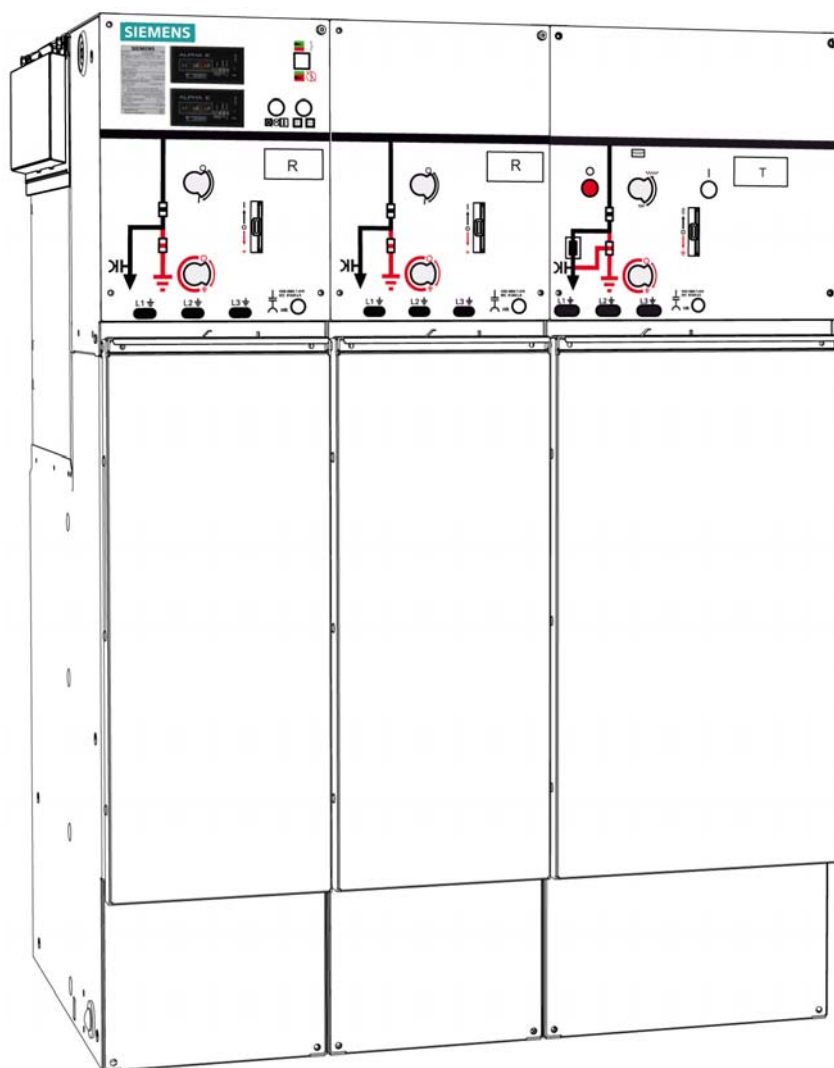


SIEMENS

Medium-Voltage Switchgear

Type 8DJH

Up to 24 kV, Gas-Insulated



Medium-Voltage
Switchgear

INSTALLATION AND OPERATING INSTRUCTIONS

Order No.: 500-8384.9

Revision: 01

Issue: 08-09-2009

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**Overview: Panel modules
as individual panels**

	Panel modules as individual panels	Panel width
R	Ring-main feeder	310/500 mm
K	Cable feeder	310/430 mm
T	Transformer feeder	430 mm
L	Circuit-breaker feeder	430/500 mm
M	Metering panel	500/840
S	Bus sectionalizer module with three-position switch-disconnector	430/500/620 mm
H	Bus sectionalizer module with switch-disconnector/fuse combination	430 mm
V	Bus sectionalizer with circuit-breaker	500 mm
E	Busbar earthing panel	310/500 mm

Sequence	1	2	3	4
Operation		Charging the  springs		
Switch position	OPEN	OPEN	CLOSED	OPEN
Position indicator				
"Spring charged" indicator				
Closing spring	not charged	charged	not charged	not charged
Opening spring	not charged	charged	charged	not charged

Secondary equipment of the vacuum circuit-breaker type 2

Secondary components

The scope of the secondary equipment of the vacuum circuit-breaker depends on the type of application.

Motor operating mechanism (option)

Operating voltages for motor operating mechanisms (circuit-breaker and disconnecter)

- 24, 48, 60, 110, 220 V DC
- 110 and 230 V AC 50/60 Hz
- Power consumption: 80 W for AC and DC

Closing solenoid (option)

- For electrical closing (coil voltage is coupled with motor voltage)

Shunt release (option)

- Magnet coil
- Magnet coil with energy store
- Tripping by protection relay or electrical actuation

C.t.-operated release (option)

- For tripping pulse 0.1 Ws in conjunction with suitable protection systems, e.g. protection system 7SJ45, SEG WIC; other designs on request
- Used if external auxiliary voltage is missing, tripping via protection relay

Low-energy magnetic release (option)

- For tripping pulse 0.01 Ws, tripping via transformer monitor (IKI-30)

Undervoltage release (option)

- Comprising:
 - Energy store and unlatching mechanism
 - Electromagnetic system, which is permanently connected to voltage while the vacuum circuit-breaker is closed; tripping is initiated when this voltage drops
- Connection to voltage transformers possible

Circuit-breaker tripping signal (option)

- For electrical signaling (as pulse ≥ 10 ms), e.g. to remote control systems, in the case of automatic tripping (e.g. protection)
- Via auxiliary switch

Varistor module

- Integrated in the releases for voltages > 60 V DC

Auxiliary switch (option)

- For circuit-breaker: 6NO + 6NC, free contacts thereof 2NO + 2NC + 2 changeover, depending on equipped releases
- For disconnecter: 6NO + 6NC, free contacts thereof 2NO + 2NC + 2 changeover

Position switch (option)

- For "closing/opening spring charged" indication

- For bushings according to EN 50 181/DIN EN 50 181 (interface type C with bolted contact M16)
- For thermoplastic-insulated cables
- For paper-insulated mass-impregnated cable with adapter systems
- Access to the cable compartment only if the feeder has been disconnected and earthed
- As screened (semi-conductive) version independent of the site altitude
- Connection of cable elbow plugs or cable T-plugs with bolted contact M16 for 630 A, paper-insulated mass-impregnated cables via customary adapters, power cables as thermoplastic-insulated single-core cables with the corresponding plugs and adapters mentioned above

- Options**
- Mounted cable clamps on cable bracket (e.g. C profiles or similar)
 - Surge protection devices of the same make in connection with the respective cable T-plugs

- Surge arresters**
- Pluggable on cable T-plug, cable elbow plug
 - Installation of certain configurations with surge arresters possible via deep cable compartment cover
 - Surge arresters recommended if, at the same time, the cable system is directly connected to the overhead line, or the protection zone of the surge arrester at the end tower of the overhead line does not cover the switchgear

- Surge limiters**
- Pluggable on cable T-plug
 - Surge limiters recommended when motors are connected

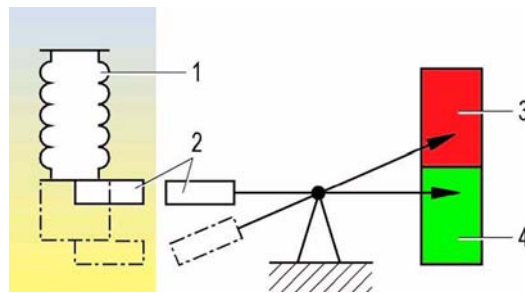
Conventional cable connections for ring-main feeders and circuit-breaker feeders

Conventional cable sealing ends can be equipped with elbow adapters, e.g. RICS (Tyco Electronics Raychem).

- Possibilities of connection**
- Cable testing e.g. with measuring bolt, make nkt cables, type PAK 630, see Page 215, "Cable testing via cable plugs"
 - Conventional sealing end: As customer supply

- Options**
- Mounted cable clamps on cable bracket (e.g. C profile or similar)

Mode of operation



Principle of gas monitoring with ready-for-service indicator

- ① Measurement box in filled stainless-steel vessel
- ② Magnetic coupling
- ③ Red indication: not ready for service
- ④ Green indication: ready for service

For the ready-for-service indicator, a gas-tight measurement box is installed on the inside of the switchgear vessel.

A coupling magnet, which is fitted to the bottom end of the measurement box, transmits its position to an outside armature through the non-magnetizable switchgear vessel. This armature moves the ready-for-service indicator of the switchgear.

While changes in the gas density during the loss of gas, which are decisive for the insulating capacity, are displayed, changes in the gas pressure dependent on temperature and external pressure variations are not. The gas in the measurement box has the same temperature as that in the switchgear.

The temperature effect is compensated via the same pressure change in both gas volumes.

7.13 Short-circuit/earth-fault indicators

All ring-main feeders can be **optionally** equipped with a 3-phase short-circuit or earth-fault indicator.

Features

- Indication at the switchgear front
- Factory-assembled including sensor mounted on ring-main cable bushing
- Short-circuit pickup values: See table
- Reset manually or automatically after a preset time, depending on the type
- Optical signals when a pre-selected pickup value is exceeded
- Option: Remote electrical indication via passing contact (changeover contact) or via maintained contact (D) connected to terminals (rear side of device).

Operating times

Operating times	Component		Duration for type 1.1	Duration for type 2	Unit
Closing time			75	25	ms
Charging time			< 15	< 15	s
Opening time	Shunt release	(Y1)	< 65	< 30	ms
	Additional release 3AX 11	(Y2), (Y4),(Y7)	< 50	< 50	ms
Arcing time			< 15	< 15	ms
Break time	Shunt release	(Y1)	< 80	< 50	ms
	Additional release 3AX 11	(Y2), (Y4),(Y7)	< 65	< 50	ms
Dead time			300	3 min	ms
Close-open contact time	Shunt release	(Y1)	< 80	< 80	ms
	Additional release 3AX 11	(Y2), (Y4),(Y7)	< 60	< 80	ms
Minimum command duration					
CLOSED	Closing solenoid	(Y9)	45	60	ms
OPEN	Shunt release	(Y1)	40	30	ms
OPEN	Additional release 3AX 11	(Y2), (Y4),(Y7)	< 20	< 40	ms
Shortest impulse duration of the c.b. tripping signal			10	10	ms

Closing time The interval of time between the initiation (command) of the closing operation and the instant when the contacts touch in all poles.

Opening time The interval of time between the initiation (command) of the opening operation and the instant when the contacts separate in all poles.

Arcing time The interval of time from the first initiation of an arc and the instant of final arc extinction in all poles.

Break time The interval of time between the initiation (command) of the opening operation and the instant of final arc extinction in the last-pole-to-clear (=opening time and arcing time).

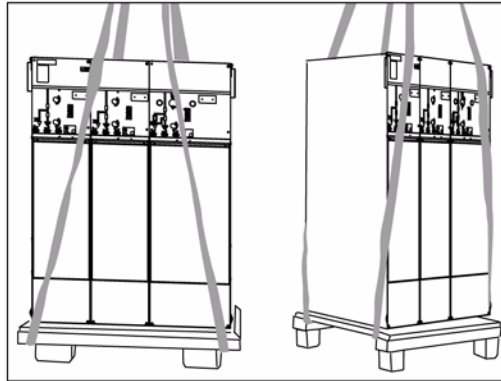
Close-open contact time The interval of time - in a make-break operating cycle - between the instant when the contacts touch in the first pole in the closing process, and the instant when the contacts separate in all poles in the subsequent opening process.

Motor operating mechanism For DC operation, the maximum power consumption is approx. 350 W.
For AC operation, the maximum power consumption is approx. 400 V A

Transformer				HV HRC fuse			
U [kV]	S _N [kVA]	u _K [%]	I ₁ [A]	I _s [A]	U _s [kV]	e [mm]	Order no.
6-7.2	250	4	24	50	6-12	292	30 004 13.50
				50	6-12	442	30 101 13.50
				63	6-12	292	30 012 43.63
	315	4	30.3	50	3-7.2	292	30 098 13.50
				50	6-12	292	30 004 13.50
				50	6-12	442	30 101 13.50
				63	6-12	292	30 012 43.63
	400	4	38.4	63	6-12	292	30 012 43.63
				80	6-12	292	30 012 43.80
				80	6-12	442	30 102 43.80
				63	3-7.2	292	30 099 13.63
				63	6-12	292	30 012 13.63
				63	6-12	442	30 102 13.63
	500	4	48	80	6-12	292	30 012 43.80
				80	6-12	442	30 102 43.80
				80	3-7.2	292	30 099 13.80
				80	6-12	292	30 012 13.80
				80	6-12	442	30 102 13.80
				100	6-12	292	30 012 43.100
				100	6-12	442	30 102 43.100
630	4	61	100	6-12	442	30 102 43.100	
			125	6-12	442	30 103 43.125	
			125	6-12	292	30 020 43.125	
10-12	50	4	2.9	10	6-12	292	30 004 13.10
				10	6-12	442	30 101 13.10
				10	10-17.5	292	30 255 13.10
				10	10-17.5	442	30 231 13.10
				10	10-24	442	30 006 13.10
	75	4	4.3	10	6-12	292	30 004 13.10
				10	6-12	442	30 101 13.10
				10	10-17.5	292	30 255 13.10
				10	10-17.5	442	30 231 13.10
				10	10-24	442	30 006 13.10
	100	4	5.8	16	6-12	292	30 004 13.16
				16	6-12	442	30 101 13.16
				16	10-17.5	292	30 255 13.16
				16	10-17.5	442	30 231 13.16
				16	10-24	442	30 006 13.16
	125	4	7.2	16	6-12	292	30 004 13.16
				16	6-12	442	30 101 13.16
				16	10-17.5	292	30 255 13.16
				16	10-17.5	442	30 231 13.16
				16	10-24	442	30 006 13.16
	160	4	9.3	20	6-12	292	30 004 13.20
				20	6-12	442	30 101 13.20
				20	10-17.5	292	30 221 13.20
				20	10-17.5	442	30 231 13.20
				20	10-24	442	30 006 13.20
	200	4	11.5	25	6-12	292	30 004 13.25
				25	6-12	442	30 101 13.25

Unloading and transport in original packing

⇒ Transport the switchgear by means of a crane or a fork-lift truck.



Removing the wooden pallets

The transport units are screwed on the wooden pallets with transport angles or directly in the switchgear subframe.

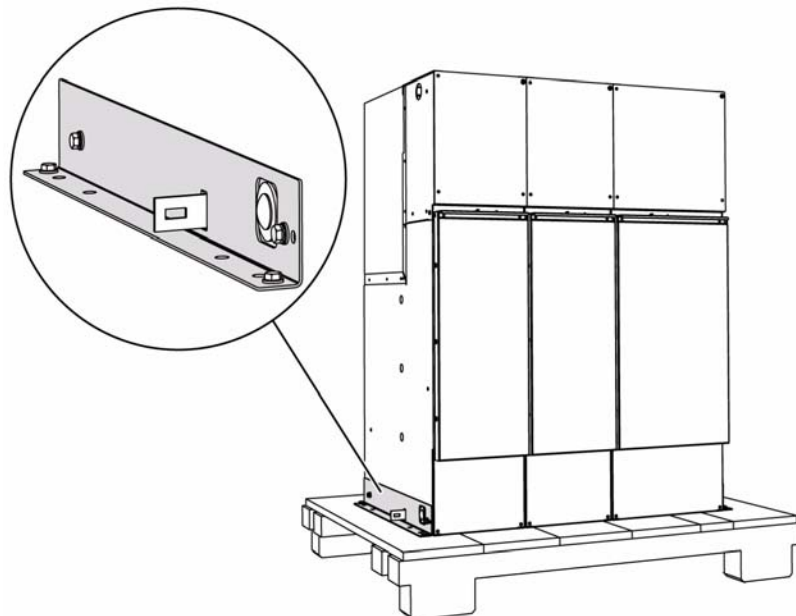


Fig. 39: Transport unit fixed on wooden pallet with transport angle (view from the left)

- ⇒ Remove the PE foil; if required, remove seaworthy or latticed crate before.
- ⇒ Remove the front cable compartment cover from the subframe of the switchgear.
- ⇒ Remove the fixing screws from the transport angles / pallet.
- ⇒ Remove the transport angles.

If the switchgear cannot be lifted directly from the wooden pallet onto its mounting position, please proceed as follows:

- ⇒ Lower the transport units by means of the lateral transport angles onto roller pads (reinforced rollers) or tubes.
- ⇒ Lift the switchgear at the side edges with roller crowbars and slowly lower it onto the mounting position.

Switchgear installation with pressure relief downwards

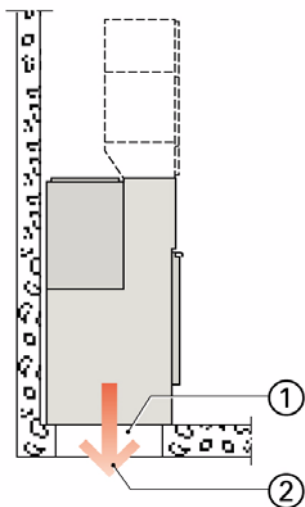


Fig. 46: Side view

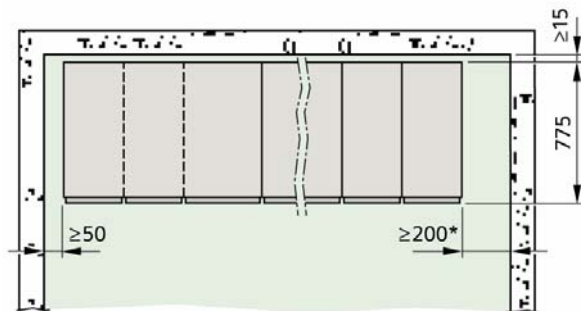


Fig. 47: Top view

Switchgear installation with pressure relief downwards / to the rear (option)

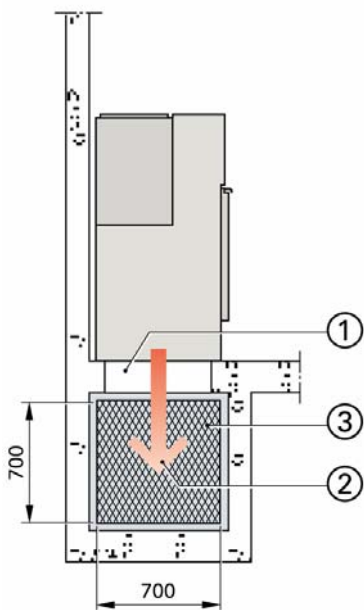


Fig. 48: Side view

- ① Floor opening
- ② Direction of pressure relief

- ③ Expanded metal (supplied by site)

* for lined up switchgear

** Depending on national requirements. For extension or panel replacement, a control aisle of at least 1000 mm is recommended

12.4 Installing switchgear with pressure absorber
Switchgear with integrated pressure absorber ≤ 16 kA

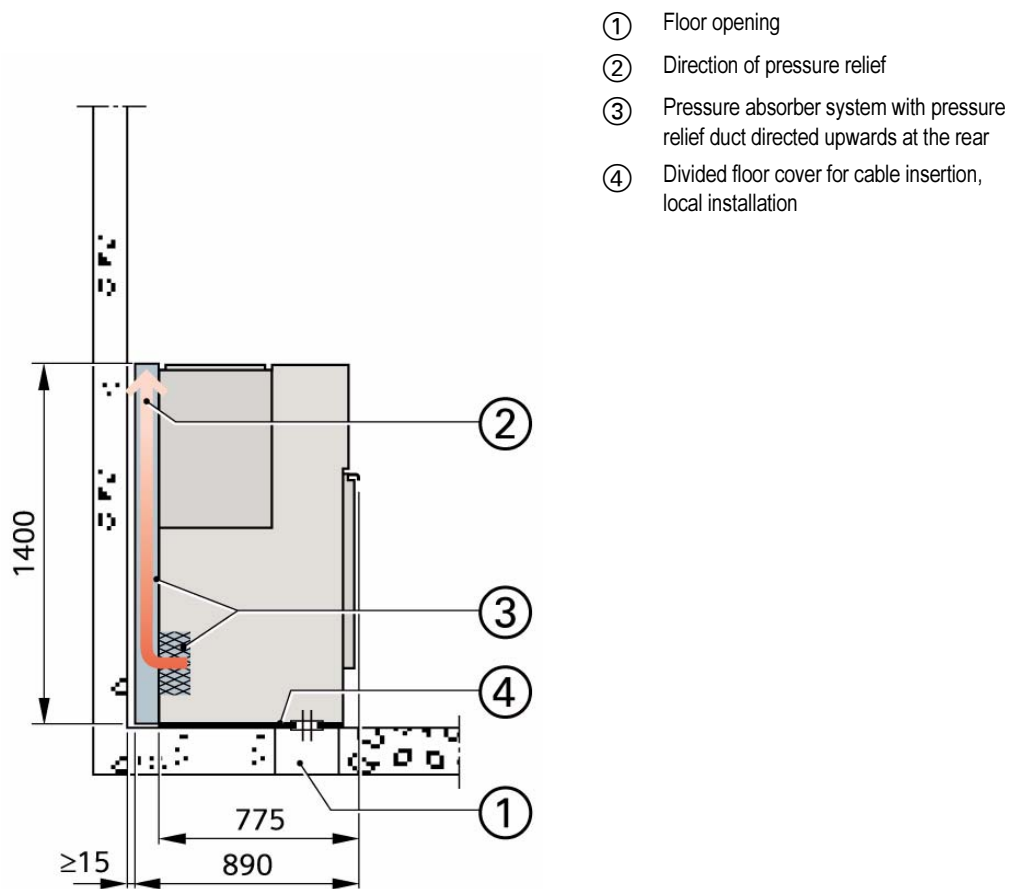


Fig. 56: Option: Switchgear installation with rear pressure relief duct for switchgear blocks with IAC A FL up to 16 kA/1s (side view)

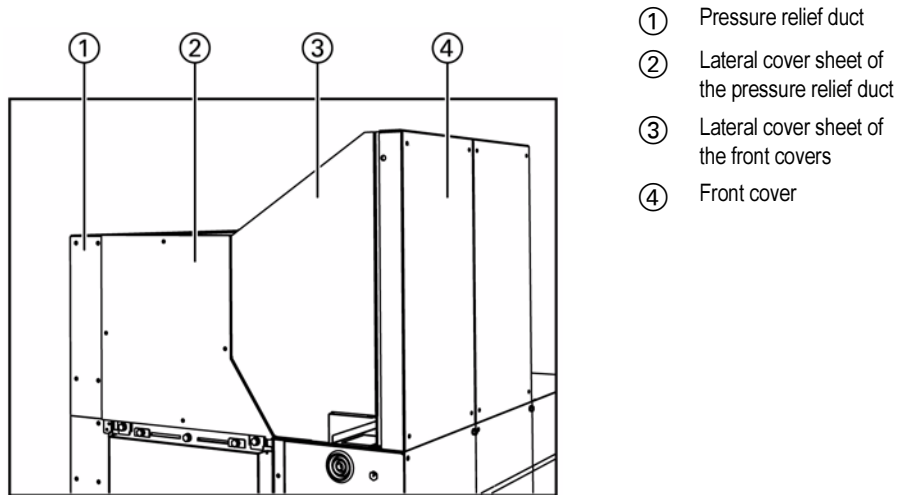
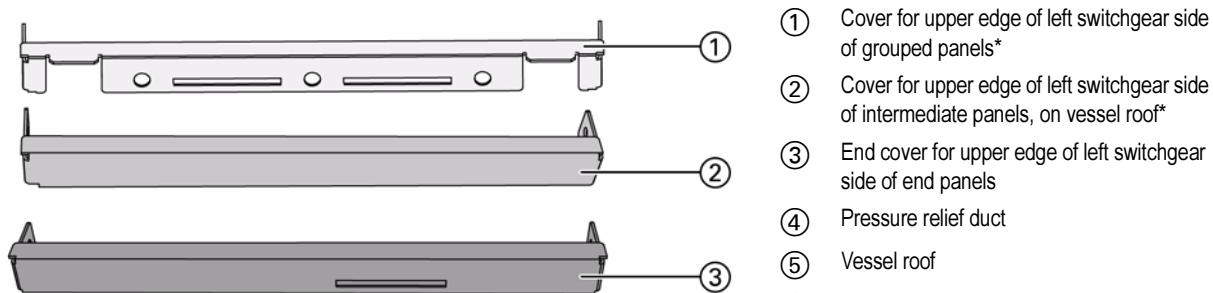


Fig. 69: Top pressure absorber unit with the front covers

⇒ Mount an end cover onto the upper edge of end panels, and a simple cover onto the upper edge of intermediate panels.



- ① Cover for upper edge of left switchgear side of grouped panels*
- ② Cover for upper edge of left switchgear side of intermediate panels, on vessel roof*
- ③ End cover for upper edge of left switchgear side of end panels
- ④ Pressure relief duct
- ⑤ Vessel roof
- ⑥ Clamping plate bracket (only for panel groups)
- ⑦ Clamping cover for dummy plugs
- ⑧ Busbar termination cover

* Covers and end cover for right switchgear side not shown here. Same installation procedure as for left switchgear side.

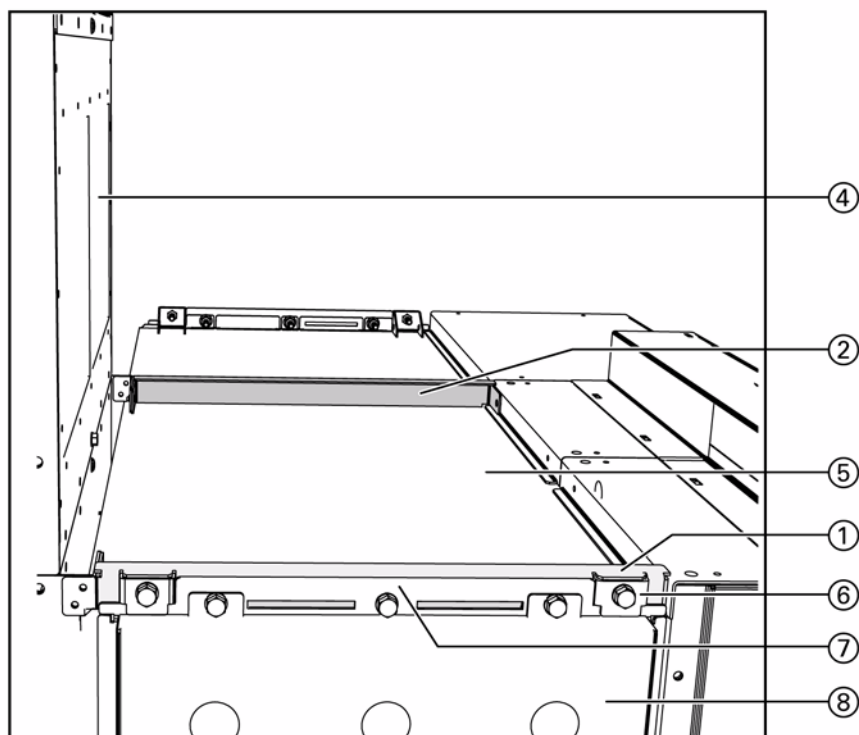


Fig. 70: Position of covers for the top absorber unit

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12.6 Preparing panel interconnections

Preparation of left-hand panel



ATTENTION!

Remove the protective caps used for transport from the busbar bushes. Take care not to damage the busbar bushes.

- ⇒ The protective caps are only used as transport block.
Do not use them as surge-proof caps under any circumstances.
- ⇒ Remove the protective caps downwards in inclined position.
- ⇒ Do not use any sharp or other objects as aids, which could damage the busbar bushes.

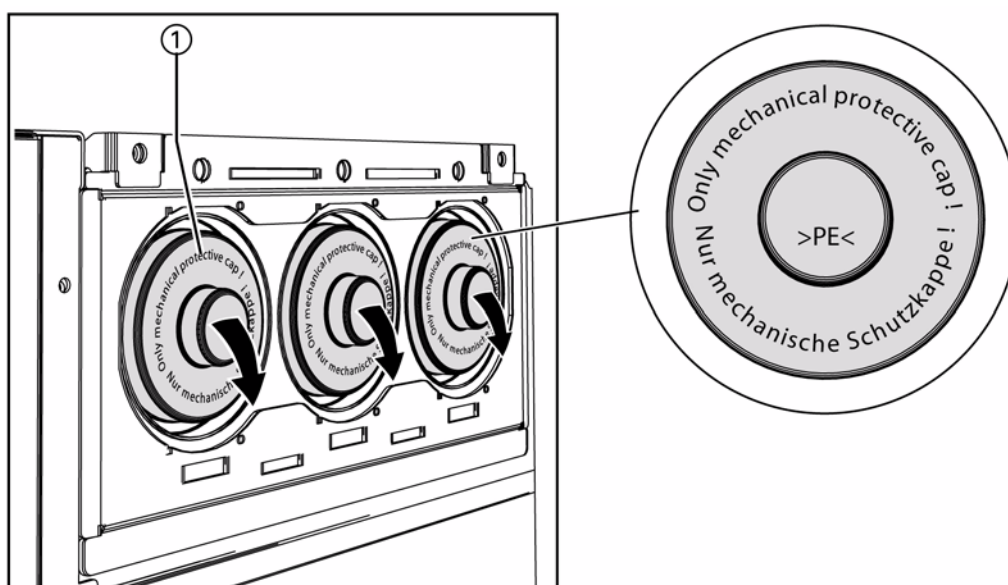
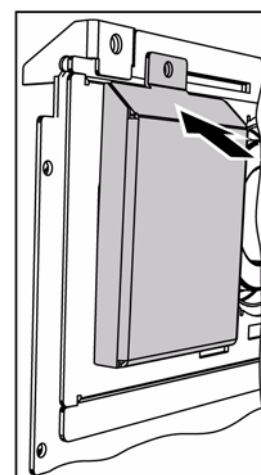
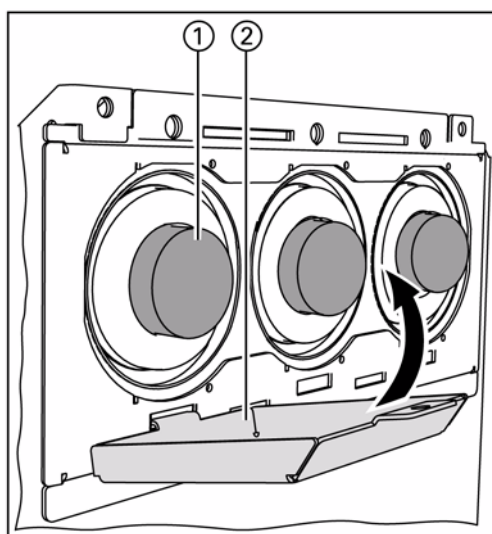


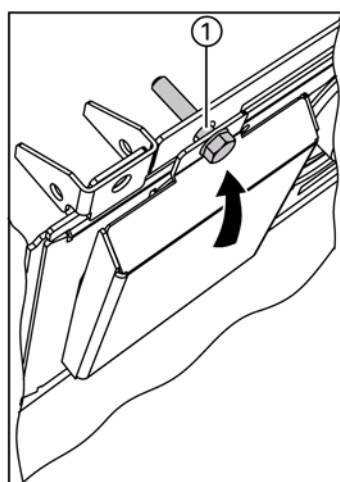
Fig. 85: Removing the protective caps from the busbar bushes

If they have not been pre-assembled at the factory, equip the right-hand busbar couplings with tension springs for earthing.

⇒ Mount the clamping cover for the dummy plugs.



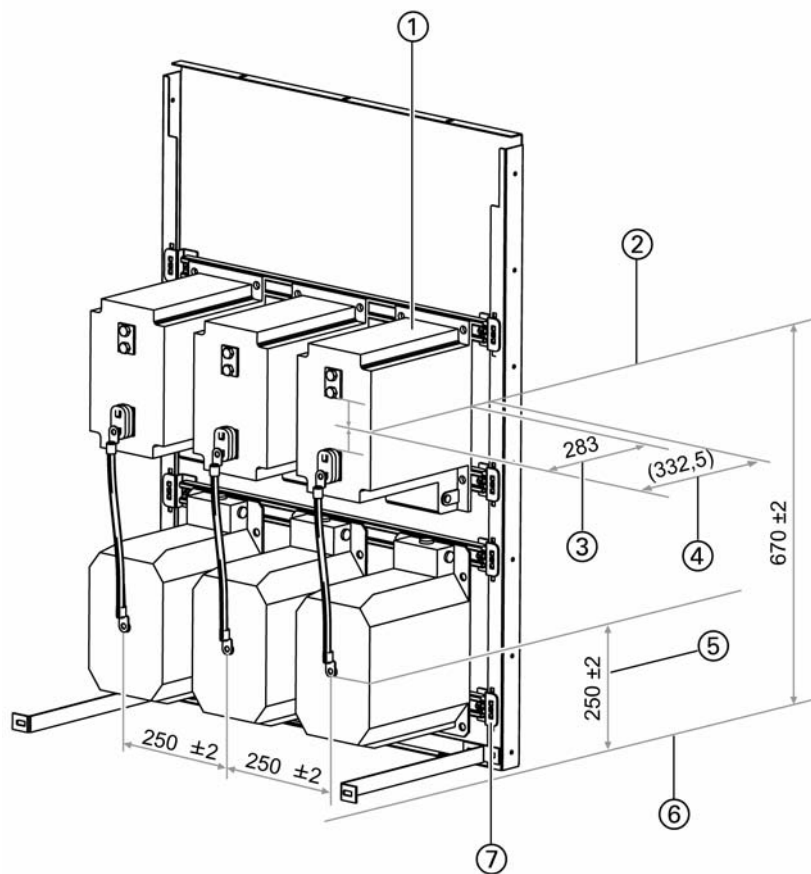
- ① Silicone dummy plug with insertable sleeve
- ② Clamping cover for dummy plugs



- ① Bolted joint

⇒ Press the clamping cover for dummy plugs on softly and fix it with the bolted joint M8.

Installing transformers in an air-insulated metering panel



- ① Transformer height 280 mm
- ② Dimension: Up to center of current transformer
- ③ Dimension: Lower edge of rear wall
- ④ Dimension: Rear edge of rear wall
- ⑤ Dimension: Center of voltage transformer
- ⑥ Dimension: Lower edge of panel
- ⑦ Z angle

Fig. 108: Dimensions and mounting positions of transformers in an air-insulated metering panel type busbar-busbar (dimensions in mm) for 24 kV

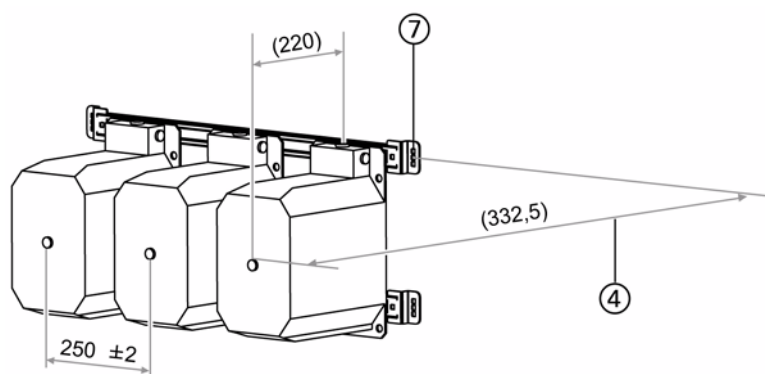


Fig. 109: Dimensions and mounting positions of transformers in an air-insulated metering panel type busbar-busbar (dimensions in mm) for 12 kV

The dimensions and mounting positions of the transformers in the air-insulated metering panel type cable-busbar and type busbar-cable correspond to the type busbar-busbar shown here.

- ⇒ Bolt the current and voltage transformers for phase L2 centrally on the C profiles. For 12 kV version: Z angle to fasten the C profile, turned to the front. For 24 kV version: Z angle to fasten the C profile, turned to the rear.

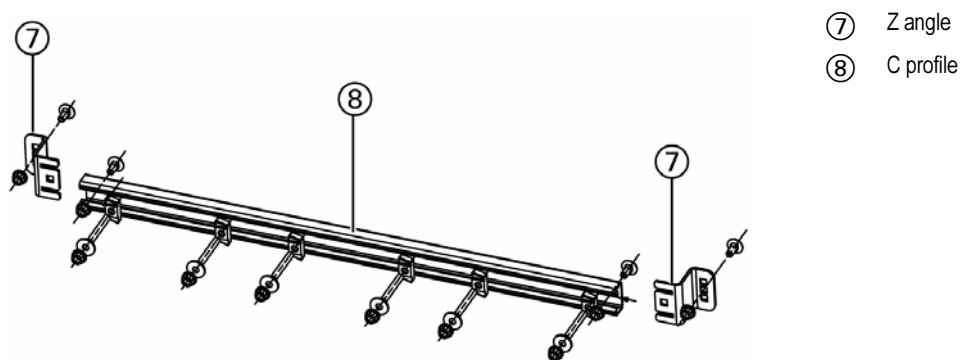


Fig. 123: Z angle for 12 kV

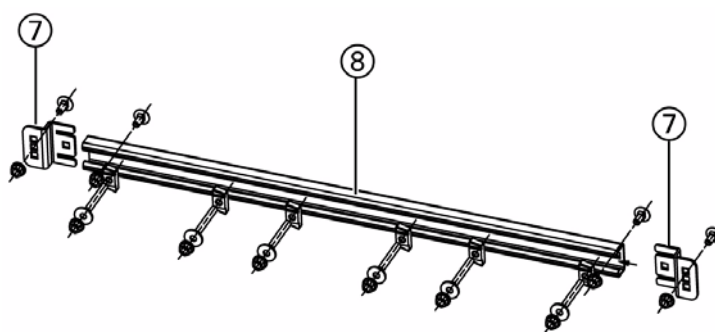


Fig. 124: Z angle for 24 kV

- ⇒ Bolt the other transformers onto the C profiles at a distance of 250 ± 2 mm each.
- ⇒ Align the voltage transformers at a height of 250 ± 2 mm, and bolt tight.
- ⇒ Align the current transformers at a height of 670 ± 2 mm, and bolt tight.
- ✓ Now the current and voltage transformers are installed. The following section describes how to fasten the transformer bars.

- ⇒ Bolt the current and voltage transformers for phase L2 centrally on the C profiles. For 12 kV version: Z angle to fasten the C profile, turned to the front. For 24 kV version: Z angle to fasten the C profile, turned to the rear.

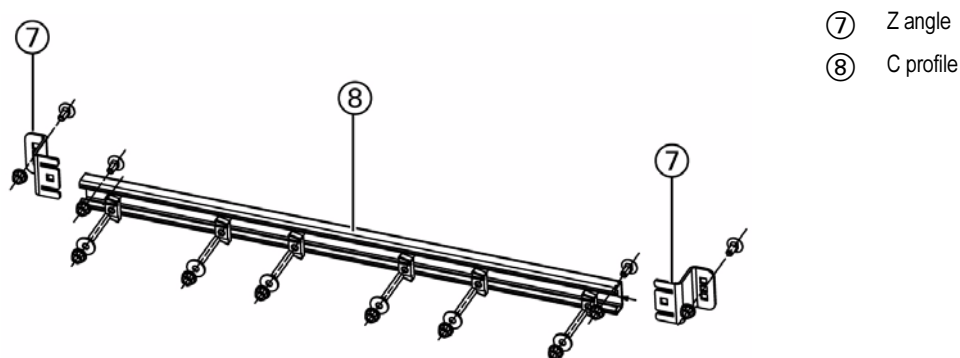


Fig. 135: Z angle for 12 kV

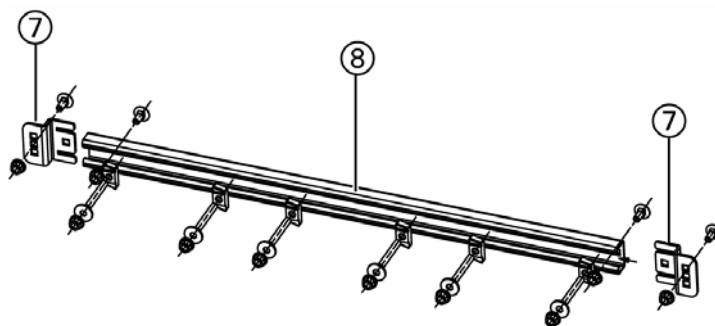


Fig. 136: Z angle for 24 kV

- ⇒ Bolt the other transformers onto the C profiles at a distance of 250 ± 2 mm each.
- ⇒ Align the voltage transformers at a height of 1110 ± 2 mm, and bolt tight.
- ⇒ Align the current transformers at a height of 670 ± 2 mm, and bolt tight.
- ✓ Now the current and voltage transformers are installed. The following section describes how to fasten the transformer bars.

- ⇒ Mount cable plug type Rayschem RICS5xxx with surge arrester RAD according to the manufacturer's instructions (see order documents).
- ⇒ Fasten adapter feet with hexagonal nuts M12 and strain washers to the surge arrester plate.

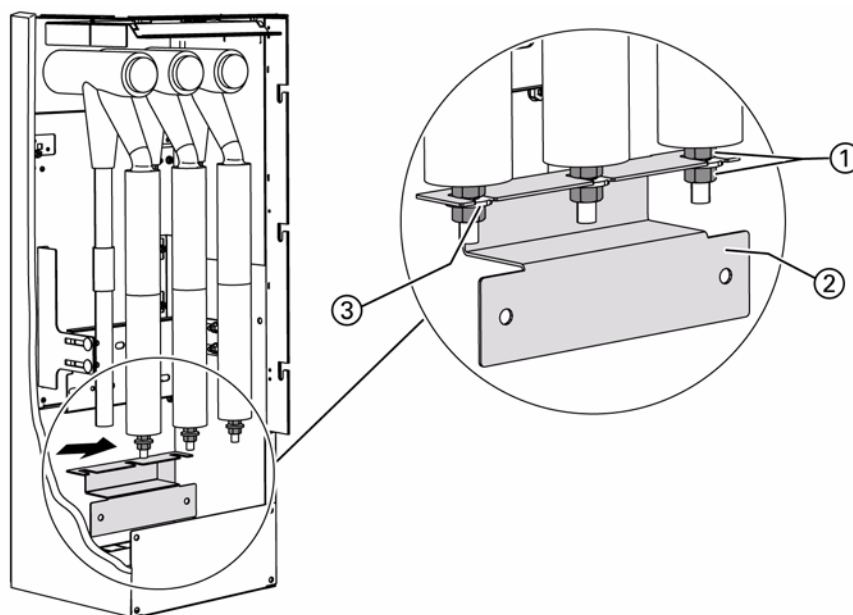


Fig. 148: Push the surge arrester plate ② between the hexagonal nuts M12 of the adapter feet, and tighten it. Use hexagonal nuts M12 ① with strain washers ③.

- ⇒ Fasten upper cross member with two bolt-and-washer assemblies M8 x 20.

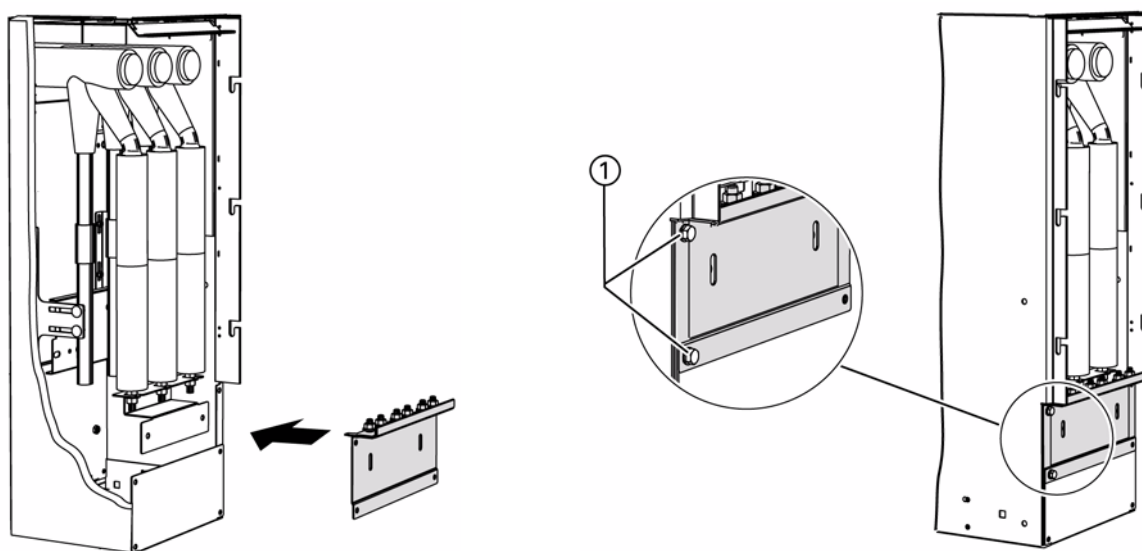
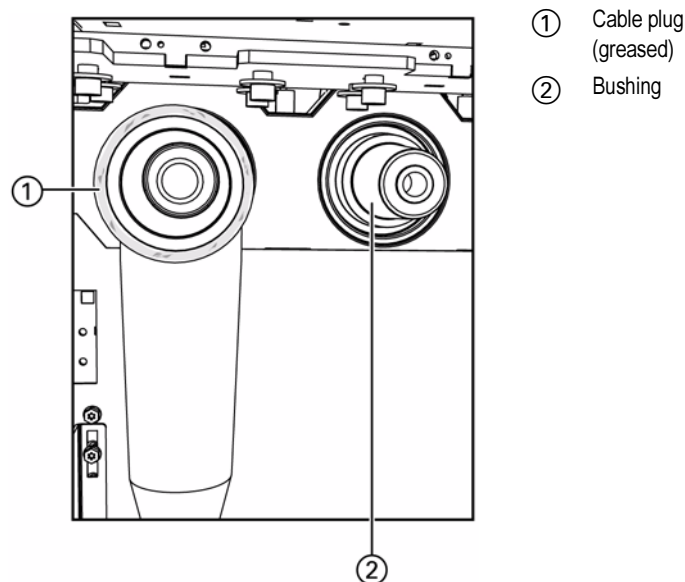


Fig. 149: Mounting bolt-and-washer assemblies ① on the upper cross member.

Connecting transformers If a power-frequency voltage test is planned at site after installation (see Page 180, "Preparing the power-frequency voltage test"), do not mount the voltage transformers yet.

The height of the transformer mounting plate must have been adjusted before connecting the cables (see above). The cables are connected to the feeder, the stoppers of the cable plugs must be removed.



⇒ Push the transformer onto the guide bolts in front of the left-hand cable plug (L1) together with its support. The transformer cone must be completely inserted in the T-plug .

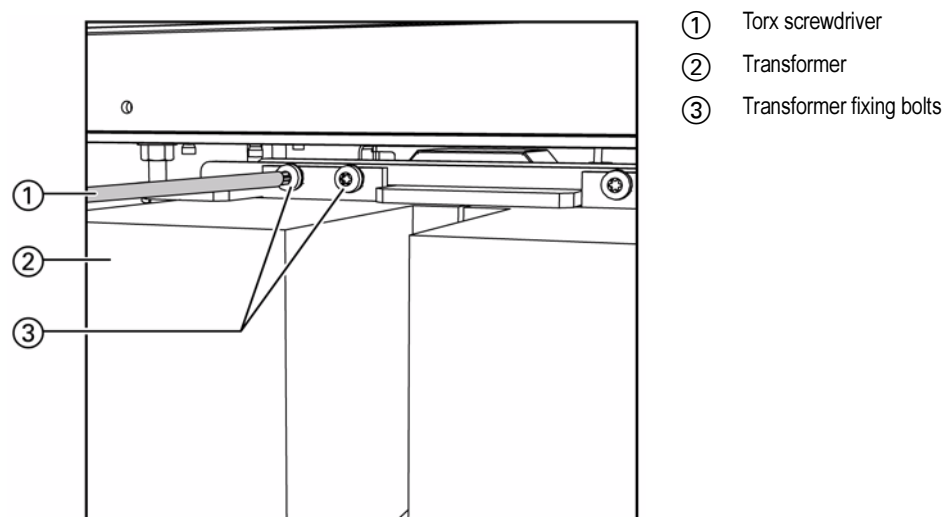


Fig. 159: Tightening the transformer fixing bolts

- ⇒ Tighten the transformer fixing bolts ③ by turns and uniformly. Tightening torque: 20 Nm.
- ⇒ Mount the right-hand transformer (L3) in the same way, then the intermediate one (L2).
- ⇒ Plug the low-voltage connector into the transformers according to the phase designation.
- ✓ Now the voltage transformers are connected to the cable feeder.

14.5 Applying operating voltage


Preparations before switching on

The operating personnel must have been instructed, the installation work checked, and test operation must have been performed without faults.

- ⇒ Close all covers.
- ⇒ Make sure that the capacitive test sockets are covered.
- ⇒ Switch switching devices in feeders without connected cables to EARTHED position and lock them, or cover the bushings with surge-proof caps.
- ⇒ Reset short-circuit indicators.
- ✓ Now you can apply operational high voltage and put the switchgear into operation as described hereafter.

Switching on the first outgoing/incoming feeder

- ⇒ First, apply voltage from opposite substation, then switch feeder from OPEN to CLOSED position.

	DANGER!
	<p>Short-circuit in case of different phase sequence of the incoming feeders.</p> <ul style="list-style-type: none"> ⇒ Make sure that all incoming feeders have the same phase sequence. ⇒ To check the phase sequence, use only phase comparison test units which are adequate for HR or LRM test sockets.

- ⇒ Verify correct phase sequence of the next incoming feeder and switch on.
- ⇒ Switch on the tested incoming feeder.

The three-position switch-disconnector of the feeder to be tested must be in "OPEN" position. The opposite substation must be de-earthed and live.

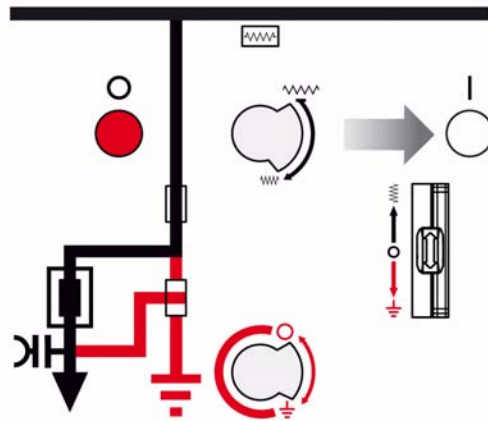
Verify correct terminal-phase connections using a phase comparison test unit at the capacitive test sockets of the panel to be tested and a panel that has already been connected.

- ⇒ Plug the measuring cables of the phase comparison test unit into the "L1" test sockets of the two panels.



- ⇒ Read the indication.
- ⇒ Proceed in the same way with the test sockets of the two other phases ("L2" and "L3").
- ✓ If the test unit shows "coincidence" in any case, the phase sequence of the tested feeder is correct.

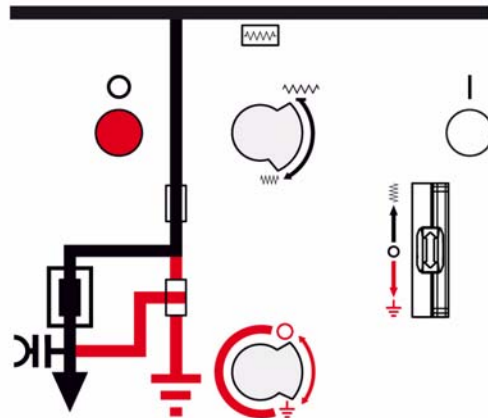
⇒ Actuate the "ON" pushbutton.



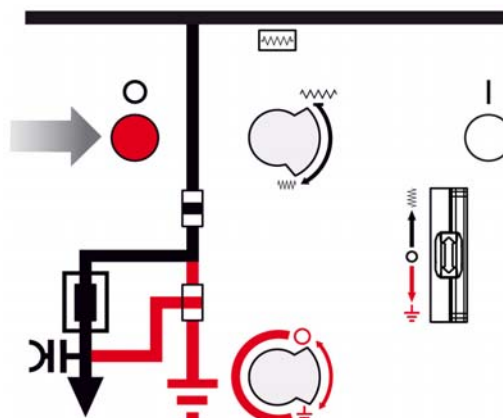
✓ The feeder is closed.

Disconnecting the transformer feeder from the busbar

⇒ Initial situation CLOSED.



⇒ Actuate the "OFF" pushbutton.



✓ The feeder is open.

18 Operating the vacuum circuit-breaker type 1.1

Possible switching operations:

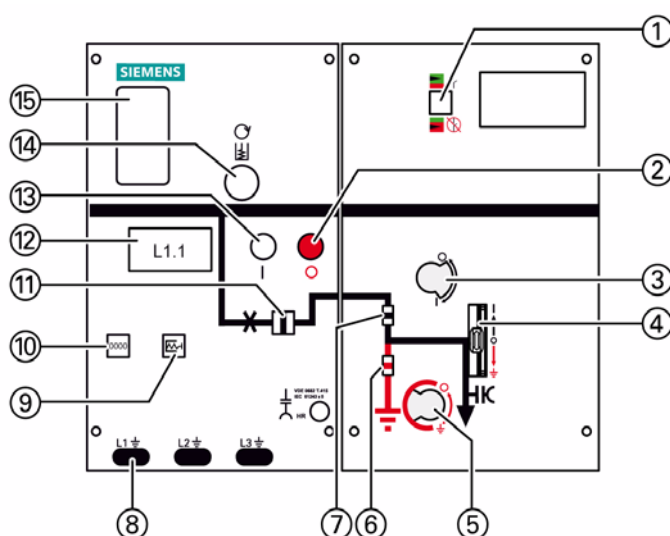
- Manual local operation, i.e. at the panel itself
- Electrical remote operation, e.g. from the control center
- Automatic operation from the installed protection equipment, e.g. SIPROTEC

If the circuit-breaker is equipped with a motor operating mechanism, the closing spring is charged automatically after applying auxiliary voltage. The circuit-breaker can be closed via a closing pulse supplied by the closing coil.

If the circuit-breaker is operated manually, the closing spring must be charged manually (see Page 203, "Charging the spring energy store manually").

The circuit-breaker can be closed and opened with the pushbuttons.

The control elements of the circuit-breaker are located at the panel front in the upper control board.




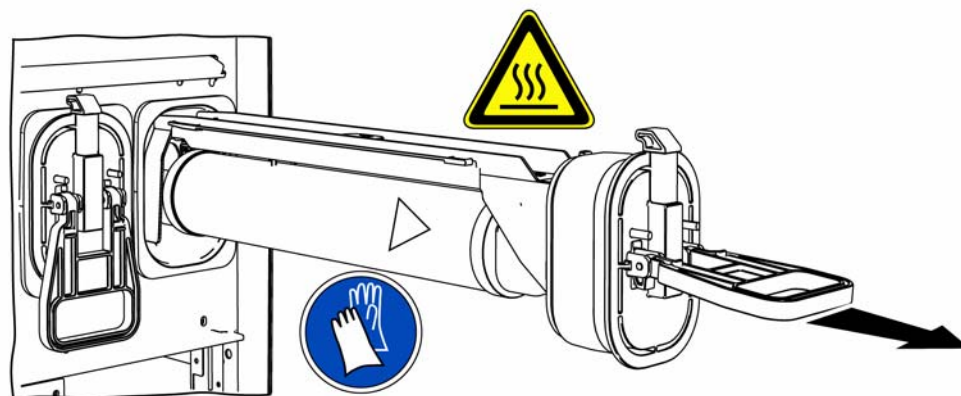
- ① Ready-for-service indicator
- ② OFF pushbutton for circuit-breaker
- ③ Actuating opening for DISCONNECTING, three-position disconnector
- ④ Control gate/locking device for three-position disconnector
- ⑤ Actuating opening for EARTHING
- ⑥ Position indicator for earthing switch
- ⑦ Position indicator for disconnector
- ⑧ Socket of capacitive voltage detecting system (HR system)
- ⑨ Indicator for the circuit-breaker closing spring (not charged / charged)
- ⑩ Operations counter
- ⑪ Position indicator for circuit-breaker
- ⑫ Feeder designation label
- ⑬ ON pushbutton for circuit-breaker
- ⑭ Actuating opening for "spring charging" at the circuit-breaker
- ⑮ Rating plate

Fig. 171: Control board of circuit-breaker panel type 1.1

	ATTENTION!
	<p>Please do absolutely observe the following:</p> <p>⇒ The max. service life of the circuit-breaker panel depends on the permissible number of switching operations of the switching device used (see Page 50, "Vacuum circuit-breaker" and see Page 49, "Three-position disconnector").</p>

Removing the HV HRC fuse slide


	ATTENTION! HV HRC fuse-links may be hot!
	⇒ Let HV HRC fuse-links cool down or wear gloves to withdraw the fuse slide.



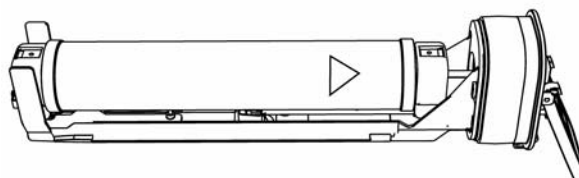
⇒ Withdraw the HV HRC fuse slide with the fuse-link.

Replacing HV HRC fuse-links

If one HV HRC fuse has tripped, always replace the fuses in all three phases.

	ATTENTION! Incorrectly selected or mounted fuse-links and extension tubes can damage the fuse box or the switchgear.
	⇒ 7.2 kV fuse-links with dimension 192 mm and 24 kV fuse-links with dimension 292 mm are not permissible.

⇒ Lay the HV HRC fuse-link on a flat, clean and firm underground.



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