

EvoPact HVX Embedded Pole

Medium Voltage Vacuum Circuit Breaker
From 12 kV to 24 kV - 630 A to 4000 A



User Guide

NVE8601501-01
May 2020



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



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Safety Information

Important Information

Read these instructions carefully and look at the equipment to become familiar with it before trying to install, operate, service or maintain it. The following special messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a "Danger" or "Warning" safety message indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages with this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol shall not be used with this signal word.

Please Note

Electrical equipment should only be installed, operated, serviced, and maintained by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Before You Begin

- This user guide is meant for anyone who will operate the circuit breaker: panel builder, installer or end user. The generic term used in this guide for any such person is the USER.
- This user guide cannot be used to define or check the circuit breaker's compatibility with every single user's application, nor its reliability within it. It is the duty of every user or integrator to perform a complete risk analysis, evaluation and testing of the products in specific applications according to relevant standards.
- When the products are used in applications with specific technical and safety rules, you must follow the integration guide and protection rules for the specific application.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See standards or local equivalent.
- Do not modify the mechanical or electrical parts.
- This circuit breaker must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this circuit breaker before working on or inside the circuit breaker.
- Always use a properly rated voltage sensing device to confirm power is off.
- Turn off or trip the circuit breaker and discharge the mechanism.
- Replace all devices, covers and doors before turning on power to this equipment.
- Perform work only after reading and understanding all of the instructions contained in this guide.
- Beware of potential hazards and carefully inspect the work area for tools and objects that may have been left inside the circuit breaker.
- Do not operate the system with interlocks and safety barriers removed.

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

CAUTION

HAZARD OF DEGRADED EQUIPMENT PERFORMANCE

- Respect the handling rules and avoid any shocks to the device.
- Observe the normal service conditions described in this manual.
- If the circuit breaker, or the equipment in which the circuit breaker is mounted, is stored before its final installation, observe the storage conditions.

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



Overall Information

Purpose of the Document



This user guide is an integral part of the device. It describes the operation and use of the HVX circuit breaker, as well as its storage and handling conditions. This document must be available at all times to those required to use or work on the circuit breaker.

It is required to read carefully and to understand all the instructions contained in this guide and follow its recommendations. However, this manual cannot describe every single condition of use or every variant specific to the customer.

Technical Documentation Access



Visit our website www.schneider-electric.com:

- for downloading additional documents
- for contacting Schneider Electric customer support if you need information not contained in this document
- if you have any suggestions on how to improve this document.

You can access this information using the QR code located on the front cover of the circuit breaker.

Limitation of Liability



Schneider Electric cannot be held responsible for damage due to:

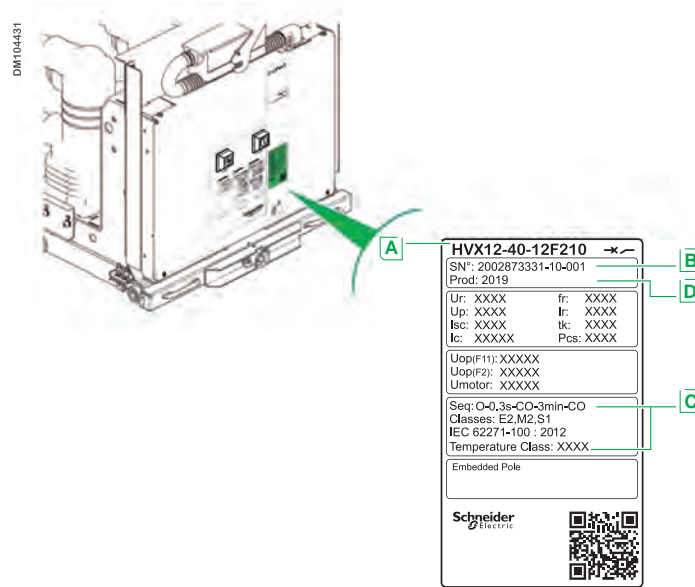
- failure to follow the instructions in this guide and additional documents
- improper use of the device
- improper assembly, testing, installation, connection or misuse of the circuit breaker
- use of components or spare parts other than those recommended by Schneider Electric.

Introduction to the HVX Circuit Breaker

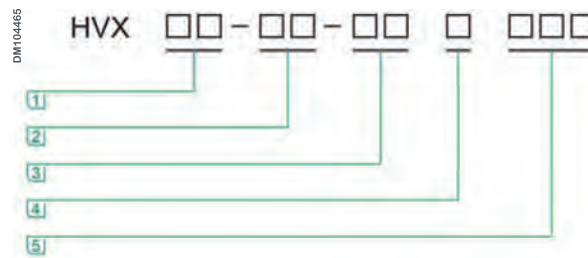


Presentation of the Circuit Breaker

Nameplate



A Type Designation



- 1 Rated voltage (kV)
- 2 Rated short-circuit breaking current (kA)
- 3 Rated current (A)
- 4 Installation: E for withdrawable; F for fixed
- 5 Phase distance (PD)

B Serial numbers

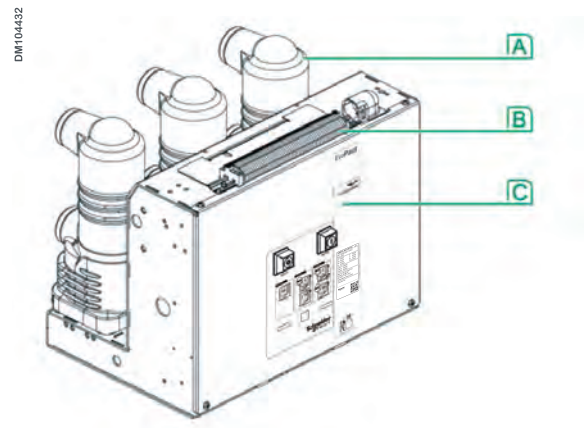
C Technical data

O-0.3s-CO-3min-CO: Rated operating sequence					
U_r	Rated voltage	I_r	Rated normal current	f_r	Rated frequency
I_{sc}	Rated short circuit breaking current	I_c	Rated cable-charging breaking current	t_k	Rated duration of short circuit
U_p	Rated lightning impulse withstand voltage	U_{op}	Rated supply voltage of closing or opening devices	U_{motor}	Rated charging voltage
P_{cs}	d.c. component of the rated short-circuit breaking current at contact separation corresponding to the d.c. time constant of the rated short-circuit breaking current				

D Manufacturing date (year-month)

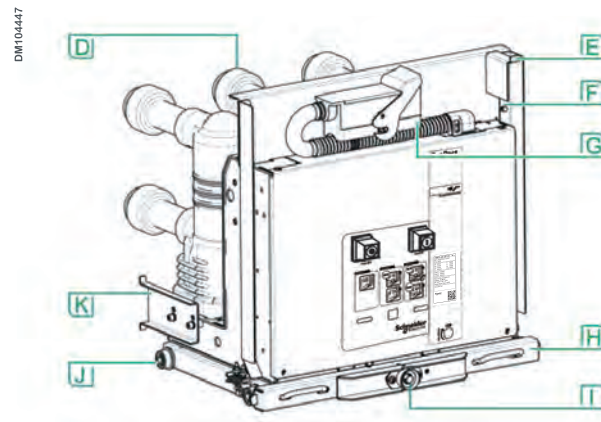
Front View of the Circuit Breaker

Fixed circuit breaker



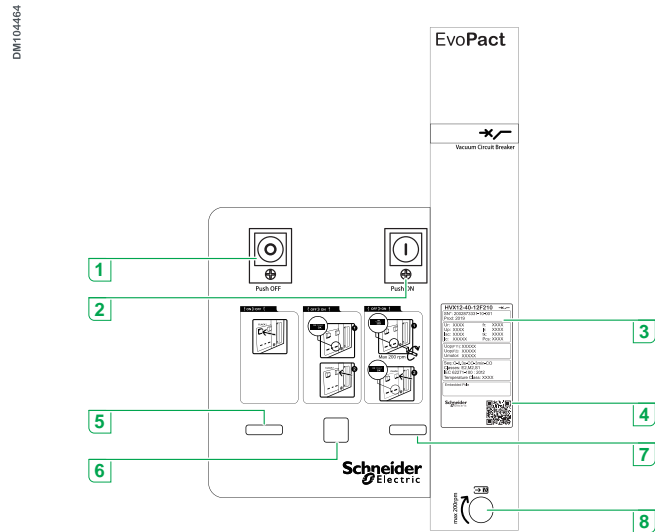
- A** Circuit breaker poles
- B** Secondary terminal blocks (or auxiliary circuit plug)
- C** Operator interface

Withdrawable circuit breaker



- D** Conductor bar terminal/tulip type contact
- E** Secondary terminal locking rail
- F** "IP" protection sheet
- G** Auxiliary circuit plug
- H** Racking trolley
- I** Opening for the insertion of the crank handle to move the circuit breaker into its disconnected/service position
- J** Rollers
- K** Shutter driver

Detail illustration of operator interface



- 1 OFF button (rocker switch "O" or push button "O")
- 2 ON button (rocker switch "I" or push button "I")
- 3 Nameplate
- 4 QR code
- 5 Operation counter
- 6 Position indicator of circuit breaker
- 7 Status indicator of spring
- 8 Insertion opening for manual charging of the operation mechanism

How to Use the QR Code

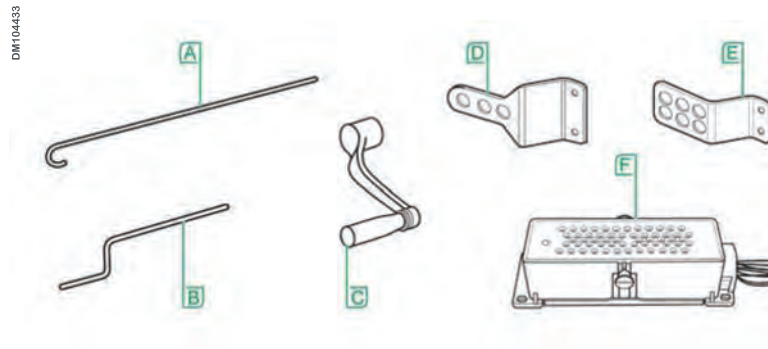
The QR code located under the nameplate grants access to all data related to your circuit breaker, from a smart phone or a connected tablet:

- User guide
- Receipt guide
- Spare parts list

To access this information, read the QR code with your smart phone or your connected tablet; you will be directed to the website containing the data relating to your circuit breaker. Follow the instructions to obtain personal access.

Accessories

The illustration below shows the accessories provided with the circuit breaker.^[1]



- A** ON/OFF operating rod
- B** Crank handle for charging the operation mechanism
- C** Crank handle for racking in/out the trolley (for HVX-E only)
- D** Lifting bracket for 24 kV circuit breaker (2)
- E** Lifting bracket for 12/17.5 kV circuit breaker (2)
- F** Male socket of auxiliary circuit

[1] Depending on the panel type used and must be inquired about if necessary.

Technical Data

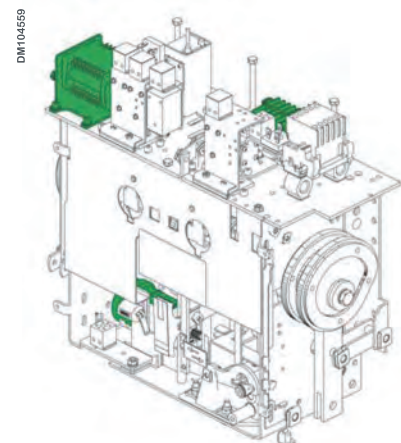
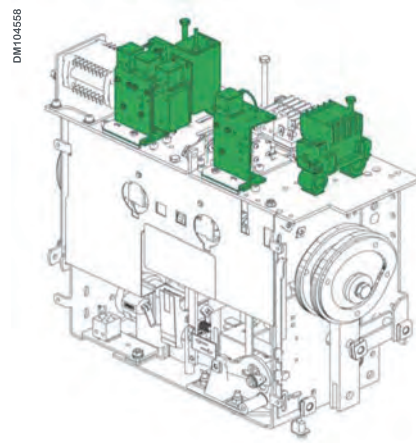
Overall Technical Data

Designation		Value		
Rated voltage (U_r)	kV	12	17.5	24
Rated lightning impulse withstand voltage (U_p)	kV	75	95	125
Rated power frequency withstand voltage (U_d)	kV	28	38	50
Rated current (I_r)	A	630, 1250, 1600, 2000, 2500, 3150, 4000 ^[1]		630, 1250, 1600, 2000, 2500
Rated short-circuit breaking current (I_{sc})	kA	25, 31.5, 40, 50		25, 31.5
Rated short-time current (I_k)				
Rated duration of short circuit (t_k)	s	3		
Rated frequency (f_r)	Hz	50/60		

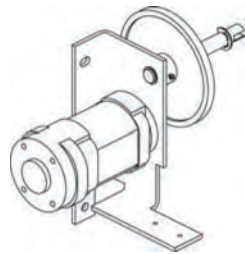
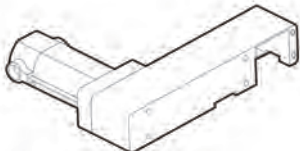
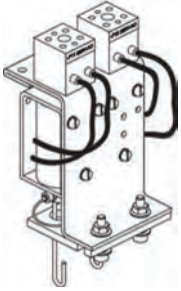
[1] Forced cooling is necessary.

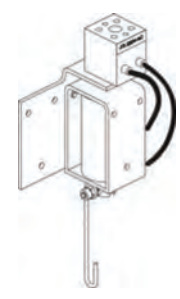
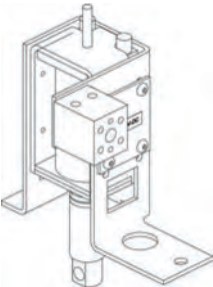
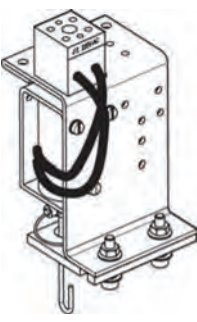
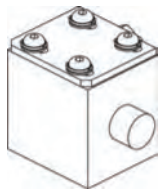
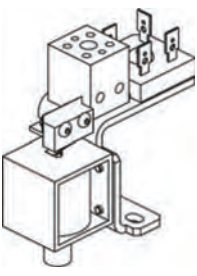
Control and Operating Devices

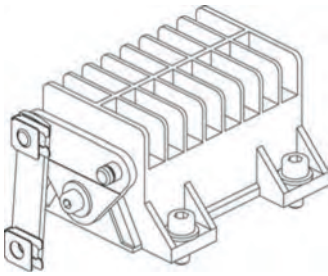
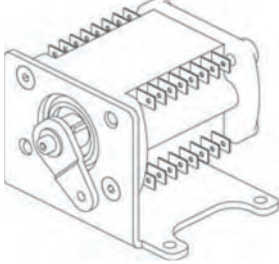
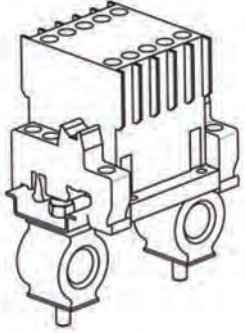
The operation mechanism of the circuit breaker is designed to be manually charged. Additionally, the drive mechanism can be equipped with optional operating and control devices.



Low Voltage Components

Component		Function	Illustration
Motor	M1	Charging the operation mechanism	DM104400 
	M2	Racking in/out the trolley	DM104401 
Opening release	F11+ F12	Opening the circuit breaker	DM104402 

Component		Function	Illustration
Over-current release Rated supply current: 0.5 A/1 A/ 5 A	F3	Opening the circuit breaker	DM104403 
Under-voltage release	F4	Opening the circuit breaker	DM104404 
Closing release	F2	Closing the circuit breaker	DM104405 
Blocking coil	Y0	Locking the rack in/out of the trolley	DM104406 
	Y1	<ul style="list-style-type: none"> Locking the closing of the circuit breaker Preventing the circuit breaker from being closed via the push buttons "ON". If the rated auxiliary voltage has fallen or is shut off, all blocking coils are locking the positions. 	DM104407 

Component	Function	Illustration
<p>Auxiliary switches for charging</p>	<p>S2</p> <p>The auxiliary switch is mainly used to check and indicate the charging status.</p> <p>It is connected by the charging mechanism to ensure that, during the closing operation, the driving mechanism can automatically store energy.</p> <p>When charging is complete, it breaks the electrical charging circuit.</p> <p>Some contacts of this S2 auxiliary switch are also available for the customer (see wiring diagram).</p>	<p>DM104408</p> 
<p>Auxiliary switches for position indication</p>	<p>S11+ S12</p> <p>Snap-action switches on the drive mechanism that are installed according to the circuit breaker equipment (or according to the circuit breaker customization).</p>	<p>DM104409</p> 
<p>Anti-pumping relay</p>	<p>K01</p> <p>The anti-pumping relay prevents continuous closing and opening of the circuit-breaker.</p>	<p>DM104438</p> 

Technical Data, Auxiliary Switches

Description	Value				Standard	
Electrical						
Rated operational current (I_c)	15 A				IEC 62271-100: 2012	
Minimum making current (silver/gold contact)	1 mA (6 V)					
Rated short-time withstand current (I_{cw})	250 A (during 3 s)				CEI 60094	
Rated operational voltage (U_e)	230 V (+10 -15%) for both a.c. and d.c.				CEI 60094	
Power frequency withstand voltage (50/60Hz - 1mm)	2000 V					
Rated impulse withstand voltage (U_p) (1.2 μ s/50 μ s)	5 kV				CEI 60094	
Rated breaking capacity with inductive charge:	L/R = 10 ms		L/R = 20 ms		CEI 60094	
	Voltage (V d.c.)	125	48	220		125
	Charging current (A)	3.8	10	1		2
	Opening Speed (°/s)	9200		3000		
	Closing Speed (°/s)	1500		1500		
Mechanical						
Mechanical endurance with electrical charge	10000 cycles					
Maximum bouncing time	10 ms					
Operating temperature	-25 °C to +40 °C					
Mechanical endurance (according to the use)	30000 cycles					
Contact resistance after mechanical endurance	< 50 Ω					
Corrosion withstand (salt spray per NFC20-711)	240 hours				NFC20-711	
S0 ₂ test	8 hours+ 16 hours at 40°C & 100% HR & S0 ₂					
Industrial atmosphere H ₂ S	10 to 15 ppm, 25 °C 75% RH, 10 days					
Humidity	12 hours 40°C, 60% RH 12 hours 55°C, 90% RH				Hm-63/7515/3	

Auxiliaries Voltage Supply

Rated auxiliary voltage (V d.c.)						Rated auxiliary voltage (V a.c.)			
24	48	60	110	125	220	110	120	220	230

Power Consumption, Auxiliary Releases and Motor

Auxiliary releases/motor	Power consumption ^[1]	
	[W] (d.c.)	[VA] (a.c., 50/60 Hz)
Closing release	180	
Opening release	180	
Under-voltage release	Approx.12	
Motor for operation mechanism	Approx.100	
Motor for withdrawable trolley	Approx.120	
Over-current release	-	Approx.12

[1] Information about the power consumption of auxiliary releases and motors is available from the manufacturer.

Operating Times

Times for coils and motor ^[1]		
Minimum command time "OFF" electrical tripping	[ms]	20
Minimum command time "ON" electrical tripping	[ms]	20
Motor charging time	[s]	4 to 12

[1] Under rated supply voltage U_a specified on nameplate (50/60 Hz)

Auxiliary Switches

Auxiliary switches are always actuated directly by the switch shaft via an intermediate linkage. Their position always corresponds to that of the main contacts. As standard, the circuit breaker is equipped with two auxiliary switches each with 8 contact elements.

The switching functions have been set in the factory according to the wiring diagram.

Service Conditions

Normal Service Conditions

The circuit breaker, including its control units and auxiliary equipment, is designed to operate according to its rated characteristics and under the service conditions listed below.

IEC 62271-100: 2012	
Ambient air temperature:	
Minimum value	- 25 °C
Maximum value	+ 40 °C
Average measured over a 24-hour period	≤ 35 °C
Average relative humidity:	
Measured over a 24-hour period	95%
Measured over a 1-month period	90%
Altitude above sea level	≤1000 m
Atmosphere	The ambient air must not be significantly polluted with dust, smoke, corrosive gas, flammable gas, vapors or salt.

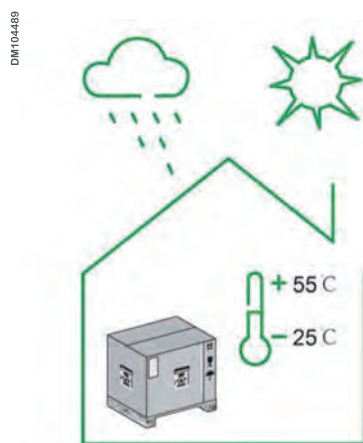
Other Service Conditions

NOTICE
<p>HAZARD OF INOPERABLE EQUIPMENT</p> <ul style="list-style-type: none"> • If operated beyond the normal service conditions, the circuit breaker is subject to accelerated ageing with a risk of malfunction. • The circuit breaker may only be used under conditions other than the normal service conditions with express written permission from the manufacturer. <p>Failure to follow these instructions can result in equipment damage.</p>

Storage Conditions and Arrangements

Storage Conditions

⚠ CAUTION
<p>HAZARD OF DAMAGE TO THE CIRCUIT BREAKER</p> <ul style="list-style-type: none"> • Never install the equipment if damaged. • If the circuit breaker is to be stored, observe all storage instructions. The circuit breaker must remain in the packaging until the final installation. <p>Failure to follow these instructions can result in injury or equipment damage.</p>



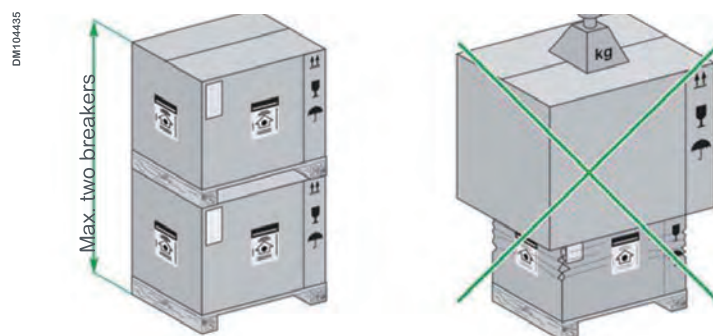
If the circuit breaker is not installed immediately upon delivery, we recommend that the circuit breaker be stored in its original packaging, in dry conditions, and sheltered from the sun and rain at a temperature of between -25 °C and +55 °C. This helps preserve all of the functional unit's characteristics when stored for prolonged periods.

The maximum storage period is 24 months.

After unpacking, check the circuit breaker carefully for:


- absence of broken or damaged parts
- absence of condensation marks or droplets
- absence of device degradation (color change, rust, deposits, etc...)
- the nameplate


Storage Arrangements - Stacking



⚠ CAUTION
<p>HAZARD OF DAMAGE TO THE CIRCUIT BREAKER</p> <p>Do not place any heavy objects on the packaging that could either deform it or apply mechanical stress to the circuit breaker's structure.</p> <p>Failure to follow this instruction can result in injury or equipment damage.</p>

Handling

 WARNING
<p>HAZARD OF FALL OR TIPPING OF THE CIRCUIT BREAKER DURING UNLOADING OR HANDLING</p> <ul style="list-style-type: none"> Apply appropriate personal protective equipment (PPE) and provide collective protection equipment (CPE) whenever possible. Follow all safe work practices. Do not try to catch the parcel if it falls. Use handling equipment suitable for the dimensions and weight of the circuit breaker. Take into account the position of the center of gravity when handling the parcels or the device. <p>Failure to follow these instructions can result in death, serious injury or equipment damage.</p>

 CAUTION
<p>HAZARD OF DAMAGE TO THE CIRCUIT BREAKER</p> <ul style="list-style-type: none"> Move the circuit breaker with utmost caution and avoid shocks. Do not move the circuit breaker by rolling it on the floor. <p>Failure to follow these instructions can result in injury or equipment damage.</p>

Mass

Type	HVX-E Withdrawable Type								
Rated voltage (kV)	12/17.5						24		
Rated current (A)	630	1250		1600/2000	2500/4000		≤ 1250	≤ 2500	
Rated short-circuit breaking current (kA)	25/31.5		40/50	25/50			25	31.5	25/31.5
Phase distance (mm)	150/210/275		210/275	210	275	275	210/275	275	
Mass (kg) ^[1]	100/105/115	105/115/120	180/200	180	200	250	180/190	279	

[1] Values without packaging

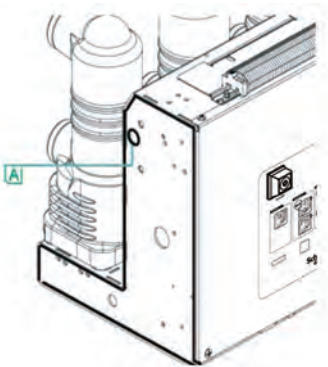
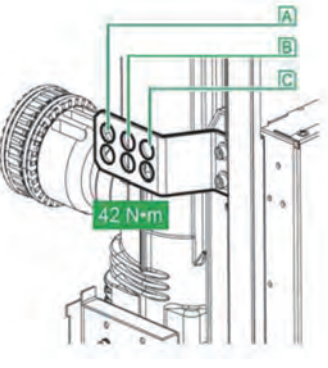
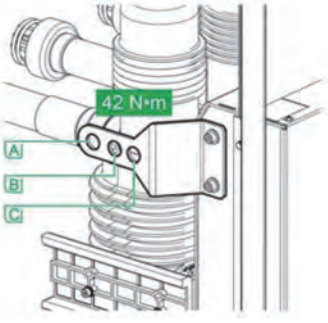
Type	HVX-F Fixed Type								
Rated voltage (kV)	12/17.5						24		
Rated current (A)	630	1250		1600/2000	2500/4000		≤ 1250	≤ 2500	
Rated short-circuit breaking current (kA)	25/31.5		40/50	25/50	25/50		25	31.5	25/31.5
Phase distance (mm)	150/210/275		210/275	210	275		210/275	275	
Mass (kg) ^[1]	90/95/105	95/105/110	155/175	155	175	195	165/175	255	

[1] Values without packaging

Lifting Positions

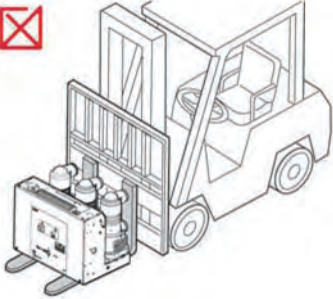
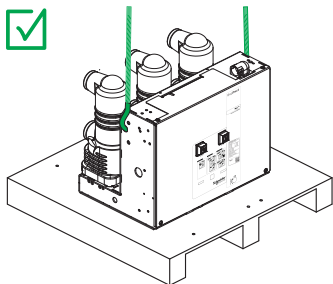
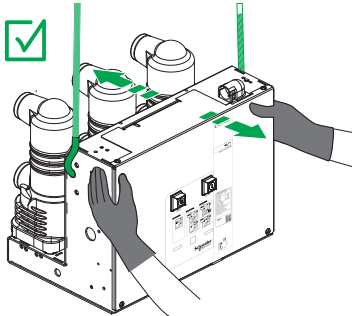
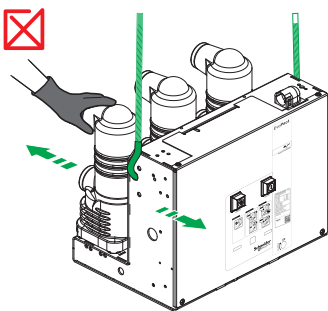
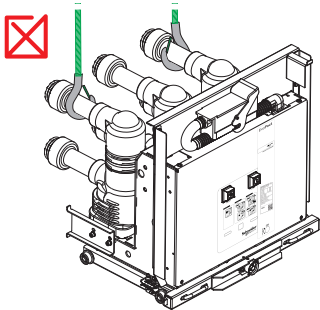
For the circuit breaker supplied with two lifting brackets, lift it using the lifting brackets.
 For the circuit breaker without any lifting bracket, lift it using the lifting holes in the side plate of the circuit breaker.

The lifting positions for each circuit breaker model are listed and illustrated in the table below.

U _r (kV)	Phase distance (mm)	I _r (A)	I _{sc} (kA)	Lifting positions		Illustration
				Fixed type	Withdrawable type	
12/17	150/210	≤ 1250	25/31.5	A (side plates)	A (side plates)	 DM104468
	275			C	C	
	210/275	< 2500	40/50	B	B	 DM104471
	≥ 2500			A		
24	210/275	≤ 1250	25	C	C	 DM104469
			31.5	B	B	
		1250 to 2500	25/31.5		B	
		≥ 2500			A	

Lifting the Circuit Breaker

For circuit breakers without lifting brackets

<p>DM10453</p> 	<p>Never lift the circuit breaker by placing forklift bars beneath the circuit breaker frame.</p>
<p>DM10472</p> 	<p>Install the lifting hooks on the side plates of the circuit breaker (see "Lifting Positions" on page 21).</p>
<p>DM10470</p> 	<p>When handling, guide the circuit breaker roughly in horizontal position by the front cover.</p>
<p>DM10473</p> 	<p>Do not manipulate the circuit breaker poles as handles for moving the circuit breaker to the desired position.</p>
<p>DM10488</p> 	<p>For withdrawable type, do not lift the circuit breaker by the power connections.</p>

For circuit breaker provided with lifting brackets

DM104475		<p>Install the lifting brackets onto the sides of the circuit breaker and then insert the lifting hooks into the specified lifting positions on the lifting brackets (see “Lifting Positions” on page 21).</p>
DM104476		<p>The lifting hooks and ropes MUST NOT touch the poles.</p>
DM104477		<p>When handling, guide the circuit breaker roughly in horizontal position by the front cover.</p>
DM104478		<p>Do not manipulate the circuit breaker poles as handles for moving the circuit breaker to the desired position.</p>
DM104474		<p>For withdrawable type, do not lift the circuit breaker by the power connections.</p>

Before Energizing for the First Time



A general check of the device takes only a few minutes and reduces the risk of mistakes due to errors or negligence.

It must be carried out:

- before energizing following switchboard installation
- before re-energizing following an extended period during which the device has not been in service.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

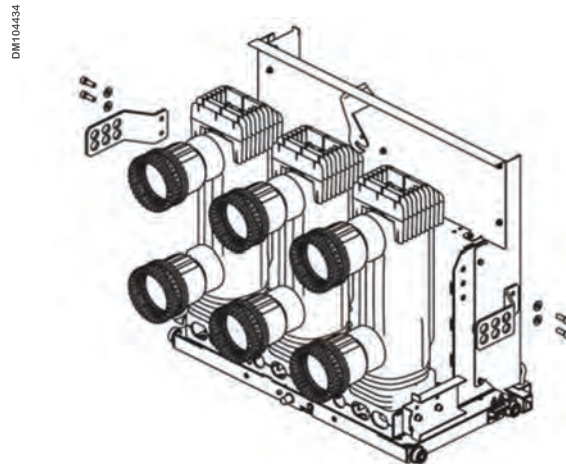
- Perform all the checks with the entire switchboard de-energized.
- Check that the circuit breaker's lifting brackets have been removed.
- Remove the rear lifting eye and check that the front lifting eyes have been put back in their down position.
- Check that nameplate data is compatible with that of electrical installation.
- Check the correct operation of the auxiliary releases.

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

The installer of your equipment must deliver a commissioning report before the first energizing of your electrical installation.

Circuit Breaker Inspection

Check that the circuit breakers are installed in a clean environment in accordance with the service conditions, free of any installation scrap or items (tools, electrical wires, broken parts or shreds, metal objects, etc.).



DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

The circuit breaker's lifting brackets must be removed prior to installation in the cubicle.
Failure to follow this instruction will result in death or serious injury.

Conformity with the Installation Electrical Diagram

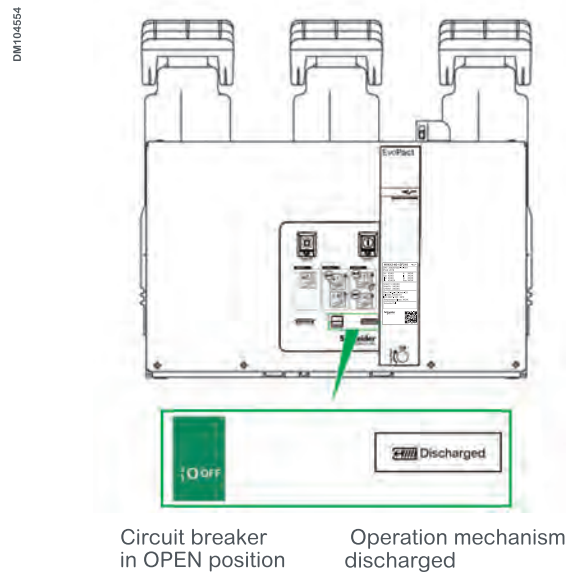
Check that the circuit breakers match the installation diagram:

- breaking capacities indicated on the nameplates
- presence of optional functions (electric control of charging mechanism, auxiliaries, and meters and indicators, etc.) and conformity of their electrical characteristics
- identification of the protected circuit on the front of the circuit breaker or/and equipment

Operating

Refer to your equipment documentation and follow your switchboard commissioning rules.

The circuit breaker initial state is:



Initial state for fixed (left) and withdrawable (right) circuit breaker.

Check the mechanical operation of the devices in every control modes (local mechanical and electrical controls and remote control) and for every possible operation:

- close the device
- open the device
- close the device and perform an operation sequence OPEN - CLOSE - OPEN
- rack in and rack out your device (according to the configuration of your switchboard)
- check the operation of the locking and interlocking.


Place back the circuit breaker in its initial state waiting for the switchboard energizing.

Initialization of the Maintenance Information

Record the number of the circuit breaker operations (as displayed on the operation counter), date of observation and note this information in the maintenance log of your installation.

Understanding the Controls and Indicators

Position Indicators on the Operator Interface

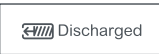

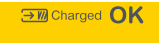



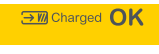

 **DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR BURN

- Installation, repair and maintenance work on the circuit breaker must only be carried out by qualified personnel.
- Beware of potential danger, apply appropriate personal protective equipment and take appropriate safety precautions.

Failure to follow this instruction will result in death or serious injury.

Position indicators on the operator interface (see “Front View of the Circuit Breaker” on page 10) of the circuit breaker and possible operating sequences are listed and illustrated in the table below.

Item	Position indicator (Operation mechanism)		Position indicator (Contacts position)		Possible operating sequence (mechanical)
	Indicator Image	Label	Indicator Image	Label	
1		Discharged		Off	none
2		Charged		Off	C-O
3		Discharged		On	O
4		Charged		On	O - C - O

C = Close; O = Open

Interlocks (only for withdrawable type)

⚠ WARNING

HAZARD OF DAMAGE TO THE CIRCUIT BREAKER

Operators must be familiar with those interlocks before operating the circuit breaker.
Failure to follow this instruction can result in death, serious injury, or equipment damage.

Mechanical interlocks

The HVX embedded pole circuit breaker with racking trolley includes basic mechanical interlocks to prevent operating errors.

1. Between the racking trolley and earthing switch

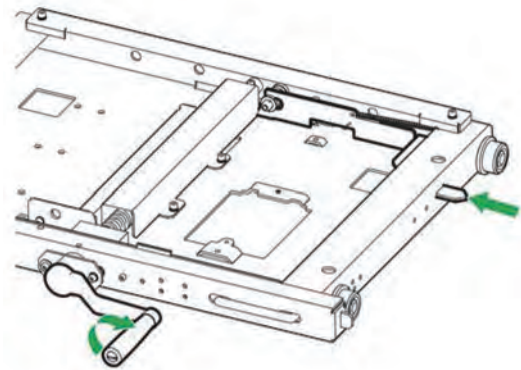
Function:

The racking trolley cannot be racked in while the earthing switch of the switchboard is in the "ON" position.

Operation:

Insert the crank handle; it can't be twirled after ½ turn in clockwise direction.

DM104443



Function:

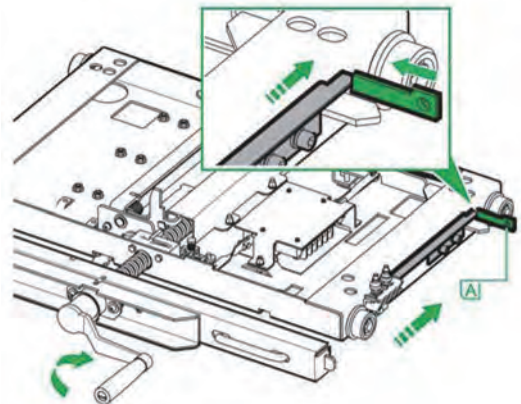
The earthing switch cannot be closed when the racking trolley has left its test position.

Operation:

Crank handle of earthing switch can't operate while operating hole of earthing switch is closed. **Do not apply force!**

A connect with operating hole of earthing switch

DM104460

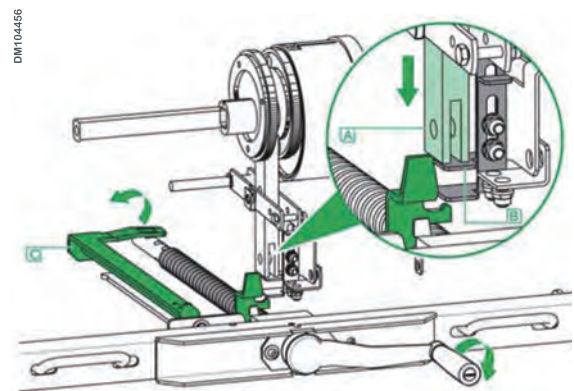


2. Between the racking trolley and operating state of the circuit breaker

Function:
The racking trolley cannot be racked in or out while the circuit breaker is closed.

Operation:
Insert the crank handle; it can't be twirled after 1/2 turn in the clockwise/anticlockwise direction.

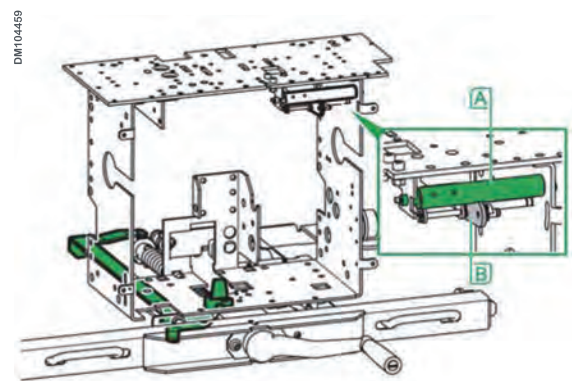
Note:
While the circuit breaker is closed, **A** will press **B**, and **C** can't rotate, so the racking trolley can't be racked in/out.



Function:
The circuit breaker cannot be closed unless the racking trolley is completely in its test or service position.

Operation:
The circuit breaker can't be closed by manual operation or power drive.

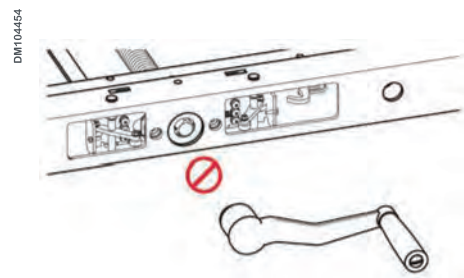
Note:
The close shaft **A** is stopped by the lever **B**, so the circuit breaker can't be closed.



3. Door interlock (optional)

Function:
The racking trolley cannot be racked in or out while the door of the switchboard is not closed.

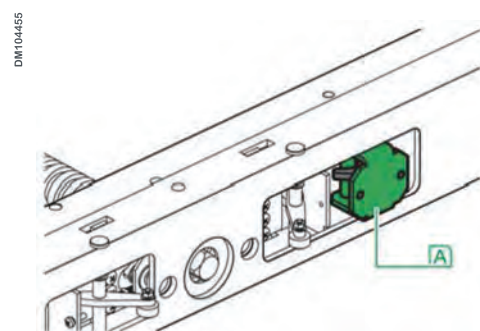
Operation:
The crank handle cannot be inserted.



Function:
The door of the switchboard can't open as soon as the racking trolley has left its test position.

Operation:
The door of the switchboard can't open.

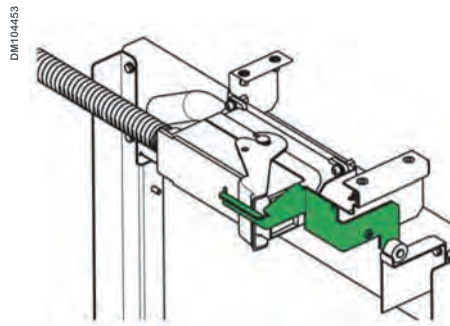
A Part fixed on the door



4. Interlock between the auxiliary circuit plug and cubicle

Function:
The auxiliary circuit plug can't be disconnected while the circuit breaker is in service position.

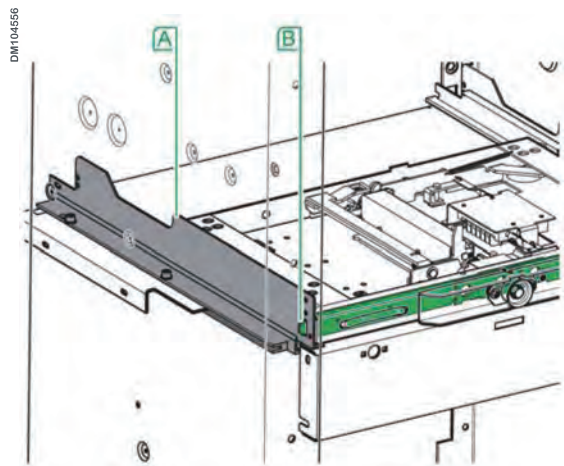
Operation:
The auxiliary circuit plug's operating handle can't be moved.



5. Interlock between the racking trolley and cubicle

Function:
Fix the circuit breaker in the cubicle.

Operation:
The racking trolley is locked by a locking tongue **B** inserted into a slot on the cubicle rail **A**.



Electrical interlocks

Electrical interlocks have been designed according to the wiring diagram.

NOTICE

HAZARD OF INOPERABLE EQUIPMENT

Re-establish power supply to the circuit breaker before electrically unlocking the circuit breaker.

Failure to follow this instruction can result in equipment damage.

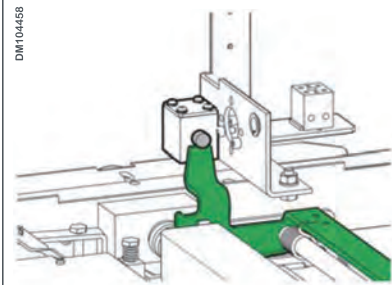
Electrical interlock

Interlock type:

Racking trolley interlock

Operation:

When blocking magnet Y0 is not powered on, the racking trolley can't be racked in or out.

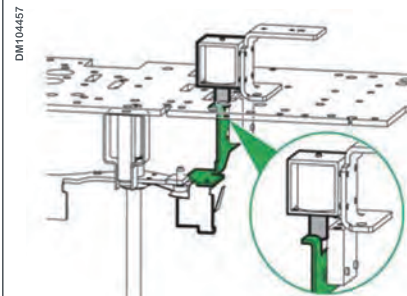


Interlock type:

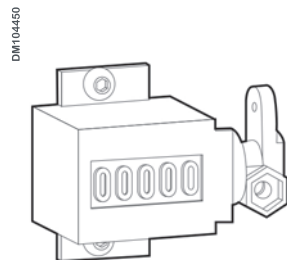
Closing interlock

Operation:

When blocking magnet Y1 is not powered on, the circuit breaker can't be closed.



Operation Counter



The operation counter shows the number of opening/closing cycles performed by your circuit breaker.

When the circuit breaker is delivered, the number of cycles is not zero (< 100 cycles) due to functional tests and controls performed in the factory.

Local Control

A control of an operation is performed at a point on or adjacent to the controlled device.

Mechanical control



A mechanical operation allows you to store the energy required to open or close your circuit breaker. The handle located on the front face of the circuit breaker enables the manual charging of this mechanism.

The push buttons on the front face of the circuit breaker control the position of the circuit breaker (OPEN or CLOSED).

Electrical Control (local and remote)

In order to use the electrical control functions, either local or remote, the remote control auxiliaries must be installed.

The table below shows the possible configurations for electrical control of the device.

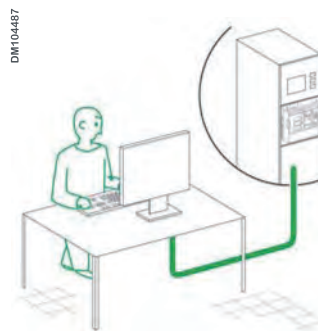
electrical charging motor and auxiliary switch	M1+ S2
electrical closing	F2
electrical opening	F11, F12 ¹ , F3 ¹ , F4 ¹

[1] Optional depending on circuit breaker configuration



Local electric control

Refer to your equipment's user guide to find out where the circuit breaker control buttons are located.



Remote electric control

Refer to your equipment's user guide to find out the available communication functions.

Operation Tools

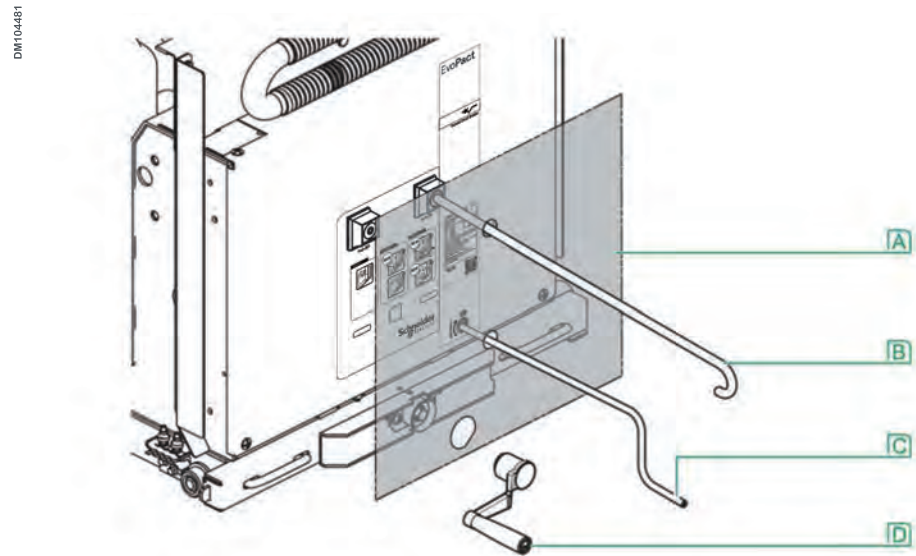
⚠️ ⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Make sure you have installed the correct circuit breaker in the correct cubicle.

Failure to follow this instruction will result in death or serious injury.

The tools for operating the circuit breaker are shown below.



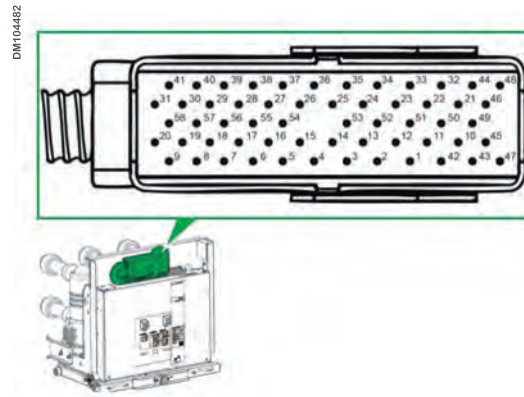
- A** Closed door of switchboard
- B** ON/OFF operating rod
- C** Crank handle for charging the spring of the operation mechanism
- D** Crank handle for racking in/out the racking trolley (for HVX-E only)

Low Voltage Connection

For all electrical operations of the circuit breaker, please make sure that the wiring harness has been reliably connected between the switchboard low voltage cabinet and the circuit breaker. The wiring harness for HVX can be connected using one of the following components:

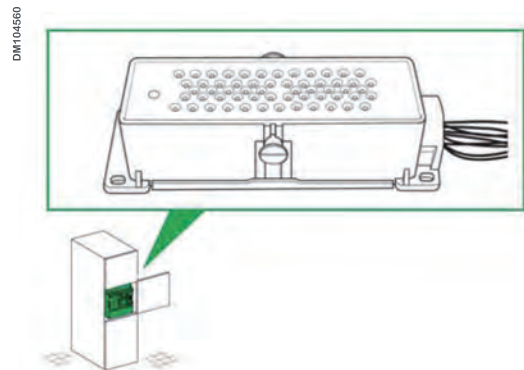
- a connection plug with wires 1 mm²
- a terminal block with wires 1 mm² (for fixed type only)
- an earthing wire 1.5 mm²

Connection plug



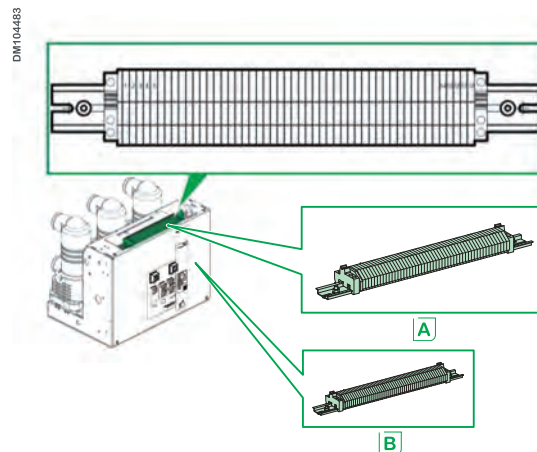
The wiring harness is connected, depending on design, via a connection plug.

Male socket for the connection plug



The male socket is used to connect the circuit breaker to the low voltage cabinet of the switchboard.

Terminal block



The wiring harness is connected, depending on design, via a terminal block.

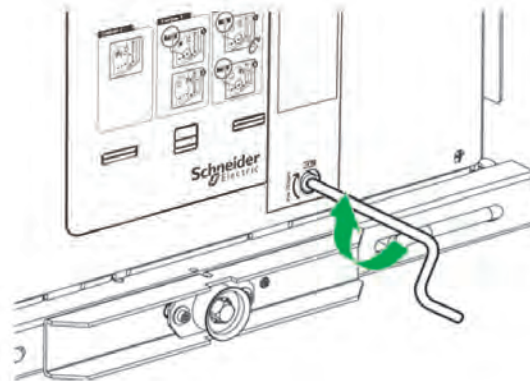
For P=150 VCB, the terminals mounted on the top of the frame (see view A). For other VCB, terminals mounted on the right plate of frame (see view B)

Charging the Operation Mechanism

Manual charging

Perform the following steps to manually charge the operation mechanism:

DM104484



1. Move the circuit breaker into the "Ready for Closing" position by checking that circuit breaker is in test or service position.
2. Insert the crank handle into the opening for tensioning the operation mechanism.
3. Charge the operation mechanism using the crank handle as illustrated in the figure above.

As soon as it is charged, the operation mechanism is uncoupled and the status indicator signals "charged".

DM104482

 Charged OK

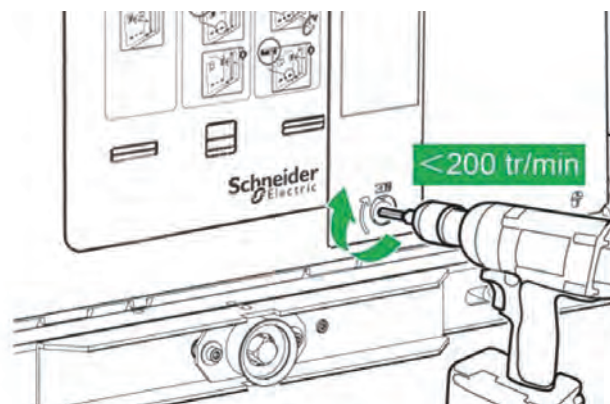
NOTICE

HAZARD OF INOPERABLE EQUIPMENT

In the case of manual charging using a power drill, make sure the maximum speed of the tool does not exceed 200 tr/min. If the motor starts during this process, this does not constitute a risk to the operator.

Failure to follow this instruction can result in equipment damage.

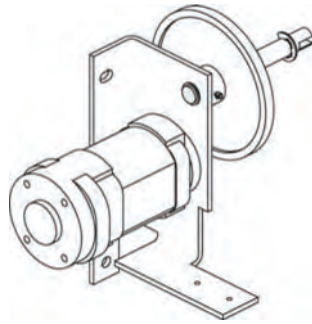
DM104561



4. Remove the crank handle.
The circuit breaker is ready for closing.

Automatic charging

DM104400

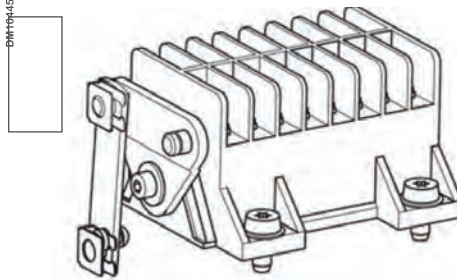


The operation mechanism of motorized circuit breakers is charged automatically as soon as the auxiliary voltage is applied.

If the M1 gear motor for electrical charging is powered on, the mechanism is automatically charged each time the circuit breaker closes.

S2 "Ready to Close" contact

DM104451

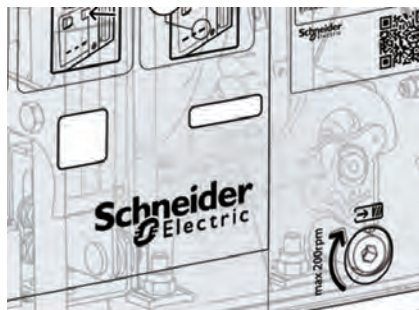


The "Ready to Close" state of the circuit breaker is shown by a mechanical indicator and a S2 changeover contact.

This state ensures simultaneously that:

- the circuit breaker is open
- the operation mechanism is charged
- no closing order is present
- no opening order is activated by an opening order (F11; or optional F12; F3; or F4)

DM104449



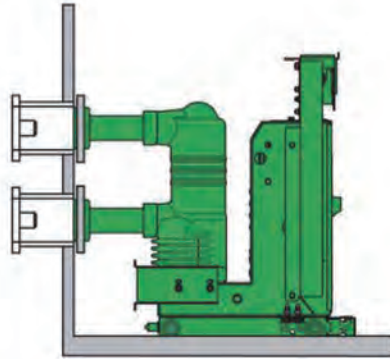
Rack-in/Rack-out Mechanism (for withdrawable type only)

The withdrawable circuit breaker can be moved from test position to service position or vice versa either manually or electrically.

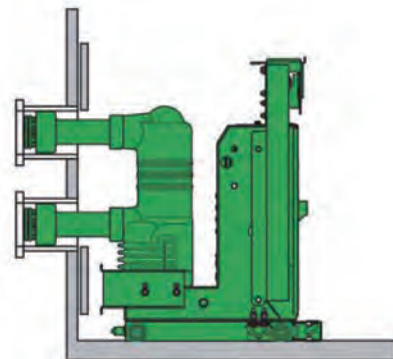
The inward moving operation (from test position to service position) is called “Rack-in”; the opposite outward operation is called “Rack-out”.

Circuit breaker in test position

DM104452



Circuit breaker in service position



DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

- Observe the interlock conditions.
- Observe the position indicator on the switchboard for racking trolley.

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

Manual rack-in/rack-out

Conditions to manually rack-in:

- Circuit breaker OFF

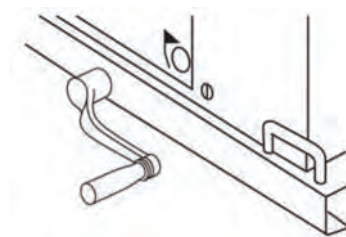
DM104467



- Earthing switch in open position
- If the blocking magnet for the racking trolley (Y0) is installed, it has to be powered-on
- The door of the switchboard is closed (if the circuit breaker comes with door interlocks)

Manual rack-in procedure:

DM104461



1. Insert crank handle and turn it clockwise until it stops; the circuit breaker is racked into its service position.
2. Observe the position indicator on the low voltage cabinet of the switchboard.
3. Remove the crank handle.

Conditions to manually rack-out:

- Circuit breaker OFF

DM104467



- Earthing switch in open position
- If the blocking magnet for the racking trolley (Y0) is installed, it has to be powered-on
- The door of the switchboard is closed (if the circuit breaker comes with door interlocks)

Manual rack-out procedure:

1. Insert the crank handle and turn it anticlockwise until it stops;
2. Observe the position indicator on the low voltage cabinet of the switchboard.
3. Remove the crank handle.

Motorized rack-in/rack-out

Conditions to automatically rack in/rack out:

- Circuit breaker OFF

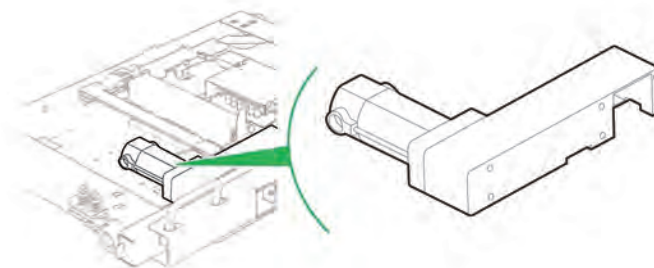
DM104467



- Earthing switch in open position
- If the blocking magnet for the racking trolley (Y0) is installed, it has to be powered-on
- The door of the switchboard is closed (if the circuit breaker comes with door interlocks)

⚠ CAUTION
HAZARD OF UNEXPECTED EQUIPMENT OPERATION
Remove the crank handle to allow rack-in / rack-out with the M2 gear motor.
Failure to follow this instruction can result in injury or equipment damage.

DM104444



Local

If the M2 gear motor for the electrical racking trolley is powered on, the racking trolley can be racked in/out by electrical control.

Refer to your equipment's user guide to find out where the racking trolley rack-in/rack-out button is.

Remote

If the M2 gear motor for the electrical racking trolley is powered on, the racking trolley can be racked in/out by electrical control.

Closing the Circuit Breaker

Closing conditions

NOTICE

HAZARD OF INOPERABLE EQUIPMENT

Closing is possible only if the circuit breaker is "ready to close".

Failure to follow this instruction can result in equipment damage.

To close the circuit breaker, the circuit breaker must be in "ready to close" state, the following conditions must be fulfilled simultaneously:

- The circuit breaker is open

DM104467



- The spring is charged

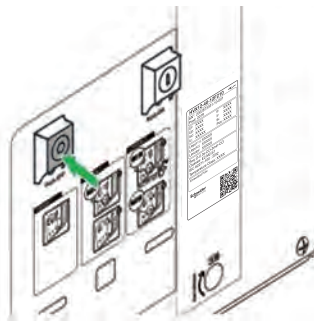
DM104462



- No opening order is activated by F11, or by optional F12, F3 or F4

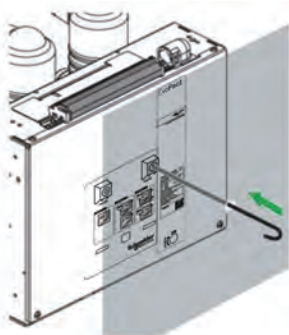
Manual closing (local)

DM104439



1. Press the closing push button (either directly on the circuit breaker operating interface, or through the front panel of the cubicle using the provided operating rod).

DM104440

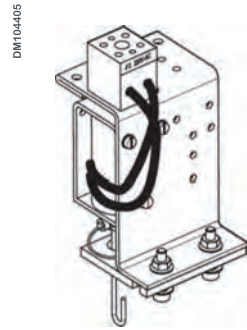


2. The main contact position indicator moves to the "On" state.

DM104466



Closing by electrical control



Local

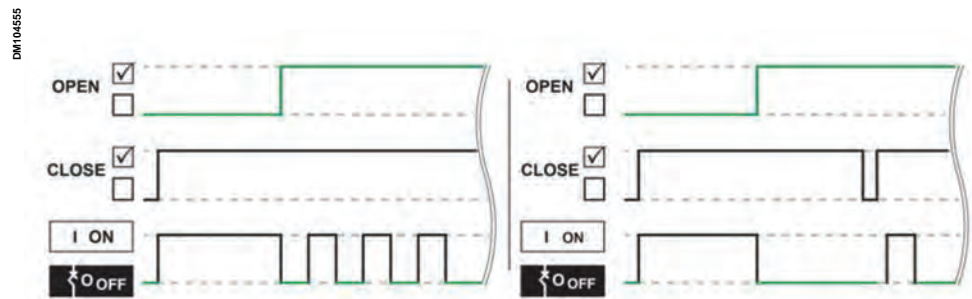
By adding the F2 closing release, the circuit breaker can be closed by electrical control.

Refer to your equipment's user guide to find out where the circuit breaker closing button is.

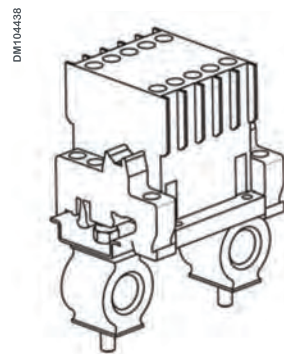
Remote

By adding the F2 closing release, the circuit breaker can be closed by electrical control.

Anti-pumping function



The purpose of the mechanical anti-pumping function is to prevent a circuit breaker to open and close indefinitely when receiving simultaneous opening and closing orders.



If there is a continuous closing order, after its opening the circuit breaker remains open until the closing order is discontinued. A new closing order then closes the circuit breaker. This function can be disabled by wiring the closing release auxiliary in series with the S2 "ready to close" contact.

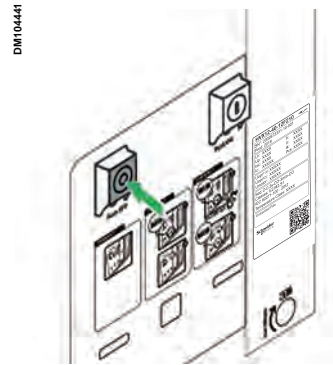
For design detail about the electrical anti-pumping (K01) function, please refer to the wiring diagram (see "Annex: Wiring Diagrams" on page 55).

Opening the Circuit Breaker

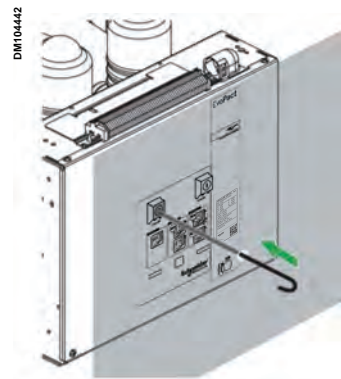
Opening conditions

The opening order has priority over any other command.

Manual opening (local)

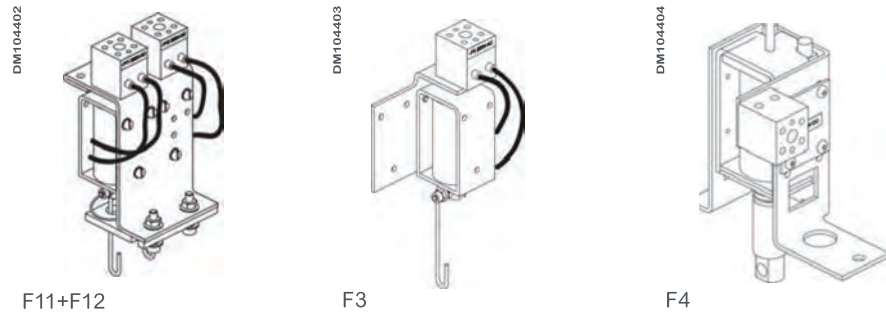


1. Press the opening push button (either directly on the circuit breaker operating interface, or through the front panel of the cubicle using the provided operating rod).



2. The main contact position indicator moves to the "Off" state.

Opening by electrical control:



Local

The circuit breaker can be opened by electrical control using the following auxiliaries:

- F11: opening release
- F12: optional opening release
- F3: over-current opening release
- F4: under-voltage opening release

By adding the opening releases, the circuit breaker can be opened by electrical control. Refer to your equipment's user guide to find out where the circuit breaker opening button is.

Remote

The circuit breaker can be opened by remote electrical control using one of the following auxiliaries:

- F11: opening release
- F12: optional opening release
- F3: over-current opening release
- F4: under-voltage opening release

By adding the opening releases, the circuit breaker can be opened by electrical control.

Discharging the Mechanism

To discharge the mechanism:

- Turn off the auxiliary voltage supply or remove the auxiliary connection plug to disable automatic charging.
- Press alternately the opening and closing pushbuttons until the state indicators of the circuit breaker are OFF / "Discharged" (state shown opposite).



Circuit Breaker Equipped with a F4 Under-voltage Opening Release

The F4 under-voltage opening release is monitoring the presence of voltage: voltage on the auxiliary circuit of the switchboard or a voltage being an image of the voltage of the medium voltage network through a voltage transformer positioned on the grid.

When the F4 under-voltage opening release is not energized, it forces mechanically the opening of the circuit breaker: it is then impossible to close the circuit breaker in local or remote control.

For commissioning of a circuit breaker equipped with a F4 under-voltage opening release, the voltage monitored by the F4 must be present at F4's terminals.

Refer to your equipment documentation to identify the voltage monitored and its position on the grid.

Maintaining the Performance of the Circuit Breaker



ProDiag Breaker

Prodiag Breaker is part of the Schneider Electric Service suite Prodiag, developed by Schneider Electric for the diagnosis of equipment on the field.

Description

- Circuit Breaker diagnostics with shutdown (de-energized) detecting drifts from its optimum state if any
- Defines the breaker condition analyzing the kinematics and electrical parameters, relating to opening, closing and charging functions with 2 tests (minimum / nominal voltage) as per IEC
- Exhaustive customer report, recommending optimize maintenance actions: manufacturer maintenance, spare parts identification, device refurbishment (deep repair) or replacement (Ecofit)

Benefits

- Detects possible failure in advance
- Extends breaker lifetime while secures breaker optimum condition when recommended actions are undertaken (manufacturer maintenance, spare parts identification, deep repair, regular diagnosis, etc.)
- Mitigates the risks (unwanted outages and/or accidents) result of complete operating chain kinematic drifts, this is, securing: people's safety, MV/LV ED equipment protection, and Service continuity.



The best insurance against MV electrical network vulnerability is the complete operating chain performance verification with regular diagnostics. Schneider Electric Services recommends to conduct analysis with Prodiag Breaker at least every 5 years under normal operating conditions as defined in IEC 62271-1. This period should be shortened for harsh environments, for example an ambient with significant presence of dust, smoke, pollution, salt, humidity or depending on the installation criticality.



After Tripping due to an Electrical Fault

Note the Fault

Faults are signaled locally and remotely by the indicators and auxiliary contacts installed depending on the ordered (requested) configuration.

Refer to this user guide and that of your equipment or your protection, control and monitoring unit to find out what the available fault signaling means.

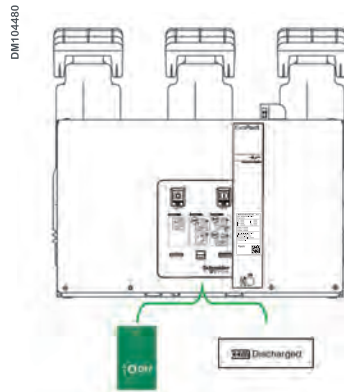
Identifying the Tripping Causes

  DANGER
<p>HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH</p> <ul style="list-style-type: none"> • Do not re-close a circuit (locally or remotely) before the root cause of the fault has been identified and cleared. • Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See related standards or local equivalents. • Turn off all power supplying this circuit breaker before working on or inside the circuit breaker. Lock the circuit breaker in the open and racked-out position. • Always use a properly rated voltage sensing device to confirm that the power is off. • Replace all devices, covers and doors before turning on power to this equipment. • Beware of potential hazards and carefully inspect the work area for tools and objects that may have been left inside the device. <p>Failure to follow these instructions will result in death or serious injury.</p>

A fault may have a number of causes, refer to “Troubleshooting and Solutions” on page 53 of this user guide.

NOTICE
<p>HAZARD OF INOPERABLE EQUIPMENT</p> <ul style="list-style-type: none"> • Troubleshooting assistance may be available, depending on the type of protection, control and monitoring unit. • Depending on the type of fault and the criticality of the loads, a number of precautionary measures must be taken, in particular the insulation and dielectric test on all or part of the installation. These checks and tests must be directed and carried out by qualified personnel. <p>Failure to follow these instructions can result in equipment damage.</p>

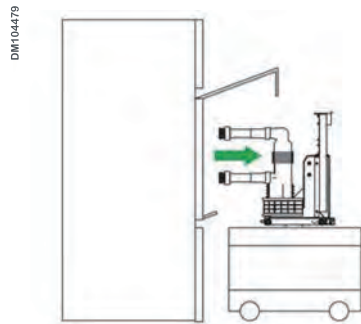
Before Working on the Circuit Breaker



For the fixed circuit breakers:

Turn off all power supplying the circuit breaker before working on or inside it.

- Turn off or trip the circuit breaker before installing components.
- Make sure the circuit breaker is in the open ("O" or OFF) position and the mechanism is not charged. Refer to "Position Indicators on the Operator Interface" on page 26.



For the withdrawable circuit breakers:

1. Rack out the circuit breaker and make sure it is in the test position.
2. Turn off all power supplying the circuit breaker before working on or inside it.
 - Turn off or trip the circuit breaker before installing components.
 - Make sure the circuit breaker is in the open ("O" or OFF) position and the mechanism is not charged. Refer to "Position Indicators on the Operator Interface" on page 26.
3. Pull the circuit breaker out of the switchboard by using a transportation trolley.

In the Event of a Short Circuit, Inspect the Device

- Check the general condition of the circuit breaker.
- Check the tightening of the connections: refer to your equipment's installation guide.
- Check the general condition of the clusters: refer to the "periodic inspections" section of this manual.

Reset the Installation

Refer to your equipment or your protection, control and monitoring unit.

After you have identified and cleared the causes of tripping, you can reset the installation.

Recommended Maintenance Program

The HVX series vacuum circuit breakers require periodic inspections. The intervals depend on the strain to which the switches are subjected during operation, and on the service conditions.

In case of frequent condensation or air pollution (dust, smoke or corrosive gases), the maintenance intervals must be adapted to the actual conditions.

Periodic Inspections

⚠ CAUTION
<p>HAZARD OF DAMAGE TO THE CIRCUIT BREAKER</p> <p>Comply the specified maintenance intervals and perform maintenance according to the actual operating and ambient conditions. In case of queries or ambiguities, please contact the manufacturer.</p> <p>Failure to follow this instruction can result in injury with or without equipment damage.</p>

Maintenance intervals (ambient conditions per IEC 62271-100: 2012)	Maintenance work	Personnel qualification/ Maintenance location
Every 4 years	<ul style="list-style-type: none"> Check for contamination, condensation and damage. If necessary, clean the circuit breaker and perform several Closing/Opening tests. 	Staff qualified accordingly for the work to be done
After 10 years	<ul style="list-style-type: none"> Clean, grease the circuit breaker and perform several Closing/Opening tests. Check releases and blocking coils for proper working order. 	
Once the summation current limit has been reached (refer to “Admissible Numbers of Breaking Operations of Vacuum Chamber” on page 51)	Replace the circuit breaker	Manufacturer's Service Center
After 10000 close-open cycles of the circuit breaker	Revision of the circuit breaker	
After 1000 operation cycles of the racking trolley	Revision of the racking trolley	

Safety Information

⚠ WARNING
<p>HAZARD OF DEVICE DAMAGE</p> <p>The circuit breaker must not be disassembled for maintenance work.</p> <p>Failure to follow this instruction can result in death or serious injury.</p>

Only qualified people certified by the manufacturer for maintenance work regarding HVX series vacuum circuit breakers and who have the required knowledge regarding operation of medium-voltage switchboard are permitted to perform maintenance and cleaning work.

Safety provisions

- In principle, the following 5 safety rules applicable for electrical engineering must be followed before maintenance work on the circuit breaker is started:
 - Isolate switchboard from power supply
 - Prevent it from re-closing
 - Verify for zero voltage
 - Ground and short-circuit it
 - Cover or bar off adjacent live components
- Switch off the auxiliary voltage for the circuit breaker drive and secure it against re-closing.
- Release the energy-storing device by performing the corresponding operating sequence on the circuit breaker (ON-OFF-ON).

Cleaning Insulating Components

To ensure the specified insulation level, the insulating components must be clean.

In principle, general cleanliness of the circuit breaker or that of its external parts should be ensured.

Slight contamination

Clean by means of a dry, lint-free cloth. Depending on dirt collected, replace cloth as often as necessary.

Severe soiling

Cleaning agent (1 liter can, see “Spare Parts List” on page 52) must be used for cleaning. The use of other cleaning agents is not permitted.

- Wear protective gloves.
- Use cleaning agent according to manufacturer's instructions.
- Soak the cloth thoroughly and wipe the insulating components. Keep the duration of exposure as short as possible.
- Expose the cleaned surface to the air for at least two hours.

When cleaning, make sure that the lubrication in the drive mechanisms is not removed. If the drives are no longer sufficiently lubricated, replace the grease.

Corrosion Protection

Drive mechanisms and covers have a long-term protection against corrosion.

Any damage to the paint, scratches and other damage must be repaired immediately to avoid corrosion.

If support is needed, please contact the manufacturer's Service Center.

Avoiding Condensation

To ensure the specified insulation level, the circuit breaker (especially its insulating components) must not be exposed to condensation.

Take the following measures in case of condensation:

- If condensation of the circuit breaker is detected, the circuit breaker must be cleaned, according to “Cleaning Insulating Components” on page 46.
- Check the heating system or install a heating device. The heating device must provide a sufficient heating performance to prevent condensation on the circuit breaker.
- Condensation can also be prevented by ensuring suitable ventilation and heating of the station or by using de-humidification devices.

Lubrication Instructions

⚠ WARNING

HAZARD OF STORED ENERGY

- Comply with the “Safety Information” on page 45.
- Do not disassemble the circuit breaker and operation mechanism for service and maintenance work.

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

NOTICE

HAZARD OF DAMAGE TO THE CIRCUIT BREAKER

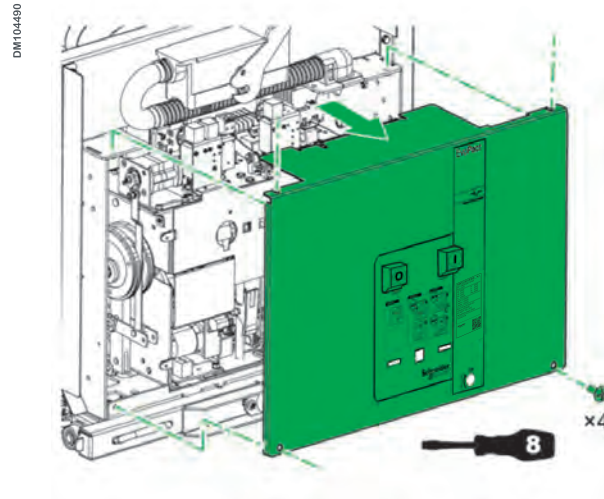
- Do not wash out the bearings and joints by the cleaning agent
- Use only approved lubricants

Failure to follow these instructions can result in equipment damage.

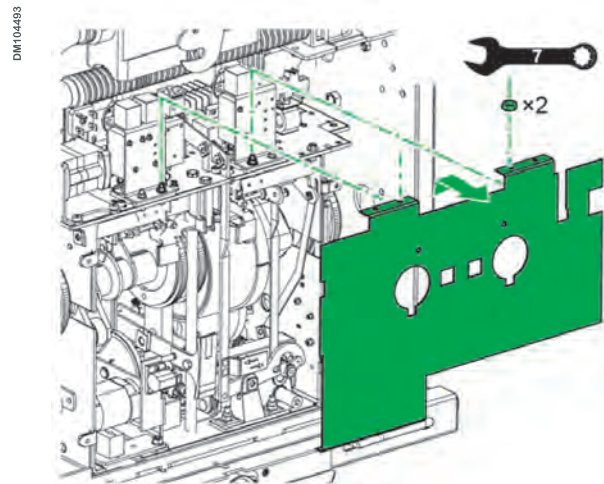
Preparatory work:

Perform the following steps before lubricating the circuit breaker:

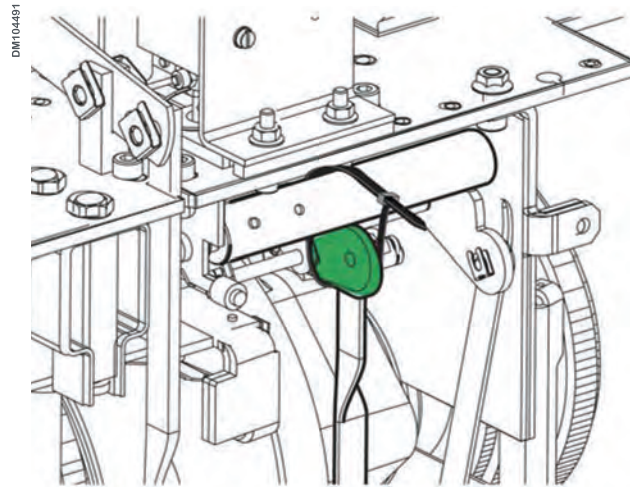
1. Remove the circuit breaker front cover.



2. Remove the mechanism front cover.



3. Secure and lock the closing latching shaft with a tie strap to prevent closing operation of the circuit breaker.



4. Remove the racking trolley from the circuit breaker if necessary.

Point of lubrication

NOTICE

HAZARD OF DAMAGE TO THE CIRCUIT BREAKER

Do not lubricate the following elements:

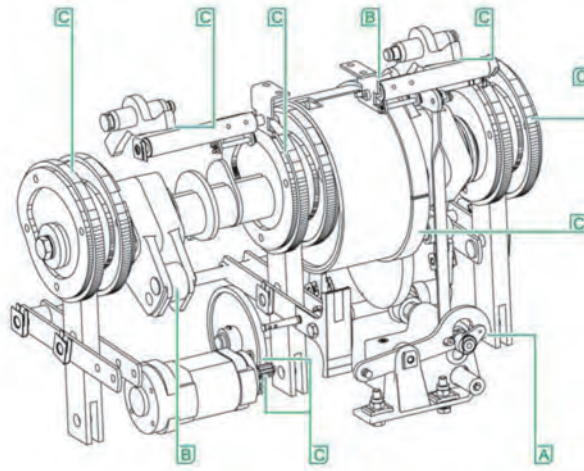
- Motor
- Ball bearings
- Auxiliary releases
- Micro switches
- Blocking magnets
- Auxiliary switches

Failure to follow these instructions can result in equipment damage.

Cleaning agent/Lubricant	Symbol	Points of lubrication	Reference No.	Lubrication procedure
Cleaning agent (1 liter can)	-	-	S 008152 HAKU 1025-920 (KLUTHE)	1. Clean lubricating points using a lint-free cloth or a soft paint brush, if necessary using cleaning agent (use sparingly, just moisten points of lubrication). 2. Apply a thin coat of lubricant (using e.g. a paint brush).
Silicone grease	A	lever on plastic housing of spring charging mechanism	ST312-504-001 Molykote PG54 (DOWCORNING)	
Cryogenic grease	B	roller levers	ST312-105-001 KLÜBERSYNTH LI 44-22 (KLÜBER)	
High-pressure grease	C	Cam discs, cogwheels, semi-shafts and all other friction points; Spindle of racking trolley	ST312-101-001 UNIMOLY GL 82 Fa. (KLÜBER)	
Contact grease (Kontasynth)	D	Moving contacts, ground bar	ST312-111-835 TECHNICAL LUBRICANT KL (KLÜBER)	

- Circuit breaker drive mechanism

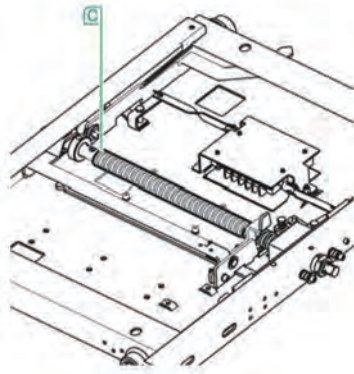
DM104445



- A** Silicone grease
- B** Cryogenic grease
- C** High-pressure grease

- Spindle of racking trolley

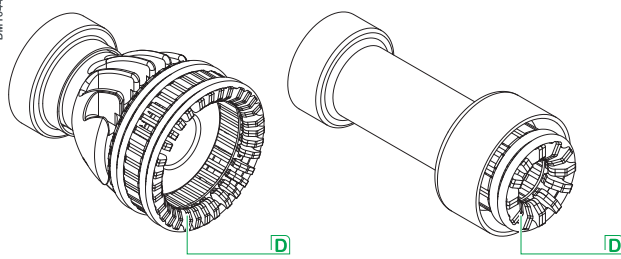
DM104437



- C** High-pressure grease

- Moving contacts

DM104446



- D** Contact grease (Kontasynth)

Final steps

⚠ CAUTION**HAZARD OF MALFUNCTION OF THE CIRCUIT BREAKER**

Be sure to install the two front covers that have been removed at the beginning of the lubrication procedure before any operation on the circuit breaker.

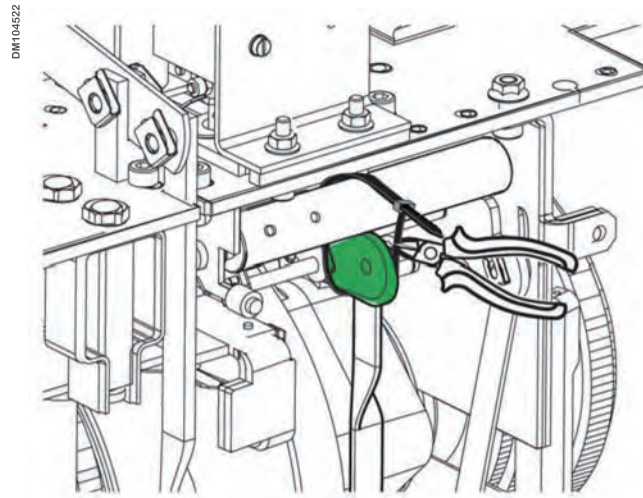
Failure to follow this instruction can result in injury or equipment damage.

NOTICE**HAZARD OF MALFUNCTION OF THE CIRCUIT BREAKER**

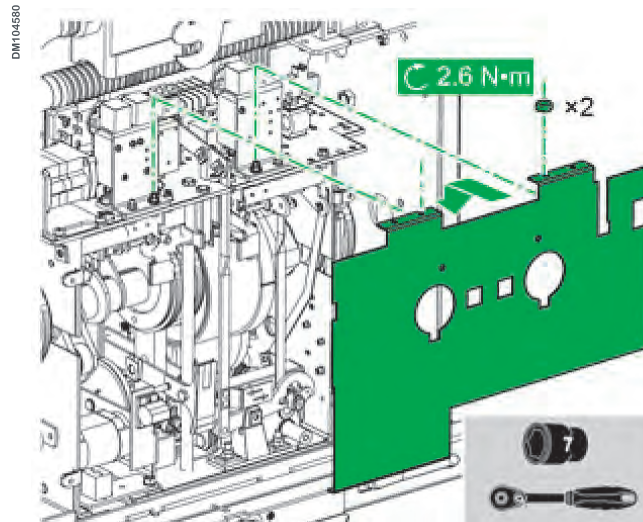
The illustrations in this section provide the required tightening torque for installing the components. Use these torque value when tightening the fasteners to ensure they are properly secured.

Failure to follow this instruction can result in equipment damage.

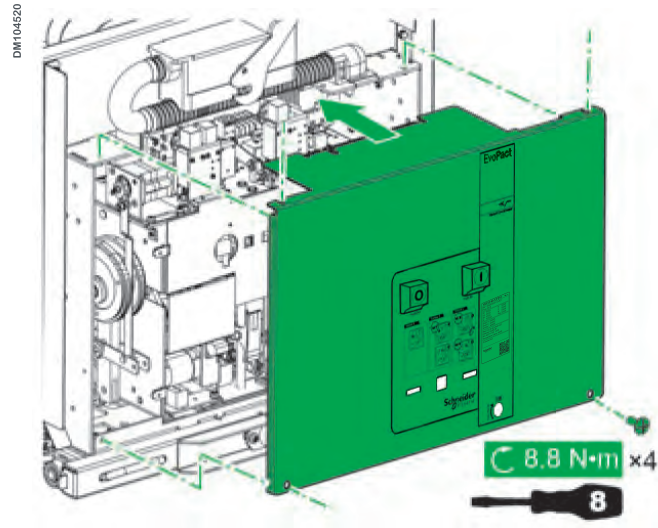
1. Cut the plastic tie strap if it is still present in the operation mechanism.



2. Install the mechanism front cover using the two M4 nuts.



3. Install the circuit breaker front cover using the four M6x16 screws.



4. Check the circuit breaker according to the instructions in “Before Energizing for the First Time” on page 24.

Admissible Numbers of Breaking Operations of Vacuum Chamber

The diagram below defines exclusively the admissible summation current limit. It is a guide as to whether the vacuum interrupter chambers/pole sections need to be replaced or not.

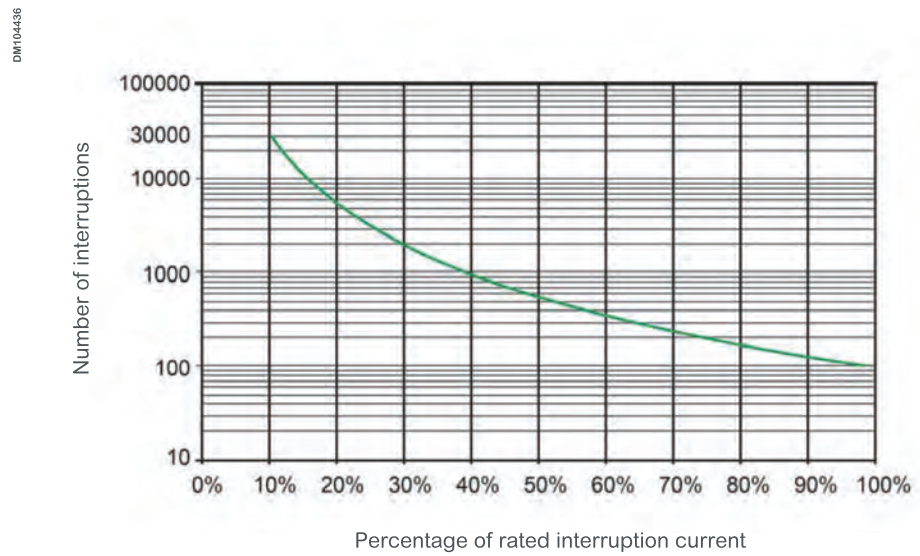



Diagram valid for HVX 12-31-12 E/F. For other ratings, please contact Schneider Electric.

Spare Parts List

According to the adaptation and replacement policy of Schneider Electric, all the equipments that are shown in the following table may be available for panel builder. For more detail please refer to the spare parts leaflets of the circuit breaker.

 DANGER	
HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH	
<ul style="list-style-type: none"> • Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See related standards or local equivalents. • This circuit breaker must only be installed and serviced by qualified electrical personnel. • Turn off all power supplying this circuit breaker before working on or inside the circuit breaker. Lock the circuit breaker in the open position. • Always use a properly rated voltage sensing device to confirm power is off. • Replace all devices, covers and doors before turning on power to this equipment. • Beware of potential hazards and carefully inspect the work area for tools and objects that may have been left inside the circuit breaker. 	
Failure to follow these instructions will result in death or serious injury.	

Spare parts	Mark	Description	Reference No.
Motor	M1	Charging the energy storing device	NVE8808401
	M2	Racking in/out the trolley	Please contact Schneider-Electric
Opening release	F11 + F12	Opening the circuit breaker	NVE6900601
Over-current release	F3		
Closing release	F2	Closing the circuit breaker	NVE6900601
Blocking magnet	Y0	Locking the rack in/out of the trolley. If the rated auxiliary voltage has fallen or is shut off, all blocking magnets are in "blocked" position.	NVE8808201
	Y1	<ul style="list-style-type: none"> • Locking the closing of the circuit breaker • Preventing the circuit breaker from being closed and opened via the push buttons "ON" or "OFF", as well as manual actuation of the withdrawable unit. If the rated auxiliary voltage has fallen or is shut off, all blocking magnets are in "blocked" position	NVE8808301
Auxiliary switches position indicator	S11+S12	Snap-action switches on the drive and are installed depending on the customized design.	NVE8807901
Anti-pumping relay	K01	If an ON and OFF command is simultaneously and permanently present at the circuit breaker, the circuit breaker returns to its initial position after closing. It remains in this initial position until the ON command is issued anew. This prevents continuous closing and opening operations ("pumping").	NVE8808001
Auxiliary circuit plug or terminal block	Q0	Used to connect the panel or control system to the circuit breaker by wiring harness.	NVE8808101

Troubleshooting and Solutions

Diagnose the problem	Identify the probable causes	Find the solutions
Circuit breaker cannot be closed locally or remotely	Circuit breaker interlocked mechanically	<ul style="list-style-type: none"> Check the position of the racking trolley Check the status of blocking magnet Y1
	Auxiliary circuit plug or terminal block not completely connected	Make sure the auxiliary circuit plug or terminal block is completely connected
	Operation mechanism not charged	<ul style="list-style-type: none"> Charge the mechanism manually If the device is equipped with M1 motor, check the voltage and power supply conformity. If the problem persists, replace the gear motor M1
	F11 / F12 opening release permanently supplied with power	<ul style="list-style-type: none"> There is an opening order. Determine the origin of the order. This order must be canceled before the circuit breaker can be closed. If the problem persists, replace the F11/F12 release.
	F4 under-voltage release not supplied with power	<ul style="list-style-type: none"> There is an opening order. Determine the origin of this order. Check the voltage and the supply circuit conformity ($U > 0.85 U_n$). If the problem persists, replace the F4 release.
	F3 over-current release continuously supplied with power	<ul style="list-style-type: none"> There is an opening order. Determine the origin of the order. This order must be canceled before the circuit breaker can be closed. If the problem persists, replace the F3 release.
	F2 closing release supplied with power, while the circuit breaker is not "ready to close", and the anti-pumping relay K01 is working	<ul style="list-style-type: none"> Eliminate the closing order Make sure the circuit breaker is ready to close Resend the closing order
Circuit breaker cannot be closed remotely, but can be closed locally using the closing push button located on the circuit breaker	Closing order not executed by the F2 closing release	<ul style="list-style-type: none"> Check the voltage and the supply circuit conformity (0.85 to $1.1 U_n$) If the problem persists, replace the F2 release
Unexpected tripping of the circuit breaker	Insufficient supply voltage of the F4 under-voltage release	Check the voltage and the supply circuit conformity ($U > 0.85 U_n$)
	Load shedding order sent to the F11/F12 opening release by another device	<ul style="list-style-type: none"> Check the overall load on your distribution system If necessary, modify the setting of devices in your distribution system
	Unexpected opening order from the F11/F12 opening release	<ul style="list-style-type: none"> Determine the origin of the order Refer to the instruction sheet for your protection, control and monitoring unit.
	One of the following causes occurs: <ul style="list-style-type: none"> Overload, load shedding order sent to the over-current release F3 Ground insulation fault Short circuit detected by the control unit 	<ul style="list-style-type: none"> Determine and eliminate the tripping causes. Check the condition of the circuit breaker before putting it back into service.
Instantaneous opening after each attempt to close the circuit breaker	Transient over-current when closing	<ul style="list-style-type: none"> Check your distribution system or the settings of your control unit. Check the condition of the device before putting it back into service.
	Closing on a short circuit	<ul style="list-style-type: none"> Determine and eliminate the tripping causes. Check the condition of the circuit breaker before putting it back into service.

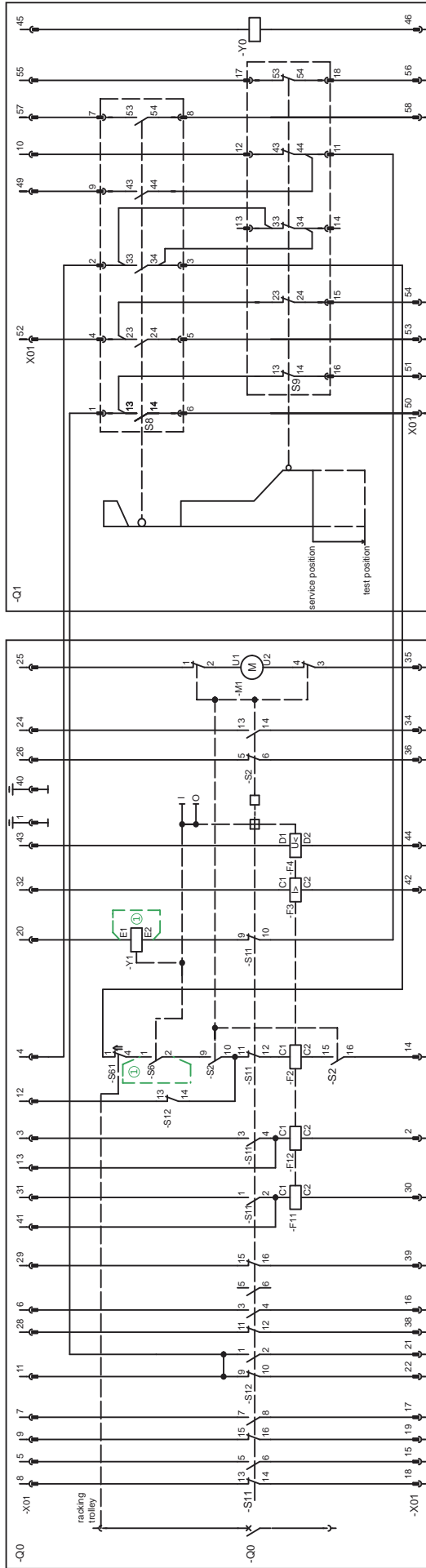
Diagnose the problem	Identify the probable causes	Find the solutions
Circuit breaker cannot be opened remotely, but can be opened locally	Opening order not executed by the F11/F12 opening release	<ul style="list-style-type: none"> Check the voltage and the supply circuit conformity (0.7 to 1.1 Un) If the problem persists, replace the F11/F12 release
	Opening order not executed by the F4 under-voltage release	Drop in voltage insufficient or residual voltage across the terminals of the under-voltage release is greater than 0.35 Un.
Circuit breaker cannot be opened locally or remotely	Operating mechanism malfunction or welded contacts	Contact a Schneider Electric service centre
Impossible to insert the crank into the racking trolley to rack-in or rack-out	A padlock or keylock is present on the racking trolley or an "open door " interlock is present	Disable the locks
Cell door cannot be opened	The racking trolley is in the racked-in position while "open door" interlock present	Rack out (disconnect) the circuit breaker.
Circuit breaker cannot be racked in (connected)	Mechanical problem on the insulating shutters	Check the operation of the insulating shutters.
	Clusters are incorrectly positioned	Check cluster data and replace clusters.
	The circuit breaker is closed.	Open the circuit breaker.
	The blocking magnet for racking trolley Y0 not supplied with power	Check the voltage and the supply circuit conformity ($U > 0.85 U_n$)
	The racking trolley is not properly locked in the correct position in the cell.	Lock the racking trolley in the correct position into the cell.
	An interlock with earthing switch is present.	the status of earthing switching, and try to disable the lock.
Impossible to turn the crank to rack-out the racking trolley	The circuit breaker is closed.	Open the circuit breaker.
	The door is open or the "open door" interlock is ineffective	Close the door of the cubicle or check the operation of the "open door" interlock.
Racking trolley cannot be pulled out from panel	Circuit breaker is not in test position	Turn the crank until the circuit breaker reaches the test position.
Withdrawable circuit breaker cannot be inserted into the cell	A lock is present on the insulating shutters	Disable the lock
	The circuit breaker is inserted into a wrong cell	Check the outline of the cell and circuit breaker.
Cell door cannot be closed	The racking trolley is not properly locked in the correct position in the cell	Lock the racking trolley in the correct position in the cell.
	The "open door" interlock is ineffective	Check the operation of the "open door" interlock.

Annex: Wiring Diagrams

This chapter provides the following standard wiring diagrams for the HVX embedded pole vacuum circuit breaker. Please check your product type and find the corresponding wiring diagram for it.

Manual trolley withdrawable type	with anti-pumping	√					
	without anti-pumping		√				
Fixed type	with anti-pumping			√			
	without anti-pumping				√		
Motorized trolley withdrawable type	with anti-pumping					√	
	without anti-pumping						√
Drawing No		ASX000525-01	ASX000525-02	ASX000525-03	ASX000525-04	ASX000525-05	ASX000525-06
Page No		56	57	58	59	60	61

- HVX withdrawable VCB, with 58 pin plug and no anti-pumping relay



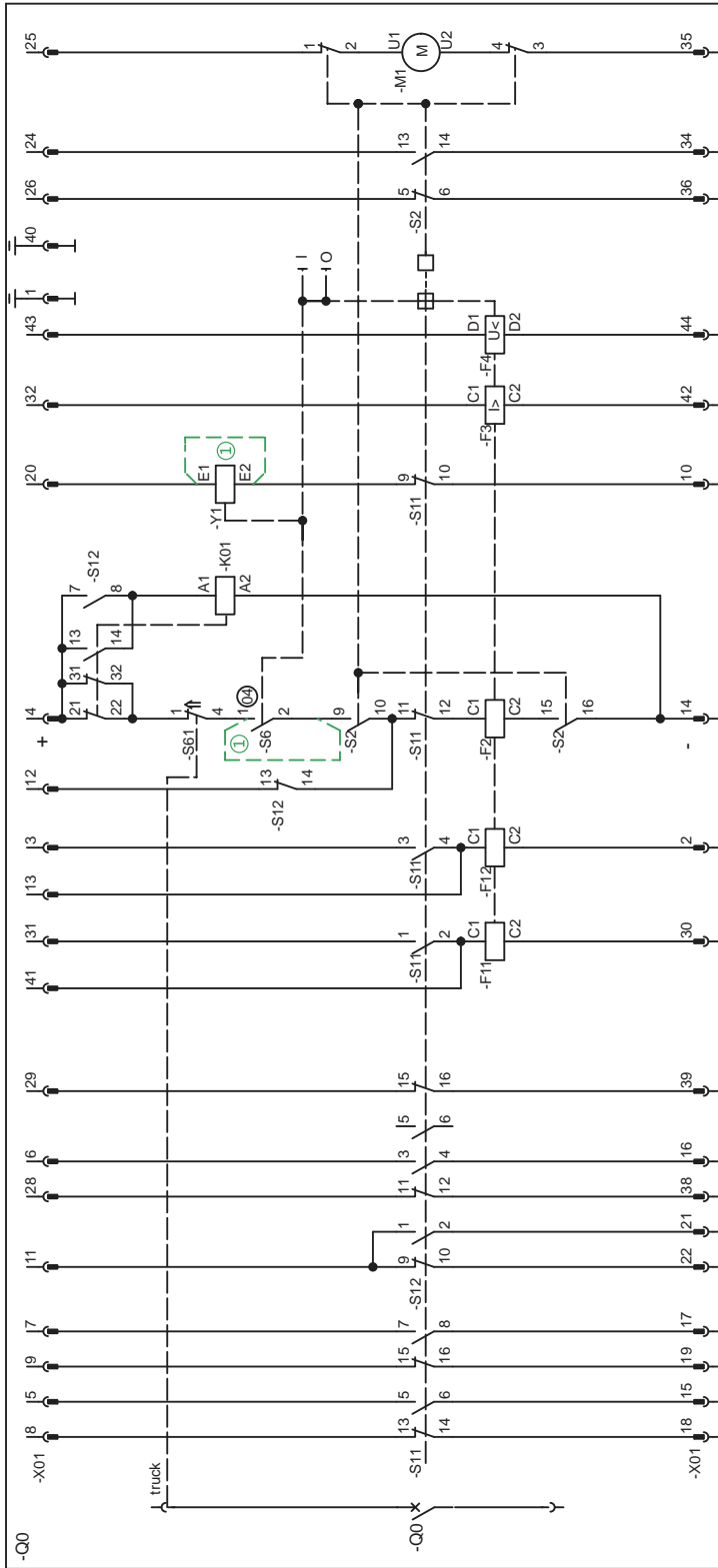
Drawing No ASX000525-02

Note:

1. This wiring diagram shows the maximum circuit breaker equipment. The standard equipment doesn't include optional items. If the customer requires optional items, please state it when placing the order.
2. The circuit breaker is in discharged and open position; the trolley is in service position.
3. If circuit breaker without blocking magnet for closing Y1, refer to dash ① in the wiring diagram (no Y1, no S6).

-Q0	Units incorporated in the circuit breaker in compliance with order	-F2	Closing release
-M1	Motor for operation mechanism	-F3	Over-current release (optional)
-S11/12	Auxiliary switches for position indication	-F4	Under-voltage release (optional)
-S2	Micro switch for motor control	-S61	Micro switch actuated by racking trolley operation or racking trolley not in end position
-S6	Micro switch for blocking magnet Y1 (optional)	-Q1	Units incorporated in the racking trolley in compliance with order
-Y1	Blocking magnet for closing (optional)	-S8	Test position switch
-F11	Opening release	-S9	Service position switch
-F12	Opening release (optional)	-Y0	Blocking magnet for trolley (optional)

- HVX fixed VCB, with 58 pin plug or terminal strip, and anti-pumping relay



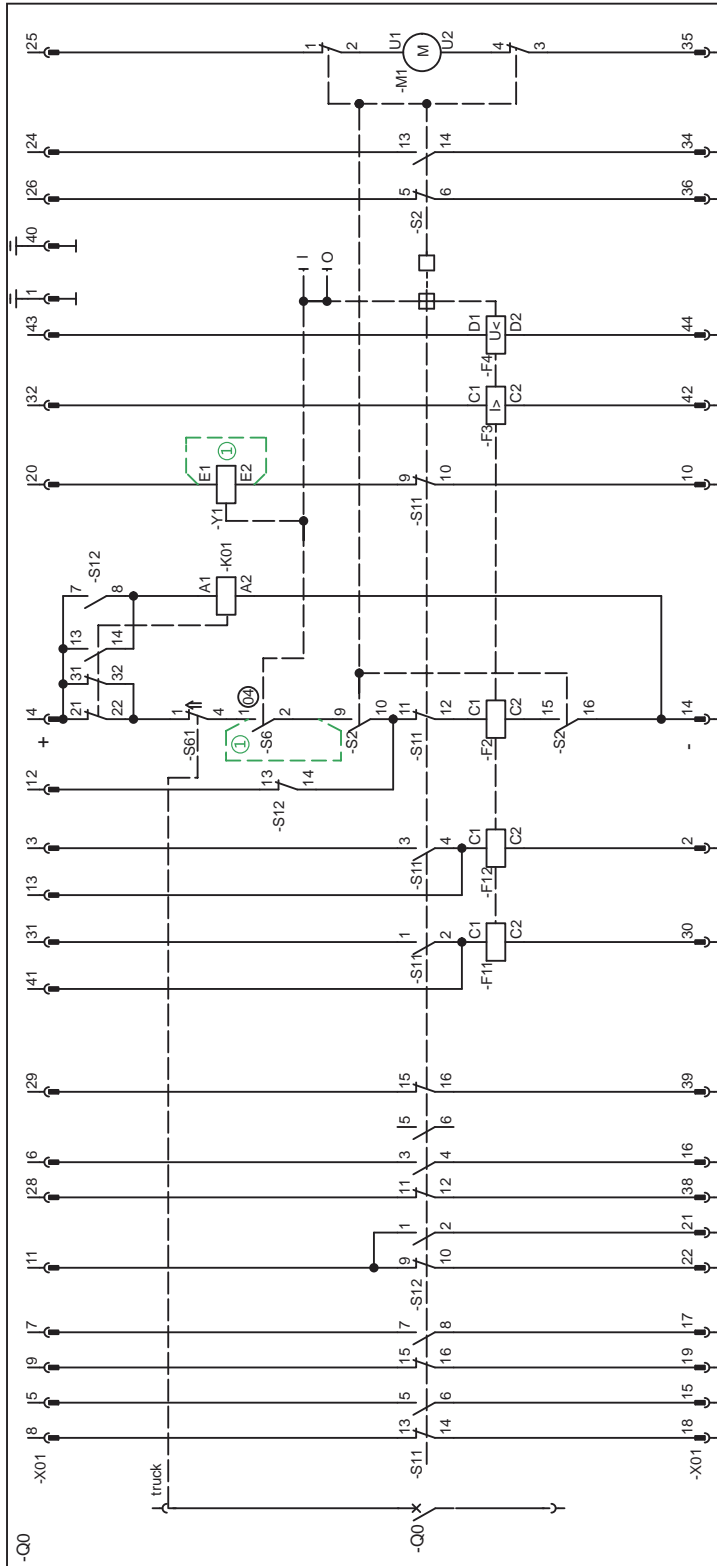
Drawing No ASX000525-03

Note:

1. This wiring diagram shows the maximum circuit breaker equipment. The standard equipment doesn't include optional items. If the customer requires optional items, please state it when placing the order.
2. The circuit breaker is in discharged and open position; the trolley is in service position.
3. If circuit breaker without blocking magnet for closing Y1, refer to dash ① in the wiring diagram (no Y1, no S6).

-Q0	Units incorporated in the circuit breaker in compliance with order	-F12	Opening release (optional)
-M1	Motor for operation mechanism	-F2	Closing release
-S11/12	Auxiliary switches for position indication	-F3	Over-current release (optional)
-S2	Micro switch for motor control	-F4	Under-voltage release (optional)
-S6	Micro switch for blocking magnet Y1 (optional)	-K01	Anti-pumping relay
-Y1	Blocking magnet for closing (optional)	-S61	Micro switch actuated by interlock operation
-F11	Opening release		

- HVX fixed VCB, with 58 pin plug or terminal strip, and anti-pumping relay



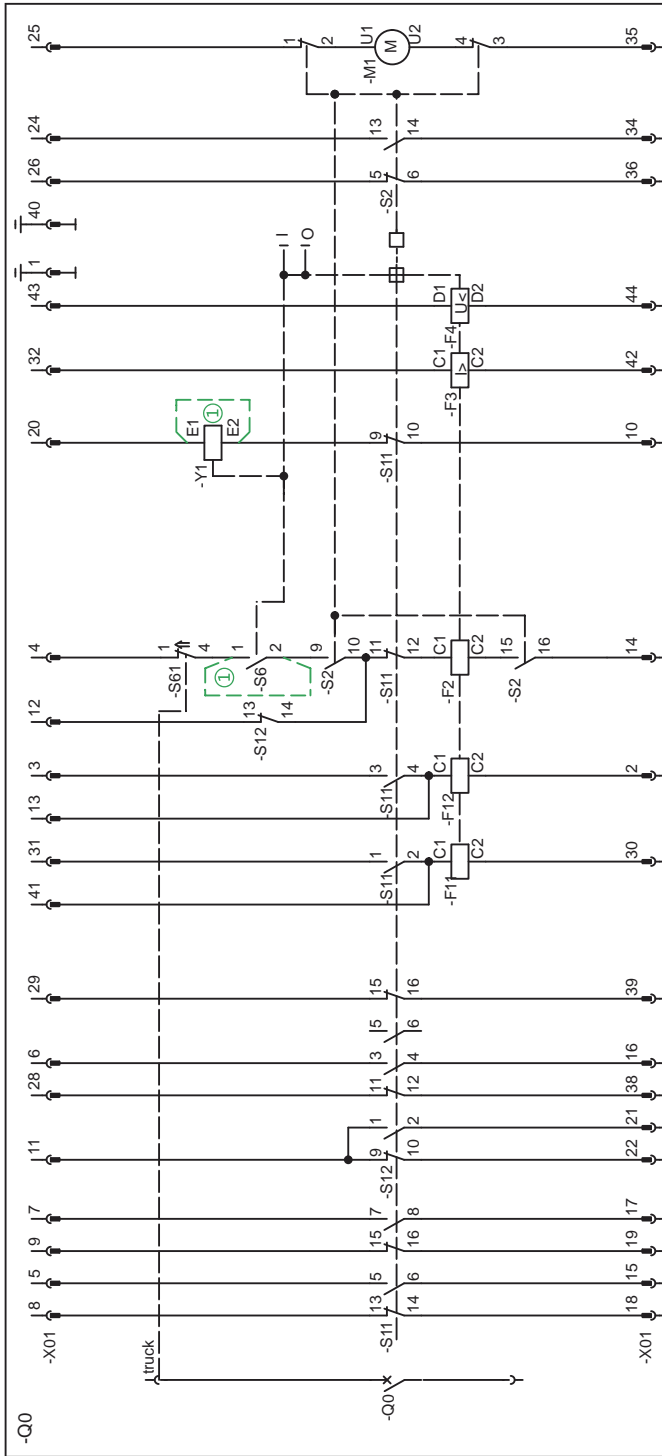
Drawing No ASX000525-03

Note:

1. This wiring diagram shows the maximum circuit breaker equipment. The standard equipment doesn't include optional items. If the customer requires optional items, please state it when placing the order.
2. The circuit breaker is in discharged and open position; the trolley is in service position.
3. If circuit breaker without blocking magnet for closing Y1, refer to dash ① in the wiring diagram (no Y1, no S6).

-Q0	Units incorporated in the circuit breaker in compliance with order	-F12	Opening release (optional)
-M1	Motor for operation mechanism	-F2	Closing release
-S11/12	Auxiliary switches for position indication	-F3	Over-current release (optional)
-S2	Micro switch for motor control	-F4	Under-voltage release (optional)
-S6	Micro switch for blocking magnet Y1 (optional)	-K01	Anti-pumping relay
-Y1	Blocking magnet for closing (optional)	-S61	Micro switch actuated by interlock operation
-F11	Opening release		

- HVX fixed VCB, with 58 pin plug or terminal strip, and no anti-pumping relay



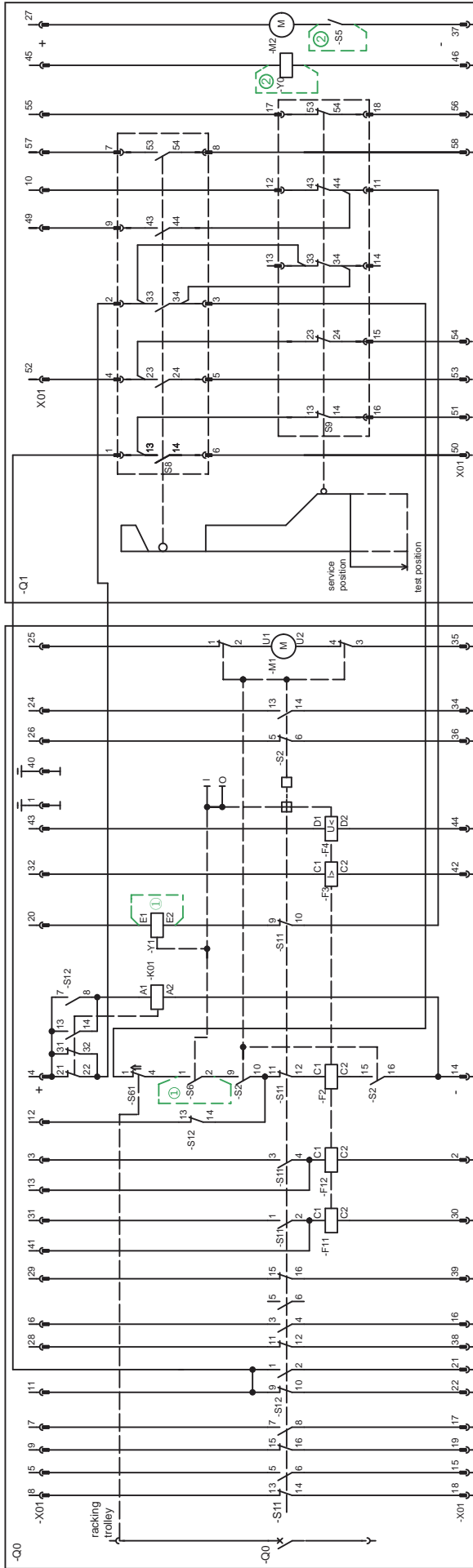
Drawing No ASX000525-04

Note:

1. This wiring diagram shows the maximum circuit breaker equipment. The standard equipment doesn't include optional items. If the customer requires optional items, please state it when placing the order.
2. The circuit breaker is in discharged and open position; the trolley is in service position.
3. If circuit breaker without blocking magnet for closing Y1, refer to dash ① in the wiring diagram (no Y1, no S6).

-Q0	Units incorporated in the circuit breaker in compliance with order	-F11	Opening release
-M1	Motor for operation mechanism	-F12	Opening release (optional)
-S11/12	Auxiliary switches for position indication	-F2	Closing release
-S2	Micro switch for motor control	-F3	Over-current release (optional)
-S6	Micro switch for blocking magnet Y1 (optional)	-F4	Under-voltage release (optional)
-Y1	Blocking magnet for closing (optional)	-S61	Micro switch actuated by interlock operation

- HVX motorized withdrawable VCB, with 58 pin plug and anti-pumping relay



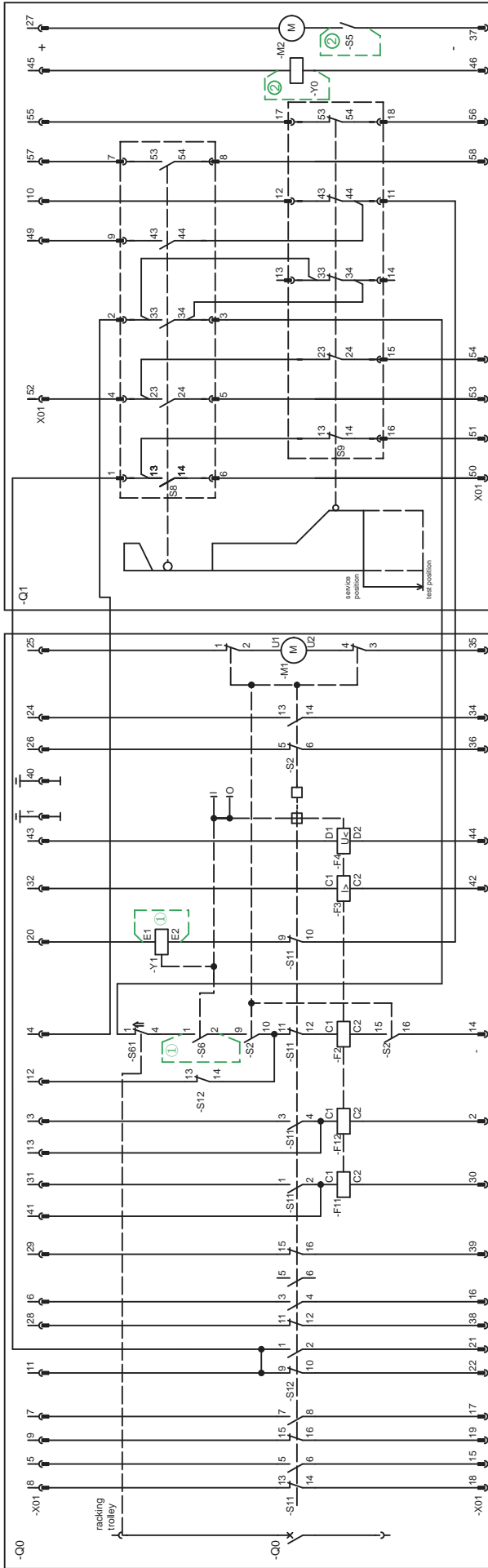
Drawing No ASX000525-05

Note:

1. This wiring diagram shows the maximum circuit breaker equipment. The standard equipment doesn't include optional items. If the customer requires optional items, please state it when placing the order.
2. The circuit breaker is in discharged and open position; the trolley is in service position.
3. If circuit breaker without blocking magnet for closing Y1, refer to dash ① in the wiring diagram (no Y1, no S6).
4. If circuit breaker without blocking magnet for trolley Y0, refer to dash ② in the wiring diagram (no Y0, no S3).

-Q0	Units incorporated in the circuit breaker in compliance with order	-F3	Over-current release (optional)
-M1	Motor for operation mechanism	-F4	Under-voltage release (optional)
-S11/12	Auxiliary switches for position indication	-K01	Anti-pumping relay
-S2	Micro switch for motor control	-S61	Micro switch actuated by racking trolley operation or racking trolley not in end position
-S6	Micro switch for blocking magnet Y1 (optional)	-Q1	Units incorporated in the racking trolley in compliance with order
-Y1	Blocking magnet for closing (optional)	-S8	Test position switch
-F11	Opening release	-S9	Service position switch
-F12	Opening release (optional)	-Y0	Blocking magnet for trolley (optional)
-F2	Closing release	-S5	Micro switch for blocking magnet Y0 (optional)
		-M2	Motor for trolley control

- HVX motorized withdrawable VCB, with 58 pin plug and no anti-pumping relay



Drawing No ASX000525-06

Note:

1. This wiring diagram shows the maximum circuit breaker equipment. The standard equipment doesn't include optional items. If the customer requires optional items, please state it when placing the order.
2. The circuit breaker is in discharged and open position; the trolley is in service position.
3. If circuit breaker without blocking magnet for closing Y1, refer to dash ① in the wiring diagram (no Y1, no S6).
4. If circuit breaker without blocking magnet for trolley Y0, refer to dash ② in the wiring diagram (no Y0, no S3).

-Q0	Units incorporated in the circuit breaker in compliance with order	-F2	Closing release
-M1	Motor for operation mechanism	-F3	Over-current release (optional)
-S11/12	Auxiliary switches for position indication	-F4	Under-voltage release (optional)
-S2	Micro switch for motor control	-S61	Micro switch actuated by racking trolley operation or racking trolley not in end position
-S6	Micro switch for blocking magnet Y1 (optional)	-Q1	Units incorporated in the racking trolley in compliance with order
-Y1	Blocking magnet for closing (optional)	-S8	Test position switch
-F11	Opening release	-S9	Service position switch
-F12	Opening release (optional)	-Y0	Blocking magnet for trolley (optional)
-M2	Motor for trolley control	-S5	Micro switch for blocking magnet Y0 (optional)

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