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# Fixed-Mounted Circuit-Breaker Switchgear Type NXPLUS C up to 24 kV, Gas-Insulated

Medium-Voltage Switchgear · Catalog HA 35.41 · 2013

Answers for infrastructure and cities.

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Application  
Public power  
supply system

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Application  
Industry



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Application  
Industry and offshore



**NXPLUS C**  
switchgear  
20 kV (example)

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## Fixed-Mounted Circuit-Breaker Switchgear Type NXPLUS C up to 24 kV, Gas-Insulated

Medium-Voltage Switchgear

Catalog HA 35.41 · 2013

Invalid: Catalog HA 35.41 · 2012

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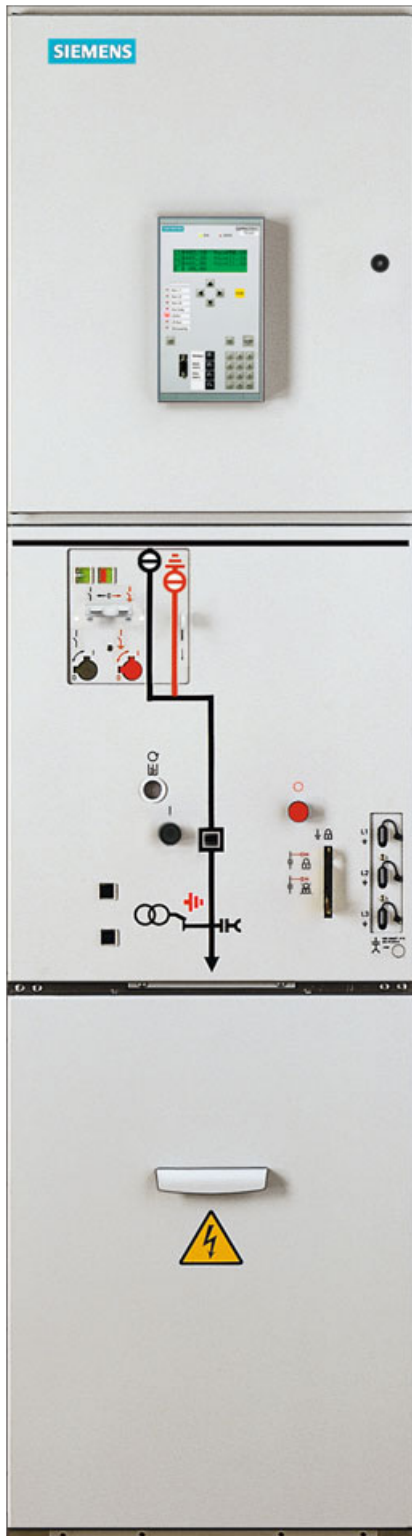
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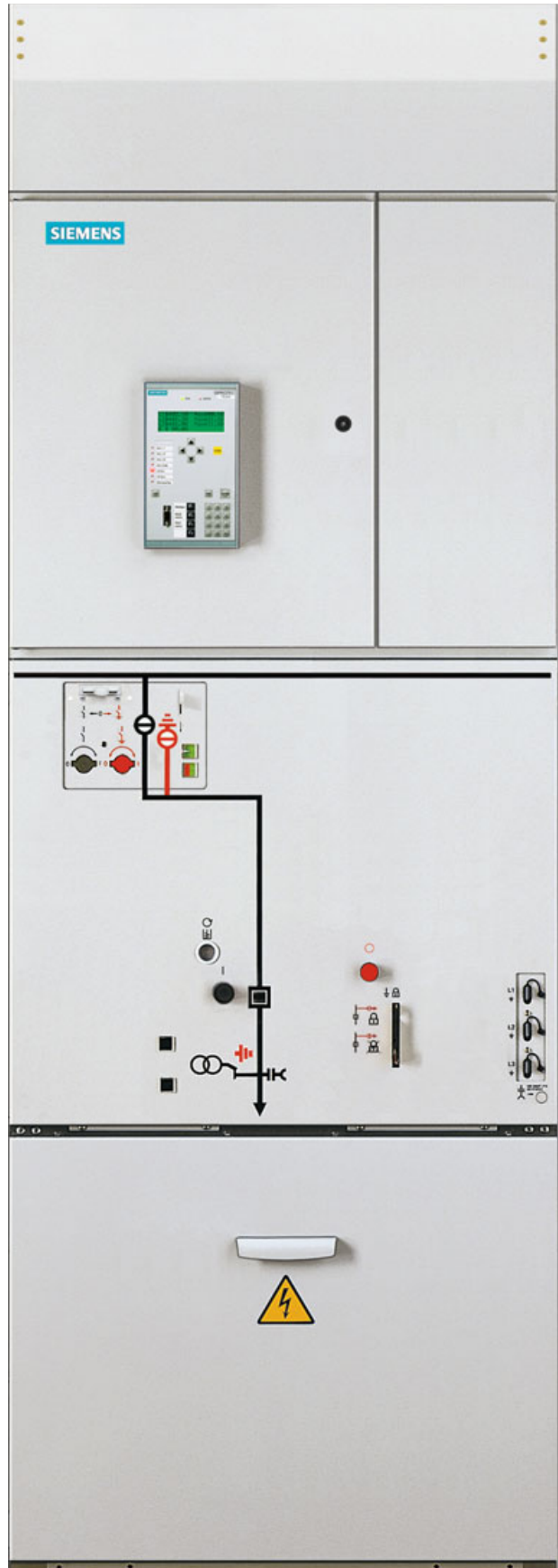
The products and systems described in this catalog are manufactured and sold according to a certified management system (acc. to ISO 9001, ISO 14001 and BS OHSAS 18001).

# Application

## Types



Circuit-breaker panel 600 mm



Circuit-breaker panel 900 mm

Fixed-mounted circuit-breaker switchgear NXPLUS C is a factory-assembled, type-tested, metal-enclosed, metal-clad, SF<sub>6</sub>-insulated switchgear for single-busbar and double-busbar applications for indoor installation.

It is used in transformer and switching substations, e.g., in:

- Power supply companies
- Power stations
- Cement industry
- Automobile industry
- Iron and steel works
- Rolling mills
- Mining industry
- Textile, paper and food industries
- Chemical industry
- Petroleum industry
- Pipeline installations
- Offshore installations
- Electrochemical plants
- Petrochemical plants
- Shipbuilding industry
- Diesel power plants
- Emergency power supply installations
- Lignite open-cast mines
- Traction power supply systems.

1) 32 kV/60 kV according to some national requirements

2) 42 kV/75 kV according to some national requirements

3) 900 mm for rated normal feeder currents of 2000 A and 2500 A

### Electrical data (maximum values) and dimensions

Rated voltage	kV	7.2	12	15	17.5	24
Rated frequency	Hz	50/60	50/60	50/60	50/60	50/60
Rated short-duration power-frequency withstand voltage	kV	20 <sup>1)</sup>	28 <sup>2)</sup>	36	38	50
Rated lightning impulse withstand voltage	kV	60 <sup>1)</sup>	75 <sup>2)</sup>	95	95	125
Rated peak withstand current	kA	80	80	80	63	63
Rated short-circuit making current	kA	80	80	80	63	63
Rated short-time withstand current 3 s	kA	31.5	31.5	31.5	25	25
Rated short-circuit breaking current	kA	31.5	31.5	31.5	25	25
Rated normal current of the busbar	A	2500	2500	2500	2500	2500
Rated normal current of feeders	A	2500	2500	2500	2000	2000
Width	mm	600 <sup>3)</sup>	600 <sup>3)</sup>	600 <sup>3)</sup>	600 <sup>3)</sup>	600 <sup>3)</sup>
Depth						
– without pressure relief duct at the rear	mm	1100	1100	1100	1100	1100
– with pressure relief duct at the rear	mm	1225	1225	1225	1225	1225
Height						
– 600 mm panels		2250	2250	2250	2250	2250
– 900 mm panels		2550	2550	2550	2550	2550

### Type approval

NXPLUS C switchgear has been type-approved by the following classification societies:

- Lloyds Register of Shipping (LRS)
- Det Norske Veritas (DNV)
- Germanischer Lloyd (GL)
- Russian Maritime Register of Shipping (RMR)
- American Bureau of Shipping (ABS)

The switchgear is therefore also approved for application on ships and platforms.



### National approval GOST

By certification in the system GOST R in Russia, NXPLUS C is approved for application at the voltage levels 6 kV, 10 kV and 20 kV. Compliance with the requirements of the GOST standard has been confirmed in the Declaration No. POCC.DE.AB28. D04717 of April 28, 2011. The approval is valid in the countries Russia, Belarus, Kazakhstan and Ukraine.

The application of NXPLUS C in all transmission and distribution systems in Russia is additionally authorized by the FSK/MRSK Approval No. 80-10 of October 5, 2011.



# Requirements

## Features

### Environmental independence

Hermetically tight, welded switchgear vessels made of stainless steel as well as single-pole solid insulation make the parts of the primary circuit under high voltage of NXPLUS C switchgear

- Insensitive to certain aggressive ambient conditions, such as:
  - Saline air
  - Air humidity
  - Dust
  - Condensation
- Tight to ingress of foreign objects, such as:
  - Dust
  - Pollution
  - Small animals
  - Humidity
- Independent of the site altitude.

### Compact design

Thanks to the use of SF<sub>6</sub> insulation, compact dimensions are possible.

Thus:

- Existing switchgear rooms and substation rooms can be used effectively
- New constructions cost little
- Costly city-area space is saved.

### Maintenance-free design

Switchgear vessels designed as sealed pressure systems, maintenance-free switching devices and enclosed cable plugs ensure:

- Maximum supply reliability
- Personnel safety
- Sealed-for-life design according to IEC 62271-200 (sealed pressure system)
- Installation, operation, extension and replacement without SF<sub>6</sub> gas work
- Reduced operating costs
- Cost-efficient investment
- No maintenance cycles.

### Innovation

The use of digital secondary systems and combined protection and control devices ensures:

- Clear integration in process control systems
- Flexible and highly simplified adaptation to new system conditions and thus to cost-efficient operation.

### Service life

Under normal operating conditions, the expected service life of the gas-insulated switchgear NXPLUS C is at least 35 years, probably 40 to 50 years, taking the tightness of the hermetically welded switchgear vessel into account. The service life is limited by the maximum number of operating cycles of the switching devices installed:

- For circuit-breakers according to the endurance class defined in IEC 62271-100
- For three-position disconnectors and earthing switches according to the endurance class defined in IEC 62271-102
- For three-position switch-disconnectors and earthing switches according to the endurance class defined in IEC 62271-103.

## Safety

### Personal safety

- Safe-to-touch and hermetically sealed primary enclosure
- Cable terminations, busbars and voltage transformers are surrounded by earthed layers
- All high-voltage parts including the cable terminations, busbars and voltage transformers are metal enclosed
- Capacitive voltage detecting system to verify safe isolation from supply
- Operating mechanisms and auxiliary switches safely accessible outside the primary enclosure (switchgear vessel)
- Due to the system design, operation is only possible with closed switchgear enclosure
- Standard degree of protection IP 65 for all high-voltage parts of the primary circuit, IP 3XD for the switchgear enclosure according to IEC 60529 and VDE 0470-1
- High resistance to internal arcs by logical mechanical interlocks and tested switchgear enclosure
- Panels tested for resistance to internal faults up to 31.5 kA
- Logical mechanical interlocks prevent maloperation
- Make-proof earthing by means of the vacuum circuit-breaker.

### Security of operation

- Hermetically sealed primary enclosure independent of environmental effects (pollution, humidity and small animals)
- Maintenance-free in an indoor environment (IEC 62271-1 and VDE 0671-1)
- Operating mechanisms of switching devices accessible outside the primary enclosure (switchgear vessel)
- Metal-coated, plug-in inductive voltage transformers mounted outside the SF<sub>6</sub> switchgear vessel
- Current transformers as ring-core current transformers mounted outside the SF<sub>6</sub> switchgear vessel
- Complete switchgear interlocking system with logical mechanical interlocks
- Welded switchgear vessels, sealed for life
- Minimum fire load
- Type and routine-tested
- Standardized, NC production processes
- Quality assurance in accordance with DIN EN ISO 9001
- More than 500,000 switchgear panels of Siemens in operation worldwide for many years
- Option: Resistance against shock, vibration, earthquakes.

### Reliability

- Type and routine-tested
- Standardized, NC production processes
- Quality assurance in accordance with DIN EN ISO 9001
- More than 500,000 switchgear panels of Siemens in operation worldwide for many years.

### General

- 3-pole enclosure of the primary part consisting of a switchgear vessel made of stainless steel
- Insulating gas SF<sub>6</sub>
- Three-position switch as busbar disconnecter and feeder earthing switch
- Make-proof earthing by means of the vacuum circuit-breaker
- Compact dimensions due to SF<sub>6</sub> insulation
- Hermetically tight, welded switchgear vessel made of stainless steel
- 1-pole, solid-insulated, screened busbars, plug-in type
- Cable connection with outside-cone plug-in system, or for connection of solid-insulated bars
- Wall-standing or free-standing arrangement
- Cable connection access from front
- Option: Cable connection access from rear (only circuit-breaker panel 1250 A)
- Hinge on the left of right of the low-voltage door
- Installation and extension of existing switchgear at both ends without gas work and without modification of existing panels
- Option: Flexible pressure relief duct systems.

### Interlocks

- According to IEC 62271-200 and VDE 0671-200
- Logical mechanical interlocks prevent maloperation
- Three-position disconnecter can only be operated with circuit-breaker in OPEN position
- Circuit-breaker or contactor can only be operated with three-position switch in end position and operating lever removed
- Switch-disconnector, contactor, ring-main and metering panels are not interlocked due to their own switching capacity
- Three-position disconnecter interlocked against the circuit-breaker in circuit-breaker panels and in bus sectionalizers with one panel width
- Locking device for "feeder earthed"
- Locking device for three-position switch  
The following interlocks can be fulfilled by placing the padlock accordingly:
  - Padlock on the left:  
Three-position switch "DISCONNECTING" function cannot be operated, three-position switch "READY-TO-EARTH" function can be operated
  - Padlock in the center:  
Control gate blocked, no switching operations possible
  - Padlock on the right:  
Three-position switch "DISCONNECTING" function can be operated, three-position switch "READY-TO-EARTH" function cannot be operated
- Cable compartment cover (access to HV HRC fuses) always interlocked against the three-position switch-disconnector in panels with HV HRC fuses (switch-disconnector panel, metering panel and contactor panel with fuses)
- Option: Cable compartment cover interlocked against the three-position switch (circuit-breaker panel, disconnecter panel, contactor panel without fuses, ring-main panel)
- Option: Electromagnetic interlocks
- Option: Actuating openings of the circuit-breaker can be padlocked
- Option: Locking device for "feeder".

### Modular design

- Panel replacement possible without SF<sub>6</sub> gas work
- Low-voltage compartment removable, plug-in bus wires.

### Instrument transformers

- Current transformers not subjected to dielectric stress
- Easy replacement of current transformers designed as ring-core transformers
- Metal-coated, plug-in and disconnectable voltage transformers.

### Vacuum circuit-breaker

- Maintenance-free under normal ambient conditions according to IEC 62271-1 and VDE 0671-1
- No relubrication or readjustment
- Up to 10,000 operating cycles
- Option: Up to 30,000 operating cycles
- Vacuum-tight for life.

### Secondary systems

- Customary protection, measuring and control equipment
- Option: Numerical multifunction protection relay with integrated protection, control, communication, operating and monitoring functions
- Can be integrated in process control systems.

### Standards (see page 69)

# Technical data

## Electrical data, filling pressure, temperature for single-busbar switchgear

Common electrical data, filling pressure and temperature	Rated insulation level	Rated voltage $U_r$	kV	7.2	12	15	17.5	24
	Rated short-duration power-frequency withstand voltage $U_d$ : – phase-to-phase, phase-to-earth, open contact gap – across the isolating distance	kV	20 <sup>1)</sup>	28 <sup>2)</sup>	36	38	50	
		kV	23 <sup>1)</sup>	32 <sup>2)</sup>	40	45	60	
		Rated lightning impulse withstand voltage $U_p$ : – phase-to-phase, phase-to-earth, open contact gap – across the isolating distance	kV	60 <sup>1)</sup>	75 <sup>2)</sup>	95	95	125
		kV	70 <sup>1)</sup>	85 <sup>2)</sup>	110	110	145	
	Rated frequency $f_r$	Hz	50/60	50/60	50/60	50/60	50/60	
	Rated normal current $I_r$ <sup>3)</sup> for the busbar	up to A	2500	2500	2500	2500	2500	
Rated filling level $p_{re}$ <sup>4)</sup>		150 kPa (absolute) at 20 °C					→	
Minimum functional level $p_{me}$ <sup>4)</sup>		130 kPa (absolute) at 20 °C					→	
Ambient air temperature		– 5 °C to +55 °C <sup>12)</sup>					→	

### Data of the switchgear panels

Circuit-breaker panel 630 A	Rated normal current $I_r$ <sup>3)</sup>	A	630	630	630	630	630				
	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	20	25	20	25	20	25	20	25
		for switchgear with $t_k = 3$ s	up to kA	20	–	20	–	20	–	20	–
	Rated peak withstand current $I_p$	50 Hz	up to kA	50	63	50	63	50	63	50	63
		60 Hz	up to kA	52	65	52	65	52	65	52	65
	Rated short-circuit making current $I_{ma}$	50 Hz	up to kA	50	63	50	63	50	63	50	63
		60 Hz	up to kA	50	63	50	63	50	63	50	63
Rated short-circuit breaking current $I_{sc}$		up to kA	20	25	20	25	20	25	20	25	
Electrical endurance of vacuum circuit-breakers	at rated normal current		10,000 operating cycles					→			
	at rated short-circuit breaking current		50 breaking operations					→			
Circuit-breaker panel and bus sectionalizer 1000 A <sup>5)</sup> 1250 A <sup>6)</sup> 2000 A 2500 A	Rated normal current $I_r$ <sup>3)</sup>	A	1000	1000	1000	1000	1000				
		A	1250	1250	1250	1250	1250				
		A	2000	2000	2000	2000	2000				
		A	2500	2500	2500	–	–				
	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	31.5	31.5	31.5	25	25			
		for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5	25	25			
	Rated peak withstand current $I_p$	50 Hz/60 Hz	up to kA	80/82	80/82	80/82	63/65	63/65			
Rated short-circuit making current $I_{ma}$	50 Hz/60 Hz	up to kA	80/82	80/82	80/82	63/65	63/65				
Rated short-circuit breaking current $I_{sc}$		up to kA	31.5	31.5	31.5	25	25				
Electrical endurance of vacuum circuit-breakers	at rated normal current		10,000 operating cycles <sup>11)</sup>					→			
	at rated short-circuit breaking current		50 breaking operations					→			
Disconnecter panel 1000 A <sup>5)</sup> 1250 A 2000 A 2500 A	Rated normal current $I_r$ <sup>3)</sup>	A	1000	1000	1000	1000	1000				
		A	1250	1250	1250	1250	1250				
		A	2000	2000	2000	2000	2000				
		A	2500	2500	2500	–	–				
Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	31.5	31.5	31.5	25	25				
	for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5	25	25				
Rated peak withstand current $I_p$	50 Hz/60 Hz	up to kA	80/82	80/82	80/82	63/65	63/65				
Switch-disconnector panel (with HV HRC fuses)	Rated normal current $I_r$ <sup>3)</sup>	for feeder <sup>7)</sup>	A	200	200	200	200	200			
	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	31.5	31.5	31.5	25	25			
		for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5	25	25			
	Rated peak withstand current $I_p$ <sup>7)</sup>	50 Hz/60 Hz	up to kA	80/82	80/82	80/82	63/65	63/65			
	Rated short-circuit making current $I_{ma}$ <sup>7)</sup>	50 Hz/60 Hz	up to kA	80/82	80/82	80/82	63/65	63/65			
Dimension "e" of HV HRC fuse-links		mm	292 <sup>8)</sup>	292 <sup>8)</sup>	442	442	442				
Ring-main panel (switch-disconnector panel without HV HRC fuses)	Rated normal current $I_r$ <sup>3)</sup>	for feeder	A	630	630	630	630	630			
	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	20	25	20	25	20	25		
		for switchgear with $t_k = 3$ s	up to kA	20	–	20	–	20	–		
	Rated peak withstand current $I_p$	50 Hz	up to kA	50	63	50	63	50	63		
		60 Hz	up to kA	52	65	52	65	52	65		
Rated short-circuit making current $I_{ma}$	50 Hz/60 Hz	up to kA	50	63	50	63	50	63			
Vacuum contactor panel (with HV HRC fuses)	Rated normal current $I_r$ <sup>3)</sup>	for feeder <sup>7)</sup>	A	450	450	450	450	450			
	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	31.5 <sup>9)</sup>	31.5 <sup>9)</sup>	31.5 <sup>9)</sup>	25 <sup>9)</sup>	25 <sup>9)</sup>			
		for switchgear with $t_k = 3$ s	up to kA	31.5 <sup>9)</sup>	31.5 <sup>9)</sup>	31.5 <sup>9)</sup>	25 <sup>9)</sup>	25 <sup>9)</sup>			
	Rated peak withstand current $I_p$ <sup>7)</sup>	50 Hz/60 Hz	up to kA	80/82	80/82	80/82	63/65	63/65			
	Rated short-circuit making current $I_{ma}$ <sup>7)</sup>	50 Hz/60 Hz	up to kA	80/82	80/82	80/82	63/65	63/65			
	Electrical endurance at rated normal current			100,000 or 500,000 operating cycles					→		
Dimension "e" of HV HRC fuse-links		mm	292 <sup>8)</sup>	442	442	442	442				
Metering panel (with HV HRC fuses)	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	31.5	31.5	31.5	25	25			
		for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5	25	25			
	Rated peak withstand current $I_p$ <sup>7)</sup>	50 Hz/60 Hz	up to kA	80/82	80/82	80/82	63/65	63/65			
	Dimension "e" of HV HRC fuse-links		mm	292 <sup>8)</sup>	292 <sup>8)</sup>	442	442	442			



## Electrical data, filling pressure, temperature for double-busbar switchgear

Common electrical data, filling pressure and temperature	Rated insulation level	Rated voltage $U_r$	kV	7.2	12	15	17.5	24
		Rated short-duration power-frequency withstand voltage $U_d$ : – phase-to-phase, phase-to-earth, open contact gap – across the isolating distance	kV	20 <sup>1)</sup>	28 <sup>2)</sup>	36	38	50
			kV	23 <sup>1)</sup>	32 <sup>2)</sup>	39	45	60
	Rated lightning impulse withstand voltage $U_p$ : – phase-to-phase, phase-to-earth, open contact gap – across the isolating distance	kV	60 <sup>1)</sup>	75 <sup>2)</sup>	95	95	125	
		kV	70 <sup>1)</sup>	85 <sup>2)</sup>	110	110	145	
	Rated frequency $f_r$	Hz	50/60	50/60	50/60	50/60	50/60	
Rated normal current $I_r$ <sup>3)</sup>	for the busbar	up to A	2500	2500	2500	2500	2500	
Rated filling level $p_{re}$ <sup>4)</sup>			150 kPa (absolute) at 20 °C					
Minimum functional level $p_{me}$ <sup>4)</sup>			130 kPa (absolute) at 20 °C					
Ambient air temperature			–5 °C to +55 °C <sup>12)</sup>					

### Data of the switchgear panels

Circuit-breaker panel, bus coupler <sup>10)</sup> 1000 A	Rated normal current $I_r$ <sup>3)</sup>	A	1000	1000	1000	1000	1000	
	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	25	25	25	25	25
		for switchgear with $t_k = 3$ s	up to kA	25	25	25	25	25
	Rated peak withstand current $I_p$ 50 Hz/60 Hz		up to kA	63/65	63/65	63/65	63/65	63/65
	Rated short-circuit making current $I_{ma}$ 50 Hz/60 Hz		up to kA	63/65	63/65	63/65	63/65	63/65
	Rated short-circuit breaking current $I_{sc}$		up to kA	25	25	25	25	25
Electrical endurance of vacuum circuit-breakers	at rated normal current		10,000 operating cycles					
	at rated short-circuit breaking current		50 breaking operations					
Incoming sectionalizer 1250 A	Rated normal current $I_r$ <sup>3)</sup>	A	1250	1250	1250	1250	1250	
	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	25	25	25	25	25
		for switchgear with $t_k = 3$ s	up to kA	25	25	25	25	25
	Rated peak withstand current $I_p$ 50 Hz/60 Hz		up to kA	63/65	63/65	63/65	63/65	63/65
	Rated short-circuit making current $I_{ma}$ 50 Hz/60 Hz		up to kA	63/65	63/65	63/65	63/65	63/65
	Rated short-circuit breaking current $I_{sc}$		up to kA	25	25	25	25	25
Electrical endurance of vacuum circuit-breakers	at rated normal current		10,000 operating cycles					
	at rated short-circuit breaking current		50 breaking operations					
Further panel types	The above-mentioned panel types can on request be combined with panel types of the single-busbar range.							

### Footnotes for pages 8 and 9

- 1) Higher values of the rated short-duration power-frequency withstand voltage available with:
  - 32 kV for phase-to-phase, phase-to-earth and open contact gap, as well as
  - 37 kV across the isolating distance
 Higher values of the rated lightning impulse withstand voltage:
  - 60 kV for phase-to-phase, phase-to-earth and open contact gap, as well as
  - 70 kV across the isolating distance
- 2) Higher values of the rated short-duration power-frequency withstand voltage available with:
  - 42 kV for phase-to-phase, phase-to-earth and open contact gap, as well as
  - 48 kV across the isolating distance
 Higher values of the rated lightning impulse withstand voltage:
  - 95 kV for phase-to-phase, phase-to-earth and open contact gap, as well as
  - 110 kV across the isolating distance
- 3) The rated normal currents apply to ambient air temperatures of max. 40 °C.  
The 24-hour mean value is max. 35 °C (according to IEC 62271-1/VDE 0671-1) 2500 A with natural ventilation
- 4) Pressure values for SF<sub>6</sub>-insulated switchgear vessels
- 5) Bus sectionalizer panel 1000 A and disconnecter panel 1000 A only possible with rated short-time withstand current  $I_k$  25 kA ( $t_k$  1 s and 3 s), rated peak withstand current  $I_p$  63 kA and rated short-circuit breaking current  $I_{sc}$  25 kA
- 6) Bus sectionalizer panel 1250 A in 2 panel widths only possible with rated short-time withstand current  $I_k$  25 kA ( $t_k$  1 s and 3 s), rated peak withstand current  $I_p$  63 kA and rated short-circuit breaking current  $I_{sc}$  25 kA
- 7) Depending on the HV HRC fuse-link, observe max. permissible let-through current  $I_D$  of the HV HRC fuse-links
- 8) Extension tube (150 mm long) required additionally
- 9) Applies to combination of vacuum contactor with HV HRC fuses: Vacuum contactor without HV HRC fuse reaches rated short-time withstand current  $I_k$  8 kA ( $t_k$  1 s) and rated peak withstand current  $I_p$  20 kA (applies to the complete switchgear)
- 10) Bus coupler 1250 A on request
- 11) For circuit-breaker panel up to 15 kV, up to 31.5 kA, up to 1250 A, the following operating cycles are optionally available:
  - 5,000 operating cycles for DISCONNECTING function
  - 5,000 operating cycles for READY-TO-EARTH function
  - 30,000 operating cycles for circuit-breaker
  - 10,000 operating cycles for DISCONNECTING function
  - 10,000 operating cycles for READY-TO-EARTH function
  - 30,000 operating cycles for circuit-breaker
- 12) Optional ambient air temperature: –25 °C to +55 °C

# Technical data

## Room planning

### Switchgear installation

- For single-busbar applications:
  - Wall-standing arrangement or
  - Free-standing arrangement
  - Face-to-face arrangement accordingly
- For double-busbar applications:
  - Back-to-back arrangement (free-standing arrangement).

### Room dimensions

See opposite dimension drawings.

### Room height

- $\geq 2750$  mm  
NXPLUS C, all technical data, all types of arrangement, with / without horizontal pressure relief duct
- $\geq 2400$  mm  
NXPLUS C, wall-standing and free-standing arrangement with rear pressure relief duct, busbar 1250 A, LV compartment 761 mm.

### Door dimensions

The door dimensions depend on the dimensions of the individual panels (see pages 12 to 22).

### Switchgear fixing

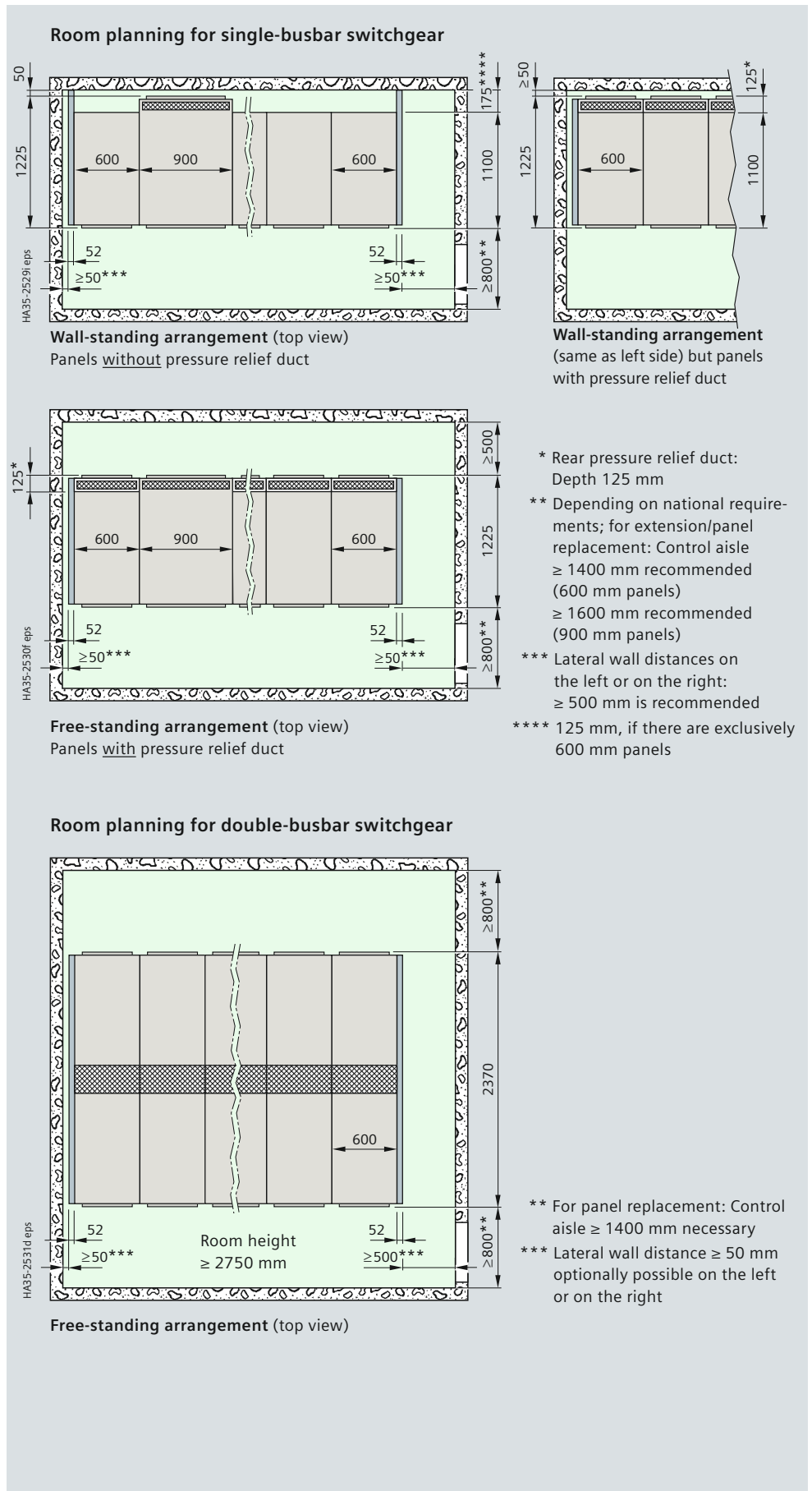
- For floor openings and fixing points of the switchgear, see pages 12 to 22
- Foundations:
  - Steel girder construction
  - Steel-reinforced concrete with foundation rails, welded or bolted on.

### Panel dimensions

See pages 12 to 22.

### Weights

- Single-busbar panels
- Panels for  $\leq 1250$  A: Approx. 800 kg
  - Panels for  $> 1250$  A: Approx. 1400 kg.
- Double-busbar panels
- Panels for  $\leq 1250$  A: Approx. 1600 kg.



### Transport

NXPLUS C switchgear is delivered in form of individual panels.

Please observe the following:

- Transport facilities on site
- Transport dimensions and transport weights
- Size of door openings in building.

In case of double-busbar panels the A and B sides are supplied separately.

### Packing

Means of transport: Rail and truck

- Panels on pallets
- Open packing with PE protective foil.

Means of transport: Ship

- Panels on pallets
- In closed crates with sealed upper and lower PE protective foil
- With desiccant bags
- With sealed wooden base
- Max. storage time: 6 months.

Means of transport: Airplane

- Panels on pallets
- In wooden latticed crate with sealed upper and lower PE protective foil.

### Transport dimensions, transport weights <sup>1)</sup>

Panel widths mm	Transport dimensions Width × Height × Depth mm × mm × mm	Transport weight	
		with packing approx. kg	without packing approx. kg

#### Single-busbar switchgear transport with rail or truck

1 × 600	1100 × 2470 × 1450	900	800
1 × 900	1450 × 2470 × 1450	1500	1400
1 × 600 (top-rear cable connection)	1100 × 2470 × 2100	900	800

#### Single-busbar switchgear transport with ship or airplane

1 × 600	1130 × 2650 × 1450	900	800
1 × 900	1480 × 2650 × 1450	1500	1400
1 × 600 (top-rear cable connection)	1130 × 2650 × 2100	900	800

#### Double-busbar switchgear transport with rail or truck

1 × 600	1100 × 2470 × 1450	900	800
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#### Double-busbar switchgear transport with ship or airplane

1 × 600	1130 × 2650 × 1450	900	800
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### Classification of NXPLUS C switchgear according to IEC 62271-200

#### Design and construction

Partition class	PM (partition of metal) <sup>2)</sup>
Loss of service continuity category	LSC 2
Panels with HV HRC fuses	LSC 2
Panels without HV HRC fuses	LSC 2
Accessibility to compartments (enclosure)	
Busbar compartment	Tool-based
Switching-device compartment	Non-accessible
Low-voltage compartment	Tool-based
Cable compartment	
– without HV HRC fuses	Tool-based
– with HV HRC fuses	Interlock-controlled and tool-based

#### Internal arc classification

Designation of the internal arc classification IAC	7.2 kV, 12 kV, 15 kV	17.5 kV, 24 kV
IAC class for:		
Wall-standing arrangement	IAC A FL 31.5 kA, 1 s	IAC A FL 25 kA, 1 s
Free-standing arrangement	IAC A FLR 31.5 kA, 1 s	IAC A FLR 25 kA, 1 s
Type of accessibility A	Switchgear in closed electrical service location, access "for authorized personnel only" according to IEC 62271-200	
– F	Front	
– L	Lateral	
– R	Rear (for free-standing arrangement)	
Arc test current	25 kA, 31.5 kA	
Test duration	1 s	

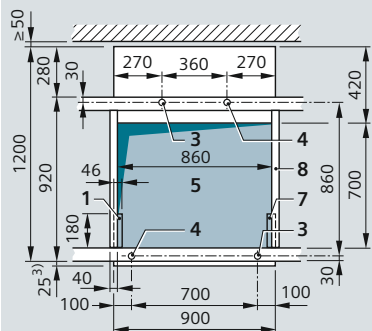
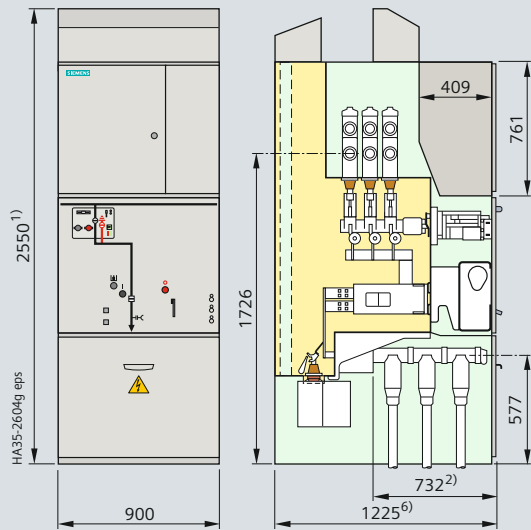
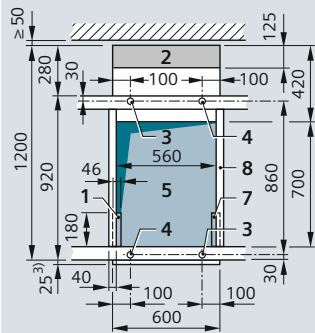
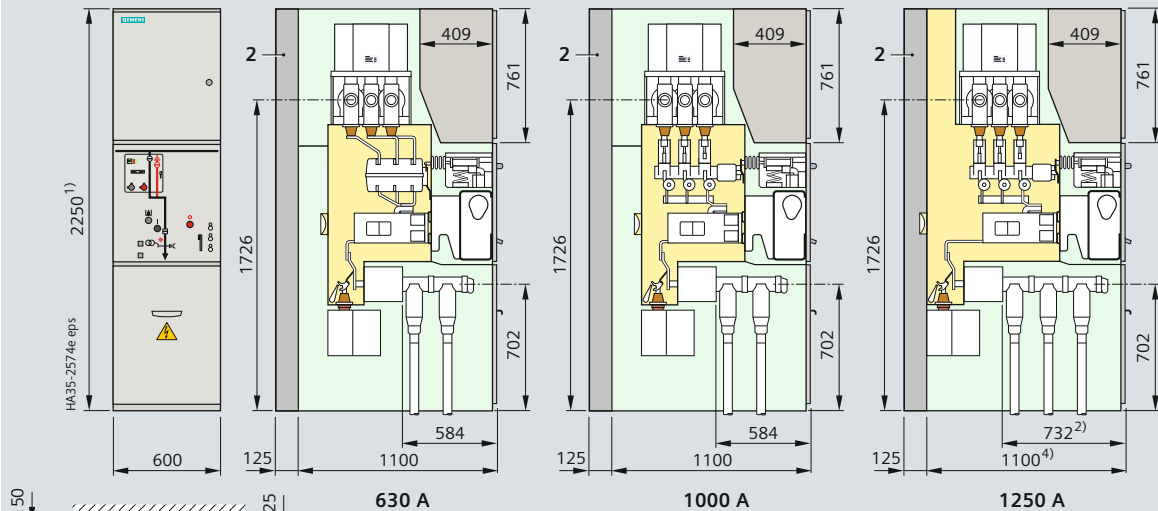
1) Average values depending on the degree to which panels are equipped

2) Corresponds to "metal-clad" according to former standard IEC 60298

# Dimensions

## Front views, sections, floor openings, fixing points for single-busbar switchgear

### Circuit-breaker panels



### Legend

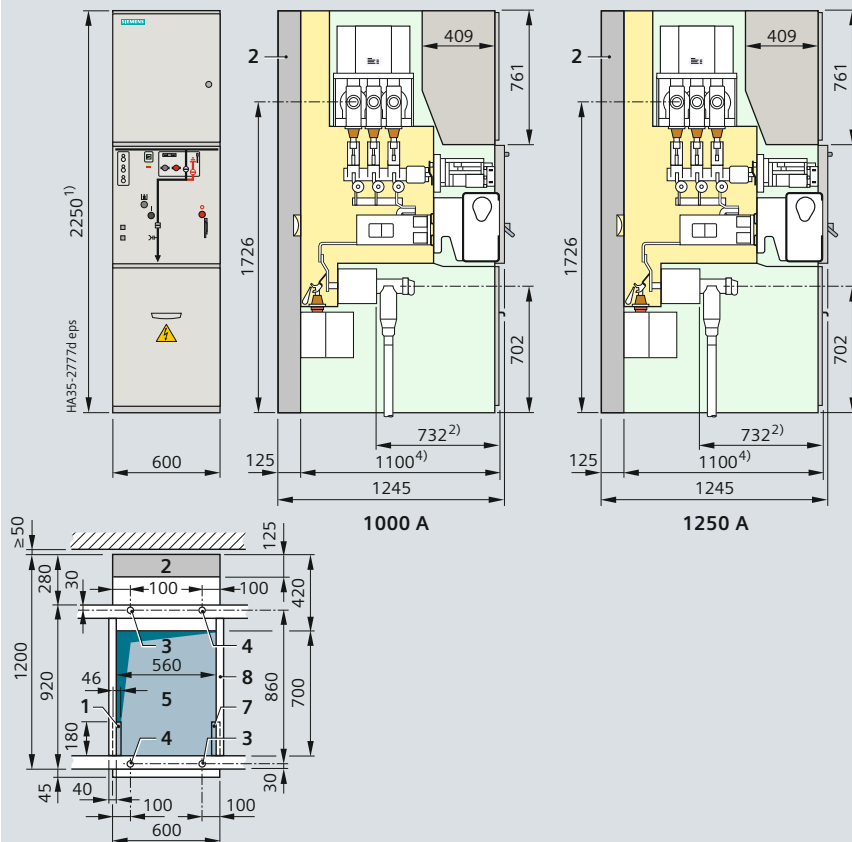
- 1 Left-side floor opening for control cables
- 2 Option: Pressure relief duct
- 3 Fixing hole for M8 / M10
- 4 Fixing hole for M8 / M10 (only for resistance against shock, vibration, earthquakes)
- 5 Floor opening for high-voltage cables
- 7 Right-side floor opening for control cables (only required for zero-sequence current transformers in the cable basement)
- 8 Cross member (necessary for panel replacement)

### Footnotes

- 1) 2650 mm for higher low-voltage compartment
- 2) 752 mm for deeper cable compartment cover
- 3) 45 mm for deeper cable compartment cover
- 6) 1245 mm for deeper cable compartment cover

## Front views, sections, floor openings, fixing points for single-busbar switchgear

Circuit-breaker panels (5000-5000/30,000 operating cycles or 10,000-10,000/30,000 operating cycles)



### Legend

- 1 Left-side floor opening for control cables
- 2 Option: Pressure relief duct
- 3 Fixing hole for M8 / M10
- 4 Fixing hole for M8 / M10 (only for resistance against shock, vibration, earthquakes)
- 5 Floor opening for high-voltage cables
- 7 Right-side floor opening for control cables (only required for zero-sequence current transformers in the cable basement)
- 8 Cross member (necessary for panel replacement)

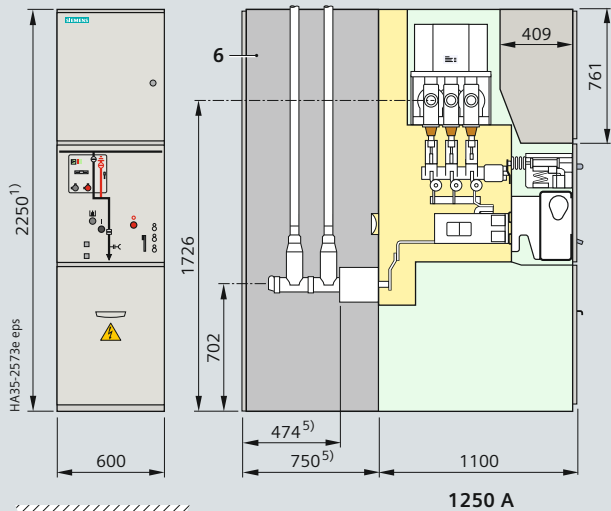
### Footnotes

- 1) 2650 mm for higher low-voltage compartment
- 2) 752 mm for deeper cable compartment cover
- 4) 1120 mm for deeper cable compartment cover

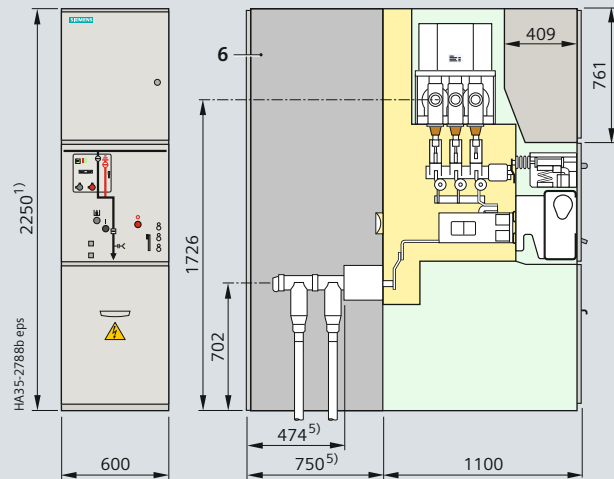
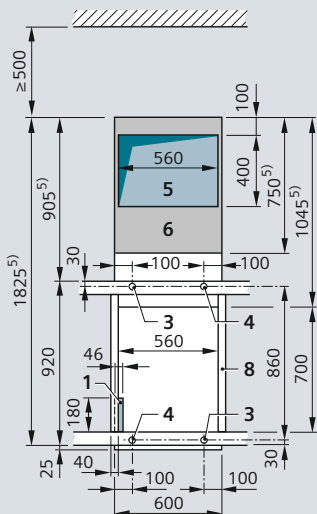
# Dimensions

## Front views, sections, floor openings, fixing points for single-busbar switchgear

Circuit-breaker panels (cable connection from top rear)



1250 A



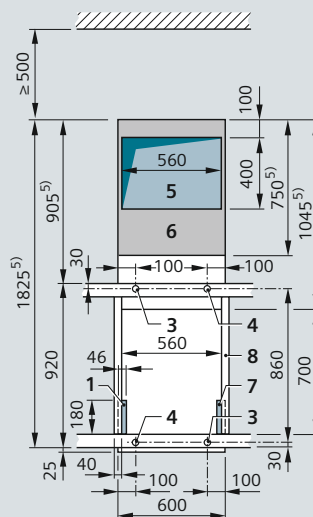
1250 A

### Legend and footnotes

- 1 Left-side floor opening for control cables
- 3 Fixing hole for M8/M10
- 4 Fixing hole for M8/M10 (only for resistance against shock, vibration, earthquakes)
- 5 Floor opening for high-voltage cables
- 6 Cable compartment/pressure relief duct
- 7 Right-side floor opening for control cables (only required for zero-sequence current transformers in the cable basement)
- 8 Cross member (necessary for panel replacement)

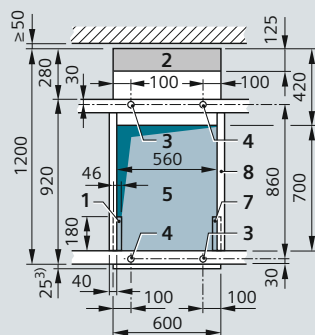
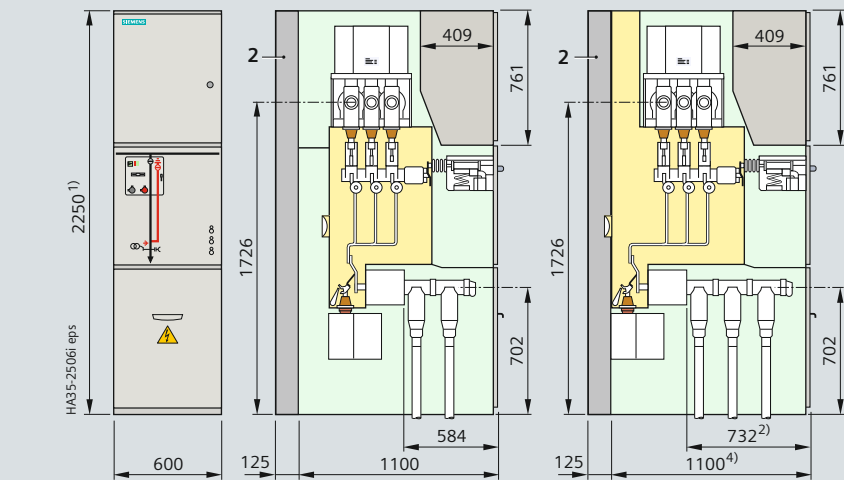
1) 2650 mm for higher low-voltage compartment

5) When only one cable is connected, the dimension is reduced by 275 mm



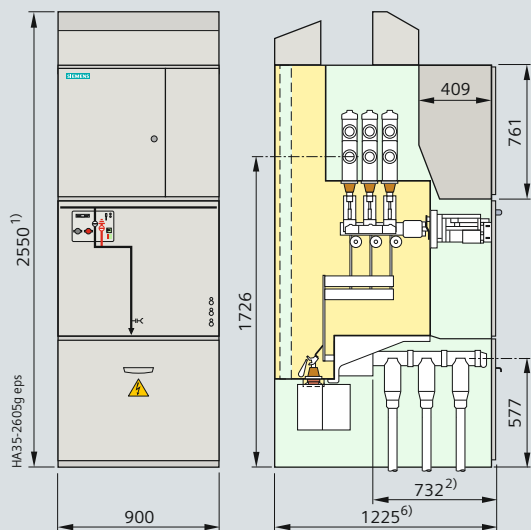
## Front views, sections, floor openings, fixing points for single-busbar switchgear

### Disconnecter panels

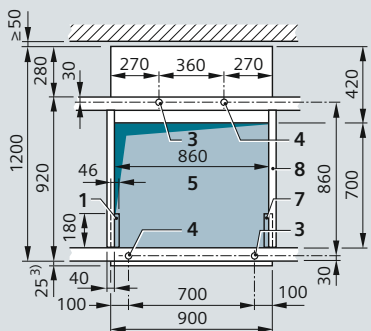


1000 A

1250 A



2000 A and 2500 A



### Legend

- 1 Left-side floor opening for control cables
- 2 Option: Pressure relief duct
- 3 Fixing hole for M8 / M10
- 4 Fixing hole for M8 / M10 (only for resistance against shock, vibration, earthquakes)
- 5 Floor opening for high-voltage cables
- 7 Right-side floor opening for control cables (only required for zero-sequence current transformers in the cable basement)
- 8 Cross member (necessary for panel replacement)

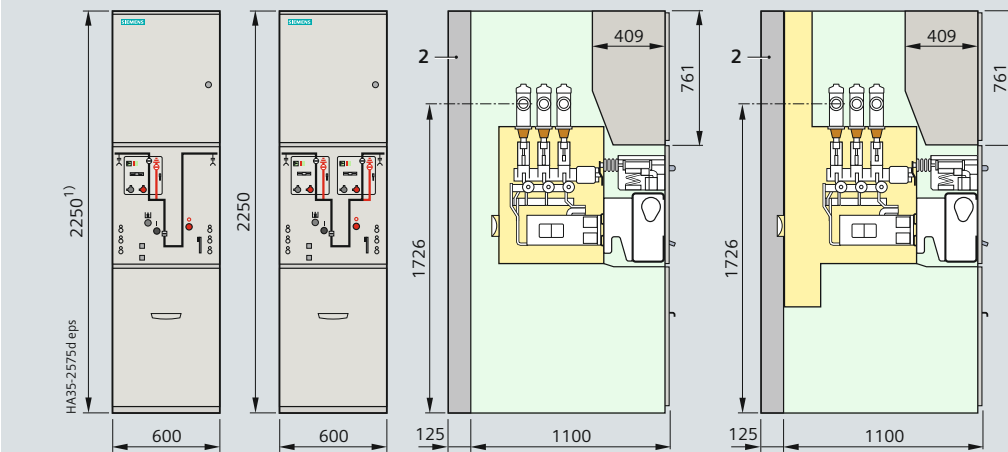
### Footnotes

- 1) 2650 mm for higher low-voltage compartment
- 2) 752 mm for deeper cable compartment cover
- 3) 45 mm for deeper cable compartment cover
- 4) 1120 mm for deeper cable compartment cover
- 6) 1245 mm for deeper cable compartment cover

# Dimensions

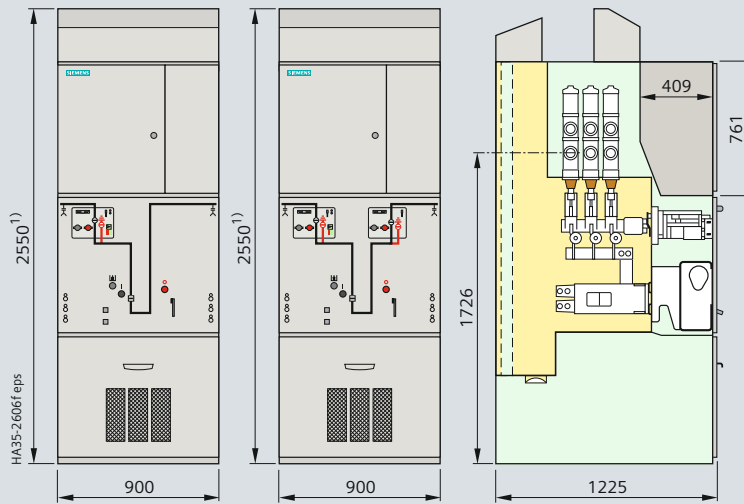
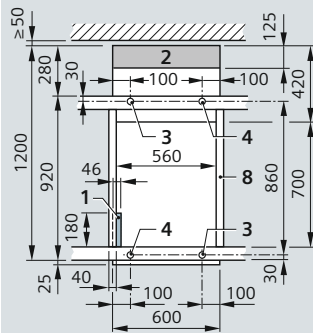
## Front views, sections, floor openings, fixing points for single-busbar switchgear

Bus sectionalizers with one or two disconnectors (1 panel width)

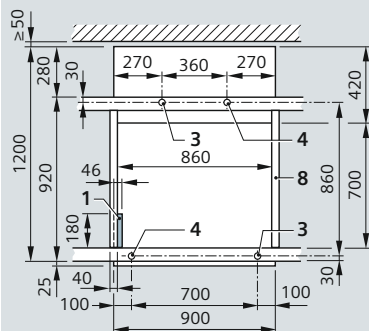


1000 A

1250 A



2000 A and 2500 A



### Legend and footnote

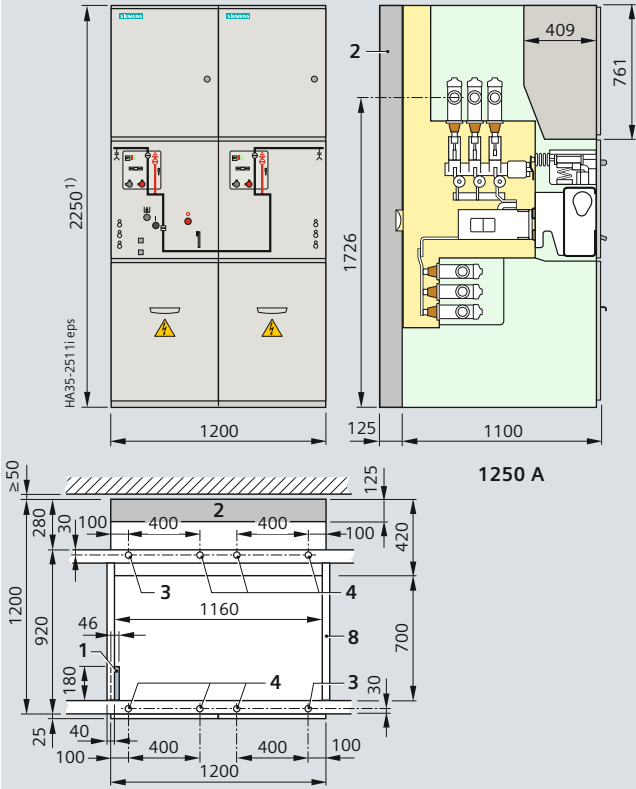
- 1 Left-side floor opening for control cables
- 2 Option: Pressure relief duct
- 3 Fixing hole for M8 / M10
- 4 Fixing hole for M8 / M10 (only for resistance against shock, vibration, earthquakes)
- 8 Cross member (necessary for panel replacement)

1) 2650 mm for higher low-voltage compartment



## Front views, sections, floor openings, fixing points for single-busbar switchgear

Bus sectionalizers with disconnecter (2 panel widths)



**Legend**

- 1 Floor opening for control cables
- 2 Option: Pressure relief duct
- 3 Fixing hole for M8/ M10
- 4 Fixing hole for M8/ M10 (only for resistance against shock, vibration, earthquakes)
- 8 Cross member (necessary for panel replacement)

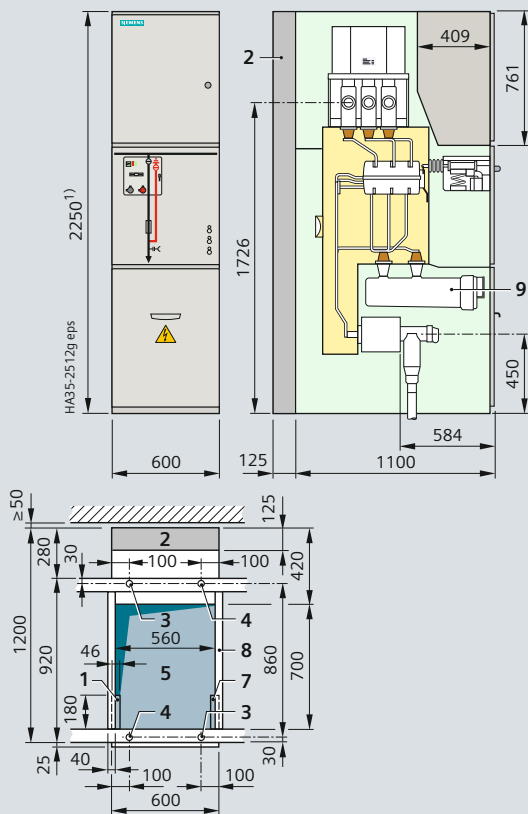
**Footnote**

- 1) 2650 mm for higher low-voltage compartment

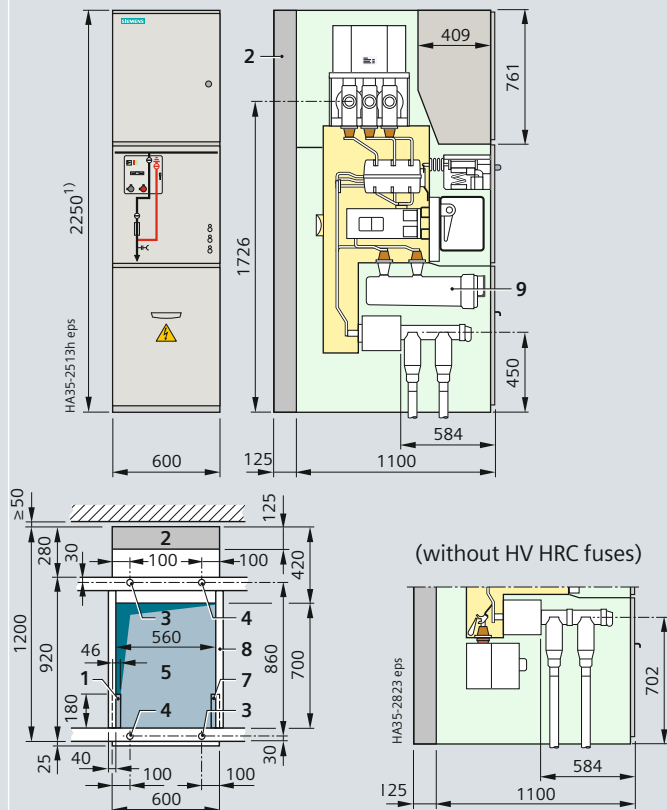
# Dimensions

## Front views, sections, floor openings, fixing points for single-busbar switchgear

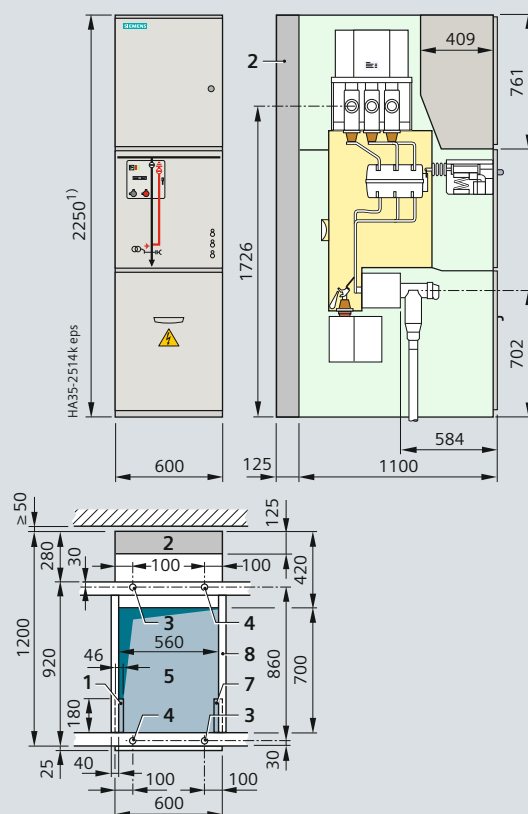
**Switch-disconnector panel with HV HRC fuses**



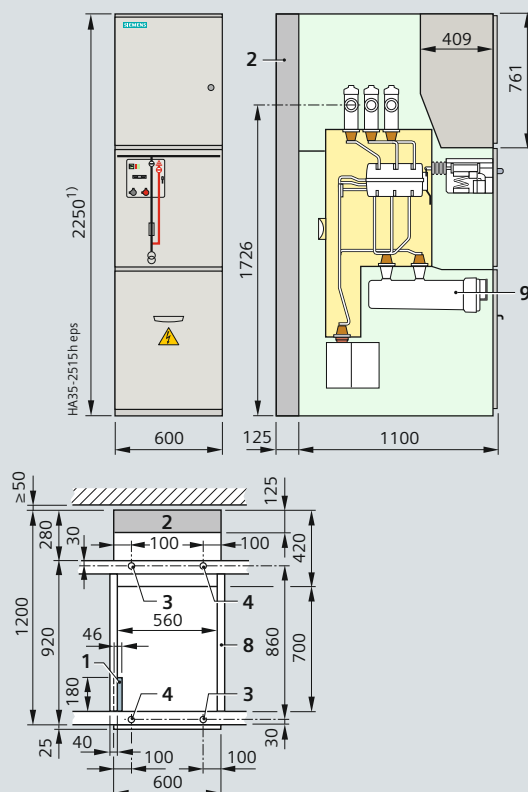
**Vacuum contactor panel with HV HRC fuses**



**Ring-main panel (switch-disconnector panel without HV HRC fuses)**



**Metering panel with HV HRC fuses**



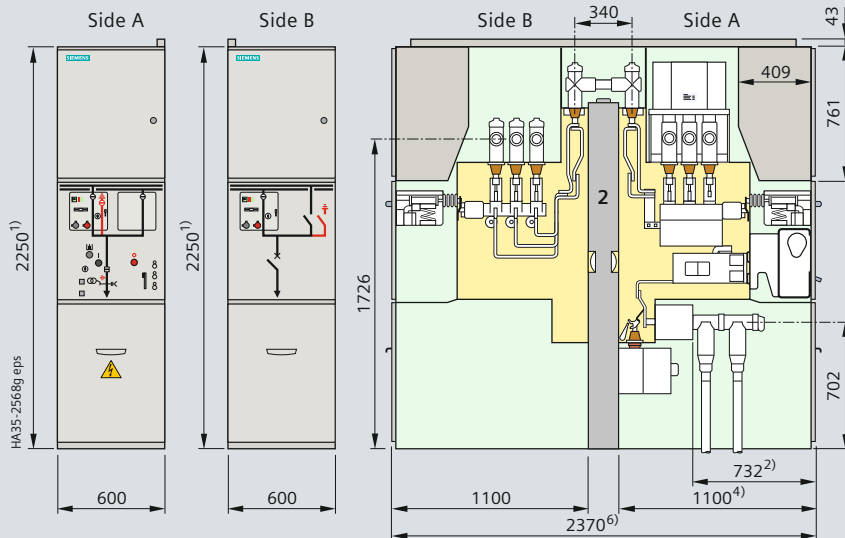
**Legend and footnote**

- 1 Left-side floor opening for control cables
- 2 Option: Pressure relief duct
- 3 Fixing hole for M8 / M10
- 4 Fixing hole for M8 / M10 (only for resistance against shock, vibration, earthquakes)
- 5 Floor opening for high-voltage cables
- 7 Right-side floor opening for control cables (only required for zero-sequence current transformers in the cable basement)
- 8 Cross member (necessary for panel replacement)
- 9 Option: HV HRC fuses

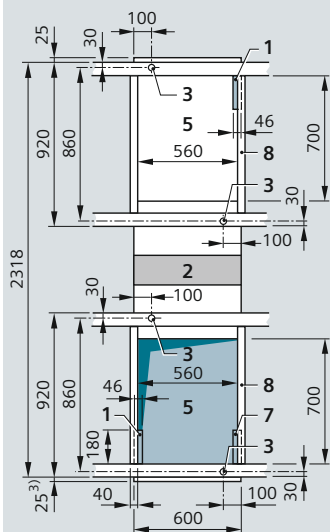
1) 2650 mm for higher low-voltage compartment

## Front views, sections, floor openings, fixing points for double-busbar switchgear

### Circuit-breaker panels



1000 A



#### Legend

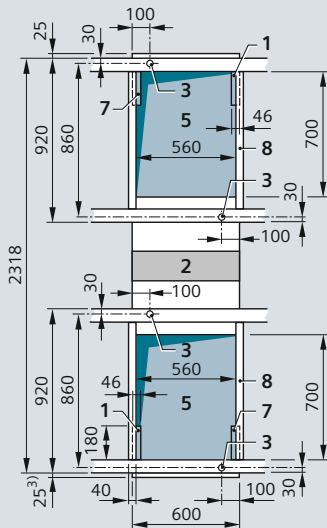
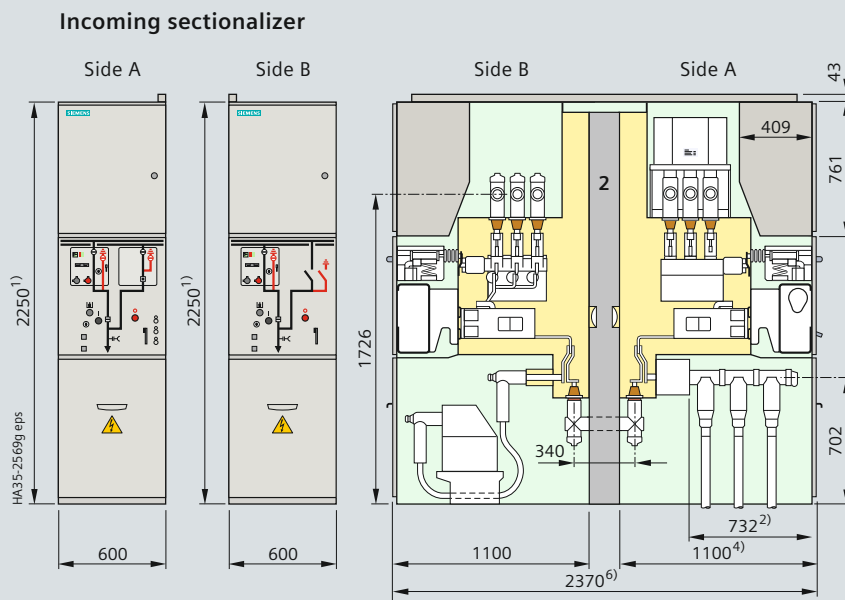
- 1 Left-side floor opening for control cables
- 2 Pressure relief duct
- 3 Fixing hole for M8/M10
- 5 Floor opening for high-voltage cables
- 7 Right-side floor opening for control cables (only required for zero-sequence current transformers in the cable basement)
- 8 Cross member (necessary for panel replacement)

#### Footnotes

- 1) 2650 mm for higher low-voltage compartment
- 2) 752 mm for deeper cable compartment cover
- 3) 45 mm for deeper cable compartment cover
- 4) 1120 mm for deeper cable compartment cover
- 6) 2390 mm for deeper cable compartment cover

# Dimensions

## Front views, sections, floor openings, fixing points for double-busbar switchgear



### Legend

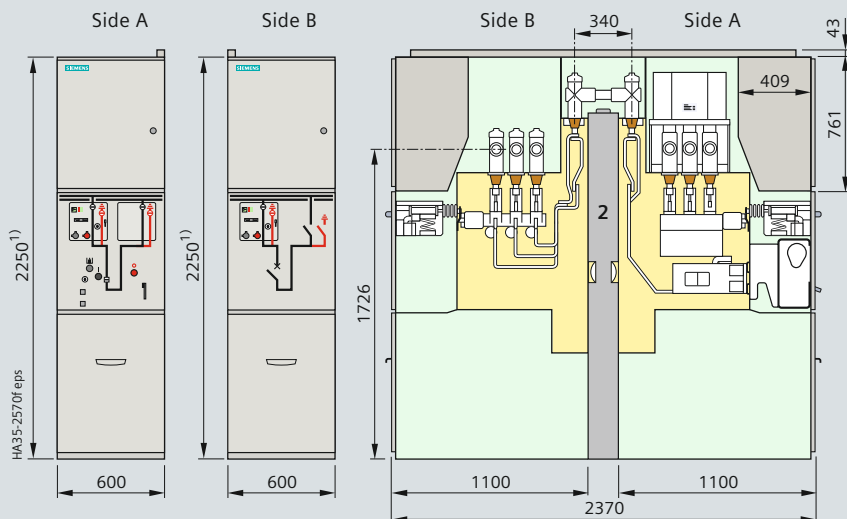
- 1 Left-side floor opening for control cables
- 2 Pressure relief duct
- 3 Fixing hole for M8 / M10
- 5 Floor opening for high-voltage cables
- 7 Right-side floor opening for control cables (only required for zero-sequence current transformers in the cable basement)
- 8 Cross member (necessary for panel replacement)

### Footnotes

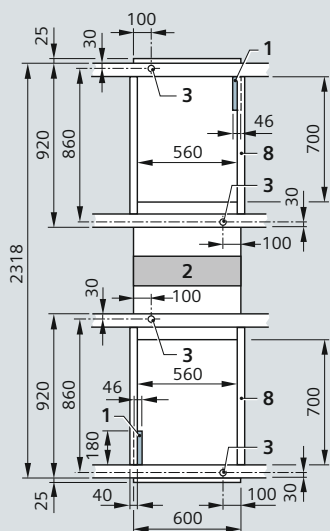
- 1) 2650 mm for higher low-voltage compartment
- 2) 752 mm for deeper cable compartment cover
- 3) 45 mm for deeper cable compartment cover
- 4) 1120 mm for deeper cable compartment cover
- 6) 1245 mm for deeper cable compartment cover

## Front views, sections, floor openings, fixing points for double-busbar switchgear

### Bus coupler



1000 A



#### Legend

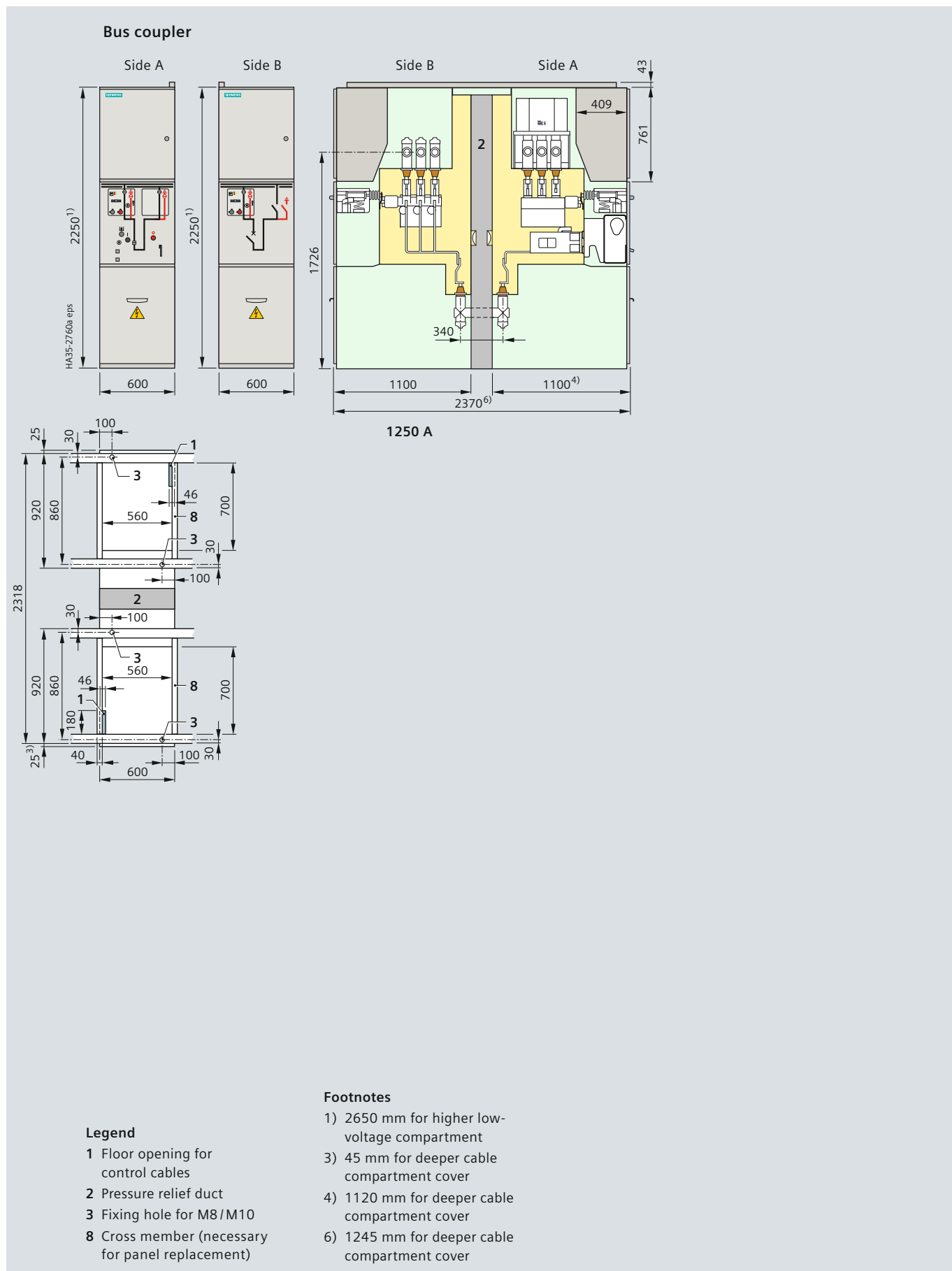
- 1 Floor opening for control cables
- 2 Pressure relief duct
- 3 Fixing hole for M8/M10
- 8 Cross member (necessary for panel replacement)

#### Footnote

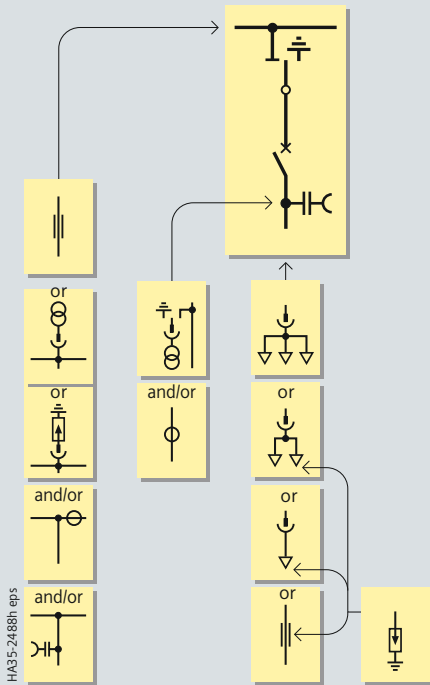
- 1) 2650 mm for higher low-voltage compartment

# Dimensions

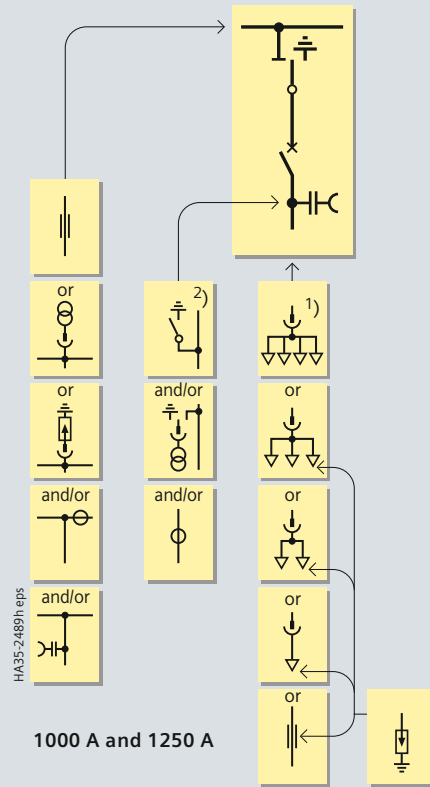
## Front views, sections, floor openings, fixing points for double-busbar switchgear



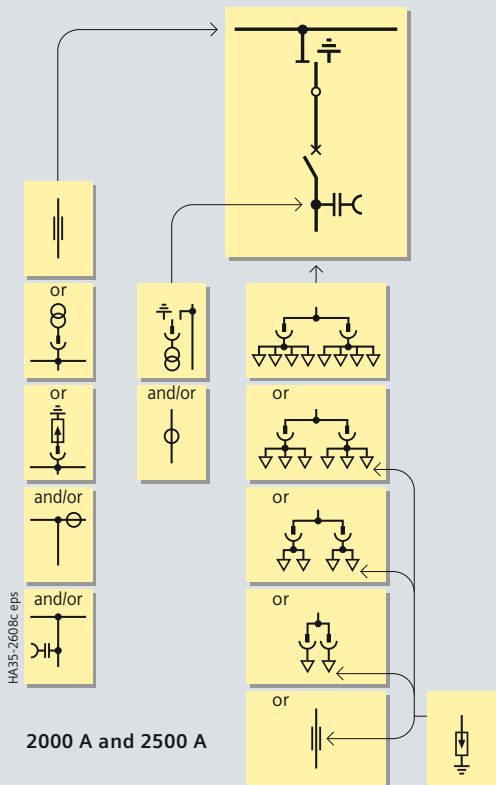
### Circuit-breaker panels



630 A

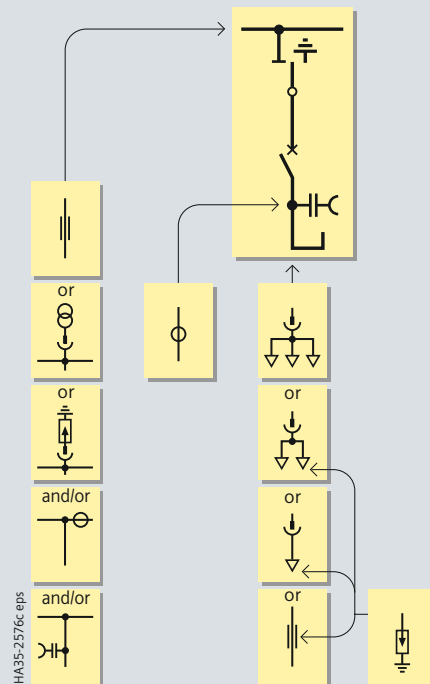


1000 A and 1250 A



2000 A and 2500 A

1) Only for 1250 A



1250 A, top-rear cable connection

2) Only for version with 10,000 operating cycles



Three-position disconnector



Vacuum circuit-breaker



Plug-in voltage transformer



Disconnectable and plug-in voltage transformer



Current transformer



Capacitive voltage detecting system



Busbar earthing switch



Surge arrester or limiter



Solid-insulated bar



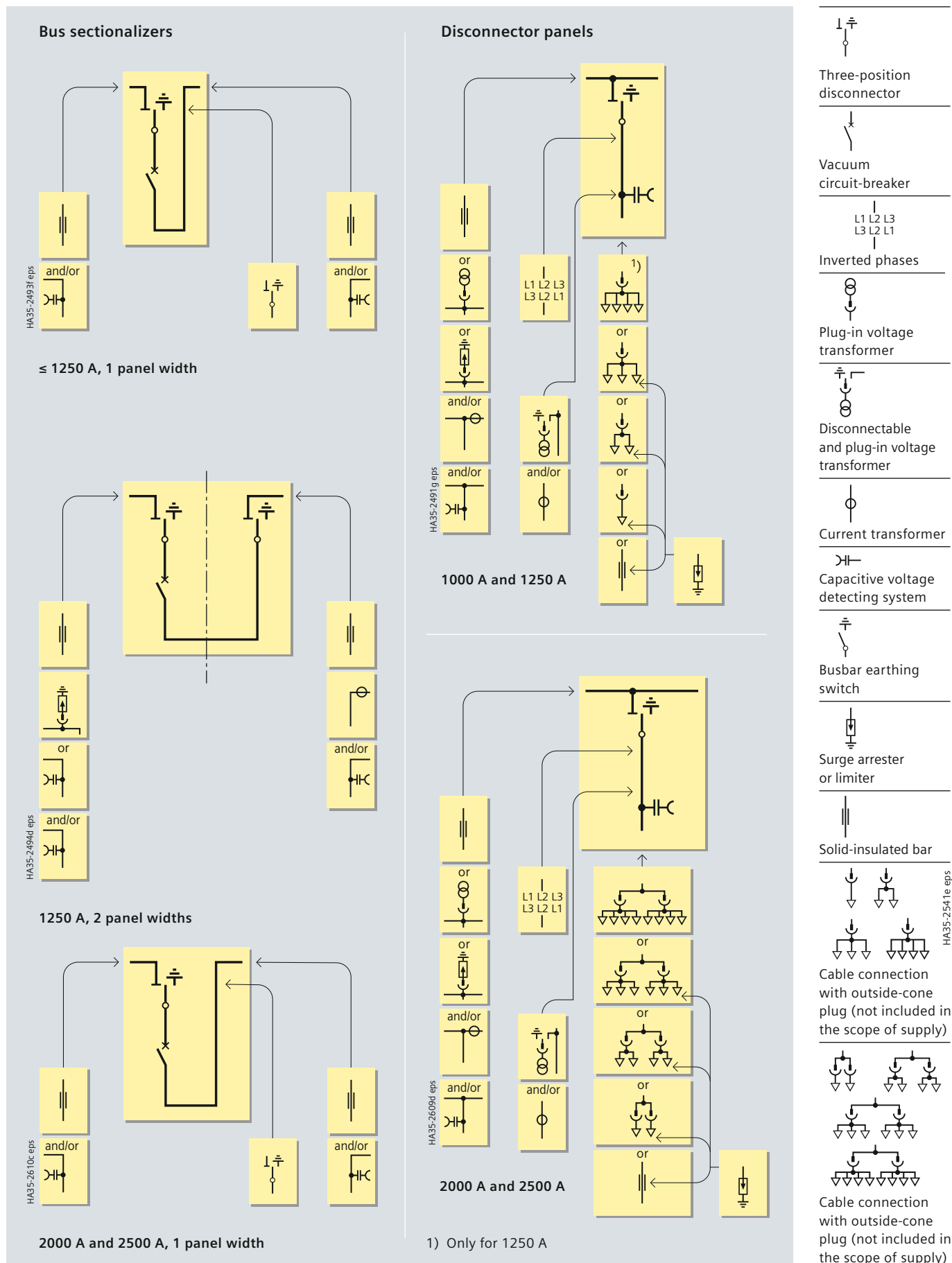
Cable connection with outside-cone plug (not included in the scope of supply)



Cable connection with outside-cone plug (not included in the scope of supply)

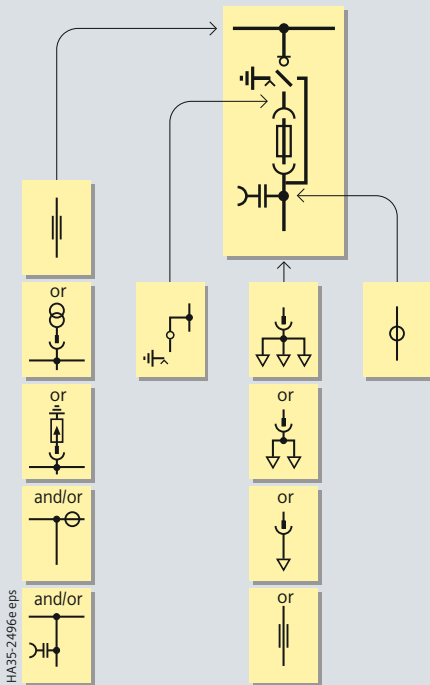
# Product range

## Single-busbar panels

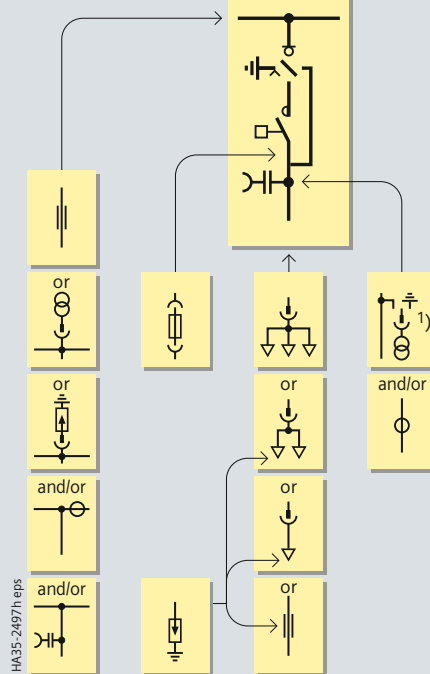




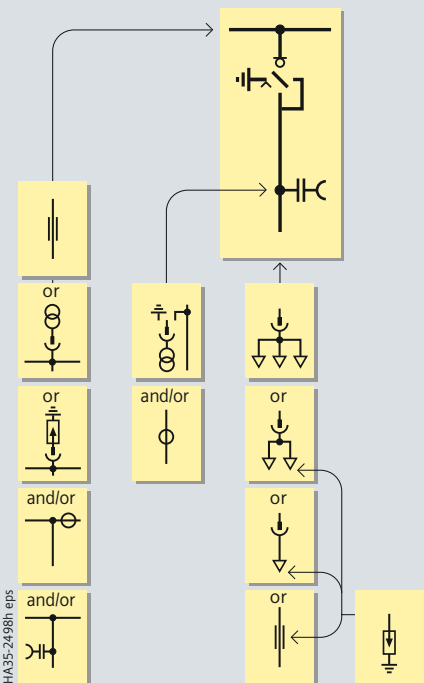
### Switch-disconnector panel



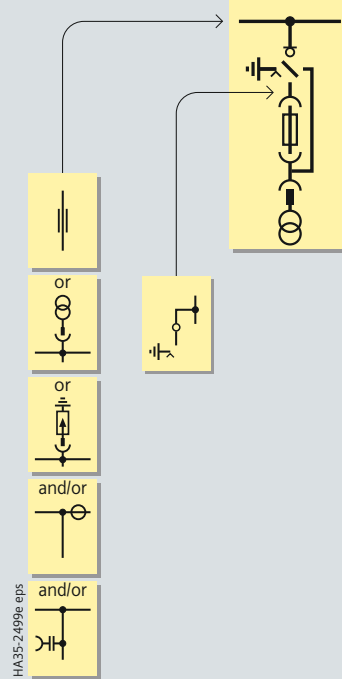
### Vacuum contactor panel



### Ring-main panel



### Metering panel



Three-position  
switch-disconnector



Vacuum contactor



HV HRC fuses



Plug-in voltage  
transformer



Disconnectable  
and plug-in voltage  
transformer



Current transformer



Capacitive voltage  
detecting system



2<sup>nd</sup> earthing switch  
for fuses



Surge arrester  
or limiter

HA35-2541e eps



Solid-insulated bar

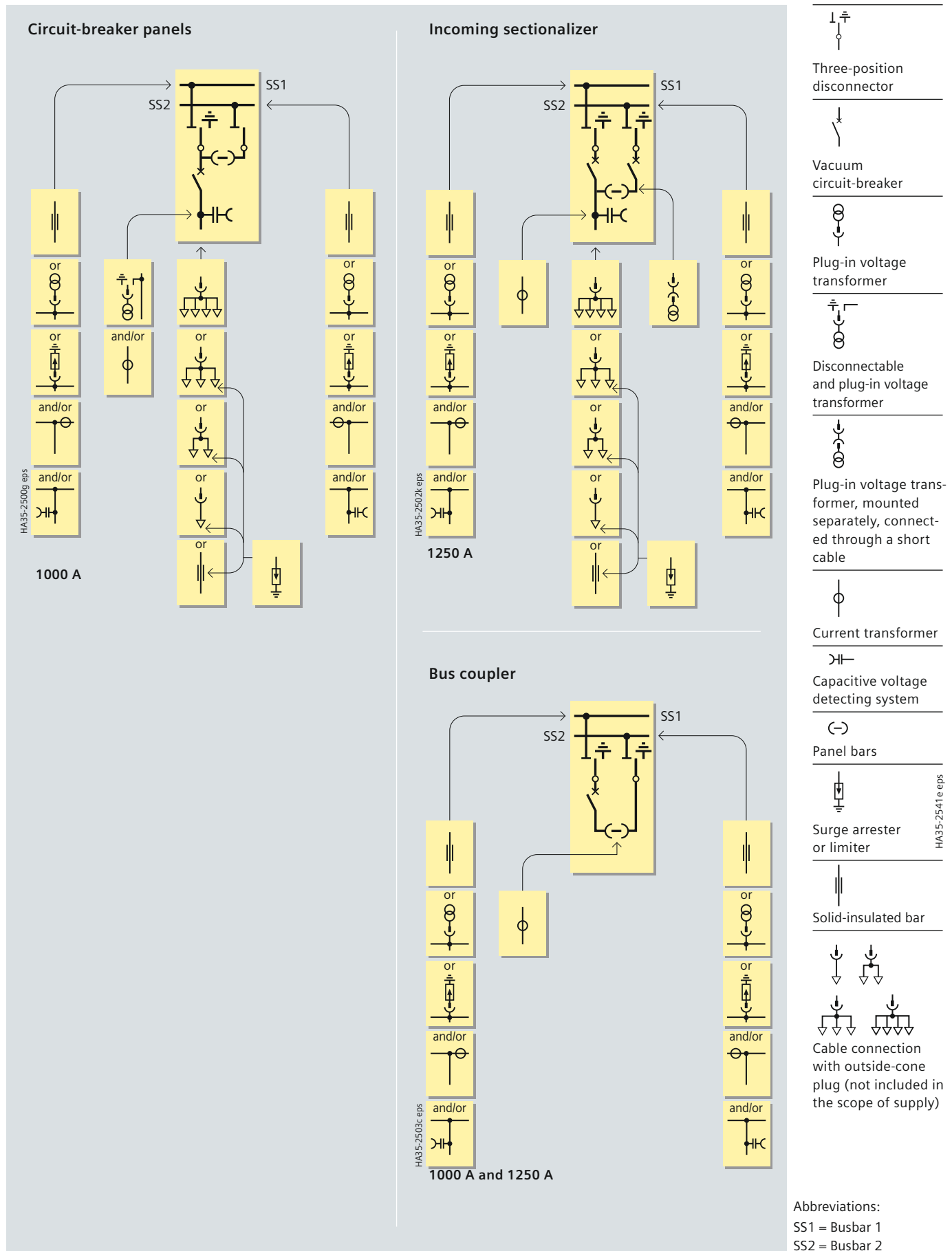


Cable connection  
with outside-cone  
plug (not included in  
the scope of supply)

1) Only possible when vacuum contactor panel is designed without fuse

# Product range

## Double-busbar panels

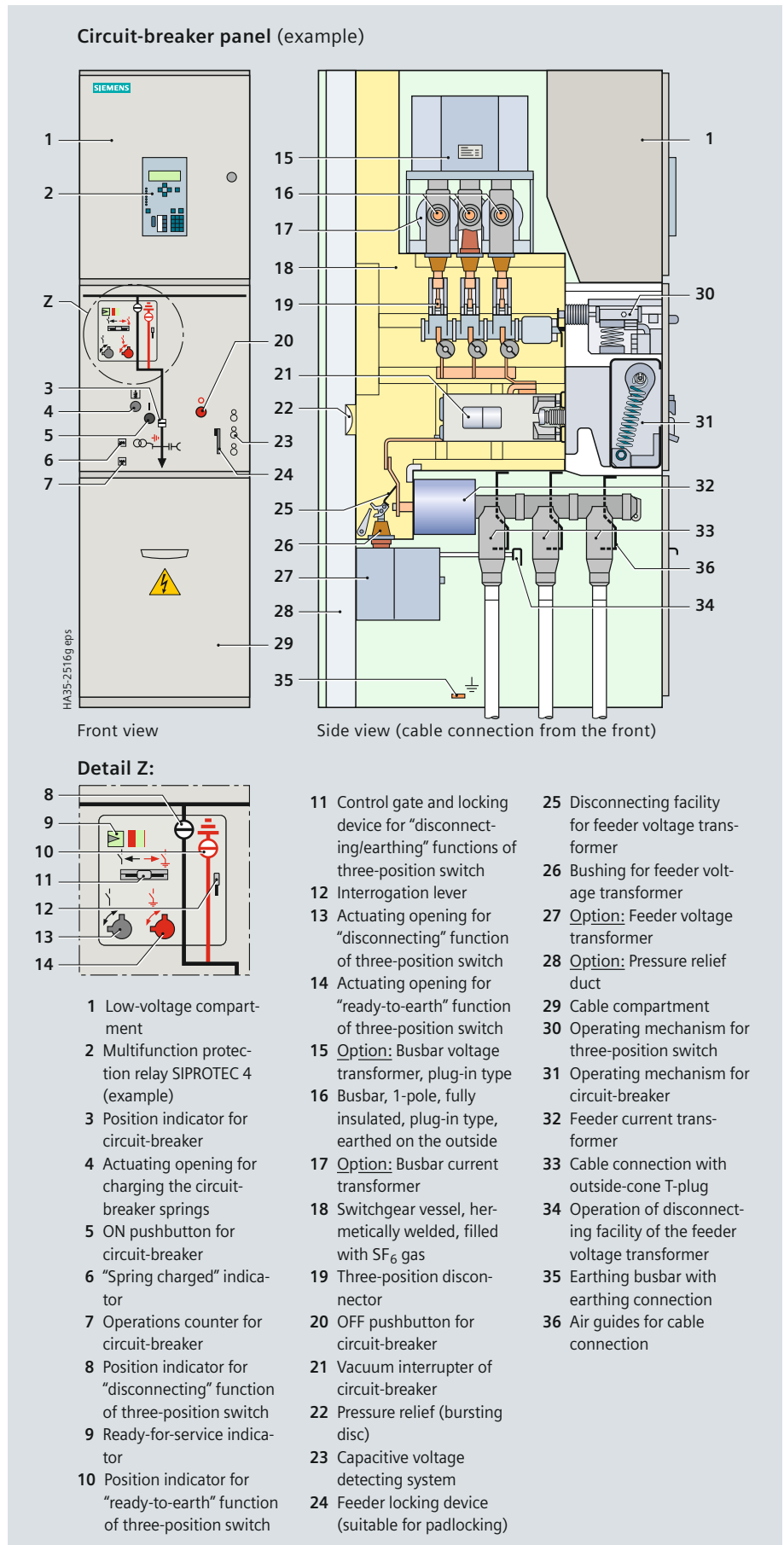


### Insulating system

- Switchgear vessel filled with SF<sub>6</sub> gas
- Features of SF<sub>6</sub> gas:
  - Non-toxic
  - Odorless and colorless
  - Non-inflammable
  - Chemically neutral
  - Heavier than air
  - Electronegative (high-quality insulator)
- Pressure of SF<sub>6</sub> gas in the switchgear vessel (absolute values at 20 °C):
  - Rated filling level: 150 kPa
  - Design pressure: 180 kPa
  - Design temperature of the SF<sub>6</sub> gas: 80 °C
  - Operating pressure of bursting disc: ≥ 300 kPa
  - Bursting pressure: ≥ 550 kPa
  - Gas leakage rate: < 0.1 % per year.

### Panel design

- Factory-assembled, type-tested
- Metal-enclosed, metal-clad
- Hermetically tight, welded switchgear vessel made of stainless steel
- 1-pole, solid-insulated, screened busbars, plug-in type
- Maintenance-free
- Degree of protection
  - IP 65 for all high-voltage parts of the primary circuit
  - IP 3XD for the switchgear enclosure
- Vacuum circuit-breaker or vacuum contactor
- Three-position disconnector for disconnecting and earthing by means of the circuit-breaker
- Make-proof earthing by means of the vacuum circuit-breaker
- Three-position switch-disconnector
- Cable connection with outside-cone plug-in system according to DIN EN 50 181
- Wall-standing or free-standing arrangement
- Installation and possible later extension of existing panels without gas work
- Replacement of switchgear vessel without gas work
- Replacement of instrument transformers without gas work, as they are located outside the gas compartments
- Enclosure made of sendzimir-galvanized sheet steel, front cover, rear cover and end walls powder-coated in color "light basic" (SN 700)
- Low-voltage compartment removable, plug-in bus wires
- Lateral, metallic wiring ducts for control cables.



# Components

## Vacuum circuit-breaker

### Features

- According to IEC 62271-100 and VDE 0671-100 (for standards, see page 69)
- Application in hermetically welded switchgear vessel in conformity with the system
- Climate-independent vacuum interrupter poles in the SF<sub>6</sub>-filled switchgear vessel
- Maintenance-free for indoor installation acc. to IEC 62271-1 and VDE 0671-1
- Individual secondary equipment
- A metal bellows is used for gasketless separation of the SF<sub>6</sub> insulation and the operating mechanism (already used with success for over 2 million vacuum interrupters).

### Trip-free mechanism

The vacuum circuit-breaker is fitted with a trip-free mechanism according to IEC 62271 and VDE 0671.

### Switching duties and operating mechanisms

The switching duties of the vacuum circuit-breaker are dependent, among other factors, on its type of operating mechanism.

#### Motor operating mechanism

- Motor-operating stored-energy mechanism
- For auto-reclosing (K)
- For synchronization and rapid load transfer (U)

#### Further operating mechanism features

- Located outside the switchgear vessel in the operating mechanism box and behind the control board
- Stored-energy spring mechanism for 10,000 operating cycles
- Option: Stored-energy spring mechanism for 30,000 operating cycles.

### Operating mechanism functions

#### Motor operating mechanism <sup>1)</sup> (M1 \*)

- In the case of motor operating mechanism, the closing spring is charged by means of a motor and latched in the charged position ("spring charged" indication is visible). Closing is effected either by means of an ON pushbutton or a closing solenoid. The closing spring is recharged automatically (for auto-reclosing).

### Endurance class of circuit-breaker (standard)

Function	Class	Standard	Property of NXPLUS C
BREAKING	M2	IEC 62271-100	10,000 times mechanically without maintenance
	E2	IEC 62271-100	10,000 times rated normal current without maintenance 50 times short-circuit breaking current without maintenance
	C2	IEC 62271-100	Very low probability of restrikes

### Endurance class of circuit-breaker (option)

(only up to 15 kV, up to 31.5 kA, up to 1250 A)

Function	Class	Standard	Property of NXPLUS C
BREAKING	M2	IEC 62271-100	30,000 times mechanically without maintenance
	E2	IEC 62271-100	30,000 times rated normal current without maintenance 50 times short-circuit breaking current without maintenance
	C2	IEC 62271-100	Very low probability of restrikes

### Operating times

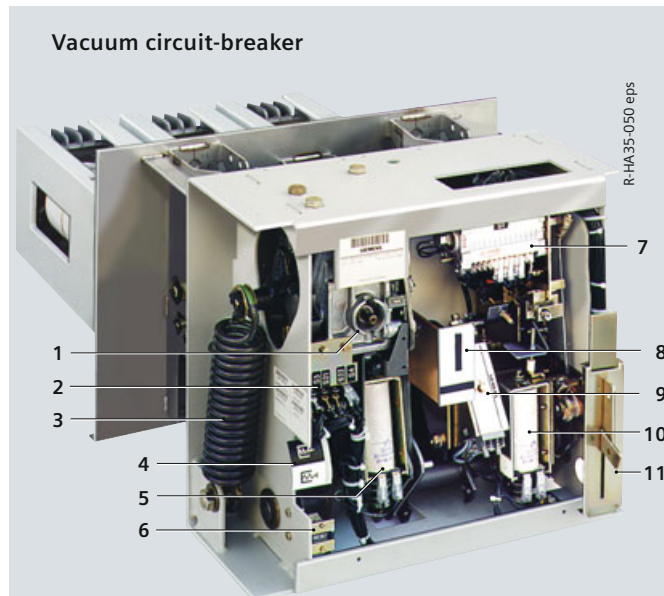
Closing time	Closing solenoid	< 75 ms
Opening time	1 <sup>st</sup> release	< 65 ms
	2 <sup>nd</sup> release	< 50 ms
Arcing time at 50 Hz		< 15 ms
Break time	1 <sup>st</sup> release	< 80 ms
	2 <sup>nd</sup> release	< 65 ms
Dead time		300 ms
Total charging time		< 15 s

Abbreviations for switching duties: U = Synchronization and rapid load transfer (closing time ≤ 90 ms)

K = Auto-reclosing

1) Motor rating at 24 V to 240 V DC: 600 W / 700 W (for 30,000 operating cycles)  
100 V to 240 V AC: 750 VA / 1100 VA (for 30,000 operating cycles)

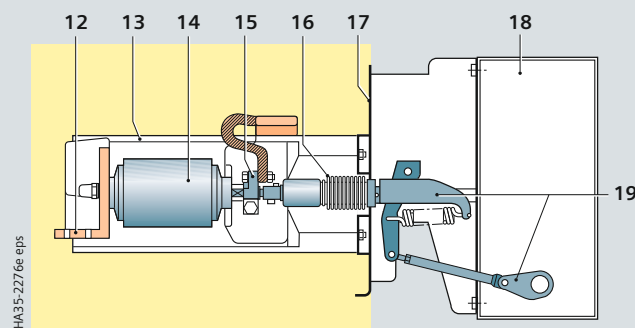
\* Item designation



Vacuum circuit-breaker

Open on the side of the operating mechanism

- 1 Gear with motor (M1 \*)
- 2 Position switch (S4 \*)
- 3 Closing spring
- 4 "Closing spring charged" indication
- 5 Closing solenoid (Y9 \*)
- 6 Operations counter
- 7 Auxiliary switch 6 NO + 6 NC (S1 \*), option: 12 NO + 12 NC
- 8 CLOSED / OPEN position indicator for circuit-breaker
- 9 Option: 2<sup>nd</sup> release (Y2 \*)
- 10 1<sup>st</sup> release (Y1 \*)
- 11 Feeder locking device



Section through the vacuum circuit-breaker

- 12 Fixed terminal
- 13 Pole support
- 14 Vacuum interrupter
- 15 Moving terminal
- 16 Metal bellows
- 17 Switchgear vessel, SF<sub>6</sub>-insulated, with vacuum interrupter
- 18 Operating mechanism box (see figure above)
- 19 Operating kinematics

For further technical data and description of typical applications, please refer also to Catalog HG 11.05 "3AH5 Vacuum Circuit-Breakers".

### Secondary equipment

The scope of secondary equipment of the vacuum circuit-breaker depends on the type of application and offers a wide range of variations, thus allowing even the highest requirements to be satisfied:

#### Closing solenoid

- Type 3AY15 10 (Y9 \*)
- For electrical closing.

#### Shunt releases

- Types:
  - Standard: 3AY15 10 (Y1 \*)
  - Option: 3AX11 01 (Y2 \*), with energy store
- Tripping by protection relay or electrical actuation.

#### C.t.-operated release

- Type 3AX11 02 (Y4 \*), 0.5 A
- Type 3AX11 04 (Y6 \*) for tripping pulse  $\geq 0.1$  Ws in conjunction with suitable protection systems
- Used if external auxiliary voltage is missing, tripping via protection relay.

#### Undervoltage release

- Type 3AX11 03 (Y7 \*)
- 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.

#### Anti-pumping (mechanical and electrical)

- Function: If constant CLOSE and OPEN commands are present at the vacuum circuit-breaker at the same time, the vacuum circuit-breaker will return to the open position after closing. It remains in this position until a new CLOSE command is given. In this manner, continuous closing and opening (= pumping) is avoided.

#### Circuit-breaker tripping signal

- For electrical signaling (as pulse  $> 10$  ms), e.g. to remote control systems, in the case of automatic tripping (e.g. protection)
- Via limit switch (S6 \*) and cut-out switch (S7 \*).

#### Varistor module

- To limit overvoltages to approx. 500 V for protection devices (when inductive components are mounted in the vacuum circuit-breaker)
- For auxiliary voltages  $\geq 60$  V DC.

#### Auxiliary switch

- Type 3SV9 (S1 \*)
- Standard: 6 NO + 6 NC, free contacts thereof <sup>1)</sup> 3 NO + 4 NC
- Option: 12 NO + 12 NC, free contacts thereof <sup>1)</sup> 9 NO + 6 NC.

#### Position switch

- Type 3SE4 (S4 \*, S16\*)
- For signaling "closing spring charged"
- For signaling "circuit-breaker locked".

#### Mechanical interlocking

- Mechanical interlocking to the three-position disconnecter
- During operation of the three-position switch, the vacuum circuit-breaker cannot be operated.

#### Possible release combinations

Release	Release combination				
	1	2	3	4	5
1 <sup>st</sup> shunt release type 3AY15 10	•	•	•	–	•
2 <sup>nd</sup> shunt release type 3AX11 01	–	•	–	–	–
C.t.-operated release type 3AX11 02, 0.5 A, or type 3AX11 04, 0.1 Ws	–	–	•	•	–
Undervoltage release type 3AX11 03	–	–	–	–	•

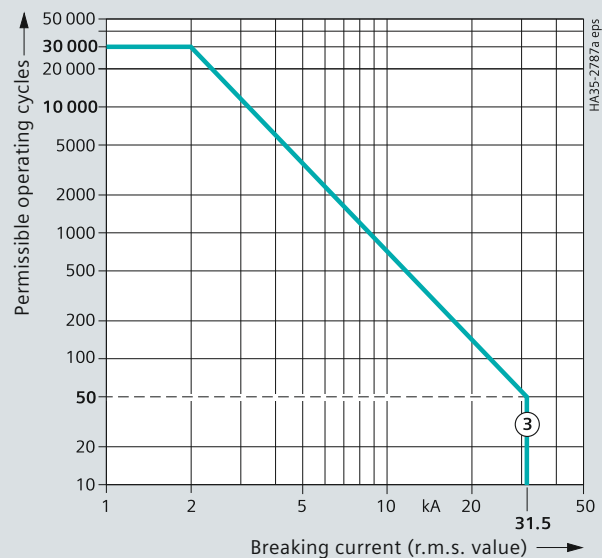
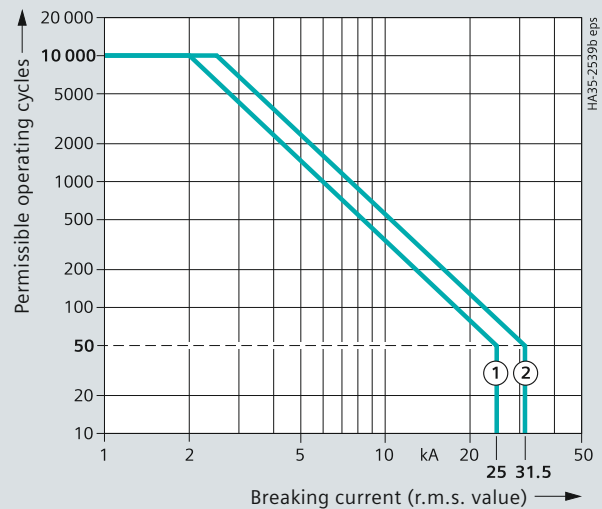
<sup>1)</sup> 1 unit of each release, a maximum of 2 releases can be combined only.

1) For utilization by the customer

\* Item designation

Abbreviations: NO = normally open contact NC = normally closed contact

### Switching rate of the vacuum interrupter



#### Electrical data (curve 1)

- Rated voltage 17.5 kV, 24 kV
- Rated short-circuit breaking current  $\leq 25$  kA
- Rated normal current  $\leq 2000$  A

#### Electrical data (curve 2)

- Rated voltage 7.2 kV, 12 kV, 15 kV
- Rated short-circuit breaking current  $\leq 31.5$  kA
- Rated normal current  $\leq 2500$  A

#### Electrical data (curve 3)

- Rated voltage 7.2 kV, 12 kV, 15 kV
- Rated short-circuit breaking current  $\leq 31.5$  kA
- Rated normal current  $\leq 1250$  A

#### Rated operating sequences

- Rapid load transfer (U): O-t-CO-t'-CO (t 0.3 s, t' 3 min)
- Auto-reclosing (K): O-t-CO-t'-CO (t 0.3 s, t' 3 min)
- Auto-reclosing (K): O-t-CO-t'-CO (t 0.3 s, t' 15 s)

O = OPEN operation

CO = CLOSE operation with subsequent OPEN operation at the shortest internal close-open time of the vacuum circuit-breaker

# Components

## Three-position switches

### Common features

- According to IEC 62271-102 and VDE 0671-102 (for standards, see page 69)
- Application in hermetically welded switchgear vessel in conformity with the system
- Climate-independent contacts in the SF<sub>6</sub>-filled switchgear vessel
- Maintenance-free for indoor installation according to IEC 62271-1 and VDE 0671-1
- Individual secondary equipment
- A metal bellows is used for gasketless separation of the SF<sub>6</sub> insulation and the operating mechanism (already used with success for over 2 million vacuum interrupters)
- A rotary bushing is used for separation of the SF<sub>6</sub> insulation and the operating mechanism (already used with success millions of times in medium-voltage and high-voltage switchgear)
- Compact design due to short contact gaps in SF<sub>6</sub> gas
- Operation via gas-tight welded-in metal bellows or rotary bushing at the front of the switchgear vessel
- Reliable mechanical switch position up to the operating front of the panel (in double-busbar switchgear, the position indication for side B is done on side A via electrical position indicators).

### Three-position disconnecter

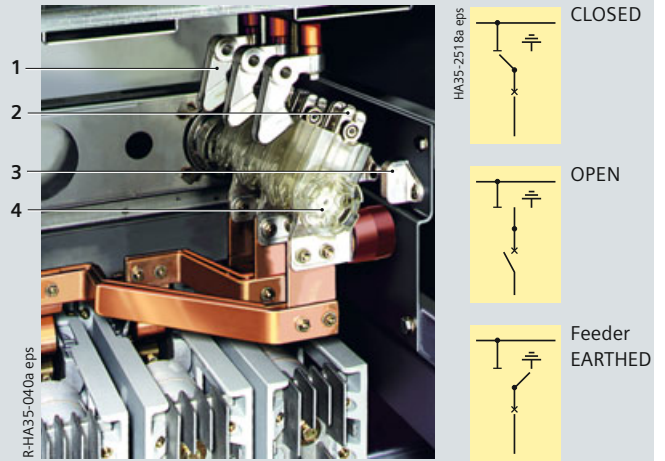
- Application in:
  - Circuit-breaker panel 630 A to 2500 A (with interlock against the circuit-breaker)
  - Disconnector panel 1000 A to 2500 A
  - Bus sectionalizer 1000 A to 2500 A
- 2000 mechanical operating cycles for CLOSED/OPEN
- 1000 mechanical operating cycles for OPEN/READY-TO-EARTH
- Option: 5,000 or 10,000 mechanical operating cycles for the duty cycle CLOSED/OPEN/READY-TO-EARTH (only up to 15 kV, 31.5 kA and 1,250 A).

### Three-position switch-disconnector

- Application in:
  - Switch-disconnector panel
  - Ring-main panel
  - Contactor panel
  - Metering panel
- 2000<sup>1)</sup> mechanical operating cycles for CLOSED/OPEN
- 1000 mechanical operating cycles for OPEN/EARTHED
- Switching functions as general-purpose switch-disconnector according to:
  - IEC 62271-103
  - VDE 0670-301
  - IEC 62271-102
  - VDE 0671-102 (for standards, see page 69)
- Designed as a multi-chamber three-position switch with the functions:
  - Switch-disconnector and
  - Make-proof earthing switch.

1) For switch-disconnector panel: 1000 mechanical operating cycles for CLOSED/OPEN/EARTHED

### Switch positions of the three-position switches

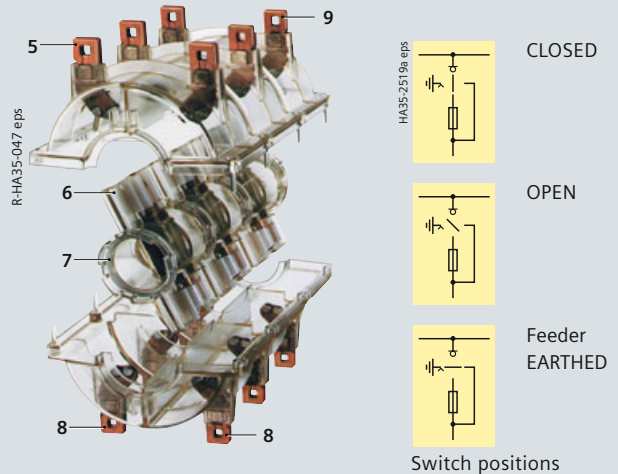


### Three-position disconnecter

(in OPEN position) with vacuum circuit-breaker arranged below (view into the switchgear vessel opened at the rear)

### Switch positions of the three-position disconnecter

- |  |   |   |
|--|---|---|
| <p>“CLOSED”</p> <ul style="list-style-type: none"> <li>• Closed current path between busbar and vacuum circuit-breaker</li> <li>• Contact blades connected with fixed contacts at the busbar bushings</li> </ul> | <p>“OPEN”</p> <ul style="list-style-type: none"> <li>• Open current path between busbar and vacuum circuit-breaker</li> <li>• Isolating distances withstand prescribed test voltages</li> </ul> | <p>“READY-TO-EARTH”</p> <ul style="list-style-type: none"> <li>• Contact blades connected with earth contact of switchgear vessel</li> <li>• Earthing and short-circuiting the cable connection possible by closing the vacuum circuit-breaker</li> </ul> |
|--|---|---|



### Three-position switch-disconnector (exploded view)

### Switch positions of the three-position switch-disconnector

- |  |   |   |
|--|---|---|
| <p>“CLOSED”</p> <ul style="list-style-type: none"> <li>• Closed current path between busbar and vacuum circuit-breaker</li> <li>• Contact blades connected with contact pieces at the busbar bushings</li> </ul> | <p>“OPEN”</p> <ul style="list-style-type: none"> <li>• Open current path between busbar and vacuum circuit-breaker</li> <li>• Isolating distances withstand prescribed test voltages</li> </ul> | <p>“EARTHED”</p> <ul style="list-style-type: none"> <li>• Contact blades connected with contact pieces earthed</li> </ul> |
|--|---|---|

- |                                      |                               |
|--------------------------------------|-------------------------------|
| 1 Fixed contact at the busbar        | 6 Rotary contact blade        |
| 2 Swivel-mounted contact blade       | 7 Operating shaft             |
| 3 Fixed contact for “feeder EARTHED” | 8 Fixed contact to the feeder |
| 4 Operating shaft                    | 9 Fixed contact to the busbar |

### Interlocks

- Selection of permissible switching operations by means of a control gate with mechanically interlocked vacuum circuit-breaker
- Corresponding operating shafts are not released at the operating front until they have been pre-selected with the control gate
- Operating lever cannot be removed until switching operation has been completed
- Circuit-breaker cannot be closed until control gate is in neutral position again
- Switchgear interlocking system also possible with electro-mechanical interlocks if switchgear is equipped with motor operating mechanisms (mechanical interlocking for manual operation remains).

### Switch positions

- "CLOSED", "OPEN", "EARTHED" or "READY-TO-EARTH"
- In circuit-breaker panels, earthing and short-circuiting the cable connection is completed by closing the vacuum circuit-breaker.

### Operating mechanism

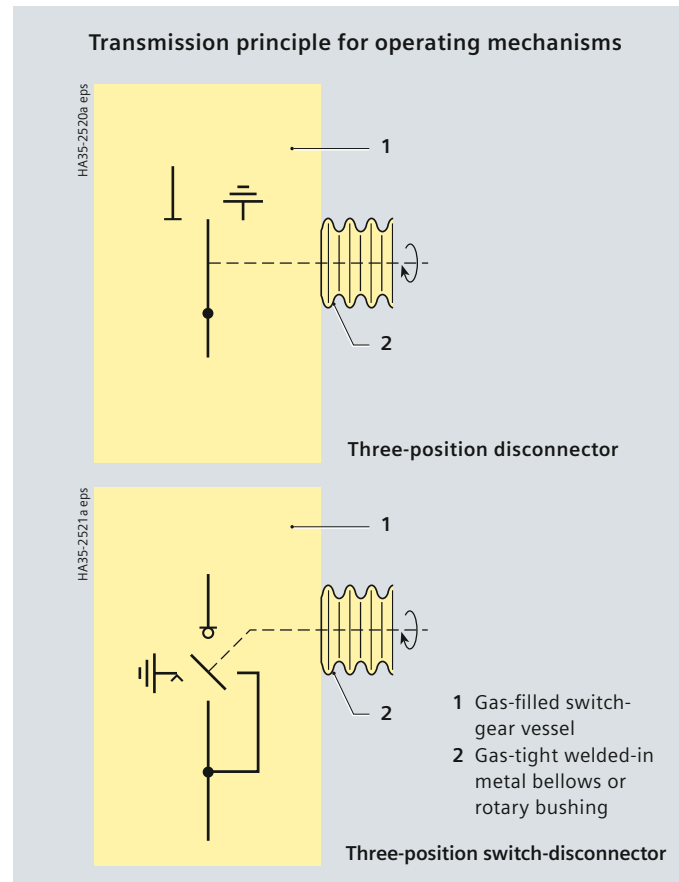
- Spring-operated mechanism, used in:
  - Circuit-breaker panels 630 A to 1250 A
  - Bus sectionalizers 1000 A, 1250 A
  - Incoming sectionalizer
  - Bus coupler
  - Disconnecter panels 1000 A, 1250 A
  - Vacuum contactor panel
  - Metering panel
  - Ring-main panel
- Slow motion mechanism, used in:
  - Circuit-breaker panels 1000 A, 1250 A with 30,000 operating cycles
  - Circuit-breaker panels 2000 A, 2500 A
  - Bus sectionalizers 2000 A, 2500 A
  - Disconnecter panels 2000 A, 2500 A
- Spring-operated / stored-energy mechanism, used in:
  - Switch-disconnector panel
- Spring-operated and spring-operated / stored-energy and slow motion mechanism actuated via operating lever at the operating front of the panel
- Separate operating shafts for the DISCONNECTING and EARTHING or READY-TO-EARTH functions
- Option: Motor operating mechanism for the DISCONNECTING and EARTHING or READY-TO-EARTH functions
- Spring-operated/stored-energy mechanism for the switch-disconnector function with fuses: Opening spring precharged (after closing)
- Maintenance-free due to non-rusting design of parts subjected to mechanical stress
- Bearings which require no lubrication.

### Transmission principle for operating mechanisms (see illustration)

- Transmission of operating power from outside into the gas-filled switchgear vessel by means of a metal bellows or a rotary bushing
- Gas-tight
- Maintenance-free.

### Endurance class of three-position switch-disconnector

Function	Class	Standard	Property of NXPLUS C
DISCONNECTING	M1 <sup>2)</sup>	IEC 62271-102	2000 times mechanically without maintenance
LOAD BREAKING	M1	IEC 60265-1	1000 times mechanically without maintenance
	E3	IEC 60265-1	100 times rated mainly active load breaking current $I_1$ without maintenance 5 times rated short-circuit making current $I_{ma}$ without maintenance
EARTHING	M0	IEC 62271-102	1000 times mechanically without maintenance
	E2	IEC 62271-102	5 times rated short-circuit making current $I_{ma}$ without maintenance



### Endurance class of three-position disconnecter (standard)

Function	Class	Standard	Property of NXPLUS C
DISCONNECTING	M1	IEC 62271-102	2000 times mechanically without maintenance
READY-TO-EARTH	M0	IEC 62271-102	1000 times mechanically without maintenance
	E0	IEC 62271-102	no making capacity
EARTHING	E2 <sup>1)</sup>	IEC 62271-200	50 times rated short-circuit making current $I_{ma}$ without maintenance
		IEC 62271-102	

### Endurance class of three-position disconnecter (option)

(only up to 15 kV, up to 31.5 kA, up to 1250 A)

Function	Class	Standard	Property of NXPLUS C
DISCONNECTING	M1	IEC 62271-102	5000 times mechanically without maintenance
READY-TO-EARTH	M0	IEC 62271-102	5000 times mechanically without maintenance
	E0	IEC 62271-102	no making capacity
EARTHING	E2 <sup>1)</sup>	IEC 62271-200	50 times rated short-circuit making current $I_{ma}$ without maintenance
		IEC 62271-102	

### Endurance class of three-position disconnecter (option)

(only up to 15 kV, up to 31.5 kA, up to 1250 A)

Function	Class	Standard	Property of NXPLUS C
DISCONNECTING	M2	IEC 62271-102	10,000 times mechanically without maintenance
READY-TO-EARTH	M0	IEC 62271-102	10,000 times mechanically without maintenance
	E0	IEC 62271-102	no making capacity
EARTHING	E2 <sup>1)</sup>	IEC 62271-200	50 times rated short-circuit making current $I_{ma}$ without maintenance
		IEC 62271-102	

1) The EARTHING function with endurance class E2 is achieved by closing the circuit-breaker in combination with the three-position disconnecter (endurance class E0)

2) For switch-disconnector panel: M0 1000 times mechanically without maintenance

# Components

## Key-operated interlocks

### Features

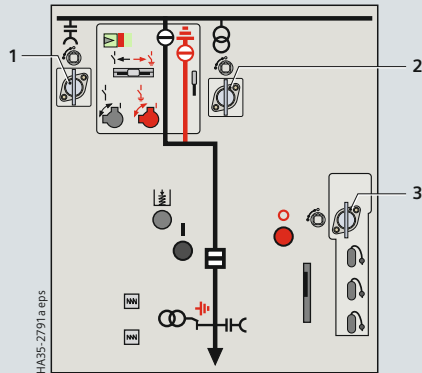
Installation of key-operated interlocks is optionally possible

- Key-operated interlock make Castell Safety International Ltd. (type FS)

- Key-operated interlock make Fortress Interlocks Ltd. (type CLIS)
- Key-operated interlock from other suppliers on request

### Mode of operation

#### Key-operated interlock for circuit-breaker panel

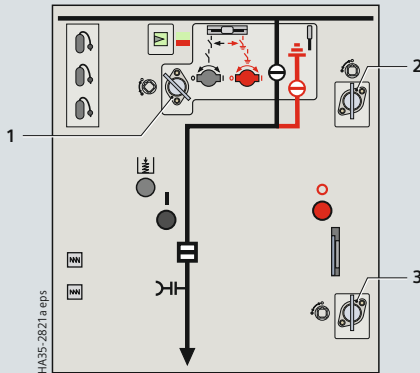


Switching device	Key function (KF)	
Disconnecter -Q1	Key free in OPEN	
	KF1 Key trapped in CLOSED	
or		
	Key trapped in OPEN	
	KF4 Key free in CLOSED	
Earthing switch -Q1	Key free in OPEN	
	KF2 Key trapped in READY-TO-EARTH	
and / or		
	Key trapped in OPEN	
	KF3 Key free in EARTHED	

#### Legend

- 1 KF1 or KF4
- 2 KF2
- 3 KF3

#### Key-operated interlocking circuit-breaker panel for 30,000 operating cycles

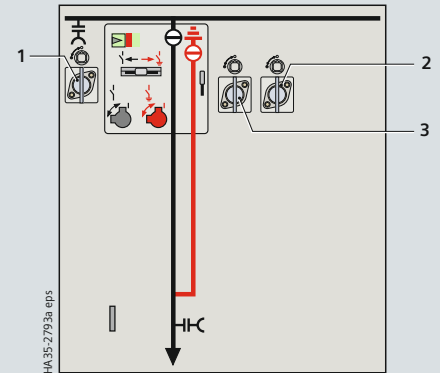


Switching device	Key function (KF)	
Disconnecter -Q1	Key free in OPEN	
	KF1 Key trapped in CLOSED	
or		
	Key trapped in OPEN	
	KF4 Key free in CLOSED	
Earthing switch -Q1	Key free in OPEN	
	KF2 Key trapped in READY-TO-EARTH	
and / or		
	Key trapped in OPEN	
	KF3 Key free in EARTHED	

#### Legend

- 1 KF1 or KF4
- 2 KF2
- 3 KF3

#### Key-operated interlock for disconnecter panel, switch-disconnector panel, vacuum contractor panel, ring-main panel, metering panel



Schaltgerät	Schlüsselfunktion KF	
Disconnecter -Q1	Key free in OPEN	
	KF1 Key trapped in CLOSED	
Earthing switch -Q1	Key free in OPEN	
	KF2 Key trapped in EARTHED	
and / or		
	Key trapped in OPEN	
	KF3 Key free in EARTHED	

#### Legend

- 1 KF1
- 2 KF2
- 3 KF3

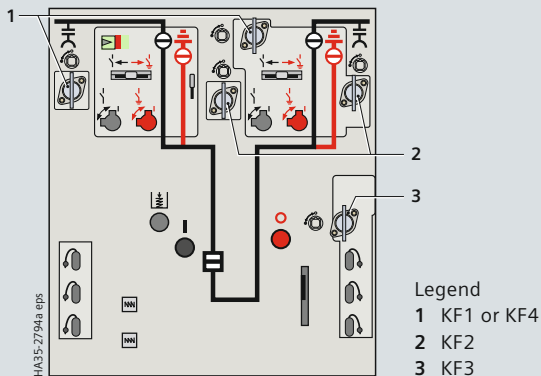
#### Legend

- = key free
- = key trapped



### Mode of operation

#### Key-operated interlock for bus sectionalizer

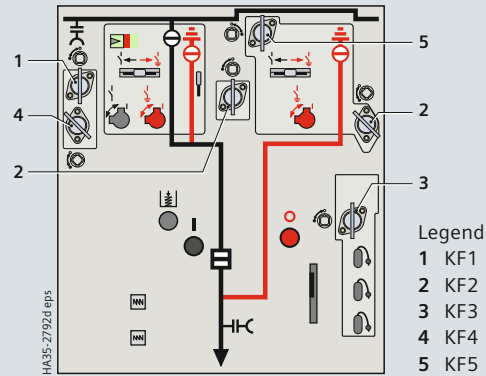


Switching device	Key function (KF)		
Disconnecter -Q1, -Q10	KF1	Key free in OPEN	
		Key trapped in CLOSED	
or	KF4	Key trapped in OPEN	
		Key free in CLOSED	
Earthing switch -Q1, -Q10	KF2	Key free in OPEN	
		Key trapped in READY-TO-EARTH	
and/or	KF3	Key trapped in OPEN	
		Key free in EARTHED	
	KF3	Key trapped in OPEN	
		Key free in EARTHED	

**Legend**

= key free  
 = key trapped

#### Key-operated interlock for circuit-breaker panel with busbar earthing



Switching device	Key function (KF)		
Disconnecter -Q1	KF1	Key free in OPEN	
		Key trapped in CLOSED	
or	KF4	Key trapped in OPEN	
		Key free in CLOSED	
Earthing switch -Q1	KF2	Key free in OPEN	
		Key trapped in READY-TO-EARTH	
and/or	KF3	Key trapped in OPEN	
		Key free in EARTHED	
Earthing switch -Q15	KF2	Key free in OPEN	
		Key trapped in READY-TO-EARTH	
and/or	KF5	Key trapped in OPEN	
		Key free in READY-TO-EARTH	

# Components

## HV HRC fuse assembly

### Features

- Application in:
  - Switch-disconnector panel
  - Contactor panel
  - Metering panel
- HV HRC fuse-links according to DIN 43 625 (main dimensions) with striker in "medium" version according to IEC 60282/ VDE 0670-4
- As short-circuit protection before transformers in the switch-disconnector panel
- As short-circuit protection before motors in the contactor panel
- As short-circuit protection before voltage transformers in the metering panel
- With selectivity (depending on correct selection) to upstream and downstream connected equipment
- 1-pole insulated
- Requirements according to IEC 62271-105 and VDE 067-105 fulfilled by combination of HV HRC fuses with the three-position switch-disconnector
- Climate-independent and maintenance-free, with fuse boxes made of cast resin
- Fuse assembly connected to the three-position switch-disconnector via welded-in bushings and connecting bars
- Arrangement of fuse assembly below the switchgear vessel
- Fuses can only be replaced if feeder is earthed
- Option: "Fuse tripped" indication for remote electrical indication with 1 normally open contact.

### Mode of operation

In the event that an HV HRC fuse-link has tripped, the switch is tripped via an articulation which is integrated into the cover of the fuse box (see figure).

In the event that the fuse tripping fails, e.g. if the fuse has been inserted incorrectly, the fuse box is protected by thermal protection. The overpressure generated by overheating trips the switch via the diaphragm in the cover of the fuse box and via an articulation. This breaks the current before the fuse box incurs irreparable damage.

This thermal protection works independently of the type and design of the HV HRC fuse used. Like the fuse itself, it is maintenance-free and independent of any outside climatic effects. Furthermore, the SIBA HV HRC fuses release the striker depending on the temperature and trip the three-position switch-disconnector as early as in the fuse overload range. Impermissible heating of the fuse box can be avoided in this way.

### Replacement of HV HRC fuse-links

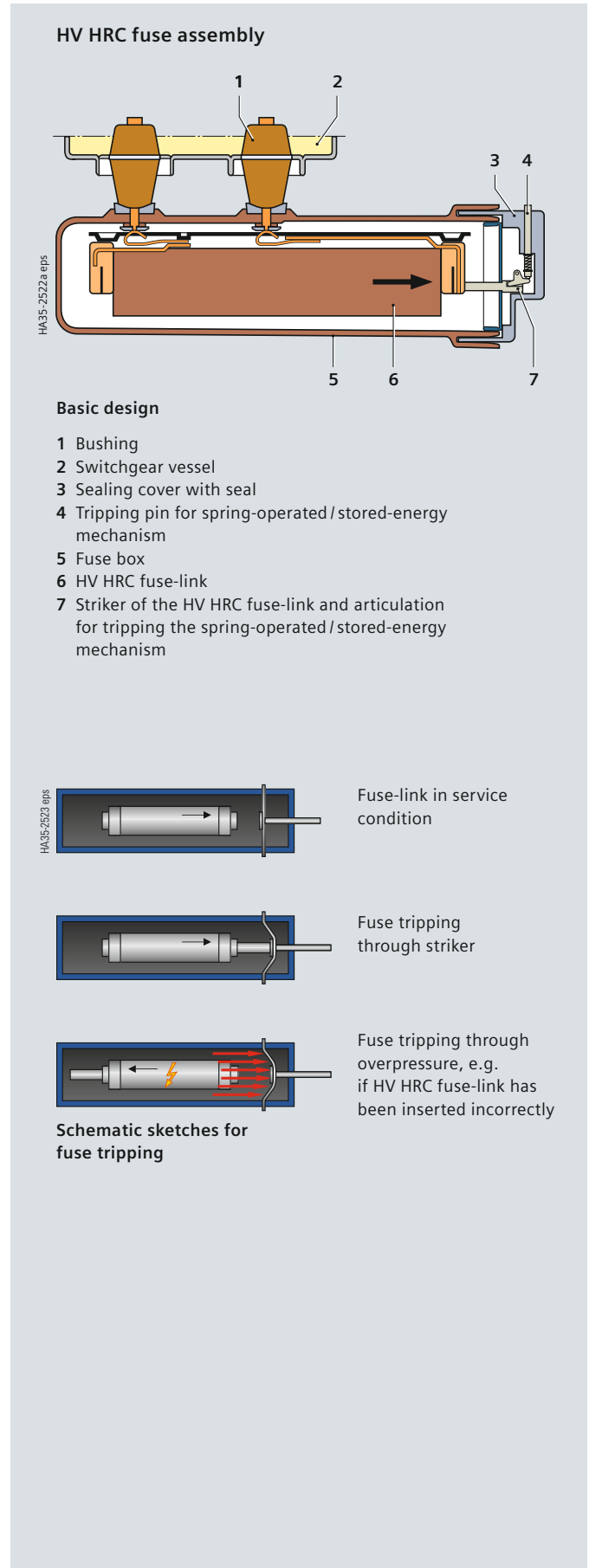
- The transformer feeder has to be isolated and earthed.
- Subsequent manual replacement of the HV HRC fuse-link after removing the cable compartment cover.

### Note to HV HRC fuse-links

According to IEC 60282-1 (2009) Clause 6.6, the breaking capacity of HV HRC fuses is tested within the scope of the type test at 87 % of their rated voltage.

In three-phase systems with resonance-earthed or isolated neutral, under double earth fault and other conditions, the full phase-to-phase voltage may be available at the HV HRC fuse during breaking. Depending on the size of the operating voltage of such a system, this applied voltage may then exceed 87 % of the rated voltage.

It must therefore already be ensured during configuration of the switching devices and selection of the HV HRC fuse that only such fuse-links are used, which either satisfy the above operating conditions, or whose breaking capacity was tested at least with the maximum system voltage. In case of doubt, a suitable HV HRC fuse must be selected together with the fuse manufacturer.



## Allocation of three-position switch-disconnector with HV HRC fuses, transformer ratings

The table shows the recommended HV HRC fuse-links make SIBA (electrical data valid for ambient air temperatures of up to 40 °C) for fuse protection of transformers.

### Recommendation

The three-position switch-disconnector in the transformer feeder (transformer switch) was combined with HV HRC fuse-links and tested in accordance with IEC 62271-105. Higher transformer ratings on request.

### Standards

- HV HRC fuse-links with striker in "medium" version according to
- IEC 60282
  - VDE 0670-4 and 402
  - DIN 43 625 main dimensions.

Note: The exact selection of the SIBA fuse to be used is given in the NXPLUS C operating and installation instructions.

Dimension "e" = 292 mm with extension tube SIBA 3400601

Transformer				HV HRC fuse			
Operating voltage $U$ kV	Rated power $S_N$ kVA	Relative impedance voltage $u_k$ %	Rated current $I_1$ A	Rated normal current of fuse $I_{fuse}$ A	Operating voltage $U_{fuse}$ kV	Dimension "e" mm	Order No. Make SIBA
3.3 to 3.6	20	4	3.5	6.3 10	3 to 7.2 3 to 7.2	292 292	30 098 13.6,3 30 098 13.10
	30	4	5.25	10 16	3 to 7.2 3 to 7.2	292 292	30 098 13.10 30 098 13.16
	50	4	8.75	16 20	3 to 7.2 3 to 7.2	292 292	30 098 13.16 30 098 13.20
	75	4	13.1	20 25	3 to 7.2 3 to 7.2	292 292	30 098 13.20 30 098 13.25
	100	4	17.5	31.5 40	3 to 7.2 3 to 7.2	292 292	30 098 13.31,5 30 098 13.40
	125	4	21.9	31.5 40	3 to 7.2 3 to 7.2	292 292	30 098 13.31,5 30 098 13.40
	160	4	28	40 50	3 to 7.2 3 to 7.2	292 292	30 098 13.40 30 098 13.50
	200	4	35	50 63	3 to 7.2 3 to 7.2	292 292	30 098 13.50 30 099 13.63
	250	4	43.7	63 80	3 to 7.2 3 to 7.2	292 292	30 099 13.63 30 099 13.80
	315	4	55.1	80 100	3 to 7.2 3 to 7.2	292 292	30 099 13.80 30 099 13.100
	400	4	70	100	3 to 7.2	292	30 099 13.100
4 to 4.8	20	4	2.9	6.3	3 to 7.2	292	30 098 13.6,3
	30	4	4.4	10	3 to 7.2	292	30 098 13.10
	50	4	7.3	16	3 to 7.2	292	30 098 13.16
	75	4	11	16 20	3 to 7.2 3 to 7.2	292 292	30 098 13.16 30 098 13.20
	100	4	14.5	20 25	3 to 7.2 3 to 7.2	292 292	30 098 13.20 30 098 13.25
	125	4	18.1	25 31.5	3 to 7.2 3 to 7.2	292 292	30 098 13.25 30 098 13.31,5
	160	4	23.1	31.5 40	3 to 7.2 3 to 7.2	292 292	30 098 13.31,5 30 098 13.40
	200	4	28.7	40 50	3 to 7.2 3 to 7.2	292 292	30 098 13.40 30 098 13.50
	250	4	36.1	50 63	3 to 7.2 3 to 7.2	292 292	30 098 13.50 30 099 13.63
	315	4	45.5	63 80	3 to 7.2 3 to 7.2	292 292	30 099 13.63 30 099 13.80
	400	4	57.8	80 100	3 to 7.2 3 to 7.2	292 292	30 099 13.80 30 099 13.100
5 to 5.5	20	4	2.3	6.3	3 to 7.2	292	30 098 13.6,3
	30	4	3.4	6.3 10	3 to 7.2 3 to 7.2	292 292	30 098 13.6,3 30 098 13.10
	50	4	5.7	10 16	3 to 7.2 3 to 7.2	292 292	30 098 13.10 30 098 13.16
	75	4	8.6	16 20	3 to 7.2 3 to 7.2	292 292	30 098 13.16 30 098 13.20
	100	4	11.5	16 20	3 to 7.2 3 to 7.2	292 292	30 098 13.16 30 098 13.20
	125	4	14.4	20 25	3 to 7.2 3 to 7.2	292 292	30 098 13.20 30 098 13.25
	(continued on next page)						

# Components

## Allocation of three-position switch-disconnector with HV HRC fuses, transformer ratings

Transformer				HV HRC fuse			
Operating voltage $U$ kV	Rated power $S_N$ kVA	Relative impedance voltage $u_k$ %	Rated current $I_1$ A	Rated normal current of fuse $I_{fuse}$ A	Operating voltage $U_{fuse}$ kV	Dimension "e" mm	Order No. Make SIBA
5 to 5.5	160	4	18.4	31.5	3 to 7.2	292	30 098 13.31,5
				40	3 to 7.2	292	30 098 13.40
	200	4	23	40	3 to 7.2	292	30 098 13.40
				50	3 to 7.2	292	30 098 13.50
	250	4	28.8	40	3 to 7.2	292	30 098 13.40
				50	3 to 7.2	292	30 098 13.50
	315	4	36.3	50	3 to 7.2	292	30 098 13.50
				63	3 to 7.2	292	30 099 13.63
400	4	46.1	63	3 to 7.2	292	30 099 13.63	
			80	3 to 7.2	292	30 099 13.80	
500	4	57.7	80	3 to 7.2	292	30 099 13.80	
			100	3 to 7.2	292	30 099 13.100	
630	4	72.74	100	3 to 7.2	292	30 099 13.100	
6 to 7.2	20	4	1.9	6.3	6 to 12	292	30 004 13.6,3
				6.3	3 to 7.2	292	30 098 13.6,3
				6.3	6 to 12	442	30 101 13.6,3
	30	4	2.8	6.3	6 to 12	292	30 004 13.6,3
				6.3	3 to 7.2	292	30 098 13.6,3
				6.3	6 to 12	442	30 101 13.6,3
	50	4	4.8	10	3 to 7.2	292	30 098 13.10
				10	6 to 12	292	30 004 13.10
				10	6 to 12	442	30 101 13.10
				16	3 to 7.2	292	30 098 13.16
				16	6 to 12	292	30 004 13.16
				16	6 to 12	442	30 101 13.16
	75	4	7.2	16	3 to 7.2	292	30 098 13.16
				16	6 to 12	292	30 004 13.16
				16	6 to 12	442	30 101 13.16
	100	4	9.6	16	3 to 7.2	292	30 098 13.16
				16	6 to 12	292	30 004 13.16
				16	6 to 12	442	30 101 13.16
				20	3 to 7.2	292	30 098 13.20
				20	6 to 12	292	30 004 13.20
				20	6 to 12	442	30 101 13.20
	125	4	12	20	3 to 7.2	292	30 098 13.20
				20	6 to 12	292	30 004 13.20
				20	6 to 12	442	30 101 13.20
				25	3 to 7.2	292	30 098 13.25
				25	6 to 12	292	30 004 13.25
				25	6 to 12	442	30 101 13.25
	160	4	15.4	31.5	3 to 7.2	292	30 098 13.31,5
				31.5	6 to 12	292	30 004 13.31,5
				31.5	6 to 12	442	30 101 13.31,5
	200	4	19.2	31.5	3 to 7.2	292	30 098 13.31,5
				31.5	6 to 12	292	30 004 13.31,5
				31.5	6 to 12	442	30 101 13.31,5
				40	3 to 7.2	292	30 098 13.40
				40	6 to 12	292	30 004 13.40
				40	6 to 12	442	30 101 13.40
	250	4	24	40	3 to 7.2	292	30 098 13.40
				40	6 to 12	292	30 004 13.40
				40	6 to 12	442	30 101 13.40
				50	3 to 7.2	292	30 098 13.50
				50	6 to 12	292	30 004 13.50
				50	6 to 12	442	30 101 13.50
	315	4	30.3	50	3 to 7.2	292	30 098 13.50
				50	6 to 12	292	30 004 13.50
				50	6 to 12	442	30 101 13.50
				63	6 to 12	292	30 012 43.63
	400	4	38.4	63	3 to 7.2	292	30 099 13.63
				63	6 to 12	292	30 012 13.63
63				6 to 12	442	30 102 13.63	
63				6 to 12	292	30 012 43.63	
80				6 to 12	292	30 012 43.80	
80				6 to 12	442	30 102 43.80	

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## Allocation of three-position switch-disconnector with HV HRC fuses, transformer ratings

Transformer				HV HRC fuse			
Operating voltage $U$ kV	Rated power $S_N$ kVA	Relative impedance voltage $u_k$ %	Rated current $I_1$ A	Rated normal current of fuse $I_{fuse}$ A	Operating voltage $U_{fuse}$ kV	Dimension "e" mm	Order No. Make SIBA
6 to 7.2	500	4	48	80	6 to 12	292	30 012 43.80
				80	6 to 12	442	30 102 43.80
				80	3 to 7.2	292	30 099 13.80
				80	6 to 12	292	30 012 13.80
				80	6 to 12	442	30 102 13.80
				100	6 to 12	292	30 012 43.100
	630	4	61	100	6 to 12	292	30 099 13.100
				100	6 to 12	292	30 012 13.100
				100	6 to 12	442	30 102 13.100
				100	6 to 12	292	30 012 43.100
				100	6 to 12	442	30 102 43.100
				125	6 to 12	292	30 020 43.125
125	6 to 12	442	30 103 43.125				
800	5 to 6	77	125	6 to 12	442	30 103 43.125	
7.6 to 8.4	20	4	1.5	6.3	6 to 12	292	30 004 13.6,3
				6.3	6 to 12	442	30 101 13.6,3
	30	4	2.27	5	6 to 12	292	30 004 13.5
				6.3	6 to 12	292	30 004 13.6,3
				6.3	6 to 12	442	30 101 13.6,3
	50	4	3.7	10	6 to 12	292	30 004 13.10
				10	6 to 12	442	30 101 13.10
	75	4	5.7	16	6 to 12	292	30 004 13.16
				16	6 to 12	442	30 101 13.16
	100	4	7.6	16	6 to 12	292	30 004 13.16
				16	6 to 12	442	30 101 13.16
	125	4	9.5	20	6 to 12	292	30 004 13.20
				20	6 to 12	442	30 101 13.20
	160	4	12.1	31.5	6 to 12	292	30 004 13.31,5
				31.5	6 to 12	442	30 101 13.31,5
	200	4	15.2	31.5	6 to 12	292	30 004 13.31,5
31.5				6 to 12	442	30 101 13.31,5	
250	4	19	40	6 to 12	292	30 004 13.40	
			40	6 to 12	442	30 101 13.40	
315	4	23.9	50	6 to 12	292	30 004 13.50	
			50	6 to 12	442	30 101 13.50	
400	4	30.3	63	6 to 12	292	30 012 13.63	
			63	6 to 12	442	30 102 13.63	
500	4	37.9	80	6 to 12	292	30 012 43.80	
			80	6 to 12	442	30 102 43.80	
630	4	47.8	100	6 to 12	292	30 012 43.100	
			100	6 to 12	442	30 102 43.100	
8.9	20	4	1.3	6.3	6 to 12	292	30 004 13.6,3
				6.3	6 to 12	442	30 101 13.6,3
	30	4	2	5	6 to 12	292	30 004 13.5
				6.3	6 to 12	292	30 004 13.6,3
				6.3	6 to 12	442	30 101 13.6,3
	50	4	3.3	10	6 to 12	292	30 004 13.10
				10	6 to 12	442	30 101 13.10
	75	4	4.9	16	6 to 12	292	30 004 13.16
				16	6 to 12	442	30 101 13.16
	100	4	6.5	16	6 to 12	292	30 004 13.16
				16	6 to 12	442	30 101 13.16
	125	4	8.1	20	6 to 12	292	30 004 13.20
20				6 to 12	442	30 101 13.20	
160	4	10.4	25	6 to 12	292	30 004 13.25	
			25	6 to 12	442	30 101 13.25	
200	4	13	31.5	6 to 12	292	30 004 13.31,5	
			31.5	6 to 12	442	30 101 13.31,5	
250	4	16.2	40	6 to 12	292	30 004 13.40	
			40	6 to 12	442	30 101 13.40	
315	4	20.5	50	6 to 12	292	30 004 13.50	
			50	6 to 12	442	30 101 13.50	

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# Components

## Allocation of three-position switch-disconnector with HV HRC fuses, transformer ratings

Transformer				HV HRC fuse			
Operating voltage $U$ kV	Rated power $S_N$ kVA	Relative impedance voltage $u_k$ %	Rated current $I_1$ A	Rated normal current of fuse $I_{fuse}$ A	Operating voltage $U_{fuse}$ kV	Dimension "e" mm	Order No. Make SIBA
8.9	400	4	26	63 63	6 to 12 6 to 12	292 442	30 012 13.63 30 102 13.63
	500	4	32.5	80 80	6 to 12 6 to 12	292 442	30 012 43.80 30 102 43.80
	630	4	41	100 100	6 to 12 6 to 12	292 442	30 012 43.100 30 102 43.100
10 to 12	20	4	1.15	4	6 to 12	292	30 004 13.4
	30	4	1.7	6.3	6 to 12	442	30 101 13.6,3
	50	4	2.9	10	6 to 12	292	30 004 13.10
				10	6 to 12	442	30 101 13.10
				10	10 to 17.5	292	30 255 13.10
				10	10 to 17.5	442	30 231 13.10
				10	10 to 24	442	30 006 13.10
	75	4	4.3	10	6 to 12	292	30 004 13.10
				10	6 to 12	442	30 101 13.10
				10	10 to 17.5	292	30 255 13.10
				10	10 to 17.5	442	30 231 13.10
				10	10 to 24	442	30 006 13.10
	100	4	5.8	16	6 to 12	292	30 004 13.16
				16	6 to 12	442	30 101 13.16
				16	10 to 17.5	292	30 255 13.16
				16	10 to 17.5	442	30 231 13.16
				16	10 to 24	442	30 006 13.16
	125	4	7.2	16	6 to 12	292	30 004 13.16
				16	6 to 12	442	30 101 13.16
				16	10 to 17.5	292	30 255 13.16
16				10 to 17.5	442	30 231 13.16	
16				10 to 24	442	30 006 13.16	
160	4	9.3	20	6 to 12	292	30 004 13.20	
			20	6 to 12	442	30 101 13.20	
			20	10 to 17.5	292	30 221 13.20	
			20	10 to 17.5	442	30 231 13.20	
			20	10 to 24	442	30 006 13.20	
200	4	11.5	25	6 to 12	292	30 004 13.25	
			25	6 to 12	442	30 101 13.25	
			25	10 to 17.5	292	30 221 13.25	
			25	10 to 17.5	442	30 231 13.25	
			25	10 to 24	442	30 006 13.25	
250	4	14.5	25	6 to 12	292	30 004 13.25	
			25	6 to 12	442	30 101 13.25	
			25	10 to 17.5	292	30 221 13.25	
			25	10 to 17.5	442	30 231 13.25	
			25	10 to 24	442	30 006 13.25	
			31.5	6 to 12	292	30 004 13.31,5	
			31.5	6 to 12	442	30 101 13.31,5	
			31.5	10 to 17.5	292	30 221 13.31,5	
			31.5	10 to 17.5	442	30 231 13.31,5	
315	4	18.3	31.5	6 to 12	292	30 004 13.31,5	
			31.5	6 to 12	442	30 101 13.31,5	
			31.5	10 to 17.5	292	30 221 13.31,5	
			31.5	10 to 17.5	442	30 231 13.31,5	
			31.5	10 to 24	442	30 006 13.31,5	
			40	6 to 12	292	30 004 13.40	
			40	6 to 12	442	30 101 13.40	
			40	10 to 17.5	292	30 221 13.40	
			40	10 to 17.5	442	30 231 13.40	
400	4	23.1	40	6 to 12	292	30 004 13.40	
			40	6 to 12	442	30 101 13.40	
			40	10 to 17.5	292	30 221 13.40	
			40	10 to 17.5	442	30 231 13.40	
			40	10 to 24	442	30 006 13.40	
			50	6 to 12	292	30 004 13.50	
			50	6 to 12	442	30 101 13.50	
			50	10 to 17.5	292	30 221 13.50	
			50	10 to 17.5	442	30 232 13.50	
(continued on next page)				50	10 to 24	442	30 014 13.50

## Allocation of three-position switch-disconnector with HV HRC fuses, transformer ratings

Transformer				HV HRC fuse			
Operating voltage $U$ kV	Rated power $S_N$ kVA	Relative impedance voltage $u_k$ %	Rated current $I_1$ A	Rated normal current of fuse $I_{fuse}$ A	Operating voltage $U_{fuse}$ kV	Dimension "e" mm	Order No. Make SIBA
10 to 12	500	4	29	50	6 to 12	292	30 004 13.50
				50	6 to 12	442	30 101 13.50
				50	10 to 17.5	292	30 221 13.50
				50	10 to 17.5	442	30 232 13.50
				50	10 to 24	442	30 014 13.50
				63	6 to 12	292	30 012 43.63
				63	10 to 24	442	30 014 43.63
				63	10 to 24	442	30 014 43.63
	630	4	36.4	63	6 to 12	292	30 012 13.63
				63	6 to 12	442	30 102 13.63
				63	10 to 17.5	442	30 232 13.63
				63	6 to 12	292	30 012 43.63
				63	10 to 24	442	30 014 43.63
				80	6 to 12	292	30 012 43.80
				80	6 to 12	442	30 102 43.80
				80	10 to 24	442	30 014 43.80
	800	5 to 6	46.2	63	6 to 12	292	30 012 13.63
				63	6 to 12	442	30 102 13.63
				80	6 to 12	292	30 012 43.80
				80	6 to 12	442	30 102 43.80
1000	5 to 6	58	100	6 to 12	292	30 012 43.100	
			100	6 to 12	442	30 102 43.100	
			100	10 to 24	442	30 022 43.100	
1250	5 to 6	72	125	6 to 12	292	30 020 43.125	
			125	6 to 12	442	30 103 43.125	
12.4 to 13.4	20	4	0.94	4	10 to 24	442	30 006 13.4
	30	4	1.4	6.3	10 to 24	442	30 006 13.6,3
				6.3	10 to 24	442	30 231 13.6,3
	50	4	2.4	10	10 to 17.5	442	30 231 13.10
				10	10 to 24	442	30 006 13.10
	75	4	3.5	10	10 to 17.5	442	30 231 13.10
				10	10 to 24	442	30 006 13.10
	100	4	4.7	16	10 to 17.5	442	30 231 13.16
				16	10 to 24	442	30 006 13.16
	125	4	5.9	16	10 to 17.5	442	30 231 13.16
				16	10 to 24	442	30 006 13.16
	160	4	7.5	16	10 to 17.5	442	30 231 13.16
				16	10 to 24	442	30 006 13.16
	200	4	9.4	20	10 to 17.5	442	30 231 13.20
				20	10 to 24	442	30 006 13.20
	250	4	11.7	25	10 to 17.5	442	30 231 13.25
				31.5	10 to 17.5	442	30 231 13.31,5
				25	10 to 24	442	30 006 13.25
31.5				10 to 24	442	30 006 13.31,5	
315	4	14.7	31.5	10 to 17.5	442	30 231 13.31,5	
			31.5	10 to 24	442	30 006 13.31,5	
400	4	18.7	40	10 to 17.5	442	30 231 13.40	
			40	10 to 24	442	30 006 13.40	
500	4	23.3	50	10 to 17.5	442	30 232 13.50	
			50	10 to 24	442	30 014 13.50	
630	4	29.4	63	10 to 17.5	442	30 232 13.63	
			63	10 to 24	442	30 014 13.63	
800	5 to 6	37.3	80	10 to 24	442	30 014 43.80	
13.8	20	4	0.8	3.15	10 to 24	442	30 006 13.3,15
	30	4	1.25	4	10 to 24	442	30 006 13.4
				4	10 to 24	442	30 006 13.4
	50	4	2.1	6.3	10 to 17.5	442	30 231 13.6,3
				6.3	10 to 24	442	30 006 13.6,3
	75	4	3.2	6.3	10 to 17.5	442	30 231 13.6,3
				10	10 to 17.5	442	30 231 13.10
				10	10 to 24	442	30 006 13.10
	100	4	4.2	10	10 to 17.5	442	30 231 13.10
				16	10 to 17.5	442	30 231 13.16
16				10 to 24	442	30 006 13.16	
125	4	5.3	10	10 to 17.5	442	30 231 13.10	
			16	10 to 17.5	442	30 231 13.16	
			16	10 to 24	442	30 006 13.16	

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# Components

## Allocation of three-position switch-disconnector with HV HRC fuses, transformer ratings

Transformer				HV HRC fuse			
Operating voltage $U$ kV	Rated power $S_N$ kVA	Relative impedance voltage $u_k$ %	Rated current $I_1$ A	Rated normal current of fuse $I_{fuse}$ A	Operating voltage $U_{fuse}$ kV	Dimension "e" mm	Order No. Make SIBA
13.8	160	4	6.7	16	10 to 17.5	442	30 231 13.16
	200	4	8.4	16	10 to 17.5	442	30 231 13.16
				20	10 to 17.5	442	30 231 13.20
				20	10 to 24	442	30 006 13.20
	250	4	10.5	20	10 to 17.5	442	30 231 13.20
				25	10 to 17.5	442	30 231 13.25
				25	10 to 24	442	30 006 13.25
	315	4	13.2	25	10 to 17.5	442	30 231 13.25
				31.5	10 to 17.5	442	30 231 13.31,5
				31.5	10 to 24	442	30 006 13.31,5
	400	4	16.8	31.5	10 to 17.5	442	30 231 13.31,5
			31.5	10 to 24	442	30 006 13.31,5	
500	4	21	40	10 to 17.5	442	30 231 13.40	
			40	10 to 24	442	30 006 13.40	
630	4	26.4	50	10 to 17.5	442	30 232 13.50	
			50	10 to 24	442	30 014 13.50	
800	5 to 6	33.5	63	10 to 17.5	442	30 232 13.63	
			63	10 to 24	442	30 014 13.63	
			63	10 to 24	442	30 014 43.63	
1000	5 to 6	41.9	80	10 to 24	442	30 014 43.80	
1250	5 to 6	52.3	100	10 to 24	442	30 022 43.100	
14.4	20	4	0.8	3.15	10 to 24	442	30 006 13.3,15
	30	4	1.2	3.15	10 to 24	442	30 006 13.3,15
	50	4	2	6.3	10 to 17.5	442	30 231 13.6,3
				6.3	10 to 24	442	30 006 13.6,3
	75	4	3	6.3	10 to 17.5	442	30 231 13.6,3
				6.3	10 to 24	442	30 006 13.6,3
	100	4	4	10	10 to 17.5	442	30 231 13.10
				16	10 to 17.5	442	30 231 13.16
				16	10 to 24	442	30 006 13.16
	125	4	5	10	10 to 17.5	442	30 231 13.10
				16	10 to 17.5	442	30 231 13.16
				16	10 to 24	442	30 006 13.16
	160	4	6.5	16	10 to 17.5	442	30 231 13.16
				16	10 to 24	442	30 006 13.16
	200	4	8	16	10 to 17.5	442	30 231 13.16
				16	10 to 24	442	30 006 13.16
				20	10 to 17.5	442	30 231 13.20
20				10 to 24	442	30 006 13.20	
250	4	10	20	10 to 17.5	442	30 231 13.20	
			20	10 to 24	442	30 006 13.20	
			25	10 to 17.5	442	30 231 13.25	
			25	10 to 24	442	30 006 13.25	
315	4	12.6	20	10 to 17.5	442	30 231 13.20	
			20	10 to 24	442	30 006 13.20	
			25	10 to 17.5	442	30 231 13.25	
			25	10 to 24	442	30 006 13.25	
400	4	16.1	31.5	10 to 17.5	442	30 231 13.31,5	
			31.5	10 to 24	442	30 006 13.31,5	
500	4	20.1	40	10 to 17.5	442	30 231 13.40	
			40	10 to 24	442	30 006 13.40	
630	4	25.3	50	10 to 17.5	442	30 232 13.50	
			50	10 to 24	442	30 014 13.50	
800	5 to 6	32.1	63	10 to 24	442	30 014 43.63	
1000	5 to 6	40.1	80	10 to 24	442	30 014 43.80	
1250	5 to 6	50.2	100	10 to 24	442	30 022 43.100	
15 to 17.5	20	4	0.77	3.15	10 to 24	442	30 006 13.3,15
	30	4	1.15	3.15	10 to 24	442	30 006 13.3,15
	50	4	1.9	6.3	10 to 17.5	442	30 231 13.6,3
				6.3	10 to 24	442	30 006 13.6,3
	75	4	2.9	6.3	10 to 17.5	442	30 231 13.6,3
	100	4	3.9	10	10 to 17.5	442	30 231 13.10
	125	4	4.8	16	10 to 17.5	442	30 231 13.16
				16	10 to 24	442	30 006 13.16
	160	4	6.2	16	10 to 17.5	442	30 231 13.16
	200	4	7.7	20	10 to 17.5	442	30 231 13.20
				20	10 to 24	442	30 006 13.20

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## Allocation of three-position switch-disconnector with HV HRC fuses, transformer ratings

Transformer				HV HRC fuse				
Operating voltage $U$ kV	Rated power $S_N$ kVA	Relative impedance voltage $u_k$ %	Rated current $I_1$ A	Rated normal current of fuse $I_{fuse}$ A	Operating voltage $U_{fuse}$ kV	Dimension "e" mm	Order No. Make SIBA	
15 to 17.5	250	4	9.7	25 25	10 to 17.5 10 to 24	442 442	30 231 13.25 30 006 13.25	
	315	4	12.2	31.5 31.5	10 to 17.5 10 to 24	442 442	30 231 13.31,5 30 006 13.31,5	
	400	4	15.5	31.5 31.5	10 to 17.5 10 to 24	442 442	30 231 13.31,5 30 006 13.31,5	
	500	4	19.3	31.5 31.5 40 40	10 to 17.5 10 to 24 10 to 17.5 10 to 24	442 442 442 442	30 231 13.31,5 30 006 13.31,5 30 231 13.40 30 006 13.40	
	630	4	24.3	40 40 50 50 63	10 to 17.5 10 to 24 10 to 17.5 10 to 24 10 to 24	442 442 442 442 442	30 231 13.40 30 006 13.40 30 232 13.50 30 014 13.50 30 014 43.63	
	800	5 to 6	30.9	63	10 to 24	442	30 014 43.63	
	1000	5 to 6	38.5	63 80	10 to 24 10 to 24	442 442	30 014 43.63 30 014 43.80	
	1250	5 to 6	48.2	100	10 to 24	442	30 022 43.100	
	18 to 19	20	4	0.64	3.15	10 to 24	442	30 006 13.3,15
		30	4	0.96	3.15	10 to 24	442	30 006 13.3,15
50		4	1.6	6.3	10 to 24	442	30 006 13.6,3	
75		4	2.4	6.3	10 to 24	442	30 006 13.6,3	
100		4	3.2	10	10 to 24	442	30 006 13.10	
125		4	4	10	10 to 24	442	30 006 13.10	
160		4	5.1	16	10 to 24	442	30 006 13.16	
200		4	6.4	16	10 to 24	442	30 006 13.16	
250		4	8.1	20	10 to 24	442	30 006 13.20	
315		4	10.1	25	10 to 24	442	30 006 13.25	
400		4	12.9	31.5	10 to 24	442	30 006 13.31,5	
500		4	16.1	31.5 40	10 to 24 10 to 24	442 442	30 006 13.31,5 30 006 13.40	
630		4	20.2	40 50 63	10 to 24 10 to 24 10 to 24	442 442 442	30 006 13.40 30 006 13.50 30 014 43.63	
800		4 to 5	25.7	50 63	10 to 24 10 to 24	442 442	30 014 13.50 30 014 43.63	
1000		5 to 6	32.1	63	10 to 24	442	30 014 43.63	
1250	5 to 6	40.1	80	10 to 24	442	30 014 43.80		
20 to 23	20	4	0.57	3.15	10 to 24	442	30 006 13.3,15	
	30	4	0.86	3.15	10 to 24	442	30 006 13.3,15	
	50	4	1.5	6.3	10 to 24	442	30 006 13.6,3	
	75	4	2.2	6.3	10 to 24	442	30 006 13.6,3	
	100	4	2.9	6.3	10 to 24	442	30 006 13.6,3	
	125	4	3.6	10	10 to 24	442	30 006 13.10	
	160	4	4.7	10	10 to 24	442	30 006 13.10	
	200	4	5.8	16	10 to 24	442	30 006 13.16	
	250	4	7.3	16	10 to 24	442	30 006 13.16	
	315	4	9.2	16 20	10 to 24 10 to 24	442 442	30 006 13.16 30 006 13.20	
	400	4	11.6	20 25	10 to 24 10 to 24	442 442	30 006 13.20 30 006 13.25	
	500	4	14.5	25 31.5	10 to 24 10 to 24	442 442	30 006 13.25 30 006 13.31,5	
	630	4	18.2	31.5 40	10 to 24 10 to 24	442 442	30 006 13.31,5 30 006 13.40	
	800	5 to 6	23.1	31.5	10 to 24	442	30 006 13.31,5	
	1000	5 to 6	29	50	10 to 24	442	30 014 13.50	
	1250	5 to 6	36	50 63	10 to 24 10 to 24	442 442	30 014 13.50 30 014 43.63	
	1600	5 to 6	46.5	80 100	10 to 24 10 to 24	442 442	30 014 43.80 30 022 43.100	
	2000	5 to 6	57.8	100	10 to 24	442	30 022 43.100	

# Components

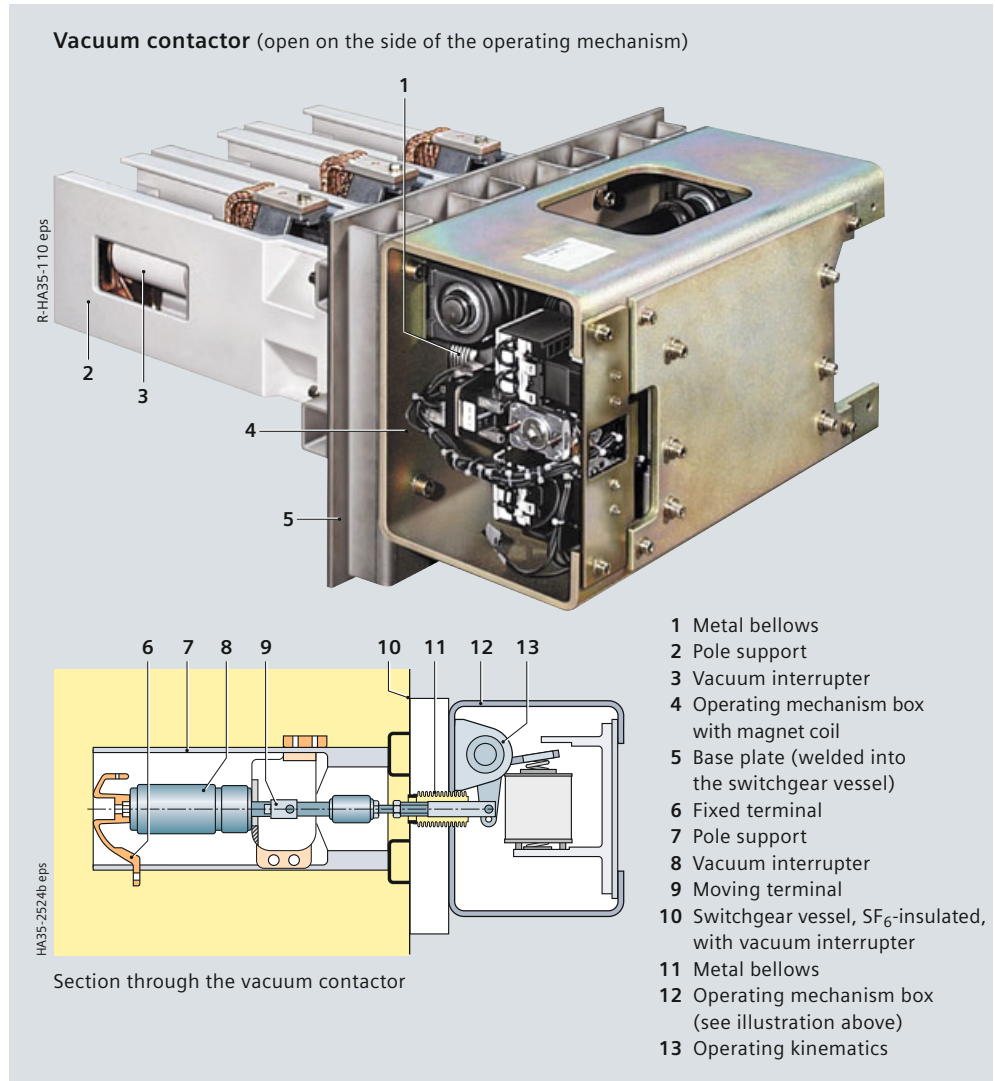
## Vacuum contactor, motor protection

### Features

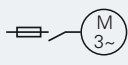
- According to IEC 60470 and VDE 0670-501 (for standards, see page 66)
- Application in hermetically welded switchgear vessel in conformity with the system
- Climate-independent vacuum interrupter poles in the SF<sub>6</sub>-filled switchgear vessel
- Maintenance-free for indoor installation according to IEC 62271-1 and VDE 0671-1
- Individual secondary equipment
- A metal bellows is used for gasketless separation of the SF<sub>6</sub> insulation and the operating mechanism (already used with success for over 2 million vacuum interrupters)
- Magnet coil for operation located outside the switchgear vessel
- 100,000 or 500,000 operating cycles at rated normal current.

### Short-circuit and overload protection in connection with motors

In circuits subjected to short-circuit currents, HV HRC fuse-links protect switching devices (e.g. vacuum contactors) without short-circuit breaking capacity. The instant when the motor starts represents the maximum stress for the HV HRC fuse-links (starting currents, starting time and starting frequency). Motor starting must neither operate nor pre-damage the fuses.



### Motor protection table (see also note on page 34)

 Number of starts per hour	Maximum permissible motor starting current in A at rated normal current of HV HRC fuse										
	40 A	50 A	63 A	80 A	100 A	125 A	160 A	200 A	224 A	250 A	
HV motors with starting times up to 5 s	3.3 to 7.2 kV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	>7.2 to 12 kV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
	>12 to 23 kV	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
HV motors with starting times up to 15 s	2	95	115	135	160	210	415	560	765	860	960
	4	85	105	120	145	190	370	500	705	840	960
	8	75	95	110	130	170	340	455	640	760	960
	16	70	85	95	115	150	300	405	575	680	925
	32	63	75	85	105	140	270	370	520	615	840
HV motors with starting times up to 30 s	2	90	105	120	145	190	335	445	625	730	960
	4	80	95	110	130	170	300	400	560	655	890
	8	70	85	100	120	155	270	360	510	595	805
	16	65	75	90	105	140	240	325	455	535	720
	32	60	70	80	95	125	220	290	410	485	655

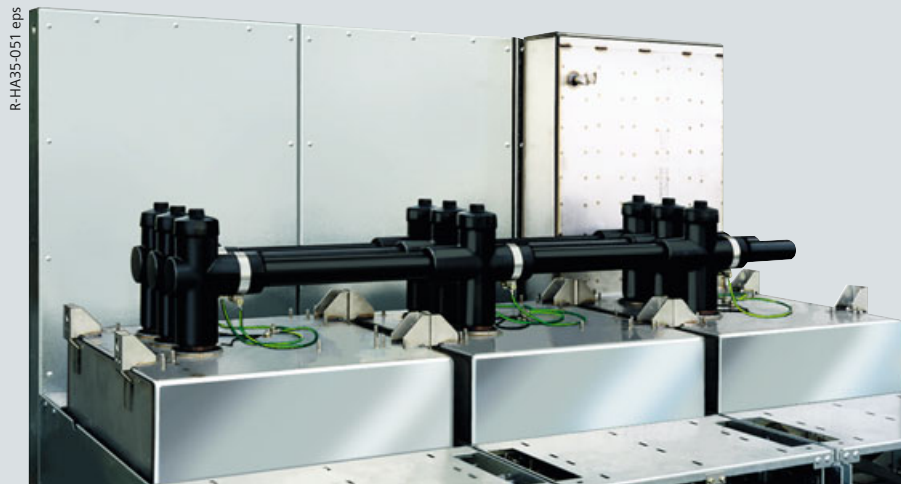
### Features

- 1-pole, plug-in and bolted design
- Consisting of round-bar copper, insulated by means of silicone rubber
- Busbar joints with cross and end adapters, insulated by means of silicone rubber
- Field control by means of electrically conductive layers on the silicone-rubber insulation (both inside and outside)
- Touchable as the external layers are earthed with the switchgear vessel
- Insensitive to pollution and condensation
- Safe-to-touch due to metal cover
- Switchgear extension or panel replacement is possible without SF<sub>6</sub> gas work.

### Possible components

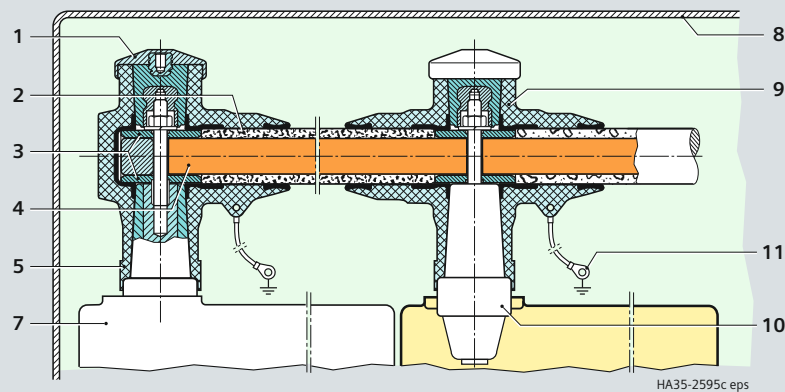
- Current transformers
- Voltage transformers
- Surge arresters
- Cables with T-plug
- Fully-insulated bars (e.g. make Duresca).

### Busbars (example)

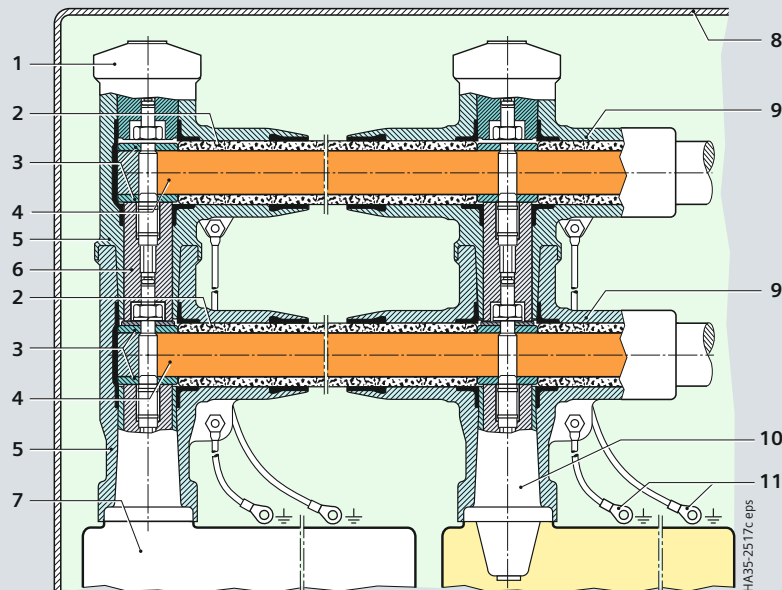


### Busbars 1250 A, plug-in type, fully insulated

(as front view of three panels, without low-voltage compartments)



Section of 1250 A busbar (basic design)  
Panel width 600 mm



Section of 1600 A, 2000 A or 2500 A busbar (basic design)  
Panel width 600 mm

### Legend

- 1 Cap
- 2 Busbar insulation made of silicone rubber
- 3 Clamps
- 4 Busbar (round-bar copper)
- 5 End adapter or coupling end adapter
- 6 Connection bolt
- 7 Switchgear vessel
- 8 Metal cover of busbars
- 9 Cross adapter or coupling cross adapter
- 10 Bushing
- 11 Earthing connection

# Components

## Current transformers

### Features

- According to IEC 61869-2 and VDE 0414-9-2
- Designed as ring-core current transformers, 1-pole
- Free of dielectrically stressed cast-resin parts (due to design)
- Insulation class E
- Inductive type
- Certifiable
- Climate-independent
- Secondary connection by means of a terminal strip in the low-voltage compartment of the panel.

### Installation

- Arranged outside the primary enclosure (switchgear vessel).

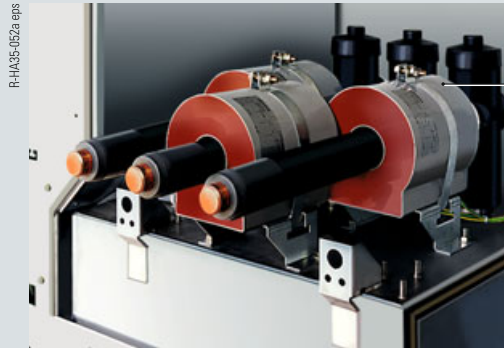
### Mounting locations

- At the busbar (1)
- At the panel connection (2)
- Around the cable (3).

### Current transformer types

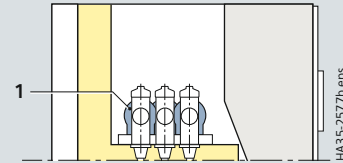
- Busbar current transformer (1):
  - Inside  $\varnothing$  of transformer 56 mm /  $\leq$  1250 A and 55 x 355 mm /  $>$  1250 A
  - Usable height max. 160 mm at  $\leq$  1250 A max. 130 mm at  $>$  1250 A
- Feeder current transformer (2):
  - Inside  $\varnothing$  of transformer 106 mm /  $\leq$  1250 A and 100 x 200 mm /  $>$  1250 A
  - Max. usable height 205 mm
- Cable-type current transformer (3) for shielded cables:
  - Inside  $\varnothing$  of transformer 55 mm
  - Max. usable height 170 mm
- Zero-sequence current transformer (4) underneath the panels (included in the scope of supply); on-site installation.

### Current transformers



- 1 Busbar current transformer
- 2 Feeder current transformer at the panel connection
- 3 Cable-type current transformer
- 4 Zero-sequence current transformer

Side views:

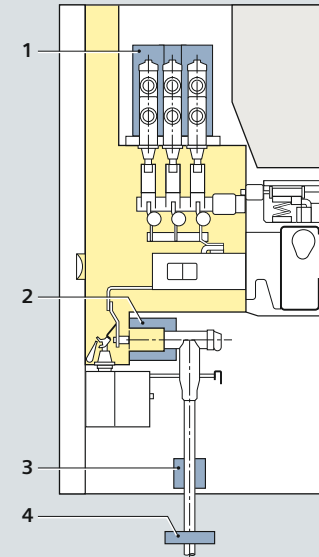
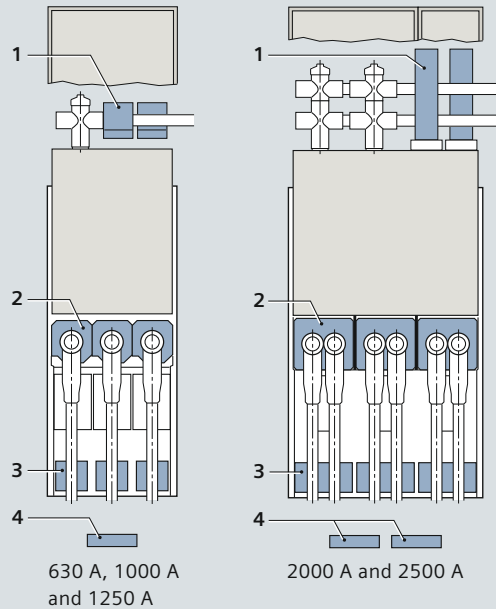


Panel with busbar 1250 A

### Busbar current transformers

Example 1250 A

Front views:



Panel with busbar 2500 A

### Current transformer installation (basic scheme)

### Electrical data

Designation	Type 4MC
Operating voltage	max. 0.8 kV
Rated short-duration power-frequency withstand voltage (winding test)	3 kV
Rated frequency	50/60 Hz
Rated continuous thermal current	1.0; 1.2; 1.33; 1.5; 2.0 x rated current (primary)
Rated thermal short-time current, max. 3 s	max. 31.5 kA
Rated current	dynamic primary unlimited 40 A to 2500 A secondary 1 A and 5 A

Designation	Type 4MC
Multiratio (secondary)	200 A – 100 A to 2500 A – 1250 A
Core data according to rated primary current:	max. 3 cores
Measuring core	Rating Class 2.5 VA to 30 VA 0.2 to 1 Overcurrent factor FS 5, FS 10
Protection core	Rating Class 2.5 VA to 30 VA 5 P or 10 P Overcurrent factor 10 to 30
Permissible ambient air temperature	max. 60 °C
Insulation class	E

### Features

- According to IEC 61869-3 and VDE 0414-9-3
- 1-pole, plug-in design
- Connection system with plug-in contact
- Inductive type
- Safe-to-touch due to metal cover
- Certifiable
- Climate-independent
- Secondary connection by means of plugs inside the panel
- Cast-resin insulated
- Arranged outside the primary enclosure (switchgear vessel)
- Mounting locations:
  - At the busbar
  - At the panel connection.

### Voltage transformer types

- Busbar voltage transformer 4MT2:
  - Pluggable in the cross adapters of the busbar  $\leq 1250$  A using additional adapters ( $> 1250$  A on request)
  - No separate metering panel required
  - Suitable for 80 % of the rated short-duration power-frequency withstand voltage at rated frequency
  - Repeat test at 80 % of the rated short-duration power-frequency withstand voltage possible with mounted voltage transformer (also valid for higher insulation ratings according to GOST and GB standards)
- Feeder voltage transformer 4MT3 at the panel connection:
  - Switchable through an SF<sub>6</sub>-insulated disconnecting facility in the switchgear vessel
  - Positions: "CLOSED" and "Transformer bushing EARTHED"
  - Operation of the disconnecting facility from outside through a metal bellows welded in the switchgear vessel
  - Voltage testing of switchgear and cables possible with mounted and earthed voltage transformer
- Feeder voltage transformer 4MU2 at the panel connection of the incoming sectionalizer (side B)
  - Connection to bushing with short, flexible cable.

### Voltage transformers

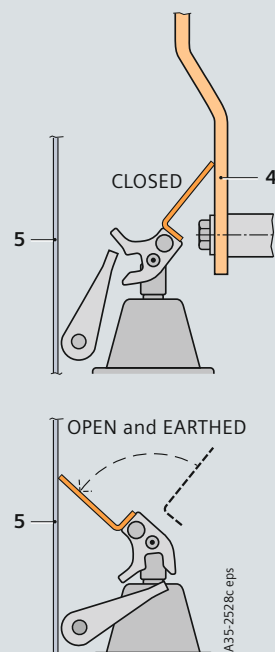
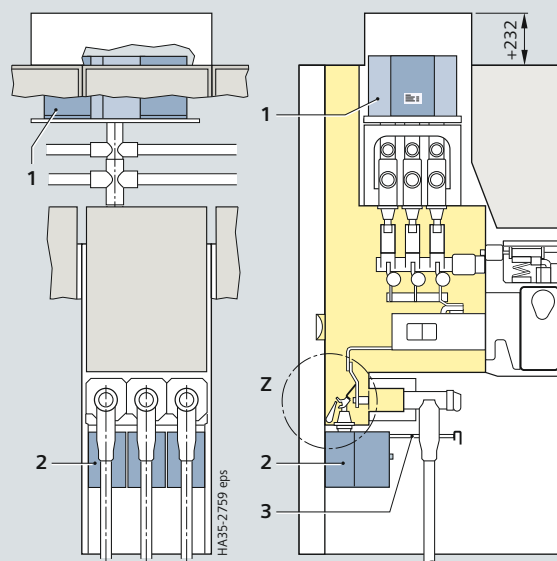
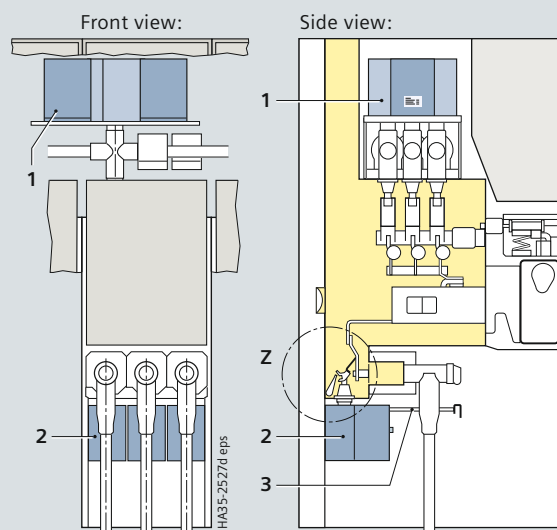


**Feeder voltage transformer**  
(metal-coated)  
4MT3



**Busbar voltage transformer**  
(metal-enclosed)  
4MT2

### Voltage transformer installation (basic design)



**Disconnecting facility for feeder voltage transformer**  
(detail Z)

- 1 Busbar voltage transformer
- 2 Feeder voltage transformer at the panel connection
- 3 Operating lever for disconnecting facility
- 4 Panel connection
- 5 Switchgear vessel wall (earthed)

# Components

## Voltage transformers

### Electrical data

#### Primary data

For types 4MT3, 4MT2 and 4MU2

For operating voltages from 3.3 kV to 23 kV, rated voltage factor  $U_n/8h = 1.9$ ;  $U_n/\text{continuous} = 1.2$

Rated voltage kV	Rated short-duration power-frequency withstand voltage kV	Rated lightning impulse withstand voltage kV	Standard	Operating voltage kV
3.6	10	20	IEC	$3.3/\sqrt{3}$
7.2	20	60	IEC	$3.6/\sqrt{3}$ ; $4.0/\sqrt{3}$ ; $4.16/\sqrt{3}$ ; $4.2/\sqrt{3}$ ; $4.8/\sqrt{3}$ ; $5.0/\sqrt{3}$ ; $5.5/\sqrt{3}$ ; $6.0/\sqrt{3}$ ; $6.24/\sqrt{3}$ ; $6.3/\sqrt{3}$ ; $6.6/\sqrt{3}$ ; $6.9/\sqrt{3}$
	32	60	GOST	$6.0/\sqrt{3}$ ; $6.3/\sqrt{3}$ ; $6.6/\sqrt{3}$
12	28	75	IEC	$7.2/\sqrt{3}$ ; $7.6/\sqrt{3}$ ; $8.0/\sqrt{3}$ ; $8.3/\sqrt{3}$ ; $8.4/\sqrt{3}$ ; $8.9/\sqrt{3}$ ; $10/\sqrt{3}$ ; $10.5/\sqrt{3}$ ; $11/\sqrt{3}$ ; $11.4/\sqrt{3}$ ; $11.5/\sqrt{3}$ ; $11.6/\sqrt{3}$
	38	75	GOST	$10/\sqrt{3}$ ; $10.5/\sqrt{3}$ ; $11/\sqrt{3}$
	42	75	GB	$10/\sqrt{3}$ ; $10.5/\sqrt{3}$ ; $11/\sqrt{3}$
17.5	38	95	IEC	$12/\sqrt{3}$ ; $12.4/\sqrt{3}$ ; $12.47/\sqrt{3}$ ; $12.5/\sqrt{3}$ ; $12.8/\sqrt{3}$ ; $13.2/\sqrt{3}$ ; $13.4/\sqrt{3}$ ; $13.8/\sqrt{3}$ ; $14.4/\sqrt{3}$ ; $15/\sqrt{3}$ ; $15.8/\sqrt{3}$ ; $16/\sqrt{3}$ ; $17/\sqrt{3}$
24	50	125	IEC	$17.5/\sqrt{3}$ ; $18/\sqrt{3}$ ; $19/\sqrt{3}$ ; $20/\sqrt{3}$ ; $22/\sqrt{3}$ ; $23/\sqrt{3}$

#### Secondary data

For type	Operating voltage V	Auxiliary winding V	Thermal limit current (measuring winding) A	Rated long- time current 8 h A	Rating at accuracy class			
					0.2 VA	0.5 VA	1 VA	3 VA
4MT3 4MU2	$100/\sqrt{3}$ ; $110/\sqrt{3}$ ; $120/\sqrt{3}$	100/3; 110/3; 120/3	6	4	IEC			
					10, 15, 20, 25, 30	10, 15, 20, 25, 30, 45, 50, 60, 75, 90	10, 15, 20, 25, 30, 45, 50, 60, 75, 90, 100, 120, 150, 180	10, 15, 20, 25, 30, 45, 50, 60, 75, 90, 100, 120, 150, 180
					GOST 32/60 kV			
					10, 15, 20, 25, 30	10, 15, 20, 25, 30, 45, 50, 60, 75, 90	10, 15, 20, 25, 30, 45, 50, 60, 75, 90, 100, 120, 150, 180	10, 15, 20, 25, 30, 45, 50, 60, 75, 90, 100, 120, 150, 180
GOST 42/75 kV, GB 42/75 kV								
					10, 15, 20, 25	10, 15, 20, 25, 30, 45, 50, 60, 75	10, 15, 20, 25, 30, 45, 50, 60, 75, 90, 100, 120, 150	10, 15, 20, 25, 30, 45, 50, 60, 75, 90, 100, 120, 150
4MT2	$100/\sqrt{3}$ ; $110/\sqrt{3}$ ; $120/\sqrt{3}$	100/3; 110/3; 120/3	8	6	IEC			
					5, 10, 15, 20, 25	10, 15, 20, 25, 30, 45	10, 15, 20, 25, 30, 45, 50, 60, 75	10, 15, 20, 25, 30, 45, 50, 60, 75
					GOST 32/60 kV			
					5	10, 15	10, 15, 20, 25, 30	10, 15, 20, 25, 30
GOST 42/75 kV, GB 42/75 kV								
					5, 10	10, 15, 20, 25, 30	10, 15, 20, 25, 30, 45, 50, 60	10, 15, 20, 25, 30, 45, 50, 60

GOST : Russian standard  
GB : Chinese standard

### Design

- Modular design per panel
- Various elements for flexible design of the evacuation
- Pressure flap insertion element for wall penetration (masonry opening).

### Dimensions

- Height of switchgear panel 2640 mm
- Minimum room height  $\geq 2750$  mm
- See dimensions of evacuation elements on the next page.

### Tests

- Type-tested design.

### Installation

- The horizontal pressure relief duct on the panel is installed on site
- Evacuation elements according to constructional planning.

NXPLUS C with horizontal pressure relief duct



Example: 3 panels NXPLUS C with pressure relief duct and evacuation to the left



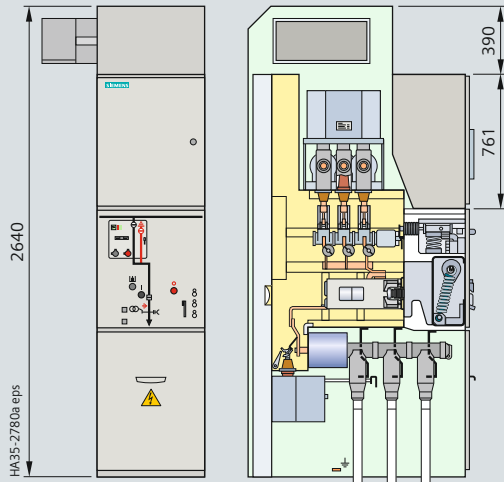
Example for evacuation outside the substation room



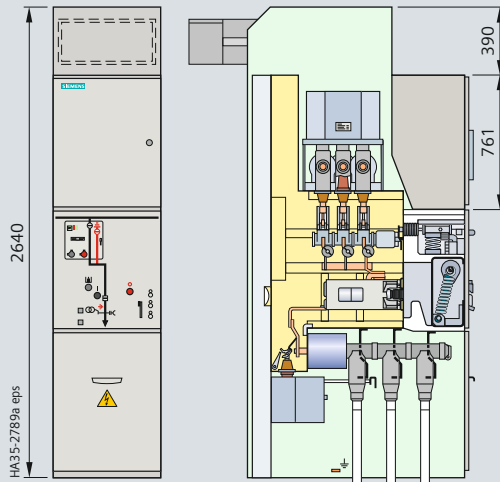
# Components

## Horizontal pressure relief duct, dimensions

### NXPLUS C with horizontal pressure relief duct and evacuation

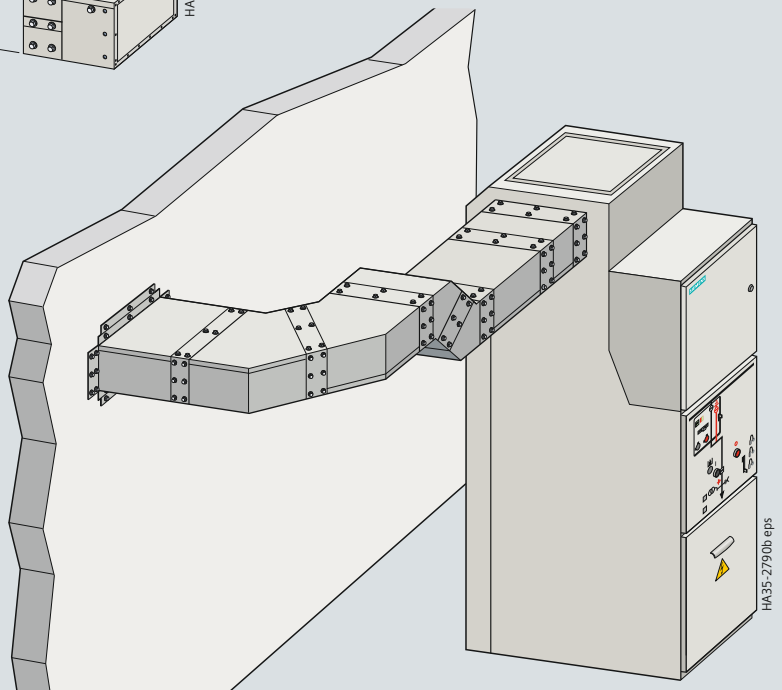
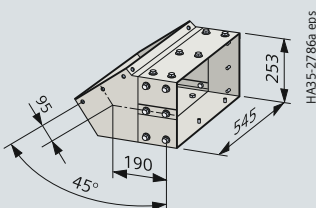
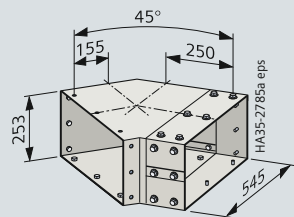
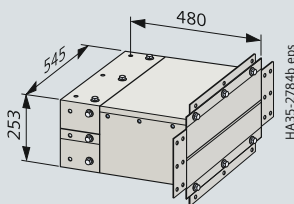
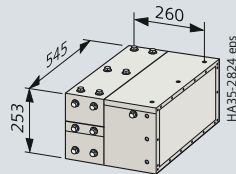
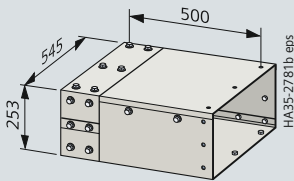
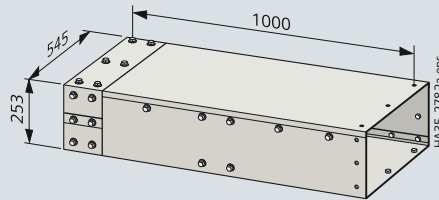
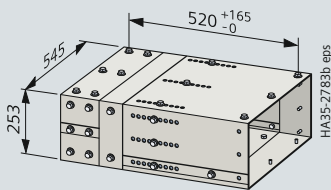


Evacuation to the left (also possible to the right)



Evacuation to the rear

### Elements for the evacuation duct





### Features

- Bushings with outside cone
- With bolted contact (M16) as interface type "C" according to EN 50 180/EN 50 181
- For cable connection heights, see table on the right
- Max. connection depth: 584 mm or 732 mm with standard cable compartment cover, 752 mm with deep cable compartment cover
- With cable bracket type C40 according to DIN EN 50 024
- Option: Access to the cable compartment only if the feeder has been isolated and earthed
- For thermoplastic-insulated cables
- For shielded cable T-plugs or cable elbow plugs with bolted contact
- For connection cross-sections up to 1200 mm<sup>2</sup>
- Larger cross-sections on request
- Cable routing downwards, cable connection from the front
- Option: Cable routing upwards to the rear, cable connection from the rear (only for circuit-breaker panel 1250 A)
- For rated normal currents up to 2500 A
- Cable T-plugs are not included in the scope of supply.

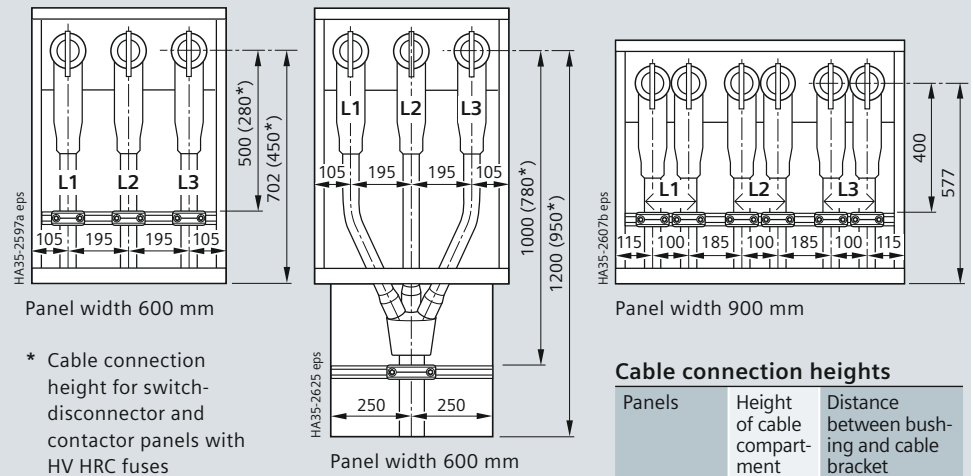
### Surge arresters

- Pluggable on cable T-plug
- Surge arresters recommended if, at the same time,
  - the cable system is directly connected to the overhead line,
  - 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 with starting currents < 600 A are connected.

### Cable compartment

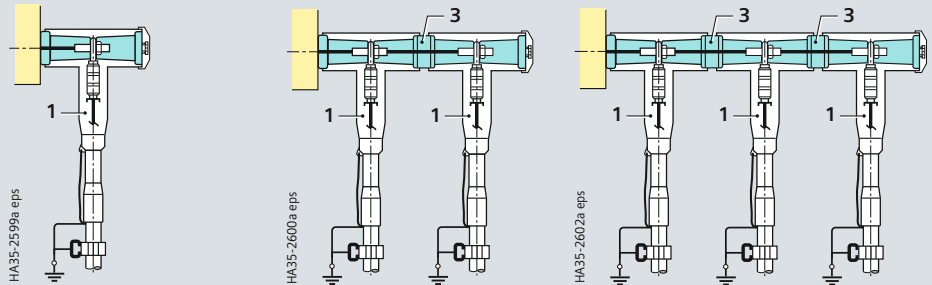


\* Cable connection height for switch-disconnector and contactor panels with HV HRC fuses

### Connectable cables

Cable T-plug with coupling insert

- Panel width 600 mm
- Panel width 900 mm



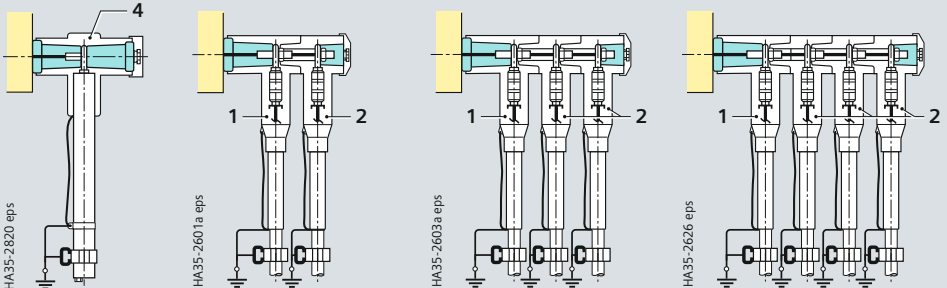
- Connection with 1 cable per phase
- Connection with 2 cables per phase

- Connection with 2 cables per phase
- Connection with 4 cables per phase

- Connection with 3 cables per phase
- Connection with 6 cables per phase

### Solid-insulated bar

### Cable T-plug with coupling T-plug



- Connection with 2 cables per phase
- Connection with 4 cables per phase

- Connection with 3 cables per phase
- Connection with 6 cables per phase

- Connection with 4 cables per phase
- Connection with 8 cables per phase

### Legend

- Cable T-plug
- Coupling T-plug
- Screw-type coupling insert
- End adapter

# Components

## Panel connection (commercially available cable T-plugs)

Cable type	Cable T-plugs			Comment
	Make	Type	Cross-section mm <sup>2</sup>	
<b>Thermoplastic-insulated cables ≤ 12 kV according to IEC 60502-2 and VDE 0276-620</b>				
Single-core cable, PE and XLPE-insulated N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	<b>Nexans Euromold</b>	400TB/G	35 to 300	EPDM with semi-conductive layer
		430TB/G	35 to 300	EPDM with semi-conductive layer
		440TB/G	400 to 630	EPDM with semi-conductive layer
		484TB/G	50 to 630	EPDM with semi-conductive layer
		489TB/G	800 to 1200	EPDM with semi-conductive layer
	<b>nkt cables</b>	CB 12-630	25 to 300	Silicone with semi-conductive layer (optionally with metal housing)
		CB 17.5-630	25 to 500	Silicone with semi-conductive layer
		CB 24-1250-2	185 to 500	Silicone with semi-conductive layer
		CB 36-630(1250)	400 to 630	Silicone with semi-conductive layer
		CB 42-1250-3	630 to 1000	Silicone with semi-conductive layer
<b>Südkabel</b>	SET 12	50 to 300	Silicone with semi-conductive layer (optionally with metal housing)	
	SEHDT 13	400 to 500	Silicone with semi-conductive layer (optionally with metal housing)	
<b>Tyco Electronics Raychem</b>	RSTI-58xx	25 to 300	Silicone with semi-conductive layer, with capacitive measuring point	
	RSTI-395x	400 to 800	Silicone with semi-conductive layer, with capacitive measuring point	
<b>3M</b>	93-EE 705-6	50 to 240	Silicone with semi-conductive layer (optionally with metal housing)	
	93-EE 715-6	300 to 400	Silicone with semi-conductive layer (optionally with metal housing)	
<b>GCA</b>	CJB10-630	35 to 500	Silicone with semi-conductive layer	
<b>ABB Kabeldon</b>	CSE-A 12630-xx	25 to 630	EPDM with semi-conductive layer	
<b>Cellpack</b>	CTS 630A 24kV	50 to 400	EPDM with semi-conductive layer, with capacitive measuring point	
<b>Ample</b>	AQT3-15/630	25 to 400	EPDM with semi-conductive layer	
Three-core cable PE and XLPE-insulated N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	<b>Nexans Euromold</b>	400TB/G	35 to 300	EPDM with semi-conductive layer, in combination with distribution kit
		430TB/G	35 to 300	EPDM with semi-conductive layer, in combination with distribution kit
	<b>nkt cables</b>	CB 12-630	25 to 300	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit
		CB 24-1250-2	185 to 500	Silicone with semi-conductive layer, in combination with distribution kit
		CB 17.5-630	25 to 500	Silicone with semi-conductive layer, in combination with distribution kit
	<b>Südkabel</b>	SET 12	50 to 300	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit
		SEHDT 13	400 to 500	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit
	<b>Tyco Electronics Raychem</b>	RSTI-58xx	25 to 300	Silicone with semi-conductive layer, with capacitive measuring point, in combination with distribution kit RSTI-TRFOx
		93-EE 705-6	50 to 240	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit
	<b>3M</b>	93-EE 715-6	300 to 400	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit
<b>GCA</b>	CJB10-630	25 to 500	Silicone with semi-conductive layer, in combination with distribution kit	
<b>ABB Kabeldon</b>	CSE-A 12630-xx	25 to 630	EPDM with semi-conductive layer, in combination with distribution kit	
<b>Cellpack</b>	CTS 630A 24kV	50 to 400	EPDM with semi-conductive layer, with capacitive measuring point in combination with distribution kit	
<b>Ample</b>	AQT3-15/630	25 to 400	EPDM with semi-conductive layer, in combination with distribution kit	
<b>Thermoplastic-insulated cables 15/17.5/24 kV according to IEC 60502-2 and VDE 0276-620</b>				
Single-core cable, PE and XLPE-insulated N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	<b>Nexans Euromold</b>	K400TB/G	35 to 300	EPDM with semi-conductive layer
		K430TB/G	35 to 300	EPDM with semi-conductive layer
		K440TB/G	400 to 630	EPDM with semi-conductive layer
		K484TB/G	35 to 630	EPDM with semi-conductive layer
		K489TB/G	800 to 1200	EPDM with semi-conductive layer
	<b>nkt cables</b>	CB 24-630	25 to 300	Silicone with semi-conductive layer (optionally with metal housing)
		CB 24-1250-2	95 to 500	Silicone with semi-conductive layer
		CB 36-630(1250)	400 to 630	Silicone with semi-conductive layer
		CB 42-1250-3	630 to 1000	Silicone with semi-conductive layer
	<b>Südkabel</b>	SET 24	50 to 300	Silicone with semi-conductive layer (optionally with metal housing)
SEHDT 23		400 to 500	Silicone with semi-conductive layer (optionally with metal housing)	
<b>Tyco Electronics Raychem</b>	RSTI-58xx	25 to 300	Silicone with semi-conductive layer, with capacitive measuring point	
	RSTI-595x	400 to 800	Silicone with semi-conductive layer, with capacitive measuring point	
<b>3M</b>	93-EE 705-6	25 to 240	Silicone with semi-conductive layer (optionally with metal housing)	
	93-EE 715-6	300 to 400	Silicone with semi-conductive layer (optionally with metal housing)	
<b>GCA</b>	CJB20-630	35 to 500	Silicone with semi-conductive layer	
<b>ABB Kabeldon</b>	CSE-A 24630-xx	25 to 630	EPDM with semi-conductive layer	
<b>Cellpack</b>	CTS 630A 24kV	25 to 300	EPDM with semi-conductive layer, with capacitive measuring point	
<b>Ample</b>	AQT3-24/630	35 to 500	EPDM with semi-conductive layer	
Three-core cable PE and XLPE-insulated N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	<b>Nexans Euromold</b>	K400TB/G	35 to 300	EPDM with semi-conductive layer, in combination with distribution kit
		K430TB/G	35 to 300	EPDM with semi-conductive layer, in combination with distribution kit
	<b>nkt cables</b>	CB 24-630	25 to 300	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit
CB 24-1250-2		185 to 500	Silicone with semi-conductive layer, in combination with distribution kit	
<b>Südkabel</b>	SET 24	50 to 300	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit	
	SEHDT 23	400 to 500	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit	

## Panel connection (commercially available cable T-plugs)

Cable type	Cable T-plugs			Comment
	Make	Type	Cross-section mm <sup>2</sup>	

### Thermoplastic-insulated cables 15/17.5/24 kV according to IEC 60502-2 and VDE 0276-620

Three-core cable PE and XLPE-insulated N2YSY (Cu) and N2XSX (Cu) or NA2YSY (Al) and NA2XSX (Al)	<b>Tyco Electronics Raychem</b>	RSTI-58xx	25 to 300	Silicone with semi-conductive layer, with capacitive measuring point, in combination with distribution kit RSTI-TRFOx
	<b>3M</b>	93-EE 705-6	25 to 240	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit
		93-EE 715-6	300 to 400	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit
	<b>GCA</b>	CJB20-630	25 to 500	Silicone with semi-conductive layer, in combination with distribution kit
	<b>ABB Kabeldon</b>	CSE-A 24630-xx	25 to 630	EPDM with semi-conductive layer, in combination with distribution kit
	<b>Cellpack</b>	CTS 630A 24kV	25 to 300	EPDM with semi-conductive layer, with capacitive measuring point in combination with distribution kit
	<b>Ample</b>	AQT3-24/630	35 to 500	EPDM with semi-conductive layer, in combination with distribution kit

### Paper-insulated belted cables (non-draining cables) ≤ 12 kV according to IEC 60 055 and VDE 0255

Three-core cable paper-insulated NKBA (Cu), NKBY (Cu), NKRA (Cu) and NKFA (Cu) or NAKBA (Al), NAKBY (Al), NAKRA (Al) and NAKFA (Al)	<b>Nexans Euromold</b>	400TB/G	35 to 300	EPDM with semi-conductive layer, in combination with distribution kit MIND
		430TB/G	35 to 300	EPDM with semi-conductive layer, in combination with distribution kit MIND
	<b>nkt cables</b>	CB 24-630	25 to 240	Silicone with semi-conductive layer (optionally with metal housing), in combination with transition sealing end type SÜEV 10

### Paper-insulated belted cables (non-draining cables) ≤ 12 kV according to GOST 18410-73

Three-core cable paper-insulated ASB and ASBL	<b>Nexans Euromold</b>	400TB/G	35 to 300	EPDM with semi-conductive layer, in combination with distribution kit MIND
		430TB/G	35 to 300	EPDM with semi-conductive layer, in combination with distribution kit MIND
	<b>nkt cables</b>	CB 24-630	25 to 240	Silicone with semi-conductive layer (optionally with metal housing), in combination with transition sealing end type SÜEV 10

### Paper-insulated belted cables (mass-impregnated cables) ≤ 12 kV according to IEC 60055 and VDE 0255

Three-core cable paper-insulated NKBA (Cu), NKBY (Cu), NKRA (Cu) and NKFA (Cu) or NAKBA (Al), NAKBY (Al), NAKRA (Al) and NAKFA (Al)	<b>nkt cables</b>	CB 24-630	25 to 240	Silicone with semi-conductive layer (optionally with metal housing), in combination with transition sealing end type SÜEV 10
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### Paper-insulated belted cables (mass-impregnated cables) ≤ 12 kV according to GOST 18410-73

Three-core cable paper-insulated ASB and ASBL	<b>nkt cables</b>	CB 24-630	25 to 240	Silicone with semi-conductive layer (optionally with metal housing), in combination with transition sealing end type SÜEV 10
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### Commercially available bar systems

Type of bar	Bar connection				Remarks
	Make	Type	Conductor material	Max. rated current	
Solid-insulated bar	<b>MGC Moser Glaser</b>	Duresca DE	Copper	1250 A / 2500 A	Outer sheath made of polyamide (polyamide tube)
		Duresca DG	Copper	1250 A / 2500 A	Outer sheath made of CrNi steel or aluminum (metal sheath)
	<b>Preissinger</b>	ISOBUS MB	Copper	1250 A / 2500 A	Outer sheath made of epoxy resin (if required with heat shrinkable tube)
	<b>Ritz</b>	SIS	Copper	1250 A / 2500 A	Outer sheath made of epoxy resin (if required with heat shrinkable tube)

### Surge-proof end cover

				Remark
Make	Type	Size	"Rated voltage	
<b>3M</b>	SP 33	Outside cone type "C"	12 kV	Silicone with semi-conductive layer
	SP 33	Outside cone type "C"	24 kV	
<b>Nexans Euromold</b>	400DR-B	Outside cone type "C"	12 kV	EPDM with semi-conductive layer
	K400DR-B	Outside cone type "C"	24 kV	
<b>nkt cables</b>	CBC 40.5-630	Outside cone type "C"	12 kV	Silicone with semi-conductive layer
	CBC 40.5-630	Outside cone type "C"	24 kV	
<b>Südkabel</b>	SP 33	Outside cone type "C"	12 kV	Silicone with semi-conductive layer
	SP 33	Outside cone type "C"	24 kV	
<b>Cellpack</b>	CIK	Outside cone type "C"	12 kV	EPDM with semi-conductive layer
	CIK	Outside cone type "C"	24 kV	
<b>Ample</b>	AJM-15/630	Outside cone type "C"	12 kV	EPDM with semi-conductive layer
	AJM-24/630	Outside cone type "C"	24 kV	

# Components

## Installation possibilities for cable connections and surge arresters, single-core PE and XLPE-insulated

Number of cables per panel and phase	Make	Conductor cross-section 1) mm <sup>2</sup>	Cable T-plugs	Coupling inserts/ coupling plugs	Surge arresters with coupling inserts		According to standard	
			bolted 12 kV 24 kV	bolted 12 kV 24 kV	Arresters	Coupling inserts		
• Circuit-breaker panel 630 A, 1000 A • Switch-disconnector panel 630 A • Disconnector panel 1000 A • Ring-main panel 630 A • Contactor panel • Circuit-breaker panel with top-rear cable connection 1250 A 2)								
1	Nexans Euromold	35 to 300	1x 400TB/G 1x K400TB/G 1x K400TB/G-CSxxx	– – –	400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL	
		35 to 300	1x 430TB/G 1x K430TB/G 1x K430TB/G-CSxxx	– – –	300SA-5(10)SA 300SA-5(10)SA 300SA-5(10)SA	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL	
		400 to 630	1x 440TB/G 1x K440TB/G 1x K440TB/G-CSxxx	– – –	400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL	
		50 to 630 35 to 630	1x 484TB/G 1x K484TB/G	– –	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC	
		800 to 1200	1x 489TB/G 1x K489TB/G	– –	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC	
	Südkabel	50 to 300 25 to 240	1x SET 12 1x SET 24	– –	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		300 to 500 300 to 630	1x SEHDT 13 1x SEHDT 23	– –	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		nkt cables	25 to 300 25 to 500 25 to 300	1x CB 12-630 1x CB 17.5-630 1x CB 24-630	– – –	CSA 12-x CSA 17,5-x CSA 24-x	– – –	IEC GOST, GB/DL IEC, GOST, GB/DL
	185 to 500 95 to 500		1x CB 24-1250-2 1x CB 24-1250-2	– –	CSA 12-x CSA 24-x	– –	IEC IEC	
	400 to 630		1x CB 36-630(1250) 1x CB 36-630(1250)	– –	CSA 12-x CSA 24-x	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
	630 to 1000		1x CB 42-1250-3 1x CB 42-1250-3	– –	CSA 12-x CSA 24-x	– –	IEC IEC	
	Tyco Electronics Raychem	25 to 300	1x RSTI-58xx 1x RSTI-58xx	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	IEC IEC	
		25 to 300	1x RSTI-58xx-CEE01 1x RSTI-58xx-CEE01	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	GOST GOST	
		400 to 800	1x RSTI-395x 1x RSTI-595x	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	IEC IEC	
		400 to 800	1x RSTI-595x-CEE01 1x RSTI-595x-CEE01	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	GOST GOST	
	3M	50 to 240 25 to 240	1x 93-EE 705-6 1x 93-EE 705-6	– –	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		300 to 400	1x 93-EE 715-6 1x 93-EE 715-6	– –	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
	GCA	35 to 500 25 to 500	1x CJB10-630 1x CJB20-630	– –	– –	– –	GB/DL GB/DL	
		ABB Kabeldon	25 to 630	1x CSE-A 12630-xx 1x CSE-A 24630-xx	– –	– –	– –	IEC, GOST IEC, GOST
	Cellpack		50 to 400 25 to 300	1x CTS 630A 24kV 1x CTS 630A 24kV	– –	CTKSA CTKSA	– –	IEC IEC
		Ample	25 to 400 35 to 500	1x AQT3-15/630 1x AQT3-24/630	– –	AHY5WZ7 AHY5WZ7	– –	GB/DL GB/DL
	2		Nexans Euromold	35 to 300	2x 400TB/G 2x K400TB/G 2x K400TB/G-CSxxx	1x 400CP 1x K400CP 1x K400CP	– – –	– – –
		35 to 300		1x 430TB/G 1x K430TB/G 1x K430TB/G-CSxxx	1x 300PB/G 1x K300PB/G 1x K300PB/G-CSxxx	300SA-5(10)SA 300SA-5(10)SA 300SA-5(10)SA	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL
		400 to 630		2x 440TB/G 2x K440TB/G 2x K440TB/G-CSxxx	1x 440CP 1x K440CP 1x K440CP	– – –	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL
		50 to 630 35 to 630		1x 484TB/G 1x K484TB/G	1x 804PB/G 1x K804PB/G	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC
		800 to 1200		1x 489TB/G 1x K489TB/G	1x 809PB/G 1x K809PB/G	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC
		Südkabel	50 to 300 25 to 240	1x SET 12 1x SET 24	1x SEHDK 13.1 1x SEHDK 23.1	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
			50 to 300 25 to 240	2x SET 12 2x SET 24	1x KU 23.2 1x KU 23.2	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
			300 to 500 300 to 630	2x SEHDT 13 2x SEHDT 23	1x KU 23 1x KU 23	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL

1) Observe the actual short-circuit and current carrying capacity of the cables and sealing ends

2) At a normal current of more than 1150 A, cable sealing ends with tin-plated, nickel-plated or silver-plated cable lugs are required

## Installation possibilities for cable connections and surge arresters, single-core PE and XLPE-insulated

Number of cables per panel and phase	Make	Conductor cross-section <sup>1)</sup> mm <sup>2</sup>	Cable T-plugs	Coupling inserts/ coupling plugs	Surge arresters with coupling inserts		According to standard
			bolted 12 kV 24 kV	bolted 12 kV 24 kV	Arresters	Coupling inserts	
<ul style="list-style-type: none"> <li>• Circuit-breaker panel 630 A, 1000 A • Switch-disconnector panel 630 A • Disconnector panel 1000 A • Ring-main panel 630 A</li> <li>• Contactor panel • Circuit-breaker panel with top-rear cable connection 1250 A <sup>2)</sup></li> </ul>							
2	nkt cables	25 to 300	1x CB 12-630	1x CC 12-630	CSA 12-x	–	IEC
		25 to 500	1x CB 17.5-630	1x CC 17.5-630	CSA 17,5-x	–	GOST, GB/DL
		25 to 300	1x CB 24-630	1x CC 24-630	CSA 24-x	–	IEC, GOST, GB/DL
		25 to 300	2x CB 12-630	1x CP 630-C	CSA 12-x	–	IEC
			2x CB 24-630	1x CP 630-C	CSA 24-x	–	IEC, GOST, GB/DL
		185 to 500	1x CB 24-1250-2	1x CC 24-1250-2	CSA 12-x	–	IEC
		95 to 500	1x CB 24-1250-2	1x CC 24-1250-2	CSA 24-x	–	IEC
	185 to 500	2x CB 24-1250-2	1x CP 630-C	CSA 12-x	–	IEC	
	95 to 500	2x CB 24-1250-2	1x CP 630-C	CSA 24-x	–	IEC	
	400 to 630	1x CB 36-630(1250)	1x CC 36-630(1250)	CSA 12-x	–	IEC, GOST, GB/DL	
		1x CB 36-630(1250)	1x CC 36-630(1250)	CSA 24-x	–	IEC, GOST, GB/DL	
	400 to 630	2x CB 36-630(1250)	1x CP 630-M16	CSA 12-x	–	IEC, GOST, GB/DL	
		2x CB 36-630(1250)	1x CP 630-M16	CSA 24-x	–	IEC, GOST, GB/DL	
	630 to 1000	1x CB 42-1250-3	1x CC 42-2500-3	CSA 12-x	–	IEC	
		1x CB 42-1250-3	1x CC 42-2500-3	CSA 24-x	–	IEC	
	Tyco Electronics Raychem	25 to 300	1x RSTI-58xx	1x RSTI-CC-58xx	RSTI-CC-58SAxxxx	–	IEC
			1x RSTI-58xx	1x RSTI-CC-58xx	RSTI-CC-68SAxxxx	RSTI-SA-PIN	IEC
		25 to 300	1x RSTI-58xx-CEE01	1x RSTI-CC-58xx-CEE01	RSTI-CC-58SAxxxx	–	GOST
			1x RSTI-58xx-CEE01	1x RSTI-CC-58xx-CEE01	RSTI-CC-68SAxxxx	RSTI-SA-PIN	GOST
	400 to 800	1x RSTI-395x	1x RSTI-CC-395x	RSTI-CC-58SAxxxx	–	IEC	
		1x RSTI-595x	1x RSTI-CC-595x	RSTI-CC-68SAxxxx	RSTI-SA-PIN	IEC	
	400 to 800	1x RSTI-595x-CEE01	1x RSTI-CC-595x-CEE01	RSTI-CC-58SAxxxx	–	GOST	
		1x RSTI-595x-CEE01	1x RSTI-CC-595x-CEE01	RSTI-CC-68SAxxxx	RSTI-SA-PIN	GOST	
	3M	50 to 240	2x 93-EE 705-6	1x KU 23.2	–	–	IEC, GOST, GB/DL
		25 to 240	2x 93-EE 705-6	1x KU 23.2	–	–	IEC, GOST, GB/DL
		240	1x 93-EE 705-6	1x 93-EE 718-6	–	–	IEC, GOST, GB/DL
	150 to 240	1x 93-EE 705-6	1x 93-EE 718-6	–	–	IEC, GOST, GB/DL	
	300 to 400	2x 93-EE 715-6	1x KU 23.2	–	–	IEC, GOST, GB/DL	
		2x 93-EE 715-6	1x KU 23.2	–	–	IEC, GOST, GB/DL	
	GCA	35 to 500	1x CJB10-630	1x CJBK10-630	–	–	GB/DL
25 to 500		1x CJB20-630	1x CJBK20-630	–	–	GB/DL	
ABB Kabeldon	25 to 630	2x CSE-A 12630-xx	PC 630-3	–	–	IEC, GOST	
		2x CSE-A 24630-xx	PC 630-3	–	–	IEC, GOST	
Cellpack	50 to 400	2x CTS 630A 24kV	1x CKS 630A 24kV	–	–	IEC	
	25 to 300	2x CTS 630A 24kV	1x CKS 630A 24kV	–	–	IEC	
50 to 240	1x CTS 630A 24kV	1x CTKS 630A 24kV	CTKSA	–	IEC		
25 to 240	1x CTS 630A 24kV	1x CTKS 630A 24kV	CTKSA	–	IEC		
Ample	25 to 400	1x AQT3-15/630	1x AHT3-15/630	AHY5WZ7	–	GB/DL	
	35 to 500	1x AQT3-24/630	1x AHT3-24/630	AHY5WZ7	–	GB/DL	
3	Nexans Euromold	35 to 300	1x 430TB/G	2x 300PB/G	–	–	IEC, GOST, GB/DL
			1x K430TB/G	2x K300PB/G	–	–	IEC
			1x K430TB/G-CSxxx	2x K300PB/G-CSxxx	–	–	GOST, GB/DL
	50 to 630	1x 484TB/G	2x 804PB/G	–	–	IEC	
	35 to 630	1x K484TB/G	2x K804PB/G	–	–	IEC	
	800 to 1200	1x 489TB/G	2x 809PB/G	–	–	IEC	
		1x K489TB/G	2x K809PB/G	–	–	IEC	
	nkt cables	25 to 300	1x CB 12-630	2x CC 12-630	–	–	IEC
		25 to 500	1x CB 17.5-630	2x CC 17.5-630	–	–	GOST, GB/DL
		25 to 300	1x CB 24-630	2x CC 24-630	–	–	IEC, GOST, GB/DL
		185 to 500	1x CB 24-1250-2	2x CC 24-1250-2	–	–	IEC
		95 to 500	1x CB 24-1250-2	2x CC 24-1250-2	–	–	IEC
	400 to 630	1x CB 36-630(1250)	2x CC 36-630(1250)	–	–	IEC, GOST, GB/DL	
		1x CB 36-630(1250)	2x CC 36-630(1250)	–	–	IEC, GOST, GB/DL	
	630 to 1000	1x CB 42-1250-3	2x CC 42-2500-3	–	–	IEC	
	1x CB 42-1250-3	2x CC 42-2500-3	–	–	IEC		
Tyco Electronics Raychem	25 to 300	1x RSTI-58xx	2x RSTI-CC-58xx	–	–	IEC	
		1x RSTI-58xx	2x RSTI-CC-58xx	–	–	IEC	
	25 to 300	1x RSTI-58xx-CEE01	2x RSTI-CC-58xx-CEE01	–	–	GOST	
		1x RSTI-58xx-CEE01	2x RSTI-CC-58xx-CEE01	–	–	GOST	
400 to 800	1x RSTI-395x	2x RSTI-CC-395x	–	–	IEC		
	1x RSTI-595x	2x RSTI-CC-595x	–	–	IEC		
400 to 800	1x RSTI-595x-CEE01	2x RSTI-CC-595x-CEE01	–	–	GOST		
	1x RSTI-595x-CEE01	2x RSTI-CC-595x-CEE01	–	–	GOST		
Cellpack	50 to 240	1x CTS 630A 24kV	2x CTKS 630A 24kV	–	–	IEC	
	25 to 240	1x CTS 630A 24kV	2x CTKS 630A 24kV	–	–	IEC	

1) Observe the actual short-circuit and current carrying capacity of the cables and sealing ends

2) At an operating current more than 1150 A only sealing ends with zinc-plated, nickel-plated or silver-plated cable lugs are permissible

# Components

## Installation possibilities for cable connections and surge arresters, single-core PE and XLPE-insulated

Number of cables per panel and phase	Make	Conductor cross-section <sup>1)</sup> mm <sup>2</sup>	Cable T-plugs	Coupling inserts/ coupling plugs	Surge arresters with coupling inserts		According to standard		
			bolted 12 kV 24 kV	bolted 12 kV 24 kV	Arresters	Coupling inserts			
• Circuit-breaker panel 1250 A <sup>2)</sup> • Disconnector panel 1250 A <sup>2)</sup> • DBB circuit-breaker panel 1000 A • DBB incoming sectionalizer <sup>2)</sup>									
1	Nexans Euromold	35 to 300	1x 400TB/G 1x K400TB/G 1x K400TB/G-CSxxx	– – –	– – –	400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL	
		35 to 300	1x 430TB/G 1x K430TB/G 1x K430TB/G-CSxxx	– – –	– – –	300SA-5(10)SA 300SA-5(10)SA 300SA-5(10)SA	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL	
		400 to 630	1x 440TB/G 1x K440TB/G 1x K440TB/G-CSxxx	– – –	– – –	400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL	
		50 to 630 35 to 630	1x 484TB/G 1x K484TB/G	– –	– –	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC	
		800 to 1200	1x 489TB/G 1x K489TB/G	– –	– –	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC	
	Südkabel	50 to 300 25 to 240	1x SET 12 1x SET 24	– –	– –	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		300 to 500 300 to 630	1x SEHDT 13 1x SEHDT 23	– –	– –	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		nkt cables	25 to 300 25 to 500 25 to 300	1x CB 12-630 1x CB 17.5-630 1x CB 24-630	– – –	– – –	CSA 12-x CSA 17,5-x CSA 24-x	– – –	IEC GOST, GB/DL IEC, GOST, GB/DL
	185 to 500 95 to 500		1x CB 24-1250-2 1x CB 24-1250-2	– –	– –	CSA 12-x CSA 24-x	– –	IEC IEC	
	400 to 630		1x CB 36-630(1250) 1x CB 36-630(1250)	– –	– –	CSA 12-x CSA 24-x	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
	630 to 1000		1x CB 42-1250-3 1x CB 42-1250-3	– –	– –	CSA 12-x CSA 24-x	– –	IEC IEC	
	Tyco Electronics Raychem		25 to 300	1x RSTI-58xx 1x RSTI-58xx	– –	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	IEC IEC
		25 to 300	1x RSTI-58xx-CEE01 1x RSTI-58xx-CEE01	– –	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	GOST GOST	
		400 to 800	1x RSTI-395x 1x RSTI-595x	– –	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	IEC IEC	
		400 to 800	1x RSTI-595x-CEE01 1x RSTI-595x-CEE01	– –	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	GOST GOST	
	3M	50 to 240 25 to 240	1x 93-EE 705-6 1x 93-EE 705-6	– –	– –	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		300 to 400	1x 93-EE 715-6 1x 93-EE 715-6	– –	– –	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		GCA	35 to 500 25 to 500	1x CJB10-630 1x CJB20-630	– –	– –	– –	– –	GB GB
	ABB Kabeldon		25 to 630	1x CSE-A 12630-xx 1x CSE-A 24630-xx	– –	– –	– –	– –	IEC, GOST IEC, GOST
		Cellpack	50 to 400 25 to 300	1x CTS 630A 24kV 1x CTS 630A 24kV	– –	– –	CTKSA CTKSA	– –	IEC IEC
	Ample		25 to 400 35 to 500	1x AQT3-15/630 1x AQT3-24/630	– –	– –	AHY5WZ7 AHY5WZ7	– –	GB/DL GB/DL
		2	Nexans Euromold	35 to 300	2x 400TB/G 2x K400TB/G 2x K400TB/G-CSxxx	1x 400CP 1x K400CP 1x K400CP	– – –	400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx	– – –
	35 to 300			1x 430TB/G 1x K430TB/G 1x K430TB/G-CSxxx	1x 300PB/G 1x K300PB/G 1x K300PB/G-CSxxx	– – –	300SA-5(10)SA 300SA-5(10)SA 300SA-5(10)SA	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL
	400 to 630			2x 440TB/G 2x K440TB/G 2x K440TB/G-CSxxx	1x 440CP 1x K440CP 1x K440CP	– – –	400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL
	50 to 630 35 to 630			1x 484TB/G 1x K484TB/G	1x 804PB/G 1x K804PB/G	– –	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC
	800 to 1200			1x 489TB/G 1x K489TB/G	1x 809PB/G 1x K809PB/G	– –	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC
	Südkabel		50 to 300 25 to 240	1x SET 12 1x SET 24	1x SEHDK 13.1 1x SEHDK 23.1	– –	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
50 to 300 25 to 240			2x SET 12 2x SET 24	1x KU 23.2 1x KU 23.2	– –	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
300 to 500 300 to 630			2x SEHDT 13 2x SEHDT 23	1x KU 23 1x KU 23	– –	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	

## Installation possibilities for cable connections and surge arresters, single-core PE and XLPE-insulated

Number of cables per panel and phase	Make	Conductor cross-section <sup>1)</sup> mm <sup>2</sup>	Cable T-plugs	Coupling inserts/ coupling plugs	Surge arresters with coupling inserts		According to standard	
			bolted 12 kV 24 kV	bolted 12 kV 24 kV	Arresters	Coupling inserts		
• Circuit-breaker panel 1250 A <sup>2)</sup> • Disconnector panel 1250 A <sup>2)</sup> • DBB circuit-breaker panel 1000 A • DBB incoming sectionalizer <sup>2)</sup>								
2	nkt cables	25 to 300 25 to 500 25 to 300	1x CB 12-630 1x CB 17,5-630 1x CB 24-630	1x CC 12-630 1x CC 17,5-630 1x CC 24-630	CSA 12-x CSA 17,5-x CSA 24-x	– – –	IEC GOST, GB/DL IEC, GOST, GB/DL	
		25 to 300	2x CB 12-630 2x CB 24-630	1x CP 630-C 1x CP 630-C	CSA 12-x CSA 24-x	– –	IEC IEC, GOST, GB/DL	
		185 to 500 95 to 500	1x CB 24-1250-2 1x CB 24-1250-2	1x CC 24-1250-2 1x CC 24-1250-2	CSA 12-x CSA 24-x	– –	IEC IEC	
		185 to 500 95 to 500	2x CB 24-1250-2 2x CB 24-1250-2	1x CP 630-C 1x CP 630-C	CSA 12-x CSA 24-x	– –	IEC IEC	
		400 to 630	1x CB 36-630(1250) 1x CB 36-630(1250)	1x CC 36-630(1250) 1x CC 36-630(1250)	CSA 12-x CSA 24-x	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		400 to 630	2x CB 36-630(1250) 2x CB 36-630(1250)	1x CP 630-M16 1x CP 630-M16	CSA 12-x CSA 24-x	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		630 to 1000	1x CB 42-1250-3 1x CB 42-1250-3	1x CC 42-2500-3 1x CC 42-2500-3	CSA 12-x CSA 24-x	– –	IEC IEC	
	Tyco Electronics Raychem	25 to 300	1x RSTI-58xx 1x RSTI-58xx	1x RSTI-CC-58xx 1x RSTI-CC-58xx	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	IEC IEC	
		25 to 300	1x RSTI-58xx-CEE01 1x RSTI-58xx-CEE01	1x RSTI-CC-58xx-CEE01 1x RSTI-CC-58xx-CEE01	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	GOST GOST	
		400 to 800	1x RSTI-395x 1x RSTI-595x	2x RSTI-CC-395x 2x RSTI-CC-595x	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	IEC IEC	
		400 to 800	1x RSTI-595x-CEE01 1x RSTI-595x-CEE01	2x RSTI-CC-595x-CEE01 2x RSTI-CC-595x-CEE01	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	GOST GOST	
	3M	50 to 240 25 to 240	2x 93-EE 705-6 2x 93-EE 705-6	1x KU 23.2 1x KU 23.2	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		240 150 to 240	1x 93-EE 705-6 1x 93-EE 705-6	1x 93-EE 718-6 1x 93-EE 718-6	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		300 to 400	2x 93-EE 715-6 2x 93-EE 715-6	1x KU 23.2 1x KU 23.2	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
	GCA	35 to 500 25 to 500	1x CJB10-630 1x CJB20-630	1x CJBK10-630 1x CJBK20-630	– –	– –	GB GB	
		ABB Kabledon	25 to 630	2x CSE-A 12630-xx 2x CSE-A 24630-xx	1x PC 630-3 1x PC 630-3	– –	– –	IEC, GOST IEC, GOST
	Cellpack		50 to 400 25 to 300	2x CTS 630A 24kV 2x CTS 630A 24kV	1x CKS 630A 24kV 1x CKS 630A 24kV	CTKSA CTKSA	– –	IEC IEC
		50 to 240 25 to 240	1x CTS 630A 24kV 1x CTS 630A 24kV	1x CTKS 630A 24kV 1x CTKS 630A 24kV	CTKSA CTKSA	– –	IEC IEC	
	Ample	25 to 400 35 to 500	1x AQT3-15/630 1x AQT3-24/630	1x AHT3-15/630 1x AHT3-24/630	AHY5WZ7 AHY5WZ7	– –	GB/DL GB/DL	
		3	Nexans Euromold	35 to 300 <sup>3)</sup>	3x 400TB/G 3x K400TB/G 3x K400TB/G-CSxxx	2x 400CP 2x K400CP 2x K400CP	– – –	– – –
	35 to 300			1x 430TB/G 1x K430TB/G 1x K430TB/G-CSxxx	2x 300PB/G 2x K300PB/G 2x K300PB/G-CSxxx	300SA-5(10)SA 300SA-5(10)SA 300SA-5(10)SA	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL
	400 to 630 <sup>3)</sup>			3x 440TB/G 3x K440TB/G 3x K440TB/G-CSxxx	2x 440CP 2x K440CP 2x K440CP	– – –	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL
	50 to 630 35 to 630			1x 484TB/G 1x K484TB/G	2x 804PB/G 2x K804PB/G	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC
	800 to 1200			1x 489TB/G 1x K489TB/G	2x 809PB/G 2x K809PB/G	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC
	nkt cables		25 to 300 25 to 500 25 to 300	1x CB 12-630 1x CB 17,5-630 1x CB 24-630	2x CC 12-630 2x CC 17,5-630 2x CC 24-630	CSA 12-x CSA 17,5-x CSA 24-x	– – –	IEC GOST, GB/DL IEC, GOST, GB/DL
			25 to 300	3x CB 12-630 3x CB 24-630	2x CP 630-C 2x CP 630-C	– –	– –	IEC IEC, GOST, GB/DL
			185 to 500 95 to 500	1x CB 24-1250-2 1x CB 24-1250-2	2x CC 24-1250-2 2x CC 24-1250-2	CSA 12-x CSA 24-x	– –	IEC IEC
			185 to 500 95 to 500	3x CB 24-1250-2 3x CB 24-1250-2	2x CP 630-C 2x CP 630-C	– –	– –	IEC IEC
			400 to 630	1x CB 36-630(1250) 1x CB 36-630(1250)	2x CC 36-630(1250) 2x CC 36-630(1250)	CSA 12-x CSA 24-x	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
		400 to 630	3x CB 36-630(1250) 3x CB 36-630(1250)	2x CP 630-M16 2x CP 630-M16	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		630 to 1000	1x CB 42-1250-3 1x CB 42-1250-3	2x CC 42-2500-3 2x CC 42-2500-3	CSA 12-x CSA 24-x	– –	IEC IEC	

1) Observe the actual short-circuit and current carrying capacity of the cables and sealing ends

2) At an operating current more than 1150 A only sealing ends with zinc-plated, nickel-plated or silver-plated cable lugs are permissible

3) Only possible with deep cable compartment cover

# Components

## Installation possibilities for cable connections and surge arresters, single-core PE and XLPE-insulated

Number of cables per panel and phase	Make	Conductor cross-section 1) mm <sup>2</sup>	Cable T-plugs	Coupling inserts / coupling plugs	Surge arresters with coupling inserts		According to standard
			bolted 12 kV 24 kV	bolted 12 kV 24 kV	Arresters	Coupling inserts	

• Circuit-breaker panel 1250 A 2) • Disconnector panel 1250 A 2) • DBB circuit-breaker panel 1000 A • DBB incoming sectionalizer 2)

3	Tyco Electronics Raychem	25 to 300	1x RSTI-58xx 1x RSTI-58xx	2x RSTI-CC-58xx 2x RSTI-CC-58xx	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	IEC IEC
		25 to 300	1x RSTI-58xx-CEE01 1x RSTI-58xx-CEE01	2x RSTI-CC-58xx-CEE01 2x RSTI-CC-58xx-CEE01	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	GOST GOST
		400 to 800	1x RSTI-395x 1x RSTI-595x	2x RSTI-CC-395x 2x RSTI-CC-595x	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	IEC IEC
		400 to 800	1x RSTI-595x-CEE01 1x RSTI-595x-CEE01	2x RSTI-CC-595x-CEE01 2x RSTI-CC-595x-CEE01	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	GOST GOST
	Cellpack	50 to 240 25 to 240	1x CTS 630A 24kV 1x CTS 630A 24kV	2x CTKS 630A 24kV 2x CTKS 630A 24kV	– –	– –	IEC IEC
4	Nexans Euromold	35 to 300	1x 430TB/G 1x K430TB/G 1x K430TB/G-CSxxx	3x 300PB/G 3x K300PB/G 3x K300PB/G-CSxxx	– –	– –	IEC, GOST, GB/DL IEC GOST, GB/DL
		50 to 630 35 to 630	1x 484TB/G 1x K484TB/G	3x 804PB/G 3x K804PB/G	– –	– –	IEC IEC
		800 to 1200	1x 489TB/G 1x K489TB/G	3x 809PB/G 3x K809PB/G	– –	– –	IEC IEC
	nkt cables	185 to 500 95 to 500	1x CB 24-1250-2 1x CB 24-1250-2	3x CC 24-1250-2 3x CC 24-1250-2	– –	– –	IEC IEC
		630 to 1000	1x CB 42-1250-3 1x CB 42-1250-3	3x CC 42-2500-3 3x CC 42-2500-3	– –	– –	IEC IEC
	Tyco Electronics Raychem	25 to 300	1x RSTI-58xx 1x RSTI-58xx	3x RSTI-CC-58xx 3x RSTI-CC-58xx	– –	– –	IEC IEC
		25 to 300	1x RSTI-58xx-CEE1 1x RSTI-58xx-CEE1	3x RSTI-CC-58xx-CEE1 3x RSTI-CC-58xx-CEE1	– –	– –	GOST GOST

• Circuit-breaker and disconnector panel 2000 A, 2500 A

2	Nexans Euromold	35 to 300	2x 400TB/G 2x K400TB/G 2x K400TB/G-CSxxx	– – –	400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL
		35 to 300	2x 430TB/G 2x K430TB/G 2x K430TB/G-CSxxx	– – –	300SA-5(10)SA 300SA-5(10)SA 300SA-5(10)SA	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL
		400 to 630	2x 440TB/G 2x K440TB/G 2x K440TB/G-CSxxx	– – –	400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL
		50 to 630 35 to 630	2x 484TB/G 2x K484TB/G	– –	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC
	Südkabel	50 to 300 25 to 240	2x SET 12 2x SET 24	– –	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
		300 to 500 300 to 630	2x SEHDT 13 2x SEHDT 23	– –	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
	nkt cables	25 to 300 25 to 500 25 to 300	2x CB 12-630 2x CB 17,5-630 2x CB 24-630	– – –	CSA 12-x CSA 17,5-x CSA 24-x	– – –	IEC GOST, GB/DL IEC, GOST, GB/DL
		185 to 500 95 to 500	2x CB 24-1250-2 2x CB 24-1250-2	– –	CSA 12-x CSA 24-x	– –	IEC IEC
		400 to 630	2x CB 36-630(1250) 2x CB 36-630(1250)	– –	CSA 12-x CSA 24-x	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
	Tyco Electronics Raychem	25 to 300	2x RSTI-58xx 2x RSTI-58xx	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	IEC IEC
		25 to 300	2x RSTI-58xx-CEE01 2x RSTI-58xx-CEE01	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	GOST GOST
		400 to 800	2x RSTI-395x 2x RSTI-595x	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	IEC IEC
		400 to 800	2x RSTI-595x-CEE01 2x RSTI-595x-CEE01	– –	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	GOST GOST
	3M	50 to 240 25 to 240	2x 93-EE 705-6 2x 93-EE 705-6	– –	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
		300 to 400	2x 93-EE 715-6 2x 93-EE 715-6	– –	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
	GCA	35 to 500 25 to 500	2x CJB10-630 2x CJB20-630	– –	– –	– –	GB GB
	ABB Kabeldon	25 to 630	2x CSE-A 12630-xx 2x CSE-A 24630-xx	– –	– –	– –	IEC, GOST IEC, GOST
	Cellpack	50 to 400 25 to 300	2x CTS 630A 24kV 2x CTS 630A 24kV	– –	CTKSA CTKSA	– –	IEC IEC
	Ample	25 to 400 35 to 500	2x AQT3-15/630 2x AQT3-24/630	– –	AHY5WZ7 AHY5WZ7	– –	GB/DL GB/DL



## Installation possibilities for cable connections and surge arresters, three-core PE and XLPE-insulated

Number of cables per panel and phase	Make	Conductor cross-section <sup>1)</sup> mm <sup>2</sup>	Cable T-plugs	Coupling inserts/ coupling plugs	Surge arresters with coupling inserts		According to standard	
			bolted 12 kV 24 kV	bolted 12 kV 24 kV	Arresters	Coupling inserts		
• Circuit-breaker and disconnector panel 2000 A, 2500 A								
4	Nexans Euromold	35 to 300	4x 400TB/G 4x K400TB/G 4x K400TB/G-CSxxx	2x 400CP 2x K400CP 2x K400CP	400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL	
		35 to 300	2x 430TB/G 2x K430TB/G 2x K430TB/G-CSxxx	2x 300PB/G 2x K300PB/G 2x K300PB/G-CSxxx	300SA-5(10)SA 300SA-5(10)SA 300SA-5(10)SA	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL	
		400 to 630	4x 440TB/G 4x K440TB/G 4x K440TB/G-CSxxx	2x 440CP 2x K440CP 2x K440CP	400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL	
		50 to 630 35 to 630	2x 484TB/G 2x K484TB/G	2x 804PB/G 2x K804PB/G	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC	
	Südkabel	50 to 300 25 to 240	2x SET 12 2x SET 24	2x SEHDK 13.1 2x SEHDK 23.1	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		50 to 300 25 to 240	4x SET 12 4x SET 24	2x KU 23.2 2x KU 23.2	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		300 to 500 300 to 630	4x SEHDT 13 4x SEHDT 23	2x KU 23 2x KU 23	MUT 23 MUT 23	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
	nkt cables	25 to 300 25 to 500 25 to 300	2x CB 12-630 2x CB 17.5-630 2x CB 24-630	2x CC 12-630 2x CC 12-630 2x CC 24-630	CSA 12-x CSA 17,5-x CSA 24-x	– – –	IEC GOST, GB/DL IEC, GOST, GB/DL	
		25 to 300	4x CB 12-630 4x CB 24-630	2x CP 630-C 2x CP 630-C	CSA 12-x CSA 24-x	– –	IEC IEC, GOST, GB/DL	
		185 to 500 95 to 500	2x CB 24-1250-2 2x CB 24-1250-2	2x CC 24-1250-2 2x CC 24-1250-2	CSA 12-x CSA 24-x	– –	IEC IEC	
		185 to 500 95 to 500	4x CB 24-1250-2 4x CB 24-1250-2	2x CP 630-C 2x CP 630-C	CSA 12-x CSA 24-x	– –	IEC IEC	
		400 to 630	2x CB 36-630(1250) 2x CB 36-630(1250)	2x CC 36-630(1250) 2x CC 36-630(1250)	CSA 12-x CSA 24-x	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		400 to 630	4x CB 36-630(1250) 4x CB 36-630(1250)	2x CP 630-M16 2x CP 630-M16	CSA 12-x CSA 24-x	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		Tyco Electronics Raychem	25 to 300	2x RSTI-58xx 2x RSTI-58xx	2x RSTI-CC-58xx 2x RSTI-CC-58xx	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	IEC IEC
			25 to 300	2x RSTI-58xx-CEE01 2x RSTI-58xx-CEE01	2x RSTI-CC-58xx-CEE01 2x RSTI-CC-58xx-CEE01	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	GOST GOST
	400 to 800		2x RSTI-395x 2x RSTI-595x	2x RSTI-CC-395x 2x RSTI-CC-595x	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	IEC IEC	
	400 to 800		2x RSTI-595x-CEE01 2x RSTI-595x-CEE01	2x RSTI-CC-595x-CEE01 2x RSTI-CC-595x-CEE01	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	GOST GOST	
	3M	50 to 240 25 to 240	4x 93-EE 705-6 4x 93-EE 705-6	2x KU 23.2 2x KU 23.2	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		240 150 to 240	2x 93-EE 705-6 2x 93-EE 705-6	2x 93-EE 718-6 2x 93-EE 718-6	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		300 to 400	4x 93-EE 715-6 4x 93-EE 715-6	2x KU 23.2 2x KU 23.2	– –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		GCA	35 to 500 25 to 500	2x CJB10-630 2x CJB20-630	2x CJBK10-630 2x CJBK20-630	– –	– –	GB GB
	ABB Kابدon		25 to 630	4x CSE-A 12630-xx 4x CSE-A 24630-xx	2x PC 630-3 2x PC 630-3	– –	– –	IEC, GOST IEC, GOST
		Cellpack	50 to 400 25 to 300	4x CTS 630A 24kV 4x CTS 630A 24kV	2x CKS 630A 24kV 2x CKS 630A 24kV	– –	– –	IEC IEC
	50 to 240 25 to 240		2x CTS 630A 24kV 2x CTS 630A 24kV	2x CTKS 630A 24kV 2x CTKS 630A 24kV	CTKSA CTKSA	– –	IEC IEC	
Ample	25 to 400 35 to 500	2x AQT3-15/630 2x AQT3-24/630	2x AHT3-15/630 2x AHT3-24/630	AHY5WZ7 AHY5WZ7	– –	GB/DL GB/DL		
	Nexans Euromold	35 to 300 <sup>3)</sup>	6x 400TB/G 6x K400TB/G 6x K400TB/G-CSxxx	4x 400CP 4x K400CP 4x K400CP	– – –	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL	
35 to 300		2x 430TB/G 2x K430TB/G 2x K430TB/G-CSxxx	4x 300PB/G 4x K300PB/G 4x K300PB/G-CSxxx	300SA-5(10)SA 300SA-5(10)SA 300SA-5(10)SA	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL		
400 to 630 <sup>3)</sup>		6x 440TB/G 6x K440TB/G 6x K440TB/G-CSxxx	4x 440CP 4x K440CP 4x K440CP	– – –	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL		
50 to 630 35 to 630		2x 484TB/G 2x K484TB/G	4x 804PB/G 4x K804PB/G	800SA-10-xxx 800SA-10-xxx	– –	IEC IEC		

1) Observe the actual current and short-current carrying capacity of the cables and the sealing ends

3) Only possible with deep cable compartment cover

# Components

## Installation possibilities for cable connections and surge arresters, single-core PE and XLPE-insulated

Number of cables per panel and phase	Make	Conductor cross-section <sup>1)</sup> mm <sup>2</sup>	Cable T-plugs	Coupling inserts/ coupling plugs	Surge arresters with coupling inserts		According to standard
			bolted 12 kV 24 kV	bolted 12 kV 24 kV	Arresters	Coupling inserts	

• Circuit-breaker and disconnector panel 2000 A, 2500 A

6	nkt cables	25 to 300 25 to 500 25 to 300	2x CB 12-630 2x CB 17.5-630 <b>2x CB 24-630</b>	4x CC 12-630 4x CC 12-630 <b>4x CC 24-630</b>	CSA 12-x CSA 17,5-x CSA 24-x	– – –	IEC GOST, GB/DL IEC, GOST, GB/DL
		25 to 300	6x CB 12-630 <b>6x CB 24-630</b>	4x CP 630-C <b>4x CP 630-C</b>	– –	– –	IEC IEC, GOST, GB/DL
		185 to 500 95 to 500	2x CB 24-1250-2 <b>2x CB 24-1250-2</b>	4x CC 24-1250-2 <b>4x CC 24-1250-2</b>	CSA 12-x CSA 24-x	– –	IEC IEC
		185 to 500 95 to 500	6x CB 24-1250-2 <b>6x CB 24-1250-2</b>	4x CP 630-C <b>4x CP 630-C</b>	– –	– –	IEC IEC
		400 to 630	2x CB 36-630(1250) <b>2x CB 36-630(1250)</b>	4x CC 36-630(1250) <b>4x CC 36-630(1250)</b>	CSA 12-x CSA 24-x	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
	Tyco Electronics Raychem	25 to 300	2x RSTI-58xx <b>2x RSTI-58xx</b>	4x RSTI-CC-58xx <b>4x RSTI-CC-58xx</b>	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	IEC IEC
		25 to 300	2x RSTI-58xx-CEE01 <b>2x RSTI-58xx-CEE01</b>	4x RSTI-CC-58xx-CEE01 <b>4x RSTI-CC-58xx-CEE01</b>	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	– RSTI-SA-PIN	GOST GOST
		400 to 800	2x RSTI-395x <b>2x RSTI-595x</b>	4x RSTI-CC-395x <b>4x RSTI-CC-595x</b>	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	IEC IEC
		400 to 800	2x RSTI-595x-CEE01 <b>2x RSTI-595x-CEE01</b>	4x RSTI-CC-595x-CEE01 <b>4x RSTI-CC-595x-CEE01</b>	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	RSTI-SA-PIN RSTI-SA-PIN	GOST GOST
	Cellpack	50 to 240 25 to 240	2x CTS 630A 24kV <b>2x CTS 630A 24kV</b>	4x CTKS 630A 24kV <b>4x CTKS 630A 24kV</b>	– –	– –	IEC IEC
8	Nexans Euromold	35 to 300	2x 430TB/G <b>2x K430TB/G</b> 2x K430TB/G-CSxxx	6x 300PB/G <b>6x K300PB/G</b> 6x K300PB/G-CSxxx	– – –	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL
		50 to 630 35 to 630	2x 484TB/G <b>2x K484TB/G</b>	6x 804PB/G <b>6x K804PB/G</b>	– –	– –	IEC IEC
	nkt cables	185 to 500 95 to 500	2x CB 24-1250-2 <b>2x CB 24-1250-2</b>	6x CC 24-1250-2 <b>6x CC 24-1250-2</b>	– –	– –	IEC IEC
	Tyco Electronics Raychem	25 to 300	2x RSTI-58xx <b>2x RSTI-58xx</b>	6x RSTI-CC-58xx <b>6x RSTI-CC-58xx</b>	– –	– –	IEC IEC
		25 to 300	2x RSTI-58xx-CEE1 <b>2x RSTI-58xx-CEE1</b>	6x RSTI-CC-58xx-CEE1 <b>6x RSTI-CC-58xx-CEE1</b>	– –	– –	GOST GOST

• Circuit-breaker panel 630 A • Switch-disconnector panel 630 A • Disconnector panel 1000 A • Ring-main panel 630 A  
• Contactor panel • Circuit-breaker panel 1250 A <sup>2)</sup> • Disconnector panel 1250 A <sup>2)</sup> • DBB circuit-breaker panel 1000 A  
• DBB incoming sectionalizer <sup>2)</sup>

1	Nexans Euromold	35 to 300	1x 400TB/G <b>1x K400TB/G</b> 1x K400TB/G-CSxxx	– – –	1x trifurcation <b>1x trifurcation</b> 1x trifurcation	400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx 400PB-5(10)-SA-xxx	IEC, GOST, GB/DL IEC GOST, GB/DL
		35 to 300	1x 430TB/G <b>1x K430TB/G</b> 1x K430TB/G-CSxxx	– – –	1x trifurcation <b>1x trifurcation</b> 1x trifurcation	300SA-5(10)SA 300SA-5(10)SA 300SA-5(10)SA	IEC, GOST, GB/DL IEC GOST, GB/DL
	Südkabel	50 to 300 25 to 240	1x SET 12 <b>1x SET 24</b>	– –	1x trifurcation SAT <b>1x trifurcation SAT</b>	MUT 23 MUT 23	IEC, GOST, GB/DL IEC, GOST, GB/DL
	nkt cables	25 to 300 25 to 500 25 to 300	1x CB 12-630 1x CB 17.5-630 <b>1x CB 24-630</b>	– – –	1x trifurcation ATS 1x trifurcation ATS <b>1x trifurcation ATS</b>	CSA 12-x CSA 17,5-x CSA 24-x	IEC GOST, GB/DL IEC, GOST, GB/DL
		185 to 500 95 to 500	1x CB 24-1250-2 <b>1x CB 24-1250-2</b>	– –	1x trifurcation ATS <b>1x trifurcation ATS</b>	CSA 12-x CSA 24-x	IEC IEC
	Tyco Electronics Raychem	25 to 300	1x RSTI-58xx <b>1x RSTI-58xx</b>	– –	1x trifurcation RSTI-TRF0x <b>1x trifurcation RSTI-TRF0x</b>	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	IEC IEC
		25 to 300	1x RSTI-58xx-CEE01 <b>1x RSTI-58xx-CEE01</b>	– –	1x trifurcation RSTI-TRF0x <b>1x trifurcation RSTI-TRF0x</b>	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	GOST GOST
	3M	50 to 240 25 to 240	1x 93-EE 705-6 <b>1x 93-EE 705-6</b>	– –	1x trifurcation <b>1x trifurcation</b>	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
		300 to 400	1x 93-EE 715-6 <b>1x 93-EE 715-6</b>	– –	1x trifurcation <b>1x trifurcation</b>	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL
	GCA	35 to 500 25 to 500	1x CJB 10-630 <b>1x CJB 20-630</b>	– –	1x trifurcation <b>1x trifurcation</b>	– –	GB GB
	ABB Kabeldon	25 to 300	1x CSE-A 12630-xx <b>1x CSE-A 24630-xx</b>	– –	1x trifurcation <b>1x trifurcation</b>	– –	IEC, GOST IEC, GOST
	Cellpack	50 to 400 25 to 300	1x CTS 630A 24kV <b>1x CTS 630A 24kV</b>	– –	1x trifurcation <b>1x trifurcation</b>	CTKSA CTKSA	IEC IEC
	Ample	25 to 400 35 to 500	1x AQT3-15/630 <b>1x AQT3-24/630</b>	– –	1x trifurcation <b>1x trifurcation</b>	AHY5WZ7 AHY5WZ7	GB/DL GB/DL

1) Observe the actual short-circuit and current carrying capacity of the cables and sealing ends

2) At an operating current more than 1150 A only sealing ends with zinc-plated, nickel-plated or silver-plated cable lugs are permissible

## Installation possibilities for cable connections and surge arresters, three-core PE and XLPE-insulated

Number of cables per panel and phase	Make	Conductor cross-section <sup>1)</sup> mm <sup>2</sup>	Cable T-plugs	Coupling inserts/ coupling plugs	Distribution kit for three-core cables	Surge arresters	According to standard	
			bolted 12 kV 24 kV	bolted 12 kV 24 kV			additionally	GOST for Russia & GUS GB/DL for China
<ul style="list-style-type: none"> <li>• Circuit-breaker panel 630 A, 1000 A • Switch-disconnector panel 630 A • Disconnector panel 1000 A • Ring-main panel 630 A</li> <li>• Contactor panel • Circuit-breaker panel 1250 A<sup>2)</sup> • Disconnector panel 1250 A<sup>2)</sup> • DBB circuit-breaker panel 1000 A</li> <li>• DBB incoming sectionalizer<sup>2)</sup></li> </ul>								
2	Nexans Euromold	35 to 300	2x 400TB/G 2x K400TB/G 2x K400TB/G-CSxxx	1x 400CP 1x K400CP 1x K400CP	2x trifurcation 2x trifurcation 2x trifurcation	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL	
		35 to 300	1x 430TB/G 1x K430TB/G 1x K430TB/G-CSxxx	1x 300PB/G 1x K300PB/G 1x K300PB/G-CSxxx	2x trifurcation 2x trifurcation 2x trifurcation	300SA-5(10)SA 300SA-5(10)SA 300SA-5(10)SA	IEC, GOST, GB/DL IEC GOST, GB/DL	
	Südkabel	50 to 300 25 to 240	1x SET 12 1x SET 24	1x SEHDK 13.1 1x SEHDK 23.1	2x trifurcation SAT 2x trifurcation SAT	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		50 to 300 25 to 240	2x SET 12 2x SET 24	1x KU 23.2 1x KU 23.2	2x trifurcation SAT 2x trifurcation SAT	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
	nkt cables	25 to 300 25 to 500 25 to 300	1x CB 12-630 1x CB 17,5-630 1x CB 24-630	1x CC 12-630 1x CC 17,5-630 1x CC 24-630	2x trifurcation ATS 2x trifurcation ATS 2x trifurcation ATS	CSA 12-x CSA 17,5-x CSA 24-x	IEC GOST, GB/DL IEC, GOST, GB/DL	
		25 to 300	2x CB 12-630 2x CB 24-630	1x CP 630-C 1x CP 630-C	2x trifurcation ATS 2x trifurcation ATS	CSA 12-x CSA 24-x	IEC IEC, GOST, GB/DL	
		185 to 500 95 to 500	1x CB 24-1250-2 1x CB 24-1250-2	1x CC 24-1250-2 1x CC 24-1250-2	2x trifurcation ATS 2x trifurcation ATS	CSA 12-x CSA 24-x	IEC IEC	
		185 to 500 95 to 500	2x CB 24-1250-2 2x CB 24-1250-2	1x CP 630-C 1x CP 630-C	2x trifurcation ATS 2x trifurcation ATS	CSA 12-x CSA 24-x	IEC IEC	
	Tyco Electronics Raychem	25 to 300	1x RSTI-58xx 1x RSTI-58xx	1x RSTI-CC-58xx 1x RSTI-CC-58xx	2x trifurcation RSTI-TRF0x 2x trifurcation RSTI-TRF0x	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	IEC IEC	
		25 to 300	1x RSTI-58xx-CEE01 1x RSTI-58xx-CEE01	1x RSTI-CC-58xx-CEE01 1x RSTI-CC-58xx-CEE01	2x trifurcation RSTI-TRF0x 2x trifurcation RSTI-TRF0x	RSTI-CC-58SAxxxx RSTI-CC-68SAxxxx	GOST GOST	
	3M	50 to 240 25 to 240	2x 93-EE 705-6 2x 93-EE 705-6	1x KU 23.2 1x KU 23.2	2x trifurcation 2x trifurcation	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		240 150 to 240	1x 93-EE 705-6 1x 93-EE 705-6	1x 93-EE 718-6 1x 93-EE 718-6	2x trifurcation 2x trifurcation	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		300 to 400	2x 93-EE 715-6 2x 93-EE 715-6	1x KU 23.2 1x KU 23.2	2x trifurcation 2x trifurcation	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
	GCA	35 to 500 25 to 500	1x CJB10-630 1x CJB20-630	1x CJBK10-630 1x CJBK20-630	2 x trifurcation 2 x trifurcation	– –	GB GB	
	ABB Kabeldon	25 to 300	2x CSE-A 12630-xx 2x CSE-A 24630-xx	PC 630-3 PC 630-3	2 x trifurcation 2 x trifurcation	– –	IEC, GOST IEC, GOST	
	Cellpack	50 to 400 25 to 300	2x CTS 630A 24kV 2x CTS 630A 24kV	1x CKS 630A 24kV 1x CKS 630A 24kV	2 x trifurcation 2 x trifurcation	– –	IEC IEC	
		50 to 240 25 to 240	1x CTS 630A 24kV 1x CTS 630A 24kV	1x CTKS 630A 24kV 1x CTKS 630A 24kV	2 x trifurcation 2 x trifurcation	CTKSA CTKSA	IEC IEC	
	Ample	25 to 400 35 to 500	1x AQT3-15/630 1x AQT3-24/630	1x AHT3-15/630 1x AHT3-24/630	2 x trifurcation 2 x trifurcation	AHY5WZ7 AHY5WZ7	GB/DL GB/DL	
	3	Nexans Euromold	35 to 300	1x 430TB/G 1x K430TB/G 1x K430TB/G-CSxxx	2x 300PB/G 2x K300PB/G 2x K300PB/G-CSxxx	3x trifurcation 3x trifurcation 3x trifurcation	– – –	IEC, GOST, GB/DL IEC GOST, GB/DL
			nkt cables	25 to 300 25 to 500 25 to 300	1x CB 12-630 1x CB 17,5-630 1x CB 24-630	2x CC 12-630 2x CC 17,5-630 2x CC 24-630	3x trifurcation ATS 3x trifurcation ATS 3x trifurcation ATS	– – –
185 to 500 95 to 500		1x CB 24-1250-2 1x CB 24-1250-2		2x CC 24-1250-2 2x CC 24-1250-2	3x trifurcation ATS 3x trifurcation ATS	– –	IEC IEC	
Tyco Electronics Raychem		25 to 300	1x RSTI-58xx 1x RSTI-58xx	2x RSTI-CC-58xx 2x RSTI-CC-58xx	3x trifurcation RSTI-TRF0x 3x trifurcation RSTI-TRF0x	– –	IEC IEC	
		25 to 300	1x RSTI-58xx-CEE01 1x RSTI-58xx-CEE01	2x RSTI-CC-58xx-CEE01 2x RSTI-CC-58xx-CEE01	3x trifurcation RSTI-TRF0x 3x trifurcation RSTI-TRF0x	– –	GOST GOST	
Cellpack		50 to 400 25 to 300	1x CTS 630A 24kV 1x CTS 630A 24kV	2x CKS 630A 24kV 2x CKS 630A 24kV	3x trifurcation 3x trifurcation	– –	IEC IEC	

1) Observe the actual short-circuit and current carrying capacity of the cables and sealing ends

2) At an operating current more than 1150 A only sealing ends with zinc-plated, nickel-plated or silver-plated cable lugs are permissible

# Components

Installation possibilities for cable connections and surge arresters, three-core PE and XLPE-insulated, paper-insulated non-draining cables and paper-insulated mass-impregnated cables

Number of cables per panel and phase	Make	Conductor cross-section <sup>1)</sup> mm <sup>2</sup>	Cable T-plugs	Coupling inserts / coupling plugs	Distribution kit for three-core cables	Surge arresters	According to standard
			bolted 12 kV 24 kV	bolted 12 kV 24 kV		additionally	GOST for Russia & GUS GB/DL for China

## Three-core paper-insulated non-draining cables

- Circuit-breaker panel 630 A, 1000 A • Switch-disconnector panel 630 A • Disconnector panel 1000 A • Ring-main panel 630 A
- Contactor panel • Circuit-breaker panel 1250 A <sup>2)</sup> • Disconnector panel 1250 A <sup>2)</sup> • DBB circuit-breaker panel 1000 A
- DBB incoming sectionalizer <sup>2)</sup>

1	Nexans Euromold	35 to 300	1x 400TB/G –	– –	1x trifurcation MIND –	400PB-5(10)-SA-xxx –	IEC, GOST, GB/DL	
		35 to 300	1x 430TB/G –	– –	1x trifurcation MIND –	300SA-5(10)SA –	IEC, GOST, GB/DL	
	nkt cables	25 to 120	1x SÜEV10-120CU- xxxx-CB24 –	– –	– –	– –	CSA 12-x –	IEC, GOST, GB/DL
		150 to 240	1x SÜEV10-240CU- xxxx-CB24 –	– –	– –	– –	CSA 12-x –	IEC, GOST, GB/DL
2	Nexans Euromold	35 to 300	2x 400TB/G –	1x 400CP –	2x trifurcation MIND –	– –	IEC, GOST, GB/DL	
		35 to 300	1x 430TB/G –	1x 300PB/G –	2x trifurcation MIND –	– –	IEC, GOST, GB/DL	
	nkt cables	25 to 120	1x SÜEV10-120CU- xxxx-CB24 –	1x SÜEV10-120CU- xxxx-CC24 –	– –	– –	CSA 12-x –	IEC, GOST, GB/DL
		150 to 240	1x SÜEV10-240CU- xxxx-CB24 –	1x SÜEV10-240CU- xxxx-CC24 –	– –	– –	CSA 12-x –	IEC, GOST, GB/DL
3	Nexans Euromold	35 to 300 <sup>3)</sup>	3x 400TB/G –	2x 400CP –	3x trifurcation MIND –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	
		35 to 300	1x 430TB/G –	2x 300PB/G –	3x trifurcation MIND –	– –	IEC, GOST, GB/DL IEC, GOST, GB/DL	

## Three-core paper-insulated mass-impregnated cables

- Circuit-breaker panel 630 A, 1000 A • Switch-disconnector panel 630 A • Disconnector panel 1000 A • Ring-main panel 630 A
- Contactor panel • Circuit-breaker panel 1250 A <sup>2)</sup> • Disconnector panel 1250 A <sup>2)</sup> • DBB circuit-breaker panel 1000 A
- DBB incoming sectionalizer <sup>2)</sup>

1	nkt cables	25 to 120	1x SÜEV10-120CU- xxxx-CB24 –	– –	– –	CSA 12-x –	IEC, GOST, GB/DL IEC, GOST, GB/DL
		150 to 240	1x SÜEV10-240CU- xxxx-CB24 –	– –	– –	CSA 12-x –	IEC, GOST, GB/DL IEC, GOST, GB/DL
		25 to 120	1x SÜEV10-120CU- xxxx-CB24 –	1x SÜEV10-120CU- xxxx-CC24 –	– –	– –	CSA 12-x –
2	nkt cables	150 to 240	1x SÜEV10-240CU- xxxx-CB24 –	1x SÜEV10-240CU- xxxx-CC24 –	– –	CSA 12-x –	IEC, GOST, GB/DL IEC, GOST, GB/DL

1) Observe the actual short-circuit and current carrying capacity of the cables and sealing ends

2) At an operating current more than 1150 A only sealing ends with zinc-plated, nickel-plated or silver-plated cable lugs are permissible

3) Only possible with deeper cable compartment cover

### Voltage detecting systems according to IEC 61243-5 or VDE 0682-415, IEC 62271-206 or VDE 0671-206 (WEGA ZERO)

- To verify safe isolation from supply
- LRM detecting systems
  - with plug-in indicator
  - with integrated indicator, type VOIS+, VOIS R+, WEGA ZERO
- with integrated indicator, with integrated repeat test of the interface, with integrated function test, type CAPDIS-S1+, WEGA 1.2, WEGA 1.2 Vario, with integrated signaling relays type CAPDIS-S2+, WEGA 2.2.

#### Plug-in voltage indicator

- Verification of safe isolation from supply phase by phase
- Indicator suitable for continuous operation
- Measuring system and voltage indicator can be tested
- Voltage indicator flashes if high voltage is present.

#### VOIS+, VOIS R+

- Integrated display, without auxiliary power
- With indication "A1" to "A3" (see legend)
- Maintenance-free, repeat test required
- With integrated 3-phase LRM test socket for phase comparison
- With integrated signaling relays (only VOIS R+)
- Degree of protection IP54.

#### CAPDIS-Sx+ Common features

- Maintenance-free
- Integrated display, without auxiliary power
- Integrated repeat test of the interfaces (self-monitoring)
- With integrated function test (without auxiliary power) by pressing the "Display-Test" pushbutton
- Adjustable for different operating voltages (adjustable capacity C2)
- With integrated 3-phase LRM test socket for phase comparison
- With connectable signal-lead test
- With overvoltage monitoring and signaling (1.2 times operating voltage)
- Degree of protection IP54.

#### CAPDIS-S1+

- Without auxiliary power
- With indication "A1" to "A7" (see legend)
- Without ready-for-service monitoring
- Without signaling relays (without auxiliary contacts).

#### CAPDIS-S2+

- With indication "A0" to "A8" (see legend)
- Only by pressing the "Display-Test" pushbutton: "ERROR" indication (A8), e.g. in case of missing auxiliary voltage
- With ready-for-service monitoring (auxiliary power required)
- With integrated signaling relay for signals (auxiliary power required).

### Indicators and detecting systems

R-HA40-103 eps



**Plug-in voltage indicator**  
per phase at the panel front

R-HA40-104 eps



**Integrated voltage indicator**  
VOIS+, VOIS R+

R-HA35-154 eps



R-HA35-155 eps



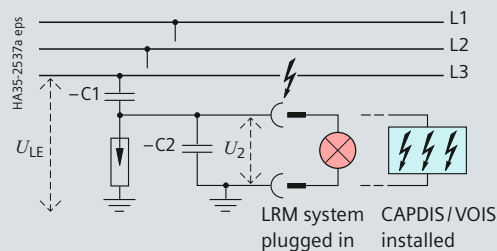
**Integrated voltage detecting system CAPDIS-S1+, -S2+**

### Symbols shown

	VOIS+, VOIS R+			CAPDIS-S1+			CAPDIS-S2+		
	L1	L2	L3	L1	L2	L3	L1	L2	L3
A0							000		
A1	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
A2									
A3	⚡	⚡		⚡	⚡		⚡	⚡	
A4				⚡	⚡	⚡	⚡	⚡	⚡
A5				000			000		
A6				000			000		
A7				000			000		
A8							000		

HA35-2579b eps

- A0 CAPDIS-S2+: Operating voltage not present
- A1 Operating voltage present
- A2 – Operating voltage not present
  - For CAPDIS-S2+: Auxiliary power not present
- A3 Failure in phase L1, operating voltage at L2 and L3 (for CAPDIS-Sx+ also earth-fault indication)
- A4 Voltage (not operating voltage) present
- A5 Indication "Test" passed (lights up briefly)
- A6 Indication "Test" not passed (lights up briefly)
- A7 Overvoltage present (lights up permanently)
- A8 Indication "ERROR", e.g.: in case of missing auxiliary voltage



#### Voltage indication

via capacitive voltage divider (principle)

- C1 Capacity integrated into bushing
- C2 Capacity of the connection leads and the voltage indicator to earth

$$U_{LE} = U_N / \sqrt{3} \text{ during rated operation in the three-phase system}$$

$$U_2 = U_A = \text{Voltage at the capacitive interface of the switchgear or at the voltage indicator}$$

# Components

## Indicating and measuring equipment

### WEGA ZERO

- Voltage detecting system according to IEC 62271-206 or VDE 0671-206
- With indication "A1" to "A4" (see legend)
- Maintenance-free
- With integrated 3-phase test socket for phase comparison
- Degree of protection IP54.



Integrated voltage indicator  
WEGA ZERO

### WEGA 1.2, WEGA 1.2 Vario

- Voltage detecting system according to IEC 61243-5 or VDE 0682-415
- With indication "A1" to "A5" (see legend)
- Maintenance-free
- Integrated repeat test of the interface (self-monitoring)
- With integrated function test (without auxiliary power) by pressing the "Display-Test" pushbutton
- With integrated 3-phase LRM test socket for phase comparison
- Without integrated signaling relay
- Without auxiliary power
- Degree of protection IP54
- Adjustable for different operating voltages (adjustable capacity C2) (only for WEGA 1.2 Vario).



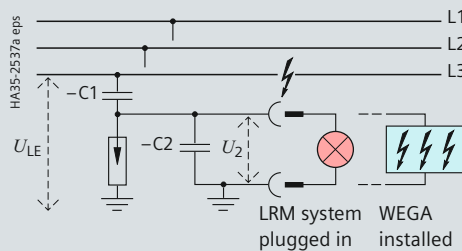
Integrated voltage detecting system  
WEGA 1.2, WEGA 1.2 Vario

### WEGA 2.2

- Voltage detecting system according to IEC 61243-5 or VDE 0682-415
- With indication "A0" to "A6" (see legend)
- Maintenance-free
- Integrated repeat test of the interface (self-monitoring)
- With integrated function test (without auxiliary power) by pressing the "Display-Test" pushbutton
- With integrated 3-phase LRM test socket for phase comparison
- With integrated signaling relay (auxiliary power required)
- Degree of protection IP54.



Integrated voltage detecting system  
WEGA 2.2



### Voltage indication

via capacitive voltage divider (principle)

- C1 Capacity integrated into bushing
  - C2 Capacity of the connection leads and the voltage indicator to earth
- $$U_{LE} = U_N / \sqrt{3} \text{ during rated operation in the three-phase system}$$

$U_2 = U_A =$  Voltage at the capacitive interface of the switchgear or at the voltage indicator

### Symbols shown

	WEGA ZERO			WEGA 1.2 WEGA 1.2 Vario			WEGA 2.2		
	L1	L2	L3	L1	L2	L3	L1	L2	L3
A0							←	←	←
A1	☀	☀	☀	⚡	⚡	⚡	⚡	⚡	⚡
A2	○	○	○						
A3	○	☀	☀	⚡	⚡		←	⚡	⚡
A4	☀	☀	☀	⚡	⚡	⚡	⚡	⚡	⚡
A5				⚡	⚡	⚡	⚡	⚡	⚡
A6							⚡	⚡	⚡

LC display gray: not illuminated  
LC display white: illuminated

### A0 For WEGA 2.2:

Operating voltage not present, auxiliary power present, LCD illuminated

### A1 Operating voltage present

For WEGA 2.2: Auxiliary power present, LCD illuminated

### A2 Operating voltage not present

For WEGA 2.2: Auxiliary power not present, LCD not illuminated

### A3 Failure in phase L1,

operating voltage at L2 and L3  
For WEGA 2.2: Auxiliary power present, LCD illuminated

### A4 Voltage present,

current monitoring of coupling section below limit value  
For WEGA 2.2: Auxiliary power present, LCD illuminated

### A5 Indication "Display-Test" passed

For WEGA 2.2: Auxiliary power present, LCD illuminated

### A6 For WEGA 2.2: LCD for missing auxiliary voltage is not illuminated

### Verification of correct terminal-phase connections

- Verification of correct terminal-phase connections possible by means of a phase comparison test unit (can be ordered separately)
- Safe-to-touch handling of the phase comparison test unit by inserting it into the capacitive taps (socket pairs) of the switch-gear.

### Phase comparison test units according to IEC 61243-5 or VDE 0682-415



- Phase comparison test unit make Pfisterer, type EPV**  
as combined test unit (HR and LRM) for:
- Voltage detection
  - Phase comparison
  - Interface test
  - Integrated self-test
  - Indication via LED



- Phase comparison test unit make Horstmann, type ORION 3.1**  
as combined test unit (HR and LRM) for:
- Phase comparison
  - Interface testing at the switchgear
  - Voltage detection
  - Integrated self-test
  - Indication via LED and acoustic alarm
  - Phase sequence indicator



- Phase comparison test unit make Kries, type CAP-Phase**  
as combined test unit (HR and LRM) for:
- Voltage detection
  - Repeat test
  - Phase comparison
  - Phase sequence test
  - Self-test
- The unit does not require a battery



- Phase comparison test unit make Hachmann, type VisualPhase LCD**  
as combined test unit (HR and LRM) for:
- Voltage detection with measured-value indication
  - Interface test
  - Low voltage detection
  - Documentable repeat test
  - Phase comparison with LED signal and measured-value indication
  - Phase angle from  $-180^\circ$  to  $+180^\circ$
  - Phase sequence evaluation
  - Frequency quality
  - Complete self-test

# Components

## Indicating and measuring equipment

### Ready-for-service indicator

#### Features

- Self-monitoring; easy to read
- Independent of temperature and pressure variations
- Independent of the site altitude
- Only responds to changes in gas density
- **Option:** Alarm switch "1NO + 1NC" for remote electrical indication.

#### Mode of operation

For the ready-for-service indicator, a gas-tight measurement box is installed inside 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 dielectric strength, are displayed, temperature-dependent changes in the gas pressure are not.

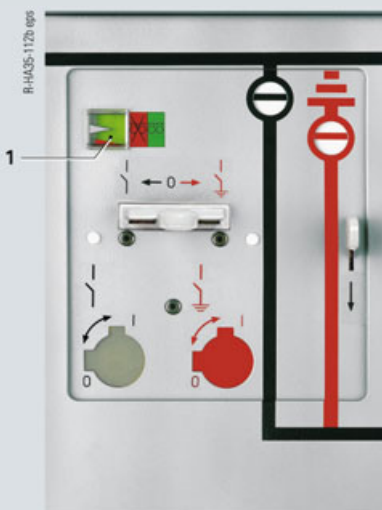
The gas in the measurement box has the same temperature as that in the switchgear.

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

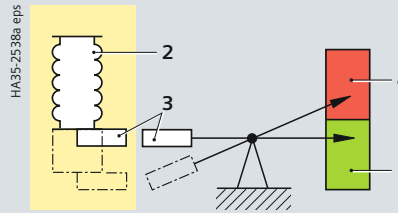
### Low-voltage compartment

- For accommodation of protection, control, measuring and metering equipment
- Partitioned safe-to-touch from the high-voltage part of the panel
- Low-voltage compartment can be removed, bus wires and control cables are plugged in
- **Option:** Higher low-voltage compartment (1161 mm instead of 761 mm) possible.

#### Gas monitoring



**Control board (detail)**  
with red / green ready-for-service indicator



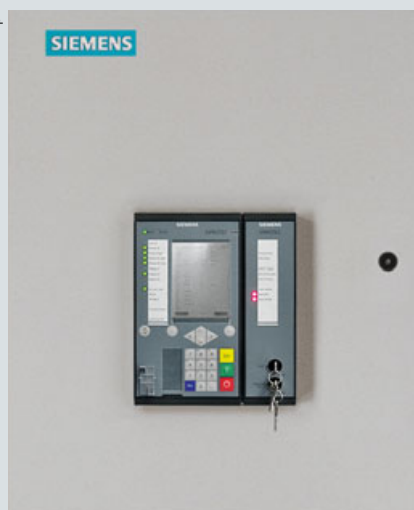
Stainless-steel vessel filled with SF<sub>6</sub> gas, relative pressure 50 kPa at 20 °C

Ready-for-service indicator

**Principle of operation**  
of gas monitoring with ready-for-service indicator

- 1 Ready-for-service indicator
- 2 Measurement box
- 3 Magnetic coupling
- 4 Red indication: not ready for service
- 5 Green indication: Ready for service

#### Low-voltage compartment



**Low-voltage compartment with SIPROTEC 5 7SJ86 (example)**

For description of the SIPROTEC 5 protection devices, see page 66 and 67



Protecting, controlling and monitoring are the basic requirements placed on a complete bay controller across all technology generations. The properties the user expects from modern bay controllers are: multifunctionality, reliability, safety and communication capability.

The increasing integration of many functions in one multifunctional device leads to an optimally supported engineering

process, IT security, service and testability, or simple and safe operability of the devices and tools.

On the following pages you will find functional descriptions for some selected devices. The low-voltage compartment can accommodate all customary protection, control, measuring and monitoring equipment available on the market:

### Overview of the device types of the SIPROTEC device series: SIPROTEC 5, SIPROTEC Compact and SIPROTEC 4

#### SIPROTEC 5

Overcurrent protection with PMU, control and power quality	7SJ82, 7SJ85
Distance protection with PMU and control	7SA84, 7SA86, 7SA87
Line differential protection with PMU and control	7SD84, 7SD86, 7SD87
Combined line differential and distance protection with PMU and control	7SL86, 7SL87
Circuit-breaker management device with PMU and control	7VK87
Overcurrent protection for lines	7SJ86
Transformer protection with PMU, control, monitoring	7UT85 7UT86 7UT87
Motor protection with PMU	7SK82, 7SK85
Central busbar protection	7SS85
Bay controllers for control/interlocking tasks with PMU and monitoring, optionally with protection functions	6MD85, 6MD86
Digital fault recorder	7KE85

#### SIPROTEC Compact

Overcurrent protection	7SJ80, 7SJ81
Motor protection	7SK80, 7SK81
Voltage and frequency protection	7RW80
Line differential protection	7SD80
Distribution system controller	7SC80

#### SIPROTEC 4

Overcurrent protection	EASY 7SJ45/7SJ46
	7SJ600, 7SJ601, 7SJ602 7SJ61, 62, 63, 64
Distance protection	7SA522
	7SA6
Line differential protection	7SD600, 7SD610
	7SD52, 53
Transformer differential protection	7UT612, 613, 63
Busbar protection	7SS60, 7SS522
	7SS52
Generator and motor protection	7UM61, 7UM62, 7VE6
	7UM518
Accessories for generator and motor protection	7UW50; 7XR, 3PP, 7KG61, 7XT, 4NC
Rapid changeover device	7VU683
Bay controllers	6MD61, 6MD63
	6MD662, 663, 664
	6MB525
U/f relay	7RW600
Transient earth-fault relay	7SN600
Breaker failure protection	7SV600
Automatic reclosing, synchrocheck	7VK61
High-impedance protection	7VH60

# Components

## Protection, control, measuring and monitoring equipment

### SIPROTEC 5 device series

- Powerful automation with graphical CFC (Continuous Function Chart)
- Secure serial protection data communication, also over large distances and all available physical media (fiber-optic cable, 2-wire connections and communication networks)
- Recognition of static and transient earth faults (passing contact function in resonant-earthed and isolated systems)
- Measurement of operational values
- Phasor Measurement Unit (PMU) for synchrophasor measured values and IEEE C37.118 protocol
- Powerful fault recording
- Control of switching devices.

### Overcurrent protection device SIROTEC 7SJ82

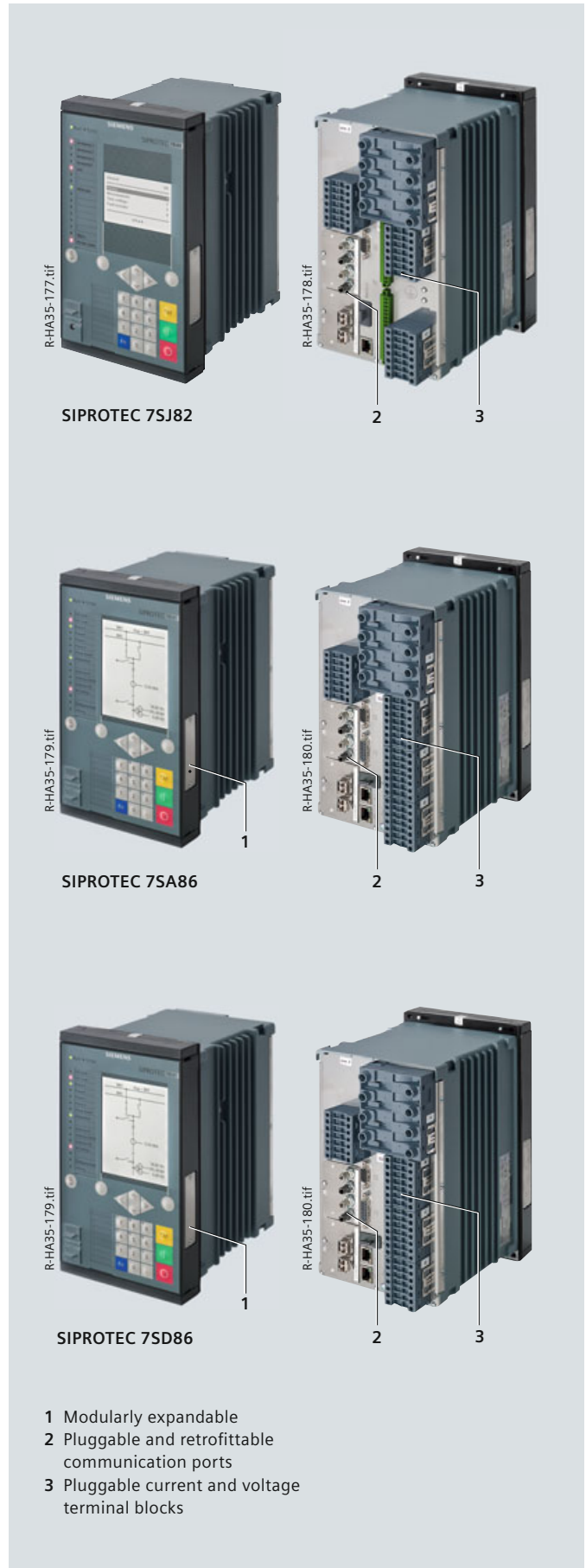
- Directional and non-directional time-overcurrent protection with additional functions
- Time optimization of the tripping times by directional comparison and protection data communication
- Frequency protection and rate-of-frequency-change protection for load shedding applications
- Overvoltage and undervoltage protection in all required variations
- Power protection, configurable as active or reactive power protection
- Control, synchrocheck and system interlocking
- Firmly integrated electrical Ethernet port J for DIGSI
- Complete IEC 61850 (reporting and GOOSE) via integrated port J
- Two optional, pluggable communication modules usable for different and redundant protocols (IEC 61850, IEC 60870-5-103, DNP3 (serial+TCP), Modbus RTU Slave, protection data communication).

### Distance protection SIPROTEC 7SA86

- Line protection for all voltage levels with 3-pole tripping
- Very short tripping time
- Selective protection of overhead lines and cables with single- and multi-ended infeeds
- Time-graded backup protection to differential protection relays
- Suitable for radial, ring-shaped, or any type of meshed systems of any voltage level with earthed, resonant-earthed or isolated neutral point
- Main protection function: 6-system distance protection
- Detection of current transformer saturation for fast tripping with high accuracy at the same time.

### Differential protection SIPROTEC 7SD86

- Line protection for all voltage levels with 3-pole tripping
- Phase-selective protection of overhead lines and cables with single- and multi-ended infeeds of all lengths with up to 6 line ends
- Transformers and shunt reactors within the protection zone are possible
- Suitable for radial, ring-shaped, or any type of meshed systems of any voltage level with earthed, resonant-earthed or isolated neutral point
- Protection of lines with capacitive series compensation
- Directional backup protection and various additional functions.



### Transformer differential protection SIPROTEC 7UT85

- Transformer differential protection for two-winding transformers with versatile additional protection functions
- Universal utilization of the permissible measuring points
- Flexible adjustment to the transformer vector group, controlling of making and overexcitation processes, secure performance in case of current transformer saturation with different saturation degrees.
- Protection of standard power transformers and auto-transformers
- Increased sensitivity in case of earth short-circuits close to the neutral point by means of a separate earth-fault differential protection
- Additional current and voltage inputs can be provided for standard protection functions such as overcurrent, voltage, frequency, etc.
- In the standard version, two communication modules can be plugged in, and different protocols can be used (IEC 61850, IEC 60870-5-103, DNP3 (serial, TCP), Modbus RTU Slave).

### Motor protection SIPROTEC 7SK82

- Motor protection functions: start-time supervision, thermal overload protection for stator and rotor, restart inhibit, unbalanced load protection, load-jump protection
- Stator and bearing temperature monitoring via a temperature sensor with an external RTD box
- Directional and non-directional time-overcurrent protection (short-circuit protection) with additional functions
- Overvoltage and undervoltage protection in all required variations
- Power protection, configurable as active or reactive power protection
- Control, synchrocheck and switchgear-interlocking system
- Firmly integrated electrical Ethernet port J for DIGSI
- Complete IEC 61850 (reporting and GOOSE) via integrated port J
- Two optional, pluggable communication modules usable for different and redundant protocols (IEC 61850, IEC 60870-5-103, DNP3 (serial+TCP), Modbus RTU Slave, protection data communication).

### Digital fault recorder SIPROTEC 7KE85

- Fast-scan recorder
- Up to 2 slow scan recorders
- Up to 5 continuous recorders
- Usable as Phasor Measurement Unit (PMU) according to IEEE C37.118 Standard
- Transfer of recordings and triggering via IEC 61850
- Variable sampling rates programmable between 1 kHz – 16 kHz
- No-loss data compression
- Time synchronization via IRIG-B, DCF77 and SNTP
- Free mapping of measured values to the individual recorders
- Free combination of measuring groups for power calculation
- Quality bits for displaying the momentary channel quality
- The trigger functions of a function block are the fundamental value, r.m.s. value, zero-sequence, positive-sequence, negative-sequence system,  $\Sigma$  active,  $\Sigma$  reactive and  $\Sigma$  apparent power
- Level trigger and gradient trigger for each trigger function
- Flexible cross and network trigger
- Creation of trigger functions with the graphical automation editor CFC (Continuous Function Chart)
- Trigger functions by combination of single signals, double signals, analog values, binary signals, Bool signals and GOOSE messages.



# Components

## Protection, control, measuring and monitoring equipment

### SIPROTEC Compact series

#### Overcurrent protection SIPROTEC 7SJ80

- Pluggable current and voltage terminals
- Binary input thresholds settable using DIGSI (3 stages)
- Secondary current transformer values (1A/5A) settable using DIGSI
- 9 programmable function keys
- 6-line display
- Buffer battery exchangeable from the front
- USB front port
- 2 additional communication ports
- IEC 61850 with integrated redundancy (electrical or optical)
- Relay-to-relay communication through Ethernet with IEC 61850 GOOSE
- Millisecond-accurate time synchronization through Ethernet with SNTP.

### SIPROTEC 4 series

#### Overcurrent and motor protection SIPROTEC 7SJ61 / 7SJ62

- For stand-alone or master operation
- Communications and bus capability
- Functions: Protection, control, signaling, communication and measuring
- LC text display (4 lines) for process and equipment data, as text, e.g. for
  - Measuring and metering values
  - Information on status of switchgear and switching device
  - Protection data
  - General indications
  - Alarms
- Four freely programmable function keys for frequently performed functions
- Seven freely programmable LEDs for displaying any desired data
- Keys for navigation in menus and for entering values
- Fault recorder.

#### Overcurrent and motor protection SIPROTEC 7SJ63

- For stand-alone or master operation
- Communications and bus capability
- Functions: Protection, control, signaling, communication and measuring
- LC display for process and equipment data in the form of a feeder control diagram and as text, e.g. for
  - Measuring and metering values
  - Information on status of switchgear and switching device
  - Protection data
  - General indications
  - Alarms
- Four freely programmable function keys for frequently performed functions
- Fourteen freely programmable LEDs for displaying any desired data
- Two key-operated switches to switch between “local and remote control” and “interlocked and non-interlocked operation”
- Keys for navigation in menus and for entering values
- Integrated motor control by special relays with enhanced performance
- Fault recorder.



SIPROTEC 7SJ80



SIPROTEC 7SJ61 / 7SJ62



SIPROTEC 7SJ63

**Type of service location**

The switchgear can be used as indoor installation according to IEC 61936 (Power installations exceeding 1 kV AC) and VDE 0101

- Outside lockable electrical service locations at places which are not accessible to the public. Enclosures of switchgear can only be removed with tools
- In lockable electrical service locations. A lockable electrical service location is a place outdoors or indoors that is reserved exclusively for housing electrical equipment and which is kept under lock and key. Access is restricted to authorized personnel and persons who have been properly instructed in electrical engineering. Untrained or unskilled persons may only enter under the supervision of authorized personnel or properly instructed persons.

**Terms**

"Make-proof earthing switches" are earthing switches with short-circuit making capacity according to IEC 62271-102 and VDE 0671-102/EN 62271-102.

**Dielectric strength**

- The dielectric strength is verified by testing the switchgear with rated values of short-duration power-frequency withstand voltage and lightning impulse withstand voltage according to IEC 62271-1/VDE 0671-1 (see table "Dielectric strength").
- The rated values are referred to sea level and to normal atmospheric conditions (1013 hPa, 20 °C, 11g/m<sup>3</sup> humidity according to IEC 60071 and VDE 0111).

The gas insulation at a relative gas pressure of 50 kPa permits switchgear installation at any desired altitude above sea level without the dielectric strength being adversely affected. This also applies to the cable connection when plug-in sealing ends are used.

A decrease (reduction) of the dielectric strength with increasing site altitude must only be considered for panels with HV HRC fuses. For site altitudes above 1000 m, a higher insulation level must be selected. It results from the multiplication of the rated insulation level for 0 to 1000 m with the altitude correction factor  $K_a$  (see illustration and example).

**Standards**

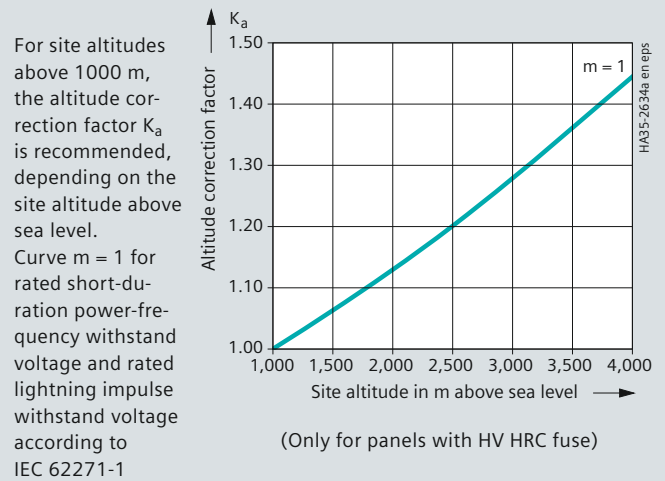
NXPLUS C switchgear complies with the relevant standards and specifications applicable at the time of type tests. In accordance with the harmonization agreement reached by the countries of the European Union, their national specifications conform to the IEC standard.

**Overview of standards (June 2013)**

		IEC standard	VDE standard	EN standard
Switchgear	NXPLUS C	IEC 62271-1	VDE 0671-1	EN 62 271-1
		IEC 62271-200	VDE 0671-200	EN 62 271-200
		IEC 62271-304	–	eLC/TS 62271-304
Devices	Circuit-breakers	IEC 62271-100	VDE 0671-100	EN 62 271-100
	Vacuum contactors	IEC 60470	VDE 0670-501	EN 60 470
	Disconnectors and earthing switches	IEC 62271-102	VDE 0671-102	EN 62 271-102
	Switch-disconnectors	IEC 60265-1	VDE 0670-301	EN 60 265-1
	Switch-disconnector / fuse combination	IEC 62271-105	VDE 0671-105	EN 62 271-105
	HV HRC fuses	IEC 60282	VDE 0670-4	EN 60 282
	Voltage detecting systems	IEC 61243-5	VDE 0682-415	EN 61243-5
Degree of protection	IP code	IEC 60529	VDE 0470-1	EN 60 529
	IK code	IEC 62262	VDE 0470-100	EN 50 102
Insulation	–	IEC 60071	VDE 0111	EN 60 071
Instrument transformers	–	IEC 61869-1	VDE 0414-9-1	EN 61 869-1
	Current transformers	IEC 61869-2	VDE 0414-9-2	EN 61 869-2
	Voltage transformers	IEC 61869-3	VDE 0414-9-3	EN 61 869-3
Installation, erection	–	IEC 61936-1	VDE 0101	–
Insulating gas SF <sub>6</sub>	Specification for new SF <sub>6</sub>	IEC 60376	VDE 0373-1	EN 60 376

**Table – Dielectric strength**

Rated voltage (r.m.s. value)	kV	7.2	12	15	17.5	24
Rated short-duration power-frequency withstand voltage (r.m.s. value)						
– Between phases and to earth	kV	20	28	35	38	50
– Across isolating distances	kV	23	32	39	45	60
Rated lightning impulse withstand voltage (peak value)						
– Between phases and to earth	kV	60	75	95	95	125
– Across isolating distances	kV	70	85	105	110	145

**Altitude correction factor  $K_a$** **Example:**

3000 m site altitude above sea level ( $K_a = 1.28$ ),  
 17.5 kV switchgear rated voltage,  
 95 kV rated lightning impulse withstand voltage  
 Rated lightning impulse withstand voltage to be selected =  
 $95 \text{ kV} \cdot 1.28 = 122 \text{ kV}$

**Result:**

According to the above table, a switchgear for a rated voltage of 24 kV with a rated lightning impulse withstand voltage of 125 kV is to be selected.

# Standards

## Standards, specifications, guidelines

### Current carrying capacity

- According to IEC 62271-200 or IEC 62271-1, VDE 0671-200 or VDE 0671-1, the rated normal current refers to the following ambient air temperatures:
  - Maximum of 24-hour mean + 35 °C
  - Maximum + 40 °C
- The current carrying capacity of the panels and busbars depends on the ambient air temperature outside the enclosure.

### Internal arc classifications

- Protection of operating personnel by means of tests for verifying the internal arc classification
- Internal arcing tests must be performed in accordance with IEC 62271-200 or VDE 0671-200
- Definition of criteria:
  - **Criterion 1:**  
Correctly secured doors and covers do not open, limited deformations are accepted.
  - **Criterion 2:**  
No fragmentation of the enclosure, no projection of small parts above 60 g
  - **Criterion 3:**  
No holes in accessible sides up to a height of 2 m
  - **Criterion 4:**  
No ignition of indicators due to hot gases
  - **Criterion 5:**  
The enclosure remains connected to its earthing point.

### Resistance to internal faults

Due to the single-pole enclosure of external components and the SF<sub>6</sub> insulation of switching devices, the possibility of faults in SF<sub>6</sub>-insulated switchgear is improbable and a mere fraction of that typical of earlier switchgear types:

- There are no effects due to external influences, such as:
  - Pollution layers
  - Humidity
  - Small animals and foreign objects
- Maloperation is practically excluded due to logical arrangement of operating elements
- Short-circuit-proof feeder earthing by means of the circuit-breaker or the three-position switch-disconnector.

In the unlikely event of a fault within the switchgear vessel, the energy conversion in the case of an internal arc fault is minor thanks to the SF<sub>6</sub> insulation and the shorter arc length, approximately only 1/3 of the converted energy of an arc in air insulation. The escaping gases are discharged upwards through a pressure relief duct (option).

### Aseismic capacity (option)

NXPLUS C switchgear can be upgraded for regions at risk from earthquakes.

For upgrading, earthquake qualification testing has been carried out in accordance with the following standards:

- IEC 60068-3-3 "Guidance – seismic test methods for equipment"
- IEC 60068-2-57 "Test Ff: Vibration – Time-history method"
- IEC 60068-2-59 "Test Fe: Vibration – Sine-beat method"
- IEEE 693-2005 "Recommended Practice for Seismic Design of Substations".

For installation on even and rigid concrete or steel structure (without considering building influences), the tested ground accelerations meet the following requirements:

- Uniform Building Code 1997 (UBC) – Zone 4
- California Building Code 1998 (CBC) – Zone 4
- IEEE 693-2005 – High required response spectrum (Figure A.1).

### Shock, vibration (option)

NXPLUS C switchgear can be upgraded to withstand stress caused by shock and vibration. For upgrading, shock and vibration tests have been carried out in accordance with the following standards:

- ETSI EN 300 019-2-2; T2.3 Public Transportation
- IEC 60068-2-6, Environmental Testing – Part 2-6:  
Tests – Test Fc: Vibration (sinusoidal)
- IEC 60068-2-64, Environmental Testing – Part 2-64:  
Tests – Test Fh: Vibration, broad-band, random and guidance (noise spectrum according to DNV).

### Color of the panel front

Siemens standard (SN) 47 030 G1, color no. 700/light basic (similar to RAL 7047/telegrey).

### Climate and environmental influences

The parts of the primary circuit of NXPLUS C switchgear under high voltage are completely enclosed and insensitive to climatic influences.

- All medium-voltage devices (except for HV HRC fuses) are installed in a gas-tight, welded stainless-steel switchgear vessel which is filled with SF<sub>6</sub> gas
- Live parts outside the switchgear vessel are provided with single-pole enclosure
- At no point can creepage currents flow from high-voltage potentials to earth
- Operating mechanism parts which are functionally important are made of corrosion-resistant materials
- Bearings in the operating mechanism are designed as dry-type bearings and do not require lubrication.

The NXPLUS C switchgear is suitable for application in indoor installations under normal operating conditions as defined in the standard IEC 62271-1.

- Temperature –5 °C up to +55 °C  
–25°C up to +55°C <sup>1)</sup> (optional)
- Relative air humidity Mean value over 24 hours <sup>1)</sup>: ≤ 98 %  
Mean value over 1 month: ≤ 90 %
- Condensation Occasionally  
Frequently (degree of protection min. IP31D, with anti-condensation heater in the low-voltage part <sup>2)</sup>)
- Site altitude Panels without HV HRC fuse:  
No restriction  
Panels with HV HRC fuse:  
Altitude correction to be considered (see page 69)

Furthermore, the high-voltage part of the NXPLUS C switchgear can be used in environmental conditions of the climatic category 3C2 according to the standard IEC 60721-3-3.

NXPLUS C has been subjected to a climatic test according to IEC 60932, Level 2, and is suitable for operating conditions according to "Design Class 2". This test also meets the requirements of IEC 62271-304 for "Design Class 2".

- 1) Secondary devices (e.g. protection devices, meters, measuring transducer etc.) must be suitable for the given operating conditions
- 2) Heater in the low-voltage compartment and operating mechanism box of the circuit-breaker

**Protection against solid foreign objects, electric shock and water**

NXPLUS C switchgear fulfills according to the standards

IEC 62271-1	VDE 0671-1, EN 62 271-1
IEC 62271-200	VDE 0671-200, EN 62 271-200
IEC 60529	VDE 0470-1, EN 60 529
IEC 62262	VDE 0470-100, EN 50 102

the following degrees of protection:

Degree of protection IP	Type of protection
IP 65	for parts of the primary circuit under high voltage
IP 3XD	for switchgear enclosure
IP 31D	for switchgear enclosure (optional)
IP 32D	for switchgear enclosure (optional)
IP 34D	for switchgear enclosure (optional)
IP 4X	for switchgear enclosure (optional)
IP 54	for switchgear enclosure (optional)
Degree of protection IK	Type of protection
IK 07	for switchgear enclosure

For secondary devices in the low-voltage door, the stipulations of the IP degree of protection apply according to the definitions for the switchgear enclosure.

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