Installation manual







Moulded case circuit breakers 630 A to 1600 A CE

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1 Safety instructions

Warnings and instructions

This documentation contains safety advice which must be respected for your own safety and to prevent property damage. Safety instructions relating to your own safety are identified by a safety warning symbol in the documentation. Safety advice relating to damage to property is identified by 'Notice'.

The safety warning symbols and the wording below are classified according to the risk level.



Danger

Danger indicates a situation of imminent danger which, unless averted, will result in death or serious injuries.



Warning

Warning indicates a potentially dangerous situation which, if it cannot be avoided, may result in serious injuries or even death.



Caution

Caution indicates a potentially dangerous situation which, unless averted, may result in minor or moderate injuries.



Notice

Notice indicates a warning message about possible equipment damage.



Information

Information also indicates important instructions for use and particularly relevant information regarding the product, which must be respected to ensure effective and safe use.



Qualified personnel

The product or the system described in this documentation must be installed, operated and maintained by qualified personnel only. Hager Electro accepts no responsibility regarding the consequences of this equipment being used by unqualified personnel. Qualified personnel are those people who have the necessary skills and knowledge for building, operating and installing electrical equipment, and who have received training enabling them to identify and avoid the risks incurred.

Appropriate use of Hager products

Hager products are designed to be used only for the applications described in the catalogues and in the technical documentation relating to them. If products and components from other manufacturers are used, they must be recommended or approved by Hager. Appropriate use of Hager products during transport, storage, installation, assembly, commissioning, operation and maintenance is required to guarantee problem-free operation in complete safety. The permissible ambient conditions must be respected.

Publication liability

The contents of this documentation have been reviewed in order to ensure that the information is correct at the time of publication. Hager cannot, however, guarantee the accuracy of all the information contained in this documentation. Hager assumes no responsibility for printing errors and any damage they may cause. Hager reserves the right to make the necessary corrections and modifications to subsequent versions.



2 Using this guide

Purpose of the document

This manual is designed to provide users, electrical installers, panel builders and maintenance personnel with the technical information necessary for the installation and commissioning of circuit breakers PW1600 with electronic trip units.

Field of application

This document is applicable to the PW1600 switch-disconnectors and circuit breakers of the h3+ range.

Revisions

| Version | Date |
|------------|---------|
| 6LE009395A | 2024-11 |

Documents to consult

| Document | Reference |
|--|------------|
| User manual for sentinel trip units | 6LE007969A |
| User manual for sentinel Energy trip units | 6LE008147A |
| User manual for circuit breakers | 6LE009399A |
| sentinel Energy Modbus communication guide | 6LE007964A |
| HTD210H panel display user guide | 6LE002999A |
| Rotary control installation manual | 6LE009240A |
| Installation manual for rotary control accessories | 6LE009406A |

You can download these publications and other technical information from our website: www.hager.com

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3 Description of circuit breakers

3.1 Description



Fig. 1: Description of the circuit breaker

- \bigcirc Front connections
- ② Front cover
- ③ Identification label
- ④ Transparent sealable cover of the trip unit
- 5 sentinel Energy trip unit
- 6 Operating handle
- \bigcirc Extension cable



3.2 Description of the accessories



Fig. 2: Description of the accessories

- ① Connection cable for neutral voltage measurement vN^[1]
- Terminal strip D-type (ZSI, remote display HTD210H, Modbus communication module, 24 V power supply)
- 3 Coil terminal blocks
- ④ Auxiliary contacts AX
- (5) Alarm contact AL
- 6 SH shunt trip coil^[2]
- Terminal strip of the external neutral current sensor ENCT
- Output Alarm Contact module OAC
- (9) Locking the circuit breaker in the open or closed position using padlocks
- 10 FS Fault trip contact
- 1 Undervoltage release coil UV or shunt trip coil SH

- ^[1] This cable is visible on a 3P circuit breaker fitted with a sentinel Energy trip unit
- ^[2] The slot is dedicated ONLY to the SH shunt trip coil. It is not permitted to install a UV undervoltage coil in this slot





Fig. 3: Description of the accessories

- 1 Panel display HTD210H
- ② Adapter HWY210H for remote panel display
- ③ UVTC Undervoltage Time Delay Controller
- (4) Communication module
- 5 Front connection covers
- 6 Locking the circuit breaker in the open or closed position using keylocks
- External neutral current sensor ENCT
- 8 Rotary control



3.3 Function and connection of electrical accessories

Terminal strip A-type

This connector is for using an undervoltage release coil UV or a shunt trip coil SH.

Connection of wires via the quickconnect system.



Terminal strip A-type

ENCT sensor terminal strip

This terminal strip allows connection of an external neutral current sensor for 3-pole circuit breakers.

Connection of wires via the quickconnect system.

ENCT sensor terminal strip





Information

Connecting cable vN

In the case of a 3-pole circuit breaker fitted with the sentinel Energy trip unit and installed in an earthing system in which the neutral is distributed, the vN cable must be connected to the neutral potential.

This connection is essential to obtain correct measurement of phase-neutral voltages V1N, V2N, V3N, powers per phase and for operation of the advanced protections against active power feedback and undervoltage or overvoltage.



Terminal strip D-type

This terminal strip is used to connect various components to the electronic trip unit:

- External 24V power supply.
- Communication accessories such as the remote display panel and the Modbus COM module.
- A connection between circuit breakers for zone selectivity (ZSI).

1 Trip unit power supply

24 V + and -: external 24V DC SELV power supply (recommended product reference Hager HTG911H) is necessary to use the OAC output alarm contacts module and/or the permanent power supply of the trip unit.

2 Communication accessories

CIP 1 and 2: connection to remote display HTD210H and Modbus communication module for Energy sentinel trip unit

For zone selectivity on the STD protection and/or ground fault protection.

Connection to downstream circuit breakers:

- ZSI OUT STD: selectivity on the Short time delay protection
- ZSI OUT GF: selectivity on the ground-fault protection
- ZSI OUT COM: common

Connection to the upstream circuit breaker:

- ZSI IN STD: selectivity on the Short time delay protection
- ZSI IN GF: selectivity on the ground-fault protection
- ZSI IN COM: common









Signalling contact

AX Auxiliary Contact

Signalling the circuit breaker open/closed status.

2 Contact AXO / AXC

Indicates the open/closed position of the rotary handle.

Alarm contact AL

Signalling of circuit breaker tripping (opening).

4 FS Fault trip contact

Unlike OAC terminal strips which gives accurate information about the cause of the tripping, this terminal strip gives general tripping information.

5 Output Alarm Contacts OAC

sentinel trip unit:

- LTD, tripping after Long Time Delay protection
- STD/INST, Short Time Delay or Instantaneous protection
- GF, tripping after earth fault protection
- PTA, Overload pre-alarm activation
- HWF, tripping following a critical system alarm
- DOC, common

sentinel Energy trip unit:

- LTD by default, tripping after Long Time Delay protection
- STD/INST by default, Grouped Alarm (configured for Short Time Delay or Instantaneous tripping)
- GF by default, tripping after ground-fault protection
- PTA by default, activation of the overload prealarm PTA1
- HWF by default, tripping following a critical system alarm
- DOC, common

(i)

Information

To ensure that the proper operation of the OAC, a 24V DC SELV external power supply should be connected.

To connect a 24V DC power supply for a circuit breaker fitted with a trip unit:

- sentinel, it is necessary to add the connection harness referenced HYH957H and the type D terminal strip referenced HXH957H.
- sentinel Energy, it is necessary to add the type D terminal strip with reference HXH957H.

Contact AX, AXO, AXC, AL, FS



Output Alarm Contacts OAC



Communication module connections

Connection via RJ45 cable to an RS 485 serial communication network using the Modbus-RTU protocol or an Ethernet network using the Modbus-TCP protocol.

RJ45 connections





3.4 Connecting diagram

Circuit breaker fitted with a sentinel trip unit





Circuit breaker fitted with a sentinel Energy trip unit



Description of circuit breakers Connecting diagram



| Description | Connection |
|-------------|--|
| ENCT | External sensor |
| ZSI | Zone selectivity function |
| 24 V DC | External power supply |
| COM | Communication module |
| OAC | Output Alarm Contacts |
| FS | Fault trip contact |
| AL | Alarm contact |
| UV or SH2 | UV undervoltage coil or 2 nd SH shunt trip coil |
| SH | SH shunt trip coil |
| AX | Auxiliary contact: 3 contacts signalling the circuit breaker open/closed status |
| AXO | 2 pre-opening auxiliary contacts: The pre-opening function provide information about the position of the rotary handle, specifically used to anticipate the opening of safety tripping devices |
| AXC | 2 pre-opening auxiliary contacts: The pre-closing function provides information about the position of the rotary handle, for ensuring the power supply to a control device before the circuit breaker closes |

The cables used must have a cross section of between 0.6 mm² and 2.5 mm². They can be flexible or rigid.

In order to be correctly maintained in the terminal blocks, the connected cables must be stripped in advance by 10 to 12 mm. The flexible cables must not be twisted. Only one cable can be connected to one terminal.

4 **Description of the electronic trip unit**

Circuit breakers of the h3+ range are equipped with a sentinel or sentinel Energy electronic trip unit on the front to protect against overloads and short circuits.



The detailed description of the characteristics, functions and settings is available in the sentinel 6LE007969A trip unit user manual and the sentinel Energy 6LE008147A trip unit user manual.

5 Circuit breaker usage conditions

Compliance with the standards

The h3+ circuit breakers and the related auxiliary devices comply with the following standards:

International standards

- IEC 60947-1: General rules
- IEC 60947-2: Circuit breakers
- IEC 60947-3: Switch disconnectors
- IEC 60947-5-1: Control circuit devices and switching elements

Degree of contamination

h3+ circuit breakers are certified for operation in pollution degree 3 environments as defined by IEC standard 60947-1.

Temperature

h3+ circuit breakers can be used at temperatures between -25 °C and 70 °C. For ambient temperatures above 50 °C, the devices must be derated, refer to the values given in the Technical Catalogue . The acceptable storage temperature range in the original packing is from -40°C to 70°C.

Humidity

h3+ circuit breakers can be used in an atmosphere with a relative humidity of max. 45 to 85%.

Altitude

h3+ circuit breakers can be used without derating up to an altitude of 2000 m. Above this, refer to the values provided in the Technical Catalogue .

Vibrations

h3+ circuit breakers can withstand mechanical vibrations. They are compliant with the requirements of the standard IEC 60068-2-52:

- 2.0 to 13.2 Hz and amplitude +/- 1 mm.
- 13.2 to 100 Hz acceleration +/- 0.7 g.
- Resonance frequency (+/- 1 mm / +/- 0.7 g) for 90 minutes.

Excessive vibration may cause nuisance (false) tripping and/or damage to connections and/or mechanical parts.

Impacts

h3+ breakers can withstand impacts with an acceleration of 200 m/s² (20 g) max.

Environment

h3+ circuit breakers must be used in an environment:

- Without excess of water vapour, oil vapour, dust or corrosive gases.
- Without sudden temperature fluctuations and without condensation.
- With the following levels of chemical compounds:
 - Ammonia (NH3): 0.5 ppm max.
 - Hydrogen sulphide (H2S)/sulphur dioxide (SO2)/hydrogen chloride (HCl): 0.1 ppm max.
 - Chlorine (Cl2): 0.05 ppm max.



6 Circuit breaker operating mode

6.1 Circuit breaker status

The state of the circuit breaker is indicated by the position of the operating handle. There are three different states.





6.2 Circuit breaker operation

To open or close the circuit breaker, use the operating extension lever.



6.3 Reset after tripping

Warning

Risk of reclosing due to an electrical fault

In the event of tripping, do not close the circuit breaker without checking or possibly repairing the electrical installation.

Failure to follow these instructions may result in injuries or material damages.





6.4 Work on a circuit breaker

Danger

Risk of electric shock

Make sure that the device is only operated by qualified personnel in accordance with the installation standards in force in the relevant country.

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

- Disconnect all power supply sources from this equipment before performing any internal or external operation.
- Trip it by pressing the PUSH TO TRIP button.
- Use a voltage detection device with an appropriate nominal value to confirm that the power supply is cut off.



7 Storage

Circuit breaker should be stored:



8 Identification of the circuit breakers

Labels on the circuit breaker and packaging

h3+ circuit breakers can be identified by means of the various labels affixed to the product or packaging.



1 Identification label on the circuit breaker

- 2 Identification label on the packaging
- ③ Type plate on the circuit breaker



Information

For more information on the codification and the references indicated on the labels, refer to the Technical Catalogue .

Identification label on the circuit breaker



- ① Circuit breaker reference
- 2 Circuit breaker designation
- ③ Configuration identifier



Circuit breaker type plate



- rig. 4. nor circuit breaker teeninear speene
- 1 Ue: Operating voltage
- 2 Icu: Rated ultimate short-circuit breaking capacity at the rated operating voltage Ue
- ③ Ics: Rated service short-circuit breaking capacity
- ④ Icw 1 s: Rated short-time withstand current for 1 second
- 5 Ui: Rated insulation voltage
- 6 Uimp: Rated surge voltage
- 7 Category
- 8 Frequency
- Imaximum rating of the circuit breaker
- ¹⁰ Symbol of circuit breaker suitable for isolation
- (1) QR code to access the documentation online
- 12 Not suitable for protection in an IT earthing system
- (13) Standards
- (14) Manufacturing date code



Information

The technical specification label on a switch-disconnector also provides information on the value of the rated short-circuit making capacity lcm.



Identification label on the packaging



- ① Main characteristics of the circuit breaker
- ② Circuit breaker reference

9 Handling the circuit breakers

It is recommended that the circuit breaker be handled by 2 persons.



Weight of the circuit breakers (without accessories)

| Product | Number of poles | Weight (kg) |
|------------------------------|-----------------|-------------|
| Moulded case circuit breaker | 3 | 14 |
| Moulded case circuit breaker | 4 | 17 |



10 Fastening dimensions

10.1 Circuit breaker dimensions

To install a moulded case circuit breaker, comply with the following dimensions for mounting:

| Dimensions (max. value in mm) | 3 poles | 4 poles |
|-----------------------------------|---------|---------|
| Depth A | 198 | |
| Height B | 330 | |
| Width C | 210 | 280 |
| Pitch distance D fastening width | 199 | 269 |
| Pitch distance E fastening height | 200 | |
| Height F with terminal covers | 395 | |





10.2 Dimensions of circuit breakers with rotary control

To install a moulded case circuit breaker, comply with the following dimensions for mounting:

| Dimensions (max. value in mm) | 3 poles | 4 poles |
|--|---------|---------|
| Depth A with the rotary control | 240 | |
| Depth B with the rotary control housing | 201 | |
| Height C of the rotary control housing | 210 | |
| Width D of the rotary control housing | 182 | |
| Width E of the middle of the circuit breaker with the rotary control in the OFF position | 172 | 207 |





10.3 Connection of the circuit breakers

To connect a moulded case circuit breaker, comply with the following connection dimensions:

Front connections

For 3-pole or 4-pole versions:





Rear vertical RC connections

For 3-pole or 4-pole versions:







3P



Rear horizontal RC connections

For 3-pole or 4-pole versions:



4P



3P

Rear horizontal RC connections + spreaders

For 3-pole or 4-pole versions:





Front connections + spreaders

For 3-pole or 4-pole versions:







4P

10.4 Cut-out of the HTD210H panel display

Comply with the following dimensions to install an HTD210H panel display:

| Dimensions | Width (mm) | Height (mm) | Depth (mm) |
|---------------|------------|-------------|------------------------------|
| HTD210H | 97 | | 18 (45 with fastening clips) |
| Panel cut-out | 92 | | 8 max. |





11 Safety clearances

Warning

Risk of electric shock

Danger to life, risk of injury due to electric shock, or risk of serious injury.

Make sure that the device is only operated by qualified personnel in accordance with the installation standards in force in the relevant country.

To ensure the safety of people and the installation, comply with the following safety clearances:



| Distance | Insulating material | Metallic material | Circuit breaker live (mm) |
|----------|---------------------|-------------------|---------------------------|
| A | 0 | 100 | 130 |
| В | 0 | 150 | 180 |
| С | 0 | 10 | 60 |
| D | 0 | | |

12 Installation

12.1 Prerequisites

Danger

Risk of electric shock, electrocution or electric arc

Danger to life, risk of injury due to electric shock, or risk of serious injury.

Ensure that the device is only installed by qualified personnel in accordance with the installation standards in force in the relevant country and that they are equipped with personal protective equipment (PPE).

Before installing, ensure that:

All power supply sources to the circuit breaker are disconnected and the circuit breaker is in the open position.



Fig. 5: Control switch in position O (OFF)

12.2 Fastening circuit breakers

To mount a moulded case circuit breaker on a vertical plate, comply with the following dimensions for mounting:

| Dimensions (max. value in mm) | 3 poles | 4 poles |
|---|---------|---------|
| Centre-to-centre distance A mounting height | 200 | |
| Drilling diameter B for mounting | 6 | |
| Centre-to-centre distance C mounting width | 199 | 269 |



To mount a moulded case circuit breaker with rear connections on a vertical plate, comply with the following mounting dimensions:

| Dimensions (max. value in mm) | 3 poles | 4 poles |
|--|---------|---------|
| Centre-to-centre distance A mounting height | 200 | |
| Drilling diameter B for mounting | 6 | |
| Centre-to-centre distance C mounting width | 199 | 269 |
| Drilling diameter D of cut-out hole for rear mounting | 60 | |
| Centre-to-centre distance E, height between the mounting hole and the cut-out hole for rear mounting | 25 | |
| Length F of the cut-out hole for rear mounting. | 199 | 269 |
| Centre-to-centre distance G, height between the mounting hole and the rear connection passage hole | 30 | |

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Information

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The circuit breakers are supplied with front connection sockets. An optional set of accessories such as rear connections can be used to adapt the connection to the busbar system.

The rear connections can be easily pivoted to the horizontal or vertical.



12.3 Connecting busbars and cables

Connecting bars



Notice

The connecting bars must be shaped and positioned so that they are perfectly adapted to the front sockets before tightening using bolts.

The connecting bars must be resting on a support attached to the electrical cabinet, not directly on the sockets.



Fig. 6: Front busbar connections



Fig. 7: Horizontal busbar connections

Fig. 8: Vertical busbar connections

If a short circuit occurs, the deformation of the connecting bars must not damage the fastening of the connections. To ensure this, one of the connecting bar supports should be used at maximum distance, according to the short-circuit currents as indicated below:



Fig. 9: Installing the busbar supports

- 1 Pull stud
- 2 Connecting bar
- 3 Connecting bar holder



Connection cables



Notice

The connecting cables must be tightly fastened to the electrical cabinet or the structure to avoid dragging on the connections. Cable fasteners are appropriate for this purpose. If necessary, extend the sockets using cable lug adapters, then connect them to the connection cables.



Fig. 10: Connection to the front connections

Fig. 11: Connection to the spreaders



Fig. 12: Extension of ug adapters

- 1 Cable lug adapters
- 2 Connection cable support
- 3 Connection cable
- 4 Cable fastener



Notice

Hager does not provide either the cable lug adapters or the cable fasteners. To implement these parts, refer to chapter 10 "Fastening dimensions".

12.4 Connection of accessories and auxiliary equipment

For the installation of accessories and auxiliary equipment, refer to the following instructions:

| Accessories | Instructions |
|---------------------------------|--------------|
| TB terminal strip | 6LE009031A |
| TB Energy D-type terminal strip | 6LE009850A |

TB Terminal blocks

TB terminal blocks are used to connect to the various circuit breaker accessories and auxiliary devices. TB terminal blocks should be purchased separately. Care must then be taken to ensure they are fitted in the right place.



- 1) TB Energy D-type terminal strip
- 2 TB terminal strip



12.5 Connection of the output contacts OAC

The OAC output alarm contacts module has 5 digital output contacts.

These OAC contacts are assigned by default to the following events on a circuit breaker equipped with the sentinel or sentinel Energy trip unit:

- LTD tripping,
- STD/INST tripping,
- GF tripping,
- PTA overload prealarm,
- HWF tripping.

The assignment cannot be changed on the sentinel trip unit but it can be reprogrammed on the sentinel Energy trip unit. It is fitted behind the electronic trip unit.



Fig. 13: Output Alarm Contact module OAC



Information

- An external 24V DC SELV power supply (recommended Hager reference HTG911H) is required for the use of the OAC output alarm contacts module. (see Chapter 12.6, Input connections).
- For installation of the OAC output alarm contacts module, refer to the 6LE089843A manual.
- For programming the output contacts with the sentinel Energy trip unit, see the user manuals for the 6LE008147A sentinel Energy electronic trip units.
- The LTD, STD/INST, GF and HWF output contacts are acknowledged when the tripping screens on the trip unit are reset or during activation of the RR/DI input (see Chapter 12.6, Input connections).



Output alarm contact OAC wiring diagram



Fig. 14: Characteristics of the OAC output alarm contacts: 2A/230V AC and 2A/24V DC



Information

The OAC output alarm contacts retain their state even when the circuit breaker opens thanks to the external 24V DC power supply.



12.6 Input connections

Wiring diagram of the 24V DC external power supply

Wire an external 24V DC SELV power supply (recommended Hager reference HGT911H) to the 24V ext+ and 24V ext- terminals of the 24V DC zone of the device.



Fig. 15: Example of power supply for a device such as the sentinel Energy trip unit

Take the power consumption of the following devices into account when dimensioning the external 24V DC power supply.

| Device | Rated current (mA) |
|----------------------------------|--------------------|
| sentinel Energy trip unit | 60 |
| Panel display HTD210H | 85 |
| Modbus RTU communication module | 14 |
| Modbus TCP communication module | 38 |
| OAC alarm output contacts module | 34 |

12.7 Connecting the ZSI input and output contacts

The Zone Selective Interlocking (ZSI) function is designed to limit the electro-dynamic constraints on the installation (devices, conductors and busbars) in case of a short circuit fault or ground fault.

The installed circuit breakers are linked together by cable to determine which circuit breaker should trip first. If an electrical fault appears between two linked circuit breakers connected together by the ZSI function, the downstream circuit breaker is unable to clear it. Thanks to zone selectivity, the circuit breaker upstream of the fault trips without waiting till the end of its time delay.

MCCB PW1600 h3+ circuit breakers can be connected with Energy h3+ circuit breakers as well as hw+ air circuit breakers. For zone selectivity to work correctly, the ZSI OUT/ ZSI IN of the h3+ circuit breakers and the ZSI1/ZSI2 sockets of the Energy h3+ circuit breakers must be connected together.

The installation plan should also include one or more connection terminals inside the electrical cabinet to allow:

- the connection of several circuit breakers to a single upstream circuit breaker,
- the connection of an hw+ circuit breaker and an Energy h3+ circuit breaker.



Fig. 16: TB D-Type terminal block for Energy trip unit





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① ZSI-type cable (reference no. HTC150H)



Information

Refer to the h3+ communication system manual for the connection of ZSI1/ZSI2 sockets and the use of associated accessories.



For zone selectivity on the STD protection and/or the ground fault protection:

Connection to downstream circuit breakers ZSI OUT:

- STD: selectivity on the Short time delay protection
- GF: selectivity on the ground fault protection
- COM: common

Connection to downstream circuit breakers ZSI IN:

- STD: selectivity on the Short time delay protection
- GF: selectivity on the ground fault protection
- COM: common

| Type of connection ^[1] | Total number of circuit breakers | Max. distance between 2 circuit breakers (m) |
|-----------------------------------|----------------------------------|--|
| Upstream | 3 | 300 |
| Downstream | 7 | 300 |

 $^{[1]}$ Recommended connection cable: 1 to 1.5 mm² shielded twisted cable



Information

It is recommended that the Hager Power Setup commissioning and testing software be used to verify the wiring between the circuit breakers.

12.8 Installation of the control accessories

For installation of control accessories, refer to the following manuals:

| Accessory | Manual |
|-----------|------------|
| Coils | 6LE009739A |

Coils

Two types of coils can be installed in the dedicated positions behind the front cover of the circuit breaker:



Fig. 17: SH shunt trip coil^[1]

Fig. 18: The undervoltage release coil UV or shunt trip coil SH^[2]

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Information

The length of the connection cables between the SH shunt trip coils is limited to 5 m for 200-250 V and 380-480 V coils.

^[1] The position is dedicated ONLY to the SH shunt trip coil. It is not permitted to install a UV undervoltage release coil.

^[2] Installation of a second shunt trip coil SH, only if the undervoltage release coil UV is not used.

12.9 Installation of the signalling accessories

For installation of the signalling accessories, refer to the following manuals:

| Accessory | Manual |
|---------------------------------|------------|
| AX Auxiliary contact | 6LE009737A |
| AL Alarm contact | |
| FS Fault trip contact | |
| Contact AXO / ACX | |
| OAC Output Alarm Contact module | 6LE089843A |

AX Auxiliary Contact

The auxiliary contacts indicate the open or closed position of the circuit breaker power contacts.

3 auxiliary contacts can be fitted as an option (AX1 to AX3) on h3+ circuit breakers.



Fig. 19: AX auxiliary contacts

AL Alarm contact

AL contacts indicate that the circuit breaker has tripped due to:

• Electrical fault (overload, short circuit, ground fault GF, general alarm of the HWF system).

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- The operation of a shunt trip (SH) or undervoltage release (UV) coil.
- Operation of the "push-to-trip" button.

The AL auxiliary contact is reset when the circuit breaker is reset.

1 alarm contact can be fitted as an option on the h3+ circuit breakers.



Fig. 20: AL Alarm contact

FS Fault trip contact

The fault trip contact indicates the state of the circuit breaker following faults detected by the electronic trip unit. It indicates that the circuit breaker has tripped due to a fault of the following type:

- overload,
- short circuit,
- ground fault GF,
- general system alarm.

1 trip fault trip contact can be fitted as an option on the h3+ circuit breakers.



Fig. 21: FS Fault trip contact



Output Alarm Contact module OAC

The OAC output alarm contacts module has 5 digital output contacts allowing alarm, trip or operating events to be signalled.

For more information, see Chapter 12.5, Connection of the output contacts OAC .



Fig. 22: Output Alarm Contact module OAC

12.10 Installation of the neutral protection accessories

External neutral current sensor ENCT

For the installation of neutral protection accessories, refer to the following manuals:

| Accessory | Manual |
|--------------------------------------|------------|
| External neutral current sensor ENCT | 6LE007514A |

The ENCT external neutral current sensor allows the circuit breaker to provide neutral protection on a 3-pole circuit breaker in a TN earthing system. It is installed on the neutral distribution bar generally located on the left of the circuit breaker. It must be connected to the terminal strip of the external neutral current sensor ENCT.



Fig. 23: Connection of the external neutral current sensor ENCT

- ① External current neutral sensor ENCT
- 2 ENCT sensor terminal strip
- ③ Connecting cable for measurement of the neutral voltage vN



Information

Connecting cable vN

In the case of a 3-pole circuit breaker fitted with the sentinel Energy trip unit and installed in an earthing system in which the neutral is distributed, the vN cable must be connected to the neutral potential.

This connection is essential to obtain correct measurement of phase-neutral voltages V1N, V2N, V3N, powers per phase and for operation of the advanced protections against active power feedback and undervoltage or overvoltage.

12.11 Installation of the communication and display accessories

For the installation of communication and display accessories, refer to the following instructions:

| Accessory | Manual |
|----------------------|------------|
| Communication module | 6LE089842A |
| Panel display | 6LE002194A |

Communication module

The h3+ circuit breaker, equipped with a sentinel Energy trip unit, can be connected to a Modbus communication network via a Modbus-RTU communication module or a Modbus-TCP communication module.

This communication module allows circuit breaker faults and information to be remotely communicated using the RTU or TCP/IP protocol. Only one communication module can be installed on an h3+ circuit breaker.



Fig. 24: Modbus-RTU 2 RJ45

- 1 Modbus
- $^{(2)}$ Modbus / 120 Ω _ HTG467H



Fig. 25: Modbus-TCP 1 RJ45

1 Modbus





Fig. 26: Communication module connection

- ① sentinel Energy trip unit connector
- 2 Communication module
- 3 24V DC power supply_reference no. HTG911H

Panel display

The HTD210H panel display for h3+ Energy circuit breakers allows:

- the status, measurement and settings information for a door or panel in the electrical assembly to be displayed,
- the main protection and alarm settings to be modified.
 The HWY210H adapter is necessary to connect the HTD210H panel display, a 24V DC power supply and the cables enabling the connection to the terminals CIP 1 and CIP 2.



Fig. 27: Connection of the panel display

- ① sentinel Energy trip unit connector
- 2 Panel display HDT210H
- ③ Adapter HWY210H for remote panel display
- ④ 24V DC power supply_reference no. HTG911H

13 Protection settings

The protections settings are adjusted using the dials or the keyboard depending on the sentinel or sentinel Energy trip unit type.

To see a detailed description of the functions and settings of the electronic trip units, refer to the following manuals.

| Accessory | Manual |
|---------------------------|------------|
| sentinel trip unit | 6LE007969A |
| sentinel Energy trip unit | 6LE008147A |



Warning

Risk of inappropriate settings.

For safety reasons, the trip unit's factory default settings are for the lowest level of protection. Adjust the protection settings in accordance with the short circuit and selectivity calculation made by the installation designer.



Fig. 28: sentinel trip unit

- 1 LTD Long time delay protection setting
- 2 STD Short Time Delay protection setting
- ③ INST Instantaneous protection setting
- (4) GF ground fault protection setting
- 5 N neutral protection setting



Fig. 29: sentinel Energy trip unit

- 6 Home button
- 7 Acknowledgement and confirmation button
- 8 Navigation buttons





Danger

Risk of electric shock, electrocution or electric arc

Danger to life, risk of injury due to electric shock, or risk of serious injury.

Ensure that the device is only commissioned by qualified personnel with adequate safety equipment.

For commissioning, refer to the operations described in standard IEC 61439-1 and -2.



Information

- For any additional information about commissioning the circuit breaker, contact Hager Technical Support.
- The Hager Power Setup tool is recommended in order to adjust the protection settings when commissioning the trip unit.

14 Rotary control

For installation information about this control accessory, refer to the following installation manual:

| Accessory | Manual |
|------------------------------|------------|
| Rotary control sub-assembly | 6LE009240A |
| Rotary control and extension | 6LE009406A |

The rotary control allows the opening and closing of the circuit breaker to be handled more easily while guaranteeing the three possible states (I (ON), O (OFF) and TRIP (TRIPPED).

It enables optional locking using a Ronis keylock as well as padlocking.

Assembling of the rotary handle



The rotary handle can be assembled on the circuit breaker





15 Locking the circuit breaker

Danger

Risk of electric shock, explosion, or electric arc

When the circuit breaker control switch is locked in the (O) OFF position, always use a correctly set voltage detector to ensure that the power supply is disconnected before starting work on the device.

Only authorised personnel may disable the door lock.

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

Locking the circuit breaker operating device

• Lock the mechanism using a padlock on the circuit breaker operating device in the open (OFF) position.



Fig. 30: Installing the padlock on the circuit breaker operating device

- 1 Padlock
- Locking tab pulled



Information

The diameter of the padlock on the actuator is max. 4 mm.

• Lock the mechanism using a padlocking accessory on the circuit breaker operating device in the open (OFF) position.



Fig. 31: Installing the padlock accessory on the circuit breaker operating device

- 1 Padlock accessory
- Locking tab pulled



Information

The padlocking accessory HXA039H can be used to install up to 3 padlocks.

The diameter of the padlock on the accessory is max. 6 mm.



Locking the rotary control



Information

For installation of these accessories, refer to the 6LE009240A and 6LE009406A installation manuals.

• Lock the mechanism using a keylock on the rotary control with the handle in the open (OFF) position.



• Lock the mechanism using up to three padlocks on the rotary control with its handle in the open (OFF) position.



Fig. 32: Rotary control with interlocking padlock

- 1 Padlock
- 2 Tab extended
- í

Information

- The control tab can be used to install up to 3 padlocks.
- The diameter of the padlock on the tab is between 5.5 and 8 mm max.
- Locking of the mechanism with a padlock on the actuator tab can also be combined with a keylock.



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