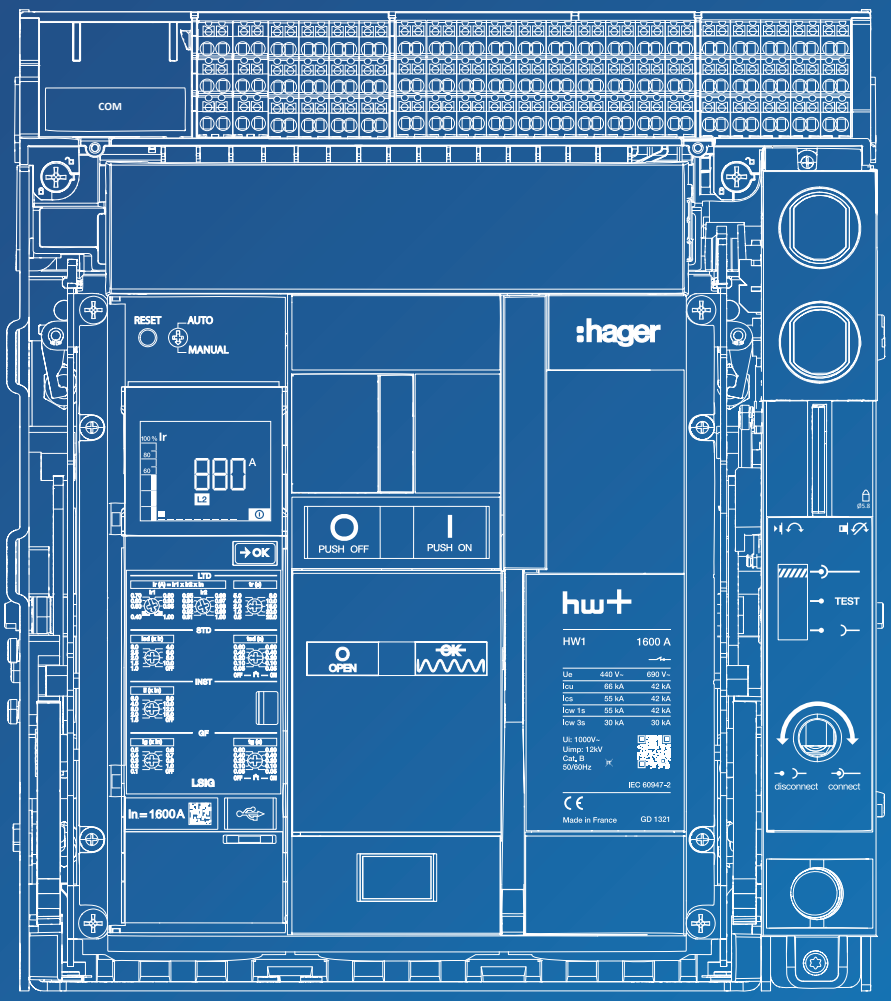
Technical catalogue

hw+

Air circuit breaker

up to 1600A



:hager

DISCLAIMER:
Whilst every effort has been made to ensure that the information is correct at the time of publication, Hager cannot guarantee the accuracy of all information contained in this document. Corrections and amendments, once verified, will be included in future editions.

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hw+ Presentation

The new generation of hager hw+ air circuit breakers and switch-disconnectors provide optimal protection against overloads, short circuits and earth faults in low voltage distribution.

Featuring a compact frame, available from 400 A to 1600 A with 3 or 4 poles and fixed or drawout versions, the hw+ provides high protection performance and a breaking capacity of up to 66 kA. The hw+ range offers flexible protection settings to adapt to all electrical distribution installations.

The hw+ range offers 2 product categories:

- circuit breakers: equipped with a sentinel electronic trip unit which protects against overloads, short circuits and earth faults,
- switch-disconnectors without electronic trip unit.

Overview of the circuit breaker and switch-disconnector range

Fixed version

3 poles

4 poles

drawout version

3 poles

4 poles

Accessories

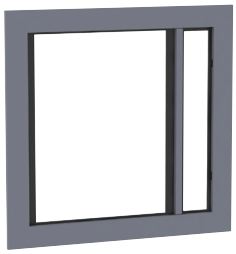
Control accessories

Signalling accessories

Interlocking accessories

Connection accessories

Protection accessories



sentinel electronic trip units

LI

LSI

LSIG

Integration in electrical distribution boards

These circuit breakers are generally used at the head of the low voltage distribution system.

The hw+ range also integrates well into Unimes, Univers and Quadro distribution board systems.

The hw+ range offers several advantages

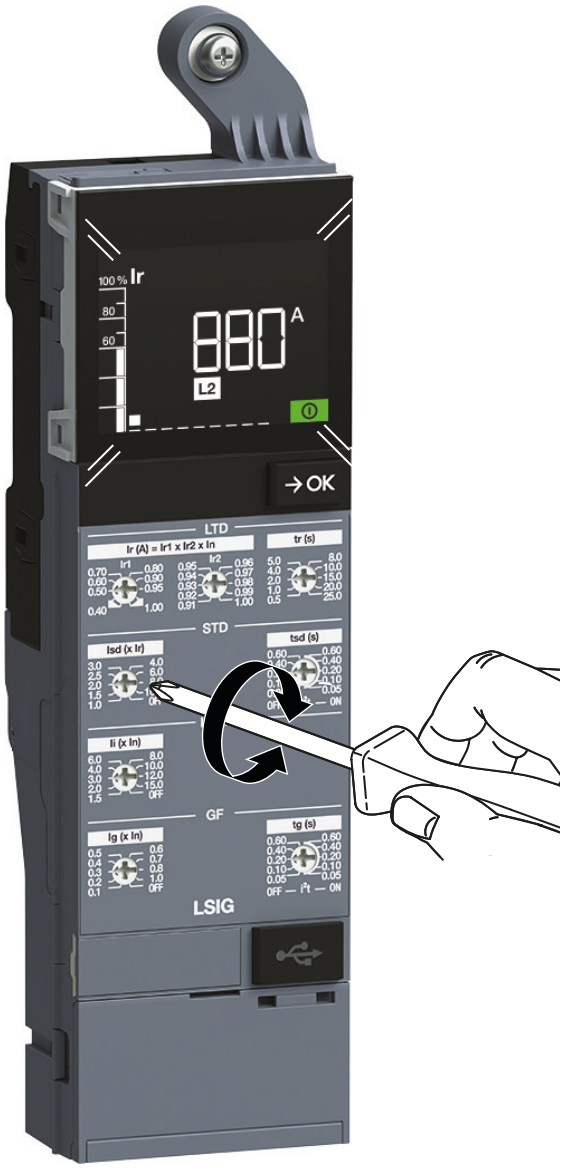
Dynamic and intelligent display

The sentinel electronic trip unit is equipped with an LCD display which simplifies adjustment of the protection settings, control of the installation as well as its maintenance.

Live display of setting values

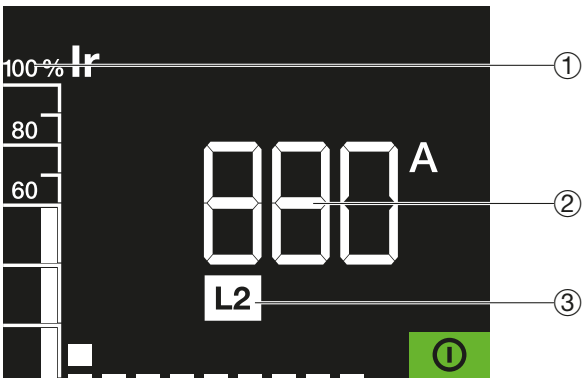
The LCD display gives a precise indication of the setting values entered in amps and seconds.

Its high contrast allows easy reading of the settings whether in a dark or bright environment.



Dynamic load display

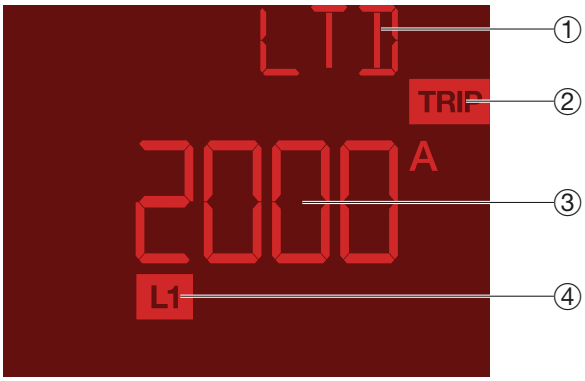
The main screen displays the maximum current flowing through the circuit breaker for the phase concerned.



1. Value of the current flowing through the circuit breaker as % of Ir
2. Value of the current flowing through the circuit breaker
3. Relevant phase

Identification of the trip cause

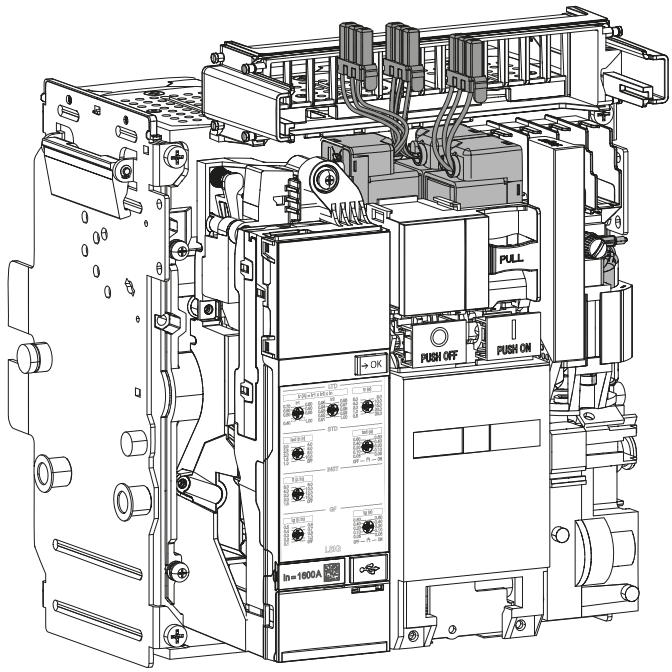
This reports the causes of tripping of the circuit breakers:



1. Trip cause
2. Trip icon
3. Fault current value
4. Phase concerned

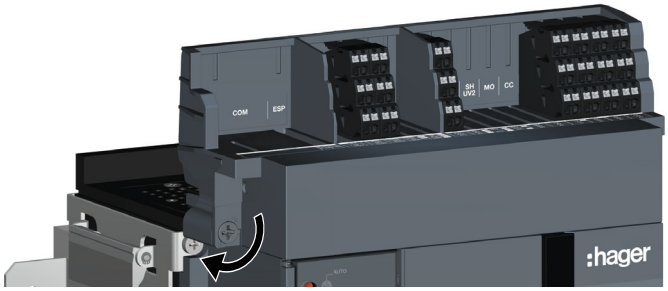
Settings viewable at all times

The OK button on the electronic trip unit allows switching between screens displaying all possible settings of the electronic trip unit.



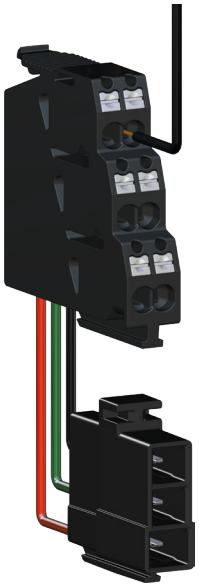
Quick and secure fitting of coils

Thanks to a patented lock system the opening and closing coils can be installed without tools and stay firmly in place.



Quick access to the connection terminal block

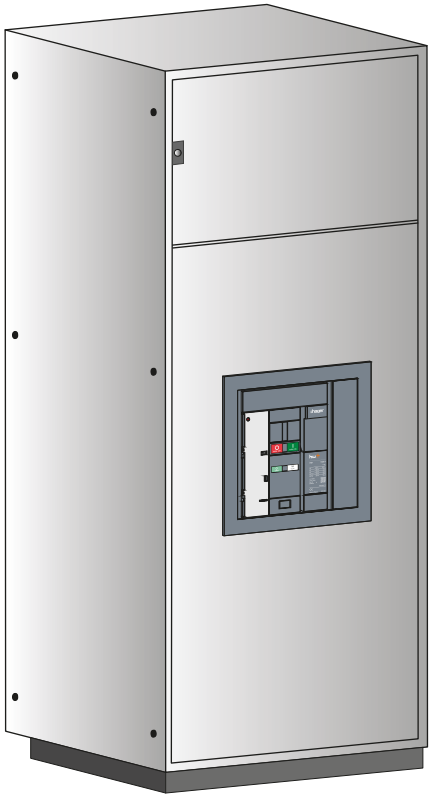
To access the connection terminal block for the various auxiliaries, just turn the screw on the terminal block cover through a quarter turn.



QuickConnect system for faster wiring of accessories

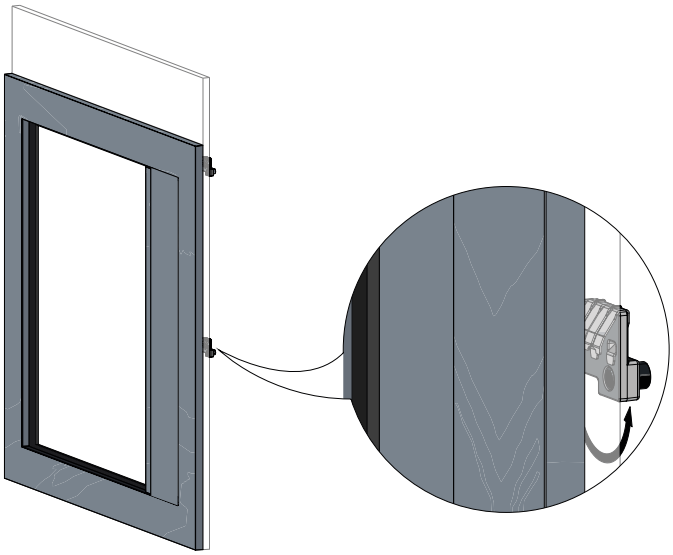
A connection terminal block is available to connect the various accessories to the circuit breaker. These connections are made with the QuickConnect feature.

- saves time: thanks to the QuickConnect technology, wiring is quick, easy and tool-free
- safer: cable connection is ensured.
- test point: used to check for the presence of voltage with a voltmeter.
- cable disconnection: the plug-in terminal can be released quickly and easily with a screwdriver.



Quick-to-mount door frame (DF)

The door frame of the hw+ range includes clamps at the back, enabling quick, tool-free installation.



Quick and easy installation of the key locks

The installation of key locks on the front of the circuit breaker is very easy. A single screw is enough to mount the OFF Locking Key (OLK) accessory on the front of the circuit breaker.

This accessory is used to lock the OFF Button or to have an interlocking between several circuit breakers.

This function can also be achieved using padlocks (1 to 3 locks) by installing the OFF Locking Padlock (OLP) accessory on the front of the circuit breaker.

The chassis position locking system (CL), which is located on the chassis, offers the possibility of installing up to 2 cylindrical key locks.

Its easy installation saves time when fitting the locks.

This accessory can be used to lock the circuit breaker (moving part) in Connected, Test or Disconnected position inside its chassis.

Locking can also be done using 1 to 3 padlocks with the tab located below.

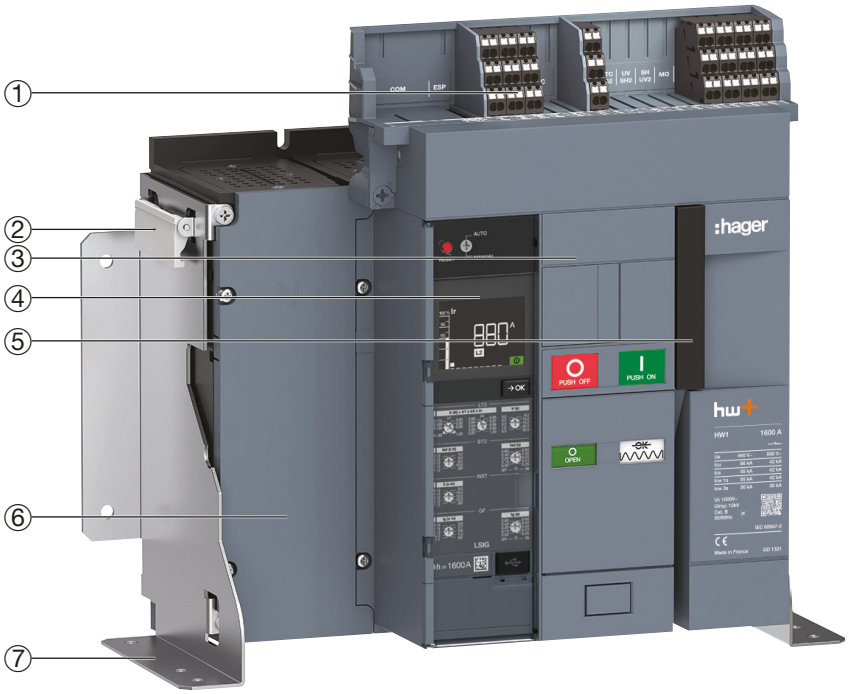
OAC output alarm contact module

The OAC output alarms contacts module has 5 dedicated output contacts.

It integrates fully into the terminal block and does not require any external terminal.

It allows signalling of the following alarms to be transferred locally:
- LTD tripping,
- STD/INST/MCR tripping,
- GF tripping,
- overload pre-alarm,
- tripping due to a critical system alarm.

General overview

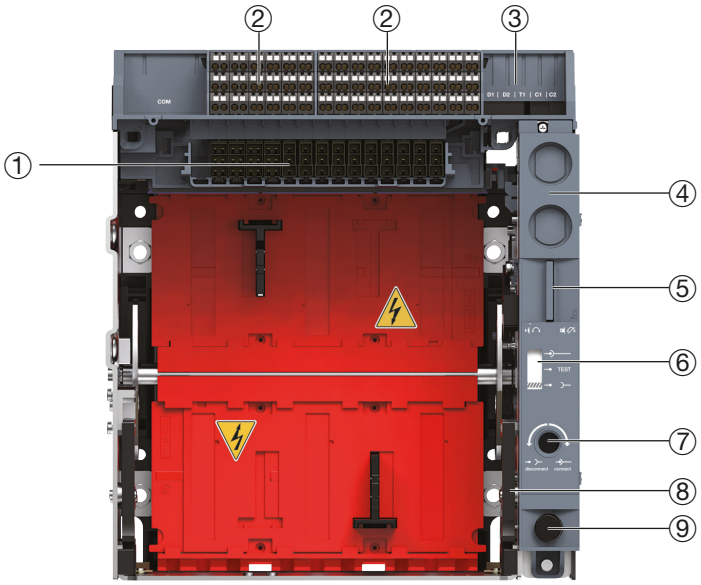


Example of a fixed type 4-pole circuit breaker

1. Terminal blocks TB
2. Lifting handle
3. Front cover
4. Electronic trip unit
5. Charging handle
6. Neutral pole position
7. Fastening plate

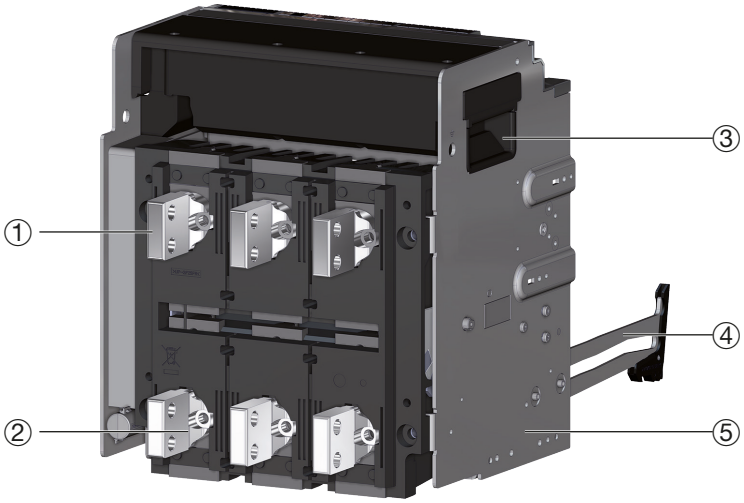
Example of a drawout type 3-pole circuit breaker outside its chassis

Front view of the chassis



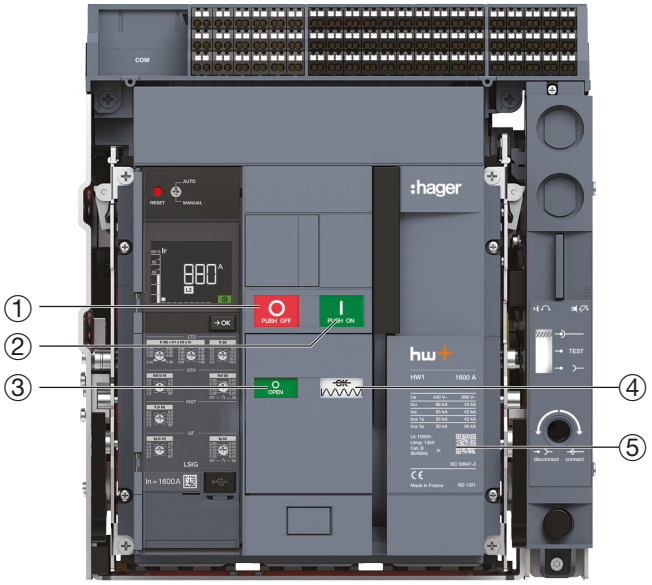
① Connection interface
② Terminal blocks TB
③ Slots for position contacts
④ Locking of the circuit breaker position using CL key locks
⑤ Locking of the circuit breaker by padlock in the Connected, Test or Disconnected position and position acknowledgement button
⑥ Position indicator
⑦ Place to insert the racking handle
⑧ Guide rail
⑨ Racking handle storage

Rear view of the chassis



① Top connection
② Bottom connection
③ Lifting handle
④ Guide rail
⑤ Side plate

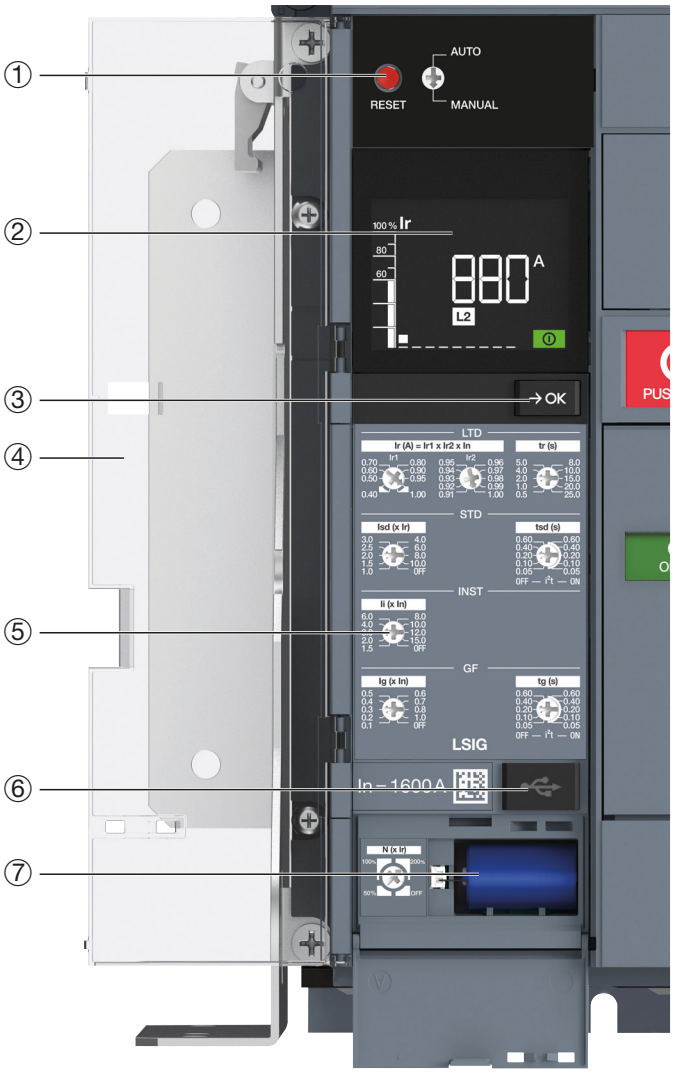
Front view of the circuit breaker



Example of a 3-pole drawout circuit breaker

① OFF push button
② ON push button
③ Contact opening and closing indicator
④ Charging spring status indicator
⑤ Nameplate

View of the sentinel electronic trip unit

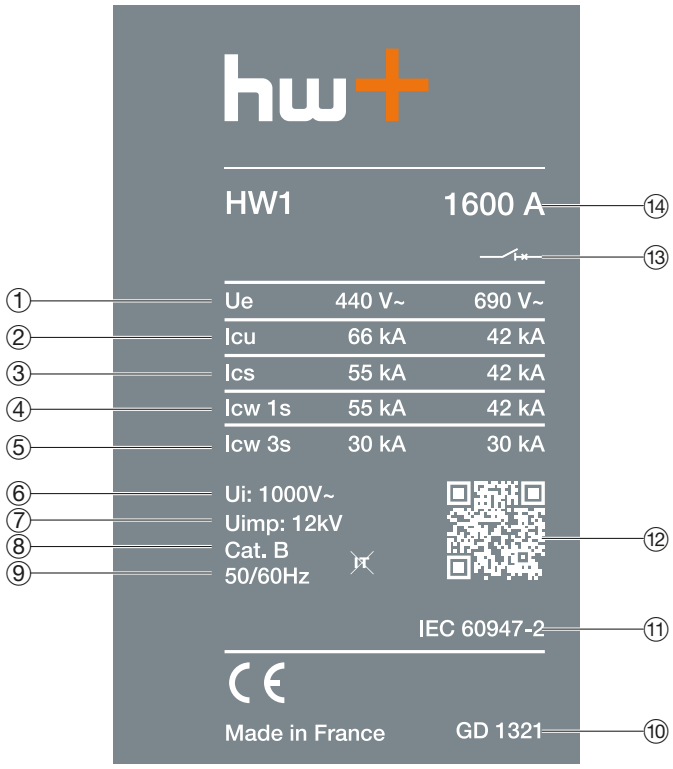


Example of a sentinel LSIG electronic trip unit

① RESET re-arm button
② LCD display
③ OK button
④ Trip unit cover
⑤ Settings dials
⑥ USB-C port
⑦ Backup battery

The RESET re-arm button configured in MANUAL is used to locally reset the circuit breaker after tripping. Configured in AUTO the circuit breaker is reset automatically after each tripping.

Circuit breaker characteristics (nameplate)



① Ue: Operating voltage

② ICU: Rated ultimate short-circuit breaking capacity at the rated operating voltage Ue

③ Ics: Service breaking capacity

④ Icw 1 s: Permissible current for 1 sec. at Ue rated operating voltage

⑤ Icw 3s: Permissible current for 3 sec. at Ue rated operating voltage

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 information about the circuit breaker

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

⑭ Maximum rating of the circuit breaker

Breaking capacity classification:

	ICU (380–440 V~)
N	42 kA
M	55 kA
E	66 kA

Compliant with standards

The hw+ 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

European standards:
- EN 60947-1: general rules
- EN 60947-2: circuit breakers
- EN 60947-3: switch-disconnectors
- EN 60947-5-1: control circuit devices and switching elements

National standards:
- China CCC, GB/T140248.2
- China CCC, GB/T140248.3
- China CCC, GB/T140248.1

Degree of pollution

hw+ circuit breakers are certified for operation in environments with a pollution degree level of 3 as defined by standard IEC 60947-1.

Ambient temperature

hw+ circuit breakers can be used at temperatures between -25 °C and 70 °C.
For ambient temperatures greater than 50 °C, the devices must be derated.

See Chapter “Installation and operating recommendations” on page 73.

hw+ circuit breakers must be operated under normal ambient temperature conditions.

The permissible storage temperature range in the original packaging is from -25 °C to 85 °C.

Electromagnetic interference

hw+ circuit breakers are protected against:
- Overvoltage caused by circuit switching, overvoltage caused by atmospheric disturbances or a breakdown in the distribution system.
- Devices emitting radio waves (walkie-talkies, radar, etc.).
- Electrostatic discharges produced directly by users.

The immunity levels comply with the following standards:
- IEC/EN 60947-2: Low-voltage switchgear and controlgear, Part 2: Circuit breakers.
- Appendix F 4.1: Harmonic currents.
- Appendix F 4.7: Current dips.
- Appendix B: Immunity tests for residual current protection

IEC/EN 61000-4-2: Electrostatic discharge immunity tests.
IEC/EN 61000-4-3: Radiated, radio-frequency, electromagnetic-field immunity tests
IEC/EN 61000-4-4: Electrical fast transient/burst immunity tests.
IEC/EN 61000-4-5: Surge immunity tests.
- IEC/EN 61000-4-6: Immunity tests for conducted disturbances induced by radio-frequency fields.
- CISPR 11: Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.

Selectivity

Selectivity is a coordination technique between protection devices enabling the downstream device to trip on overcurrent without tripping the upstream device. This improves the service continuity. The hw+ devices have the characteristics necessary to implement this technique.

Total selectivity

Selectivity is said to be total if it is provided for all levels of short circuit up to the breaking capacity of the downstream device.

Partial selectivity

Selectivity is partial if its value is less than the breaking capacity of the downstream device. This value is called the selectivity limit and is the short circuit value beyond which both circuit breakers are likely to trip simultaneously.

The selectivity tables are provided in a separate document.

Cascading

Cascading is a technique combining protection devices so as to be able to install circuit breakers which have a lower breaking capacity than the presumed short circuit level. This technique is based on the energy limiting capacity of the circuit breakers.
The tables of cascadings between the various devices are published in a separate document.

The different values of short-circuit currents between different cascadings of protection devices (ACB-MCCB-MCB) are given in coordination tables that are published in a separate document.

Suitable for isolation with positive contact indication

All hw+ circuit breakers are suitable for isolation as defined in standard IEC 60947-2
- The isolation position corresponds to the O (OFF) position.

The isolation function is certified by tests guaranteeing:
- The mechanical reliability of the position indication system,
- The absence of leakage currents,
- The capacity to withstand overvoltage between upstream and downstream connections.

Vibrations

hw+ circuit breakers withstand mechanical vibrations.
hw+ circuit breakers comply with standard IEC 60068-2-6:
- 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 tripping and/or damage to connections and/or mechanical parts.

Introduction to air circuit breakers functions

Air circuit breakers take their name from the fact that their arcing chambers operate at atmospheric pressure in air for better energy dissipation.

Characteristics of air circuit breakers

Rated current In (A)	This is the maximum value of current that the circuit breaker can permanently carry. This value is always stated for an ambient temperature (50 °C) in accordance with standard IEC 60947–2. If this temperature is higher, the operating current must be reduced.
Rated operational voltage Ue (V)	This is the voltage at which the circuit-breaker has been designed to operate, in normal operating conditions. The value provided is usually the maximum value.
Rated insulation voltage Ui (V)	This value indicates the isolation performance of the device. The dielectric test voltages (power frequency, impulse) are established based on this value.
Impulse withstand voltage Uimp (kV)	This value indicates the capacity of the device to withstand transient overvoltages such as lightning. It is expressed in kV peak (of a prescribed form and polarity).
Rated ultimate short-circuit breaking capacity Icu (kA)	This is the maximum short circuit current that a circuit breaker can break for a given voltage and power factor without being damaged. The tests are performed using the sequence O – t – CO. O represents an automatic tripping operation, t an interval of time and CO a closing operation followed by an automatic tripping operation. After the test, the circuit breaker must continue to provide a minimum level of safety (insulation, dielectric strength).
Rated service short-circuit breaking capacity Ics (kA)	This value is expressed in kA or as a percentage of Icu. The circuit breaker must be able to function normally after having cleared the Ics current three times according to the sequence O-t-CO-t-CO.
Rated short-time withstand current Icw (kA)	This is the short circuit current that a category B circuit breaker is able to withstand for a defined period of time without altering its characteristics. This value is intended to provide selectivity between upstream and downstream devices. The circuit breaker in question can remain closed while the fault is cleared by the downstream device.
Rated short-circuit making capacity Icm (kA peak)	This is the maximum current value that a device can establish at its rated voltage under standard conditions. Devices without protection functions, such as switches, must be able to withstand short circuit currents for a defined period of time to perform together with other associated protection devices.

hw+ air circuit breaker characteristics

Common data

Rated operational voltage	Ue	(V AC - 50/60 Hz)	690
Rated insulation voltage	Ui	(V)	1000
Rated impulse withstand voltage	Uimp	(kV)	12
Number of poles			3 / 4
Versions			Fixed / drawout
Normative compliance			IEC 60947-2

Rated current

Reference	**In (A)**	**Compatible rating plugs (A)**
HW1xx**04**...	400	400
HW1xx**06**...	630	400 to 630
HW1xx**08**...	800	400 to 800
HW1xx**10**...	1000	400 to 1000
HW1xx**12**...	1250	400 to 1250
HW1xx**16**...	1600	400 to 1600

Breaking capacity

Reference			HW1**N**...	HW1**M**...	HW1**E**...
Rated ultimate short-circuit breaking capacity (kA)	Icu	380-415 V AC	42	55	66
		440 V AC	42	55	66
		500-525 V AC	42	42	42
		690 V AC	42	42	42
Rated service short-circuit breaking capacity	Ics	% Icu	100	100	100(1)
Short-time withstand current rating capacity (kA)	Icw	1s - 400 V AC	42	55	55
		3s - 400 V AC	-	24	30
Rated short-circuit making capacity (kA peak)	Icm	380-415 V AC	88	121	145
		440 V AC	88	121	145
		500-525 V AC	88	88	88
		690 V AC	88	88	88
Selectivity category (in accordance with IEC 60947-2)			B	B	B

(1) Ics: 55 kA for voltages 380 to 440 V

Endurance

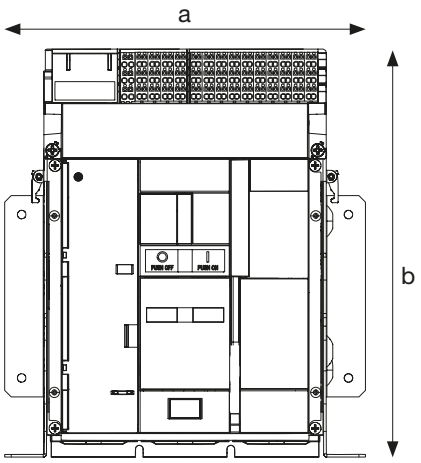
Mechanical endurance (cycles x 1000)	With maintenance	12.5	12.5	12.5
Electrical endurance (cycles x 1000)		6	6	6

Weight (kg)	3 poles	4 poles
Fixed version (without accessories)	14	18
drawout version without chassis (without accessories)	15	19
chassis alone (without accessories)	13	15

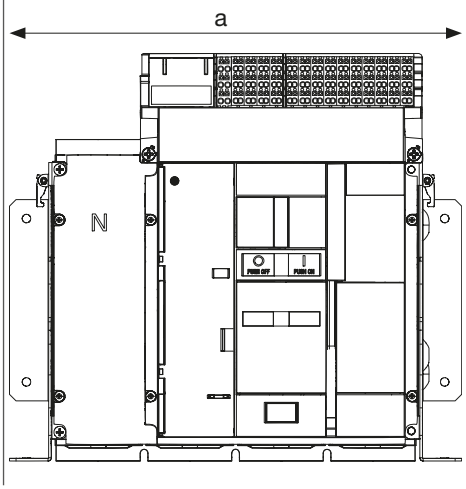
Dimensions (max. value in mm)		3 poles	4 poles
Width a	fixed version	276	346
	drawout version	284	349
Height b	fixed version	313	313
	drawout version	322	322
Depth c with connections	fixed version	227	227
	drawout version	328	328
Depth of connections		49	49

Fixed version

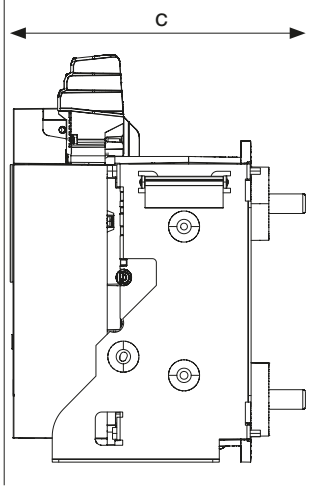
3 poles



4 poles

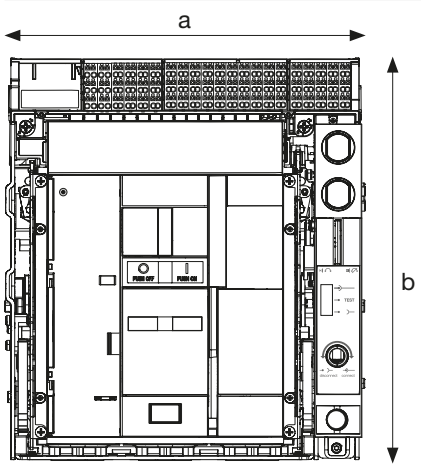


3 / 4 poles

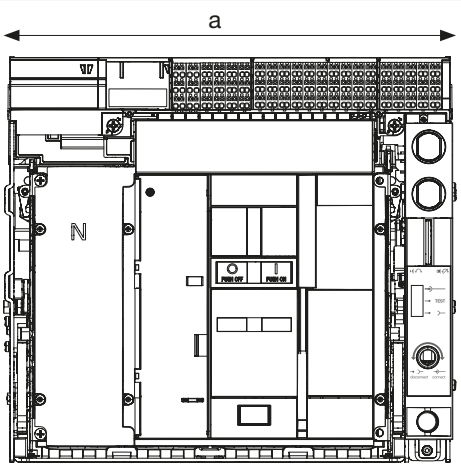


drawout version

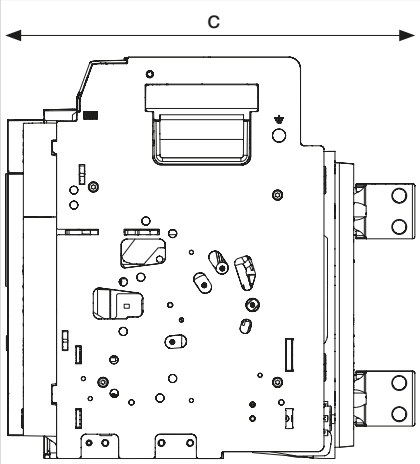
3 poles



4 poles



3 / 4 poles



Configuration and referencing

Order your Hager air circuit breaker via the Hagercad configurator

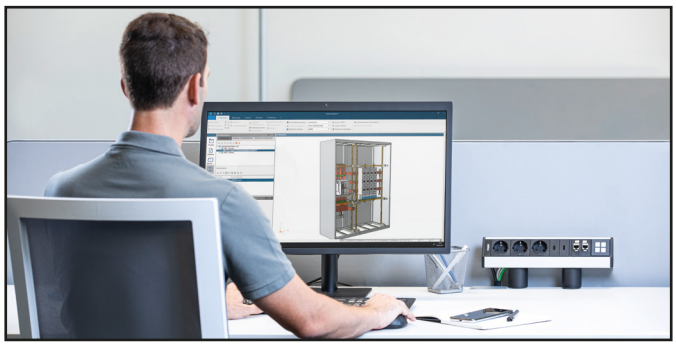
Whatever the size of your project (commercial buildings, public infrastructure), save time with the Hagercad configurator to generate your list of equipment, your connecting diagram, enclosure drawings and commercial quote.

Fast, comprehensive and smart, Hagercad is the essential tool to configure your air circuit breaker:

Fast: You have clear visibility over your projects and the products used.

Comprehensive: all the characteristics (breaking capacity, rated current, type of electronic trip unit, etc.) for your air circuit breaker can be selected based on your needs.

Intelligent: No more risk of errors, the software checks your installation according to standard IEC 61439.
For all of this:
1/ Visit your local Hager website for more information.



2/ Configure the air circuit breaker according to your needs.

HW1 web configurator
The HW1 web configurator allows easy configuration of the HW1 circuit breaker according to the installation requirements.
It allows the characteristics of the circuit breaker to be chosen, the trip unit type, accessories for control, signalling, interlocking, etc.

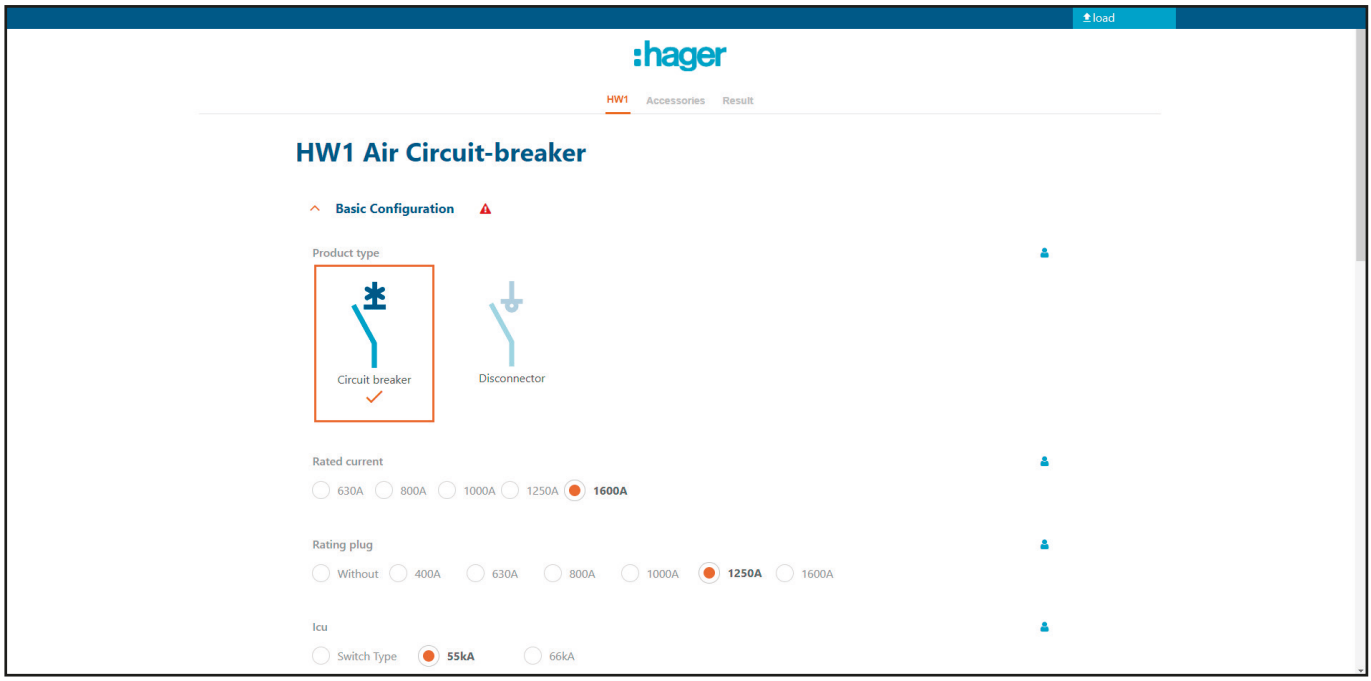
Interface and configuration rules
Thanks to its user-friendly, intuitive interface, selecting components and accessories is quick.

The cascading rules save time when selecting and validating the final configuration.

A new configuration can be created or edited in different ways:

- Following the steps on the form
- Using a **Product Code** configuration identifier
- By reusing a saved configuration.

To start using the **HW1 Web Configurator** visit your local Hager website.



HW1 web configurator

At the end of the process, an identification code corresponding to the configuration of your circuit breaker is created. This code is specific to the characteristics you have determined. Below are the first characters of this codification:

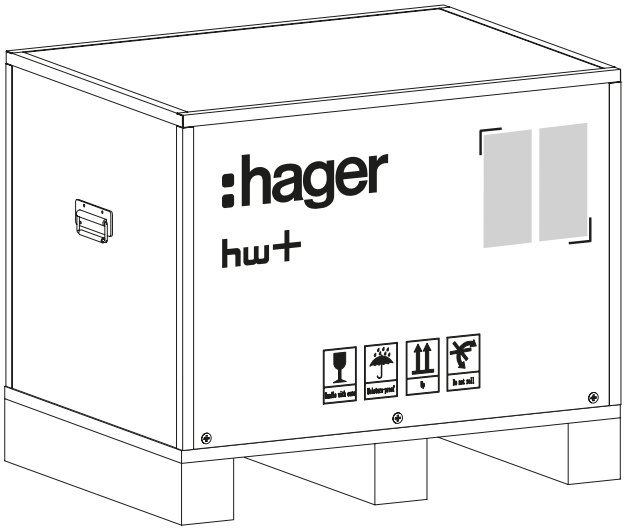
		H W 1	X	X	XX	X	X
Breaking capacity	42 kA		N				
	55 kA		M				
	66 kA		E				
	Switch-disconnector		W				
Number of poles	3 poles			3			
	4 poles			4			
Rated current	400 A				04		
	630 A				06		
	800 A				08		
	1,000 A				10		
	1,250 A				12		
	1,600 A				16		
Model	Drawout					D	
	Fixed					F	
Trip unit type	Without trip unit (Switch-disconnector)						S
	sentinel LI, LSI or LSIG						B

This gives a unique identification code of the type:
HW1M310DB XXXXX XXXXX XXXXXX XXXX
This is the image of your circuit breaker and will facilitate your communication with Hager and product identification:

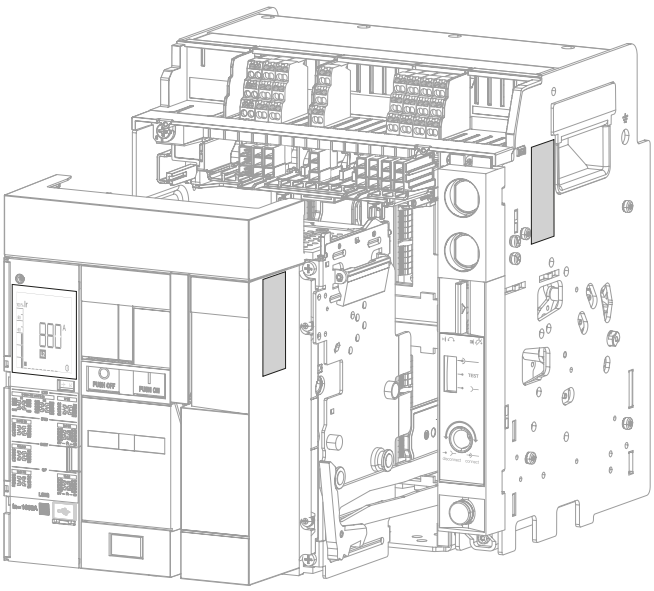
- If you want an identical circuit breaker, just provide your code with you next order
- If you want to know the configuration of a circuit breaker, note its code and refer to the referencing rule provided above.

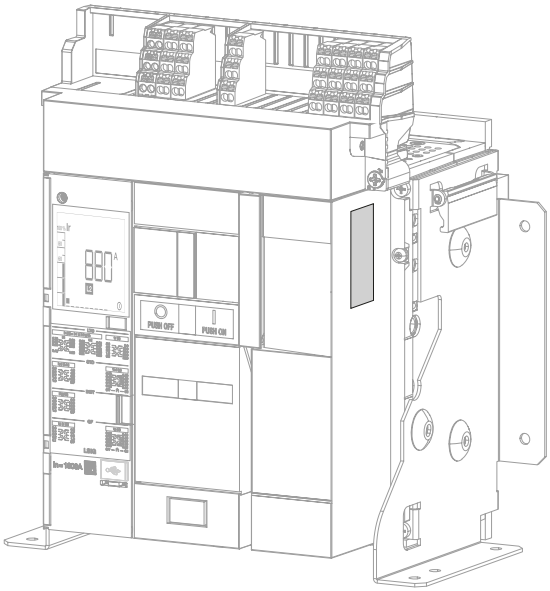
You can find it:

On the packaging labels:



On the side of the circuit breaker:





The Hager Power setup software has been designed for testing and commissioning hw+ trip units.

Thanks to the commissioning menu, it is possible to specifically generate a commissioning report proving that the protection settings comply with the short-circuit and selectivity calculations. This requires the settings to be imported from the Hagercad software.

It offers a smart way of creating the protection settings. It also allows all the trip unit parameter settings to be displayed and modified.

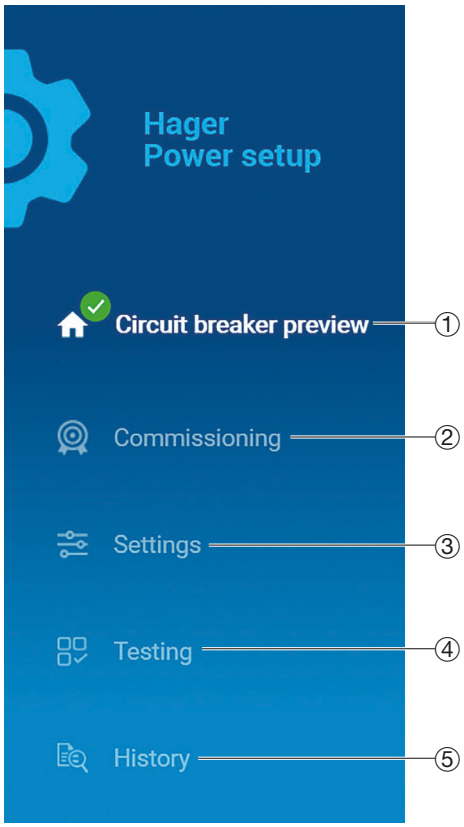
It is possible to perform a test of the hw+ circuit breakers tripping curve.

It also allows a forced electro-mechanical tripping of the circuit breakers to be performed.

It is very useful during the test phase when wiring the output contacts. It makes it possible to force the opening or closing of the OAC and ZSI output contacts.

The result of the different tests can be entered into a test report that can be generated at any time whether in the wiring workshop or during acceptance tests on site.

The functions of the Hager Power setup software can be accessed through five menus:



① Functional state of the circuit breaker, maintenance information and principal technical characteristics.

② Three-stage procedure 1. Setting, 2. Test, 3. Tripping, to commission the circuit breaker using settings data imported from the Hagercad software. Allows a commissioning report to be generated.

③ Access to all the parameter settings of the trip unit.

④ Access to the tripping curve of the manual test, the forced electro-mechanical tripping and activation of the output contacts available on the circuit breaker. Allows a test report to be generated.

⑤ Access to event history.
Display of active alarms.
Operating counters panel.

Principal functions

- Display the functional state of the circuit breaker, maintenance information and principal technical characteristics.
- Perform a commissioning or enter assisted settings by importing settings from Hagercad.
- Generate and print test reports and commissioning reports.
- Perform a manual test of the tripping curve of the hw+ circuit breakers.
- Perform a forced electro-mechanical tripping of the circuit breakers.
- Display and modify all the electronic trip unit parameter settings.
- Display alarms in progress.
- Download and export the electronic trip unit settings in a file in CSV format.
- Save the settings of a circuit breaker from within the Energy family to load them into one or more similar circuit breakers.
- Force the opening or closing of the OAC and ZSI output contacts.
- Display the active alarms.
- View the event logs and export them in a file in CSV format.
- Display the status of the operating counters available (handling cycles, tripping operations...).

The Hager Power setup software is available on the Hager website for your country.

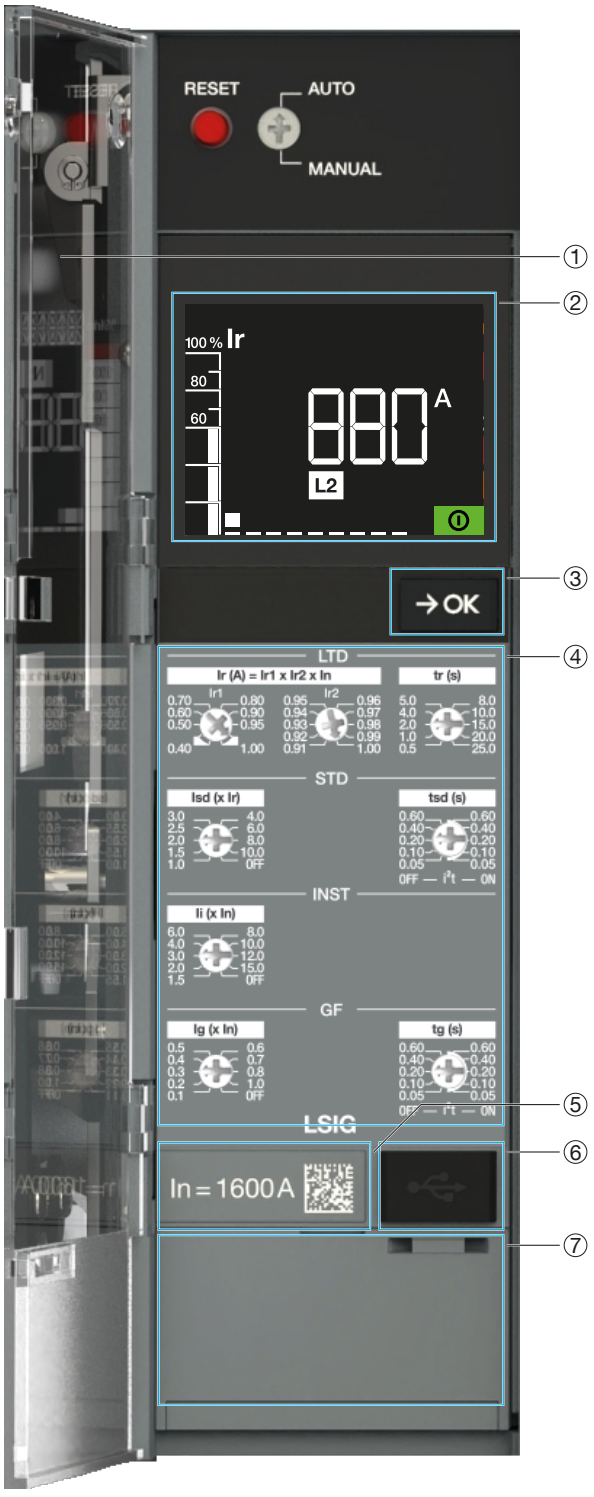
IT configuration required

	Minimal	Recommended
Operating system	Windows 10 x32 bits	Windows 10 x64 bits
Memory	4 Gb RAM	8 Gb RAM
Disk space	50 Mb	50 Mb
Components	Microsoft .NET Framework 4.7.2 .NET Core Runtime 3.1.13 .NET Desktop Runtime 3.1.13 Microsoft web view 2 v1.0.818.14	Microsoft .NET Framework 4.7.2 or higher .NET Core Runtime 3.1.13 or higher .NET Desktop Runtime 3.1.13 or higher Microsoft web view 2 v1.0.818.14 or higher
Resolution	1024x768 pixels	1280x1024 pixels

hw+ range of sentinel electronic trip units

hw+ air circuit breakers are equipped with a sentinel electronic trip unit to protect against overloads, short circuits and earth faults. It has a display and dials enabling the user to configure the protection settings and monitor its correct operation.

The following characteristics are common to all the versions of the sentinel electronic trip units:



① Transparent cover protecting access to the sentinel electronic trip unit settings (sealable).

② LCD display.

③ Button →OK which can be used:
- to acknowledge and clear an alarm after tripping,
- to navigate through the different screens of the display.

④ Settings dials of the sentinel electronic trip unit.

⑤ Rated current value In of the air circuit breaker. This value is limited by the rating plug fitted on the electronic trip unit.

⑥ USB-C port to connect an external battery.
This USB-C port is also used to connect to computers equipped with the Hager Power setup commissioning and test software.

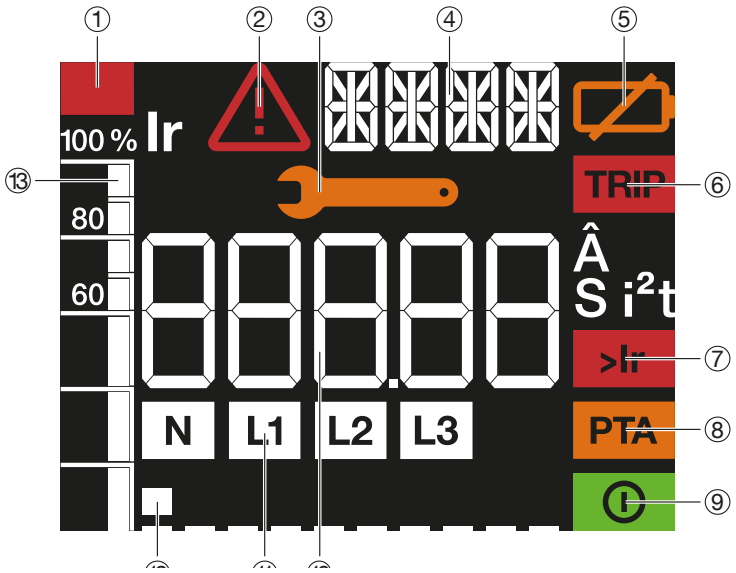
⑦ Back-up battery compartment.
The backup battery powers the display after electrical tripping.
This enables the display to signal the tripping and its cause.

This icon lights up on the display when the battery needs to be replaced.
The setting dial for neutral protection is located behind this cover.

ATTENTION

To guarantee that the electronic trip unit functions well, it is recommended that a 24V DC SELV external power supply be connected (recommended product reference hager HTG911H) to the TU terminal block.
Without this external power supply, the electronic trip unit requires the presence of a minimum current of 120 A on one phase or 80 A per phase to provide its protection functions.

Description of the LCD display
sentinel electronic trip units are equipped with an LCD display that makes it easy to adjust the settings and read the cause of the tripping of hw+ circuit breakers.



1. **Overload indicator**: shows when the current exceeds 105% of Ir.
2. **Error indicator**: displays when an error is detected.
3. **Maintenance indicator**: displays when a maintenance intervention is required.
4. **Text display area**: displays the type of the protection parameter during setting or after a trip as well as the error codes of detected operating system alarms.
5. **Battery weak or absent indicator**: displays when it is necessary to change the back-up battery of the electronic trip unit or when it is not connected.
6. **Trip indicator**: allows the cause of the tripping to be identified precisely using the numerical display area, the text display area and the phase display.
7. **Overload indicator**: flashes when the current exceeds 105 % of Ir and is constant when above 112.5 % of Ir.
8. **Overload pre-alarm indicator**:provides an alert when there is an imminent risk of tripping.
9. **ReadyToProtect indicator**: displays when the trip unit is operational and ready to protect.
10. **Numerical display area**: allows the values of the different settings to be displayed directly and also indicates what the trip value was for the following units.

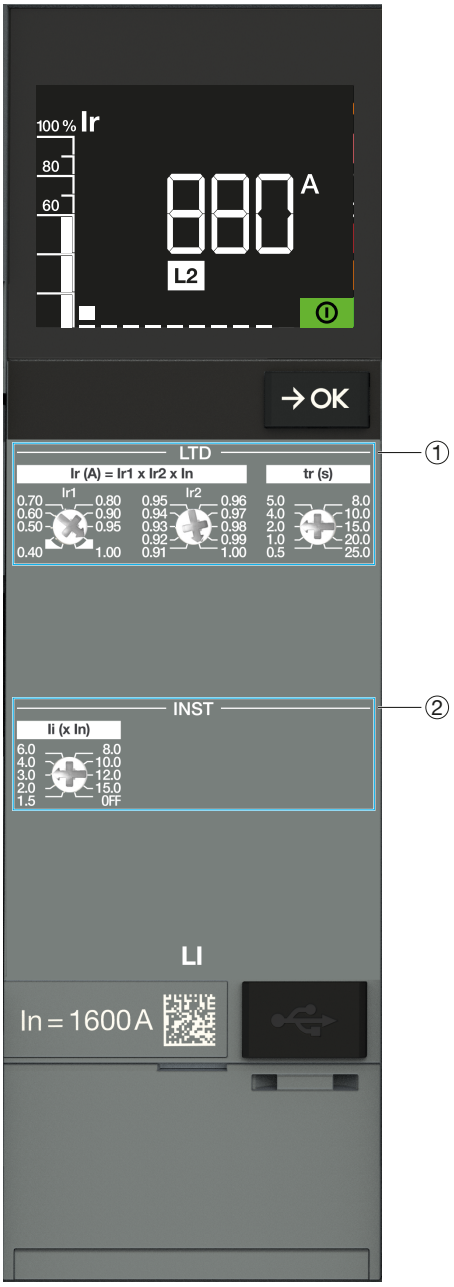
A	Ampere
Â	Peak current
S	Second
I^2t	I^2t curve

Also displays the codes of the critical system alarms.

11. **Phase display**: Neutral on the left / Phase L1 / Phase L2 / Phase L3.
12. **Marker screen**: shows the number of screens in the trip unit as well as its position in the display order.
13. **Bar graph**: displays the currents read on the most heavily loaded phase L1, L2 and L3 as a percentage of the setting Ir.

There are 3 versions of the sentinel electronic trip unit : **LI**, **LSI** and **LSIG**

LI sentinel trip unit
The LI sentinel trip unit is used to protect long cable lines where the rated fault current is limited due to the impedance of the cable.
The dials are accessible from the front of the electronic trip unit, allowing precise setting of the protection settings. The protection set in this way is independent of the ambient temperature.



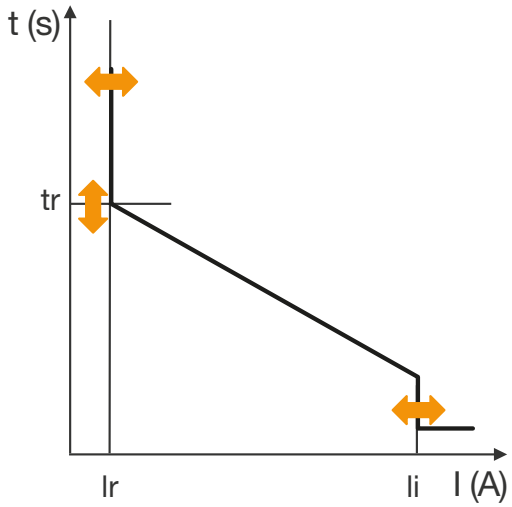
① **LTD Long Time Delay protection**
The long time delay curve offers overload protection.
Fine setting of Ir (A) is done using two dials Ir1 and Ir2.
The time delay tr (s) can be set using a dial from 0.5 to 25 s.

② **INST Instantaneous protection**
The Instantaneous protection against short-circuits Ii (x In) can be set using a dial from 1.5 to 15 times the rated current value In.
This protection can also be deactivated (OFF).

Neutral protection N
This protection is factory-installed on 4P circuit breakers and as an option with the addition of the ENCT external neutral sensor on 3P versions. It is necessary if the neutral conductor cross section is less than that of the phases, or if the neutral conductor is heavily loaded (for example, in office buildings). It uses the Long time delay, Short time delay and Instantaneous protection parameters.

LI sentinel trip unit

LI



Rated current In

	In at 50 °C	400 A	630 A	800 A	1000 A	1250 A	1600 A

Long Time Delay protection L (ANSI 49)

Ir (tripping threshold between 1.05 and 1.20 x Ir)		
Ir1		0.40 - 0.50 - 0.60 - 0.70 - 0.80 - 0.90 - 0.95 - 1.00
Ir2		0.91 - 0.92 - 0.93 - 0.94 - 0.95 - 0.96 - 0.97 - 0.98 - 0.99 - 1.00
Ir (A) = Ir1 x Ir2 x In		0.364 x In ... 1 x In
	In = 400 A	145.6 - 400 A
	In = 630 A	229.3 - 630 A
	In = 800 A	291.2 - 800 A
	In = 1000 A	364 - 1000 A
	In = 1250 A	455 - 1250 A
	In = 1600 A	582.4 - 1600 A
Time delay (s)	tr	0.5 - 1.0 - 2.0 - 4.0 - 5.0 - 8.0 - 10 - 15.0 - 20.0 - 25.0
	accuracy	0 % to -20 %

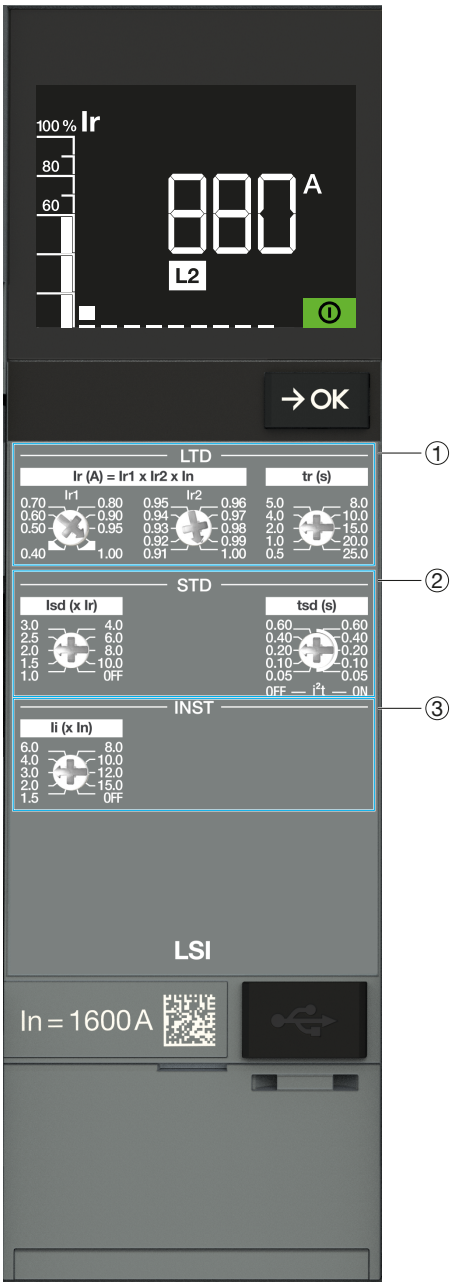
Instantaneous Protection INST (ANSI 50)

Ii = In x ...		OFF - 1.5 - 2.0 - 3.0 - 4.0 - 6.0 - 8.0 - 10.0 - 12.0 - 15.0
	accuracy	+/- 15 %
Tripping time (ms)		> 20
Maximum breaking time (ms)		≤ 80

Neutral protection N

	Neutral protection = Phase protection Ir x ...	OFF - 50 % - 100 % - 200 %
	Instantaneous protection	same as phases
	Time delay	same as phases for tr and instantaneous

LSI sentinel trip unit
The LSI sentinel trip unit is used to protect cables lines and equipment requiring a wide variety of protection settings. The dials are accessible from the front of the hw+ circuit breakers, allowing precise setting of the protection settings. The protection set in this way is independent of the ambient temperature.



① **LTD Long Time Delay protection**
The long time delay curve offers overload protection.
Fine setting of Ir (A) is done using two dials Ir1 and Ir2.
The time delay tr (s) can be set using a dial from 0.5 to 25 s.

② **STD Short Time Delay Protection**
Short Time Delay protection is for short-circuits. The Isd (x Ir) current can be set using a dial from 1 to 10 times the protection of the Ir Long Time Delay protection of the circuit breaker.
This protection can also be deactivated (OFF).
Time delay tsd (s) can be set via a dial from 50 to 600 ms with the possibility of including an inverse time curve (I^2t OFF or ON).

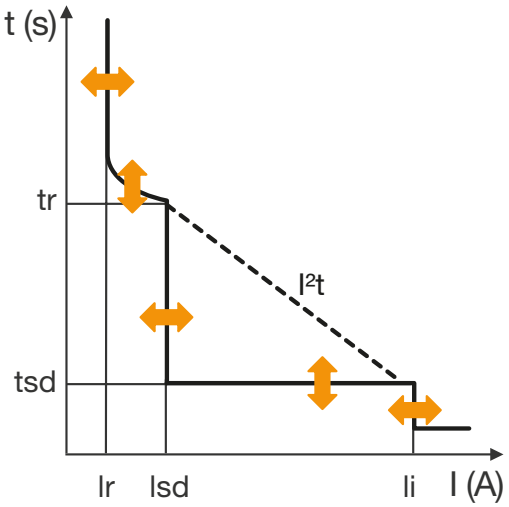
③ **INST Instantaneous protection**
The Instantaneous protection against short-circuits Ii (x In) can be set using a dial from 1.5 to 15 times the rated current value In.
This protection can also be deactivated (OFF).

Neutral protection N
Neutral protection is factory-installed on 4P circuit breakers and as an option with the addition of the ENCT external neutral sensor on 3P versions. It is necessary if the neutral conductor cross section is less than that of the phases, or if the neutral conductor is heavily loaded (for example, in office buildings).
It uses the long time delay, short time delay and instantaneous protection settings.

Zone Selective Interlocking (ZSI)
Zone Selectivity (ZSI) is available on LSI sentinel trip units. It can be used for short time delay protection (ZSI STD). The function is activated using the Hager Power setup test and commissioning software.

LSI sentinel trip unit

LSI



Rated current In

	In at 50 °C	400A	630A	800A	1000A	1250A	1600A

Long Time Delay protection L (ANSI 49)

Ir (tripping threshold between 1.05 and 1.20 x Ir)		
Ir1		0.40 - 0.50 - 0.60 - 0.70 - 0.80 - 0.90 - 0.95 - 1.00
Ir2		0.91 - 0.92 - 0.93 - 0.94 - 0.95 - 0.96 - 0.97 - 0.98 - 0.99 - 1.00
Ir (A) = Ir1 x Ir2 x In		0.364 x In … 1 x In
	In = 400 A	145.6 - 400 A
	In = 630 A	229.3 - 630 A
	In = 800 A	291.2 - 800 A
	In = 1000 A	364 - 1000 A
	In = 1250 A	455 - 1250 A
	In = 1600 A	582.4 - 1600 A
Time delay (s)	tr	0.5 - 1.0 - 2.0 - 4.0 - 5.0 - 8.0 - 10 - 15.0 - 20.0 - 25.0
	accuracy	0 % to -20 %

Short Time Delay protection STD (ANSI 50TD/51)

Isd = Ir x …			OFF - 1.0 - 1.5 - 2.0 - 2.5 - 3.0 - 4.0 - 6.0 - 8.0 - 10.0				
	accuracy		+/- 10 %				
Time delay (s)		tsd I²t OFF	0.05	0.10	0.20	0.40	0.60
		tsd I²t ON	0.05	0.10	0.20	0.40	0.60
Non-tripping time (s)			0.025	0.075	0.175	0.375	0.575
Maximum breaking time (s)			0.12	0.17	0.27	0.47	0.67

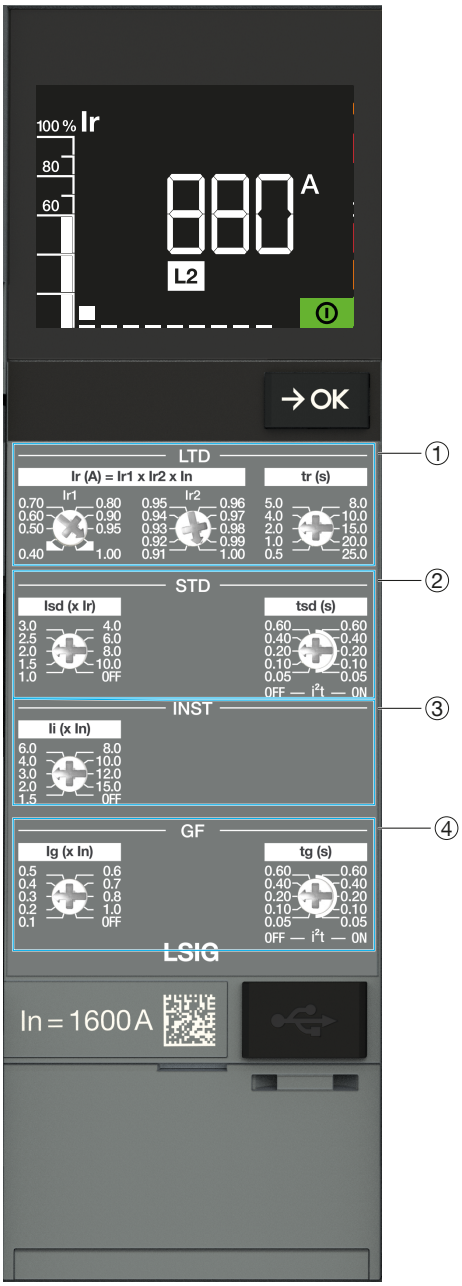
Instantaneous Protection INST (ANSI 50)

Ii = In x …		OFF - 1.5 - 2.0 - 3.0 - 4.0 - 6.0 - 8.0 - 10.0 - 12.0 - 15.0
	accuracy	+/- 15 %
Tripping time (ms)		> 20
Maximum breaking time (ms)		≤ 80

Neutral protection N

	Neutral protection = Phase protection Ir x … Phase protection Isd x …	OFF - 50 % - 100 % - 200 %
	Instantaneous protection	same as phases
	Time delay	same as phases for tr and instantaneous

LSIG sentinel trip unit
The LSIG sentinel trip unit is used to protect cable lines and equipment in case of TN earthing system where earth fault protection is required.
The dials are accessible from the front of the hw+ circuit breakers, allowing precise setting of the protection settings.
The protection adjusted in this way is independent of the ambient temperature.



① **LTD Long Time Delay protection**
The long time delay curve offers overload protection.
Fine setting of Ir (A) is done using two dials Ir1 and Ir2.
The time delay tr(s) can be set via a dial from 0.5 to 25 s.

② **STD Short Time Delay Protection**
Short Time Delay protection is for short-circuits. The Isd (x Ir) current can be adjusted using a dial from 1 to 10 times the protection of the Ir Long Time Delay protection of the circuit breaker.
This protection can also be deactivated (OFF).
Time delay tsd(s) is adjustable via a dial from 50 to 600 ms with the possibility of including an inverse time curve (I^2t OFF or ON).

③ **INST Instantaneous protection**
The Instantaneous protection against short-circuits Ii (x In) can be set using a dial from 1.5 to 15 times the rated current value In.
This protection can also be deactivated (OFF).

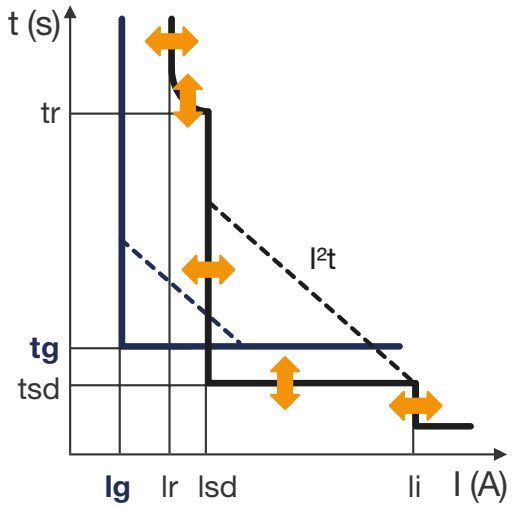
④ **GF earth protection**
The earth protection is used against phase-to-earth faults. The earth fault currents can reach a high enough ampitude that they are similar to a short circuit. It is based on the calculation of the sum of the phases and the neutral current.
The current Ig (x In) can be set using a dial from 0.1 to 1 times the rated current In.
earth fault protection can also be disabled (OFF).
Time delay tg (s) is adjustable via a dial from 50 to 600 ms with the possibility of including an inverse time curve (I^2t OFF or ON).

Neutral protection N
Neutral protection is factory-installed on 4P circuit breakers and as an option with the addition of the ENCT external neutral sensor on 3P versions. It is necessary if the neutral conductor cross section is less than that of the phases, or if the neutral conductor is heavily loaded (for example, in office buildings).
It uses similar tripping curve characteristics as the Long time delay, Short time delay and instantaneous protection parameters.

Zone Selective Interlocking (ZSI)
Zone Selectivity (ZSI) is available on LSIG sentinel trip units. It can be used for the Short Time Delay protection (ZSI STD) and the earth fault protection (ZSI GF). The function is activated using the Hager Power setup software.

LSIG sentinel trip unit

LSIG



Rated current In

	In at 50 °C	400 A	630 A	800 A	1000 A	1250 A	1600 A

Long Time Delay protection L (ANSI 49)

Ir (tripping threshold between 1.05 and 1.20 x Ir)		
Ir1		0.40 - 0.50 - 0.60 - 0.70 - 0.80 - 0.90 - 0.95 - 1.00
Ir2		0.91 - 0.92 - 0.93 - 0.94 - 0.95 - 0.96 - 0.97 - 0.98 - 0.99 - 1.00
Ir (A) = Ir1 x Ir2 x In		0.364 x In … 1 x In
	In = 400 A	145.6 - 400 A
	In = 630 A	229.3 - 630 A
	In = 800 A	291.2 - 800 A
	In = 1000 A	364 - 1000 A
	In = 1250 A	455 - 1250 A
	In = 1600 A	582.4 - 1600 A
Time delay (s)	tr	0.5 - 1.0 - 2.0 - 4.0 - 5.0 - 8.0 - 10 - 15.0 - 20.0 - 25.0
	accuracy	0 % to -20 %

Short Time Delay protection STD (ANSI 50TD/51)

Isd = Ir x …			OFF - 1.0 - 1.5 - 2.0 - 2.5 - 3.0 - 4.0 - 6.0 - 8.0 - 10.0				
	accuracy		+/- 10 %				
Time delay (s)		tsd I²t OFF	0.05	0.10	0.20	0.40	0.60
		tsd I²t ON	0.05	0.10	0.20	0.40	0.60
Non-tripping time (s)			0.025	0.075	0.175	0.375	0.575
Maximum breaking time (s)			0.12	0.17	0.27	0.47	0.67

Instantaneous Protection INST (ANSI 50)

Ii = In x …		OFF - 1.5 - 2.0 - 3.0 - 4.0 - 6.0 - 8.0 - 10.0 - 12.0 - 15.0
	accuracy	+/- 15 %
Non-tripping time (ms)		> 20
Maximum breaking time (s)		≤ 80

GF earth fault tripping (ANSI 50N TD/51N)

Ig = In x …	OFF - 0.1 - 0.2 - 0.3 - 0.3 -0.4 - 0.5 - 0.6 - 0.7 - 0.8 - 0.9 - 1.0				
Time delay (s) tg	0.05	0.10	0.20	0.40	0.60
Non-tripping time (s)	0.025	0.075	0.175	0.375	0.575
Maximum breaking time (s)	0.12	0.17	0.27	0.47	0.67

Neutral protection N

Neutral protection = Phase protection Ir x … Phase protection Isd x …	OFF - 50 % - 100 % - 200 %
Instantaneous protection	same as phases
Time delay	same as phases for tr and instantaneous

Switch-disconnectors

Presentation

hw+ switch-disconnectors comply with the IEC 60947-1 and IEC 60947-3 standards. They are mainly used in electrical distribution applications such as:

- isolation of the supply line from a generator
- isolation and coupling of busbars
- isolation of main switchboards
- isolation of secondary distribution boards

hw+ switch-disconnectors are compatible with all the accessories in the hw+ circuit breaker range except those linked to the electronic trip unit (FS, OAC, TU, etc.).

With the addition of a UV undervoltage release coil or SH shunt trip coil, this device becomes a switch-disconnector. With the addition of an MO charging motor and a CC closing coil, this device can be controlled remotely.
It can be coupled with another switch-disconnector or controllable circuit breaker and an interlocking device to form a source changeover switch.

Switch-disconnector protection

The hw+ switch-disconnector is adapted to switching loads as per AC-22A and AC-23A. It guarantees the disconnection of the circuit which can be secured by the locking accessories available in the hw+ range.
Protection against overload and short circuit must be provided by a circuit breaker upstream of the switch-disconnector and in compliance with installation standards.
In the fixed version, disconnection is fully visible by means of the status indicator.
In the drawout version, it is considered to be a visible disconnection when the product is racked out. This ensures optimal protection for users when working on the installation.

hw+ switch-disconnector characteristics

Common data

Rated operational voltage	Ue	(V AC - 50/60 Hz)	690
Rated insulation voltage	Ui	(V)	1000
Rated impulse withstand voltage	Uimp	(kV)	12
Number of poles			3 / 4
Versions			Fixed / drawout
Normative compliance			IEC 60947-3

Rated current

Reference	**In (A)**
HW1Wx**04**...	400
HW1Wx**06**...	630
HW1Wx**08**...	800
HW1Wx**10**...	1000
HW1Wx**12**...	1250
HW1Wx**16**...	1600

Breaking capacity

Short-time withstand current rating capacity (kA)	Icw	1s - 400 V AC	55
Rated short-circuit making capacity (kA peak)	Icm	380-415 V AC	121
		440 V AC	121
		500-525 V AC	88
		690 V AC	88

Endurance

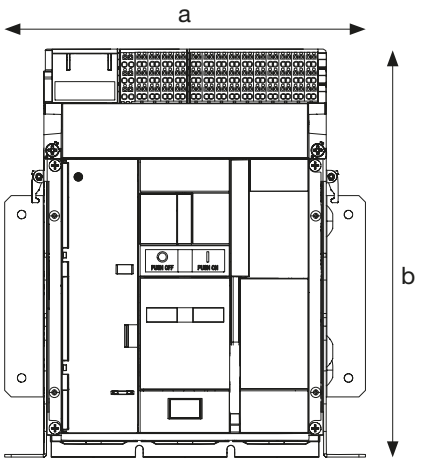
Mechanical endurance (cycles x 1000)	With maintenance	12.5	12.5	12.5
Electrical endurance (cycles x 1000)		6	6	6

Weight (kg)	**3 poles**	**4 poles**
Fixed version (without accessories)	14	18
drawout version without chassis (without accessories)	15	19
drawout chassis (without accessories)	13	15

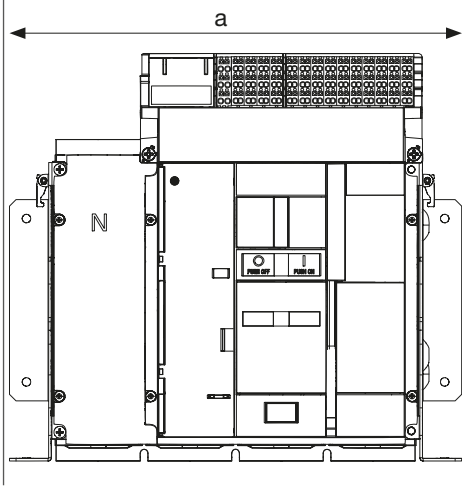
Dimensions (max. value in mm)		**3 poles**	**4 poles**
Width a	fixed version	276	346
	drawout version	284	349
Height b	fixed version	313	313
	drawout version	322	322
Depth c with connections	fixed version	227	227
	drawout version	328	328
Depth of connections		49	49

Fixed version

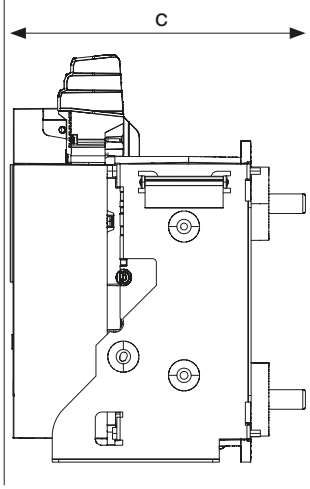
3 poles



4 poles

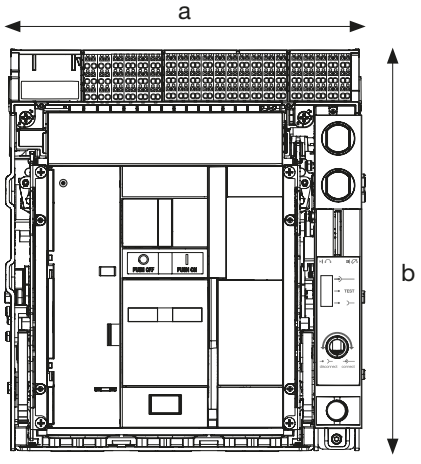


3 / 4 poles

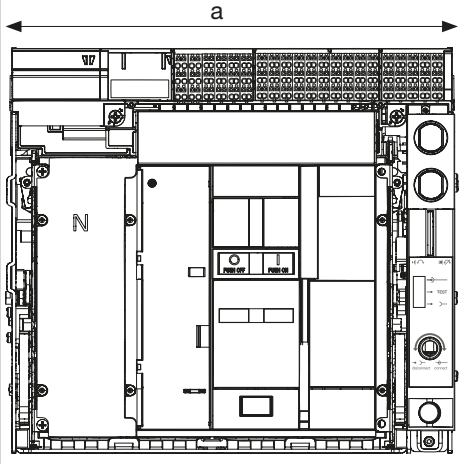


drawout version

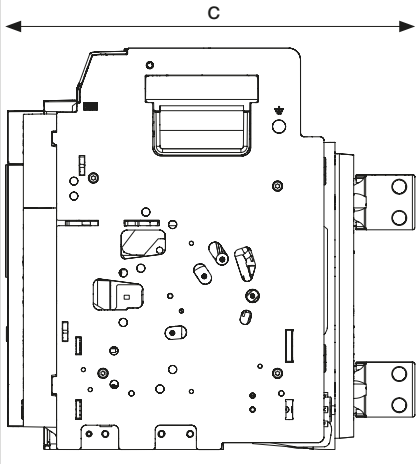
3 poles



4 poles



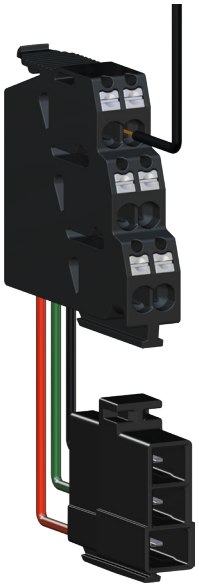
3 / 4 poles



Accessories

	Drawout	Fixed
Connection accessories - Page 45		
TB terminal block connection	•	•
Control accessories - Page 46		
SH shunt trip coil	•	•
CC closing coil	•	•
UV undervoltage release coil	•	•
UVT Time Delay controller for undervoltage release coil	•	•
MO charging motor	•	•
Signalling accessories - Page 50		
AX auxiliary contact	•	•
OAC output alarm contact module	•	•
PS position contact	•	
FS fault trip contact	•	•
RTC ready-to-close-contact	•	•
CYC cycle counter	•	•
Locking and interlocking accessories - Page 57		
WIP wrong insertion preventer for drawout circuit breaker	•	
Safety shutters	•	
RI open door racking interlock	•	
Locking of the circuit breaker in OFF by OLP padlock and OLK key lock	•	•
Locking the position of the circuit breaker in its CL chassis	•	
MI mechanical interlock	•	•
PBC push button cover	•	•
Power connection accessories - Page 65		
Rear vertical / horizontal RC connections	•	•
FC front connections	•	•
VCA vertical connectors	•	•
SP spreaders	•	•
IB interphase barriers	•	•
Protection accessories - Page 70		
TBC terminal cover	•	
DF door chassis	•	•
Cut-off chamber cover		•
ENCT external neutral sensor	•	•

TB terminal block connection

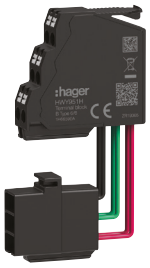


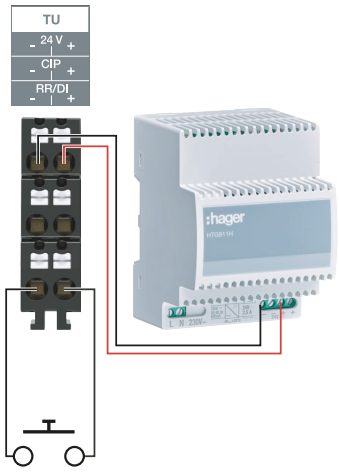
TB terminal block with QuickConnect system

This terminal block has QuickConnect technology, facilitating the wiring of the control and signalling accessories:

- time-saving: wiring is quick and easy thanks to the QuickConnect technology, and can be done tool-free
- safer: cable maintenance is ensured,
- test point: check for the presence of voltage with voltmeter, cable disconnection: the plug-in terminal can be unblocked quickly and easily with a screwdriver.

There is a choice of three types of terminal block depending on the accessory to be connected:

Description	Characteristics		
Connection terminal block	type A		For AX auxiliary contact, FS fault trip contact, RTC ready-to-close-contact, MO charging motor, SH shunt trip coil, CC closing coil, UV undervoltage release coil
	type B		For ENCT external neutral sensor, electronic sentinel trip unit
	type C		For ZSI contact, OAC output alarm contact module



hw+ air circuit breakers are fitted as standard with:

- 4 AX auxiliary contacts as well as associated TB terminal block connections,
- 1 FS fault trip contact as well as the associated TB terminal block connection,
- connection terminal blocks for ZSI function,
- 1 TU connection terminal block at the sentinel electronic trip unit. This terminal block allows an external 24 DC power supply to be connected and a remote reset circuit to be plugged in at the RR digital input.

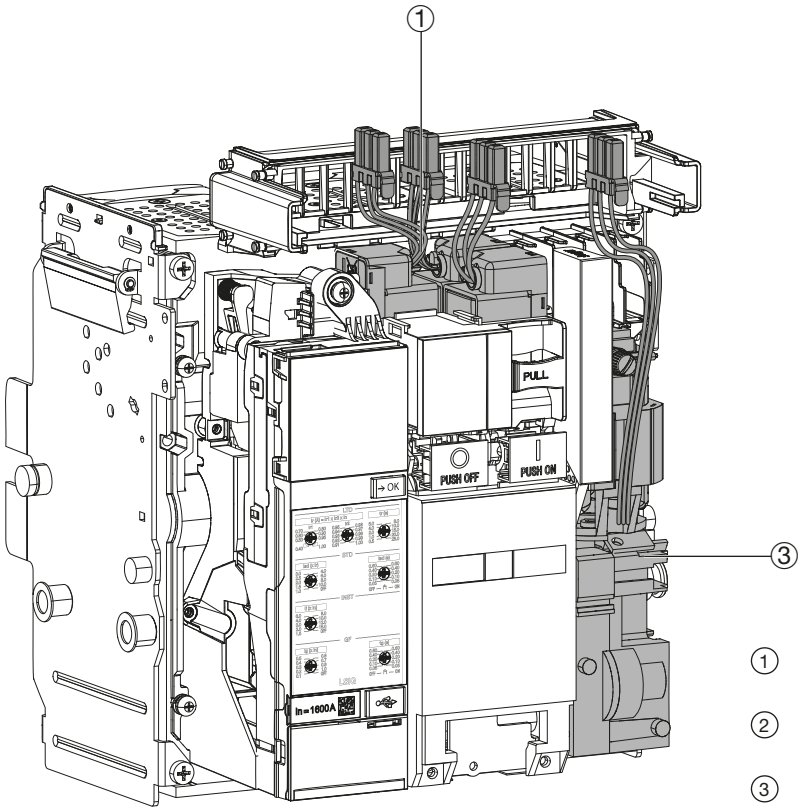
Any configuration other than this standard configuration may require one or more additional connection terminal blocks.

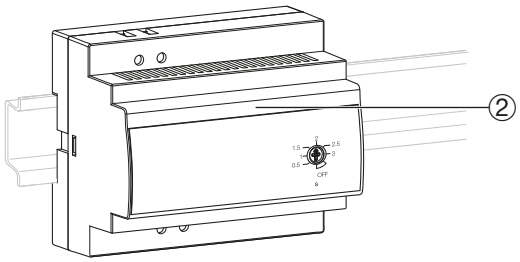
The cables used must have a cross section between 0.6mm² and 2.5mm². They can be flexible or rigid.

In order to be correctly maintained in the terminal blocks, the connected cables must be stripped in advance by 10 to 12 mm. The flexible cables can be inserted without end caps and must not be twisted.

Control accessories overview

Control accessories are used to perform circuit breaker opening, charging and closing control operations.
The command is carried out:
- locally via the charging handle and the opening and closing push-buttons,
- remotely via the TB terminal block connections of the control accessories.





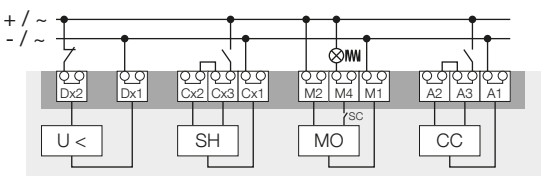
Example of a drawout circuit breaker

①	UV undervoltage release/ SH shunt trip coil / CC closing coil	page 47
②	UVT Time Delay controller for undervoltage release coil	page 49
③	MO charging motor	page 49

Location on the terminal block support

UV/SH2	SH/UV2	MO	CC
D12 C22	C12 D22	M2	A2
C23	C13	M4	A3
D11 C21	C11 D21	M1	A1

Connection diagram



⊗MW: Spring “Charged” indicator

UV undervoltage release coil / SH shunt trip coil / CC closing coil

The UV and SH shunt trip coils are used to remotely open the circuit breaker and the CC closing coil is used to remotely close the circuit breaker.

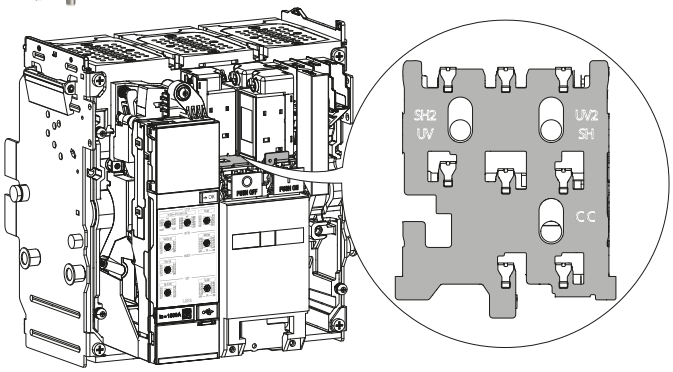
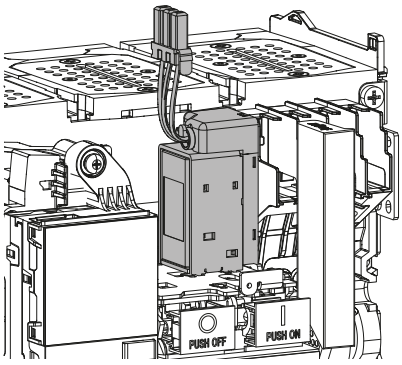


Plate for mounting coils

UV, SH and CC coils are fitted behind the front cover of the circuit breaker.
They are equipped with connectors to be placed in their respective positions.
The connection takes place by means of QuickConnect terminals with a flexible or rigid cable of cross-section 0.6 to 2.5 mm².



SH shunt trip coil in the UV2 / SH position

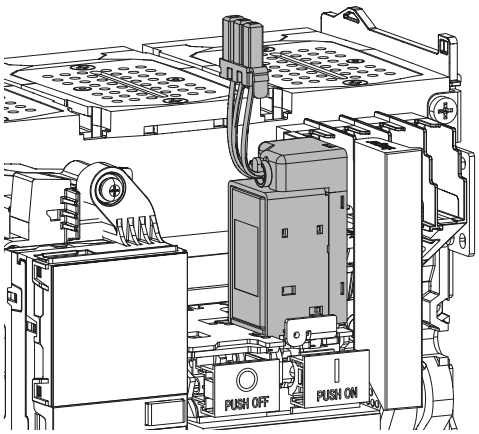
SH shunt trip coil

The SH shunt trip coil activates the circuit breaker opening mechanism when it is energised.
A second SH shunt trip coil can be installed in the SH2 mounting device.
The pulse duration must be at least 100 ms. The coil is suitable for continuous supply.

N.B. If this second coil is installed, it is no longer possible to install a second UV undervoltage release coil.

Electrical characteristics of the SH shunt trip coil

Rated voltage (Vn)		Operating range (V)	Frequency (Hz)	Electricity consumption (VA)		Circuit breaker response time at Vn (ms)
DC (V)	AC (V)			Inrush	Holding	
24-30		17-33	50/60	300 (200 ms)	5	50
48-60		34-66	50/60			
100-130		70-143	50/60	200 (200 ms)		
200-250		140-275	50/60			
-	380-480	266-528	50/60			



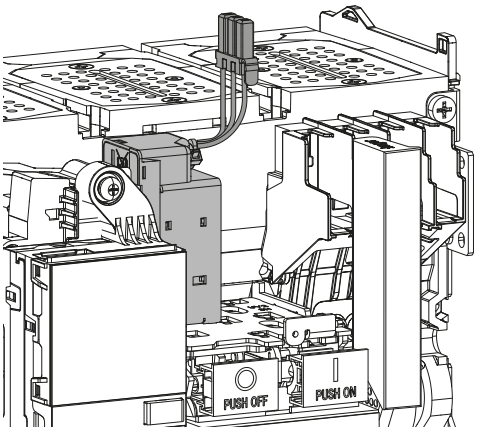
CC closing coil in its position

CC closing coil

The CC closing coil activates the circuit breaker closing mechanism when it is energised. The pulse duration must be at least 100 ms. The coil is suitable for continuous supply.

Electrical characteristics of the CC closing coil

Rated voltage (Vn)		Operating range (V)	Frequency (Hz)	Electricity consumption (VA)		Circuit breaker response time at Vn (ms)
DC (V)	AC (V)			Inrush	Holding	
24-30		21-33	50/60	300 (200 ms)	5	less than 80
48-60		41-66	50/60			
100-130		85-143	50/60	200 (200 ms)		
200-250		170-275	50/60			
-	380-480	323-528	50/60			



UV undervoltage release coil in the SH2 / UV position

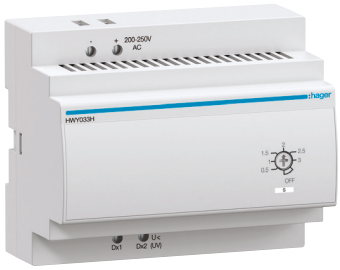
UV undervoltage release coil

The UV undervoltage coil activates the circuit breaker opening mechanism when it is no longer supplied or when its rated voltage drops between 70% and 40%.
The circuit breaker can only close if the coil supply voltage returns to normal or exceeds a defined threshold.
It is possible to add a UVTC time delay controller to the UV undervoltage release coil to delay the operation of the coil and thus reduce unwanted tripping of the circuit breaker.

Electrical characteristics of UV undervoltage release coil

Rated voltage (Vn)		Closing voltage (V)	Opening voltage (V)	Frequency (Hz)	Electricity consumption (VA)		Circuit breaker response time at Vn (ms)
DC (V)	AC (V)				Inrush	Holding	
24-30		> 21	8-21	50/60	300 (200 ms)	5	less than 90
48-60		> 41	17-42	50/60			
100-130		> 85	35-91	50/60	200 (200 ms)		
200-250		> 170	70-175	50/60			
-	380-480	> 323	133-336	50/60			

UVT Time Delay controller for undervoltage release coil



The UVTC time delay controller allows the tripping of the UV undervoltage release coil to be delayed in order to deal with a transient voltage drop of less than 0.5 seconds. It can be mounted on a DIN rail.
The time delay can be set to OFF - 0.5 - 1.0 - 1.5 - 2.0 - 2.5 - 3 seconds.

Electrical characteristics of UVTC undervoltage release coil

Rated voltage (Vn)	
DC (V)	**AC (V)**
24-30	
48-60	
200-250	
380-480	

MO charging motor

The charging motor is used to automatically recharge the closing spring.
Using the motor avoids manual charging of the spring and ensures that the spring is always kept in charged condition during normal operation.

If the motor's power supply is unavailable or the voltage drops, the spring can be charged manually using the charging handle on the circuit breaker.

Electrical characteristics of the motors

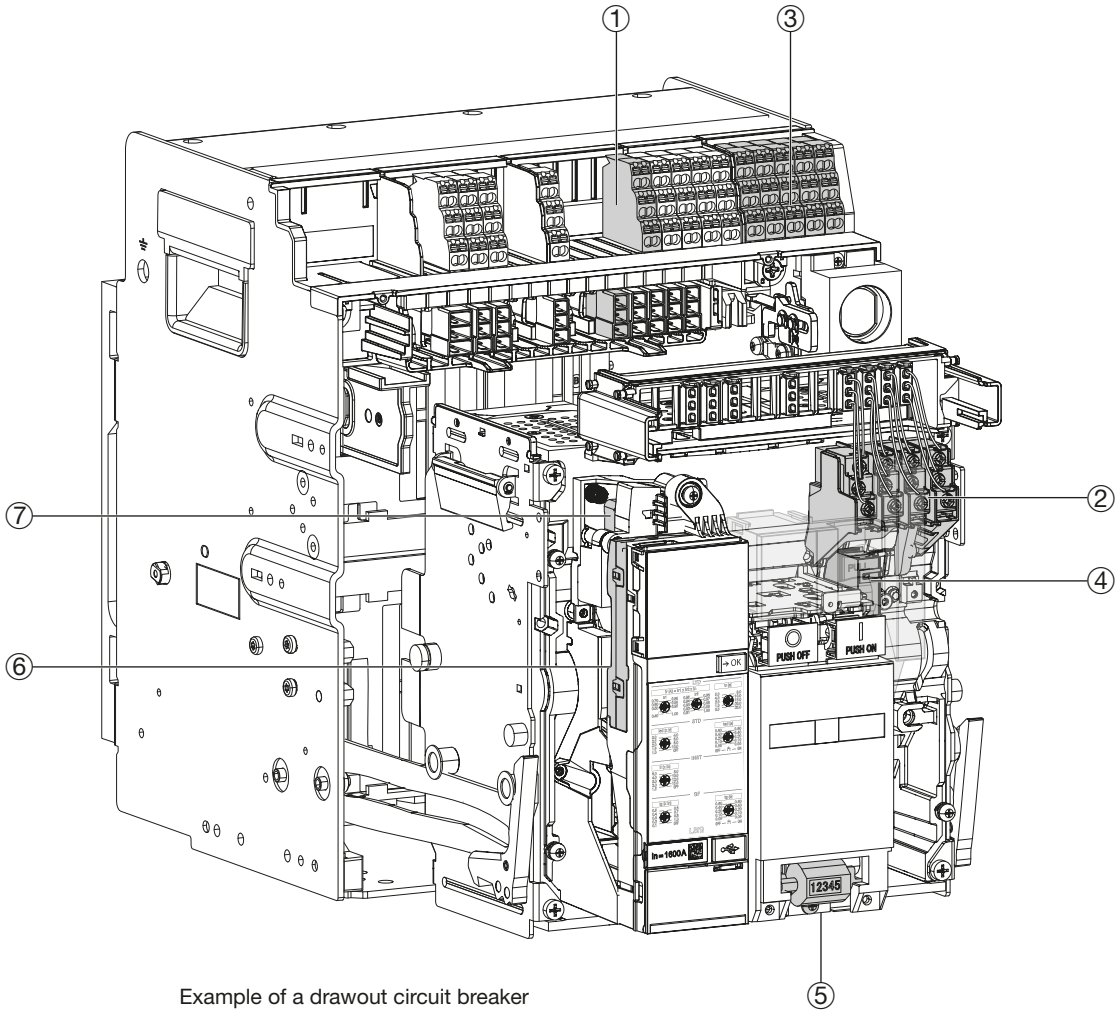
Operating voltage (AC)	24 V	48-60 V	100-130 V	200-250 V	380-400 V	415-450 V
Frequency	50/60 Hz					
Operating range	85 to 110% Vn					
Rated current / max. peak (A)	9.6 / 25	4.8 / 12.5	2 / 5.2	1 / 2.7	0.6 / 1.5	0.5 / 1.4
Start-up activation (A)	2 to 3 In for 0.1 s					
Maximum arming time (s)	8	6	4		3	
Active power (VA)	230					
Operating frequency	maximum 3 cycles per minute					
Life cycle*	15000					

Operating voltage (DC)	24 V	48-60V	100-130 V	200-250 V
Operating range	85 to 110% Vn			
Rated current / max. peak (A)	9.6 / 25	4.8 / 12.5	2 / 5.2	1 / 2.7
Start-up activation (A)	2 to 3 In for 0.1 s			
Maximum arming time (s)	8	6	4	
Active power (W)	230			
Operating frequency	maximum 3 cycles per minute			
Life cycle*	15000			

*** Test carried out with a frequency of 2 cycles per minute**

Signalling accessories overview

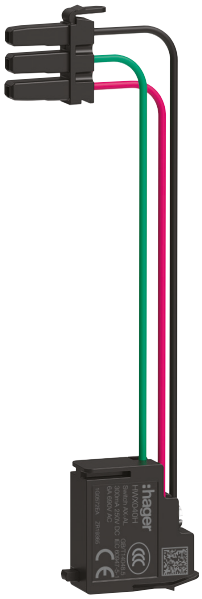
The signalling accessories provide information concerning the status and position of the circuit breaker, the presence of an electrical fault and the number of operations.



Example of a drawout circuit breaker

①	TB terminal block connection	page 45
②	AX auxiliary contact	page 51
③	PS position contact	page 54
④	RTC ready-to-close-contact	page 55
⑤	CYC cycle counter	page 56
⑥	OAC output alarm contact module	page 53
⑦	FS fault trip contact	page 52

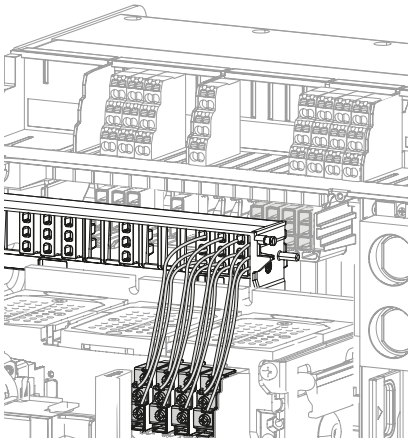
AX auxiliary contact



The AX auxiliary contacts are used for remote signalling of the “open” or “closed” status of the circuit breaker power contacts.

4 AX auxiliary contacts are included with the circuit breaker as a standard.

The mounted contacts can be “standard” or “low level” (see table at the bottom of the page) and are defined during the product configuration.

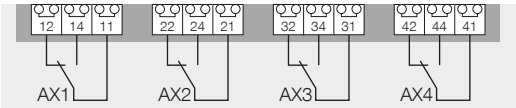


AX auxiliary contact positions

AX auxiliary contact marking

AX1/vN	AX2	AX3	AX4
12 vN	22	32	42
14	24	34	44
11	21	31	41

Connection diagram

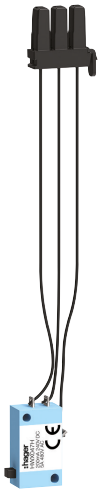


AX auxiliary contact characteristics

Type			**Standard**				**Low level**			
Minimum load			24 V 100 mA				15 V 2 mA			
Breaking capacity (A)	Usage(1)	Ue (V)	AC12	AC13	AC14	AC15	AC12	AC13	AC14	AC15
	V AC	127	6.0	5.0	0.5	5.0	5.0	2.5	0.5	2.5
		240	6.0	4.0	0.3	4.0	5.0	2.0	0.3	2
		380	6.0	4.0	0.18	2.0	5.0	1.5	0.18	1.5
		440	6.0	3.0	0.16	2.0	5.0	1.5	0.16	1.5
		480	6.0	2.0	0.15	1.5	5.0	1	0.15	-
		690	6.0	1.0	-	0.1	5.0	-	-	-
	Usage(1)	Ue (V)	DC12	DC13	DC14		DC12	DC13	DC14	
	V DC	24	2.5	2.5	1		5.0	2.5	1	
		48	2.5	1.2	0.2		2.5	1.2	0.2	
		125	0.5	0.4	0.05		0.5	0.35	0.05	
		250	0.3	0.05	0.03		0.3	0.05	0.03	

(1) According to standard IEC 60947-5-1

FS fault trip contact



The FS fault trip contact is used to signal the opening of the circuit breaker following a trip due to an electrical fault.
The causes for the tripping can be of different types:

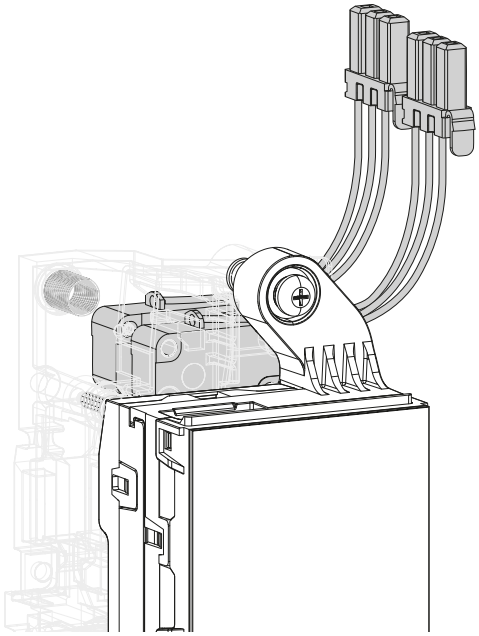
- overload,
- short circuit,
- GF earth fault,
- critical system alarm.

The contact returns to its rest position when the circuit breaker is reset using the “RESET” re-arm button on the front of the circuit breaker.

The "RESET" re-arm button resets the FS fault trip contact.

An FS contact is provided as standard on all circuit breakers.

The maximum number of FS contacts for HW1 circuit breakers is two unless the RTC ready-to-close contact is installed.



FS fault trip contact positions

FS fault trip contact marking

FS	RTC/FS2
F12	R2 F22
F14	R4 F24
F11	R1 F21

Characteristics of the FS fault trip contact

Minimum load			15 V 2 mA			
Breaking capacity (A)	Usage(1)	Ue (V)	AC12	AC13	AC14	AC15
	V AC	127	5.0	5.0	0.5	5.0
		240	5.0	5.0	0.3	4.0
		380	5.0	5.0	0.18	3.0
		440	5.0	5.0	0.16	3.0
		480	5.0	2.0	0.15	2.0
		690	-	-	-	-
	Usage(1)	Ue (V)	DC12	DC13	DC14	
	V DC	24	5.0	2.5	1	
		48	2.5	1.0	0.2	
		125	0.4	0.2	0.02	
		240	0.2	0.1	0.01	

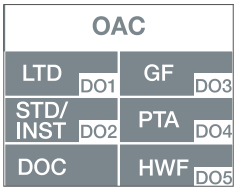
(1) According to standard IEC 60947-5-1

OAC output alarm contact module

The OAC output alarm contacts module can be used to signal the overload pre-alarm, LTD, STD/INST/MCR and GF trip alarms
as well as trip-configured critical system alarms.

For correct operation an external 24 V DC SELV power supply must be connected to the circuit breaker.

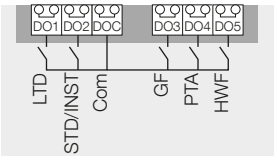
Output alarm contact marking



LTD	tripping of the Long Time Delay protection
STD/INST or S/I	tripping of the Short Time Delay, Instantaneous or MCR protection
DOC	common
GF	tripping of the GF earth fault protection
PTA	Overload pre-alarm activation
HWF	tripping due to a critical system alarm

Output alarm connector positions

Output alarm contact OAC wiring diagram



Characteristics of the contacts:
250 V AC - 2 A - AC1
30 V DC - 2 A - DC1

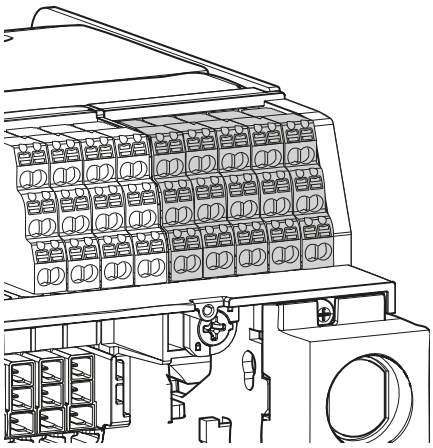
PS position contact (for drawout version only)

This contact indicates one of the three positions of the circuit breaker inside the chassis according to its position on the terminal block support. It is available in the standard or low level version:

Location of the contact on the terminal block support	Indicates the position	Status of the power circuits	Status of the auxiliary circuits
D1 / D2	Disconnected	Disconnected	Disconnected
T1	Test	Disconnected	Connected
C1 / C2	Connected	Connected	Connected

Marking of the HW1 circuit breaker PS position contacts

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



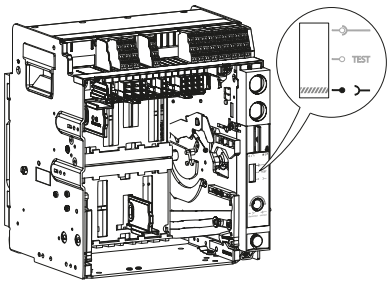
PS position contact spaces

Position	Max. number of contacts
D (Disconnected)	2
T (Test)	1
C (Connected)	2

PS position contact characteristics

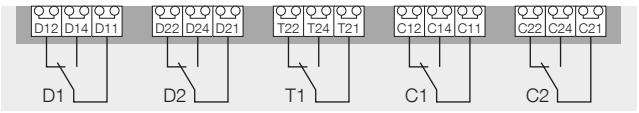
Type			Standard contact				Low level contact			
Minimum load			24 V 100 mA				15 V 2 mA			
Breaking capacity (A)	Usage(1)	Ue (V)	AC12	AC13	AC14	AC15	AC12	AC13	AC14	AC15
	V AC	127	8.0	5.0	0.5	5.0	5.0	2.5	0.5	2.5
		240	8.0	4.0	0.3	4.0	5.0	2.0	0.3	2
		380	8.0	4.0	0.18	2.0	5.0	1.5	0.18	1.5
		440	8.0	3.0	0.16	2.0	5.0	1.5	0.16	1.5
		480	8.0	2.0	0.15	1.5	5.0	1	0.15	-
		690	6.0	1.0	-	0.1	5.0	-	-	-
	Usage(1)	Ue (V)	DC12	DC13	DC14		DC12	DC13	DC14	
	V DC	24	2.5	2.5	1		5.0	2.5	1	
		48	2.5	1.2	0.2		5.0	1.2	0.2	
		125	0.8	0.4	0.05		0.8	0.35	0.05	
		250	0.3	0.05	0.03		0.3	0.05	0.03	

(1) According to standard IEC 60947-5-1



Position indicator of the moving part (circuit breaker) in its chassis

Connection diagram



The three positions are also shown by a mechanical indicator on the right-hand part of the chassis.

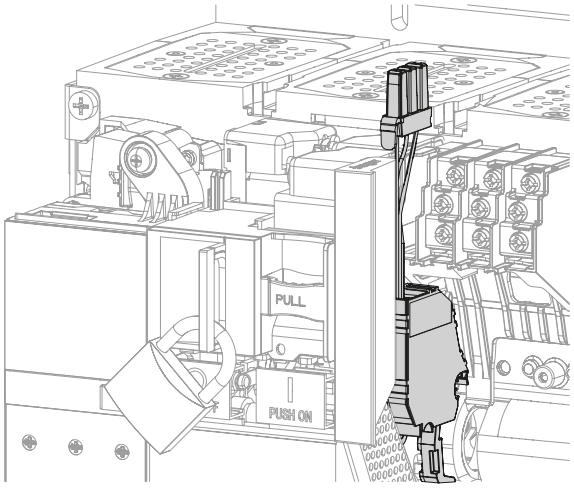
RTC ready-to-close-contact

The RTC ready to close contact indicates that the circuit breaker has checked the closing conditions and that it is ready to receive the closing command.
The contact changes status when all of these conditions are met:

- the circuit breaker is in open status,
- the status display of the closing spring shows it is in the charged condition,
- the UV undervoltage release coil is supplied (see chapter: Control accessories / UV undervoltage release coil),
- the SH shunt trip coil is not energised (see chapter: Control accessories / SH shunt trip coil),
- the circuit breaker is in connected position,
- the circuit breaker is not locked in open status by a padlock or key,
- the circuit breaker is not interlocked with a second circuit breaker,
- the "RESET" re-arm button is pressed.

The circuit breaker can now be closed manually or remotely using a closing coil.

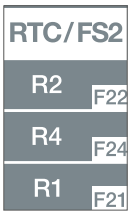
If the RTC ready-to-close contact is installed, the second FS fault trip contact cannot be fitted.



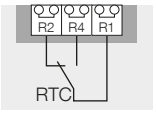
RTC ready-to-close-contact

The "Ready to close" information is also visible on the front of the circuit breaker:

RTC ready-to-close contact marking



Connection diagram



Characteristics of the RTC ready-to-close-contact

Minimum load			15 V 2 mA			
Breaking capacity (A)	Usage(1)	Ue (V)	AC12	AC13	AC14	AC15
	V AC	127	5.0	5.0	0.5	5.0
		240	5.0	5.0	0.3	4.0
		380	5.0	5.0	0.18	3.0
		440	5.0	5.0	0.16	3.0
		480	5.0	2.0	0.15	2.0
		690	-	-	-	-
	Usage(1)	Ue (V)	DC12	DC13	DC14	
	V DC	24	5.0	2.5	1	
		48	2.5	1.0	0.2	
		125	0.4	0.2	0.02	
		240	0.2	0.1	0.01	

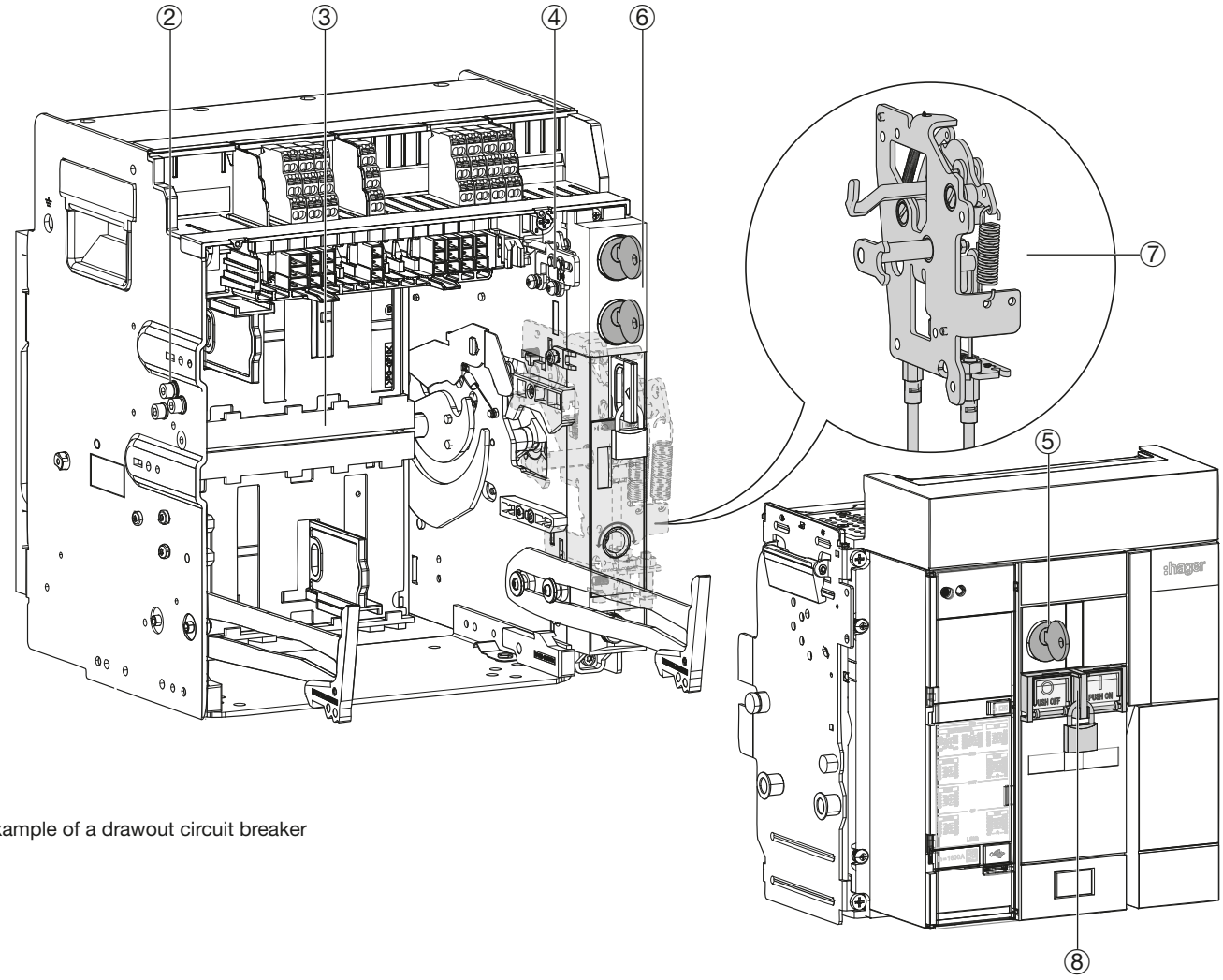
(1) According to standard IEC 60947-5-1

CYC cycle counter

The cycle counter indicates the circuit breaker's total number of electrical and mechanical operation cycles. The counter readings can be used as indicators for maintenance or inspection.
The cycle counter is installed on the front side of the circuit breaker at the bottom section.

Locking and interlocking accessories overview

The locking and interlocking accessories are safety devices designed to protect users as well as the distribution system. They:
- give access to the circuit breaker only to authorised and approved operators.
- limit the risks of errors during operation.

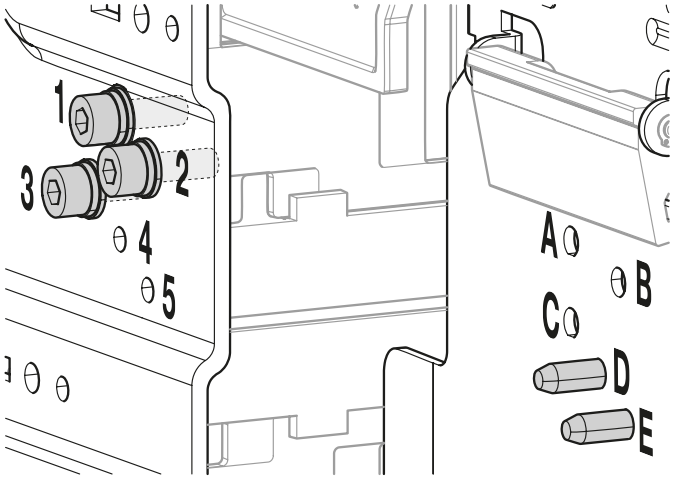


Example of a drawout circuit breaker

WIP wrong insertion preventer for drawout circuit breaker

The wrong insertion preventer is a mechanical device used to carry out a predetermined pairing of the circuit breaker with its chassis.
This system must be installed on the chassis and the moving part of the device. Up to 10 different combinations can be made.

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

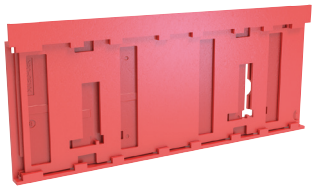


Example of installation with the combination 123 for the chassis and DE for the circuit breaker.

List of combinations

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

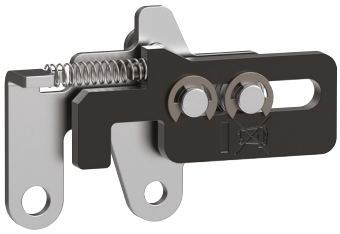
Safety shutters



- The safety shutters cover the contacts of the main circuit in the chassis when the circuit breaker is in either disconnected or test position. In this way it precludes accidental access to the clamps. The IP20 protection class is now guaranteed.
- The upper and lower shutters operate independently and can be padlocked separately. The padlocks block the safety shutters in the closed position and prevent a product being racked in. Up to three padlocks can be fitted per shutter. 1 to 3 Ø5-Ø8 mm padlocks not included.

The shutters are factory fitted on each hw+ chassis.

RI open door racking interlock



This device prevents the racking handle being inserted into the place to insert/withdraw the racking handle when the door of the distribution board is open.

Locking of the circuit breaker in OFF by OLP padlock and OLK key lock

This locking device is used to lock the OFF push button in pressed condition in order to prevent the circuit breaker from closing.
One of the following two devices can be used for the HW1 circuit breaker:
- an OLP padlock locking device.
or
- an OLK key lock locking device.

Padlocking

OLP padlock locking device as an accessory

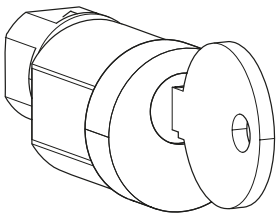
The adaptation accessory for OLP padlock locking can be mounted on the front of the circuit breaker.
To lock the circuit breaker in the open state by means of a padlock, keep the circuit breaker OFF push button pressed and then pull the tab to install the padlocks:
1 to 3 Ø5-Ø8 mm padlocks not included.

Locking with key locks

Locking device with OLK key lock as an accessory

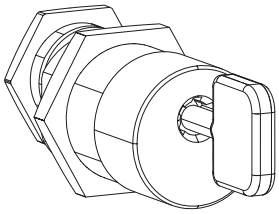
The adaptation accessory for the OLK key lock can be mounted on the front of the circuit breaker.
To lock the circuit breaker in the open state using a key lock, keep the circuit breaker OFF push button pressed and then turn the lock key. The key can be removed.

Compatible locks



Ronis type lock

Description	Characteristics	Key compatible with the type of lock
Ronis type key lock	type 1 – K1L1/L4	1, 4
	type 2 – K2L2/L4/L5	2, 4, 5
	type 3 – K3L3/L5	3, 5
	type 4 – K4L4	4
	type 5 – K5L5	5

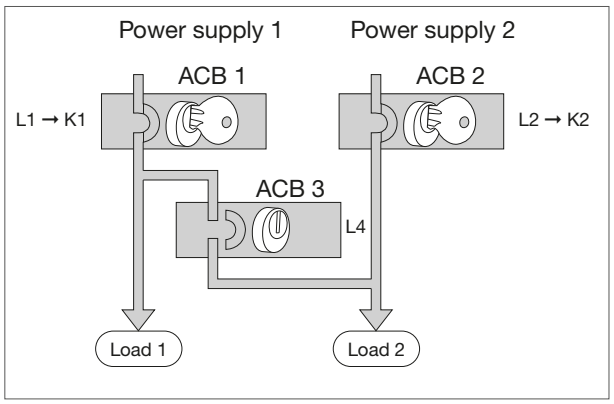


Profalux type lock

Description
Profalux type key lock (not available in our offer)

Example of key interlocking between 3 circuit breakers:
It is possible to achieve an interlocking between three circuit breakers using a combination of locks mounted on each of the products. This device is recommended for a busbar coupling application.
Only two circuit breakers can be supplied with two captive keys in ON. The third circuit breaker cannot be closed because it is locked in OFF and is keyless.

• Air circuit breaker (ACB) 3 is locked in OFF

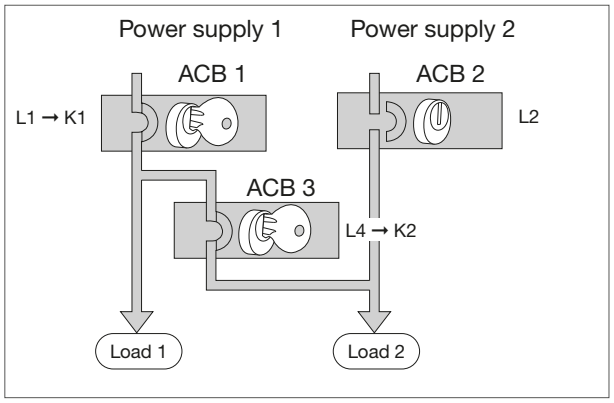


ACB 3 cannot be closed

Step 1:

- ACB 3 is locked in OFF and cannot be closed.
- ACB 1 and ACB 2 are in ON with the two captive keys in this position.

• Air circuit breaker (ACB) 2 is locked in OFF

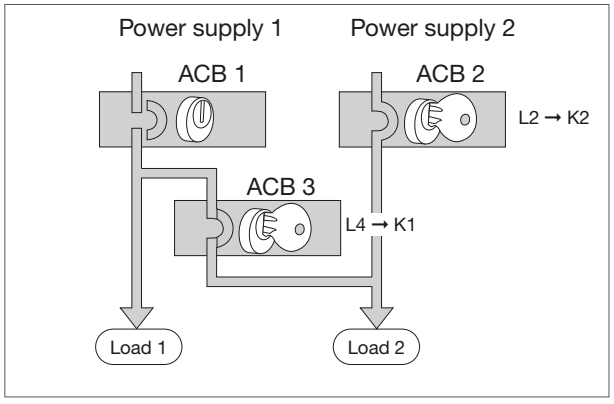


ACB 2 cannot be closed

Step 2:

First open one of the two closed circuit breakers (here ACB 2) in order to remove the key and close ACB 3.

• Air circuit breaker (ACB) 1 is locked in OFF



ACB 1 cannot be closed

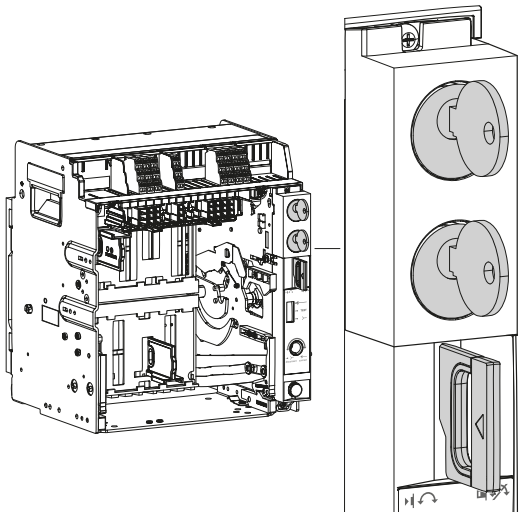
Step 3:

First open ACB 1 in order to remove the key and close ACB 2.

Locking the position of the circuit breaker in its CL chassis

This device is used to lock the circuit breaker in its chassis in disconnected, test or connected position and prevent the insertion of the racking handle.
Locking can be by means of:
- one or two key locks, available as an option,

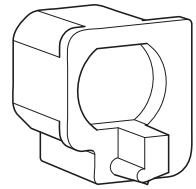
or
- 1 to 3 Ø5-Ø8 mm padlocks (not included) installed on the padlocking and position acknowledgement tab (locking device fitted as standard).



2 key locks mounted on the locking device
1 padlocking and position acknowledgement tab

Locking device with key locks, available as an option

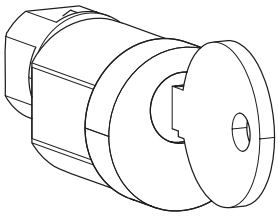
There are three possibilities for locking with keys:
- a single lock fitted in such as way as to achieve a simple locking of the circuit breaker,
- two different locks fitted in such a way as to achieve a double locking of the position, thereby guaranteeing a high level of security.



Adapter kit

Description
Adapter kit for Ronis or Profalux type locks

Compatible locks



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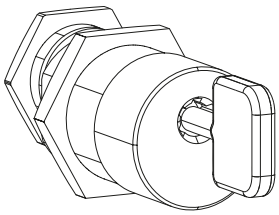
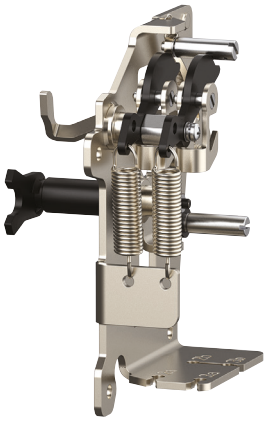
	type 4 – K4L4	4
	type 5 – K5L5	5



Profalux type lock

Description
Profalux type key lock (not available in our offer)

MI mechanical interlock



Mechanical interlocking by cable makes it possible for 2 hw+ circuit breakers to be interlocked with each other.

The cable interlocking system provides a higher degree of flexibility when it comes to integration into distribution systems:

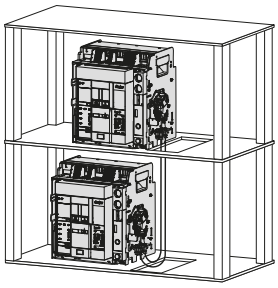
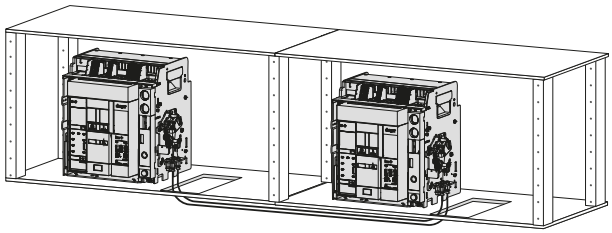
- All combinations of circuit breakers (3P, 4P, Fixed, drawout) are possible.

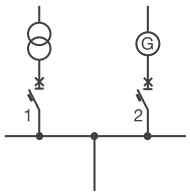
- Circuit breakers can be installed one above the other or side by side.

- Several cable lengths are available so as to be compatible with any type of installation.

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

Possibility of mechanical interlocking by cable

Vertical	Horizontal
2 circuit breakers	
	

Application	**Backup**
Source	1 transformer + 1 standby generator
Type	2 S
Description	Prevents two circuit breakers from being closed at the same time.
Truth table	**ACB 1** / **ACB 2**: 0 / 0 ; 1 / 0 ; 0 / 1
Diagram	
Required link cables between circuit breakers	2 cables
2 circuit breakers	**X**

PBC push button cover

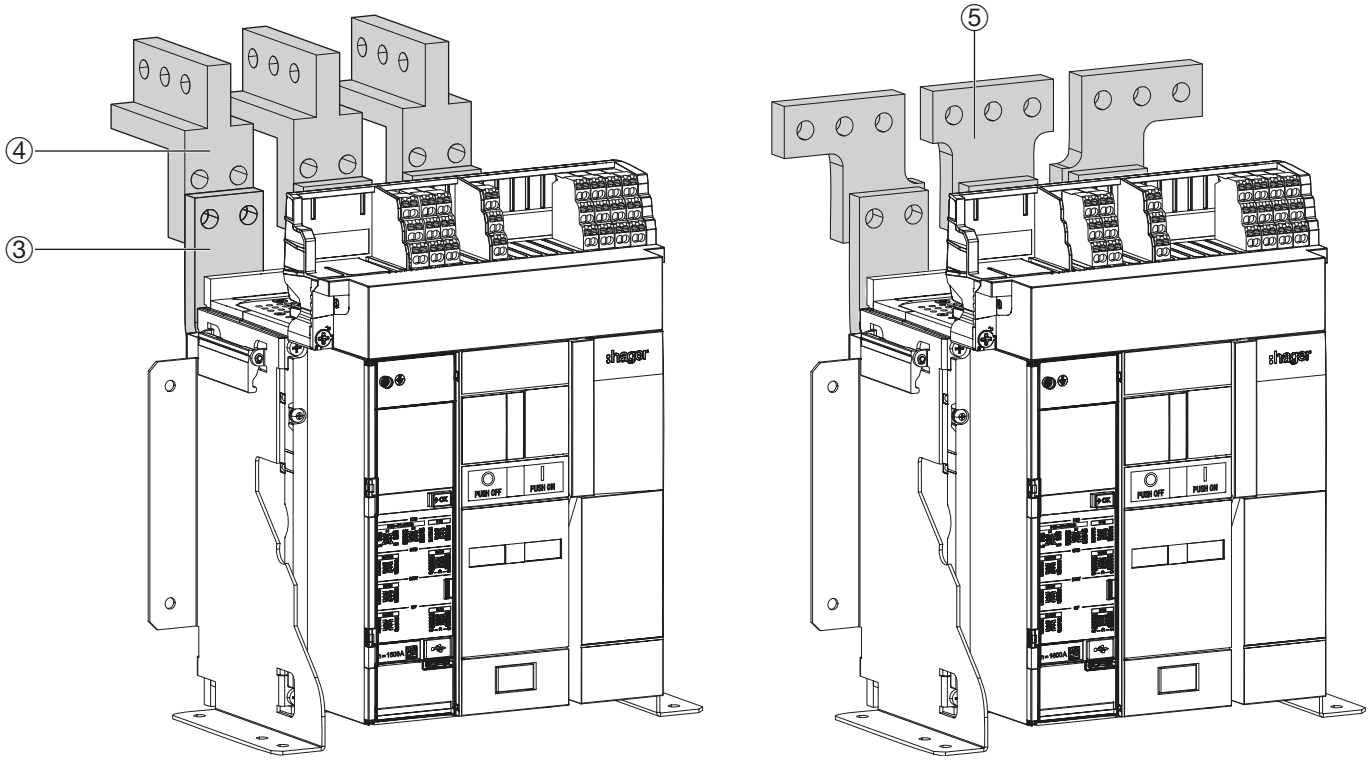
This cover is a device used to lock out access to the circuit breaker opening (PUSH OFF) and closing (PUSH ON) push buttons.
It prevents any unintentional or unauthorised operations.
It consists of two transparent covers which can be locked with padlocks: (one to three padlocks, not provided), Ø hasp 6 mm maximum.

The push buttons can be blocked independently or jointly.

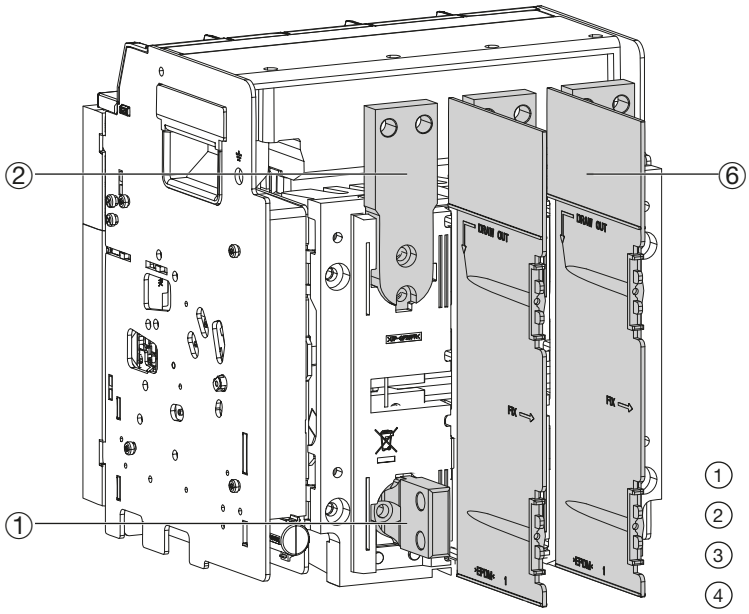
It also keeps the opening push button (PUSH OFF) pressed, thus preventing the circuit breaker from closing.

Overview of the power connection accessories

The connection sockets facilitate the integration of the circuit breaker into distribution systems.
Additional accessories simplify connection according to the needs of the installation.



Examples of a fixed circuit breaker



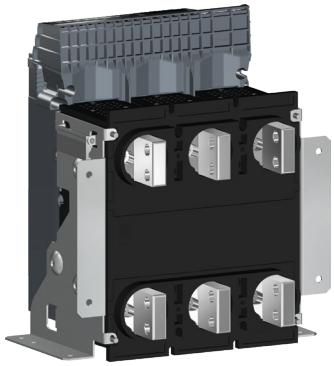
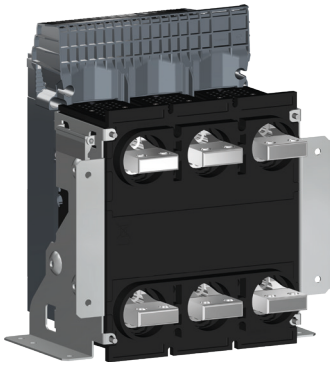
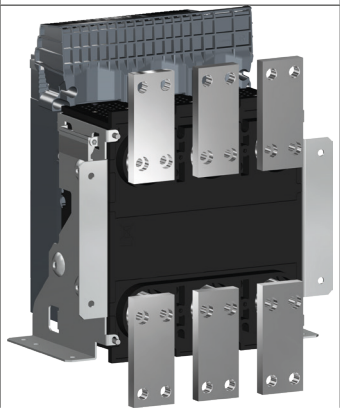
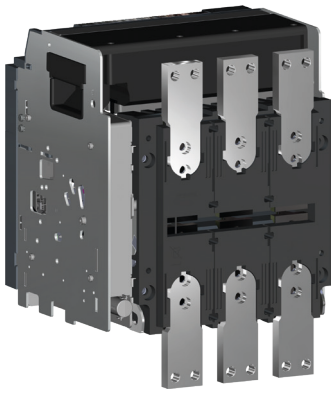
Example of a drawout circuit breaker

Terminal connections

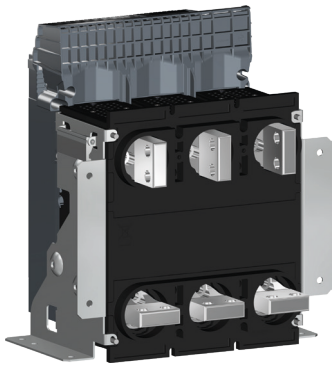
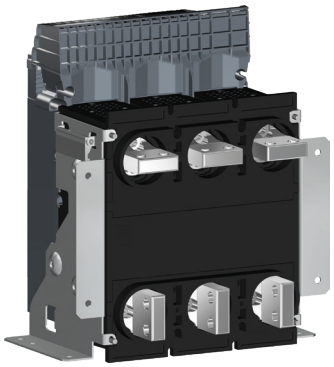
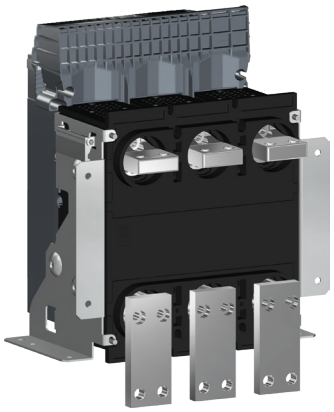
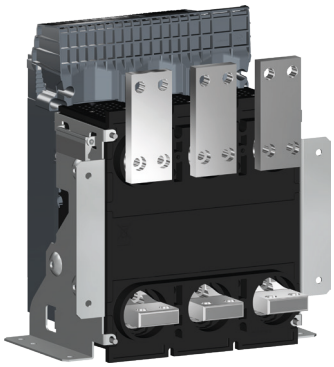
There are several types of sockets to to connect circuit breakers and HW1 chassis to power busbars:
• The rear connections:
Available on fixed and drawout circuit breakers.
The rear connections can be easily pivoted to the horizontal or vertical.

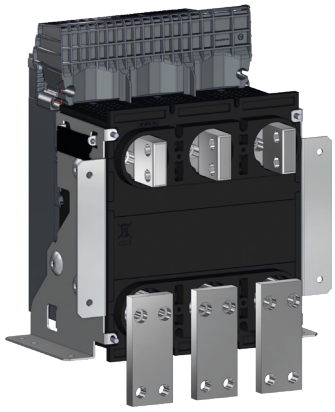
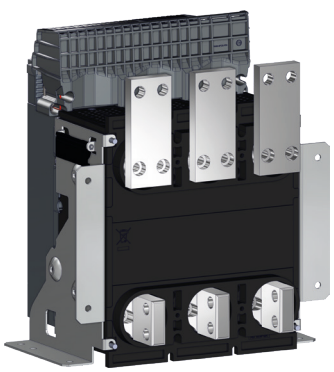
• The front connections:
Available on fixed and drawout circuit breakers. The upper and lower connections can be equipped with different combinations of sockets.
Depending on the circuit breaker, additional accessories are available to adapt the connection to the busbars (see table below).

Identical connections at the top and bottom

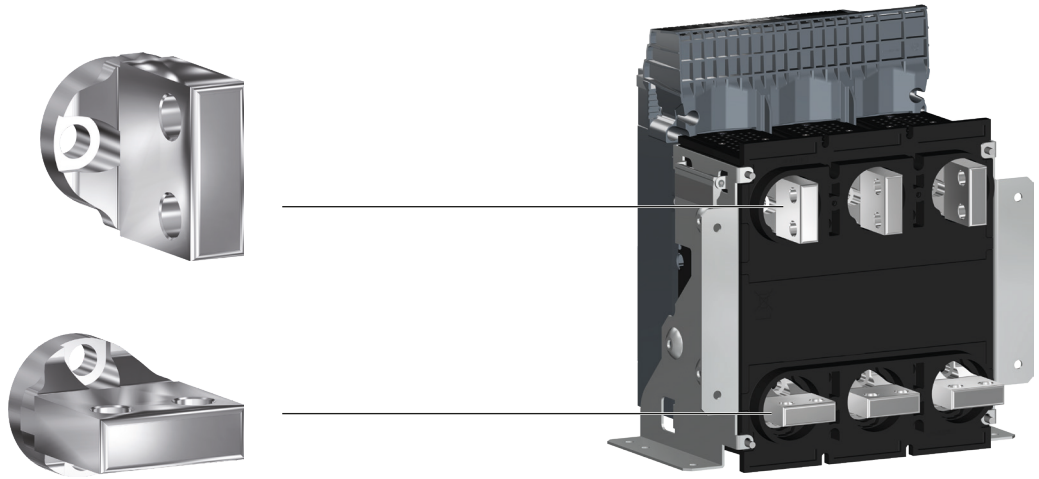
Vertical or horizontal rear connection (for fixed or drawout circuit breaker)		Front (for fixed circuit breaker)	Front (for drawout circuit breaker)
			

Sockets can also be combined. See below for some examples:

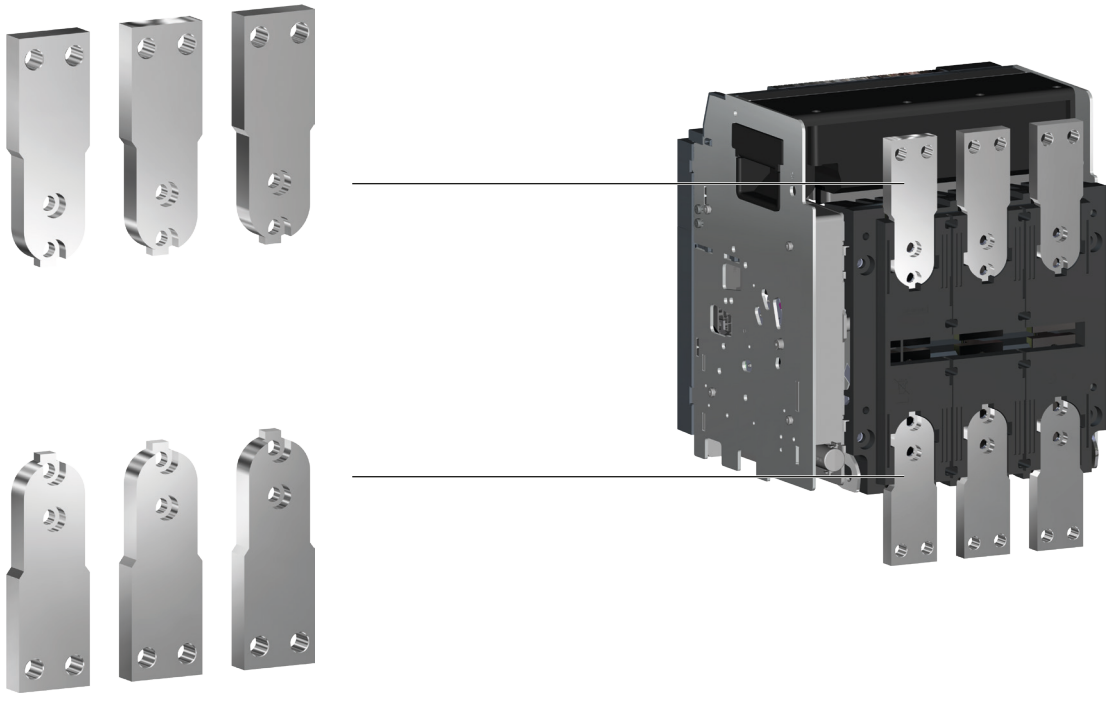
Vertical rear / Horizontal rear	Horizontal rear / Vertical rear	Horizontal rear / Front	Front / Horizontal rear
			

Vertical rear / Front	Front / Vertical rear
	

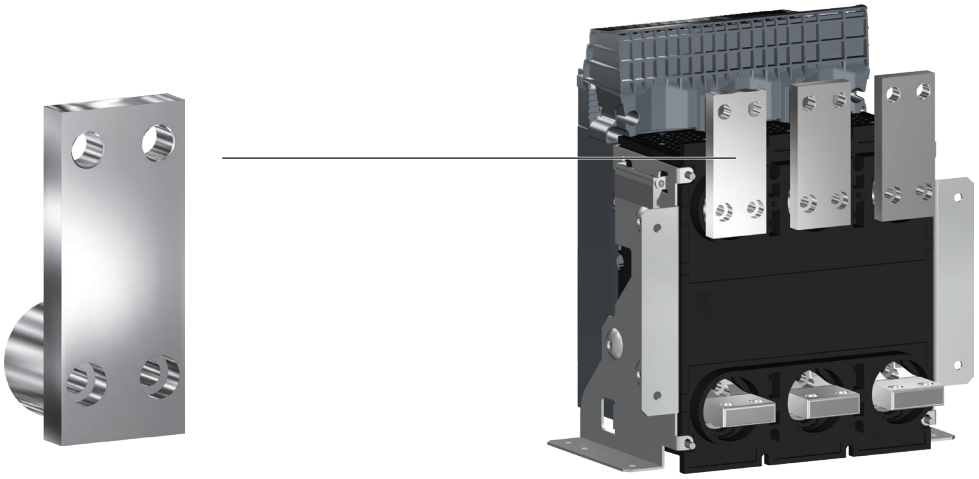
Rear vertical / horizontal RC connections



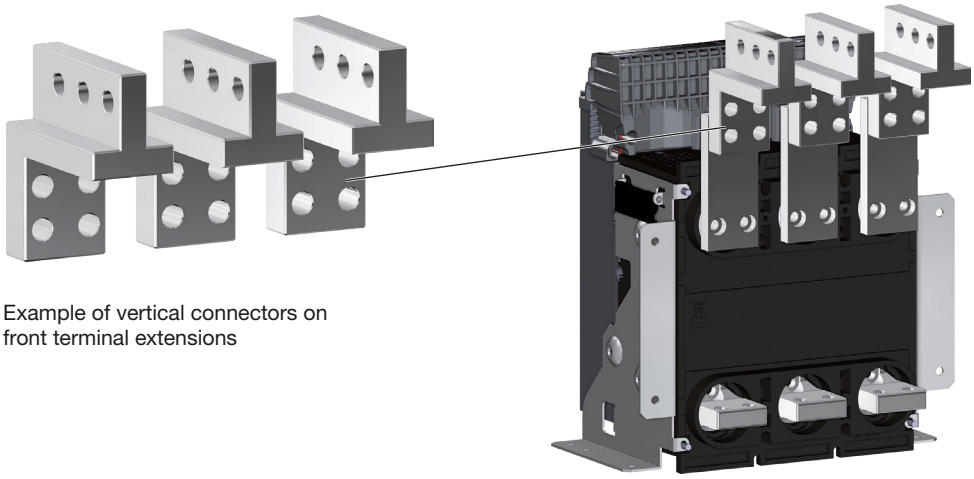
FC front connections
for drawout version



for fixed version



VCA vertical connectors



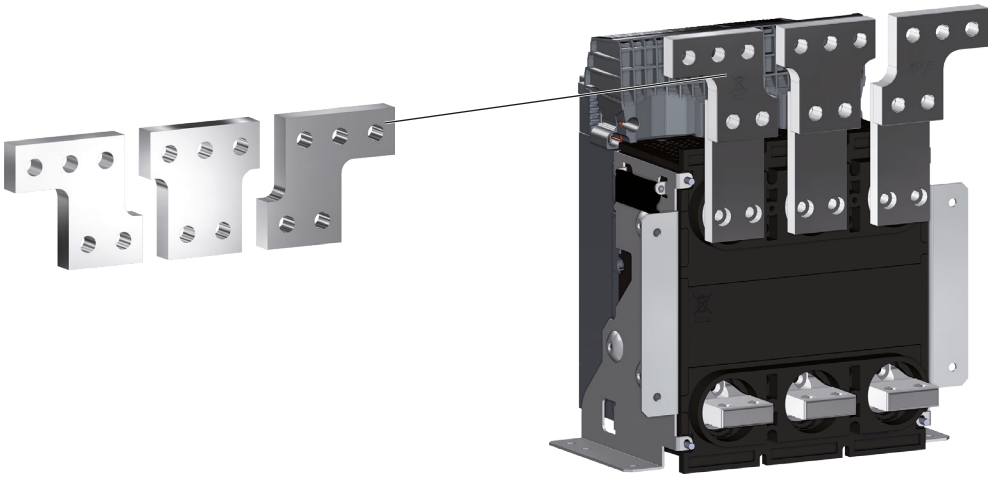
Example of vertical connectors on front terminal extensions

The vertical connectors are complementary accessories mounted on the front connections of HW1 circuit breakers. These connectors are used to facilitate connection to a vertical busbar and can be oriented towards the front or the rear of the circuit breaker according to the installation requirements.

Installing a cut-off chamber cover is mandatory in the case of a fixed HW1 circuit breaker with the vertical connectors facing forwards.

The use of vertical connectors is prohibited if the voltage is greater than or equal to 500V.

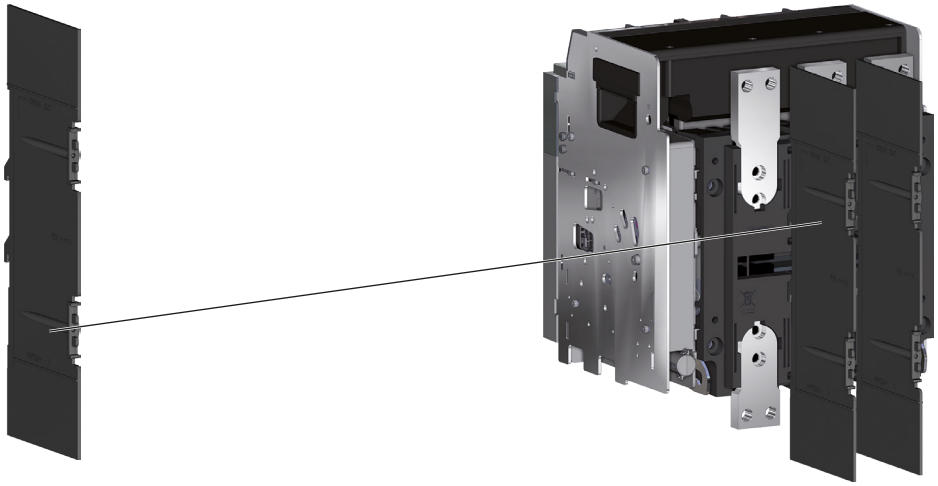
SP spreaders



The spreaders are complementary accessories mounted on the front or rear horizontal connections of HW1 circuit breakers.
They are used where the connection bars are wider than the circuit breaker sockets or for connection by means of cables.
Spreaders cannot be installed with interphase barriers for the HW1 circuit breaker.

The use of spreaders is prohibited if the voltage is greater than or equal to 500 V.

IB interphase barriers

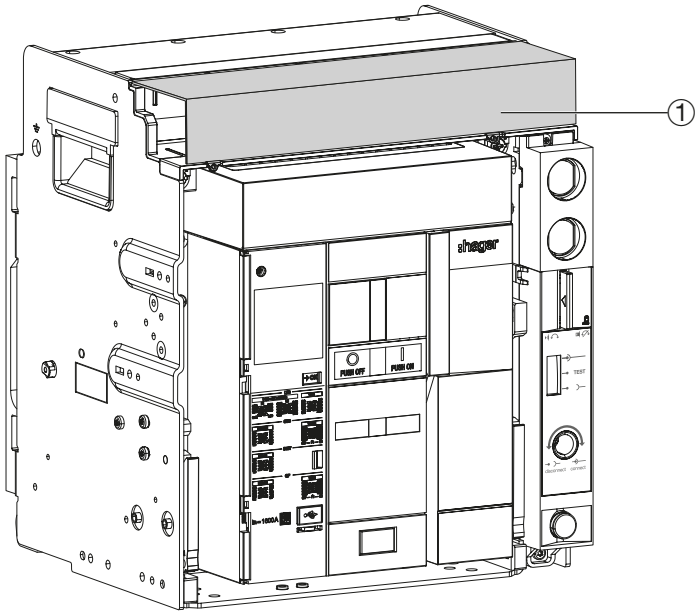


The interphase barriers are complementary accessories mounted vertically between the sockets of the HW1 circuit breakers.
Each interphase barrier improves the insulation between the connection sockets and prevents arcing between two connections.

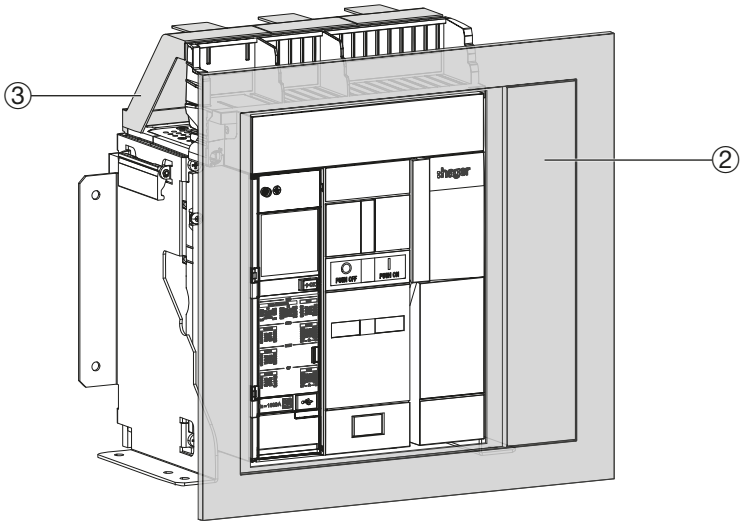
Interphase barriers cannot be installed with spreaders for the HW1 circuit breaker.
Installing interphase barriers is mandatory on an HW1 circuit breaker if the voltage is greater than or equal to 500 V.

Protection accessories overview

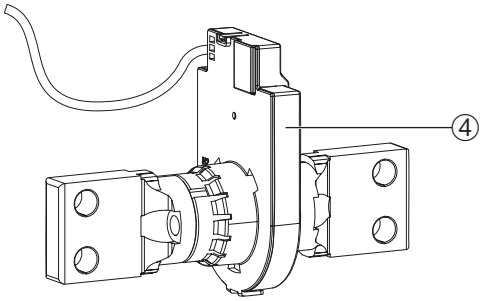
The mechanical protection accessories (TBC terminal cover, DF door frame, etc.) allow for enhanced safety levels when a physical intervention is being made on the installation.
The electrical protection accessories (ENCT) help prevent deterioration in the assets and improve the level of electrical protection.



Example of a drawout circuit breaker



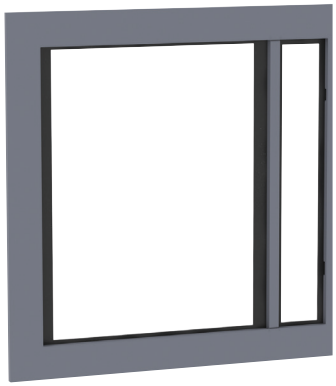
Example of a fixed circuit breaker



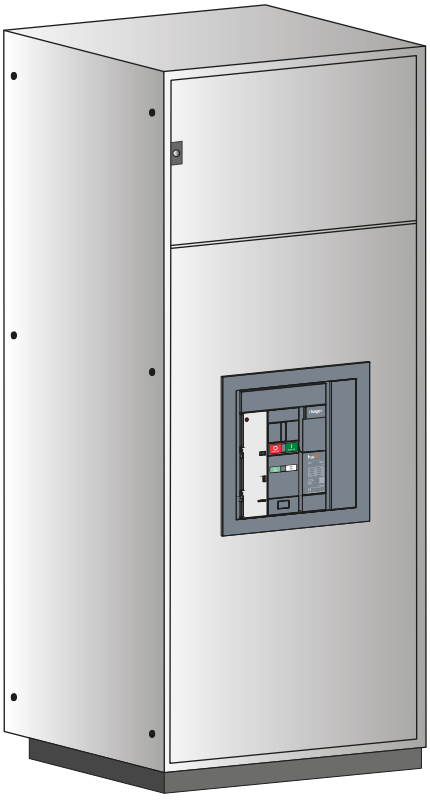
TBC terminal cover

The protective cover of the terminal block prevents access to the connection of electrical auxiliaries and also prevents any accidental contact. It is attached to the chassis by 2 screws.
This accessory is only available for drawout circuit breakers.

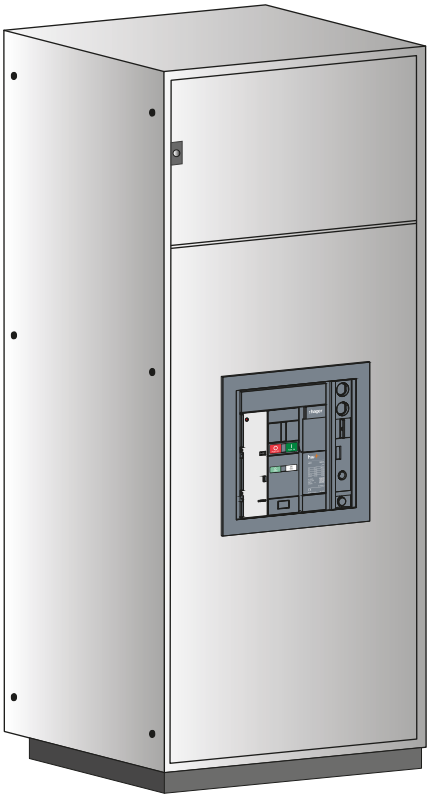
DF door chassis



A cut-out is made on the electrical distribution board door to accommodate the front part of a fixed or drawout circuit breaker.
The door frame installed on the distribution board door raises the protection class from IP20 to IP3X, protects the protruding front face of the circuit breaker as well as the cut edge of the panel door.
The door frame of the hw+ range includes flanges allowing it to be installed easily without tools. It can be installed on doors with a maximum thickness of 5 mm.



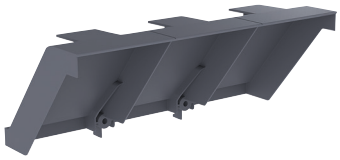
Example of a door
for a fixed circuit breaker



Example of a door frame
for a drawout circuit breaker

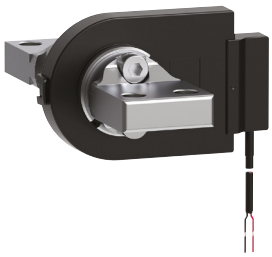
Refer to the dimensions for the size of the cut-out in the panel.
For drawout versions, the IP30 protection level is guaranteed in the connected position and in the test position.

Cut-off chamber cover



The cut-off chamber cover is an accessory mounted on fixed circuit breakers and switch-disconnectors connected with front connections.
This cover prevents exhaust gases reaching the connections when tripping occurs. This prevents electrical arcs being created between the connections.
The installation of a cut-off chamber cover is mandatory in the case of a fixed circuit breaker with front connections and vertical connectors facing forward.
It should be noted that a cut-off chamber cover is installed as standard on drawout circuit breakers.

ENCT external neutral sensor



The ENCT external neutral current sensor allows neutral protection to be provided 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 and connects to the electronic trip unit by the circuit breaker's ESP terminal connection.
4th S1 and 4th S2: connection of the ENCT sensor for 3-pole circuit breakers.

Marking of the ENCT external neutral sensor terminals

ESP	
5^{th} S1	4^{th} S1
5^{th} S2	4^{th} S2

Installation and operating recommendations

Altitude derating
Up to an altitude of 2000 m above sea level, there is no derating required for the electrical properties of hw+ circuit breakers.
However, above 2000 m, due to decrease in air density, the heat dissipation ability of the circuit breaker is reduced and decreases the dielectric strength. A derating factor must be applied , for that, please consult us.

Circuit breaker marking
Markings on hw+ circuit breaker comply with the International Standard IEC 60947-1, Appendix C.

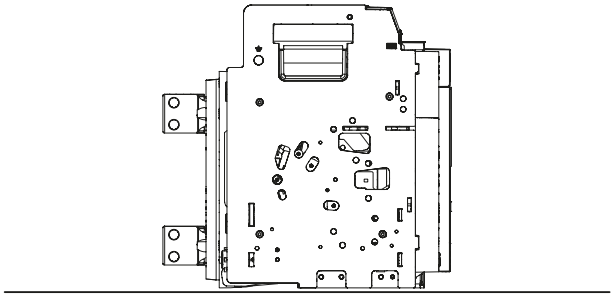
Vibrations
hw+ circuit breakers withstand mechanical vibrations.
They comply with the standard IEC 60068-2-52:
– 2.0 to 13.2 Hz and amplitude ±1 mm
– 13.2 to 100 Hz acceleration ±0.7 G
– Resonance frequency ±1 mm/±0.7 G for 90 minutes
Excessive vibration may cause nuisance (false) tripping and/or damage to connections and/or mechanical parts.

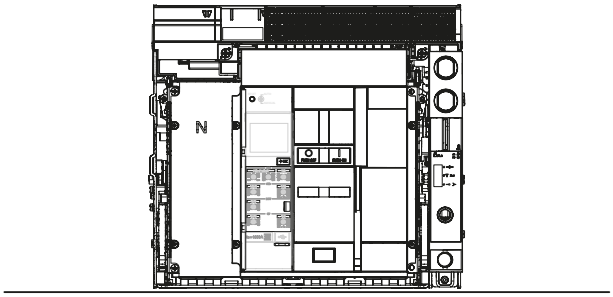
Electromagnetic interference
hw+ circuit breakers are protected against:
– overvoltage caused by circuit switching,
– overvoltage caused by atmospheric disturbances or a distribution system fault (e.g. failure of a lightning protection system),
– devices emitting radio waves (radios, walkie-talkies, radar, etc.),
– electrostatic discharges produced directly by users.

hw+ circuit breakers have successfully passed the electromagnetic compatibility tests (EMC) with immunity levels listed in the chapter on General Characteristics.

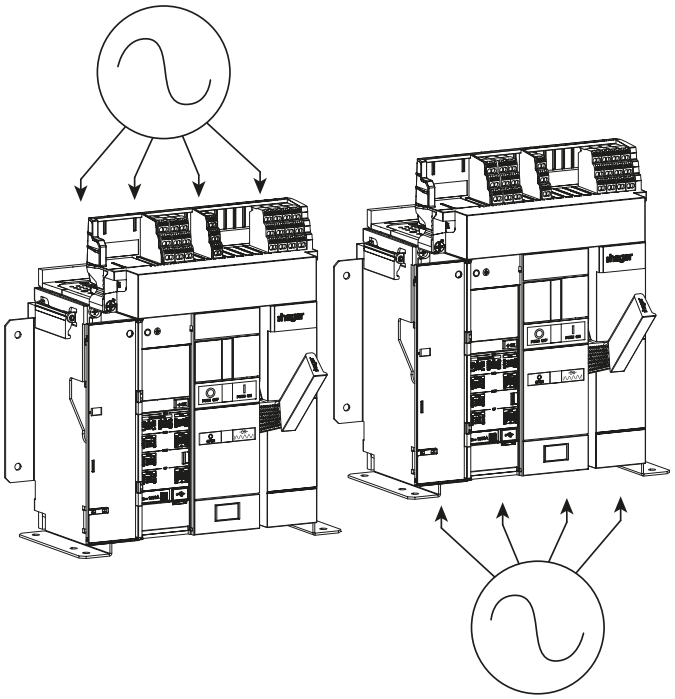
IP protection ratings
The IP protection class of the hw+ circuit breakers depend on their integration into their cabinets. The front and the connection terminal blocks are IP20.
IP3 X is achieved if the hw+ circuit breaker is installed in a switchboard with use of the "DF door chassis" - Page 71.

Mounting position
The circuit breakers must be mounted vertically.





Direction of power supply
The circuit breakers can be powered from either the top or the bottom connections, without any decrease in performance. All connections and isolation accessories can be used on circuit breakers powered either from the top or from the bottom.



Reclassification due to temperature
hw+ circuit breakers are calibrated at an ambient temperature of 50°C for overload protection. The temperature reclassifications given below are as per the IEC 60947-2 conditions for tests performed in the open air.

Influence of ambient temperature on rated current values (In) of electronic circuit breakers

The temperature of electronic circuit breakers depends on the operating current and ambient temperature.

However, ambient temperature does not affect the protection setting of electronic circuit breakers.

Derating table for rated current:

Fixed version

	Temperature °C			
In (A)	**50**	**60**	**65**	**70**
400	400	400	400	400
630	630	630	630	630
800	800	800	800	800
1000	1000	1000	1000	1000
1250	1250	1250	1250	1250
1600	1600	1600	1600	1530

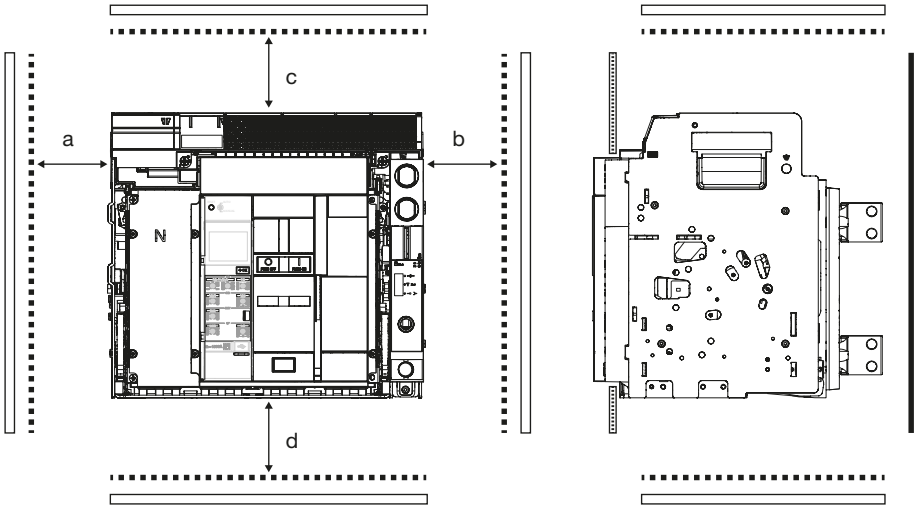
Drawout version

	Temperature °C			
In (A)	**50**	**60**	**65**	**70**
400	400	400	400	400
630	630	630	630	630
800	800	800	800	800
1000	1000	1000	1000	1000
1250	1250	1250	1250	1250
1600	1600	1600	1530	1457

Safety clearances and minimum distances
The safety clearance distances between the circuit breaker and its enclosure parts (grounded metal parts) must be maintained to prevent arcing faults.

In some cases where other specifications require different isolation distances to those shown here, the greater distance must be maintained. If two different circuit breaker models are installed one above the other, the safety clearance distance between the two models should comply with the model specifications of the bottom circuit breaker.

Minimum distance between the circuit breaker and the top, bottom or side metallic panel



Fixed version

≤ 690 V AC	Earthed metal part	Non-metallic part
a (mm)	≥ 60	0
b (mm)	≥ 60	0
c (mm)	≥ 100	0
d (mm)	0	0

Drawout version

≤ 690 V AC	Earthed metal part	Non-metallic part
a (mm)	0	0
b (mm)	0	0
c (mm)	0	0
d (mm)	0	0

Power dissipation

The power dissipation values of hw+ circuit breakers are used to calculate the temperature rise in the distribution board in which they are installed.

The values given in the tables below are typical values for a device operating at a full rated load with a frequency of 50/60 Hz.

The value of the resistance per pole is provided as a general indication for a new device. It is determined on the basis of the measured voltage drop.

The value given is the power dissipation per pole at In, 50/60 Hz. Measurement and calculation of power dissipation are carried out in compliance with the recommendations of Appendix G of standard IEC 60947-2.

Total power loss at full rated load and a frequency of 50/60 Hz is equal to the power losses per pole multiplied by 3.

Power dissipation of the circuit breakers

Number of poles	Version	Rating In (A)	Z per pole (mΩ)	P / pole (W)	Total P / circuit breaker (W)
3 /4	Fixed	400	10.8	1.7	5.2
		630	11.5	4.6	13.7
		800	12.4	7.9	23.8
		1000	15.7	15.7	47
		1250	13.9	21.7	65.1
		1600	17	43.4	130.2
	Drawout	400	38.8	6.2	18.6
		630	39.6	15.7	47.1
		800	40.4	25.9	77.6
		1000	43.7	43.7	131.1
		1250	41.9	65.5	196.5
		1600	46.7	119.5	358.6

Additional power dissipation

Power dissipation caused by the connection accessories has to be taken into account. Thus, the total power dissipation is equal to the sum of the power losses of the circuit breaker and all the corresponding connection accessories.

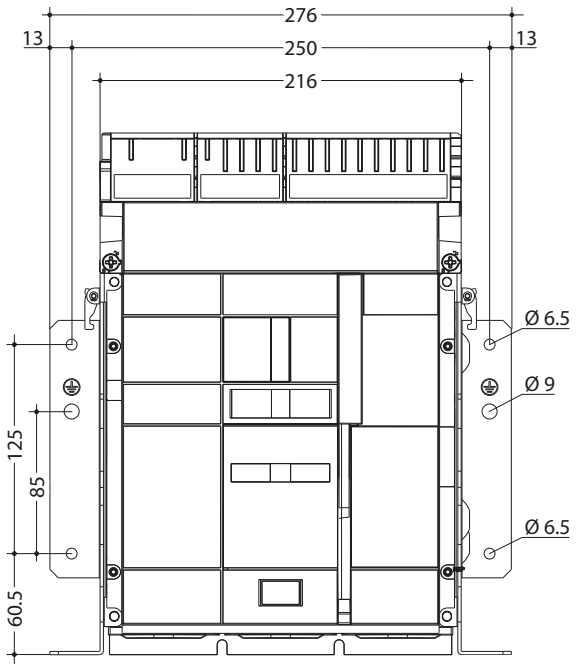
Power dissipation of the circuit breakers

Number of poles	Version	Rating In (A)	Total P / circuit breaker (W)	Additional P/ accessory kit (W)				
				Rear connections	Front connections	Front connections with short terminal extensions in bottom position	Terminal extension spreaders	Vertical adapters
3	Fixed	400	5.2	2.5	3.3	/	3.3	3.6
		630	13.7	6.3	8.2	/	8.1	9
		800	23.8	10.2	13.2	/	13.1	14.5
		1000	47	15.9	20.7	/	20.4	22.7
		1250	65.1	24.8	32.3	/	31.9	35.5
		1600	130.2	40.7	53	/	52.2	58.2
	Drawout	400	18.6	2.5	3.5	5.2	3.3	3.6
		630	47.1	6.3	8.7	13	8.1	9
		800	77.6	10.2	14.1	20.9	13.1	14.5
		1000	131.1	15.9	22	32.6	20.4	22.7
		1250	196.5	24.8	34.3	50.9	31.9	35.5
		1600	358.6	40.7	56.2	83.4	52.2	58.2
4	Fixed	400	5.2	2.5	3.3	/	3.7	3.6
		630	13.7	6.3	8.2	/	9.1	9
		800	23.8	10.2	13.2	/	14.6	14.5
		1000	47	15.9	20.7	/	22.8	22.7
		1250	65.1	24.8	32.3	/	35.6	35.5
		1600	130.2	40.7	53	/	58.3	58.2
	Drawout	400	18.6	2.5	3.5	5.2	3.7	3.6
		630	47.1	6.3	8.7	13	9.1	9
		800	77.6	10.2	14.1	20.9	14.6	14.5
		1000	131.1	15.9	22	32.6	22.8	22.7
		1250	196.5	24.8	34.3	50.9	35.6	35.5
		1600	358.6	40.7	56.2	83.4	58.3	58.2

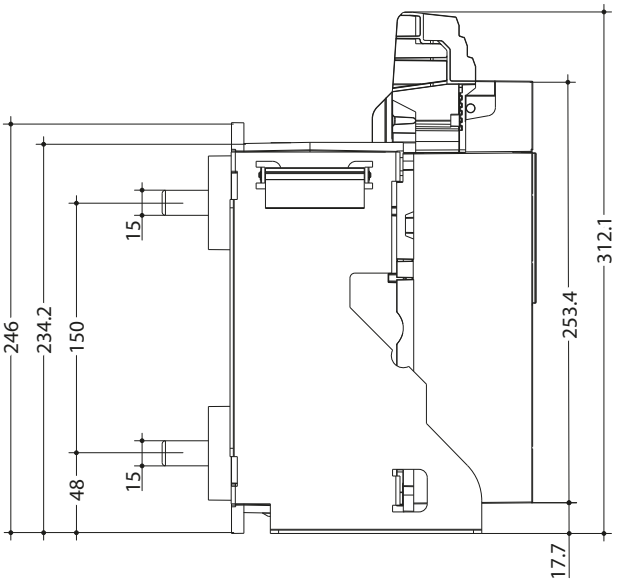
Dimensions

3 poles - Fixed version

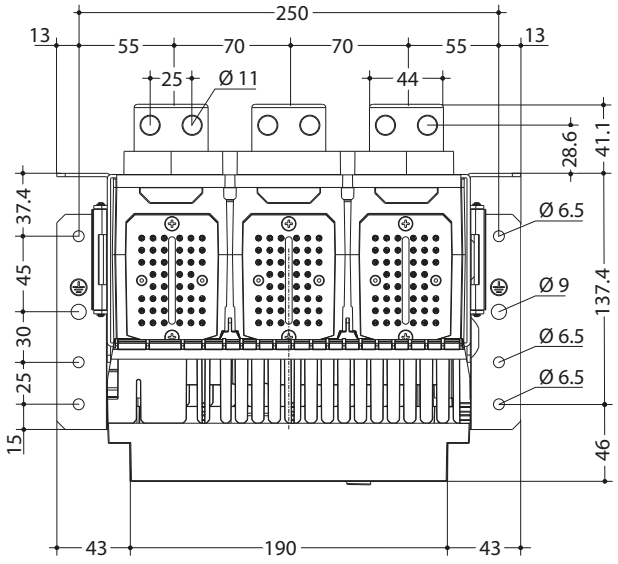
Front view



Side view

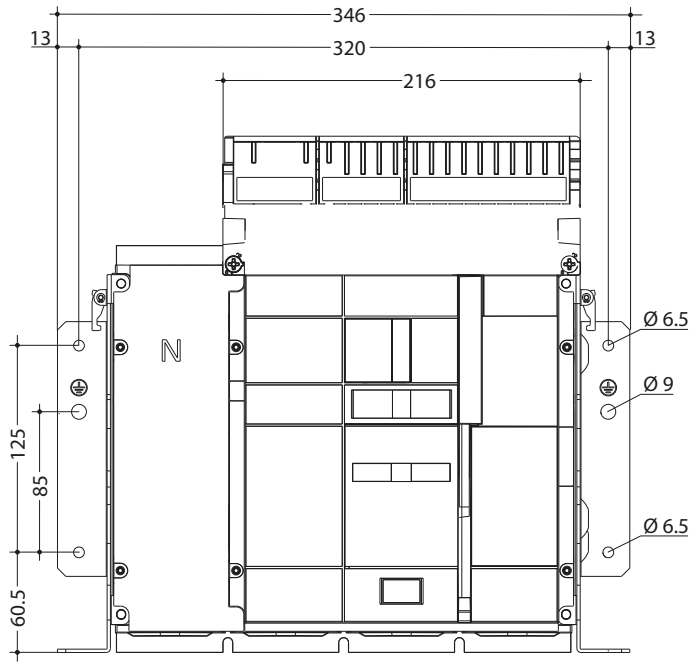


Top view

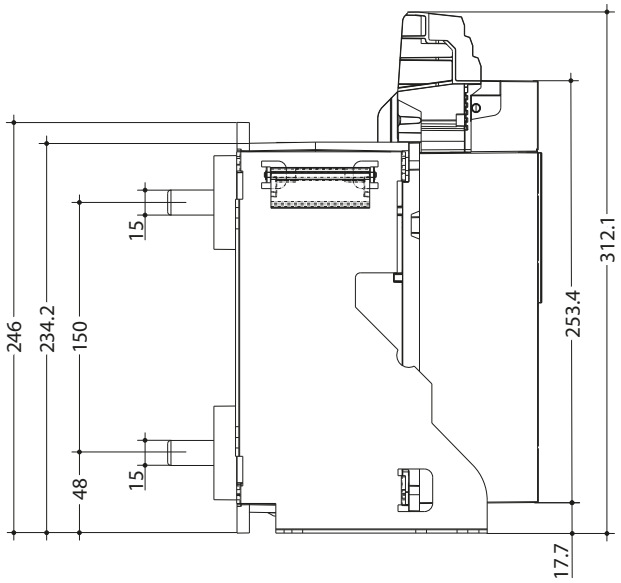


4 poles - Fixed version

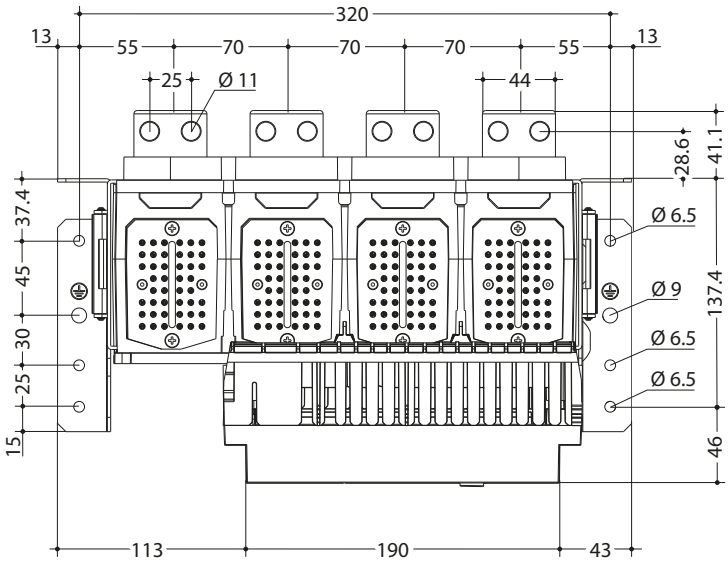
Front view



Side view

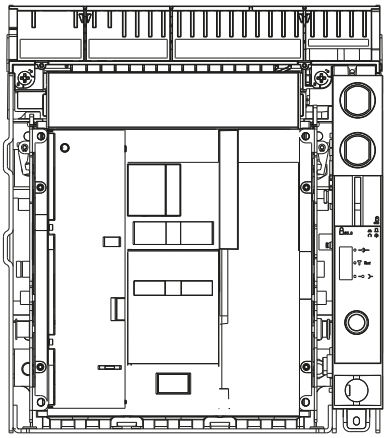


Top view

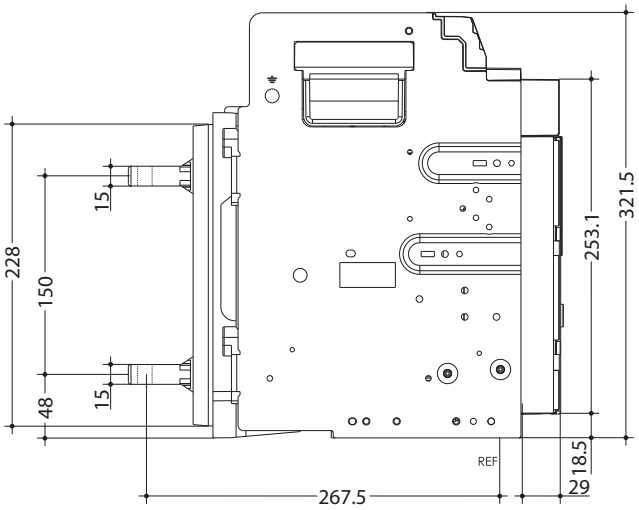


3 poles - drawout version

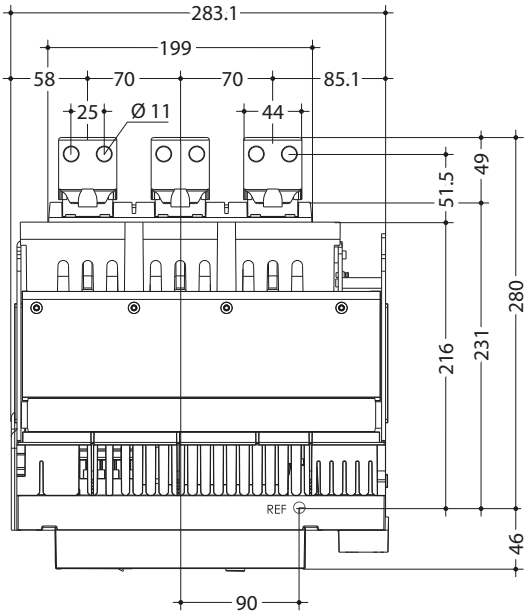
Front view



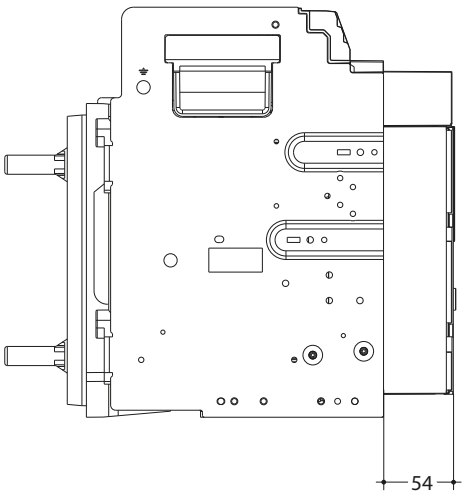
Side view



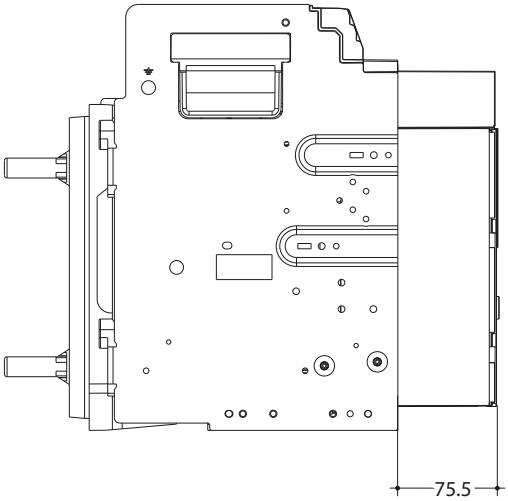
Top view



Test position

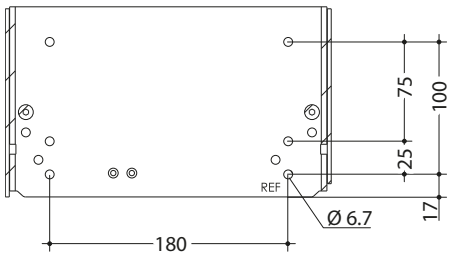


Disconnected position

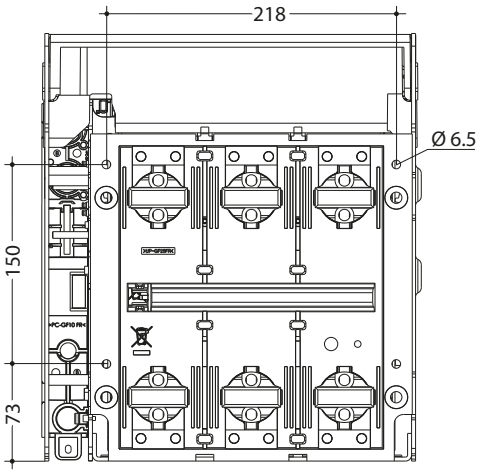


Chassis attachment

Bottom view

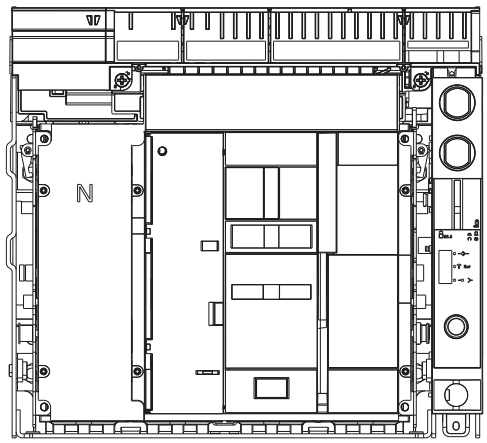


Rear view

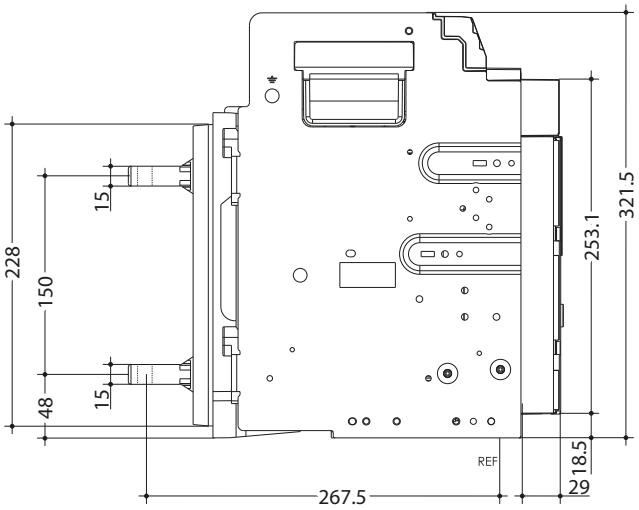


4 poles - drawout version

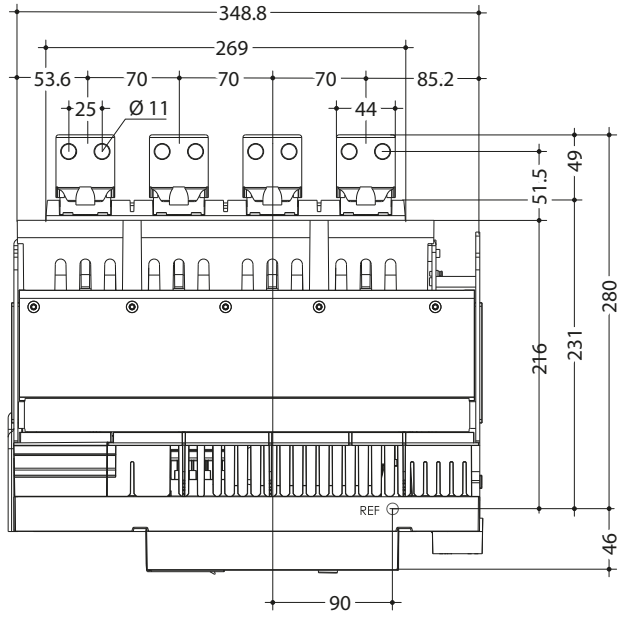
Front view



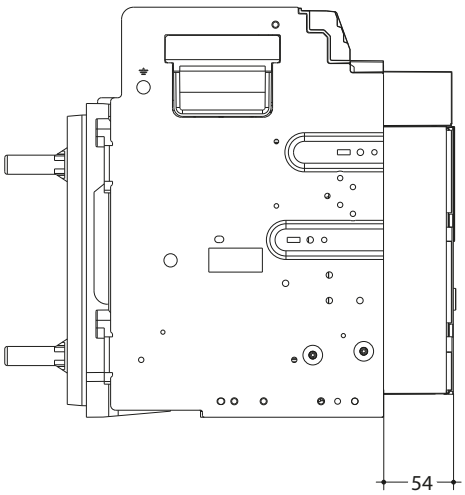
Side view



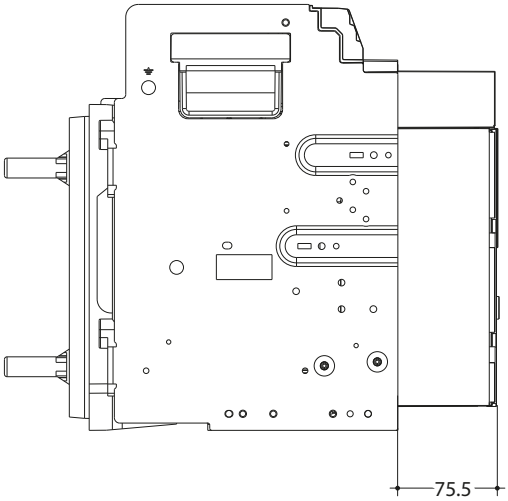
Top view



Test position

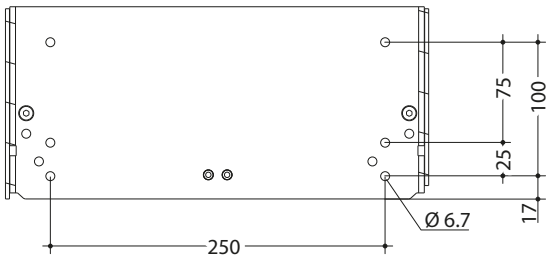


Disconnected position

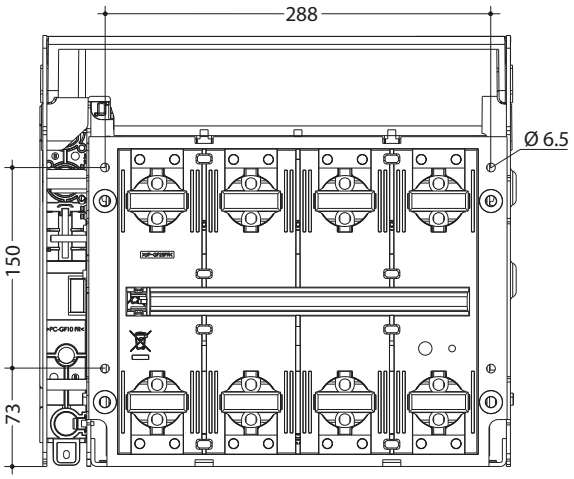


Chassis attachment

Bottom view



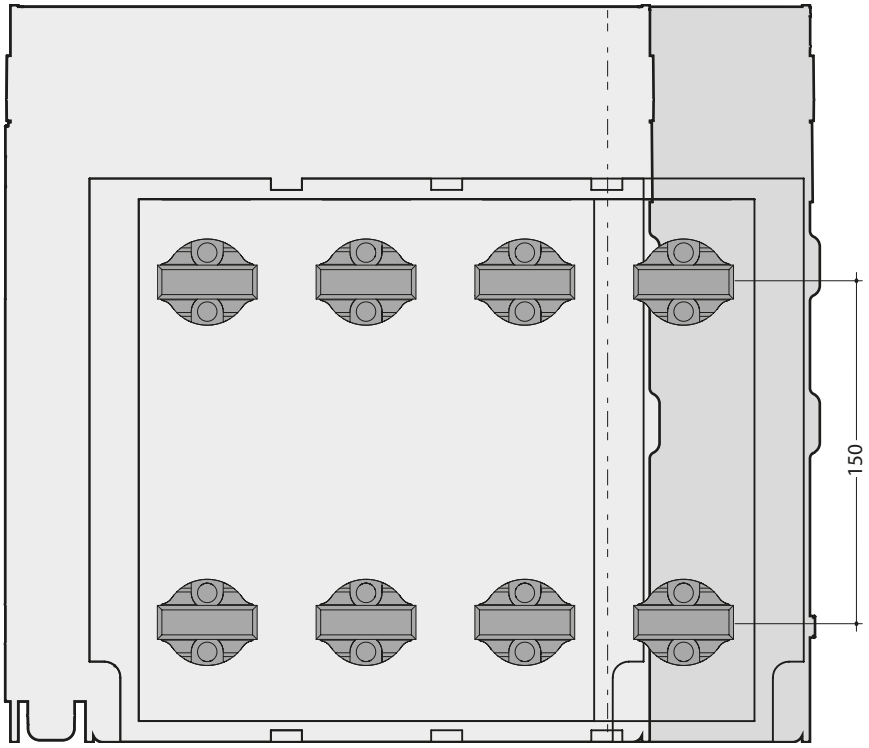
Rear view



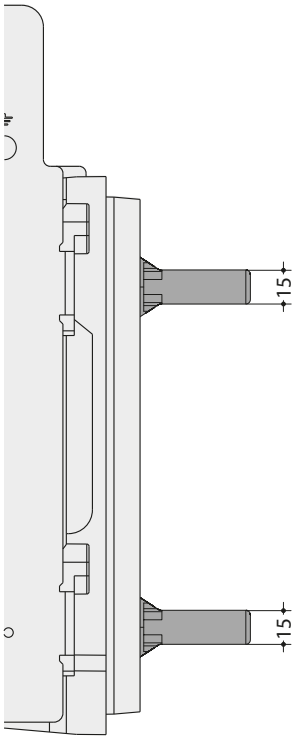
Rear horizontal RC connections

For fixed or drawout 3- or 4-pole version

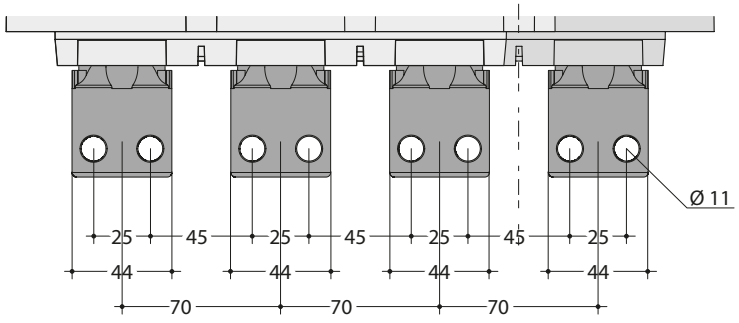
Rear view



Side view



Top view

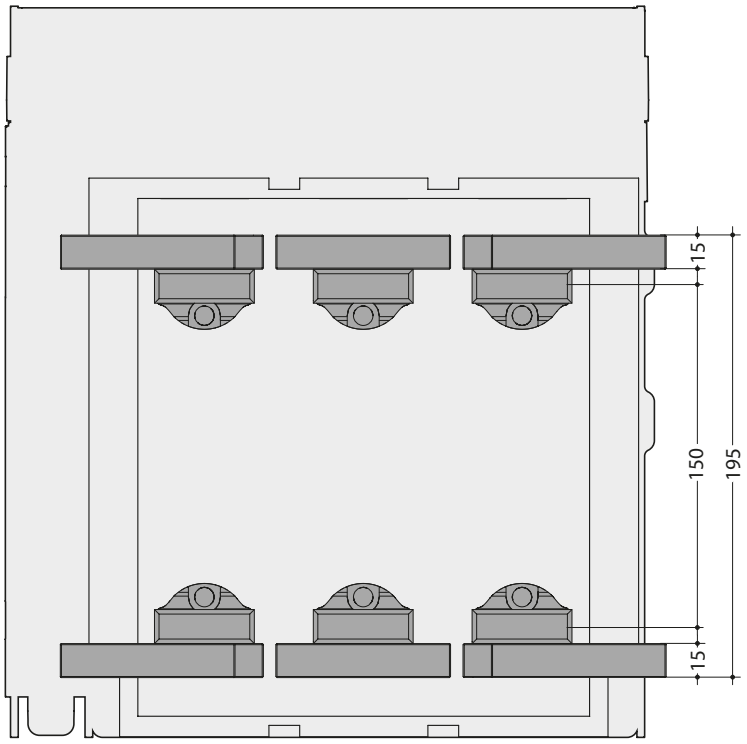


The illustration above shows a drawout version.
The dimensions given are valid for the fixed and drawout versions.

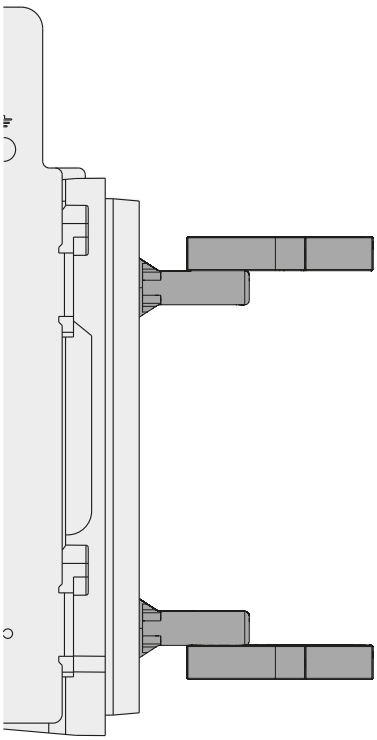
Rear horizontal RC connections

With SP spreaders for fixed or drawout 3-pole

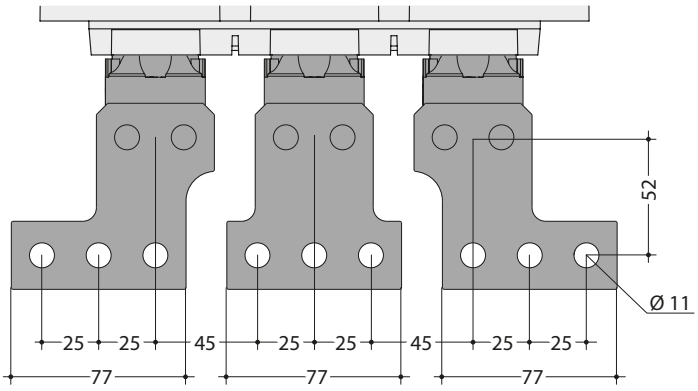
Rear view



Side view



Top view



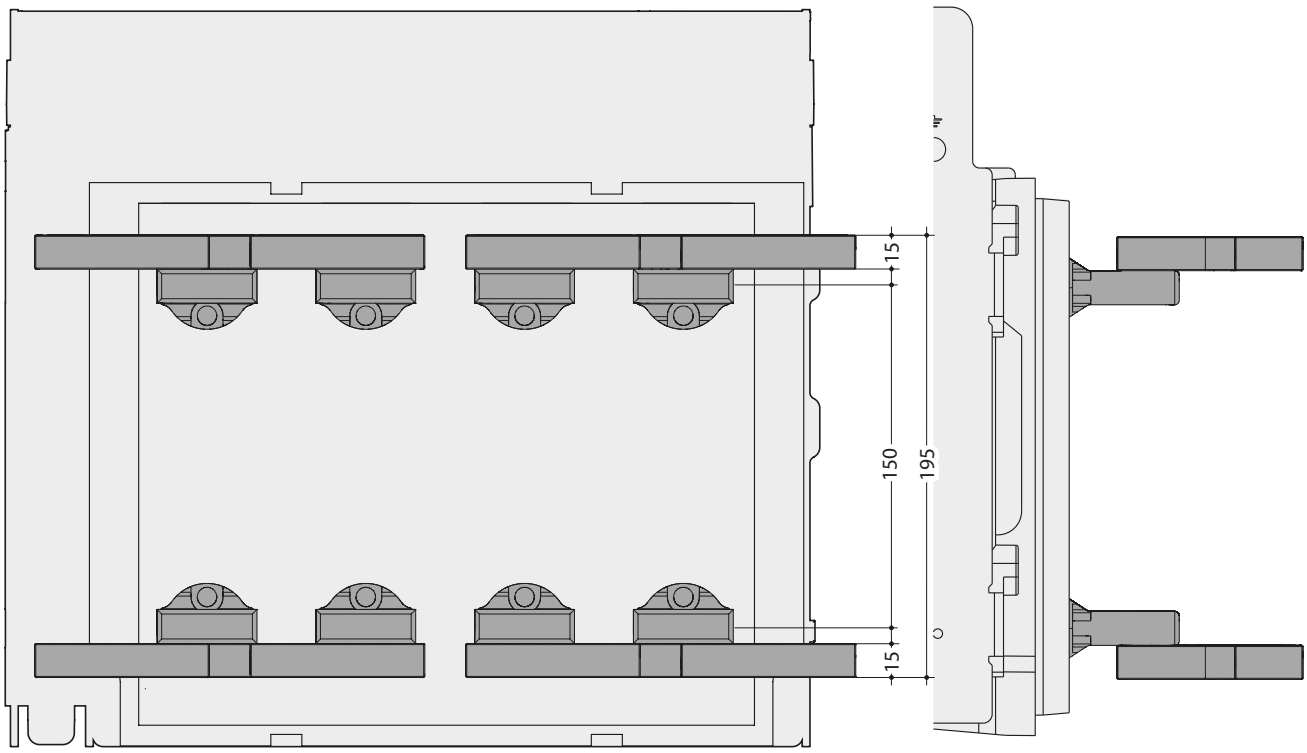
The illustration above shows a drawout version.
The dimensions given are valid for the fixed and drawout versions.

Rear horizontal RC connections

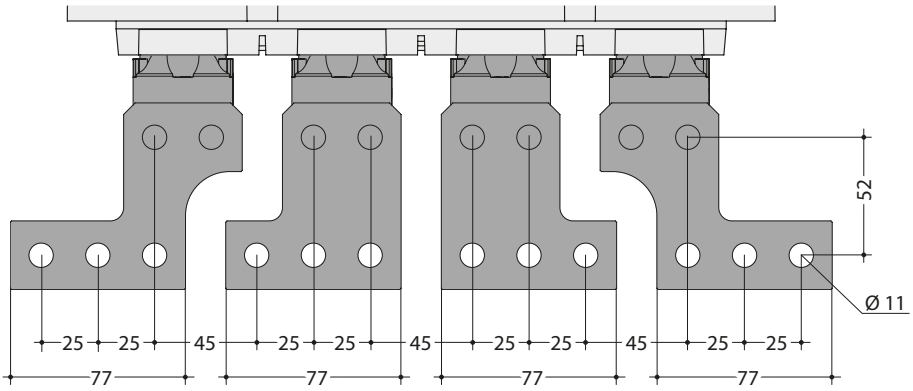
With SP spreaders for fixed or drawout 4-pole circuit breakers

Rear view

Side view



Top view

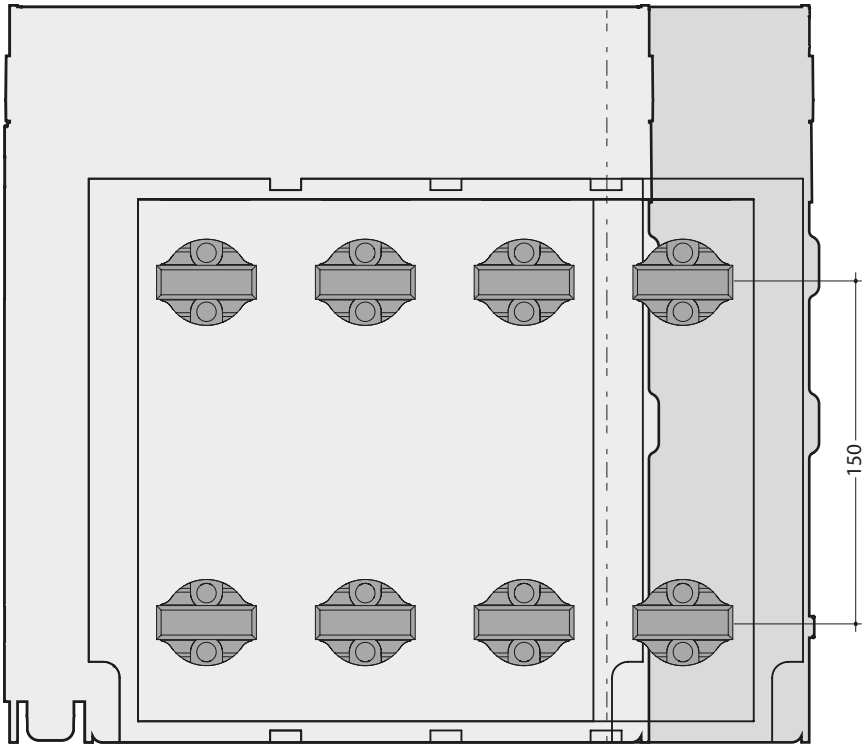


The illustration above shows a drawout version.
The dimensions given are valid for the fixed and drawout versions.

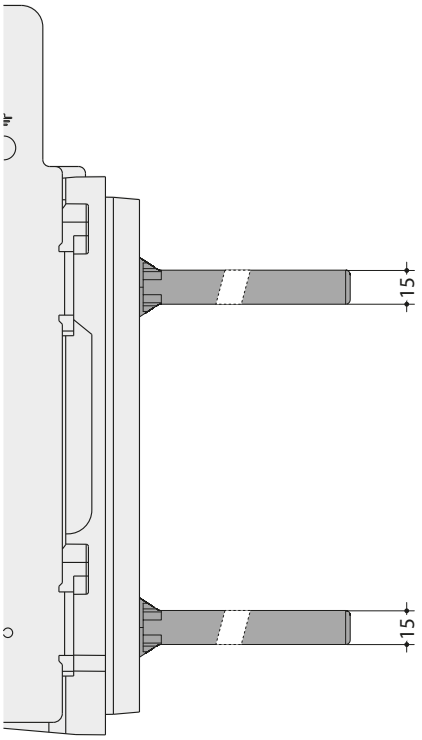
Rear horizontal RC connections

Long for UNIMES type distribution board for fixed or drawout 3- or 4-pole circuit breaker

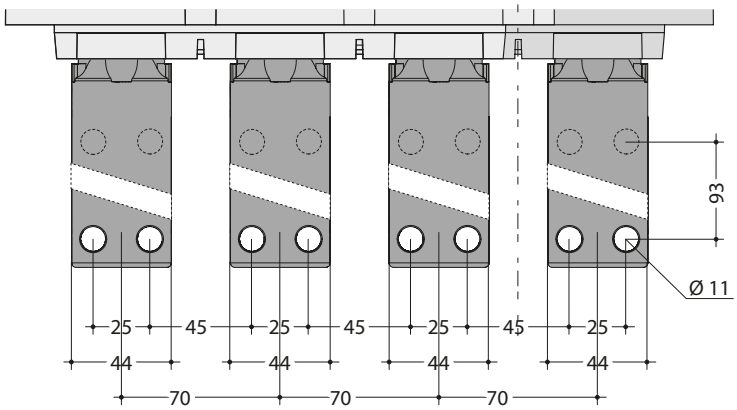
Rear view



Side view



Top view

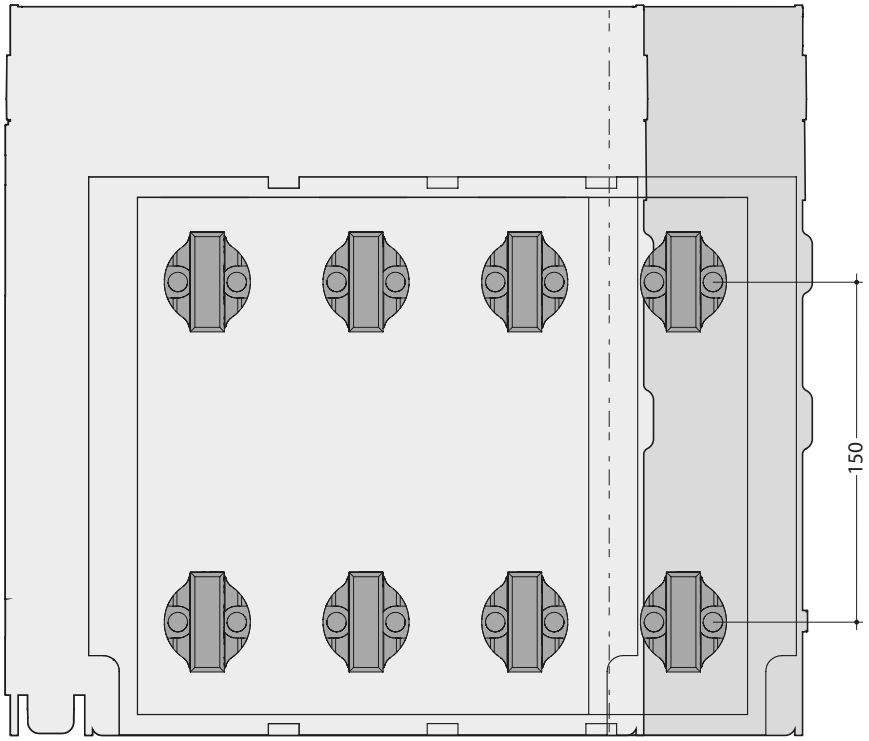


The illustration above shows a drawout version.
The dimensions given are valid for the fixed and drawout versions.

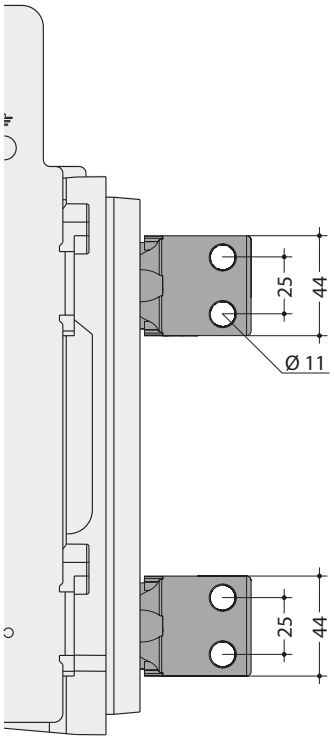
Rear vertical RC connections

For fixed or drawout 3- or 4-pole version

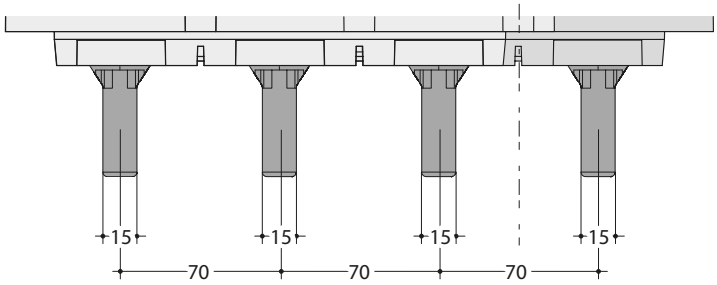
Rear view



Side view



Top view



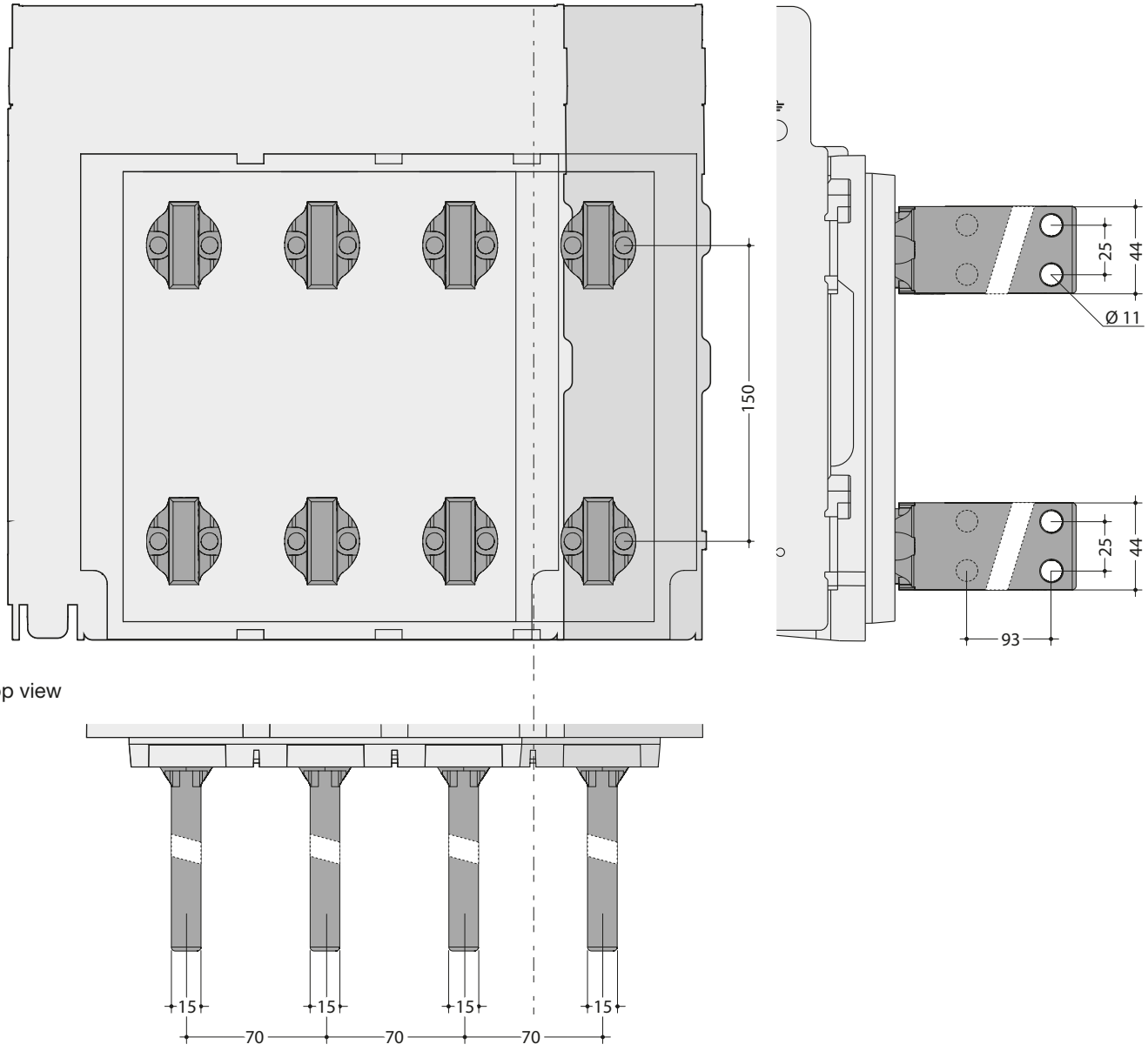
The illustration above shows a drawout version.
The dimensions given are valid for the fixed and drawout versions.

Rear vertical RC connections

Long for UNIMES type distribution board for fixed or drawout 3- or 4-pole circuit breaker

Rear view

Side view



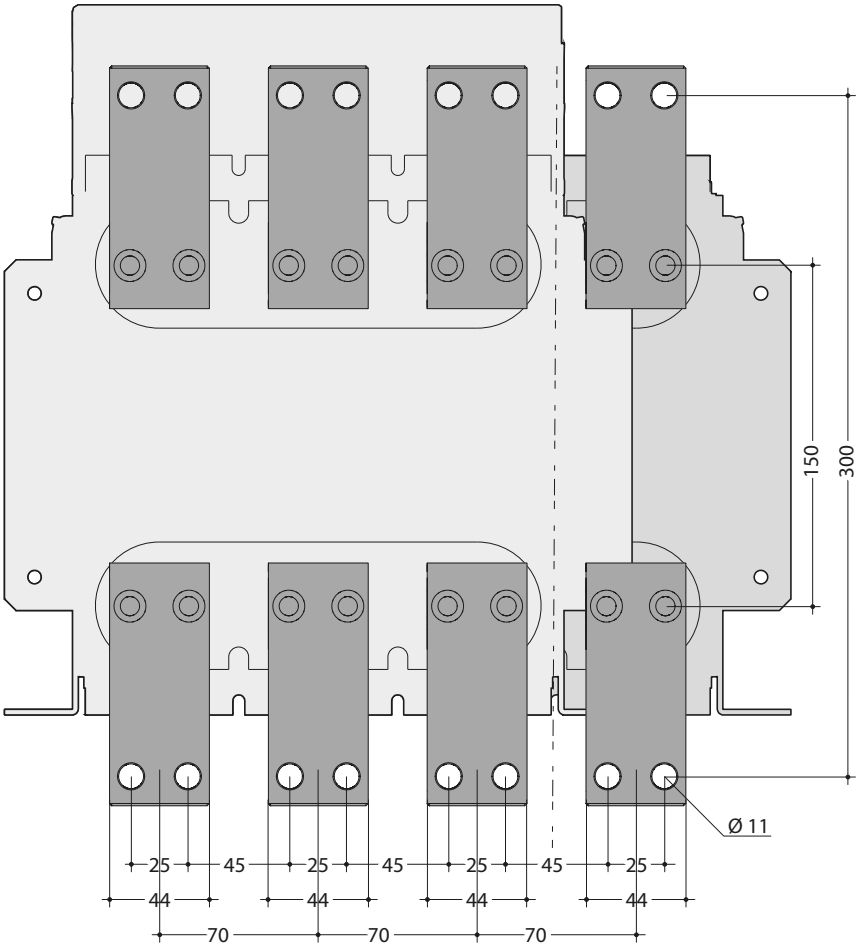
Top view

The illustration above shows a drawout version.
The dimensions given are valid for the fixed and drawout versions.

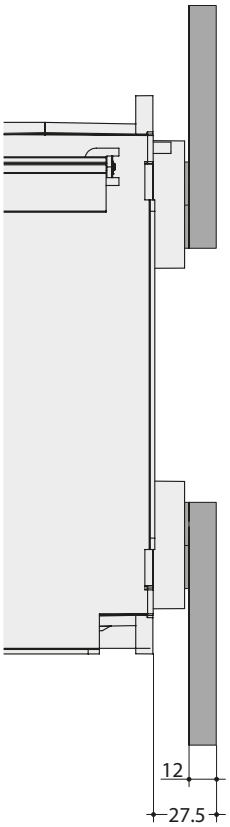
FC front connections

Front connections for fixed 3- or 4-pole circuit breaker

Rear view



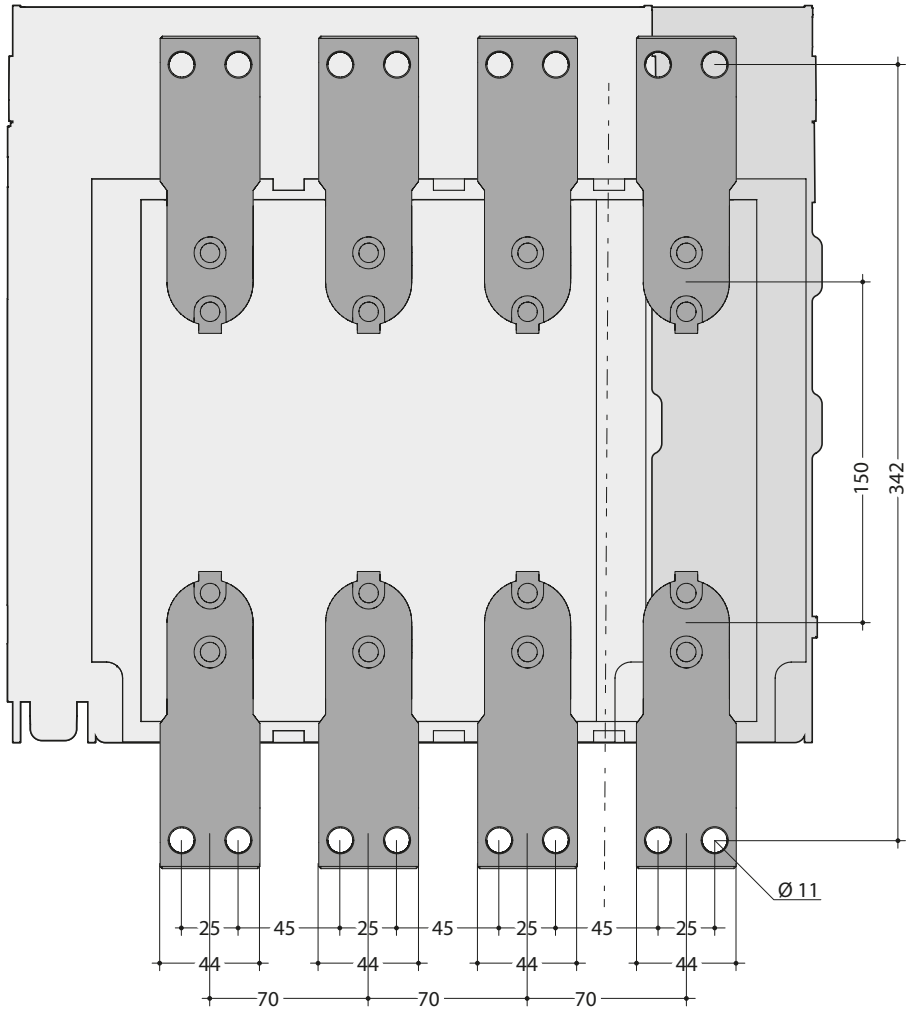
Side view



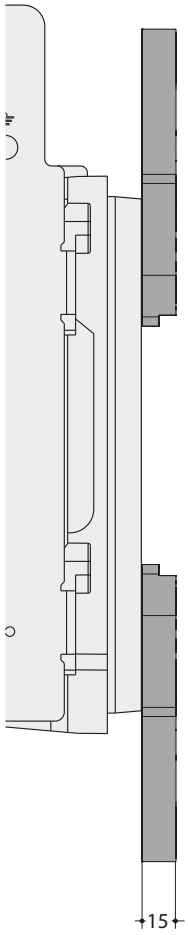
FC front connections

For drawout 3- or 4-pole circuit breaker

Rear view



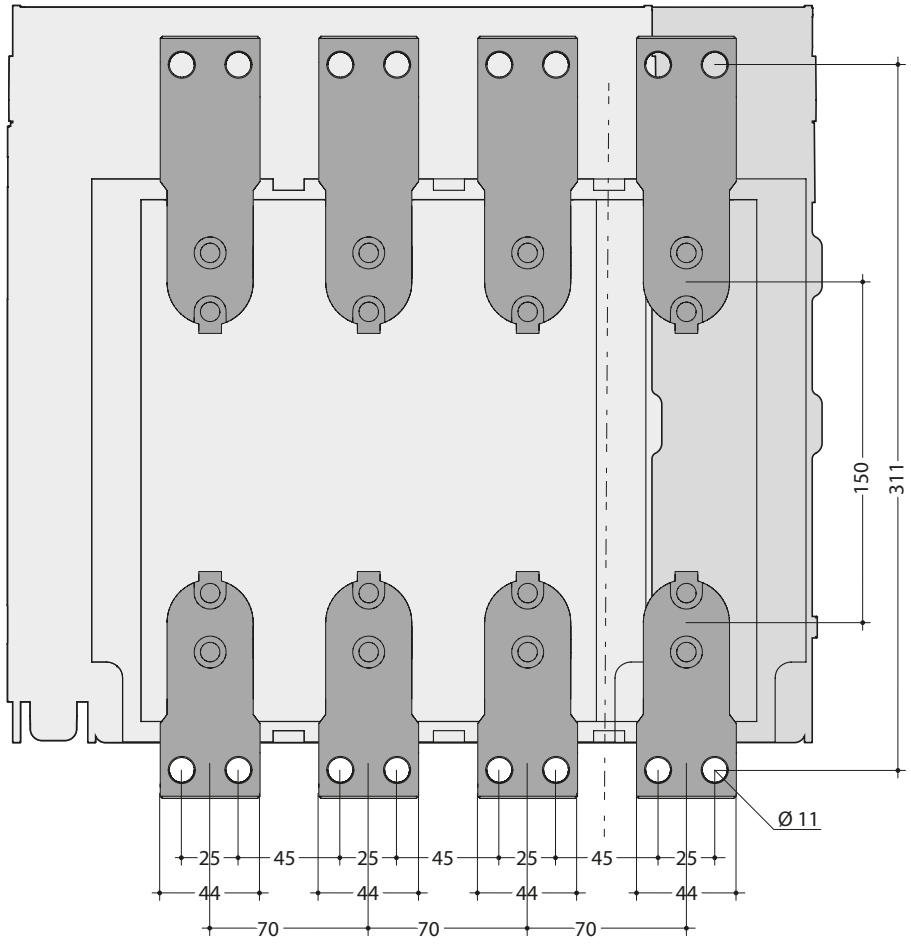
Side view



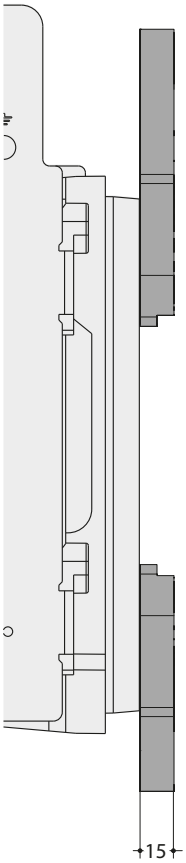
FC front connections

For drawout 3- or 4- pole circuit breaker with short terminal extensions in bottom position

Rear view

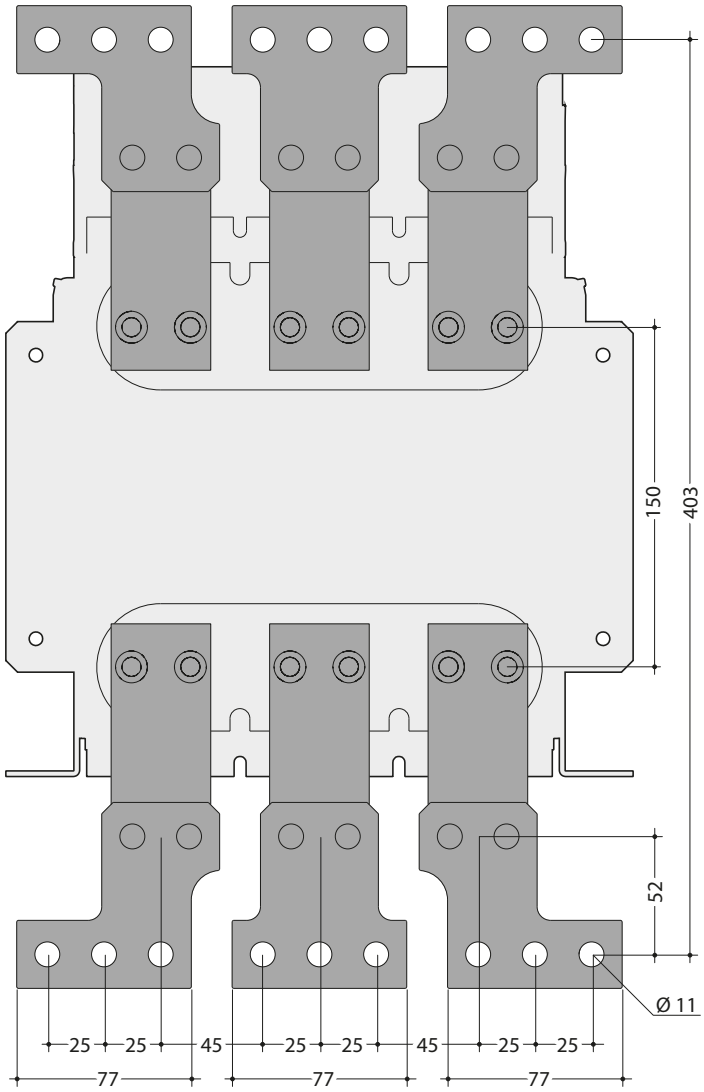


Side view



FC front connections with SP spreaders
For fixed 3 pole circuit breaker

Rear view

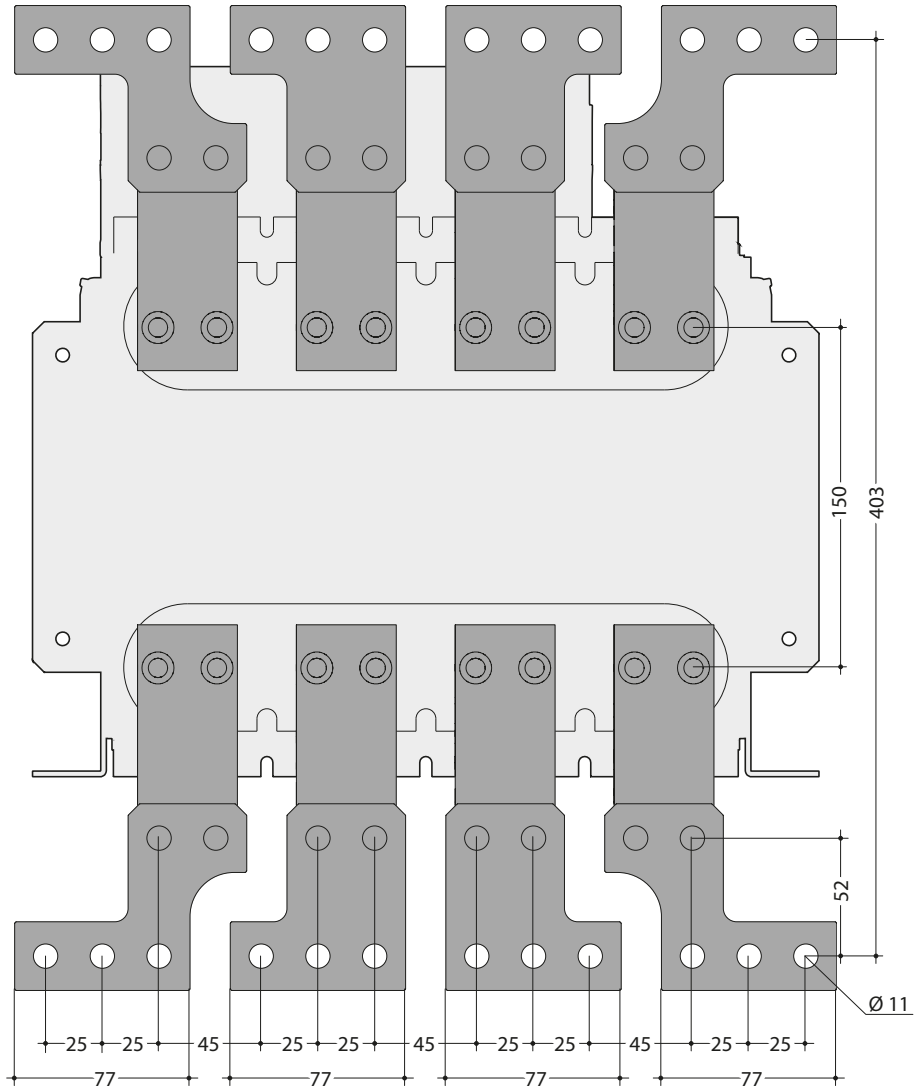


Side view

FC front connections with SP spreaders

For fixed 4 pole circuit breaker

Rear view

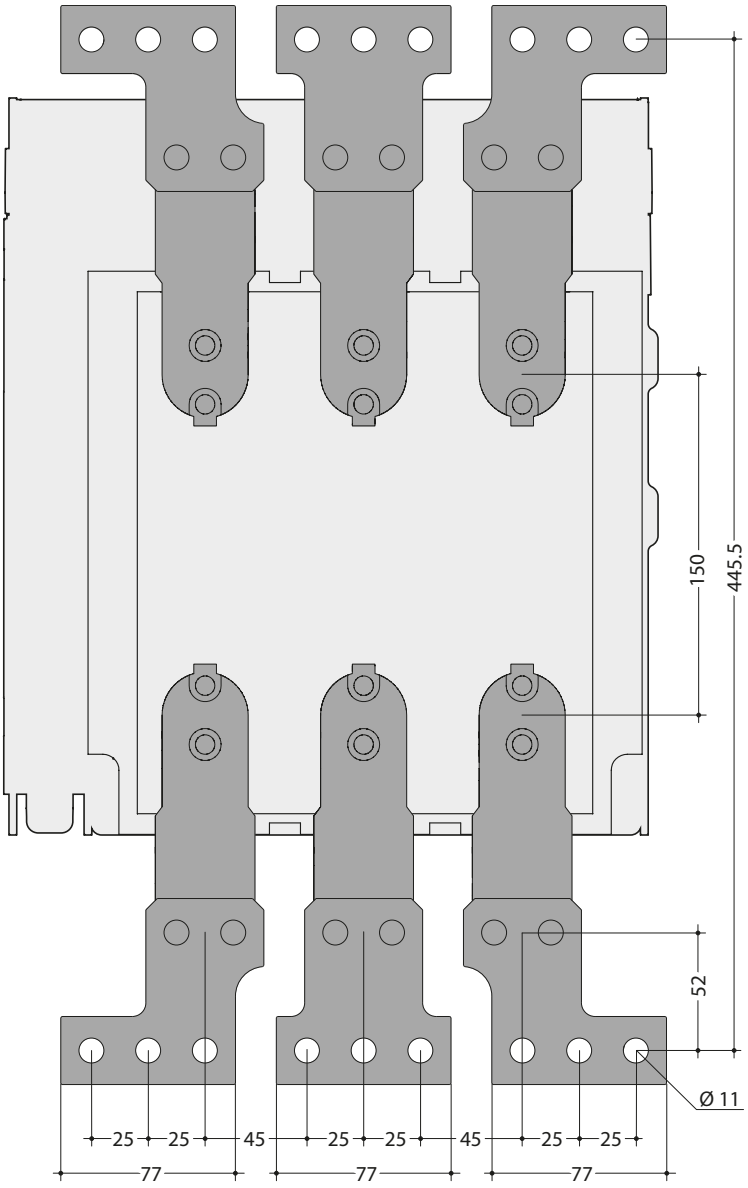


Side view

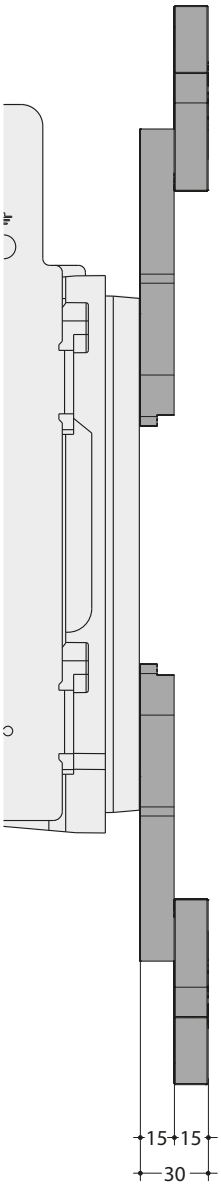
FC front connections with SP spreaders

For drawout 3 pole circuit breaker

Rear view



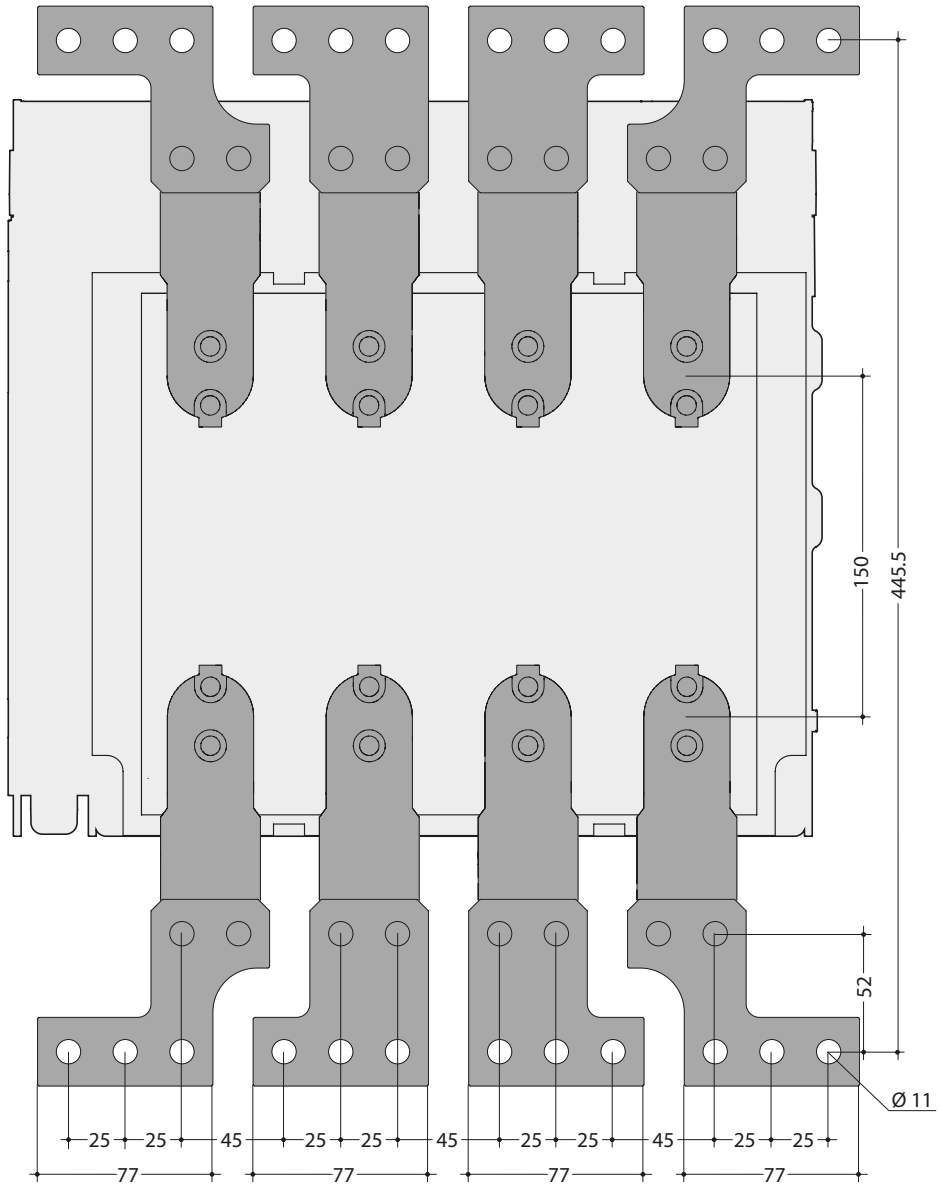
Side view



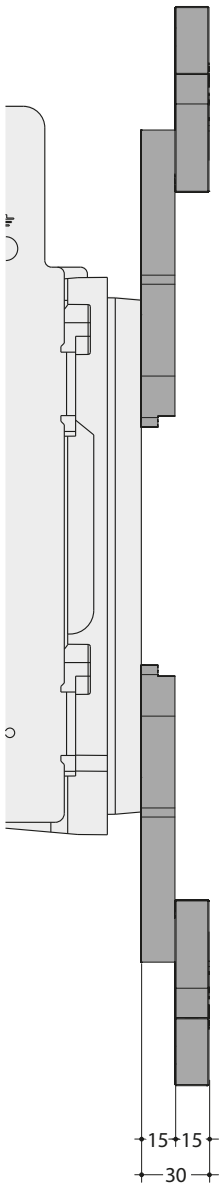
FC front connections with SP spreaders

For drawout 4 pole circuit breaker

Rear view



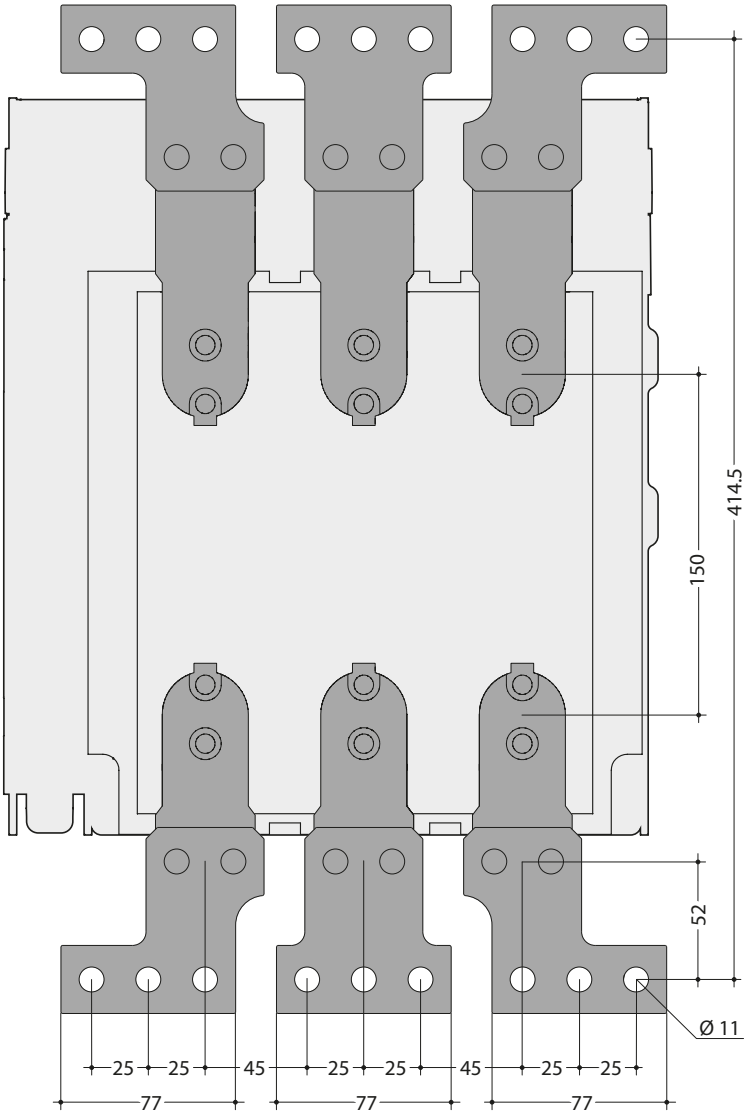
Side view



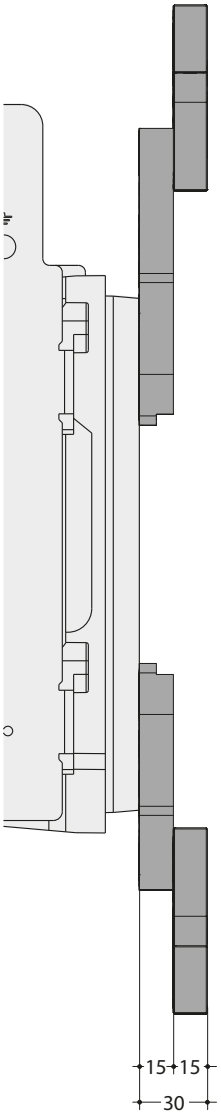
FC front connections with SP spreaders

For drawout 3-pole circuit breaker with short terminal extensions in bottom position

Rear view



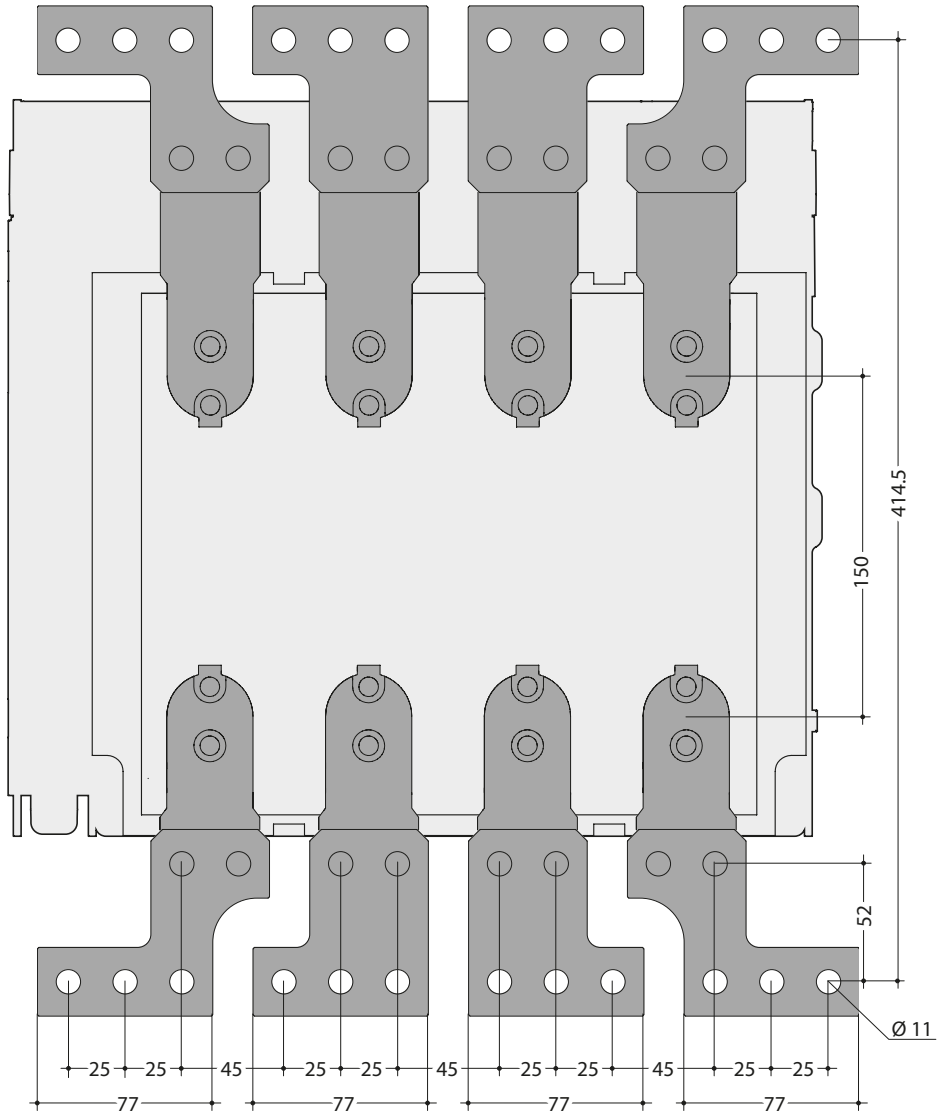
Side view



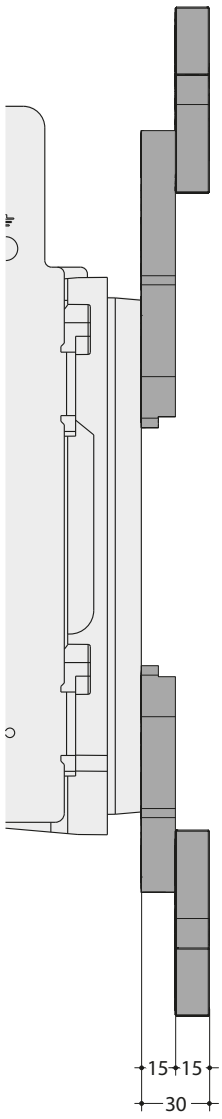
FC front connections with SP spreaders

For drawout 4-pole circuit breaker with short terminal extensions in bottom position

Rear view



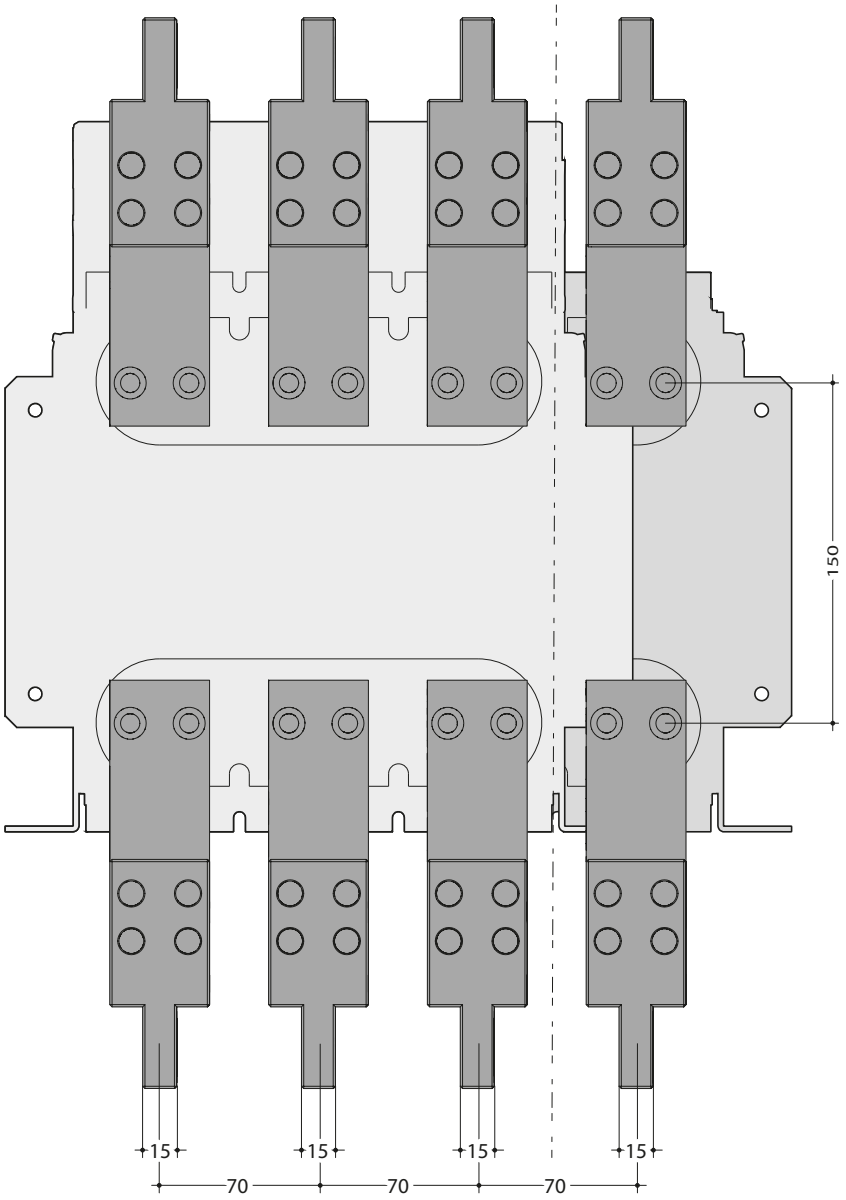
Side view



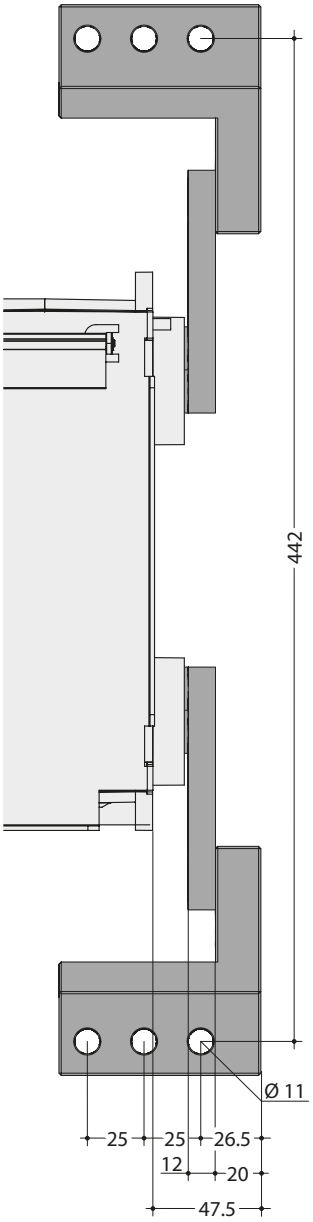
FC front connections with VCA vertical connectors

In front for fixed 3- or 4-pole circuit breaker

Rear view



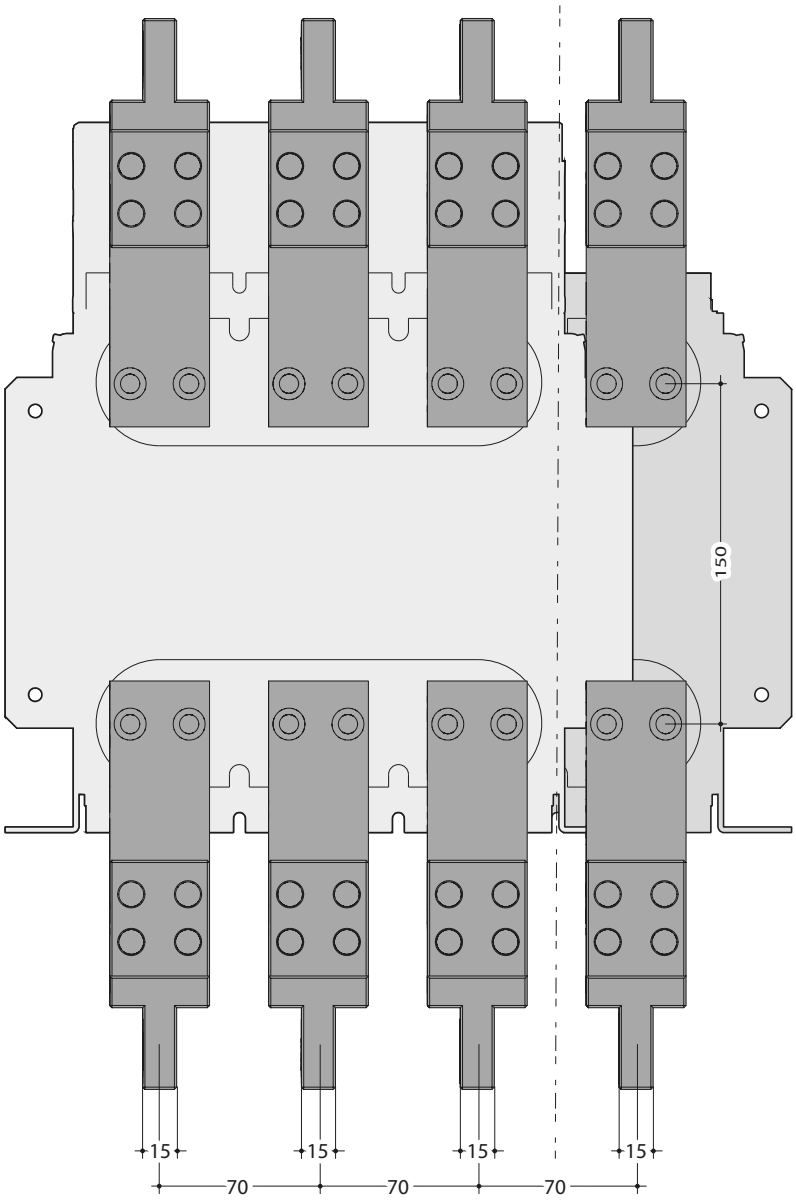
Side view



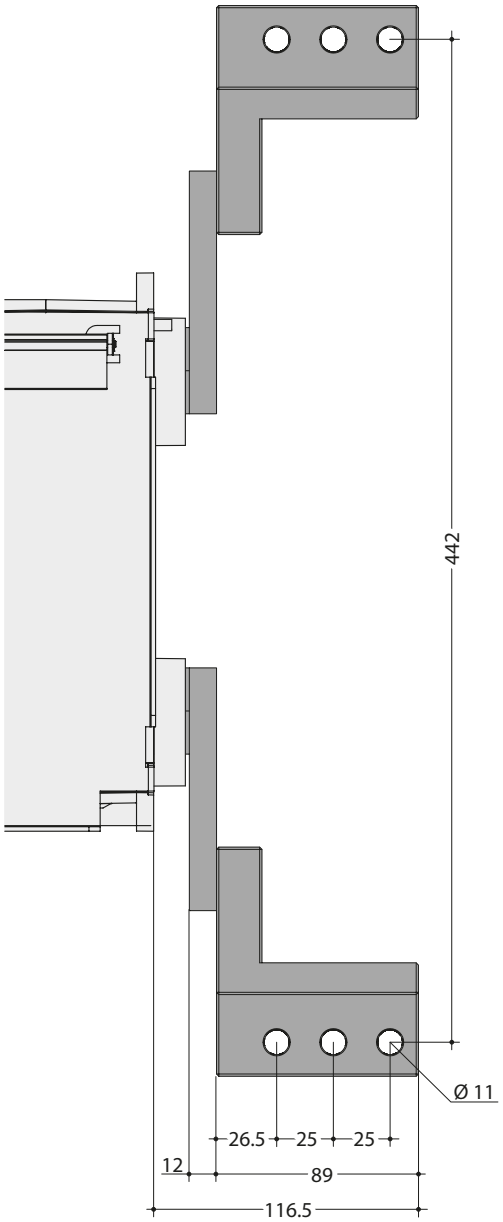
FC front connections with VCA vertical connectors

At rear for fixed 3- or 4-pole circuit breaker

Rear view



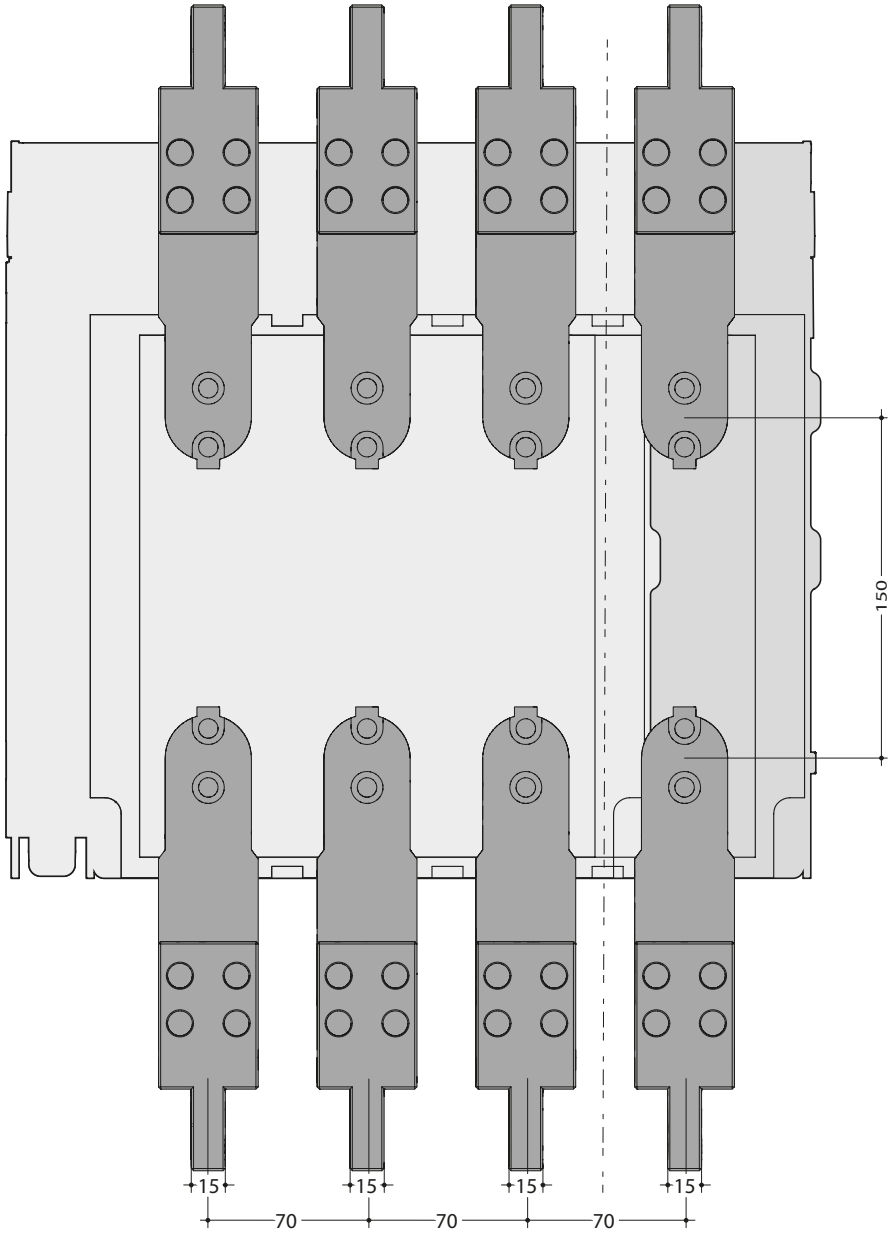
Side view



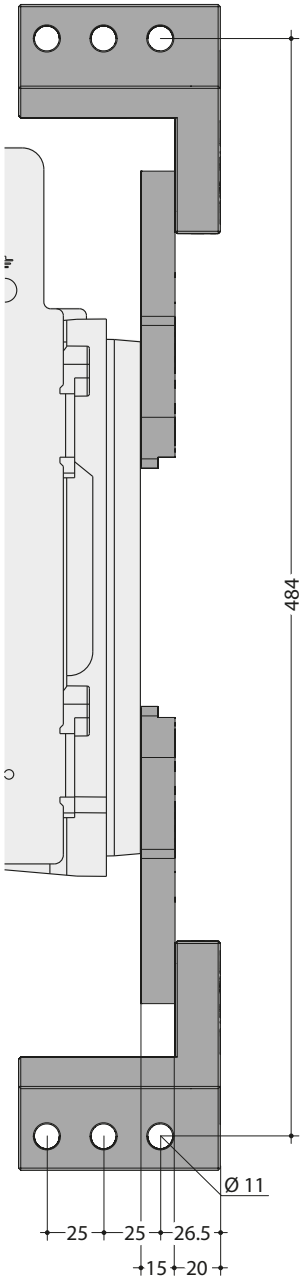
FC front connections with VCA vertical connectors

In front for drawout 3- or 4-pole circuit breaker

Rear view



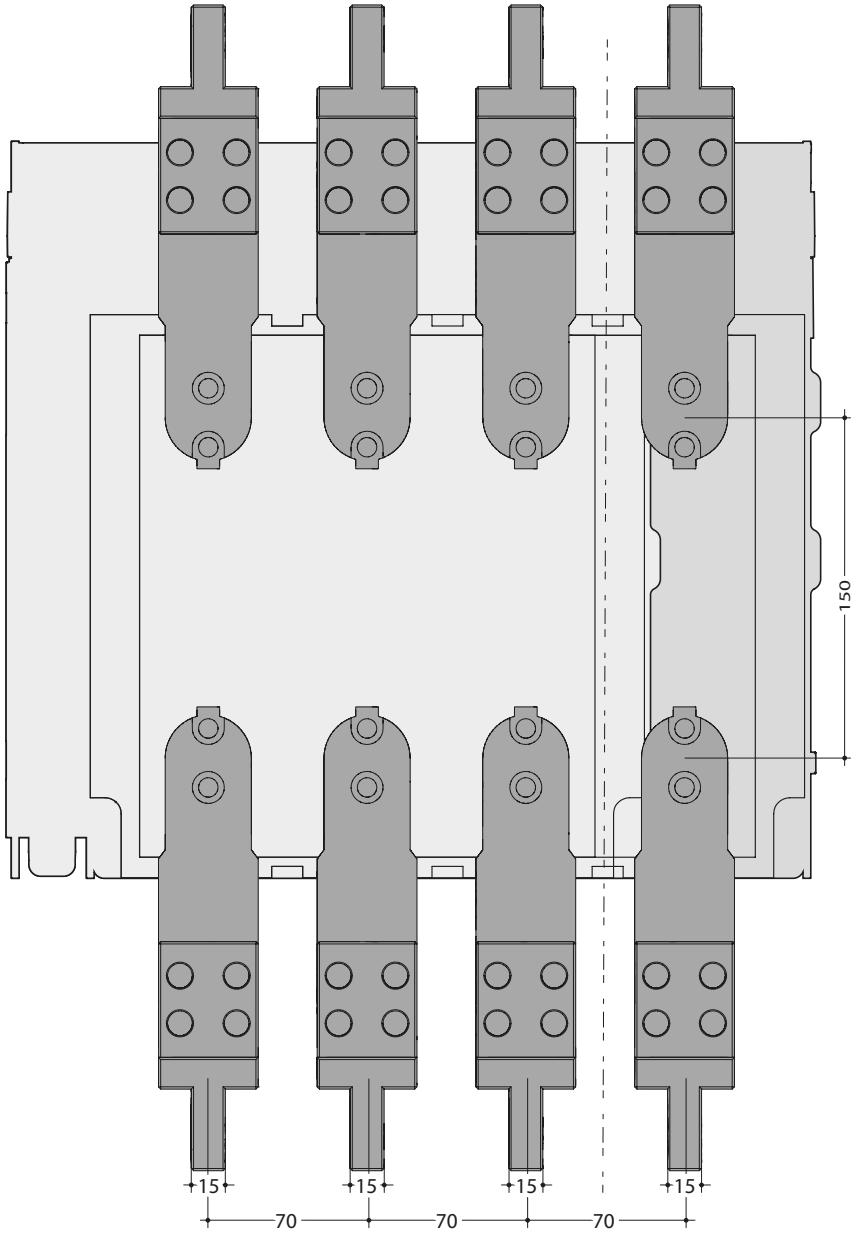
Side view



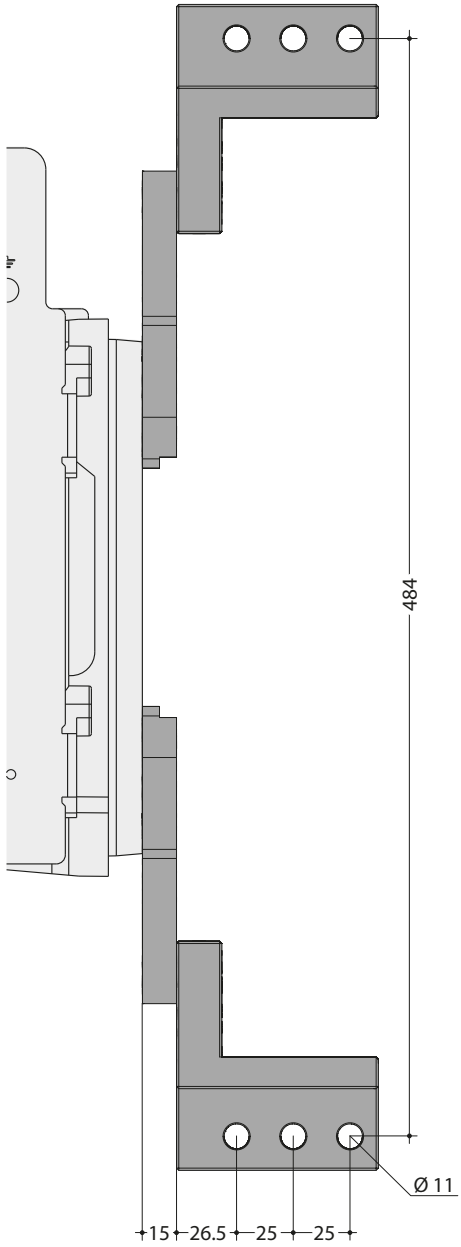
FC front connections with VCA vertical connectors

At rear for drawout 3- or 4-pole circuit breaker

Rear view



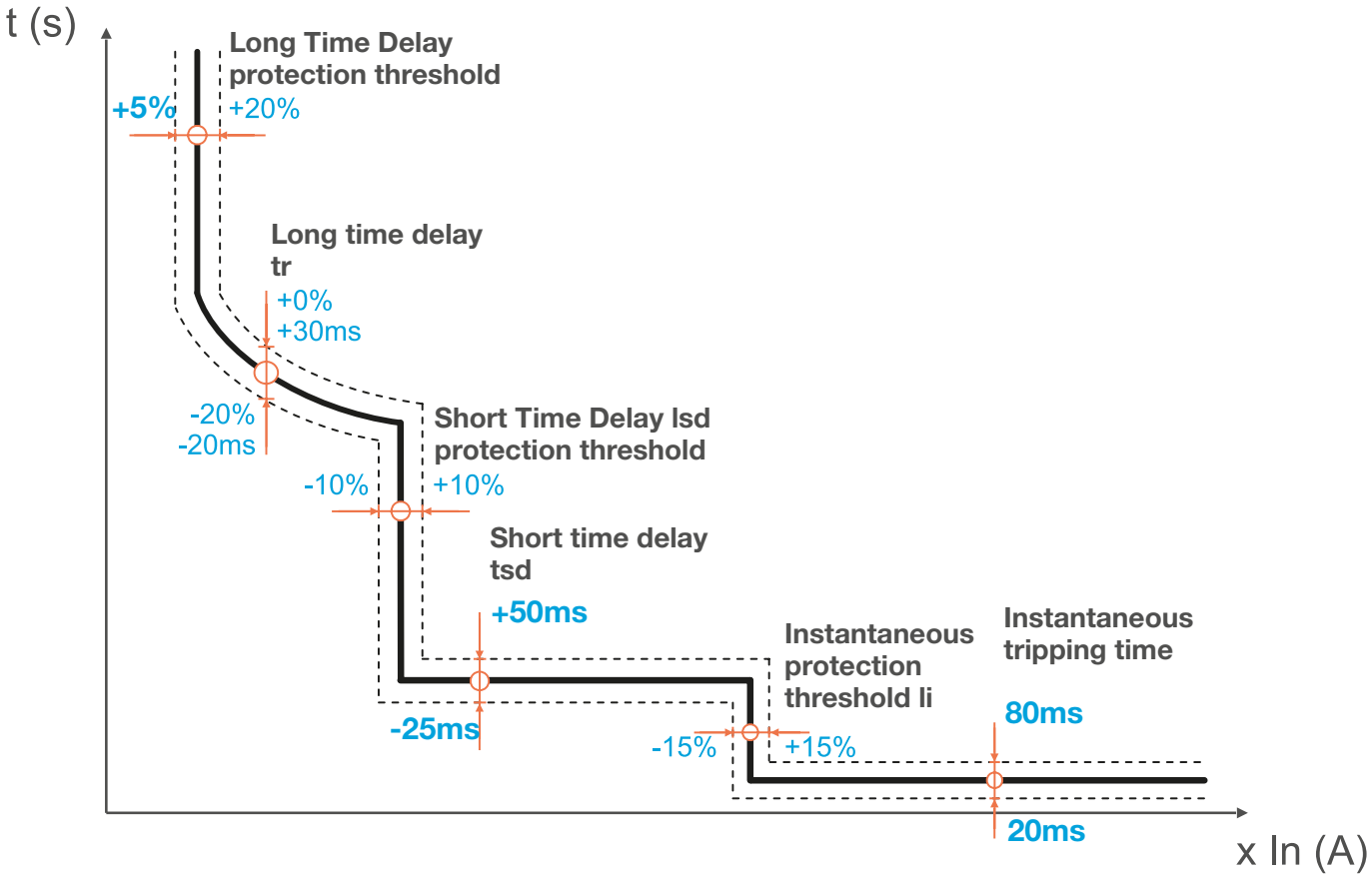
Side view



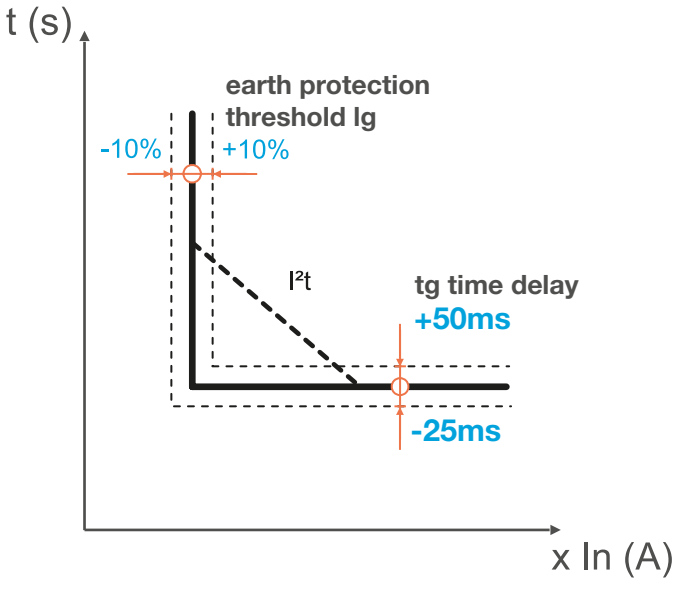
Complementary characteristics

Tripping tolerance of electronic trip units
The tolerances of the protection tripping curves for electronic trip units are described below.

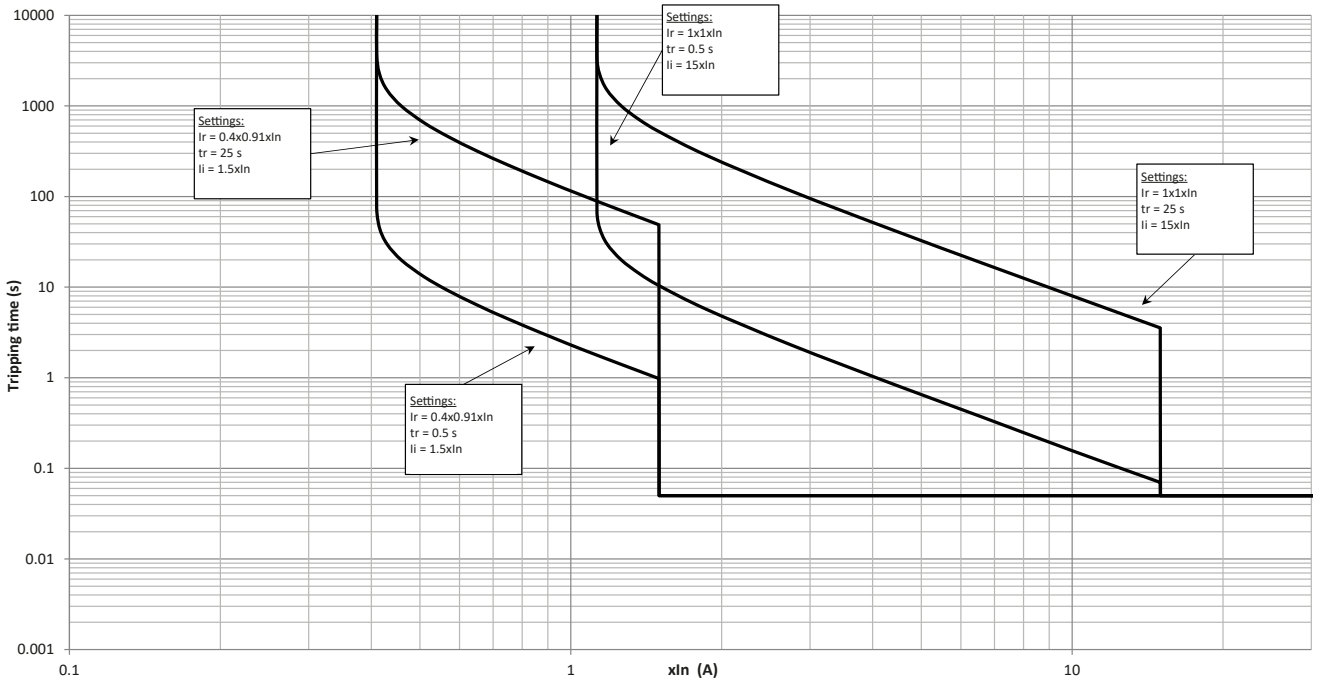
Tolerances of LI, LSI and LSIG tripping curves



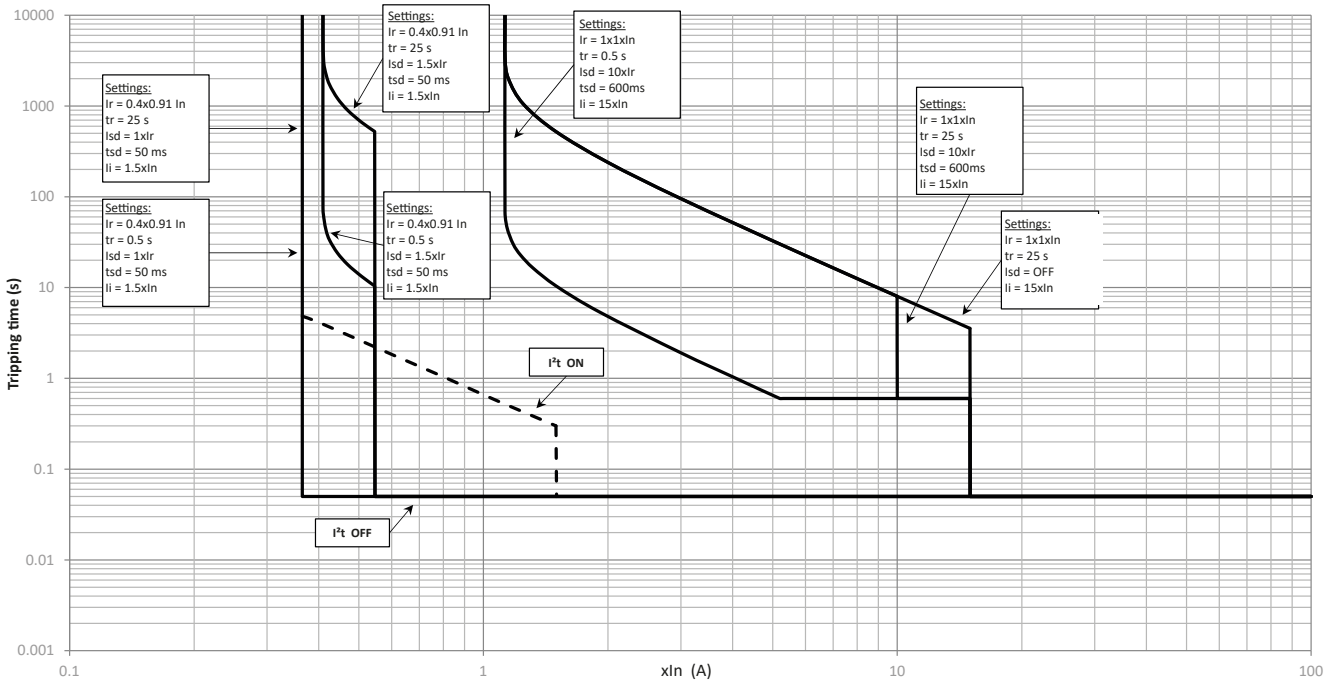
Tolerances of the earth fault protection curve (GF) for the LSIG trip unit



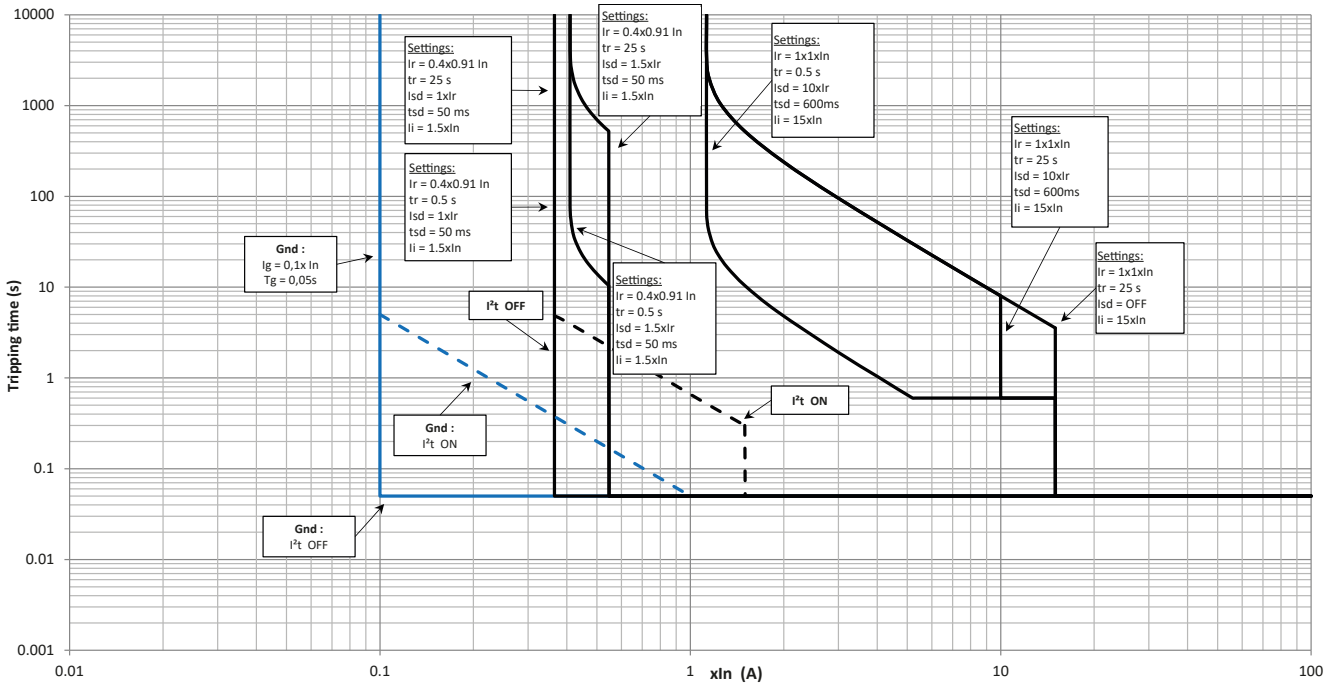
Air circuit breaker with LI sentinel electronic trip unit



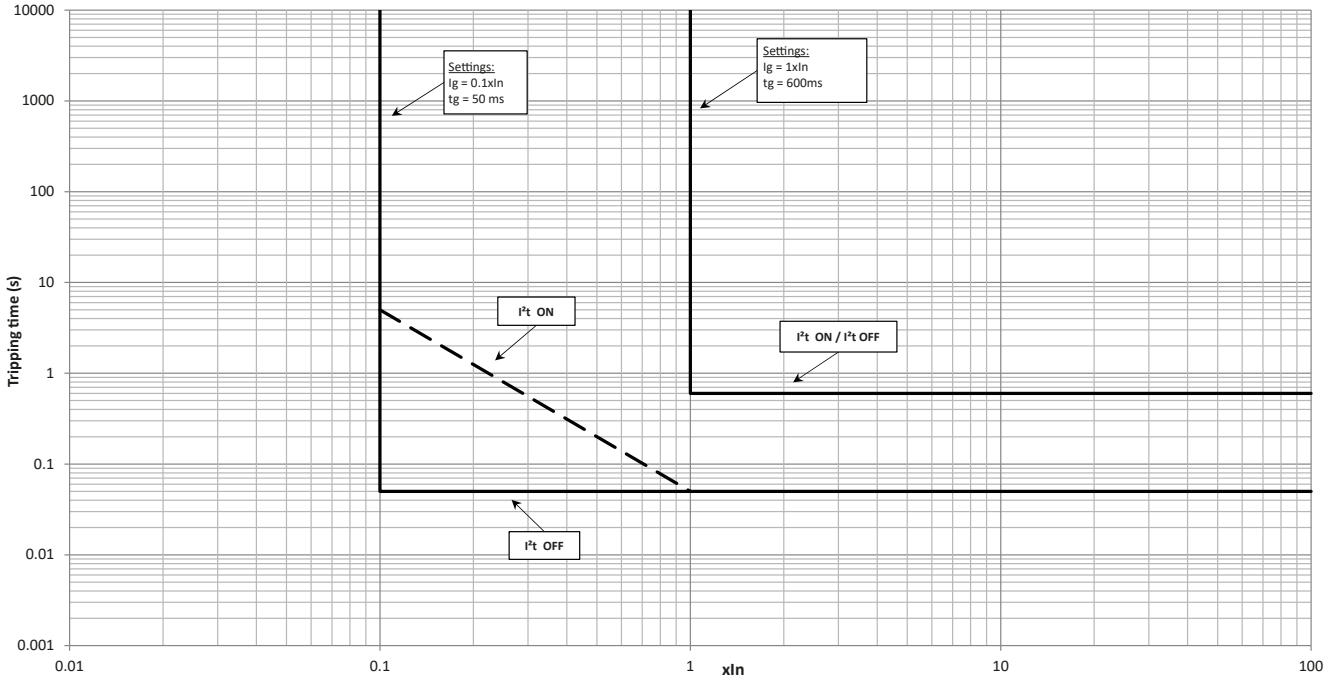
Air circuit breaker with LSI sentinel electronic trip unit



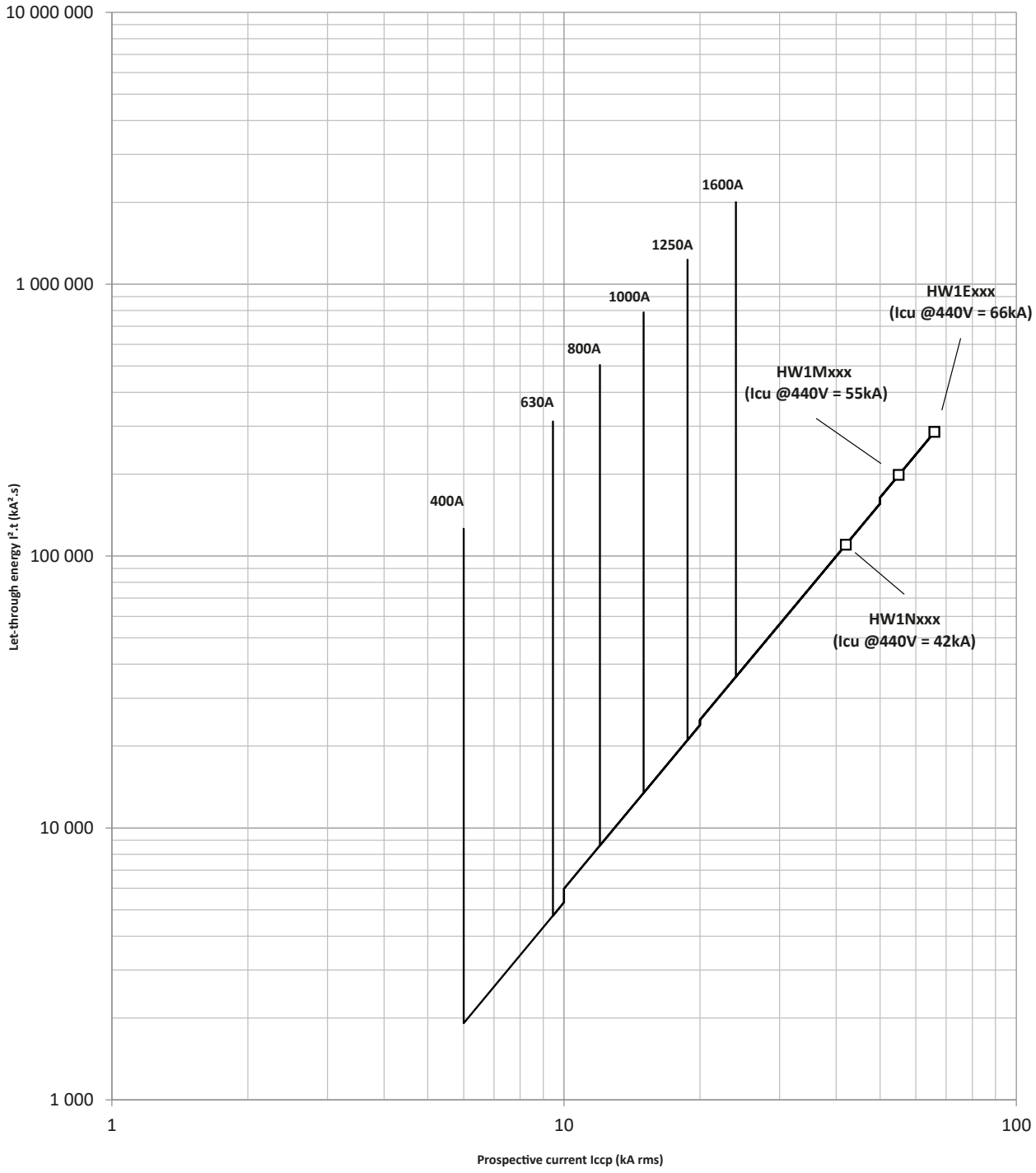
Air circuit breaker with LSIG sentinel electronic trip unit



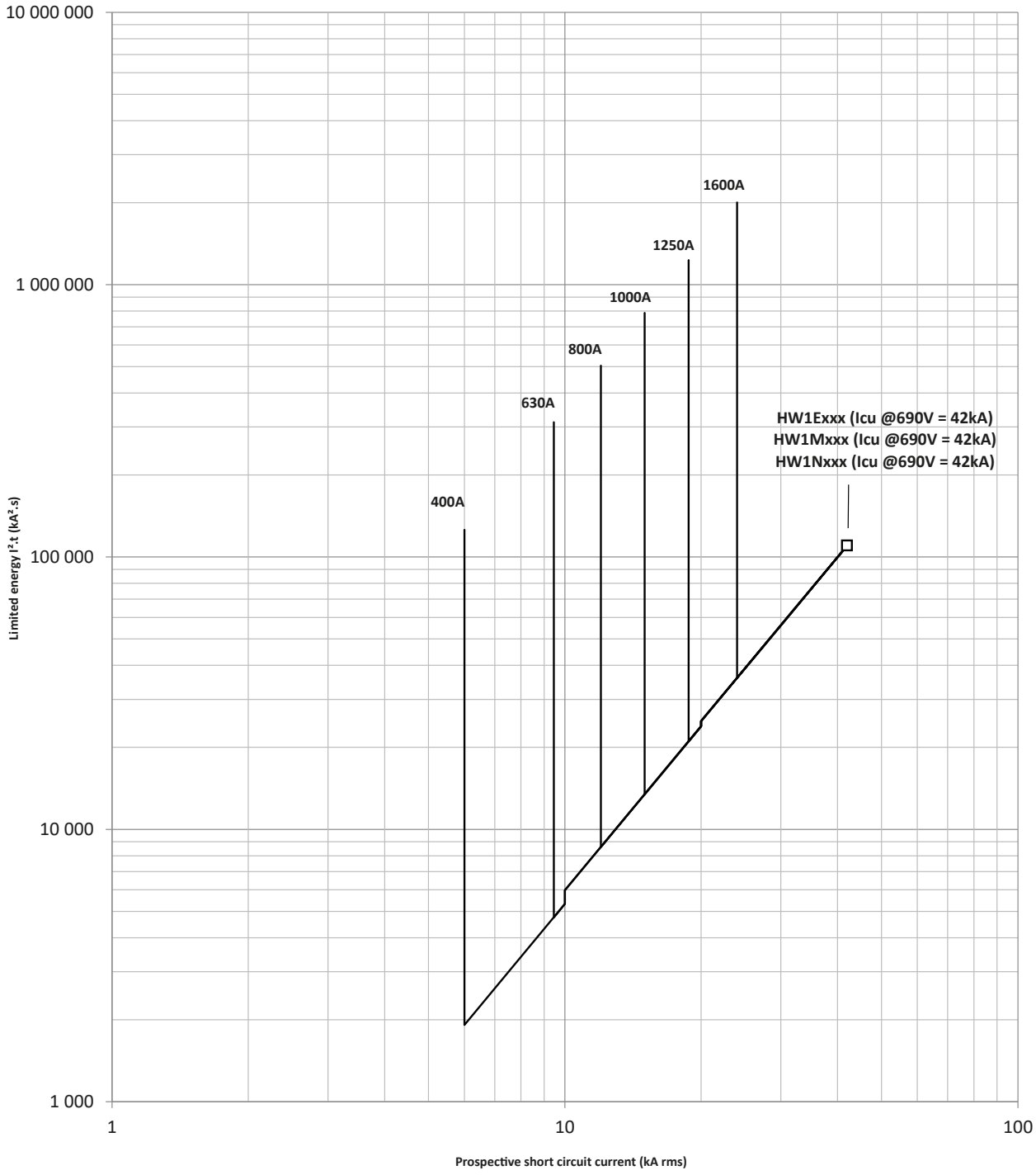
Earth fault curve



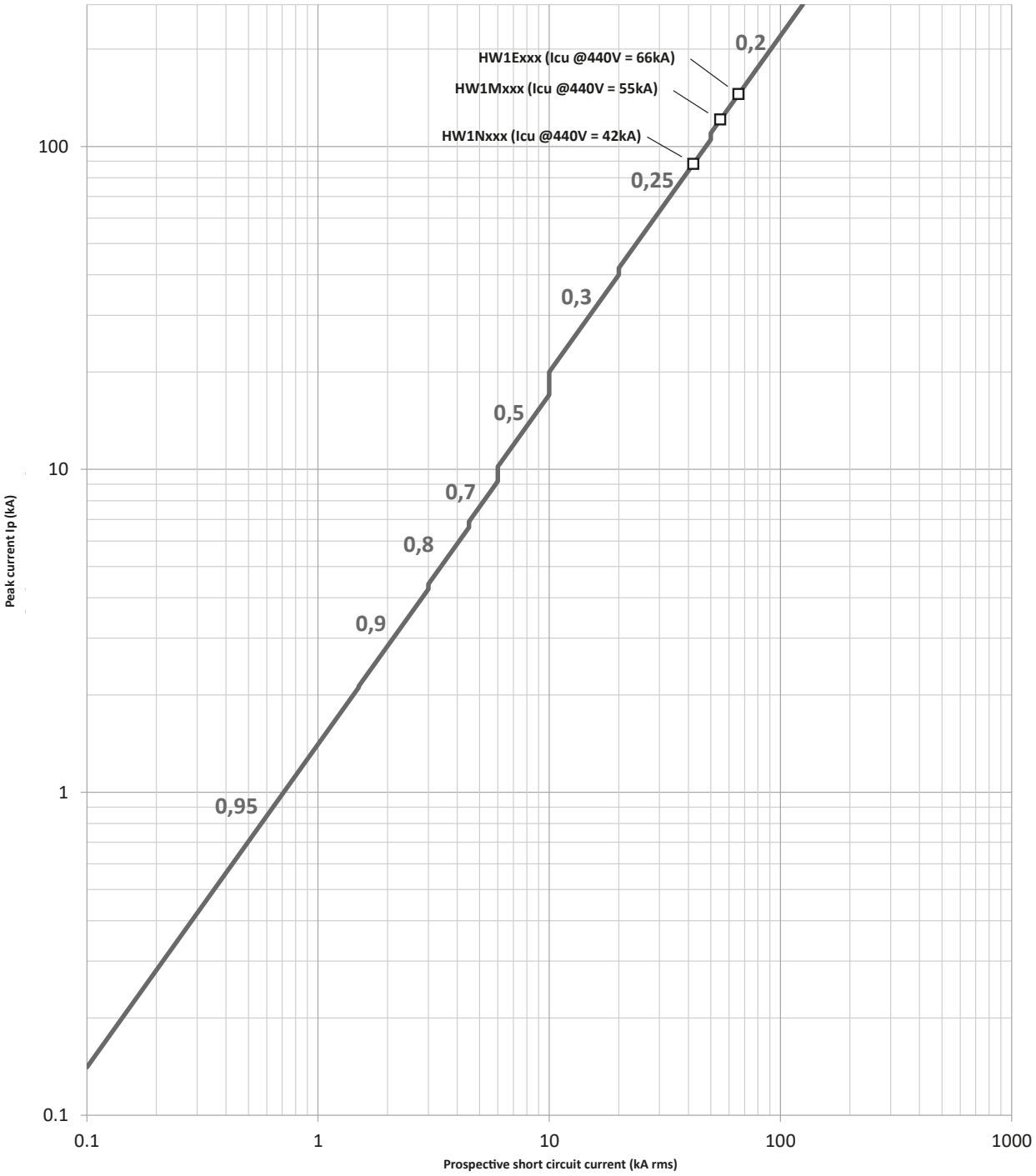
Energy limiting characteristics (thermal stress) 380/440 V AC



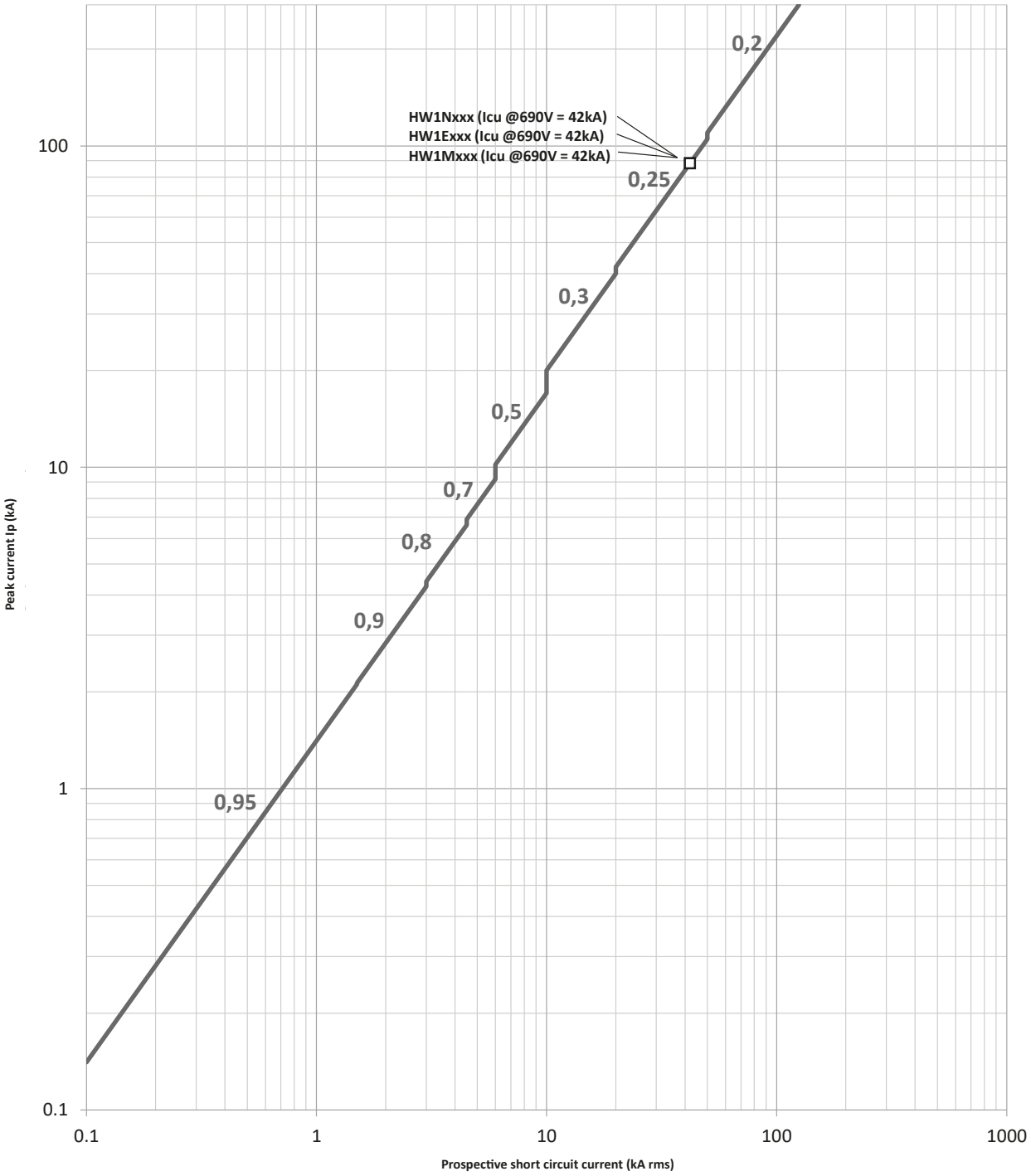
Energy limiting characteristics (thermal stress) from 440 V AC to 690 V AC



Current limiting characteristics (thermal stress) 380/440 V AC



Energy limiting characteristics (thermal stress) from 440 V AC to 690 V AC



List of references

Fixed air circuit breakers


HW1E316FB

ICU 380 – 440 V~	In (A)	3 poles	4 poles
42 kA	400	HW1N304FB	HW1N404FB
	630	HW1N306FB	HW1N406FB
	800	HW1N308FB	HW1N408FB
	1000	HW1N310FB	HW1N410FB
	1250	HW1N312FB	HW1N412FB
	1600	HW1N316FB	HW1N416FB
55 kA	400	HW1M304FB	HW1M404FB
	630	HW1M306FB	HW1M406FB
	800	HW1M308FB	HW1M408FB
	1000	HW1M310FB	HW1M410FB
	1250	HW1M312FB	HW1M412FB
	1600	HW1M316FB	HW1M416FB
66 kA	400	HW1E304FB	HW1E404FB
	630	HW1E306FB	HW1E406FB
	800	HW1E308FB	HW1E408FB
	1000	HW1E310FB	HW1E410FB
	1250	HW1E312FB	HW1E412FB
	1600	HW1E316FB	HW1E416FB

Fixed switch-disconnectors


HW1W416FS

In (A)	3 poles	4 poles
400	HW1W304FS	HW1W404FS
630	HW1W306FS	HW1W406FS
800	HW1W308FS	HW1W408FS
1000	HW1W310FS	HW1W410FS
1250	HW1W312FS	HW1W412FS
1600	HW1W316FS	HW1W416FS

Drawout air circuit breakers (moving part)

HW1E416DB

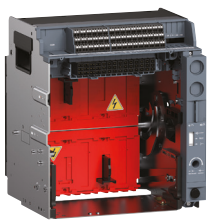
ICU 380 – 440 V~	In (A)	3 poles	4 poles
42 kA	400	HW1N304DB	HW1N404DB
	630	HW1N306DB	HW1N406DB
	800	HW1N308DB	HW1N408DB
	1000	HW1N310DB	HW1N410DB
	1250	HW1N312DB	HW1N412DB
	1600	HW1N316DB	HW1N416DB
55 kA	400	HW1M304DB	HW1M404DB
	630	HW1M306DB	HW1M406DB
	800	HW1M308DB	HW1M408DB
	1000	HW1M310DB	HW1M410DB
	1250	HW1M312DB	HW1M412DB
	1600	HW1M316DB	HW1M416DB
66 kA	400	HW1E304DB	HW1E404DB
	630	HW1E306DB	HW1E406DB
	800	HW1E308DB	HW1E408DB
	1000	HW1E310DB	HW1E410DB
	1250	HW1E312DB	HW1E412DB
	1600	HW1E316DB	HW1E416DB

Drawout switch-disconnectors (moving part)

HW1W316DS

In (A)	3 poles	4 poles
400	HW1W304DS	HW1W404DS
630	HW1W306DS	HW1W406DS
800	HW1W308DS	HW1W408DS
1000	HW1W310DS	HW1W410DS
1250	HW1W312DS	HW1W412DS
1600	HW1W316DS	HW1W416DS

Chassis for air circuit breakers or switch-disconnectors - drawout version (fixed part)



HW1C3EH

3 poles	4 poles
HW1C3EH	HW1C4EH

sentinel LI electronic trip unit

	Protection	Reference
 HWW450H	Long Time Delay and Instantaneous	HWW450H

sentinel LSI electronic trip unit

	Protection	Reference
 HWW451H	Long Time Delay, Short Delay and Instantaneous	HWW451H

sentinel LSIG electronic trip unit

	Protection	Reference
 HWW452H	Long Time Delay, Short Time Delay, Instantaneous and Earth Protection	HWW452H

Rating plug

	In	Reference (factory-assembled)	Reference (separate accessory)
 HWW469H	400 A	HWW464H	HWW464HSA
	630 A	HWW465H	HWW465HSA
	800 A	HWW466H	HWW466HSA
	1000 A	HWW467H	HWW467HSA
	1250 A	HWW468H	HWW468HSA
	1600 A	HWW469H	HWW469HSA

SH shunt trip coil

	Voltage	Inrush current (VA)	Holding current (VA)	Reference (factory-assembled)	Reference (separate accessory)
	24 - 30 V AC/DC	-	5	HWX020H	HWX020HSA
	48 - 60 V AC/DC	300 (200 ms)	5	HWX021H	HWX021HSA
	100 - 130 V AC/DC	200 (200 ms)	5	HWX022H	HWX022HSA
	200 - 250 V AC/DC	200 (200 ms)	5	HWX023H	HWX023HSA
	380 - 480 V AC	200 (200 ms)	5	HWX024H	HWX024HSA

HWX023H

CC closing coil

	Voltage	Inrush current (VA)	Holding current (VA)	Reference (factory-assembled)	Reference (separate accessory)
	24 - 30 V AC/DC	-	5	HWX025H	HWX025HSA
	48 - 60 V AC/DC	300 (200 ms)	5	HWX026H	HWX026HSA
	100 - 130 V AC/DC	200 (200 ms)	5	HWX027H	HWX027HSA
	200 - 250 V AC/DC	200 (200 ms)	5	HWX028H	HWX028HSA
	380 - 480 V AC	200 (200 ms)	5	HWX029H	HWX029HSA

HWX026H

UV undervoltage release coil

	Voltage	Inrush current (VA)	Holding current (VA)	Reference (factory-assembled)	Reference (separate accessory)
	24 - 30 V AC/DC	-	5	HWX030H	HWX030HSA
	48 - 60 V AC/DC	300 (200 ms)	5	HWX031H	HWX031HSA
	100 - 130 V AC/DC	200 (200 ms)	5	HWX032H	HWX032HSA
	200 - 250 V AC/DC	200 (200 ms)	5	HWX033H	HWX033HSA
	380 - 480 V AC	200 (200 ms)	5	HWX034H	HWX034HSA

HWX033H

UVTC Undervoltage Time Delay Controller

	Voltage	Reference (factory-assembled)	Reference (separate accessory)
	24 - 30 V AC/DC	HWY030H	HWY030HSA
	48 - 60 V AC/DC	HWY031H	HWY031HSA
	200 - 250 V AC	HWY033H	HWY033HSA
	380 - 480 V AC	HWY034H	HWY034HSA

HWY033H

MO charging Motor

For AC voltage

	Voltage	Inrush current (A)	Holding current (A)	Reference (factory-assembled)	Reference (separate accessory)
 HWX006H	24 V AC	25	9.6	HWX001H	HWX001HSA
	48 - 60 V AC	12.5	4.8	HWX002H	HWX002HSA
	100 - 130 V AC	5.2	2	HWX003H	HWX003HSA
	200 - 250 V AC	2.7	1	HWX004H	HWX004HSA
	380 - 400 V AC	1.5	0.6	HWX005H	HWX005HSA
	415 - 450 V AC	1.4	0.5	HWX006H	HWX006HSA

For DC voltage

	Voltage	Inrush current (A)	Holding current (A)	Reference (factory-assembled)	Reference (separate accessory)
 HWX702H	24 V DC	25	9.6	HWX701H	HWX701HSA
	48 - 60 V DC	12.5	4.8	HWX702H	HWX702HSA
	100 - 130 V DC	5.2	2	HWX703H	HWX703HSA
	200 - 250 V DC	2.7	1	HWX704H	HWX704HSA

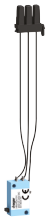
AX Auxiliary Contact

		Reference (factory-assembled)	Reference (separate accessory)
	Auxiliary contact	HWX040H	HWX040HSA
	Low level auxiliary contact	HWX041H	HWX041HSA

HWX040H

FS Fault trip contact

		Reference (factory-assembled)	Reference (separate accessory)
	FS Fault trip contact	HWX047H	HWX047HSA



HWX047H

OAC output alarm contacts module

		Reference (factory-assembled)	Reference (separate accessory)
	OAC output alarm contacts module	HWX090H	HWX090HSA

HWX090H

PS Position contact

For drawout version

		Reference (factory-assembled)	Reference (separate accessory)
	Position contact	HWX050H	HWX050HSA
	Low level position contactes	HWX051H	HWX051HSA

HWX050H

RTC Ready-to-Close contact

		Reference (factory-assembled)	Reference (separate accessory)
	RTC Ready-to-Close contact	HWX091H	HWX091HSA

HWX091H

CYC Operation Cycle Counter

		Reference (factory-assembled)	Reference (separate accessory)
	On / Off cycle counter	HWX070H	HWX070HSA

HWX070H

WIP wrong insertion preventer for drawout circuit breaker

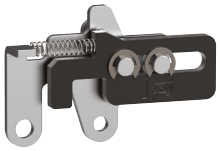
		Reference (separate accessory)
	e WIP wrong insertion preventer for drawout circuit breaker	HWY276H

HWY276H

RI open door racking interlock

For drawout version

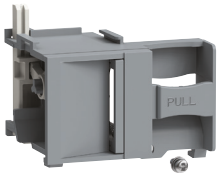
		Reference (separate accessory)
	RI open door racking interlock	HWY238H



HWY238H

Locking of the circuit breaker in OFF by OLP padlock and OLK key lock

		Reference (factory-assembled)	Reference (separate accessory)
	OLP type padlock locking device (without padlock)	HWY269H	HWY269HSA
	Locking device with OLK type key lock (without lock)	HWY260H	HWY260HSA



HWY269H

Locking of the position of the circuit breaker in its CL chassis

		Reference (factory-assembled)	Reference (separate accessory)
	Locking device with key locks	HWY270H	HWY270HSA

HWY270H

Ronis type key lock

		Reference
	Type 1 - K1L1/L4	HWY701
	Type 2 - K2L2/L4/L5	HWY702
	Type 3 - K3L3/L5	HWY703
	Type 4 - K4L4	HWY704
	Type 5 - K5L5	HWY705

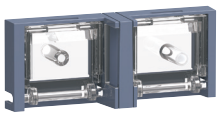
HWY701

MI mechanical interlock

		Reference (separate accessory)
	For fixed version	HWY224H
	For drawout version	HWY225H
	Set with a 1.5-metre-long cable	HWY218H
	Set with a 3-metre-long cable	HWY228H

HWY234H

PBC push button cover

		Reference (factory-assembled)	Reference (separate accessory)
	PBC push-button cover	HWY089H	HWY089HSA

HWY089H

VCA vertical connectors

	Number of poles	Position	Reference (separate accessory)
	3 poles	top / bottom	HWY005H
	4 poles	top / bottom	HWY006H

HWY005H

SP spreaders

	Number of poles	Position	Reference (separate accessory)
	3 poles	top / bottom	HWY001H
	4 poles	top / bottom	HWY002H

HWY001H

IB interphase barriers

	Number of poles	Reference (delivered with the circuit breaker)	Reference (separate accessory)
	3 poles	HWY240H	HWY240HSA
	4 poles	HWY241H	HWY241HSA

HWY241H

Rear vertical / horizontal RC connections

	Number of poles	Position	Reference (factory-assembled)	Reference (separate accessory)
	3 poles	top / bottom	HWY048H	HWY048HSA
	4 poles	top / bottom	HWY049H	HWY049HSA

HWY048H

Rear vertical / horizontal RC connections for UNIMES distribution boards

	Number of poles	Position	Reference (factory-assembled)	Reference (separate accessory)
	3 poles	top / bottom	HWY150H	HWY150HSA
	4 poles	top / bottom	HWY151H	HWY151HSA

HWY150H

Rear vertical / horizontal long RC connections for unimes H distribution boards

	Number of poles	Position	Reference (factory-assembled)	Reference (separate accessory)
	3 poles	top / bottom	HWY148H	HWY148HSA
	4 poles	top / bottom	HWY149H	HWY149HSA

HWY148H

FC front connections

For drawout version

	Number of poles	Position	Reference (factory-assembled)	Reference (separate accessory)
	3 poles	top / bottom	HWY044H	HWY044HSA
	4 poles	top / bottom	HWY045H	HWY045HSA
	3 poles	bottom short	HWY046H	HWY046HSA
	4 poles	bottom short	HWY047H	HWY047HSA

HWY044H

For fixed version

	Number of poles	Position	Reference (factory-assembled)	Reference (separate accessory)
	3 poles	top / bottom	HWY040H	HWY040HSA
	4 poles	top / bottom	HWY041H	HWY041HSA

HWY040H

For drawout version in unimes H distribution board

	Number of poles	Position	Reference (factory-assembled)	Reference (separate accessory)
	3 poles	top / bottom	HWY144H	HWY144HSA
	4 poles	top / bottom	HWY145H	HWY145HSA

HWY144H

For fixed version in unimes H distribution board

	Number of poles	Position	Reference (factory-assembled)	Reference (separate accessory)
	3 poles	top / bottom	HWY140H	HWY140HSA
	4 poles	top / bottom	HWY141H	HWY141HSA

HWY140H

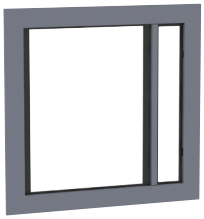
TC terminal cover

For drawout version

	Number of poles	Reference (factory-assembled)	Reference (separate accessory)
	3 poles	HWY095H	HWY095HSA
	4 poles	HWY096H	HWY096HSA

HWY095H

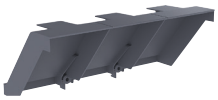
DF Door Frame

	Version	Door thickness	Reference (separate accessory)
	Fixed	thin (Quadro system)	HWY280H
		thick (UniversN and UnimesH systems)	HWY282H
	drawout	thin (Quadro system)	HWY281H
		thick (UniversN and UnimesH systems)	HWY283H

HWY281H

Cut-off chamber cover

For fixed version

	Number of poles	Reference (separate accessory)
	3 poles	HWY958H
	4 poles	HWY959H

HWY958H

ENCT External Neutral Sensor

		Reference (separate accessory)
	ENCT External Neutral Sensor	HWY970H

HWY970H

TB Terminal Block connection

		Reference (factory-assembled)	Reference (separate accessory)
 HWY951H	Connection terminal block type A 6/3 TB	HWY950H	HWY950HSA
	Connection terminal block type B 6/6 TB	HWY951H	HWY951HSA
	Connection terminal block type C 2 x 6/3 TB	HWY952H	HWY952HSA

GF
Earth fault protection.

INST
Instantaneous Protection.

LTD
Long Time Delay Protection.

MCR
Automatic instantaneous protection upon closure of the power contacts for short-circuit fault (Making Current Release).

OAC
Output alarm contact.

Breaking capacity
The value of the prospective current that a switching device is capable of breaking at a stated voltage under prescribed conditions of use and behaviour.
Reference is generally made to the rated ultimate short-circuit (Icu) breaking capacity and to the service short-circuit breaking capacity (Ics).

Rated ultimate short-circuit breaking capacity (Icu)
Expressed in kA, it indicates the maximum breaking capacity of the circuit breaker. It is confirmed by a test sequence O - t - CO (according to IEC 60947-2) at Icu, followed by a test to prove that the circuit is correctly isolated. This test ensures safety for the user.

PTA
Overload pre-alarm.

STD
Short Time Delay Protection STD.

ZSI
Zone selectivity.

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