



REGIONE SICILIANA
Città Metropolitana di Catania
COMUNI DI CASTEL DI IUDICA E RAMACCA

**PROGETTO PER LA REALIZZAZIONE DI UN IMPIANTO AGRIVOLTAICO
DELLA POTENZA DI PICCO DI 181,6 MWp E POTENZA DI IMMISSIONE 150 MW E
DELLE RELATIVE OPERE CONNESSE
NEI COMUNI DI CASTEL DI IUDICA E RAMACCA (CT)**

Proponente:

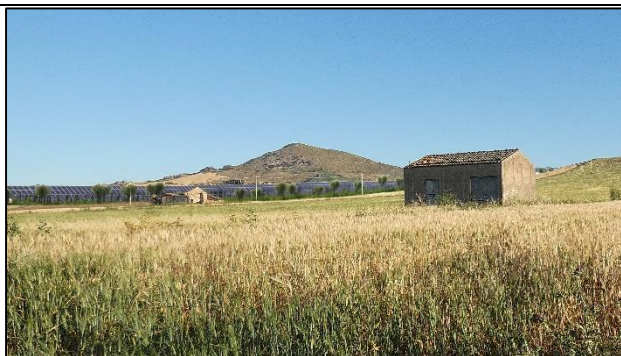


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SPECIFICHE TECNICHE APPARECCHIATURE MT

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RAMACCA – CASTEL DI IUDICA 150 MW

SPECIFICHE TECNICHE

APPARECCHIATURE MT



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Catalog
HA 35.11
2021

MEDIUM-VOLTAGE SWITCHGEAR

Types 8DA10 and 8DB10 up to 40.5 kV
and Type 8DAB 12 blue GIS up to 12 kV,
Gas-Insulated

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

SIEMENS

Application

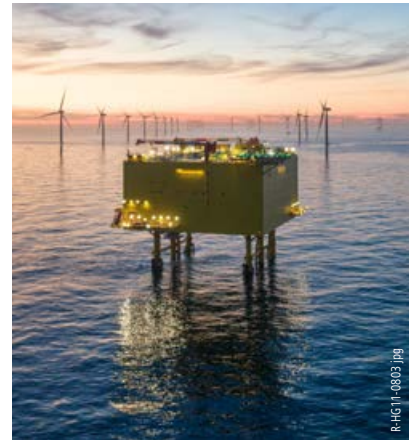
Typical uses



Typical uses
(examples):

Offshore

Traction power
supply



Typical uses
(examples):

Public power supply
system

Industry



MEDIUM-VOLTAGE SWITCHGEAR

Types 8DA10 and 8DB10 up to 40.5 kV and Type 8DAB 12 blue GIS up to 12 kV, Gas-Insulated

Catalog HA 35.11 · 2021

Invalid: Catalog HA 35.11 · 2017

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

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

Application

Versions



R-HA3511-001_8DA10.tif



R-HA3511-004_8DA10.tif



R-HA3511-002_8DA10.tif

Views of medium-voltage switchgear, single-busbar panel types 8DA10 and 8DAB 12 SBB



R-HA3511-011_8DB10.tif



R-HA3511-014_8DB10.tif



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Views of medium-voltage switchgear, double-busbar panel types 8DB10 and 8DB 12 DBB

Medium-voltage switchgear 8DA/B is indoor, factory-assembled, type-tested, single-pole metal-enclosed, gas-insulated switchgear, for single-busbar and double-busbar applications, as well as for traction power supply systems.

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

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

Electrical data (maximum values) and dimensions according to IEC						
Single-busbar and double-busbar switchgear			blue GIS			
Rated voltage	kV	12	12	24	36	40.5
Rated frequency	Hz	50/60	50/60	50/60	50/60	50/60
Rated short-duration power-frequency withstand voltage	kV	28 ¹⁾	28 ¹⁾	50 ¹⁾	70 ¹⁾	85 ¹⁾
Rated lightning impulse withstand voltage	kV	75	75	125	170	185 ¹⁾
Rated peak withstand current	kA	100/104	100/104	100/104	100/104	100/104
Rated short-circuit making current	kA	100/104	100/104	100/104	100/104	100/104
Rated short-time withstand current 3 s	kA	40	40	40	40	40
Rated short-circuit breaking current	kA	40	40	40	40	40
Rated normal current of the busbar	A	5000	2750	5000	5000	5000
Rated normal current of feeders	A	2750	2500	2750	2750	2750
	A	3150 ²⁾	2750 ²⁾	3150 ²⁾	3150 ²⁾	3150 ²⁾

Electrical data (maximum values) and dimensions according to ANSI						
Single-busbar and double-busbar switchgear						
Rated voltage	kV	4.76	8.25	15	27	38 ³⁾
Rated frequency	Hz	60	60	60	60	60
Rated short-duration power-frequency withstand voltage	kV	19	36	36	80	95
Rated lightning impulse withstand voltage	kV	60	95	95	125	200
Rated peak withstand current	up to kA	104	104	104	104	104
Rated short-circuit making current	up to kA	104	104	104	104	104
Rated short-time withstand current 3 s	up to kA	40	40	40	40	40
Rated short-circuit breaking current	up to kA	40	40	40	40	40
Rated normal current of the busbar	A	5000	5000	5000	5000	5000
Rated normal current of feeders	A	2750	2750	2750	2750	2750
	A	3000 ²⁾	3000 ²⁾	3000 ²⁾	3000 ²⁾	3000 ²⁾

Electrical data (maximum values) and dimensions			
Single-pole and double-pole traction power supply switchgear			
Rated voltage	kV	17.25	27.5
Rated frequency	Hz	16.7	50/60
Rated short-duration power-frequency withstand voltage	kV	50	95
Rated lightning impulse withstand voltage	kV	125	200
Rated peak withstand current	kA	80	80
Rated short-circuit making current	kA	80	80
Rated short-time withstand current 3 s	kA	31.5	31.5
Rated short-circuit breaking current	kA	31.5	31.5
Rated normal current of the busbar	A	3150	3150
Rated normal current of feeders	A	2500	2500

1) Higher values on request

2) With forced ventilation

3) Higher values of the rated voltage on request

Requirements

Features

Protection against environmental influences

The single-pole enclosed high-voltage part of the switchgear is suitable for applications under aggressive ambient conditions, such as:

- Saline air
- Air humidity
- Dust
- Condensation.

It is tight to ingress of foreign objects, such as

- Dust
- Pollution
- Small animals.

The application is independent of the site altitude.

Compact design

Thanks to the use of gas insulation, compact dimensions are possible.

Thus:

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

Maintenance-free design

Switchgear housings 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)
- Reduced operating costs
- Cost-efficient investment.

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 8DA/B is at least 35 years, probably 40 to 50 years, taking the tightness of the enclosed high-voltage part into account. The service life is limited by the maximum number of operating cycles of the switching devices installed:

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

Safety

Personal safety

- Safe-to-touch and hermetically sealed primary enclosure
- 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
- Operation is only possible with closed switchgear enclosure
- Standard degree of protection IP65 for all high-voltage parts of the primary circuit, IP3XD for the switchgear enclosure according to IEC 60529
- High resistance to internal arcs by single-pole enclosure of the primary circuit
- Panels tested for resistance to internal faults up to 40 kA
- Logical mechanical interlocks prevent maloperation
- Make-proof earthing by means of the vacuum circuit-breaker.

Security of operation

- Hermetically sealed primary enclosure protects against environmental effects (pollution, humidity and small animals)
- Maintenance-free in an indoor environment according to IEC 62271-1
- Two-phase and three-phase short-circuits between the primary conductors are excluded by the single-pole primary enclosure
- In isolated or compensated systems, low-current earth-fault currents are self-extinguishing
- Operating mechanisms of switching devices accessible outside the primary enclosure (switchgear housings)
- Metal-enclosed, plug-in inductive voltage transformers mounted outside the primary enclosure
- Ring-core current transformers, mounted outside the primary enclosure, not subjected to dielectric stress
- Complete switchgear interlocking system with logical mechanical interlocks
- Bolted switchgear housings sealed for life
- Minimum fire load
- Option: Aseismic design.

Reliability

- Type and routine-tested
- Standardized, NC production processes
- Quality assurance in accordance with DIN EN ISO 9001, DIN EN ISO 14001 and BS OHSAS 18001
- More than 150,000 switchgear panels of Siemens in operation worldwide.

Technology

General

- Single-pole enclosure of the primary part by modular switchgear housings made of corrosion-resistant aluminum alloy
- Insulating gas SF₆ (fluorinated greenhouse gas in sealed pressure system according to IEC 62271-1)
Alternatively, up to 12 kV, insulating gas Clean Air (consisting of the natural elements of the ambient air)
- Three-position disconnecter as busbar disconnecter and feeder earthing switch
- Make-proof earthing by means of the vacuum circuit-breaker
- Compact dimensions due to gas insulation
- Single-pole metal-enclosed, gas-insulated busbars
- Cable connection with inside-cone plug-in system, or for connection of gas-insulated and solid-insulated bars
- Wall-standing or free-standing arrangement
- Installation and extension of existing switchgear at both ends without modification of existing panels.

Interlocks

- According to IEC 62271-200
- Three-position disconnecter can only be operated with circuit-breaker in OPEN position
- Circuit-breaker can only be operated with three-position disconnecter in end position and operating lever removed.

Modular design

- Replacement of the panel connection housings or the circuit-breaker possible without interrupting busbar operation
- Low-voltage compartment removable, plug-in bus wires.

Instrument transformers

- Current transformers not subjected to dielectric stress
- Metal-enclosed, plug-in and disconnectable voltage transformers.

Vacuum circuit-breaker

- Maintenance-free under normal ambient conditions according to IEC 62271-1
- No relubrication or readjustment
- Vacuum interrupters sealed for life
- Up to 10,000 operating cycles (maintenance-free)
- Option: Up to 30,000 operating cycles (maintenance required).

Secondary systems

- 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.

Technical data

Electrical data, functional level, temperature for single-busbar and double-busbar switchgear

Common electrical data, functional level and temperature				blue GIS				
Rated insulation level	Rated voltage U_r	kV	12	12	24	36	40.5	
	Rated short-duration power-frequency withstand voltage U_d :	– phase-to-earth, open contact gap	kV	28 ¹⁾	28 ¹⁾	50 ¹⁾	70 ¹⁾	85 ¹⁾
		– across the isolating distance	kV	32 ¹⁾	32 ¹⁾	60 ¹⁾	80 ¹⁾	90 ¹⁾
	Rated lightning impulse withstand voltage U_p :	– phase-to-earth, open contact gap	kV	75	75	125	170	185 ¹⁾
		– across the isolating distance	kV	85	85	145	195	220 ¹⁾
Rated frequency f_r		Hz	50/60	50/60	50/60	50/60	50/60	
Rated normal current I_r	of the busbar	A	1250	1250	1250	1250	1250	
		A	2000	2000	2000	2000	2000	
		A	2500	2500	2500	2500	2500	
		A	3150	2750	3150	3150	3150	
		A	4000		4000	4000	4000	
		A	5000		5000	5000	5000	
Rated functional level p_{re}	(relative) of the busbar		70/120/140 kPa at 20 °C					
Minimum functional level p_{me}			50/100 kPa at 20 °C					
Ambient air temperature			– 5 °C to + 55 °C ⁴⁾					

Data of the switchgear panels				blue GIS				
Circuit-breaker panel, disconnecter panel			kV	12	12	24	36	40.5
Rated normal current I_r	A		1250	1250	1250	1250	1250	
	A		1600	1600	1600	1600	1600	
	A		2000	2000	2000	2000	2000	
	A		2500	2500	2500	2500	2500	
	A		2750	2750 ²⁾	2750	2750	2750	
	A		3150 ²⁾		3150 ²⁾	3150 ²⁾	3150 ²⁾	
Rated short-time withstand current I_k	$t_k = 3$ s	up to kA	40	40	40	40	40	
Rated peak withstand current I_p ¹⁾		up to kA	100/104	100/104	100/104	100/104	100/104	
Rated short-circuit making current I_{ma} ¹⁾		up to kA	100/104	100/104	100/104	100/104	100/104	
Rated short-circuit breaking current I_{sc}		up to kA	40	40	40	40	40	
Electrical endurance of vacuum circuit-breakers	at rated normal current		10,000 operating cycles ³⁾					
	at rated short-circuit breaking current		50 breaking operations					
Rated functional level p_{re}	(relative) for feeders		70/120/140 kPa at 20 °C					
Minimum functional level p_{me}			50/100 kPa at 20 °C					
Bus sectionalizer, bus coupler			kV	12	12	24	36	40.5
Rated normal current I_r	A		1250	1250	1250	1250	1250	
	A		2000	2000	2000	2000	2000	
	A		2500	2500	2500	2500	2500	
	A		2750	2750 ²⁾	2750	2750	2750	
	A		3150 ²⁾		3150 ²⁾	3150 ²⁾	3150 ²⁾	
	A							
Rated short-time withstand current I_k	$t_k = 3$ s	up to kA	40	40	40	40	40	
Rated peak withstand current I_p ¹⁾		up to kA	100/104	100/104	100/104	100/104	100/104	
Rated short-circuit making current I_{ma} ¹⁾		up to kA	100/104	100/104	100/104	100/104	100/104	
Rated short-circuit breaking current I_{sc}		up to kA	40	40	40	40	40	
Electrical endurance of vacuum circuit-breakers	at rated normal current		10,000 operating cycles ³⁾					
	at rated short-circuit breaking current		50 breaking operations					
Rated functional level p_{re}	(relative) for feeders		70/120/140 kPa at 20 °C					
Minimum functional level p_{me}			50/100 kPa at 20 °C					
Cable connection panel, metering panel			kV	12	12	24	36	40.5
Rated normal current I_r	A		1250	1250	1250	1250	1250	
	A		2000	2000	2000	2000	2000	
	A		2500	2500	2500	2500	2500	
	A		2750	2750 ²⁾	2750	2750	2750	
	A		3150 ²⁾		3150 ²⁾	3150 ²⁾	3150 ²⁾	
	A							
Rated short-time withstand current I_k	$t_k = 3$ s	up to kA	40	40	40	40	40	
Rated peak withstand current I_p ¹⁾		up to kA	100/104	100/104	100/104	100/104	100/104	
Rated functional level p_{re}	(relative) for feeders		70/120/140 kPa at 20 °C					
Minimum functional level p_{me}			50/100 kPa at 20 °C					

Technical data

Electrical data, functional level, temperature for single-pole and double-pole traction power supply switchgear

Common electrical data, functional level and temperature					
Rated insulation level	Rated voltage U_r	kV	17.25	27.5	
	Nominal voltage according to IEC 60850/EN 50163	kV	15	25	
	Rated short-duration power-frequency withstand voltage U_d :	– phase-to-earth, open contact gap	kV	50	95
		– across the isolating distance	kV	60	110
	Rated lightning impulse withstand voltage U_p :	– phase-to-earth, open contact gap	kV	125	200
		– across the isolating distance	kV	145	220 ¹⁾
Rated frequency f_r		Hz	16.7	50/60	
Rated normal current I_r of the busbar		A	1250	1250	
		A	2000	2000	
		A	2500	2500	
		A	3150	3150	
Rated functional level p_{re}	(relative) of the busbar		120 kPa at 20 °C		
Minimum functional level p_{me}			100 kPa at 20 °C		
Ambient air temperature			–5 °C to +55 °C ⁴⁾		

Data of the switchgear panels				
Circuit-breaker panel, disconnecter panel		kV	17.25	27.5
Rated normal current I_r		A	1250	1250
		A	1600	1600
		A	2000	2000
		A	2500	2500
Rated short-time withstand current I_k	$t_k = 3$ s	up to kA	31.5	31.5
Rated peak withstand current I_p ¹⁾		up to kA	80	80/82
Rated short-circuit making current I_{ma} ¹⁾		up to kA	80	80/82
Rated short-circuit breaking current I_{sc}		up to kA	31.5	31.5
Electrical endurance of vacuum circuit-breakers	at rated normal current at rated short-circuit breaking current		20,000 operating cycles 50 breaking operations	
Rated functional level p_{re}	(relative) for feeders		120 kPa at 20 °C	
Minimum functional level p_{me}			100 kPa at 20 °C	
Bus sectionalizer		kV	17.25	27.5
Rated normal current I_r		A	1250	1250
		A	2000	2000
		A	2500	2500
Rated short-time withstand current I_k	$t_k = 3$ s	up to kA	31.5	31.5
Rated peak withstand current I_p ¹⁾		up to kA	80	80/82
Rated short-circuit making current I_{ma} ¹⁾		up to kA	80	80/82
Rated short-circuit breaking current I_{sc}		up to kA	31.5	31.5
Electrical endurance of vacuum circuit-breakers	at rated normal current at rated short-circuit breaking current		20,000 operating cycles 50 breaking operations	
Rated functional level p_{re}	(relative) for feeders		120 kPa at 20 °C	
Minimum functional level p_{me}			100 kPa at 20 °C	

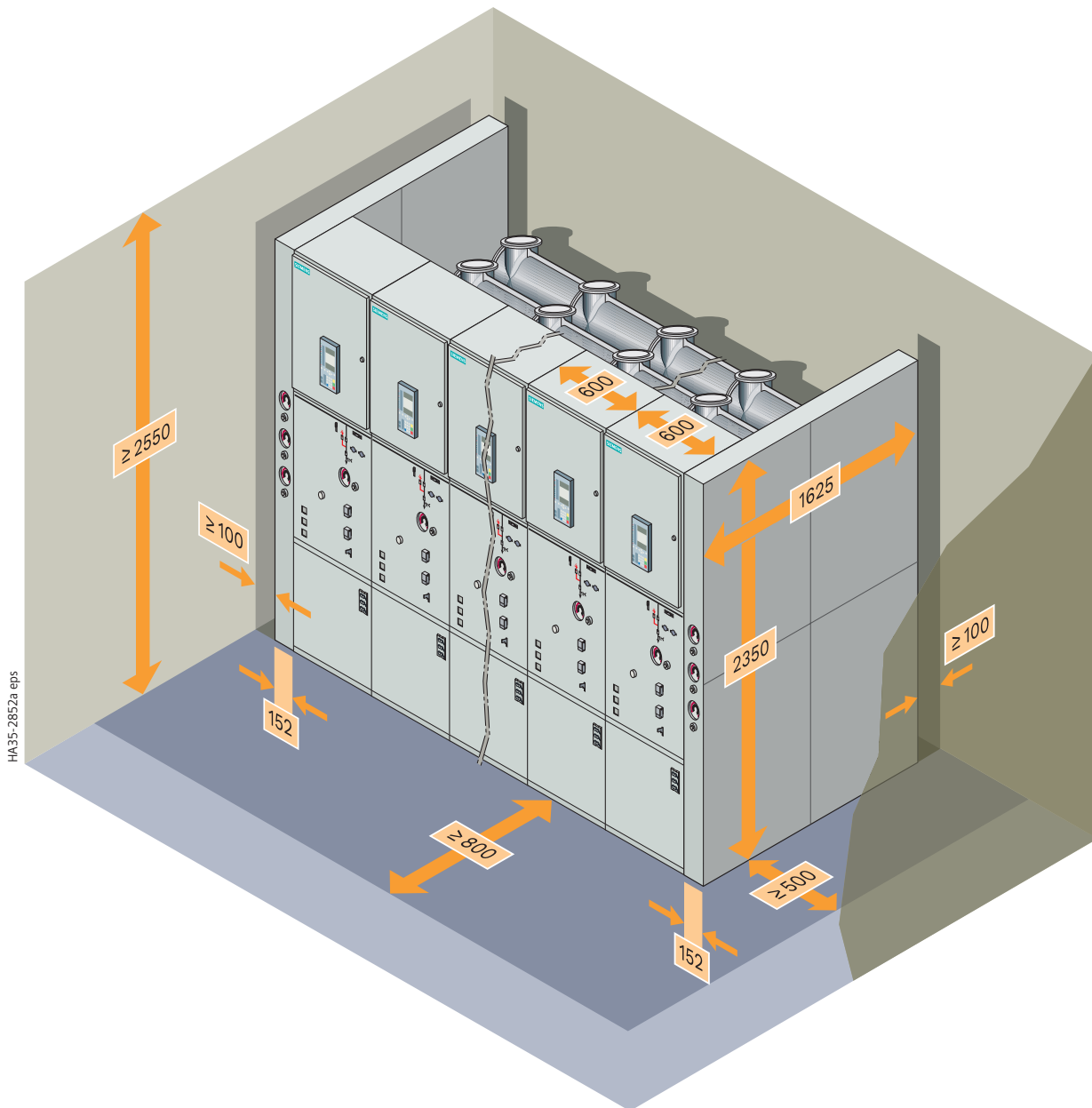
Footnotes for pages 8 and 9:

- 1) Higher values on request
- 2) With forced ventilation
- 3) Option: 30,000 operating cycles
- 4) Option: Ambient air temperature –25 °C to +55 °C

Room planning

Single-busbar switchgear and double busbar switchgear

Example: Wall-standing arrangement of single-busbar switchgear with 850 mm high low-voltage compartment – applies analogously also to double-busbar switchgear and traction power supply switchgear



HA35-2852a eps

Weights

Basic switchgear design + packing

- Single-busbar panel: approx. 800 kg + 100 kg
- Double-busbar panel: approx. 1200 kg + 100 kg

Switchgear installation

- Wall-standing arrangement without rear wall (IAC AFL)
- Free-standing arrangement without rear wall (IAC AFL)
- Free-standing arrangement with rear wall (IAC AFLR)

Room dimensions

See illustration above
Room height \geq switchgear height + 200 mm
Free-standing arrangement: Wall distance \geq 800 mm

Door dimensions

The door dimensions depend on the dimensions of the individual panels (see pages 14 to 17)

Switchgear fixing

- For floor openings and fixing points of the switchgear, see pages 14 to 17
- Foundations:
 - Steel girder construction
 - Steel-reinforced concrete with foundation rails, welded or bolted on

Panel dimensions

See pages 14 to 17

Classification of single-busbar switchgear and double-busbar switchgear according to IEC 62271-200

Design and construction

Partition class PM

Loss of service continuity category

– Single-busbar switchgear

LSC2

– Double-busbar switchgear

LSC2A

Internal arc classification

Wall-standing arrangement IAC AFL 40 kA, 1 s

Free-standing arrangement IAC AFLR 40 kA, 1 s

Type of accessibility A

Switchgear in closed electrical service location, access "for authorized personnel only" according to IEC 62271-200

– F

Front

– L

Lateral

– R

Rear (for free-standing arrangement)

Rated short-time withstand current 40 kA

Rated duration of short-circuit 1 s

Classification of single-busbar switchgear and double-busbar switchgear according to IEEE Std C37.20.7™-2017

Internal arc classification

Wall-standing arrangement Typ 1B 40 kA, 0.5 s

Free-standing arrangement Typ 2B 40 kA, 0.5 s

Type of accessibility

– Type 1B

Front

– Type 2B

Front, lateral, rear (for free-standing arrangement)

– Type BC

Front with open low-voltage compartment

Rated short-time withstand current 40 kA

Rated duration of short-circuit 0.5 s

Transport

The single-busbar switchgear and the traction power supply switchgear are delivered in transport units comprising up to four panels.


The double-busbar switchgear is delivered in transport units comprising up to three panels.

Means of transport


- Truck
- Ship
- Airplane

Product range


Single-busbar panels, example: circuit-breaker feeder panel

- 


Three-position disconnector

- 


Vacuum circuit-breaker

- 


Plug-in voltage transformer (directly plugged or with cable connection)

- 


Voltage transformer without or with three-position disconnector

- 


Current transformer

- 


Capacitive voltage detecting system

- 


Busbars
– earthing switch and
– make-proof earthing switch

- 


Busbar connection with or without three-position disconnector

- 

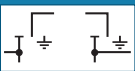
Surge arrester

- 

Panel connection with inside-cone plug or bar connection

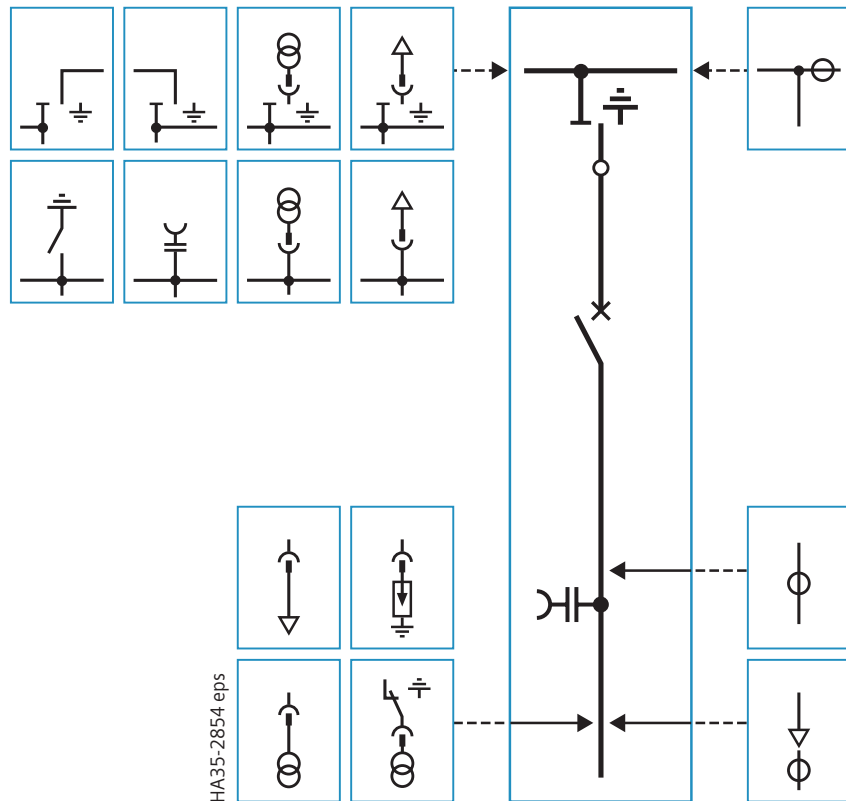
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Zero-sequence current transformer

- 

Top-mounted bus sectionalizer

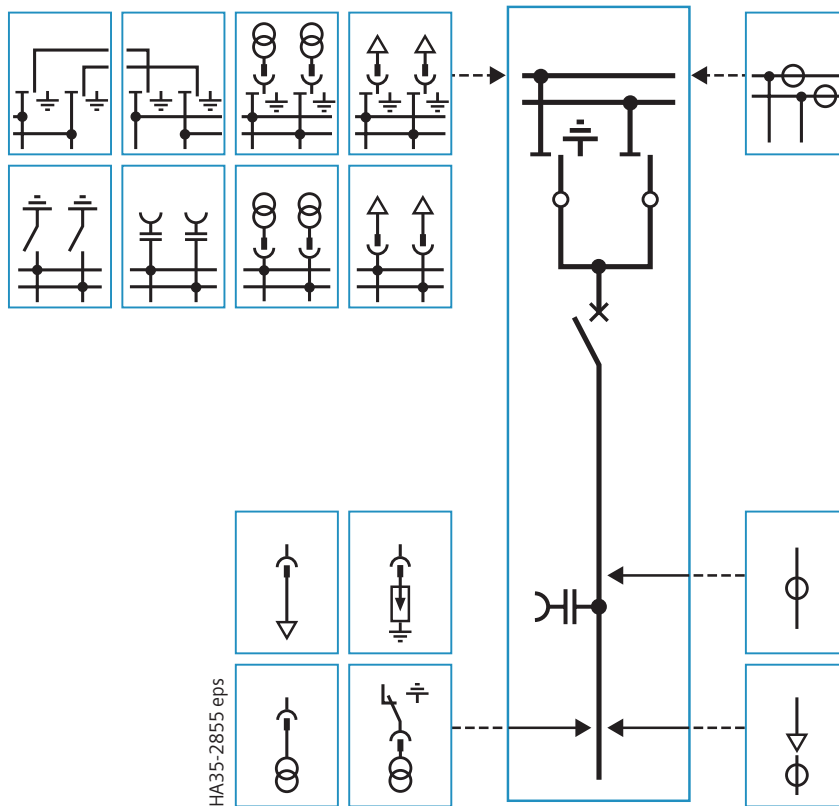
Circuit-breaker panel



Product range

Double-busbar panels, example: circuit-breaker feeder panel

Circuit-breaker panel



Three-position disconnector



Vacuum circuit-breaker



Plug-in voltage transformer (directly plugged or with cable connection)



Voltage transformer with or without three-position disconnector



Current transformer



Capacitive voltage detecting system



Busbars
– earthing switch and
– make-proof earthing switch



Busbar connection with or without three-position disconnector



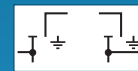
Surge arrester



Panel connection with inside-cone plug or bar connection



Zero-sequence current transformer

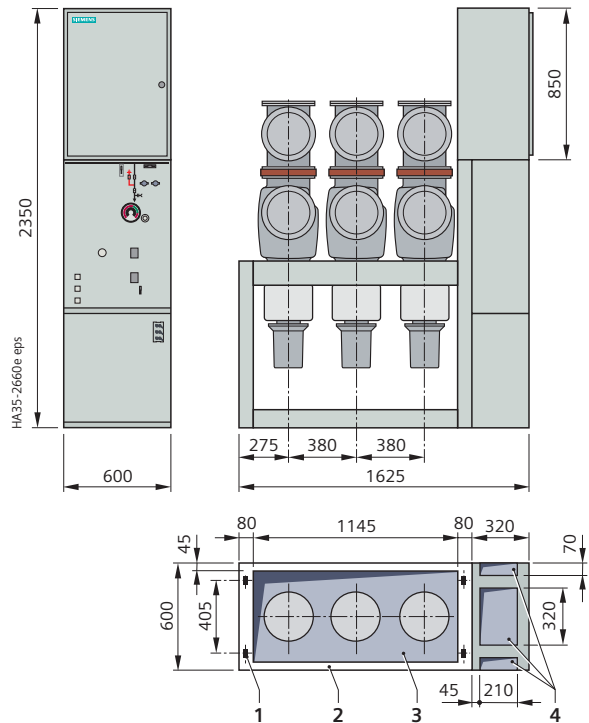


Top-mounted bus sectionalizer

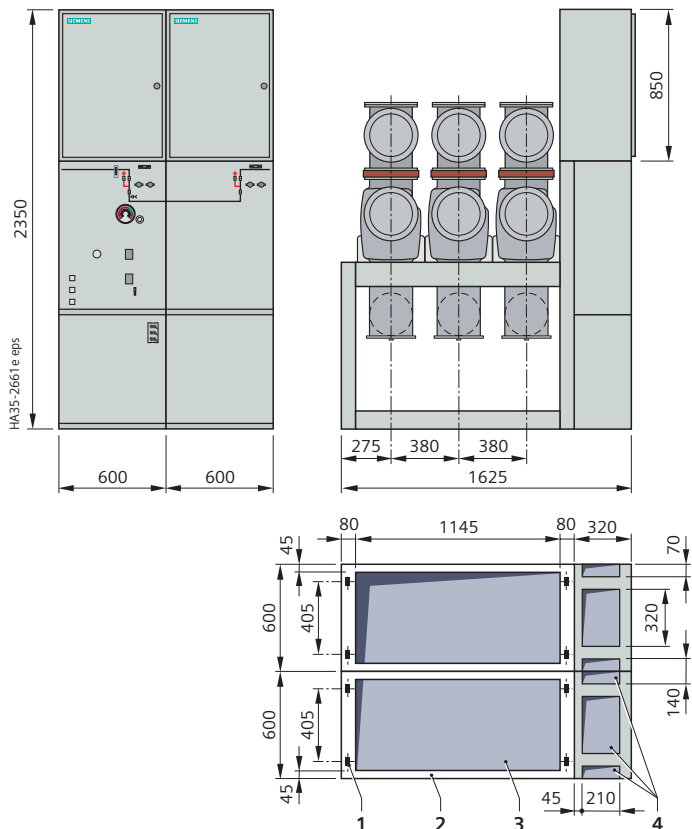
Dimensions

Typicals, single-busbar switchgear (examples)

Circuit-breaker panel up to 3150 A



Bus sectionalizer up to 3150 A



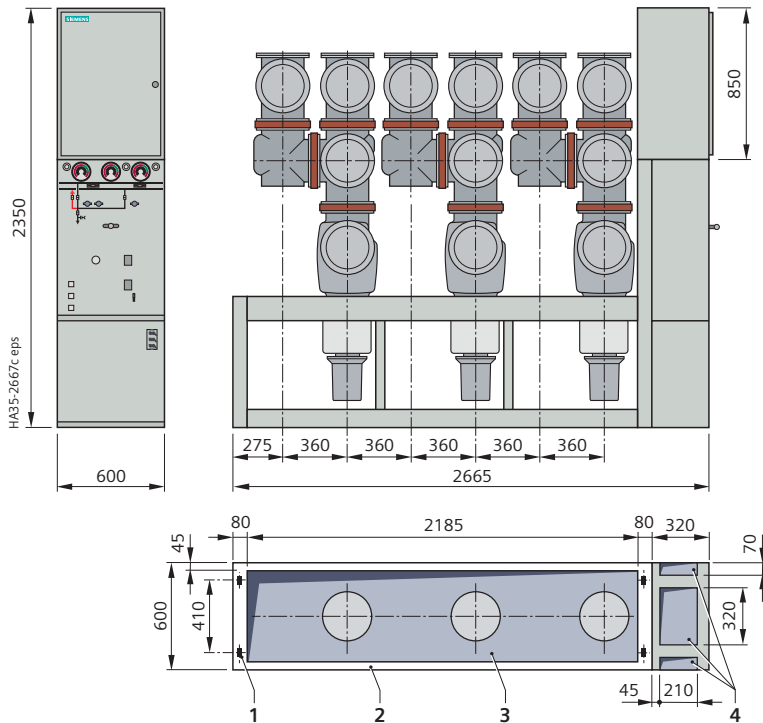
Legend and footnotes:

- 1 Fixing hole for 26 mm × 45 mm
- 2 Base frame
- 3 Floor opening for high-voltage cables
- 4 Area for floor openings for control cables

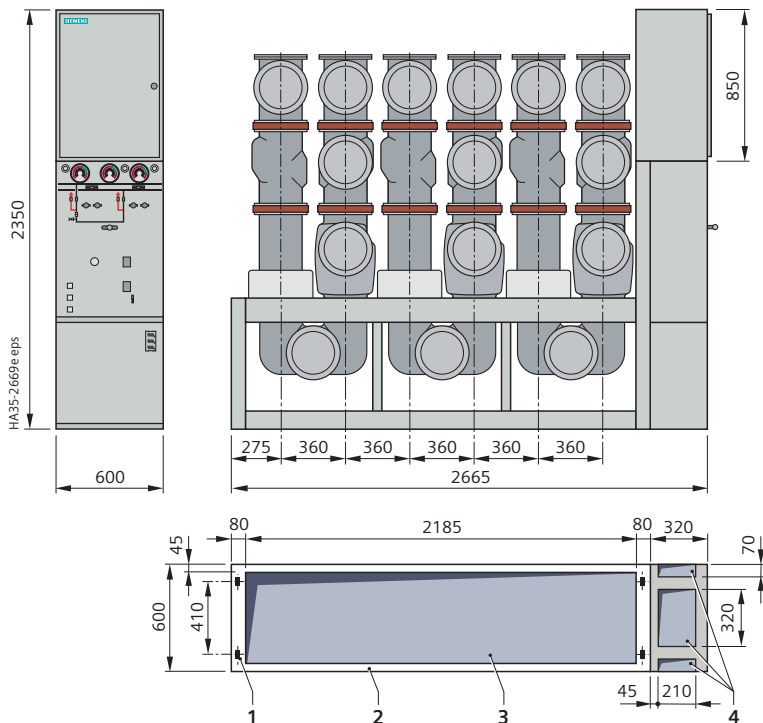
Dimensions

Typicals, double-busbar switchgear (examples)

Circuit-breaker panel up to 3150 A



Bus coupler up to 3150 A



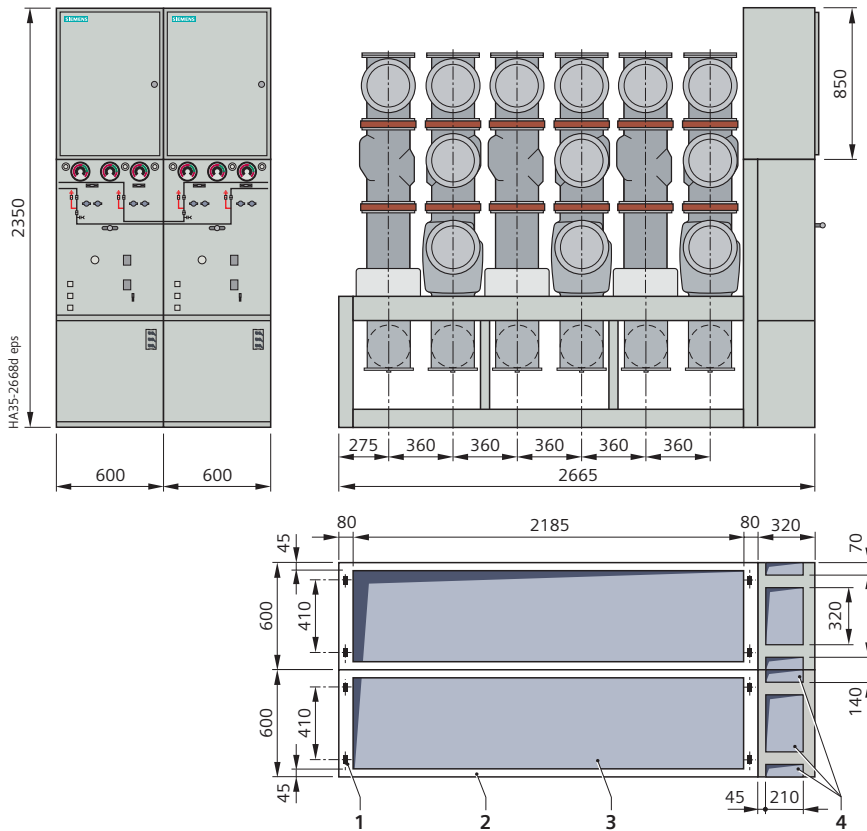
Legend and footnotes:

- 1 Fixing hole for
26 mm × 45 mm
- 2 Base frame
- 3 Floor opening for
high-voltage cables
- 4 Area for floor openings for control cables

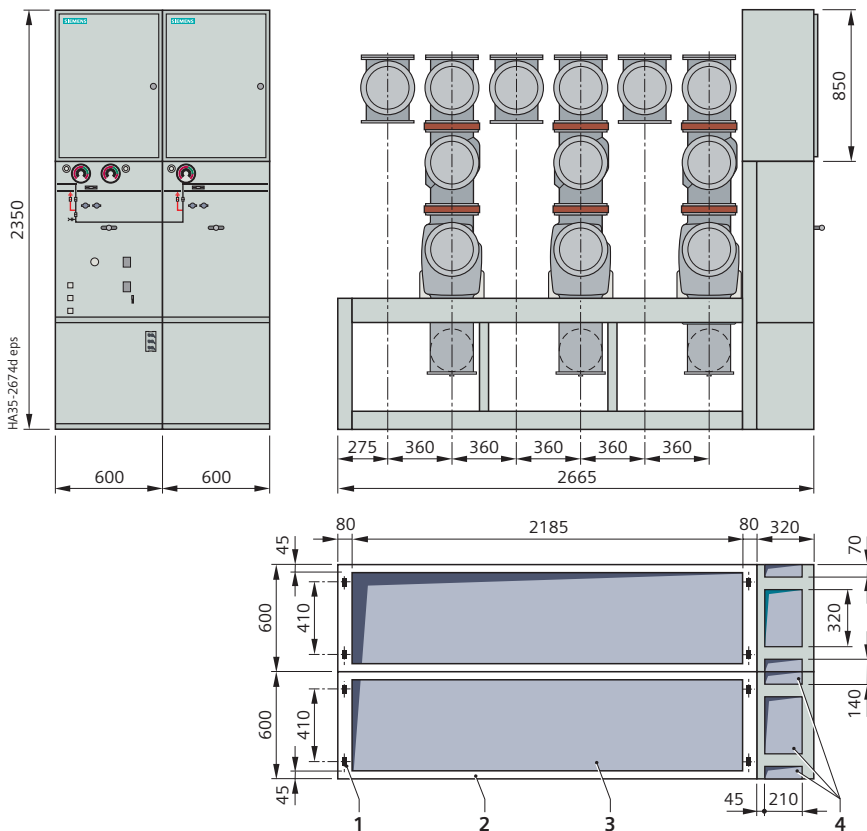
Dimensions

Typicals, double-busbar switchgear (examples)

Bus sectionalizer up to 3150 A (busbar system 1 and 2)



Bus sectionalizer up to 3150 A (busbar system 1)



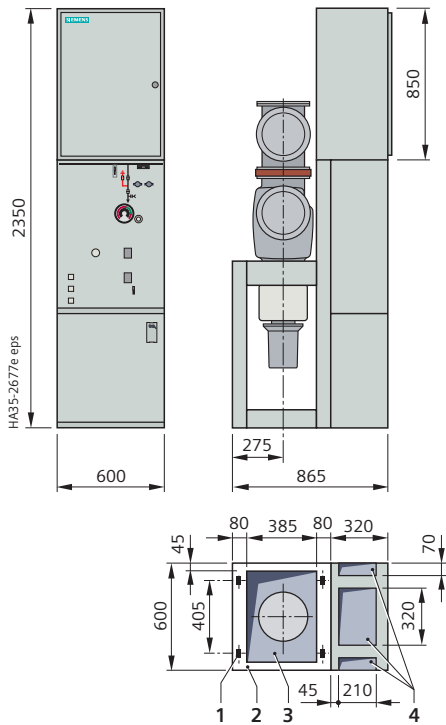
Legend and footnotes:

- 1 Fixing hole for 26 mm × 45 mm
- 2 Base frame
- 3 Floor opening for high-voltage cables
- 4 Area for floor openings for control cables

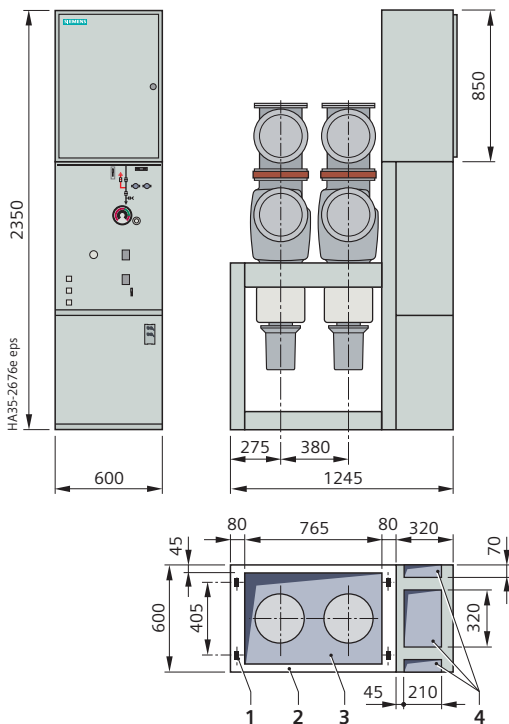
Dimensions

Typicals, traction power supply switchgear (examples)

Single-pole circuit-breaker panel up to 2500 A



Double-pole circuit-breaker panel up to 2500 A



Legend and footnotes:

- 1 Fixing hole for 26 mm x 45 mm
- 2 Base frame
- 3 Floor opening for high-voltage cables
- 4 Area for floor openings for control cables

Design

Panel design, single-busbar switchgear (example)

Panel design

- Factory-assembled, type-tested
- Single-pole metal enclosure
- Hermetically bolted switchgear housings made of corrosion-resistant aluminum alloy
- Switchpanel poles arranged one behind the other
- Maintenance-free under normal operating conditions according to IEC 62271-1
- Degree of protection
 - IP65 for all high-voltage parts of the primary circuit
 - IP3XD for the switchgear enclosure ¹⁾
- Vacuum circuit-breaker
- Three-position disconnector for disconnecting and earthing
- Make-proof earthing by means of the vacuum circuit-breaker
- Cable connection with inside-cone plug-in system according to EN 50181
- Wall-standing or free-standing arrangement
- Instrument transformers located outside the gas compartments
- Low-voltage compartment removable, plug-in bus wires
- Standardized production processes and certified quality and environmental management system according to ISO 9001, ISO 14001 and BS OHSAS 18001.

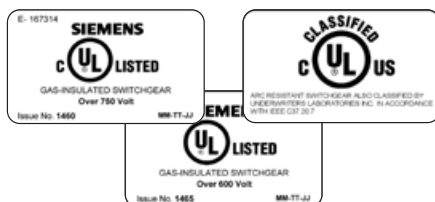
ANSI design:

Camera system

- Camera system for visual monitoring of the switch positions of the disconnectors and earthing switches.

UL certification

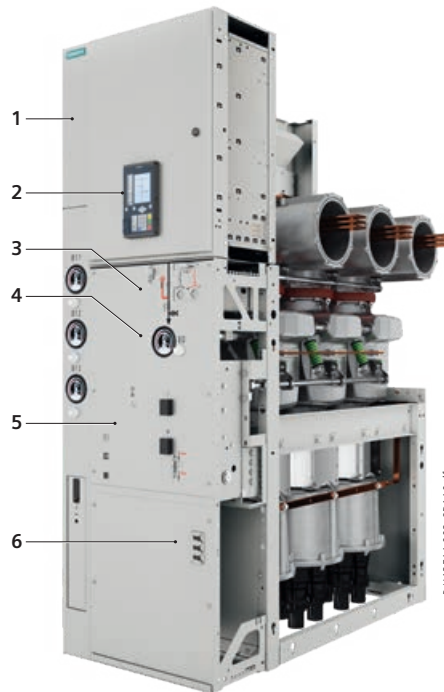
- For 8DA/B ANSI design options there is a UL or cUL certificate available.



1) Other switchgear enclosure versions on request

* Item designation

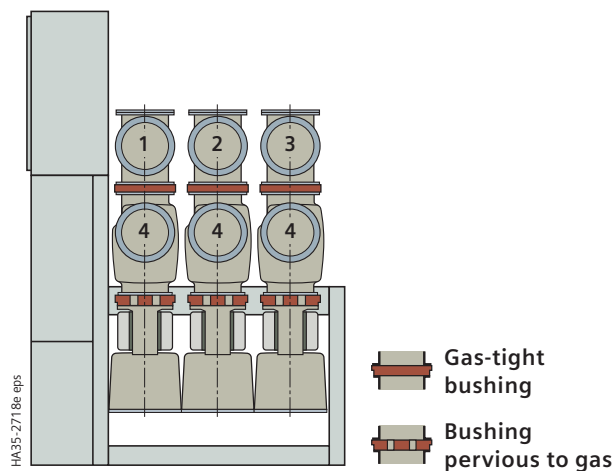
Panel design (example)



Panel for single-busbar switchgear

- 1 Low-voltage compartment
- 2 Electronic control board, e.g. multifunction protection
- 3 Operating mechanism and interlock for three-position disconnector, as well as mechanical position indicators for three-position disconnector and circuit-breaker
- 4 Manometer for gas monitoring of feeder gas compartments
- 5 Circuit-breaker operating mechanism
- 6 Voltage detecting system

Arrangement of gas compartments



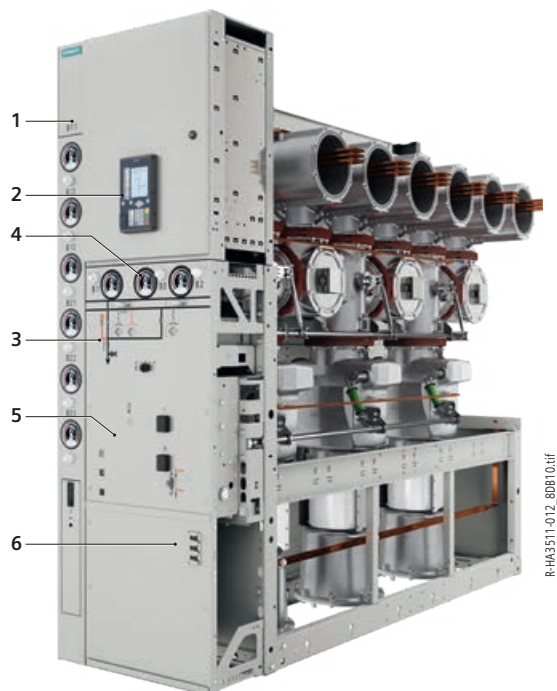
Single-busbar panel

- 1 Busbar L1 (manometer B11 *)
- 2 Busbar L2 (manometer B12 *)
- 3 Busbar L3 (manometer B13 *)
- 4 Circuit-breaker L1, L2, L3 (manometer B0 *)

Design

Panel design, double-busbar switchgear (example)

Panel design (example)

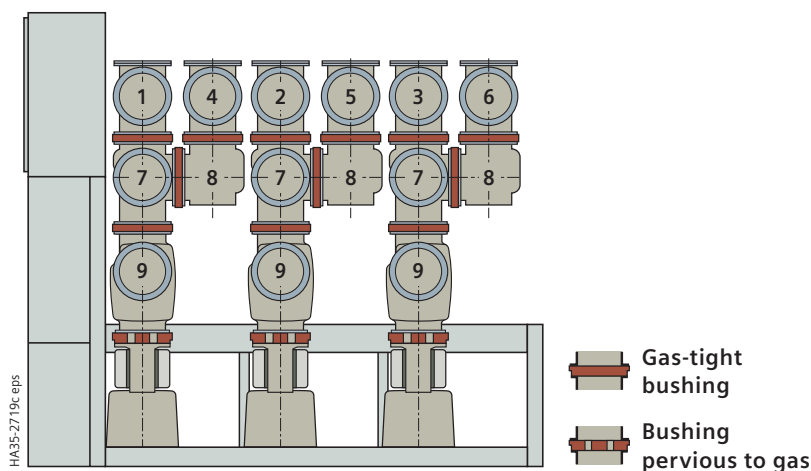


Panel for double-busbar switchgear

Insulating system

- Switchgear housing filled with gas
- Insulating gases according to IEC 62271-4:
 - Insulating gas SF₆ up to 40.5 kV, GWP (Global Warming Potential) 22,800
 - Alternatively: Insulating gas Clean Air up to 12 kV (natural elements of the ambient air)
- Pressure of the gases in the switchgear housing dependent on the electrical ratings (relative pressure at 20 °C):
 - Rated functional level (relative): 70 kPa to 140 kPa
 - Operating pressure of bursting disc: ≥ 300 kPa
 - Bursting pressure: ≥ 600 kPa
 - Gas leakage rate: < 0.1 % per year.

Arrangement of gas compartments



Double-busbar panel

Gas compartment scheme

- Sealed pressure system (according to IEC 62271-1)
- No refilling required throughout the entire service life
- Gas compartments distributed to several areas
- Simple, visual check of the gas pressure on the switchgear front
- Indication of the gas pressure without auxiliary voltage supply
- Gas filling equipment with non-return valve arranged at the switchgear front beside the associated gas pressure manometer.

Legend for 8DB10:

- | | |
|---|---|
| 1 Busbar system 1, L1 (manometer B11 *) | 7 Three-position disconnecter, busbar system 1, L1, L2, L3 (manometer B1 *) |
| 2 Busbar system 1, L2 (manometer B12 *) | 8 Disconnecter, busbar system 2, L1, L2, L3 (manometer B2 *) |
| 3 Busbar system 1, L3 (manometer B13 *) | 9 Circuit-breaker L1, L2, L3 (manometer B0 *) |
| 4 Busbar system 2, L1 (manometer B21 *) | |
| 5 Busbar system 2, L2 (manometer B22 *) | |
| 6 Busbar system 2, L3 (manometer B23 *) | |

* Item designation

Components

Vacuum circuit-breaker

Features

- Vacuum circuit-breaker according to IEC 62271-100
- Application in hermetically bolted switchgear housings in conformity with the system
- Vacuum interrupter in gas-filled switchgear housing
- Individual secondary equipment
- A metal bellows is used for gasketless separation between the gas insulation and the vacuum.

Trip-free mechanism

The vacuum circuit-breaker is fitted with a trip-free mechanism according to IEC 62271-100.

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

- Operating mechanism located outside the switchgear enclosure
- Installation behind the control board
- Stored-energy spring mechanism for 10,000 operating cycles
- Optional: Stored-energy spring mechanism for 30,000 operating cycles.

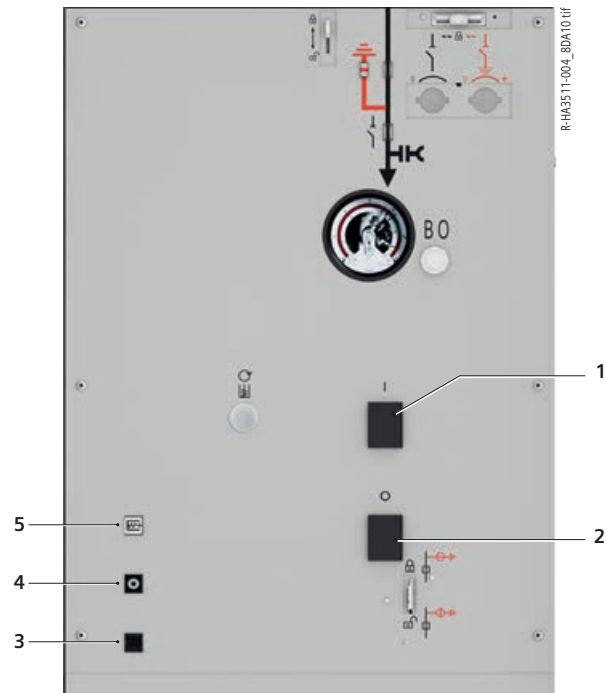
Operating mechanism functions

Motor operating mechanism

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 8DA/B
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	< 95 ms
Opening time	1 st shunt release	< 75 ms
	2 nd shunt release	< 65 ms
	Undervoltage release	< 65 ms
Arcing time	at 50 Hz	< 15 ms
	at 60 Hz	< 12 ms
Break time	at 50 Hz	1 st shunt release < 90 ms
		2 nd shunt release < 80 ms
		Undervoltage release < 80 ms
Dead time		300 ms
Total charging time		< 15 s



Circuit-breaker operating mechanism 3AH49 for single-busbar switchgear, double-busbar switchgear and traction power supply switchgear

- 1 ON pushbutton
- 2 OFF pushbutton
- 3 Operations counter
- 4 Position indicator for circuit-breaker
- 5 "Closing spring charged" indicator at the operating mechanism

For further technical data and description of typical applications, please refer also to Catalog HG 11.04 "3AH4 Vacuum Circuit-Breakers"

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 releases

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

Anti-pumping

- 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: Up to 22 NO + 22 NC.

Position switch

- Type 3SE4 (S4*)
- For signaling "closing spring charged".

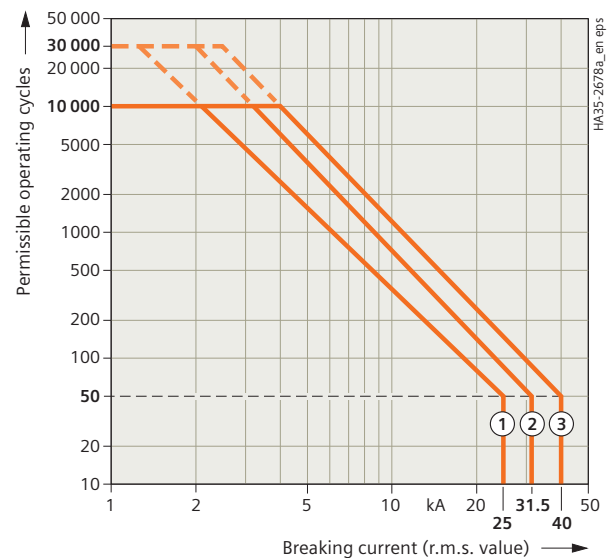
Mechanical interlock

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

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

* Item designation

Operating cycle diagram



Examples

Electrical data (curve 1)

Rated short-circuit breaking current 25 kA
Rated normal current 1250 A

Electrical data (curve 2)

Rated short-circuit breaking current 31.5 kA
Rated normal current 2000 A

Electrical data (curve 3)

Rated short-circuit breaking current 40 kA
Rated normal current 2500 A

Rated operating sequences

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

O = OPEN operation

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

Possible release combinations					
Release	1	2	3	4	5
1 st shunt release type 3AY15 10	•	•	•	•	•
2 nd shunt release type 3AX11 01	–	•	•	–	•
3 rd shunt release type Typ 3AX11 01	–	–	•	–	–
Undervoltage release type 3AX11 03	–	–	–	•	•

Components

Three-position disconnector

Features

- Rated normal currents up to 3150 A
- 2000 operating cycles for the disconnector *
- 1000 operating cycles for the earthing switch *
- Operating shaft and contact blades with common center of rotation and reliable switch position up to the operating front of the panel
- Gas-tight bushings separate the busbar and circuit-breaker housings
- Maintenance-free under normal operating conditions according to IEC 62271-1.

Switch positions

- CLOSED, OPEN, EARTHED or READY-TO-EARTH
- CLOSED: Contact blades connected with the busbar: Main circuit closed between busbar and circuit-breaker
- OPEN: Main circuit open between busbar and circuit-breaker: Test voltages for isolating distances are withstood
- READY-TO-EARTH: Contact blades connected with the earthing contact
- EARTHED: Feeder earthed and short-circuited by closing the circuit-breaker.

Operating mechanism

- Only permissible operations possible due to logical mechanical interlocks
- Mechanically coupled position indicator
- Separate operating shafts for the "DISCONNECTING", "EARTHING" and "READY-TO-EARTH" functions
- With manual operating mechanism
- Option: With motor operating mechanism
- Same sense of rotation for the switching operations of the "CLOSE" or "OPEN" functions.

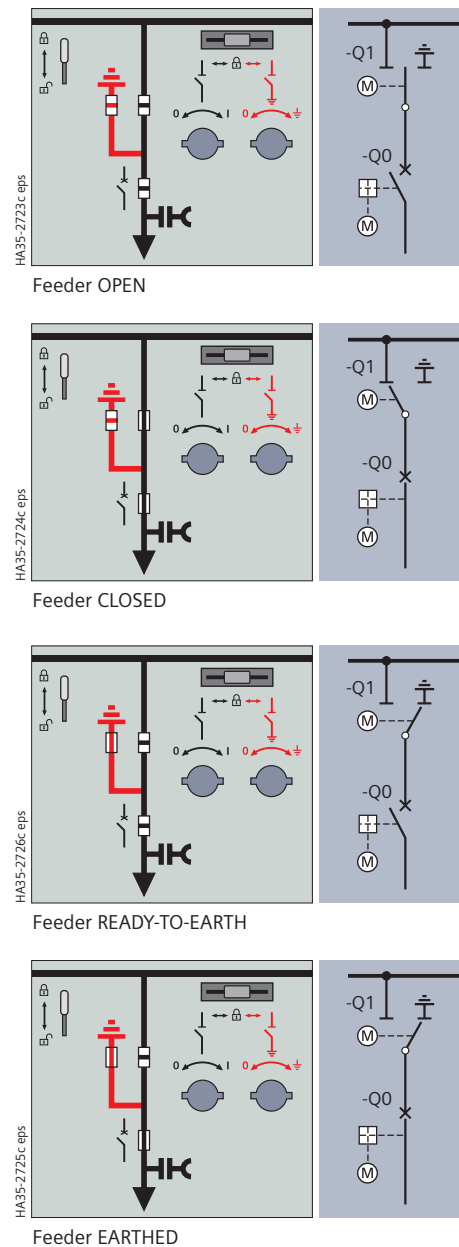
Endurance class of three-position disconnector			
Function	Class	Standard	Property of 8DA/B
DISCONNECTING	M1	IEC 62271-102	2000 times mechanically without maintenance
READY-TO-EARTH			1000 times mechanically without maintenance
EARTHING	E2 ¹⁾	IEC 62271-102	50 times rated short-circuit making current I_{ma} without maintenance

Endurance class of make-proof earthing switch			
Function	Class	Standard	Property of 8DA/B
EARTHING	E1	IEC 62271-102	1000 times mechanically without maintenance 2 times rated short-circuit making current I_{ma} without maintenance

1) By closing the circuit-breaker

* Higher operating cycles on request

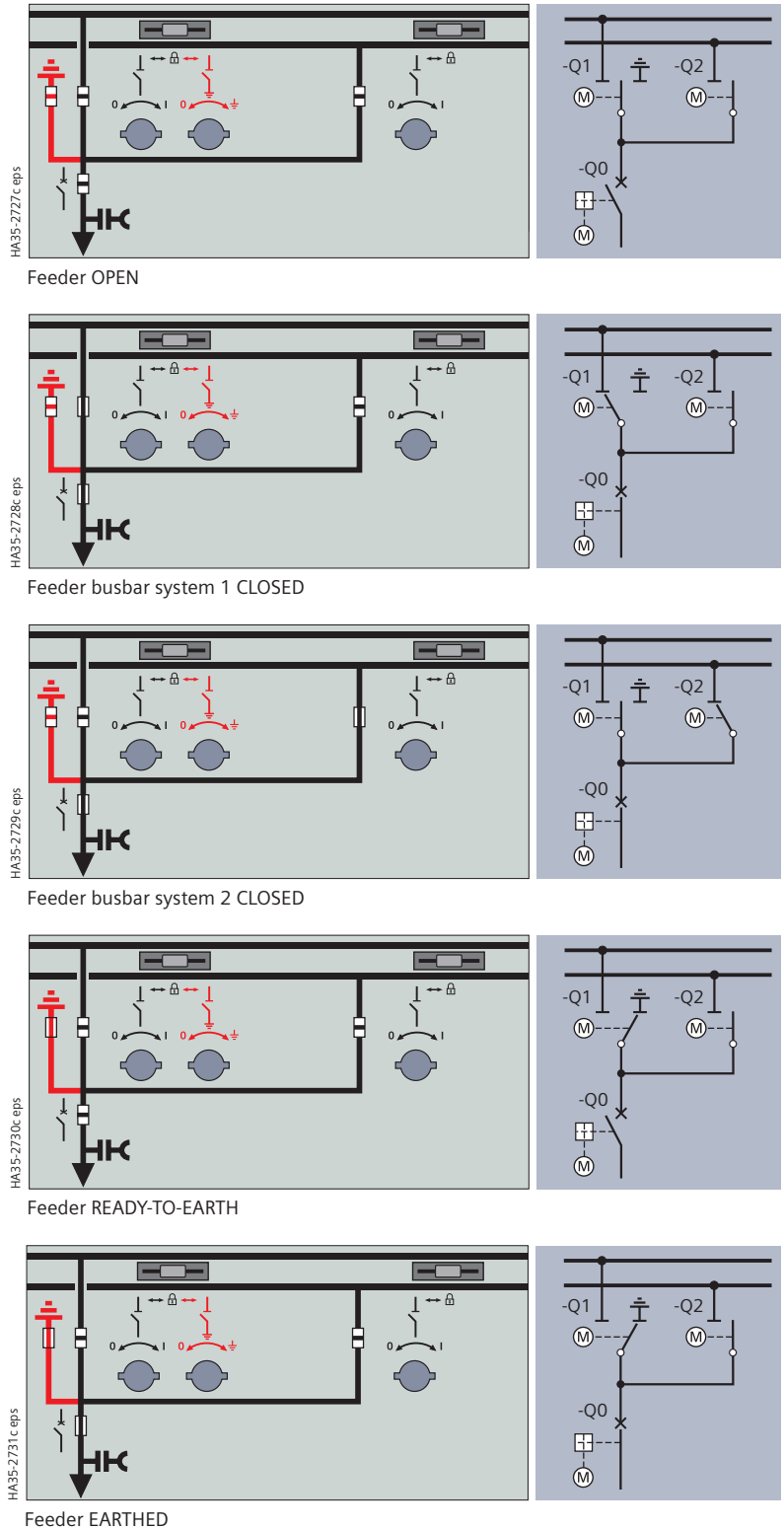
Position indicators, single-busbar switchgear for three-position disconnector and vacuum circuit-breaker



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 the control gate is in neutral position again
- Option: Switchgear interlocking system with electromechanical interlocks (mechanical interlocking for manual operation remains).

Position indicators, double-busbar switchgear for three-position disconnector and vacuum circuit-breaker



Components

Current transformers

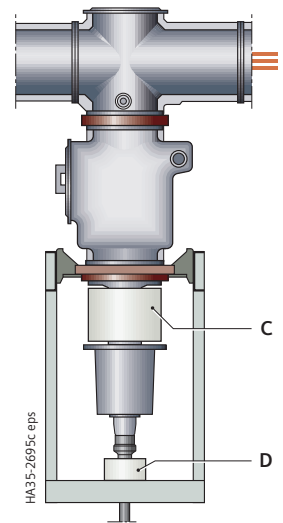
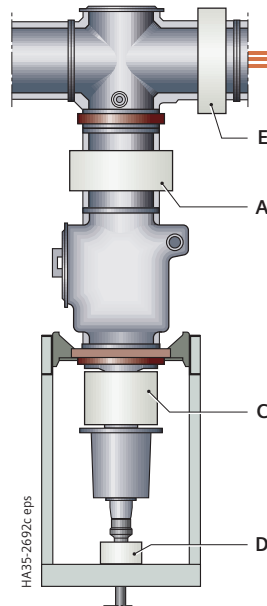
Features

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

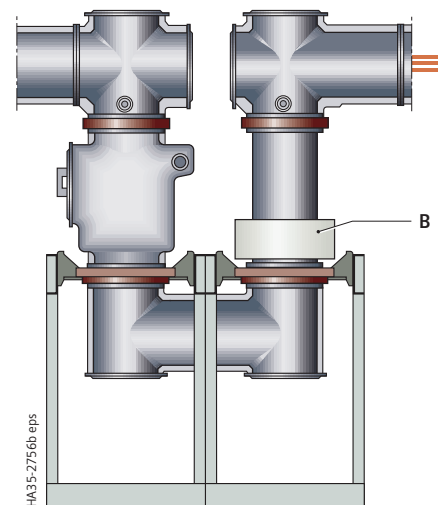
Installation

- Arranged outside the primary enclosure (switchgear housing).

Current transformers



- B** Current transformer in bus sectionalizer and bus coupler (type 4MC4_40)
- C** Feeder current transformer (type 4MC4_90)
- D** Feeder current transformer (type 4MC4_10)
- E** Busbar current transformer (type 4MC4_40)
- Option:
- A** Feeder current transformer between circuit-breaker and three-position disconnecter at the busbar (type 4MC4_90)



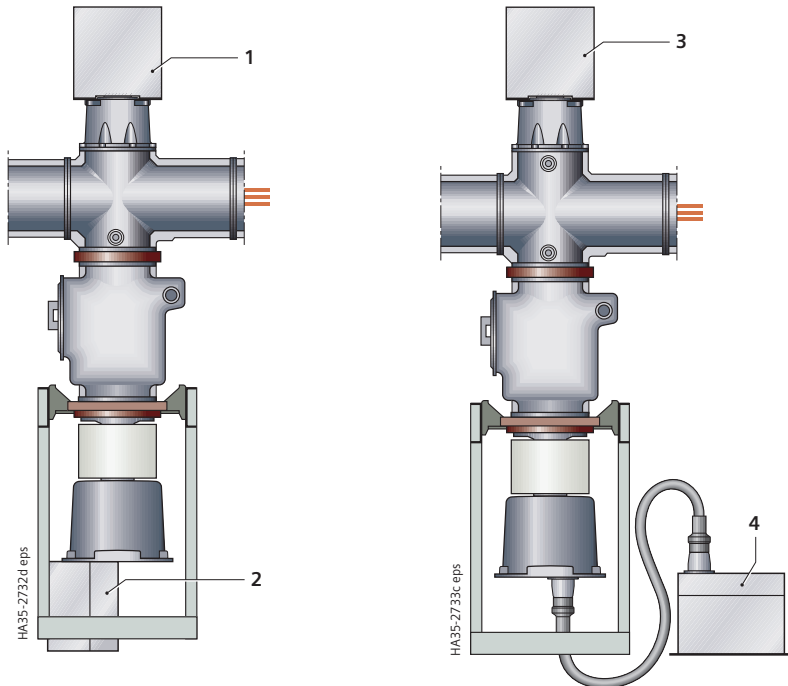
Current transformer installation (examples)

Electrical data*		
Designation	Type 4MC4	
Operating voltage	max. 0.8 kV	
Rated short-duration power-frequency withstand voltage (winding test)	3 kV	
Rated frequency	50/60 Hz	
Rated continuous thermal current	max. 1.2 × rated current (primary)	
Rated thermal short-time current, max. 3 s	max. 40 kA	
Rated current	dynamic	unlimited
	primary	40 A to 3150 A
	secondary	1 A and 5 A

Electrical data		
Designation	Type 4MC4	
Multiratio (secondary)	200 A – 100 A up to 3150 A – 1575 A	
Core data according to rated primary current	max. 3 cores	
Measuring core	Rating	2.5 VA to 30 VA
	Class	0.2 to 1
	Overcurrent factor	FS 5, FS 10
Protection core	Rating	2.5 VA to 30 VA
	Class	5 P or 10 P
	Overcurrent factor	10 to 30
Permissible ambient air temperature	max. 60 °C	
Insulation class	E	

* Further electrical data on request

Voltage transformers



Voltage transformer installation (examples)

- 1 Busbar voltage transformer 4MU4 / 4MT3
- 2 Feeder voltage transformer 4MT3 / 4MT7 (connection at panel connection housing); voltage transformer feasible with / without primary fuses; feeder voltage transformer with disconnecting function (option)
- 3 Busbar voltage transformer 4MU4 with three-position disconnector (option)
- 4 Feeder voltage transformer 4MU3 (not in the panel, connection via flexible cable with plug size S2 at the panel connection housing, and metal-enclosed voltage transformer)

Electrical data (maximum values)					
Designation		4MT3	4MU4	4MT7	4MU3
Rated voltage	kV	24.0	40.5	40.5	40.5
Rated short-duration power-frequency withstand voltage	kV	65	95	95	95
Rated lightning impulse withstand voltage	kV	125	200	200	200
Rated voltage factor		$U_n/8h = 1.9$ $U_n/\text{continuous} = 1.2$	$U_n/8h = 1.9$ $U_n/\text{continuous} = 1.2$	$U_n/8h = 1.9$ $U_n/\text{continuous} = 1.2$	$U_n/8h = 1.9$ $U_n/\text{continuous} = 1.2$
Standard		IEC GOST GB	IEC GOST GB	IEC GOST GB	IEC GOST GB

Features

- According to IEC 61869-3
- Single-pole, plug-in design
- Connection system with plug-in contact according to EN 50181
- Inductive type
- Safe-to-touch due to metal enclosure
- Certifiable
- Climate-independent
- Secondary connection by means of plugs in the low-voltage compartment of the panel
- Cast-resin insulated.

Installation

- Arranged outside the primary enclosure (switchgear housing).

Mounting locations

- On the busbar
- At the panel connection housing.

Voltage transformer types

Busbar voltage transformers 4MT3 and 4MU4

- Pluggable on the busbar with plug-in system according to EN 50181
- No separate metering panel required
- Option: Three-position disconnector for busbar voltage transformer CLOSED – OPEN – EARTHED
- Option 4MU4: Repeat test at 80% of the rated short-duration power-frequency withstand voltage possible with mounted voltage transformer.

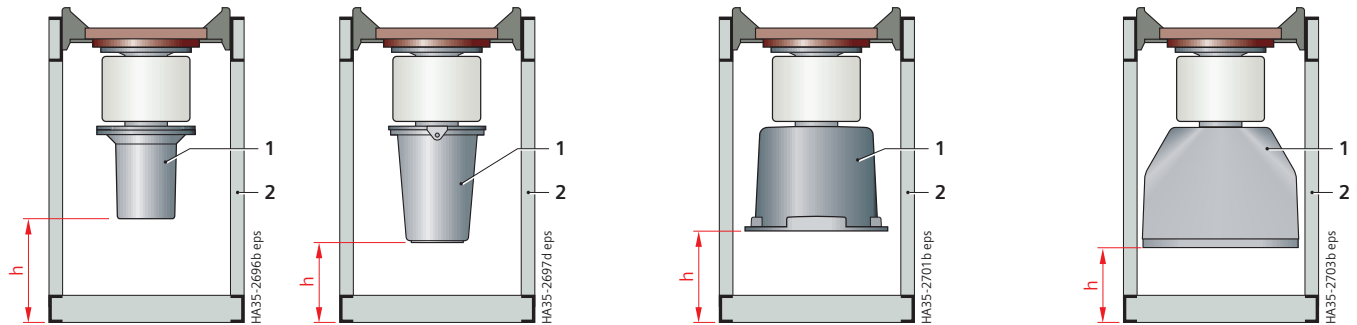
Feeder voltage transformers 4MT3/4MT7 and 4MU3

- Pluggable at the feeder with plug-in system according to EN 50181
- Connection of 4MT3/4MT7 directly at the panel connection housing
- Connection of 4MU3 via flexible cable with plug size S2 at the panel connection housing, and metal-enclosed voltage transformer.

Components

Panel connection

Panel connection for cable plugs and bar systems



Version 1		Version 2		Version 3				Version 4		
S2		S3		S2	S3	4MT7, 4MT3	Solid-insulated bar connection up to 2500 A	S2	S3	Solid-insulated bar connection up to 3150 A
1		1		1	1			4		
				2				5		
				3				6		
					2			-	4	
				1	3			1	3	
				2	2			1	4	
				2	1			2	2	
				1		1		2	3	
				2		1		3	1	
					1	1		3	2	
					2	1		4	1	
				1	1	1		1		1
						1	1	2		1
				1			1		1	1
									2	1
								1	1	1
										1

Panel connection height [mm]					
Single-busbar switchgear, traction power supply switchgear/double busbar switchgear (versions with higher subframe)					
320 / 120 (540)	240 / 40 (460)	275 / 75 (495)	240.5 / 40.5 (460.5)	222 / 22 (442)	219 / 19 (439)

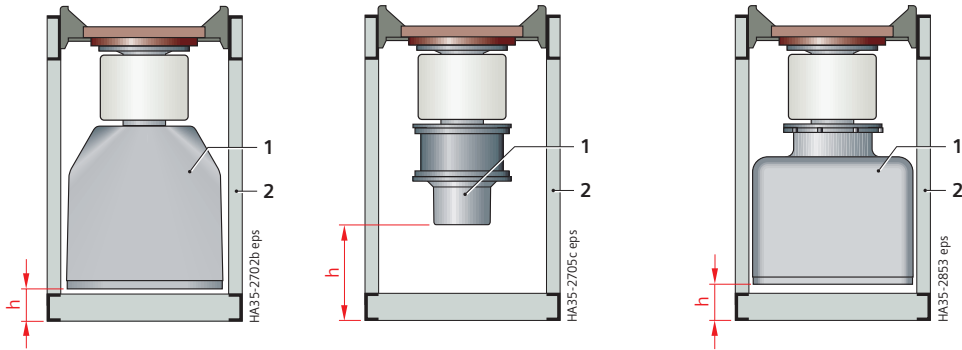
Legend:

- 1 Panel connection housing
- 2 Subframe
- h Connection height of panel connection versions

Features

- Inside-cone plug-in system for plug sizes 2, 3 and 4 according to EN 50181
- Connection of several cables with different plug sizes possible per phase
- Connection of solid-insulated or gas-insulated bar possible
- Connection of 4MT3/4MT7 voltage transformer plugged in at the panel connection housing versions 3 and 7
- Connection of 4MU3 voltage transformer via plug size 2 at the panel connection housing
- For rated normal currents up to 3150 A.

Panel connection for cable plugs and bar systems



Version 5			Version 6	Version 7			
S2	S3	S4	Solid-insulated bar connection up to 2500 A	S2	S3	4MT7, 4MU3, switchable	Test socket, switchable
		1	1	1		1	
1		1		2		1	
2		1			1	1	
	1	1			2	1	
1	1	1		1	1	1	
		2		3		1	
	2	1		4		1	
					3	1	
				2	1	1	
				1	2	1	
				2	2	1	
				1	3	1	
				1		1	1
					1	1	1
				1		1	1
				2		1	1
				3		1	1
					1	1	1
					2	1	1
				1	1	1	1
				1	2	1	1

Panel connection height [mm] Single-busbar switchgear, traction power supply switchgear/double busbar switchgear (versions with higher subframe)		
92 / -108 (312)	294 / 94 (514)	105 / - (325)

Surge arresters

- Pluggable via inside-cone plug-in system size 2 or 3 according to EN 50181

Components

Panel connection (commercially available cable plugs and bar connections)

Busbar and panel connection (commercially available cable plugs)

Cable type	Cable sealing end					Remark
	Make	Type	Size	Diameter across cable insulation mm	Conductor cross-section mm ²	
Thermoplastic-insulated cables ≤ 12 kV according to IEC 60502-2						
Single-core cable or three-core cable, PE and XLPE-insulated, N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	NKT	CPI 2	2	12.7–44.0	25–300 (Al/CU); 400 (Al RM)	Insulation material silicone rubber, without metal housing, installation without special tools
		CPI 3	3	21.2–51.0	185–630* (Al/CU); 800 (Al RE)	
		CPI 3 XL	3	34.0–57.8	800 (Al/CU); 1000 (Al RE)	
	Pffisterer	CONNEX	2	13.5–44.0	25–400	Insulation material silicone rubber, with metal housing
		CONNEX	3	15.5–55.0	35–800	
		CONNEX	4	33.0–78.5	95–1600	
	Südkabel	SEIK 14	2	13.0–40.6	25–300	Insulation material silicone rubber, with metal housing
		SEIK 15	3	19.3–50.6	120–630	
	Tyco Electronics	RPIT-321x	2	19.5–36.0	95–300	Insulation material silicone rubber, with metal housing
		RPIT-331x	3	26.0–50.0	240–630	
Thermoplastic-insulated cables ≤ 24 kV according to IEC 60502-2						
Single-core cable or three-core cable, PE and XLPE-insulated, N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	NKT	CPI 2	2	17.0–40.0	25–300 (Al/CU); 400 (Al RM)	Insulation material silicone rubber, without metal housing, installation without special tools
		CPI 3	3	21.2–45.6	95–630* (Al/CU); 800 (Al RE)	
		CPI 3 XL	3	34.0–57.8	400–800 (Al/CU); 1000 (Al RE)	
	Pffisterer	CONNEX	2	13.5–44.0	25–400	Insulation material silicone rubber, with metal housing
		CONNEX	3	15.5–55.0	35–800	
		CONNEX	4	33.0–78.5	95–1600	
	Südkabel	SEIK 24	2	13.0–40.6	25–300	Insulation material silicone rubber, with metal housing
		SEIK 25	3	19.3–50.6	50–630	
	Tyco Electronics	RPIT-521x	2	19.5–36.0	50–300	Insulation material silicone rubber, with metal housing
		RPIT-531x	3	26.0–50.0	150–630	
Thermoplastic-insulated cables ≤ 40.5 kV according to IEC 60502-2						
Single-core cable or three-core cable, PE and XLPE-insulated, N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	NKT	CPI 2	2	17.0–40.0	25–300 (Al/CU); 400 (Al RM)	Insulation material silicone rubber, without metal housing, installation without special tools
		CPI 3	3	21.2–51.0	50–630* (Al/CU); 800 (Al RE)	
		CPI 3 XL	3	34.0–57.8	400–800 (Al/CU); 1000 (Al RE)	
	Pffisterer	CONNEX	2	13.5–44.0	25–400	Insulation material silicone rubber, with metal housing
		CONNEX	3	15.5–55.0	35–800	
		CONNEX	4	33.0–78.5	95–1600	
	Südkabel	SEIK 34	2	13.0–40.6	35–300	Insulation material silicone rubber, with metal housing
		SEIK 35	3	19.3–50.6	50–630	
	Tyco Electronics	RPIT-621x	2	19.5–36.0	50–185	Insulation material silicone rubber, with metal housing
		RPIT-631x	3	26.0–50.0	95–630	

* Additional metal housing available

Busbar and panel connection (commercially available bar systems)

Bar type	Bar connection				Remark
	Make	Type	Conductor material	Max. rated current ¹⁾	
Solid-insulated bar	Ritz	SIS	Copper, aluminum	3150 A	Outer sheath made of epoxy resin (with heat shrinkable tube, if required)
	MGC Moser Glaser	Duresca DE	Copper, aluminum	2500 A	Outer sheath made of polyamide (polyamide tube)
		Duresca DG	Copper, aluminum	2500 A	Outer sheath made of CrNi steel or aluminum (metal sheath)
	Tefelen Preissinger	ISOBUS MR	Copper, aluminum	2500 A	Outer sheath made of epoxy resin (with heat shrinkable tube, if required)
Gas-insulated bar	MGC Moser Glaser	Gaslink	Copper	2500 A	Aluminum housing
	Tefelen Preissinger	ISOBUS MG	Copper	2500 A	Aluminum housing

Busbar and panel connection (commercially available dummy plugs)

Accessories	Dummy plug				Remark
	Make	Type	Size	Rated voltage	
Inside-cone plug-in system according to EN 50181	NKT	FPI 2	2	40.5 kV	Insulation material silicone rubber, with metal housing
		FPI 3	3	40.5 kV	
	Pfisterer Blindstecker		2	40.5 kV	Insulation material silicone rubber, with metal housing
			3	40.5 kV	
			4	40.5 kV	
	Südkabel	ISIK 14/24/34	2	12 / 24 / 40.5 kV	Insulation material silicone rubber, with metal housing
		ISIK 15/25/35	3	12 / 24 / 40.5 kV	
	Tyco Electronics	RPIC-2	2	40.5 kV	Insulation material silicone rubber, with metal housing
RPIC-3		3	40.5 kV		

1) Higher values on request

Standards

Standards, specifications, guidelines

Type of service location

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

- 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.

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.
- The rated values are referred to sea level and to normal atmospheric conditions (1013 hPa, 20 °C, 11g/m³ humidity according to IEC 60071).

The gas insulation permits switchgear installation at any desired altitude above sea level without the dielectric strength being adversely affected.

Standards

8DA/B 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.

Standards			
	IEC standard	Title	
Switchgear	62271-1	High-voltage switchgear and controlgear: Common specifications for alternating current switchgear and controlgear	
	62271-200	High-voltage switchgear and controlgear: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV	
Switching devices	Circuit-breakers	62271-100	High-voltage switchgear and controlgear: Alternating-current circuit-breakers
		Disconnectors and earthing switches	62271-102
Voltage detecting systems		62271-213	Voltage detecting systems (VDS), voltage indicating systems (VPIS)
		62271-215	Universal phase comparators
Surge arresters		60099	Surge arresters
Degree of protection		60529	Degrees of protection provided by enclosures (IP code)
		62262	Degrees of protection provided by enclosures (IK code)
Insulation		60071	Insulation co-ordination
Instrument transformers		61869-1	Instrument transformers
		61869-2	Current transformers
		61869-3	Voltage transformers
SF ₆		62271-4	Use and handling of SF ₆
		60376	Specification of technical grade sulphur hexafluoride (SF ₆) and complementary gases for use in electrical equipment
		60480	Specifications for the re-use of sulphur hexafluoride (SF ₆) and its mixtures in electrical equipment
Installation		61936-1	Power installations exceeding 1 kV a.c.
Environmental conditions		60721-3-3	Classification of environmental conditions
Operation		EN 50110	Operation of electrical installations

Current carrying capacity

- According to IEC 62271-200 or IEC 62271-1, 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 and IEEE Std C37.20.7™-2007
- Definition of criteria according to IEC:
 - 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 and the gas insulation of the switchgear and the switching devices, the possibility of faults in 8DA/B switchgear is a mere fraction of that typical of other 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 gas insulation and the shorter length of the arc, approximately only $\frac{1}{3}$ of the converted energy of an arc in air insulation.

Resistance to short circuits and earth faults

Two-phase and three-phase short circuits between the primary conductors are excluded by the single-pole primary enclosure.

Seismic withstand capability (optional)

8DA/B switchgear can be upgraded for regions at risk from earthquakes.

Detailed information on earthquake qualification and testing on request.

Color of the panel front

RAL 7035 Light grey.

Climate and environmental influences

8DA/B switchgear is completely enclosed and insensitive to climatic influences.

- All medium-voltage devices are installed in gas-tight and bolted switchgear housings made of corrosion-resistant aluminum alloy and filled with insulating gas
- Live parts are provided with single-pole enclosure
- 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.

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).

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**Medium-
Voltage
Switchgear**



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