Catalog
HA 40.3 · 2022

MEDIUM-VOLTAGE SWITCHGEAR

Switchgear Type 8DJH 36 for Secondary Distribution Systems up to 36 kV, Gas-Insulated

siemens.com/8DJH36

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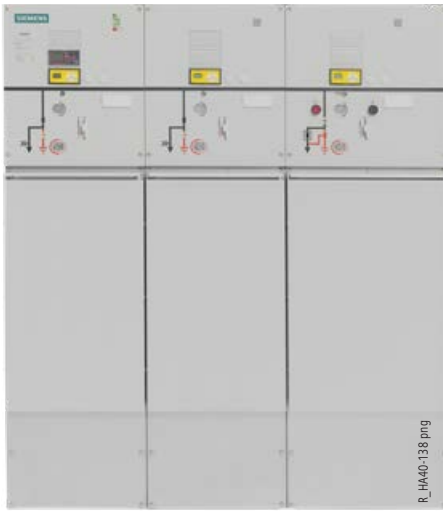
Application

Typical uses



Application in public and industrial energy systems

MEDIUM-VOLTAGE SWITCHGEAR

Switchgear Type 8DJH 36

for Secondary Distribution Systems up to 36 kV, Gas-Insulated

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siemens.com/medium-voltage-switchgear

Contents

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

R-HA40-160.jpg

Ring-main panel and circuit-breaker panel as individual panels

R-HA40-138.png

RRT block

Application

Typical uses, ratings, standards

8DJH 36 switchgear is a factory-assembled, type-tested, 3-pole metal-enclosed single-busbar switchgear for indoor installation.

8DJH 36 switchgear is used in public and industrial energy systems of the secondary distribution level, e.g. in

- Local ring-main units, customer transfer substations and switching substations of power supply and public utilities
- Wind power plants and solar plants, hydroelectric power plants
- Water and treatment plants
- Airports, train stations, underground stations
- High-rise buildings
- Data centers.

Electrical data (maximum values) and dimensions		
Rated voltage	kV	36
Rated frequency	Hz	50/60
Rated short-duration power-frequency withstand voltage	kV	70
Rated lightning impulse withstand voltage	kV	170
Rated peak withstand current	kA	63/65
Rated short-circuit making current	kA	63/65
Rated short-time withstand current 3 s	kA	25
Rated normal current of the busbar	A	630
Rated normal current of the feeders	A	200/630
Width		
– Ring-main feeder	mm	430
– Transformer feeder	mm	500
– Circuit-breaker feeder	mm	590
– Metering panel	mm	1100
Depth		
– Without pressure relief duct	mm	920 [1]
– With pressure relief duct	mm	1035 [1]
Height		
– Standard	mm	1600
– With low-voltage compartment	mm	1800/2000/2200

Standards		
		IEC standard/ EN standard
Switchgear		62271-1
		62271-200
Devices	Circuit-breakers	62271-100
	Disconnectors and earthing switches	62271-102
	Switch-disconnectors	62271-103
	Switch-disconnector/ fuse combination	62271-105
Voltage detecting systems		62271-213
HV HRC fuses		60282
Surge arresters/surge limiters		60099
Degree of protection		60529
		62262
Insulation		60071
Instrument transformers	General requirements	61869-1
	Current transformers	61869-2
	Inductive voltage transformers	61869-3
	Low-power current transformers	61869-6 61869-10
	Low-power voltage transformer	61869-6 61869-11
SF_6		60376
Installation		61936-1/EN 50522
Environmental conditions		60721-3-3
Operation		EN 50110

1) In circuit-breaker feeders with circuit-breakers type 1, the depth in the area of the front operating mechanism of the circuit-breaker is increased by 60 mm. In metering panels, the depth is increased by 60 mm.

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 8DJH 36 switchgear

- Insensitive to certain aggressive ambient conditions, such as:
  - Saline air
  - Humidity
  - Dust
  - Condensation
- Tight to ingress of foreign objects, such as:
  - Dust
  - Pollution
  - Small animals
  - Humidity
- The switchgear meets the requirements of "design class 2" according to IEC/TS 62271-304.

Compact design

Thanks to the use of SF_6 insulation, compact dimensions are possible.

Thus:

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

Maintenance-free design

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

- Maximum supply reliability
- Personnel safety
- Sealed-for-life design according to IEC 62271-200 (sealed pressure system)
- Installation, operation, extension and replacement without SF_6 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 service conditions, the expected service life of gas-insulated switchgear 8DJH 36 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
- For three-position switch-disconnectors and earthing switches, according to the endurance class defined in IEC 62271-103.

Personal safety

- Safe-to-touch and hermetically sealed primary enclosure
- Standard degree of protection IP65 for all high-voltage parts of the primary circuit, at least IP2X for the switchgear enclosure according to IEC 60529
- Cable terminations, busbars and voltage transformers are surrounded by earthed layers in all feeders except for the air-insulated metering panels. All high-voltage parts including the cable terminations, busbars and voltage transformers are metal-enclosed
- Operating mechanisms and auxiliary switches safely accessible outside the primary enclosure (switchgear vessel)
- High resistance to internal arcs by logical mechanical interlocks and tested switchgear enclosure
- Panels tested for resistance to internal faults up to 25 kA
- Capacitive voltage detecting system to verify safe isolation from supply
- Due to the system design, operation is only possible with closed switchgear enclosure
- Logical mechanical interlocks prevent maloperation
- HV HRC fuses and cable sealing ends are only accessible when outgoing feeders are earthed
- Feeder earthing via make-proof earthing switches.

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)
- Operating mechanisms of switching devices accessible outside the primary enclosure (switchgear vessel)
- Metal-enclosed and plug-in inductive voltage transformers mounted outside the SF_6 switchgear vessel
- Current transformers as ring-core current transformers mounted outside the SF_6 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 1,500,000 switchgear panels of Siemens in operation worldwide for many years.

Reliability

- Type and routine-tested
- Standardized and manufactured using numerically controlled machines
- Quality assurance in accordance with DIN EN ISO 9001
- More than 1,500,000 switchgear panels of Siemens in operation worldwide for many years.

General
- Indoor switchgear under normal ambient conditions according to IEC 62271-1
- Three-pole primary enclosure, metal-enclosed
- Welded switchgear vessel, made of stainless steel, with welded-in bushings for electrical connections and mechanical components
- Insulating gas SF_6 (fluorinated greenhouse gas)
- Maintenance-free components under normal ambient conditions according to IEC 62271-1
- Three-position switch-disconnector with load-break function and make-proof earthing function
- Vacuum circuit-breaker
- Cable connection with outside-cone plug-in system
  - In ring-main, circuit-breaker and transformer feeders with bolted contact (M16)
  - In transformer feeders optionally with plug-in contact
- Wall-standing or free-standing arrangement
- Cable connection access from front
- Installation and extension of existing switchgear at both ends without gas work and without modification of existing panels
- Pressure relief downwards, optionally to the rear/upwards, or via pressure relief duct and optionally with pressure absorber systems upwards
- Earthquake-resistant design available according to IEC/TS 62271-200, IEC 60068-2-57 and IEEE 693-2018.

Interlocks
- According to IEC 62271-200
- Logical mechanical interlocks prevent maloperation
- Logical mechanical interlocks and the constructive features of the three-position switches prevent maloperation as well as access to the cable connection of the feeders and HV HRC fuses under voltage
- Impermissible and undesired operations can be prevented by means of locking devices on the switching devices.

Insulating system
- Switchgear vessel filled with SF_6 gas
- Features of SF_6 gas:
  - Non-toxic
  - Odorless and colorless
  - Non-inflammable
  - Chemically neutral
  - Heavier than air
  - Electronegative (high-quality insulator)
  - Global Warming Potential GWP = 22,800
- Pressure of SF_6 gas in the switchgear vessel (absolute values at 20 °C):
  - Rated filling level: 150 kPa
  - Design pressure: 180 kPa
  - Design temperature of the SF_6 gas: 80 °C
  - Operating pressure of bursting disc: ≥ 300 kPa
  - Bursting pressure: ≥ 550 kPa
  - Gas leakage rate: < 0.1 % per year.

Modular design
- Individual panels and panel blocks can be lined up and extended at will – without gas work on site
- Low-voltage compartment available in 3 overall heights, wiring to the panel via plug connectors.

Panel design
- Factory-assembled, type-tested
- Metal-enclosed, with metal partitions
- Hermetically tight, welded switchgear vessel made of stainless steel
- Maintenance-free
- Degree of protection
  - IP65 for all high-voltage parts of the primary circuit in the gas-insulated panels
  - IP2X for the switchgear enclosure
- Vacuum circuit-breaker with three-position disconnector for disconnecting and earthing
- Three-position switch-disconnector
- Cable connection with outside-cone plug-in system according to DIN EN 50181
- Wall-standing arrangement, optionally free-standing arrangement
- Installation and possible later extension of existing panels without gas work
- Replacement of instrument transformers without gas work, as they are located outside the gas compartments
- Enclosure made of sendzimir-galvanized sheet steel, front cover powder-coated in color RAL 7035
- Low-voltage compartment removable, plug-in bus wires
- Lateral, metallic wiring ducts for control cables.

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

Vacuum circuit-breakers
- Maintenance-free under normal ambient conditions according to IEC 62271-1
- 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.

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 SF_6 has to be evacuated professionally as a reusable material and recycled (SF_6 must not be released into the environment).

Technical data

Electrical data of the switchgear, number of operating cycles, classifications

Electrical data of the switchgear					
Rated insulation level		Rated voltage U_r		**kV**	**36**
		Rated short-duration power-frequency withstand voltage U_d:			
		– phase-to-phase, phase-to-earth, open contact gap		kV	70
		– across the isolating distance		kV	80
		Rated lightning impulse withstand voltage U_p:			
		– phase-to-phase, phase-to-earth, open contact gap		kV	170
		– across the isolating distance		kV	195
Rated frequency f_r				Hz	50/60
Rated normal current I_r [2]		for ring-main feeders		A	630
		for circuit-breaker feeders		A	630
		for busbar		A	630
		for transformer feeders		A	Depending on the HV HRC fuse-link
50 Hz	Rated short-time withstand current I_k	for switchgear with t_k = 3 s		up to kA	20/25 [4]
	Rated peak withstand current I_p			up to kA	63
	Rated short-circuit making current I_{ma}	for ring-main feeders		up to kA	63
		for circuit-breaker feeders		up to kA	63
		for transformer feeders		up to kA	50
60 Hz	Rated short-time withstand current I_k	for switchgear with t_k = 3 s		up to kA	20/25 [4]
	Rated peak withstand current I_p			up to kA	65
	Rated short-circuit making current I_{ma}	for ring-main feeders		up to kA	65
		for circuit-breaker feeders		up to kA	65
		for transformer feeders		up to kA	52
Filling pressure (pressure values at 20 °C)		Rated filling level p_{re} (absolute)		kPa	150
		Minimum functional level p_{me} (absolute)		kPa	130
Ambient air temperature T [3]		Operation	standard	°C	–25 to +55
		Storage / transport	standard	°C	–25 to +55
			on request	°C	–40 to +70
Degree of protection		for gas-filled switchgear vessel			IP65
		for switchgear enclosure			IP2X/IP3X [1]
		for low-voltage compartment			IP3X/IP4X [1]

Switch-disconnector / fuse combination					
Switching capacity for switch-disconnector / fuse combination according to IEC 62271-105		Rated mainly active load breaking current I_{load}		A	200
		Rated transfer current $I_{transfer}$		A	740 [5]
		Maximum transformer rating		kVA	2500
Switching capacity for make-proof earthing switch, feeder side, in transformer feeder with HV HRC fuses		Rated short-circuit making current I_{ma}	50 Hz	kA	5
			60 Hz	kA	5.2
		Rated short-time withstand current I_k with t_k = 1 s		kA	2

Number of operating cycles, classifications					
Three-position switch-disconnector (IEC 62271-103)		Mechanical endurance	Class		M1
		Number of mechanical operating cycles		n	1000
		Electrical endurance	Class		E3
		Number of electrical operating cycles with I_{load}		n	100
		Number of short-circuit making operations with I_{ma}		n	5
		Capacitive switching (no restrikes, TD: I_{cc}, I_{lc})	Class		C2

1) Design option
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)
3) Minimum and maximum permissible ambient air temperature depending on the secondary equipment used
4) Transformer feeders up to 20 kA
5) At 36 kV and 50 Hz up to 800 A

Number of operating cycles, classifications (continued)				
Earthing switch (IEC 62271-102)		Mechanical endurance	Class	M0
		Number of mechanical operating cycles	n	1000
		Electrical endurance	Class	E2
		Number of short-circuit making operations with I_{ma}	n	5
Vacuum circuit-breaker (IEC 62271-100) with three-position disconnector	Type 1	Circuit-breaker:		
		Rated operating sequence		O – 0.3 s – CO – 3 min – CO
			On request	O – 0.3 s – CO – 15 s – CO
		Mechanical endurance	Class	M2
		Number of mechanical operating cycles	n	10,000
		Electrical endurance	Class	E2
		Capacitive switching	Class	C2
		Number of short-circuit breaking operations with I_k	n	25 or 50
		Three-position disconnector:		
		Mechanical endurance (DISCONNECTING and EARTHING)	Class	M0
		Number of mechanical operating cycles (DISCONNECTING and EARTHING)	n	1000
		Electrical endurance (EARTHING)	Class	E2
		Number of short-circuit making operations with I_{ma} (EARTHING)	n	5
	Type 2	Circuit-breaker:		
		Rated operating sequence		O – 3 min – CO – 3 min – CO
		Mechanical endurance	Class	M1
		Number of mechanical operating cycles	n	2000
		Electrical endurance	Class	E2
		Capacitive switching	Class	C2
		Number of short-circuit breaking operations with I_k	n	6 or 20
		Three-position disconnector:		
		Mechanical endurance (DISCONNECTING and EARTHING)	Class	M0
		Number of mechanical operating cycles (DISCONNECTING and EARTHING)	n	1000
		Electrical endurance (EARTHING)	Class	E2
		Number of short-circuit making operations with I_{ma} (EARTHING)	n	5

8DJH 36 switchgear is classified according to IEC 62271-200.

Design and construction	
Partition class	PM (metal partition)
Loss of service continuity category for panel types with cable termination	
– Feeder panels with disconnector (R, T, L)	LSC 2
– Billing metering panel M, cable panel K	LSC 1
Accessibility to compartments (enclosure)	
– Busbar compartment	– Non accessible
– Switching-device compartment	– Non accessible
– Low-voltage compartment (option)	– Tool-based
– Cable compartment for panels or panel blocks	
– With HV HRC fuses (T)	– Interlock-controlled
– Without HV HRC fuses (R, L)	– Interlock-controlled
– Cable feeder only (K)	– Tool-based
– Metering panels (air-insulated) (M)	– Tool-based

Internal arc classification (option)	
Designation of the internal arc classification IAC	Rated voltage 36 kV
IAC class for	
– Wall-standing arrangement	IAC A FL
– Free-standing arrangement	IAC A FLR
Type of accessibility A	Switchgear in closed electrical service location, access for authorized personnel only (according to IEC 62271-200)
– F	Front
– L	Lateral
– R	Rear (for free-standing arrangement)
Arc test current	Up to 25 kA
Test duration	1 s

Product range

Individual panels and modules

Vacuum circuit-breaker

Three-position switch-disconnector

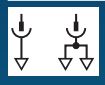
Three-position disconnector

Capacitive voltage detecting system

HV HRC fuse

Current transformer on the bushing

Cable-type current transformer



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

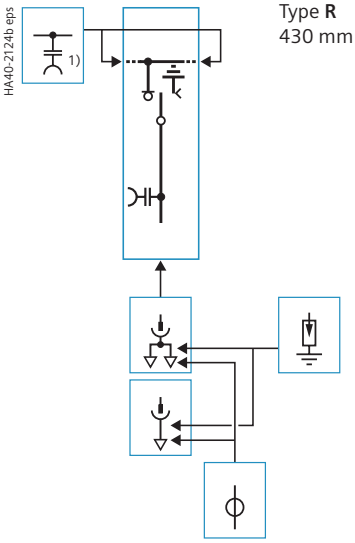
Surge arrester

Plug-in voltage transformer

Disconnectable and plug-in voltage transformer

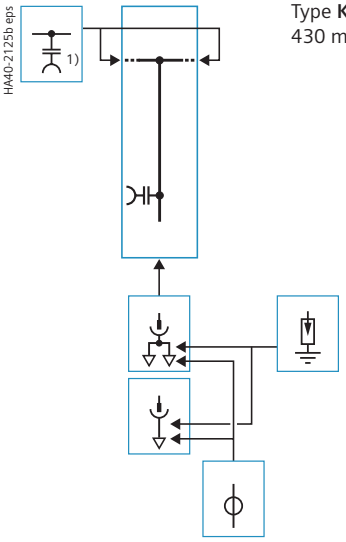
1) Only for end panel, on the free connection side of the busbar

Ring-main feeder



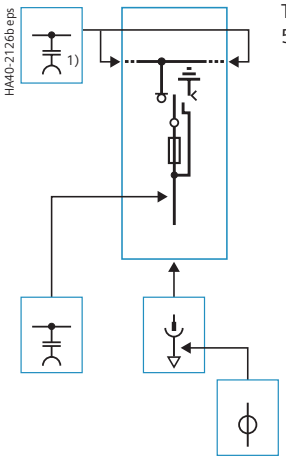
Type **R**
430 mm wide

Cable feeder



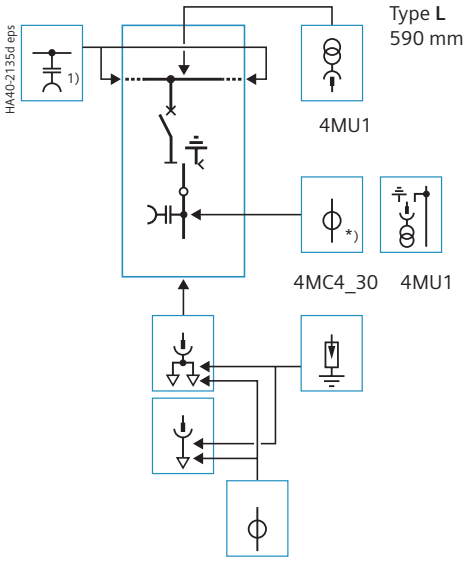
Type **K**
430 mm wide

Transformer feeder



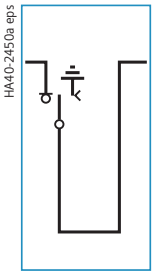
Type **T**
500 mm wide

Circuit-breaker feeder

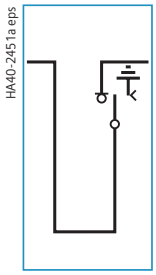


Type **L**
590 mm wide

Bus sectionalizer panel

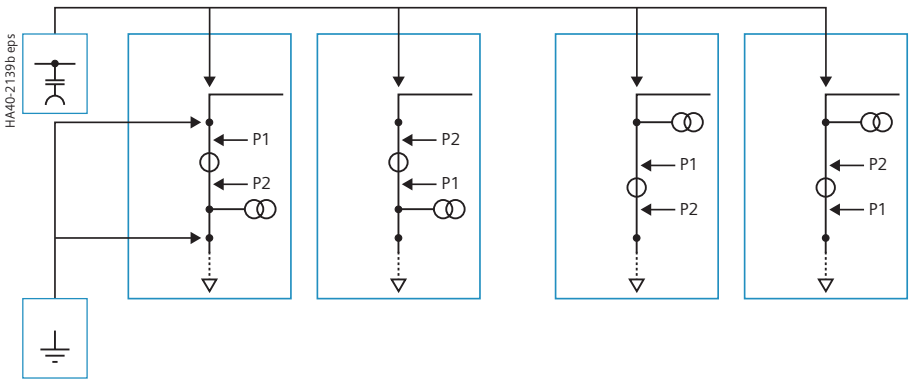


Type **S**
(earthing on the right)
590 mm wide

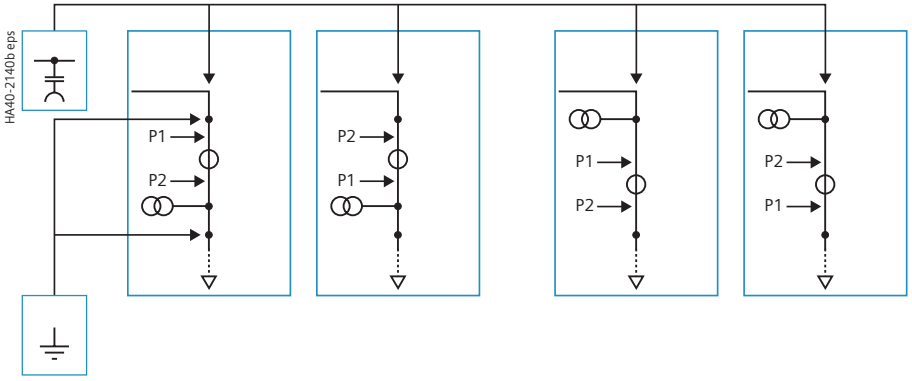


Type **S**
(earthing on the left)
590 mm wide

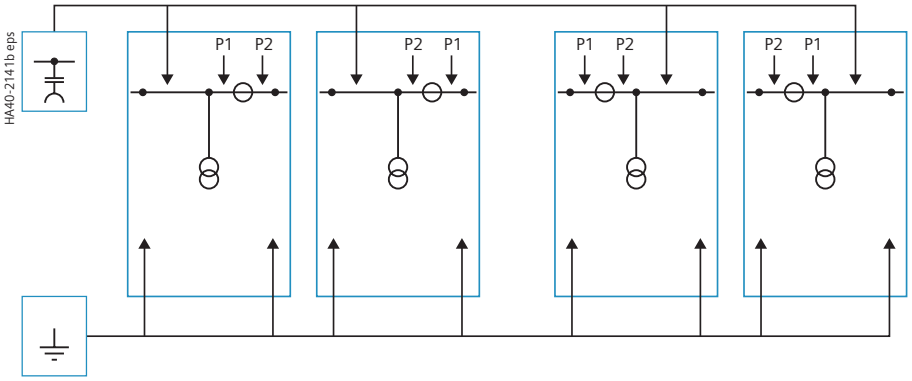
Billing metering panels with cable connection on the left



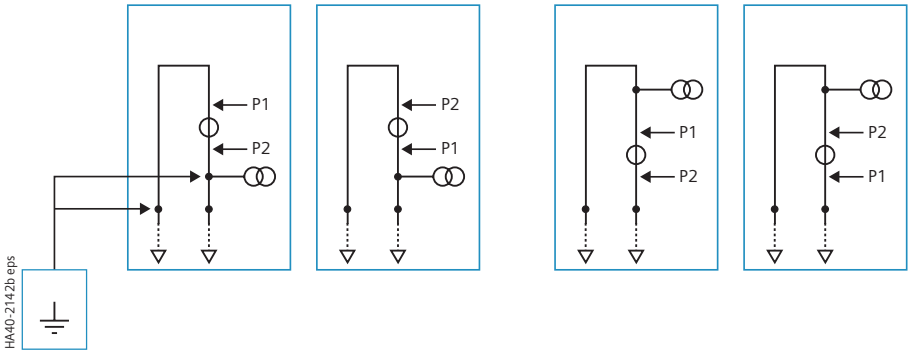
Billing metering panels with cable connection on the right



Billing metering panels with busbar connection on both sides



Billing metering panels with cable connection on both sides



Current transformer, cast-resin insulated

Voltage transformer, cast-resin insulated

Capacitive voltage detecting system

Fixed earthing points for busbar earthing

P1 and P2 are terminal designations of the current transformer

Product range

Product range overview of panel blocks

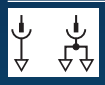
Vacuum circuit-breaker

Three-position switch-disconnector

Three-position disconnector

Capacitive voltage detecting system

HV HRC fuse



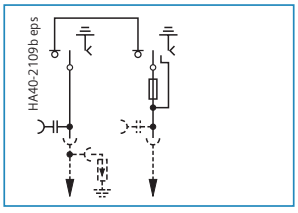
Cable connection with outside cone (not included in the scope of supply)

Surge arrester

Panel blocks with transformer feeders, optionally with busbar extension

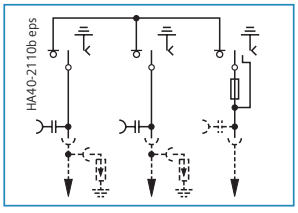
Components shown in dotted lines can be used optionally.

RT 1 ring-main feeder, 1 transformer feeder



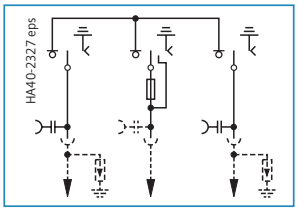
Dimensions in mm		
Width	Depth	Height
930	920	1600

RRT 2 ring-main feeders, 1 transformer feeder



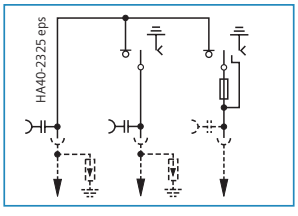
Dimensions in mm		
Width	Depth	Height
1360	920	1600

RTR 2 ring-main feeders, 1 transformer feeder



Dimensions in mm		
Width	Depth	Height
1360	920	1600

KRT 1 cable feeder,1 ring-main feeder, 1 transformer feeder

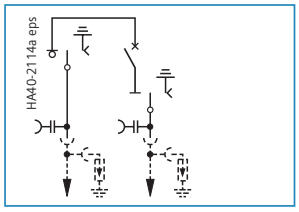


Dimensions in mm		
Width	Depth	Height
1360	920	1600

Panel blocks with circuit-breaker feeders, optionally with busbar extension

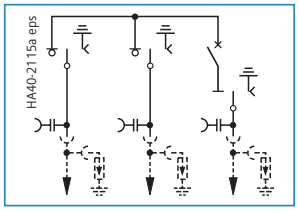
Components shown in dotted lines can be used optionally.

RL 1 ring-main feeder, 1 circuit-breaker feeder



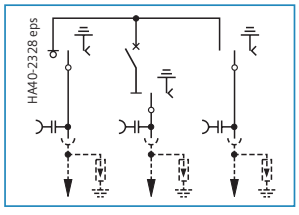
Dimensions in mm		
Width	Depth	Height
1020	920	1600

RRL 2 ring-main feeders, 1 circuit-breaker feeder



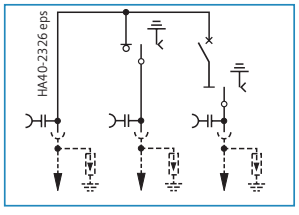
Dimensions in mm		
Width	Depth	Height
1450	920	1600

RLR 2 ring-main feeders, 1 circuit-breaker feeder



Dimensions in mm		
Width	Depth	Height
1450	920	1600

KRL 1 cable feeder,1 ring-main feeder, 1 circuit-breaker feeder



Dimensions in mm		
Width	Depth	Height
1450	920	1600

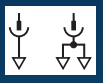
Vacuum circuit-breaker

Three-position switch-disconnector

Three-position disconnector

Capacitive voltage detecting system

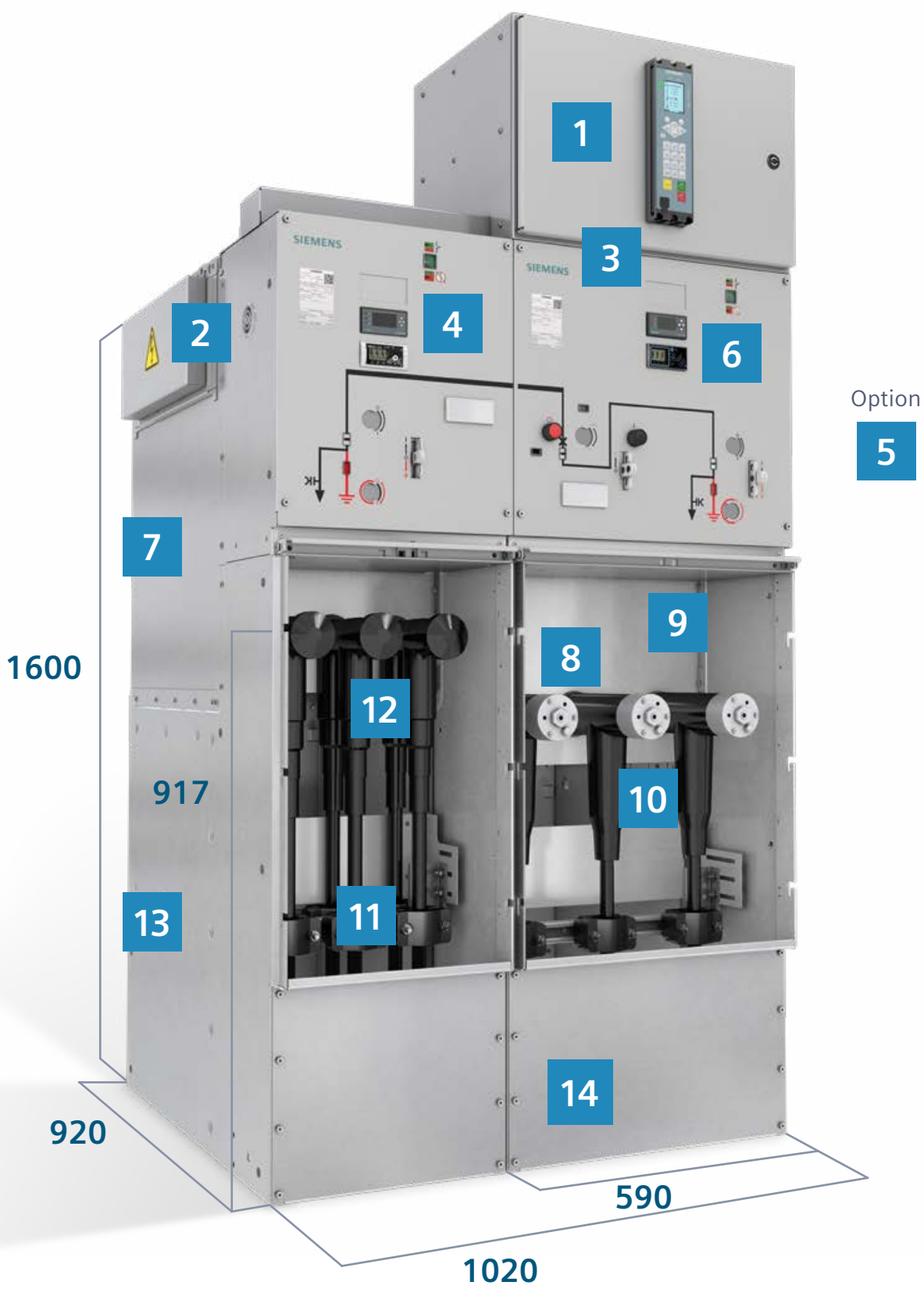
HV HRC fuse



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

Surge arrester

Design
Overview



1 Low-voltage compartment
- Customer-specific options in different heights 200 mm, 400 mm, and 600 mm possible

2 Busbar extension, modularity
- Busbar extension as an ordering option
- Plug-in unit consisting of contact coupling and screened silicone coupling
- Insensitive to pollution and condensation
- Switchgear installation, extension or panel replacement without gas work

3 Indicators
- Voltage detecting systems, short-circuit / earth-fault indicators and transformer monitors from various manufacturers

4 Ring-main feeder
- Switch positions: CLOSED – OPEN – EARTHED
- Switching functions as a general purpose switch-disconnector according to IEC 62271-103 and IEC 62271-102
- Designed as a three-position switch with the following functions: switch-disconnector and make-proof earthing switch
- With manual operating mechanism, optionally with motor operating mechanism

5 Transformer feeder
- High-voltage switch-fuse combination according to IEC 62271-105
- HV HRC fuse-links according to DIN 43625 (main dimensions) with striker; "medium" version according to IEC 60282-1
  - as short-circuit protection of transformers
  - with selectivity – if correctly selected – to upstream and downstream equipment
  - 1-phase insulated

6 Circuit-breaker feeder
- Consisting of a vacuum switching unit with an integrated three-position disconnector
- According to IEC 62271-100
- Circuit-breaker type L1 with 10,000 operating cycles and type L2 with 2000 operating cycles
- With manual operating mechanism, optionally with motor operating mechanism
- Auxiliary switch for position indication
- Closing solenoid, shunt release, c.t.-operated release, low-energy magnetic release, undervoltage release, circuit-breaker tripping signal, varistor module, position switch, and operation counter (options)

7 Enclosure
- Hermetically tight, welded switchgear vessel made of stainless steel
- Enclosure made of sendzimir-galvanized sheet steel, switchgear front powder-coated

8 SiBushing
- Outside-cone bushing type C with integrated measurement of current, voltage and temperature

9 Current sensor
- Single-phase inductive current sensor according to IEC 61869-10

10 Voltage sensor
- Voltage sensor (resistor divider) according to IEC 61869-11

11 Cable-type current transformer
- According to IEC 61869-1 and -2
- Designed as ring-core current transformer, 1-phase
- Free of dielectrically stressed cast-resin parts
- Insulation class E
- Inductive type
- Secondary connection via terminal strip in the panel

12 Cable compartment
- Bushings according to DIN EN 50181 with outside cone and bolted connection M16 as interface type C (standard) or with outside cone and plug-in contact as interface type B (option for transformer feeder)

Connection of:
- Cable elbow plugs or cable T-plugs (see page 24)
- Thermoplastic-insulated cables (1- and 3-core cables)
- Mounted cable clamps on cable bracket (option)
- Surge arresters

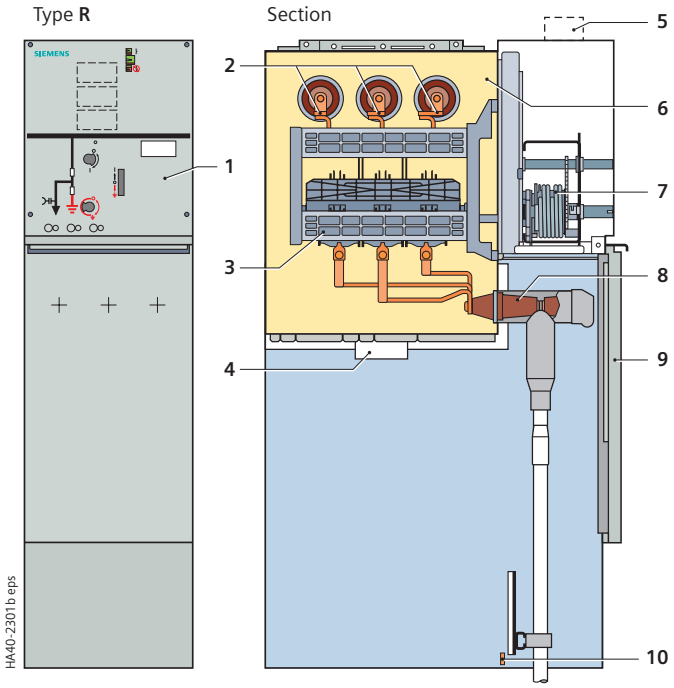
13 Dimension options
- Switchgear heights 1600 mm
- Deep cable compartment cover

14 Pressure relief
- Pressure relief downwards
- Optionally upwards with duct and optionally with absorber
- Up to IAC A FL 25 kA / 1 s or IAC A FLR 25 kA / 1 s

Design

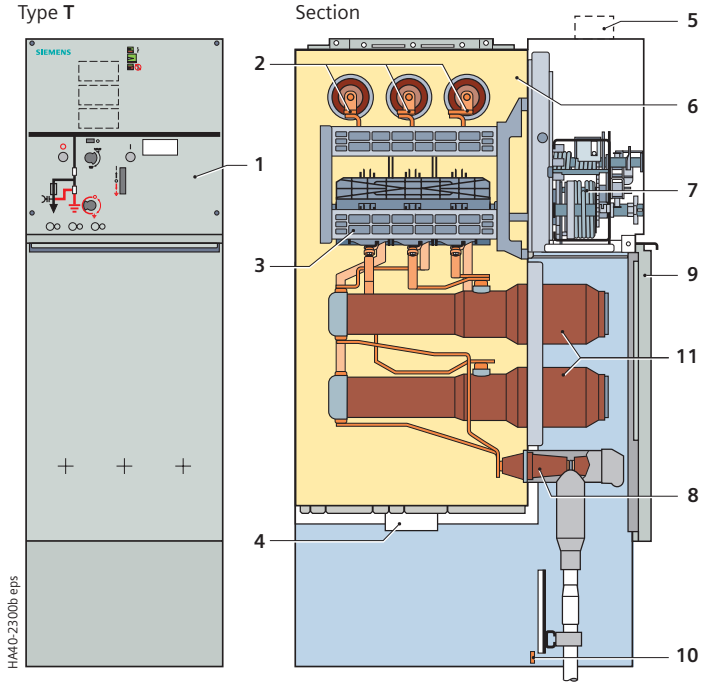
Panel design (examples)

Ring-main feeder



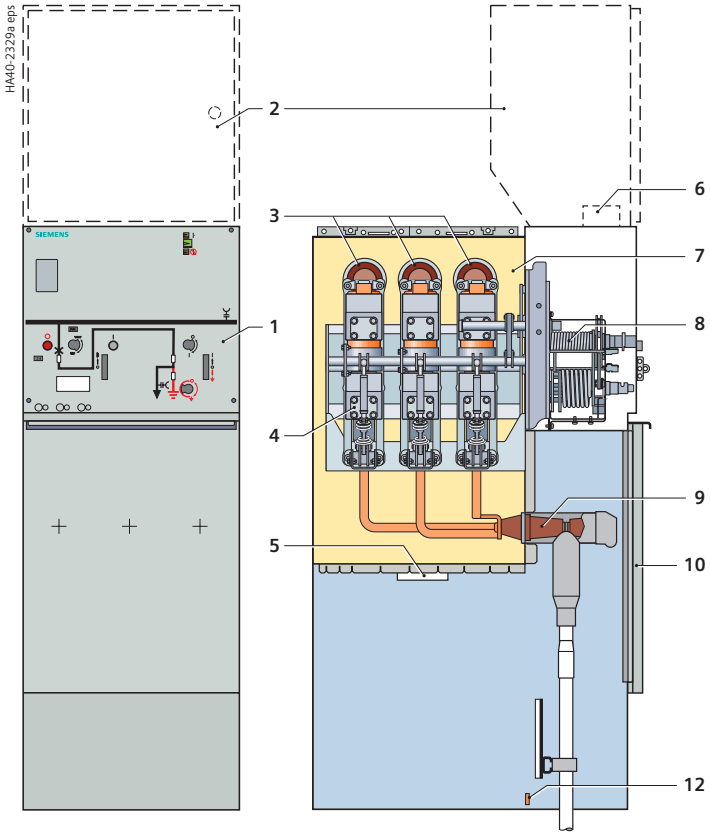
1 Control board
2 Busbar arrangement
3 Three-position switch-disconnector
4 Pressure relief device
5 Wiring duct, removable, for protection cables and / or bus wires (option)
6 Switchgear vessel, filled with gas
7 Operating mechanism of switching device
8 Bushing for cable plug with bolted contact (M16)
9 Cable compartment cover
10 Earthing busbar with earthing connection
11 HV HRC fuse assembly

Transformer feeder



Circuit-breaker panel type 2

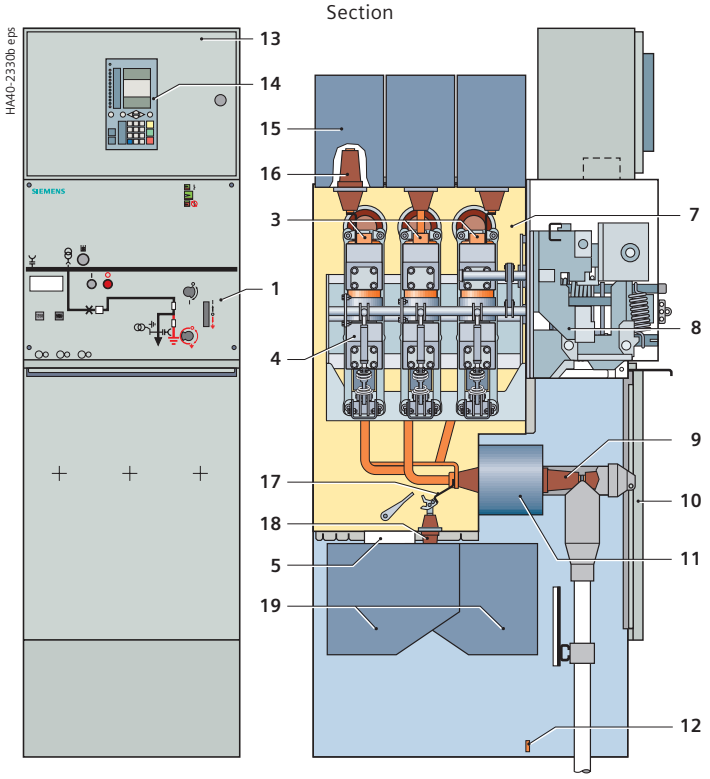
Section



1 Control board
2 Low-voltage compartment (option)
3 Busbar arrangement
4 Vacuum circuit-breaker and three-position switch module
5 Pressure relief device
6 Wiring duct, removable, for protection cables and/or bus wires (option)
7 Switchgear vessel, filled with gas
8 Operating mechanism of switching devices
9 Bushing for cable plug with bolted contact (M16)
10 Cable compartment cover
11 Current transformer on the bushing (option)
12 Earthing busbar with earthing connection
13 Low-voltage compartment
14 SIPROTEC bay controller (option)
15 Plug-in voltage transformer 4MU1 on the busbar (option)
16 Bushing for connection of plug-in voltage transformers on the busbar (option)
17 Earthing facility for the plug-in voltage transformer 4MU1 at the cable connection (option)
18 Bushing for connection of plug-in voltage transformers at the cable connection (option)
19 Plug-in voltage transformer 4MU1 at the cable connection (option)

Circuit-breaker panel type 1 with 400 mm high low-voltage compartment

Section

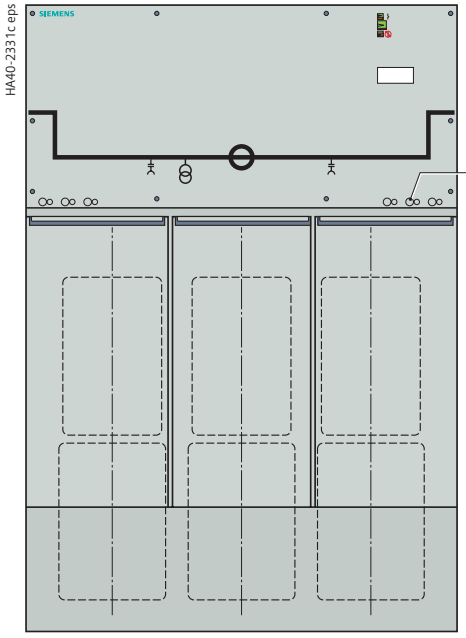


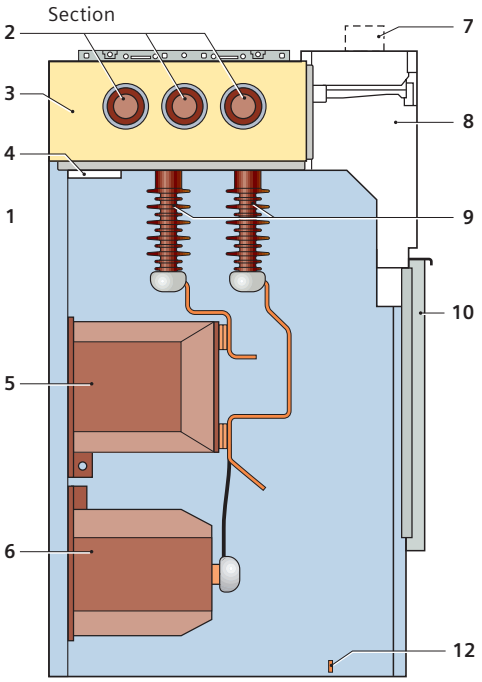
Design

Panel design (examples)

Billing metering panel

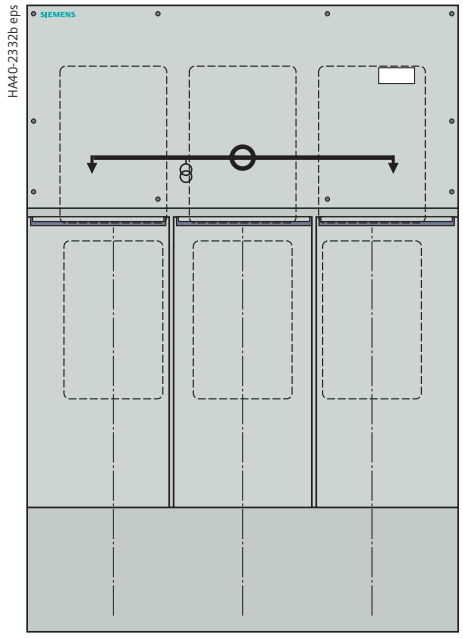
Type **M,** air-insulated

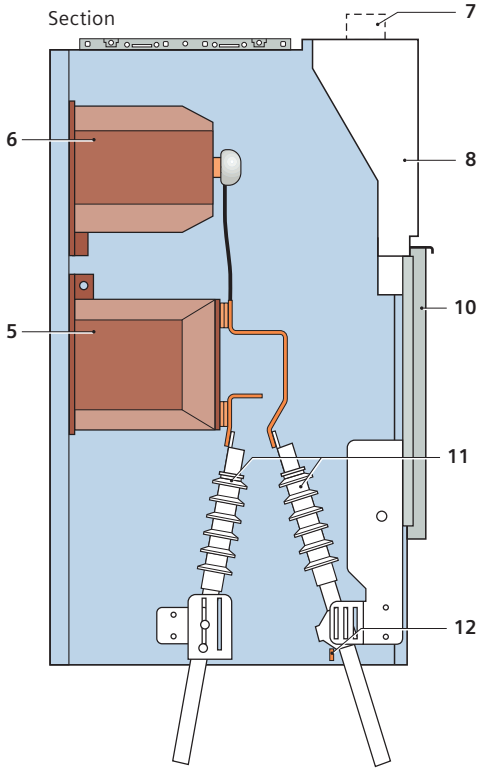




Connection: busbar – busbar

1 Sockets for voltage detecting system (option)
2 Busbar connection
3 Busbar vessel, filled with gas
4 Pressure relief device
5 Current transformer type 4MA7
6 Voltage transformer type 4MR
7 Wiring duct, removable, for protection cables and/or bus wires (option)
8 Niche for customer-side low-voltage equipment, screwed cover
9 Bushings for connection of instrument transformer bars
10 Instrument transformer compartment cover
11 Cable connection
12 Earthing busbar with earthing connection





Connection: cable – cable

On request, 8DJH 36 switchgear can be provided with an outdoor enclosure with the following features:

- For outdoor applications on company grounds
- Enclosure attached to standard indoor panels
- Enclosure with three different heights (optionally with low-voltage compartment as a 200 mm, 400 mm or 600 mm high version)
- Enclosure with three different widths for freely configurable, non-extendable switchgear rows up to a switchgear width of 2040 mm (optional combination of two enclosures up to a switchgear width of 4080 mm)
- Internal arc classification IAC A FL or FLR to 25 kA/1 s according to IEC 62271-200
- Degree of protection IP54, weatherproofing test according to IEC 62271-1.

Outdoor enclosure (front closed)

Components

Busbar extension, modularity

Features

- Busbar extension possible on all individual panels and panel blocks (ordering option)
- Plug-in unit consisting of contact coupling and screened silicone coupling
- Insensitive to pollution and condensation
- Switchgear installation, extension or panel replacement is possible without gas work.

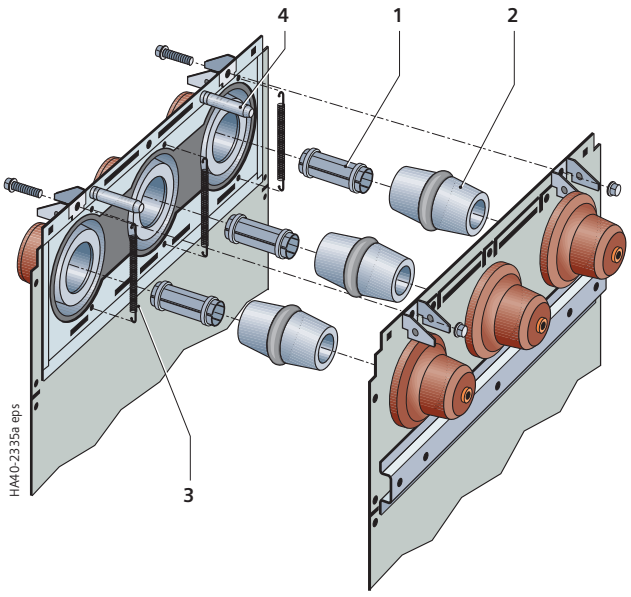
Every switchgear block and every individual panel is optionally available with busbar extension on the right, on the left, or on both sides. This offers a high flexibility for the creation of switchgear configurations, the functional units of which are lined up in any order. Local installation and lining up is done without gas work.

Lining up takes place as follows:

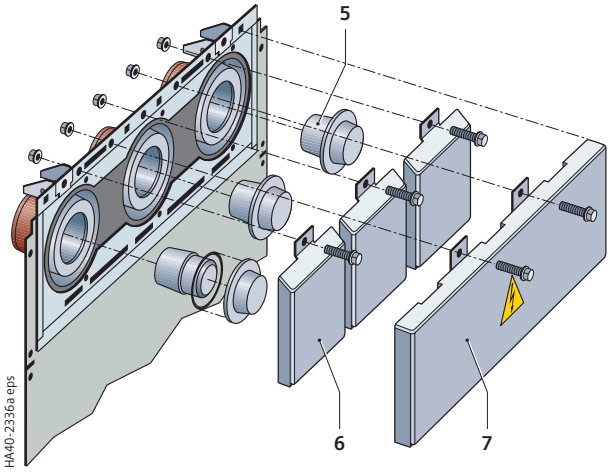
- By the busbar couplings on the medium-voltage side. Tolerances between adjacent panels are compensated by spherical fixed contacts and the movable contact coupling with degrees of freedom in all axis directions.
- By safe dielectric sealing with screened silicone couplings that are externally earthed and adjustable to tolerances. These silicone couplings are pressed on with a defined pressure when the panels are interconnected.
- On free busbar ends, screened dummy plugs are inserted, each of which is pressed on through a metal cover. A common protective cover with a warning is fixed over all three covers.
- By centering bolts for easier switchgear installation and fixing of adjacent panels.
- By bolted panel joints with defined stops for the distances between adjacent panels and the associated pressure for contact pieces and silicone couplings.

Switchgear installation, extension, or the replacement of one or more functional units requires a lateral wall distance ≥ 200 mm.

Interconnecting the panels



Surge-proof termination



1 Contact piece
2 Silicone coupling
3 Tension spring for earthing
4 Centering bolt
5 Silicone dummy plug with insertable sleeve
6 Clamping cover for dummy plugs
7 Busbar termination cover

Current transformers according to IEC 61869-1 and -2

Type	Cable-type current transformer 4MC7033 (1-pole)	Cable-type current transformer and current transformer on the bushing 4MC4_30 (1-pole)	Current transformer 4MA7 (1-pole)
Features	• Designed as a ring-core current transformer • Insulation class E • Inductive type		• Dimensions according to DIN 42600-5 • Insulation class E • Cast-resin insulated • Designed as an indoor block-type current transformer • Secondary connection by means of screw-type terminals
Installation	• Outside the switchgear vessel, around the cable at the panel connection • Installation on the cable on site • Note: Installation inside or underneath the panel depending on the panel type and the overall transformer height	• Outside the switchgear vessel, at the bushing, or around the cable at the panel connection (option in circuit-breaker panel) • Note: Installation inside or underneath the panel depending on the overall transformer height	• In the air-insulated metering panel

Voltage transformers according to IEC 61869-1 and -3

Type	4MU1 (1-pole)	4MR (1-pole)
Features	• Inductive type • Connection with plug-in contact • Safe-to-touch due to metal enclosure • Secondary connection by means of plugs at the voltage transformer • For outside-cone system type C • Busbar voltage transformer designed for up to 80 % of the rated short-duration power-frequency withstand voltage at rated frequency (option)	• Dimensions according to DIN 42600-3 • Designed as an indoor voltage transformer • Cast-resin insulated • Insulation class E • Secondary connection by means of screw-type terminals
Installation	• Arranged on the switchgear vessel in individual panels type L; connection directly at the busbar • Arranged below the switchgear vessel in individual panels type L; can be disconnected through an SF_6-insulated earthing device in the switchgear vessel; no removal necessary for cable testing	• In the air-insulated metering panel

Components

Current sensors, voltage sensors

Current sensors (make Zelisko) according to IEC 61869-6 and -10

The current sensors are inductive current transformers whose secondary winding delivers a voltage signal through a precision shunt. At the rated primary current, this is 225 mV.

Depending on their version, the sensors have a dual accuracy class; the output signal can be equally used for measuring, protection and, if required, earth-fault detection. The signal can be directly used by devices with low-power input (e. g. SICAM FCM, 7SJ81, 7SY82).

R_HA40-147.tif

R_HA40-152.tif

R_HA40-151.tif

Type	Ring-core current sensor SMCS-JW 1001	Ring-core current sensor SMCS/T-JW 1002, divisible	Ring-core current sensor GAE120 / SENS-JW 1003 for earth-fault detection, divisible

Voltage sensors (make Zelisko) according to IEC 61869-6 and -11

The voltage sensors are resistor dividers which provide an output signal of 3.25 V / $\sqrt{3}$ at the rated primary voltage. The signal can be directly used by devices with low-power input (e. g. SICAM FCM, 7SJ81, 7SY82).

R_HA40-153.tif

R-HA3541-194.tif

Type	Voltage sensor SMVS-UW1001 for symmetrical cable plugs	Voltage sensor SMVS-UW1002 for non-symmetrical cable plugs

Features

- Bushings according to DIN EN 50181 with outside cone and bolted connection M16 as interface type C, or plug-in contact as interface type B (option in transformer feeder).

Connection of

- Cable T-plugs with bolted contact M16 for 630 A
- Cable elbow plugs or cable T-plugs with plug-in contact for 400 A (option in transformer panel)
- Thermoplastic-insulated cables (1-core and 3-core cables)
- Mounted cable clamps on cable bracket (option).

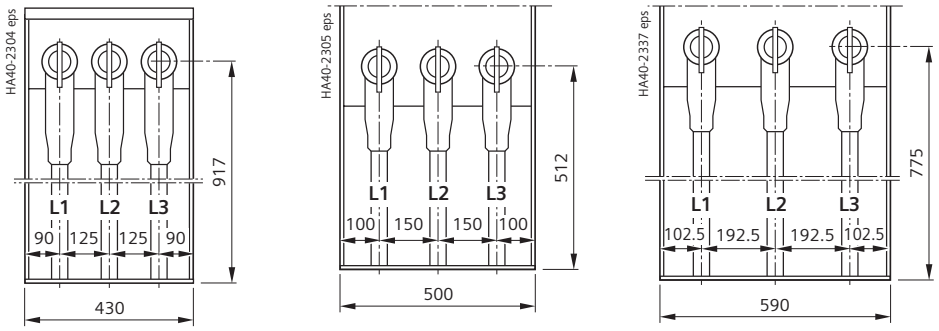
Cable plugs

- As screened (conductive) design independent of the site altitude.

Surge arresters

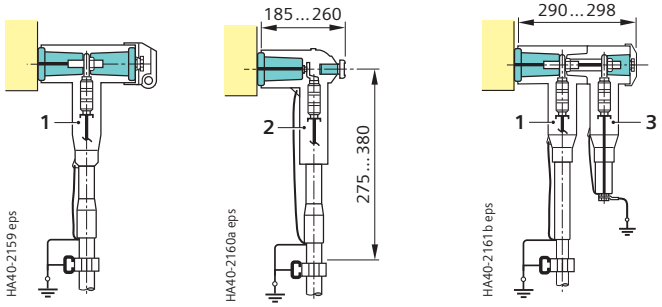
- Pluggable on cable T-plug or T-adapter
- The switchgear depth can be extended when surge arresters are mounted (depending on the make and type)
- Surge arresters recommended if, at the same time,
  – the cable system is directly connected to the overhead line,
  – the protection zone of the surge arrester at the end tower of the overhead line does not cover the switchgear.

Cable compartment

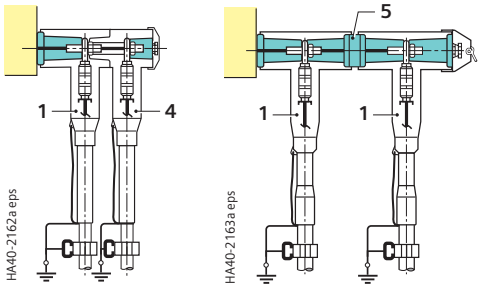


Panel width 430 mm (R) | Panel width 500 mm (T) | Panel width 590 mm (L)

Connection options



Single cable



Double cable

1 Cable T-plug
2 Cable elbow plug
3 Surge arrester
4 Coupling T-plug
5 Screw-type coupling insert

Components
Cable connection

Cable plugs for single cable connection

Cable type	Cable T-plug / cable elbow plug			
	Make	Type	Cross-section mm²	Comment
Thermoplastic-insulated cables 36 kV according to IEC 60502-2				
1-core cable, PE and XLPE-insulated N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	Nexans	M400 LR/G [1)]	50 to 240	EPDM with conductive layer
		M400 TE/G [1)]	50 to 240	EPDM with conductive layer
		M400 TB/G	50 to 240	EPDM with conductive layer
		M440 TB/G	300 to 630	EPDM with conductive layer
		M484 TB/G	50 to 630	EPDM with conductive layer
		M480 TB/G	50 to 300	EPDM with conductive layer
	Südkabel	SET 36-B [1)]	70 to 300	Silicone with conductive layer
		SET 36	70 to 300	Silicone with conductive layer
		SEHDT33	300 to 500	Silicone with conductive layer
	NKT	CB36-400 [1)]	25 to 300	Silicone with conductive layer
		CB36-630	25 to 300	Silicone with conductive layer
		CB36-630 (1250)	400 to 630	Silicone with conductive layer
	Cellpack	CTS 630A 36 kV	35 to 400	EPDM with conductive layer
	TE Connectivity	RSTI-68xx	25 to 300	Silicone with conductive layer, with capacitive measuring point
		RSTI-69xx	300 to 630	Silicone with conductive layer, with capacitive measuring point
	Prysmian	FMCT-400-X [1)]	25 to 300	EPDM with conductive layer
		FMCTs-400-X	25 to 300	EPDM with conductive layer
	Cooper Power Systems	DT436	25 to 240	EPDM with conductive layer
	3 M Germany	94-EE 705-6/-XX	70 to 400	Silicone with conductive layer
3-core cable, PE and XLPE-insulated N2YSY (Cu) and N2XSY (Cu) or NA2YSY (Al) and NA2XSY (Al)	Nexans	M400 TB/G	50 to 240	EPDM with conductive layer, in combination with distribution kit
		M480 TB/G	35 to 300	EPDM with conductive layer, in combination with distribution kit
	NKT	CB36-630	35 to 300	Silicone with conductive layer, in combination with distribution kit
		CB36-630 (1250)	400 to 630	Silicone with conductive layer, in combination with distribution kit
	TE Connectivity	RSTI-68xx	35 to 300	Silicone with conductive layer, with capacitive measuring point, in combination with distribution kit RSTI-TRF0x

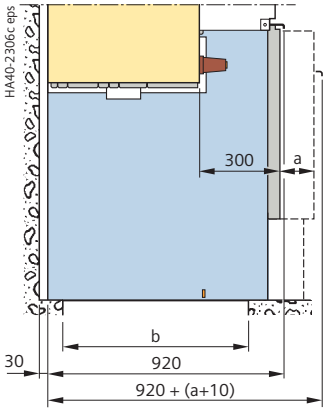
1) Cable T-plug or cable elbow plug with plug-in contact for interface type B

Larger cable cross-sections and other cable T-plugs or cable elbow plugs on request

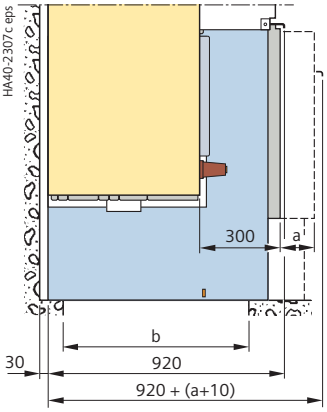
Mounting depth for cable plugs

The panels feature a mounting depth of 300 mm for the connection of cable plugs. For circuit-breaker panels with current transformers on the bushing and/or voltage transformers at the cable connection, the mounting depth is reduced to 270 mm.

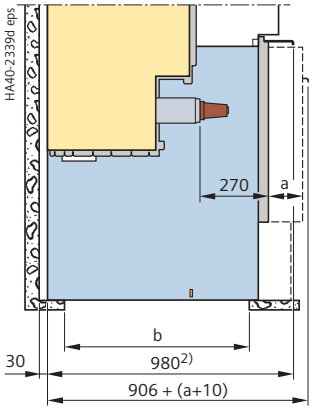
The mounting depth for cable plugs can be additionally extended by means of a 105 mm or 250 mm (dimension a) deep cable compartment cover. The depth of the floor cutouts (see dimension b) is increased from 756 mm to 861 mm or 1006 mm due to the deep cable compartment cover.



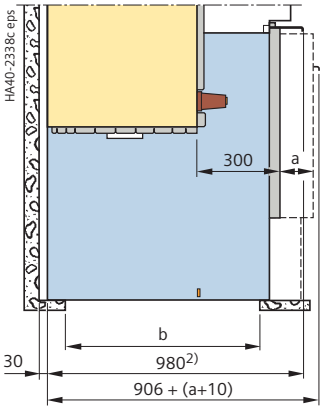
For type R



For type T



For type L *



For type L

2) Representation for circuit-breaker panel with operating mechanism L1

* With current transformer on the bushing and/or voltage transformer at the cable connection

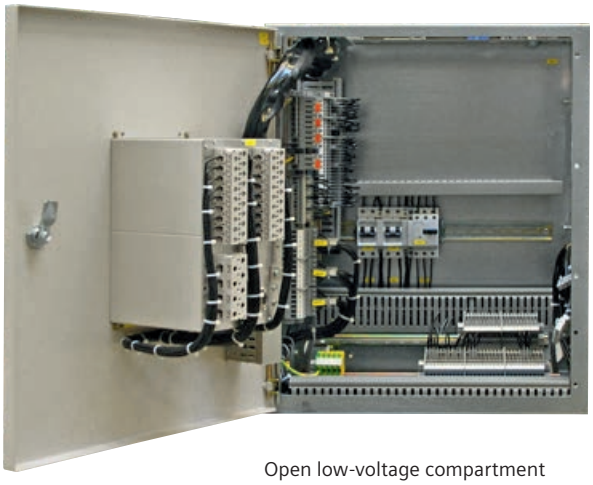
Features

- Overall heights
  – 200 mm, 400 mm, 600 mm
  – Cover (option)
- Partitioned safe-to-touch from the high-voltage part of the panel
- Installation on the panel
  – Possible per feeder
  – Option for all panel types, depending on the scope of the secondary equipment
- Customer-specific equipment
  For accommodation of protection, control, measuring and metering equipment
- Separate wiring duct on panels without low-voltage compartment (option).

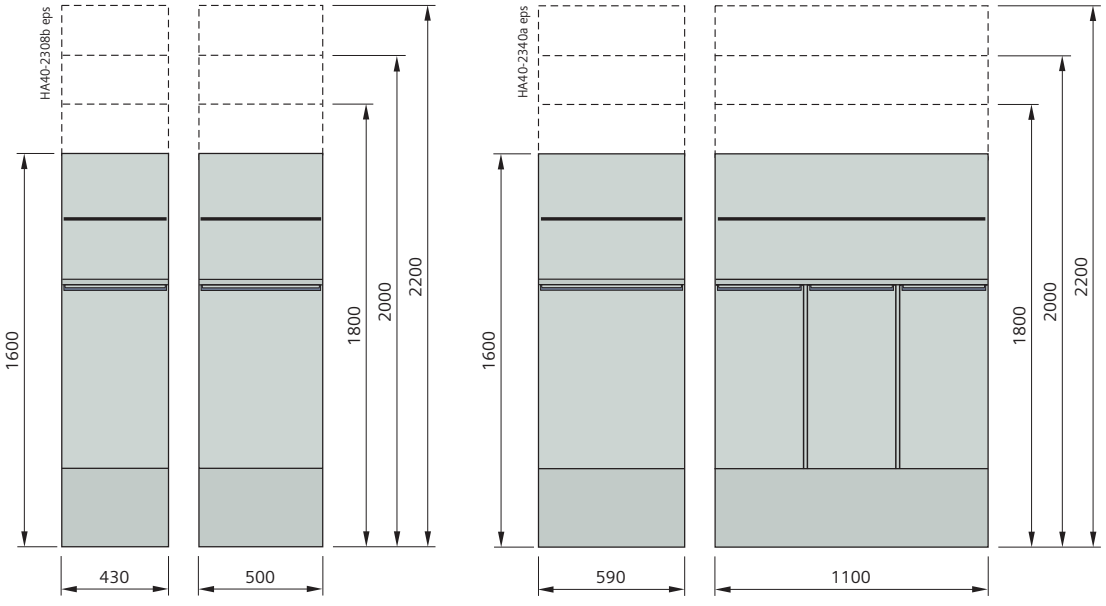
Low-voltage cables

- Control cables of the panel to the low-voltage compartment via multi-pole, coded module plugs
- Plug-in bus wires from panel to panel in the separate wiring duct on the panel (option).

Low-voltage compartment (example 500 × 600 mm)



Open low-voltage compartment with built-in equipment (option)



Switchgear height
1600 mm

Dimensions

Room planning

Switchgear installation

Wall-standing arrangement

– 1 row
– 2 rows (for face-to-face arrangement)
  A wall distance of ≥ 30 mm applies to the metering panel in switchgear with billing metering panels, as well as in switchgear with pressure relief downwards and in switchgear with pressure relief duct. Then, the wall distance of the other panel types increases to ≥ 90 mm. In switchgear with pressure relief to the rear / upwards, billing metering panels have a wall distance of 90 mm. All other panel types have a wall distance of 150 mm.

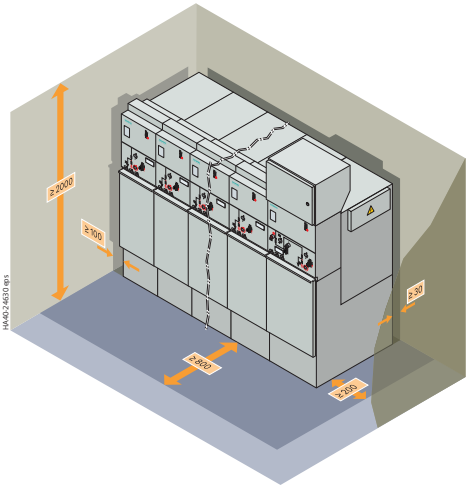
Free-standing arrangement (option)

Switchgear extension or panel replacement

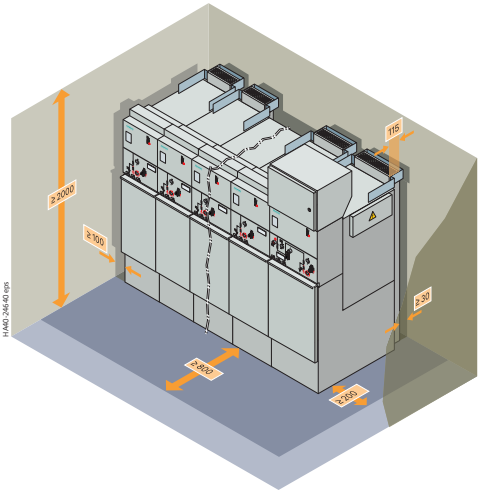
For switchgear extension or for panel replacement, a control aisle of at least 1000 mm is recommended in front of the switchgear. For panel replacement of lined up panels, there must be a wall distance of at least 200 mm on one side.

Control aisle

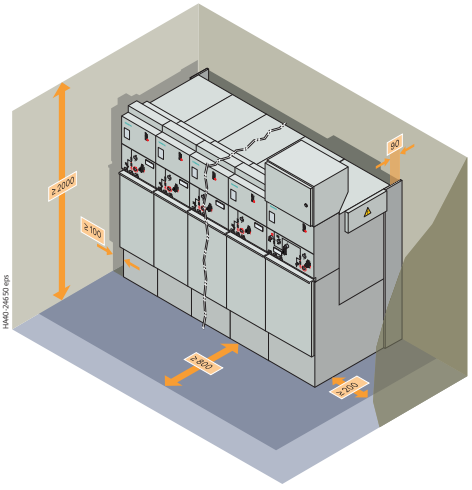
In front of the switchgear, a control aisle of at least 800 mm is required according to IEC 62271-200.



Switchgear installation with pressure relief downwards



Switchgear installation with pressure relief duct and optional absorber



Switchgear installation with pressure relief to the rear / upwards

Pressure relief

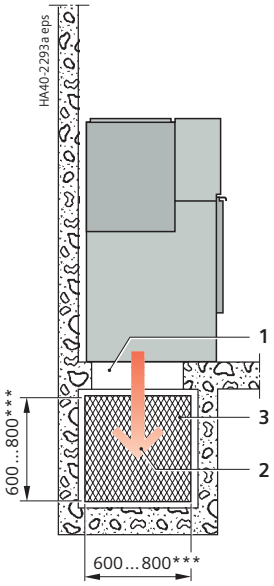
The following type-tested versions of the pressure relief system are available for 8DJH 36 switchgear:

- Downwards into the cable basement (for individual panels and panel blocks, internal arc classification up to IAC A FL 25 kA 1 s or IAC A FLR 25 kA 1 s)
- To the rear / upwards (for individual panels and panel blocks, internal arc classification up to IAC A FL 20 kA 1 s)
- Upwards through rear pressure relief duct (for individual panels and panel blocks, internal arc classification up to IAC A FL 20 kA 1 s or IAC A FLR 20 kA 1 s)
- Upwards through rear pressure relief duct and additional absorber (for individual panels – except billing metering panels – and for panel blocks, internal arc classification up to IAC A FL 25 kA 1 s or IAC A FLR 25 kA 1 s).

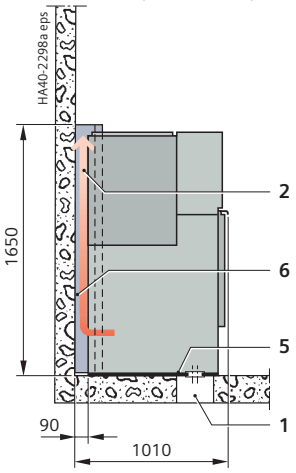
Room heights

- Minimum room heights according to the table below
- As a difference to the minimum room heights according to the table, a minimum room height of 2200 mm applies to all pressure relief versions in circuit-breaker panels with busbar voltage transformers
- For billing metering panels with pressure relief to the rear / upwards and with rear duct, a minimum room height of 2400 is required.

Switchgear installation with pressure relief downwards (standard)



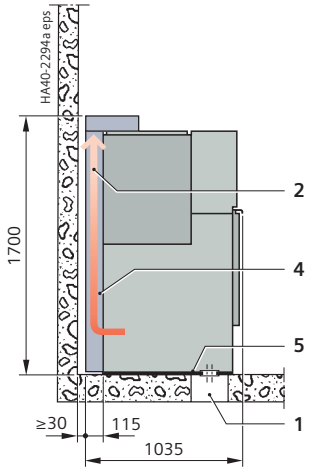
Switchgear installation with pressure relief to the rear / upwards (option)



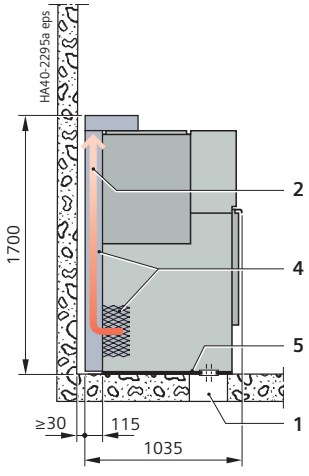
1 Floor opening
2 Direction of pressure relief
3 Expanded metal
4 Pressure relief with and without absorber and pressure relief duct directed upwards at the rear
5 Divided floor cover for cable insertion, installation on site
6 Termination plate

*** Total opening minimum 0.48 m²

Switchgear installation with pressure relief duct (option)



Switchgear installation with pressure relief duct and absorber (option)



Room heights for pressure relief to the rear/upwards and for switchgear with rear pressure relief duct

Switchgear height	Room height
1650 mm	≥ 2000 mm
1700 mm	≥ 2000 mm

ANSI design

Panel design

Panel design

- Factory-assembled, type-tested switchgear according to IEC 62271-200
- Fulfills the IEEE Std C37.20.7 and CSA C22.2 No. 31-18
- Cable, ring-main and circuit breaker feeders as individual panels or in a block
- Three-pole primary enclosure, metal-enclosed
- Welded switchgear vessel made of stainless steel, with welded-in bushings for electrical and mechanical components
- Installation and extension of existing switchgear assemblies at both ends without gas work and modifications on panels
- Bushings with outside cone according to IEEE Std 386, interface 13
- Cable connection access from front
- Wall-standing or free-standing arrangement
- Pressure relief downwards or optionally through pressure relief duct with pressure absorber
- Vacuum circuit breaker
- Three-position disconnect switch in circuit breaker panel
- Three-position load-current interrupter disconnect switch in ring-main panel.

Outdoor enclosure

- Standard switchgear equipped with an outdoor enclosure (option)
- Attached to standard indoor panels
- Three different widths for four feeders up to a switchgear width of 2040 mm
- Combination of two outdoor enclosures up to a switchgear width of 4080 mm (option)
- Weatherproofing test according to IEEE Std C37.20.9
- Enclosure category C according to IEEE Std C37.20.9.

Viewing & Lighting System

- Patented Viewing & Lighting System (VLS) for visual verification of the switch position of the three-position switch.

UL certification

- UL certification available for USA or Canada
- UL classification as an arc-resistant switchgear according to IEEE Std C37.20.7.

Electrical data of the switchgear						
Rated insulation level		Rated voltage U_r	**kV**	**15**	**27**	**38**
		Rated short-duration power-frequency withstand voltage U_d:				
		– phase-to-phase, phase-to-ground, open contact gap	kV	36	70	80
		– across the isolating distance	kV	40	77	88
		Rated lightning impulse withstand voltage U_p:				
		– phase-to-phase, phase-to-ground, open contact gap	kV	95	125	170
		– across the isolating distance	kV	105	138	187
Rated frequency f_r			Hz	50/60	50/60	50/60
Rated continuous current I_r [2]		for main bus	A	600	600	600
		for circuit breaker feeders	A	600	600	600
		for ring-main feeders	A	600	600	600
50 Hz	Rated short-time withstand current I_k	for switchgear with t_k = 2 s	up to kA	25	25	25
	Rated peak withstand current I_p		up to kA	63	63	63
	Rated short-circuit making current I_{ma}	for ring-main feeders	up to kA	63	63	63
		for circuit breaker feeders	up to kA	63	63	63
60 Hz	Rated short-time withstand current I_k	for switchgear with t_k = 2 s	up to kA	25	25	25
	Rated peak withstand current I_p		up to kA	65	65	65
	Rated short-circuit making current I_{ma}	for ring-main feeders	up to kA	65	65	65
		for circuit breaker feeders	up to kA	65	65	65
Filling pressure (pressure values at 20 °C / 68 °F)		Rated filling level p_{re} (absolute)	kPa (PSI)	150 (21.76)	150 (21.76)	150 (21.76)
		Minimum functional level p_{me} (absolute)	kPa (PSI)	130 (18.85)	130 (18.85)	130 (18.85)
Ambient air temperature T [3]		Operation	standard °C	–25 to +55	–25 to +55	–25 to +55
			°F	–13 to +131	–13 to +131	–13 to +131
		Storage / transport	standard °C	–25 to +55	–25 to +55	–25 to +55
			°F	–13 to +131	–13 to +131	–13 to +131
			on request °C	–40 to +70	–40 to +70	–40 to +70
			°F	–40 to +158	–40 to +158	–40 to +158
Degree of protection		for gas-filled switchgear vessel		IP65	IP65	IP65
		for switchgear enclosure		IP2X/IP3X [1]	IP2X/IP3X [1]	IP2X/IP3X [1]
		for low-voltage compartment		IP3X/IP4X [1]	IP3X/IP4X [1]	IP3X/IP4X [1]

1) Design option
2) The rated continuous currents apply to ambient air temperatures of max. 40 °C (104 °F). The 24-hour mean value is max. 35 °C (95 °F) (according to IEC/EN 62271-1)
3) Minimum and maximum permissible ambient air temperature depending on the secondary equipment used

ANSI design

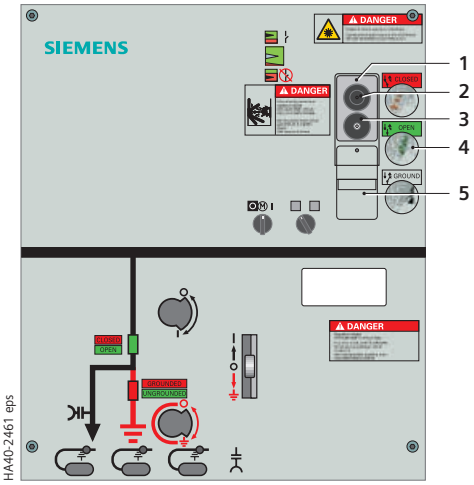
Viewing & Lighting System, position indication

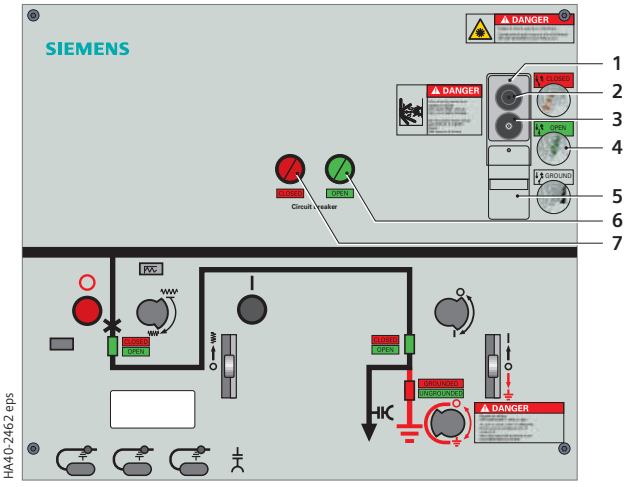
Viewing & Lighting System

- Optical system for visual verification of the switch position of the three-position switch
- No auxiliary voltage supply required
- Access from the switchgear front
- Fixed-mounted VL-base in the panel
- VL-module withdrawable and usable for several feeders
- Protective bag with cleaning kit available (option).

Position indication

- Mechanical position indicator for circuit breaker and three-position switch
- Visual check of the switch position of the three-position switch through the VLS
- Electrical position indication of the circuit breaker via signaling lamps in the operating front.





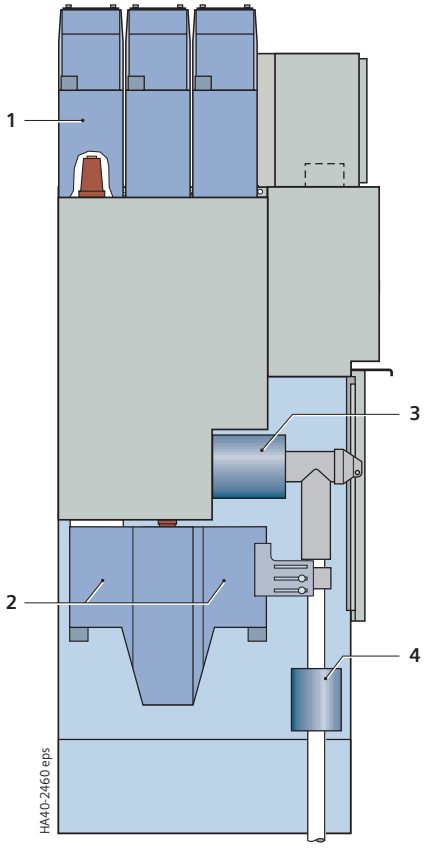
1 VL-module
2 Switch for light source
3 Eyepiece
4 Reference images
5 Protective cover
6 Electrical position indication for circuit breaker “OPEN”
7 Electrical position indication for circuit breaker “CLOSED”

Current transformer features

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

Voltage transformer features

- Single-pole, plug-in design
- Connection system plug-in contact according to DIN EN 50181
- Inductive type
- Safe-to-touch due to metal enclosure
- Climate-independent
- Secondary connection by means of plugs at the voltage transformer
- Grounding device for feeder voltage transformers
- Primary fuse integrated in the voltage transformer
- Cast-resin insulated.



1 Main-bus voltage transformer with primary fuse
2 Feeder voltage transformer with primary fuse
3 Feeder current transformer around the bushing
4 Feeder current transformer around the cable

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Medium-voltage systems

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