

SIEMENS



Catalog
HA 35.51 ·
Edition 2019

Fixed-Mounted Circuit-Breaker Switchgear Type NXPLUS up to 40.5 kV, Gas-Insulated Medium-Voltage Switchgear

[siemens.com/medium-voltage-switchgear](https://www.siemens.com/medium-voltage-switchgear)

Application

Typical uses

R-HA35-090 eps



R-HA35-092 eps



Typical uses:
Examples
Public power supply system,
steel works,
offshore wind park,
cement industry,
industrial plant

R-HA35.51-76 83.tif



R-HA35-156.tif

R_HA35-51-2758.tif



R_HA35-51-2754.tif

Fixed-Mounted Circuit-Breaker Switchgear Type NXPLUS up to 40.5 kV, Gas-Insulated

Medium-Voltage Switchgear

Catalog HA 35.51 · 2019

Invalid: Catalog HA 35.51 · 2015

www.siemens.com/medium-voltage-switchgear

www.siemens.com/NXPLUS

Application	Page
Typical uses	2
Types, typical uses, ratings	4 and 5
Requirements	
Features, safety, technology	6 and 7
Technical Data	
Electrical data	8 and 9
Room planning	10
Shipping data, classification	11
Dimensions	
Front views, sections, floor openings, fixing points	12 to 21
Product Range	
Single-busbar panels	22 and 23
Double-busbar panels	24 to 27
Design	
Single-busbar panel design	28
Double-busbar panel design	29
Components	
Vacuum circuit-breaker	30 and 31
Three-position disconnecter	32 and 33
Busbar, module coupling	34
Current transformers	35
Voltage transformers	36 to 38
Horizontal pressure relief duct	39 and 40
Panel connection with outside cone	41 to 43
Installation possibilities with outside cone	44 and 45
Panel connection with inside cone	46 and 47
Installation possibilities with inside cone	48 and 49
Indicating and measuring equipment	50 to 54
Protection, control, measuring and monitoring equipment	55 to 58
Standards	
Standards, specifications, guidelines	59 to 61

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



Panel for
single busbar



Panel for
double busbar

Fixed-mounted circuit-breaker switchgear NXPLUS is a factory-assembled, type-tested, metal-enclosed, SF₆-insulated switchgear with metallic partitions ²⁾ 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
- Textile, paper and food industries
- Chemical industry
- Petroleum industry
- Pipeline installations
- Electrochemical plants
- Petrochemical plants
- Diesel power plants
- Emergency power supply installations
- Traction power supply systems
- Offshore installations
- Renewable power generation plants.

Electrical data (maximum values) and dimensions Single-busbar panels

Rated voltage	max. kV	12	24	36	40.5
Rated frequency	Hz	50/60	→		
Rated short-duration power-frequency withstand voltage	kV	28	50	70	85
Rated lightning impulse withstand voltage	kV	75	125	170	185
Rated short-circuit breaking current	max. kA	31.5	→		
Rated short-time withstand current, 3 s	max. kA	31.5	→		
Rated short-circuit making current	max. kA	80/82	→		
Rated peak withstand current	max. kA	80/82	→		
Rated normal current of the busbar	max. A	2000 ¹⁾	2000 ¹⁾	2000 ¹⁾	2000
Rated normal current of the feeders	max. A	2000 ¹⁾	2000 ¹⁾	2000 ¹⁾	2000
Width	mm	600	→		
Depth	mm	1585	→		
Height					
– Standard	mm	2450	→		
– With higher low-voltage compartment	mm	2615	→		

Double-busbar panels

Rated voltage	max. kV	12	24	36
Rated frequency	Hz	50/60	→	
Rated short-duration power-frequency withstand voltage	kV	28	50	70
Rated lightning impulse withstand voltage	kV	75	125	170
Rated short-circuit breaking current	max. kA	31.5	→	
Rated short-time withstand current, 3 s	max. kA	31.5	→	
Rated short-circuit making current	max. kA	80/82	→	
Rated peak withstand current	max. kA	80/82	→	
Rated normal current of the busbar	max. A	2500	2500	2500
Rated normal current of the feeders	max. A	2500	2500	2500
Width				
– Up to 2000 A	mm	600	→	
– > 2000 A	mm	1200	→	
Depth	mm	1825	→	
Height				
– Standard	mm	2600	→	
– With higher low-voltage compartment	mm	2615	→	

1) 2500 A on request

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

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 switchgear

- Insensitive to certain aggressive ambient conditions, such as:
 - 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 SF₆ insulation, compact dimensions are possible up to 40.5 kV.

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 SF₆ 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 gas-insulated switchgear NXPLUS 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 switchgear 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.

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 (modules)
- Metal-coated or metal-enclosed, plug-in inductive voltage transformers mounted outside the SF₆ switchgear vessel
- Current transformers as ring-core current transformers mounted outside the SF₆ switchgear vessel
- Complete switchgear interlocking system with logical mechanical interlocks
- Welded switchgear vessels, sealed for life
- Minimum fire load
- Type and routine-tested
- Standardized and manufactured using numerically controlled machines
- 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 earthquakes (single busbar only).

Reliability

- Type and routine-tested
- Standardized and manufactured using numerically controlled machines
- 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 via modules made of stainless steel
- Insulating gas SF₆
- Three-position switch as busbar disconnecter and feeder earthing switch
- Make-proof earthing by means of the vacuum circuit-breaker
- Panel spacing of incoming and outgoing feeder panels: 600 mm (1200 mm as of 2300 A feeder current)
- Hermetically tight, welded switchgear vessel made of stainless steel
- 1-pole solid-insulated, screened module coupling in bolted technology
- Cable connection with inside-cone or outside-cone plug-in system, or for connection of solid-insulated bars
- Wall-standing or free-standing arrangement
- Cable connection access from front or rear
- Low-voltage door hinges on the left or on the right
- Installation and extension of existing switchgear at both ends without gas work and without modification of existing panels
- Panel-internal control cables in metallic wiring ducts.

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 can only be operated with three-position switch in end position and operating lever removed
- Three-position disconnecter interlocked against the circuit-breaker in circuit-breaker panels and in bus sectionalizers with one panel spacing
- "Feeder earthed" locking device
- 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
- Option: Cable compartment cover interlocked against the three-position switch (circuit-breaker panel, disconnecter panel)
- Option: Electromagnetic interlocks
- Option: Actuating openings of the circuit-breaker can be padlocked
- Option: "Feeder" locking device.

Modular design

- Replacement of the circuit-breaker module without gas work
- Low-voltage compartment removable, plug-in bus wires.

Instrument transformers

- Can be removed without altering the position of the busbar and circuit-breaker modules (outside the gas compartments)
- Current transformers not subjected to dielectric stress
- Easy replacement of ring-core current transformers
- Metal-coated or metal-enclosed, 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
- 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 59)

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	12	24	36	40.5
		Rated short-duration power-frequency withstand voltage U_d :					
		– phase-to-phase, phase-to-earth, open contact gap	kV	28	50	70	85
		– across the isolating distance	kV	32	60	80	90
		Rated lightning impulse withstand voltage U_p :					
		– phase-to-phase, phase-to-earth, open contact gap	kV	75	125	170	185
		– across the isolating distance	kV	85	145	195	218
	Rated frequency f_r		Hz	50/60			
	Rated normal current I_r ²⁾	for the busbar	up to A	2000 ¹⁾	2000 ¹⁾	2000 ¹⁾	2000
	Rated filling level p_{re} ³⁾			150 kPa (absolute)	at 20 °C		
	Minimum functional level p_{me} ³⁾			130 kPa (absolute)	at 20 °C		
	Ambient air temperature			– 5 °C to	+55 °C		

Data of the switchgear panels

Circuit-breaker panel Outside cone 1250 A	Rated normal current I_r ²⁾	A	1250	1250	1250	–	
	Rated short-time withstand current I_k	for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5	–
	Rated peak withstand current I_p 50/60 Hz		up to kA	80/82	80/82	80/82	–/–
	Rated short-circuit making current I_{ma} 50/60 Hz		up to kA	80/82	80/82	80/82	–/–
	Rated short-circuit breaking current I_{sc}		up to kA	31.5	31.5	31.5	–
	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 Inside cone 1250 A 1600 A 2000 A	Rated normal current I_r ²⁾	A	1250 1600 2000	1250 1600 2000	1250 1600 2000	1250 1600 2000	
	Rated short-time withstand current I_k	for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5	31.5
	Rated peak withstand current I_p 50/60 Hz		up to kA	80/82	80/82	80/82	80/82
	Rated short-circuit making current I_{ma} 50/60 Hz		up to kA	80/82	80/82	80/82	80/82
	Rated short-circuit breaking current I_{sc}		up to kA	31.5	31.5	31.5	31.5
	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 Separate inside cone 1250 A 1600 A 2000 A	Rated normal current I_r ²⁾	A	1250 1600 2000	1250 1600 2000	1250 1600 2000	1250 1600 2000	
	Rated short-time withstand current I_k	for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5	31.5
	Rated peak withstand current I_p 50/60 Hz		up to kA	80/82	80/82	80/82	80/82
	Rated short-circuit making current I_{ma} 50/60 Hz		up to kA	80/82	80/82	80/82	80/82
	Rated short-circuit breaking current I_{sc}		up to kA	31.5	31.5	31.5	31.5
	Electrical endurance of vacuum circuit-breakers	at rated normal current		10,000 operating cycles			
	at rated short-circuit breaking current		50 breaking operations				
Disconnecter panel Outside cone 1250 A	Rated normal current I_r ²⁾	A	1250	1250	1250	–	
	Rated short-time withstand current I_k	for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5	–
	Rated peak withstand current I_p 50/60 Hz		up to kA	80/82	80/82	80/82	–/–
Disconnecter panel Inside cone 1250 A 1600 A 2000 A	Rated normal current I_r ²⁾	A	1250 1600 2000	1250 1600 2000	1250 1600 2000	1250 1600 2000	
	Rated short-time withstand current I_k	for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5	31.5
	Rated peak withstand current I_p 50/60 Hz		up to kA	80/82	80/82	80/82	80/82

1) 2500 A on request

2) 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)

3) Pressure values for gas-insulated switchgear vessels

Common electrical data, filling pressure and temperature	Rated insulation level	Rated voltage U_r	kV	12	24	36
		Rated short-duration power-frequency withstand voltage U_d : – phase-to-phase, phase-to-earth, open contact gap – across the isolating distance	kV kV	28 32	50 60	70 80
		Rated lightning impulse withstand voltage U_p : – phase-to-phase, phase-to-earth, open contact gap – across the isolating distance	kV kV	75 85	125 145	170 195
		Rated frequency f_r	Hz	50/60	→	→
		Rated normal current I_r ¹⁾ for the busbar	up to A	2500	2500	2500
		Rated filling level p_{re} ²⁾		150 kPa (absolute) at 20 °C	→	→
		Minimum functional level p_{me} ²⁾		130 kPa (absolute) at 20 °C	→	→
	Ambient air temperature		– 5 °C to +55 °C	→	→	

Data of the switchgear panels

Circuit-breaker panel Outside cone 1250 A	Rated normal current I_r ¹⁾	A	1250	1250	1250
	Rated short-time withstand current I_k for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5
	Rated peak withstand current I_p 50/60 Hz	up to kA	80/82	80/82	80/82
	Rated short-circuit making current I_{ma} 50/60 Hz	up to kA	80/82	80/82	80/82
	Rated short-circuit breaking current I_{sc}	up to kA	31.5	31.5	31.5
	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, bus coupler, bus sectionalizer Inside cone 1250 A 1600 A 2000 A 2300 A 2500 A	Rated normal current I_r ²⁾	A A A A A	1250 1600 2000 2300 2500	1250 1600 2000 2300 2500	1250 1600 2000 2300 2500
	Rated short-time withstand current I_k for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5
	Rated peak withstand current I_p 50/60 Hz	up to kA	80/82	80/82	80/82
	Rated short-circuit making current I_{ma} 50/60 Hz	up to kA	80/82	80/82	80/82
	Rated short-circuit breaking current I_{sc}	up to kA	31.5	31.5	31.5
	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 Separate inside cone 1250 A 1600 A 2000 A 2300 A 2500 A	Rated normal current I_r ²⁾	A A A A A	1250 1600 2000 2300 2500	1250 1600 2000 2300 2500	1250 1600 2000 2300 2500
	Rated short-time withstand current I_k for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5
	Rated peak withstand current I_p 50/60 Hz	up to kA	80/82	80/82	80/82
	Rated short-circuit making current I_{ma} 50/60 Hz	up to kA	80/82	80/82	80/82
	Rated short-circuit breaking current I_{sc}	up to kA	31.5	31.5	31.5
	Electrical endurance of vacuum circuit-breakers	at rated normal current		10,000 operating cycles	→
	at rated short-circuit breaking current		50 breaking operations	→	→

1) 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)

2) Pressure values for gas-insulated switchgear vessels

Technical Data

Room planning

Switchgear installation

- For single-busbar or double-busbar applications:
 - Wall-standing arrangement or
 - Free-standing arrangement
 - Face-to-face arrangement accordingly.

Room dimensions

See opposite dimension drawings.

Room height

- SBB ≥ 2950 mm
- DBB ≥ 3100 mm.

Door dimensions

The following dimensions are recommended as a minimum for the door dimensions:

- SBB
 - Door height: ≥ 2500 mm
 - Door width: ≥ 1200 mm
- DBB
 - Door height: ≥ 2750 mm
 - Door width: ≥ 1200 mm.

Switchgear fixing

- Floor openings and fixing points of the switchgear (see pages 12 to 21)
- Foundations:
 - Steel girder construction
 - Steel-reinforced concrete with foundation rails, welded or bolted on.

Panel dimensions

See pages 12 to 21.

Panel width B1 (spacing)

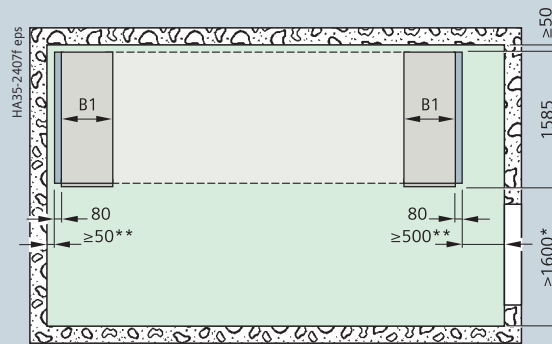
Circuit-breaker panel	600 mm
Disconnecter panel	600 mm
Bus sectionalizer panel	900 mm

Panel width B2 (spacing)

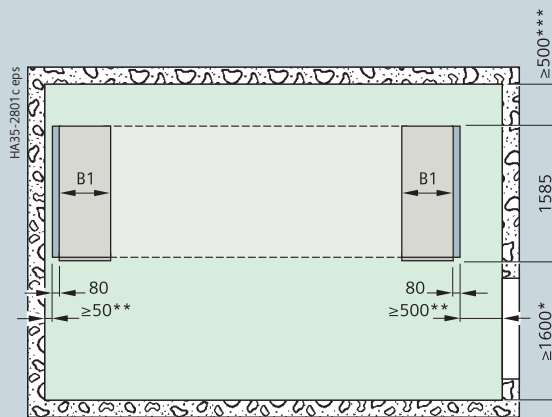
Circuit-breaker panel ¹⁾	600 mm
Bus coupler panel ¹⁾	600 mm
Bus sectionalizer panel, system 1 or system 2 ²⁾	600 mm
Metering panel	300 mm or 600 mm

1) 1200 mm at 2300/2500 A
 2) 900 mm or 1200 mm at 2300/2500 A

Room planning for single-busbar switchgear

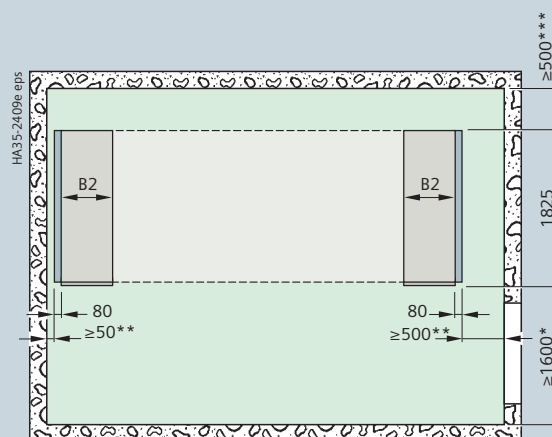


Wall-standing arrangement (top view)



Free-standing arrangement (top view)

Room planning for double-busbar switchgear



Wall-standing arrangement/free-standing arrangement (top view)

- * Aisle width
- ** Free space next to the last panel installed, either on the left or on the right of the switchgear row, recommendation ≥ 500 mm
- *** ≥ 500 mm aisle for installation and maintenance (acc. to IEC 61936-1)
 ≥ 800 mm aisle for control (IEC 62271-200)

Transport

NXPLUS 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.

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.

Transport dimensions, transport weights ¹⁾

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 by rail or truck

1 × 600	1100 × 2680 (2850) ²⁾ × 2100	1300	1200
1 × 900	1870 × 2680 (2850) ²⁾ × 2100	1350	1250

Single-busbar switchgear transport by ship

1 × 600	1120 × 3000 × 2100	1300	1250
1 × 900	1890 × 3000 × 2100	1350	1300

Double-busbar switchgear transport by rail or truck

1 × 600	1100 × 2830 (2850) ²⁾ × 2100	1900	1800
1 × 900	1870 × 2830 (2850) ²⁾ × 2100	2000	1900
1 × 1200	1870 × 2830 (2850) ²⁾ × 2100	2100	2000

Double-busbar switchgear transport by ship

1 × 600	1120 × 3000 × 2100	1950	1850
1 × 900	1890 × 3000 × 2100	2050	1950
1 × 1200	1890 × 3000 × 2100	2150	2050

Classification of NXPLUS switchgear according to IEC 62271-200

Design and construction

Partition class	PM (metallic partition) ³⁾
Loss of service continuity category	LSC 2
Accessibility to compartments (enclosure)	
Busbar compartment	Tool-based
Switching-device compartment	Non-accessible
Low-voltage compartment	Tool-based
Cable compartment	Tool-based

Internal arc classification

Designation of the internal arc classification IAC IAC class for: Wall-standing arrangement Free-standing arrangement	IAC A FL 31.5 kA, 1 s IAC A FLR 31.5 kA, 1 s
Type of accessibility A – F – L – R	Switchgear in closed electrical service location, access "for authorized personnel only" according to IEC 62271-200 Front Lateral Rear (for free-standing arrangement)
Arc test current	31.5 kA
Test duration	1 s
Test setup	According to IEC 62271-200 Annex AA: Minimum wall distance 800 mm for accessible sides

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

2) Panels with 1100 mm high low-voltage compartment

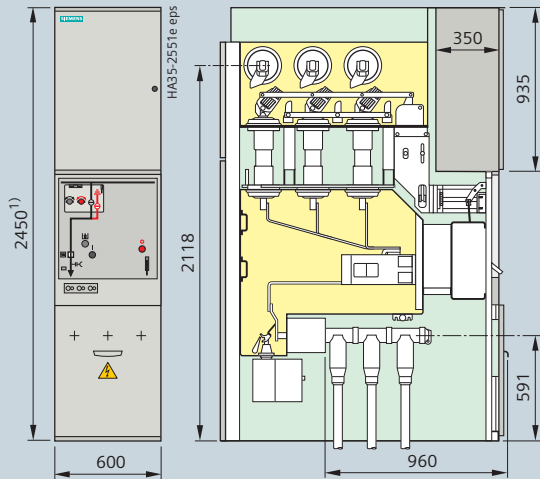
3) Corresponds to "metal-clad" according to former standard IEC 60298

Dimensions

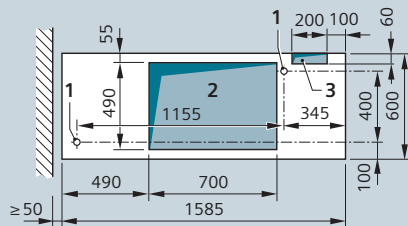
Front views, sections, floor openings, fixing points for single-busbar switchgear

Circuit-breaker panels

Outside cone



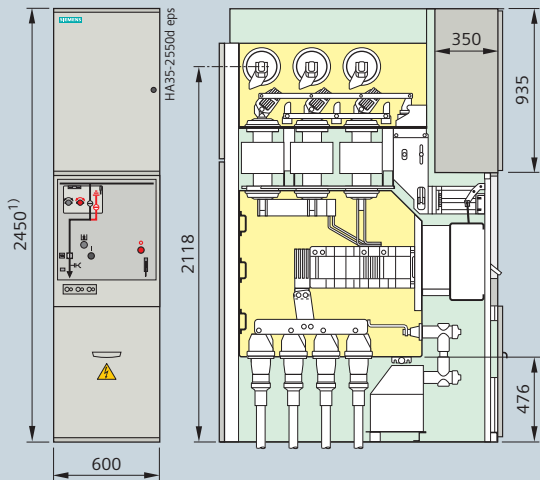
1250 A



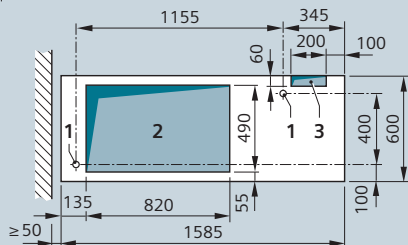
1) 2615 mm for higher low-voltage compartment

- 1 Fixing point
- 2 Floor opening for high-voltage cables
- 3 Floor opening for control cables

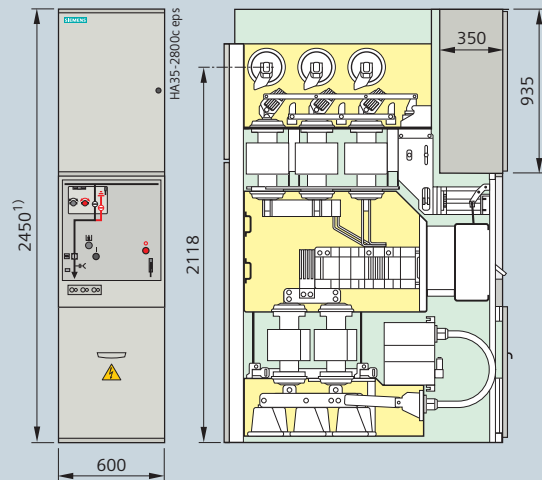
Inside cone



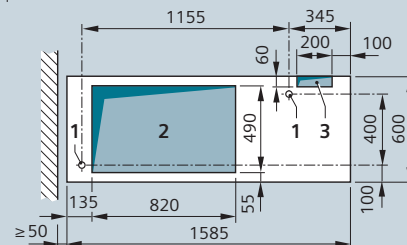
1250 A
1600 A
2000 A



Separate inside cone

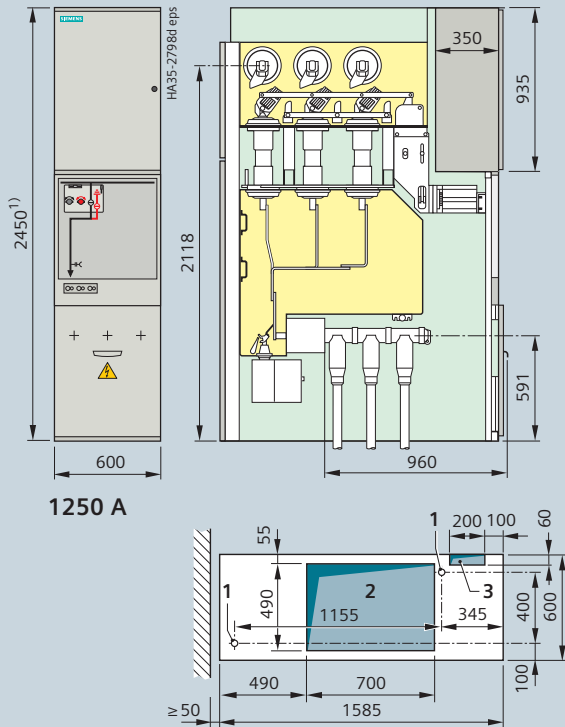


1250 A
1600 A
2000 A

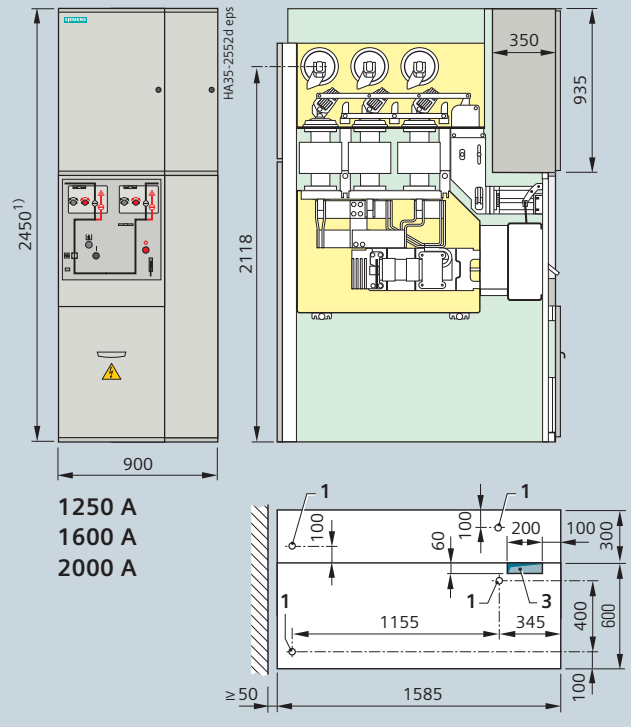


Disconnecter panels

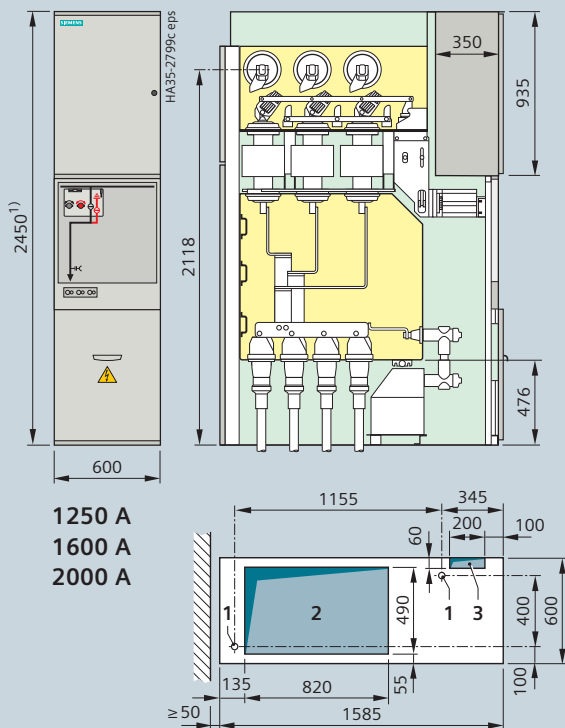
Outside cone



Bus sectionalizer



Inside cone



1) 2615 mm for higher low-voltage compartment

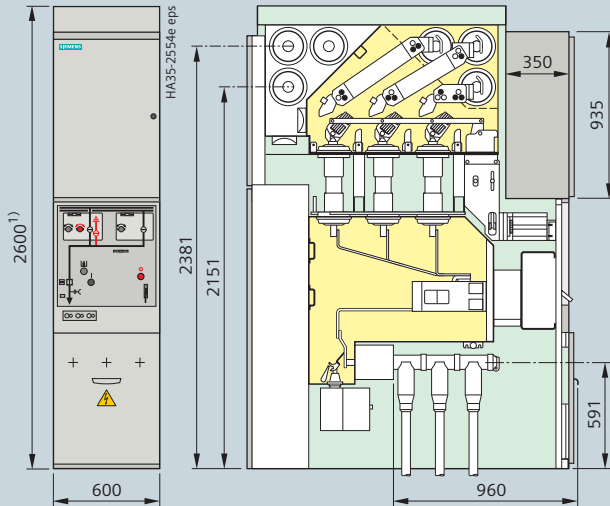
- 1 Fixing point
- 2 Floor opening for high-voltage cables
- 3 Floor opening for control cables

Dimensions

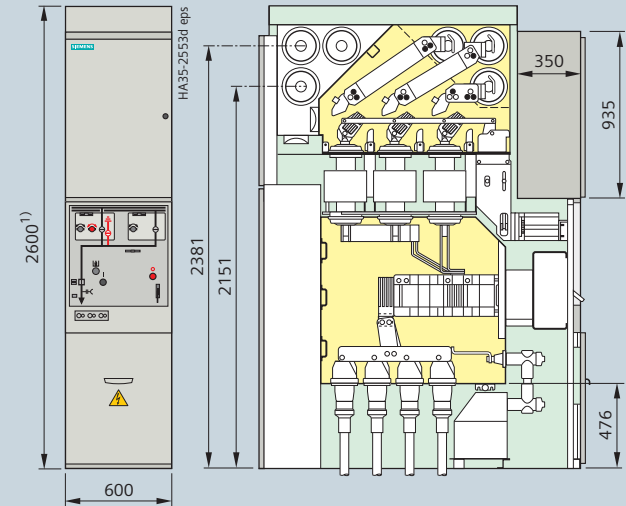
Front views, sections, floor openings, fixing points for double-busbar switchgear

Circuit-breaker panels

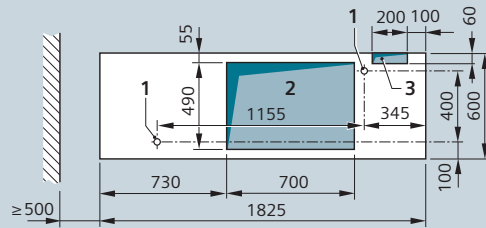
Outside cone



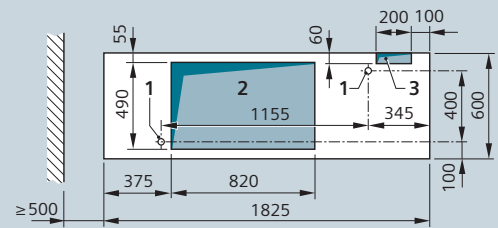
Inside cone



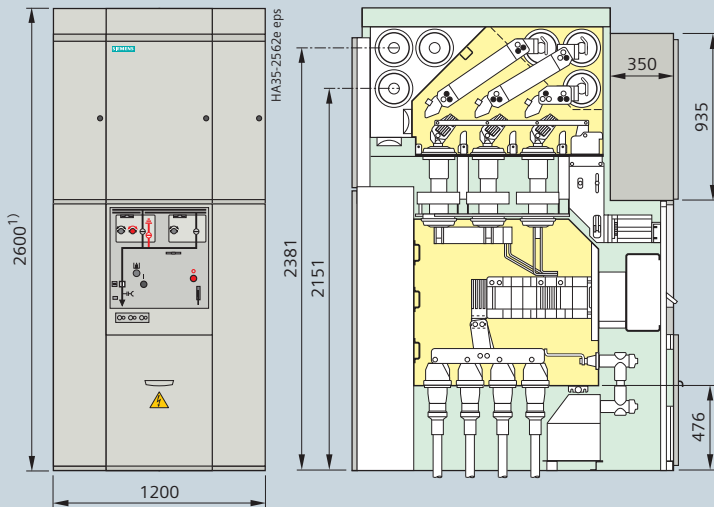
1250 A



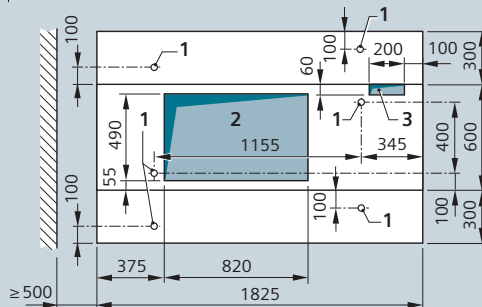
1250 A
1600 A
2000 A



Inside cone



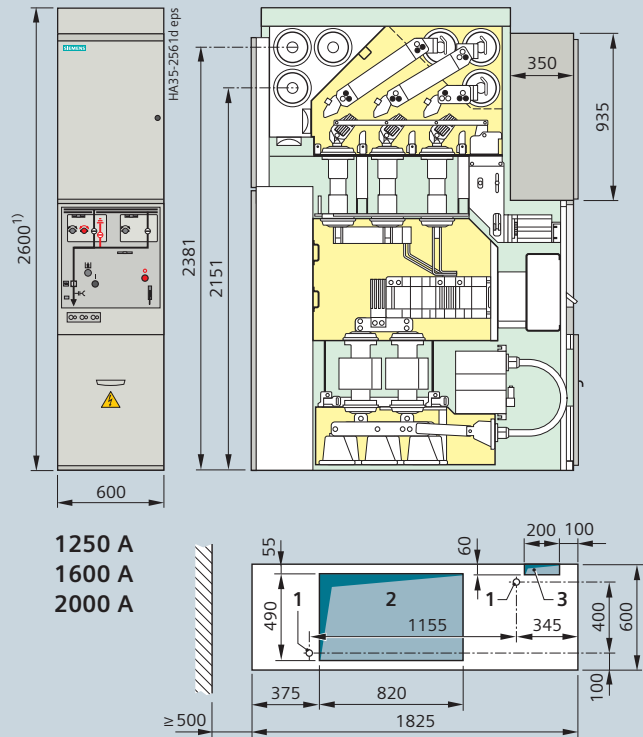
2300 A
2500 A



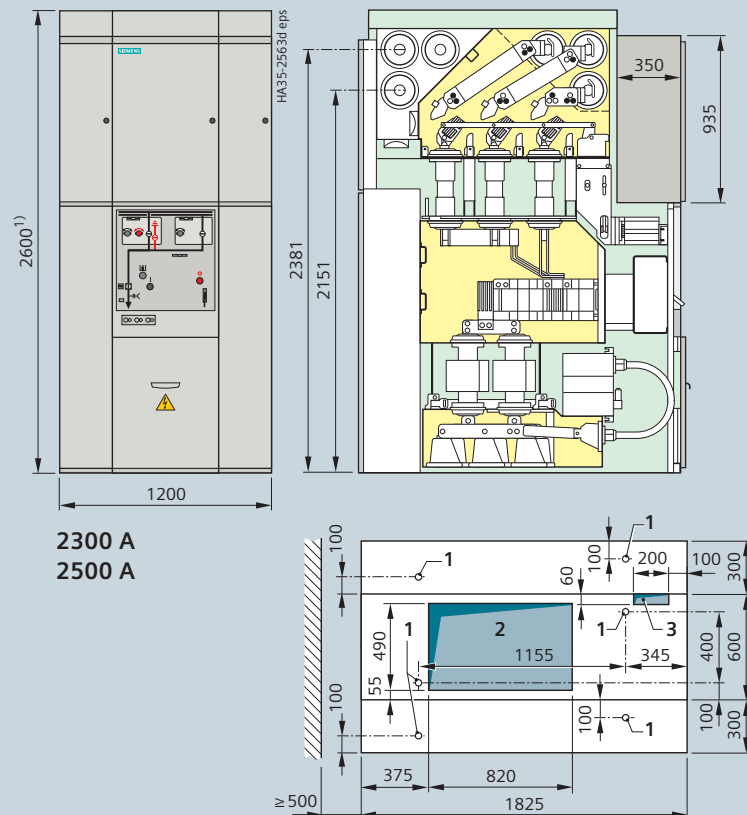
1) 2615 mm for higher low-voltage compartment

- 1 Fixing point
- 2 Floor opening for high-voltage cables
- 3 Floor opening for control cables

Circuit-breaker panels Separate inside cone



Separate inside cone



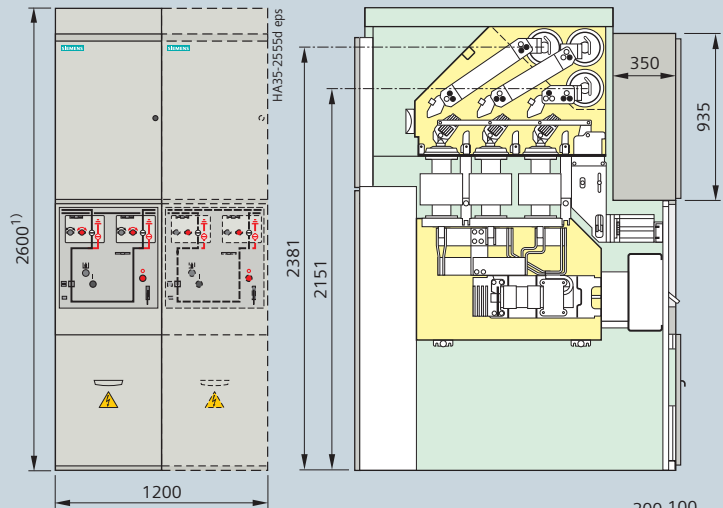
1) 2615 mm for higher low-voltage compartment

- 1 Fixing point
- 2 Floor opening for high-voltage cables
- 3 Floor opening for control cables

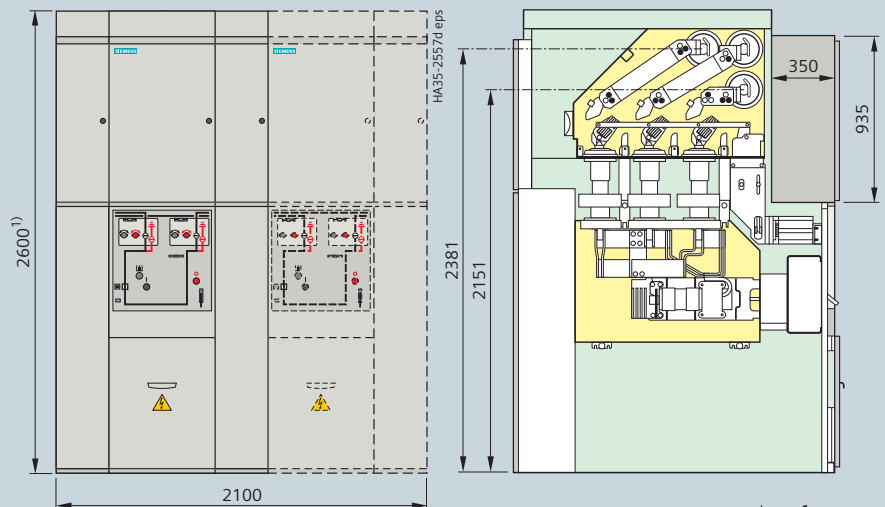
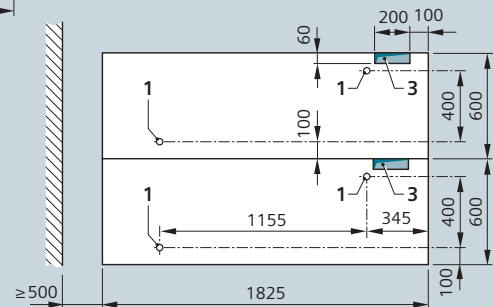
Dimensions

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

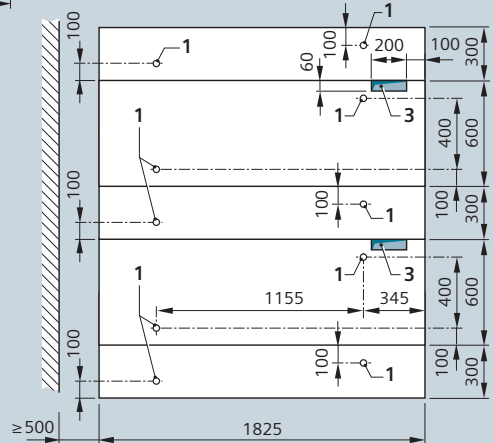
Bus sectionalizers Busbar system 1



1250 A
1600 A
2000 A



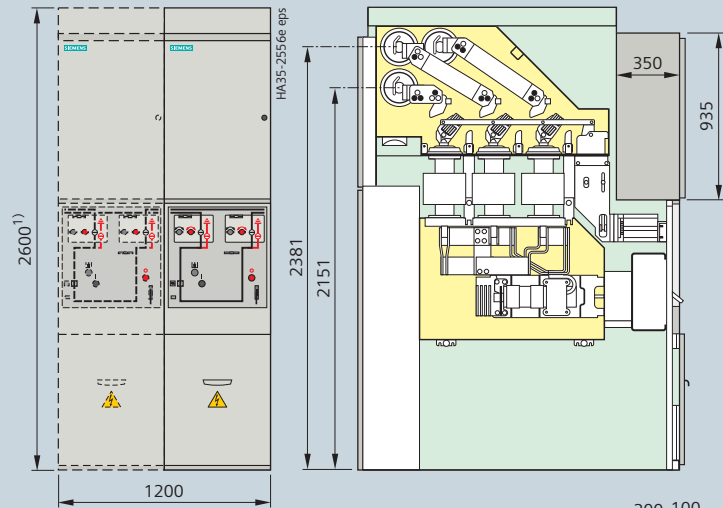
2300 A
2500 A



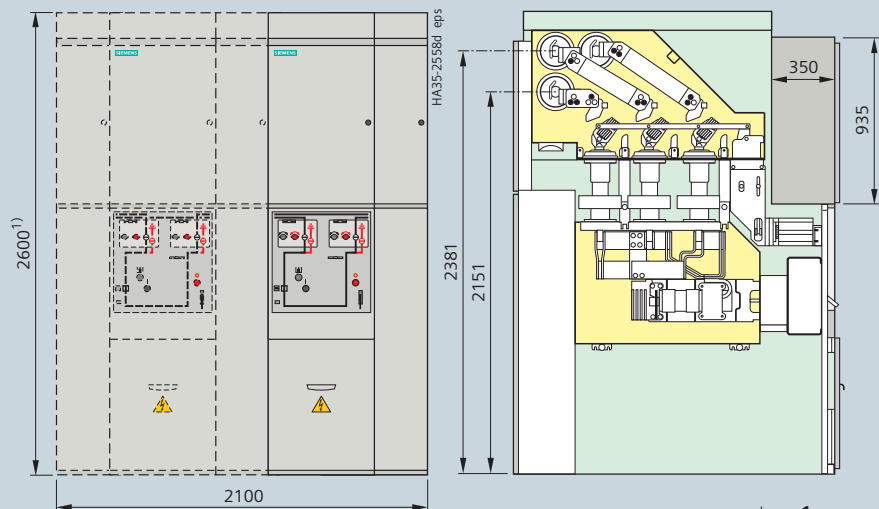
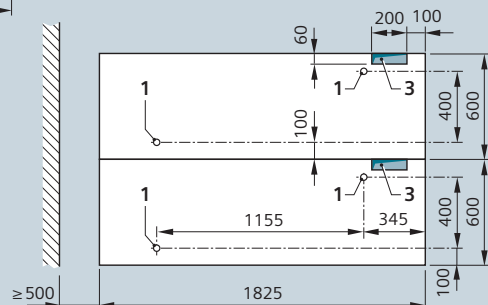
1) 2615 mm for higher low-voltage compartment

- 1 Fixing point
- 3 Floor opening for control cables

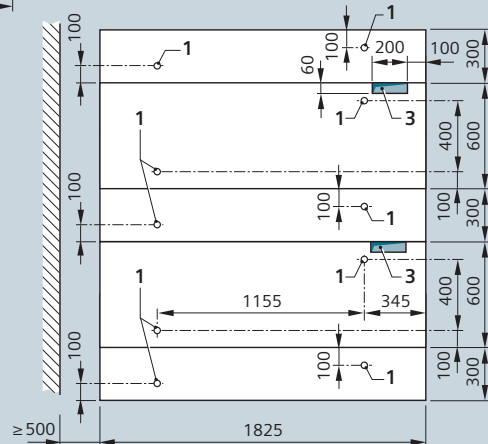
Bus sectionalizers Busbar system 2



1250 A
1600 A
2000 A



2300 A
2500 A



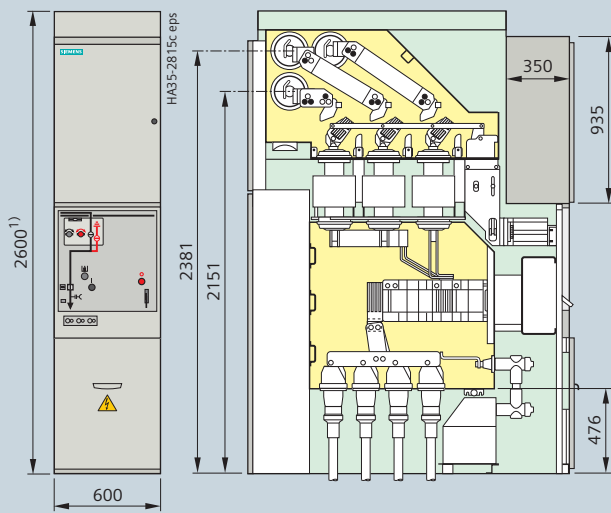
1) 2615 mm for higher low-voltage compartment

- 1 Fixing point
- 3 Floor opening for control cables

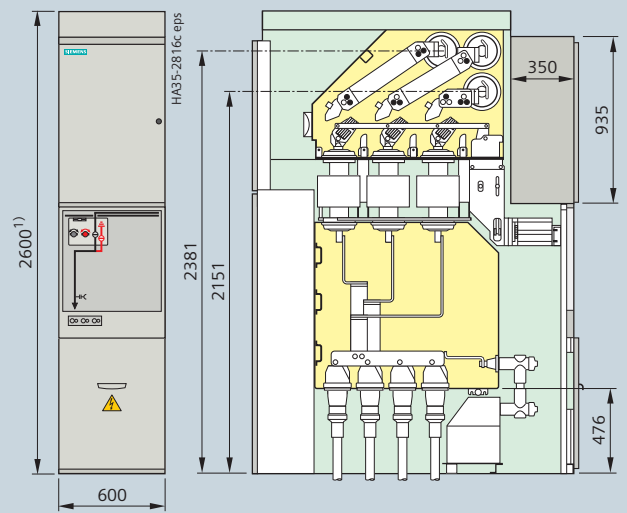
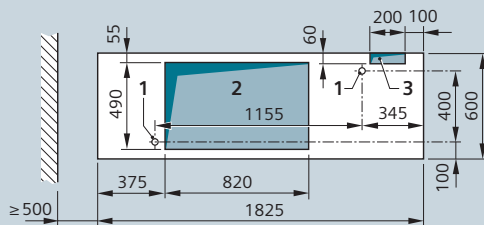
Dimensions

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

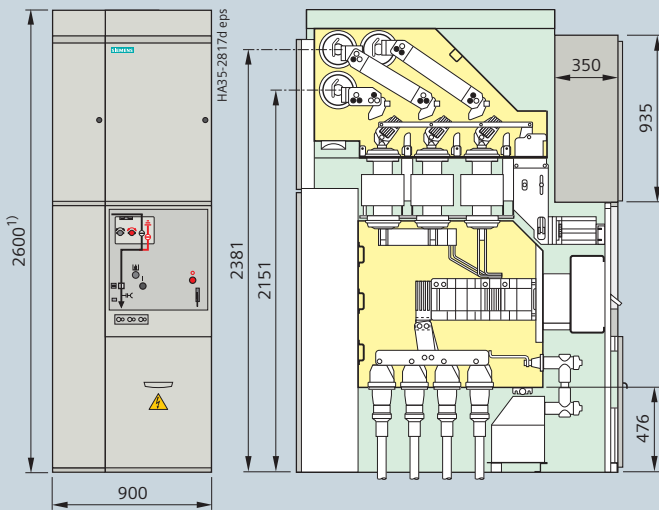
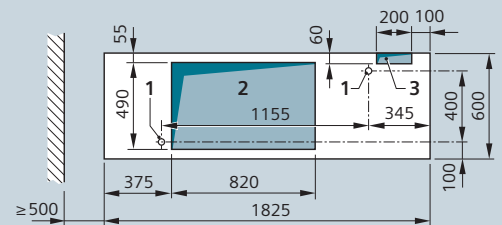
Bus sectionalizer consisting of circuit-breaker panel + disconnector panel



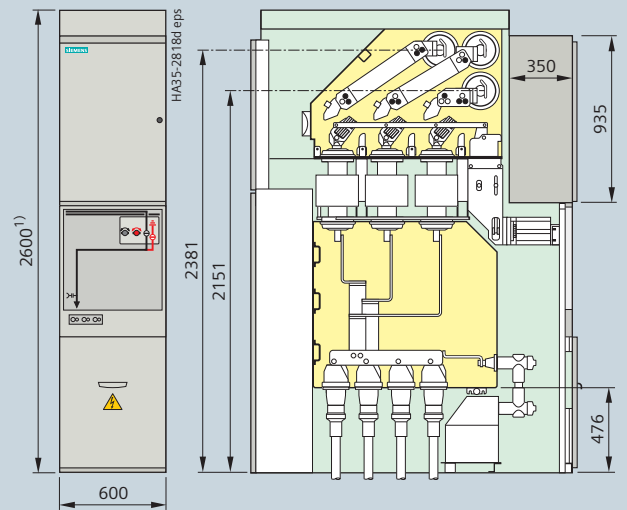
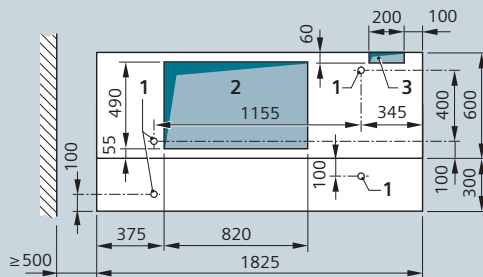
1250 A
1600 A
2000 A



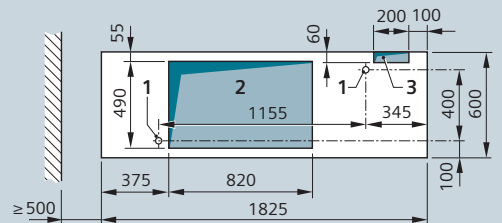
1250 A
1600 A
2000 A



2300 A
2500 A



2300 A
2500 A



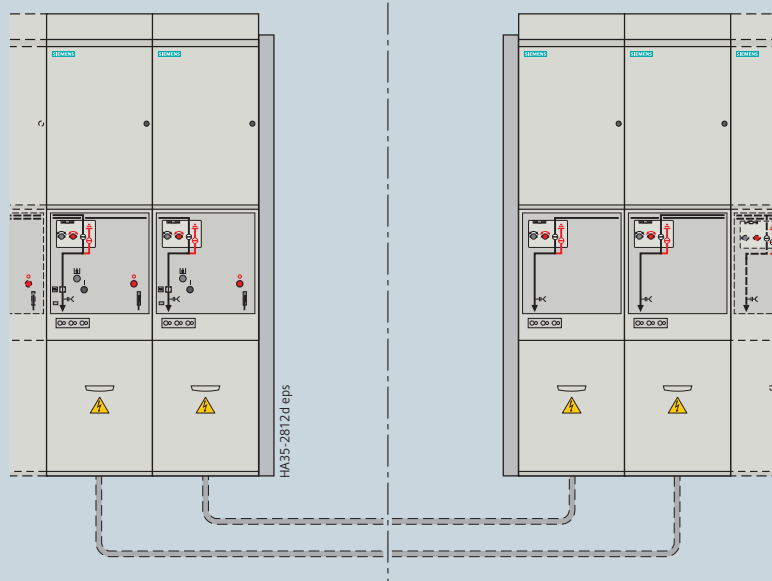
1 Fixing point

2 Floor openings for high-voltage cables

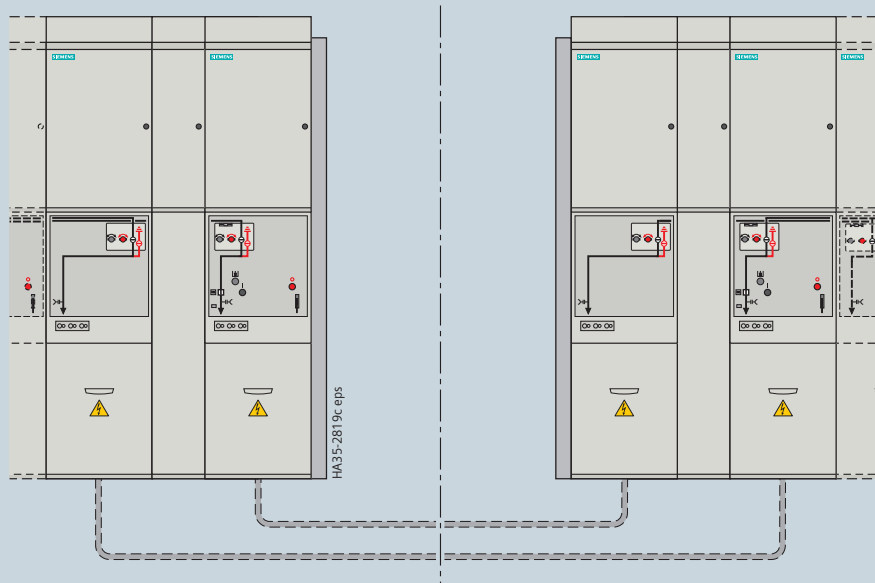
3 Floor opening for control cables

1) 2615 mm for higher low-voltage compartment

Bus sectionalizer consisting of circuit-breaker panel + disconnecter panel

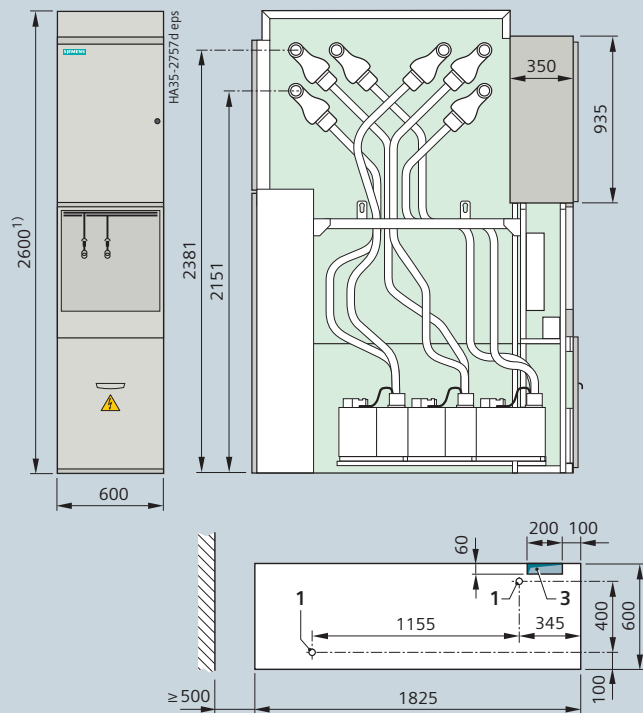
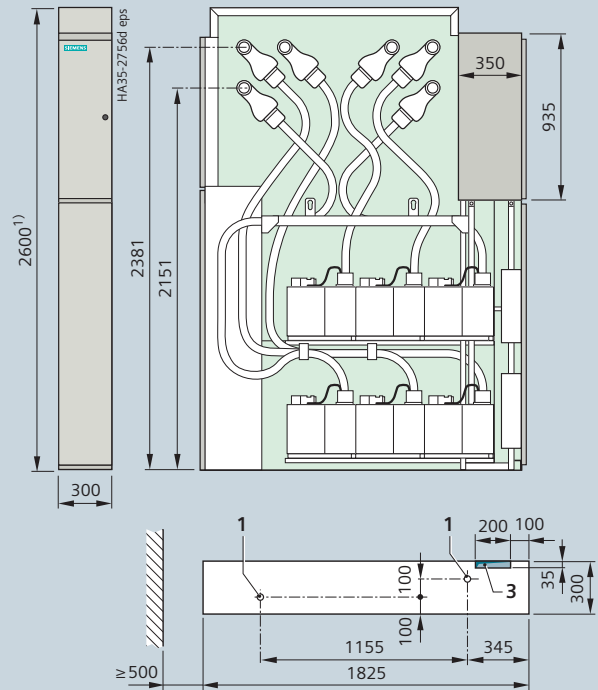


1250 A
1600 A
2000 A



2300 A
2500 A

Metering panels



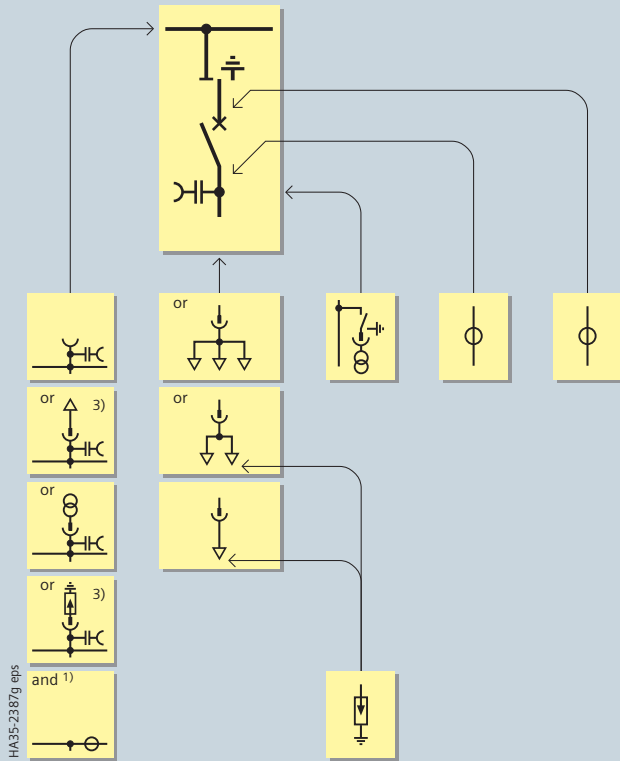
1) 2615 mm for higher low-voltage compartment

- 1 Fixing point
- 3 Floor opening for control cables

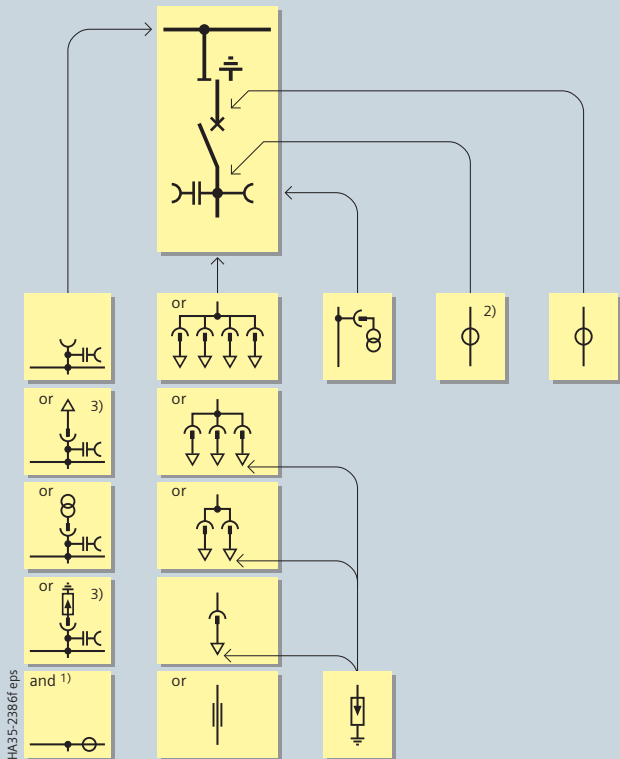
Product Range

Single-busbar panels

Circuit-breaker panel (cable connection as outside cone)



Circuit-breaker panel (cable connection as inside cone)



- 1) Not possible with busbar voltage transformer
- 2) Requires cable connection with vessel for separate inside cone
- 3) Not possible with horizontal pressure relief duct



Busbar current transformer



Solid-insulated bar



Voltage transformer, plug-in type



Voltage transformer, disconnectable



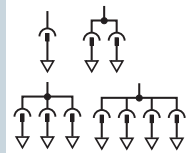
Current transformer



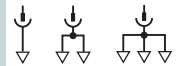
Capacitive voltage detecting system



Surge arrester, plug-in type



Plug-in cable, 1-to 4-fold, inside-cone interface type 2 or 3 (not included in the scope of supply)

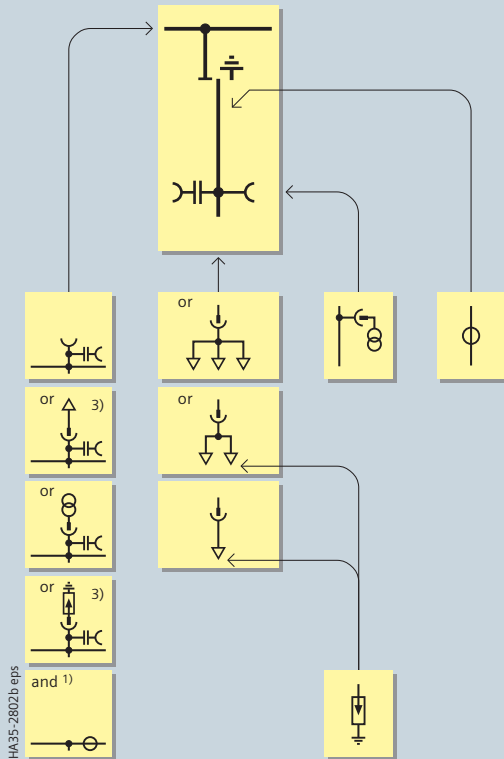


Cable connection with outside-cone plug (not included in the scope of supply)

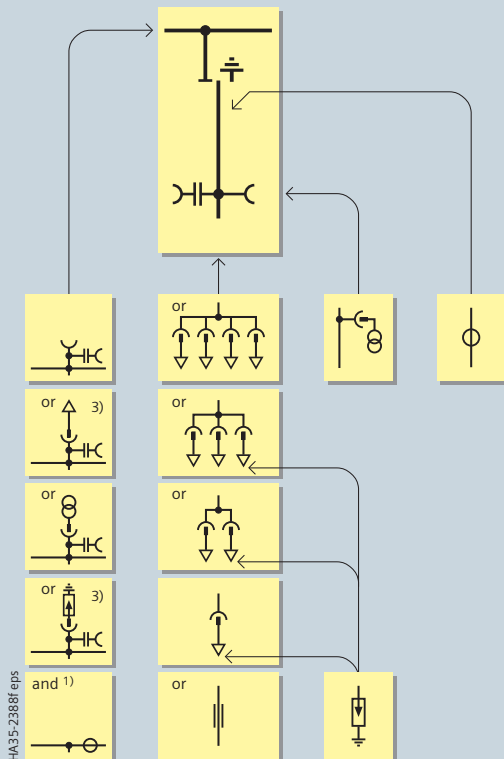


Capacitive voltage detecting system

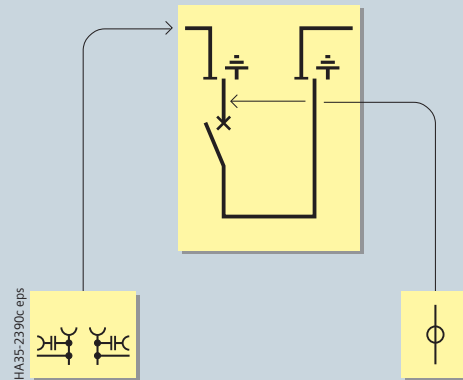
Disconnecter panel (cable connection as outside cone)



Disconnecter panel (cable connection as inside cone)



Bus sectionalizer



Busbar current transformer



Solid-insulated bar



Voltage transformer, plug-in type



Voltage transformer, disconnectable



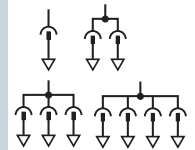
Current transformer



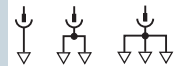
Capacitive voltage detecting system



Surge arrester, plug-in type



Plug-in cable, 1-to 4-fold, inside-cone interface type 2 or 3 (not included in the scope of supply)



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



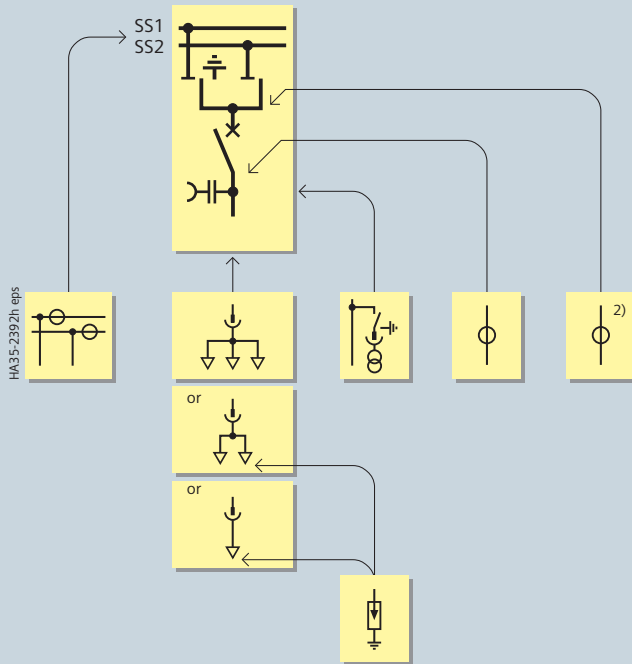
Capacitive voltage detecting system

- 1) Not possible with busbar voltage transformer
- 3) Not possible with horizontal pressure relief duct

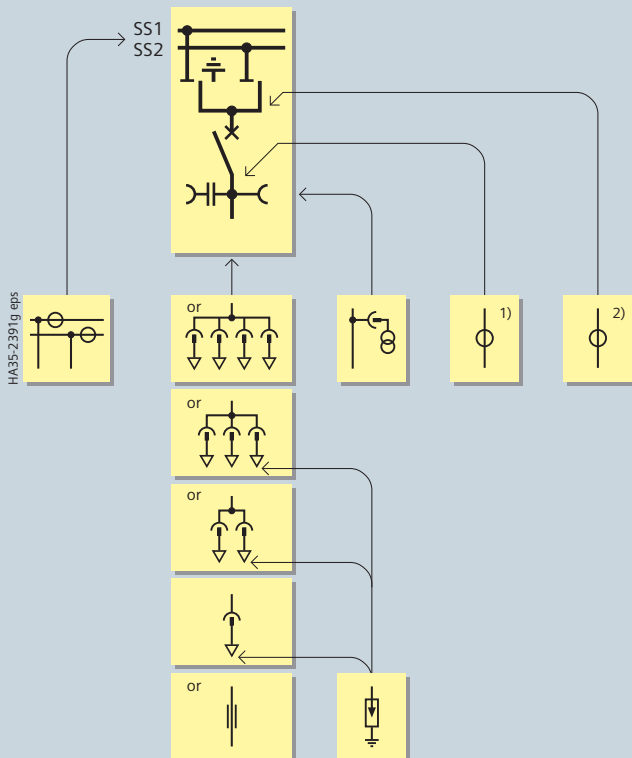
Product Range

Double-busbar panels

Circuit-breaker panel (cable connection as outside cone)



Circuit-breaker panel (cable connection as inside cone)



1) Requires cable connection with vessel for separate inside cone

2) Ring-core current transformer, oval design, suitable for use as of 1000 A

Abbreviations:

SS1 = Busbar 1

SS2 = Busbar 2



Busbar current transformer



Solid-insulated bar



Voltage transformer, plug-in type



Voltage transformer, disconnectable



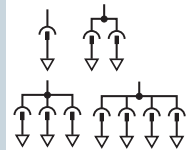
Current transformer



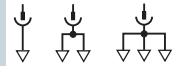
Capacitive voltage detecting system



Surge arrester, plug-in type



Plug-in cable, 1-to 4-fold, inside-cone interface type 2 or 3 (not included in the scope of supply)

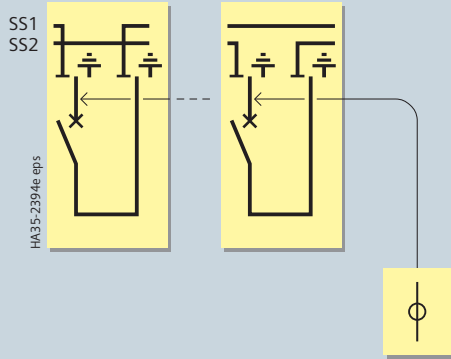


Cable connection with outside-cone plug (not included in the scope of supply)

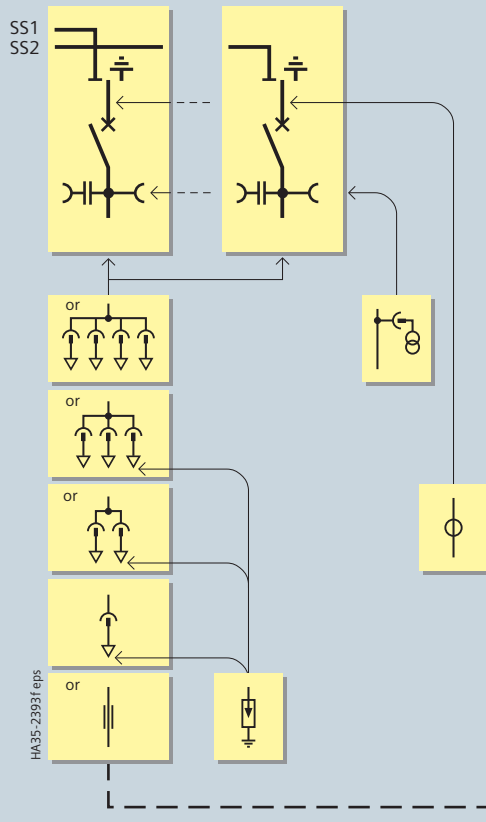


Capacitive voltage detecting system

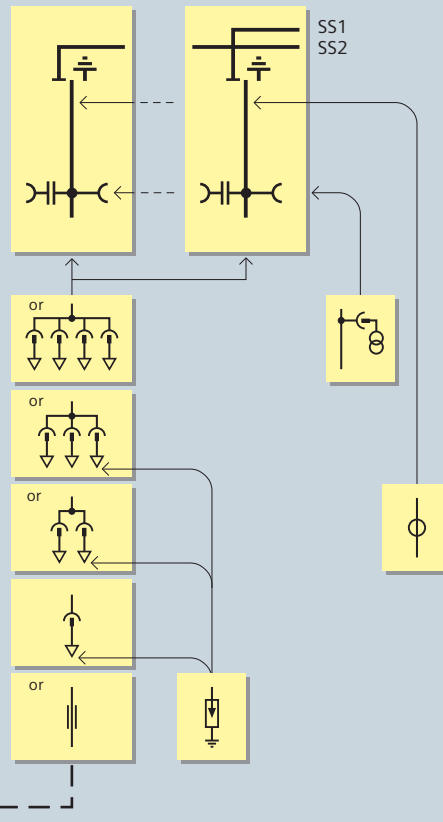
Bus sectionalizer



Bus sectionalizer – circuit-breaker panel (cable connection as inside cone)



Bus sectionalizer – disconnecter panel (cable connection as inside cone)



Busbar current transformer



Solid-insulated bar



Voltage transformer, plug-in type



Voltage transformer, disconnectable



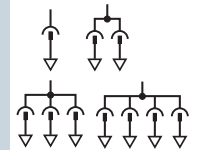
Current transformer



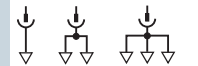
Capacitive voltage detecting system



Surge arrester, plug-in type



Plug-in cable, 1-to 4-fold, inside-cone interface type 2 or 3 (not included in the scope of supply)



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



Capacitive voltage detecting system

Abbreviations:

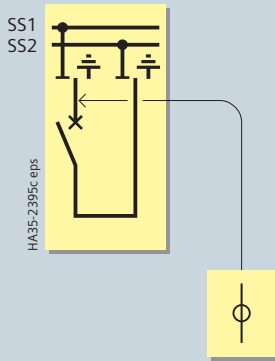
SS1 = Busbar 1




SS2 = Busbar 2

Product Range

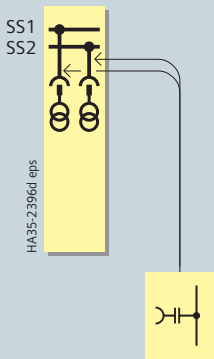
Double-busbar panels

Bus coupler



-  Current transformer
-  Capacitive voltage detecting system
-  Voltage transformer, plug-in type

Metering panel



Abbreviations:
SS1 = Busbar 1
SS2 = Busbar 2

Single-busbar panels

Circuit-breaker panel

- With cable connection as outside cone for
 - Rated voltage up to 36 kV
 - Rated short-circuit breaking current up to 31.5 kA
 - Rated normal currents of busbars up to 2000 A (2500 A on request), and of feeders up to 1250 A
- With cable connection as inside cone for
 - Rated voltage up to 40.5 kV
 - Rated short-circuit breaking current up to 31.5 kA
 - Rated normal currents of busbars and feeders up to 2000 A (2500 A on request)
- With cable connection as separate inside cone for
 - Rated voltage up to 40.5 kV
 - Rated short-circuit breaking current up to 31.5 kA
 - Rated normal currents of busbars and feeders up to 2000 A (2500 A on request).

Disconnecter panel

- With cable connection as outside cone for
 - Rated voltage up to 36 kV
 - Rated short-circuit breaking current up to 31.5 kA
 - Rated normal currents of busbars up to 2000 A (2500 A on request), and of feeders up to 1250 A
- With cable connection as inside cone for
 - Rated voltage up to 40.5 kV
 - Rated short-time withstand current up to 31.5 kA
 - Rated normal currents of busbars and feeders up to 2000 A (2500 A on request).

Bus sectionalizer

for

- Rated voltage up to 40.5 kV
- Rated short-circuit breaking current up to 31.5 kA
- Rated normal currents of busbars up to 2000 A (2500 A on request).

Double-busbar panels

Circuit-breaker panel

- With cable connection as outside cone for
 - Rated voltage up to 36 kV
 - Rated short-circuit breaking current up to 31.5 kA
 - Rated normal currents of busbars up to 2500 A, and of feeders up to 1250 A
- With cable connection as inside cone for
 - Rated voltage up to 36 kV
 - Rated short-circuit breaking current up to 31.5 kA
 - Rated normal currents of busbars and feeders up to 2500 A
- With cable connection as separate inside cone for
 - Rated voltage up to 36 kV
 - Rated short-circuit breaking current up to 31.5 kA
 - Rated normal currents of busbars and feeders up to 2500 A.

Bus sectionalizer

for

- Rated voltage up to 36 kV
- Rated short-circuit breaking current up to 31.5 kA
- Rated normal currents of busbars up to 2500 A.

Bus sectionalizer

(circuit-breaker panel and disconnector panel)

- With cable connection as inside cone for
 - Rated voltage up to 36 kV
 - Rated short-circuit breaking current up to 31.5 kA
 - Rated normal currents of busbars and feeders up to 2500 A.

Bus coupler

for

- Rated voltage up to 36 kV
- Rated short-circuit breaking current up to 31.5 kA
- Rated normal currents of busbars up to 2500 A.

Metering panel with a panel spacing of 300 mm or 600 mm

for

- Rated voltage up to 36 kV
- Rated normal currents of busbars up to 2500 A.

Design

Single-busbar panel design

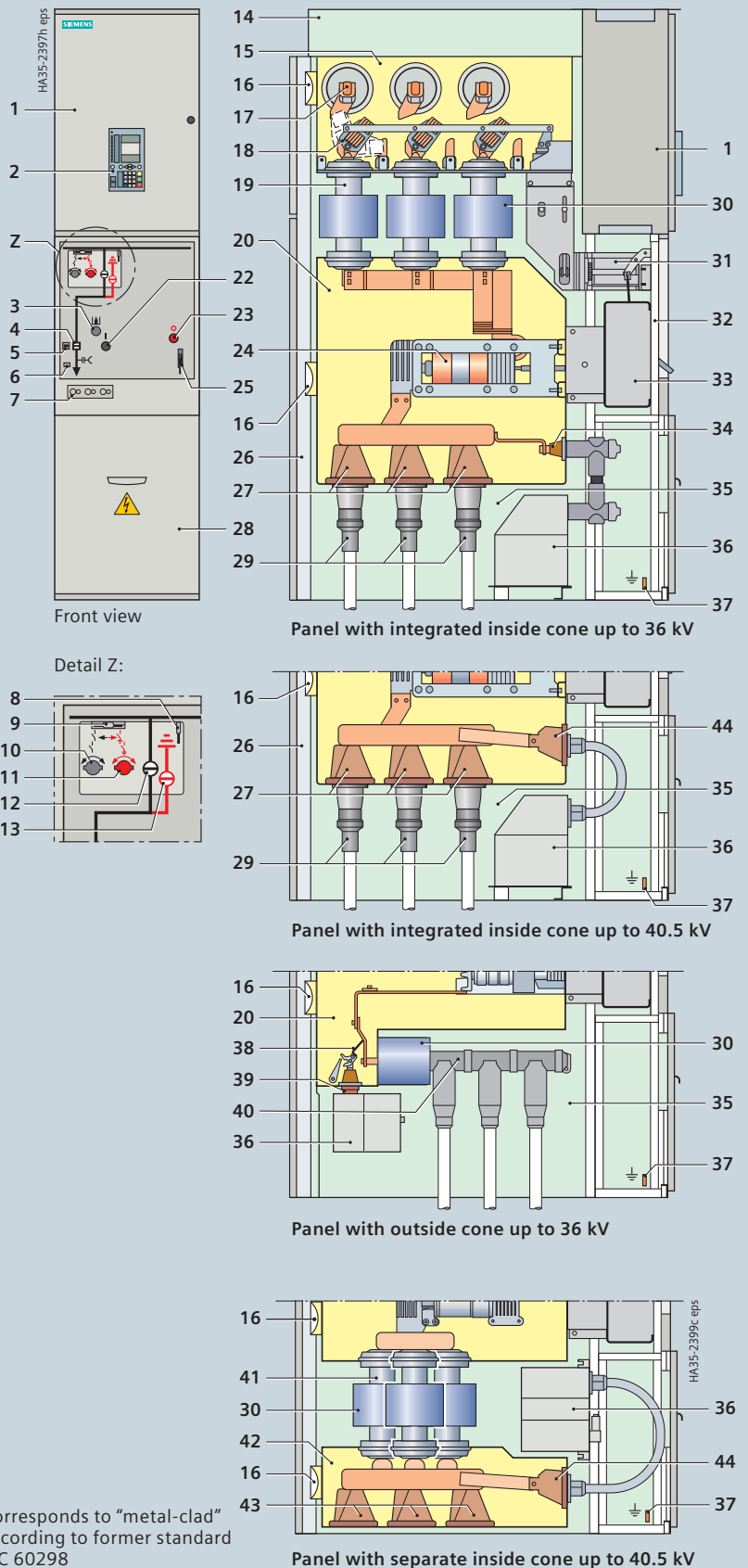
Insulating system

- Switchgear vessel filled with SF₆ gas
- Features of SF₆ gas:
 - Non-toxic
 - Odorless and colorless
 - Non-inflammable
 - Chemically neutral
 - Heavier than air
 - Electronegative (high-quality insulator)
- Pressure of SF₆ gas in the switchgear vessel (absolute values at 20 °C):
 - Rated filling level: 150 kPa
 - Design pressure: 180 kPa
 - Design temperature of the SF₆ gas: 80 °C
 - Pickup pressure of the bursting disc: ≥ 300 kPa
 - Bursting pressure: ≥ 550 kPa
 - Gas leakage rate: < 0.1 % p.a.

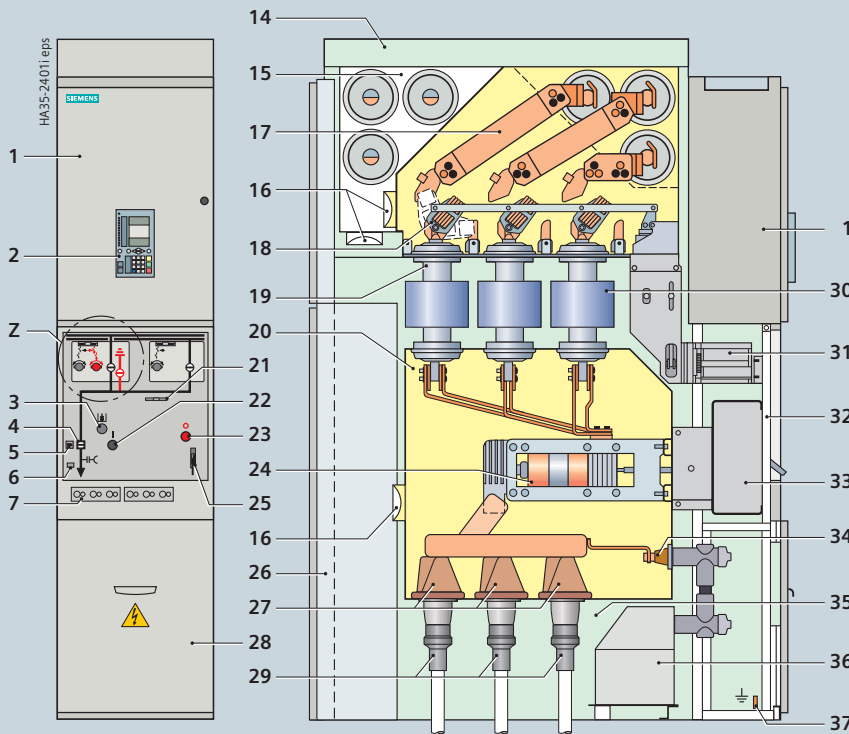
Panel design

- Factory-assembled, type-tested
- Metal-enclosed, with metallic partitions ¹⁾
- Hermetically tight, welded switchgear vessel made of stainless steel
- Electrical connections via cast-resin insulated, screened and bolted module couplings
- 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
- Three-position disconnecter for disconnecting and earthing by means of the circuit-breaker
- Make-proof earthing by means of the vacuum circuit-breaker
- Cable connection with outside-cone plug-in system or inside-cone plug-in system according to DIN EN 50181
- Wall-standing or free-standing arrangement
- Installation and possible later extension of existing panels without gas work
- Replacement of the circuit-breaker module without gas work
- Instrument transformers can be removed without altering the position of the busbar and circuit-breaker modules
- Replacement of instrument transformers without gas work, as they are located outside the gas compartments
- Enclosure made of sendzimir-galvanized sheet steel, front and rear side of switchgear as well as end walls powder-coated in color "light basic" (SN 700)
- Low-voltage compartment removable, plug-in bus wires
- Lateral metallic wiring duct for control cables.

Modular design (example)

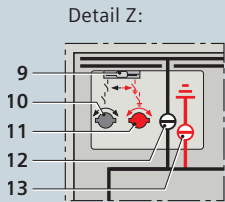


Modular design (example)

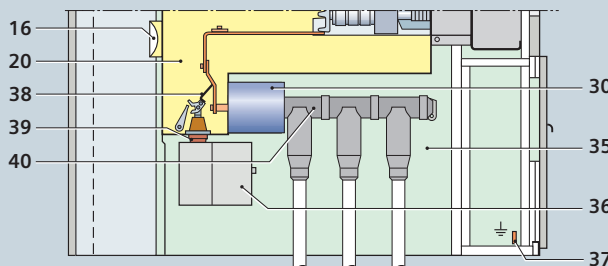


Front view

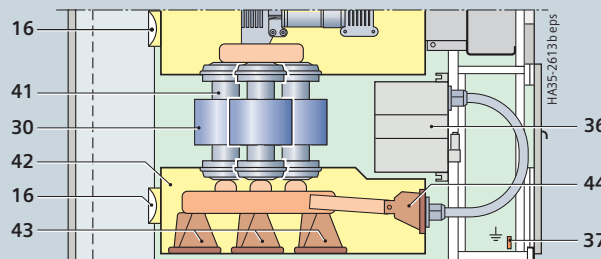
Panel with integrated inside cone



Detail Z:



Panel with outside cone



Panel with separate inside cone

- 1 Low-voltage compartment
- 2 Multifunction protection relay SIPROTEC 5 (example)
- 3 Actuating opening for charging the circuit-breaker springs
- 4 Position indicator for circuit-breaker
- 5 "Spring charged" indicator
- 6 Operations counter for circuit-breaker
- 7 Capacitive voltage detecting system
- 8 Interrogation lever
- 9 Control gate and locking device for "disconnecting/earthing" functions of three-position switch
- 10 Actuating opening for "disconnecting" function of three-position switch
- 11 Actuating opening for "ready-to-earth" function of three-position switch
- 12 Position indicator for "disconnecting" function of three-position switch
- 13 Position indicator for "ready-to-earth" function of three-position switch
- 14 Busbar cover
- 15 Busbar module, welded, SF₆-insulated
- 16 Pressure relief (bursting disc)
- 17 Three-phase busbar system
- 18 Three-position disconnector
- 19 Module coupling between busbar module and circuit-breaker module
- 20 Circuit-breaker module, welded, SF₆-insulated
- 21 Selector gate for selecting the three-position disconnector in double-busbar switchgear
- 22 ON pushbutton for circuit-breaker
- 23 OFF pushbutton for circuit-breaker
- 24 Vacuum interrupter of circuit-breaker
- 25 Feeder locking device (suitable for padlocking)
- 26 Pressure relief duct
- 27 Integrated cable connection as inside cone
- 28 Cover of cable compartment
- 29 Cable connection with inside-cone plugs
- 30 Feeder current transformer
- 31 Operating mechanism for three-position switch
- 32 Mechanical control board
- 33 Operating mechanism for circuit-breaker
- 34 Voltage transformer connection socket as outside cone
- 35 Cable compartment
- 36 Feeder voltage transformer
- 37 Earthing busbar
- 38 Disconnecting facility for feeder voltage transformer
- 39 Bushing for feeder voltage transformer
- 40 Cable connection with outside-cone T-plugs
- 41 Module coupling between circuit-breaker module and separate inside-cone module
- 42 Separate inside-cone module
- 43 Integrated cable connection as inside cone
- 44 Voltage transformer connection socket as outside cone

Components

Vacuum circuit-breaker

Features

- According to IEC 62271-100 and VDE 0671-100 (for standards, see page 59)
- Application in hermetically welded switchgear vessel in conformity with the system
- Climate-independent vacuum interrupter poles in the SF₆-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 SF₆ 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.

Operating mechanism functions

Motor operating mechanism ¹⁾ (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

Function	Class	Standard	Property of NXPLUS
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

Operating times

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

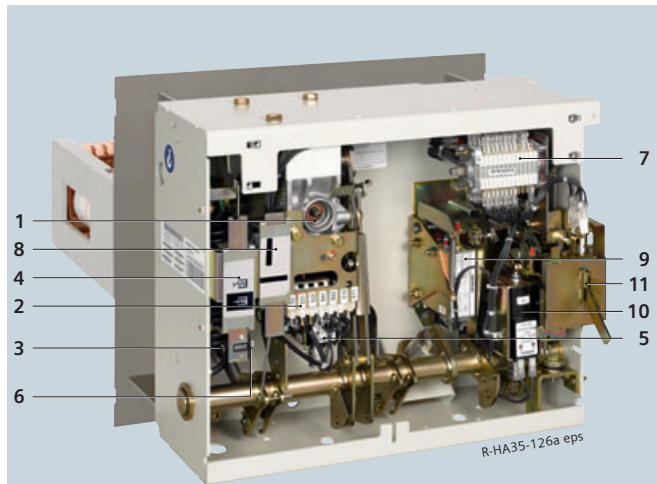
Abbreviations for switching duties:

U = Synchronization and rapid load transfer (closing time ≤ 90 ms)

K = Auto-reclosing

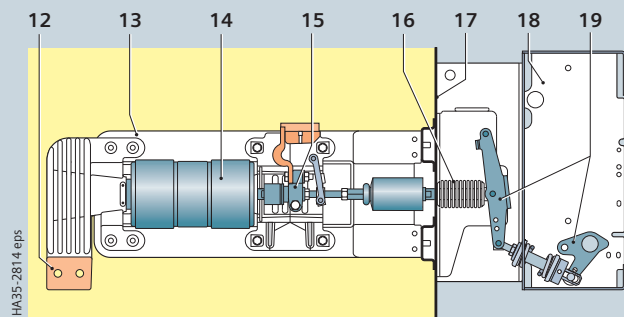
1) Motor rating at 60 V to 220 V DC: 700 W
100 V up to 230 V DC: 1100 VA

* Item designation



Inside view of the vacuum circuit-breaker

- 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: 2nd release (Y2 *), 3rd release (Y7 *)
- 10 1st 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, SF₆-insulated, with vacuum interrupter
- 18 Operating mechanism box (see figure above)
- 19 Operating kinematics

Secondary equipment

The scope of the secondary equipment of the vacuum circuit-breaker depends on the type of application and offers a wide range of possible variations, allowing almost every requirement to be satisfied:

Closing solenoid

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

Shunt release

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

Undervoltage release

- Type 3AX11 03 (Y7 *)
- Consisting of:
 - 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 cutout 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 ≥ 60 V DC.

Auxiliary switch

- Type 3SV9 (S1 *)
- Standard: 6 NO + 6 NC, free contacts thereof ¹⁾ 2 NO + 2 NC
- Option: 12 NO + 12 NC, free contacts thereof ¹⁾ 8 NO + 8 NC.

Position switch

- Type 3AX4 (S41, S42, S16 *)
- For signaling "closing spring charged"
- For signaling "circuit-breaker blocked".

Mechanical interlocking

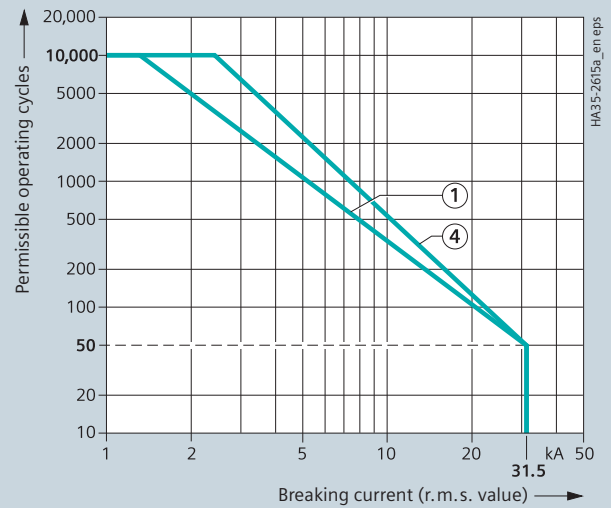
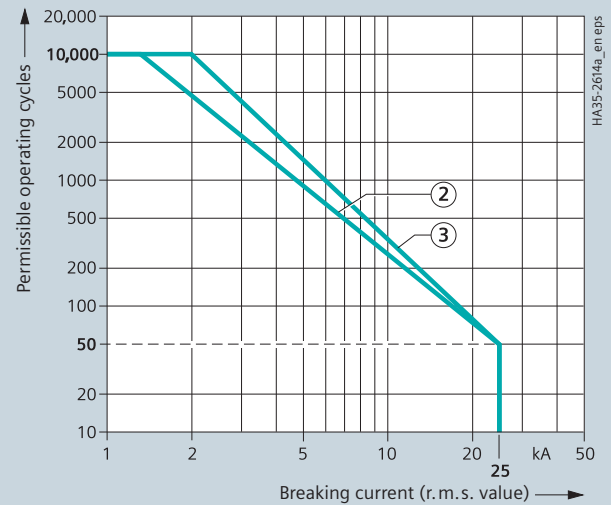
- Mechanical interlocking to the three-position disconnecter
- During operation of the three-position switch, the vacuum circuit-breaker cannot be operated.

Possible release combinations

Release	Release combination			
	1	2	3	4
1 st shunt release type 3AY1510	•	•	•	•
2 nd shunt release type 3AX1101	–	•	–	•
Undervoltage release type 3AX1103	–	–	•	•

- 1) For utilization by the customer Abbreviations: NO = normally open contact
 NC = normally closed contact
 * Item designation

Switching rate of the vacuum interrupter



Electrical data

	Curve ①	Curve ②	Curve ③	Curve ④
Rated voltage	12 kV	24 kV	24 kV	36/40.5 kV
Rated short-circuit-breaking current	31.5 kA	25 kA	25 kA	31.5 kA
Rated normal current	1250 A	1250 A	2000 A	2500 A

Rated operating sequences

Rapid 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

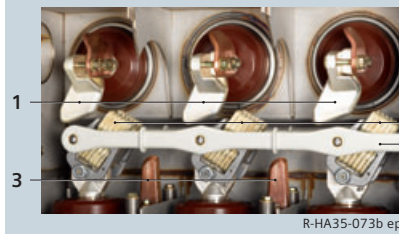
Components

Three-position disconnecter

Features of the three-position disconnecter

- According to IEC 62271-102 and VDE 0671-102 (for standards, see page 59)
- Application in hermetically welded switchgear vessel in conformity with the system
- Climate-independent contacts in the SF₆-filled switchgear vessel
- Maintenance-free for indoor installation according to IEC 62271-1 and VDE 0671-1
- A metal bellows is used for gasketless separation of the SF₆ insulation and the operating mechanism – as already used with success in millions of vacuum interrupters
- Compact design due to short contact gaps in SF₆ gas
- Operating shaft and contact blades with common center of rotation and reliable switch position up to the operating front of the panel
- 2000 mechanical operating cycles for CLOSED / OPEN
- 1000 mechanical operating cycles for OPEN / READY-TO-EARTH
- Position indication via mechanical coupled indicators
- Separate operating shafts for the "DISCONNECTING" and "READY-TO-EARTH" functions
- Maintenance-free.

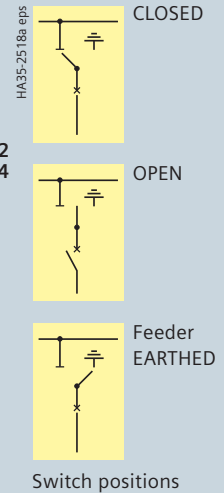
Switch positions of the three-position disconnecter



Three-position disconnecter

(in OPEN position)
(view into the laterally open switchgear vessel)

- 1 Fixed contact at the busbar
- 2 Swivel-mounted contact blade
- 3 Earthing contact
- 4 Push rod



Switch positions of the three-position disconnecter

"CLOSED"

- Closed current path between busbar and vacuum circuit-breaker
- Contact blades connected with fixed contacts at the busbar bushings

"OPEN"

- Open current path between busbar and vacuum circuit-breaker
- Isolating distances withstand prescribed test voltages

"READY-TO-EARTH"

- Contact blades connected with earth contact of switchgear vessel
- Earthing and short-circuiting the cable connection possible by closing the vacuum circuit-breaker

Endurance class of three-position disconnecter

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

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)

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 electromechanical 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.

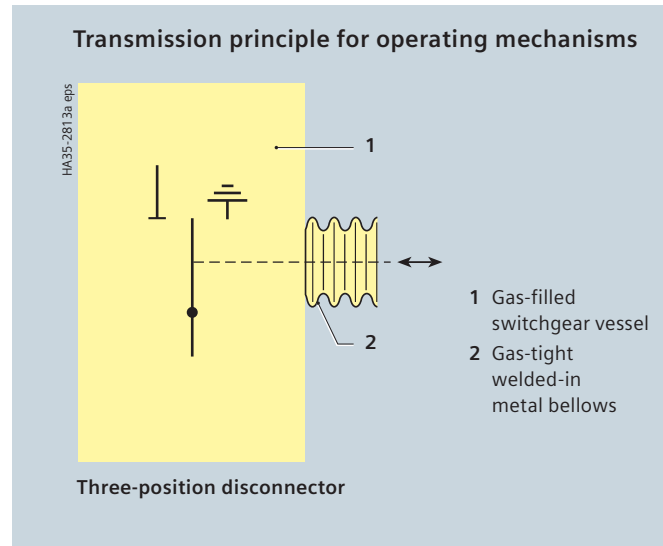
Operating mechanism

- Slow motion mechanism, used in:
 - Circuit-breaker panel
 - Disconnecter panel
 - Bus sectionalizer
 - Bus coupler
- 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
- 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
- Gas-tight
- Maintenance-free.



Components

Busbar, module coupling

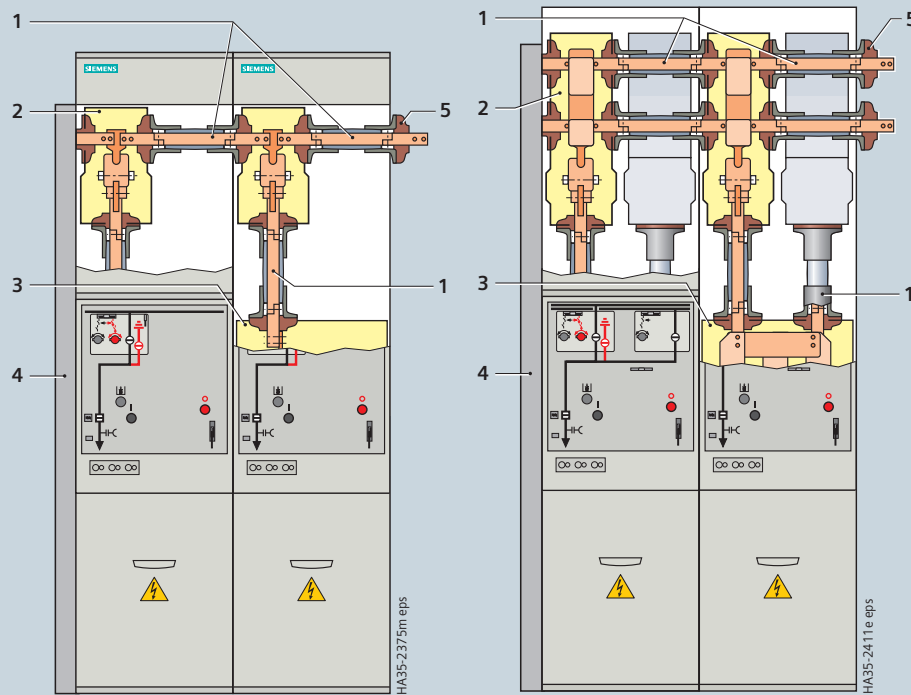
Busbar

- Designed as module coupling
- Solid-insulated
- Interconnects the panels as well as the vessels within a panel.

Module coupling

- Single-pole, bolted type
- Consisting of round-bar copper, cast-resin insulated
- Bolted busbar joint, silicone-rubber insulated
- Field control by means of electrically conductive layers on the insulation (inside and outside)
- Screened by earthing the external layers with the switchgear vessel
- Switchgear installation, extension or panel replacement without SF₆ gas work.

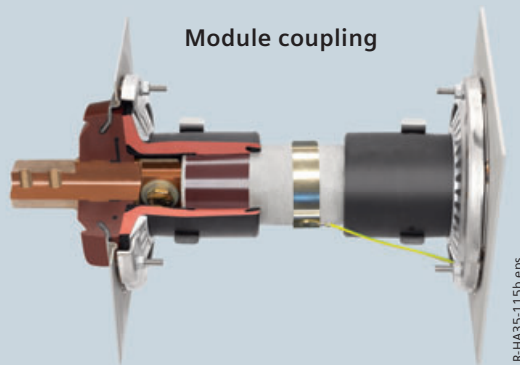
Panel interconnections in circuit-breaker panel (example)



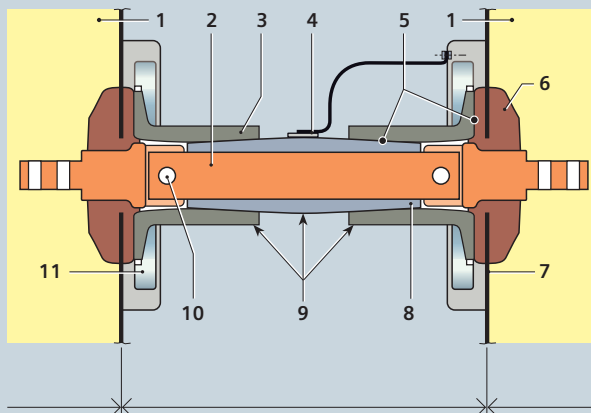
Module couplings for single-busbar panels

Module couplings for double-busbar panels

Module coupling



R-HA35-115b eps



HA35-2376g eps

Module coupling (solid-insulated)

- 1 Busbar module SF₆-insulated
- 2 Busbar conductor
- 3 Silicone sleeve
- 4 Earthing clamp
- 5 High-quality joint
- 6 Cast-resin bushing
- 7 Vessel wall
- 8 Cast-resin insulation
- 9 Conductive layer
- 10 Bolted busbar joint
- 11 Pressure ring

Features

- According to IEC 61869-2 and VDE 0414-9-2
- Designed as ring-core current transformers, single-pole
- Flexibility for selecting the mounting location
- 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).

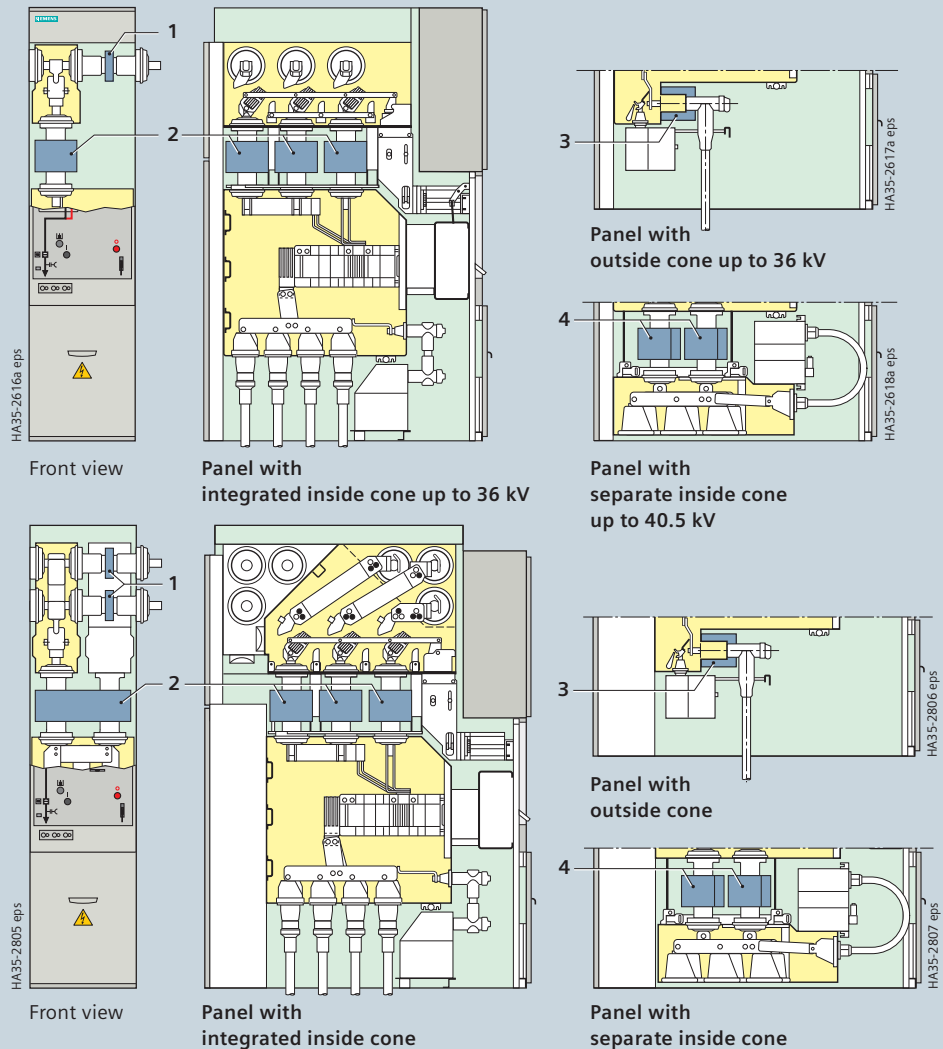
Mounting locations

- At the busbar (1)
- Between busbar module and circuit-breaker module (2)
- At the panel connection (3)
- Between circuit-breaker module and cable connection module (4)
- Zero-sequence current transformer.

Current transformer types

- Busbar current transformer (1):
 - Inside diameter of transformer 120 mm
 - Max. usable height 170 mm
- Current transformer between busbar module and circuit-breaker module (2):
 - Inside diameter of transformer 120 mm
 - Max. usable height 170 mm
- Current transformer at the panel connection (3):
 - Inside diameter of transformer 120 mm
 - Max. usable height 205 mm
- Current transformer between circuit-breaker module and cable connection module (4):
 - Inside diameter of transformer 120 mm
 - Max. usable height 170 mm
- Zero-sequence current transformer underneath the panels (included in the scope of supply); on-site installation.

Current transformer installation (basic scheme)



- 1 Current transformer at the busbar
- 2 Current transformer between busbar module and circuit-breaker module
- 3 Current transformer at the panel connection
- 4 Current transformer between circuit-breaker module and cable connection module

Electrical data

Designation		Type 4MC	Designation		Type 4MC
Operating voltage		max. 0.8 kV	Multiratio (secondary)		200 A – 100 A to 2500 A – 1250 A
Rated short-duration power-frequency withstand voltage (winding test)		3 kV	Core data depending on the rated primary current:		max. 3 cores
Rated frequency		50/60 Hz	Measuring core		Rating Class: 2.5 VA to 30 VA Overcurrent factor: 0.2 to 1
Rated continuous thermal current		max. 1.2 x rated current (primary)	Protection core		Rating Class: 2.5 VA to 30 VA Overcurrent factor: 5 P or 10 P
Rated short-time thermal current, max. 3 s		max. 31.5 kA	Permissible ambient air temperature		10 to 30
Rated current		dynamic primary: unlimited, 40 A to 2500 A secondary: 1 A and 5 A	Insulation class		max. 60 °C E

Components

Voltage transformers

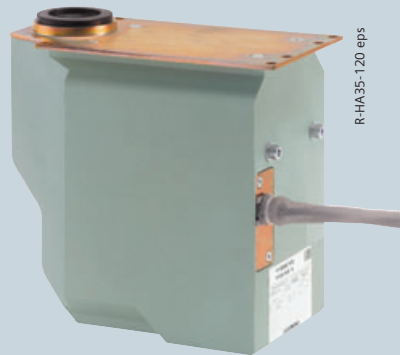
Features

- According to IEC 61869-3 and VDE 0414-9-3
- Single-pole, plug-in design
- Connection system with plug-in contact
- Inductive type
- Safe-to-touch due to metal enclosure
- Certifiable
- Climate-independent
- Secondary connection by means of plugs inside the panel
- Cast-resin insulated
- Arranged outside the primary enclosure (switch-gear vessel)
- Mounting locations:
 - At the busbar on the busbar module (1) (single busbar), or in a separate metering panel (9) (double busbar)
 - At the panel connection (2,3,5,6).

Voltage transformer types

- Busbar voltage transformer 4MT6 (1) on the busbar module (single busbar)
 - Pluggable into an inside-cone socket size 2
 - No separate metering panel required
 - Suitable for 80 % of the rated short-duration power-frequency withstand voltage at rated frequency
- Busbar voltage transformer 4MT9 (9) in a separate, 300 mm or 600 mm wide metering panel (double busbar)
 - Connected with the busbar through a flexible cable with inside-cone plug, for connection to the busbar and to the voltage transformer
 - Suitable for 80 % of the rated short-duration power-frequency withstand voltage at rated frequency.

Voltage transformers

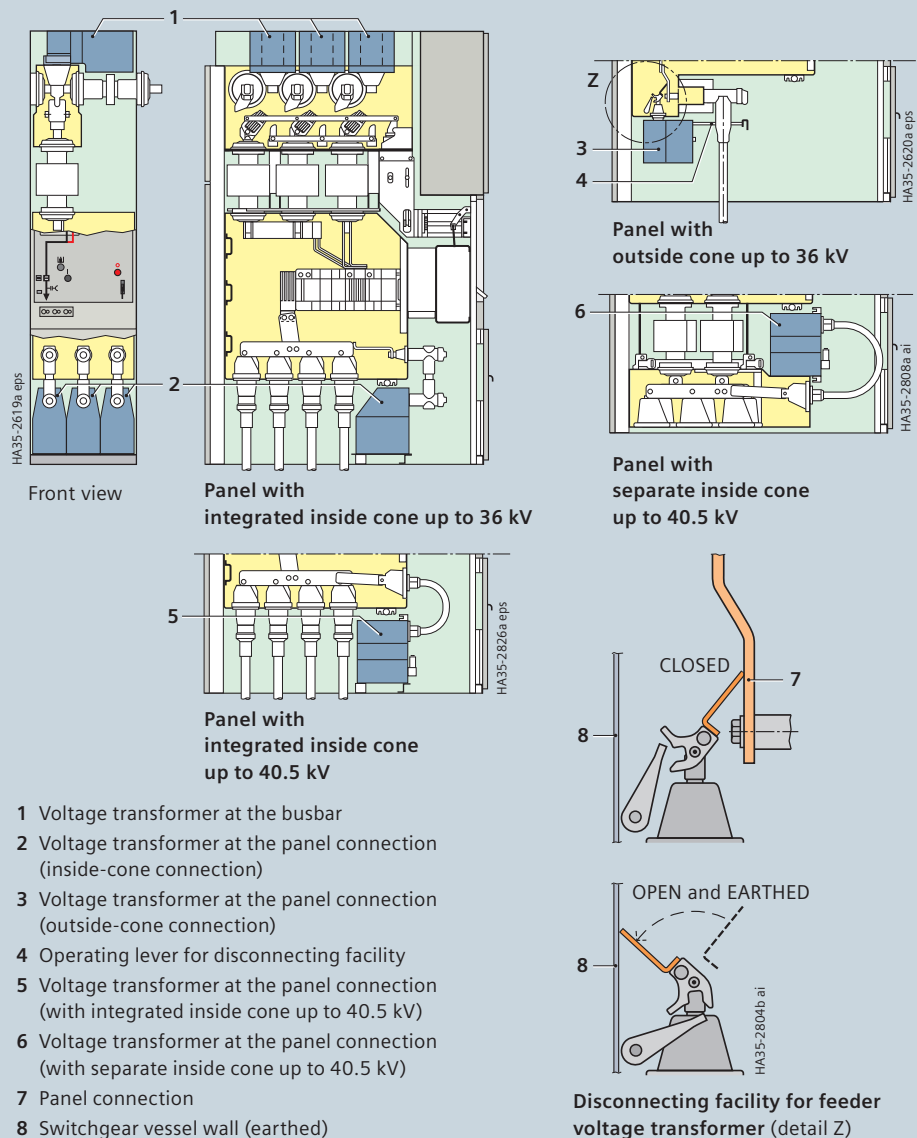


Feeder voltage transformer
(metal-coated) 4MT3



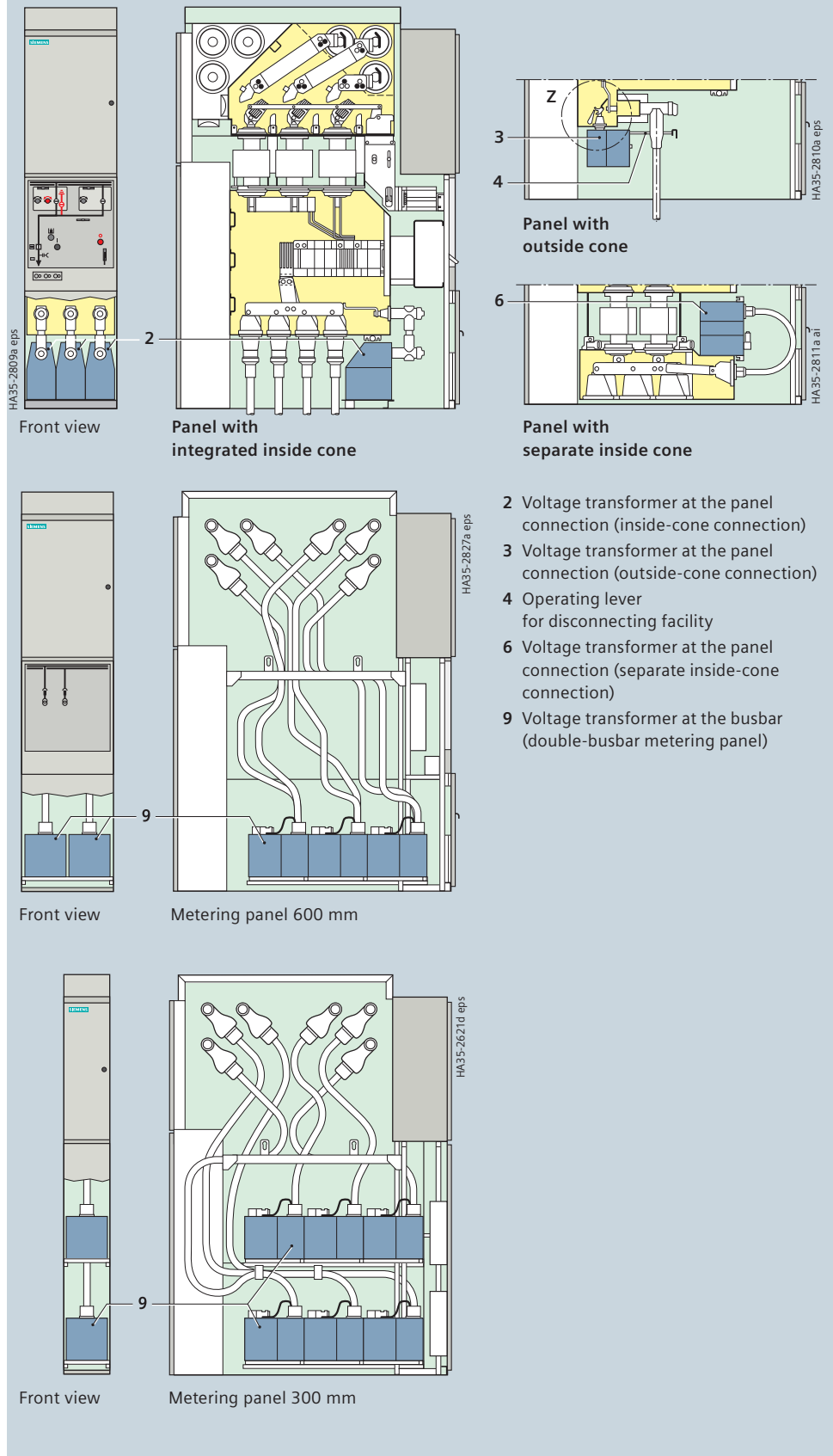
Busbar voltage transformer
(metal-enclosed) 4MT6

Voltage transformer installation for single busbar up to 40.5 kV (basic scheme)



- Voltage transformers 4MU1 (3) or 4MT3 (3) at the panel connection of the panels with outside-cone connection
 - Pluggable into an outside-cone bushing at the panel connection
 - Application of type 4MU1 at 36 kV or 24 kV and 31.5 kA
 - Application of type 4MT3 up to 24 kV
 - Disconnectable through an SF₆-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 transformers 4MU2 (2) or 4MT5 (5,6) at the panel connection of the panels with inside-cone connection
 - Connection via an outside-cone bushing at the panel connection for type 4MU2 (2) up to 36 kV
 - Connection via a flexible cable between an inside-cone socket at the panel connection and an inside-cone socket at the voltage transformer
 - Application of type 4MT5 up to 40.5 kV (5,6)
 - Application of type 4MT5 up to 36 kV (6) in DBB
 - Application of type 4MU2 up to 36 kV (2).

Voltage transformer installation for double busbar up to 36 kV (basic scheme)



Components

Voltage transformers

Electrical data

Primary data

For types 4MT3, 4MT5, 4MT6, 4MT9, 4MU1 and 4MU2

For operating voltages from 6.0 kV to 38 kV, rated voltage factor $U_n/8h = 1.9$; $U_n/\text{continuous} = 1.2$

Rated voltage	Rated short-duration power-frequency withstand voltage	Rated lightning impulse withstand voltage	Standard	Operating voltage
kV	kV	kV		kV
7.2	20	60	IEC	$6.0/\sqrt{3}$; $6.24/\sqrt{3}$; $6.3/\sqrt{3}$; $6.6/\sqrt{3}$; $6.9/\sqrt{3}$
12	28	75	IEC	$7.2/\sqrt{3}$; $7.6/\sqrt{3}$; $8.0/\sqrt{3}$; $8.3/\sqrt{3}$; $8.4/\sqrt{3}$; $8.9/\sqrt{3}$; $10/\sqrt{3}$; $10.5/\sqrt{3}$; $11/\sqrt{3}$; $11.4/\sqrt{3}$; $11.5/\sqrt{3}$; $11.6/\sqrt{3}$
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	$17.5/\sqrt{3}$; $18/\sqrt{3}$; $19/\sqrt{3}$; $20/\sqrt{3}$; $22/\sqrt{3}$; $23/\sqrt{3}$
36	70	170	IEC	$24/\sqrt{3}$; $25.0/\sqrt{3}$; $25.8/\sqrt{3}$; $27.6/\sqrt{3}$; $30.0/\sqrt{3}$; $33.0/\sqrt{3}$; $34.5/\sqrt{3}$; $35.0/\sqrt{3}$
40.5	85	185	IEC	$38/\sqrt{3}$

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	$100/\sqrt{3}$ $110/\sqrt{3}$ $120/\sqrt{3}$	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
4MT5	$100/\sqrt{3}$ $110/\sqrt{3}$ $120/\sqrt{3}$	100/3 110/3 120/3	6	6	IEC			
					5, 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
4MT6 4MT9	$100/\sqrt{3}$ $110/\sqrt{3}$ $120/\sqrt{3}$	100/3 110/3 120/3	6	6	IEC			
					5, 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
4MU1 4MU2	$100/\sqrt{3}$ $110/\sqrt{3}$ $120/\sqrt{3}$	100/3 110/3 120/3	6	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

Design

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

Installation

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

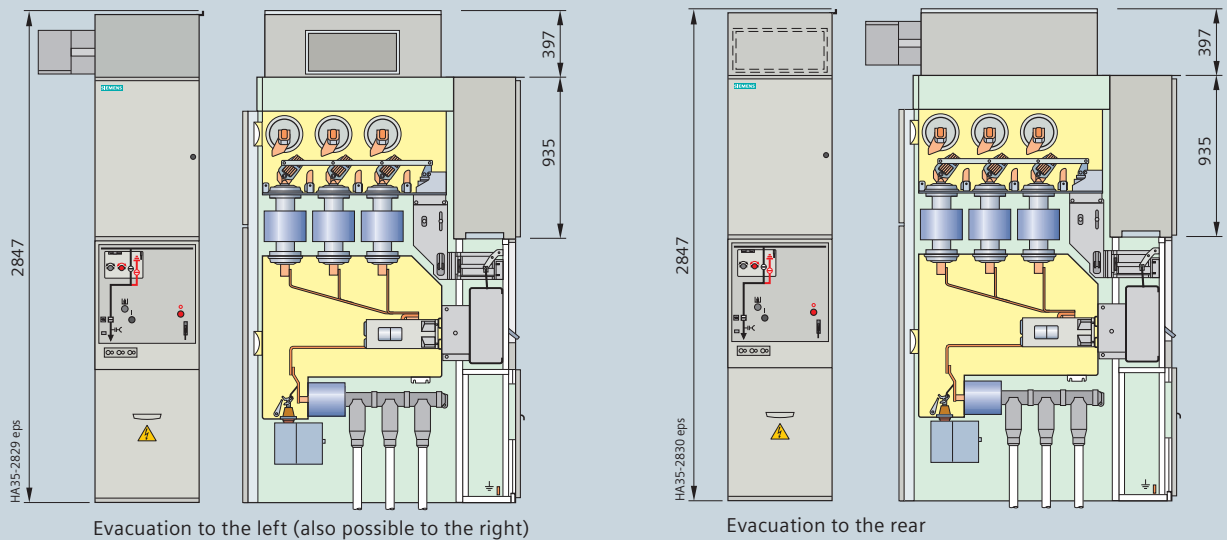
Dimensions

- Height of switchgear panel
Single busbar: 2847 mm
Double busbar: 2997 mm
- Minimum room height
Single busbar: 2950 mm
Double busbar: 3100 mm
- See dimensions of evacuation elements on the next page.

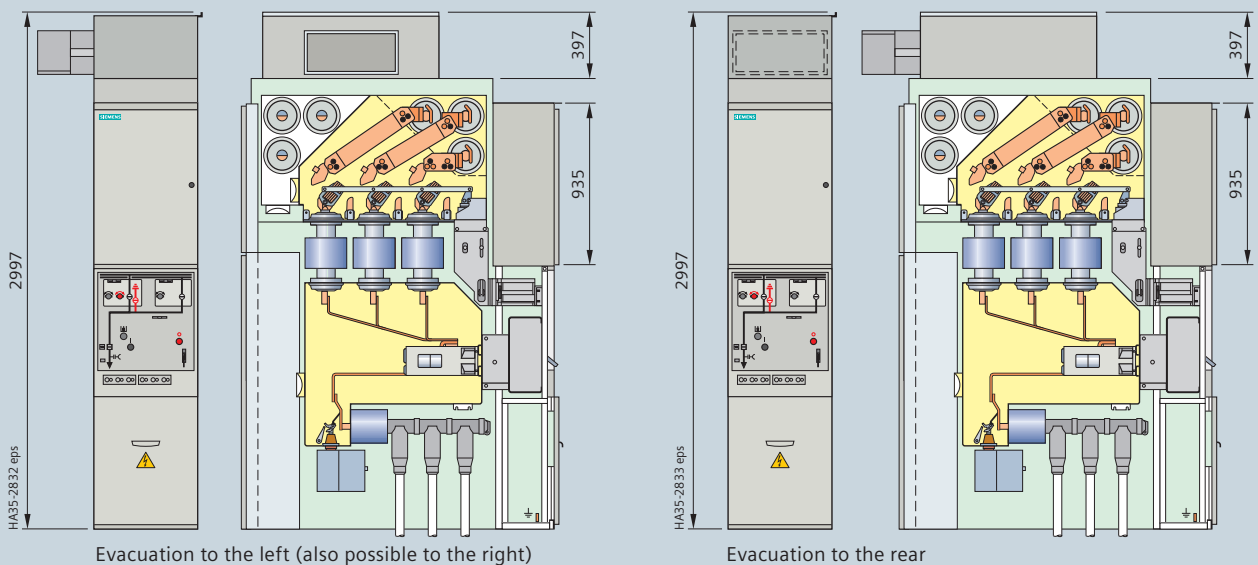
Tests

- Type-tested design.

NXPLUS SBB with horizontal pressure relief duct and evacuation



NXPLUS DBB with horizontal pressure relief duct and evacuation



Components

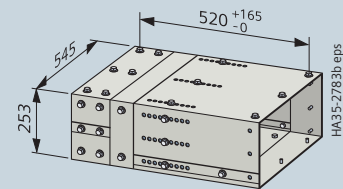
Horizontal pressure relief duct, dimensions

NXPLUS with horizontal pressure relief duct

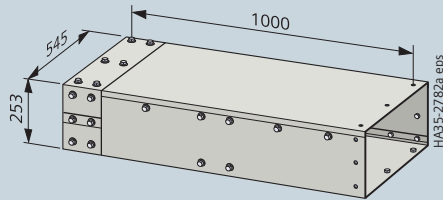


R-HA35-184.jpg

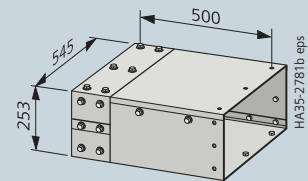
Elements for the evacuation duct



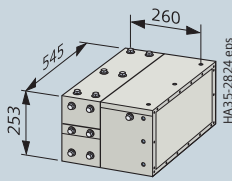
HA35-2783b eps



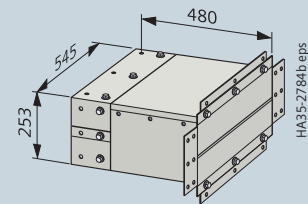
HA35-2782a eps



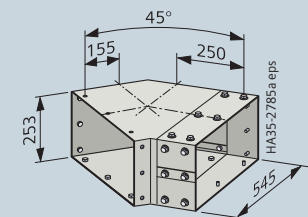
HA35-2781b eps



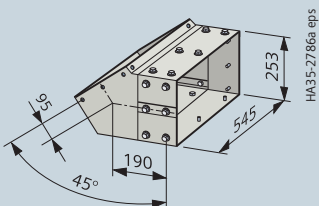
HA35-2824 eps



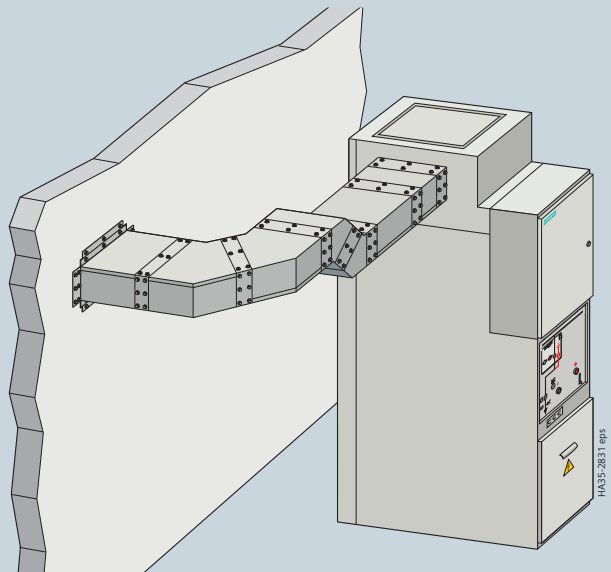
HA35-2784b eps



HA35-2785a eps



HA35-2786a eps



HA35-2831 eps

Features

- For circuit-breaker panel 1250 A,
for disconnector panel 1250 A
- Bushings with outside cone
- With bolted contact (M16) as interface type "C" according to EN 50180/EN 50181
- Cable connection height 591 mm
- Max. connection depth: 960 mm with standard cable compartment cover
- With cable bracket, type C40 according to DIN EN 50024
- Option: Access to cable compartment only if the feeder is 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 800 mm²
- Larger cross-sections on request
- Cable routing downwards, cable connection from the front
- For rated normal currents up to 1250 A
- Cable T-plugs are not included in the scope of supply.

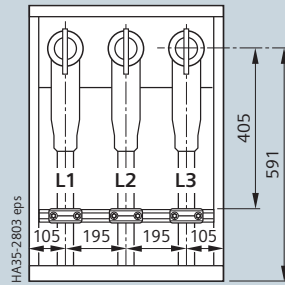
Surge arresters

- 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.

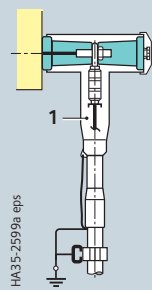
Cable compartment



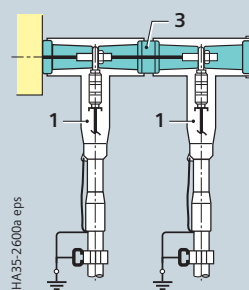
Panel width 600 mm

Connectable cables

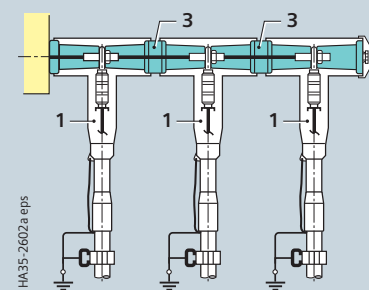
Cable T-plug with coupling insert



Connection with 1 cable per phase

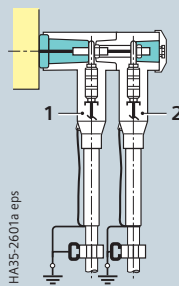


Connection with 2 cables per phase

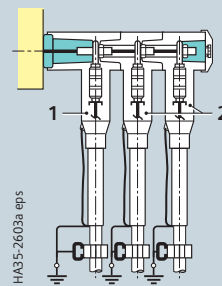


Connection with 3 cables per phase

Cable T-plug with coupling T-plug

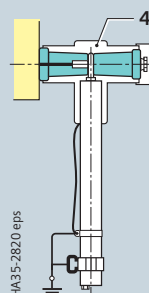


Connection with 2 cables per phase



Connection with 3 cables per phase

Solid-insulated bar



- 1 Cable T-plug
- 2 Coupling T-plug
- 3 Screw-type coupling insert
- 4 End adapter

Components

Panel connection with outside cone (commercially available cable plugs and bar connections)

Cable type	Cable sealing end			Comment
	Make	Type	Cross-section mm ²	
Thermoplastic-insulated cables ≤ 12 kV according to IEC 60502-2 and VDE 0276-620				
1-core cable, PE and XLPE-insulated N2YSY (Cu) and N2XSX (Cu) or NA2YSY (Al) and NA2XSX (Al)	Nexans Euromold	430TB/G 480TB/G 484TB/G 489TB/G	35 to 300 35 to 300 50 to 630 800 to 1200	EPDM with semi-conductive layer EPDM with semi-conductive layer EPDM with semi-conductive layer EPDM with semi-conductive layer
	nkt cables	CB 24-630 CB 24-1250/2 CB 36-630(1250) CB 42-1250/3	25 to 300 95 to 500 300 to 800 95 to 1000	Silicone with semi-conductive layer (optionally with metal housing) Silicone with semi-conductive layer Silicone with semi-conductive layer Silicone with semi-conductive layer
	Tyco Electronics Raychem	RSTI-58xx RSTI-395x	25 to 300 400 to 800	Silicone with semi-conductive layer, with capacitive measuring point Silicone with semi-conductive layer, with capacitive measuring point
	Südkabel	SET 12 SEHDT 13	50 to 300 400 to 500	Silicone with semi-conductive layer (optionally with metal housing) Silicone with semi-conductive layer (optionally with metal housing)
	ABB Kabeldon	CSE-A 12630-xx	25 to 630	EPDM with semi-conductive layer
	3-core cable, PE and XLPE-insulated, N2YSY (Cu) and N2XSX (Cu) or NA2YSY (Al) and NA2XSX (Al)	Nexans Euromold	430TB/G 480TB/G	35 to 300 35 to 300
3-core cable, PE and XLPE-insulated, N2YSY (Cu) and N2XSX (Cu) or NA2YSY (Al) and NA2XSX (Al)	nkt cables	CB 24-630 CB 24-1250-2	25 to 300 185 to 500	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit Silicone with semi-conductive layer, in combination with distribution kit
	Tyco Electronics Raychem	RSTI-58xx ELBC-810	25 to 300 25 to 500	Silicone with semi-conductive layer, with capacitive measuring point EPDM with semi-conductive layer, in combination with distribution kit
	Südkabel	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
	ABB Kabeldon	CSE-A 12630-xx	25 to 630	EPDM with semi-conductive layer, in combination with distribution kit
	Thermoplastic-insulated cables 15/17.5/24 kV according to IEC 60502-2 and VDE 0276-620			
1-core cable, PE and XLPE-insulated, N2YSY (Cu) and N2XSX (Cu) or NA2YSY (Al) and NA2XSX (Al)	Nexans Euromold	K430TB/G K480TB/G K484TB/G K489TB/G	35 to 300 35 to 300 50 to 630 800 to 1200	EPDM with semi-conductive layer EPDM with semi-conductive layer EPDM with semi-conductive layer EPDM with semi-conductive layer
	nkt cables	CB 24-630 CB 24-1250/2 CB 36-630(1250) CB 42-1250/3	25 to 300 35 to 500 300 to 800 630 to 1000	Silicone with semi-conductive layer (optionally with metal housing) Silicone with semi-conductive layer Silicone with semi-conductive layer Silicone with semi-conductive layer
	Tyco Electronics Raychem	RSTI-58xx RSTI-595x ELBC-824	25 to 300 400 to 800 35 to 400	Silicone with semi-conductive layer, with capacitive measuring point Silicone with semi-conductive layer, with capacitive measuring point EPDM with semi-conductive layer
	Südkabel	SET 24 SEHDT 23	50 to 300 400 to 500	Silicone with semi-conductive layer (optionally with metal housing) Silicone with semi-conductive layer (optionally with metal housing)
		ABB Kabeldon	CSE-A 24630-xx	25 to 630
	3-core cable, PE and XLPE-insulated, N2YSY (Cu) and N2XSX (Cu) or NA2YSY (Al) and NA2XSX (Al)	Nexans Euromold	K430TB/G K480TB/G	35 to 300 35 to 300
3-core cable, PE and XLPE-insulated, N2YSY (Cu) and N2XSX (Cu) or NA2YSY (Al) and NA2XSX (Al)	nkt cables	CB 24-630 CB 24-1250-2	25 to 300 35 to 500	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit Silicone with semi-conductive layer, in combination with distribution kit
	Tyco Electronics Raychem	RSTI-58xx ELBC-824	25 to 300 35 to 400	Silicone with semi-conductive layer, with capacitive measuring point, in combination with distribution kit RSTI-TRF0x EPDM with semi-conductive layer, in combination with distribution kit
	Südkabel	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
	ABB Kabeldon	CSE-A 24630-xx	25 to 630	EPDM with semi-conductive layer, in combination with distribution kit
	Thermoplastic-insulated cables 36 kV according to IEC 60502-2 and VDE 0276-620			
1-core cable, PE and XLPE-insulated N2YSY (Cu) and N2XSX (Cu) or NA2YSY (Al) and NA2XSX (Al)	Nexans Euromold	M430TB/G M480TB/G M484TB/G M489TB/G	35 to 300 35 to 300 50 to 630 800 to 1200	EPDM with semi-conductive layer EPDM with semi-conductive layer EPDM with semi-conductive layer EPDM with semi-conductive layer
	nkt cables	CB 36-630 CB 36-630(1250) CB 42-1250/3	35 to 300 300 to 800 95 to 1000	Silicone with semi-conductive layer (optionally with metal housing) Silicone with semi-conductive layer Silicone with semi-conductive layer
	Tyco Electronics Raychem	RSTI-68xx RSTI-695x	35 to 300 400 to 800	Silicone with semi-conductive layer, with capacitive measuring point Silicone with semi-conductive layer, with capacitive measuring point
	Südkabel	SET 36 SEHDT 33	70 to 300 300 to 500	Silicone with semi-conductive layer (optionally with metal housing) Silicone with semi-conductive layer (optionally with metal housing)
		ABB Kabeldon	CSE-A 36630-xx	50 to 630

Panel connection with outside cone (commercially available cable plugs and bar connections)

Cable type	Cable sealing end			Comment
	Make	Type	Cross-section mm ²	
Thermoplastic-insulated cables 36 kV according to IEC 60502-2 and VDE 0276-620				
3-core cable, PE and XLPE-insulated N2YSY (Cu) and N2XSX (Cu) or NA2YSY (Al) and NA2XSX (Al)	Nexans Euromold	M430TB/G	35 to 300	EPDM with semi-conductive layer, in combination with distribution kit
		M480TB/G	35 to 300	EPDM with semi-conductive layer, in combination with distribution kit
	nkt cables	CB 36-630	35 to 300	Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit
		CB 36-630(1250)	240 to 630	Silicone with semi-conductive layer, in combination with distribution kit
	Tyco Electronics Raychem	RSTI-68xx	35 to 300	Silicone with semi-conductive layer, with capacitive measuring point, in combination with distribution kit RSTI-TRFOx
		Südkabel	SET 36	50 to 300
SEHDT 33	400 to 500		Silicone with semi-conductive layer (optionally with metal housing), in combination with distribution kit	
ABB Kabeldon	CSE-A 36630-xx	25 to 630	EPDM with semi-conductive layer, in combination with distribution kit	

Paper-insulated belted cables (non-draining cables) ≤ 12 kV according to IEC 60055 and VDE 0255

3-core cable, paper insulated NKBA (Cu), NKBY (Cu), NKRA (Cu) and NKFA (Cu) or NAKBA (Al), NAKBY (Al), NAKRA (Al) and NAKFA (Al)	Euromold	400TB/G	35 to 300	EPDM with semi-conductive layer in combination with distribution kit MIND
		430TB-630A	35 to 300	EPDM with semi-conductive layer in combination with distribution kit MIND
	nkt cables	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

3-core cable, paper insulated ASB and ASBL	Euromold	400TB/G	35 to 300	EPDM with semi-conductive layer in combination with distribution kit MIND
		430TB-630A	35 to 300	EPDM with semi-conductive layer in combination with distribution kit MIND
	nkt cables	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

3-core cable, paper insulated NKBA (Cu), NKBY (Cu), NKRA (Cu) and NKFA (Cu) or NAKBA (Al), NAKBY (Al), NAKRA (Al) and NAKFA (Al)	nkt cables	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 GOST 18410-73

3-core cable, paper insulated ASB and ASBL	nkt cables	CB 24-630	25 to 240	Silicone with semi-conductive layer (optionally with metal housing), in combination with transition sealing end type SÜEV 10
--	------------	-----------	-----------	--

Commercially available bar systems

Bar type	Bar connection				Comment
	Make	Type	Conductor material	Max. rated current	
Solid-insulated bar	MGC Moser Glaser	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)
	Preissinger	ISOBUS MR	Copper	1250 A / 2500 A	Outer sheath made of epoxy resin (if appropriate with heat shrinkable tube)
	Ritz	SIS	Copper	1250 A / 2500 A	Outer sheath made of epoxy resin (if appropriate with heat shrinkable tube)

Surge-proof caps

	Make	Type	Size	Rated voltage	Comment
Outside-cone plug-in system according to EN 50181	3M	SP 33	Outside cone type "C"	12 kV	Silicone with semi-conductive layer
		SP 33	Outside cone type "C"	24 kV	
		SP 33	Outside cone type "C"	36 kV	
	Nexans Euromold	400DR-B	Outside cone type "C"	12 kV	EPDM with semi-conductive layer
		K400DR-B	Outside cone type "C"	24 kV	
		M400DR-B	Outside cone type "C"	36 kV	
	nkt cables	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	
		CBC 40.5-630	Outside cone type "C"	36 kV	
	Südkabel	SP 33	Outside cone type "C"	12 kV	Silicone with semi-conductive layer
		SP 33	Outside cone type "C"	24 kV	
		SP 33	Outside cone type "C"	36 kV	

Components

Installation possibilities with outside cone for cable connections and surge arresters

Number of cables per panel and phase	Make	Rated voltage	Conductor cross-section ¹⁾	Insulation	Cable T-plugs	Coupling plugs	Surge arresters with coupling inserts		According to standard	Distance cable of one phase	
					bolted	bolted	Arresters	Coupling inserts			
• Circuit-breaker panel 1250 A • Disconnector panel 1250 A											
1	Nexans Euromold	12	35 to 300	EPDM	1x 430TB/G	–	300SA-5(10)SA	–	GOST for Russia & CIS GB/DL for China	–	
		24	35 to 300		1x K430TB/G	–	300SA-5(10)SA	–			
		36	35 to 300		1x M430TB/G	–	300SA-5(10)SA	–			
		38	–		–	–	–	–			
		12	35 to 300	EPDM	1x 480TB/G	–	800SA-10-xxx	–	IEC	–	
		24	35 to 300		1x K480TB/G	–	800SA-10-xxx	–			
		36	35 to 300		1x M480TB/G	–	800SA-10-xxx	–			
		38	35 to 300		1x P480TB/G	–	800SA-10-xxx	–			
		12	50 to 630	EPDM	1x 484TB/G	–	800SA-10-xxx	–	IEC	–	
		24	50 to 630		1x K484TB/G	–	800SA-10-xxx	–			
		36	50 to 630		1x M484TB/G	–	800SA-10-xxx	–			
		38	50 to 630		1x P484TB/G	–	800SA-10-xxx	–			
	12	800 to 1200	EPDM	1x 489TB/G	–	800SA-10-xxx	–	IEC	–		
	24	800 to 1200		1x K489TB/G	–	800SA-10-xxx	–				
	36	800 to 1200		1x M489TB/G	–	800SA-10-xxx	–				
	38	800 to 1200		1x P489TB/G	–	800SA-10-xxx	–				
	nkt cables	12	25 to 300	Silicone	1x CB 24-630	–	CSA 24-x	–	IEC	–	
			24		25 to 300	1x CB 24-630	–	CSA 24-x			–
			36		35 to 300	1x CB 36-630	–	CSA 36-x			–
			38		35 to 300	1x CB 36-630	–	CSA 38-x			–
		12	95 to 500	Silicone	1x CB 24-1250/2	–	CSA 24-x	–	IEC	–	
			24		35 to 500	1x CB 24-1250/2	–	CSA 24-x			–
			36		240 to 630	1x CB 36-630(1250)	–	CSA 36-x			–
			38		240 to 630	1x CB 36-630(1250)	–	CSA 38-x			–
		12	95 to 1000	Silicone	1x CB 42-1250/3	–	CSA 12-x	–	IEC	–	
			24		95 to 1000	1x CB 42-1250/3	–	CSA 24-x			–
			36		95 to 1000	1x CB 42-1250/3	–	CSA 36-x			–
			38		95 to 1000	1x CB 42-1250/3	–	CSA 38-x			–
	Tyco Electronics Raychem	12	25 to 300	Silicone	1x RSTI-58xx	–	RSTI-CC-58SAxxxx	–	IEC	–	
			24		25 to 300	1x RSTI-58xx	–	RSTI-CC-58SAxxxx			–
			36		35 to 300	1x RSTI-68xx	–	RSTI-CC-68SAxxxx			–
			38		35 to 300	1x RSTI-68xx	–	RSTI-CC-68SAxxxx			–
		12	400 to 800	Silicone	1x RSTI-395x	–	RSTI-CC-58SAxxxx	RSTI-SA-PIN	IEC	–	
			24		400 to 800	1x RSTI-595x	–	RSTI-CC-58SAxxxx			RSTI-SA-PIN
			36		400 to 800	1x RSTI-695x	–	RSTI-CC-68SAxxxx			RSTI-SA-PIN
			38		400 to 800	1x RSTI-695x	–	RSTI-CC-68SAxxxx			RSTI-SA-PIN
Südkabel	12	50 to 300	Silicone	1x SET 12	–	MUT 23	–	IEC	–		
		24		25 to 240	1x SET 24	–	MUT 23			–	
		36		70 to 300	1x SET 36	–	MUT 33			KU 33	
	12	300 to 500	Silicone	1x SEHDT 13	–	MUT 23	–	IEC	–		
		24		300 to 630	1x SEHDT 23	–	MUT 23			–	
		36		300 to 500	1x SEHDT 33	–	MUT 33			KU 33	
ABB Kabeldon	12	25 to 630	Silicone	1x CSE-A 12630-xx	–	–	–	IEC	–		
	24	25 to 630		1x CSE-A 24630-xx	–	–	–				
	36	50 to 630		1x CSE-A 36630-xx	–	–	–				
2	Nexans Euromold	12	35 to 300	EPDM	1x 430TB/G	1x 300PB/G	300SA-5(10)SA	–	IEC	105	
		24	35 to 300		1x K430TB/G	1x K300PB/G	300SA-5(10)SA	–			
		36	35 to 300		1x M430TB/G	1x M300PB/G	300SA-5(10)SA	–			
		38	–		–	–	–	–			
		12	35 to 300	EPDM	1x 480TB/G	1x 800PB/G	800SA-10-xxx	–	IEC	105	
		24	35 to 300		1x K480TB/G	1x K800PB/G	800SA-10-xxx	–			
		36	35 to 300		1x M480TB/G	1x M800PB/G	800SA-10-xxx	–			
		38	35 to 300		1x P480TB/G	1x P800PB/G	800SA-10-xxx	–			
		12	50 to 630	EPDM	1x 484TB/G	1x 804PB/G	800SA-10-xxx	–	IEC	110	
		24	50 to 630		1x K484TB/G	1x K804PB/G	800SA-10-xxx	–			
		36	50 to 630		1x M484TB/G	1x M804PB/G	800SA-10-xxx	–			
		38	50 to 630		1x P484TB/G	1x P804PB/G	800SA-10-xxx	–			
	12	800 to 1200	EPDM	1x 489TB/G	1x 809PB/G	800SA-10-xxx	–	IEC	120		
	24	800 to 1200		1x K489TB/G	1x 809PB/G	800SA-10-xxx	–				
	36	800 to 1200		1x M489TB/G	1x 809PB/G	800SA-10-xxx	–				
	38	800 to 1200		1x P489TB/G	1x 809PB/G	800SA-10-xxx	–				

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

Number of cables per panel and phase	Make	Rated voltage	Conductor cross-section ¹⁾	Insulation	Cable T-plugs	Coupling plugs	Surge arresters with coupling inserts		According to standard	Distance cable of one phase	
					bolted	bolted	Arresters	Coupling inserts			
• Circuit-breaker panel 1250 A • Disconnecter panel 1250 A											
2	nkt cables	12	25 to 300	Silicone	1x CB 24-630	1x CC 24-630 M12	CSA 12-x	–	IEC	100	
		24	25 to 300		1x CB 24-630	1x CC 24-630 M12	CSA 24-x	–	IEC	100	
		36	35 to 300		1x CB 36-630	1x CC 36-630 M12	CSA 36-x	–	IEC	110	
		38	35 to 300		1x CB 36-630	1x CC 36-630 M12	CSA 38-x	–	IEC	110	
		12	95 to 500	Silicone	1x CB 24-1250/2	1x CC 24-1250/2 M12	CSA 12-x	–	IEC	100	
		24	35 to 500		1x CB 24-1250/2	1x CC 24-1250/2 M12	CSA 24-x	–	IEC	100	
		36	240 to 630		1x CB 36-630(1250)	1x CC 36-630(1250)	CSA 36-x	–	IEC	110	
		38	240 to 630		1x CB 36-630(1250)	1x CC 36-630(1250)	CSA 38-x	–	IEC	110	
		12	95 to 1000	Silicone	1x CB 42-1250/3	1x CC 42-2500/3	CSA 12-x	–	IEC	127	
		24	95 to 1000		1x CB 42-1250/3	1x CC 42-2500/3	CSA 24-x	–	IEC	127	
		36	95 to 1000		1x CB 42-1250/3	1x CC 42-2500/3	CSA 36-x	–	IEC	127	
		38	95 to 1000		1x CB 42-1250/3	1x CC 42-2500/3	CSA 38-x	–	IEC	127	
	Tyco Electronics Raychem	12	25 to 300	Silicone	1x RSTI-58xx	1x RSTI-CC-58xx	RSTI-CC-58SAxxxx	–	IEC	100	
		24	25 to 300		1x RSTI-58xx	1x RSTI-CC-58xx	RSTI-CC-58SAxxxx	–	IEC	100	
		36	35 to 300		1x RSTI-68xx	1x RSTI-CC-68xx	RSTI-CC-68SAxxxx	–	IEC	101	
		38	35 to 300		1x RSTI-68xx	1x RSTI-CC-68xx	RSTI-CC-68SAxxxx	–	IEC	101	
		12	400 to 800	Silicone	1x RSTI-395x	1x RSTI-CC-395x	RSTI-CC-58SAxxxx	RSTI-SA-PIN	IEC	100	
		24	400 to 800		1x RSTI-595x	1x RSTI-CC-595x	RSTI-CC-58SAxxxx	RSTI-SA-PIN	IEC	100	
	36	400 to 800	1x RSTI-695x		1x RSTI-CC-695x	RSTI-CC-68SAxxxx	RSTI-SA-PIN	IEC	120		
	38	400 to 800	1x RSTI-695x		1x RSTI-CC-695x	RSTI-CC-68SAxxxx	RSTI-SA-PIN	IEC	120		
	Süd kabel	12	50 to 300	Silicone	1x SET 12	1x SEHDT 13.1	MUT 23	–	IEC	–	
		24	25 to 240		1x SET 24	1x SEHDT 23.1	MUT 23	–	IEC	–	
		12	50 to 300	Silicone	2x SET 12	1x KU 23.2	MUT 23	–	IEC	–	
		24	25 to 240		2x SET 24	1x KU 23.2	MUT 23	–	IEC	–	
12		300 to 500	Silicone	2x SEHDT 13	1x KU 33	MUT 23	–	IEC	–		
24		300 to 630		2x SEHDT 23	1x KU 33	MUT 23	–	IEC	–		
36	300 to 500	2x SEHDT 33	1x KU 33	MUT 33	KU 33	IEC	–				
ABB Kabeldon	12	25 to 630	Silicone	2x CSE-A 12630-xx	PC 630-3	–	–	IEC	–		
	24	25 to 630		2x CSE-A 24630-xx	PC 630-3	–	–	IEC	–		
	36	50 to 630		2x CSE-A-36630-xx	PC 630-3 L	–	–	IEC	–		
3	Nexans Euromold	12	35 to 300	EPDM	1x 430TB/G	2x 300PB/G	–	–	IEC	105	
		24	35 to 300		1x K430TB/G	2x K300PB/G	–	–	IEC	105	
		36	35 to 300		1x M430TB/G	2x M300PB/G	–	–	IEC	105	
		38	–		–	–	–	–	–	–	
		12	35 to 300	EPDM	1x 480TB/G	2x 800PB/G	–	–	IEC	105	
		24	35 to 300		1x K480TB/G	2x K800PB/G	–	–	IEC	105	
		36	35 to 300		1x M480TB/G	2x M800PB/G	–	–	IEC	105	
		38	35 to 300		1x P480TB/G	2x P800PB/G	–	–	IEC	105	
		12	50 to 630	EPDM	1x 484TB/G	2x 804PB/G	–	–	IEC	110	
		24	50 to 630		1x K484TB/G	2x K804PB/G	–	–	IEC	110	
		36	50 to 630		1x M484TB/G	2x M804PB/G	–	–	IEC	110	
		38	50 to 630		1x P484TB/G	2x P804PB/G	–	–	IEC	110	
	12	800 to 1200	EPDM	1x 489TB/G	2x 809PB/G	–	–	IEC	120		
	24	800 to 1200		1x K489TB/G	2x K809PB/G	–	–	IEC	120		
	36	800 to 1200		1x M489TB/G	2x M809PB/G	–	–	IEC	120		
	38	800 to 1200		1x P489TB/G	2x P809PB/G	–	–	IEC	120		
	nkt cables	12	25 to 300	Silicone	1x CB 24-630	2x CC 24-630 M12	–	–	IEC	100	
			24		25 to 300	1x CB 24-630	2x CC 24-630 M12	–	–	IEC	100
			36		35 to 300	1x CB 36-630	2x CC 36-630 M12	–	–	IEC	110
			38		35 to 300	1x CB 36-630	2x CC 36-630 M12	–	–	IEC	110
		12	95 to 500	Silicone	1x CB 24-1250/2	2x CC 24-1250/2 M12	–	–	IEC	110	
			24		35 to 500	1x CB 24-1250/2	2x CC 24-1250/2 M12	–	–	IEC	110
			36		240 to 630	1x CB 36-630(1250)	2x CC 36-630(1250)	–	–	IEC	110
			38		240 to 630	1x CB 36-630(1250)	2x CC 36-630(1250)	–	–	IEC	110
12		95 to 1000	Silicone	1x CB 42-1250/3	2x CC 42-2500/3	–	–	IEC	127		
		24		95 to 1000	1x CB 42-1250/3	2x CC 42-2500/3	–	–	IEC	127	
		36		95 to 1000	1x CB 42-1250/3	2x CC 42-2500/3	–	–	IEC	127	
		38		95 to 1000	1x CB 42-1250/3	2x CC 42-2500/3	–	–	IEC	127	
Tyco Electronics Raychem	12	25 to 300	Silicone	1x RSTI-58xx	2x RSTI-CC-58xx	–	–	IEC	100		
	24	25 to 300		1x RSTI-58xx	2x RSTI-CC-58xx	–	–	IEC	100		
	36	35 to 300		1x RSTI-68xx	2x RSTI-CC-68xx	–	–	IEC	101		
	38	35 to 300		1x RSTI-68xx	2x RSTI-CC-68xx	–	–	IEC	101		
	12	400 to 800	Silicone	1x RSTI-395x	2x RSTI-CC-395x	–	–	IEC	100		
	24	400 to 800		1x RSTI-595x	2x RSTI-CC-595x	–	–	IEC	100		
36	400 to 800	1x RSTI-695x		2x RSTI-CC-695x	–	–	IEC	120			
38	400 to 800	1x RSTI-695x		2x RSTI-CC-695x	–	–	IEC	120			

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

Components

Panel connection with inside cone

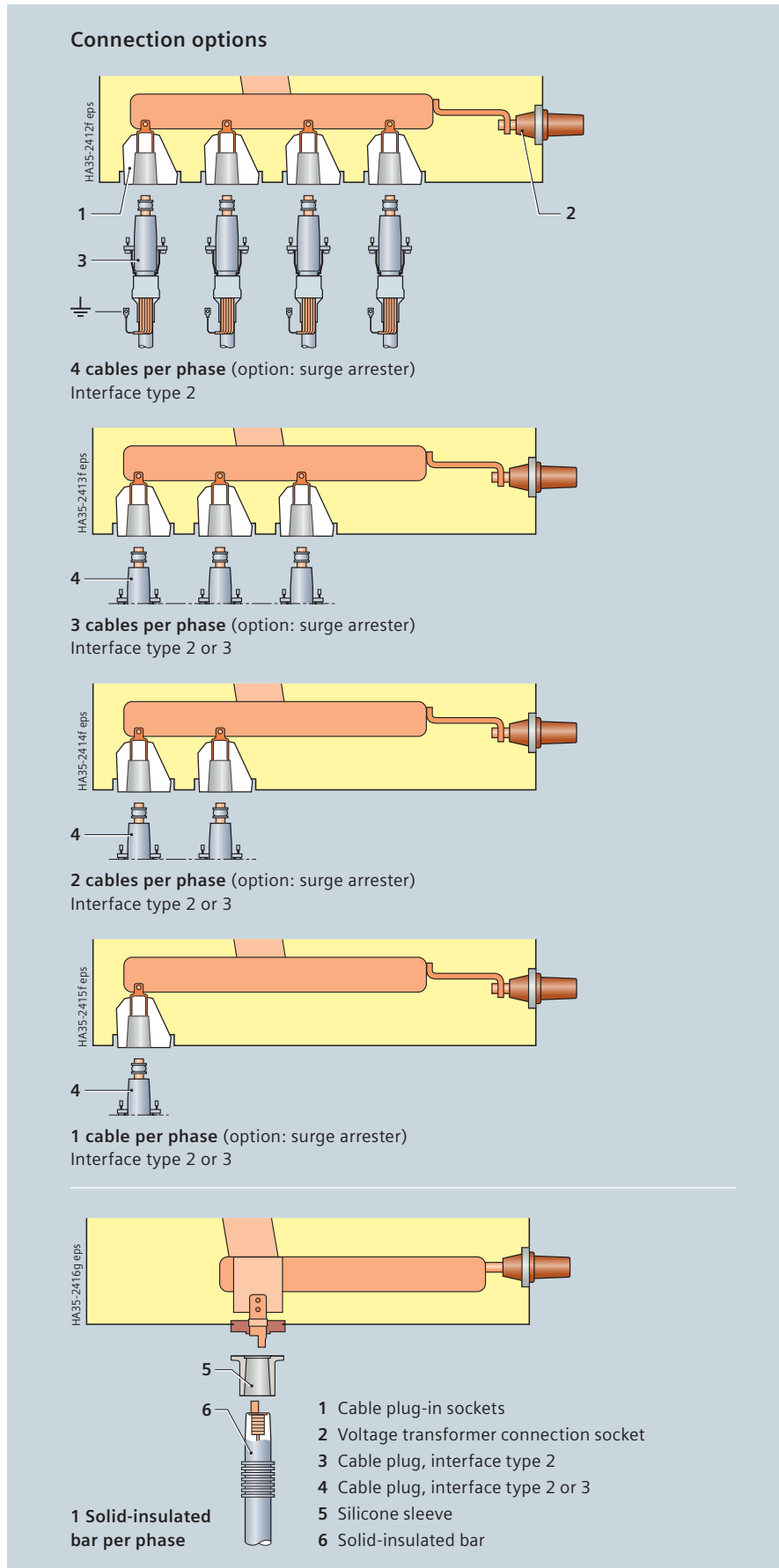
Panel connection with inside-cone plug-in system or solid-insulated bar

Features

- For circuit-breaker and disconnecter panels
- Inside-cone plug-in system according to DIN EN 50181
- For connection cross-sections up to 630 mm²
- Up to 4 cables with inside-cone plug size 2
- Up to 3 cables with inside-cone plug size 3
- With cable bracket, type C40 according to DIN EN 50024
- Option: Access to the cable compartment only if the feeder has been isolated and earthed
- For thermoplastic-insulated cables
- Cable routing downwards, cable connection from the front
- Inside-cone plugs are not part of the scope of supply
- Additionally one outside-cone connection (up to 36 kV) or one inside-cone socket (40.5 kV) for connection of a voltage transformer
- Instead of an inside-cone plug, the cable connection can also be designed for a solid-insulated bar.

Surge arresters

- Inside-cone sockets can be equipped with a surge arrester instead of an inside-cone cable plug
- Surge arresters are available for plug-in sockets size 2 or 3
- Surge arresters are available with discharge currents of 5 kA and 10 kA.



Panel connection with inside cone (commercially available cable plugs and bar connections)

Panel connection (commercially available plugs)

Cable type	Cable sealing end				Comment
	Comment	Type	Size	Cross-section mm ²	

Thermoplastic-insulated cables ≤ 12 kV according to IEC 60502-2 and VDE 0276-620

1-core cable or 3-core cable, PE and XPLE-insulated N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	nkt cables	CPI 2	2	25 to 300	Insulation material silicone rubber, with or without metal housing, installation without special tool
		CPI 3	3	185 to 630	
	Pfisterer	CONNEX	2	50 to 300	Insulation material silicone rubber, with metal housing
		CONNEX	3	240 to 630	
	Südkabel	SEIK 14	2	25 to 300	Insulation material silicone rubber, with metal housing
		SEIK 15	3	120 to 630	

Thermoplastic-insulated cables ≤ 24 kV according to IEC 60502-2 and VDE 0276-620

1-core cable or 3-core cable, PE and XPLE-insulated N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	nkt cables	CPI 2	2	25 to 300	Insulation material silicone rubber, with or without metal housing, installation without special tool
		CPI 3	3	95 to 630	
	Pfisterer	CONNEX	2	50 to 300	Insulation material silicone rubber, with metal housing
		CONNEX	3	150 to 630	
	Südkabel	SEIK 24	2	25 to 300	Insulation material silicone rubber, with metal housing
		SEIK 25	3	50 to 630	

Thermoplastic-insulated cables ≤ 36 kV according to IEC 60502-2 and VDE 0276-620

1-core cable or 3-core cable, PE and XPLE-insulated N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	nkt cables	CPI 2	2	25 to 300	Insulation material silicone rubber, with or without metal housing, installation without special tool
		CPI 3	3	50 to 630	
	Pfisterer	CONNEX	2	25 to 300	Insulation material silicone rubber, with metal housing
		CONNEX	3	95 to 630	
	Südkabel	SEIK 34	2	35 to 300	Insulation material silicone rubber, with metal housing
		SEIK 35	3	50 to 630	

Commercially available bar systems

Bar type	Bar connection				Comment
	Make	Type	Conductor material	Max. rated current	
Solid-insulated bar	MGC Moser Glaser	Duresca DE	Aluminium	2500 A	Outer sheath made of polyamide (polyamide tube)
		Duresca DE	Copper	2500 A	
		Duresca DG	Aluminium	2500 A	Outer sheath made of CrNi steel or aluminum (metal sheath)
		Duresca DG	Copper	2500 A	
	Preissinger	ISOBUS MR	Aluminium	2500 A	Outer sheath made of heat shrinkable tube; insulated with cast-resin impregnated paper bandage
		ISOBUS MR	Copper	2500 A	
	Ritz	SIS	Copper	2500 A	Outer sheath made of epoxy resin (if appropriate with heat shrinkable tube)

Surge-proof caps

	Make	Type	Size	Rated voltage	Comment
Inside-cone plug-in system according to EN 50181	nkt cables	FPI 2	Inside cone size 2	40.5 kV	Silicone with metal cover
		FPI 3	Inside cone size 3	40.5 kV	Silicone with metal cover
	Pfisterer	CONNEX	Inside cone size 2	40.5 kV	Silicone with metal cover
		CONNEX	Inside cone size 3	40.5 kV	Silicone with metal cover
	Südkabel	ISIK 14	Inside cone size 2	12 kV	Silicone with metal cover
		ISIK 24		24 kV	
		ISIK 34		40.5 kV	
		ISIK 15 ISIK 25 ISIK 35	Inside cone size 3	12 kV 24 kV 40.5 kV	Silicone with metal cover

Components

Installation possibilities with inside cone for cable connections and surge arresters

Number of cables per panel and phase	Size of inside-cone plug-in system	Make	Rated voltage	Conductor cross-section ¹⁾	Insulation	Cable plugs	Surge arresters	According to standard

- Circuit-breaker panel 1250 A • Circuit-breaker panel 1600 A • Circuit-breaker panel 2000 A • Circuit-breaker panel 2300 A
- Circuit-breaker panel 2500 A • Disconnecter panel 1250 A • Disconnecter panel 1600 A • Disconnecter panel 2000 A

1	Size 2	nkt cables	12	25 to 300	Silicone	1x CPI 2	SPI 2	IEC
			24	25 to 300		1x CPI 2		
			36	25 to 300		1x CPI 2		
		40.5	25 to 300	1x CPI 2				
		Pfisterer	12	50 to 300	Silicone	1x MV-CONNEX	MV-CONNEX	IEC
			24	50 to 300		1x MV-CONNEX		
	36		35 to 300	1x MV-CONNEX				
	40.5	35 to 300	1x MV-CONNEX					
	Südkabel	12	25 to 300	Silicone	1x SEIK 14	-	IEC	
24		25 to 300	1x SEIK 24					
36		35 to 300	1x SEIK 34					
40.5	-	-						
Size 3	nkt cables	12	185 to 630	Silicone	1x CPI 3	SPI 3	IEC	
		24	95 to 630		1x CPI 3			
		36	50 to 630		1x CPI 3			
	40.5	50 to 630	1x CPI 3					
	Pfisterer	12	240 to 630	Silicone	1x MV-CONNEX	MV-CONNEX	IEC	
		24	150 to 300		1x MV-CONNEX			
36		95 to 300	1x MV-CONNEX					
40.5	95 to 300	1x MV-CONNEX						
Südkabel	12	120 to 630	Silicone	1x SEIK 15	-	IEC		
	24	50 to 630		1x SEIK 25				
	36	50 to 630		1x SEIK 35				
40.5	95 to 400	1x SEIK 55						
2	Size 2	nkt cables	12	25 to 300	Silicone	2x CPI 2	SPI 2	IEC
			24	25 to 300		2x CPI 2		
			36	25 to 300		2x CPI 2		
		40.5	25 to 300	2x CPI 2				
		Pfisterer	12	50 to 300	Silicone	2x MV-CONNEX	MV-CONNEX	IEC
			24	50 to 300		2x MV-CONNEX		
	36		35 to 300	2x MV-CONNEX				
	40.5	35 to 300	2x MV-CONNEX					
	Südkabel	12	25 to 300	Silicone	2x SEIK 14	-	IEC	
24		25 to 300	2x SEIK 24					
36		35 to 300	2x SEIK 34					
40.5	-	-						
Size 3	nkt cables	12	185 to 630	Silicone	2x CPI 3	SPI 3	IEC	
		24	95 to 630		2x CPI 3			
		36	50 to 630		2x CPI 3			
	40.5	50 to 630	2x CPI 3					
	Pfisterer	12	240 to 630	Silicone	2x MV-CONNEX	MV-CONNEX	IEC	
		24	150 to 300		2x MV-CONNEX			
36		95 to 300	2x MV-CONNEX					
40.5	95 to 300	2x MV-CONNEX						
Südkabel	12	120 to 630	Silicone	2x SEIK 15	-	IEC		
	24	50 to 630		2x SEIK 25				
	36	50 to 630		2x SEIK 35				
40.5	95 to 400	2x SEIK 55						

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

Number of cables per panel and phase	Size of inside-cone plug-in system	Make	Rated voltage	Conductor cross-section ¹⁾	Insulation	Cable plugs	Surge arresters	According to standard

- Circuit-breaker panel 1250 A • Circuit-breaker panel 1600 A • Circuit-breaker panel 2000 A • Circuit-breaker panel 2300 A
- Circuit-breaker panel 2500 A • Disconnecter panel 1250 A • Disconnecter panel 1600 A • Disconnecter panel 2000 A

3	Size 2	nkt cables	12 24 36 40.5	25 to 300 25 to 300 25 to 300 25 to 300	Silicone	3x CPI 2 3x CPI 2 3x CPI 2 3x CPI 2	SPI 2	IEC
		Pfisterer	12 24 36 40.5	50 to 300 50 to 300 35 to 300 35 to 300	Silicone	3x MV-CONNEX 3x MV-CONNEX 3x MV-CONNEX 3x MV-CONNEX	MV-CONNEX	IEC
		Südkabel	12 24 36 40.5	25 to 300 25 to 300 35 to 300 –	Silicone	3x SEIK 14 3x SEIK 24 3x SEIK 34 –	–	IEC
	Size 3	nkt cables	12 24 36 40.5	185 to 630 95 to 630 50 to 630 50 to 630	Silicone	3x CPI 3 3x CPI 3 3x CPI 3 3x CPI 3	SPI 3	IEC
		Pfisterer	12 24 36 40.5	240 to 630 150 to 300 95 to 300 95 to 300	Silicone	3x MV-CONNEX 3x MV-CONNEX 3x MV-CONNEX 3x MV-CONNEX	MV-CONNEX	IEC
		Südkabel	12 24 36 40.5	120 to 630 50 to 630 50 to 630 95 to 400	Silicone	3x SEIK 15 3x SEIK 25 3x SEIK 35 3x SEIK 55	–	IEC
4	Size 2	nkt cables	12 24 36 40.5	25 to 300 25 to 300 25 to 300 25 to 300	Silicone	4x CPI 2 4x CPI 2 4x CPI 2 4x CPI 2	SPI 2	IEC
		Pfisterer	12 24 36 40.5	50 to 300 50 to 300 35 to 300 35 to 300	Silicone	4x MV-CONNEX 4x MV-CONNEX 4x MV-CONNEX 4x MV-CONNEX	MV-CONNEX	IEC
		Südkabel	12 24 36 40.5	25 to 300 25 to 300 35 to 300 –	Silicone	4x SEIK 14 4x SEIK 24 4x SEIK 34 –	–	IEC

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

Components

Indicating and measuring equipment

Voltage detecting systems according to IEC 61243-5 or VDE 0682-415, IEC 62271-206

- To verify safe isolation from supply
- LRM detecting systems
 - with plug-in indicator
 - with integrated indicator,
- with integrated indicator, with integrated repeat test of the interface, with integrated function test, type CAPDIS-S1+, WEGA 1.2 C, WEGA 1.2 C Vario, with integrated signaling relay, type CAPDIS-S2+, WEGA 2.2 C, WEGA 3.

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, repeat test according to local specifications and standards
- 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 according to local specifications and standards required
- With integrated 3-phase LRM test socket for phase comparison
- With integrated signaling relay (only VOIS R+)
- Degree of protection IP54.

Common features of CAPDIS-Sx+

- 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 capacitance 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 "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-HA35-104a.png



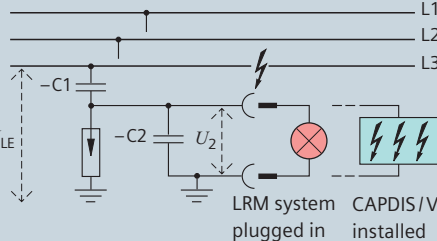
Integrated voltage indicator VOIS+, VOIS R+

R-HA35-154a.png



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

HA35-2537a eps



Voltage indication

via capacitive voltage divider (principle)

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

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

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

Symbols shown

	VOIS+, VOIS R+			CAPDIS-S1+			CAPDIS-S2+			
	L1	L2	L3	L1	L2	L3	L1	L2	L3	
A0							000			U=0 ● U=0 ●
A1	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	U=0 ● U=0 ●
A2										U=0 ● U=0 ●
A3	⚡	⚡		⚡	⚡		⚡	⚡		U=0 ● U=0 ●
A4				⚡	⚡	⚡	⚡	⚡	⚡	U=0 ● U=0 ●
A5				000	000	000	000	000	000	U=0 ● U=0 ●
A6				000	000	000	000	000	000	U=0 ● U=0 ●
A7				000	000	000	000	000	000	U=0 ● U=0 ●
A8							000	000	000	U=0 ● U=0 ●

CAPDIS S2+: The red and green LEDs show the state of the relay contact

● LED doesn't light up

● LED lights up

U = Operating voltage

- 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

WEGA 3

- Display indication "A1" to "A5"
- Integrated repeat test of the interface (self-monitoring)
- With integrated 3-phase LRM test socket for phase comparison.

WEGA 1.2 C, WEGA 1.2 C Vario

- Display indication "A1" 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
- Without integrated signaling relay
- Without auxiliary power
- Degree of protection IP54
- Adjustable for different operating voltages (adjustable capacitance C2) (only for WEGA 1.2 C Vario).

WEGA 2.2 C

- Display indication "A0" to "A7" (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 two integrated signaling relays (auxiliary power required)
- Degree of protection IP54.



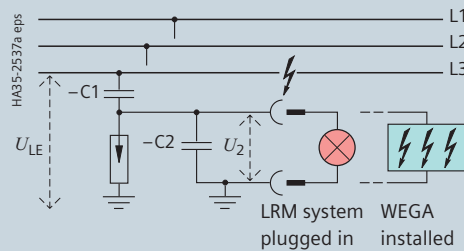
Integrated voltage indicator
WEGA 3



Integrated voltage detecting system
WEGA 1.2 C, WEGA 1.2 C Vario



Integrated voltage detecting system
WEGA 2.2 C



Voltage indication

via capacitive voltage divider (principle)

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

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

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

Symbols shown

	WEGA 3			WEGA 1.2 C WEGA 1.2 C Vario			WEGA 2.2 C			U≠0 ● U=0 ○
	L1	L2	L3	L1	L2	L3	L1	L2	L3	
A0										U≠0 ● U=0 ○
A1	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	U≠0 ● U=0 ○
A2										U≠0 ● U=0 ○
A3	⚡	⚡		⚡	⚡		⚡	⚡		U≠0 ● U=0 ○
A4	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	U≠0 ● U=0 ○
A5	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	U≠0 ● U=0 ○
A6				⚡	⚡	⚡	⚡	⚡	⚡	U≠0 ● U=0 ○
A7							⚡	⚡	⚡	U≠0 ● U=0 ○

LC display gray: not illuminated

LC display white: illuminated

WEGA 2.2 C: The red and green LEDs show the state of the relay contacts

○ LED doesn't light up

● LED lights up

U = Operating voltage

A0 For WEGA 2.2 C:

Operating voltage not present, auxiliary power present, LCD illuminated

A1 Operating voltage present

For WEGA 2.2 C: Auxiliary power present, LCD illuminated

A2 Operating voltage not present

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

A3 Failure in phase L1,

operating voltage at L2 and L3

For WEGA 2.2 C: Auxiliary power present, LCD illuminated

A4 Voltage present,

current monitoring of coupling section below limit value

For WEGA 2.2 C: Auxiliary power present, LCD illuminated

A5 Indication "Display-Test" passed

For WEGA 2.2 C: Auxiliary power present, LCD illuminated

A6 Indication "Display Test" passed

For WEGA 2.2 C:

Auxiliary power present

A7 For WEGA 2.2 C: LCD for missing auxiliary voltage is not illuminated

Components

Indicating and measuring equipment

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 switchgear.

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 Horstmann, type ORION M1
as combined test unit (HR and LRM) for:

- Voltage detection
- Phase comparison
- Interface testing at the switchgear
- Integrated self-test
- Indication via display and acoustic alarm
- Phase sequence indication and status LED
- Measurement of interface current up to 25 μ A
- Measurement of phase angle from -180° to $+180^\circ$
- Measurement of harmonics up to 40th harmonic
- Securing the measured values via PC software (ORION explorer) and USB.

Ready-for-service indicator

- Self-monitoring; easy to read
- Independent of temperature and pressure variations
- Independent of the site altitude
- Only responds to changes in gas density
- Signaling switch, 1 changeover contact, 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 signaling switch through the non-magnetizable switchgear vessel. Then, the armature activates the proximity switch. 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.

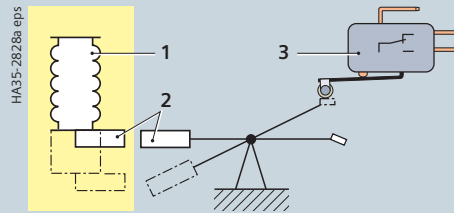
Indication

- Signaling switches -S41..S44 are wired to the binary input of the bay controller
- Indication as "panel" group signal at the bay controller
- "Substation" group signal is transferred to the telecontrol system.

NXDENS (option)

- Signaling switches -S41..S44 are wired to the NXDENS indicator
- Indication as "panel" status message on NXDENS indicator
Green status LED: Panel is ready for service
Red status LED: Panel is not ready for service
- If the status LED lights up red, missing service readiness can be spatially assigned to the individual module vessels through the LEDs 1...4
- The spatially correct assignment is supported by suitable pictograms at the switchgear front
- Signaling relays are available for signaling and monitoring of each module vessel (telecontrol system)
- "Life" signaling relay monitors proper operation of NXDENS (telecontrol system)
- The "Test" key is used for checking proper operation of the red LED
- The crank generator (below the status LEDs) allows for short-time checking of service readiness, even if the auxiliary voltage supply is missing. Here, the individual signaling relays remain in OPEN position, i.e., no signal to telecontrol system
- Auxiliary voltage 100 V to 230 V AC, 24 V to 220 V DC (wide-range power supply unit).

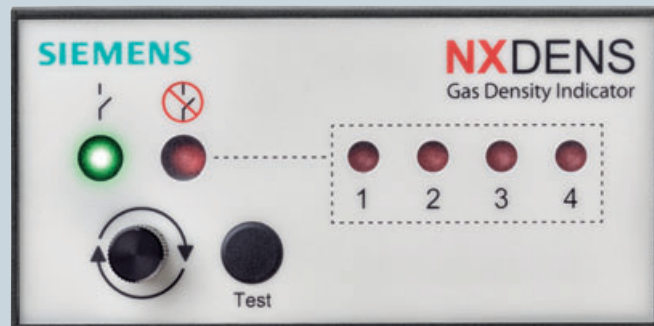
Ready-for-service indicator



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

- 1 Measurement box
- 2 Magnetic coupling
- 3 Signaling switch

Stainless-steel vessel filled with SF₆ gas, relative pressure 50 kPa at 20 °C



NXDENS indicator

Status GREEN	Status RED	NXPLUS SBB	NXPLUS DBB				
	Gas loss in the module vessel with LED no.	Pictogram	Pictogram				
		Feeders Bus sectionalizers Feeders	Feeders Bus sectionalizers Bus sectionalizers	Bus couplers Feeders			

Representation of pictograms at the panel front

Components

Indicating and measuring equipment

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 (1100 mm instead of von 935 mm) possible.

Low-voltage compartment

R-HA35-51-80.tif



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

For description of the SIPROTEC 5 protection devices, see page 56 and 57

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

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

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

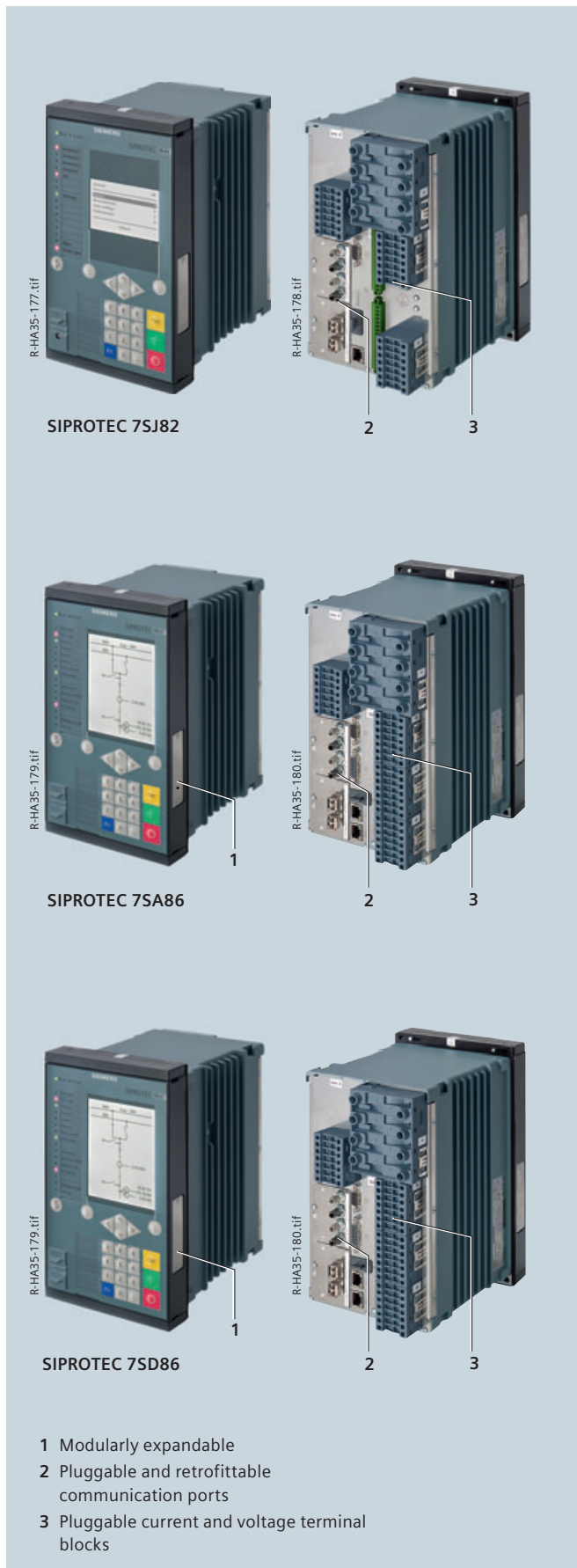
- Directional and non-directional time-overcurrent protection with additional functions
- Time optimization of the tripping times by directional comparison and protection data communication
- Frequency protection and rate-of-frequency-change protection for load shedding applications
- Overvoltage and 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, Σ active, Σ reactive and Σ 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.



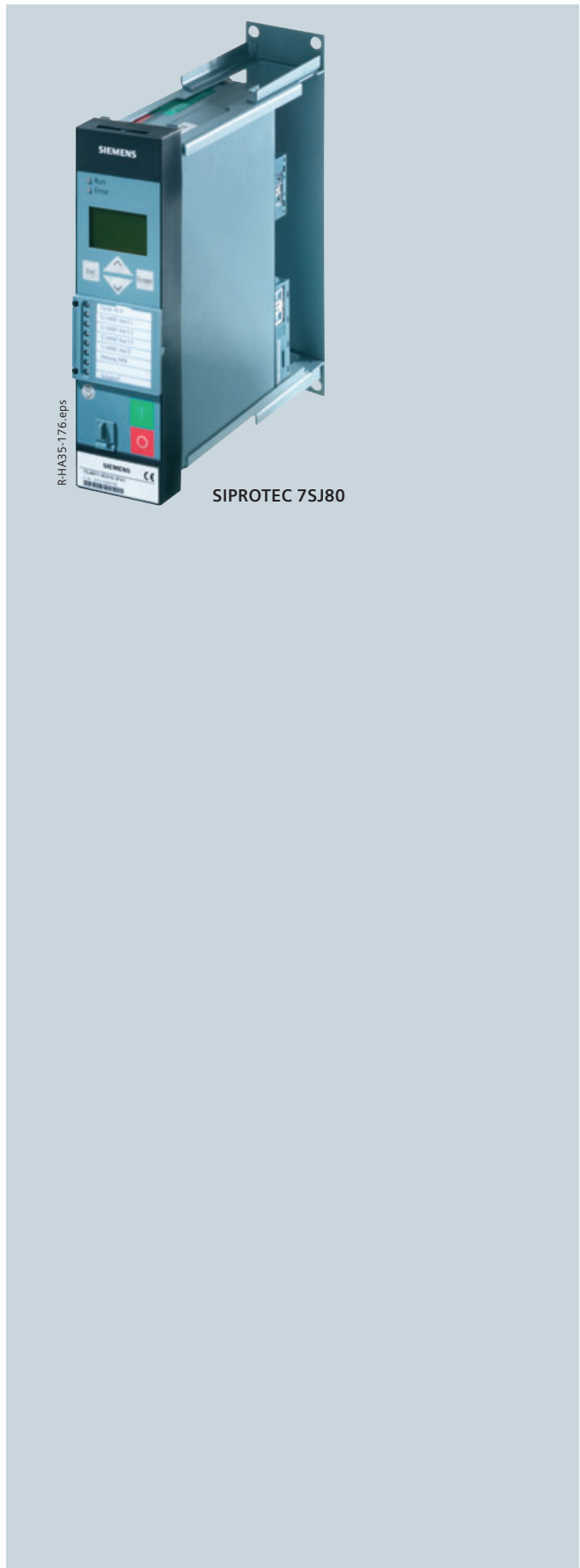
Components

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.



Type of service location

NXPLUS switchgear can be used as indoor installation according to IEC 61936 (Power Installations exceeding AC 1 kV) 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/m³ 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.

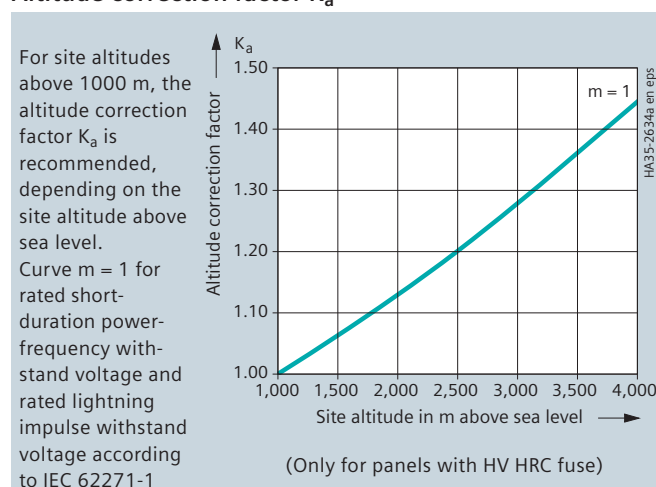
Table – Dielectric strength

Rated voltage (r.m.s. value)	kV	12	24	36	40.5
Rated short-duration power-frequency withstand voltage (r.m.s. value)					
– Across isolating distances	kV	32	60	80	90
– Between phases and to earth	kV	28	50	70	85
Rated lightning impulse withstand voltage (peak value)					
– Across isolating distances	kV	85	145	195	218
– Between phases and to earth	kV	75	125	170	185

Standards

NXPLUS 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.

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.

Overview of standards (January 2019)

		IEC standard	VDE standard	EN standard
Switchgear	NXPLUS	IEC 62271-1 IEC 62271-200	VDE 0671-1 VDE 0671-200	EN 62271-1 EN 62271-200
Devices	Circuit-breakers	IEC 62271-100	VDE 0671-100	EN 62271-100
	Disconnectors and earthing switches	IEC 62271-102	VDE 0671-102	EN 62271-102
	Voltage detecting systems	IEC 61243-5	VDE 0682-415	EN 61243-5
Degree of protection	IP code	IEC 60529	VDE 0470-1	EN 60529
	IK code	IEC 62262	VDE 0470-100	EN 50102
Insulation	–	IEC 60071	VDE 0111	EN 60071
Instrument transformers	–	IEC 61869-1	VDE 0414-9-1	EN 61869-1
	Current transformers	IEC 61869-2	VDE 0414-9-2	EN 61869-2
	Voltage transformers	IEC 61869-3	VDE 0414-9-3	EN 61869-3
Installation, erection	–	IEC 61936-1	VDE 0101	–
Insulating gas SF ₆	Specification for new SF ₆	IEC 60376	VDE 0373-1	EN 60376

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 SF₆ insulation of switching devices, the possibility of faults in SF₆-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.

In the unlikely event of a fault within the switchgear housing, the energy conversion in the case of an internal arc fault is minor thanks to the SF₆ insulation and the shorter length of the arc – 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.

Seismic withstand capability (option)

NXPLUS single-busbar 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, 1993
- IEC 60068-2-6, 1995.

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 Zone 3
- Seismic Requirements Spec. 9067; Department of Water & Power, Los Angeles
- GTS – 1.013 ENDESA, Chile
- VDE 0670-111.

Color of the panel front

RAL 7035 (light grey).

Climate and environmental influences

NXPLUS switchgear is completely enclosed and insensitive to climatic influences.

- All medium-voltage devices are installed in a gas-tight, welded stainless-steel switchgear vessel which is filled with SF₆ 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 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
- Relative air humidity Mean value over 24 hours: ≤ 98% ¹⁾
Mean value over 1 month: ≤ 90%
- Condensation Occasionally
Frequently (degree of protection min. IP31D, with anti-condensation heater in the low-voltage part ²⁾)
- Site altitude No restriction

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

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

Recycling

The switchgear can be recycled in ecological manner in compliance with existing legislation. Auxiliary devices such as short-circuit indicators have to be recycled as electronic scrap.

Batteries have to be recycled professionally. Insulating gas SF₆ has to be evacuated professionally as a reusable material and recycled (SF₆ must not be released into the environment).

Protection against solid foreign objects, electric shock and water

NXPLUS switchgear fulfills according to the standards

IEC 62271-1	VDE 0671-1, EN 62271-1
IEC 62271-200	VDE 0671-200, EN 62271-200
IEC 60529	VDE 0470-1, EN 60529
IEC 62262	VDE 0470-100, EN 50102

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
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.

Notes

Published by
Siemens AG 2019

Smart Infrastructure
Distribution Systems
Mozartstraße 31 C
91052 Erlangen, Germany

For more information, please contact our
Customer Support Center.

Tel.: +49 180 524 7000

Fax: +49 180 524 2471

E-mail: support.energy@siemens.com

www.siemens.com/medium-voltage-switchgear

www.siemens.com/NXPLUS

Article No. EMMS-K1435-A511-B2-7600

Printed in Germany

Dispo 40401

PU 004972 KG 03.19 0.0

Subject to changes and errors. The information given in this document only contains general descriptions and/or performance features which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products. The requested performance features are binding only when they are expressly agreed upon in the concluded contract.

2019

