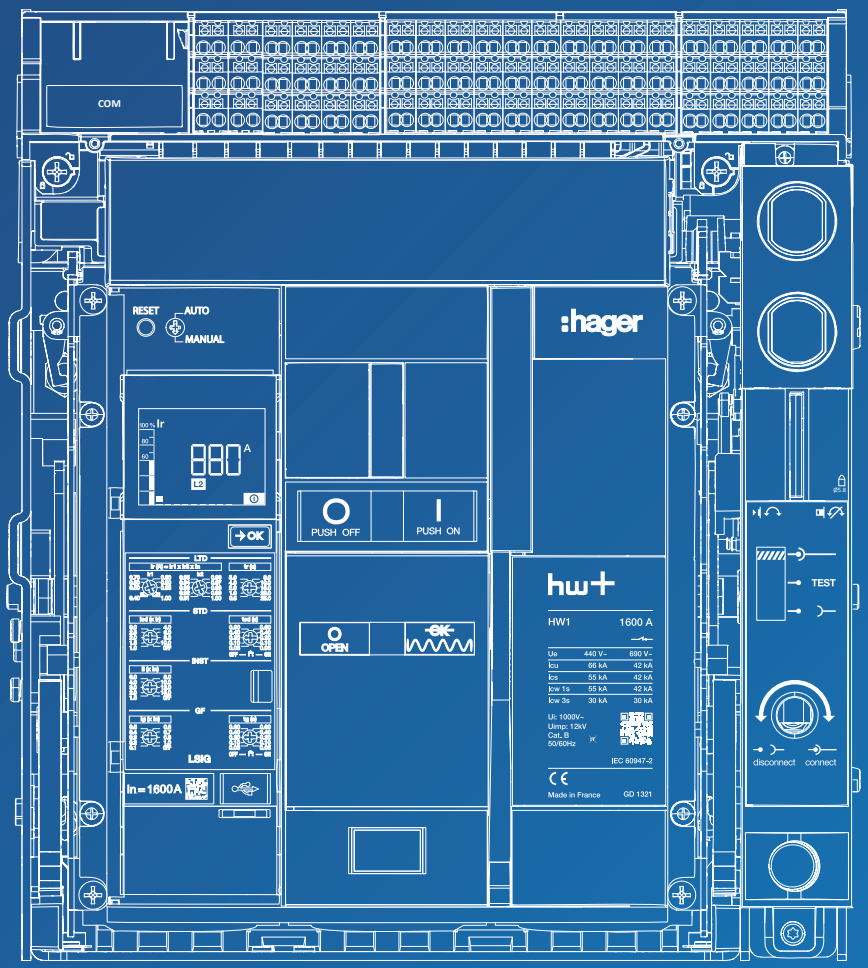
User manual

hw+

Air circuit breakers
up to 1600A



:hager

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Warnings and instructions

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

DANGER

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

WARNING

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

CAUTION

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

ATTENTION

ATTENTION indicates a warning message relating to equipment damage.
ATTENTION also indicates important instructions for use and particularly relevant information regarding the product, which must be respected to ensure effective and safe use.

Qualified personnel

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

Appropriate use of Hager products

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

Publication liability

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

Purpose of the document.

This manual is designed to provide users, electricians, panel builders and maintenance personnel with the technical information required to use the hw+ circuit breakers with electronic trip units.

Field of application

This document applies to hw+ circuit breakers with electronic trip units.

Revisions

Version	Date
6LE007331A	September 2022

Documents to consult

Document	Reference
Installation manual for hw+ air circuit breakers	6LE007893A
hw+ user maintenance guide	6LE007897A
User manual for Sentinel hw+ electronic trip units	6LE007969A

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

Contact

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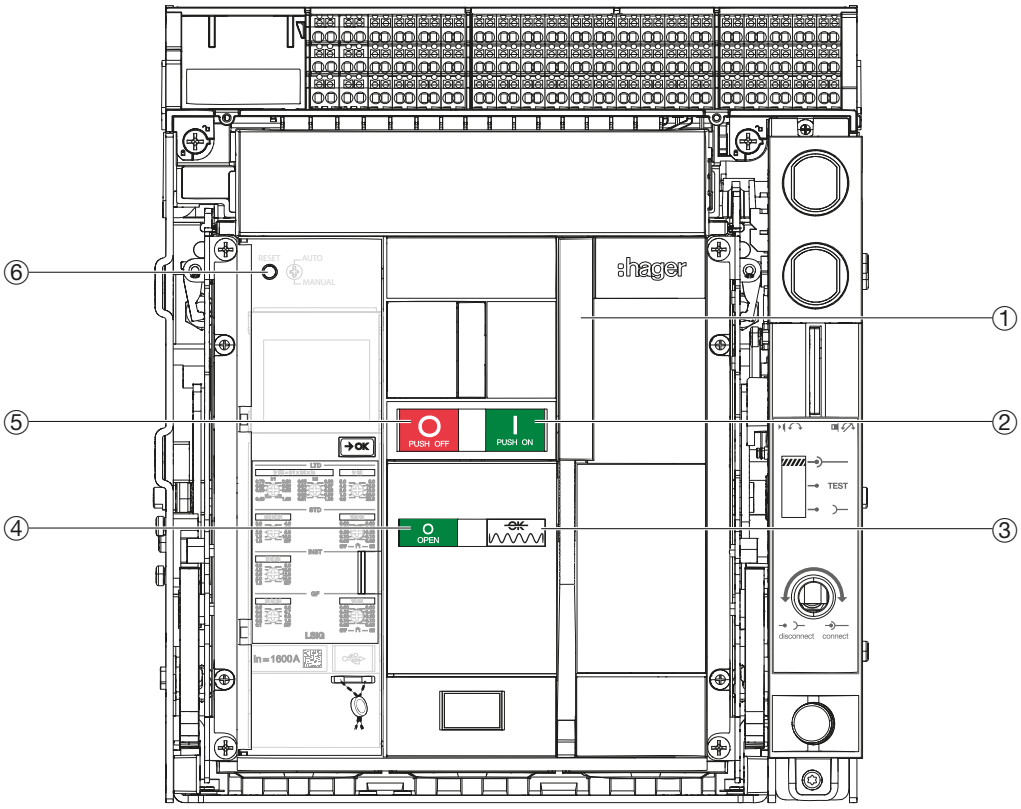
Website	www.hager.com

The hw+ circuit breaker has the following elements on the front:

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



Status indicators

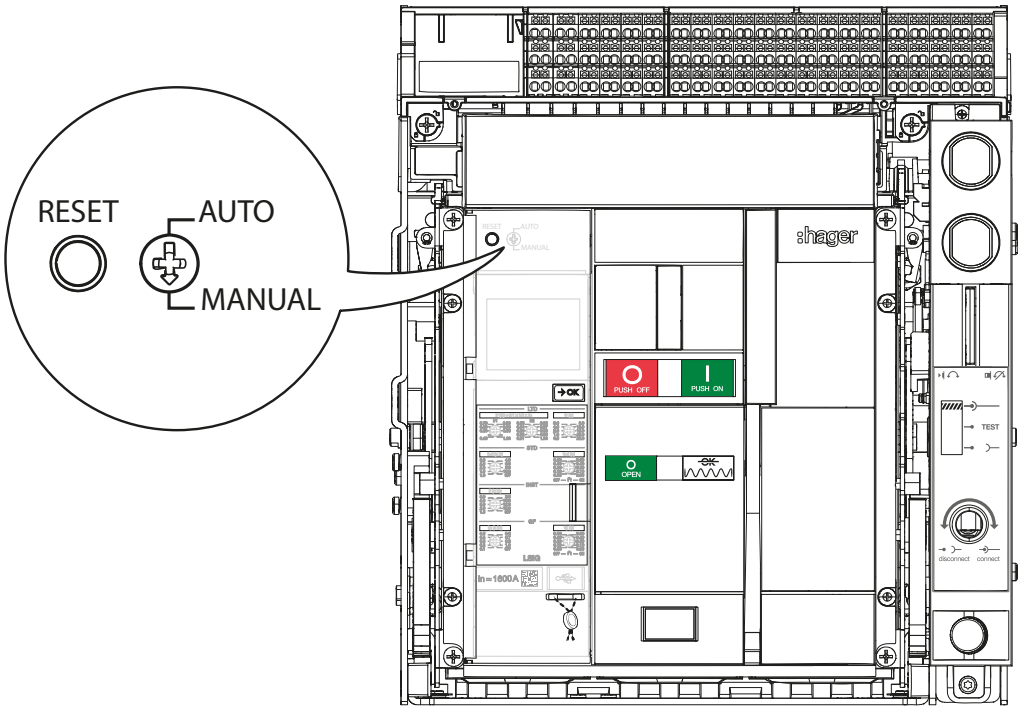
The combination of the two indicators shows the status of the circuit breaker.

Opening and closing indicator	Closing spring status indicator	Circuit breaker status
O OPEN	OK	Circuit breaker open. Closing spring discharged.
O OPEN	OK	Circuit breaker open. Closing spring charged but not ready to close. The circuit breaker is not ready to be closed because: • Following tripping, it has not been reset via the acknowledgement procedure (see Chapter 07 Closing the circuit breaker after a trip operation) • The circuit breaker is locked in open position using a lock or padlock.
O OPEN	OK	Circuit breaker open. Closing spring charged. The circuit breaker is ready to be closed.
I CLOSED	OK	Circuit breaker closed. Closing spring discharged.
I CLOSED	OK	Circuit breaker closed. Closing spring charged.

RESET re-arm button

The RESET re-arm button is used to reset the circuit breaker after tripping (see Chapter 07 Circuit breaker closure after a trip operation).

The operation of the RESET re-arm button depends on the Auto or Manual mode set using the adjustment dial on the right.



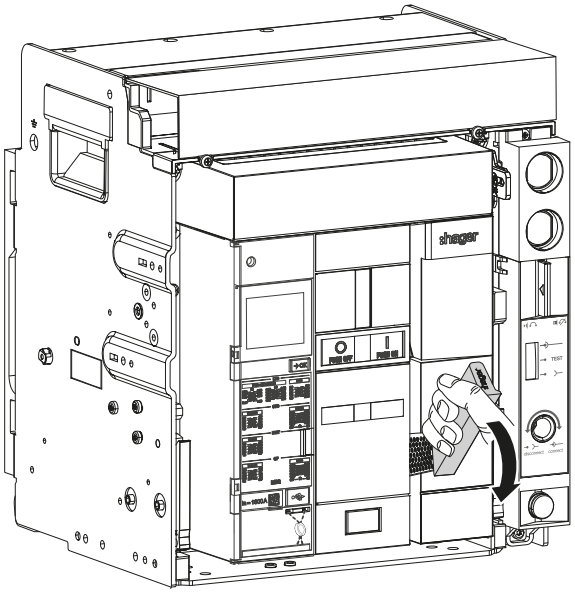
- **Auto mode**, in which it is not necessary to press the RESET re-arm button before closing the circuit breaker again after tripping.
  This mode is usually used if the circuit breaker is remotely monitored, as it can be closed without requiring a person to perform the action on-site.

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

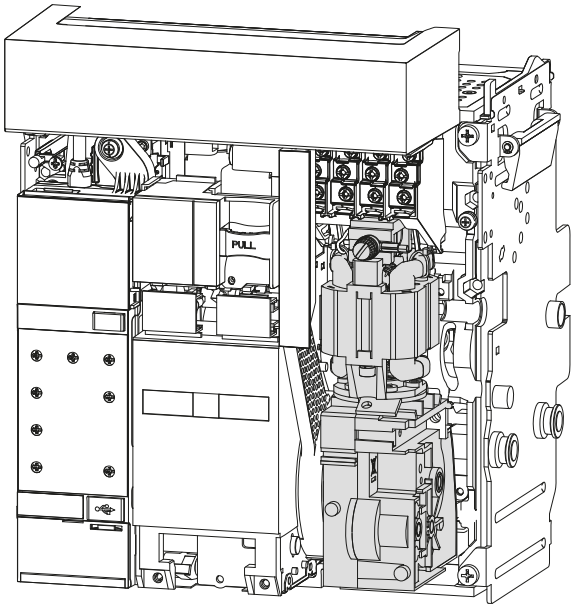
Closing spring

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

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



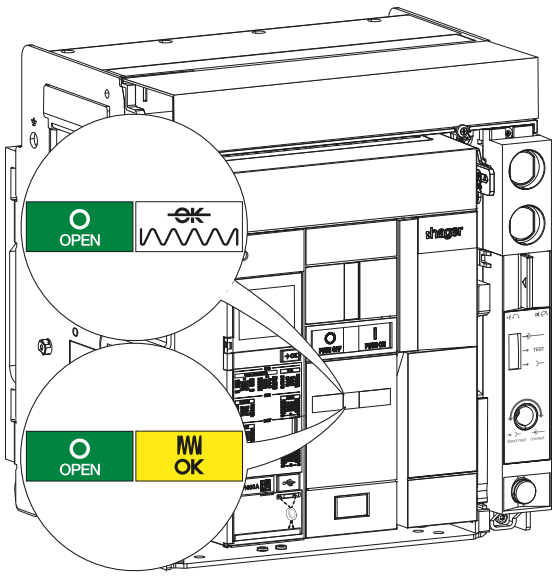
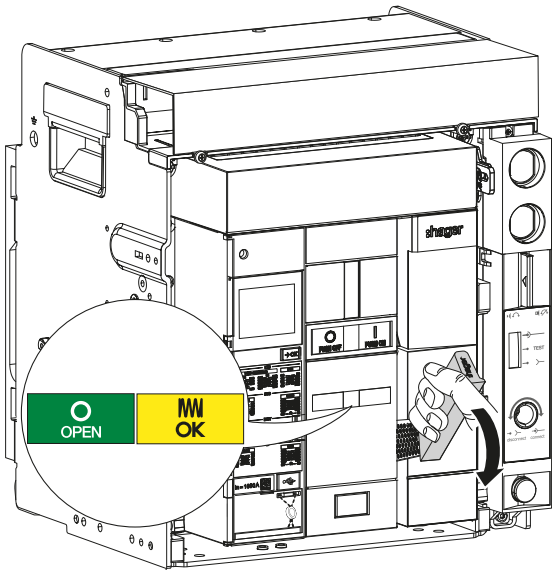
- Automatic charging
If an MO charging motor is installed and powered, the closing spring charges automatically each time the circuit breaker closes.

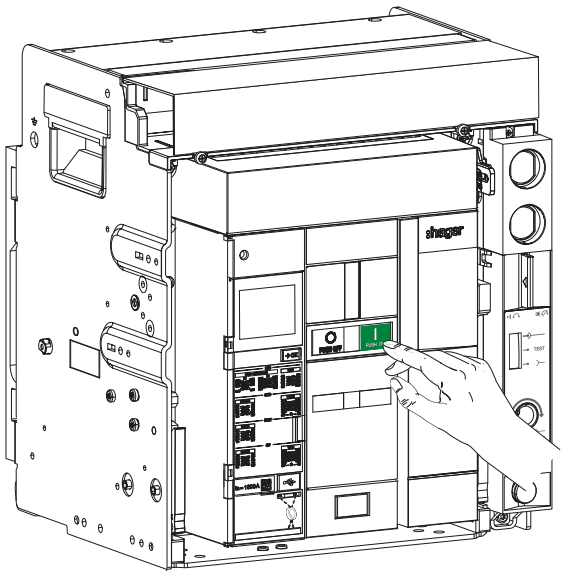
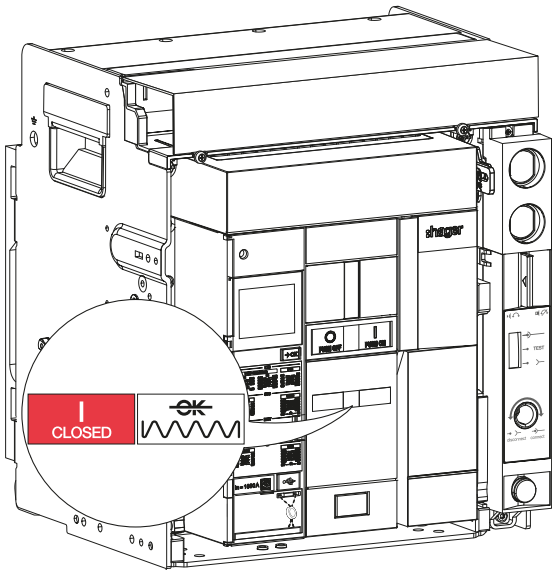
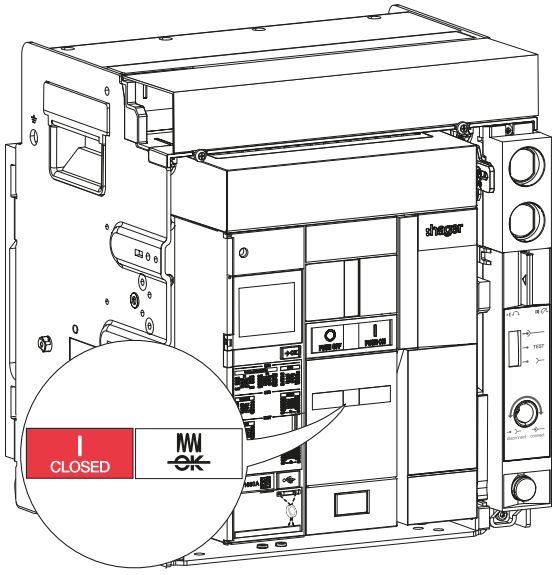


DANGER

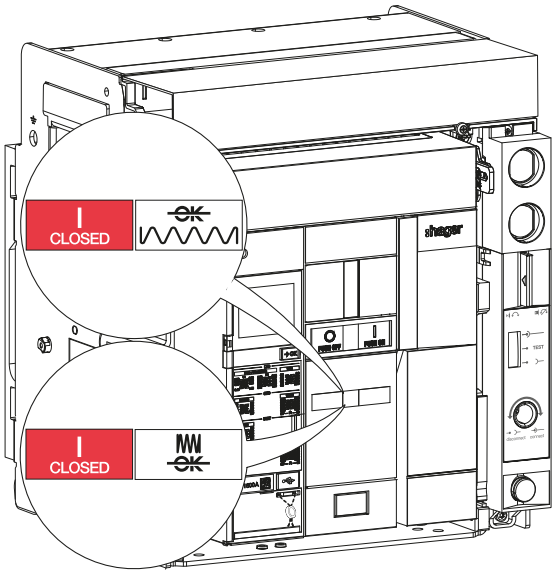
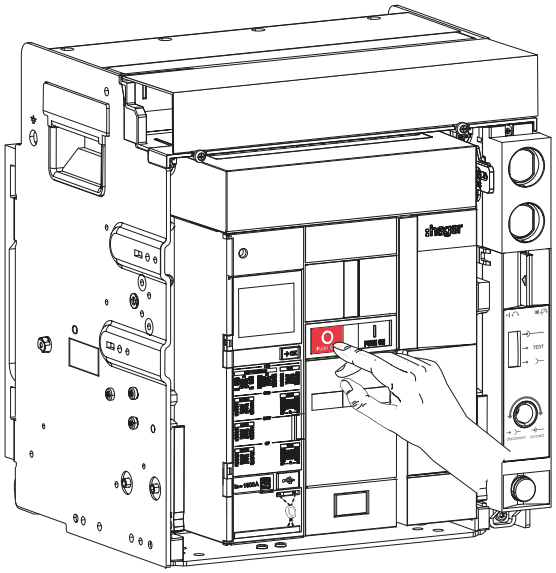
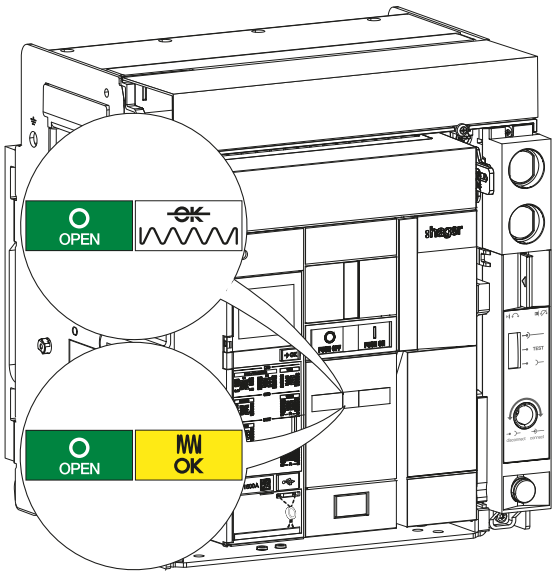
Risk of electric shock, explosion or electric arc.
Inspect the electrical installation and remove the tripping cause before closing the circuit breaker again.
Never close a circuit breaker locally or remotely without first making sure that the installation complies with the safety standards.

To close the circuit breaker:

	Action	Illustration
1	Check that the circuit breaker is open, the closing spring discharged or charged if a charging motor is installed.	
2	If necessary, charge the closing spring using the charging handle until the following indicators appear.	

	Action	Illustration
3	Close the circuit breaker by pressing the closing push button I PUSH ON.	
4	Check that the indicators change status.	
5	If a charging motor is installed and powered, the closing spring charges automatically.	

To open the circuit breaker:

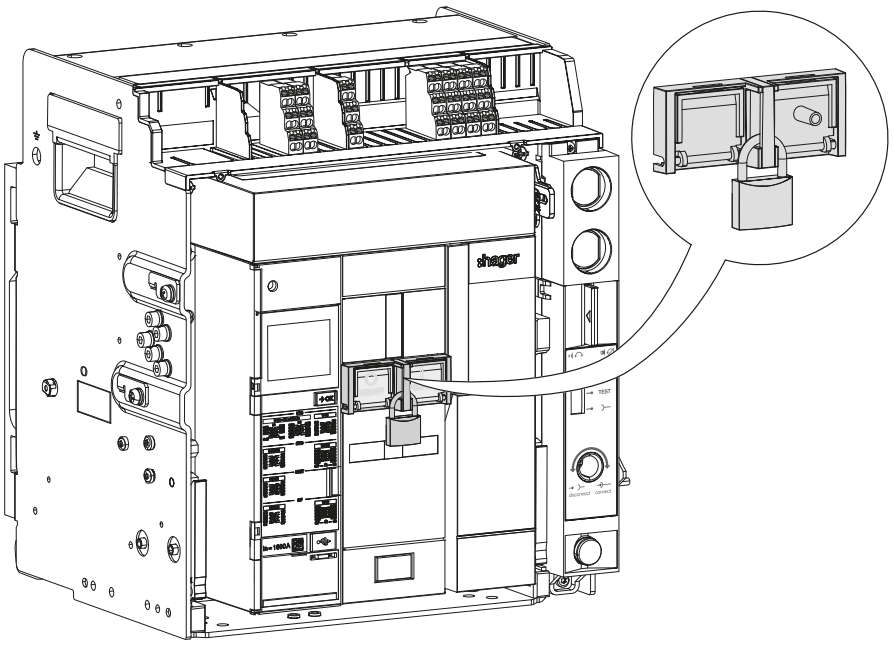
	Action	Illustration
1	Check that the following indicators appear on the circuit breaker.	
2	Open the circuit breaker by pressing the opening push button  .	
3	Check that the indicators update: - indicator OPEN, - closing spring discharged indicator (case of manual charging), - or closing spring charged indicator (automatic charging with motor).	

The closing PUSH ON and opening PUSH OFF push buttons can be locked against any operation using the PBC push button covers.
It prevents any unintended or unauthorised operation.

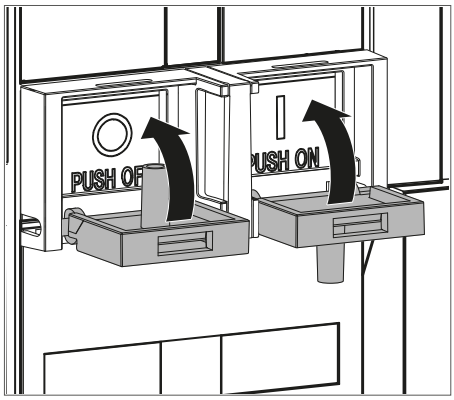
The transparent PBC push button covers have an additional function.
They can be disengaged and turned so that the opening push button PUSH OFF remains permanently and mechanically engaged. This locking function is also guaranteed if the circuit breaker is activated remotely by a CC closing coil. Even if the CC closing coil is driven, the principal contacts remain open.

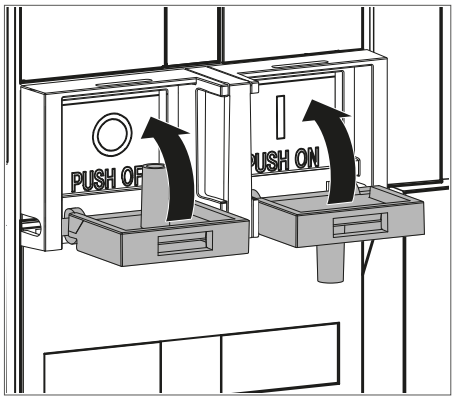
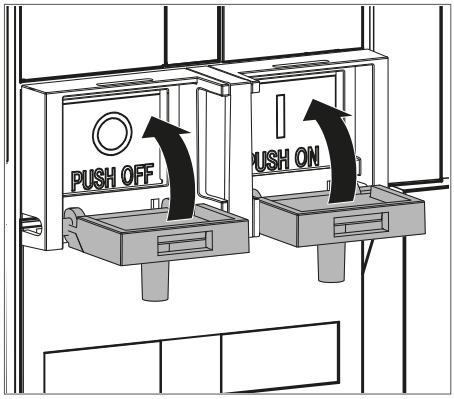
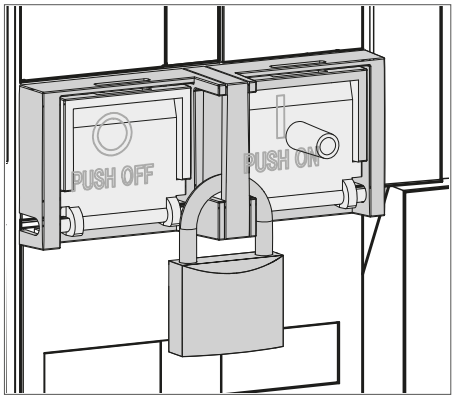
It prevents any unintentional or unauthorised operations.

The push buttons can be locked independently or jointly and up to 3 Ø5-Ø8 mm padlocks can be fitted.



To activate the locking device:

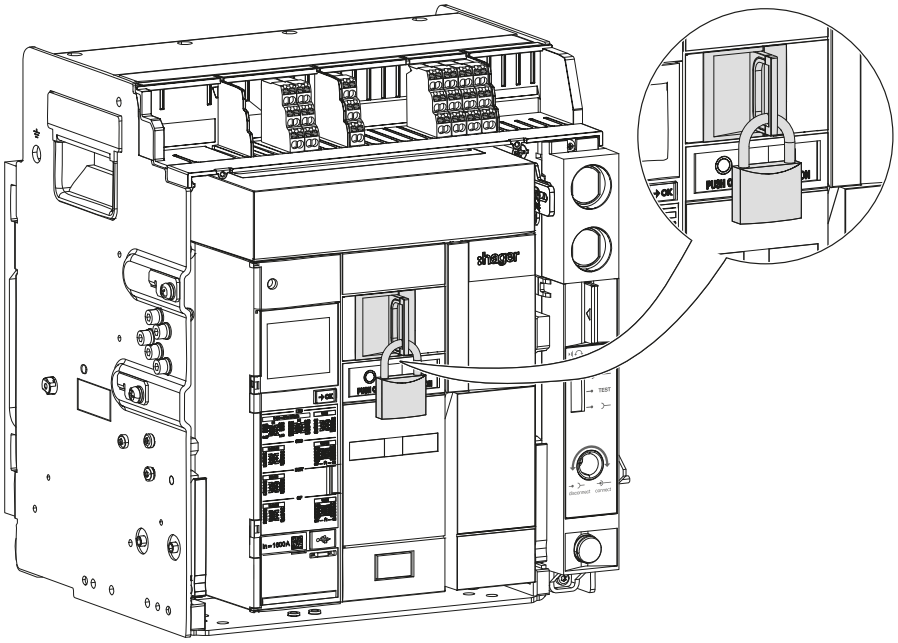
	Action	Illustration
1	Close the cover of the push button you wish to lock.	

	Action	Illustration
1	**Case 1** The opening push button PUSH OFF is pressed continuously and the the closing push button PUSH ON is locked.	
	Case 2 The opening push button PUSH OFF and closing push button PUSH ON are locked.	
2	Lock it using one or more padlocks.	

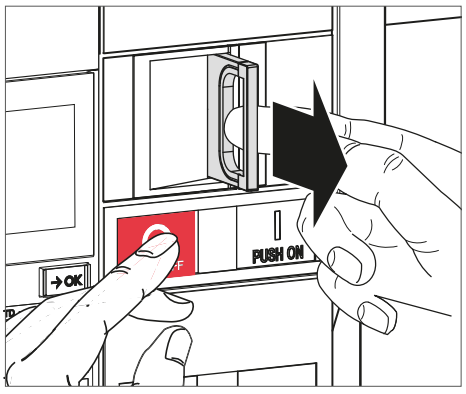
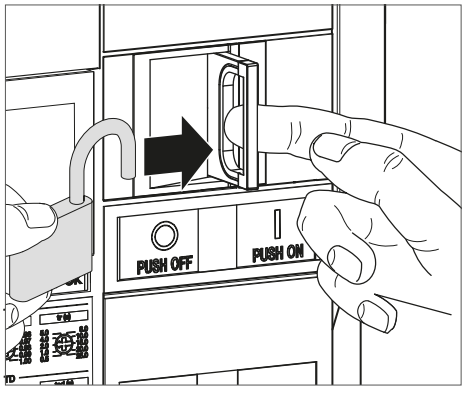
ATTENTION
It is not possible to hold down the closing push button PUSH ON with this accessory.

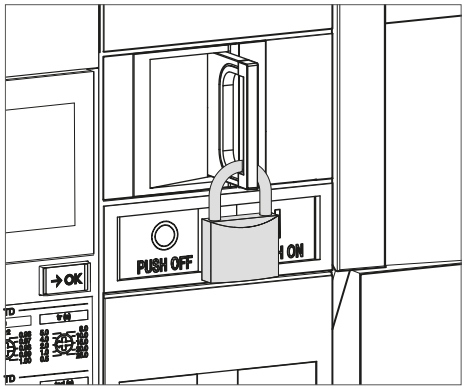
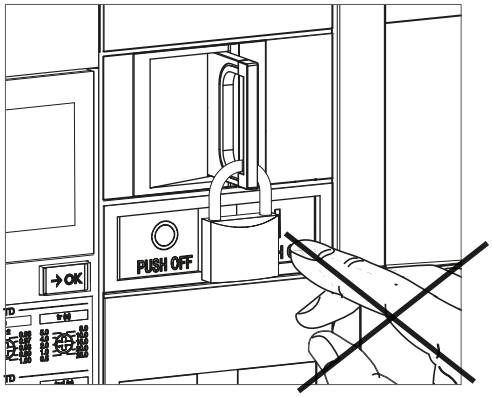
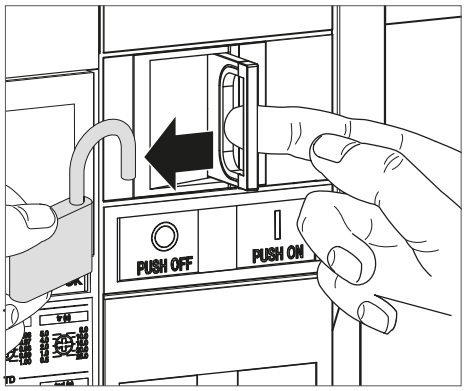
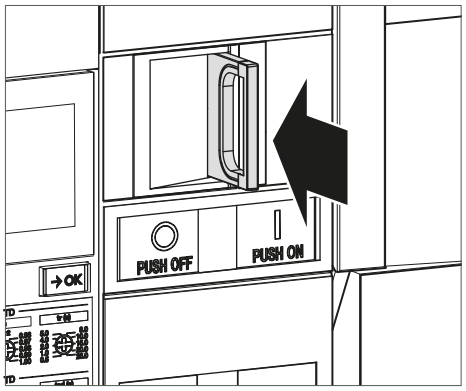
ATTENTION
Refer to manual 6LE007490A to install this locking accessory.

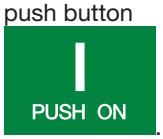
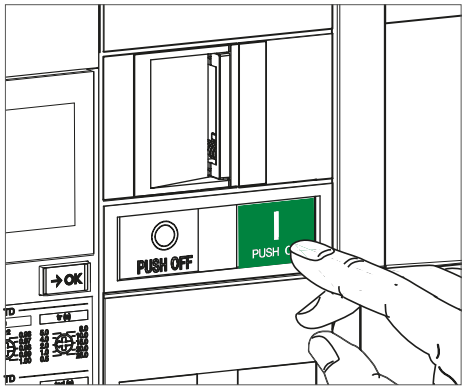
This locking device prevents the circuit breaker from closing using padlocks.
Up to three Ø5–Ø8 mm padlocks can be installed.



To activate or deactivate the locking device:

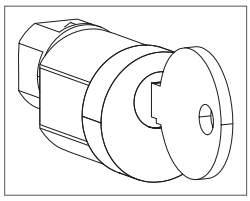
	Action	Illustration
1	Press the opening push button  and, while holding it down, pull the tab of the locking device.	
2	Release the opening push button  Position...	

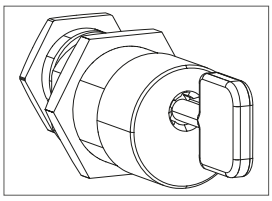
	Action	Illustration
2	... Then close the padlock.	
3	Check that it is no longer possible to close the circuit breaker by pressing the closing push button 	
4	To unlock the device, remove the padlock.	
5	Check that the tab returns to its initial position.	

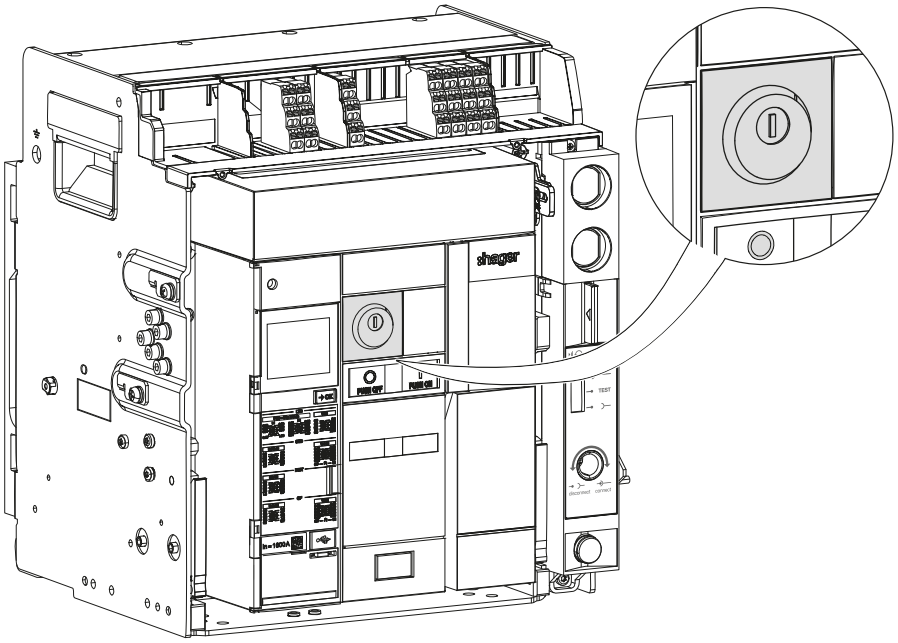
	Action	Illustration
6	Check that it is now possible to close the circuit breaker by pressing the closing push button 	

ATTENTION
Refer to manual 6LE007488A to install this locking accessory.

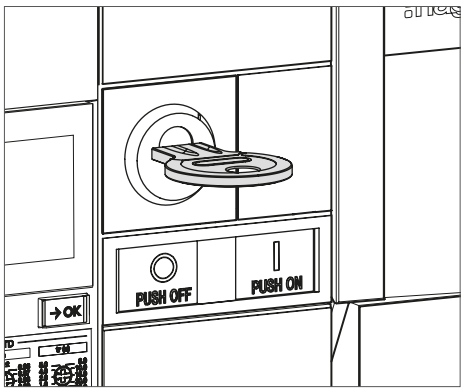
This locking device prevents the circuit breaker from closing using a key lock.
Several types of locks can be installed.

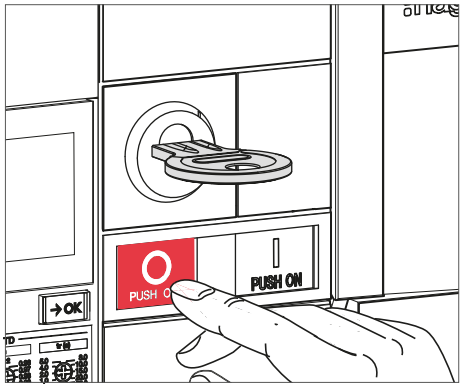
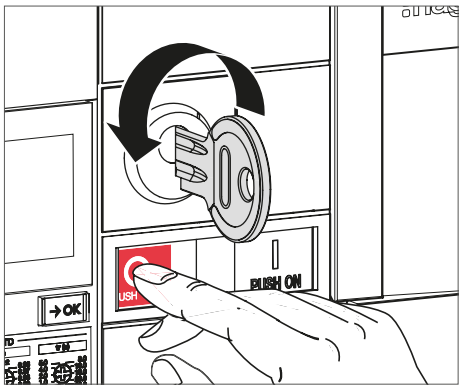
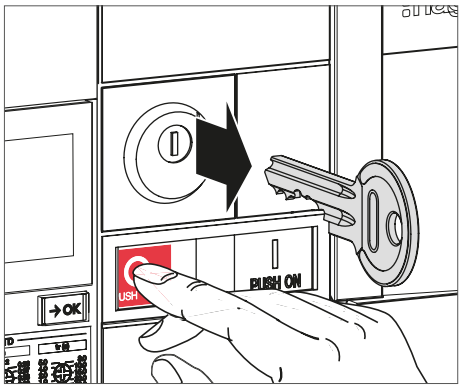
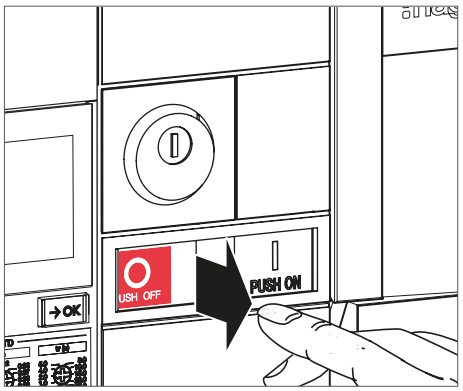

Ronis type lock

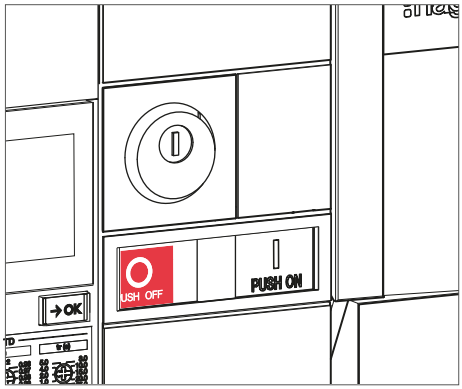
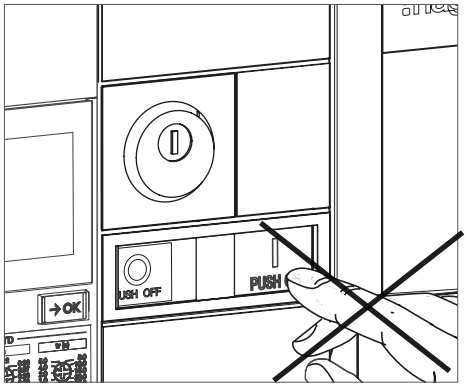
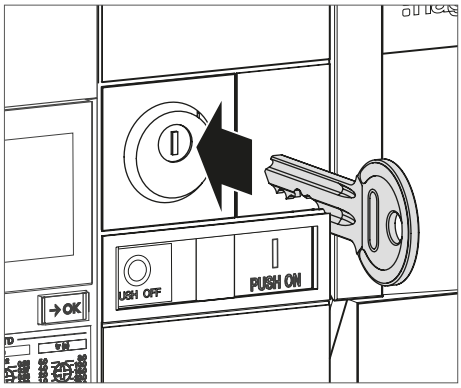
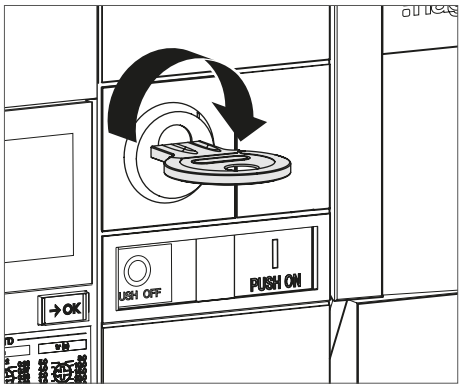

Profalux type lock

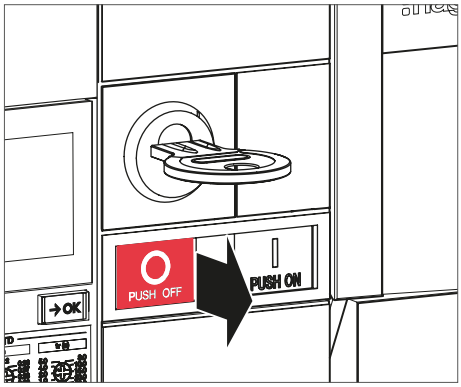
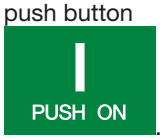
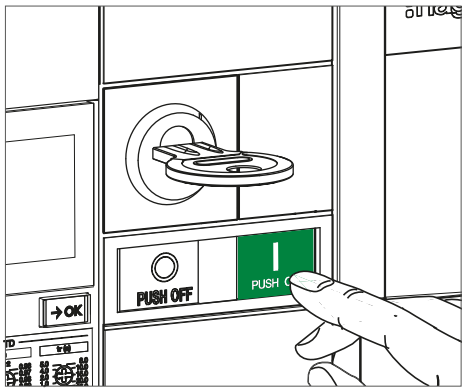


To activate or deactivate the locking device:

	Action	Illustration
1	Check that the key is in the horizontal position.	

	Action	Illustration
2	Press the opening push button  .	
3	While holding down the opening push button  , put the key back into the vertical position by turning it counter-clockwise.	
4	Remove the key.	
5	Then release the opening push button  .	

	Action	Illustration
5	(continued) It remains pressed in.	
6	Check that it is no longer possible to close the circuit breaker by pressing the closing push button 	
7	To unlock the device, insert the key into the lock.	
8	Turn the key clockwise.	

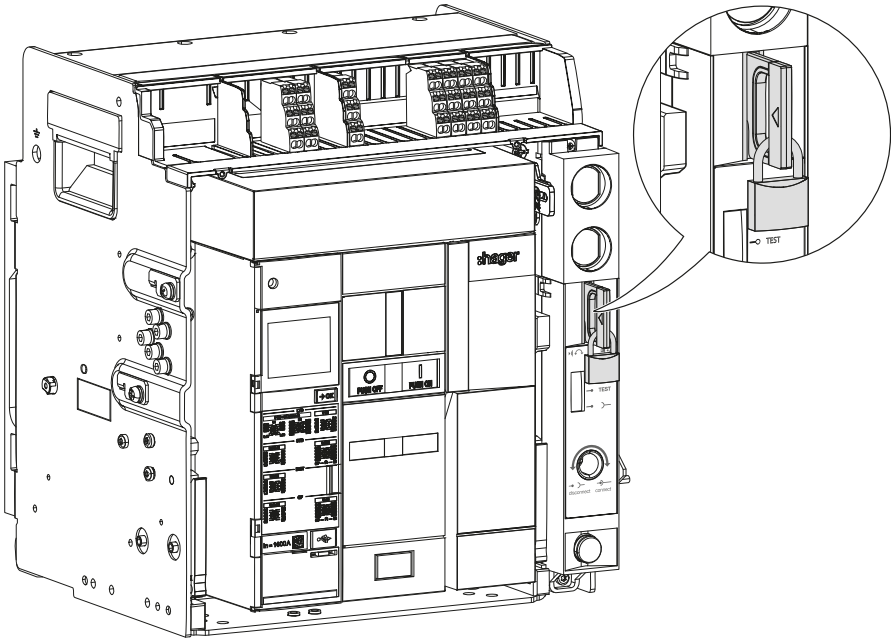
	Action	Illustration
8	*(continued)* The push button returns to its initial position.	
9	Check that it is now possible to close the circuit breaker by pressing the closing push button 	

ATTENTION
The key cannot be removed in horizontal position. To remove it, follow steps 1 to 4.

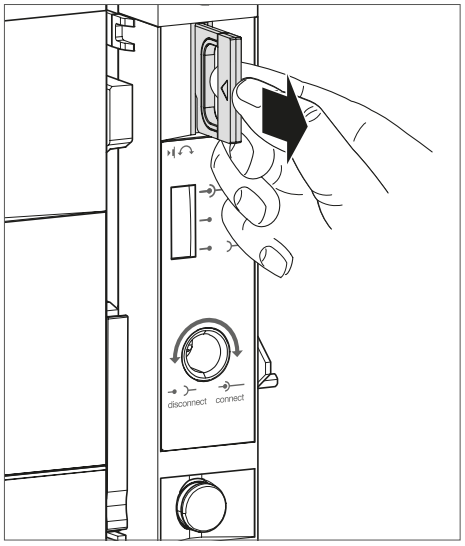
ATTENTION
Refer to manual 6LE007488A to install this locking accessory.

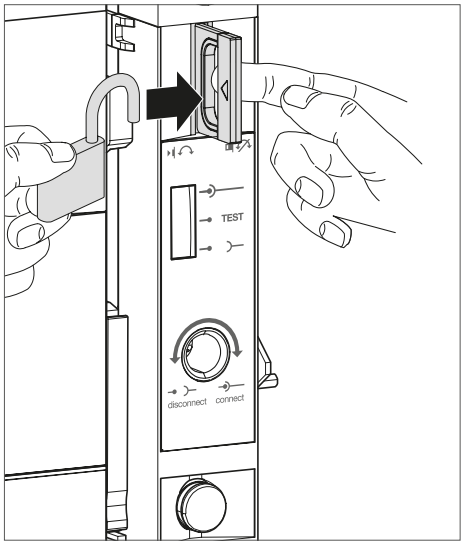
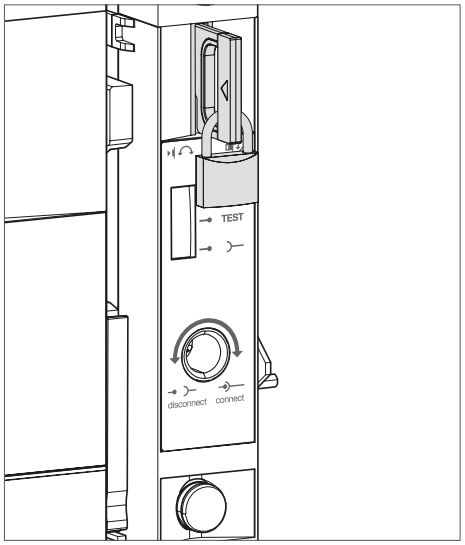
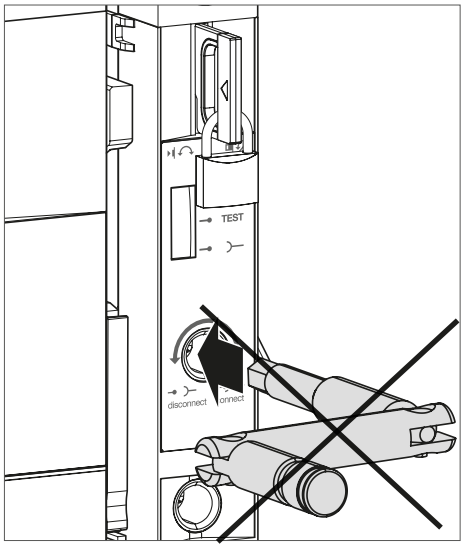
This locking device locks the circuit breaker in the chassis and prevents the racking handle from being inserted.

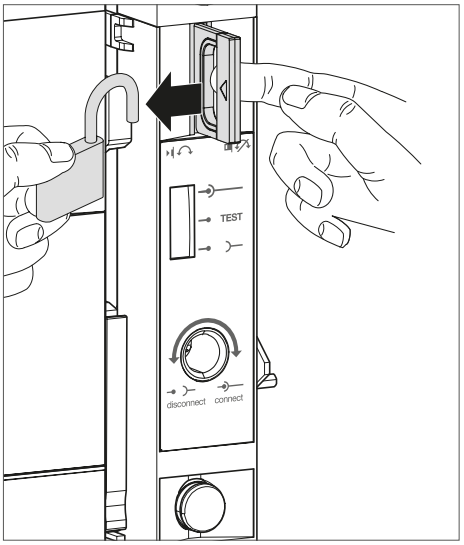
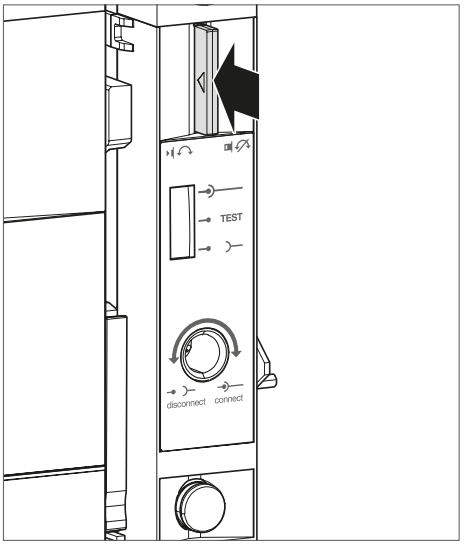
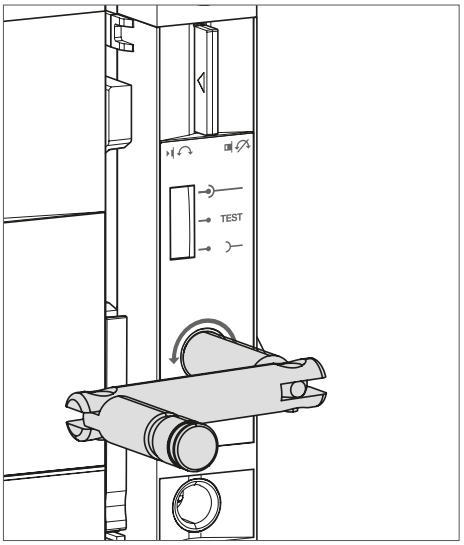
Up to three Ø5–Ø8 mm padlocks can be installed.



To activate or deactivate the locking device:

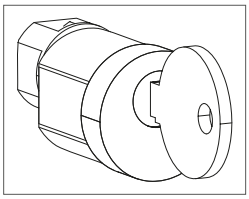
	Action	Illustration
1	Pull the padlocking and position acknowledgement tab.	

	Action	Illustration
2	Position...	
	then close the padlock.	
3	Check to ensure that it is not possible to insert the racking handle into the place to insert/withdraw.	

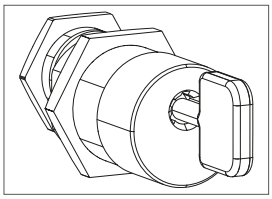
	Action	Illustration
4	To unlock the device, remove the padlock.	
5	Check that the padlocking and position acknowledgement tab returns to its initial position.	
6	Check that it is now possible to insert the racking handle into the place to insert/withdraw.	

This locking device locks the circuit breaker in the chassis and prevents the racking handle from being inserted.

Several types of locks can be installed.

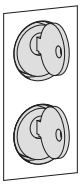


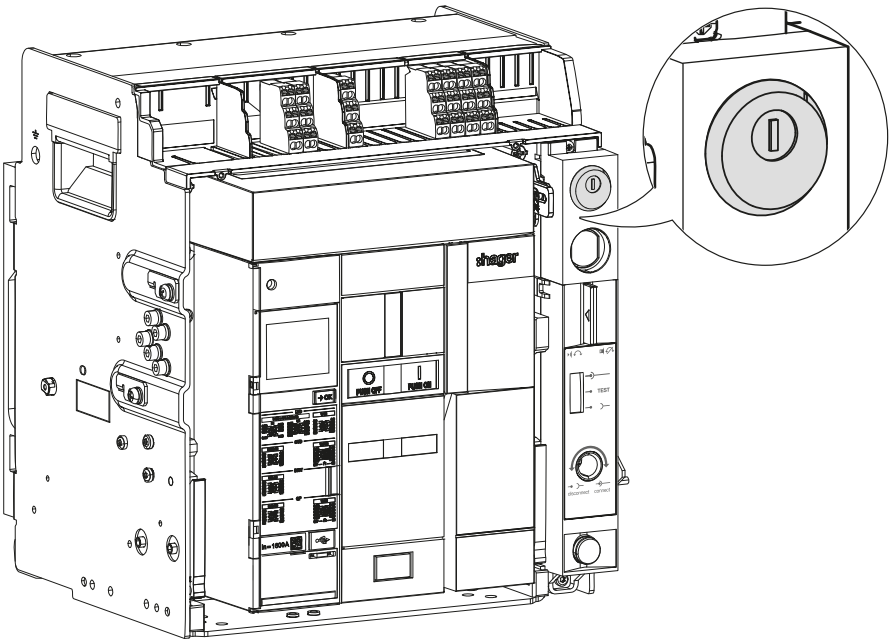
Ronis type lock



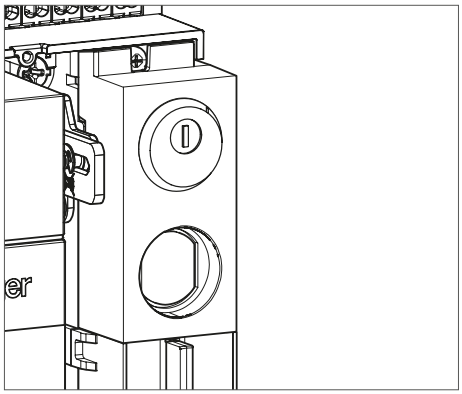
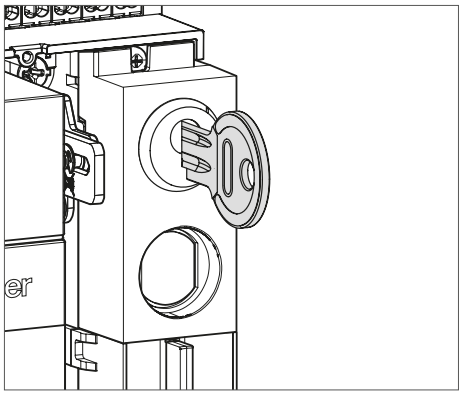
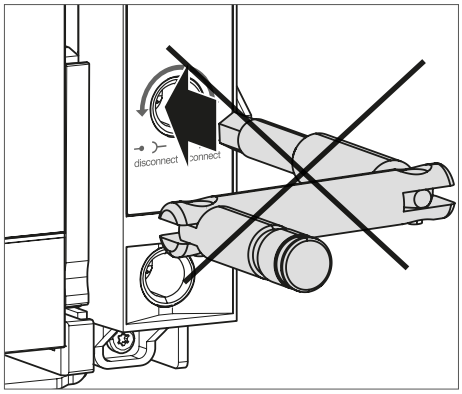
Profalux type lock (not included)

Up to 2 locks can be installed in the housing.



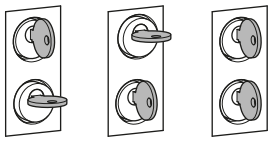


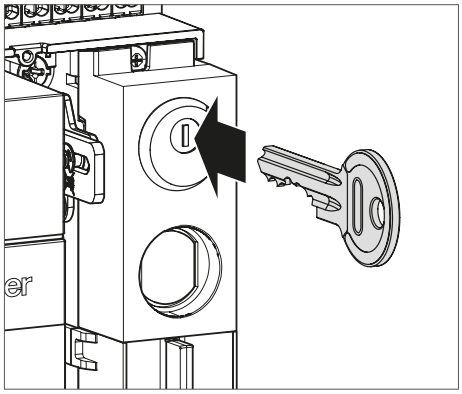
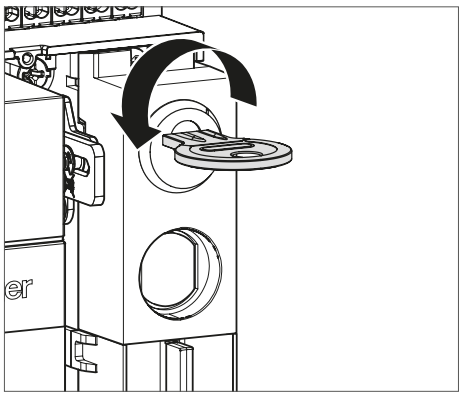
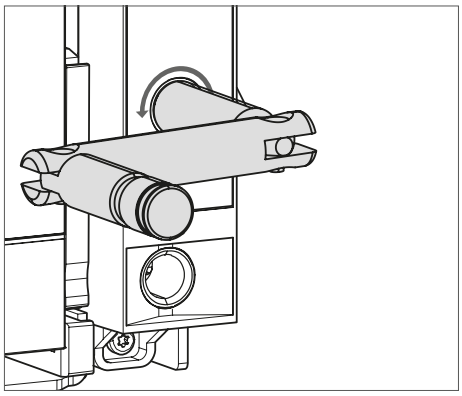
To activate or deactivate the locking device:

	Action	Illustration
1	Check that the keylock is in the vertical position...	
	or that the key is inserted in the vertical position.	
2	Check to ensure that it is not possible to insert the racking handle into the place to insert/withdraw.	

ATTENTION

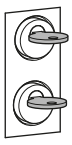
If 2 locks are installed, only one key in the vertical position prevents the introduction of the racking handle into the place to insert/withdraw.

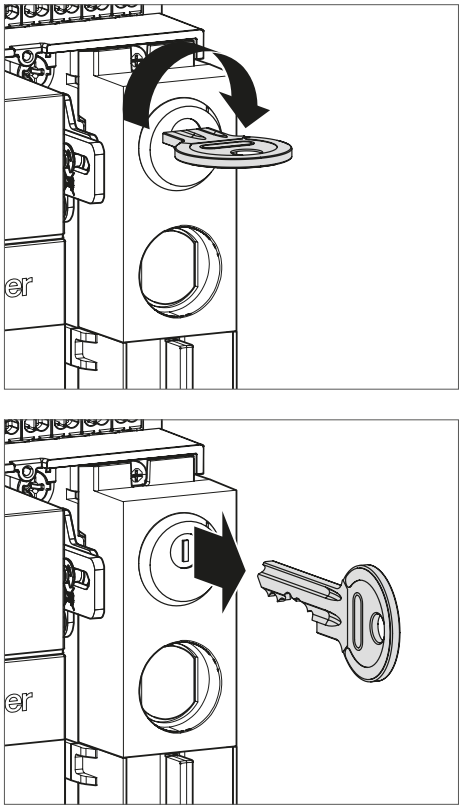


	Action	Illustration
3	To unlock the device, insert the key into the lock.	
4	Turn the key in the locking device in an anti-clockwise direction.	
5	Check that it is now possible to insert the racking handle into the place to insert/withdraw.	

ATTENTION

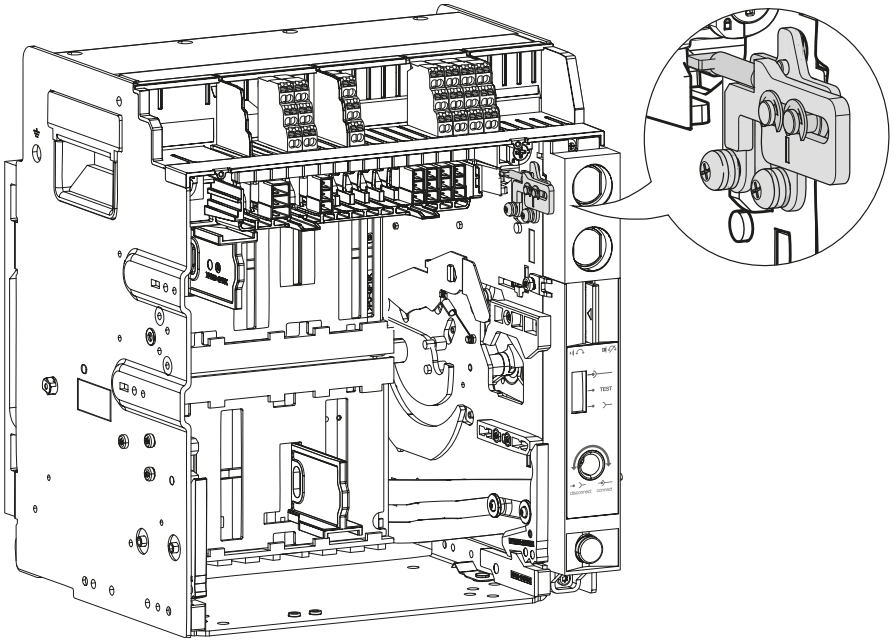
If 2 locks are installed, both keys must be in the horizontal position to allow the introduction of the racking handle into the place to insert/withdraw.



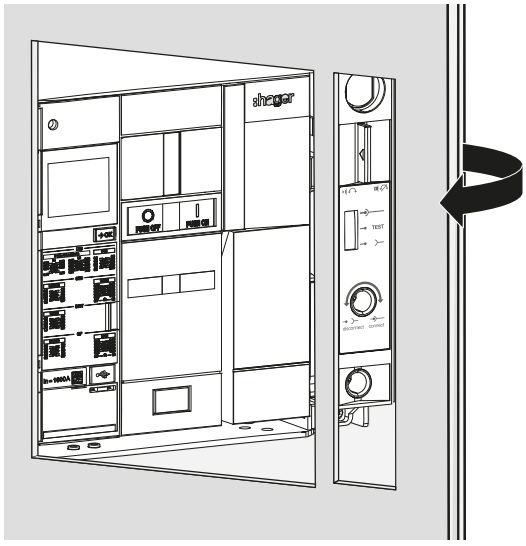
	Action	Illustration
6	The key cannot be removed in horizontal position. To remove it, turn until it is vertical.	

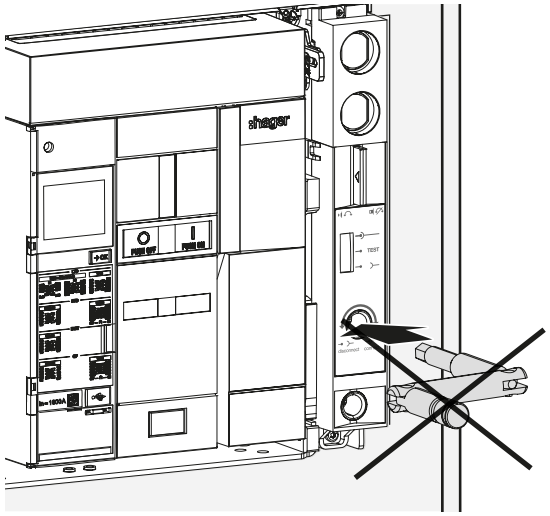
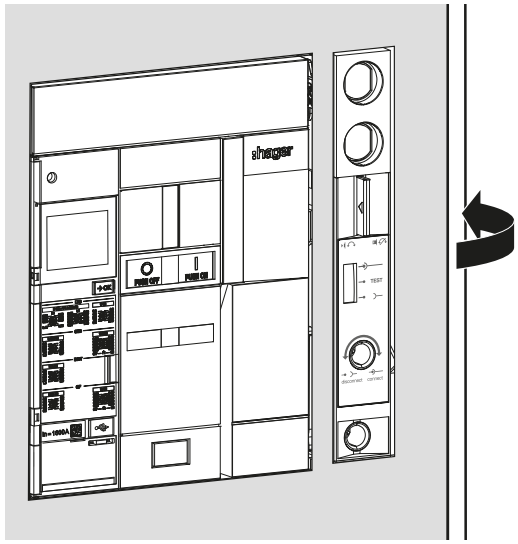
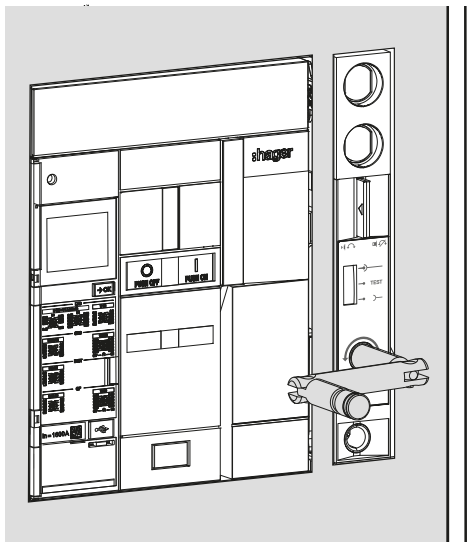
ATTENTION
For the installation of this accessory, refer to the manual 6LE007677A.

This device prevents the racking handle being inserted into the circuit breaker rack in/rack out mechanism when the door of the electrical distibution board is open.



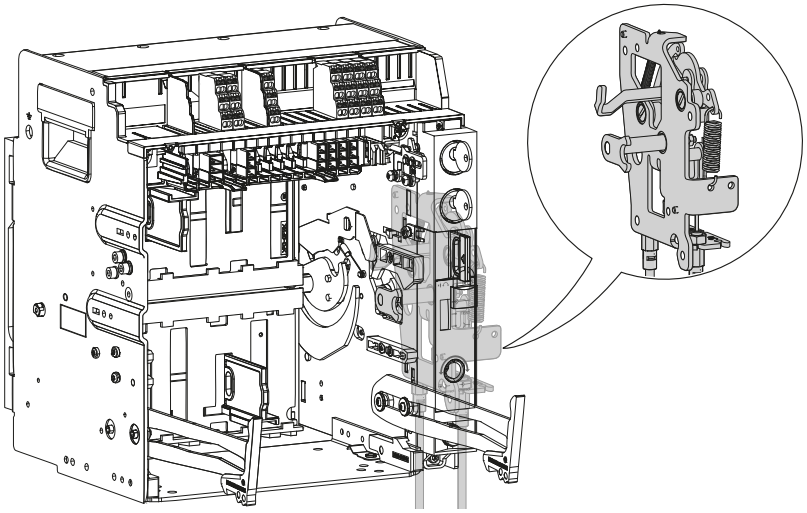
To test the locking device:

	Action	Illustration
1	Open the electrical distibution board door.	

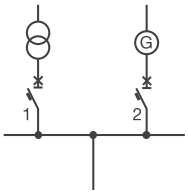
	Action	Illustration
2	Check to ensure that it is not possible to insert the racking handle into the place to insert/withdraw.	
3	Close the electrical distibution board door.	
4	Check that it is now possible to insert the racking handle into the place to insert/withdraw.	

ATTENTION
Refer to manual 6LE007491A to install this locking accessory.

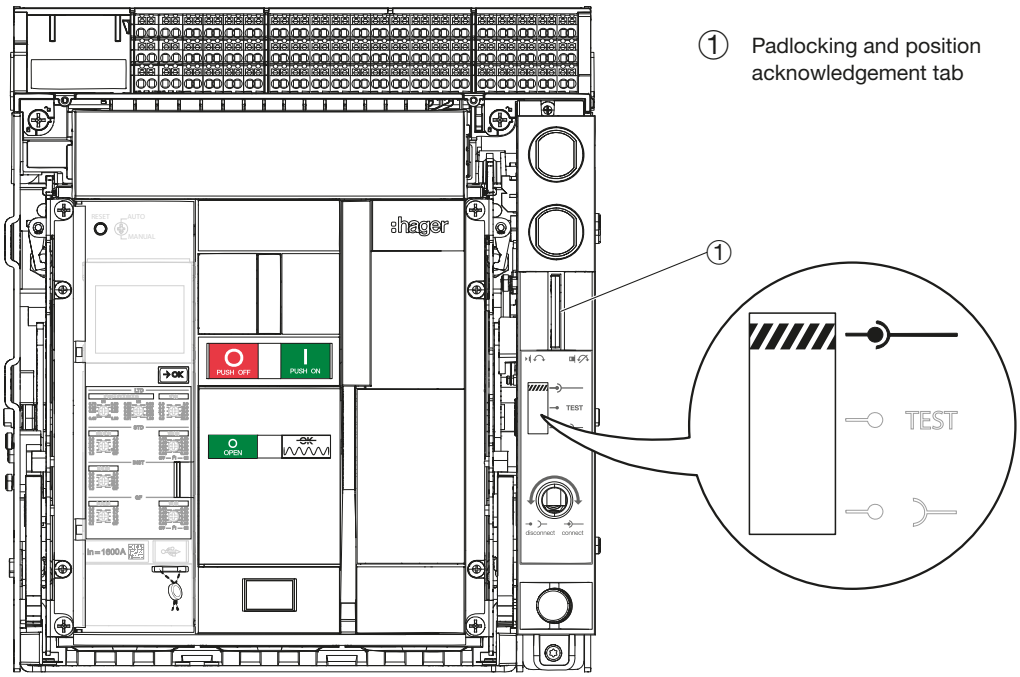
The interlocking kit is used to interlock 2 to 3 circuit breakers installed vertically or horizontally in the electrical distibution board.



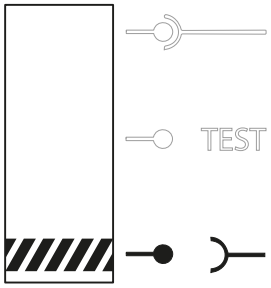
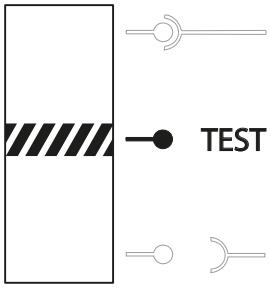
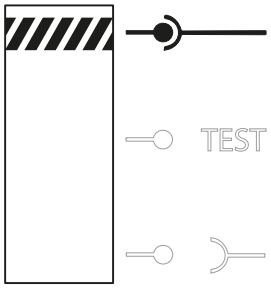
In this way it prevents interlocked circuit breakers closing at the same time according to the types of application described below:

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**
Number of powered circuits	**1**

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



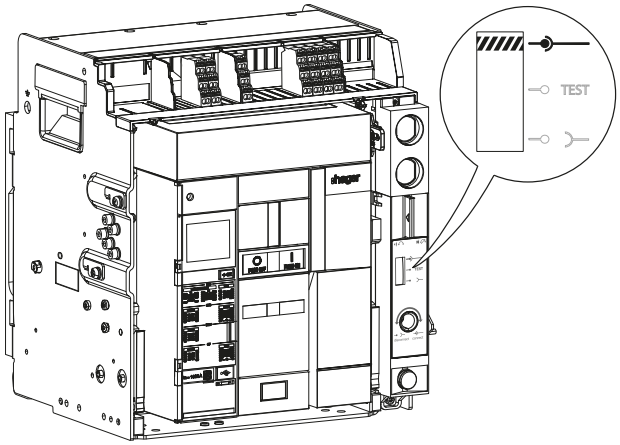
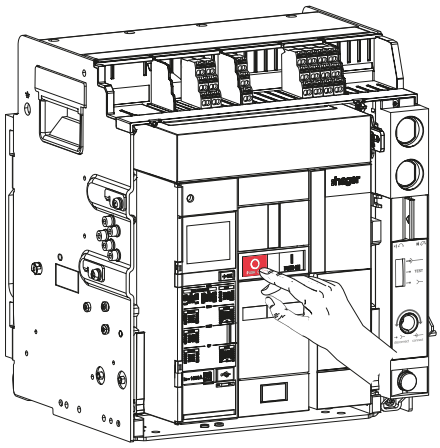
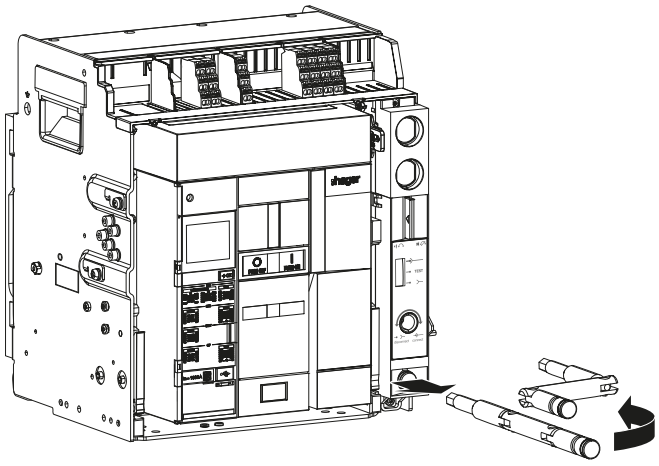
① Padlocking and position acknowledgement tab

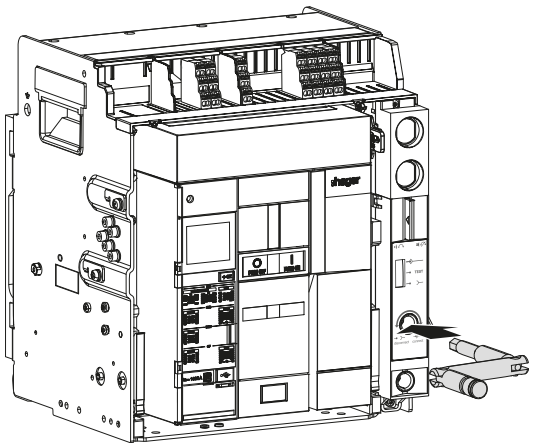
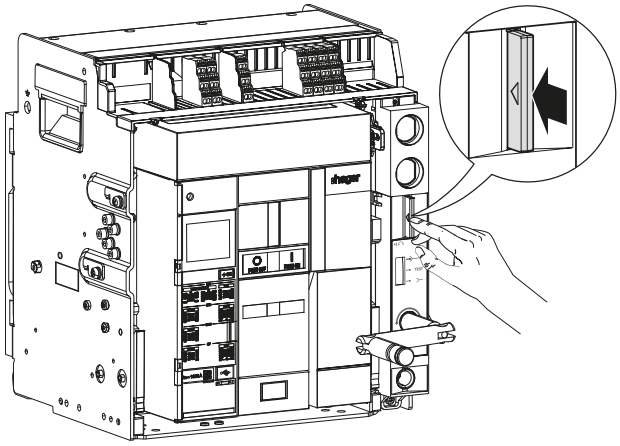
Circuit breaker position	Circuit breaker status	Mechanical position indicator
Disconnected	The circuit breaker can be withdrawn from or inserted into the chassis.	
Test	The circuit breaker's power contacts are isolated. All of the auxiliaries remain electrically connected so that they remain functional.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

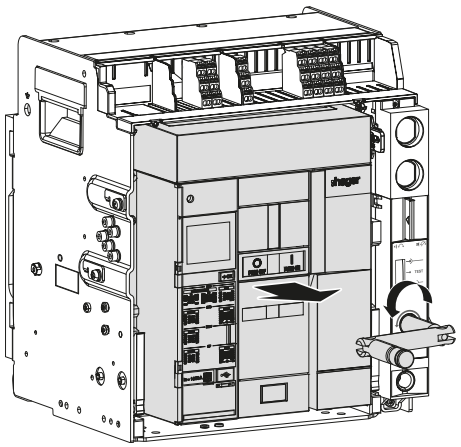
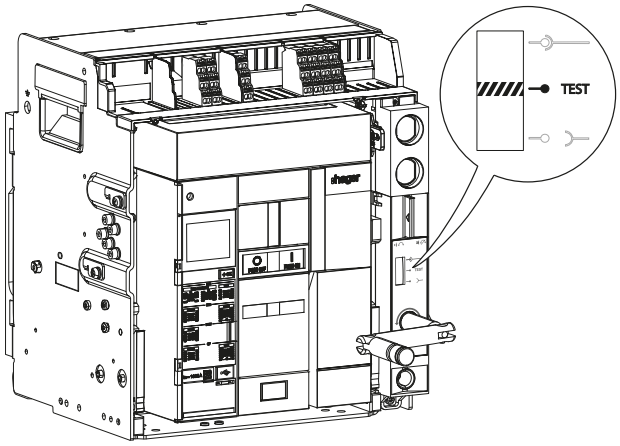
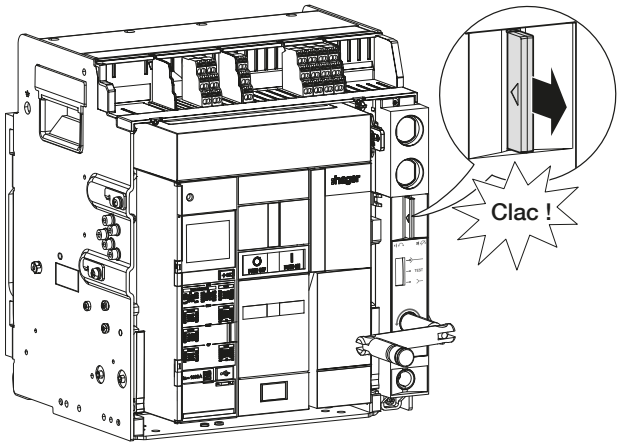
⚠ WARNING

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

To change from connected position to test position:

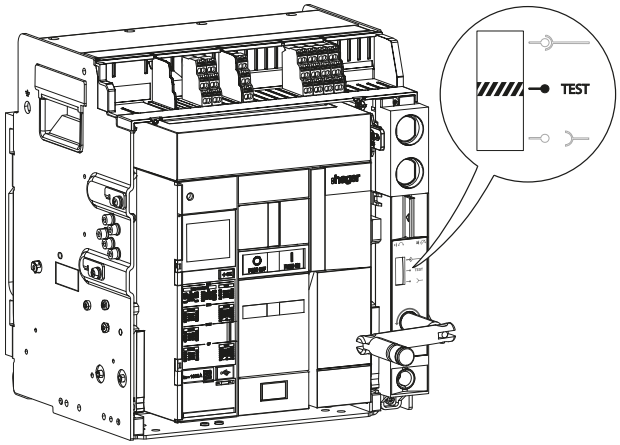
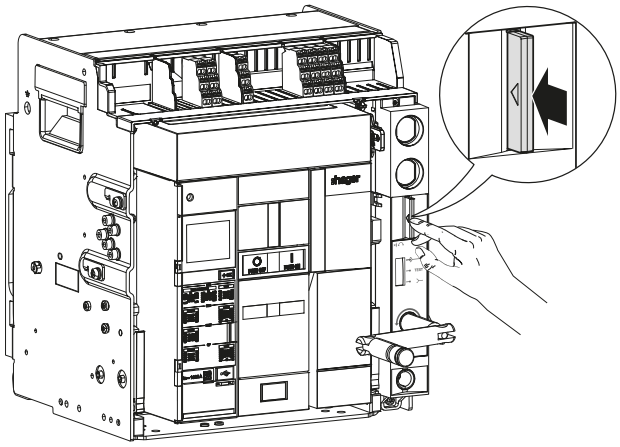
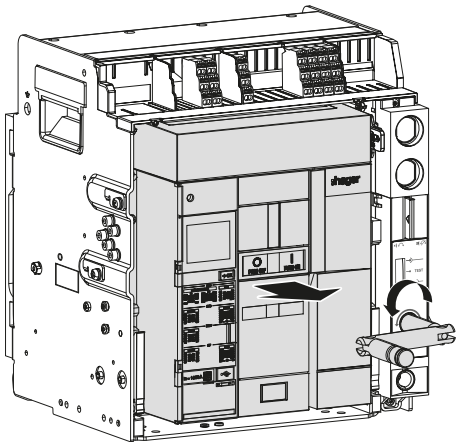
	Action	Illustration
1	Check that the circuit breaker is in the connected position and the mechanical position indicator displays:	
2	Open the circuit breaker by pressing the opening push button 	
3	Remove the racking handle from its housing.	

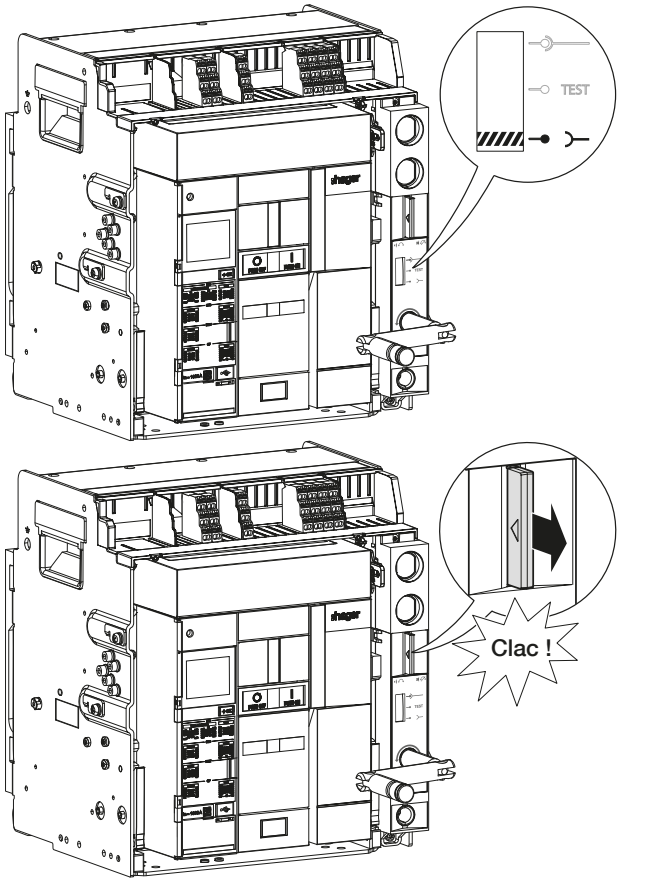
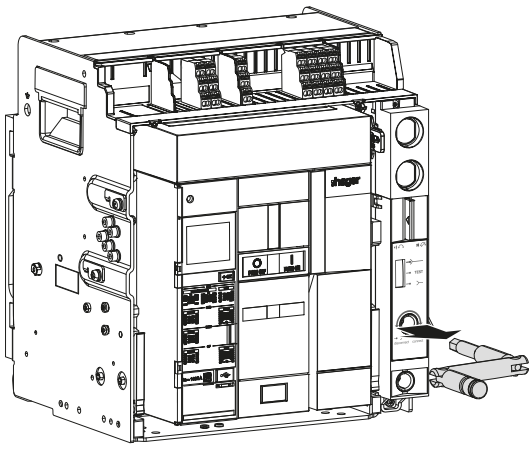
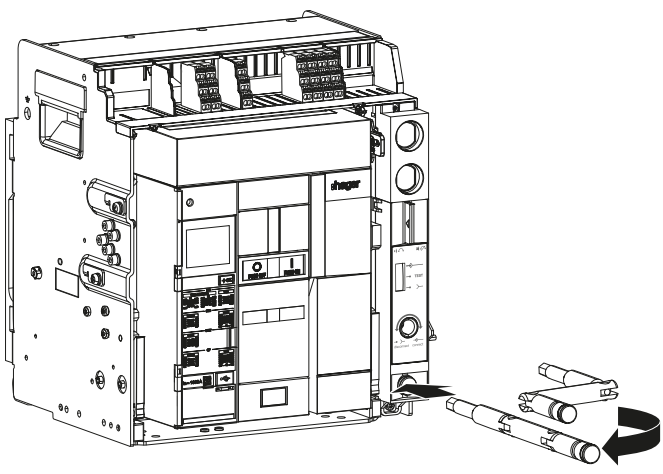
	Action	Illustration
4	Insert the racking handle into the place to insert/ withdraw.	
5	Press the padlocking and position acknowledgement tab.	

	Action	Illustration
6	Turn the racking handle anti-clockwise...	
	... until the mechanical position indicator displays:	
	and the padlocking and position acknowledgement tab comes out of its housing.	

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

To change from test position to disconnected position:

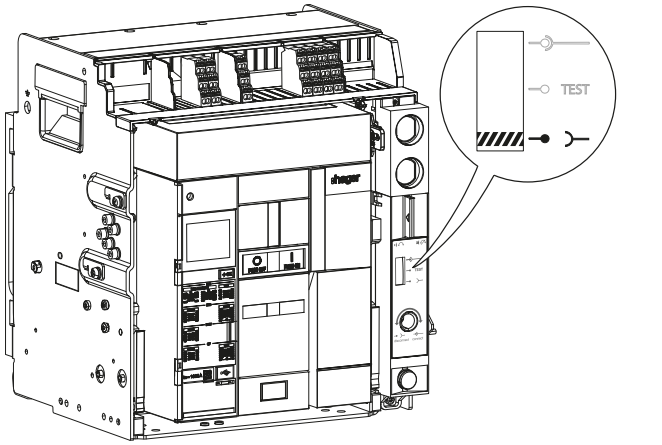
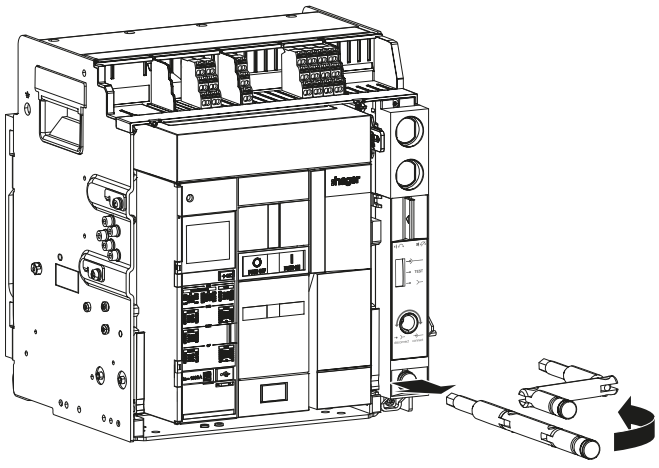
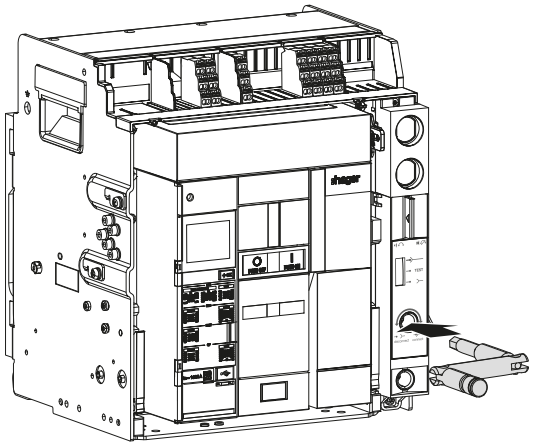
	Action	Illustration
1	Check that the circuit breaker is in the test position and the mechanical position indicator displays:	
2	Press the padlocking and position acknowledgement tab	
3	Turn the racking handle anti-clockwise...	

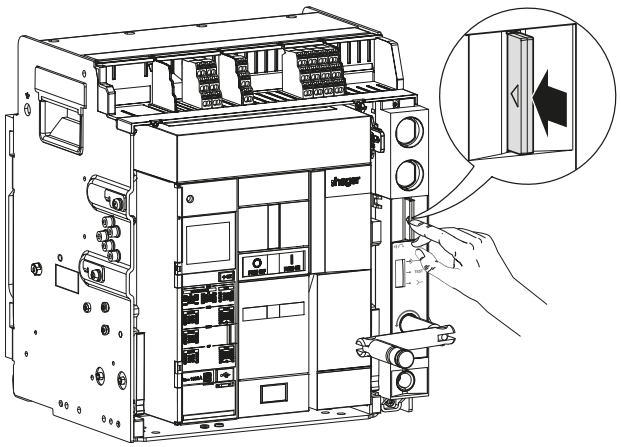
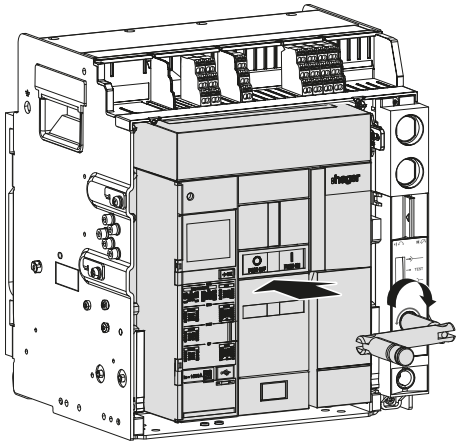
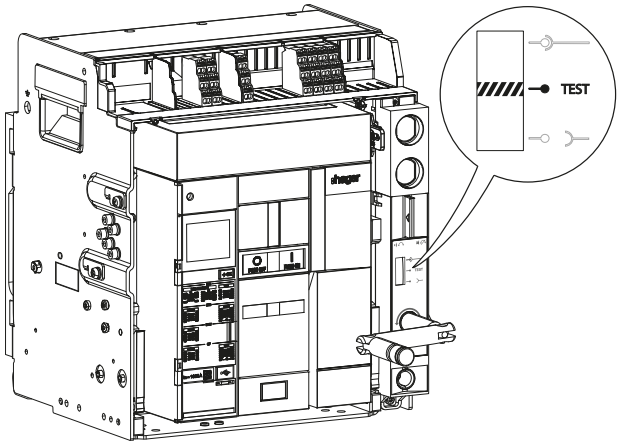
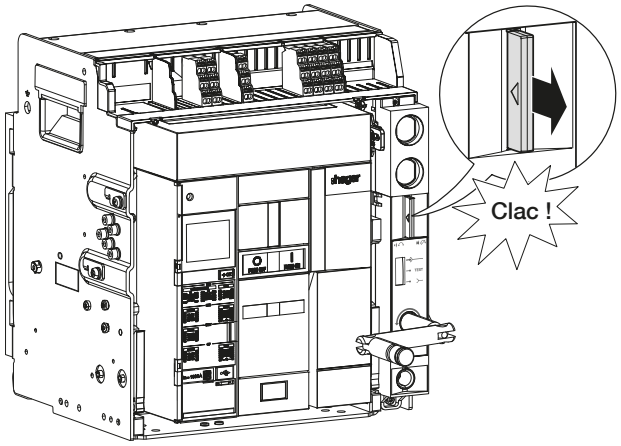
	Action	Illustration
3	... until the mechanical position indicator displays: and the padlocking and position acknowledgement tab comes out of its housing.	
4	Remove the racking handle.	
5	Place the racking handle back in its housing.	

⚠ WARNING

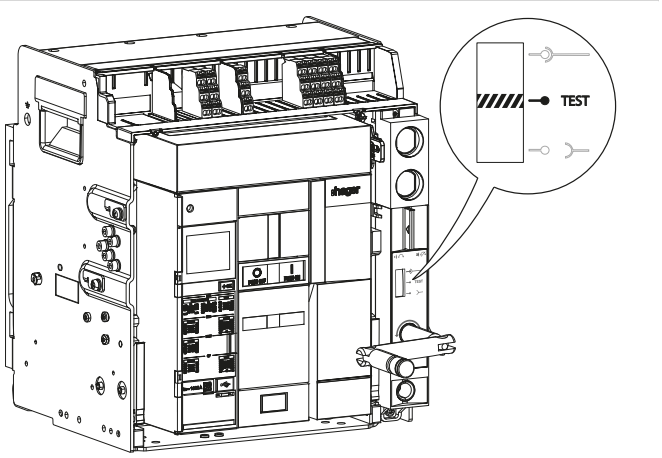
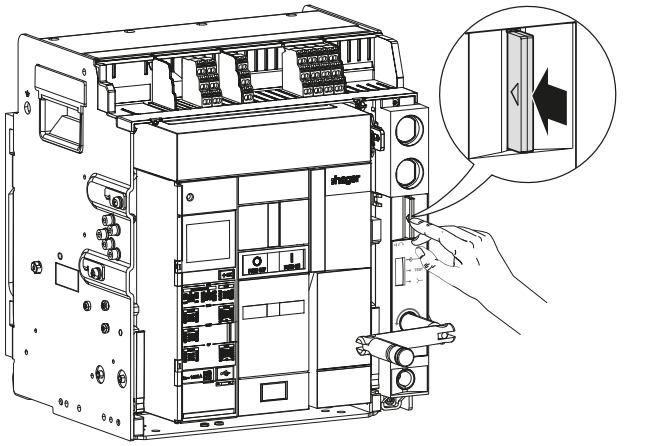
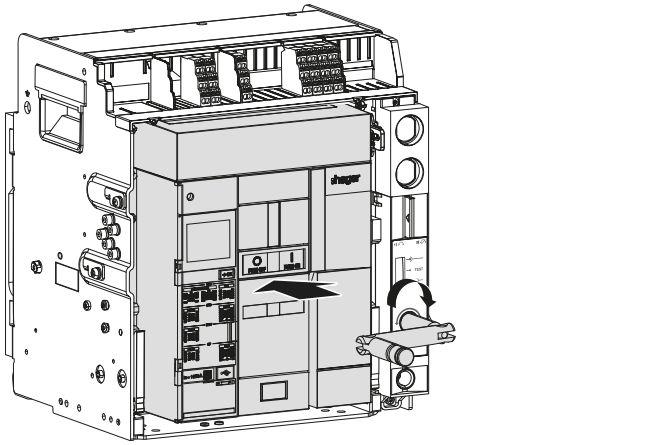
Risk of electric shock
Make sure that the device is only operated by qualified personnel in accordance with to the installation standards in force in the relevant country.

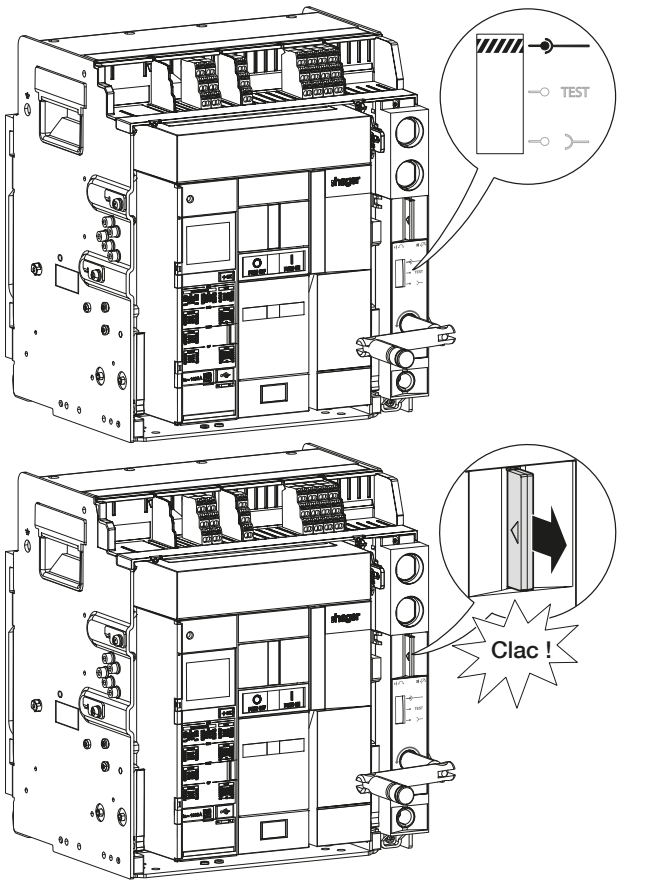
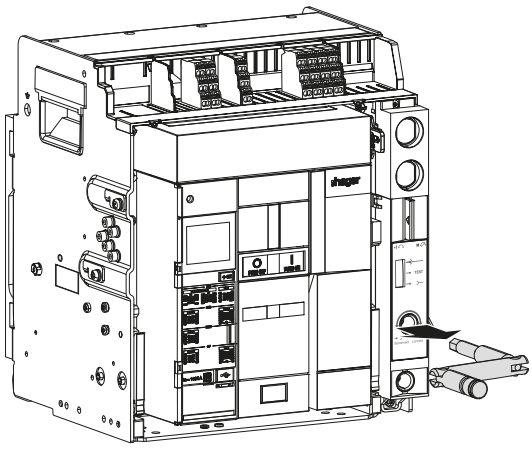
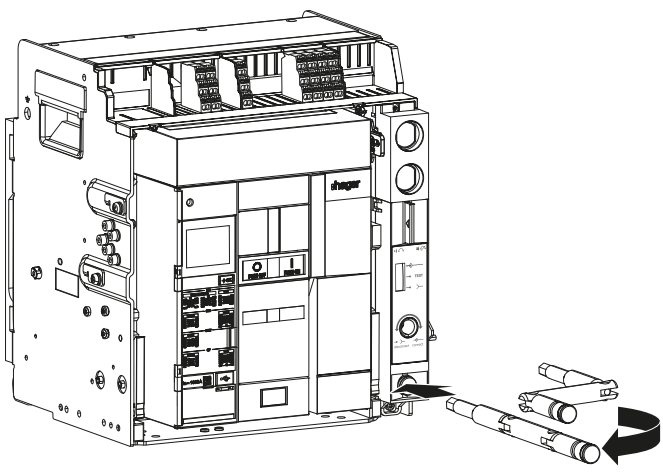
To change from disconnected position to test position:

	Action	Illustration
1	Check that the circuit breaker is in the disconnected position and that the mechanical position indicator displays:	
2	Remove the racking handle from its housing.	
3	Insert the racking handle into the place to insert/ withdraw.	

	Action	Illustration
4	Press the padlocking and position acknowledgement tab.	
5	Turn the racking handle clockwise...	
	... until the mechanical position indicator displays:	
	and the padlocking and position acknowledgement tab comes out of its housing.	

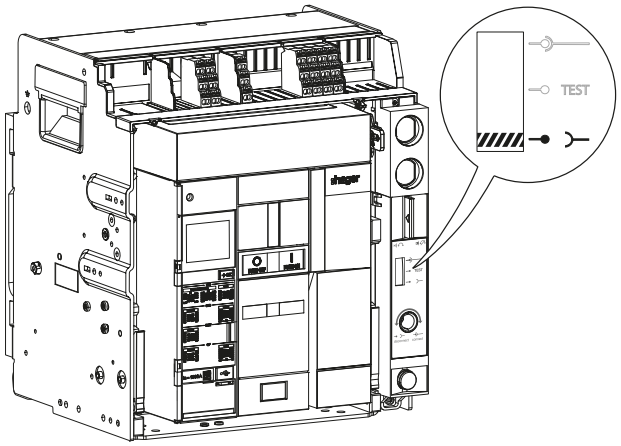
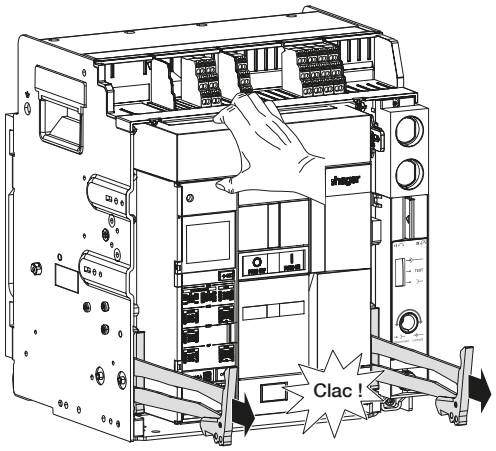
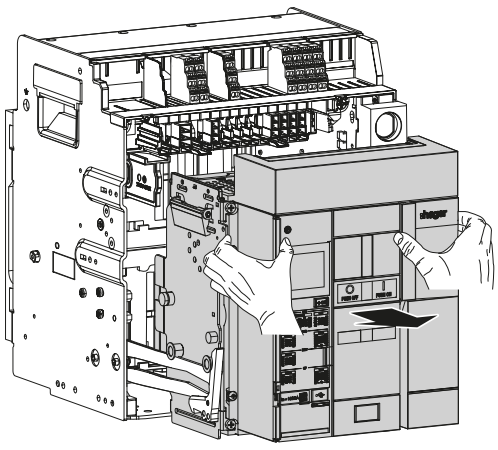
To change from test position to connected position:

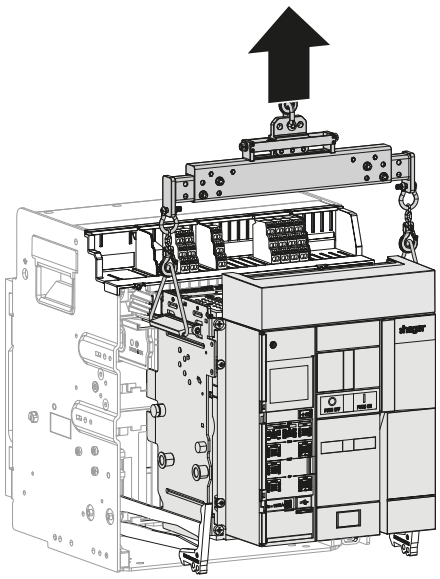
	Action	Illustration
1	Check that the circuit breaker is in the test position and the mechanical position indicator displays:	
2	Press the padlocking and position acknowledgement tab	
3	Turn the racking handle clockwise...	

	Action	Illustration
3	... until the mechanical position indicator displays: and the padlocking and position acknowledgement tab comes out of its housing.	
4	Remove the racking handle.	
5	Place the racking handle back in its housing.	

⚠ CAUTION

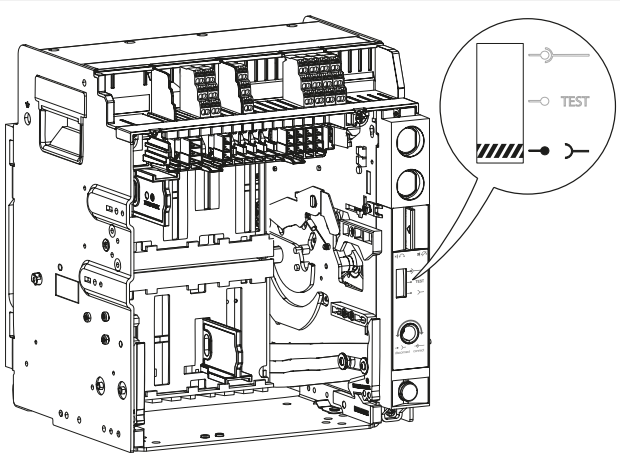
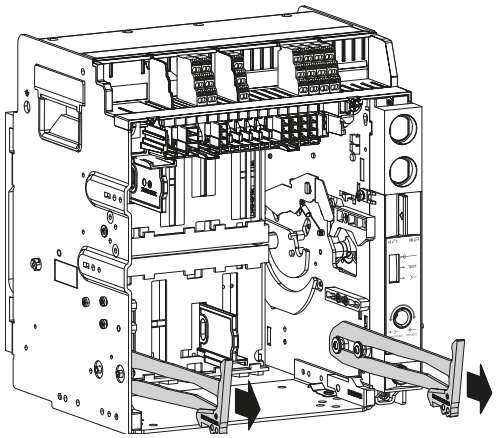
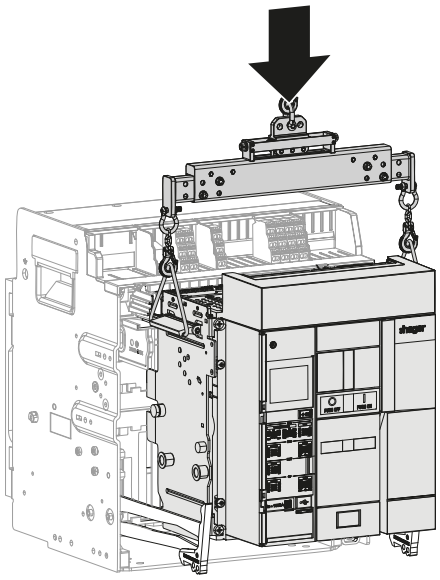
Risk of the circuit breaker falling.
Risk of injury by crushing.
Before handling the circuit breaker, ensure the chassis is fastened within the electrical distribution board. Ensure the device is only handled by qualified personnel equipped with lifting equipment and suitable safety equipment.

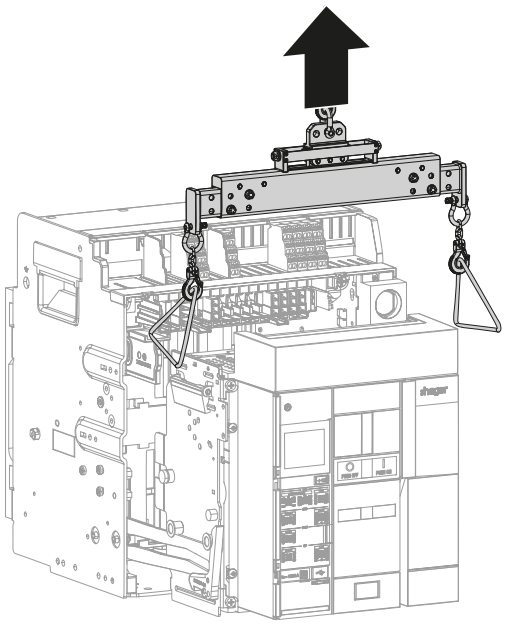
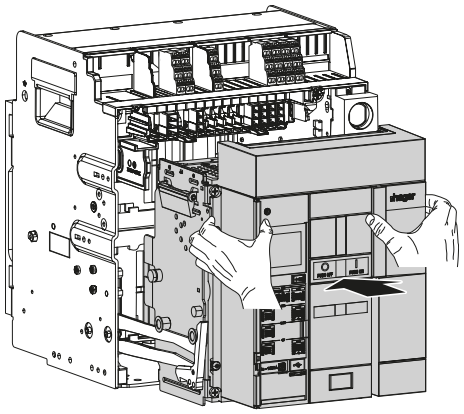
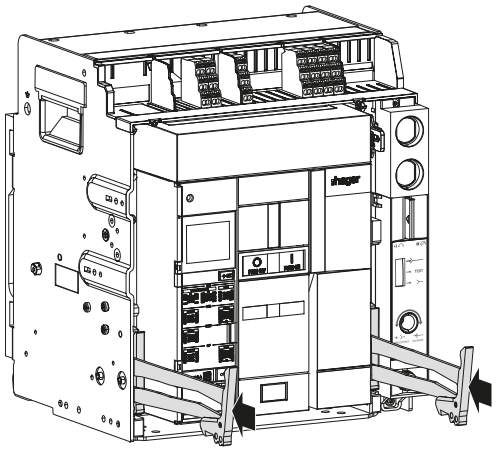
	Action	Illustration
1	Check that the circuit breaker is in the disconnected position (cf. Chapters 4.1 Changing from the connected position to the test position and 4.2 Changing from the test position to the disconnected position).	
2	The circuit breaker remains in the chassis in the disconnected position. Pull the guide rails as far as possible while holding the upper part of the circuit breaker.	
3	Slide the circuit breaker from the chassis on its guide rails.	

	Action	Illustration
4	Remove the circuit breaker from the guide rails.	

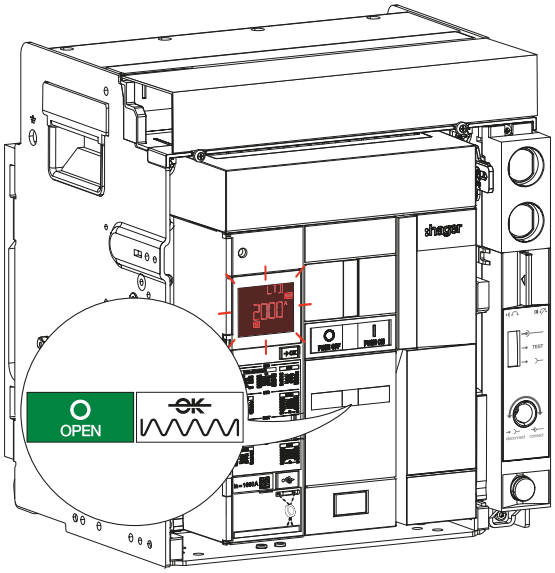
⚠ CAUTION

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

	Action	Illustration
1	Check that the chassis is in the disconnected position.	
2	Pull the guide rails as far as possible.	
3	Using suitable lifting equipment, position the circuit breaker on the guide rails.	

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

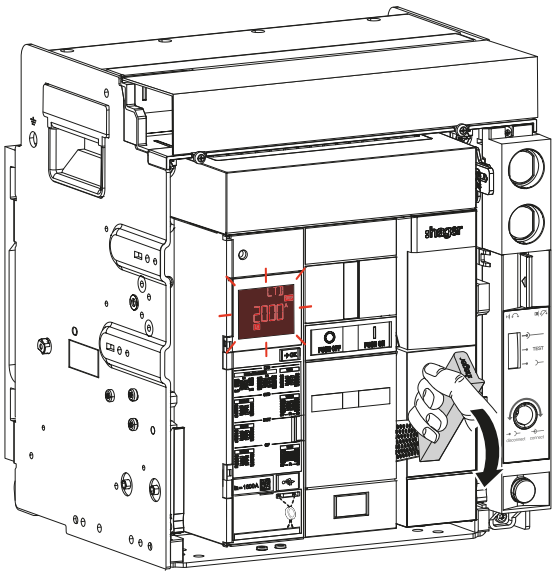
After tripping, the circuit breaker is open, the closing spring discharged or charged if a charging motor is installed. The electronic trip unit display flashes.
To determine the tripping cause, refer to the 6LE007969A user manual for hw+ sentinel electronic trip units.

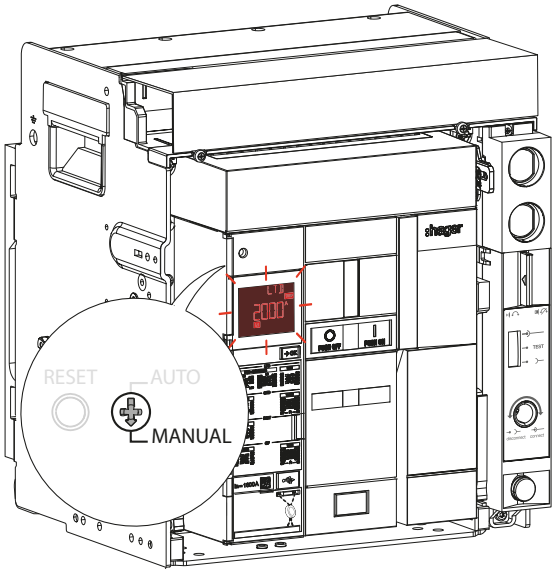
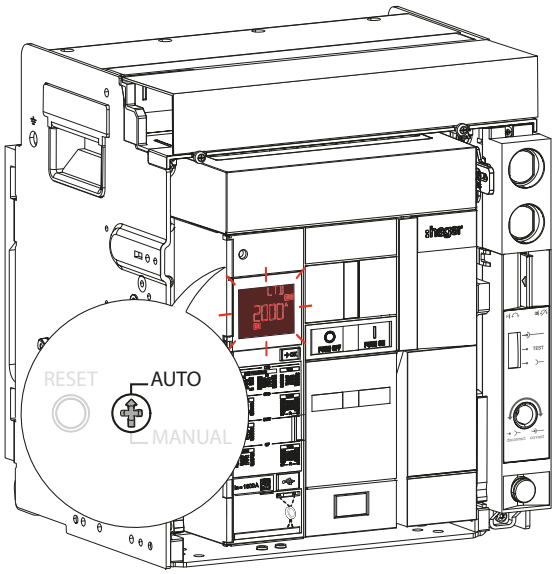
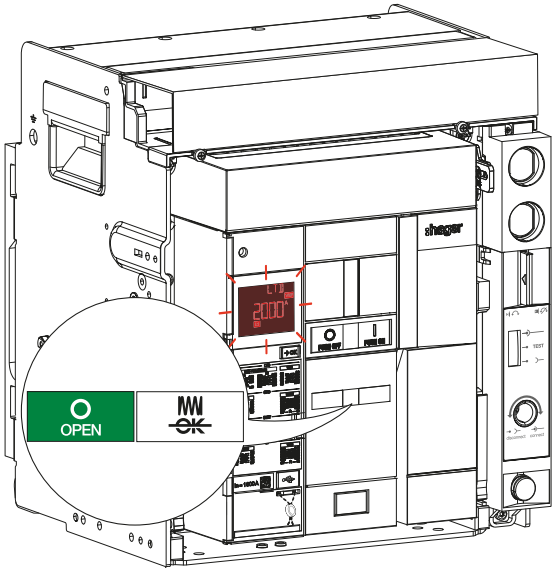


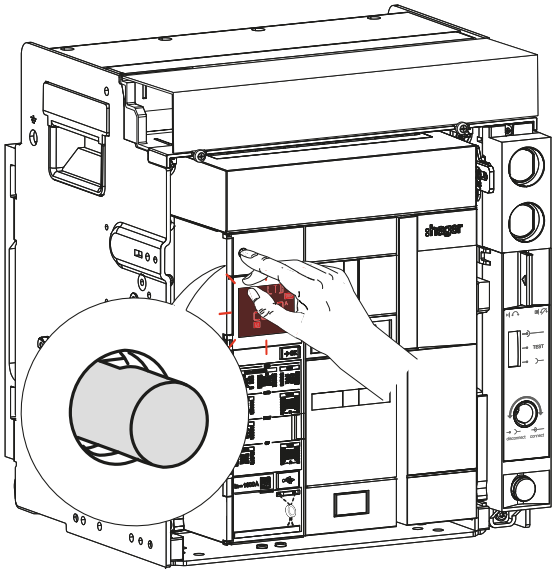
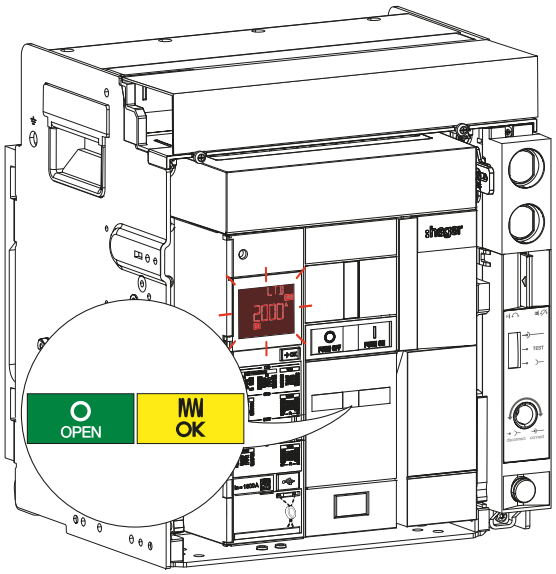
DANGER

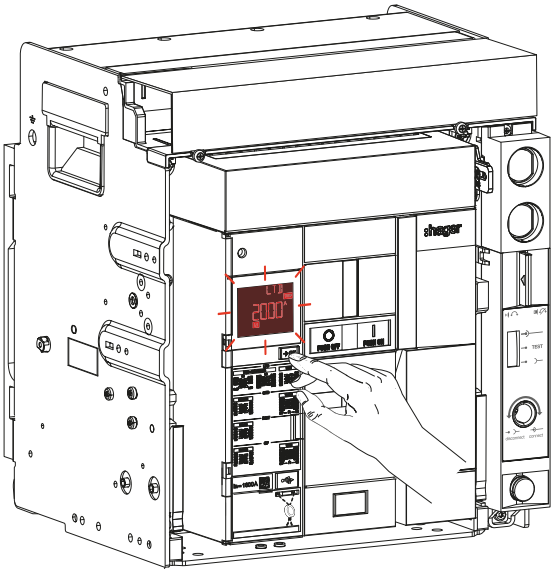
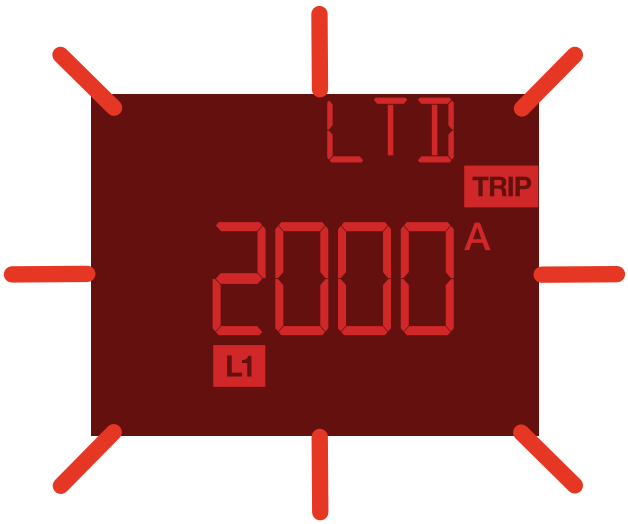
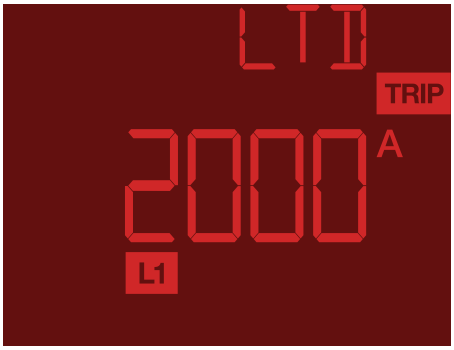
Risk of electric shock, explosion or electric arc.
Inspect the electrical installation and remove the tripping cause before closing the circuit breaker again.
Never close a circuit breaker locally or remotely without first making sure that the installation complies with the safety standards.

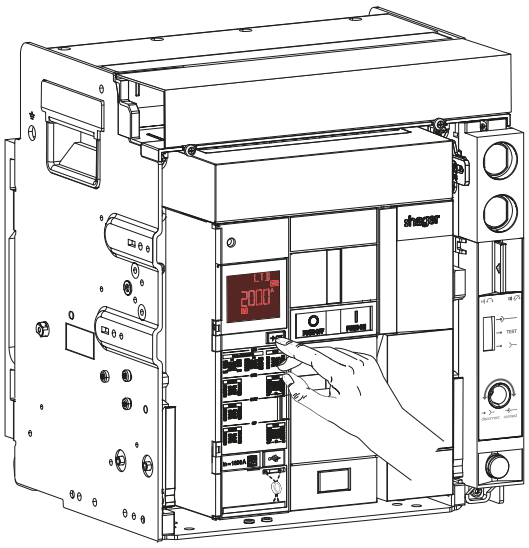
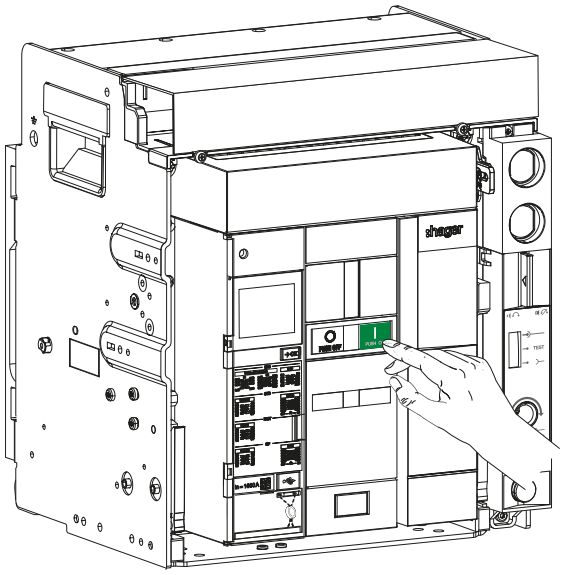
To close the circuit breaker:

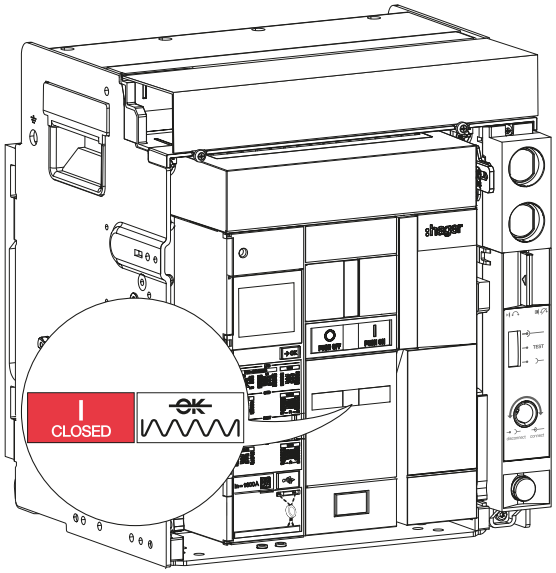
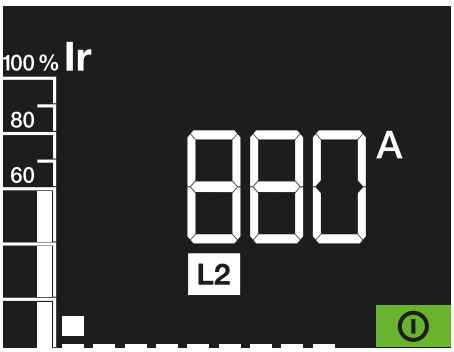
	Action	Illustration
1	Charge the spring using the charging handle until the status of the indicator changes. If a spring charging motor is installed, move on to step 2.	

	Action	Illustration
2	If the circuit breaker rearming type is configured to **MANUAL**, move on to step 3.	
	If the circuit breaker rearming type is set to **AUTO**, go directly to step 5.	
3	Check that the indicators display: The closing spring is charged, but the circuit breaker is not ready to be closed.	

	Action	Illustration
4	Press the circuit breaker RESET re-arm button.	
5	Check that the closing spring is charged. The circuit breaker is now ready to be closed.	

	Action	Illustration
6	Then reset the electronic trip unit display. Make a **short press** on the →OK button.	
	The sentinel electronic trip unit display stops flashing:	
	and becomes steady:	

	Action	Illustration
7	Press the →OK button **for more than 3 s** .	
8	Check that the fault is cleared and that the display switches off.	
9	Close the circuit breaker by pressing the closing push button I PUSH ON.	

	Action	Illustration
10	Check that the indicators change status.	
11	Check that the ReadyToProtect indicator flashes on the electronic trip unit display. If the display remains off, connect an external battery to the USB-C socket to perform this check.	

ATTENTION

To guarantee that the electronic trip unit functions well, it is recommended that a 24V DC SELV external power supply be connected.

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.

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