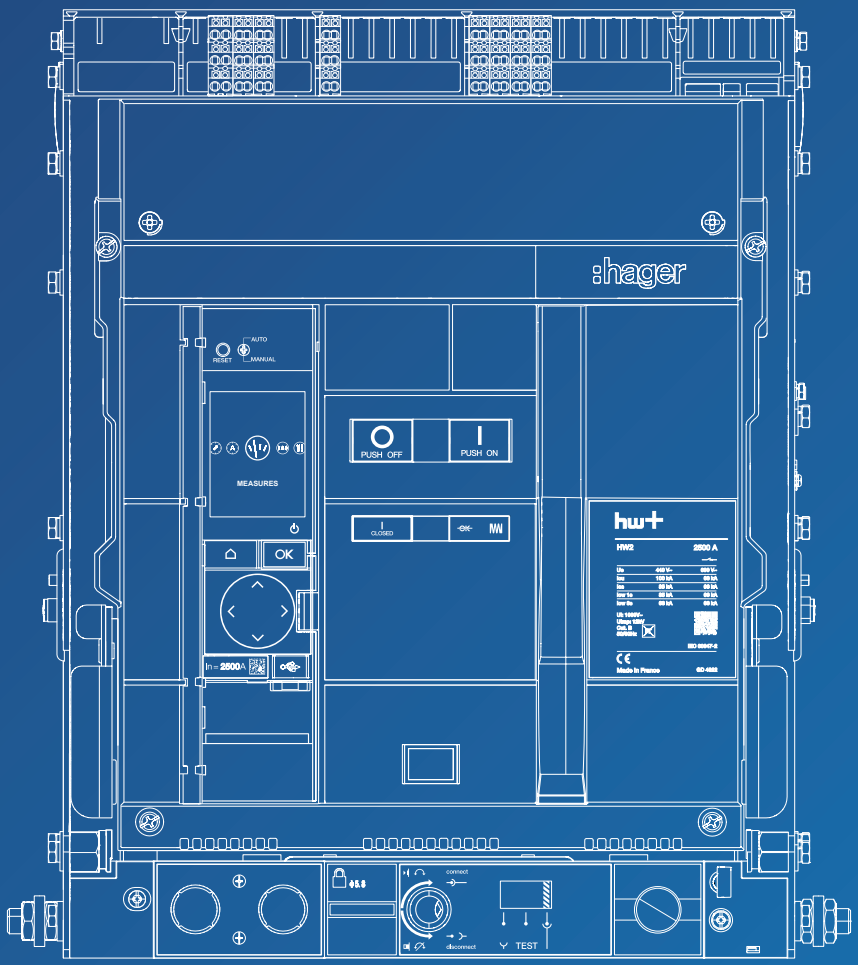
Installation manual

hw+

Air circuit breakers

HW2 / HW4



:hager

Contents

Page

Page

Warnings and instructions

This documentation contains safety advice which must be respected for your own safety and to prevent property damage.
Safety advice relating to your own safety is identified by a safety warning symbol in the documentation. Safety advice relating to damage to property is identified by "ATTENTION".
The safety warning symbols and the wording below are classified according to the risk level.

DANGER

DANGER indicates an imminent dangerous situation which, if not avoided, will result in death or serious injuries.

WARNING

WARNING indicates a potentially dangerous situation which, if not avoided, may result in serious injuries or even death.

CAUTION

CAUTION indicates a potentially dangerous situation which, if not avoided, may result in minor or moderate injuries.

ATTENTION

ATTENTION indicates a warning message relating to equipment damage.
ATTENTION 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. The information contained in the technical documentation 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.

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 HW2 and HW4 circuit breakers with electronic trip units.

Field of application

This document is applicable to the HW2 and HW4 circuit breakers of the hw+ range.

Revisions

Version	Date
6LE09207A	December 2023

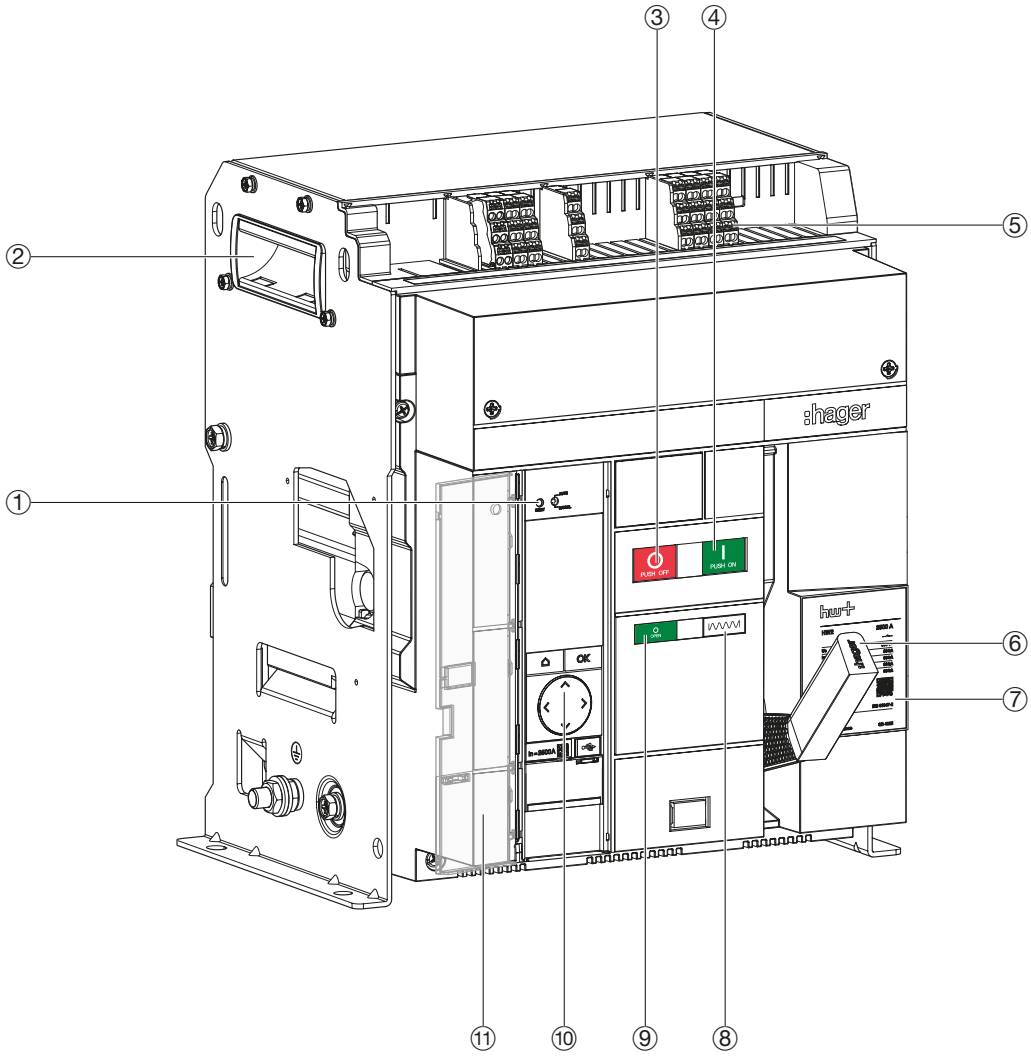
Documents to consult

Document	Reference
User manual for sentinel hw+ electronic trip units	6LE007969A
User manual for sentinel Energy hw+ electronic trip units	6LE008147A
User manual for HW2 / HW4 air circuit breakers	6LE009210A
HW2/HW4/HW6 user maintenance guide	6LE009217A
sentinel Energy Modbus communication guide	6LE007964A
HTD210H panel display user guide	6LE002999A

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

Contact

Address	Hager Electro SAS 132 Boulevard d'Europe 67215 Obernai France
Phone	+ 33 (0)3 88 49 50 50
Website	www.hager.com



① RESET button

② Lifting handle

③ Opening push button

④ Closing push button

⑤ Terminal blocks TB

⑥ Charging handle

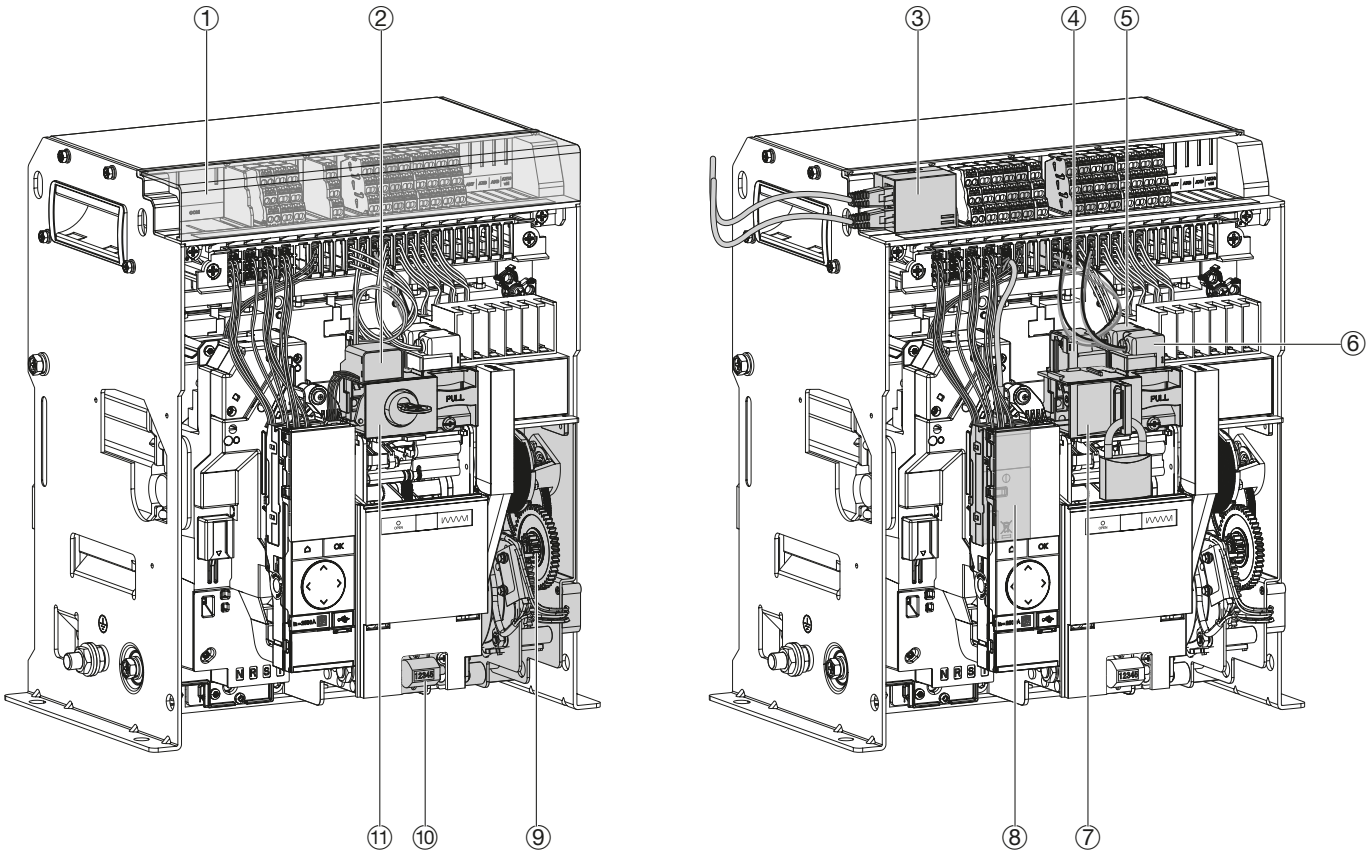
⑦ Circuit breaker rating label

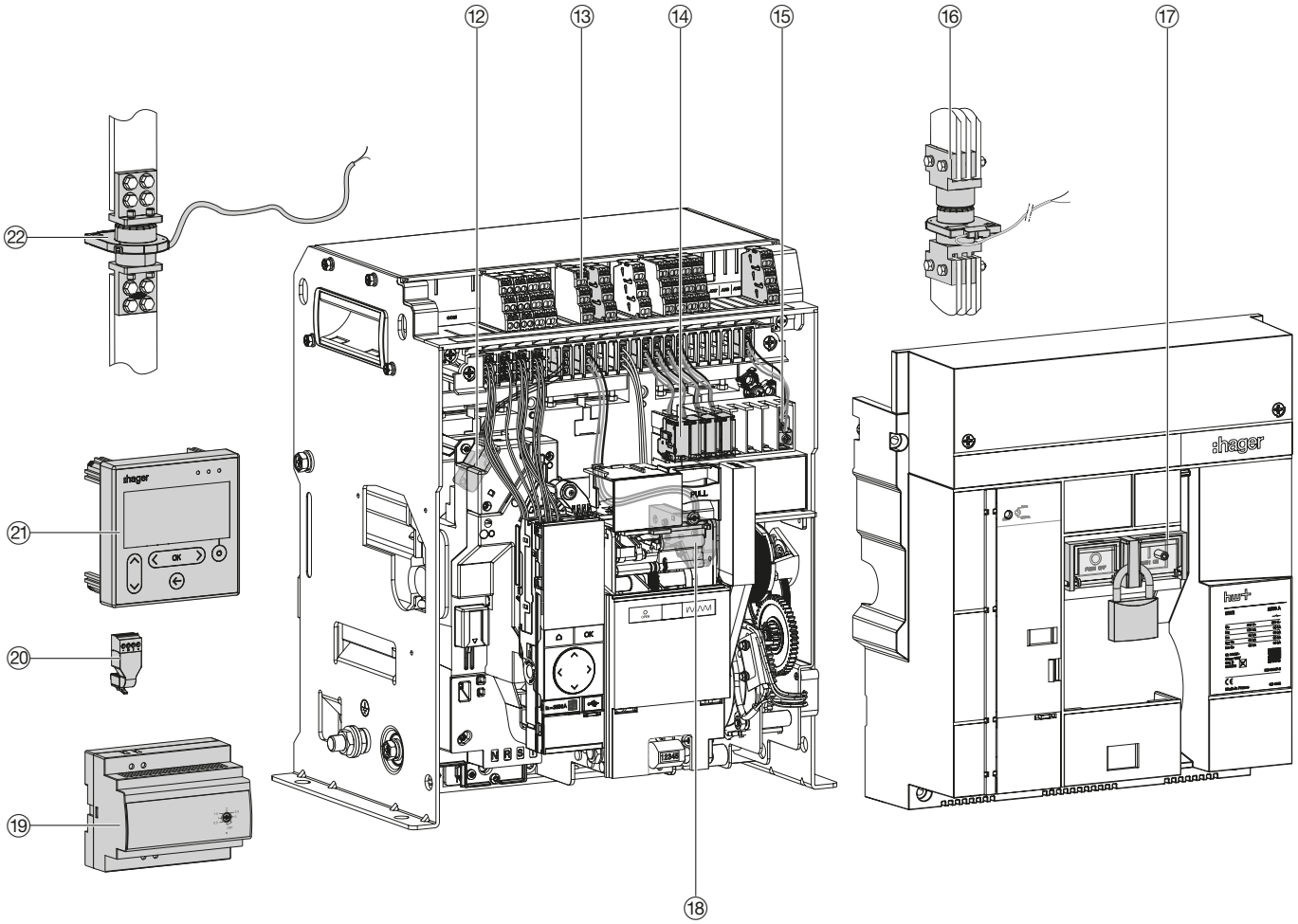
⑧ Closing spring status indicator

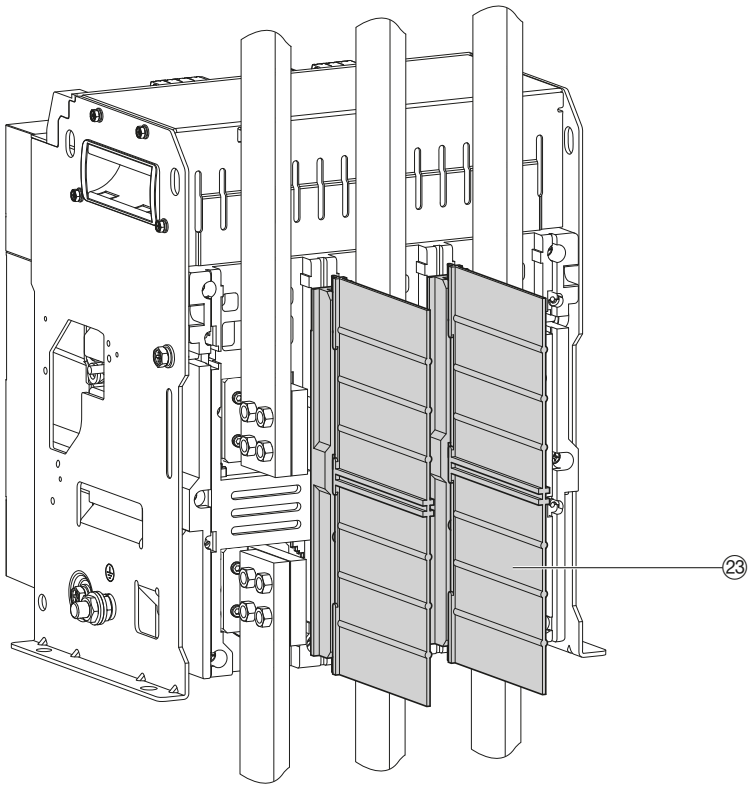
⑨ Contact opening and closing indicator

⑩ Trip unit

⑪ Transparent cover of the trip unit

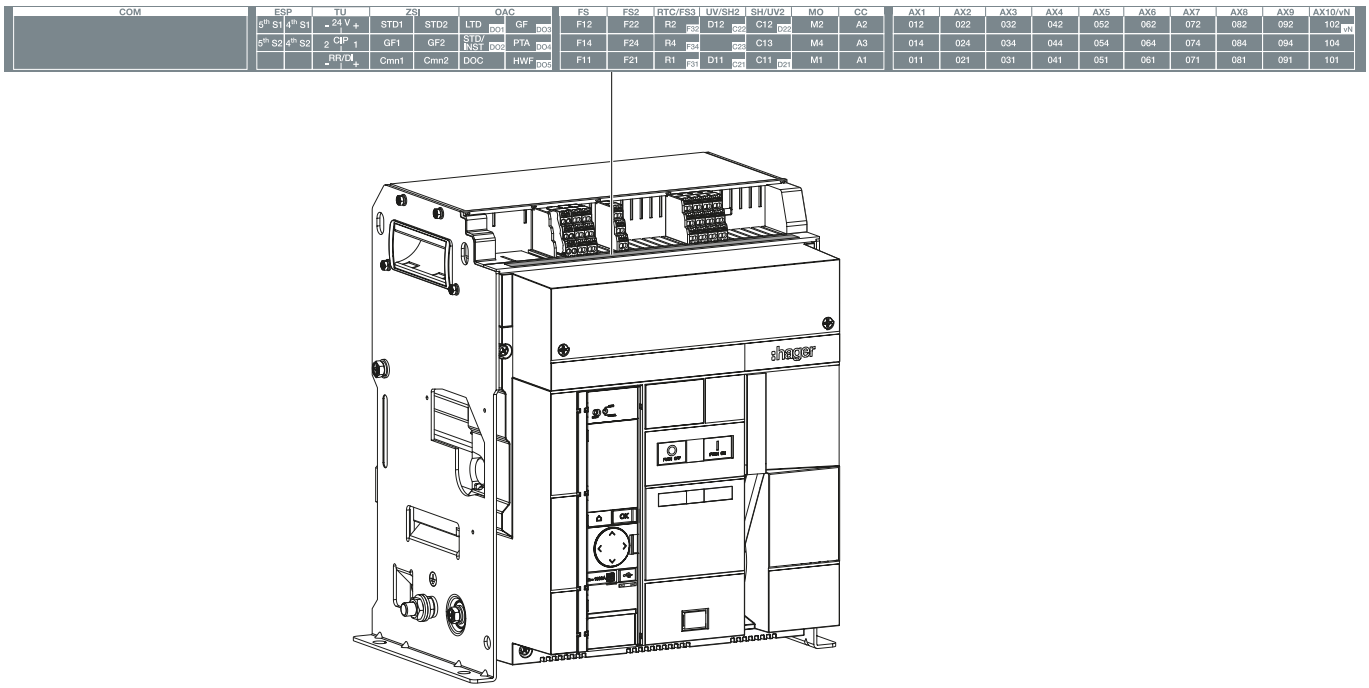

①
②
③
④
⑤
⑥
⑦
⑧
⑨
⑩
⑪


⑫
⑬
⑭
⑮
⑯
⑰
⑱
⑲
⑳
㉑
㉒

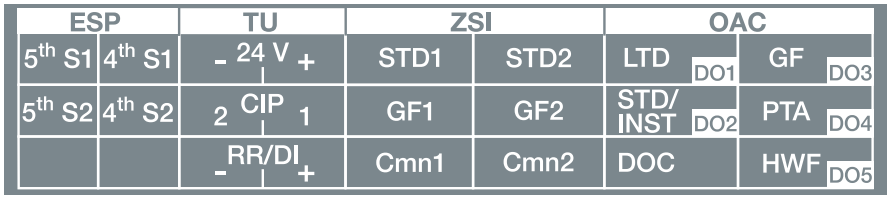


① Terminal block protection cover
② INS insulation module
③ Communication module
④ Undervoltage release coil UV or shunt trip coil SH
⑤ Shunt trip coil SH or undervoltage release coil UV
⑥ CC closing coil
⑦ Locking the circuit breaker in open position using OLP padlocks
⑧ OAC Output Alarm Contact module
⑨ MO charging Motor
⑩ CYC Operation Cycle Counter
⑪ Locking the circuit breaker in open position using OLK key locks
⑫ FS Fault trip contact
⑬ Terminal blocks TB
⑭ Auxiliary contacts AX (Integrated)
⑮ Auxiliary contacts AX (Additional)
⑯ External neutral current sensor ENCT HW4
⑰ Opening and closing PBC push-buttons locking cover
⑱ RTC Ready-to-Close contact
⑲ UVTC Undervoltage Time Delay Controller
⑳ HWY210H adapter for panel display
㉑ HTD210H panel display
㉒ External neutral current sensor ENCT HW2
㉓ IB interphase barrier

HW2 and HW4 circuit breakers are equipped with terminal blocks designed to connect the accessories. Some are provided as standard and always installed while others are installed according to the circuit breaker configuration.



Terminal blocks	Description	Integrated or additional
COM	Communication module Either 2 connections via RJ45 cable for connection to the Modbus-RTU HWY965H module, Or 1 connection via RJ45 cable for connection to the Modbus-TCP HWY966H module.	Additional



Terminal blocks	Description	Integrated or additional
ESP	External sensors 4th S1 and 4th S2: connection of an external ENCT neutral current sensor for 3-pole circuit breakers.	Additional
TU	Trip unit 24V + and -: an external 24V DC SELV power supply (Hager HTG911H recommended) is necessary to guarantee permanent operation of the trip unit. It is also necessary if the OAC output alarm contacts module or the HTD210H panel display is installed. CIP 1 and 2: connection to the HTD210H panel display. RR/DI + and -: the RR/DI digital input is used to remotely acknowledge the sentinel trip unit's trip alarms and remotely reset the OAC alarm output contacts. It can be used for one of the following control functions on the sentinel Energy trip unit: - remote acknowledgement of the trip unit's trip alarms and remote reset of the alarm output contacts, - switching between tariff meters T1 and T2, - inhibition of advanced protections, - switching between profile A and B. It is configured by default for remote acknowledgement of the sentinel trip unit's trip alarms and the remote reset of the OAC alarm output contacts with the sentinel Energy trip unit.	Integrated
ZSI	Zone selectivity function Connection to downstream circuit breakers: STD1: selectivity on the Short time delay protection GF1: selectivity on the earth fault protection Cmn1: common Connection to the upstream circuit breaker: STD2: selectivity on the Short time delay protection GF2: selectivity on the earth fault protection Cmn2: common	Integrated terminal block but function deactivated
OAC	Output Alarm Contacts sentinel Energy trip unit DO1: LTD, tripping after Long Time Delay protection DO2: S/I, tripping after Short Time Delay, Instantaneous or MCR protection DO3: GF, tripping after earth fault protection DO4: PTA, Overload pre-alarm activation DO5: HWF, tripping following a critical system alarm DOC: common sentinel Energy trip unit DO1: by default, tripping after Long Time Delay protection DO2: by default, Grouped Alarm (configured for Short Time Delay, Instantaneous or MCR tripping) DO3: by default, tripping after earth protection DO4: by default, activation of the PTA1 overload prealarm DO5: by default, tripping following a critical system alarm DOC: common	Additional

FS	FS2	RTC/FS3	UV/SH2	SH/UV2	MO	CC
F12	F22	R2 F32	D12 C22	C12 D22	M2	A2
F14	F24	R4 F34	C23	C13	M4	A3
F11	F21	R1 F31	D11 C21	C11 D21	M1	A1

Terminal blocks	**Description**	**Integrated or additional**
FS	Fault trip contact General tripping information.	Integrated
FS2	FS Fault trip contact No. 2 General tripping information.	Additional
RTC/FS3	Contact ready to close or trip fault contact No. 3 These terminal blocks can be connected either to use an RTC ready to close contact or a 3rd FS3 Fault trip contact.	Additional
UV/SH2	These terminal blocks can be connected either to use a UV undervoltage release coil or an SH shunt trip coil.	Additional
SH/UV2	These terminal blocks can be connected either to use an SH shunt trip coil or a 2nd UV undervoltage release coil.	Additional
MO	Power supply of the MO charging motor. The connection terminals M1 and M2 power the drive mechanism of the MO motor. The M4 terminal is used to connect the SC "spring-loaded" signalling contact. Note that the M4 terminal is at the same potential as the power supply of the drive mechanism	Additional
CC	Connection of a closing coil CC	Additional

HW2 circuit breakers

AX1	AX2	AX3	AX4	AX5	AX6	AX7	AX8	AX9	AX10/vN
012	022	032	042	052	062	072	082	092	102 vN
014	024	034	044	054	064	074	084	094	104
011	021	031	041	051	061	071	081	091	101

HW4 circuit breakers

AX1	AX2	AX3	AX4	AX5	AX6	AX7	AX8	AX9	AX10	AX11	AX12/vN
012	022	032	042	052	062	072	082	092	102	112	122 vN
014	024	034	044	054	064	074	084	094	104	114	124
011	021	031	041	051	061	071	081	091	101	111	121

Terminal blocks	Description	Integrated or additional	
		HW2	HW4
AX1	Auxiliary contact No. 1 - Signals the open/closed status of the circuit breaker	Integrated	Integrated
AX2	Auxiliary contact No. 2 - Signals the circuit breaker open/closed status	Integrated	Integrated
AX3	Auxiliary contact No. 3 - Indication of the open / closed state of the circuit breaker	Integrated	Integrated
AX4	Auxiliary contact No. 4 - Indication of the open / closed state of the circuit breaker	Integrated	Integrated
AX5	Auxiliary contact No. 5 - Signals the circuit breaker open/closed status	Additional	Integrated
AX6	Auxiliary contact No. 6 - Signals the circuit breaker open/closed status	Additional	Integrated
AX7	Auxiliary contact No. 7 - Signals the circuit breaker open/closed status	Additional	Additional
AX8	Auxiliary contact No. 8 - Signals the circuit breaker open/closed status	Additional	Additional
AX9	Auxiliary contact No. 9 - Signals the circuit breaker open/closed status	Additional	Additional
AX10/vN	Auxiliary contact No. 10 - Signals the circuit breaker open/closed status / vN connection to neutral potential	Additional	-
AX10	Auxiliary contact No. 10 - Signals the circuit breaker open/closed status	-	Additional
AX11	Auxiliary contact No. 11 - Signals the circuit breaker open/closed status	-	Additional
AX12/vN	Auxiliary contact No. 12 - Signals the circuit breaker open/closed status / vN connection to neutral potential	-	Additional

HW2 circuit breakers

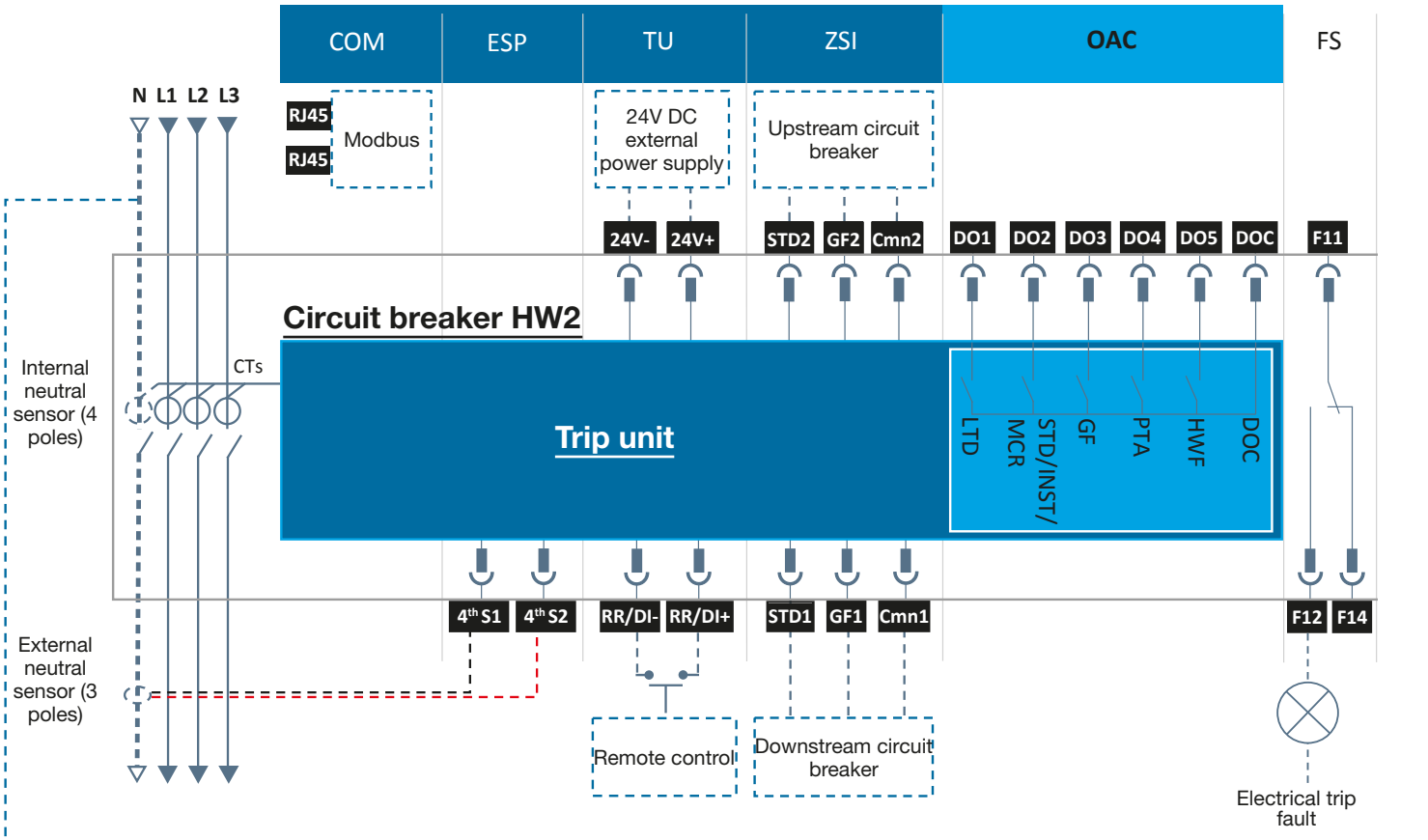
HW4 circuit breakers

ATTENTION

Terminal block vN

In case of a 3-pole circuit breaker equipped with sentinel Energy trip unit and installed in an earthing system in which the neutral is distributed, the vN terminal block must be connected to the neutral potential.
This connection is essential to obtain correct measurement of single phase voltages V1N, V2N, V3N, power values per phase and for operation of the advanced protections against reverse active power, undervoltage or overvoltage.
The three-pole circuit breaker equipped with the sentinel Energy trip unit is delivered without the AX10 (HW2) or AX12 (HW4) contact.
The terminals 101, 104 (HW2), 121 and 124 (HW4) are inoperative.

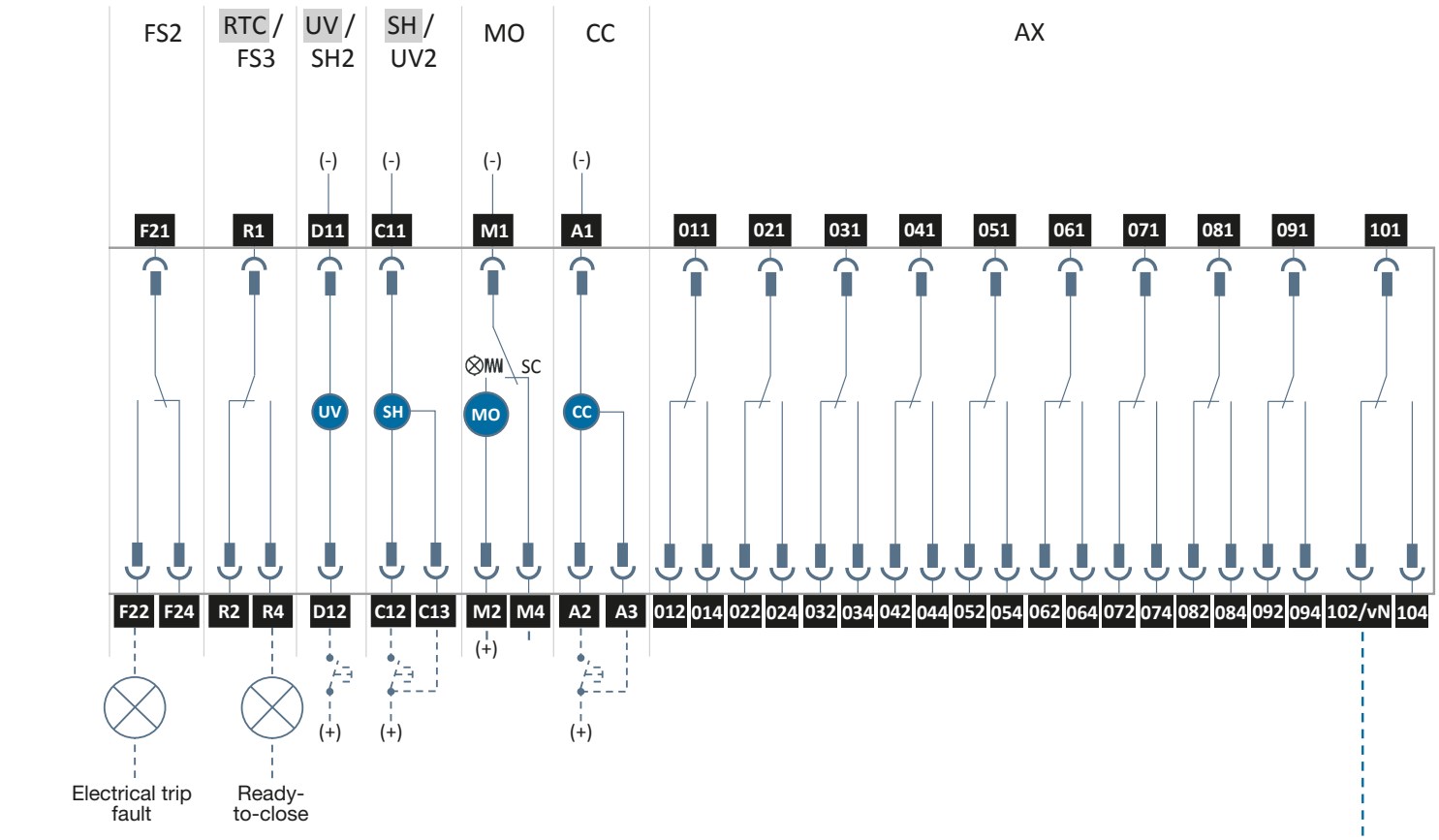
Connection diagram of the HW2 fixed circuit breakers



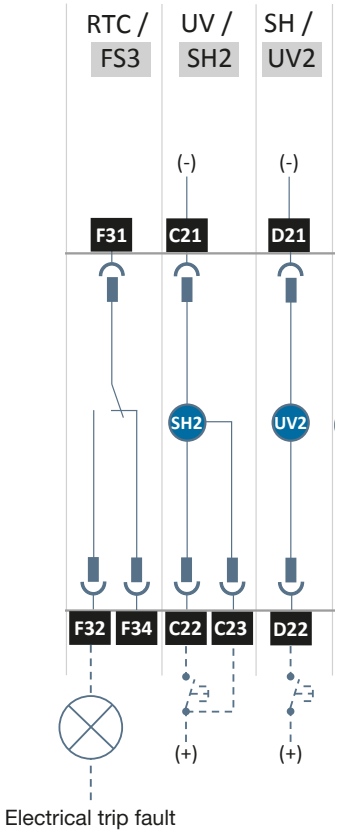
Terminal blocks	Terminations
COM	Communication module
ESP	External sensors
TU	External power supply for the trip unit
ZSI	Zone selectivity function
OAC	Output Alarm Contacts
FS	Fault trip contact
FS2	FS Fault trip contact No. 2
RTC/FS3	Contact ready to close or 3rd electrical trip fault contact
UV/SH2	UV undervoltage coil or 2nd SH shunt trip coil
SH/UV2	SH shunt trip coil or 2nd UV undervoltage coil
MO	MO charging motor and SC spring-loaded signal contact
CC	Closing coil CC
AX	Auxiliary contact - maximum 10 contacts signalling the circuit breaker open/closed status (4 contacts by default)
102/vN	Neutral potential ENVA

The cables (flexible or rigid) used must have a cross section between 0.6 mm^2 and 2.5 mm^2.

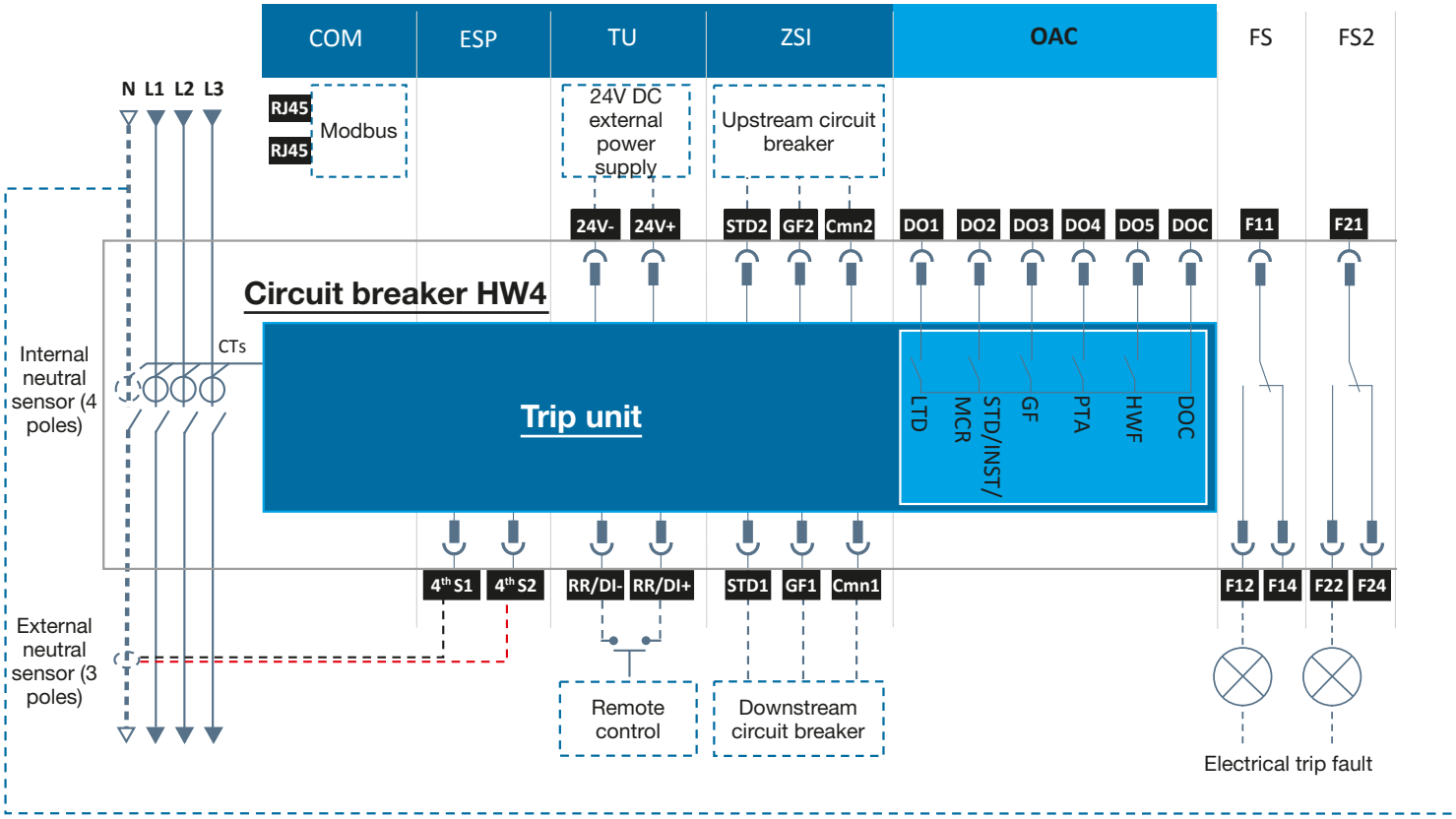
In order to be properly held in place in the terminals, the connected cables must first be stripped form 10 to 12 mm.
The cables must not be twisted and only one cable is authorised per terminal.



Second possibility



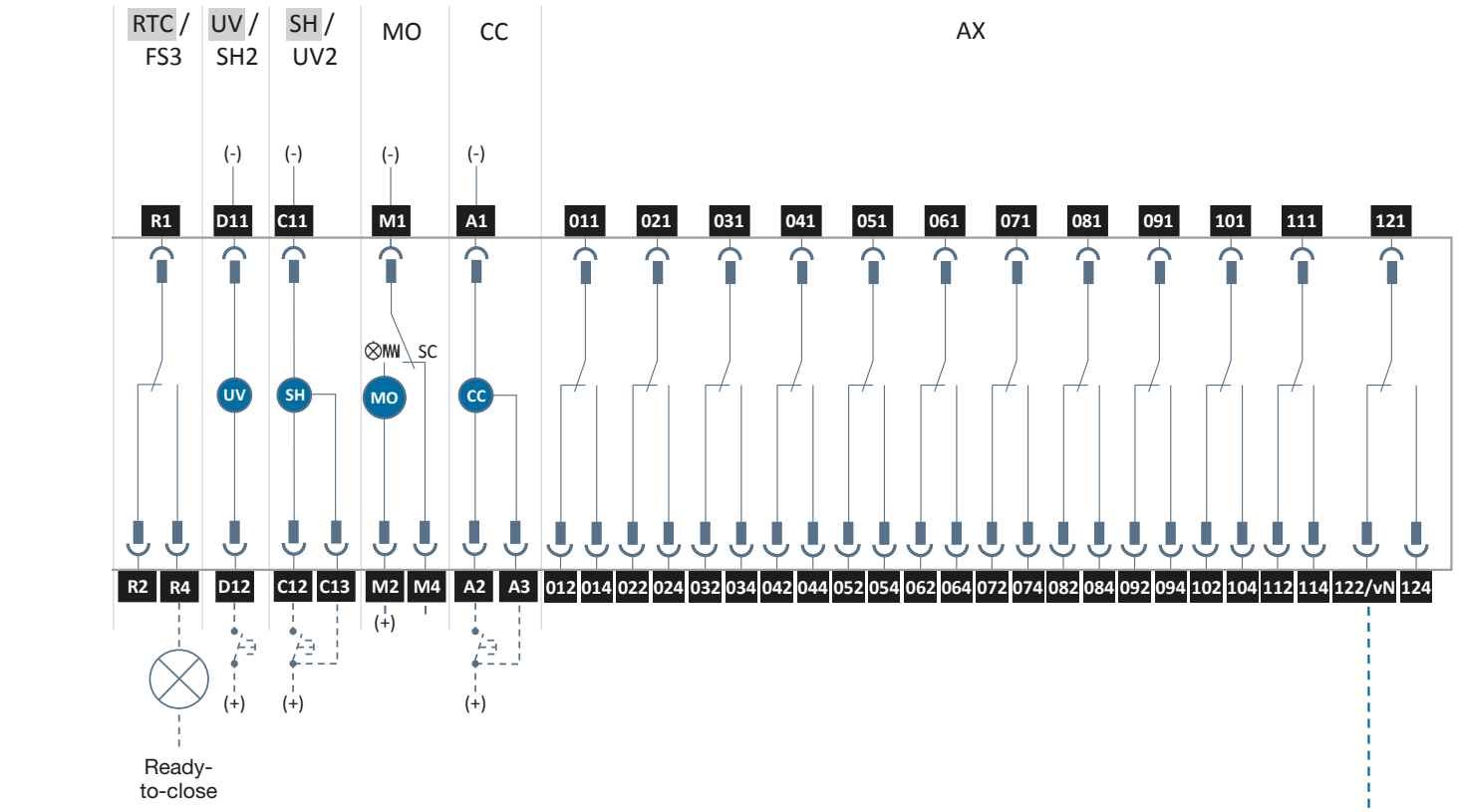
Connection diagram of the HW4 fixed circuit breakers



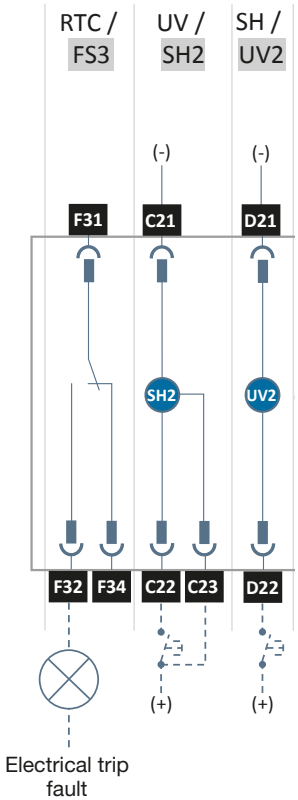
Terminal blocks	Terminations
COM	Communication module
ESP	External sensors
TU	External power supply for the trip unit
ZSI	Zone selectivity function
OAC	Output Alarm Contacts
FS	Fault trip contact
FS2	FS Fault trip contact No. 2
RTC/FS3	Contact ready to close or 3rd electrical trip fault contact
UV/SH2	UV undervoltage coil or 2nd SH shunt trip coil
SH/UV2	SH shunt trip coil or 2nd UV undervoltage coil
MO	MO charging motor and SC spring-loaded signal contact
CC	Closing coil CC
AX	Auxiliary contact - maximum 12 contacts signalling the circuit breaker open/closed status (6 contacts by default)
122/vN	Neutral potential ENVA

The cables (flexible or rigid) used must have a cross section between 0.6 mm^2 and 2.5 mm^2.

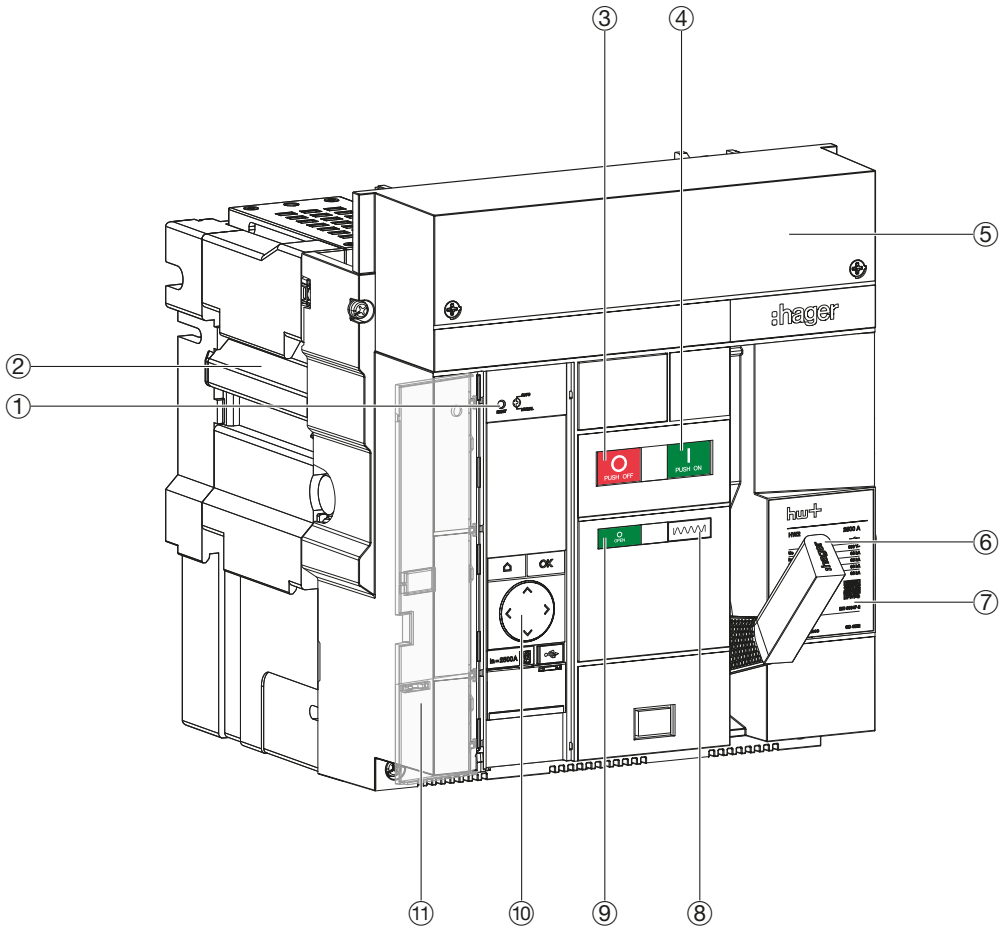
In order to be properly held in place in the terminals, the connected cables must first be stripped form 10 to 12 mm.
The cables must not be twisted and only one cable is authorised per terminal.



Second possibility



A drawout circuit breaker has two parts:
- A fixed part, the chassis.
- A mobile part, the circuit breaker itself which is inserted into the chassis.



① RESET button

② Lifting handle

③ Opening push button

④ Closing push button

⑤ Accessory connector cover

⑥ Charging handle

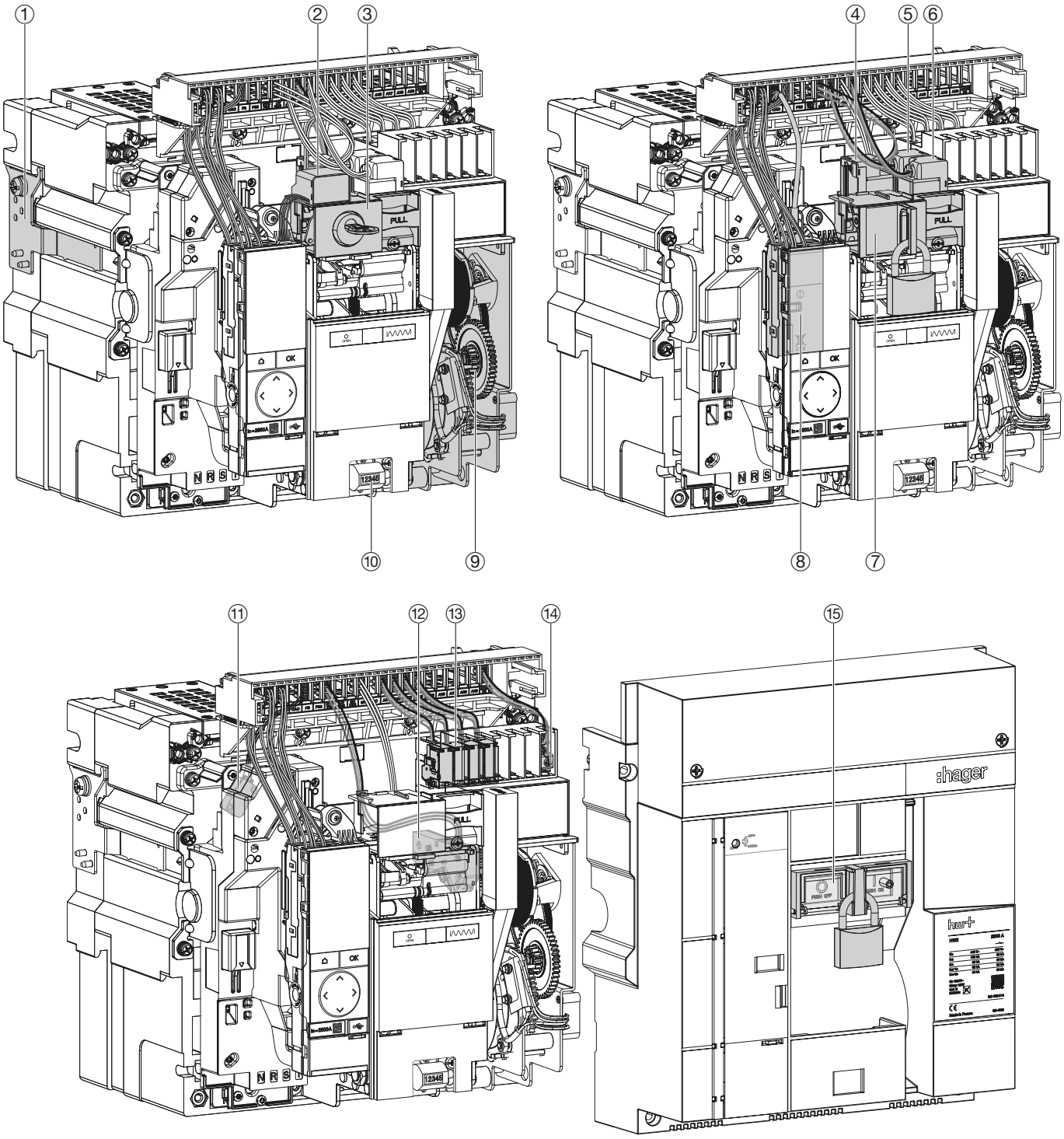
⑦ Circuit breaker rating label

⑧ Closing spring status indicator

⑨ Contact opening and closing indicator

⑩ Trip unit

⑪ Transparent cover of the trip unit



① WIP wrong insertion preventer chassis / circuit breaker

② INS insulation module

③ Locking the circuit breaker in open position using OLK key locks

④ Shunt trip coil SH or undervoltage release coil UV

⑤ Shunt trip coil SH or undervoltage release coil UV

⑥ CC closing coil

⑦ Locking the circuit breaker in open position using OLP padlocks

⑧ OAC Output Alarm Contact module

⑨ MO charging Motor

⑩ CYC Operation Cycle Counter

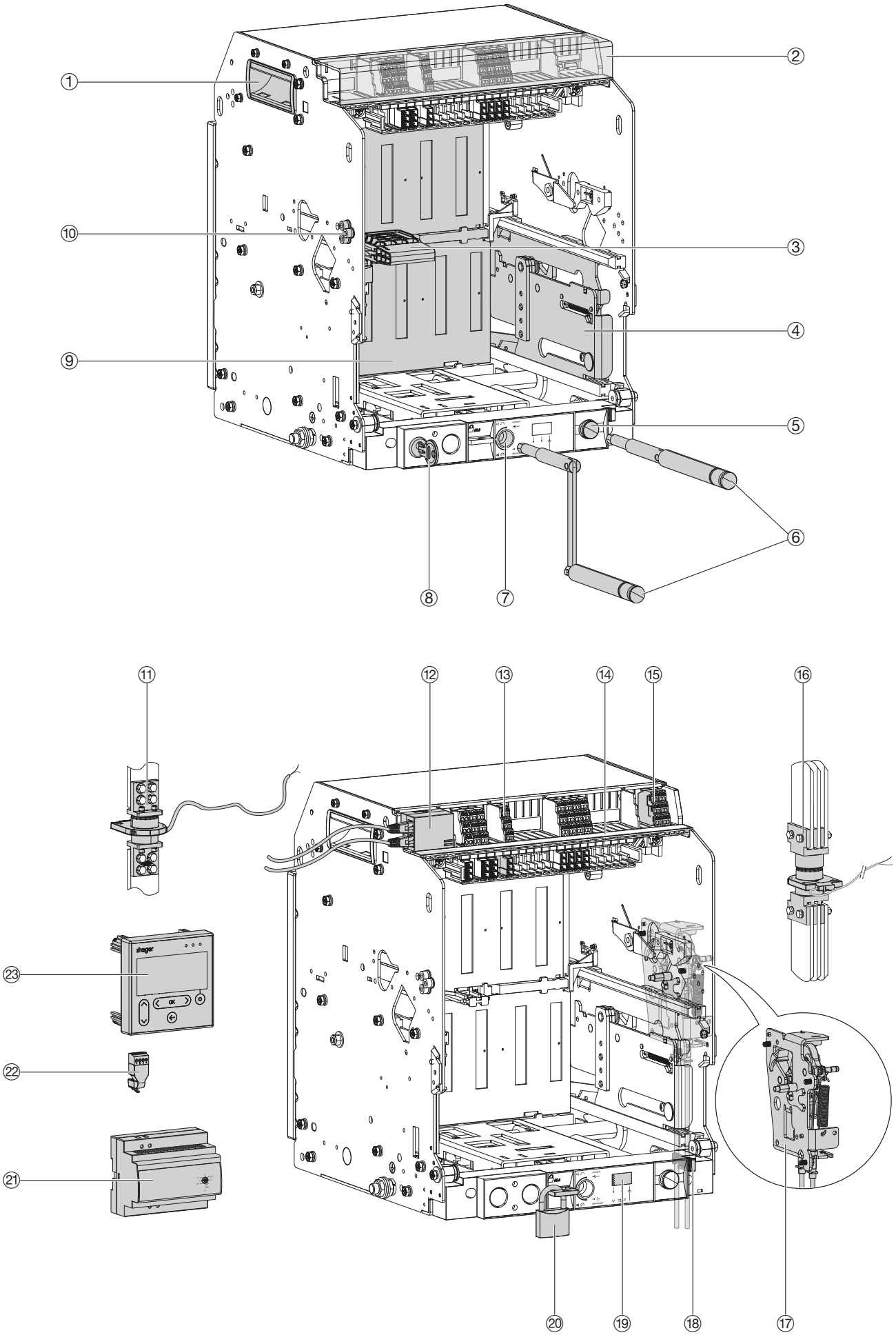
⑪ RTC Ready-to-Close contact

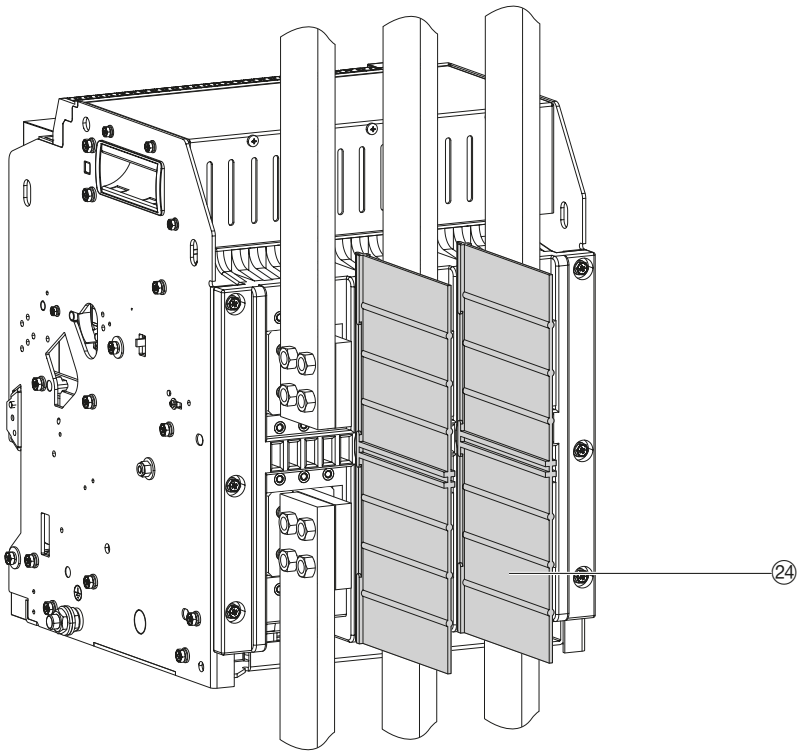
⑫ FS Fault trip contact

⑬ Auxiliary contacts AX (Integrated)

⑭ Auxiliary contacts AX (Additional)

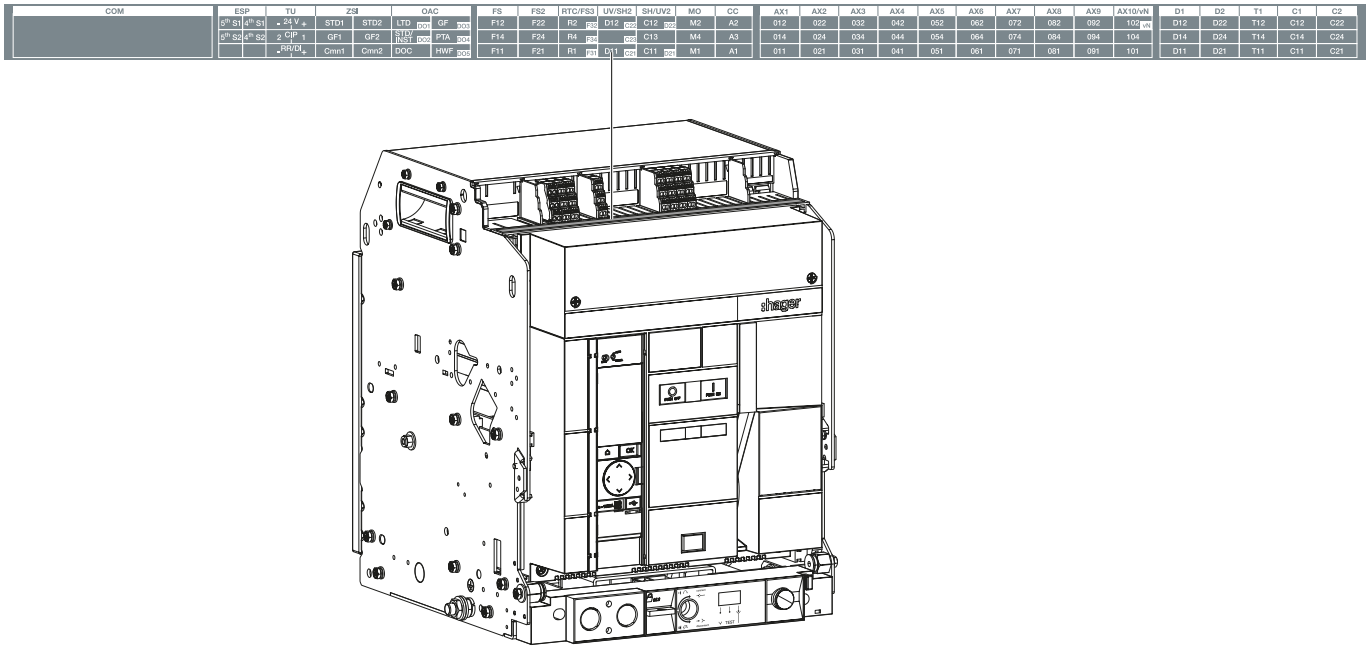
⑮ Opening and closing PBC push-buttons locking cover


①
②
③
④
⑤
⑥
⑦
⑧
⑨
⑩
⑪
⑫
⑬
⑭
⑮
⑯
⑰
⑱
⑲
⑳
㉑
㉒
㉓



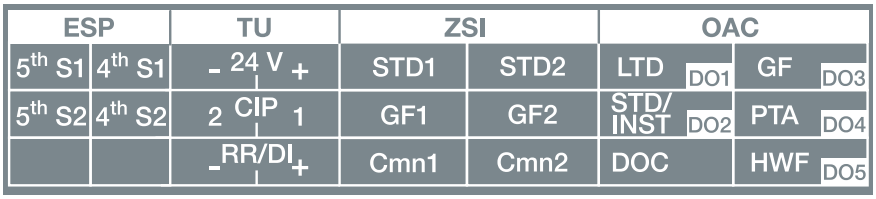
① Lifting handle
② Terminal block protection cover
③ Locking of the insulating safety shutters
④ Guide rail
⑤ Handle storage space
⑥ Handle
⑦ Place to insert/withdraw the racking handle
⑧ Locking of the position of the moving part using CL key locks
⑨ Safety shutters
⑩ WIP wrong insertion preventer chassis / circuit breaker
⑪ External neutral current sensor ENCT HW2
⑫ Communication module
⑬ Terminal blocks TB
⑭ Terminal block label
⑮ PS position contacts
⑯ External neutral current sensor ENCT HW4
⑰ MI mechanical interlock
⑱ RI open door racking interlock
⑲ Mechanical position indicator of the moving part
⑳ Locking of the position of the moving part with padlocks
㉑ UVTC Undervoltage Time Delay Controller
㉒ HWY210H adapter for panel display
㉓ HTD210H panel display
㉔ IB interphase barrier

The chassis of drawout HW2 and HW4 circuit breakers is equipped with terminal blocks designed to connect the accessories. Some are provided as standard and always installed while others are installed according to the circuit breaker configuration.



COM

Terminal blocks	Description	Integrated or additional
COM	Communication module Either 2 connections via RJ45 cable for connection to the Modbus-RTU HWY965H module, Or 1 connection via RJ45 cable for connection to the Modbus-TCP HWY966H module.	Additional



Terminal blocks	Description	Integrated or additional
ESP	External sensors 4th S1 and 4th S2: connection of an external ENCT neutral current sensor for 3-pole circuit breakers.	Additional
TU	Trip unit 24V + and -: an external 24V DC SELV power supply (Hager HTG911H recommended) is necessary to guarantee permanent operation of the trip unit. It is also necessary if the OAC output alarm contacts module or the HTD210H panel display is installed. CIP 1 and 2: connection to the HTD210H panel display. RR/DI + and -: the RR/DI digital input is used to remotely acknowledge the sentinel trip unit's trip alarms and to remotely reset the OAC alarm output contacts. It can be used for one of the following control functions on the sentinel Energy trip unit: - remote acknowledgement of the trip alarms on the trip unit and remote reset of the output alarm contacts, - switching between tariff meters T1 and T2, - inhibition of advanced protections, - switching between profile A and B. It is configured by default for remote acknowledgement of the sentinel trip unit's trip alarms and the remote reset of the OAC alarm output contacts with the sentinel Energy trip unit.	Integrated
ZSI	Zone selectivity function Connection to downstream circuit breakers: STD1: selectivity on the Short time delay protection GF1: selectivity on the earth fault protection Cmn1: common Connection to the upstream circuit breaker: STD2: selectivity on the Short time delay protection GF2: selectivity on the earth fault protection Cmn2: common	Integrated terminal block but function deactivated
OAC	Output Alarm Contacts sentinel Energy trip unit DO1: LTD, tripping after Long Time Delay protection DO2: STD/INST, tripping after Short Time Delay, Instantaneous or MCR protection DO3: GF, tripping after earth fault protection DO4: PTA, Overload pre-alarm activation DO5: HWF, following a critical system alarm DOC: common sentinel Energy trip unit DO1: by default, tripping after Long Time Delay protection DO2: by default, Grouped Alarm (configured for Short Time Delay, Instantaneous or MCR tripping) DO3: by default, tripping after earth protection DO4: by default, activation of the PTA1 overload prealarm DO5: by default, tripping following a critical system alarm DOC: common	Additional

FS	FS2	RTC/FS3	UV/SH2	SH/UV2	MO	CC
F12	F22	R2 F32	D12 C22	C12 D22	M2	A2
F14	F24	R4 F34	C23	C13	M4	A3
F11	F21	R1 F31	D11 C21	C11 D21	M1	A1

Terminal blocks	**Description**	**Integrated or additional**
FS	Fault trip contact General tripping information.	Integrated
FS2	FS Fault trip contact No. 2 General tripping information.	Additional
RTC/FS3	Contact ready to close or trip fault contact No. 3 These terminal blocks can be connected either to use an RTC ready to close contact or a 3rd FS3 Fault trip contact.	Additional
UV/SH2	These terminal blocks can be connected either to use a UV undervoltage release coil or an SH shunt trip coil.	Additional
SH/UV2	These terminal blocks can be connected either to use an SH shunt trip coil or a 2nd UV undervoltage release coil.	Additional
MO	Power supply of the MO charging motor. The connection terminals M1 and M2 power the drive mechanism of the MO motor. The M4 terminal is used to connect the SC "spring-loaded" signalling contact. Note that the M4 terminal is at the same potential as the power supply of the drive mechanism.	Additional
CC	Connection of a closing coil CC	Additional

HW2 circuit breakers

AX1	AX2	AX3	AX4	AX5	AX6	AX7	AX8	AX9	AX10/vN
012	022	032	042	052	062	072	082	092	102 vN
014	024	034	044	054	064	074	084	094	104
011	021	031	041	051	061	071	081	091	101

HW4 circuit breakers

AX1	AX2	AX3	AX4	AX5	AX6	AX7	AX8	AX9	AX10	AX11	AX12/vN
012	022	032	042	052	062	072	082	092	102	112	122 vN
014	024	034	044	054	064	074	084	094	104	114	124
011	021	031	041	051	061	071	081	091	101	111	121

Terminal blocks	Description	Integrated or additional	
		HW2	HW4
AX1	Auxiliary contact No. 1 - Signals the open/closed status of the circuit breaker	Integrated	Integrated
AX2	Auxiliary contact No. 2 - Signals the circuit breaker open/closed status	Integrated	Integrated
AX3	Auxiliary contact No. 3 - Indication of the open / closed state of the circuit breaker	Integrated	Integrated
AX4	Auxiliary contact No. 4 - Indication of the open / closed state of the circuit breaker	Integrated	Integrated
AX5	Auxiliary contact No. 5 - Signals the circuit breaker open/closed status	Additional	Integrated
AX6	Auxiliary contact No. 6 - Signals the circuit breaker open/closed status	Additional	Integrated
AX7	Auxiliary contact No. 7 - Signals the circuit breaker open/closed status	Additional	Additional
AX8	Auxiliary contact No. 8 - Signals the circuit breaker open/closed status	Additional	Additional
AX9	Auxiliary contact No. 9 - Signals the circuit breaker open/closed status	Additional	Additional
AX10/vN	Auxiliary contact No. 10 - Signals the circuit breaker open/closed status / vN connection to neutral potential	Additional	-
AX10	Auxiliary contact No. 10 - Signals the circuit breaker open/closed status	-	Additional
AX11	Auxiliary contact No. 11 - Signals the circuit breaker open/closed status	-	Additional
AX12/vN	Auxiliary contact No. 12 - Signals the circuit breaker open/closed status / vN connection to neutral potential	-	Additional

HW2 circuit breakers

HW4 circuit breakers

ATTENTION

Terminal block vN
In case of a 3-pole circuit breaker equipped with sentinel Energy trip unit and installed in an earthing system in which the neutral is distributed, the vN terminal block must be connected to the neutral potential.
This connection is essential to obtain correct measurement of single phase voltages V1N, V2N, V3N, power values per phase and for operation of the advanced protections against reverse active power, undervoltage or overvoltage.
The three-pole circuit breaker equipped with the sentinel Energy trip unit is delivered without the AX10 (HW2) or AX12 (HW4) contact.
The terminals 101, 104 (HW2), 121 and 124 (HW4) are inoperative.

HW2 circuit breakers

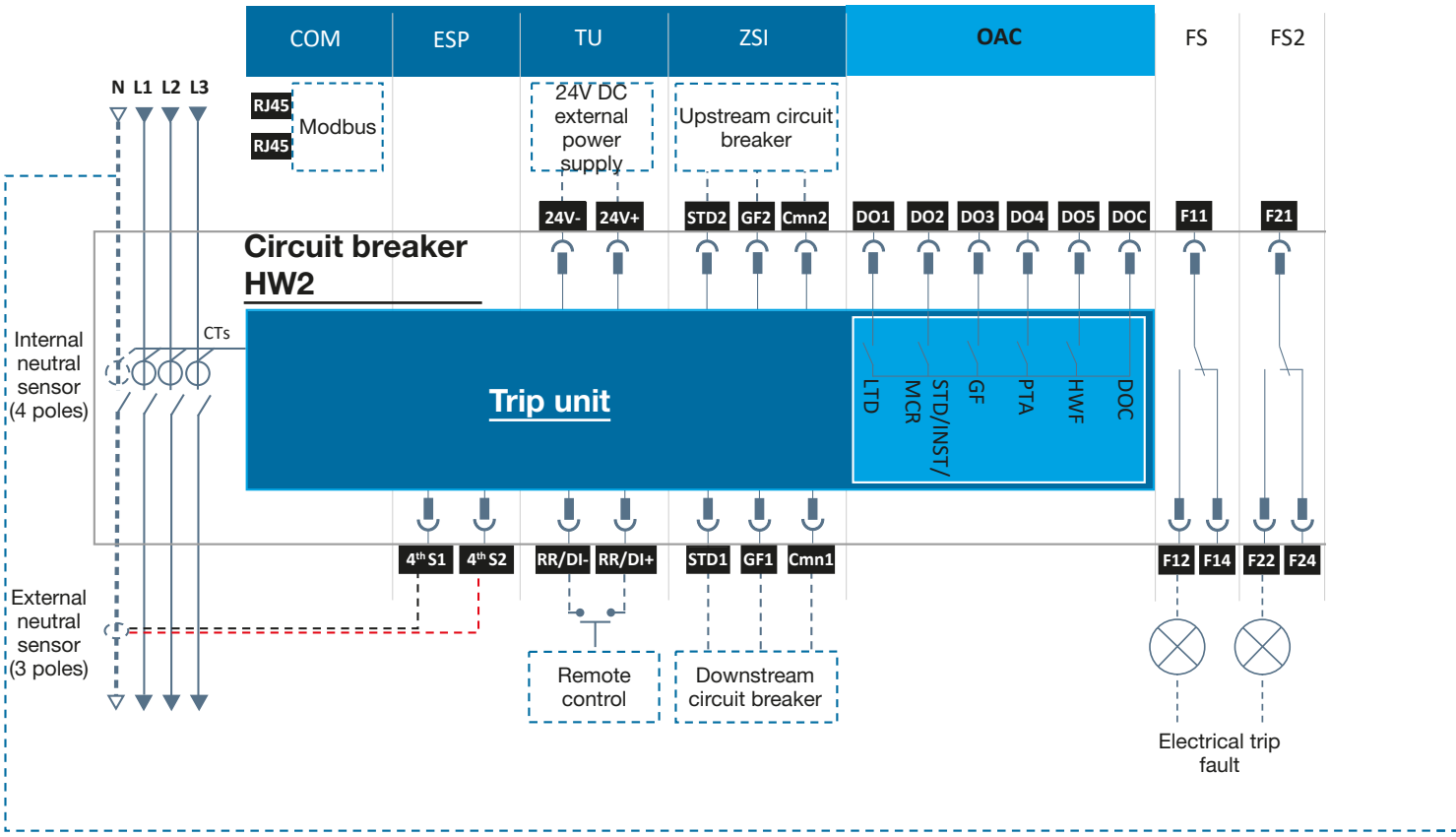
D1	D2	T1	C1	C2
D12	D22	T12	C12	C22
D14	D24	T14	C14	C24
D11	D21	T11	C11	C21

HW4 circuit breakers

D1	D2	D3	T1	T2	C1	C2	C3
D12	D22	D32	T12	T22	C12	C22	C32
D14	D24	D34	T14	T24	C14	C24	C34
D11	D21	D31	T11	T21	C11	C21	C31

Terminal blocks	Description	Integrated or additional
D1, D2 and D3	Contacts indicating the Disconnected position of the circuit breaker in the chassis. D3 only for HW4 circuit breakers.	Additional
T1 and T2	Contacts indicating the test position of the circuit breaker in the chassis. T2 only for HW4 circuit breakers.	
C1, C2 and C3	Contacts indicating the Connected position of the circuit breaker in the chassis. C3 only for HW4 circuit breakers.	

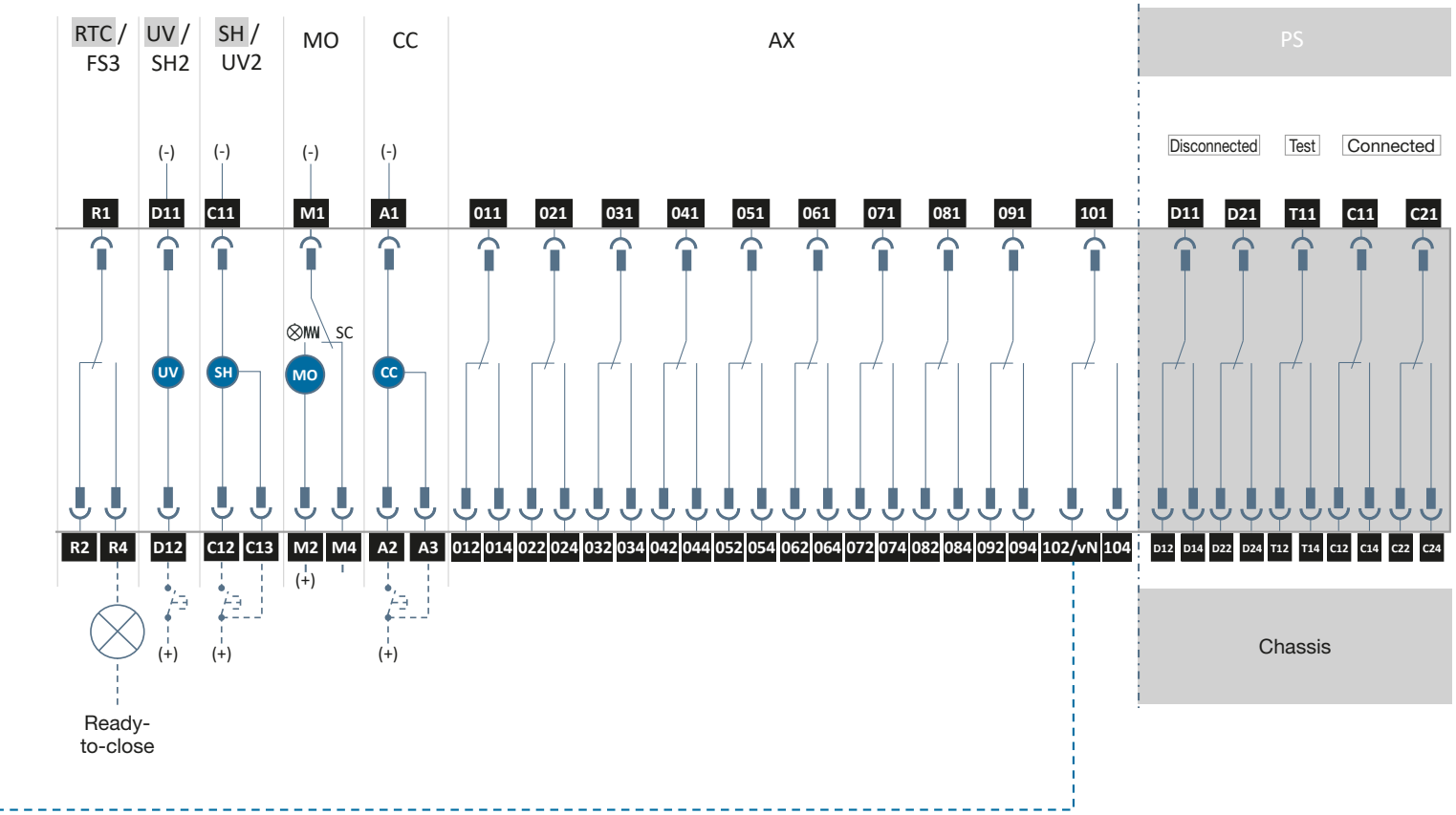
Connection diagram of the HW2 drawout circuit breakers



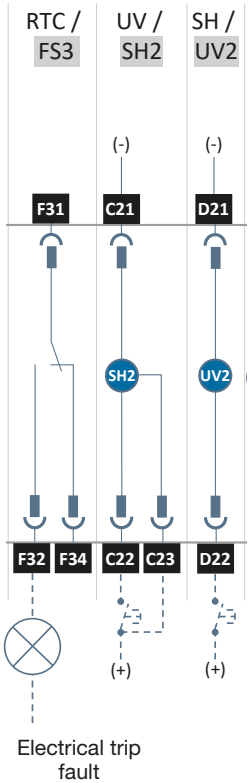
Terminal blocks	Terminations
COM	Communication module
ESP	External sensors
TU	External power supply for the trip unit
ZSI	Zone selectivity function
OAC	Output Alarm Contacts
FS	Fault trip contact
FS2	FS Fault trip contact No. 2
RTC/FS3	Contact ready to close or 3rd electrical trip fault contact
UV/SH2	UV undervoltage coil or 2nd SH shunt trip coil
SH/UV2	SH shunt trip coil or 2nd UV undervoltage coil
MO	MO charging motor and SC spring-loaded signal contact
CC	Closing coil CC
AX	Auxiliary contact - maximum 10 contacts signalling the circuit breaker open/closed status (4 contacts by default)
PS	Position contacts - Up to 5 contacts indicating the position of the circuit breaker in the chassis.
102/vN	Neutral potential ENVA

The cables (flexible or rigid) used must have a cross section between 0.6 mm^2 and 2.5 mm^2.

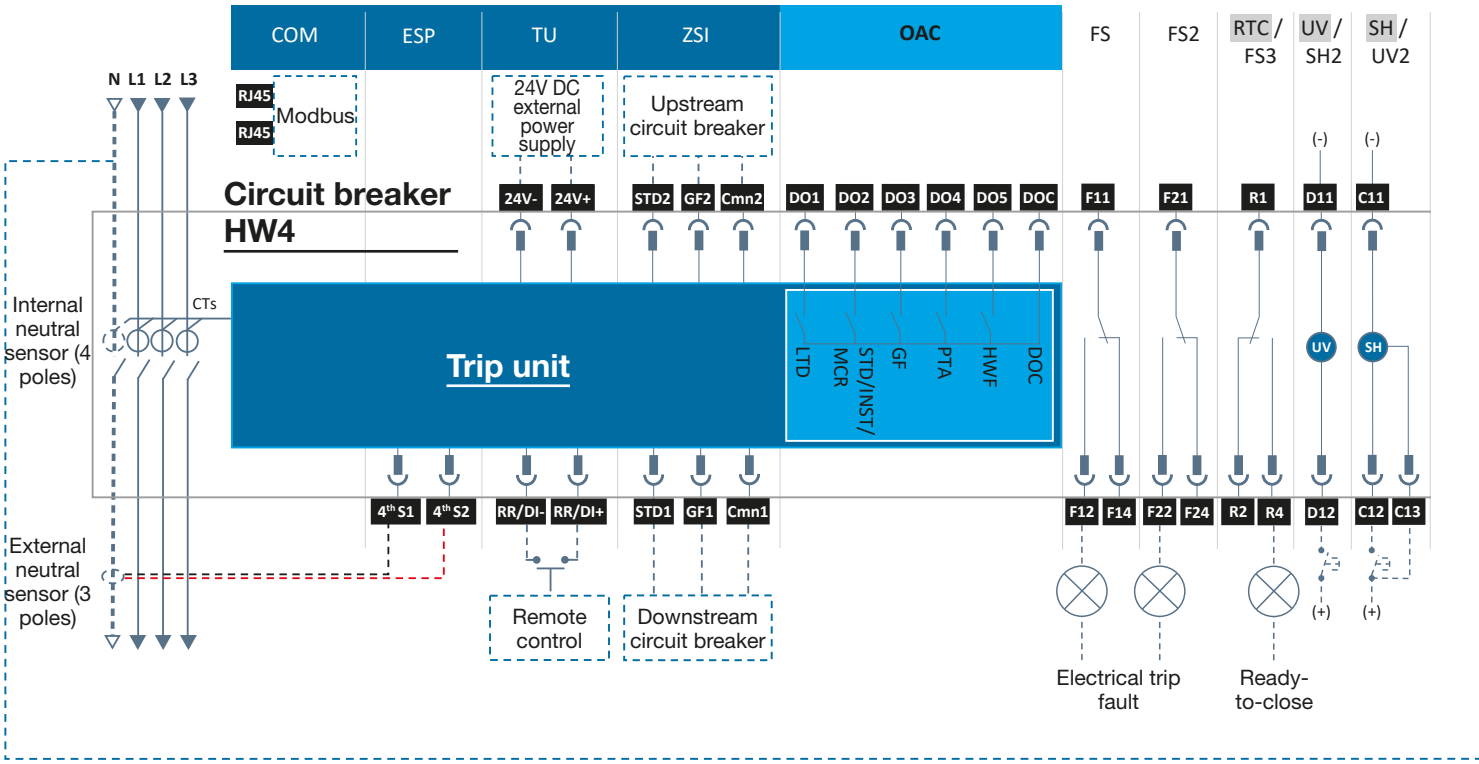
In order to be properly held in place in the terminals, the connected cables must first be stripped form 10 to 12 mm.
The cables must not be twisted and only one cable is authorised per terminal.



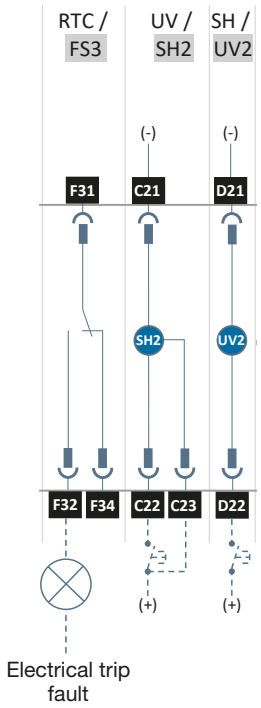
Second possibility

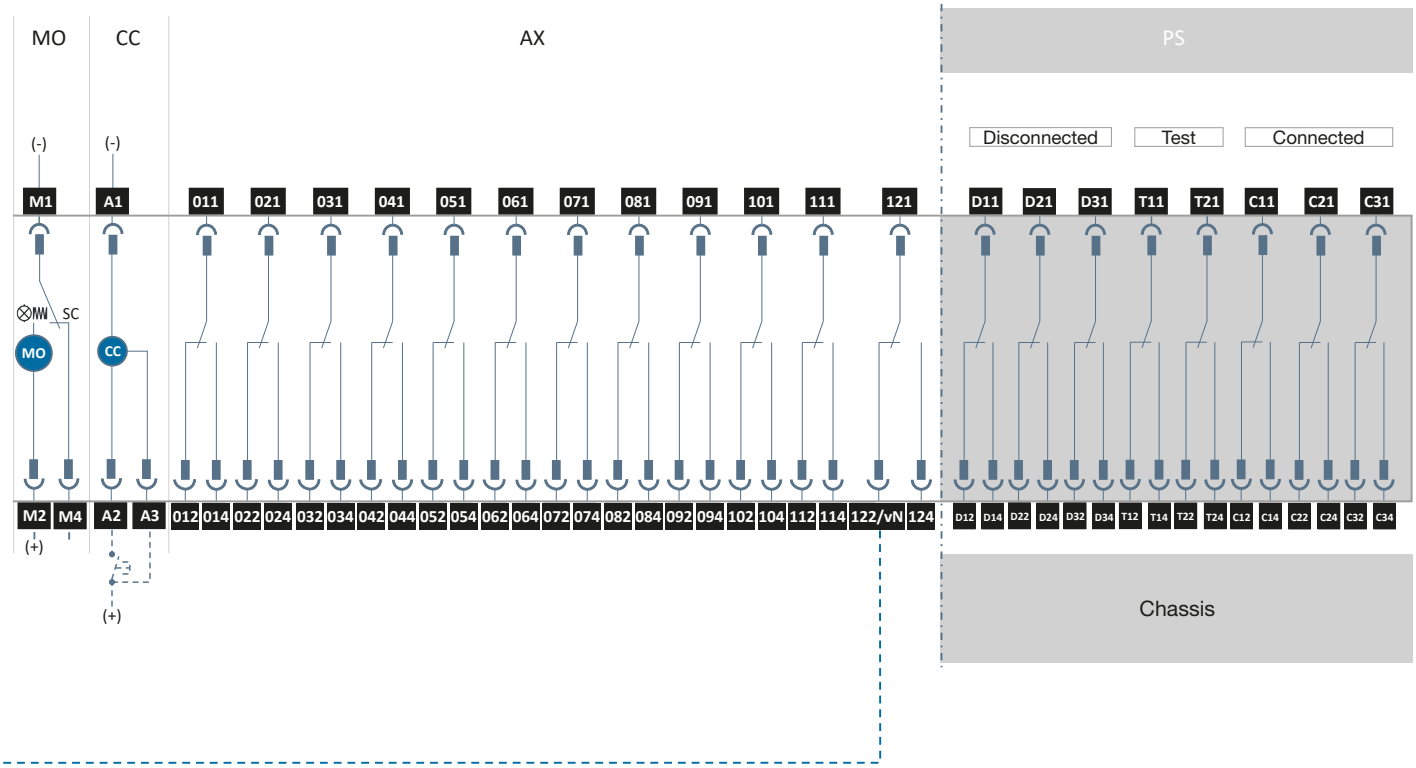


Connection diagram of the HW4 drawout circuit breakers



Second possibility



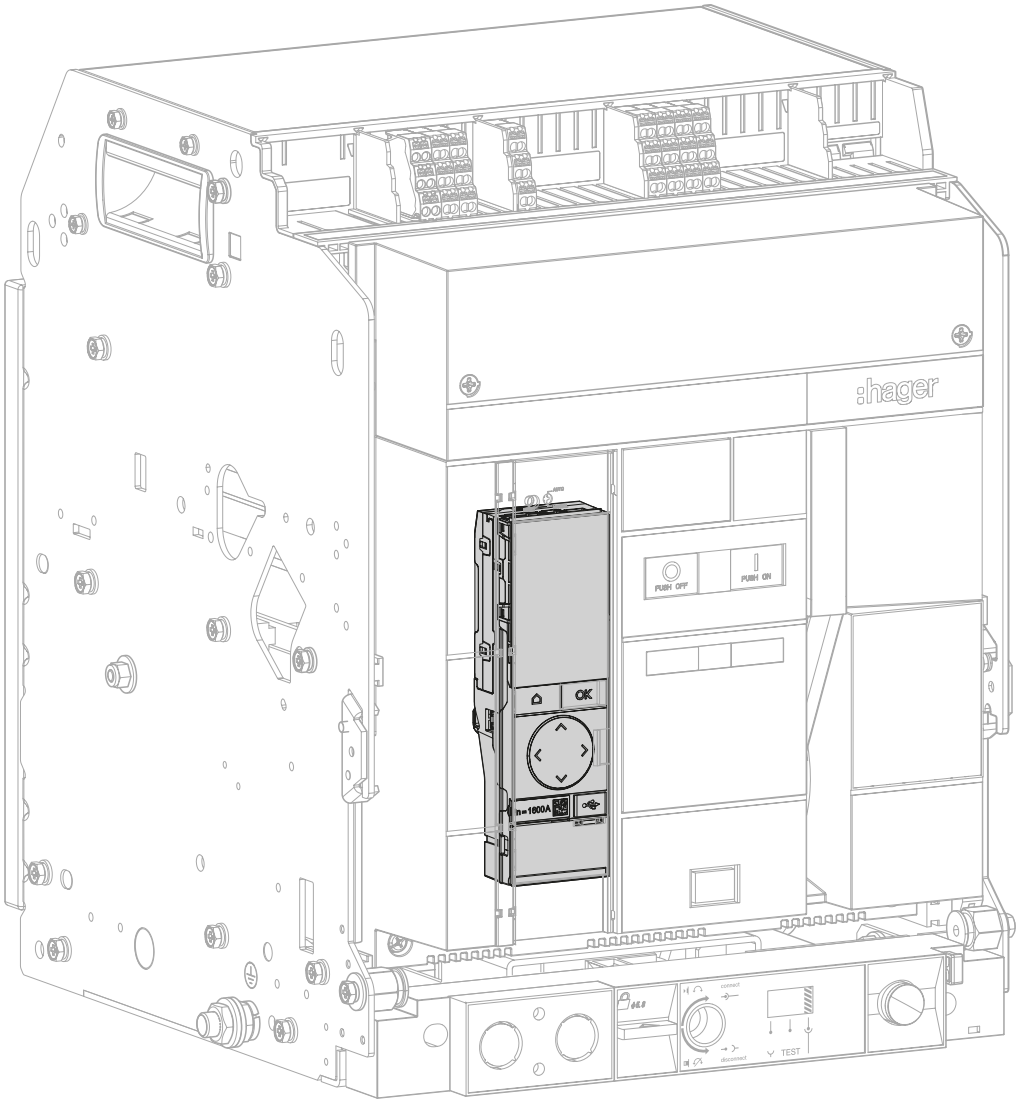


Terminal blocks	Terminations
COM	Communication module
ESP	External sensors
TU	External power supply for the trip unit
ZSI	Zone selectivity function
OAC	Output Alarm Contacts
FS	Fault trip contact
FS2	FS Fault trip contact No. 2
RTC/FS3	Contact ready to close or 3rd electrical trip fault contact
UV/SH2	UV undervoltage coil or 2nd SH shunt trip coil
SH/UV2	SH shunt trip coil or 2nd UV undervoltage coil
MO	MO charging motor and SC spring-loaded signal contact
CC	Closing coil CC
AX	Auxiliary contact - maximum 12 contacts signalling the circuit breaker open/closed status (6 contacts by default)
PS	Position contacts - Up to 8 contacts indicating the position of the circuit breaker in the chassis.
122/vN	Neutral potential ENVA

The cables (flexible or rigid) used must have a cross section between 0.6 mm^2 and 2.5 mm^2.

In order to be properly held in place in the terminals, the connected cables must first be stripped form 10 to 12 mm.
The cables must not be twisted and only one cable is authorised per terminal.

hw+ air circuit breakers 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 6LE007969A user manual for hw+ sentinel electronic trip units and the 6LE008147A user manual for hw+ sentinel Energy electronic trip units.

Compliance with the standards
hw+ air 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

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

Temperature
hw+ air circuit breakers can be used at temperatures between -25°C and 70 °C.
With ambient temperatures above 50 °C, the devices must be reclassified; refer to the values provided in the Technical Catalogue 6LE007334A.
The acceptable storage temperature range in the original packing is from -40°C to 70°C.

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

Altitude
hw+ air 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 6LE007334A.

Vibrations
hw+ air 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 min

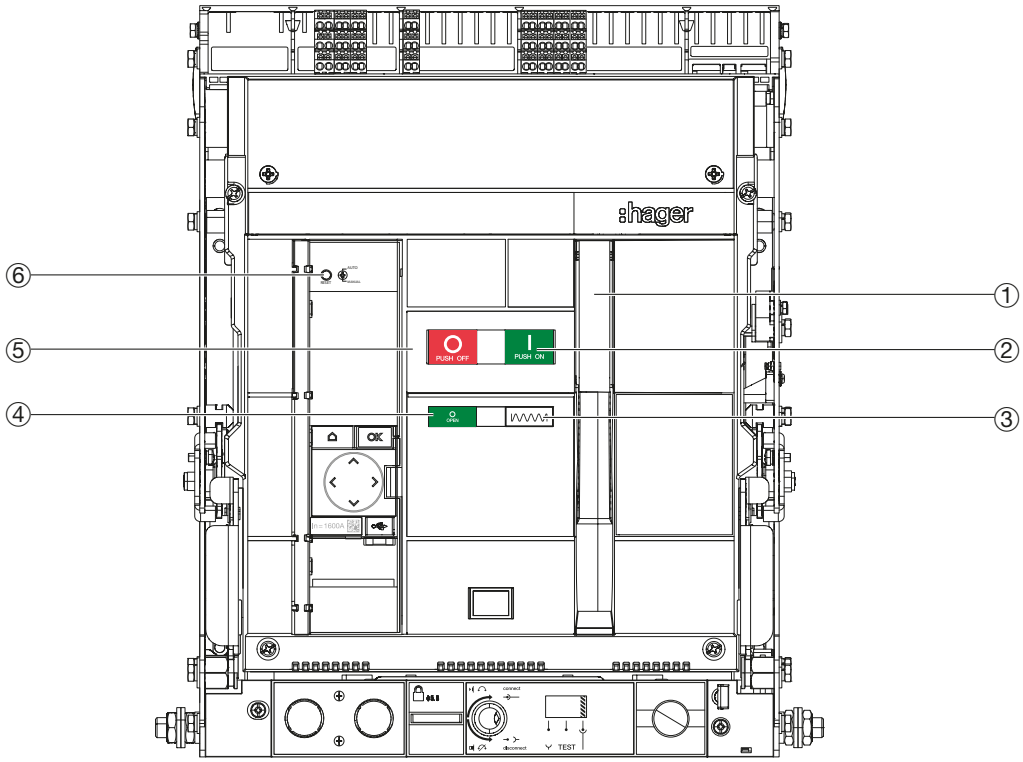
Excessive vibration may cause nuisance (false) tripping and/or damage to connections and/or mechanical parts.

Impacts
hw+ air circuit breakers can withstand impacts with an acceleration of 200 m/s^2 (20 g) max.

Environment
hw+ air circuit breakers must be used in an environment without excess 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.

The HW2 and HW4 circuit breakers have the following elements on the front.

① Charging handle
② Closing push button
③ Closing spring status indicator
④ Contact opening and closing indicator
⑤ Opening push button
⑥ RESET re-arm button



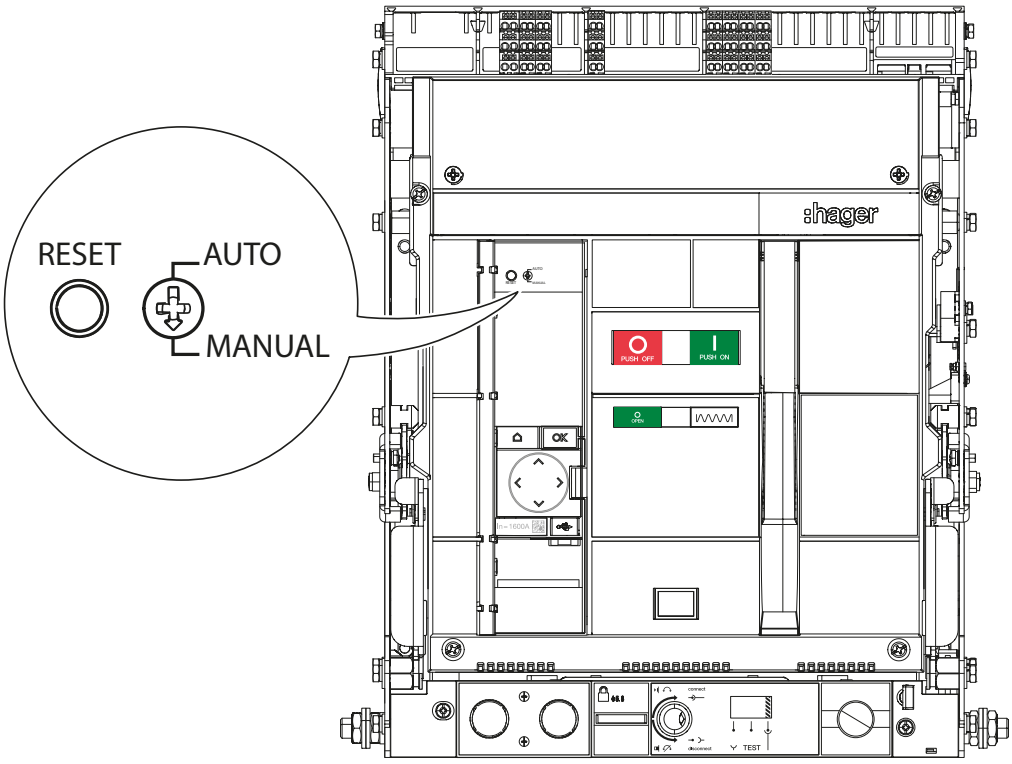
Status indicators

The combination of the two indicators shows the status of the circuit breaker.

Opening and closing indicator	Closing spring status indicator	Circuit breaker status
OPEN		Circuit breaker open. Closing spring discharged.
OPEN	OK	Air circuit breaker Closing spring charged but not ready to close because: • Following tripping, the circuit breaker has not been reset via the acknowledgement procedure (see 6LE009210A user manual for HW2 / HW4 air circuit breakers, Chapter 07 Closing the circuit breaker after a tripping). • The circuit breaker is locked mechanically in the open position using a lock or padlock.
OPEN	OK	Circuit breaker open. Closing spring charged. The circuit breaker is ready to be closed.
I CLOSED		Circuit breaker closed. Closing spring discharged.
I CLOSED	OK	Circuit breaker closed. Closing spring charged.

RESET re-arm button

The RESET re-arm button is used to reset the circuit breaker after tripping (see 6LE009210A user manual for HW2 / HW4 air circuit breakers, Chapter 07 Closing the circuit breaker after a tripping).
The operation of the RESET re-arm button depends on the Auto or Manual mode set using the adjustment dial on the right.



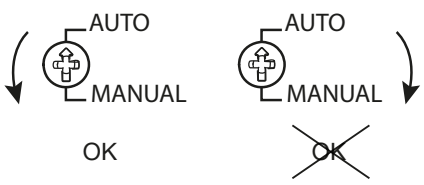
- **Auto mode**, in which it is not necessary to press the RESET re-arm button before closing the circuit breaker again after tripping.
  This mode is usually used if the circuit breaker is remotely monitored, as it can be closed without requiring a person to perform the action on-site.

- **Manual mode**, in which the RESET re-arm button must be pressed in before closing the circuit breaker again aftertripping.

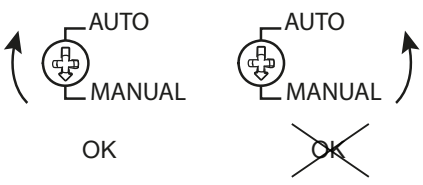
ATTENTION

Risk of property damage

To switch from Auto to Manual mode, always turn the dial **anti-clockwise**.



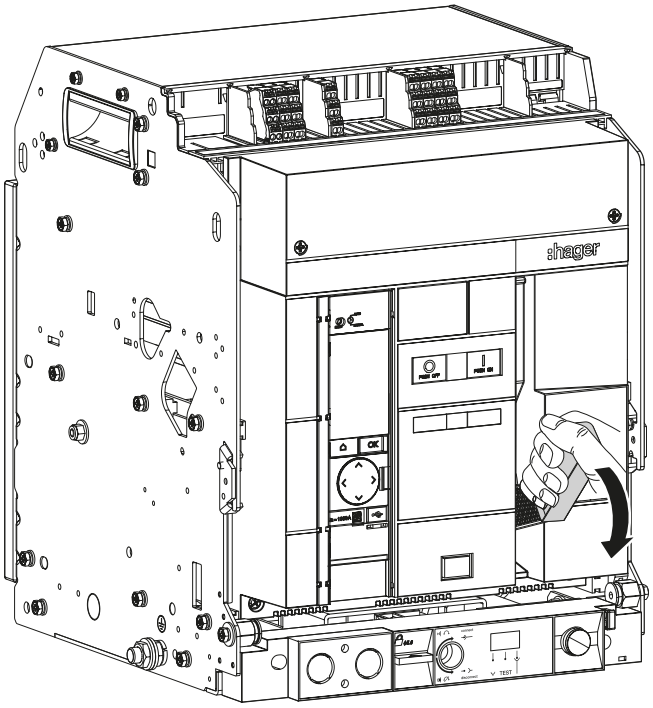
To switch from Manual to Auto mode, always turn the dial **clockwise**.



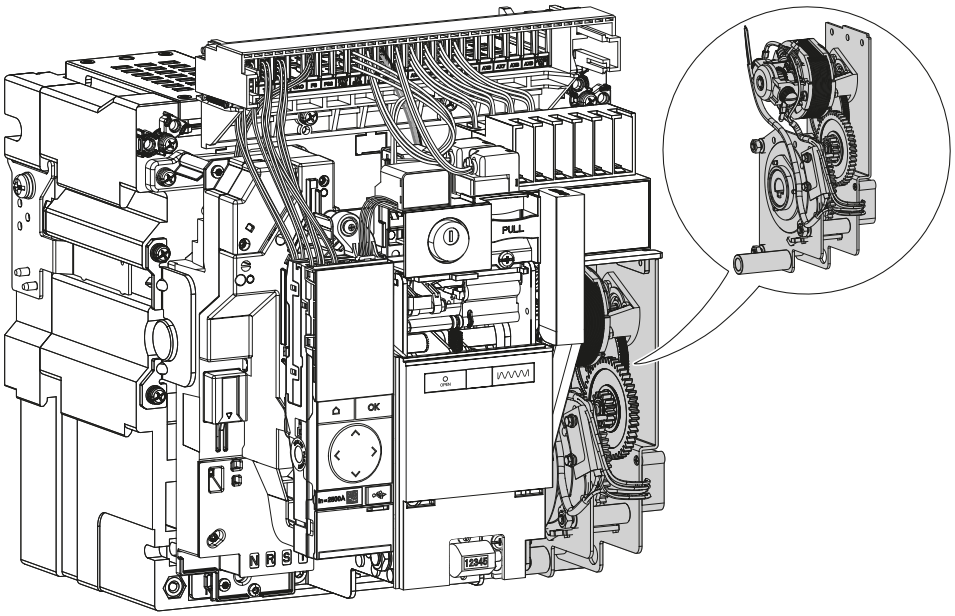
Closing spring

The closing spring is used to mechanically close the circuit breaker. It must be charged first, and there are two procedures for this:

- Manual charging
Charge the spring using the charging handle until the status of the indicator changes.



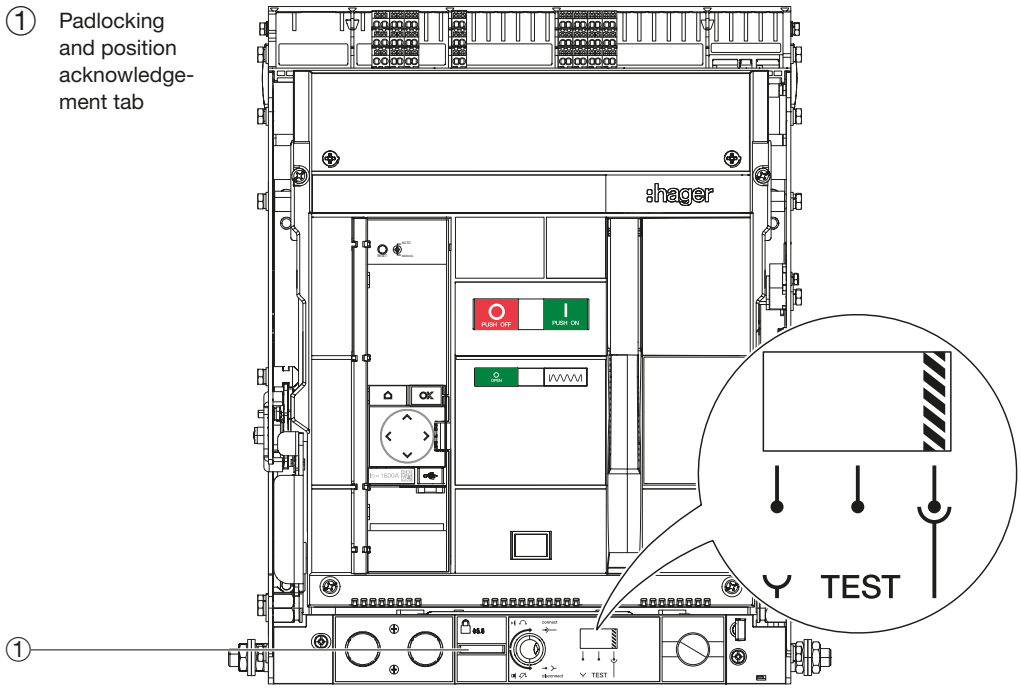
- Automatic charging
If an MO charging motor is installed and powered, the closing spring charges automatically each time the circuit breaker closes.

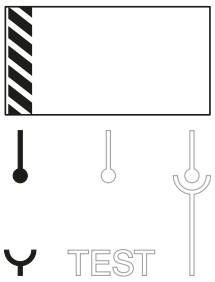
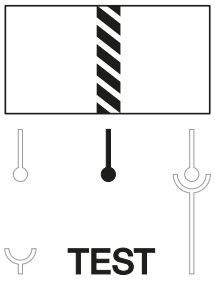
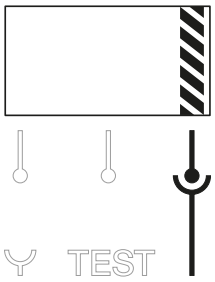


The detailed description of the circuit breaker closing and opening operations is available in the 6LE009210A user manual for HW2 / HW4 air circuit breakers.

The position of the circuit breaker in the chassis is shown by the mechanical position indicator of the moving part on the front. There are three different positions, connected, test and disconnected.
Changing from one position to another is done using a racking handle.
Before changing from one position to another, the padlocking and position acknowledgement tab must be pressed.

① Padlocking and position acknowledge-ment tab

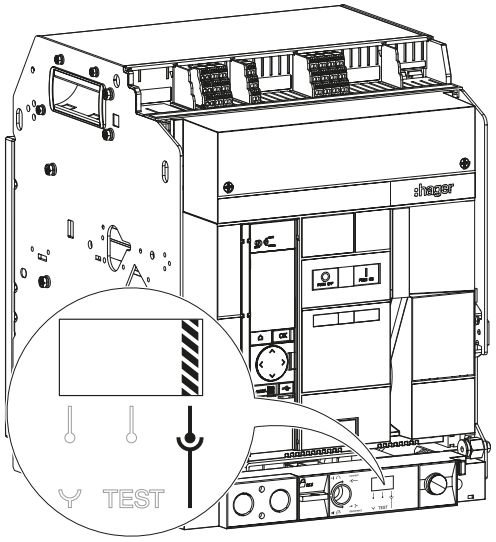
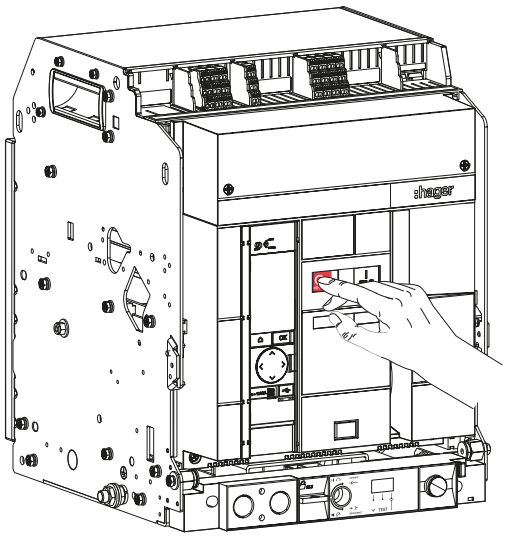


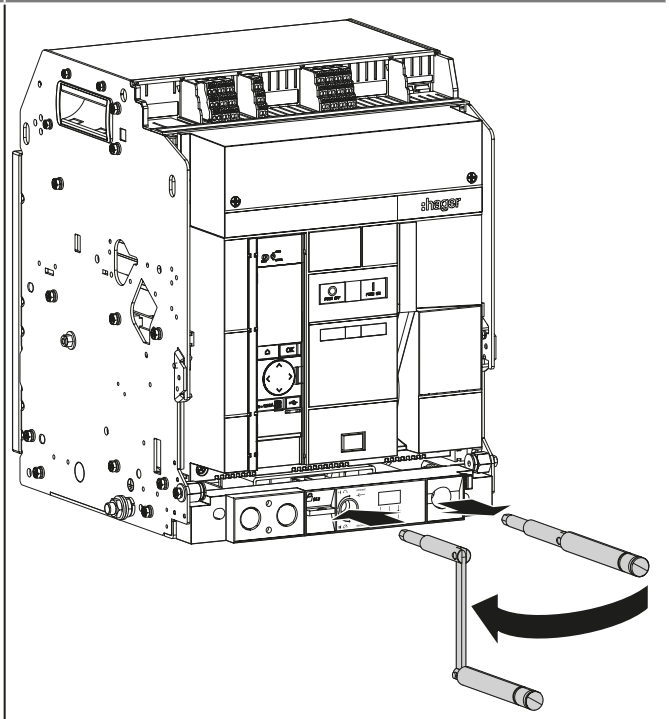
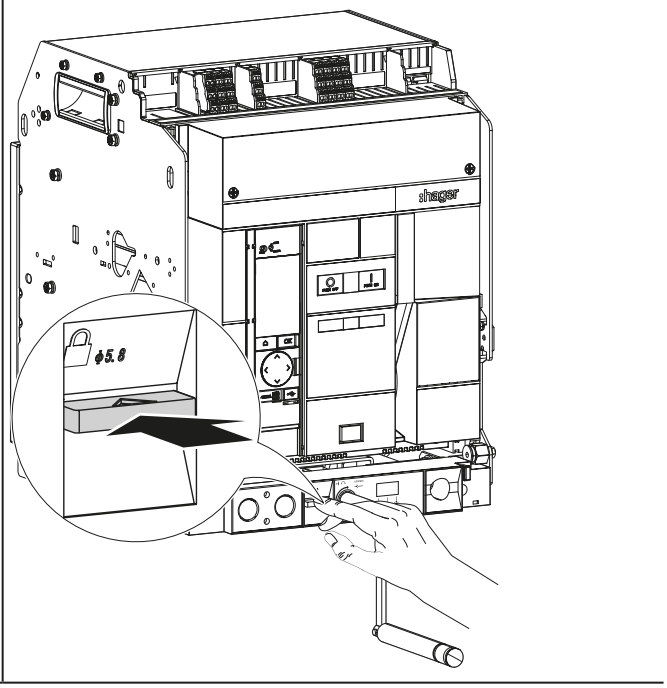
Circuit breaker position	Circuit breaker status	Mechanical position indicator of the moving part
Disconnected	The circuit breaker can be withdrawn from or inserted into the chassis.	
Test	The circuit breaker's power contacts are isolated. All of the auxiliaries remain electrically connected so that they remain functional.	
Connected	The connections on the circuit breaker are connected to the jaw contacts on the chassis. The circuit breaker is ready for operation.	

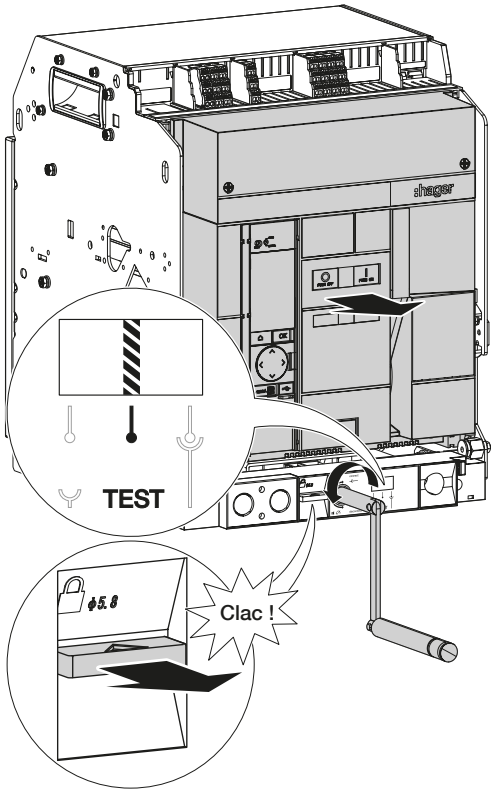
⚠ WARNING

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

To change from connected position to test position:

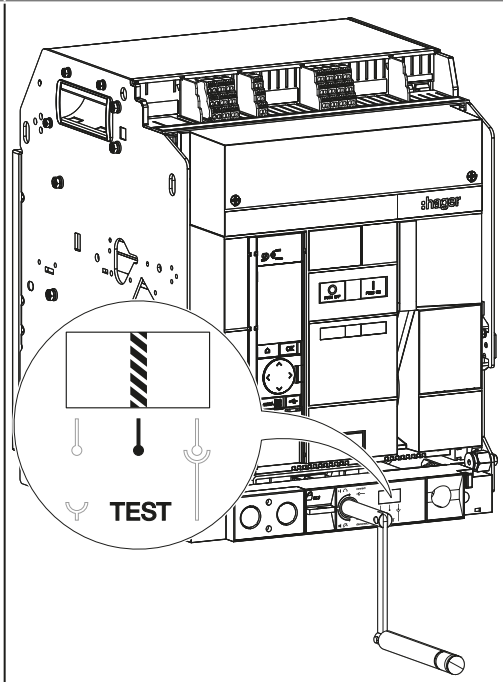
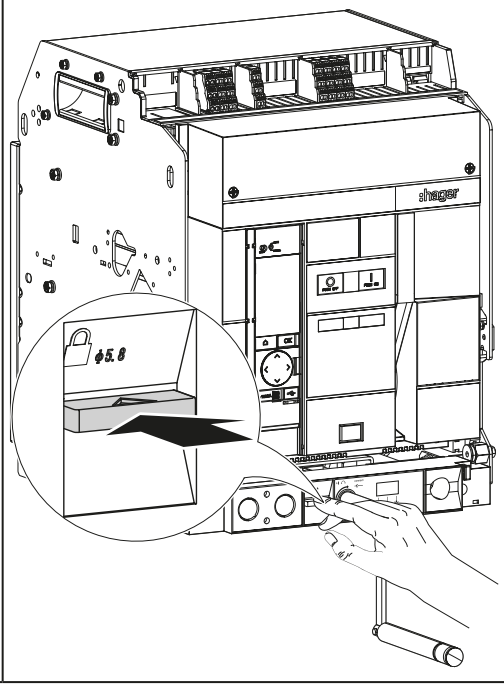
	Action	Illustration
1	Check that the circuit breaker is in the connected position and the mechanical position indicator displays:	
2	Open the circuit breaker by pressing the opening push button  .	

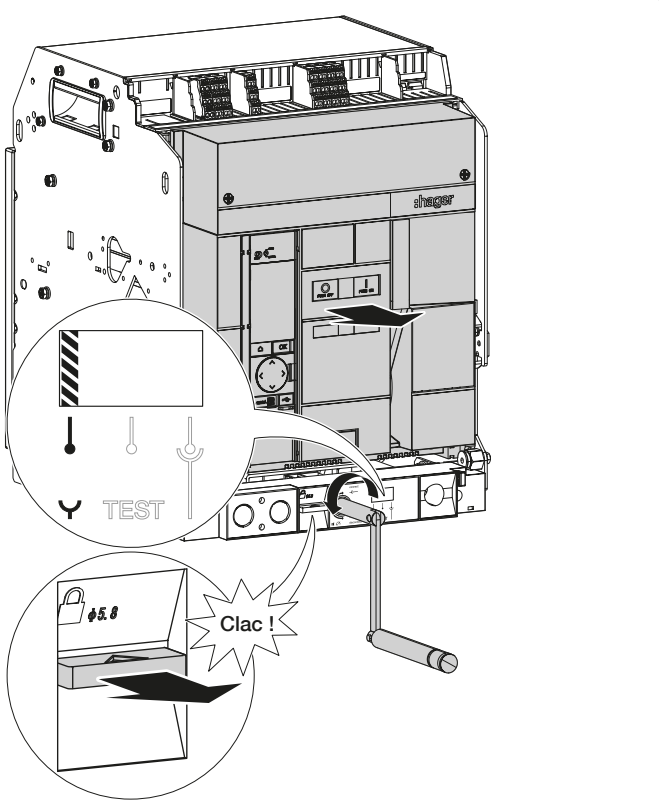
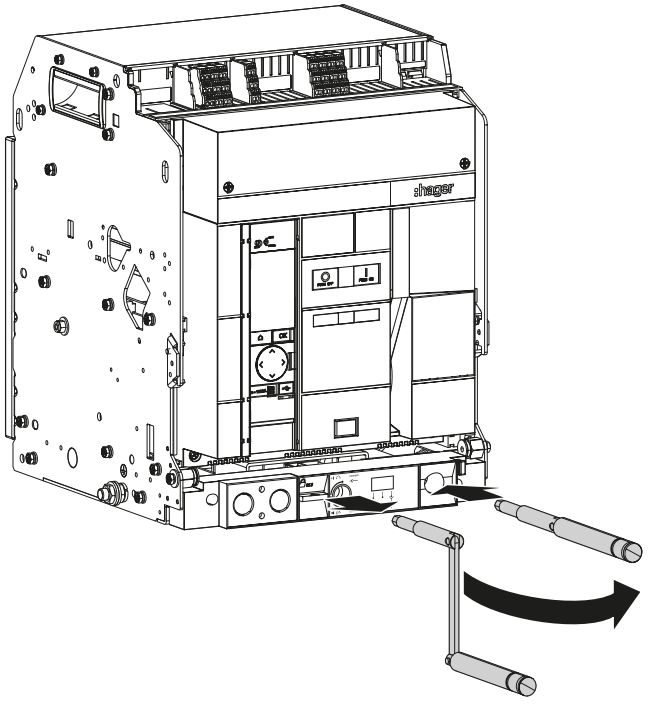
	Action	Illustration
3	Take the racking handle out of its housing and insert it in the racking-in/ racking-out hole.	
4	Press the padlocking and position acknowledgement tab.	

	Action	Illustration
5	Turn the racking handle anti-clockwise until: - the mechanical position indicator displays the Test position, - the padlock latch and position acknowledgement tab comes out of its housing.	

ATTENTION
Risk of property damage If the chassis is not fitted in an electrical panel, ensure it is correctly fastened before changing position.

To change from test position to disconnected position:

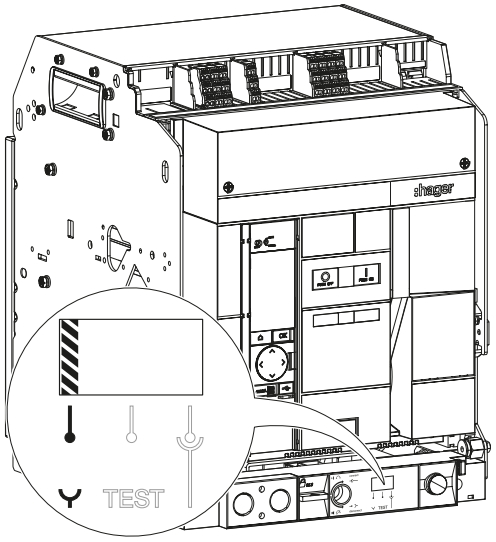
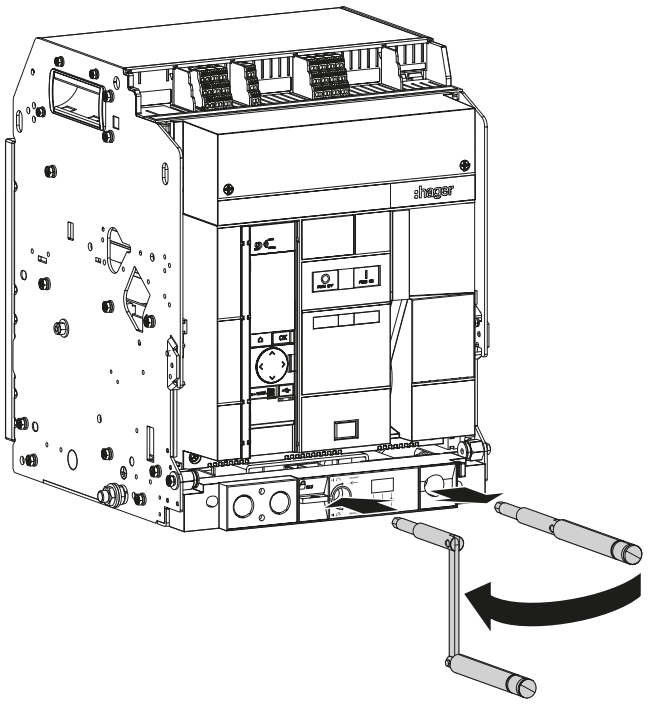
	Action	Illustration
1	Check that the circuit breaker is in the test position and the mechanical position indicator displays:	
2	Press the padlocking and position acknowledgement tab.	

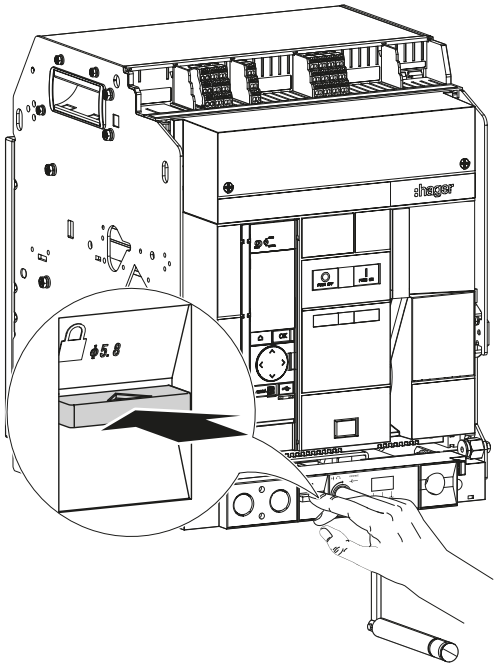
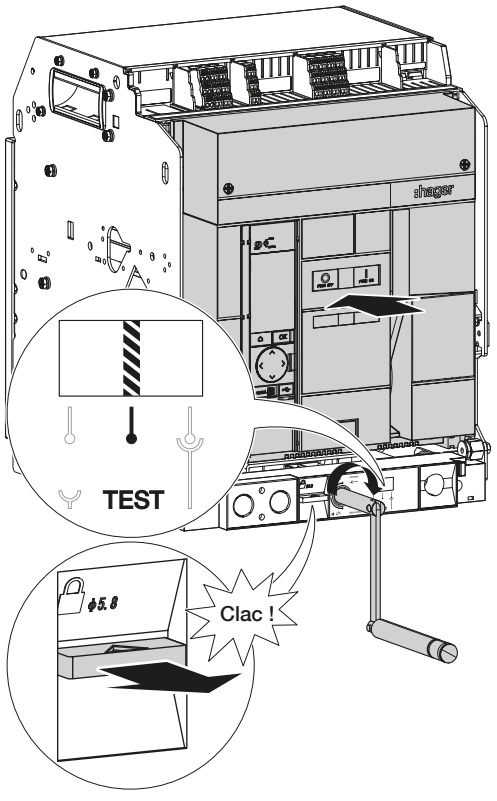
	Action	Illustration
3	Turn the racking handle anti-clockwise until: - the mechanical position indicator displays the Disconnected position, - the padlock latch and position acknowledgement tab comes out of its housing.	
4	Remove, then store the racking handle in its housing.	

⚠ WARNING

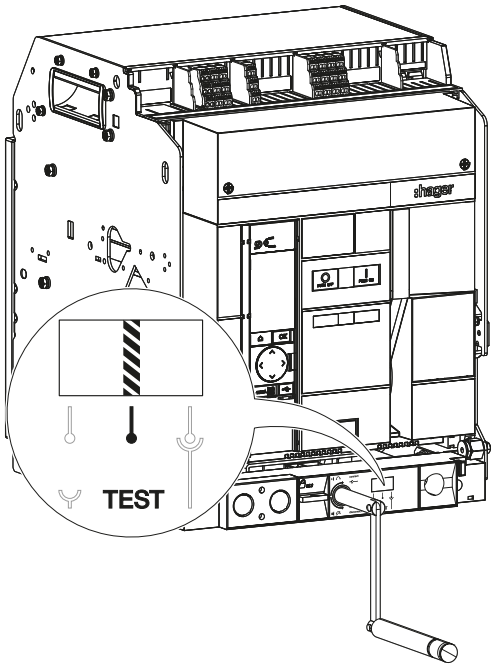
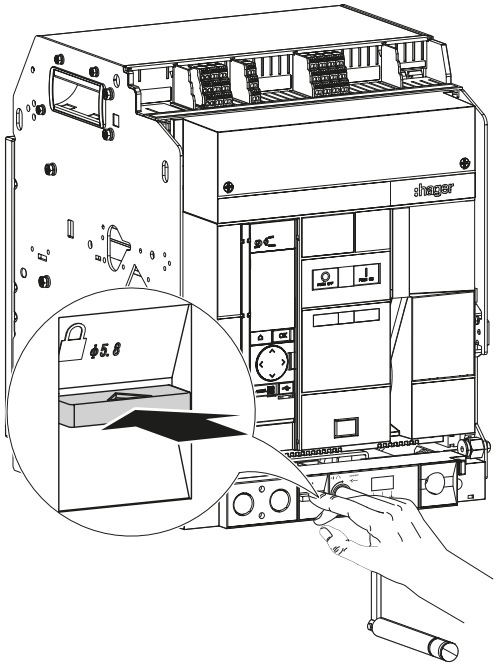
Risk of electric shock
Make sure that the device is only operated by qualified personnel in accordance with to the installation standards in force in the relevant country.

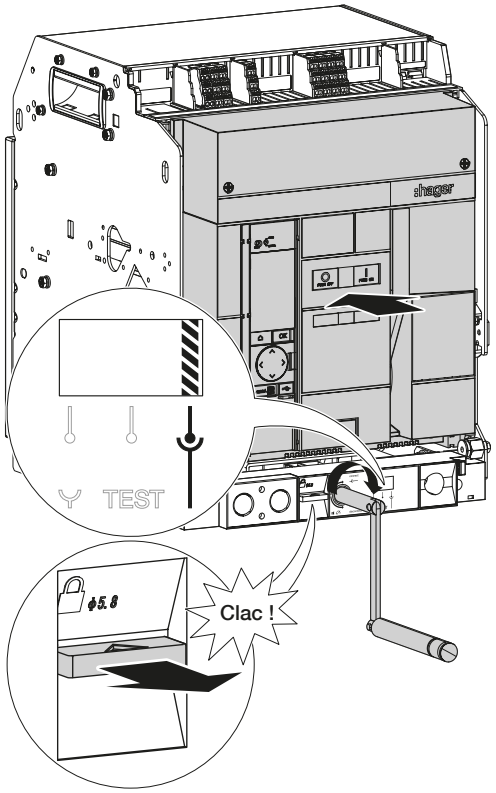
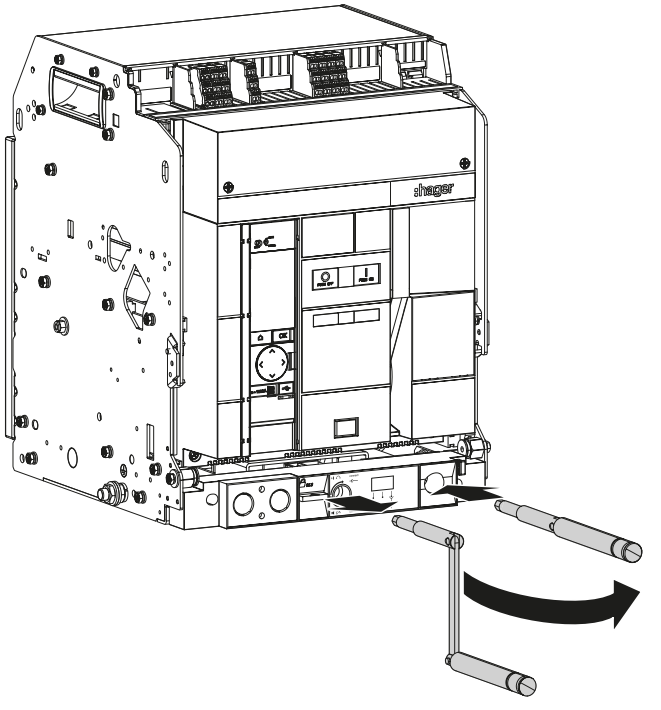
To change from disconnected position to test position:

	Action	Illustration
1	Check that the circuit breaker is in the disconnected position and that the mechanical position indicator displays:	
2	Take the racking handle out of its housing and insert it in the racking-in/ racking-out hole.	

	Action	Illustration
3	Press the padlocking and position acknowledgement tab.	
4	Turn the racking handle clockwise until: - the mechanical position indicator displays the Test position, - the padlock latch and position acknowledgement tab comes out of its housing.	

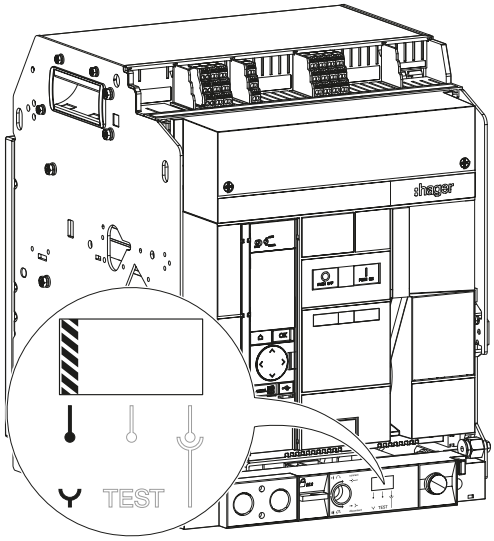
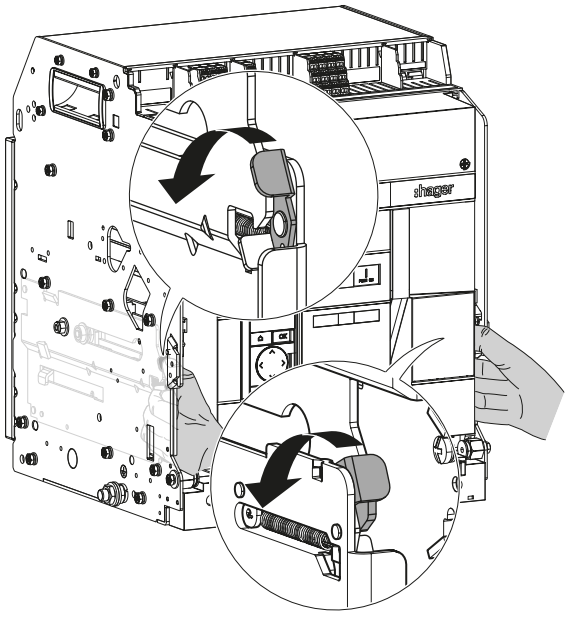
To change from test position to connected position:

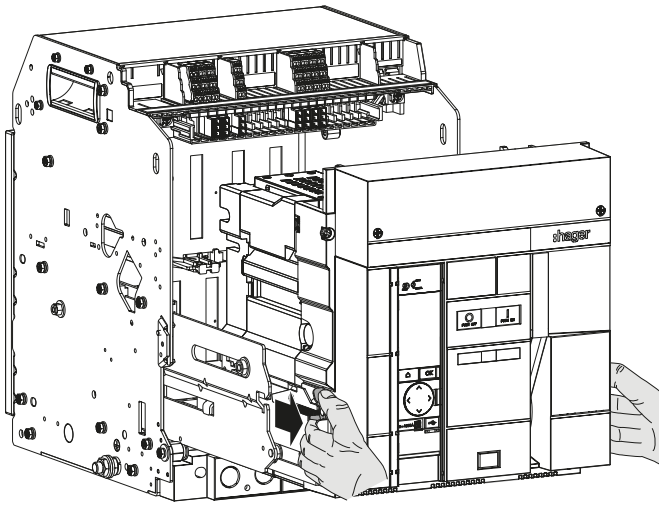
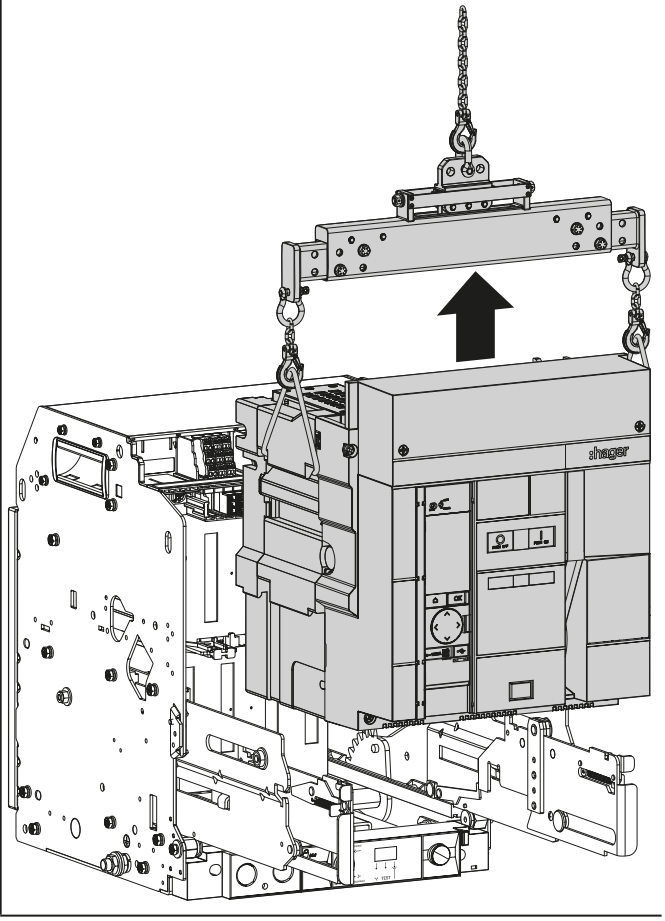
	Action	Illustration
1	Check that the circuit breaker is in the test position and the mechanical position indicator displays:	
2	Press the padlocking and position acknowledgement tab.	

	Action	Illustration
3	Turn the racking handle clockwise until: - the mechanical position indicator displays the Connected position, - the padlock latch and position acknowledgement tab comes out of its housing.	
4	Remove, then store the racking handle in its housing.	

⚠ CAUTION

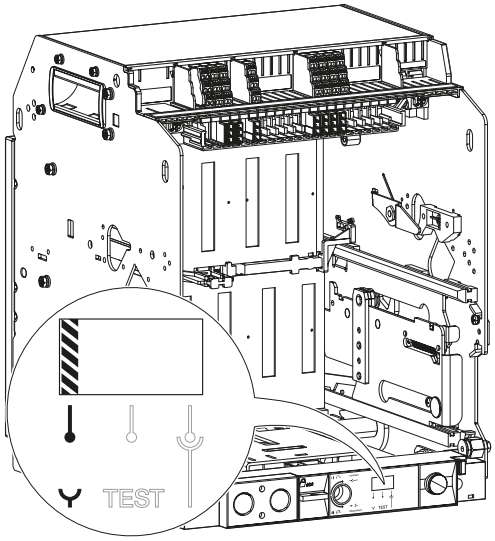
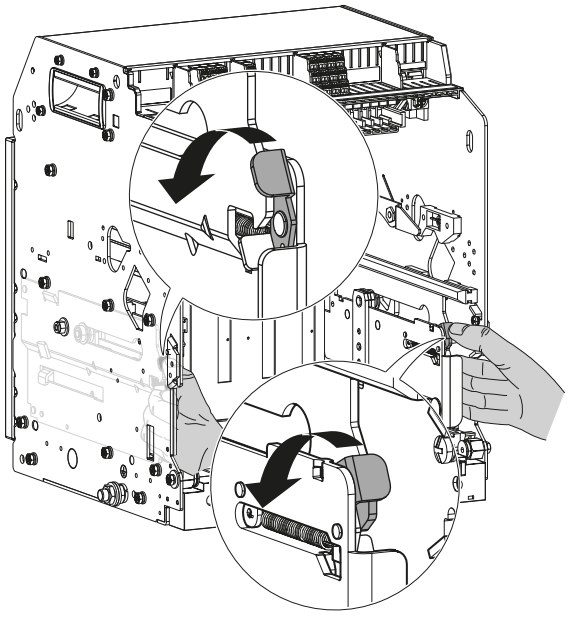
Risk of the circuit breaker falling out
Risk of injury by crushing.
Before handling the circuit breaker, ensure the chassis is fastened within the electrical distribution board. Ensure the device is only handled by qualified personnel equipped with lifting equipment and suitable safety equipment.

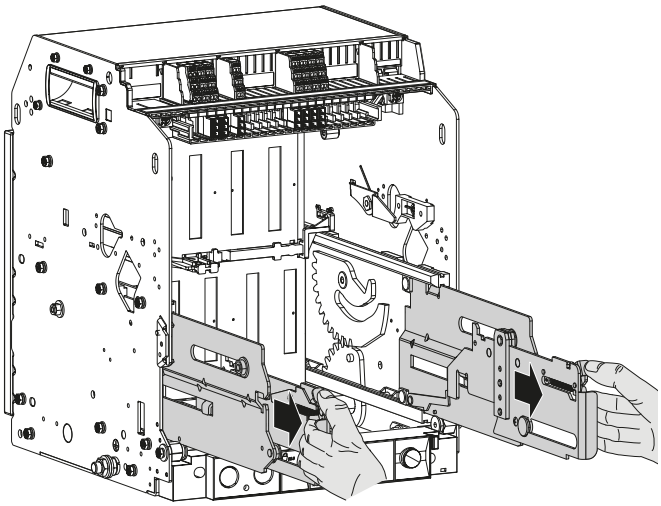
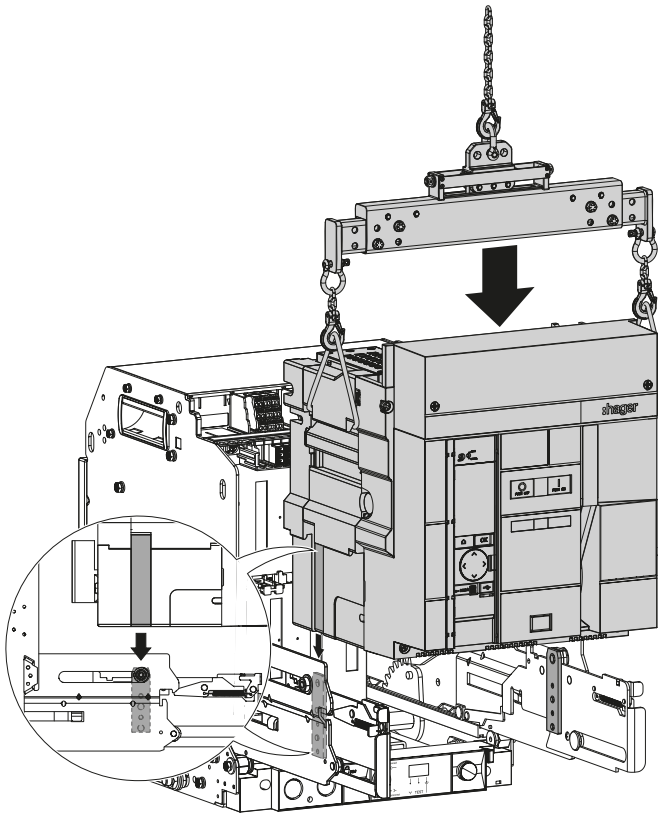
	Action	Illustration
1	Check that the circuit breaker is in the disconnected position (cf. Chapters 4.1 Changing from the connected position to the test position and 4.2 Changing from the test position to the disconnected position).	
2	The circuit breaker remains in the chassis in the disconnected position. While pressing the push buttons...	

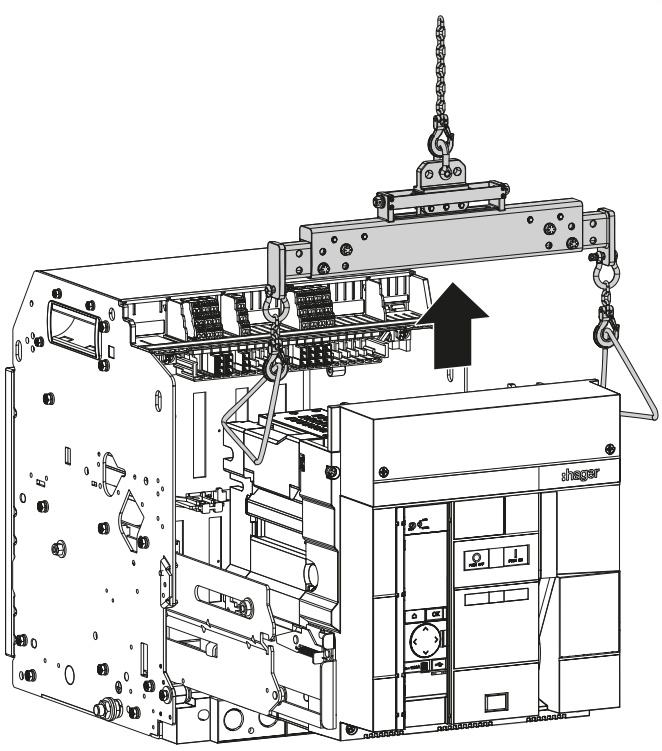
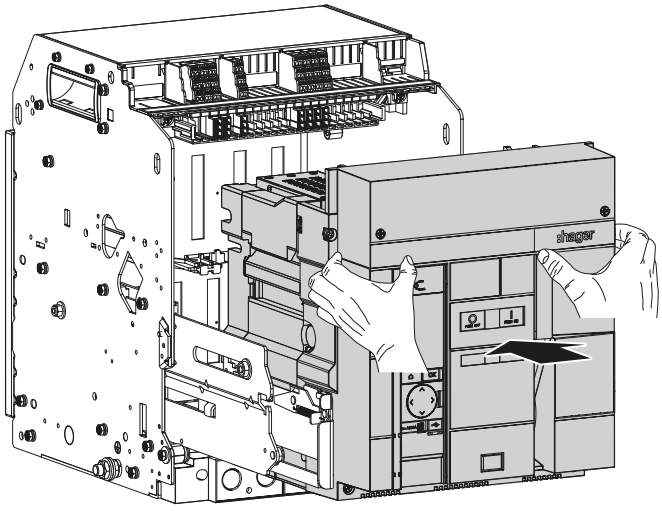
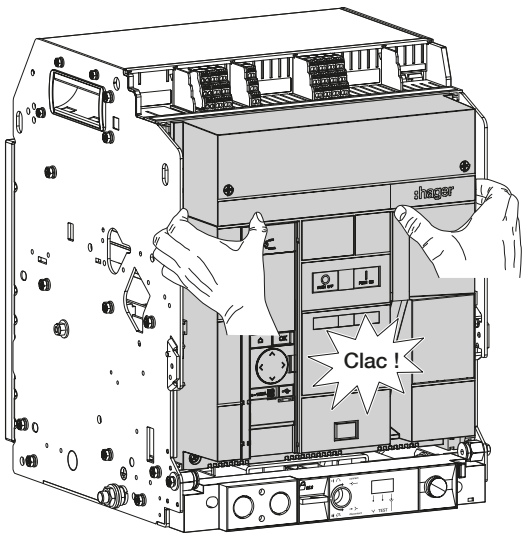
	Action	Illustration
2	*(continued)* pull the racking handles to take the circuit breaker out of its housing.	
3	Remove the circuit breaker from the guide rails using an appropriate lifting device.	

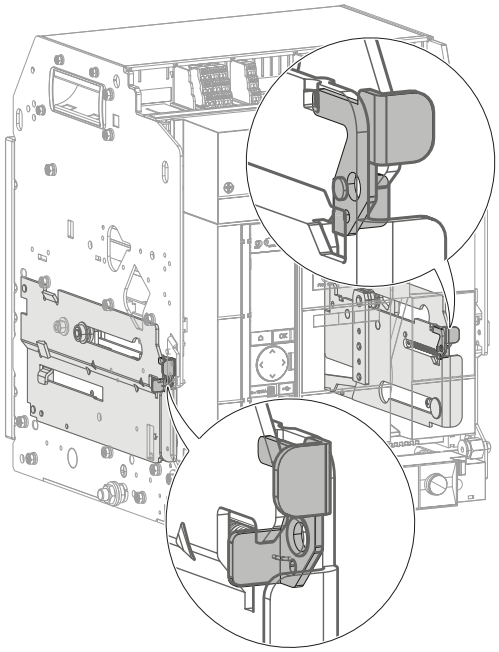
⚠ CAUTION

Risk of the circuit breaker falling out
Risk of injury by crushing.
Before handling the circuit breaker, ensure the chassis is fastened within the electrical distribution board. Ensure the device is only handled by qualified personnel equipped with lifting equipment and suitable safety equipment.

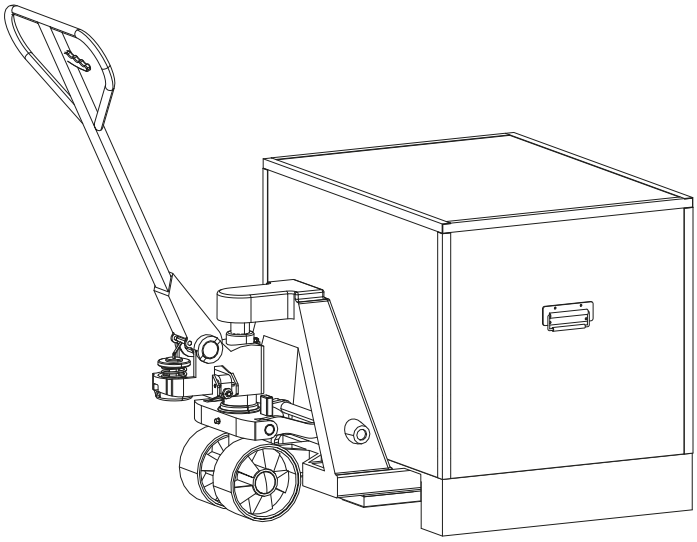
	Action	Illustration
1	Check that the chassis is in the disconnected position.	
2	While pressing the push buttons...	

	Action	Illustration
2	*(continued)* pull the racking handles to take out the guide rails.	
3	Using an appropriate lifting device, position the circuit breaker on the guide rails, having previously aligned the guides with the slots on the circuit breaker.	

	Action	Illustration
4	Remove the lifting equipment.	
5	Push the circuit breaker to the back of the chassis without pushing on the guide rails.	 

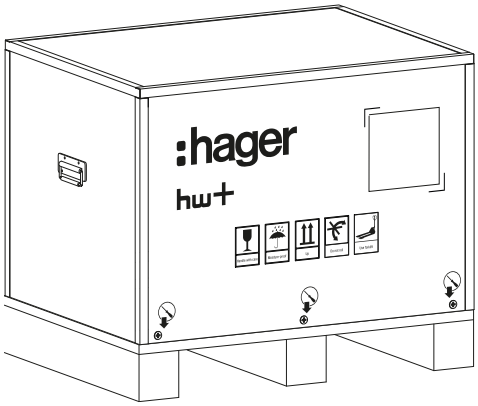
	Action	Illustration
6	Verify that the guide rails are correctly positioned.	

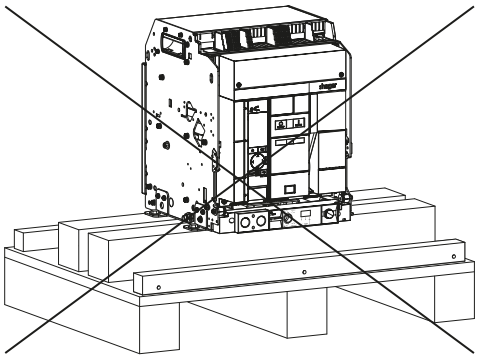
Use a pallet truck to move the hw+ transport box.



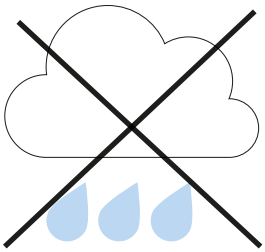
Store the circuit breaker:

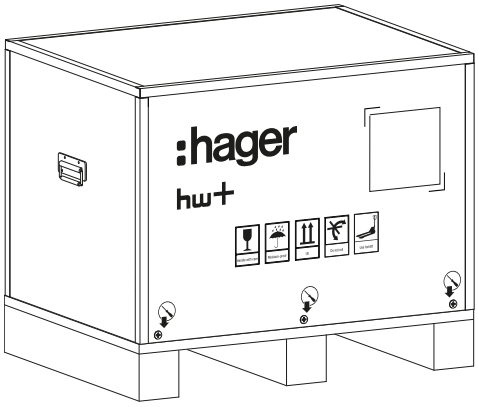
• in its original transport box,





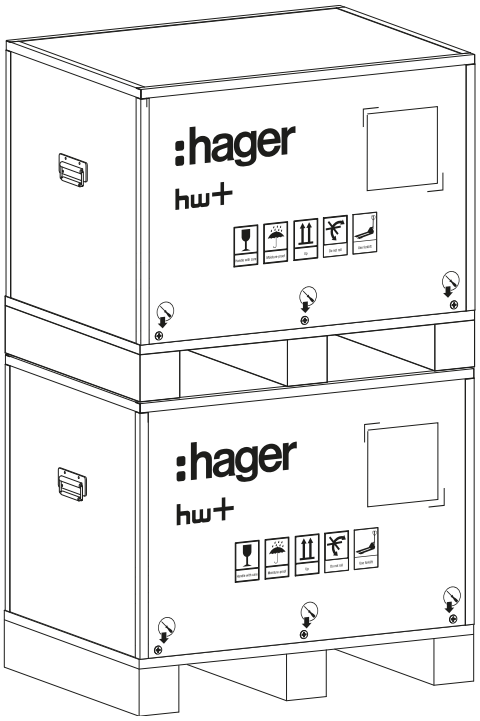
• indoors only

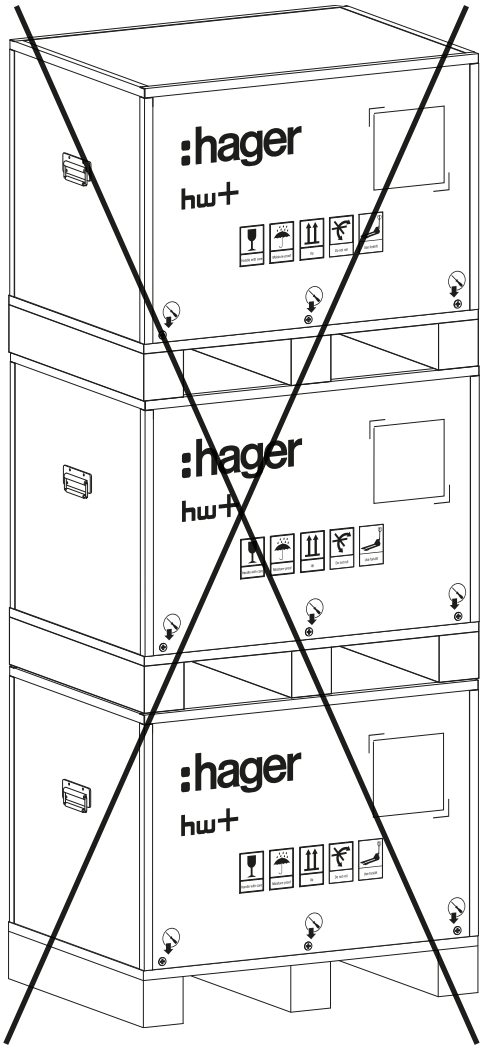




• At a temperature between -40 °C and 70 °C.
• In an environment as described in chapter **Circuit breaker operating conditions**.

Do not store more than two circuit breakers in their original packaging one on top of the other.



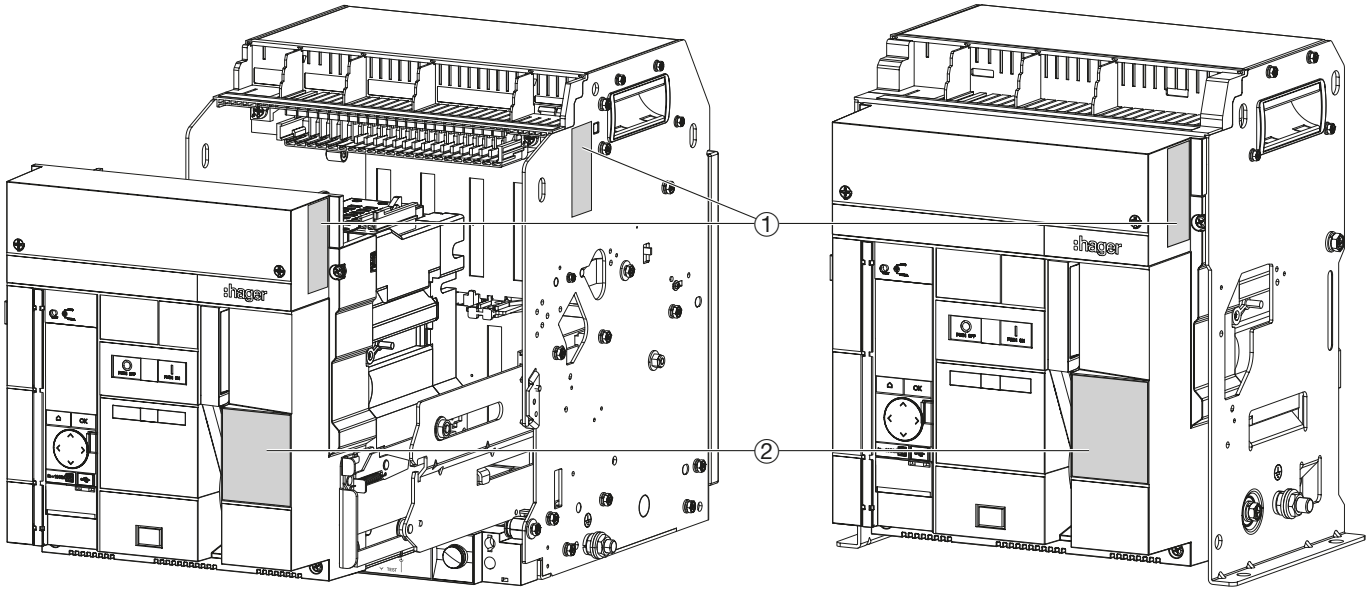


HW2 and HW4 air circuit breakers can be identified by means of the various labels affixed to the product or packaging.

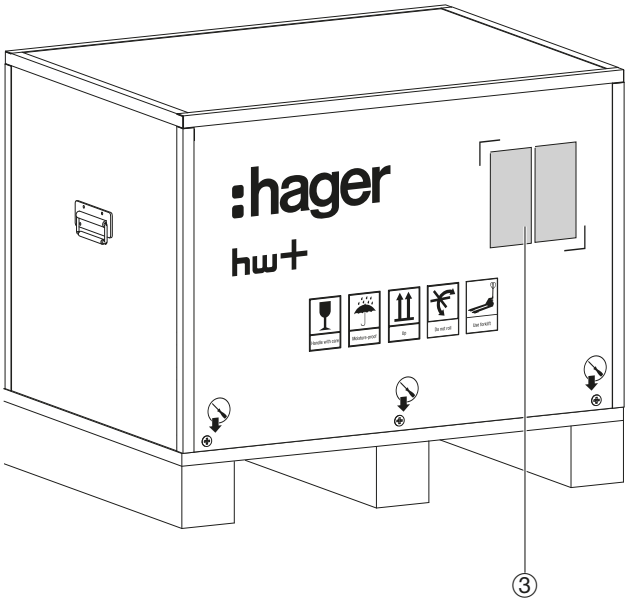
ATTENTION
For more information on the codification and the references indicated on the labels, refer to the Technical Catalogue 6LE007334A.

Drawout circuit breaker

Fixed circuit breaker



Packaging

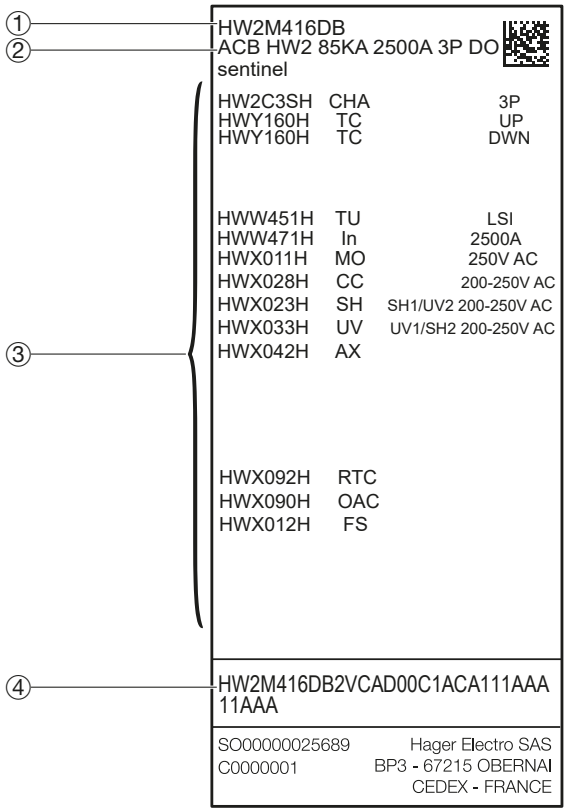


① Identification label on the circuit breaker and the chassis

② Circuit breaker rating label

③ Identification label on the packaging

Identification label on the circuit breaker and the chassis



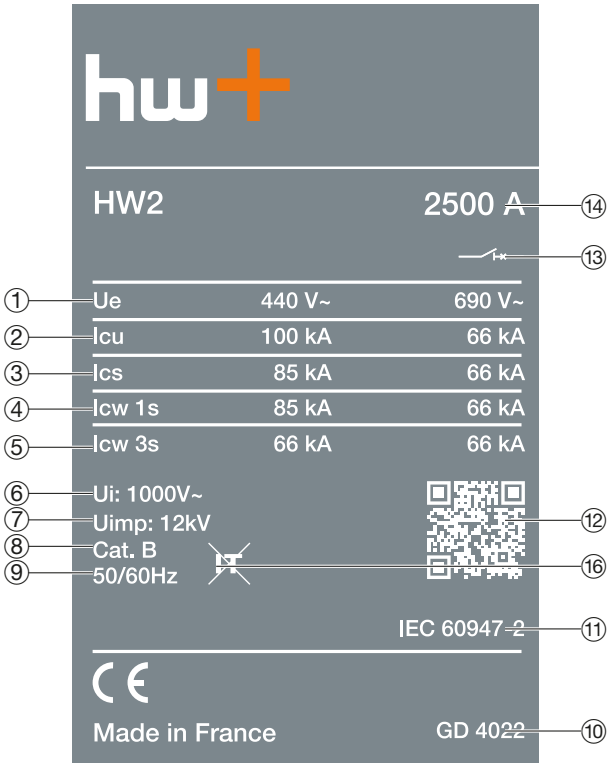
① Circuit breaker reference

② Circuit breaker designation

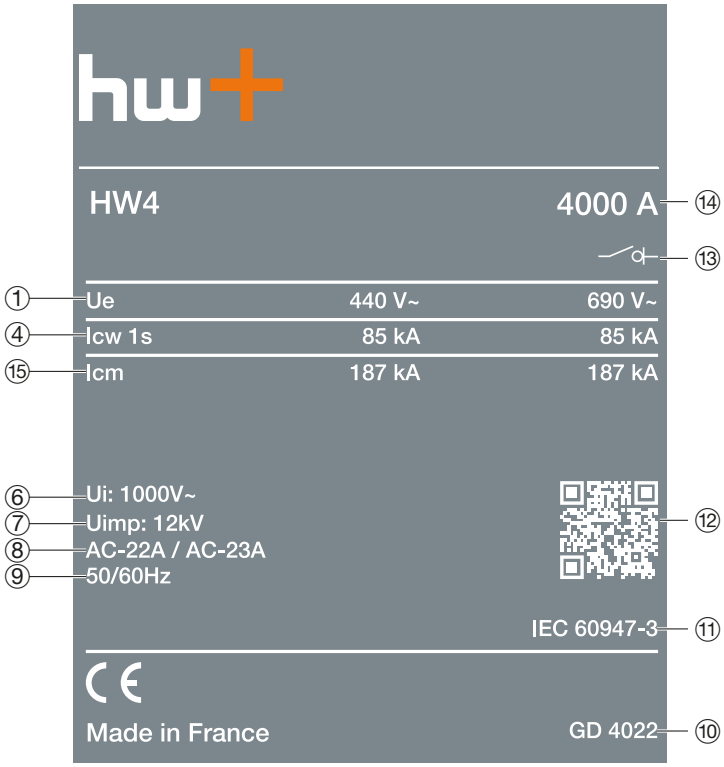
③ List of accessories mounted

④ Configuration identifier

HW2 circuit breaker technical specification label



HW4 switch-disconnectors technical specification label



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 Icw 3s: Rated short-time withstand current for 3 seconds

⑥ Ui: Rated insulation voltage

⑦ Uimp: Rated impulse withstand voltage

⑧ Category

⑨ Frequency

⑩ Manufacturing date code

⑪ Standards

⑫ QR code to access the documentation online

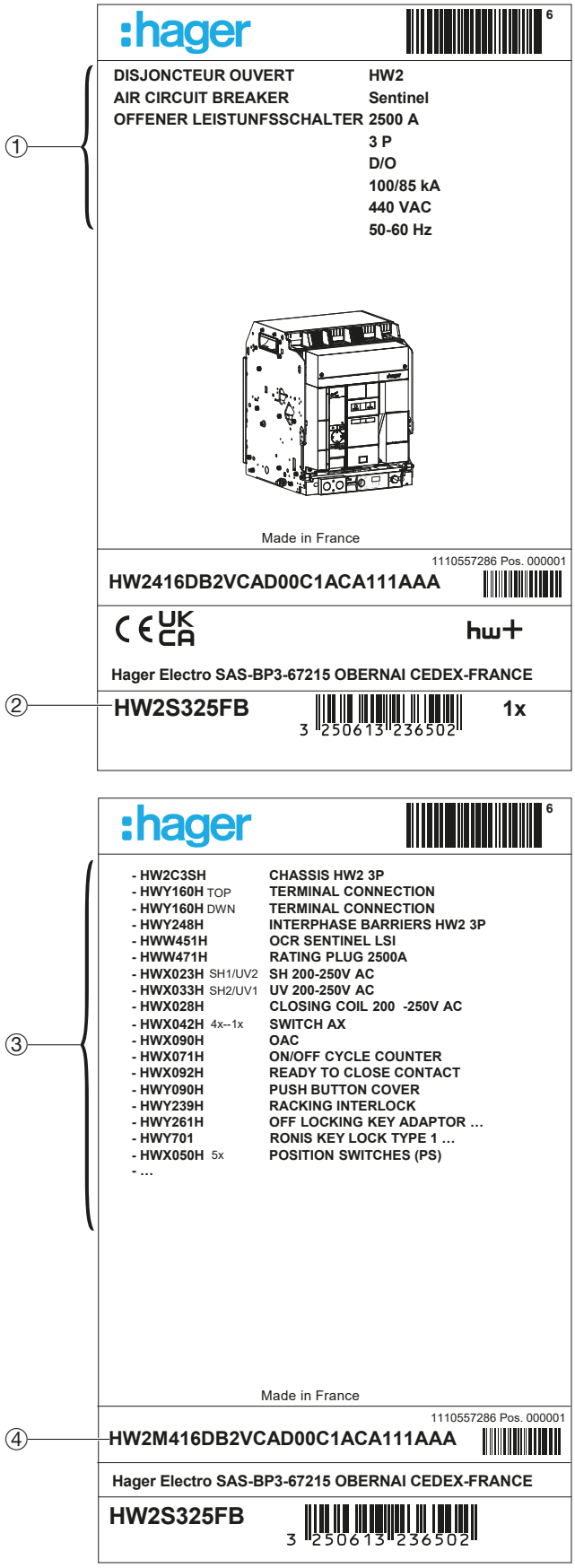
⑬ Symbol of a circuit breaker suitable for isolation or symbol of a switch-disconnector

⑭ Maximum rating of the circuit breaker

⑮ Icm: Rated short-circuit making capacity

⑯ Not suitable for protection in an IT earthing system

Identification label on the packaging



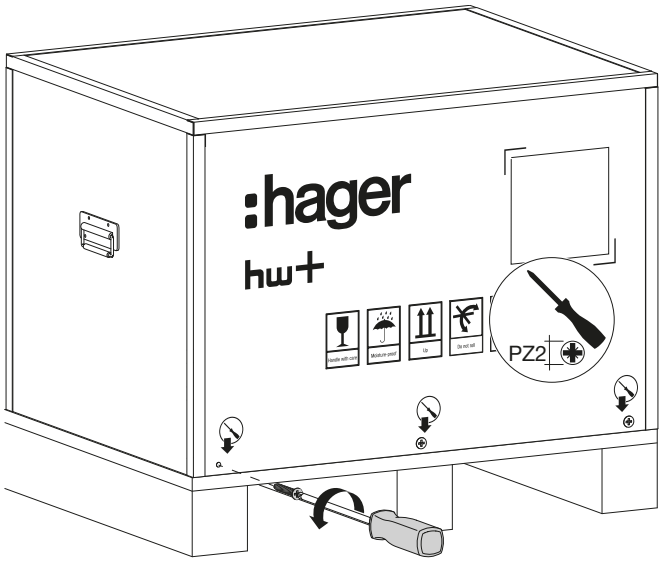
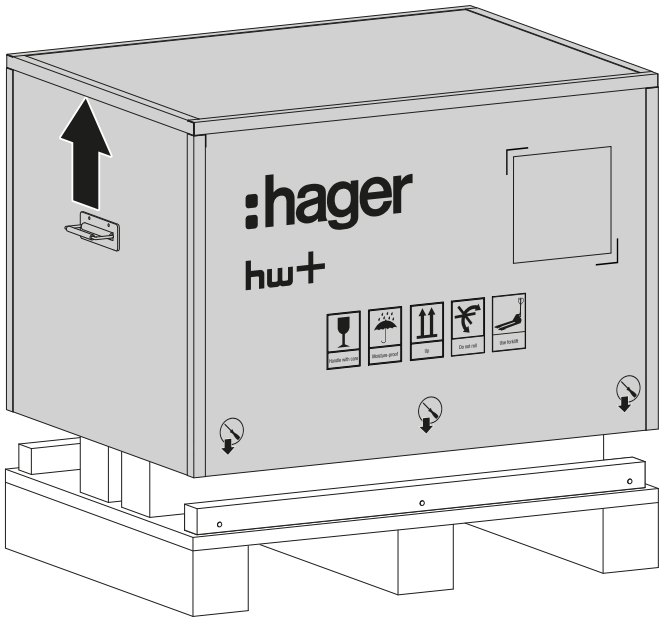
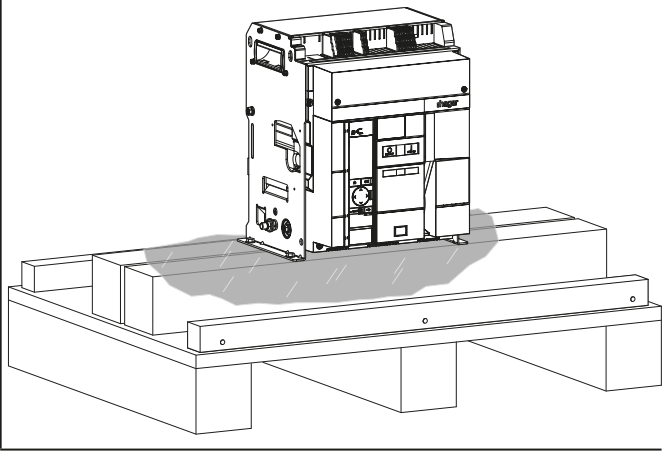
① Main characteristics of the circuit breaker

② Circuit breaker reference

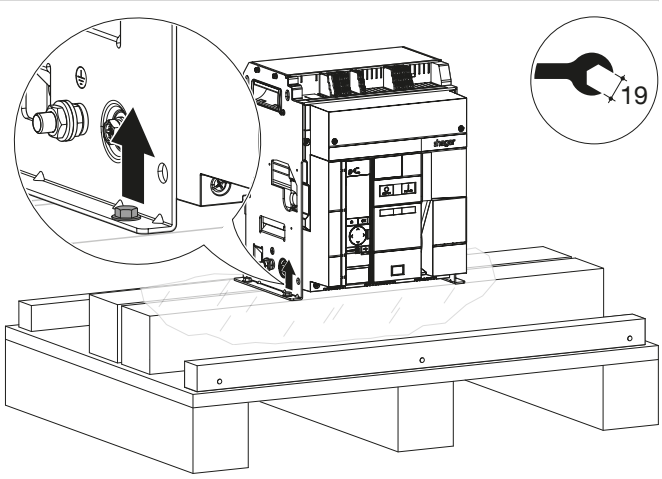
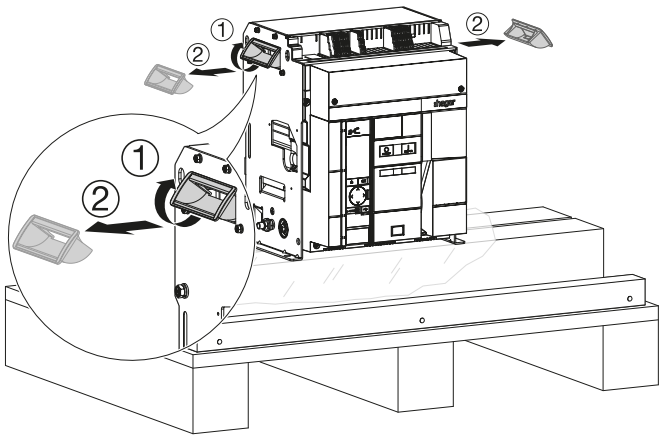
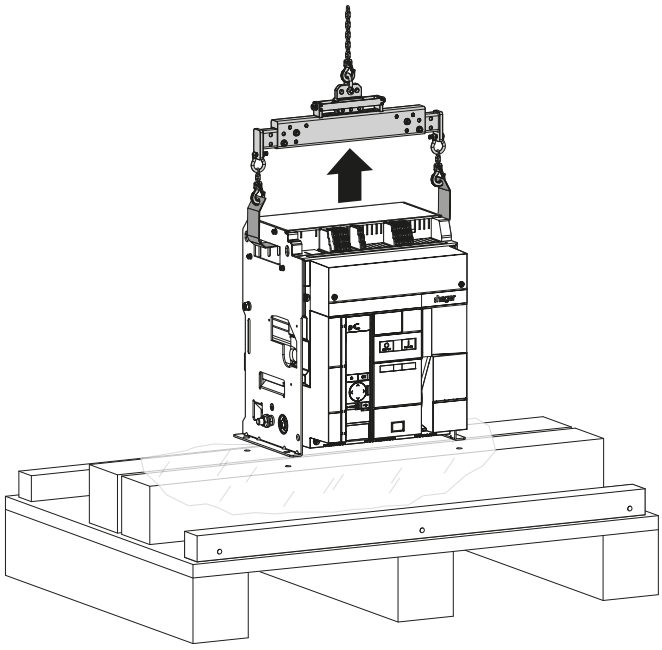
③ List of accessories mounted

④ Configuration identifier

Remove the product from its case following the procedure below:

	Action	Illustration
1	Remove the 6 screws (3 on each side) which hold the case on the pallet.	
2	Remove the case using the side handles.	
3	Remove the adhesive tape then open the plastic protection to gain access to the circuit breaker.	

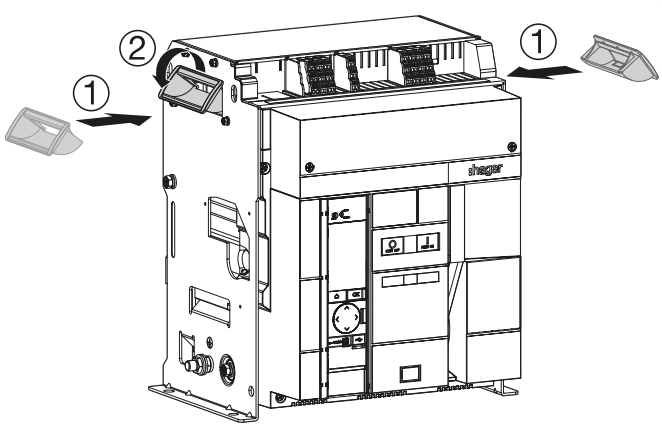
To remove a fixed circuit breaker from its pallet, proceed as follows:

	Action	Illustration
1	Remove the 4 screws holding the circuit breaker in place.	
2	Switch the lifting handles upwards, then remove them.	
3	Remove the circuit breaker from the pallet using an appropriate lifting device and place it in an appropriate place.	

ATTENTION

Risk of property damage

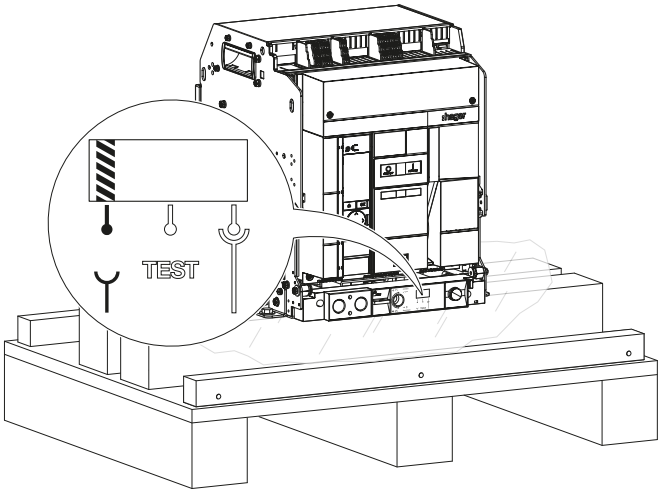
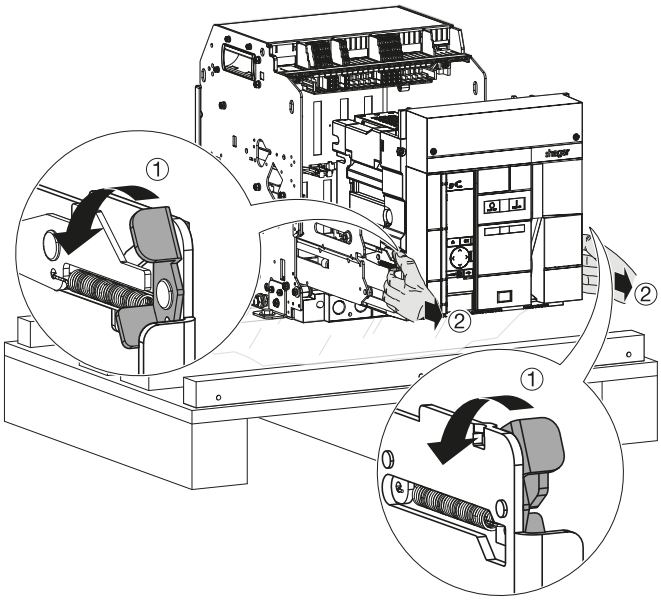
Always remove the handles before positioning the lifting system.

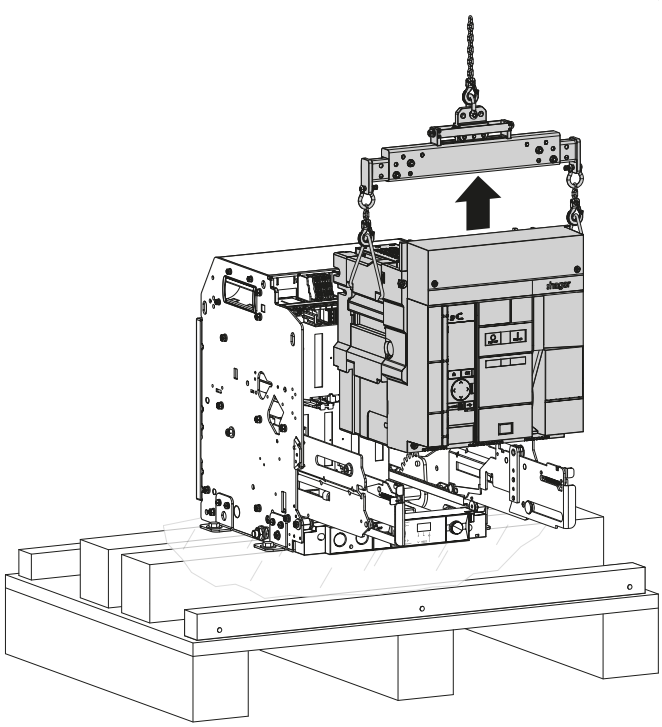
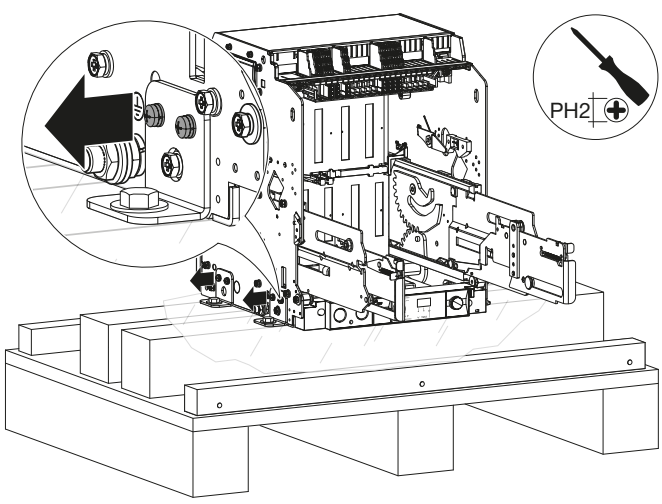
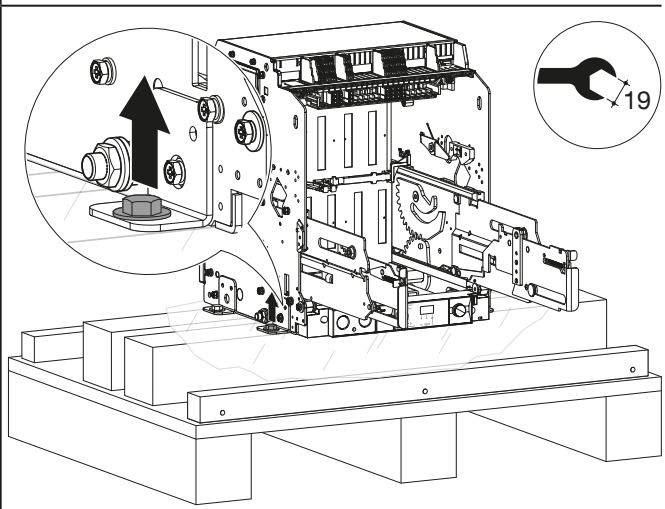
	Action	Illustration
4	Put the lifting handles back.	

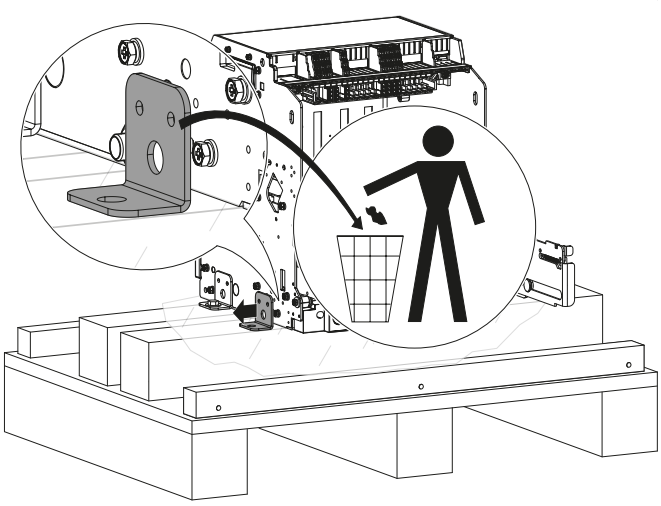
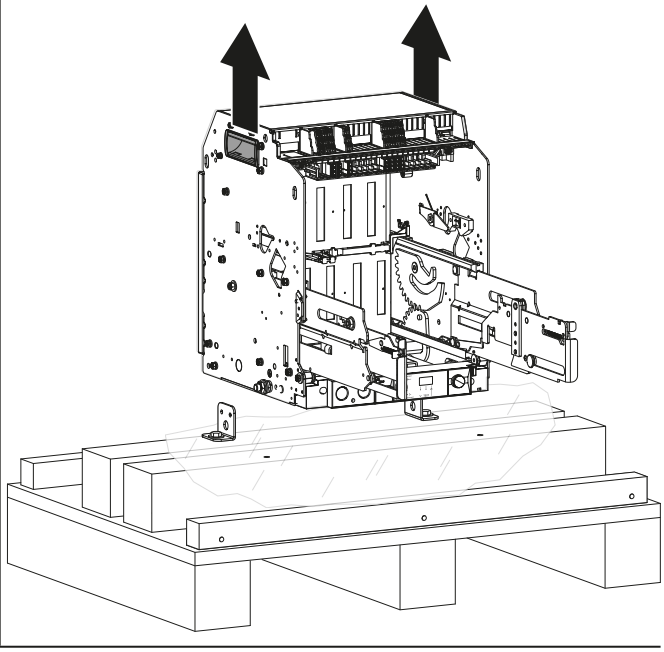
⚠ CAUTION

Risk of the circuit breaker falling out
Risk of injury by crushing.
Ensure the device is only handled by qualified personnel equipped with lifting equipment and suitable safety equipment.

To remove a drawout circuit breaker with chassis from its pallet, proceed as follows:

	Action	Illustration
1	Put the circuit breaker in the disconnected position (see Chapters 8.1 Changing from the connected position to the test position and 8.2 Changing from the test position to the disconnected position).	
2	Push the toggles then pull the handles to take the circuit breaker out of its housing.	

	Action	Illustration
3	Remove the circuit breaker from the guide rails using an appropriate lifting device.	
4	Remove the 8 screws attaching the chassis to the brackets.	
5	Remove the 2 screws attaching the brackets to the pallet.	

	Action	Illustration
6	Remove the 2 brackets and put them in the bin.	
7	Remove the chassis from the pallet using the lifting handles and place it in an appropriate place.	

⚠ CAUTION

Risk of the circuit breaker falling out
Risk of injury by crushing.
Ensure the device is only handled by qualified personnel equipped with lifting equipment and suitable safety equipment.

The fixed circuit breaker, drawout circuit breaker and chassis have lifting handles to be used for handling.

Ensure you have a lifting system corresponding to the weight of the circuit breaker or chassis to be moved.

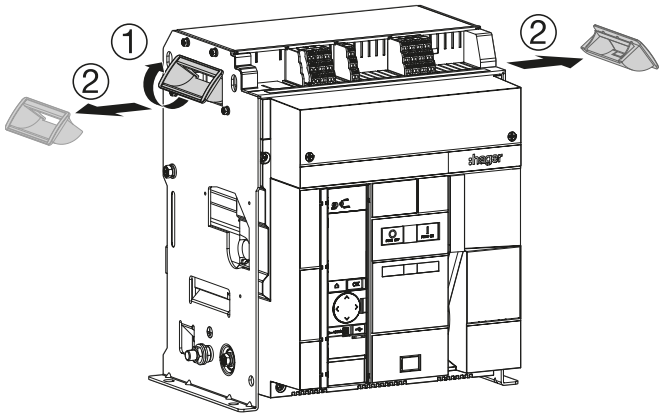
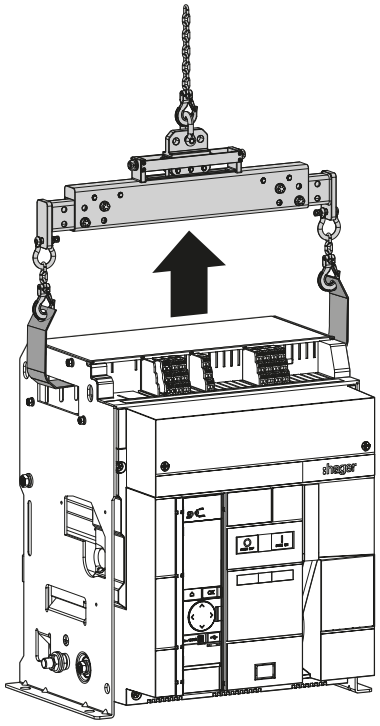
Weight of the HW2 circuit breakers (without accessories)

Product	Number of poles	Weight
Fixed circuit breaker	3 poles	40 kg
Drawout circuit breaker (without chassis)		38 kg
Chassis		38 kg
Fixed circuit breaker	4 poles	49 kg
Drawout circuit breaker (without chassis)		49 kg
Chassis		44 kg

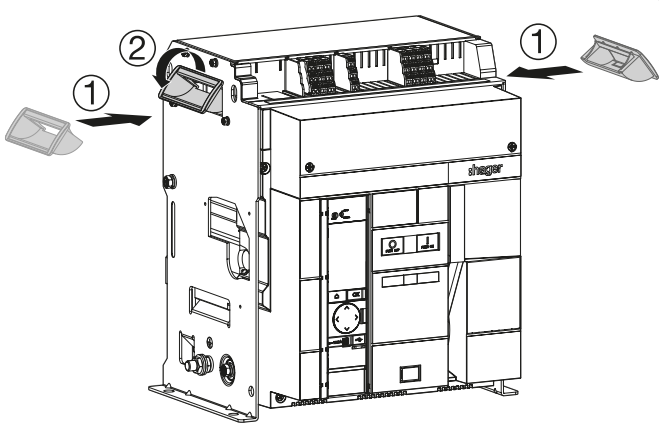
Weight of the HW4 circuit breakers (without accessories)

Product	Number of poles	Weight
Fixed circuit breaker	3 poles	51 kg
Drawout circuit breaker (without chassis)		51 kg
Chassis		48 kg
Fixed circuit breaker	4 poles	65 kg
Drawout circuit breaker (without chassis)		65 kg
Chassis		59 kg

It is recommended that a lifting system be used to move the circuit breaker. For all of this:

	Action	Illustration
1	Switch the lifting handles upwards, then remove them.	
2	Use a lifting system to move the circuit breaker.	

ATTENTION
Risk of property damage Always remove the handles before positioning the lifting system.

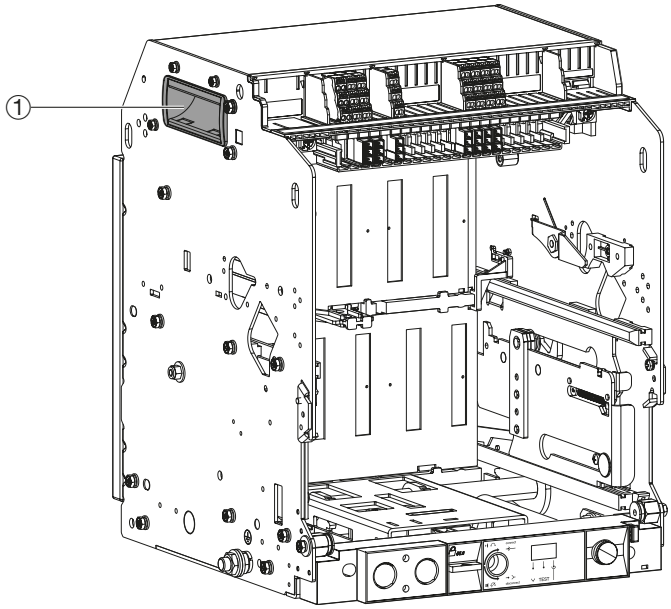
	Action	Illustration
3	When the circuit breaker is in the desired place, remove the lifting system and put the handles back.	

ATTENTION
Risk of property damage Never move a drawout circuit breaker in its chassis. Always move the two elements separately.

ATTENTION
Risk of the circuit breaker falling out **Risk of injury by crushing.** To handle circuit breakers, wear suitable personal protective equipment (PPE).

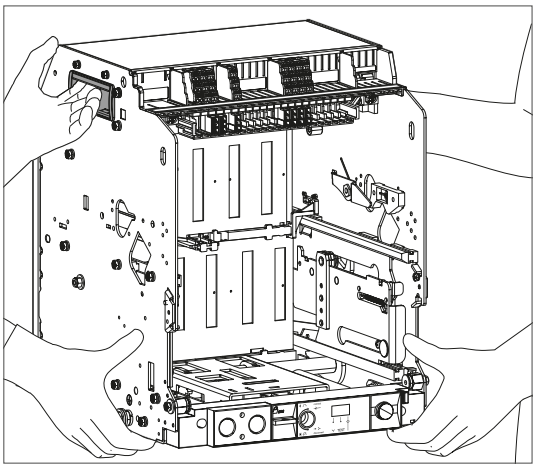
Handling the chassis

Use the lifting handles on the side of the circuit breaker.

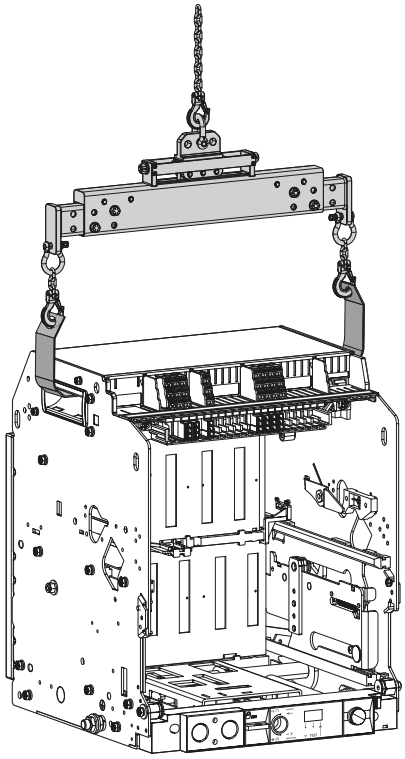


① Lifting handle

It is recommended that the chassis be handled
by 2 persons
or that a lifting system be used.

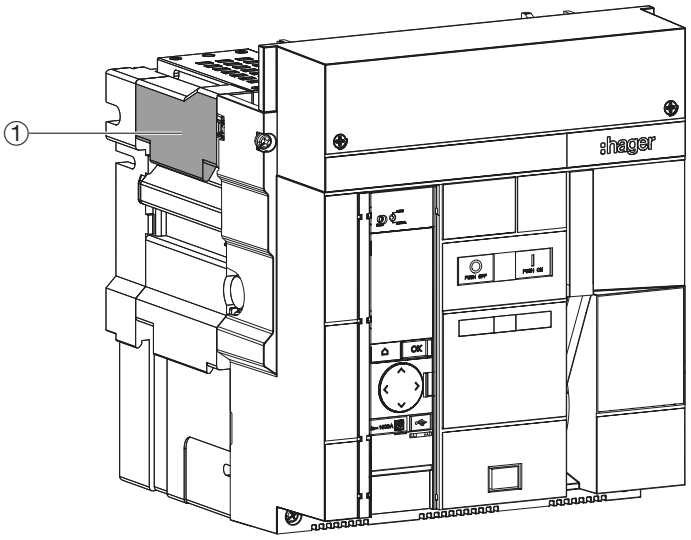


or



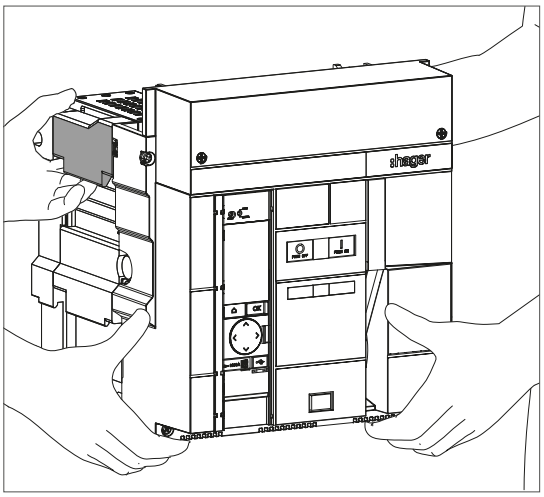
Handling the circuit breaker

Use the lifting handles on the side of the circuit breaker.

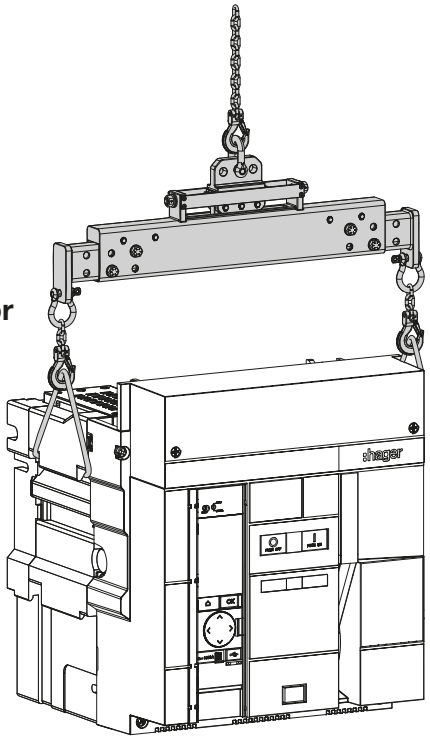


① Lifting handle

It is recommended that the circuit breaker be handled by 2 persons
or that a lifting system be used.

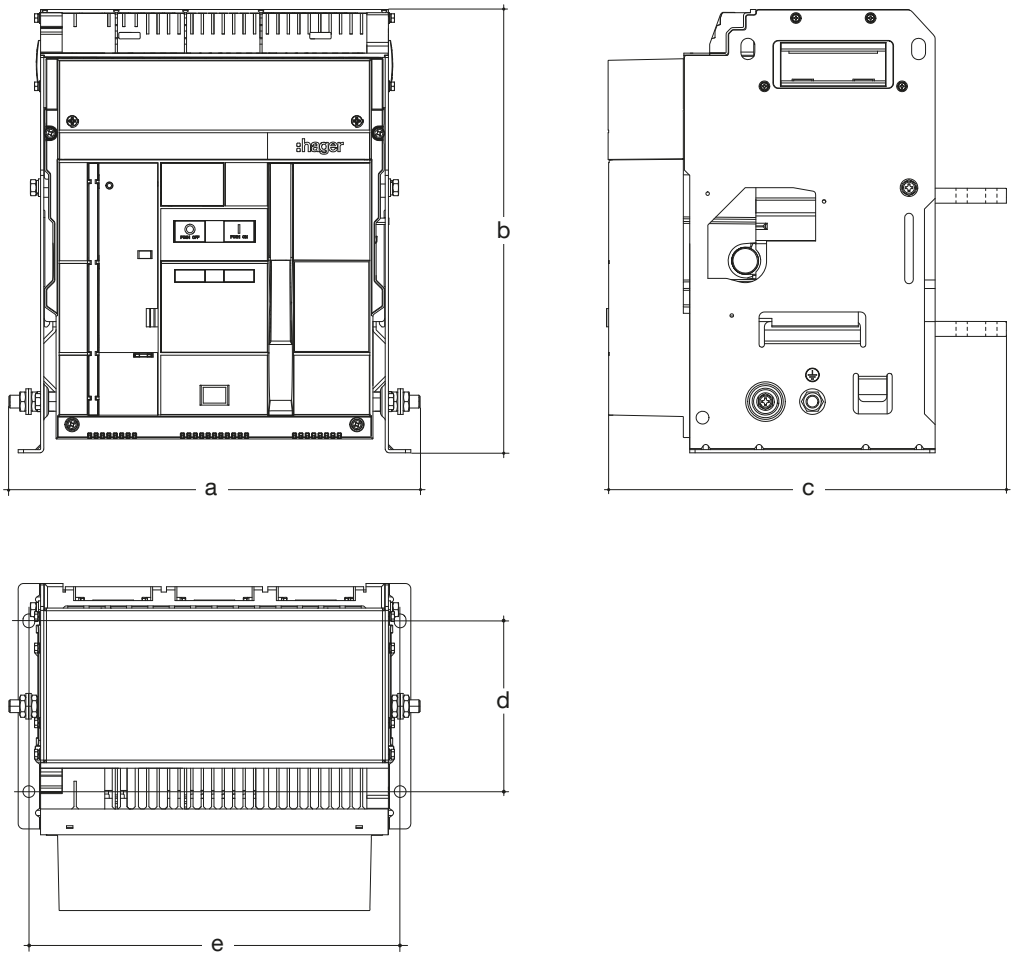


or



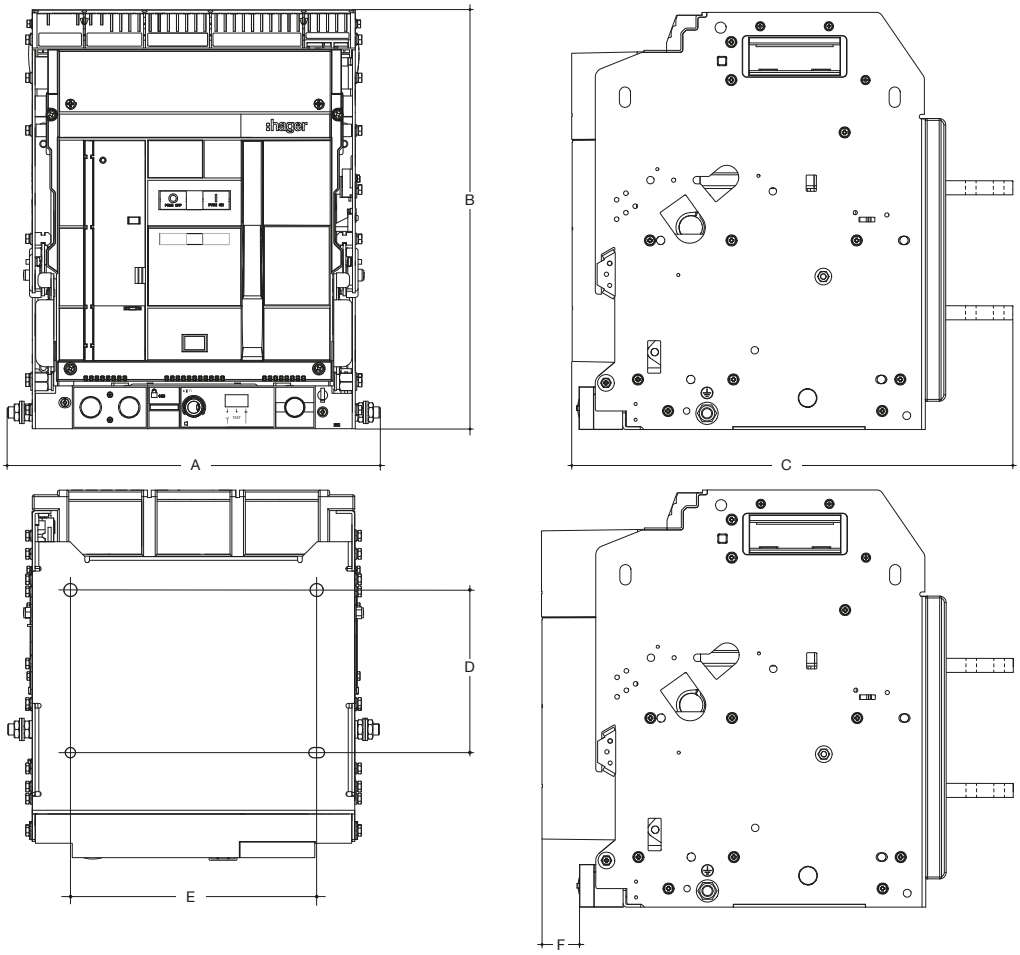
To install a fixed HW2 or HW4 circuit breaker, comply with the following dimensions for mounting:

Dimensions (max. value in mm)	**HW2**		**HW4**	
	3 poles	**4 poles**	**3 poles**	**4 poles**
Width A	385	480	478	604
Height B	416	416	416	416
Depth C with connections	373	373	373	373
Pitch distance D fastening depth	160	160	160	160
Pitch distance E fastening width	348	443	441	567



To install a drawout HW2 or HW4 circuit breaker, comply with the following dimensions for mounting:

Dimensions (max. value in mm)		**HW2**		**HW4**	
		3 poles	**4 poles**	**3 poles**	**4 poles**
Width A		400	495	493	619
Height B		450	450	450	450
Depth C with connections		465	465	465	465
Pitch distance D fastening depth		175	175	175	175
Pitch distance E fastening width		265	360	325	440
Protrusion F circuit breaker	in the Test position	40	40	40	40
	in the Disconnected position	56	56	56	56

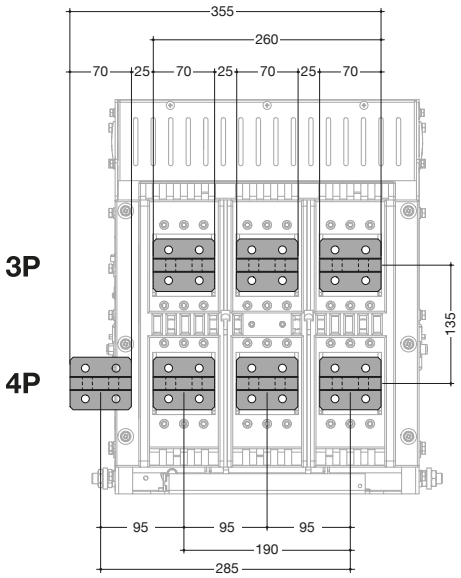


To connect an HW2 circuit breaker, comply with the following connection dimensions:

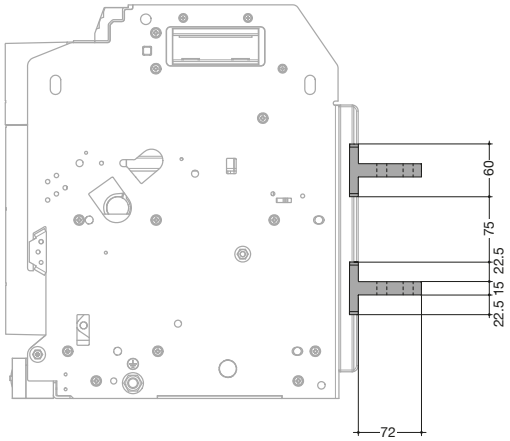
HW2 rear horizontal RC connections

For fixed or drawout 3-pole or 4-pole version from 630 A to 2500 A.

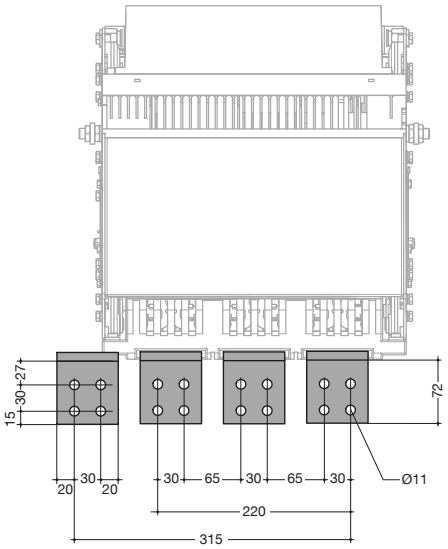
Rear view



Side view



Top view

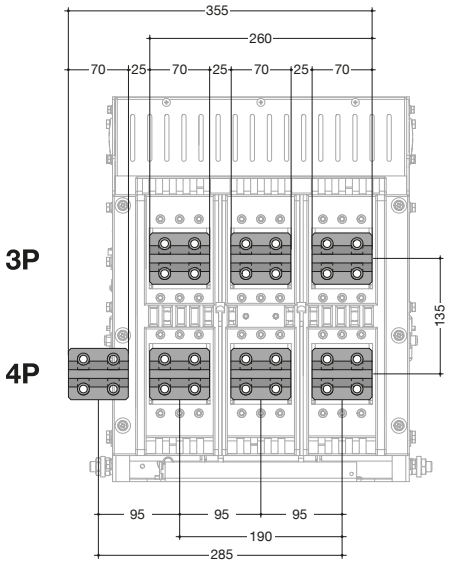


The dimensions given are valid for the fixed and drawout versions.

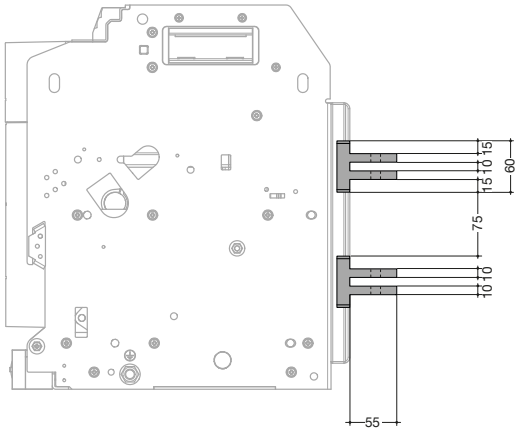
Rear horizontal RC HW2 connections for unimes H distribution boards

For fixed or drawout 3-pole or 4-pole version from 630 A to 2500 A.

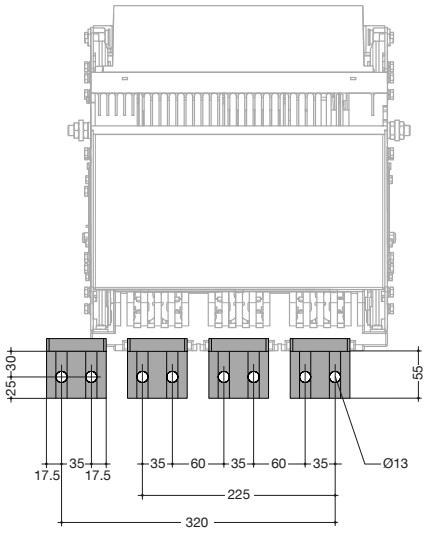
Rear view



Side view



Top view

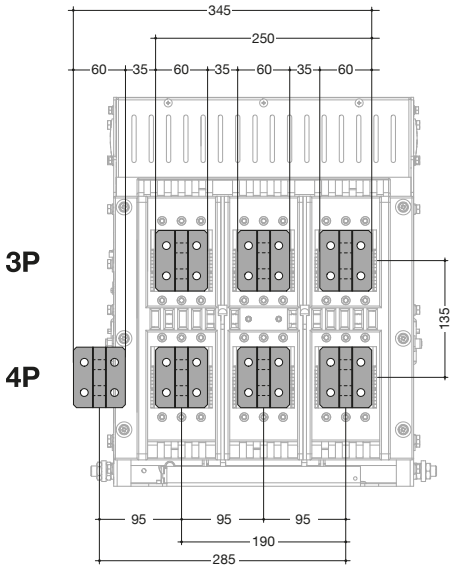


The dimensions given are valid for the fixed and drawout versions.

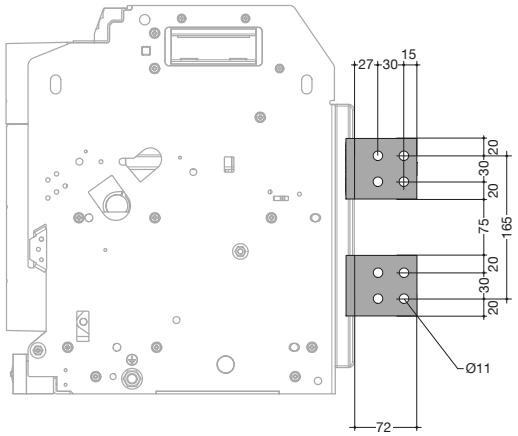
HW2 rear vertical RC connections

For fixed or drawout 3-pole or 4-pole version from 630 A to 2500 A.

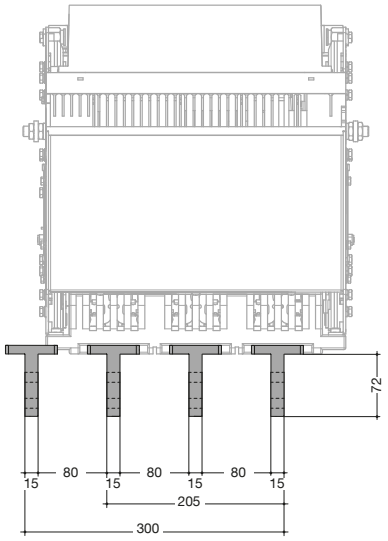
Rear view



Side view



Top view



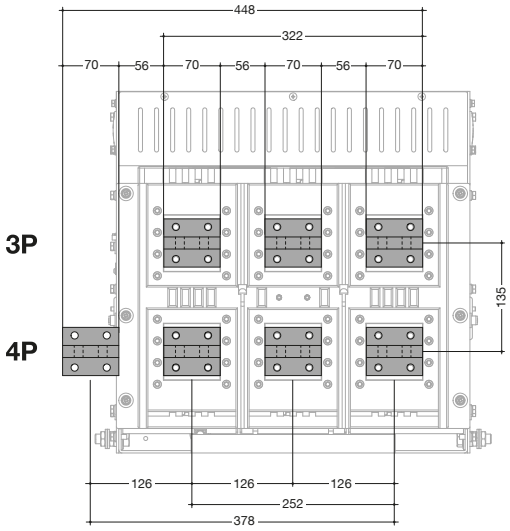
The dimensions given are valid for the fixed and drawout versions.

To connect an HW4 circuit breaker, comply with the following connection dimensions.
For more information on the installation of the connections, refer to the instruction manual 6LE009122A.

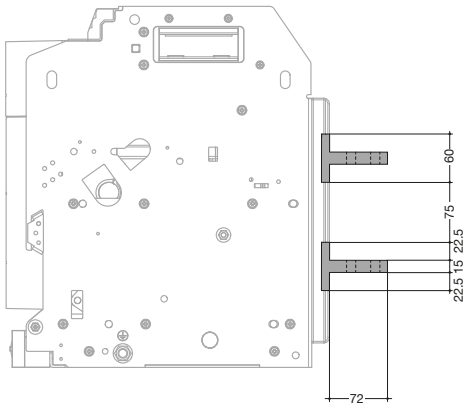
HW4 rear horizontal RC connections

For fixed or drawout 3-pole or 4-pole version from 1000A to 2500A.

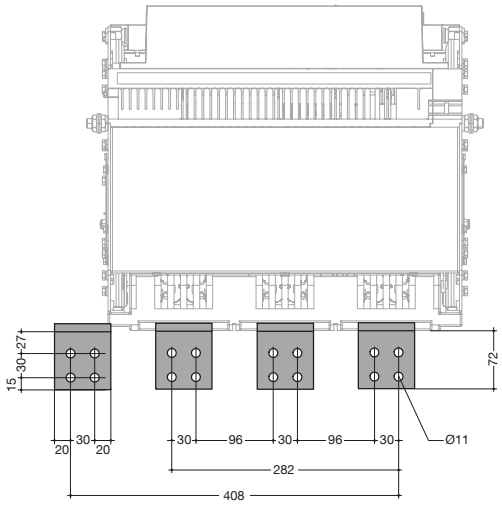
Rear view



Side view



Top view

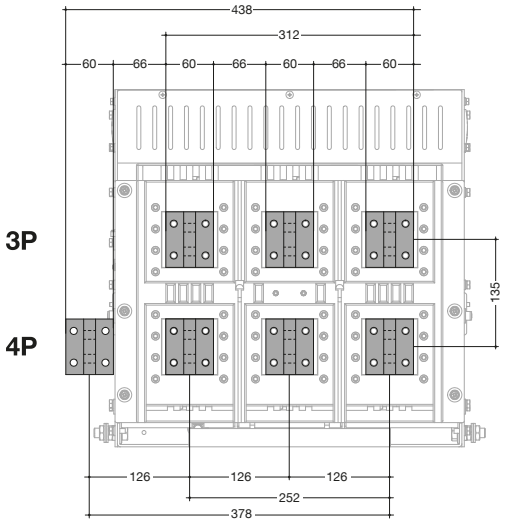


The dimensions given are valid for the fixed and drawout versions.

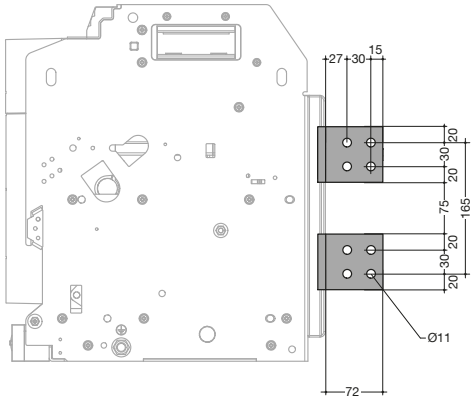
HW4 rear vertical RC connections

For fixed or drawout 3-pole or 4-pole version from 1000A to 2500A.

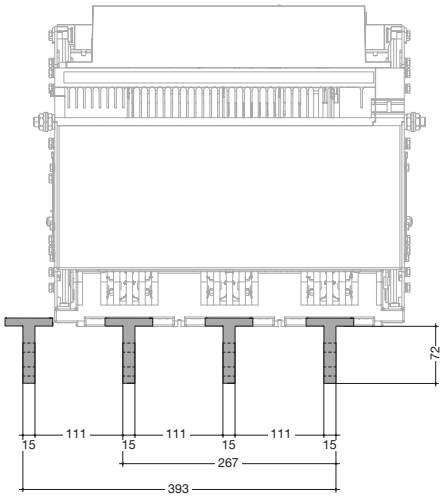
Rear view



Side view



Top view

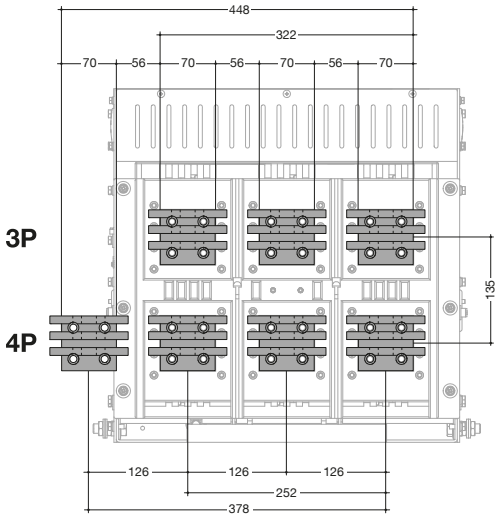


The dimensions given are valid for the fixed and drawout versions.

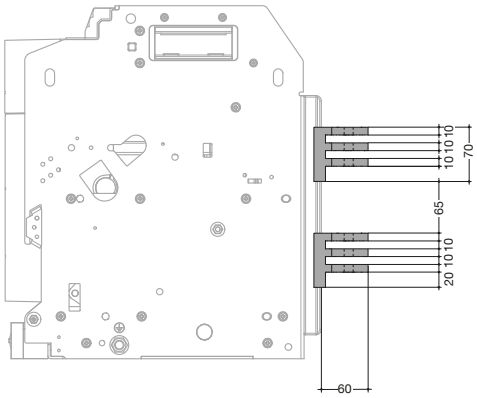
HW4 rear horizontal RC connections

For fixed or drawout 3-pole or 4-pole version from 3200A to 4000A.

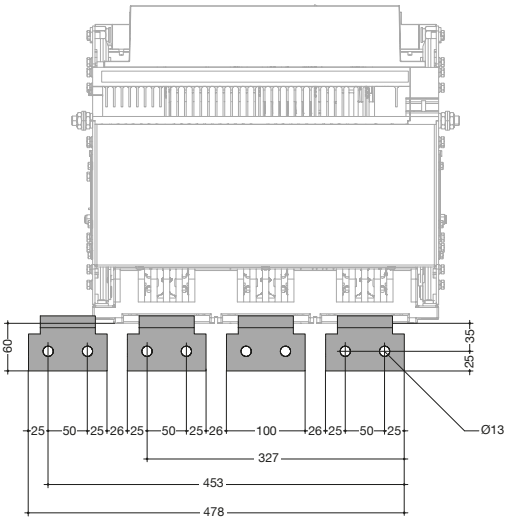
Rear view



Side view



Top view

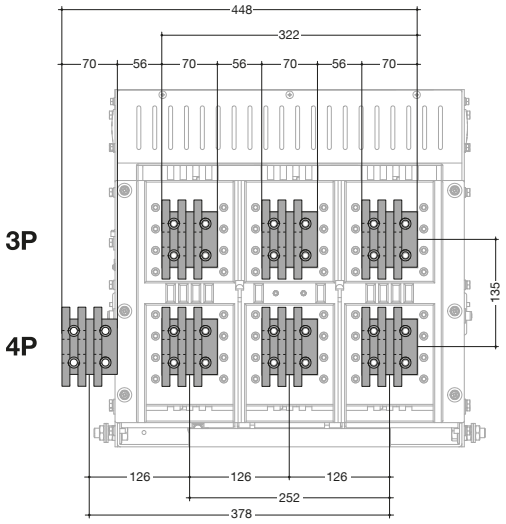


The dimensions given are valid for the fixed and drawout versions.

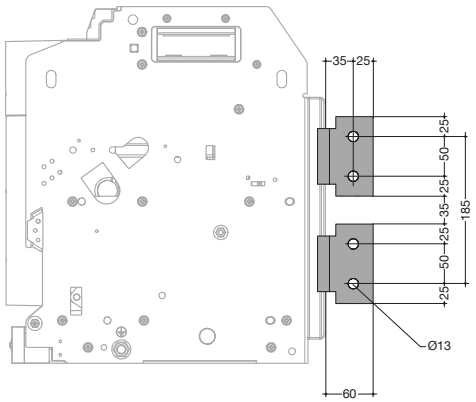
HW4 rear vertical RC connections

For fixed or drawout 3-pole or 4-pole version from 3200A to 4000A.

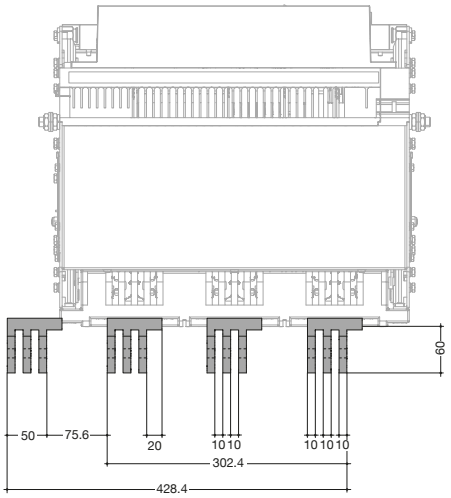
Rear view



Side view



Top view

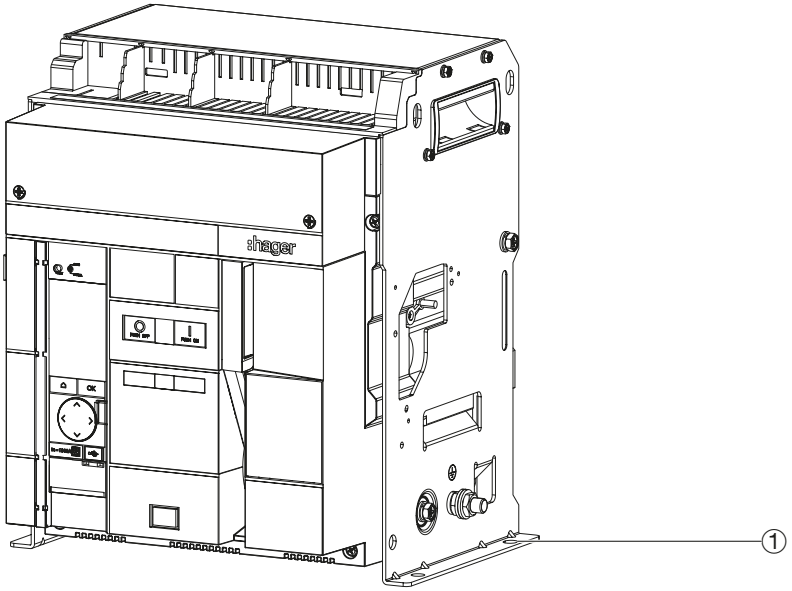


The dimensions given are valid for the fixed and drawout versions.

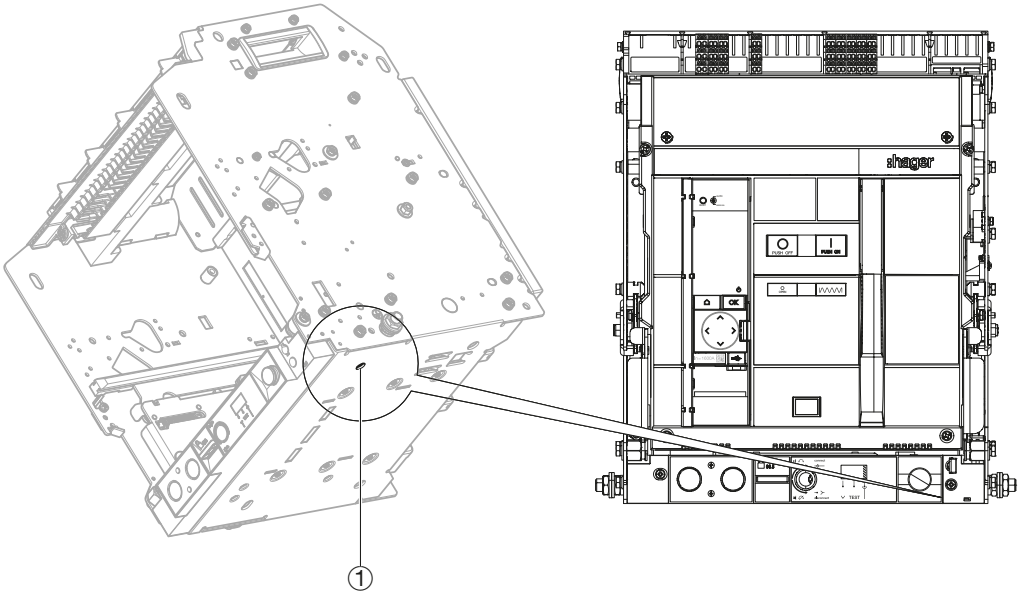
The door frame must be positioned in relation to the **reference point** between the circuit breaker and the distribution board door.

The **reference point** is one of the product's fastening holes.

Fixed 3 and 4 pole circuit breaker, fastening on a plate or mounting rails.



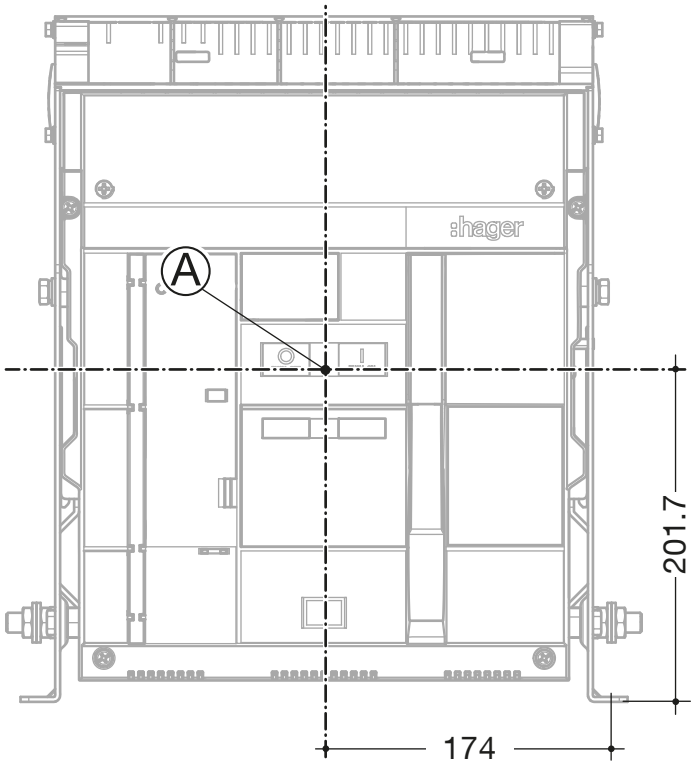
Drawout 3 and 4 pole circuit breaker, fastening on a plate or mounting rails.



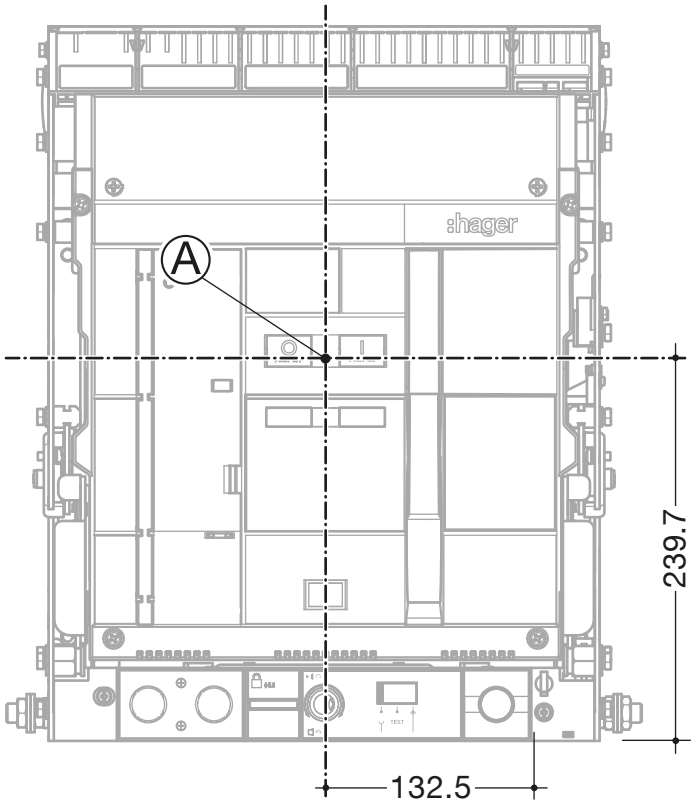
① Reference point

Comply with the following dimensions to install a door frame on an HW2 circuit breaker:

Fixed 3-pole and 4-pole circuit breaker.

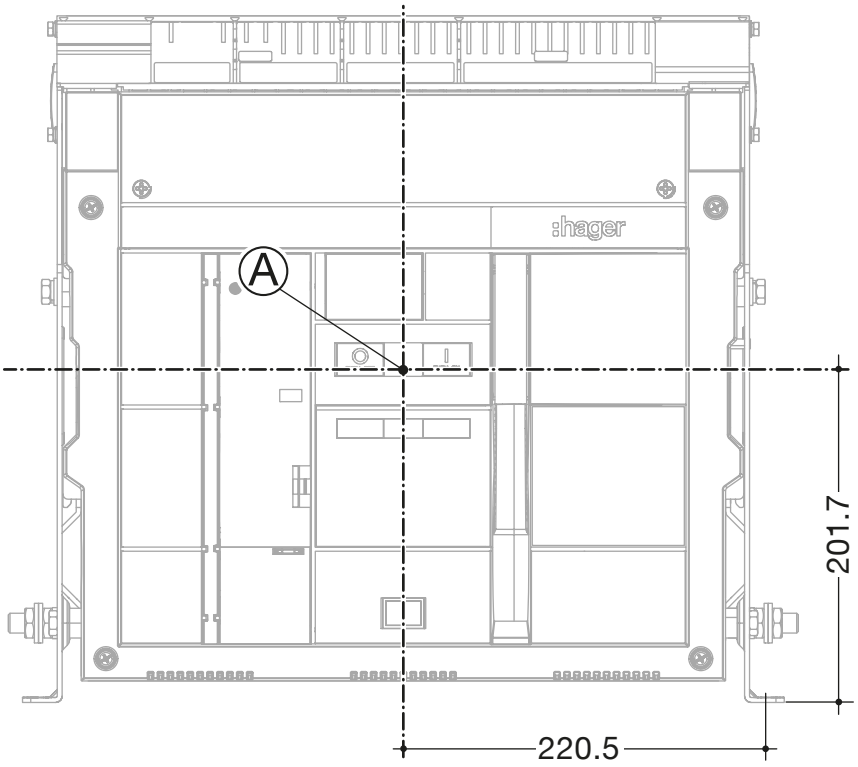


Drawout 3-pole and 4-pole circuit breaker.

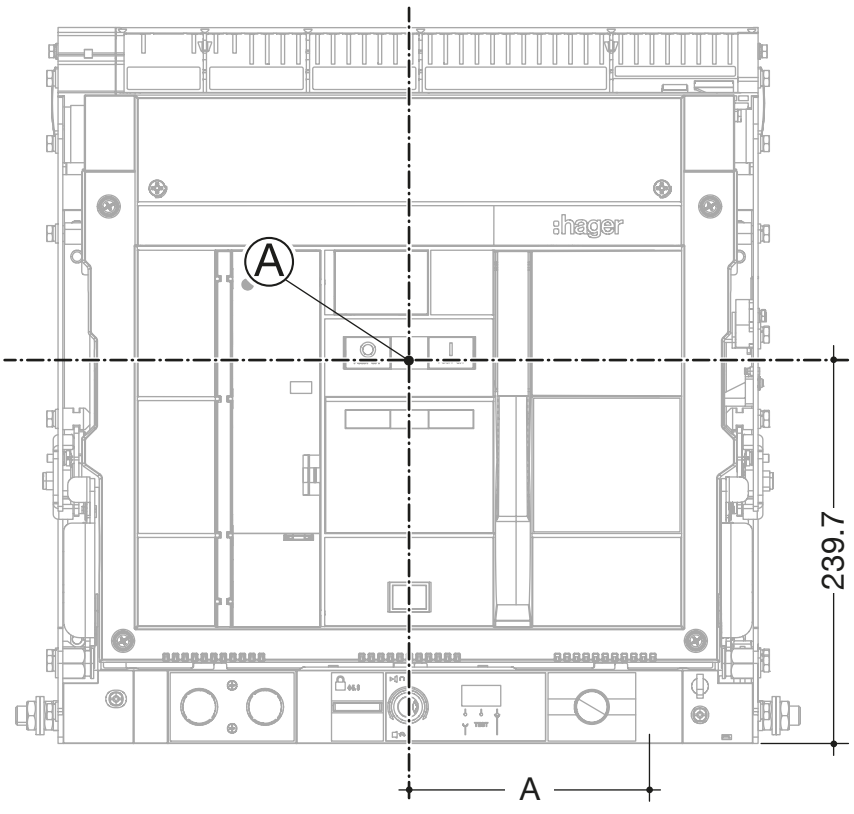


Comply with the following dimensions to install a door frame on an HW4 circuit breaker:

Fixed 3-pole and 4-pole circuit breaker.



Drawout 3-pole and 4-pole circuit breaker.

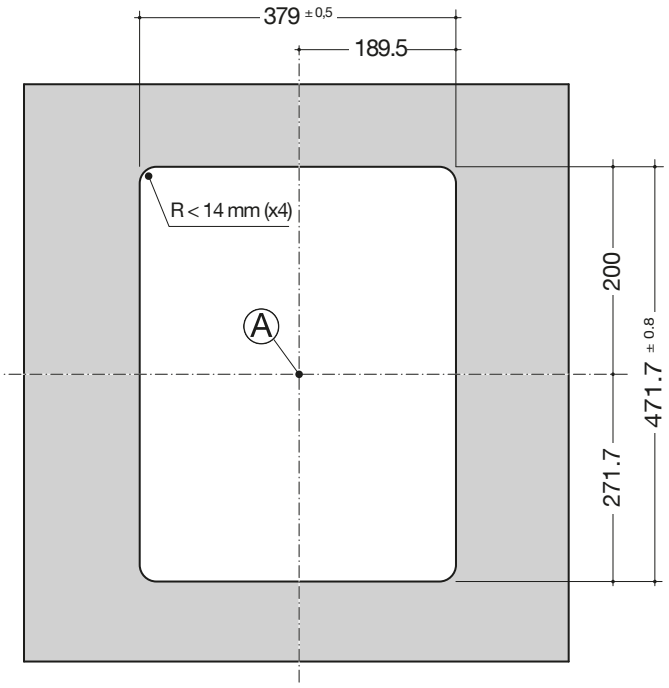


	A
3P	162.5
4P	157

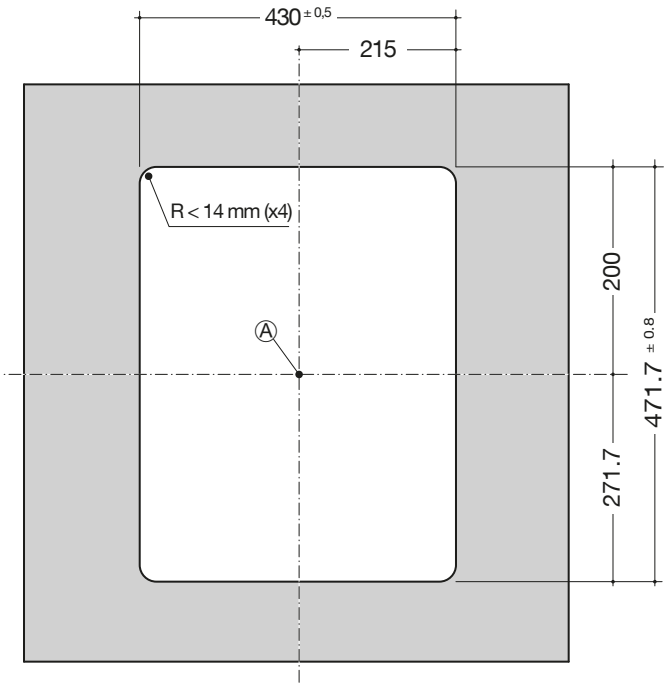
DF Door Frame

Provide a cut-out with the following dimensions in the distribution board door to install the DF door frame.

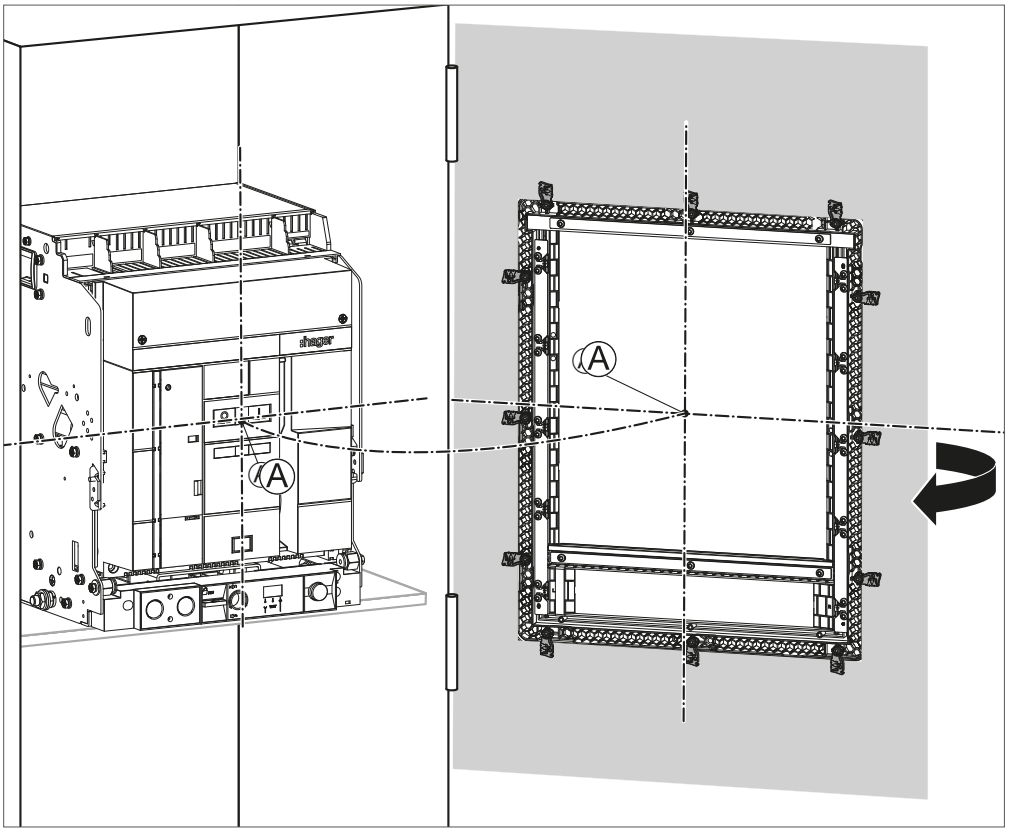
For a fixed or drawout HW2 circuit breaker:



For a fixed or drawout HW4 circuit breaker:

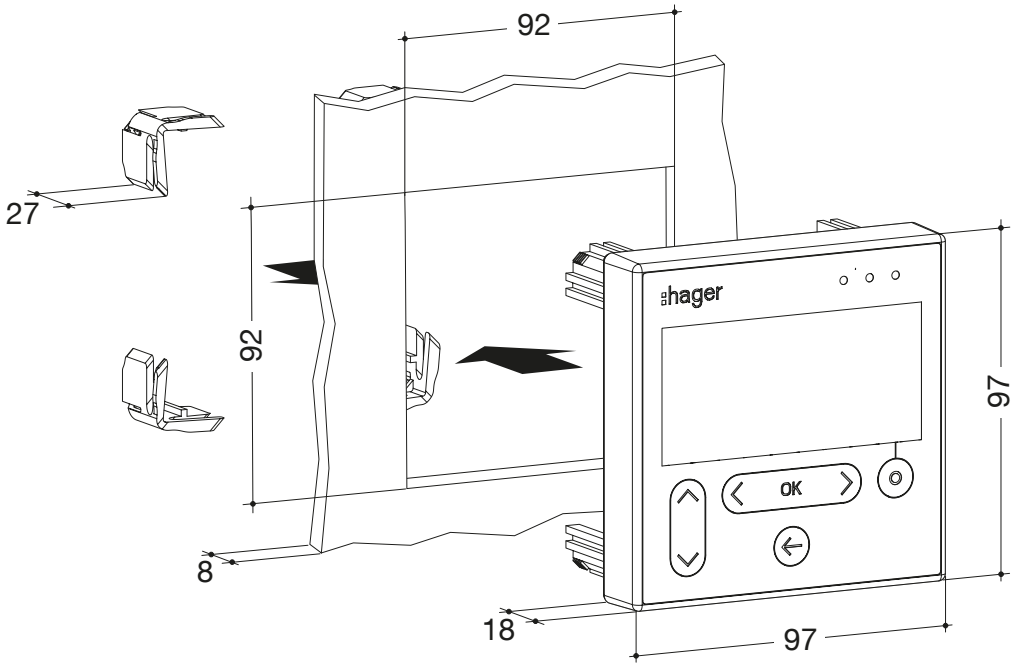


Align the centre Ⓐ of the circuit breaker with the centre Ⓐ of the door frame.



For more information on the installation of the DF Door Frame, refer to the manual 6LE007882A for HW2 circuit breakers and manual 6LE009126A for HW4 circuit breakers.

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

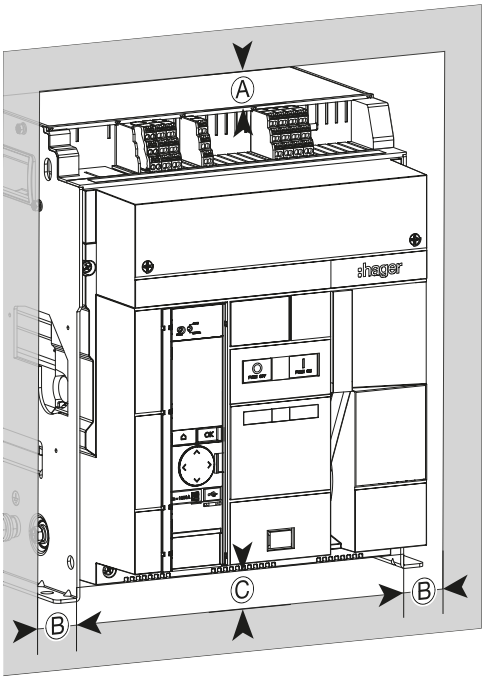


Dimensions	Width (mm)	Height (mm)	Depth (mm)
HTD210H	97	97	18 (45 with fastening clips)
Panel cut-out	92	92	8 max.

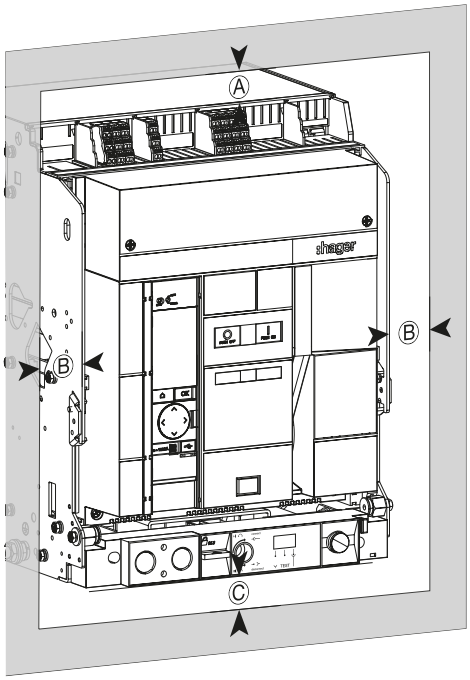
⚠ WARNING

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 to the installation standards in force in the relevant country.

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



Fixed circuit breaker



Drawout circuit breaker

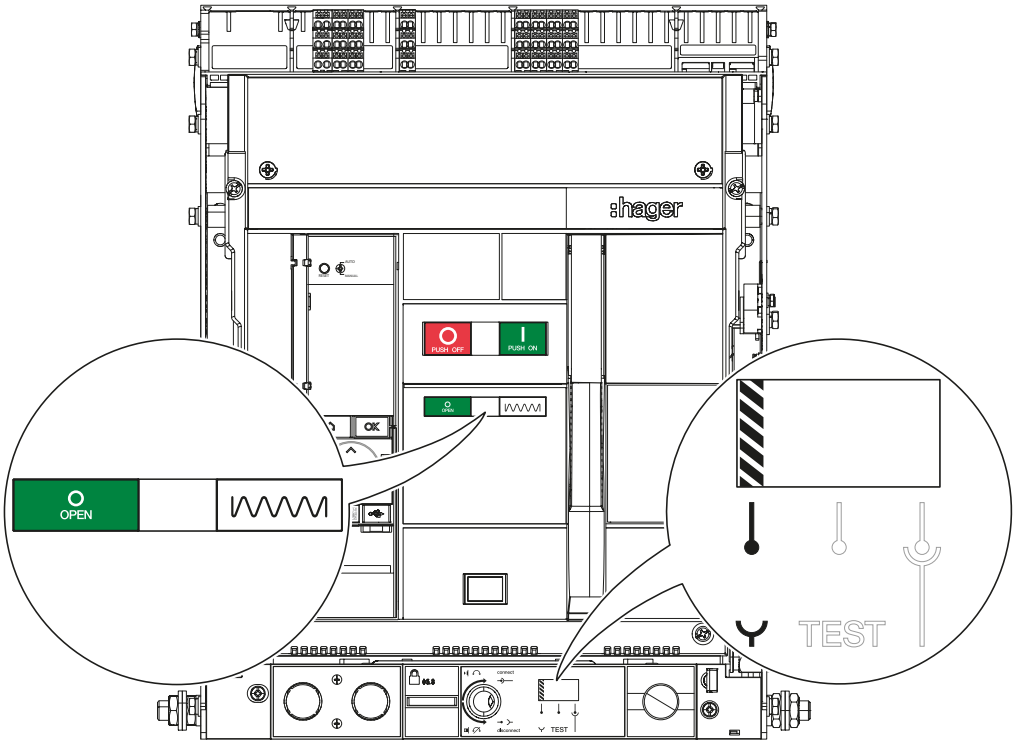
Circuit breaker	Distance (mm)	Insulating material	Conductive material	Energised circuit breaker
Fixed	Ⓐ	0	0	0
	Ⓑ	0	0	60
	Ⓒ	0	0	0
Drawout	Ⓐ	0	0	0
	Ⓑ	0	0	60
	Ⓒ	0	0	0

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).

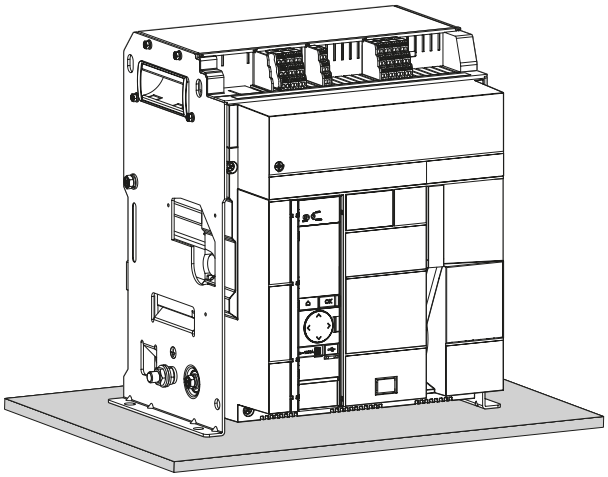
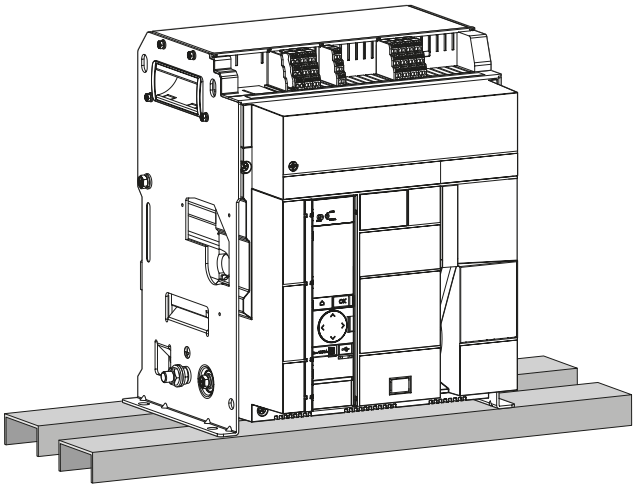
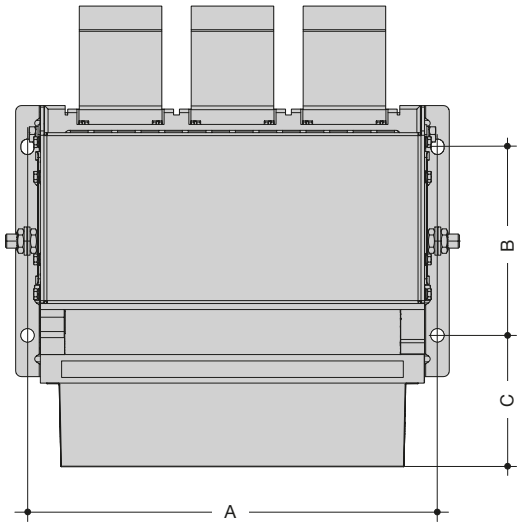
Before installing, ensure that:

All of the circuit breaker's power sources are shut off, the circuit breaker is open, closing spring discharged and in the disconnected position.

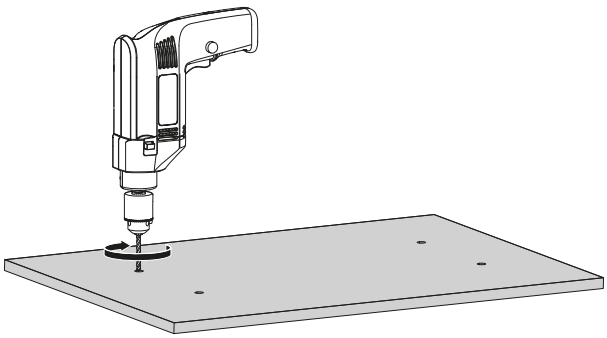
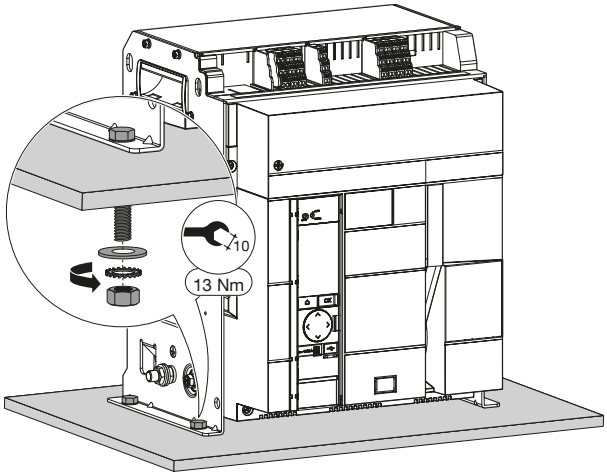
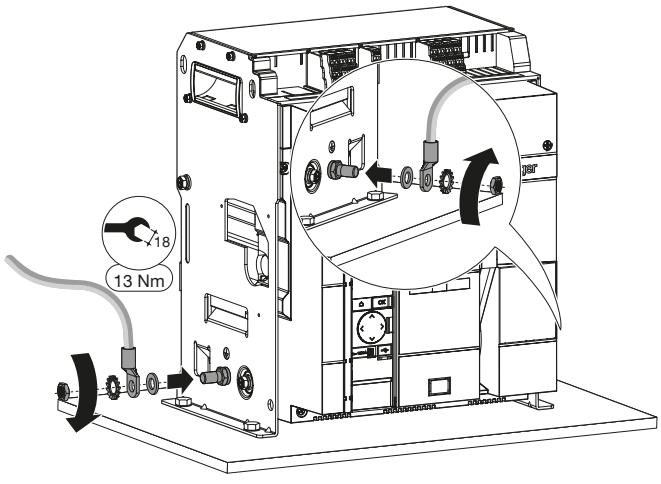


17.2.1 Fastening on a plate or mounting rails

To fasten a fixed circuit breaker on a horizontal support, proceed as follows:

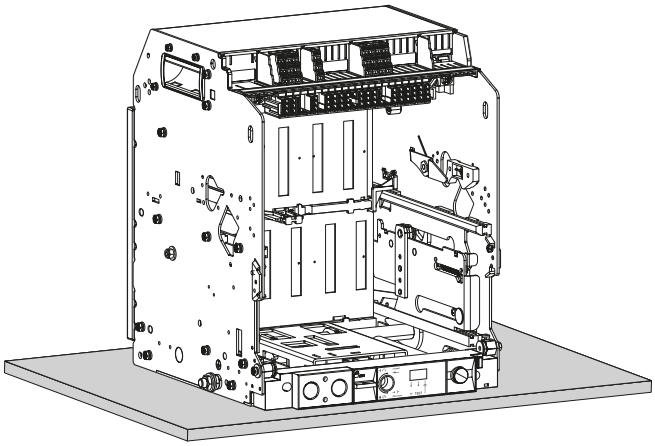
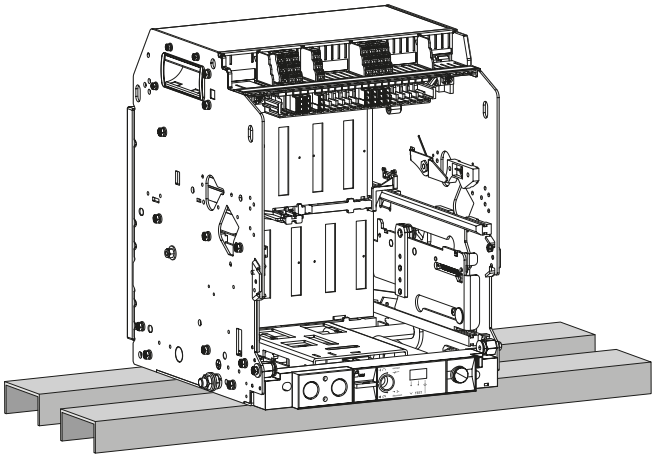
	Action	Illustration
1	Be sure to mount the circuit breaker on a plate with sufficient resistance	
	or on mounting supports that are stable enough.	
2	Identify at least 4 mounting holes (2 on each side) complying with the following dimensions. **3 poles** **or** **4 poles**	

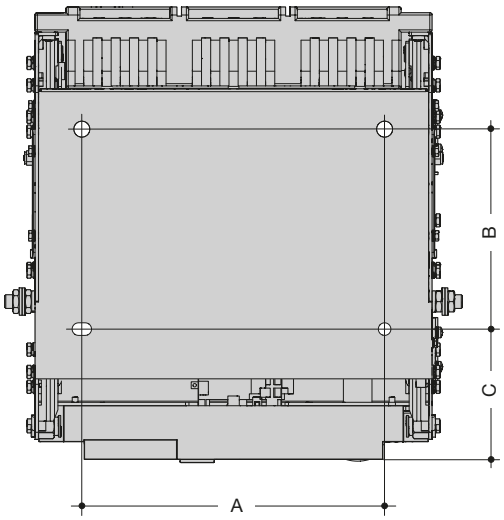
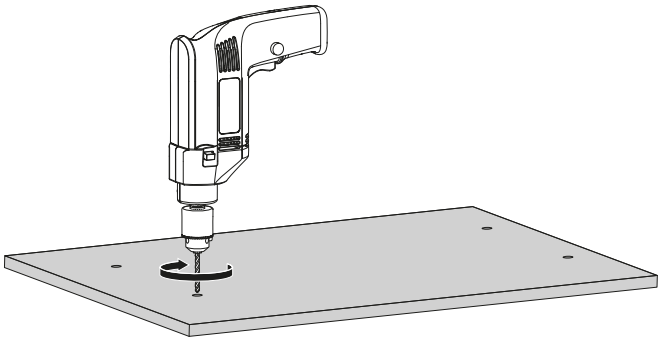
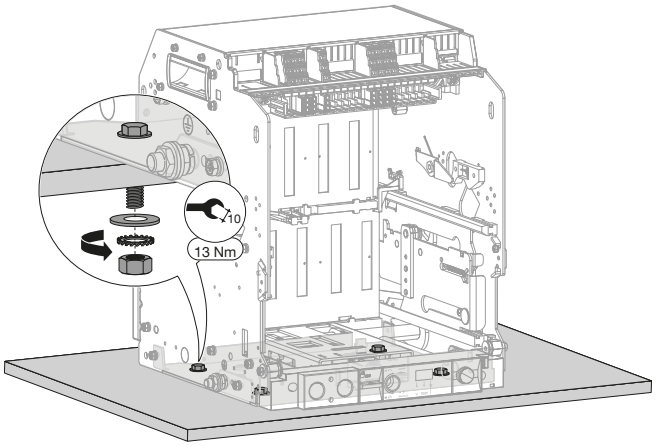
Dimensions (in mm)	HW2		HW4	
	3 poles	4 poles	3 poles	4 poles
A	348	443	441	567
B	160	160	160	160
C	111	111	111	111

	Action	Illustration
3	Drill the 4 fixing holes (Ø mini 6.5 mm).	
4	Mount the circuit breaker using M6 screws.	
5	If the mounting plate is not connected to the earth, connect an earthing conductor to each side of the mounting plate using an M6 screw and an unused drilled hole. It is recommended that an earthing conductor with a cross-section of 16 mm² be used.	

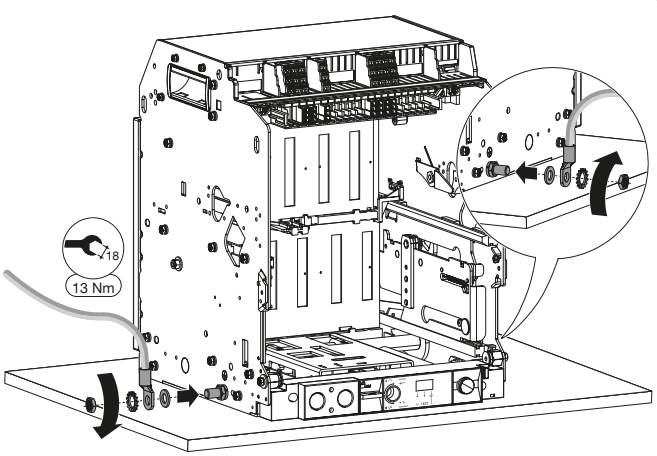
ATTENTION
Risk of property damage Always mount the chassis before racking in or racking out the circuit breaker.

To mount the chassis of a drawout circuit breaker, proceed as follows:

	Action	Illustration
1	The circuit breaker must first be removed from the chassis. Be sure to mount the circuit breaker on a plate with sufficient resistance	
	or on mounting supports that are stable enough.	

	Action	Illustration
2	Identify at least 4 mounting holes (2 on each side) for the HW2 and HW4 circuit breakers, complying with the following dimensions. **3 poles** **or** **4 poles**	
3	Drill the 4 fixing holes (Ø mini 6.5 mm).	
4	Mount the chassis using M6 screws.	

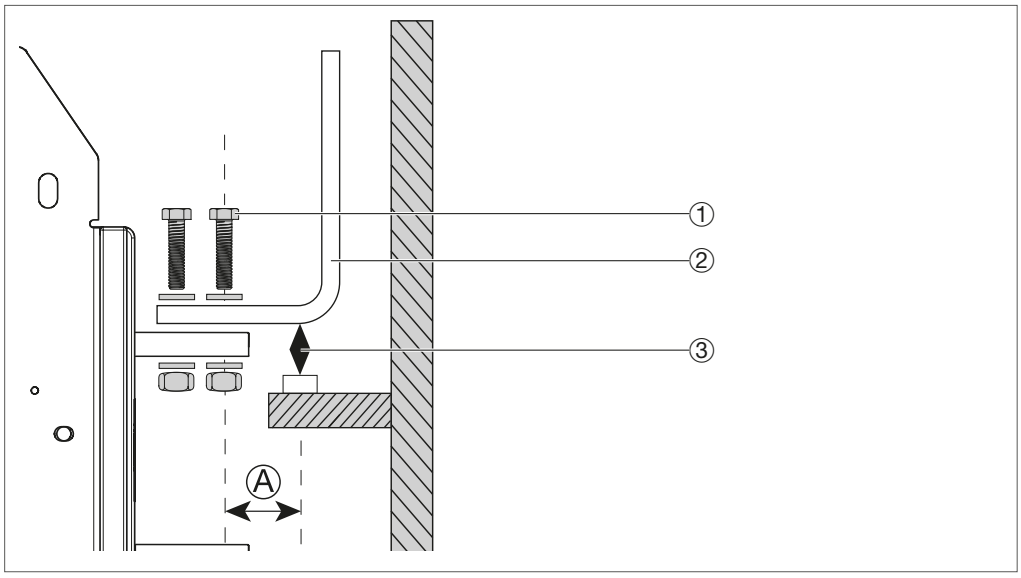
Dimensions (in mm)	HW2		HW4	
	3 poles	4 poles	3 poles	4 poles
A	265	360	325	440
B	175	175	175	175
C	121	121	121	121

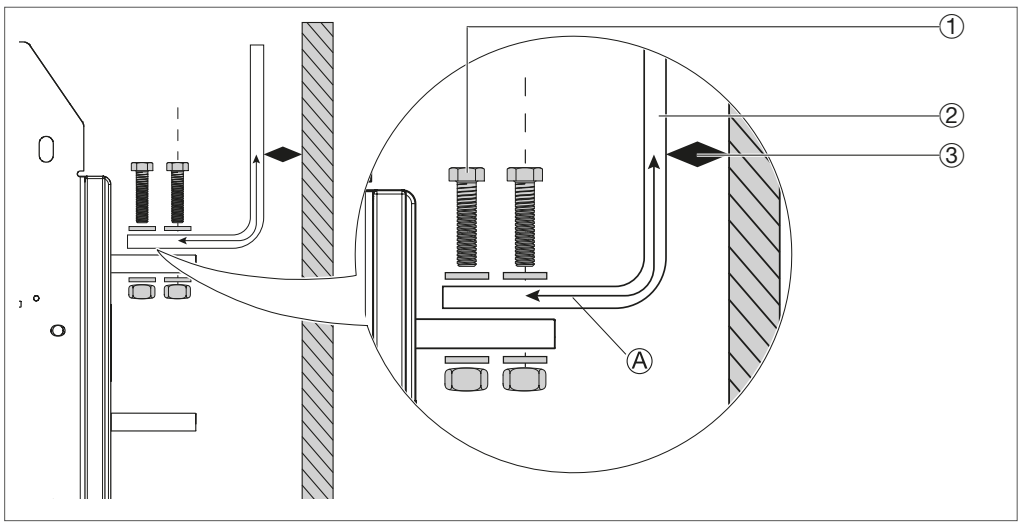
	Action	Illustration
5	If the plate is not earthed, connect an earthing conductor directly to the chassis using an M10 screw. It is recommended that an earthing conductor with a cross-section of 16 mm² be used.	

ATTENTION
Risk of property damage The connecting bars must be shaped and positioned so that they are perfectly adapted to the rear sockets before tightening using bolts. The connecting bars must be resting on a support attached to the electrical distribution board, not directly on the rear sockets.

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

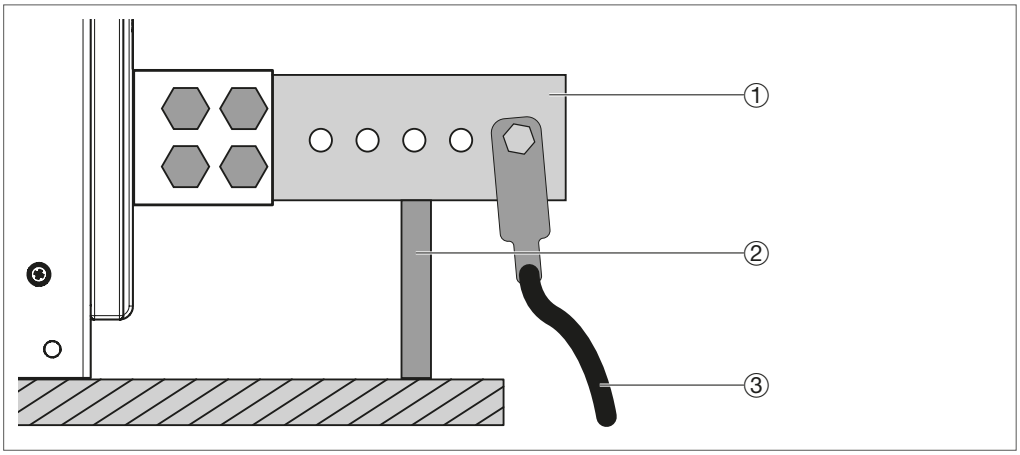
Presumed short circuit current (kA)	**Distance A (mm)**
42	350
55	300
66	250
85	150
100	150
120	150





① Tightening bolt ② Connecting bar ③ Connecting bars holder

ATTENTION
Risk of property damage The connecting cables must be fastened to the electrical cabinet to avoid dragging on the rear connections. Cable retaining bars are indicated for this. If necessary, extend the rear sockets using terminal extensions for cables, then connect them to the connection cables.



① Terminal extensions for cables

② Connection cable support

③ Connection cable

ATTENTION
Hager does not provide either the cable terminals or the bar extensions for cables. To create these parts, refer to chapter 15 Fastening dimensions.

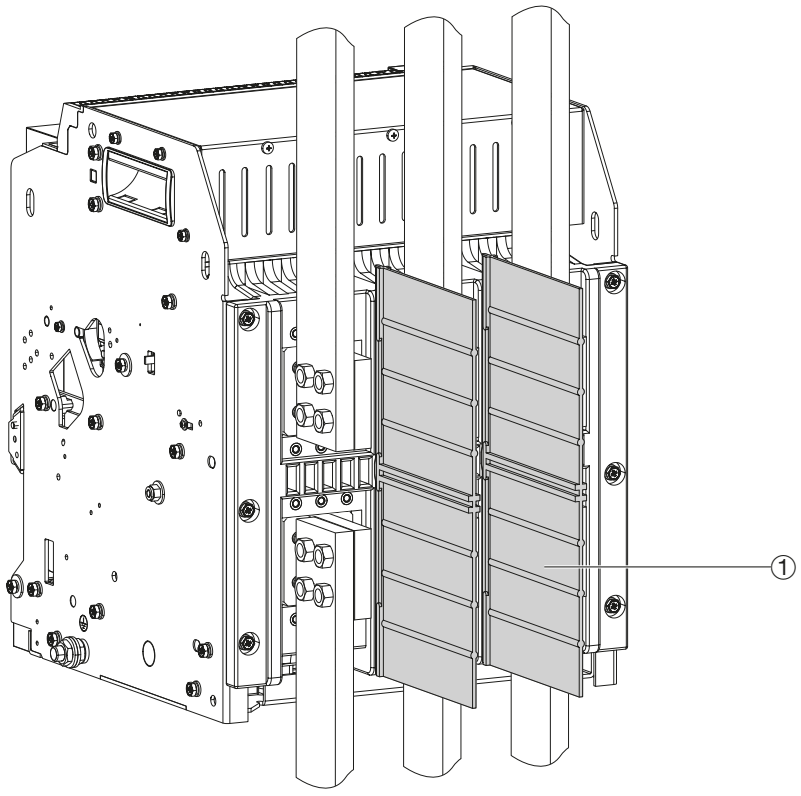
For the installation of protection accessories, refer to the following manuals:

Accessories	Instructions
IB interphase barrier	6LE007870A
HW2 DF Door Frame	6LE009126A
HW4 DF Door Frame	6LE007882A
Terminal block protection cover	6LE007885A

IB interphase barrier

The interphase barriers are safety accessories designed to strengthen the isolation between the phases at the rear connections.

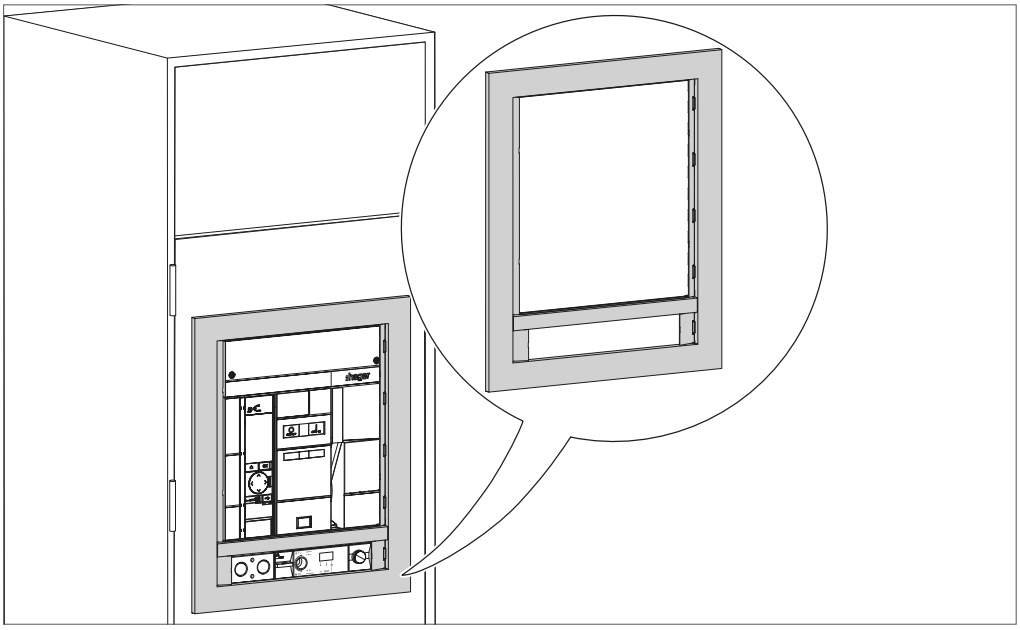
ATTENTION
The use of interphase barriers is mandatory for supply voltages over 500 V AC.



① IB interphase barrier

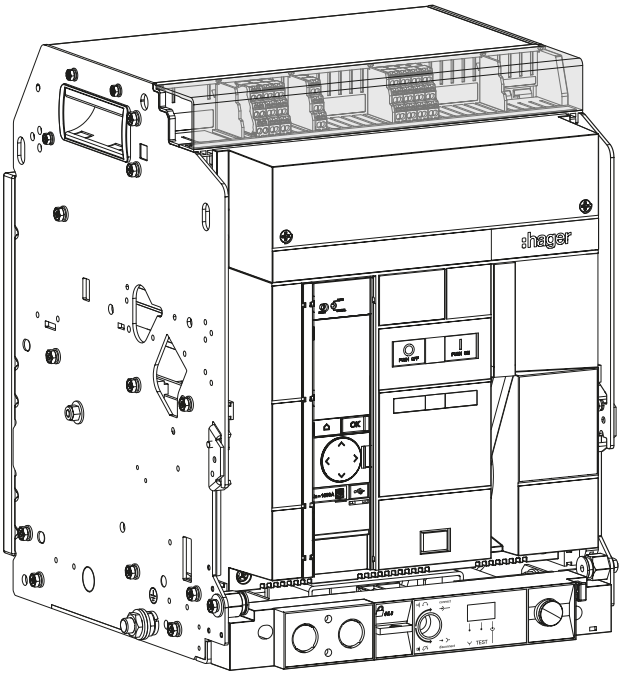
DF Door Frame

The door frame is fitted on the cut-out in the electrical distribution board door and raised the protection class to IP30.
It is used for a fixed or drawout circuit breaker.
For a drawout circuit breaker, the IP30 protection level is guaranteed in the connected position and in the test position.



Terminal block protection cover

The cover offers protection and prevents accidental access to the terminal blocks.

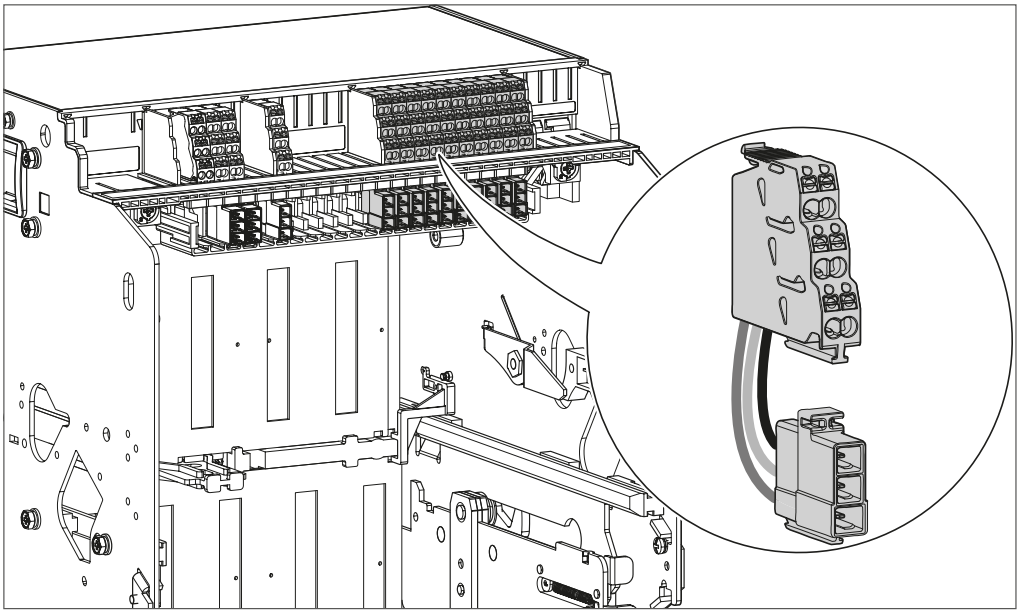


For the installation of accessories and auxiliaries, refer to the following instructions:

Accessories	Instructions
Terminal blocks TB	6LE009031A

Terminal blocks TB

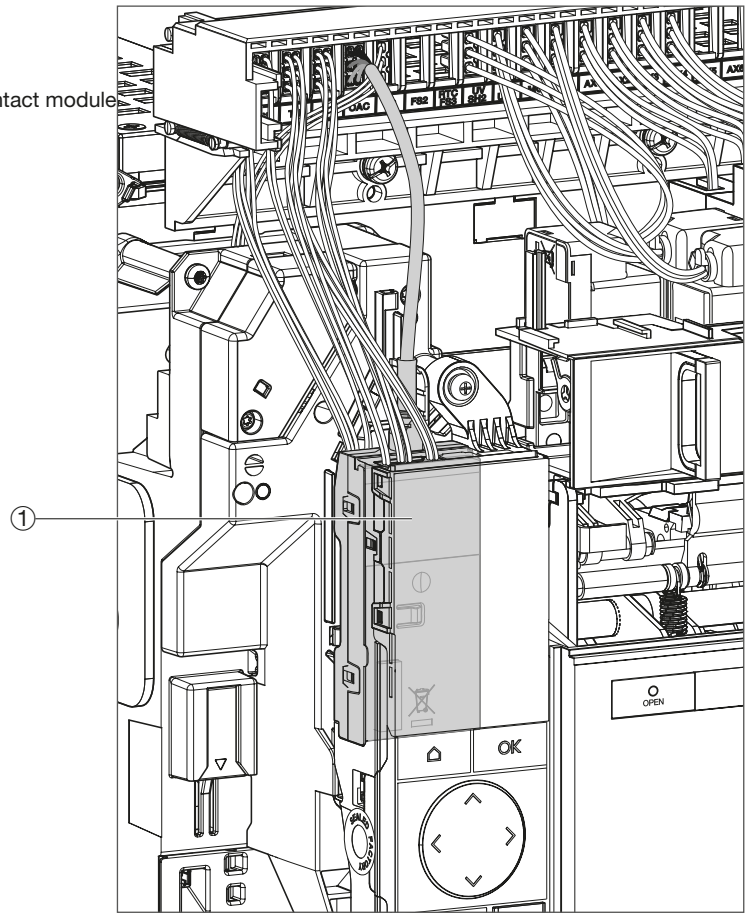
The terminal blocks TB are used to connect to the various circuit breaker accessories and auxiliary devices. For a pre-configured circuit breaker, all the accessories, including terminal blocks TB, are delivered pre-fitted. If the accessories are installed later, the terminal blocks TB must be purchased separately.
Care must then be taken to ensure they are fitted in the right place.



The OAC output alarm contacts module has 5 digital output contacts. By default, these contacts are pre-assigned to an alarm, trip or operating event. 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 trip unit.
By default, it allows the following alarms to be signalled:

- with the sentinel trip unit:
  - LTD trips on one output, STD/INST/MCR on one output and GF on one output,
  - overload pre-alarm,
  - HWF trip.
- with the sentinel Energy trip unit
  - LTD trip,
  - grouped alarm (configured on Short Time Delay, Instantaneous or MCR),
  - GF trip,
  - PTA 1 overload prealarm,
  - HWF trip.

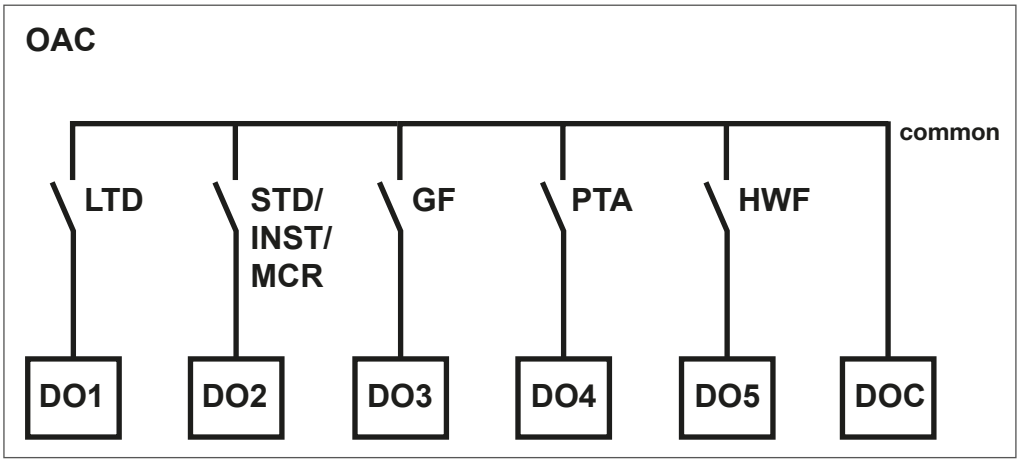
① OAC Output alarm contact module



ATTENTION
An external 24V DC SELV power supply (recommended reference Hager HTG911H) connected on the TU terminal blocks of the circuit breaker is necessary to use the OAC output alarm contacts module (see Chapter 17.9 Connecting the inputs).

ATTENTION
For installation of the OAC output alarm contacts module, refer to the 6LE009032A manual.

Output alarm contact OAC wiring diagram



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

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

• LSIG tripping operations

	Contact No.	Not active	Active
LTD output contact	DO1	open	closed
STD/INST/MCR output contact or grouped alarm with the sentinel Energy trip unit	DO2	open	closed
GF output contact	DO3	open	closed

• Overload pre-alarm

	Contact No.	Not active	Current level > 90% x Ir
PTA output contact	DO4	open	closed

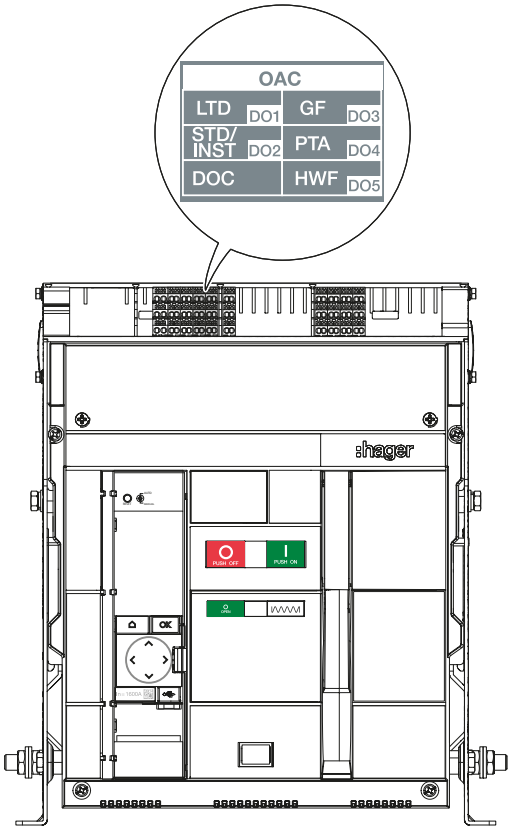
• Tripping due to a critical system alarm

	Contact No.	Not active	Active
HWF output contact	DO5	open	closed

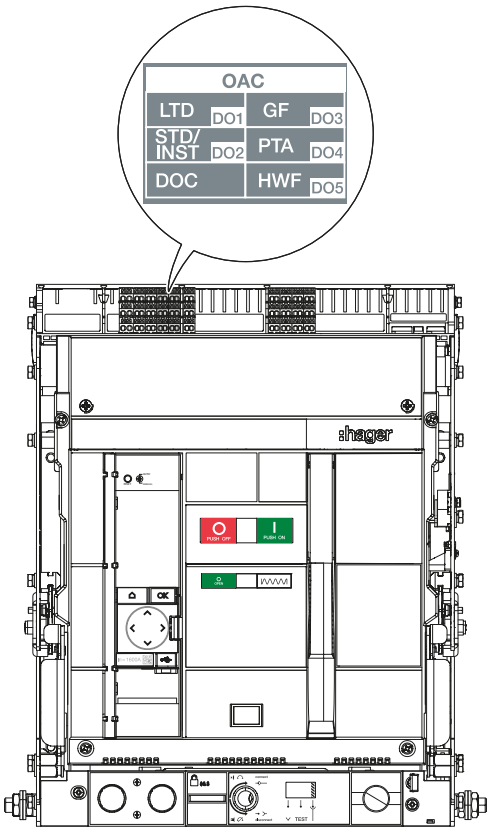
ATTENTION
For programming the output contacts with the sentinel Energy trip unit, see the sentinel Energy hw+ 6LE008147A electronic trip unit user manual.

ATTENTION
The LTD, STD/INST/MCR, 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 17.9 Connecting the inputs).

Fixed circuit breaker



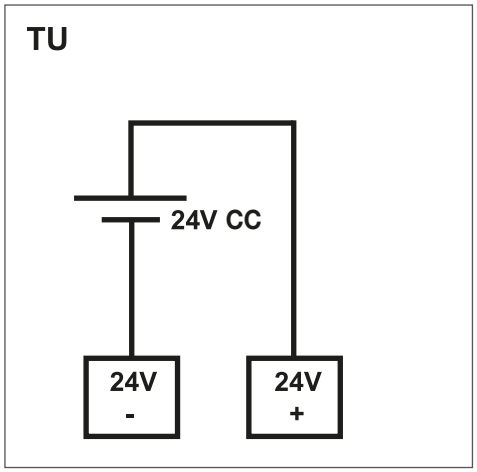
Drawout circuit breaker



Several termina block inputs can be connected to the circuit breaker:

Wiring diagram of the 24V DC external power supply

Wire an external 24V DC SELV power supply (recommended reference Hager HTG911H) to the 24V + and - terminals.



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

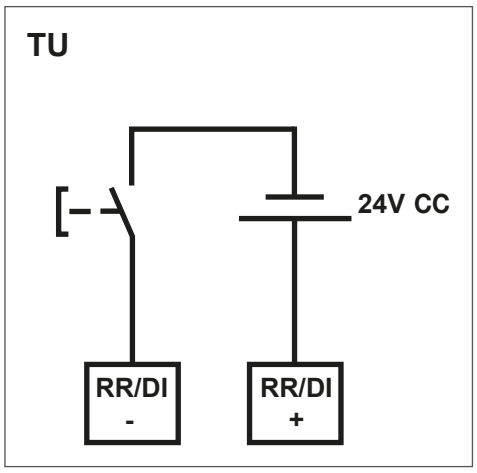
sentinel Energy trip unit	60 mA
HTD210H panel display	85 mA
Modbus RTU communication module	14 mA
Modbus TCP communication module	38 mA
OAC alarm output contacts module	34 mA

Wiring diagram of the RR/DI digital input

The RR/DI digital input is used to remotely acknowledge the sentinel trip unit's trip pop-ups and remotely reset the OAC alarm output contacts. It can be used for one of the following control functions on the sentinel Energy trip unit:
- remote acknowledgement of the trip alarms on the trip unit and remote reset of the output alarm contacts,
- switching between tariff meters T1 and T2,
- inhibition of advanced protections,
- switching between profile A and B.

It is configured by default for remote acknowledgement of the sentinel trip unit's trip pop-ups and the remote reset of the OAC alarm output contacts with the sentinel Energy trip unit (refer to the 6LE008147A hw+ sentinel Energy electronic trip unit user manual).

The digital input must be powered with 24V DC in accordance with the following diagram.



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

The devices, conductors, bar sheathing and busbars can thus benefit from this limitation.

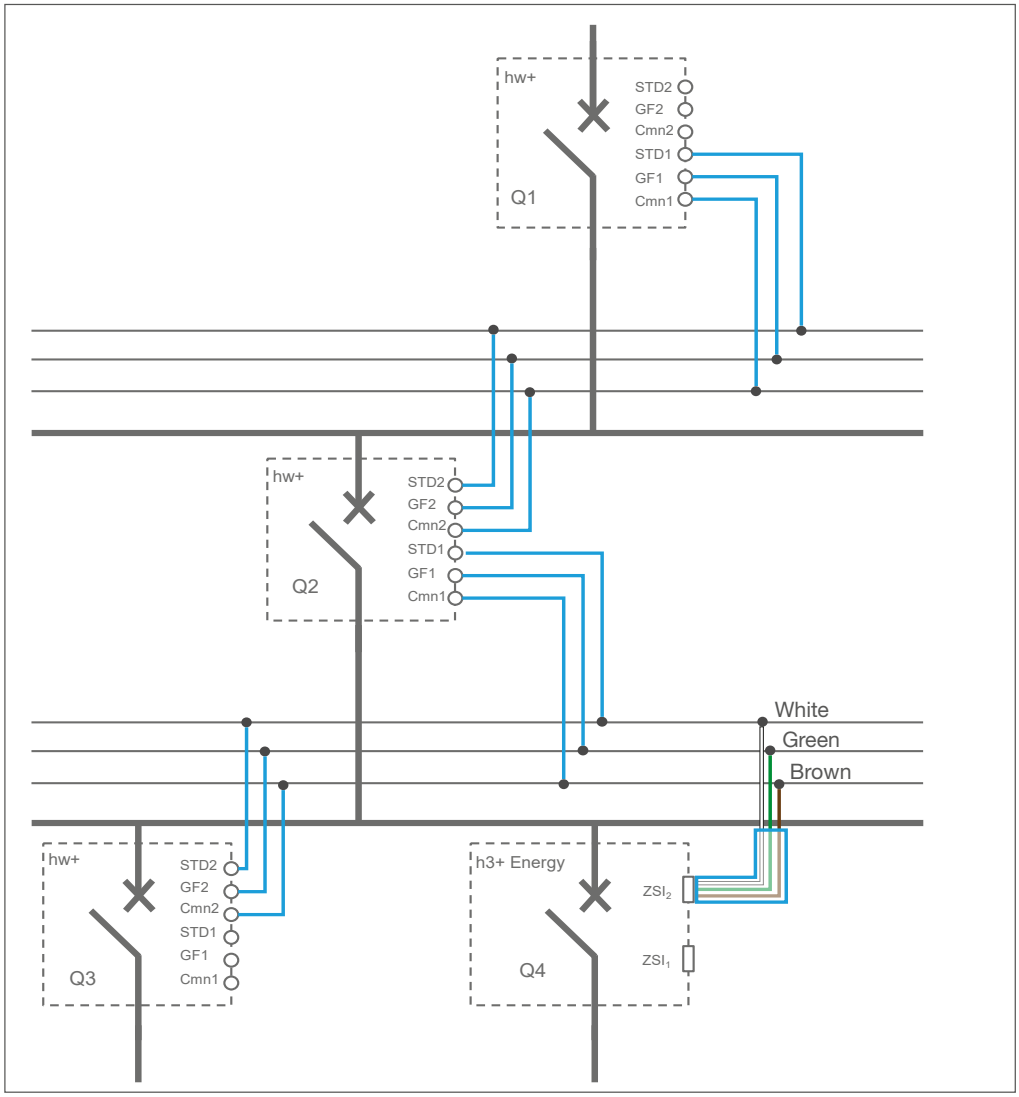
The installed circuit breakers are linked together by cable to determine which circuit breaker should trip first. If an electrical fault appears between two linked circuit breakers connected together by the ZSI function, the downstream circuit breaker is unable to clear it. Thanks to zone selectivity,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

hw+ circuit breakers can be linked with h3+ Energy circuit breakers.

For zone selectivity to work correctly, the ZSI hw+ 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 link terminals inside the electrical cabinet to allow:
- the linkage between several circuit breakers connected to a single upstream circuit breaker,
- the linkage between an hw+ circuit breaker and an Energy h3+ circuit breaker.

ZSI inputs and outputs wiring diagram



ATTENTION
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 earth fault protection:
Connection to downstream circuit breakers:
STD1: selectivity on the Short time delay protection
GF1: selectivity on the earth fault protection
Cmn1: common
Connection to the upstream circuit breaker:
STD2: selectivity on the Short time delay protection
GF2: selectivity on the earth fault protection
Cmn2: common

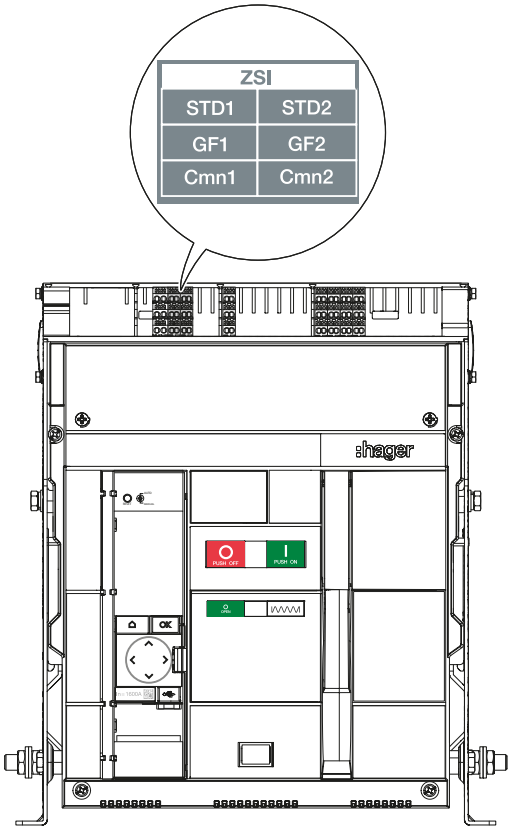
hw+ air circuit breakers have 6 ZSI terminal blocks enabling the upstream or downstream circuit breakers to be connected to deploy zone selectivity (ZSI).

Type of connection	Total number of circuit breakers	Max. distance between 2 circuit breakers
Upstream	3	300 m
Downstream	7	300 m

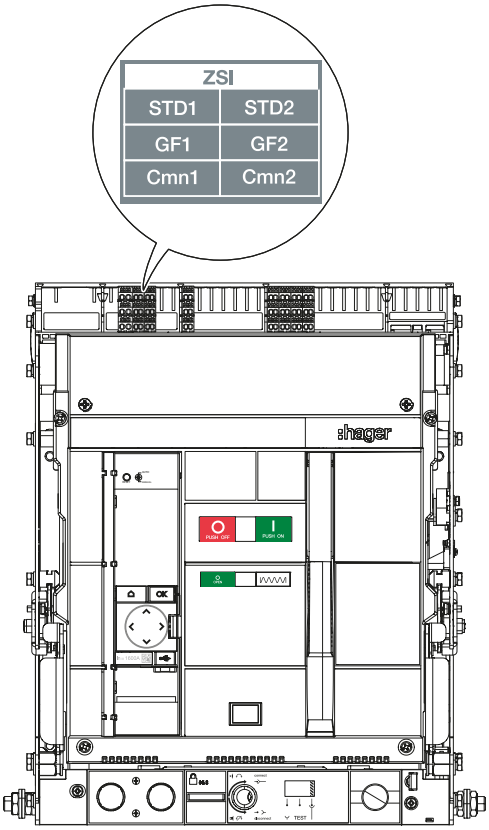
Recommended connection cable: 1 to 1.5 mm^2 twisted cable.

ATTENTION
It is recommended that the Hager Power setup software be used to verify the wiring between the circuit breakers.

Fixed circuit breaker



Drawout circuit breaker



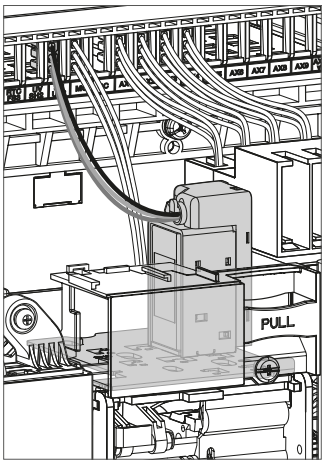
For the installation of control accessories, refer to the following manuals:

Accessories	Instructions
Coils	6LE009029A
MO charging Motor	6LE007865A

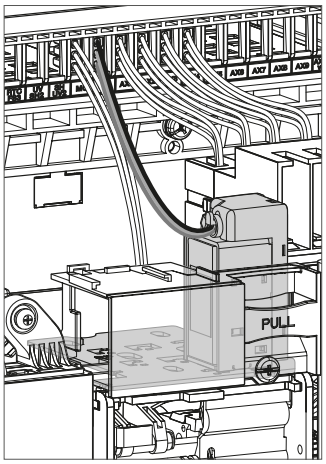
Coils

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

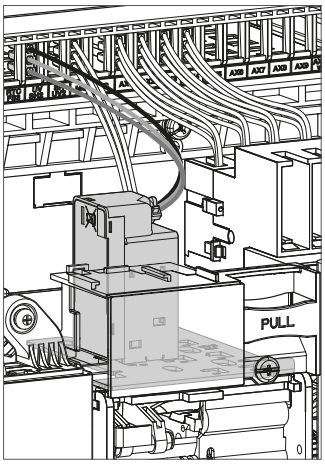
Shunt trip coil SH or Undervoltage release coil UV



Closing coil CC



Undervoltage release coil UV or Shunt trip coil SH



The SH shunt trip coils and CC closing coils can be controlled by the sentinel Energy trip unit using the INS insulation module (See Chapter 17.14 Installation of the communication and display accessories).

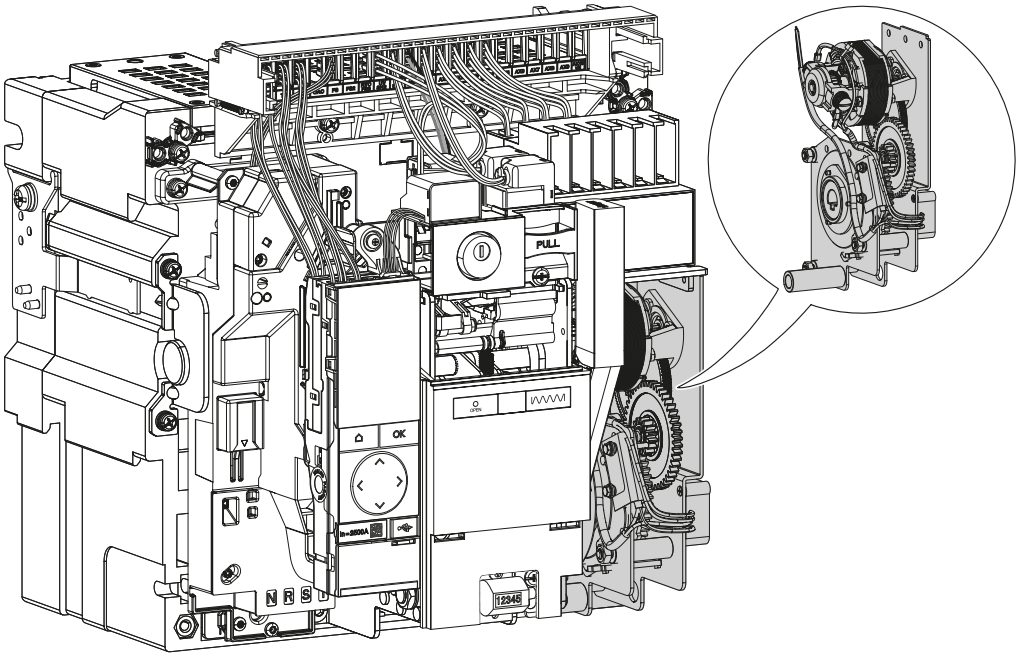
ATTENTION

Connection of the coils for a sentinel Energy trip unit.
The length of the connection cables between:
- the terminals A1/A2 and A3 of the CC closing coils,
- the terminals Cx1/Cx2 and Cx3 of the SH shunt trip coils,

is limited to 5 m for the 200-250 V coils (beyond that, an intermediate relay is necessary).
A bridging must be performed between the closest terminal between A2 and A3 and/or Cx2 and Cx3 (less than 10 cm) in order to be able to use a shunt trip coil and/or CC closing coil of 380-480 V AC.
Remote control (via Modbus or Bluetooth) is therefore not possible with 380-480 V AC coils.

MO charging Motor

The MO charging motor is positioned on the right side of the charging handle and automatically charges the spring after each time the circuit breaker closes.

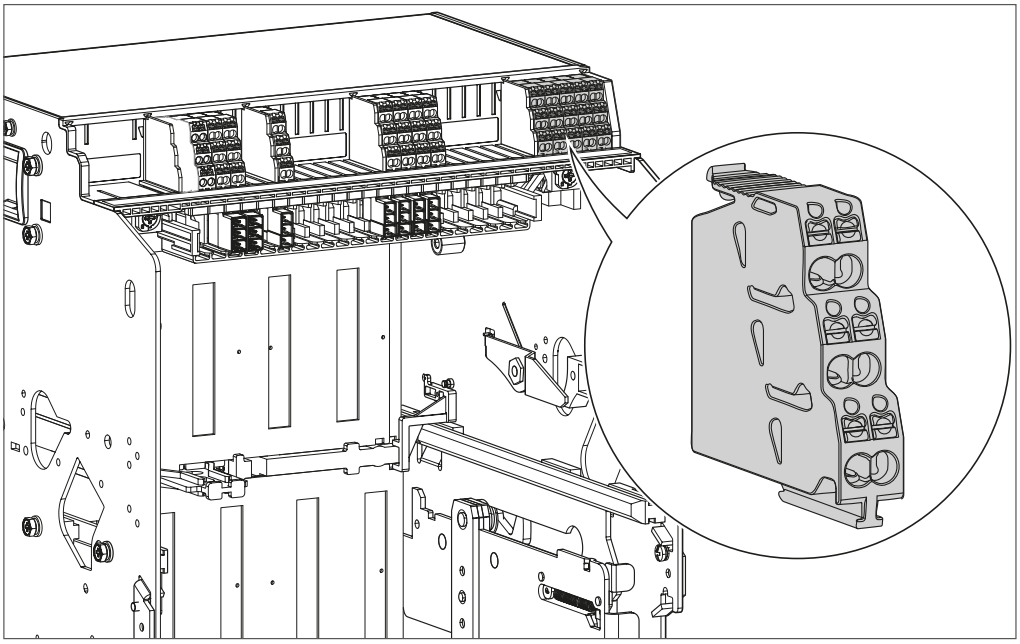


For the installation of signalling accessories, refer to the following manuals:

Accessories	Instructions
PS Position contact	6LE009030A
AX Auxiliary Contact	6LE007866A
RTC Ready-to-Close contact	6LE007867A
CYC Operation Cycle Counter	6LE007868A
OAC Output Alarm Contact module	6LE009032A
FS Fault trip contact	6LE009028A

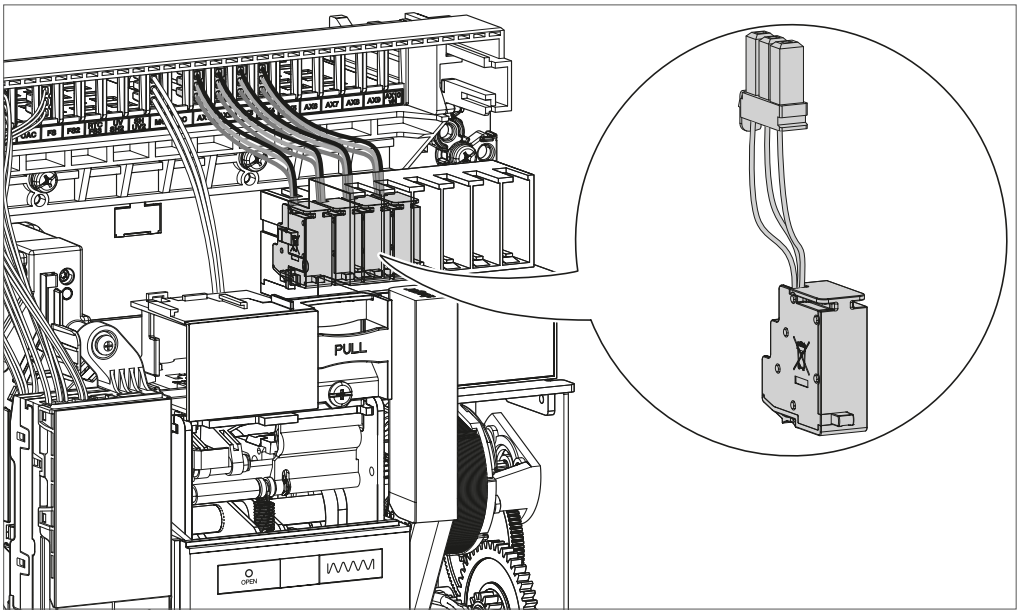
PS Position contact

This contact indicates the connected, test or disconnected position of the circuit breaker in its chassis.

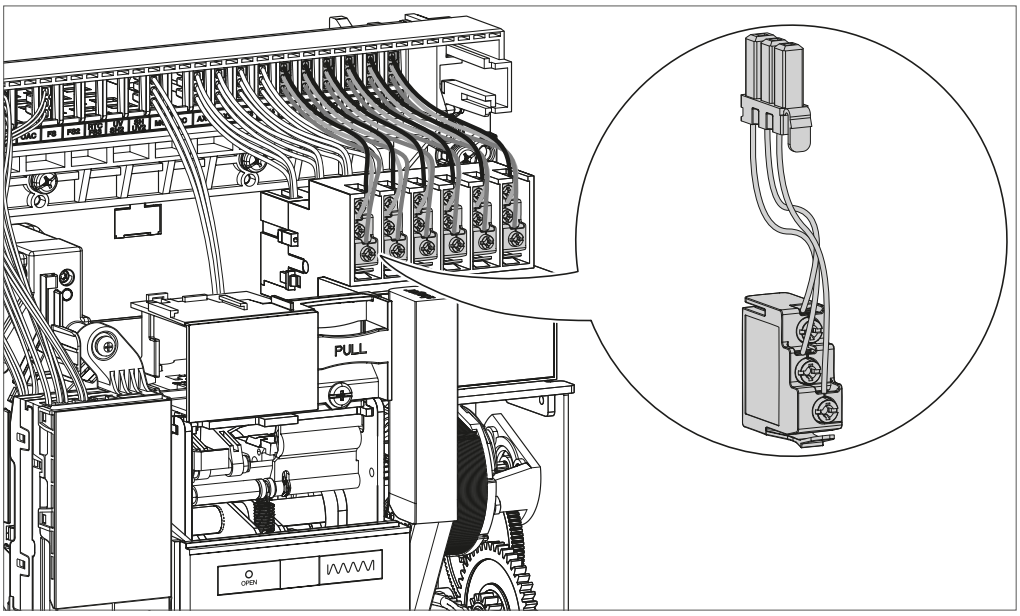


AX Auxiliary Contact

The auxiliary contacts indicate the open or closed position of the circuit breaker power contacts.
4 auxiliary contacts are fitted as standard (AX1 to AX4) on HW2 circuit breakers.
6 auxiliary contacts are fitted as standard (AX1 to AX6) on HW4 circuit breakers.



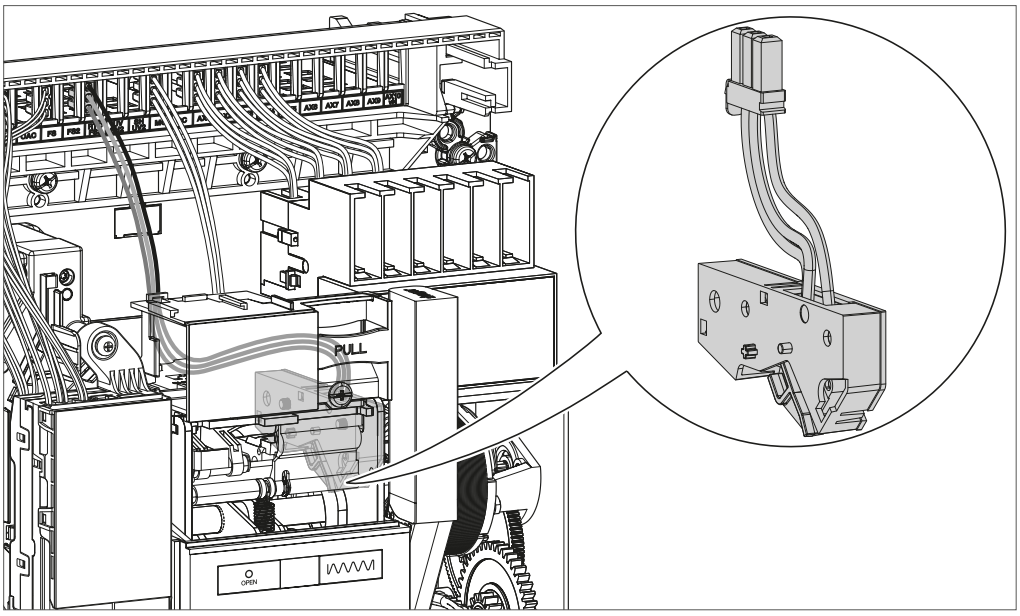
6 contacts can be fitted additionally (AX5 to AX10/Vn for HW2 circuit breakers and AX7 to AX12/Vn for HW4 circuit breakers).



ATTENTION
The contacts AX10 (HW2) and AX12 (HW4) are not available on the 3-pole circuit breaker with the sentinel Energy trip unit because of the voltage tap vN.

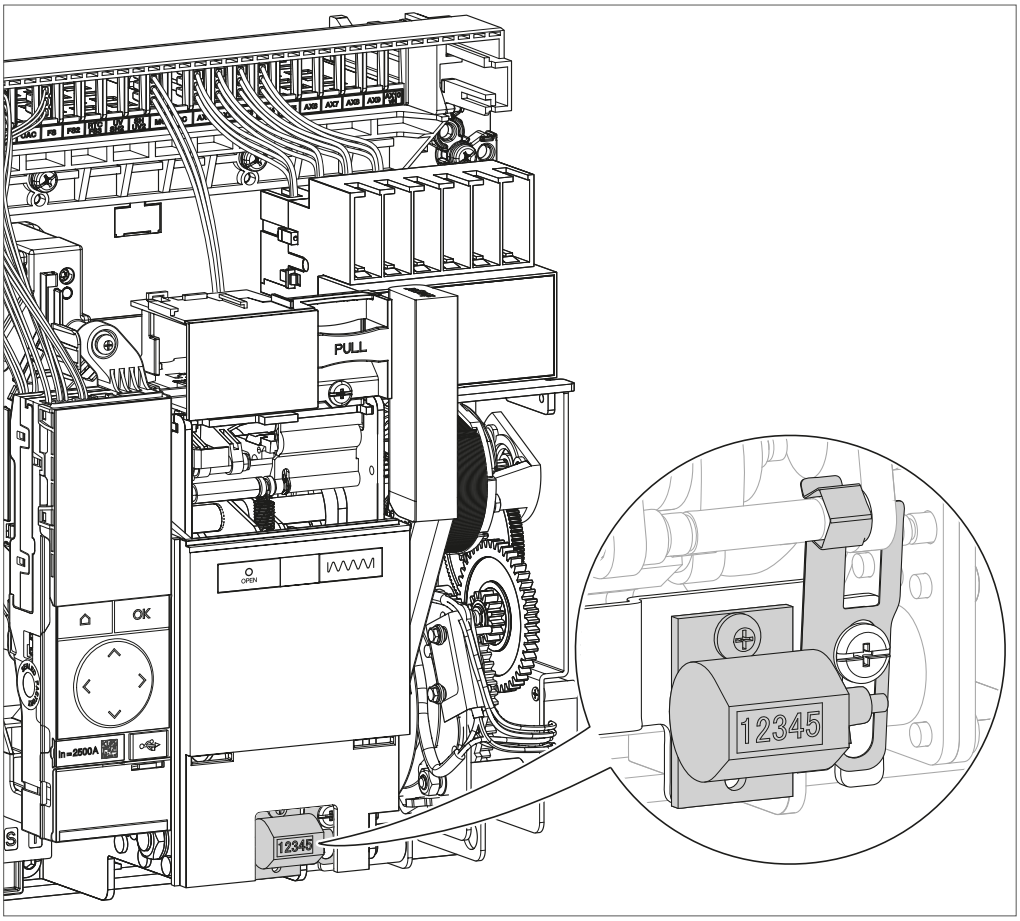
RTC Ready-to-Close contact

The ready-to-close contact gives the information that the circuit breaker is ready to be closed.



CYC Operation Cycle Counter

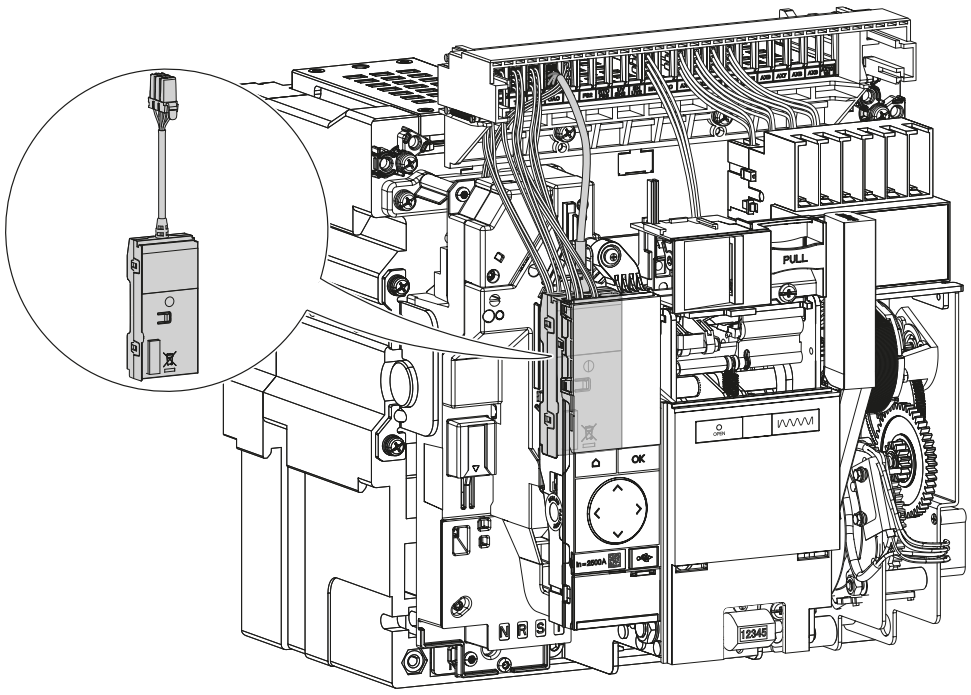
The cycle counter shows the number of ON-OFF operations completed by the circuit breaker.



OAC Output Alarm Contact module

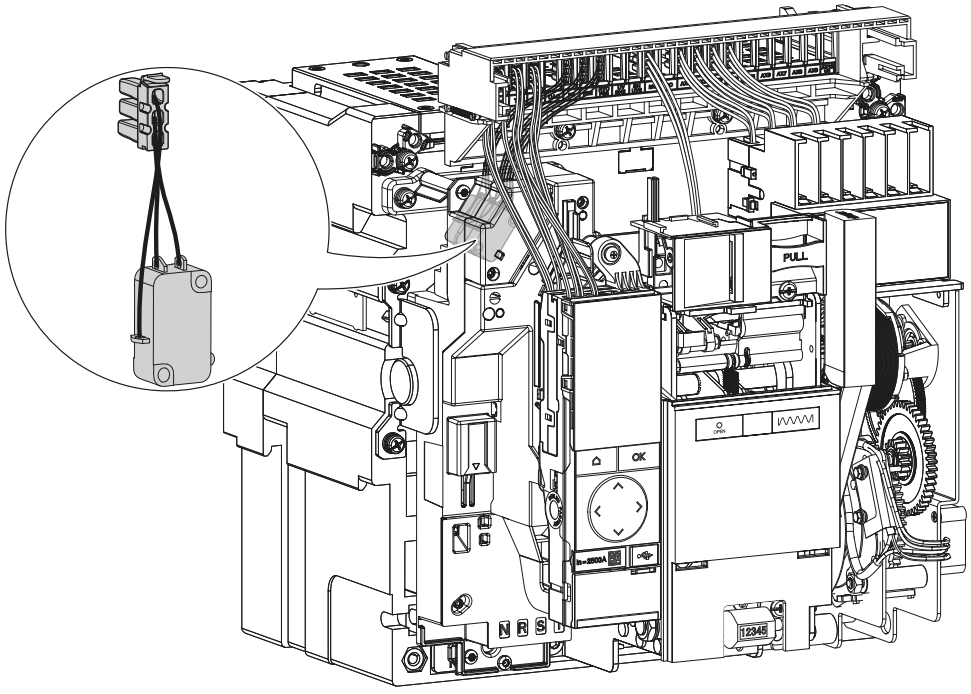
The OAC alarm output contacts module has 5 digital output contacts allowing the following alarm, trip or operating events to be signalled.

For more information, see chapter 17.8 Connecting the output contacts.



FS Fault trip contact

The FS fault trip contact is used to signal the tripped status of the circuit breaker due to faults detected by the trip unit. Two other contacts (FS2 and FS3) can be fitted.
If an FS3 contact is fitted and wired, the RTC ready-to-close contact cannot be wired.



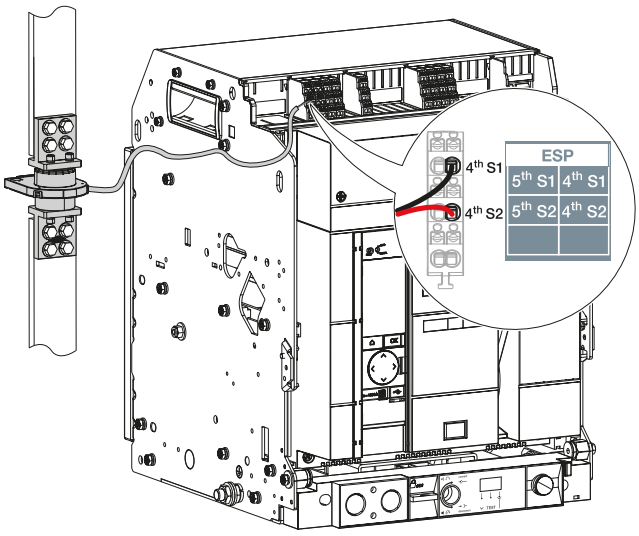
For the installation of neutral protection accessories, refer to the following manuals:

Accessory	Manual
External neutral current sensor ENCT HW2	6LE007879A
External neutral current sensor ENCT HW4	6LE009124A

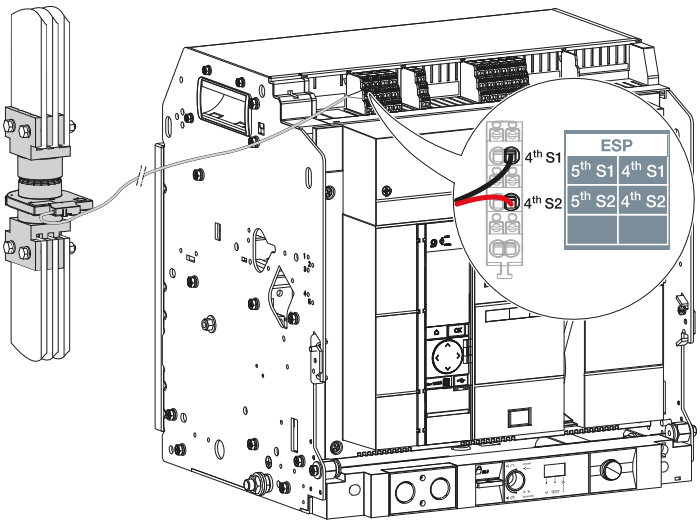
ENCT external neutral current sensor

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 terminals marked ESP 4th S1 (black wire) and 4th S2 (red wire).

Circuit breaker HW2

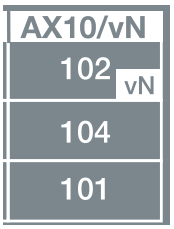


Circuit breaker HW4



ATTENTION

Terminal block vN
In case of a 3-pole circuit breaker equipped with sentinel Energy trip unit, the vN terminal block must be connected to the neutral potential.
This connection is essential to obtain correct measurement of single phase voltages V1N, V2N, V3N, power values per phase and for operation of the advanced protections against reverse active power, undervoltage or overvoltage.

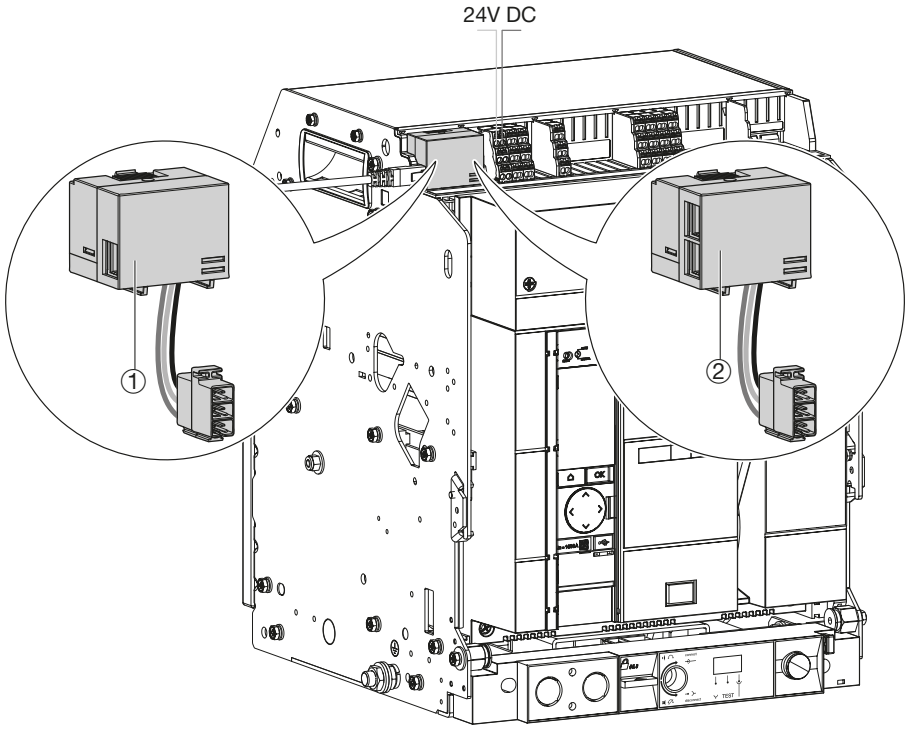


For the installation of communication and display accessories, refer to the following instructions:

Accessories	Instructions
Communication module	6LE009015A
INS insulation module	6LE008004A
Panel display	6LE002999A

Communication module

The HW2 or HW4 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 the circuit breaker to be monitored remotely and status, alarm and measurement information to be sent back.
Only one communication module can be installed on an hw+ circuit breaker.

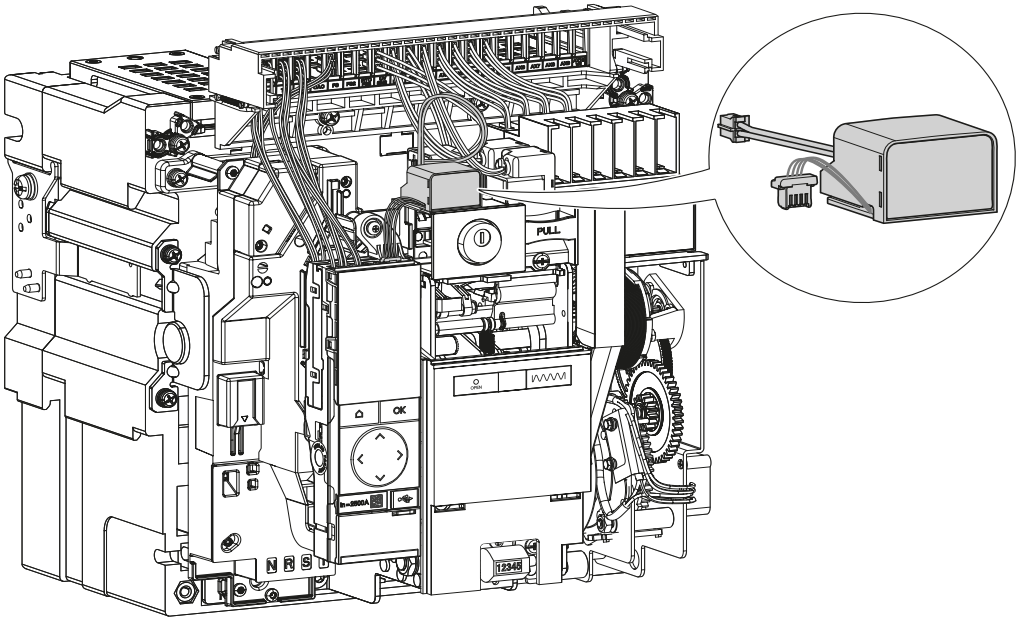


① Modbus-TCP 1 RJ45

② Modbus-RTU 2 RJ45

INS insulation module

The INS insulation module is an interface between the sentinel Energy trip unit and the remote opening and closing functions of the circuit breaker. Remote functions are to be used from the Bluetooth Hager Power touch application, via modbus if a communication module is installed or from Hager Power setup (USB-C).
This insulation module also prevents the overvoltage caused by the SH or CC coil affecting the trip unit.

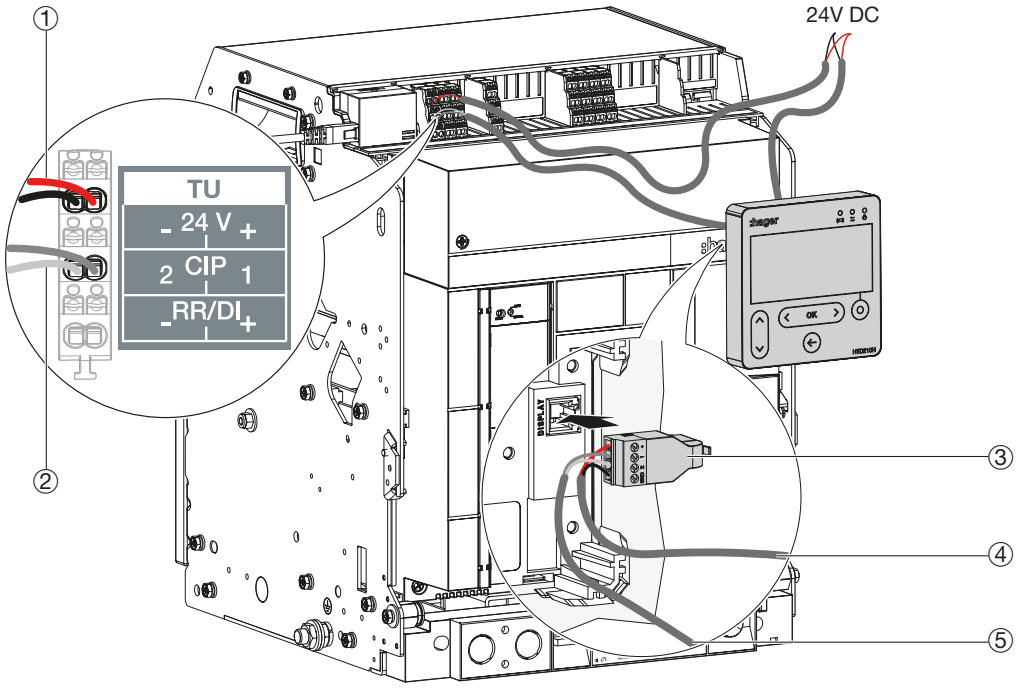


ATTENTION
The terminals of the CC coils (A1 and A2), SH (C11 and C12) and SH2 (C21 and C22) must be powered for the remote commands to function. The cable length between the PLC or the push button and the terminal of an SH shunt trip coil or a CC closing coil connected to the INS insulation module must be a maximum of 5 metres.

Panel display

The HTD210H panel display for h3+ Energy circuit breakers is also compatible with hw+ circuit breakers equipped with sentinel Energy trip units. It enables:
- to display the status, measurement and settings information mounted on door of the electrical distribution board,
- the main protection and alarm settings to be modified.

The HWY210H adapter is necessary to connect the HTD210H panel display with a 24V DC power supply and enables the connection to the terminals CIP 1 and CIP 2.



① To the 24 V DC power supply

② To terminals 1 and 2 of the HWY210H adapter

③ HWY210H adapter

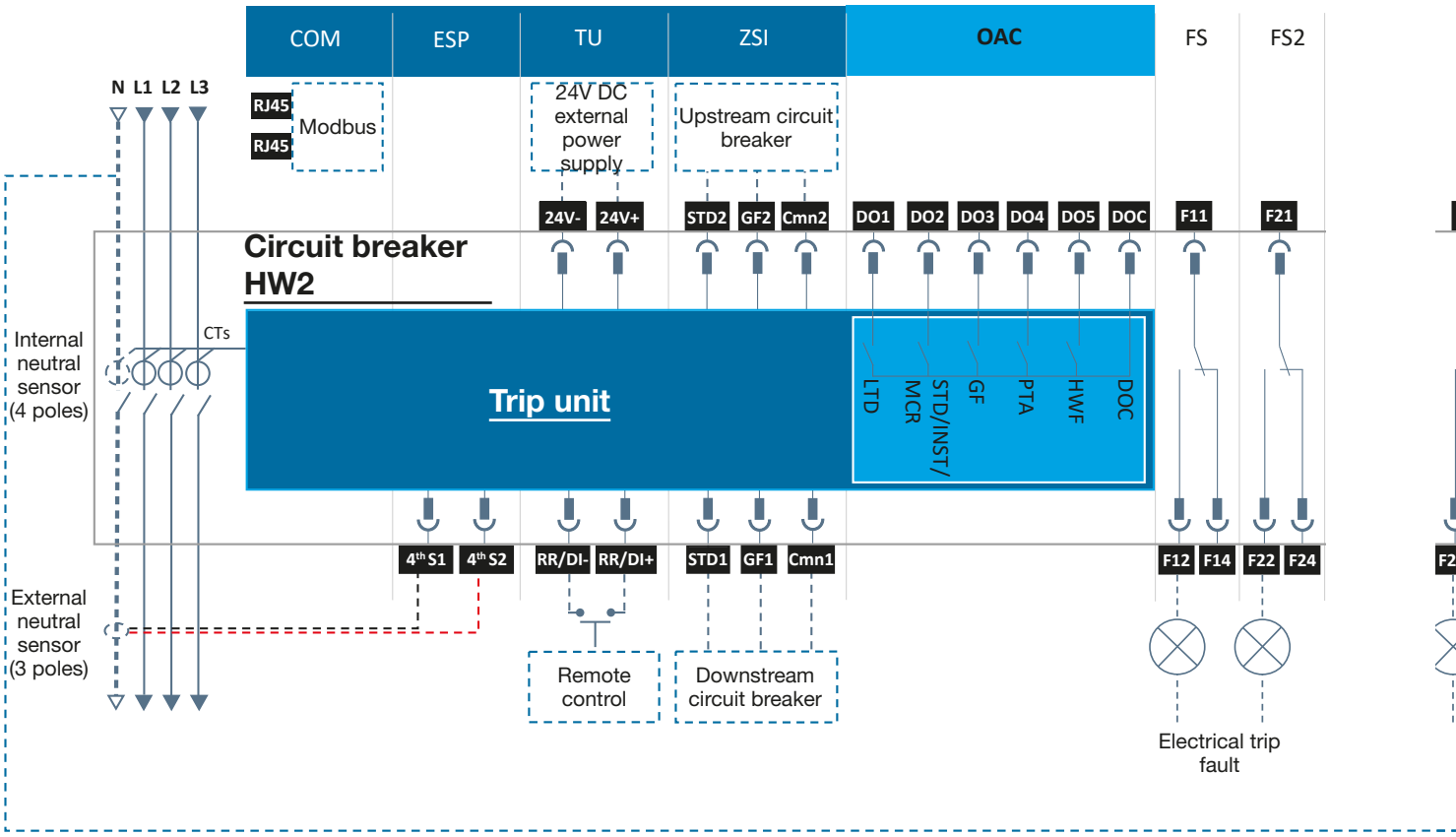
④ To the 24 V DC power supply

⑤ To terminals CIP 1 and CIP 2 on the TU terminal block

ATTENTION
An external 24 V DC SELV power supply (recommended reference HTG911H) must be connected to the TU terminal of the circuit breaker and the HWY210H adapter to allow the panel display to operate correctly.

ATTENTION
Use a twisted pair data bus cable with 0.75 mm^2 cross section, 18 AWG or 19 AWG (for example "FD CP (TP) plus" from LAPP) to connect the CIP terminals of the circuit breaker to terminals 1 and 2 of the HWY210H adapter. Cables connected to the HWY210H adapter must be fastened to the door panel.

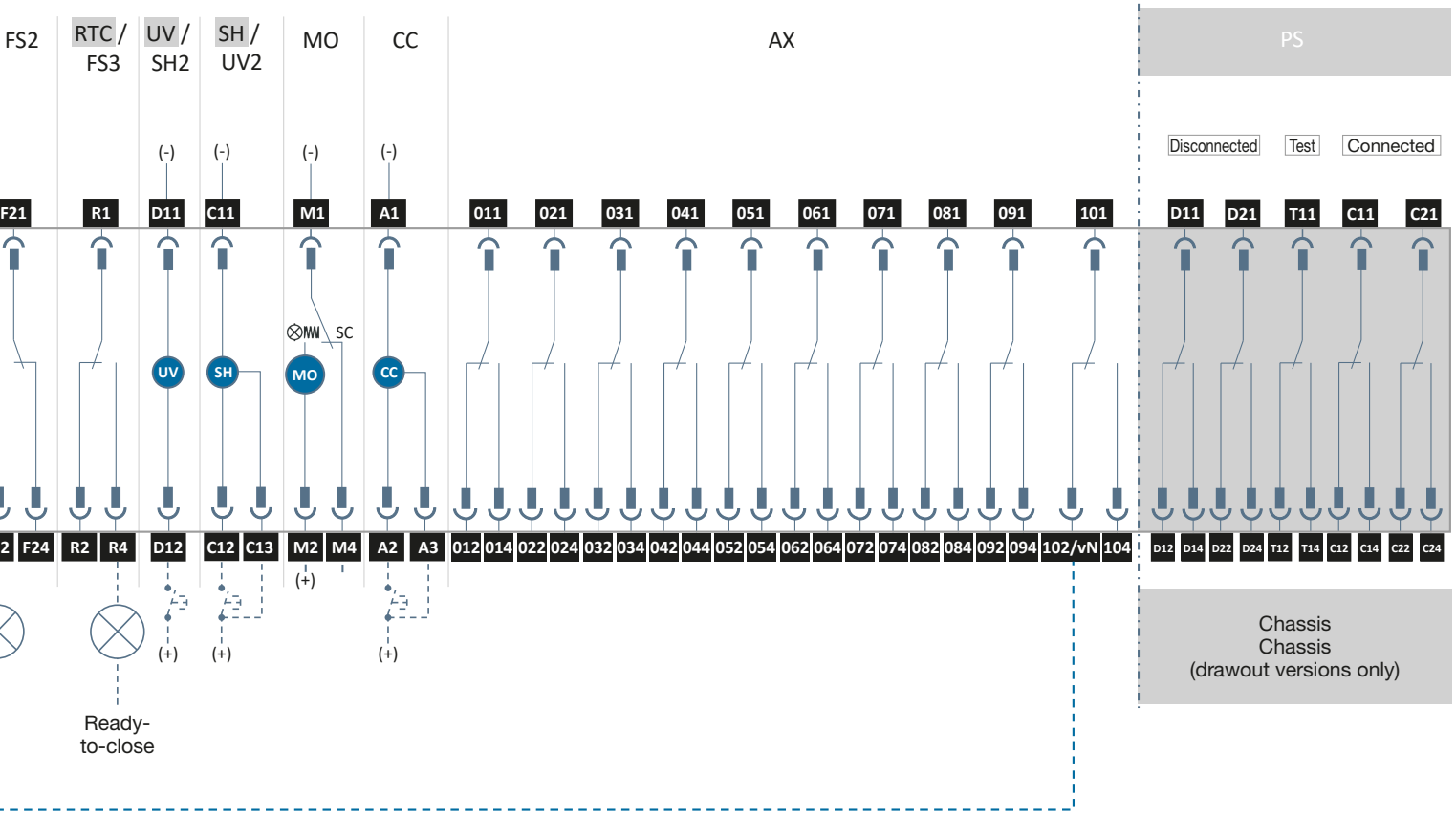
Connection diagram of the HW2 fixed and drawout circuit breakers



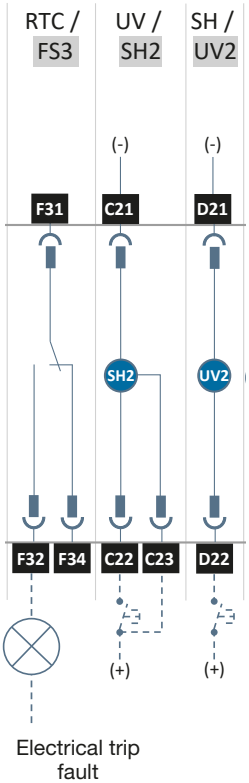
Terminal blocks	Terminations
COM	Communication module
ESP	External sensors
TU	External power supply for the trip unit
ZSI	Zone selectivity function
OAC	Output Alarm Contacts
FS	Fault trip contact
FS2	FS Fault trip contact No. 2
RTC/FS3	Contact ready to close or 3rd electrical trip fault contact
UV/SH2	UV undervoltage coil or 2nd SH shunt trip coil
SH/UV2	SH shunt trip coil or 2nd UV undervoltage coil
MO	MO charging motor and SC spring-loaded signal contact
CC	Closing coil CC
AX	Auxiliary contact - maximum 10 contacts signalling the circuit breaker open/closed status (4 contacts by default)
PS	Position contacts - Up to 5 contacts indicating the position of the circuit breaker in the chassis.
102/vN	Neutral potential ENVA

The cables (flexible or rigid) used must have a cross section between 0.6 mm^2 and 2.5 mm^2.

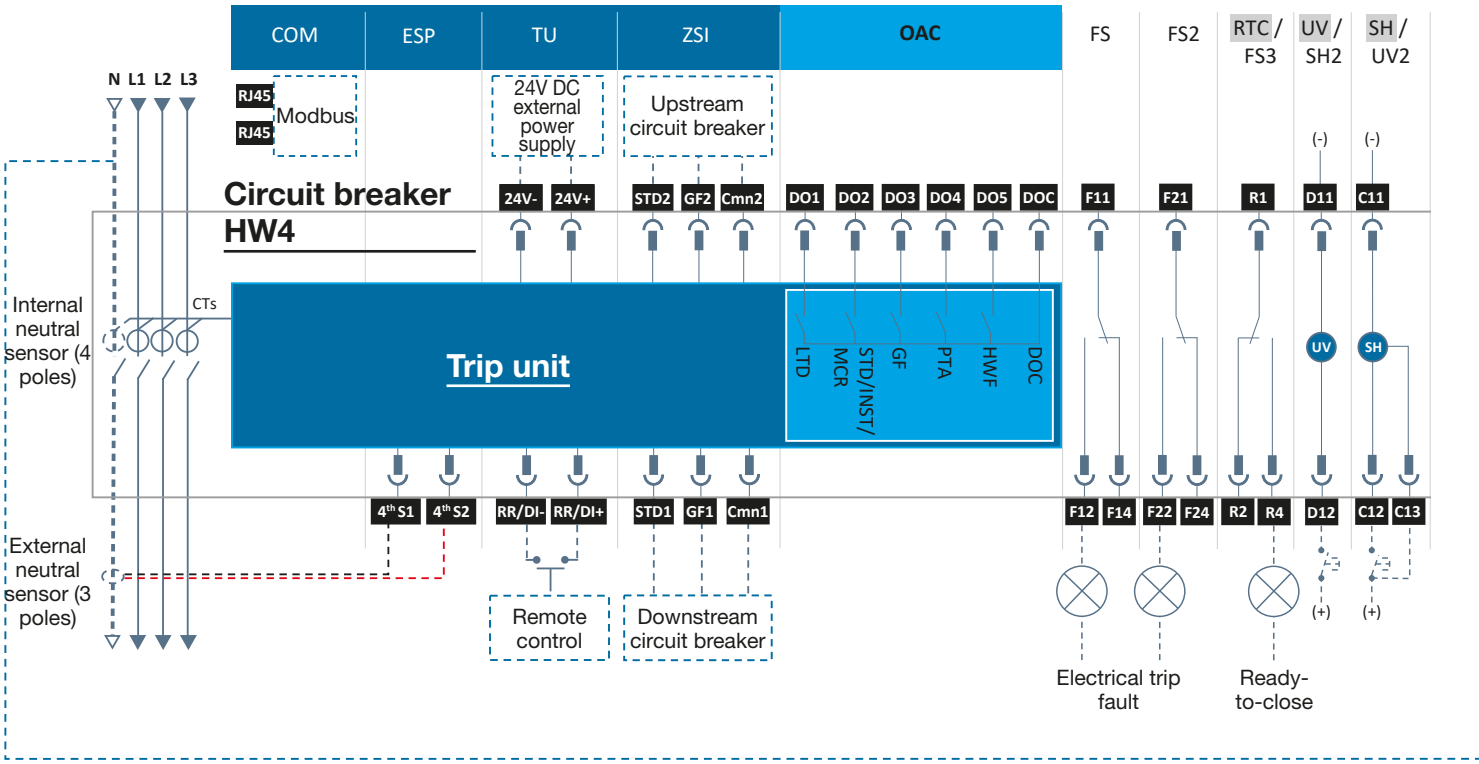
In order to be properly held in place in the terminals, the connected cables must first be stripped form 10 to 12 mm.
The cables must not be twisted and only one cable is authorised per terminal.



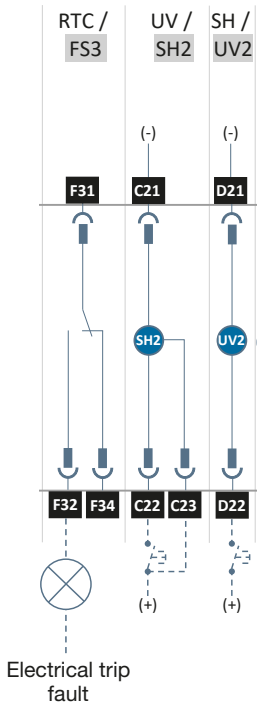
Second possibility

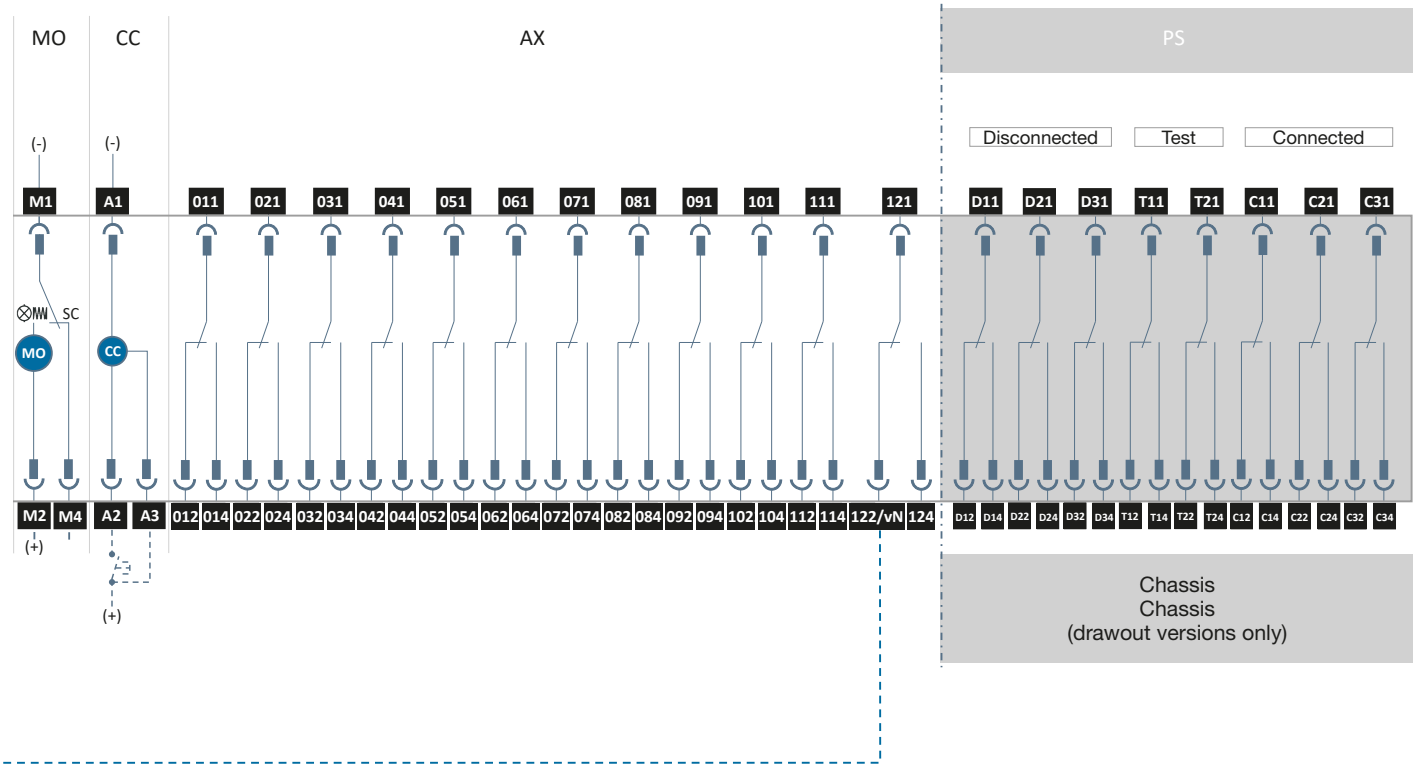


Connection diagram of the HW4 fixed and drawout circuit breakers



Second possibility





Terminal blocks	Terminations
COM	Communication module
ESP	External sensors
TU	External power supply for the trip unit
ZSI	Zone selectivity function
OAC	Output Alarm Contacts
FS	Fault trip contact
FS2	FS Fault trip contact No. 2
RTC/FS3	Contact ready to close or 3rd electrical trip fault contact
UV/SH2	UV undervoltage coil or 2nd SH shunt trip coil
SH/UV2	SH shunt trip coil or 2nd UV undervoltage coil
MO	MO charging motor and SC spring-loaded signal contact
CC	Closing coil CC
AX	Auxiliary contact - maximum 12 contacts signalling the circuit breaker open/closed status (6 contacts by default)
PS	Position contacts - Up to 8 contacts indicating the position of the circuit breaker in the chassis.
122/vN	Neutral potential ENVA

The cables (flexible or rigid) used must have a cross section between 0.6 mm^2 and 2.5 mm^2.

In order to be properly held in place in the terminals, the connected cables must first be stripped form 10 to 12 mm.
The cables must not be twisted and only one cable is authorised per terminal.

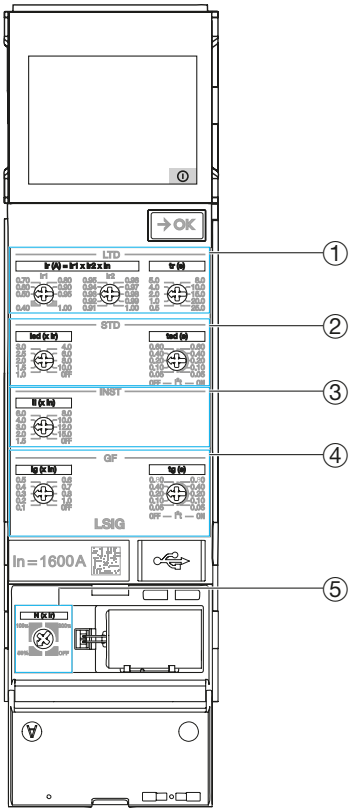
The protections settings are adjusted using the dials or the keyboard depending on the sentinel or sentinel Energy trip unit type.

A detailed description of the functions and settings is available in the user manuals for 6LE007969A hw+ sentinel electronic trip units and 6LE008147A hw+ sentinel Energy electronic trip units.

WARNING

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

sentinel Energy trip unit



① LTD Long time delay protection setting

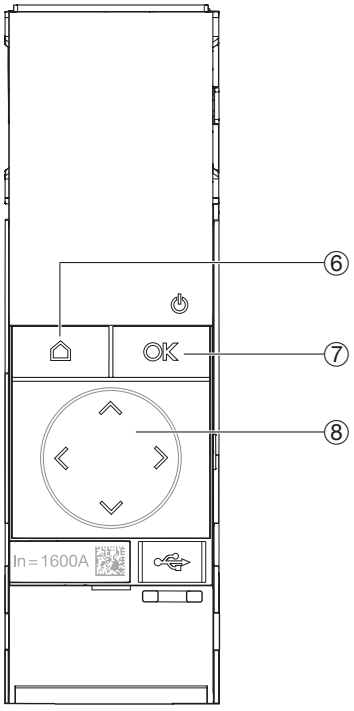
② STD Short Time Delay protection setting

③ INST Instantaneous protection setting

④ GF earth fault protection setting

⑤ N neutral protection setting adjustment

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 who are equipped with adequate safety equipment.

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

ATTENTION

For any further information about commissioning the circuit breaker, contact Hager Technical Support.

ATTENTION

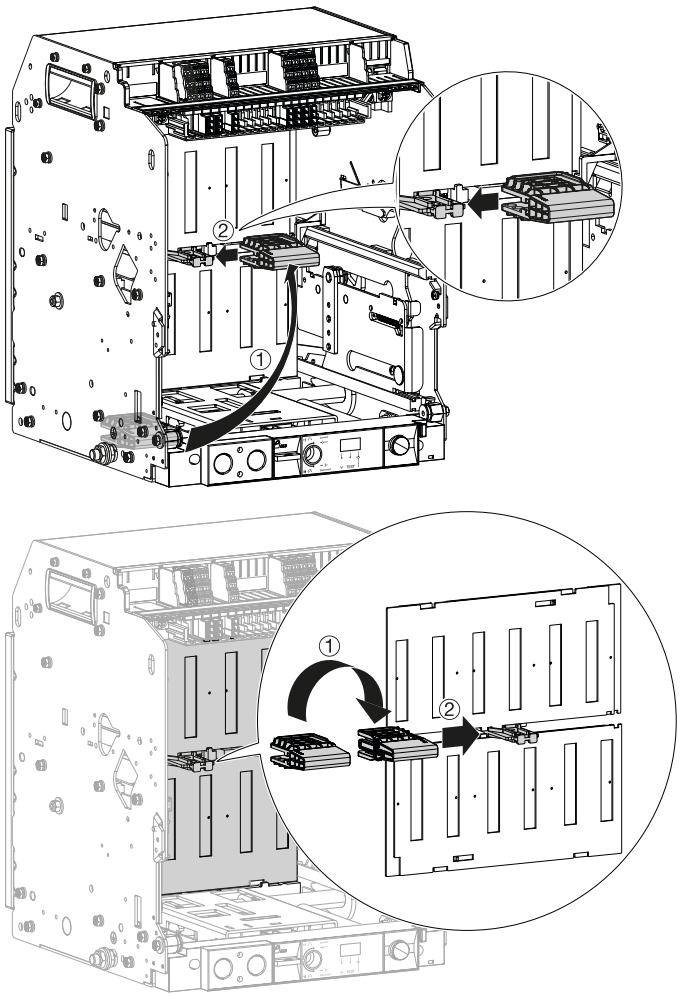
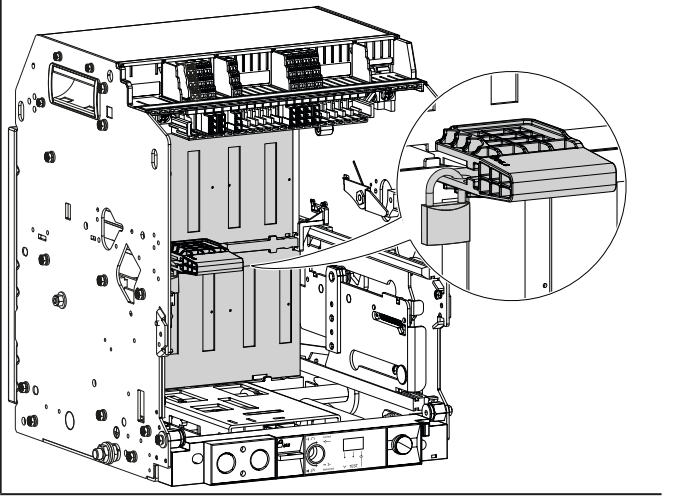
The Hager Power setup tool is recommended in order to implement the protection settings when commissioning the trip unit.

The safety shutters cover the contacts of the main circuit in the chassis when the circuit breaker is in the disconnected or test position.

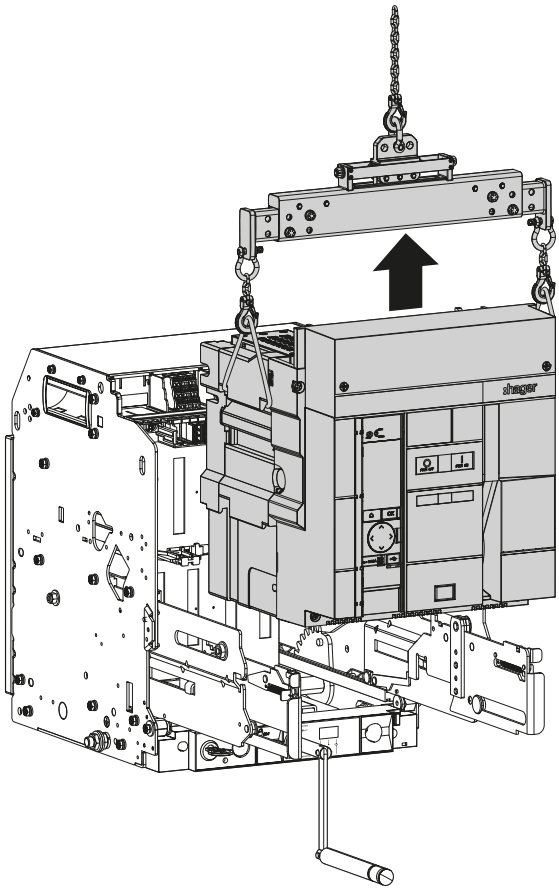
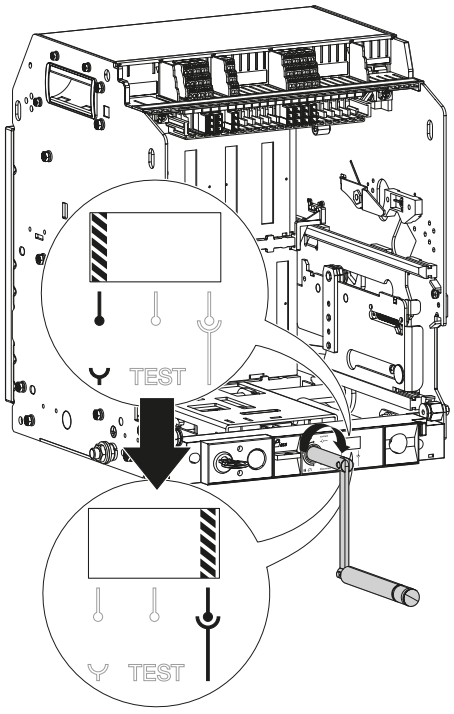
In this way they preclude accidental access to the connections.

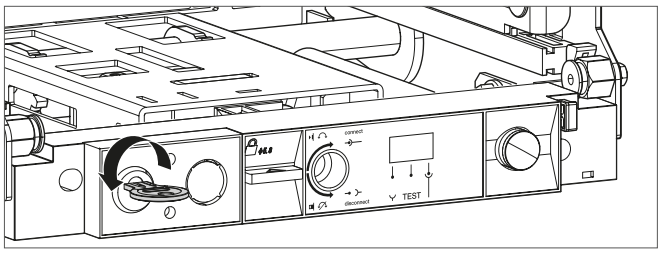
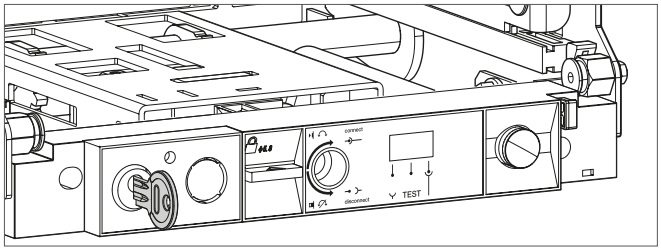
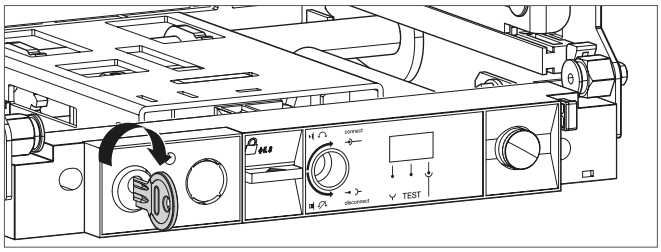
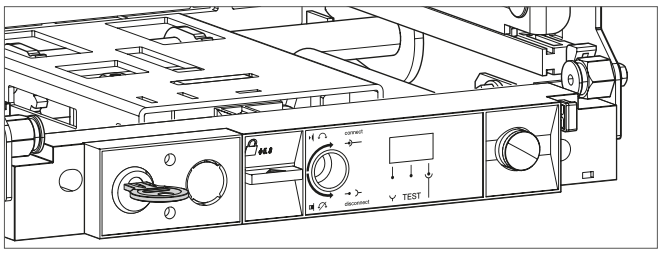
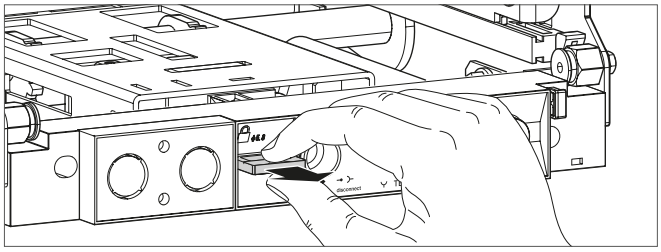
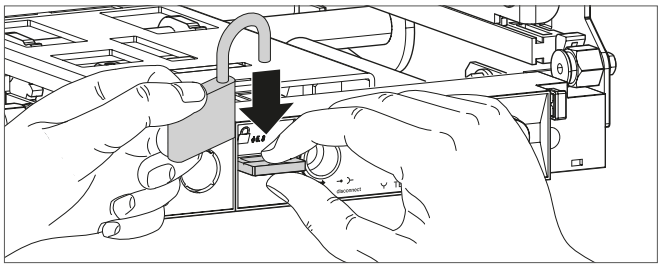
The upper and lower shutters can be locked to prevent their opening or the insertion of the circuit breaker in the connected position.

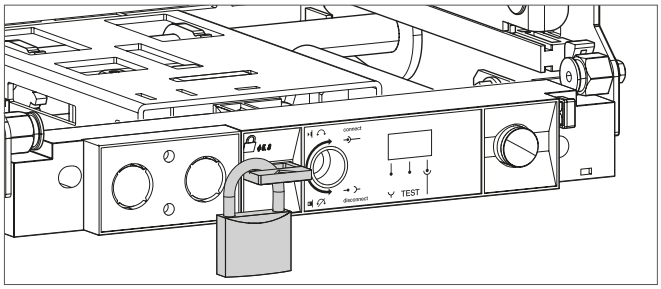
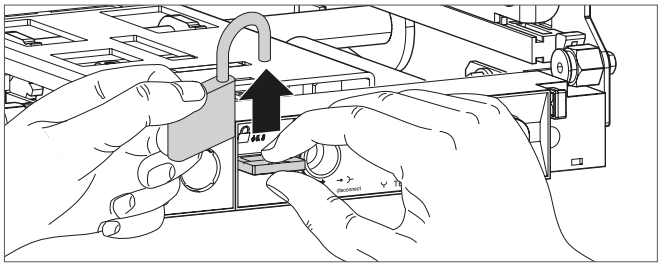
• Locking using the accessory in the chassis.

	Action	Illustration
1	Remove the locking accessory from the chassis and place it on the insulated safety shutter. Note that the accessory can be inserted from 2 sides by turning it through 180°.	
2	Lock the shutter with a padlock. Up to three Ø5-Ø8 mm padlocks can be installed.	

• Locking using the CL key locks or padlocking and position acknowledgement tab.

	Action	Illustration
1	Remove the circuit breaker from the chassis (see Chapter 09 Extracting the drawout circuit breaker).	
2	Put the circuit breaker in the connected position (see Chapters 8.3 Changing from the disconnected position to the test position and 8.4 Changing from the test position to the connected position).	

	Action	Illustration
3	Remove and stow away the racking handle.	
	Using the key lock, turn the key in the locking device in an anti-clockwise direction...	
	until it is in the vertical position.	
	To unlock the insulated safety shutters, turn the key clockwise...	
	to put it in the horizontal position.	
4	The insulating safety shutters can also be locked using the padlocking and position acknowledgement tab.	
	Pull on the tab...	
	position...	

	Action	Illustration
4	*(continued)* then close the padlock.	
	To unlock the insulated safety shutters, pull the tab and remove the padlock.	

To install this wrong insertion accessory, refer to the 6LE007878A manual.

The WIP wrong insertion preventer is used when several circuit breakers of the same model are installed in an electrical panel and are configured differently. To prevent any confusion, all the circuit breakers and their chassis must be coded in such a way that each circuit breaker can be racked in in its corresponding chassis.

It is composed of screws and pins which must be installed on the chassis and circuit breaker in one of the following 10 combinations:

Chassis	Circuit breaker	Chassis	Circuit breaker
123	DE	145	BC
124	CE	234	AE
125	CD	235	AD
134	BE	245	AC
135	BD	345	AB

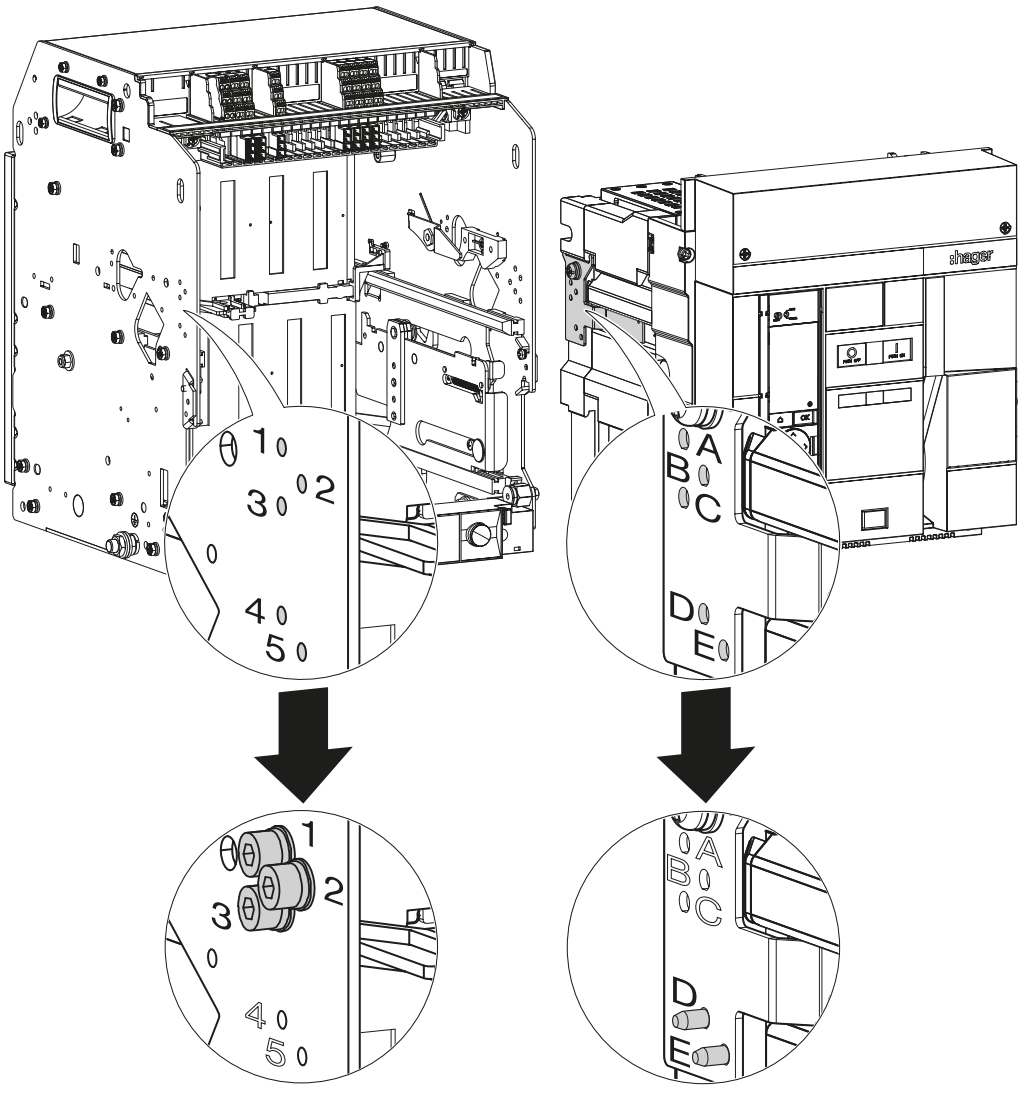
The combination chosen on the chassis must correspond to the combination of the circuit breaker in order for the 2 parts to be compatible.

On the chassis side, the wrong insertion preventer is numbered 1 to 5.

On the circuit breaker side, the wrong insertion preventers are marked A to D.

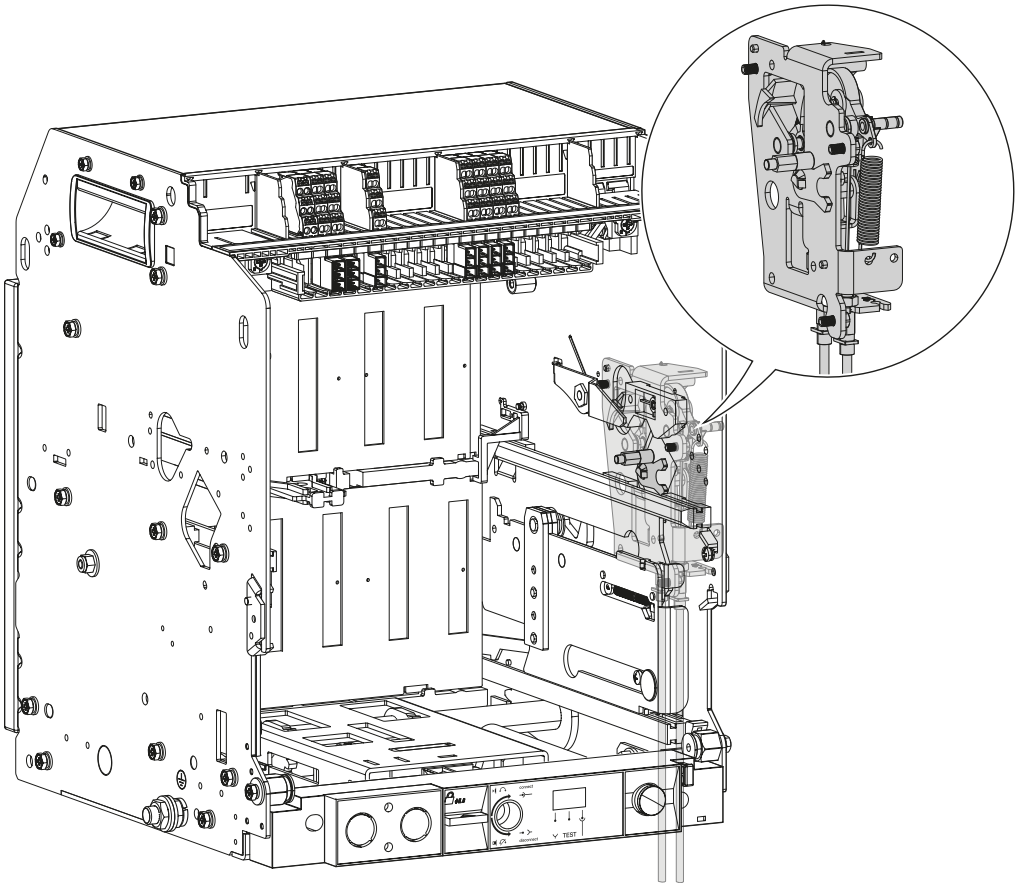
Example of installation with the combinations 123 and DE:

Chassis	Circuit breaker
123	DE



Refer to its installation manual for installation of this locking accessory.

The mechanical interlocking kit is used to interlock 2 to 3 circuit breakers installed vertically or horizontally in the electrical distribution board.



ATTENTION
For any mechanical interlocking installation, the following must be installed on the circuit breaker: - a CYC cycle counter, - a PBC push button cover.

Hager Electro SAS
132 Boulevard d'Europe
BP3
67210 OBERNAI CEDEX

www.hager.com

2024-04

6LE009206A