open the .epz file with the backup of Zigbee connection.
3. After the .epz file is opened, in the **FILE** view, go to **GENERAL/Zigbee network**, click on the **File** button, then click on **Copy view to DEVICE** if you want to copy only the configuration of Zigbee network, or click on **Copy all to DEVICE** if you want to copy all.

Figure 374 - File button and dropdown list



4. Switch to the **DEVICE** view of eSetup Easergy Pro, go to **GENERAL/Zigbee network**, click on the **Restore file** button on the top right.
5. In the pop-up window, click on **Yes** to start the restore. If you click on **No**, the restore will not be started.
6. When the restore is completed, there will be a pop-up window to prompt for a restart of the PowerLogic P5, click on **Yes** to restart immediately or click on **No** to restart later.

Zigbee board firmware upgrade

The operations to make the update are as follows:

1. Connect the laptop with eSetup Easergy Pro installed to PowerLogic P5, launch eSetup Easergy Pro and log in with "InstallerLevel". If the logged-in account is not InstallerLevel, the software will prompt to switch account.
2. In eSetup Easergy Pro/**GENERAL/Zigbee network**, click on the **Update firmware...** button.
3. The **Update module firmware** window will be popped-up, click on the **Browse** button to select upgrade .gbl file.
4. You can find current version of the firmware of the Zigbee board after **EXR ProcApp version**, for example, "001.032.000", it's the version 1.32. Type in a version number newer than the current version in the input box of **Version**, for example 1.33. The input version must be newer than current version of the Zigbee board, if not, the update cannot be started.
5. In **Module information/Module** dropdown list, select *Zigbee*.
6. Click the **Update** button to start the update.
7. A pop-up window will be popped-up with information *Do NOT POWER OFF the device during the firmware update operation. Do you want to proceed?* Click **Yes** button to continue. If you click on the button **No**, the update process will not be started.
8. When update is finished, there will be an information *Update OK* displayed in the **Update** section, click **Close** button to finish the update.

PowerLogic CL110/PowerLogic TH110 replacing

To replace PowerLogic CL110/PowerLogic TH110, please operate as listed in followed:

1. Connect the laptop with eSetup Easergy Pro installed to PowerLogic P5, launch eSetup Easergy Pro and log in with "InstallerLevel". If the logged-in account is not InstallerLevel, the software will prompt to switch account.
2. Unpair sensor in eSetup Easergy Pro/**GENERAL/Zigbee network/Zigbee devices** by clicking **UnPair** button of the sensor to be replaced.
3. In the list of **Zigbee devices**, double click the cells of the sensor to be replaced to type in name and ID of the sensor which will replace actual sensor.
4. Click **Pair** button of the sensor in the list.
5. Power on if the new sensor is CL110.
6. Wait until the new sensor is paired or timeout.

Circuit breaker swapping

Before swap-in the circuit breaker, please ensure the Modbus slave ID of the EOS-BM100 module to be swapped-in is set to be the same with the EOS-BM100 module to be swapped-out so that the communication between PowerLogic P5 and the swapped-in EOS-BM100 will be rebuilt automatically.

After the circuit breaker is swapped, in PowerLogic P5 all alarms and status data of this circuit breaker will be set to default state. A "CB swap" alarm will pop up and the event will be logged in event buffer of PowerLogic P5. A "CB swap" event will be recorded as a reference to differentiate events between the swapped-out circuit breaker and the swapped-in circuit breaker.

In PowerLogic P5, circuit breaker swapping log will be created, includes swapping date, time, serial number of the swapped-in circuit breaker and the swapped-out circuit breaker, number of operations of the swapped-in circuit breaker and the

swapped-out circuit breaker. The log can be checked through eSetup Easergy Pro and Web HMI, under **Digital CB/BM100 maintenance**.

Truck data backup and restore

PowerLogic P5 backups the truck data from EOS-MCMx00 to EOS-BM100. When PowerLogic P5 found the truck data was updated in EOS-MCMx00 it will update the backup in EOS-BM100. Since the EOS-MCMx00 module will not be swapped out with the swapped out circuit breaker, after circuit breaker swapping, the truck data of the EOS-MCMx00 will not be of the swapped in circuit breaker. To solve this issue, PowerLogic P5 will restore the truck data from the EOS-BM100 to the EOS-MCMx00.

The backup and restore are automatic, event will be created accordingly.

The truck data are as listed below:

	Data
1	Presence
2	Serial number
3	Reference
4	Manufacturing date
5	Manufacturing
6	Installation date
7	Eref status, the calibration status of energy reference
8	Number of operations
9	Eref, the energy reference, unit: Joule (J)
10	Opening time
11	Closing time
12	Running current
13	Max. running current per operation
14	Max. power per operation
15	Opening time sample 1
16	Opening time sample 2
17	Opening time sample 3
18	Opening time sample 4
19	Opening time sample 5
20	Opening time sample 6
21	Opening time sample 7
22	Opening time sample 8
23	Opening time sample 9
24	Opening time sample 10
25	Closing time sample 1
26	Closing time sample 2
27	Closing time sample 3
28	Closing time sample 4
29	Closing time sample 5
30	Closing time sample 6
31	Closing time sample 7

	Data
32	Closing time sample 8
33	Closing time sample 9
34	Closing time sample 10
35	Max. current per operation sample 1
36	Max. current per operation sample 2
37	Max. current per operation sample 3
38	Max. current per operation sample 4
39	Max. current per operation sample 5
40	Max. current per operation sample 6
41	Max. current per operation sample 7
42	Max. current per operation sample 8
43	Max. current per operation sample 9
44	Max. current per operation sample 10

Zigbee sensor backup and restore

The TH110 sensors are installed on circuit breaker arms (upper arms phase A/B/C, lower arms phase A/B/C). When circuit breaker swap happens, the installed sensors are also swapped. To avoid pairing the swapped-in sensors again, PowerLogic P5 backups these sensors before circuit breaker swap. After circuit breaker swap, PowerLogic P5 restores swapped-in sensors network automatically. PowerLogic P5 creates backup success or failure event for each sensor in event list and creates restore success or failure alarms in alarm list.

NOTE: The restore will be failed in following cases:

- The Zigbee network status is not OK.
- Backup-ed data in EOS-BM100 with error.
- The Zigbee sensor to be restored is offline.
- The Zigbee sensors to be restored makes the number of paired Zigbee sensors exceeds 18 and the sensors to be restored are not mapped.

In case of restore failed, please configure the pairing operation manually.

End of life

At end of life, PowerLogic P5 protection relays must be dismantled to facilitate the recovery of the various constituent materials.

The proportion of recyclable material is higher than 65%. This percentage includes the metallic materials and marked thermoplastics conforming to the current legislation, as well as the subassemblies that must be sent to specialised treatment systems: 3 to 5 electronic cards, and an LCD screen that can easily be disassembled.

It is calculated according to "ECO'DEEE recyclability and recoverability calculation method" (version V1.20, September 2008, presented to ADEME, the French Agency for Environment and Energy Management).

Revision history

Document version	Description	
P5/EN M/11A		First edition for initial product release
2019-05	Hardware version	A
	Firmware version	V01
	Release / Build	001.029
	Configuration tool	eSetup Easergy Pro V2.0.0 or later
		CET850 V3.1.2 or later
P5/EN M/22A	Hardware version	A
2019-11	Firmware version	V01
	Release / Build	200.008
	Configuration tool	eSetup Easergy Pro V2.2.0 or later
		CET850 V3.2.0 or later
	Hardware	LPCT/LPVT available for P5U20
		Ethernet communication module with RSTP redundancy (reference REL51042)
	Local panel	Local panel layout enhanced
	$U_2 >$, $U_2 >>$	Negative sequence overvoltage protection (ANSI 47)
	$I_0 / U_0 >$, $I_0 / U_0 >>$	Neutral admittance protection (ANSI 21YN)
	$N >$	Motor restart inhibition function (ANSI 66) enhanced
	CB monitoring	CB monitoring function enhanced
	Firmware upgrade	Firmware upgrade feature
	USB data transfer	USB data transfer function available
	$I_2 >$ $I >$, $I >>$ $I_0 >$, $I_0' >$, $I_0' >>$ $I\phi >$, $I\phi >>$ $I_0\phi >$, $I_0\phi >>$, $I_0\phi >>>$	The following features are available: <ul style="list-style-type: none">STI and CO8 curves to the IEC and IEEE curve types, respectivelyIDMT reset curve
	Logic gate	Logic gate number increased to 250
P5/EN M/33A	Hardware version	A
2020-07	Firmware version	V01
	Release / Build	300.103
	Configuration tool	eSetup Easergy Pro V3.0.0 or later
		CET850 V3.3.0 or later
	Hardware	12I4O and 5I5O modules available
		24 to 48 V DC voltage power supply module available for P5x30
	Motor speed detection	Motor speed detection available
	Motor speed>1, Motor speed>2	Motor overspeed (ANSI 12) protection available
	Motor speed<1, Motor speed<2	Motor underspeed (ANSI 14) protection available

	ABS	Motor Anti-backspin (ABS) protection available
	Inrush	Inrush detection enhanced
	$Ih2>$	2nd harmonic detection (ANSI 68H2) removed
	Motor status	Motor status enhanced
	Logic timer	Logic timer available
	Global trip timer	Global trip timer available
P5/EN M/33B	Hardware version	A
2021-02	Firmware version	V01
	Release / Build	301.103
	Configuration tool	eSetup Easergy Pro V3.1.0 or later
		CET850 V3.4.0 or later
	VTS	Voltage transformer supervision enhanced
	Special access control	F1 key access control and communication SCADA access control available
P5/EN M/33C	Hardware version	A
2021-07	Firmware version	V01
	Release / Build	303.101
	Configuration tool	eSetup Easergy Pro V3.2.1 or later
		CET850 V3.6.1 or later
	Logic functions	The information for logic functions updated
P5/EN M/44A	Hardware version	A
2021-10	Firmware version	V01
	Release / Build	400.101
	Configuration tool	eSetup Easergy Pro V4.0.0 or later
		CET850 V4.0.0 or later
		Easergy Studio V9.3.3 or later
	Operate time delay	Global update of operate time delay philosophy. Start time compensation removed.
	General nomenclature update	IL1, IL2 and IL3 changed to IA, IB and IC; VL1, VL2, VL3 changed to VA, VB, VC; U12, U23, U31 changed to VAB, VBC, VCA, change of labels for protection stages, change of the units for modified protection elements
	64REF	Restricted earth/ground fault protection available
	Phase overcurrent protection	Harmonized direction and non-directional phase overcurrent protection with phase segregation information, 6 stages in total
	Earth fault over current protection	Harmonized direction and non-directional earth fault overcurrent protection, 6 stages in total
	Overfrequency	Two dedicated over frequency stages
	Underfrequency	Increase the number of stages to 8
	Residual overvoltage	Algorithm refinement
	Overvoltage/ Undervoltage	Algorithm updated to have phase to phase and phase to neutral voltage selection, phase segregation information added

	Advanced logic engine	More complex logic feature with ISaGRAF available
P5/EN M/44B	Hardware version	A
2022-07	Firmware version	V01
	Release / Build	402.101
	Configuration tool	eSetup Easergy Pro 4.2.0 or later
		CET850 V4.2.0 or later
		Easergy Studio V9.4.0 or later
	Rate of change of frequency protection	Algorithm revised, frequency and frequency + RoCoF modes introduced. Increased accuracy. 9 independent stages with the same settings and performance introduced.
	Overcurrent protection	Definite time setting range updated.
	Undercurrent protection	Pick-up setting range updated. Low-current block limit setting introduced. The function is now available in P5F30.
	Broken conductor protection	Algorithm revised. The precondition for operation is the positive phase sequence component greater than 5% of nominal value. 2nd stage with the same settings and performance introduced.
	Emergency restart	New automation function for motor application introduced.
	Virtual inputs	VI1 to VI10 are configurable virtual inputs, they can operate in pulse mode with a settable pulse length.
	Default mimic	Improved manipulation of default mimic screens. Use arrow-up or arrow-down keys to scroll between visible Mimos 1-5.
	Disturbance recorder	Auto-Reclose, CB monitoring, SOL, CTS/VTS related signals added to Disturbance Recorder.
	Alarms	Fault direction added to 67/67N related alarms.
	System	Confirmation popup window displayed when firmware upgrade is completed successfully.
		Special access control by F1 button enhanced with auto log-out within 3 mins and reset button behaviour.
		Connection between P5 and Easergy Pro improved.
	Communication	Ethernet/IP protocol data model updated.
		Modbus protocol data model updated.
		IEC 60870-5-103 protocol data model updated.
		Enhancements and bug fixes in IEC 61850 fPN feature.
	Advanced logic engine	Advanced logic can be now viewed with ISaGRAF Workbench Demo only (without ISaGRAF Workbench license).
	Nomenclature	Change for setting units from ln/% to pu.
	Continuous engineering	Regular corrections & bug fixes package introduced.
P5/EN M/44C	Hardware version	A
2022-09	Firmware version	V01
	Release / Build	402.201
	Configuration tool	eSetup Easergy Pro 4.2.0 or later
		CET850 V4.2.0 or later
		Easergy Studio V9.4.0 or later

	Rebranding to PowerLogic	The product has been renamed to PowerLogic keeping its design, specification, performance, missing profile, safety and reliability unchanged.
P5/EN M/44D	Hardware version	A
2023-05	Firmware version	V01
	Release / Build	500.102
	Configuration tool	eSetup Easergy Pro 4.3.0 or later CET850 V4.4.2 or later Easergy Studio V9.4.0 or later
	Offer structure	P5T30 Transformer Differential protection relay introduced as new model in P5x30 platform. Settable Cybersecurity license introduced. New configuration options introduced: E - Settable CS, F - Settable CS and Advanced Logic Engine.
	Interposing CT	New possibility for neutral current measurement introduced. CSH30 interposing CT can be used now to interface CSH neutral current inputs with standard 1A or 5A core-balance CTs.
	Recording	Last fault record summary screen introduced. Additional sampling rate option introduced: 24 samples/cycle.
	Cybersecurity	Compatibility with LDAP server introduced.
	Continuous engineering	Regular package of corrections & bug-fixes introduced.
P5/EN M/44D	Hardware version	A
2023-05	Firmware version	V01
	Release / Build	500.103
	Configuration tool	eSetup Easergy Pro 4.3.0 or later CET850 V4.4.2 or later Easergy Studio V9.4.0 or later
	Continuous engineering	Regular package of corrections and adaptations to support the manufacturing process.
P5/EN M/44E	Hardware version	A
2023-11	Firmware version	V01
	Release / Build	500.104
	Configuration tool	eSetup Easergy Pro 4.3.0 or later CET850 V4.4.2 or later Easergy Studio V9.4.0 or later
	Continuous engineering	The issue with incorrect UTC time records in Daylight Saving Time mode has been fixed.
P5/EN M/44E	Hardware version	A
2024-04	Firmware version	V01
	Release / Build	500.104
	Configuration tool	eSetup Easergy Pro 4.3.0 or later CET850 V4.4.0 or later Easergy Studio V9.3.4 or later

P5/EN M/02-501A 2024-05	Hardware release	Combined HSR/PRP FO + RS485 RJ45 communication module has been introduced. This module replaces old HSR/PRP module (REL51023 / REL51033).
		Extension and backup memory module with wireless receiver (Zigbee) has been introduced.
	Hardware version	B
	Firmware version	V02
	Release / Build	501.101
	Configuration tool	eSetup Easergy Pro 4.7.0 or later
		CET850 V4.12.0 or later
		Easergy Studio V9.6.0 or later
	Hardware version	Introduction of hardware version B of the main board. Additional memory component (NVRAM) has been added increasing the product's memory capacity to enable further functional evolution.
	Offer structure	P5L30 Line Differential protection and control relay has been introduced as a new model in P5x30 platform. P5L30 model contains by default InterRelay module in slot L.
		Optional InterRelay communication modules have been introduced to P5x30 platform (slot L). The modules can be selected in P5F30, P5M30, P5T30 to enable relay-to-relay protection communication (ANSI 85).
		Combined HSR/PRP RJ45 + RS485 RJ45 communication module has been introduced.
	Monitoring	Digital Circuit Breaker condition monitoring and advanced control functionalities have been introduced.
		Switchgear condition monitoring functionality has been introduced.
	Measurement	Sequence voltages and currents have been added to measurements.
	Protection	Trip conditioning matrix has been introduced.
		Setting step for under-/overvoltage protection (ANSI 27/59) thresholds has been changed from 0.01 to 0.001 pu.
		Restricted earth/ground fault protection (ANSI 64REF) scaling factors low setting has been changed down to 0.01.
		Transformer monitoring function (ANSI 26/63) has been introduced to P5F30 and P5U20 models.
		Arc sensor alarms have been introduced to matrix.
		Trip circuit supervision (TCS) default logic has been enhanced.
	Digital inputs	Setting of digital inputs for nominal DC voltage range has been increased to 250V.
	Human-machine interface	Digital CB menu branch has been introduced to HMI.
		Download of the protection settings and events to USB type A port has been introduced.
		Number of customizable mimics increased from 5 to 10
		Second default mimic for P5T30 and P5L30 models has been introduced with differential/bias currents.
		Setting to disable automatic alarm pop-up has been introduced

Continuous engineering	Communication diagnostics capabilities have been improved
	Regular package of corrections and bug-fixes has been introduced.

Order information

Protection relay

For ordering, please visit www.se.com and use PowerLogic P5 Product Selector. Alternatively, please contact Customer Care Center stating a complete model number (according to below table) and quantity.



PowerLogic P5

Schneider Electric

Application	Slot D	Slot E	Slot B	Slot C	Slot A	Slot L	Slot M	Slot N	Slot P	Model	Firmware	Function	Language
Feeder protection relay	P5F30 -												
Motor protection relay	P5M30												
Transformer differential relay	P5T30												
Line differential relay	P5L30												
Universal protection relay	P5U20												
Voltage protection relay	P5V20												
Slot D - Additional I/O in P5x30													
Without	A												
6DI + 4DO	B												
3 Arc sensors + 3DI + 3DO	C												
5DI + 5DO	D												
12DI + 4DO	E												
Slot E - Additional I/O in P5x30													
Without	A												
6DI + 4DO	B												
3 Arc sensors + 3DI + 3DO	C												
5DI + 5DO	D												
12DI + 4DO	E												
Slot B - Power supply													
48 - 250 V DC / 100 - 230 V AC + 4DI + 3DO + WD	C												
24 - 48 V DC + 4DI + 3DO + WD	D												
Slot C - Additional I/O													
Without	A												
6DI + 4DO	B												
5DI + 5DO	C												
12DI + 4DO	E												
Slot A - CT/VT													
3 phase CT + 2 neutral CT (available for P5U20)	B												
3 phase CT + 1 neutral CSH (available for P5U20)	C												
4 VT (available for P5V20)	D												
3 phase CT + 2 neutral CT + 4 VT (available for P5F30, P5M30)	G												
3 phase CT + 1 neutral CSH + 4 VT (available for P5F30, P5M30)	H												
3 LPCT + 1 neutral CSH + 4 LPVT (available for P5F30, P5M30, P5U20)	I												
6 phase CT + 2 neutral CT + 1 VT (available for P5T30)	J												
3 phase CT + 2 neutral CT + 4 VT (available for P5L30)	L												
3 phase CT + 1 neutral CSH + 4 VT (available for P5L30)	M												
Slot L - 2nd Ethernet communication port													
Without (except P5L30)	A												
Ethernet TP module with RSTP (2* RJ45) (except P5L30)	B												
InterRelay FO module 1310 nm SM 40 km (2*LC)	D												
InterRelay FO module 1310 nm MM 2 km (2*LC)	E												
Slot M - Ethernet communication port													
Without	A												
Ethernet TP module with RSTP (2* RJ45)	B												
Ethernet FO module with RSTP (2*LC)	C												
Combined Ethernet TP module with HSR/PRP and PTP (2* RJ45) + RS485 serial (2* RJ45)	G												
Combined Ethernet FO module with HSR/PRP and PTP (2*LC) + RS485 serial (2* RJ45)	H												
Slot N - Serial communication port													
Without	A												
RS485 serial line module	E												
RS485 FO serial line module	F												
(Occupied when when option G is selected on Slot M)	G												
(Occupied when when option H is selected on Slot M)	H												
Slot P - Extension port													
Without	A												
Extension module + Backup memory	H												
Extension module + Backup memory + Wireless Communication + Condition Monitoring	W												
Model version													
Version A - for V01 firmware	A												
Version B - for V02 firmware	B												
Firmware version													
Latest firmware version V02.501	A												
Firmware V01.402 - hardware version A	E												
Firmware V01.500.104 - hardware version A	F												
Function packages													
Cybersecurity Basic - firmware V01.402	A												
Cybersecurity Advanced IEC 62443 4-2 Security Level 1 - firmware V01.402	B												
Cybersecurity Basic & Advanced Logic Engine - firmware V01.402	C												
Cybersecurity Advanced IEC 62443 4-2 Security Level 1 & Advanced Logic Engine - firmware V01.402	D												
Settable cybersecurity (Basic or Advanced IEC 62443 4-2 SL1) - firmware V01.500 and higher	E												
Settable cybersecurity (Basic or Advanced IEC 62443 4-2 SL1) + Advanced Logic Engine - firmware V01.500 and higher	F												
Languages													
English	A												
English - Chinese	B												
English - French	C												
English - Italian	E												
English - Polish	F												
English - Portuguese	G												
English - Russian	H												
English - Spanish	I												
English - Tr. Chinese	L												
English - English ANSI	K												

NOTE: For the applicable slot occupation rules for your PowerLogic P5 protection relay ordered, refer to Slot occupation rules, page 653 to get more details.

Slot occupation rules

The slot occupation rules for PowerLogic P5 protection relay based on your ordering are stated as the table below:

30TE withdrawable HW possible combinations				No. of boards				No. of digital I/O	
	slot D	slot E	slot C	5I5O	arc-flash	6I4O	12I4O	DI	DO
A A * A	cover	cover	cover	0	0	0	0	4	3 + WD
A A * B	cover	cover	6I4O	0	0	1	0	10	7 + WD
B A * B	6I4O	cover	6I4O	0	0	2	0	16	11 + WD
B B * B	6I4O	6I4O	6I4O	0	0	3	0	22	15 + WD
C A * A	arc-flash	cover	cover	0	1	0	0	7	6 + WD
C A * B	arc-flash	cover	6I4O	0	1	1	0	13	10 + WD
C B * B	arc-flash	6I4O	6I4O	0	1	2	0	19	14 + WD
C C * A	arc-flash	arc-flash	cover	0	2	0	0	10	9 + WD
C C * B	arc-flash	arc-flash	6I4O	0	2	1	0	16	13 + WD
A A * D	cover	cover	5I5O	1	0	0	0	9	8 + WD
B A * D	6I4O	cover	5I5O	1	0	1	0	15	12 + WD
B B * D	6I4O	6I4O	5I5O	1	0	2	0	21	16 + WD
C A * D	arc-flash	cover	5I5O	1	1	0	0	12	11 + WD
C B * D	arc-flash	6I4O	5I5O	1	1	1	0	18	15 + WD
C C * D	arc-flash	arc-flash	5I5O	1	2	0	0	15	14 + WD
D A * D	5I5O	cover	5I5O	2	0	0	0	14	13 + WD
B D * D	6I4O	5I5O	5I5O	2	0	1	0	20	17 + WD
C D * D	arc-flash	5I5O	5I5O	2	1	0	0	17	16 + WD
D D * D	5I5O	5I5O	5I5O	3	0	0	0	19	18 + WD
A A * E	cover	cover	12I4O	0	0	0	1	16	7 + WD
E A * B	12I4O	cover	6I4O	0	0	1	1	22	11 + WD
B E * B	6I4O	12I4O	6I4O	0	0	2	1	28	15 + WD
C A * E	arc-flash	cover	12I4O	0	1	0	1	19	10 + WD
C E * B	arc-flash	12I4O	6I4O	0	1	1	1	25	14 + WD
C C * E	arc-flash	arc-flash	12I4O	0	2	0	1	22	13 + WD
E A * D	12I4O	cover	5I5O	1	0	0	1	21	12 + WD
B E * D	6I4O	12I4O	5I5O	1	0	1	1	27	16 + WD
C E * D	arc-flash	12I4O	5I5O	1	1	0	1	24	15 + WD
D E * D	5I5O	12I4O	5I5O	2	0	0	1	26	17 + WD
E A * E	12I4O	cover	12I4O	0	0	0	2	28	11 + WD
E E * B	12I4O	12I4O	6I4O	0	0	1	2	34	15 + WD
C E * E	arc-flash	12I4O	12I4O	0	1	0	2	31	14 + WD
E E * D	12I4O	12I4O	5I5O	1	0	0	2	33	16 + WD
E E * E	12I4O	12I4O	12I4O	0	0	0	3	40	15 + WD

Accessories

Model number		Description
Communication Modules		
REL51038	<input type="checkbox"/>	Ethernet TP module - slot M
REL51039	<input type="checkbox"/>	Ethernet FO module - slot M
REL51042	<input type="checkbox"/>	Ethernet TP module - slot L
REL51036	<input type="checkbox"/>	RS485 serial line module - slot N
VW3A8306RC	<input type="checkbox"/>	RS485 line termination accessory
LV434211	<input type="checkbox"/>	RJ45 to open 2/4 wire adaptor for Modbus
REL51040	<input type="checkbox"/>	Fiber optic serial line module - slot N
REL51034	<input type="checkbox"/>	Extension module - slot P
REL51044	<input type="checkbox"/>	Extension Zigbee module - slot P
REL51043	<input type="checkbox"/>	P2P, InterRelay module(FO) module with 40 km single-mode SFP - slot L
REL51053	<input type="checkbox"/>	P2P, InterRelay module(FO) module with 2 km multi-mode SFP - slot L
REL51048	<input type="checkbox"/>	Combined Ethernet HSR/PRP 2TP + RS485 module- slots M-N
REL51049	<input type="checkbox"/>	Combined Ethernet HSR/PRP FO + RS485 module - slots M-N
External modules		
59641	<input type="checkbox"/>	8 temperature sensor module (MET148-2)
REL51045	<input type="checkbox"/>	IRIG-B module
59660	<input type="checkbox"/>	0.6m remote module connection cord
59661	<input type="checkbox"/>	2m remote module connection cord
59662	<input type="checkbox"/>	4m remote module connection cord
Sensors		
59635	<input type="checkbox"/>	Core balance CT, Ø=120mm (CSH120)
59636	<input type="checkbox"/>	Core balance CT, Ø=200mm (CSH200)
59637	<input type="checkbox"/>	Core balance CT, Ø=300mm (CSH300)
59634	<input type="checkbox"/>	CSH30 interposing ring CT
REL52801	<input type="checkbox"/>	Arc accessory VA1DA-20 Arc sensor 20m
REL52802	<input type="checkbox"/>	Arc accessory VA1DA-20S-HF Arc sensor 20m shielded halogen free
REL52803	<input type="checkbox"/>	Arc accessory VA1DA-20S Arc sensor 20m shielded
REL52804	<input type="checkbox"/>	Arc accessory VA1DA-6 Arc sensor 6m connect cable
REL52805	<input type="checkbox"/>	Arc accessory VA1DA-6S-HF Arc sensor 6m shielded halogen free
REL52806	<input type="checkbox"/>	Arc accessory VA1DA-6S Arc sensor 6m shielded
REL52807	<input type="checkbox"/>	Arc accessory VA1EH-20 Arc sensor 20m pipe sensor
REL52808	<input type="checkbox"/>	Arc accessory VA1EH-20S Arc sensor 20m pipe sensor shielded
REL52809	<input type="checkbox"/>	Arc accessory VA1EH-6 Arc sensor 6m pipe sensor
REL52810	<input type="checkbox"/>	Arc accessory VA1EH-6S Arc sensor 6m pipe sensor shielded
Mounting accessories		
REL51032	<input type="checkbox"/>	20TE flush mounting accessory
REL51052	<input type="checkbox"/>	30TE flush mounting accessory
REL51021	<input type="checkbox"/>	19inch rack mounting accessory
REL51018	<input type="checkbox"/>	30TE blanking plate for rack mounting
REL51019	<input type="checkbox"/>	20TE blanking plate for rack mounting

REL51020	<input type="checkbox"/>	10TE blanking plate for rack mounting
eSetup Easergy Pro connection cable		
59700	<input type="checkbox"/>	PC cord USB
LPIT accessories		
EMS59572	<input type="checkbox"/>	VT adapter
EMS59573	<input type="checkbox"/>	LPVT hub connector
REL51037 ¹⁷⁴	<input type="checkbox"/>	LPIT Test Box
REL51089 ¹⁷⁴	<input type="checkbox"/>	LPCT Test Socket with cover
REL51090 ¹⁷⁴	<input type="checkbox"/>	LPCT Test Plug
REL51092 ¹⁷⁴	<input type="checkbox"/>	LPVT Test Socket with cover
REL51093 ¹⁷⁴	<input type="checkbox"/>	LPVT Test Plug
P7M12025	<input type="checkbox"/>	LPVT transducer
REL51095 ¹⁷⁴	<input type="checkbox"/>	T-box 3-way RJ45 junction
Spare parts		
REL51077	<input type="checkbox"/>	Spare 2 screw type connectors kit
REL51078	<input type="checkbox"/>	Spare accessories kit for CT/VT
REL51079	<input type="checkbox"/>	Spare accessories kit for LPCT/LPVT
REL51088 ¹⁷⁴	<input type="checkbox"/>	Spare cable for LPIT Test Box

174. Please contact Schneider Electric for availability.

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