



Switchgear Type 8DH10,  
up to 24 kV, **Gas-Insulated**, Extendable

Medium-Voltage Switchgear

Catalog HA 41.11 · 2006

**SIEMENS**

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See Catalog HA 40.1	

Supersedes: Catalog HA 41.11 · 2005



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# Application, Requirements

## Features

8DH10 switchgear is a factory-assembled, type-tested, three-phase, metal-enclosed, metal-clad single-busbar switchgear for indoor installation:

- Up to 24 kV
- Feeder currents up to 630 A
- Busbar currents up to 1250 A

### Typical uses

8DH10 switchgear is used – even under severe environmental conditions – for power distribution in secondary distribution systems, e.g. in

- Substations, customer transfer substations, distribution substations and switching substations of power supply and public utilities
- Industrial plants, such as:
  - Wind power stations
  - High-rise buildings
  - Airports
  - Lignite open-cast mines
  - Underground railway stations
  - Sewage treatment plants
  - Port facilities
  - Traction power supply systems
  - Automobile industry
  - Petroleum industry
  - Chemical industry
  - Cement industry
  - Unit-type heating power stations
  - Textile, paper and food industry
  - Emergency power supply installations

### Modular design

- Individual panels and panel blocks can be freely combined and extended – without gas work on site
- Low-voltage compartments can be supplied in two overall heights and are wired to the panel by means of plug-in connections

### Reliability

- Type and routine-tested
- Standardized and manufactured using numerically controlled machines
- More than 430,000 8DJ/8DH panels in operation worldwide for many years

## Quality and environment

Quality and environmental management system acc. to DIN EN ISO 9001 and DIN EN ISO 14001

## Personal safety

- Safe-to-touch and hermetically sealed primary enclosure
- HV HRC fuses and cable sealing ends are only accessible when the outgoing feeders are earthed
- Operation is only possible when the enclosure is closed
- Logical mechanical interlocking
- Capacitive voltage detection system for verification of safe isolation from supply
- Earthing of outgoing feeders by means of make-proof earthing switches

## Security of operation

- Hermetically sealed primary enclosure independent of environmental effects (dirt, moisture and small animals) – sealed for life:
  - Welded switchgear vessel
  - Welded-in bushings and operating mechanism
- Maintenance-free operating mechanism parts (IEC 60 694/VEE 0670-1000)
- Switch operating mechanisms accessible outside the switchgear vessel
- Switchgear interlocking by means of logical mechanical interlocking
- Mechanical switch position indications integrated in the mimic diagram

## Cost-efficiency

Extremely low “life-cycle costs” and extremely high availability throughout the entire product service life as a result of:

- Maintenance-free concept
- Climatic independence
- Minimum space requirement
- Maximum availability

## Security of investment

Innovative developments, such as:

- Modular design
- Extendability of the switchgear without gas work on site
- 3AH maintenance-free vacuum circuit-breakers
- SIPROTEC protection relay family

## Typical uses

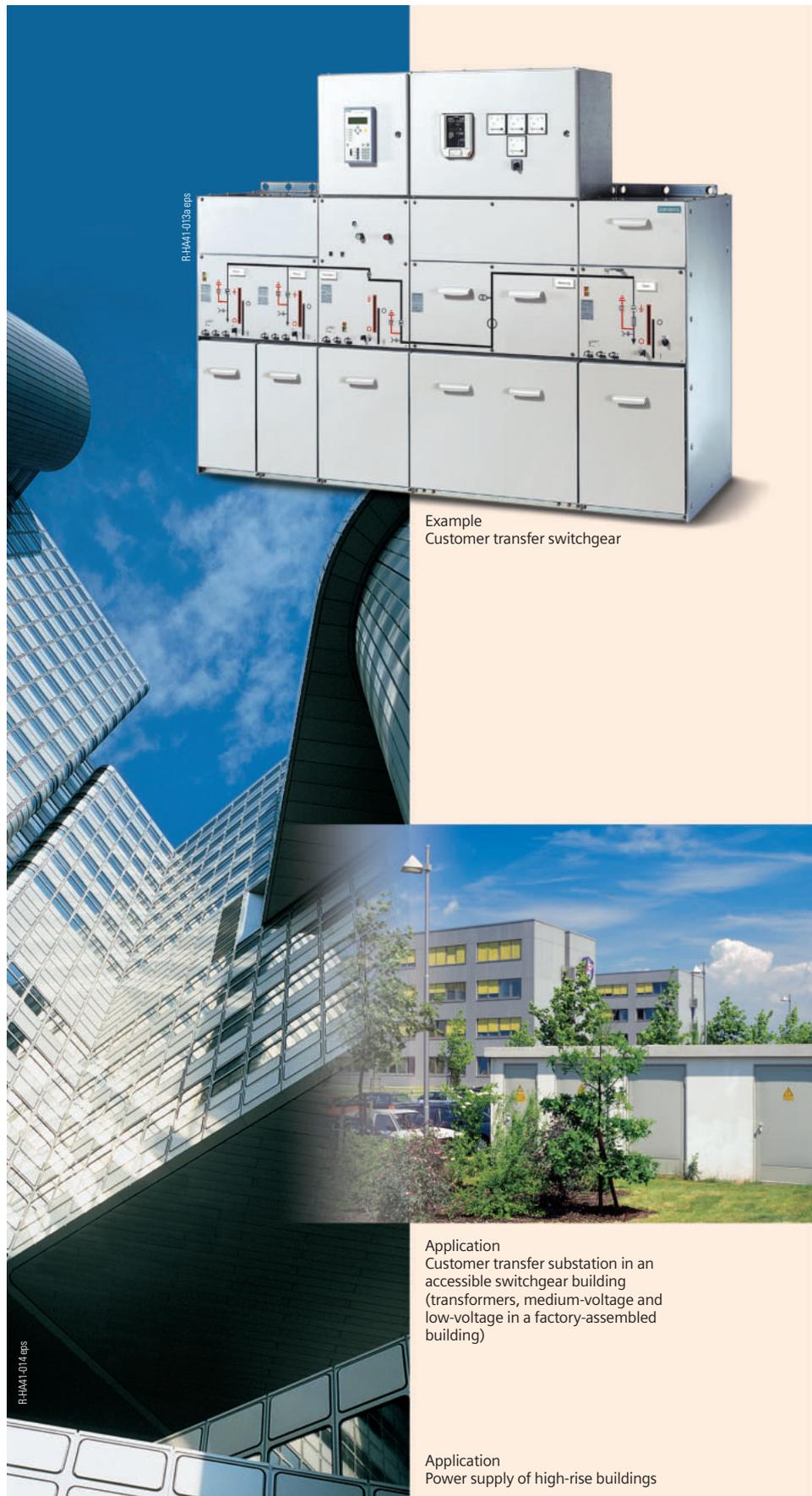
## Technical features

- Maintenance-free
- Climate-independent
- Partition class: Class PM (partition of metal)
- Three-pole primary enclosure, metal-enclosed, metal-clad
- Insulating gas SF<sub>6</sub>
- Gas-tight, welded switchgear vessel made of stainless steel with welded-in bushings for electrical connections and mechanical components
- Three-position switch-disconnector with load-break and make-proof earthing function
- Cable connection for bushings with outside cone
- Connection by means of cable plugs
  - In ring-main feeders and circuit-breaker feeders with bolted contact (M16)
  - In transformer feeders with plug-in contact
- Option: Connection with conventional cable sealing ends
  - For thermoplastic-insulated cables via elbow adapter AKE 20 / 630 (make Siemens)
  - For paper-insulated mass-impregnated cables via commercially available adapter systems
- Easy installation
- Option: Pressure absorber system
  - Maintenance-free
  - For rated short-time withstand current  $I_k \leq 20$  kA
  - For single and multi-panel combinations of 700 mm to 2000 mm width (for panel type ME1 with max. 1 adjacent panel)
  - With 300 mm high pressure absorber duct below the switchgear
  - With 115 mm deep pressure absorber duct for pressure relief upwards
  - With bolted cable compartment cover
  - Possible for switchgear with standard cable compartment cover
  - Option: Deeper cable compartment cover: 105 or 300 mm
  - For switchgear height, see page 6
  - Option: Free-standing arrangement, for switchgear height 2300 mm and with rear cover

For further information concerning the pressure absorber system, please refer to page 39 and to Catalog HA 40.1

## Standards

See page 14



Example  
Customer transfer switchgear

Application  
Customer transfer substation in an accessible switchgear building (transformers, medium-voltage and low-voltage in a factory-assembled building)

Application  
Power supply of high-rise buildings

# Technical Data

## Electrical data

Common electrical data	Rated insulation level	Rated voltage $U_r$	kV					
			7.2	12	15	17.5	24	
	Rated short-dur. power-freq. withstand voltage $U_d$ :	– phase-to-phase, phase-to-earth, open contact gap	kV	20	28 <sup>1)</sup>	36	38	50
		– across the isolating distance	kV	23	32	39	45	60
	Rated lightning impulse withstand voltage $U_p$ :	– phase-to-phase, phase-to-earth, open contact gap	kV	60	75 <sup>1)</sup>	95	95	125
		– across the isolating distance	kV	70	85	110	110	145
	Rated frequency $f_r$		50/60 Hz					
	Rated normal current $I_r$ <sup>2)</sup>	for busbar (standard)	up to A	630	630	630	630	630
		for busbar (option) <sup>*)</sup>	A	1250	1250	1250	1250	1250
Filling pressure, temperature, partition class and classification	Rated filling pressure $p_{re}$	for insulation	150 kPa (absolute) at 20 °C					
	Min. operating pressure $p_{me}$	for insulation	130 kPa (absolute) at 20 °C					
	Ambient temperature $T$ <sup>3)</sup>	Panels without secondary equipment	Class	"Minus 25 indoors" (-25 to +70 °C <sup>4)</sup> )				
		Panels with secondary equipment, circuit-breaker panel	Class	"Minus 5 indoors" (-5 to +55 °C <sup>4)</sup> )				
	Partition class		Class	PM (partition of metal)				
Loss of service continuity category	LSC (loss of service continuity)		LSC 2					

## Panel data

Ring-main panel type RK, bus sectionalizer panel type LT2, cable connection panel type K	Rated normal current $I_r$ <sup>2)</sup>	for feeder (for panel types RK ... and K ...)	A	400, 630	400, 630	400, 630	400, 630	400, 630	
		for bus sectionalizer panel type LT2	A	400, 630	400, 630	400, 630	400, 630	400, 630	
	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	20	25	20	25	20	25
		for switchgear with $t_k = 3$ s (option)	up to kA	–	–	20	–	20	–
	Rated peak withstand current $I_p$		up to kA	50	63	50	63	50	63
Rated short-circuit making current $I_{ma}$		up to kA	50	63	50	63	50	63	

Transformer panel type TR	Rated normal current $I_r$ <sup>2)</sup>	for feeder <sup>5)</sup>	A	200	200	200	200	200	
	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	20	25	20	25	20	25
		for switchgear with $t_k = 3$ s	up to kA	–	–	20	–	20	–
	Rated peak withstand current $I_p$ <sup>5)</sup>		up to kA	50	63	50	63	50	
	Rated short-circuit making current $I_{ma}$ <sup>5)</sup>		up to kA	25	25	25	25	25	
Reference dimension "e" of the HV HRC fuse links		mm	292 <sup>6)</sup>	292	442	442	442		

Circuit-breaker panel type LS, bus sectionalizer panel type LT1	Rated normal current $I_r$ <sup>2)</sup>	for feeder (for panel types LS ...)	A	400, 630	400, 630	400, 630	400, 630	400, 630
		for bus sectionalizer panel type LT1	A	400, 630	400, 630	400, 630	400, 630	400, 630
	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	20	25	20	25	20
		for switchgear with $t_k = 3$ s	up to kA	–	–	20	–	20
	Rated peak withstand current $I_p$		up to kA	50	63	50	63	50
	Rated short-circuit making current $I_{ma}$		up to kA	50	63	50	63	50
	Rated short-circuit breaking current $I_{sc}$ <sup>7)</sup>		up to kA	20	25	20	25	20
Electrical service life of 3AH vacuum circuit-breakers	at rated normal current		10 000 operating cycles					
	at rated short-circuit breaking current		50 make-break operations					

\*) Not for billing metering panels type ME1

1) 12/42/95 kV (for  $I_k = 20$  kA) according to some national requirements

2) The rated normal currents apply to ambient temperatures of max. 40 °C. The 24-hour-mean value is max. 35 °C (according to IEC 60 694 / VDE 0670-1000)

3) Operating conditions according to IEC 62 271-200.

For application, see also pages 2 and 41 (climate and ambient conditions)

4) Temperature range, reduced normal currents at > +40 °C

5) Depending on the HV HRC fuse link, observe the max. cut-off current of the HV HRC fuse links

6) Extension tube (150 mm long) required additionally for fuse mounting 442 mm

7) For 3AH vacuum circuit-breakers

## Electrical data

Common electrical data	Rated insulation level	Rated voltage $U_r$	kV		7.2	12	15	17.5	24
			Rated short-dur. power-freq. withstand voltage $U_d$ :						
			– phase-to-phase, phase-to-earth, open contact gap	kV	20	28 <sup>1)</sup>	36	38	50
			– across the isolating distance	kV	23	32	39	45	60
		Rated lightning impulse withstand voltage $U_p$ :							
		– phase-to-phase, phase-to-earth, open contact gap	kV	60	75 <sup>1)</sup>	95	95	125	
		– across the isolating distance	kV	70	85	110	110	145	
	Rated frequency $f_r$			50/60 Hz					
	Rated normal current $I_r$ <sup>2)</sup>	for busbar (standard)	up to A	630	630	630	630	630	
		for busbar (option) <sup>*)</sup>	A	1250	1250	1250	1250	1250	
Filling pressure, temperature, partition class and classification	Rated filling pressure $p_{re}$	for insulation		150 kPa (absolute) at 20 °C					
	Min. operating pressure $p_{me}$	for insulation		130 kPa (absolute) at 20 °C					
	Ambient temperature $T$ <sup>3)</sup>	Panels without secondary equipment	Class		"Minus 25 indoors" (-25 to +70 °C <sup>4)</sup> )				
		Panels with secondary equipment, circuit-breaker panels	Class		"Minus 5 indoors" (-5 to +55 °C <sup>4)</sup> )				
	Partition class		Class		PM (partition of metal)				
Loss of service continuity category	LSC (loss of service continuity)			LSC 2					

## Panel data

Busbar earthing panel type SE, busbar voltage metering panel type ME3	Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	20	25	20	25	20	25	20	25	20	
			for switchgear with $t_k = 3$ s (option)	up to kA	–	–	20	–	20	–	20	–	20
			Rated peak withstand current $I_p$	up to kA	50	63	50	63	50	63	50	63	50
		Rated short-circuit making current $I_{ma}$		up to kA	50	63	50	63	50	63	50	63	50

Billing metering panels types ME1 and ME2	Rated normal current $I_r$ <sup>2)</sup>	for transfer	up to A	630	630	630	630	630	630			
			for feeder (cable connection panel type ME1-K)	up to A	630	630	630	630	630	630		
			for busbar metering	up to A	630	630	630	630	630	630		
		Rated short-time withstand current $I_k$	for switchgear with $t_k = 1$ s	up to kA	–	25	20	25	20	25	20	
for switchgear with $t_k = 3$ s			up to kA	20	–	20	–	20	–	20	–	
	Rated peak withstand current $I_p$		up to kA	50	63	50	63	50	63	50	63	50

\*) Not for billing metering panels type ME1

1) 12/42/95 kV (for  $I_k = 20$  kA) according to some national requirements

2) The rated normal currents apply to ambient temperatures of max. 40 °C. The 24-hour-mean value is max. 35 °C (according to IEC 60 694 / VDE 0670-1000)

3) Operating conditions according to IEC 62 271-200.

For application, see also pages 2 and 41 (climate and ambient conditions)

4) Temperature range, reduced normal currents at > +40 °C

# Technical Data

## Switchgear installation

### Room planning

#### Switchgear installation

- Wall-standing arrangement
- Single row
  - Double row (for face-to-face arrangement)
- For room planning and switchgear installation, please note:
- Floor openings: Dimensions see pages 36 to 39
  - Direction of pressure relief acc. to serial No. 13
  - Respective pressure relief rooms

Room dimensions see opposite dimension drawings

#### Door dimensions

- The door dimensions depend on the
- Number of panels in a transport unit
  - Design with or without low-voltage compartment

#### Switchgear fastening

- For floor openings and fixing points of the switchgear, see pages 36 to 39
- Foundations:
  - Steel structure
  - Steel-reinforced concrete

Panel dimensions see p. 30 to 34

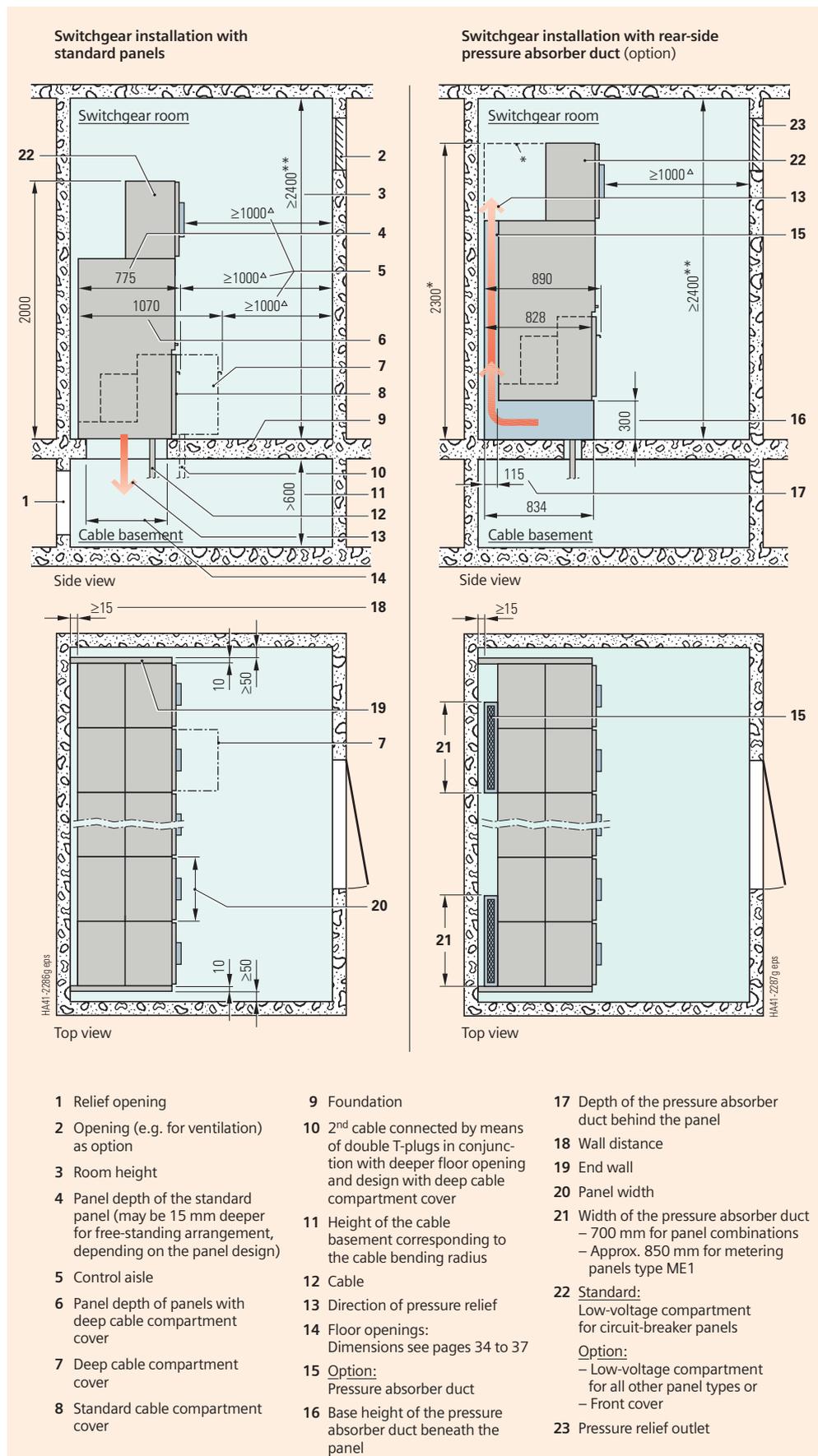
#### Weight

The weight of a panel depends on the extent to which it is equipped (e.g. with motor operating mechanism, voltage transformer). For details, please refer to page 7.

- \* Switchgear height for version with pressure absorber duct:
  - For wall-standing arrangement  $\geq 1950$  mm (panel combination without metering panel ME1)  $\geq 2300$  mm (for combination with metering panel ME1)
  - For free-standing arrangement  $\geq 2300$  mm (high end walls, rear wall and front covers, optional low-voltage compartment)

- \*\* Installation conditions for internal arc classification acc. to IEC 62 271-200

- △ Depending on national requirements:
  - For extension/panel replacement: Control aisle  $\geq 1000$  mm recommended (for Germany  $\geq 800$  mm)



## Shipping data

Individual panel, panel block or combinations thereof for standard switchgear (without pressure relief duct)	Type	Panel or panel combination		Transport unit (including packing) for standard panels (without pressure absorber system)				
		Width B1 mm	Net weight <sup>1)</sup> approx. kg without / with LVC * / LVC *	Width B2 m	Height m without / with LVC * / LVC *	Depth T2 m	Volume m <sup>3</sup> without / with LVC * / LVC *	Gross weight <sup>1)</sup> approx. kg without / with LVC * / LVC *

## Transport of individual panels

Ring-main panel (standard)	RK	350	150 / 210	0.70	1.60 / 2.20	1.10	1.23 / 1.69	210 / 270	
	RK1	500	180 / 240	0.70	1.60 / 2.20	1.10	1.23 / 1.69	240 / 300	
	RK2	500	200 / 260	0.70	1.60 / 2.20	1.10	1.23 / 1.69	260 / 320	
Cable panel (standard)	K	350	145 / 205	0.70	1.60 / 2.20	1.10	1.23 / 1.69	205 / 265	
Transformer panel	TR	500	180 / 240	0.70	1.60 / 2.20	1.10	1.23 / 1.69	240 / 300	
Circuit-breaker panel (standard)	LS1	500	- / 260	0.70	- / 2.20	1.10	- / 1.69	- / 320	
	LS2	500	- / 380	0.70	- / 2.20	1.10	- / 1.69	- / 440	
Bus sectionalizer panel	LT1	500	- / 280	0.70	- / 2.20	1.10	- / 1.69	- / 340	
	LT1-V	500	- / 380	0.70	- / 2.20	1.10	- / 1.69	- / 440	
	LT2	500	150 / 210	0.70	1.60 / 2.20	1.10	1.23 / 1.69	210 / 270	
Busbar earthing panel	SE1	350	150 / 210	0.70	1.60 / 2.20	1.10	1.23 / 1.69	210 / 270	
	SE2	500	250 / 310	0.70	1.60 / 2.20	1.10	1.23 / 1.69	310 / 370	
Busbar voltage metering panel	ME3	500	250 / 310	0.70	1.60 / 2.20	1.10	1.23 / 1.69	310 / 370	
Billing metering panels, air-insulated	low structure	ME1 **	850	250 / 310	1.08	1.60 / 2.20	1.10	1.90 / 2.61	310 / 370
	with combined instrument transformers	ME2 **	600	390 / 450	1.08	1.60 / 2.20	1.10	1.90 / 2.61	450 / 510

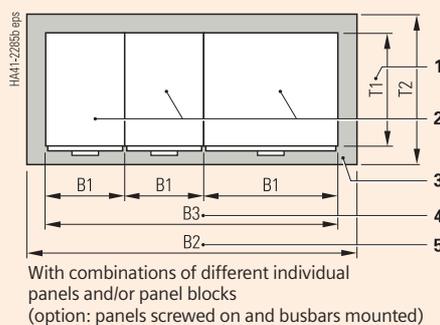
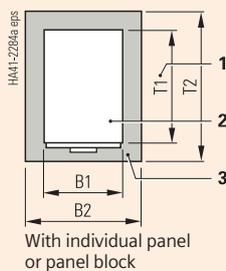
## Transport of panel blocks

Ring-main panel block	R-B2	700	280 / 400	1.08	1.60 / 2.20	1.10	1.90 / 2.61	340 / 460
	R-B3	1050	400 / 580	1.40	1.60 / 2.20	1.10	2.46 / 3.40	470 / 650
Transformer panel block	T-B2	1000	320 / 440	1.40	1.60 / 2.20	1.10	2.46 / 3.40	390 / 510
	T-B3	1500	480 / 660	2.03	1.60 / 2.20	1.10	3.57 / 4.91	560 / 740
Ring-main/transformer panel block	RT-B2	700	300 / 420	1.08	1.60 / 2.20	1.10	1.90 / 2.61	360 / 480
	2RT-B3	1050	450 / 630	1.40	1.60 / 2.20	1.10	2.46 / 3.40	520 / 700
	3RT-B4	1400	580 / 820	2.03	1.60 / 2.20	1.10	3.57 / 4.91	660 / 900
Cable connection/transformer panel block	KT-B2	700	300 / 420	1.08	1.60 / 2.20	1.10	1.90 / 2.61	360 / 480

## Transport of combinations of different individual panels or panel blocks

Comprising	Overall width B3	B2	T2			
- a number of individual panels or - 1 panel block or - a number of panel blocks or - individual panels with panel blocks	≤ 850 mm	1.08	1.60 / 2.20	1.10	1.90 / 2.61	2) + 60 ***
	≤ 1200 mm	1.40	1.60 / 2.20	1.10	2.46 / 3.39	2) + 70 ***
	≤ 1800 mm	2.03	1.60 / 2.20	1.10	3.57 / 4.91	2) + 85 ***
	≤ 2350 mm	2.53	1.60 / 2.20	1.10	4.49 / 6.17	2) + 100 ***

## Transport units for shipping (top view)



- 1 T1 = Depth of individual panel or of panel block
- 2 Individual panel or panel block, dimension B1 x T1
- 3 Transport unit, dimension B2 x T2
- 4 B3 = Overall width of combination of different individual panels or panel blocks
- 5 B2 = Width of the transport unit

- 1) The net weight and the gross weight depend on the extent to which they are equipped (e.g. with current transformers, motor operating mechanism, deep cable compartment cover) and are therefore given as mean value
- 2) Sum of the net weights of individual panels and / or panel blocks

\* Low-voltage compartment, 600 mm high, weight approx. 60 kg depending on the panel type and on the extent to which it is equipped

\*\* The weights depend on the weights of the mounted transformers

\*\*\* Packing weight

# Product Range

## Product range overview

Designation of the individual panels and panel blocks	Panel width	Type
---	-------------	------

### Individual panels

Column No. \_\_\_\_\_

Ring-main panel	350	RK
	500	RK1
	350	RK-U
	500	RK1-U
Cable panel without earthing switch	350	K
	350	K-U
Cable panel with make-proof earthing switch	350	K
	350	K-U
Transformer panel	500	TR
	500	TR-U
Transformer panel with plug-in voltage transformers	500	TR-V
	500	TR/V
Circuit-breaker panel	500	LS1-...
	500	LS1-U
Circuit-breaker panel with plug-in busbar voltage transformers	500	LS2-...
	500	LS2-U
Bus sectionalizer panel with vacuum circuit-breaker	500	LT1
	500	LT1-V
Bus sectionalizer panel	500	LT2
Busbar earthing panel	350	SE1
	500	SE2
Busbar voltage metering panel	500	ME3
Billing metering panel	850	ME1
	850	ME1-K
Billing metering panel for busbar connection cable connection	850	ME1-S
	850	ME1-KS
Billing metering panel with combined transformers	600	ME2

### Panel blocks

Column No. \_\_\_\_\_

Ring-main panel block	700	R-B2
	1050	R-B3
Transformer panel block	1000	T-B2
	1500	T-B3
	700	RT-B2 < $\begin{matrix} \text{RK} \\ \text{T} \end{matrix}$
Ring-main/transformer panel block	1050	2RT-B3 < $\begin{matrix} \text{RK} \\ \text{T} \end{matrix}$
	1400	3RT-B4 < $\begin{matrix} \text{RK} \\ \text{T} \end{matrix}$
Cable connection/transformer panel block (cable panel without make-proof earthing switch)	700	KT-B2 < $\begin{matrix} \text{K} \\ \text{T} \end{matrix}$
Cable connection/transformer panel block (cable panel with make-proof earthing switch)	700	KT-B2 < $\begin{matrix} \text{K} \\ \text{T} \end{matrix}$

#### Legend for page 9

△ Three-position switch as three-position switch-disconnector (switch-disconnector CLOSED-OPEN-EARTHED)

△△ Three-position switch as three-position circuit-breaker (circuit-breaker CLOSED-OPEN-EARTHED), see Supplements to Catalogs HA 45.31/41.11-2006

1) The equipment applies to the entire panel block, but it is located in the first feeder panel from the left

2) Low-voltage terminals arranged in the low-voltage niche of the ring-main or cable feeder

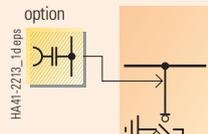
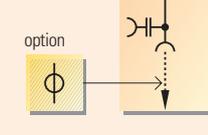
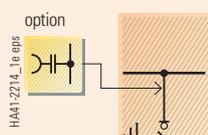
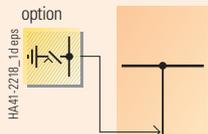
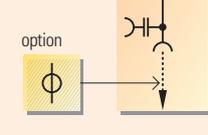
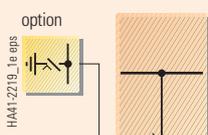
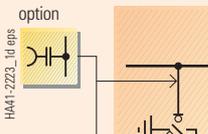
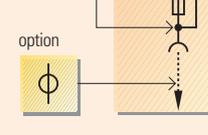
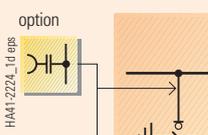
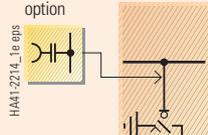
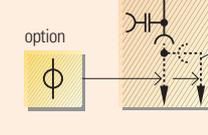
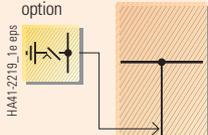
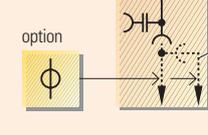
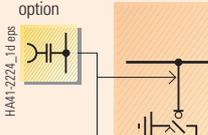
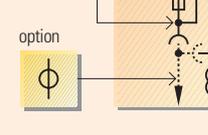
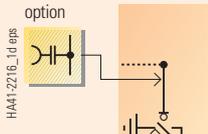
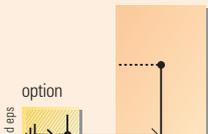
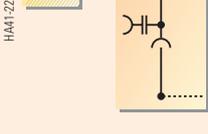
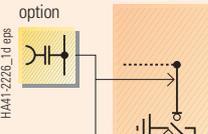
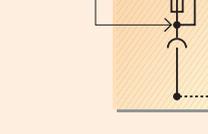
Equipment features

- Basic equipment
- Additional equipment (option), further additional equipment on request
- Not available

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Manual operating mechanism for three-position switch Δ)	•	–	•	–	•	•	–	–	–	•	○	○	○	–	–	○	○	○	–	–	○	○	○	○
Manual operating mechanism for three-position circuit-breaker Δ)	•	–	•	–	•	•	–	–	–	•	○	○	○	–	–	○	○	○	–	–	○	○	○	○
Interlock for cable compartment for three-position switch Δ)	•	–	•	–	–	•	–	–	–	•	○	○	○	–	–	○	○	–	–	–	○	○	–	○
Cable compartment cover locked in place/screwed on	–	–	–	•	•	•	–	–	–	•	○	–	–	–	–	–	–	○	–	–	○	○	○	○
C-rail as cable bracket	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Low-voltage niche as terminal comp. above the operating mechanism box	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Separate low-voltage terminals in the operating mechanism box	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Shunt release for three-position switch Δ)	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Mechan. ready for service indicator Δ)	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Signalling switch (1 NO) for remote electrical ready-for-service indication	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Aux. switch for three-position switch Δ): SWITCHDISCONNECTOR CLOSED/OPEN; 2 NO + 2 NC	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Motor-operat. mechan. for three-position switch Δ)	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Interlock in circuit-breaker panel for three-position switch Δ)	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
De-earthing lock-out for make-proof earthing switch of three-position switch Δ)	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Closing lock-out for three-position switch Δ)	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Locking device for three-position switch Δ)	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Short-circuit or earth-fault indicator	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Motor operating mechanism for 3AH vacuum circuit-breaker	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Low-voltage compartment	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Low-voltage cover	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Mounted cable clamps	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○
Secondary equipment	•	–	•	–	•	•	–	–	–	•	○	○	–	–	–	–	–	○	○	–	○	○	○	○

# Product Range

## Ring-main panels, cable and transformer panels as individual panels

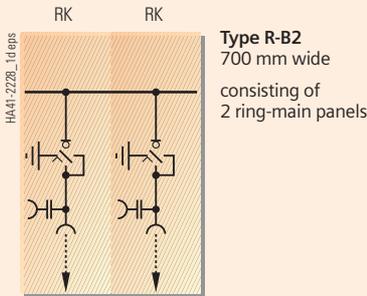
Ring-main panels as feeder panels	Cable panels as feeder panels	Transformer panels as feeder panels	
<p><b>option</b></p>  <p><b>Type RK</b> 350 mm wide</p> <p><b>option</b></p>  <p><b>Type RK1</b> <sup>1) 2) 3)</sup> 500 mm wide</p> <p><b>option</b></p>  <p>On request: <b>Type RK2</b> <sup>1) 2) 3)</sup> 500 mm wide</p>	<p><b>option</b></p>  <p><b>Type K</b> 350 mm wide</p> <p><b>option</b></p>  <p><b>Type K-K</b> * 350 mm wide for 2<sup>nd</sup> cable</p> <p><b>option</b></p>  <p><b>Type K-A</b> * 350 mm wide with plug-in surge arresters</p>	<p><b>option</b></p>  <p><b>Type TR</b> 500 mm wide</p> <p><b>option</b></p>  <p><b>Type TR-V</b> Δ 500 mm wide with plug-in voltage transformers</p> <p><b>option</b></p>  <p><b>Type TR-V</b> Δ 500 mm wide (105 mm deeper cable compartment cover) with plug-in voltage transformers instead of cable connection</p>	 <p>Three-position switch-disconnector</p>  <p>HV HRC fuse</p>  <p>Capacitive voltage detection system</p>  <p>Cable-type current transformer</p>  <p>4MT8 plug-in voltage transformer at the cable connection</p>  <p>4MT8 plug-in voltage transformer at the connection</p>
<p><b>option</b></p>  <p><b>Type RK-K</b> * 350 mm wide for 2<sup>nd</sup> cable</p> <p><b>option</b></p>  <p><b>Type RK-A</b> * 350 mm wide with plug-in surge arresters</p>	<p><b>option</b></p>  <p><b>Type K-K</b> * 350 mm wide for 2<sup>nd</sup> cable</p> <p><b>option</b></p>  <p><b>Type K-A</b> * 350 mm wide with plug-in surge arresters</p>	<p><b>option</b></p>  <p><b>Type TR-V</b> Δ 500 mm wide with plug-in voltage transformers</p> <p><b>option</b></p>  <p><b>Type TR-V</b> Δ 500 mm wide (105 mm deeper cable compartment cover) with plug-in voltage transformers instead of cable connection</p>	<p>↓</p> <p>Cable (not included in the scope of supply)</p> <p>↓</p> <p>2<sup>nd</sup> cable (not included in the scope of supply)</p>
<p><b>option</b></p>  <p><b>Type RK-U</b> 350 mm wide for transfer to the right</p> <p>On request: <b>Type RK1-U</b> <sup>3)</sup> <b>Type RK2-U</b> <sup>2) 3)</sup> 500 mm wide</p> <p><b>option</b></p>  <p><b>Type RK-U</b> 350 mm wide for transfer to the left</p> <p>On request: <b>Type RK1-U</b> <sup>3)</sup> <b>Type RK2-U</b> <sup>2) 3)</sup> 500 mm wide</p>	<p><b>option</b></p>  <p><b>Type K-U</b> 350 mm wide for transfer to the right</p> <p><b>option</b></p>  <p><b>Type K-U</b> 350 mm wide for transfer to the left</p>	<p><b>option</b></p>  <p><b>Type TR-U</b> 500 mm wide for transfer to the right</p> <p><b>option</b></p>  <p><b>Type TR-U</b> 500 mm wide for transfer to the left</p>	 <p>Plug-in surge arrester</p>  <p>Make-proof earthing switch</p>

Footnotes see page 11

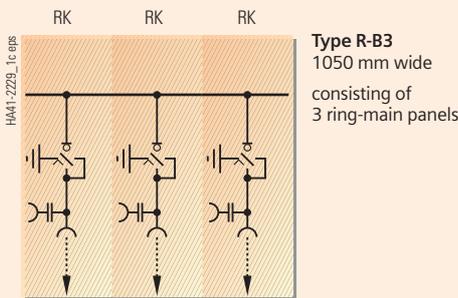
Ring-main panels, cable and transformer panels in panel blocks

Ring-main panel blocks

Designs and options for each panel, see page 10



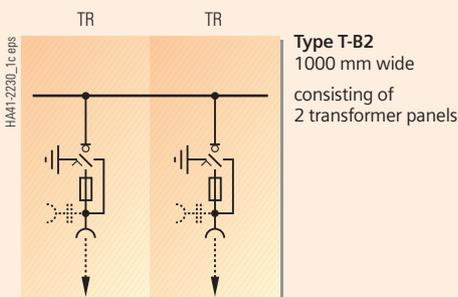
**Type R-B2**  
700 mm wide  
consisting of  
2 ring-main panels



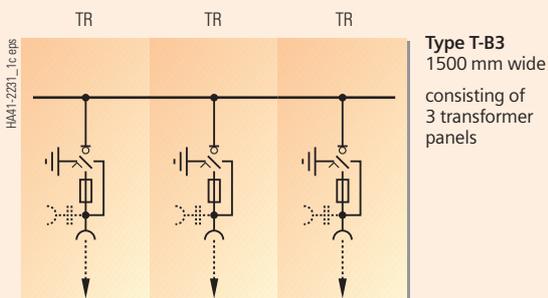
**Type R-B3**  
1050 mm wide  
consisting of  
3 ring-main panels

Transformer panel blocks

Designs and options for each panel, see page 10



**Type T-B2**  
1000 mm wide  
consisting of  
2 transformer panels



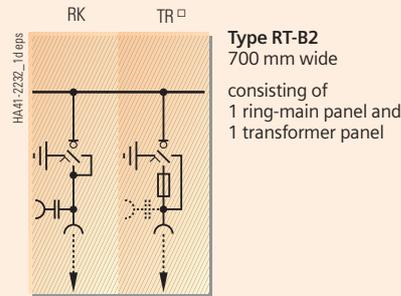
**Type T-B3**  
1500 mm wide  
consisting of  
3 transformer panels

Designs

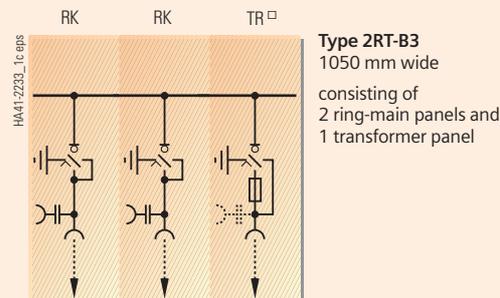
- Busbar connection system for connection of individual panels or panel blocks: Arranged in the left-hand panel of the panel block (therefore extendable at a later date)
- Only either the left-hand or the right-hand panel of the panel block can be designed as a transfer panel with busbar connection
- Panel blocks are also available without a busbar connection system (extendable at a later date only via the cable feeder)

Ring-main/transformer panel blocks

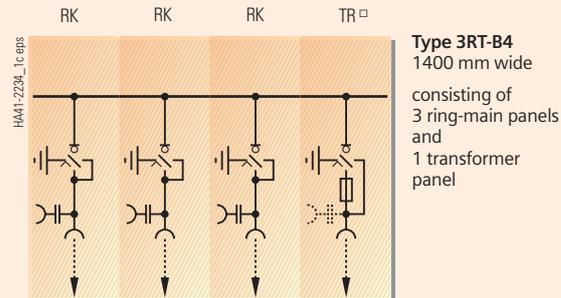
Designs and options for each panel, see page 10



**Type RT-B2**  
700 mm wide  
consisting of  
1 ring-main panel  
and  
1 transformer panel



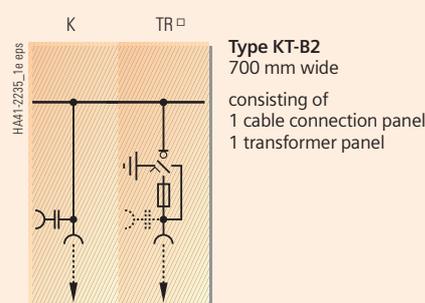
**Type 2RT-B3**  
1050 mm wide  
consisting of  
2 ring-main panels  
and  
1 transformer panel



**Type 3RT-B4**  
1400 mm wide  
consisting of  
3 ring-main panels  
and  
1 transformer panel

Cable connection/transformer panel block

Designs and options for each panel, see page 10

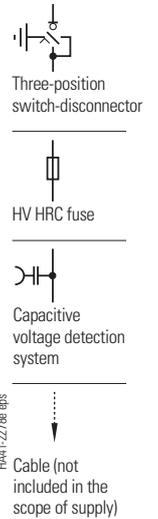


**Type KT-B2**  
700 mm wide  
consisting of  
1 cable connection panel  
and  
1 transformer panel

Designs

- Busbar connection system for connection of individual panels or panel blocks: Arranged in the left-hand panel of the panel block (therefore extendable at a later date)
- Only either the left-hand or the right-hand panel of the panel block can be designed as a transfer panel with busbar connection
- Panel blocks are also available without a busbar connection system (extendable at a later date only via the cable feeder)

□ A plug-in voltage transformer cannot be provided at the connection



Footnotes from page 10

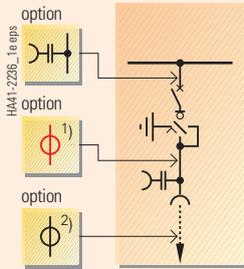
- △ Deep cable compartment cover required
  - \* Depending on the make/type of the cable plug or arrester: Deep cable compartment cover required
  - \*\* Cable-type current transformer on the 2<sup>nd</sup> cable: For 300 mm deeper cable compartment cover
- 1) Suitable for type 4MT8 voltage transformers
  - 2) Suitable for type 4MT3 voltage transformer
  - 3) Suitable for three-phase current transformers

# Product Range

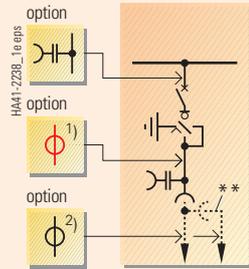
## Circuit-breaker panels as individual panels

### Circuit-breaker panels

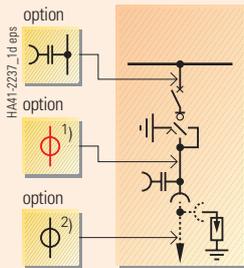
as feeder panels



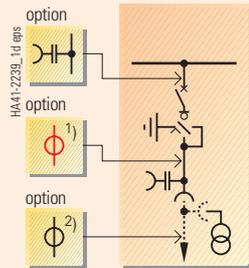
**Type LS1**  
500 mm wide  
Basic panel



**Type LS1-K \***  
500 mm wide  
for 2<sup>nd</sup> cable



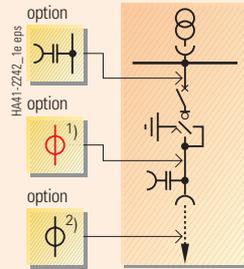
**Type LS1-A \***  
500 mm wide  
with plug-in  
surge arresters or  
limiters



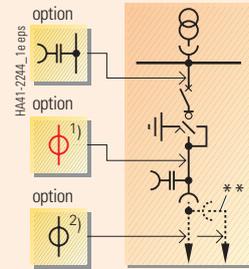
**Type LS1-V Δ**  
500 mm wide  
with plug-in  
voltage trans-  
formers

### Circuit-breaker panels with plug-in busbar voltage transformers

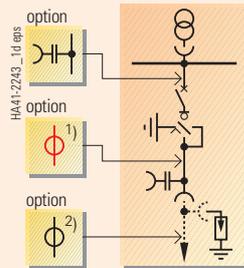
as feeder panels



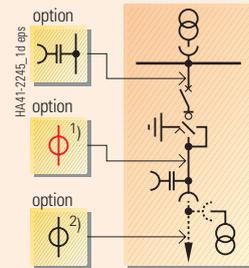
**Type LS2**  
500 mm wide  
Basic panel



**Type LS2-K \***  
500 mm wide  
for 2<sup>nd</sup> cable

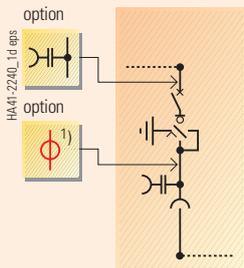


**Type LS2-A \***  
500 mm wide  
with plug-in  
surge arresters or  
limiters

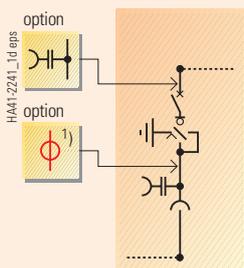


**Type LS2-V Δ**  
500 mm wide  
with plug-in  
voltage trans-  
formers

as transfer panels

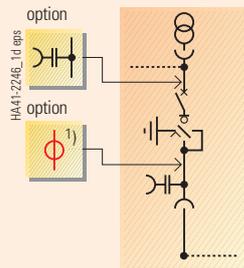


**Type LS1-U**  
500 mm wide  
for transfer  
to the right

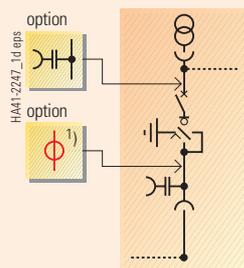


**Type LS1-U**  
500 mm wide  
for transfer  
to the left

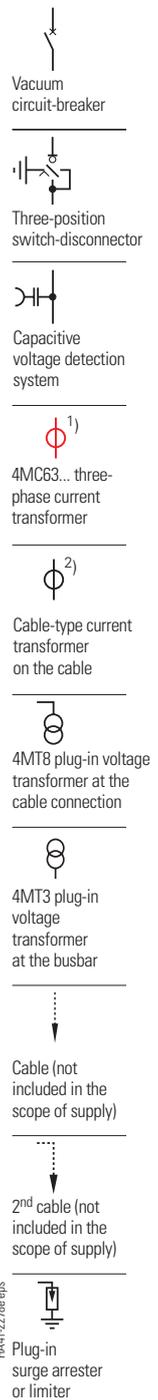
as transfer panels



**Type LS2-U**  
500 mm wide  
for transfer  
to the right



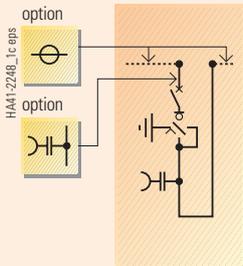
**Type LS2-U**  
500 mm wide  
for transfer  
to the left



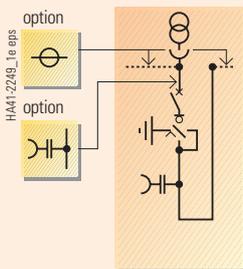
Footnotes  
see page 13

Bus sectionalizer panels, busbar earthing panels and busbar voltage metering panel as individual panels

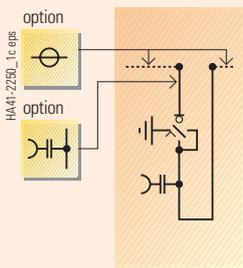
Bus sectionalizer panels



**Type LT1**  
500 mm wide  
with vacuum  
circuit-breaker



**Type LT1-V**  
500 mm wide  
with vacuum  
circuit-breaker and  
plug-in voltage  
transformers

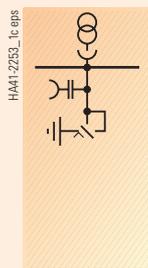


**Type LT2**  
500 mm wide

Busbar earthing panels

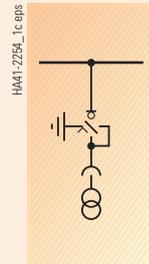


**Type SE1**  
350 mm wide

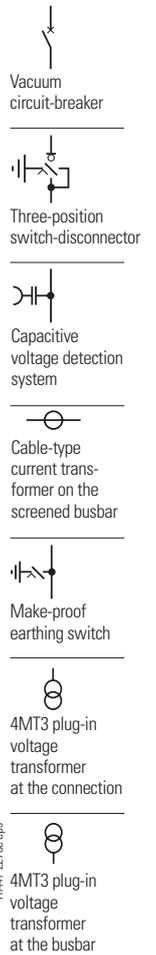


**Type SE2**  
500 mm wide  
with plug-in  
voltage  
transformers

Busbar voltage metering panel



**Type ME3**  
500 mm wide



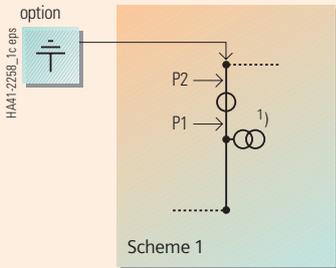
**Footnotes**  
from page 12

- △ Deep cable compartment cover required
- \* Depending on the make/type of the cable plug or arrester: Deep cable compartment cover required
- \*\* Cable-type current transformer on the 2<sup>nd</sup> cable: For 300 mm deeper cable compartment cover

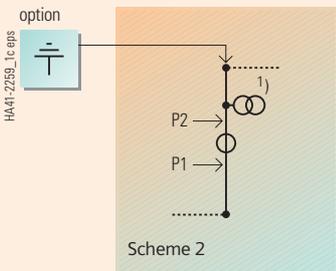
# Product Range

## Air-insulated metering panels as transfer panels

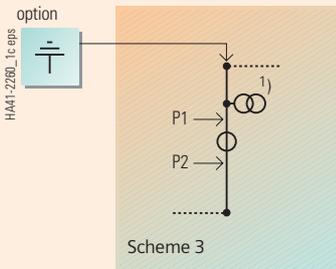
### Billing metering panels (standard) low structure



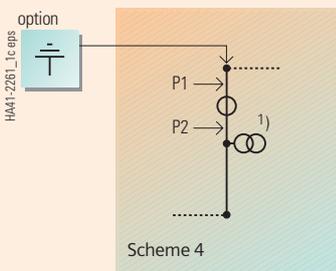
**Type ME1**, 850 mm wide for transfer to the right



**Type ME1**, 850 mm wide for transfer to the right, transformer terminals interchanged



**Type ME1**, 850 mm wide for transfer to the right

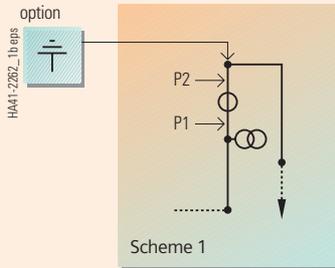


**Type ME1**, 850 mm wide for transfer to the right, transformer terminals interchanged

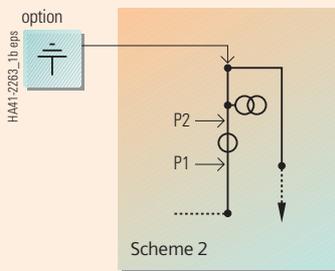
**Note**

Schemes 1 to 4 also feasible for transfer to the left

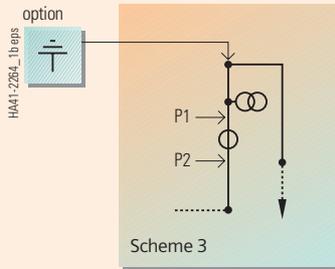
### Billing metering panels as end panels, for cable connection low structure



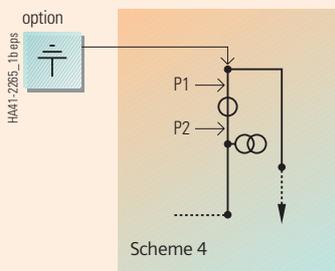
**Type ME1-K**, 850 mm wide for transfer to the right



**Type ME1-K**, 850 mm wide for transfer to the right, transformer terminals interchanged



**Type ME1-K**, 850 mm wide for transfer to the right

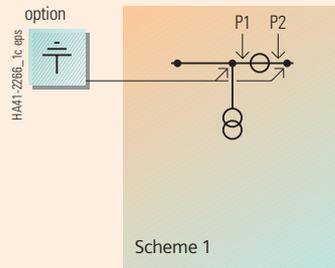


**Type ME1-K**, 850 mm wide for transfer to the right, transformer terminals interchanged

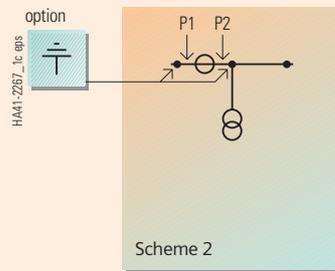
**Note**

Schemes 1 to 4 also feasible for transfer to the left

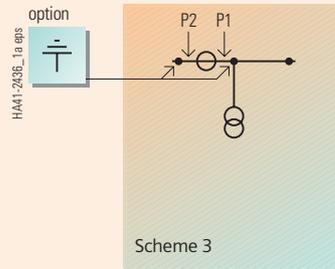
### Billing metering panels for busbar connection low structure



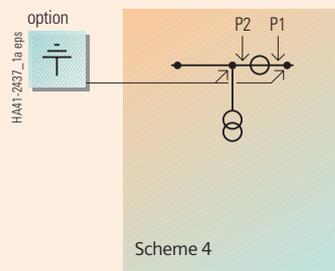
**Type ME1-S**, 850 mm wide for busbar metering



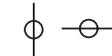
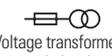
**Type ME1-S**, 850 mm wide for busbar metering, transformer terminals interchanged



**Type ME1-S**, 850 mm wide for busbar metering, transformer terminals interchanged



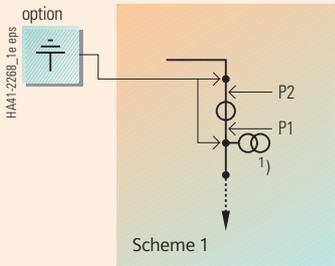
**Type ME1-S**, 850 mm wide for busbar metering, transformer terminals interchanged

-  Current transformer, cast-resin insulated
-  1) Voltage transformer, cast-resin insulated or on request:
-  Voltage transformer, cast-resin insulated, with HV HRC fuses
-  Voltage transformer, cast-resin insulated
-  Fixed points for busbar earthing
-  Cable (not included in the scope of supply)

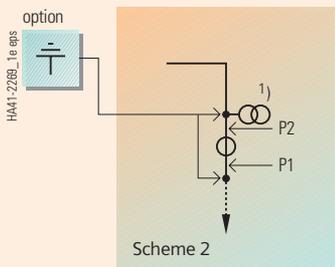
P1 and P2 are terminal designations of the current transformer

Air-insulated metering panels as transfer panels

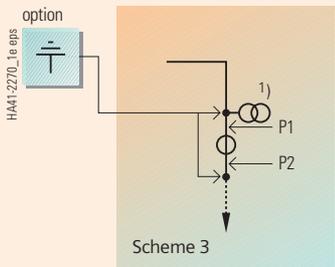
Billing metering panels as end panels, for cable connection low structure



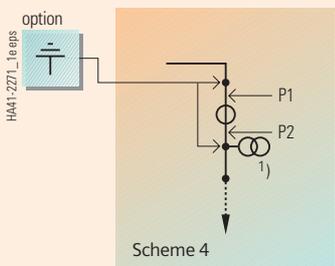
**Type ME1-KS**, 850 mm wide for transfer to the right



**Type ME1-KS**, 850 mm wide for transfer to the right, transformer terminals interchanged

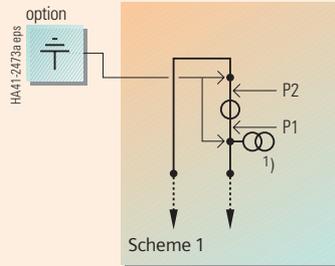


**Type ME1-KS**, 850 mm wide for transfer to the right

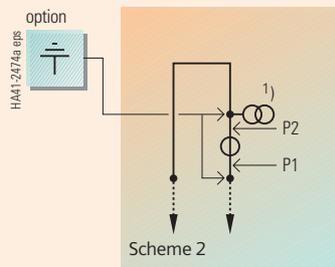


**Type ME1-KS**, 850 mm wide for transfer to the right, transformer terminals interchanged

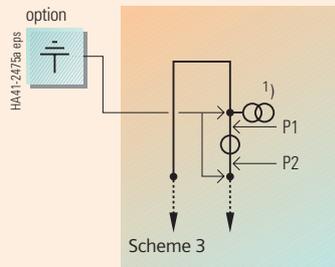
Billing metering panels as individual panels, for cable connection, low structure



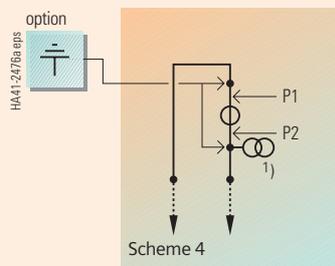
**Type ME1-KK**, 850 mm wide for cable connection



**Type ME1-KK**, 850 mm wide for cable connection, transformer terminals interchanged



**Type ME1-KK**, 850 mm wide for cable connection

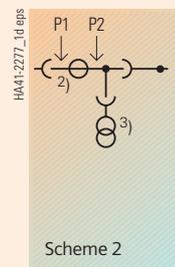


**Type ME1-KK**, 850 mm wide for cable connection, transformer terminals interchanged

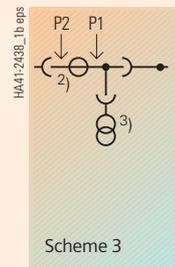
Billing metering panels \* with metal-enclosed combined transformers



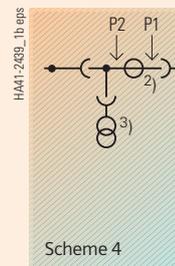
**Type ME2**, 600 mm wide for transfer to the right



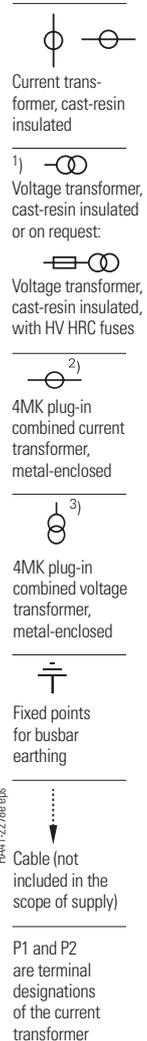
**Type ME2**, 600 mm wide for transfer to the right, transformer terminals interchanged



**Type ME2**, 600 mm wide for transfer to the left



**Type ME2**, 600 mm wide for transfer to the left, transformer terminals interchanged



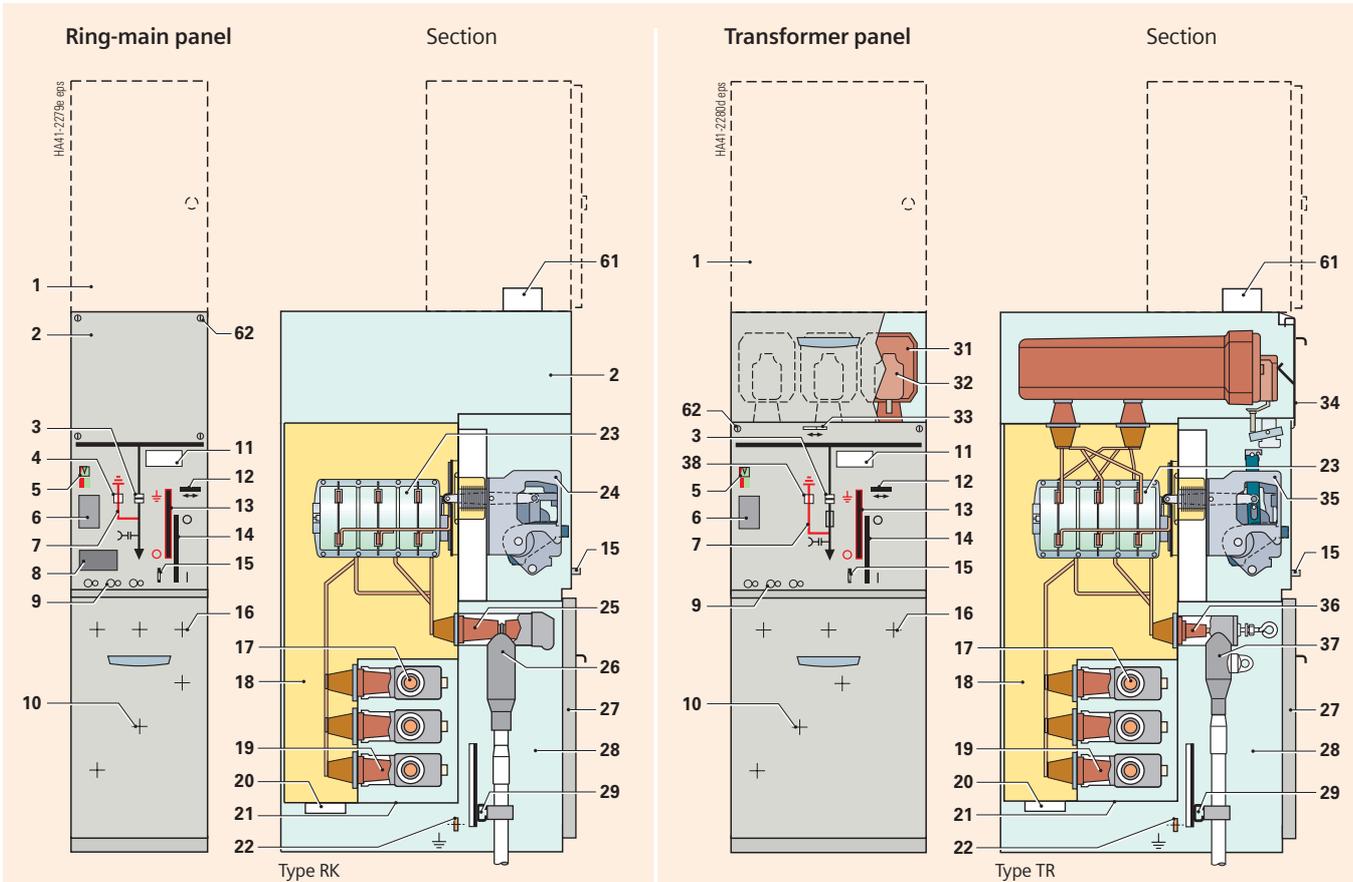
Note

Schemes 1 to 4 also feasible as left-hand end panel for transfer to the left

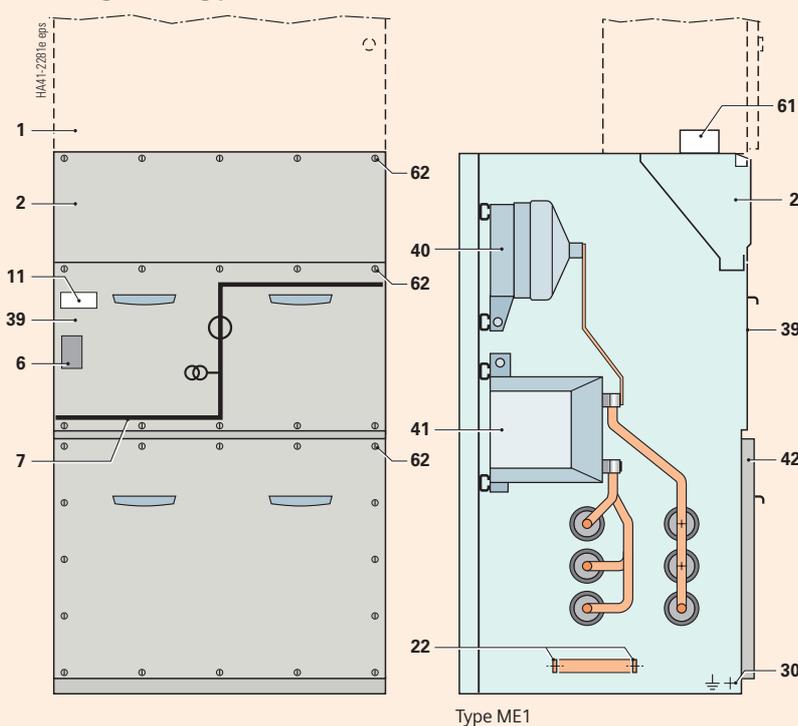
\* Mainly for connection to bus sectionalizer panels LT1, LT1-V and LT2

# Design

## Panel design (examples)



### Billing metering panel, air-insulated



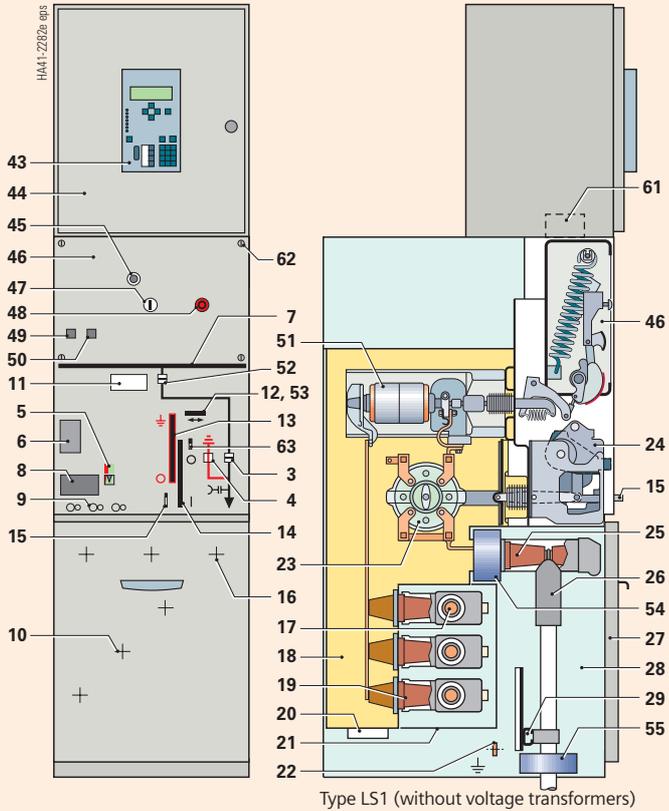
#### Legend for pages 16 and 17

- 1 Option: Low-voltage compartment
- 2 Niche for optional low-voltage equipment, with hinged cover
- 3 Switch position indication for load-break function "CLOSED - OPEN"
- 4 Switch position indication for earthing function "OPEN - EARTHED"
- 5 Ready-for-service indicator
- 6 Rating plate
- 7 Mimic diagram
- 8 Option: Short-circuit / earth-fault indicator
- 9 Sockets for voltage detection system
- 10 Arrangement of the busbars
- 11 Feeder designation label
- 12 Option: Locking device for three-position switch-disconnector
- 13 Manual operation for the mechanism of the earthing function
- 14 Manual operation for the mechanism of the load-break function
- 15 Interlock of the cable compartment cover
- 16 Arrangement of the cable connections
- 17 Busbar system
- 18 Switchgear vessel filled with gas
- 19 Busbar connection
- 20 Pressure relief device

## Panel design (examples)

Circuit-breaker panel

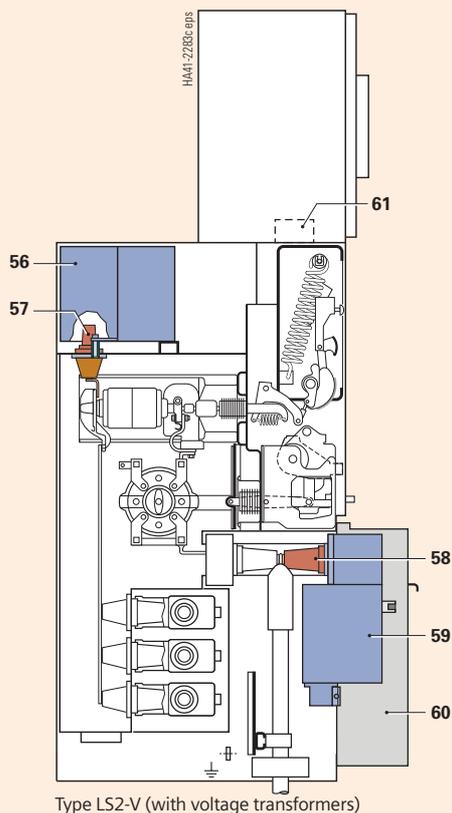
Section



- 21 Compartmentalization for busbar
- 22 Earthing busbar with earthing connection
- 23 Three-position switch-disconnector
- 24 Spring-operated mechanism
- 25 Bushing for cable plug with bolted contact (M16)
- 26 Option: Cable T-plug
- 27 Cable compartment cover
- 28 Cable connection compartment
- 29 Cable bracket
- 30 Earthing connection for earthing accessories
- 31 HV HRC fuse assembly, cover removed
- 32 Handle for replacing HV HRC fuse links
- 33 Interlock for HV HRC fuse assembly
- 34 Cover of the HV HRC fuse compartment
- 35 Spring-operated / stored-energy mechanism
- 36 Bushing for cable plug with plug-in contact
- 37 Cable elbow plug with plug-in contact
- 38 Switch position indication for load-break function "CLOSED – OPEN" and, if applicable, "HV HRC fuse tripped" or "shunt release tripped"
- 39 Cover for access to the busbar connection and to the instrument transformers, screwed on
- 40 4MR voltage transformer
- 41 4MA7 current transformer
- 42 Cover to busbar connection compartment, screwed on
- 43 Option: SIPROTEC bay control unit
- 44 Low-voltage compartment (standard)

## Vacuum circuit-breaker:

- 45 Opening for the hand crank
  - for closing with manual operating mechanism
  - for emergency operation with motor operating mechanism
- 46 Operating mechanism box
- 47 Mechanical "ON" pushbutton (not supplied with spring-operated mechanism)
- 48 Mechanical "OFF" pushbutton
- 49 Operating cycle counter
- 50 "Spring charged" indicator
- 51 Vacuum interrupter
- 52 Switch position indication



- 53 Option: Interlock between vacuum circuit-breaker and three-position switch-disconnector
- 54 Option: Three-phase current transformer (protection transformer)
- 55 Cable-type current transformer
- 56 4MT3 plug-in voltage transformer at the busbar
- 57 Bushing for connection of plug-in voltage transformers
- 58 Plug-in connection according to EN 50 181 / DIN EN 50 181 as interface type "A"
- 59 Option: 4MT8 plug-in voltage transformer at the connection
- 60 Deep cable compartment cover
- 61 Wiring duct, removable, for control cables and/or bus wires
- 62 Cover screwed on
- 63 Option: Interlock between three-position switch-disconnector and circuit-breaker

# Components

## 3AH vacuum circuit-breakers

### Features

- According to IEC 62 271/ VDE 0671-100 (standards see page 41)
- Application of all 8DH10 switchgear in hermetically sealed vessel in conformity with the system
- Climate-independent vacuum interrupter poles in the gas-filled switchgear vessel
- Maintenance-free for use indoors according to IEC 60 694/ VDE 0670-1000 (standards see page 41)
- Individual secondary equipment
- A metal bellows is used for gasketless separation of the SF<sub>6</sub>-insulation and the operating mechanism – as already used with success for over 100,000 vacuum interrupters

### Switching duties and operating mechanisms

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

- Motor operating stored-energy mechanism
  - For auto-reclosure (K),
  - For synchronization and rapid load transfer (U)
- Manual operating stored-energy mechanism
  - For auto-reclosure (K)
- Manual spring-operated mechanism (= spring CLOSED, stored-energy OPEN)
  - Not for auto-reclosure (K)
  - For normal closing and
  - For storage of one opening

### Further operating mechanism features

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

### Abbreviations for switching duties and applications:

- U = Synchronization and rapid load transfer (make time ≤ 90 ms)
- K = Auto-reclosure
- O = OPEN operation

- CO = CLOSE operation with subsequent OPEN operation at the shortest internal close-open time of the vacuum circuit-breaker
- t = Dead time 0.3 s
- t' = Dead time 3 min

### Operating mechanism functions

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

In the case of the motor operating mechanism, the closing spring is charged by means of a motor and latched in the charged position (the "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-reclosure).

#### Manual operating stored-energy mechanism

The closing spring is charged by means of the hand crank supplied until latching of the closing latch is indicated (= "spring charged" indication).

Subsequently the vacuum circuit-breaker can be closed either manually or electrically and the closing spring can be recharged manually. The "possibility to close" is thus stored once more (for auto-reclosure).

#### Manual spring-operated mechanism (= spring CLOSED, stored-energy OPEN)

The closing spring of the vacuum circuit-breaker is charged by means of the hand crank supplied until the vacuum circuit-breaker closes. Subsequently either manual or electrical opening is possible.

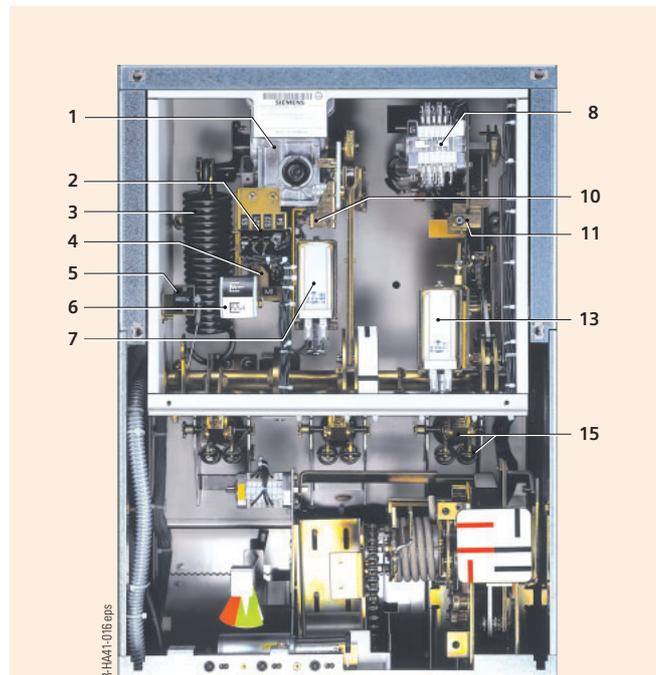
Vacuum circuit-breakers with spring-operated mechanism are not suitable for auto-reclosure.

#### Trip-free mechanism

The vacuum circuit-breaker is fitted with a trip-free mechanism.

1) Motor rating at 24 V to 220 V DC: 350 W  
110 V and 230 V AC: 400 VA

2) With closing solenoid  
\* Equipment code



Operating mechanism of the vacuum circuit-breaker (for the legend, see page 19)

### Differences between the vacuum circuit-breakers depending on the operating mechanism version

Operating mechanism version	Motor operating stored-energy mechanism	Manual operating stored-energy mechanism	Manual spring-operated mechanism
Typical uses	Utility substations and industrial plants	Classic transfer substations and substations without auxiliary voltage supply	Simple utility substations (circuit-breaker employed as transformer switch)
Mechanism function	Stored-energy CLOSED, stored-energy OPEN	Stored-energy CLOSED, stored-energy OPEN	Spring CLOSED, stored-energy OPEN
Mechanism operation	With motor <sup>1)</sup> , manual (emergency) operation at the panel including anti-pumping	With hand crank	With hand crank
Closing the vacuum circuit-breaker	Electrically <sup>2)</sup> or mechanically at the panel with pushbutton	Mechanically at the panel with push-button, option: electrically <sup>2)</sup>	Mechanically at the panel with hand crank (charging process)
Closing solenoid, e.g. for remote electrical closing	Always provided, with electrical signal "closing spring charged"	Option	Without
Rated switching sequence	O-t-CO or O-t-CO-t'-CO	O-t-CO	O or CO
Auto-reclosure (K)	Suitable (multiple auto-reclosure possible)	Suitable (only with closing solenoid)	–

For further technical data and description of typical applications, please refer also to Catalog HG 11.11 "3AH Vacuum Circuit-Breakers"

## Secondary equipment of the 3AH vacuum circuit-breaker

The scope of the 3AH vacuum circuit-breaker secondary equipment depends on the type of application and offers a wide range of variations, thus allowing even the highest requirements to be satisfied.

### Closing solenoid

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

### Shunt releases

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

### Current-transformer operated release

- Type 3AX11 04 (Y6 \*) for tripping pulse  $\geq 0.1$  Ws in conjunction with suitable protection systems, e.g. 7SJ4 protection system, 4MC6.. transformer protection system, SEG relay (other designs on request)
- Used where no external auxiliary voltage is available, tripping by protection relay

### Undervoltage release

- Type 3AX11 03 (Y7 \*)
- Comprising:
  - Energy store and unlatching mechanism
  - Electromagnetic system, to which voltage is permanently applied in the CLOSED position of the vacuum circuit-breaker; tripping is initiated when this voltage drops
- Connection to voltage transformers possible

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

- Function: If CLOSE and OPEN commands are applied simultaneously and continuously to the vacuum circuit-breaker, this reverts to its OPEN position subsequent to closing. The circuit-breaker remains in this position until a new CLOSE command is given. Thus continuous closing and opening (= pumping) is avoided.

### Breaker tripping signal (standard)

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

### Varistor module

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

### Auxiliary switch

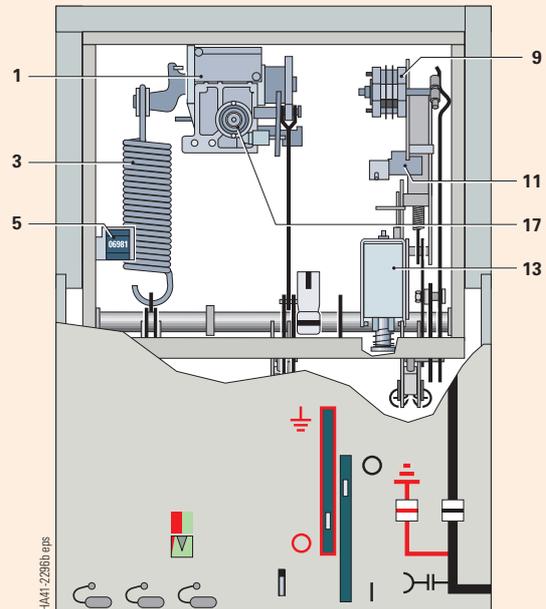
- Type 3SV9 (S1 \*)
- Standard: 6NO+6NC, of which 2NO+2NC+2 changeover contacts are free <sup>1)</sup>
- Option: 12NO+12NC, of which 7NO+4NC+2 changeover contacts are free <sup>1)</sup>

### Position switch

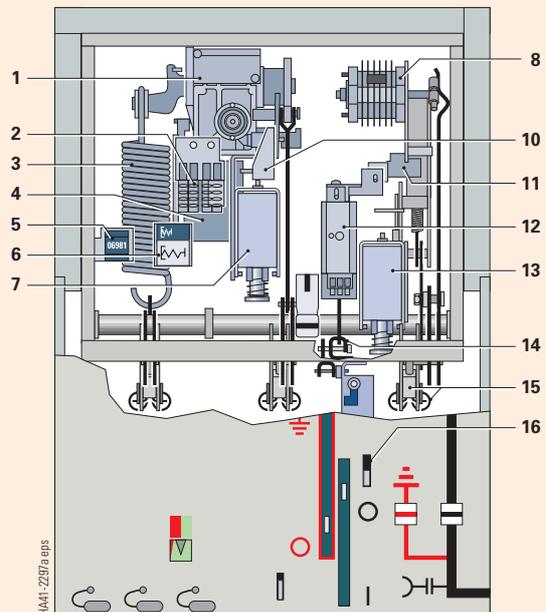
- Type 3SE4 (S4 \*)
- For signalling "closing spring charged"
- Only in conjunction with stored-energy mechanisms

### Mechanical interlocking

- Dependent on the type of operating mechanism
- Option: Switchgear interlocking with the three-position switch-disconnector (option: closing lock-out for the three-position switch-disconnector in circuit-breaker panels type LS and LT1)
- Option: Operating mechanism with mechanical interlocking as
  - Spring-operated mechanism: Hand crank opening is blocked
  - Stored-energy mechanism with closing solenoid (Y9 \*) and pushbutton (S12 \*): The pushbutton (S12 \*) operated by the mechanical interlock prevents a continuous command to the closing solenoid
- During operation of the three-position switch-disconnector from CLOSED to OPEN: vacuum circuit-breaker cannot be closed.



Basic equipment with manual spring-operated mechanism



Maximum equipment with motor operating stored-energy mechanism

### Secondary equipment (view into the operating mechanism box)

- |                                      |   |
|--------------------------------------|---|
| 1 Gear                               | 11 Circuit-breaker "OPEN"   |
| 2 Position switch (S4 *)             | 12 Option: 2 <sup>nd</sup> release  |
| 3 Closing spring                     | 13 1 <sup>st</sup> release (Y1 *)   |
| 4 Motor (M1 *)                       | 14 Option: Mechanical interlocking with interrogation of the three-position switch-disconnector |
| 5 Operating cycle counter            | 15 Operating rod with contact pressure springs  |
| 6 "Closing spring charged" indicator | 16 Interlocking to the three-position switch-disconnector                                       |
| 7 Closing solenoid (Y9 *)            | 17 Actuation for closing the vacuum circuit-breaker   |
| 8 Option: Auxiliary switch 12NO+12NC |   |
| 9 Auxiliary switch 6NO+6NC (S1 *)    |   |
| 10 Circuit-breaker "CLOSED"          |   |

1) For utilization by the customer

\* Equipment code

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

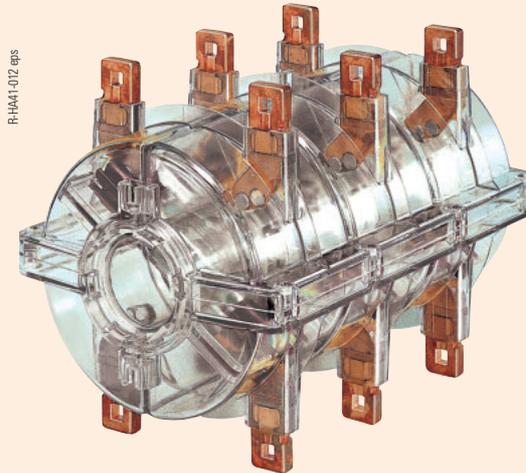
For further technical data and description of typical applications, please refer also to Catalog HG 11.11 "3AH Vacuum Circuit-Breakers"

# Components

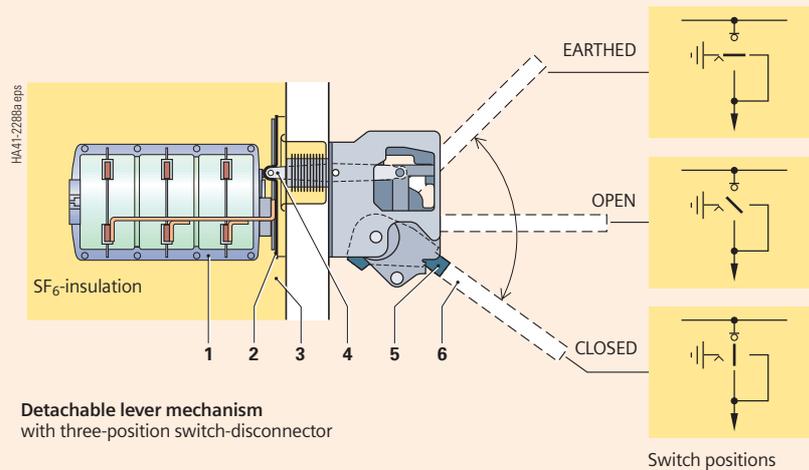
## Three-position switch-disconnectors

### Features

- Switch positions: CLOSED – OPEN – EARTHED
- Switching functions as general-purpose switch-disconnector (class E3) according to
  - IEC 60 265-1/VDE 0670-301
  - IEC 62 271-102/VDE 0671-102 (standards see page 41)
- Designed as a multi-chamber switch incorporating the functions
  - Switch-disconnector and
  - Make-proof earthing switch
- Operation via a gas-tight welded bushing at the front of the switchgear vessel



Three-position switch-disconnector



Detachable lever mechanism with three-position switch-disconnector

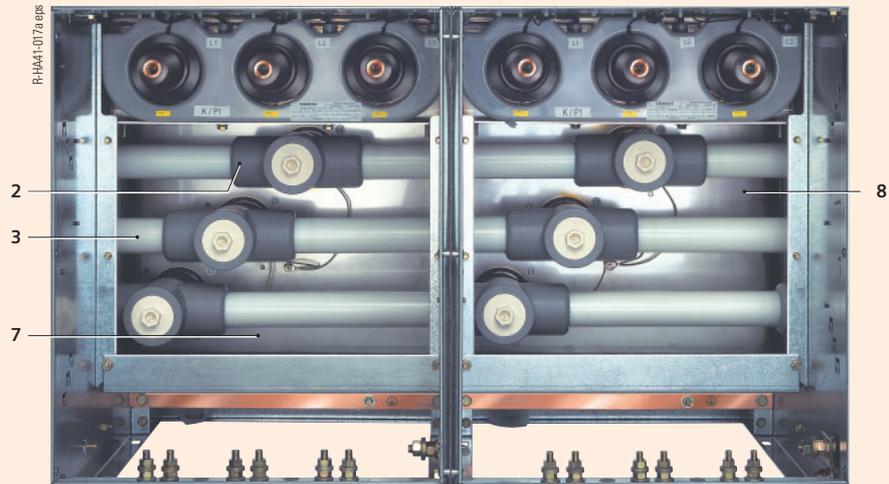
- 1 Three-position switch-disconnector
- 2 Gear plate
- 3 Switchgear vessel
- 4 Operating mechanism rocker
- 5 Detachable lever mechanism
- 6 Operating lever inserted

For further details, please refer to Catalog HA 40.1 "Switchgear Types 8DJ and 8DH for Secondary Distribution Systems up to 24 kV, Gas-Insulated" (General Part)

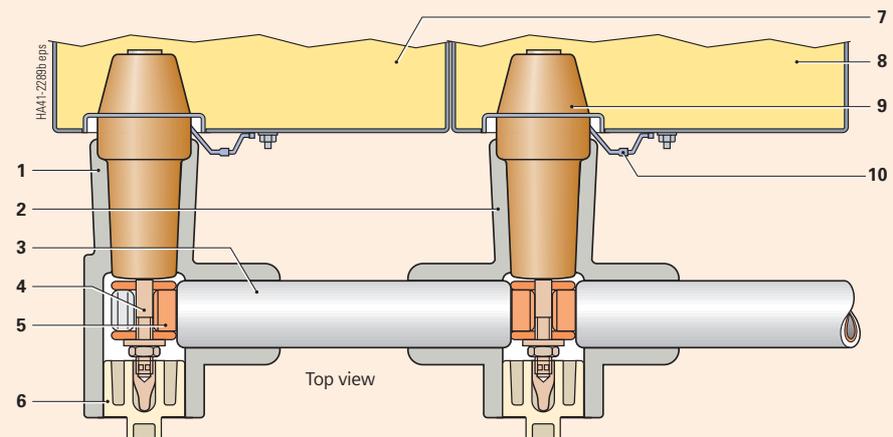
## Busbars

### Features

- Safe-to-touch as a result of use of metal covers
- Plug-in type
- Consisting of round-bar copper, insulated by means of silicone rubber
- Busbar joints with cross and end adapters, insulated by means of silicone rubber
- Insensitive to pollution and condensation
- Switchgear extension or panel replacement is possible without gas work
- Special busbar connections to metering panels type ME1 are possible. Connection to the
  - Cable connection bushings of the adjacent panel or to the
  - Busbar bushings
- Busbar arrangement in panel blocks within the switchgear vessel filled with gas
  - Busbar arrangement in panel blocks within the switchgear vessel filled with gas
- Option: Screened busbar:
  - Field control by means of electrically conductive layers on the silicone-rubber insulation
  - Installation of 4MC70 32 current transformers is thus possible
  - Independent of the site altitude
- Option: Capacitive voltage detection system for the busbar, refer also to the product range, pages 10 to 15



Busbar compartments over 2 panels  
with busbar connections, busbar covers removed



Insulated plug-in type busbar  
unscreened design

#### Busbar system

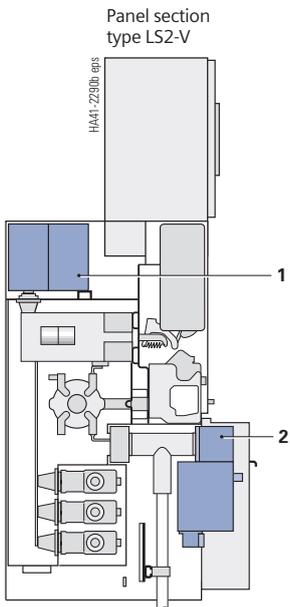
- 1 End adapter
- 2 Cross adapter
- 3 Busbar insulation of silicone rubber
- 4 Threaded bolt M12 / M16
- 5 Busbar, Cu, diameter 32 mm
- 6 Stopper

#### Switchgear vessel

- 7 Primary enclosure panel 1
- 8 Primary enclosure panel 2
- 9 Bushing
- 10 Capacitive tap at the bushings, earthed (standard)

# Components

## 4MT3 \* and 4MT8 \* plug-in voltage transformers for panel types LS, TR, SE and ME3



1 4MT3 \* for the busbar  
2 4MT8 \* at the cable connection

### Common features

- According to IEC 60 044-2/ VDE 0414-2
- Designed as single-pole voltage transformers, plug-in type
- Inductive type
- Climate-independent
- Secondary connection by means of plugs inside the panel
- Connection with plug-in contact
- Installation behind metallic cover

### Features type 4MT3

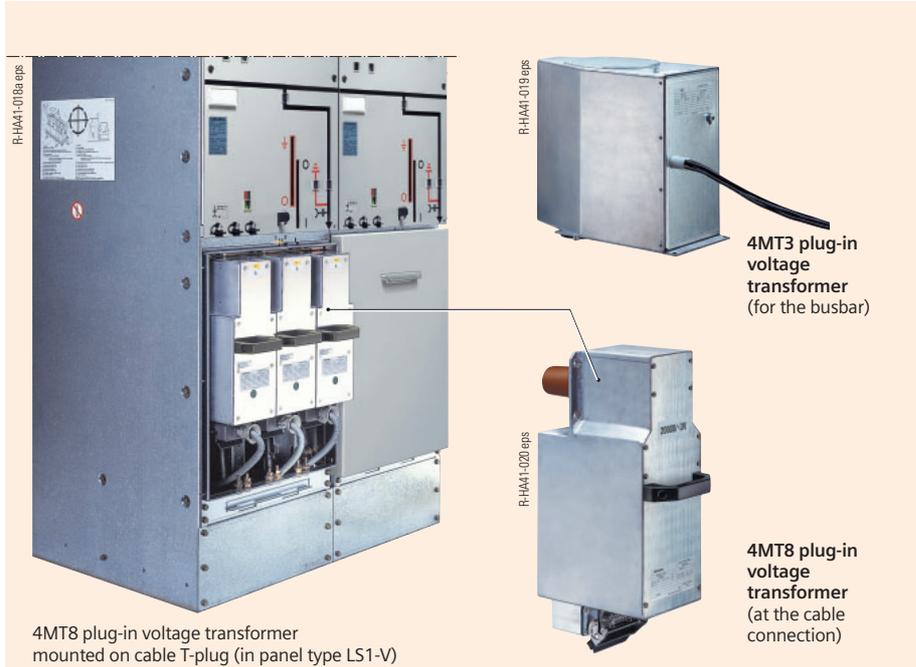
- Inside cone system, metal coated

### Features type 4MT8

- Outside cone system, metal-enclosed
- For deep cable compartment cover

### Installation

- Safe-to-touch arrangement due to metallic cover
- Arrangement on the switchgear vessel for busbar metering:
  - 4MT3 voltage transformer for panel types LS2, SE2, ME3 and LT1-V
- Arrangement at the cable connection:
  - 4MT8 plug-in voltage transformer, on shielded cable T-plug, for panel types LS1-V, LS2-V and TR-V (deep cable compartment cover required)
  - 4MT8 voltage transformer, which is directly plugged in the bushing via an adapter with a plug-in contact (interface type "A"), for panel type TR-V (deep cable comp. cover required)



4MT8 plug-in voltage transformer mounted on cable T-plug (in panel type LS1-V)

### Technical data

#### 4MT3 \* and 4MT8 \* voltage transformers

##### Primary data

Max. equipment operating voltage $U_m (= 1.2 \times U_N)$	12 kV
Rated voltage $U_N$ at max. rated short-duration power-frequency withstand voltage $U_d$	3.3/√3 kV at 10 kV
	3.6/√3 kV at 20 kV
	4.8/√3 kV at 20 kV
	5.0/√3 kV at 20 kV
	6.0/√3 kV at 20 kV
	6.6/√3 kV at 20 kV
Rated lightning impulse withstand voltage $U_p$	7.2/√3 kV at 28 kV
	10.0/√3 kV at 28 kV
	11.0/√3 kV at 28 kV
Rated lightning impulse withstand voltage $U_p$	3.6 kV / 20 kV 7.2 kV / 60 kV 12 kV / 75 kV
Rated voltage factor (8 h)	$1.9 \times U_N$
Max. equipment operating voltage $U_m (= 1.2 \times U_N)$	24 kV
Rated voltage $U_N$ at max. rated short-duration power-frequency withstand voltage $U_d$	13.8/√3 kV at 38 kV
	15.0/√3 kV at 38 kV
	17.5/√3 kV at 50 kV
	20.0/√3 kV at 50 kV
Rated lightning impulse withstand voltage $U_p$	22.0/√3 kV at 50 kV
	17.5 kV / 95 kV 24 kV / 125 kV
Rated voltage factor (8 h)	$1.9 \times U_N$

##### Secondary data for 4MT3 voltage transformers

Rated voltage	100/√3 V 110/√3 V (option)
Rated voltage for auxiliary winding (option)	100/3 V 110/3 V (option)
Rated thermal limit current (measuring winding)	6 A
Rated long-time thermal current (8 h)	4 A
Rating	VA 25   15   60   100   150
Class	0.2   0.5   0.5   1   1

##### Secondary data for 4MT8 voltage transformers

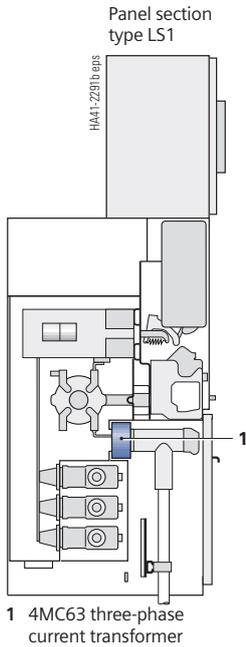
Rated voltage	100/√3 V 110/√3 V (option)
Rated voltage for auxiliary winding (option)	100/3 V 110/3 V (option)
Rated thermal limit current (measuring winding)	4 A
Rated long-time thermal current (8 h)	4 A
Rating	VA 15   15   30   30   100
Class	0.2   0.5   0.5   1   3

### Combination of 4MT8 \* voltage transformers with cable T-plugs (screened, without metal housing)

Make	Type	Combination	Make	Type	Combination
Euromold	(K) 400 TB / G	yes	Südkabel (ABB)	SEHDT (13/23)	yes
	(K) 440 TB, AGT 10/20	yes	Südkabel (ABB)	SET (12/24)	on request
nkt cables	CB 24-630, ASTS 10/630, ASTS 20/630	yes	Cooper	DT 400 P	yes
	Prysmian Kabel und Systeme	FMCTS-400, FMCTg-400	Tyco Electronics	RSTI for 35 to 300 mm <sup>2</sup> (M12)	additional measures
Raychem			RSTI for > 300 mm <sup>2</sup> (M16)	yes	
			RSTI-L	on request	

\* Disassembly is necessary in order to perform local switchgear voltage tests (max. 80 %  $U_d$ )

### 4MC63 three-phase current transformers for panel type LS



#### Features

- According to IEC 60 044-1/ VDE 0414-1
- Designed as three-pole ring-core current transformers
- Free of dielectrically stressed cast-resin parts (due to design)
- Insulation class E
- Inductive type
- Climate-independent
- Secondary connection by means of a terminal strip inside the panel

#### Installation

- Arranged outside the switchgear vessel on the bushings of the cable connection
- Mounted at the factory

#### Other designs (option)

Three-phase current transformers for protection equipment based on the current-transformer operation principle:

- 7SJ4x protection system as definite-time overcurrent protection
- Definite-time overcurrent protection relay make SEG, type WIP 1 or type WIC

#### Technical data

**4MC63 10 three-phase current transformer for  $I_N \leq 150$  A and  $I_D = 630$  A**

##### Primary data

Max. equipment operating voltage $U_m$	0.72 kV
Rated current $I_N$ A	150   100   75   50
Rated short-duration power-frequency withstand voltage (winding test)	3 kV
Rated thermal short-time withstand current $I_{th}$	25 kA
Rated continuous thermal current $I_D$	630 A
Transient overload current	$1.5 \times I_D / 1$ h
Rated peak withstand current $I_{dyn}$	unlimited

##### Secondary data

Rated current A	1	0.67	0.5	0.33
Rating VA	2.5	1.7	1.25	0.8
Rated current (option)	5 A			
Current at $I_D$	4.2 A			
Protection Class	10 P			
Protection core Overcurrent factor	10			

Other values on request

**4MC63 11 three-phase current transformer for  $I_N \leq 400$  A and  $I_D = 630$  A**

##### Primary data

Max. equipment operating voltage $U_m$	0.72 kV
Rated current $I_N$ A	400   300   200
Rated short-duration power-frequency withstand voltage (winding test)	3 kV
Rated thermal short-time withstand current $I_{th}$	25 kA
Rated continuous thermal current $I_D$	630 A
Transient overload current	$2 \times I_D / 0.5$ h
Rated peak withstand current $I_{dyn}$	unlimited

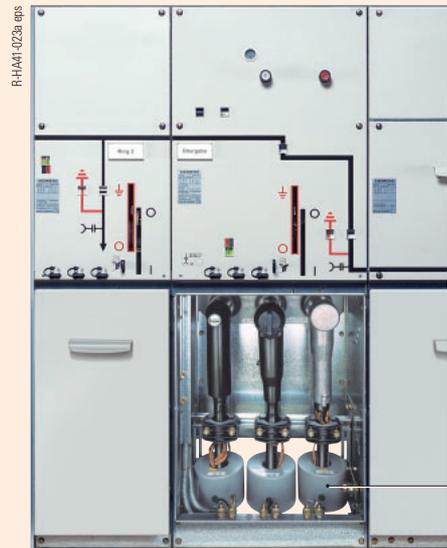
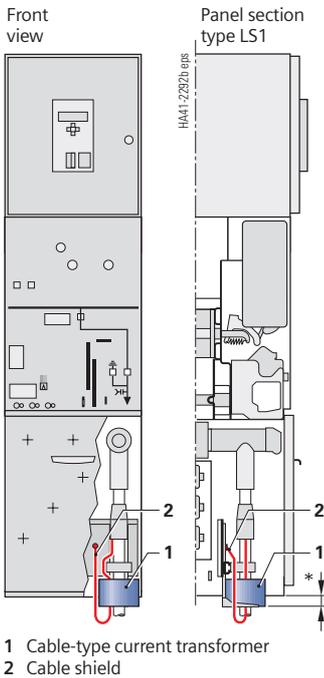
##### Secondary data

Rated current A	1	0.75	0.5
Rating VA	4	3	2
Rated current (option)	5 A		
Current at $I_D$	1.575 A		
Protection Class	10 P		
Protection core Overcurrent factor	10		

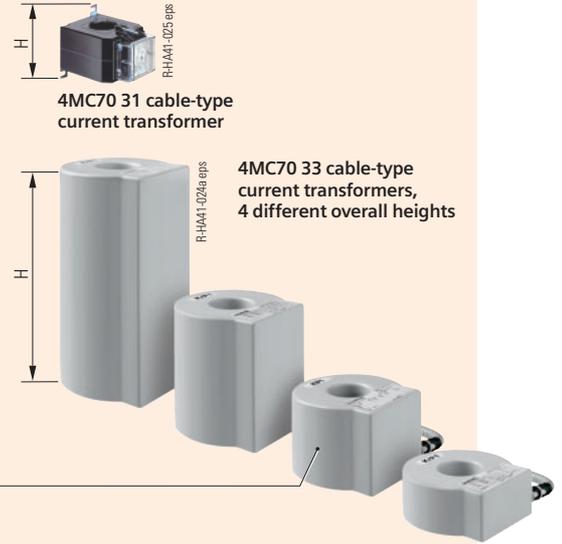
Other values on request

# Components

## 4MC70 33 and 4MC70 31 cable-type current transformers for panel types LS, RK and TR



4MC70 33 cable-type current transformer for the cables at the panel connection



### Features

- According to IEC 60 044-1/ VDE 0414-1
- Designed as single-pole ring-core current transformers
- Free of dielectrically stressed cast-resin parts (due to design)
- Insulation class E
- Inductive type
- Climate-independent
- Secondary connection by means of a terminal strip inside the panel
- Only for shielded cables

### Installation

- 4MC70 33 cable-type current transformer for panel type LS
- 4MC70 31 cable-type current transformer for panel types RK and TR
- Arranged outside the switchgear vessel around the cable at the panel connection
- Transformers mounted on a supporting plate at the factory; final assembly around the cables on site
- For double cable: 300 mm deeper cable compartment cover

\* Max. 230 mm, depending on the core data of the 4MC70 33 cable-type current transformer, overall heights 170 and 285 mm (observe floor openings on page 36)

### Technical data

#### 4MC70 33 cable-type current transformer

Primary data	
Max. equipment operating voltage $U_m$	0.72 kV
Rated current $I_N$	30 A to 600 A
Rated short-duration power-frequency withstand voltage (winding test)	3 kV
Rated thermal short-time withstand current $I_{th}$	25 kA
Rated continuous thermal current $I_D$	$1.0 \times I_N$ option: $1.2 \times I_N$
Transient overload current	$1.5 \times I_D / 1 \text{ h}$ or $2 \times I_D / 0.5 \text{ h}$
Rated peak withstand current $I_{dyn}$	unlimited

#### Secondary data

Rated current	1 A (option: 5 A)	
Measuring core	Class	0.2   0.5   1
	Overcurrent factor	FS10 (option: FS5)
	Rating	2.5 VA to 10 VA
Protection core	Class	10 P   5 P
	Overcurrent factor	10   10
	Rating	2.5 VA to 10 VA
Option: Secondary tap	1 : 2 (e.g. 150 A – 300 A)	

#### Dimensions

Overall height H, dependent on the core data	mm	50	100	170	285
Outside diameter		145 mm			
Inside diameter		55 mm			
For cable diameter		50 mm			

Other values on request

#### 4MC70 31 cable-type current transformer

Primary data	
Max. equipment operating voltage $U_m$	0.72 kV
Rated current $I_N$	50 A to 600 A
Rated short-duration power-frequency withstand voltage (winding test)	3 kV
Rated thermal short-time withstand current $I_{th}$	25 kA
Rated continuous thermal current $I_D$	$1.0 \times I_N$ option: $1.2 \times I_N$
Transient overload current	$1.5 \times I_D / 1 \text{ h}$ or $2 \times I_D / 0.5 \text{ h}$
Rated peak withstand current $I_{dyn}$	unlimited

#### Secondary data

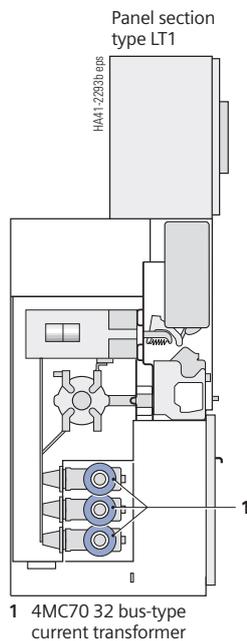
Rated current	1 A (option: 5 A)	
Measuring core	Class	1
	Overcurrent factor	FS5 (option: FS10)
	Rating	2.5 VA to 10 VA
Option: Secondary tap	1 : 2	

#### Dimensions

Overall height H	89 mm
Width x depth	85 mm x 114 mm
Inside diameter	40 mm
For cable diameter	36 mm

Other values on request

## 4MC70 32 bus-type current transformers for panel type LT (for screened busbars only)



1 4MC70 32 bus-type current transformer

### Features

- Used exclusively for screened busbars
- Preferably in combination with panel type ME2
- According to IEC 60 044-1/ VDE 0414-1
- Designed as single-pole ring-core current transformers
- Free of dielectrically stressed cast-resin parts (due to design)
- Insulation class E
- Inductive type
- Climate-independent
- Secondary connection by means of a terminal strip inside the panel

### Installation

- Arranged outside the switchgear vessel only on the screened busbars
- Installation of the bus-type current transformers either between the panels or alternatively
- Supplied loosely (including the busbar connections), if the mounting position of the bus-type current transformers lies at the joint of a transport unit



4MC70 32 bus-type current transformer, mounted on screened busbars, in some cases between the panels

### Technical data

#### 4MC70 32 bus-type current transformer

#### Primary data

Max. equipment operating voltage $U_m$	0.72 kV
Rated current $I_N$	200 A to 600 A
Rated short-duration power-frequency withstand voltage (winding test)	3 kV
Rated thermal short-time withstand current $I_{th}$	25 kA
Rated continuous thermal current $I_D$	1.0 x $I_N$ option: 1.2 x $I_N$
Transient overload current	1.5 x $I_D$ / 1 h or 2 x $I_D$ / 0.5 h
Rated peak withstand current $I_{dyn}$	unlimited

#### Secondary data

Rated current	1 A (option: 5 A)	
Measuring core	Class	0.2   0.5   1
	Overcurrent factor	FS10 (option: FS5)
	Rating	2.5 VA to 10 VA
Protection core	Class	10 P   5 P *
	Overcurrent factor	10   10
	Rating	2.5 VA to 15 VA
Option: Secondary tap	1 : 2 (e.g. 150 A – 300 A)	

#### Dimensions

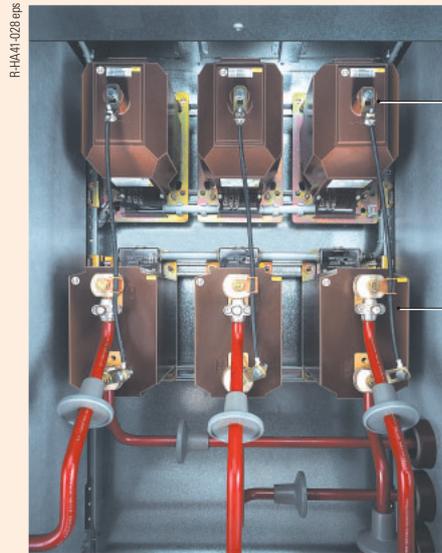
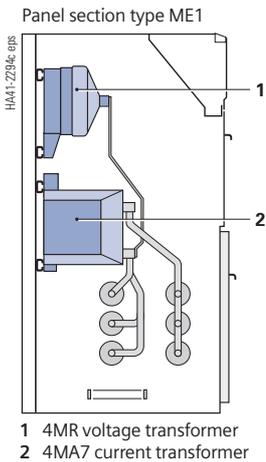
Overall width B, dependent on the core data	80 mm	150 mm
Outside diameter	125 mm	
Inside diameter	55 mm	

Other values on request

\* On request

# Components

## 4MA7 current transformers and 4MR voltage transformers for air-insulated billing metering panels type ME1



4MR voltage transformers and 4MA7 current transformers installed in billing metering panel type ME1



4MR14 voltage transformer



4MA7 current transformer

### Features

#### 4MA7 current transformer

- According to IEC 60 044-1/ VDE 0414-1
- Dimensions according to DIN 42 600-8 (small design)
- Designed as single-pole indoor block-type current transformers
- Cast-resin insulated
- Insulation class E
- Secondary connection by means of screw-type terminals

#### 4MR voltage transformer

- According to IEC 60 044-2/ VDE 0414-2
- Dimensions according to DIN 42 600-9 (small design)
- Designed as indoor voltage transformers:
  - Type 4MR, single-pole
  - Option: Type 4MR, two-pole
- Cast-resin insulated
- Insulation class E
- Secondary connection by means of screw-type terminals

### Technical data

#### 4MA7 single-pole current transformer

Primary data		
Max. equipment operating voltage $U_m$	12/ 17.5 kV	24 kV
Rated short-duration power-frequency withstand voltage $U_d$	28/ 38 kV	50 kV
Rated lightning impulse withstand voltage $U_p$	75/ 95 kV	125 kV
Rated current $I_N$	25 A to 600 A	
Rated thermal short-time withstand current $I_{th}$	up to 25 kA	
Rated continuous thermal current $I_D$	1.0 x $I_N$ option: 1.2 x $I_N$	
Rated peak withstand current $I_{dyn}$	max. 2.5 x $I_{th}$	

#### Secondary data

Rated current		1 A or 5 A		
Measuring core	Class	0.2   0.5   1		
	Overcurrent factor	FS5 or FS10		
	Rating	10 VA to 15 VA		
Protection core	Class	5 P or 10 P		
	Overcurrent factor	10		
Rating		5 VA to 15 VA		

Other values on request

#### 4MR single-pole voltage transformer

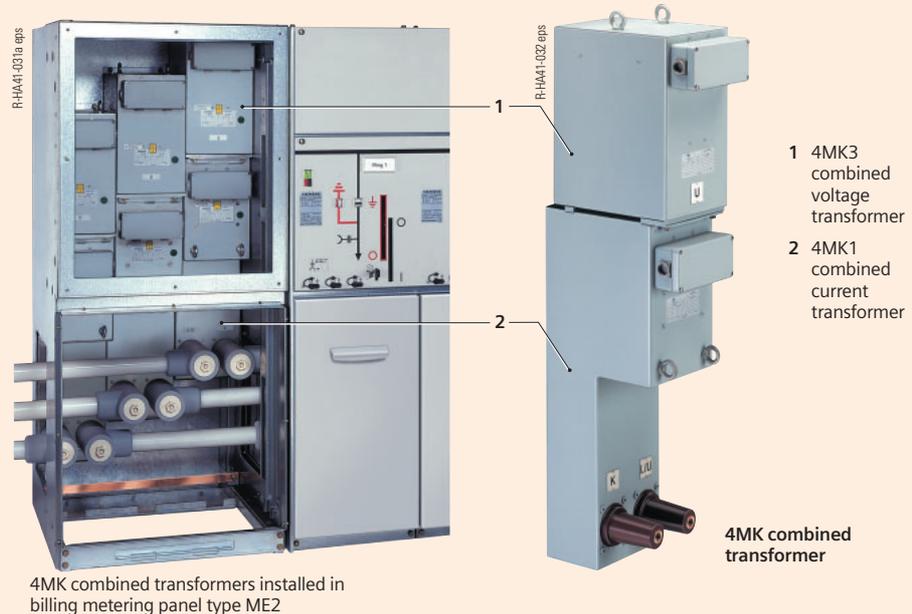
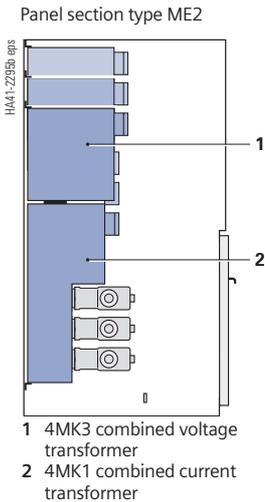
Primary data	
Max. equipment operating voltage $U_m (= 1.2 \times U_N)$	12 kV
Rated voltage $U_N$ at max. rated short-duration power-frequency withstand voltage $U_d$	3.3/√3 kV at 10 kV
	3.6/√3 kV at 20 kV
	4.8/√3 kV at 20 kV
	5.0/√3 kV at 20 kV
	6.0/√3 kV at 20 kV
Rated lightning impulse withstand voltage $U_p$	6.6/√3 kV at 20 kV
	7.2/√3 kV at 28 kV
	10.0/√3 kV at 28 kV
Rated voltage factor (8 h)	11.0/√3 kV at 28 kV
	3.6 kV / 20 kV
Rated lightning impulse withstand voltage $U_p$	7.2 kV / 60 kV
	12 kV / 75 kV
Rated voltage factor (8 h)	1.9 x $U_N$
Max. equipment operating voltage $U_m (= 1.2 \times U_N)$	24 kV
Rated voltage $U_N$ at max. rated short-duration power-frequency withstand voltage $U_d$	13.8/√3 kV at 38 kV
	15.0/√3 kV at 38 kV
	17.5/√3 kV at 50 kV
	20.0/√3 kV at 50 kV
Rated lightning impulse withstand voltage $U_p$	22.0/√3 kV at 50 kV
	17.5 kV / 95 kV
Rated voltage factor (8 h)	24 kV / 125 kV
	1.9 x $U_N$

#### Secondary data

Rated voltage	100/√3 V
	110/√3 V (option)
	120/√3 V (option)
Rated voltage for auxiliary winding (option)	100/3 V
	110/3 V (option)
	120/3 V (option)
Rating	20 VA   50 VA   100 VA
Class	0.2   0.5   1

Other values on request

## 4MK \* metal-enclosed combined transformers for billing metering panels type ME2



### Technical data

#### 4MK1 combined current transformer

Primary data		12 kV	24 kV
Max. equipment+ operating voltage $U_m$		12 kV	24 kV
Rated short-duration power-frequency withstand voltage $U_d$		28 kV	50 kV
Rated lightning impulse withstand voltage $U_p$		75 kV	125 kV
Rated current $I_N$		50 A to 600 A	
Rated thermal short-time withstand current $I_{th}$		up to 25 kA	
Rated continuous thermal current $I_D$		1.0 x $I_N$ option: 1.2 x $I_N$	
Rated peak withstand current $I_{dyn}$		max. 2.5 x $I_{th}$	

#### Secondary data

Rated current	1 A or 5 A		
Measuring core	Class	0.2   0.5   1	
	Overcurrent factor	FS5 or FS10	
	Rating	10 VA to 15 VA	
Protection core	Class	10 P	
	Overcurrent factor	10	
Rating	5 VA or 15 VA		
Secondary multi-ratio function	option		

Other values on request

#### 4MK3 combined voltage transformer

Primary data		12 kV
Max. equipment operating voltage $U_m (= 1.2 \times U_N)$		12 kV
Rated voltage $U_N$ at max. rated short-duration power-frequency withstand voltage $U_d$		3.3/√3 kV at 10 kV
		3.6/√3 kV at 20 kV
		4.8/√3 kV at 20 kV
		5.0/√3 kV at 20 kV
		6.0/√3 kV at 20 kV
	6.6/√3 kV at 20 kV	
	7.2/√3 kV at 28 kV	
	10.0/√3 kV at 28 kV	
	11.0/√3 kV at 28 kV	
Rated lightning impulse withstand voltage $U_p$		3.6 kV / 20 kV
		7.2 kV / 60 kV
		12 kV / 75 kV
Rated voltage factor (8 h)		1.9 x $U_N$
Max. equipment operating voltage $U_m (= 1.2 \times U_N)$		24 kV
Rated voltage $U_N$ at max. rated short-duration power-frequency withstand voltage $U_d$		13.8/√3 kV at 38 kV
		15.0/√3 kV at 38 kV
		17.5/√3 kV at 50 kV
		20.0/√3 kV at 50 kV
	22.0/√3 kV at 50 kV	
Rated lightning impulse withstand voltage $U_p$		17.5 kV / 95 kV
		24 kV / 125 kV
Rated voltage factor (8 h)		1.9 x $U_N$

#### Secondary data

Rated voltage	100/√3 V
	110/√3 V (option)
Rated voltage for auxiliary winding (option)	100/3 V
	110/3 V (option)
Rating	30 VA   75 VA   150 VA
Class	0.2   0.5   1

Other values on request

### Features

- 4MK \* combined transformer, comprising
  - 4MK1 combined current transformer
  - 4MK3 combined voltage transformer
- According to IEC 60 044-3/ VDE 0414-5
- Designed as single-pole, combined indoor transformers
- Metal-enclosed
- Insulation class E
- Inductive type
- Secondary connection by means of screw-type terminals

### Panel type ME2

- For combination with left-hand panels
  - As individual panels or
  - As panel blocks (on request)
- For combination with right-hand panels as end panels or panel blocks

\* Available only as a combination of current and voltage transformers

# Components

## Cable connection

### Features

- Bushings with outside cone
- Uniform cable connection height 575 mm
- With cable bracket, e.g. type C40 according to DIN EN 50 024
- Access to the cable connection compartment only if the feeder has been isolated and earthed

### Special features

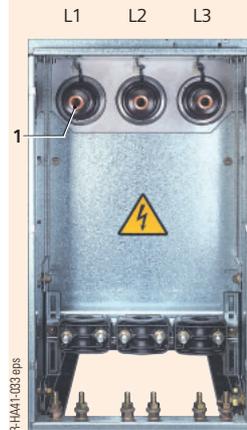
- In ring-main panels
- In circuit-breaker panels
- In cable panels:
- With bolted contact (M16) as interface type "C" according to EN 50 181/ DIN EN 50 181
- For thermoplastic-insulated cables
- For paper-insulated mass-impregnated cables with adapter systems
- For conventional cable sealing ends via elbow adapter AKE 20/630 (make Siemens)
- For cable T-plugs or cable elbow plugs with bolted contact
- For connection cross-sections up to 300 mm<sup>2</sup> (standard)
- Cable routing downwards, cable connection at front
- For rated normal currents of 400/630 A
- In transformer panels:
- With plug-in contact as interface type "A" according to EN 50 181/ DIN EN 50 181
- For cable elbow plugs with plug-in contact
- For thermoplastic-insulated cables
- For connection cross-sections up to 120 mm<sup>2</sup>
- For rated normal currents of 200 A

### Options

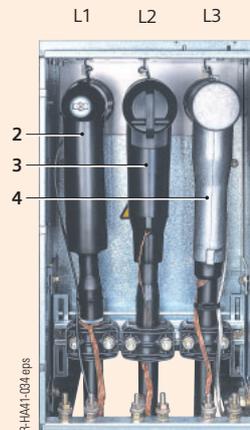
See figures on the right

\* Cable plugs, cable sealing ends and cable clamps are not included in the scope of supply

### Cable connection · Examples



Cable connection compartment, as-delivered condition \*

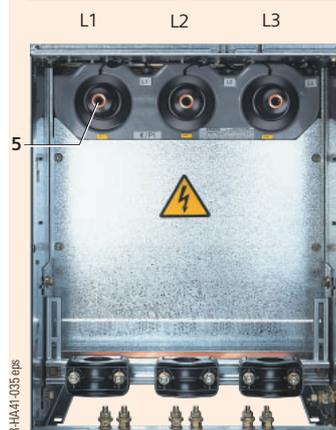


Cable plugs with bolted contact (M16)

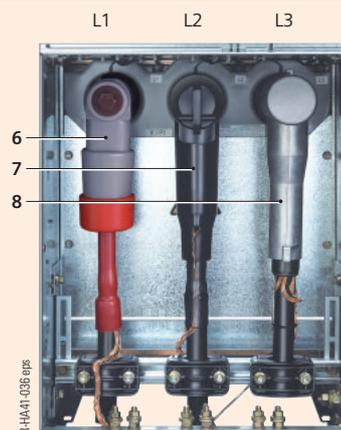
### Cable connections in ring-main panels

- 1 Prepared for cable plugs with bolted contact (M16)
- 2 Phase L1: Make: Euromold, type K400 LB as cable elbow plug
- 3 Phase L2: Make: Euromold, type K400 TB as cable T-plug
- 4 Phase L3: Make: Euromold, type AGT 20/630 as cable T-plug

For options A, B, C and E, see below



Cable connection compartment, as-delivered condition \*

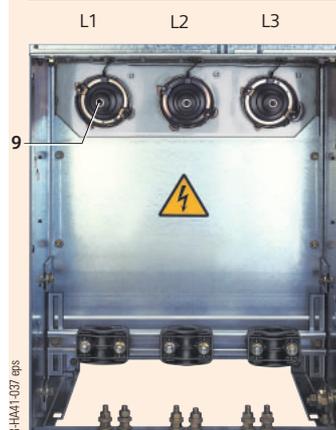


Cable plugs with bolted contact (M16)

### Cable connections in circuit-breaker panels

- 5 Prepared for cable plugs with bolted contact (M16)
- 6 Phase L1: Elbow adapter, make: Siemens, type AKE 20/630
- 7 Phase L2: Make: Euromold, type K400 TB as cable T-plug
- 8 Phase L3: Make: Euromold, type AGT 20/630 as cable T-plug

For options A, B, C, E and F, see below



Cable connection compartment, as-delivered condition \*



Cable elbow plugs with plug-in contact

### Cable connections in transformer panels

- 9 Prepared for cable elbow plugs with plug-in contact
- 10 Phase L1: Make: Euromold, type AWGL
- 11 Phase L2: Make: Euromold, type K158 LR
- 12 Phase L3: Make: Euromold, type AGW 20/250 (with metal housing)

For options A, D and F, see below

### Options

- A Mounted cable clamps
- B Short-circuit / earth-fault indicator
- C Double cable connection with corresponding cable plugs and deep cable compartment cover

- D Bushings as interface type "C" according to EN 50 181 / DIN EN 50 181 for cable plugs with bolted contact (M16)
- E Suitable for connection of plug-in surge arresters in conjunction with corresponding cable T-plugs
- F Suitable for connection of 4MT8 metal-enclosed voltage transformers in conjunction with corresponding cable T-plugs; deep cable compartment cover is required

## Low-voltage equipment

### Low-voltage compartment \*

- Height
  - Standard 600 mm
  - Option 900 mm
- Safe-to-touch compartmentalization from the high-voltage part of the panel
- Installation on the panel:
  - Standard for circuit-breaker panels type LS and bus sectionalizer panel type LT1
  - Option for all other panel types, depending on the scope of the secondary equipment
- For accommodation of protection, control, measuring and metering equipment, e. g. suitable for multifunction protection relay SIPROTEC 4 7SJ63
- Electronic control board of the multifunction protection relay SIPROTEC 4 7SJ63 with the following features:

- 1 User-programmable LEDs with application-specific label, for displaying any desired process and equipment data
- 2 LCD for process and equipment data, e.g. for Measuring and metering values
- Binary information on status of switchgear and switching device
- Protection data
- General indications
- Alarms
- 3 Keys for navigation in the menus and for entering values
- 4 Four user-programmable function keys for frequently performed actions

### Low-voltage niche

- Only inside billing metering panels type ME1
- Option: For accommodation, e.g. of voltage transformer mcbs

### Low-voltage cables

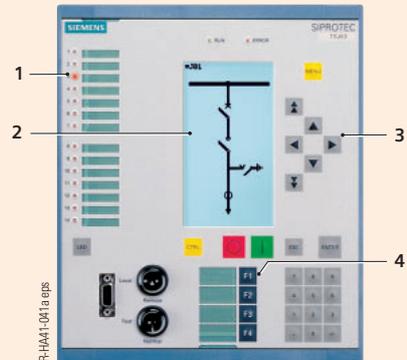
- Control cables of the panel to the low-voltage compartment are connected via multi-pole, coded module plug connectors
- Option: Plug-in bus wires from panel to panel are routed in the separate wiring duct on the panel

\* Door hinge on the left (standard)

### Low-voltage compartment

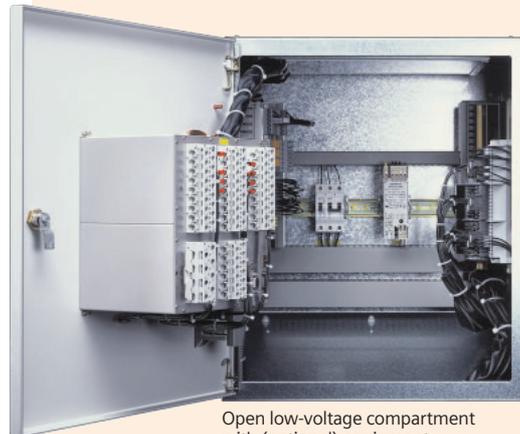


Low-voltage compartment of a circuit-breaker panel type LS



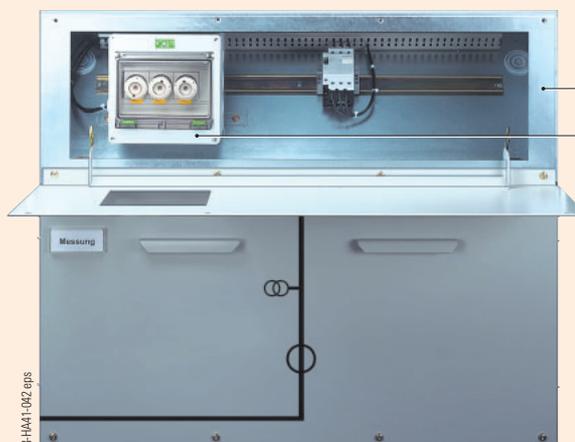
Electronic control board with multifunction protection relay SIPROTEC 4 7SJ63

- 1 LEDs
- 2 LCD
- 3 Navigation keys
- 4 Function keys



Open low-voltage compartment with (optional) equipment

### Low-voltage niche

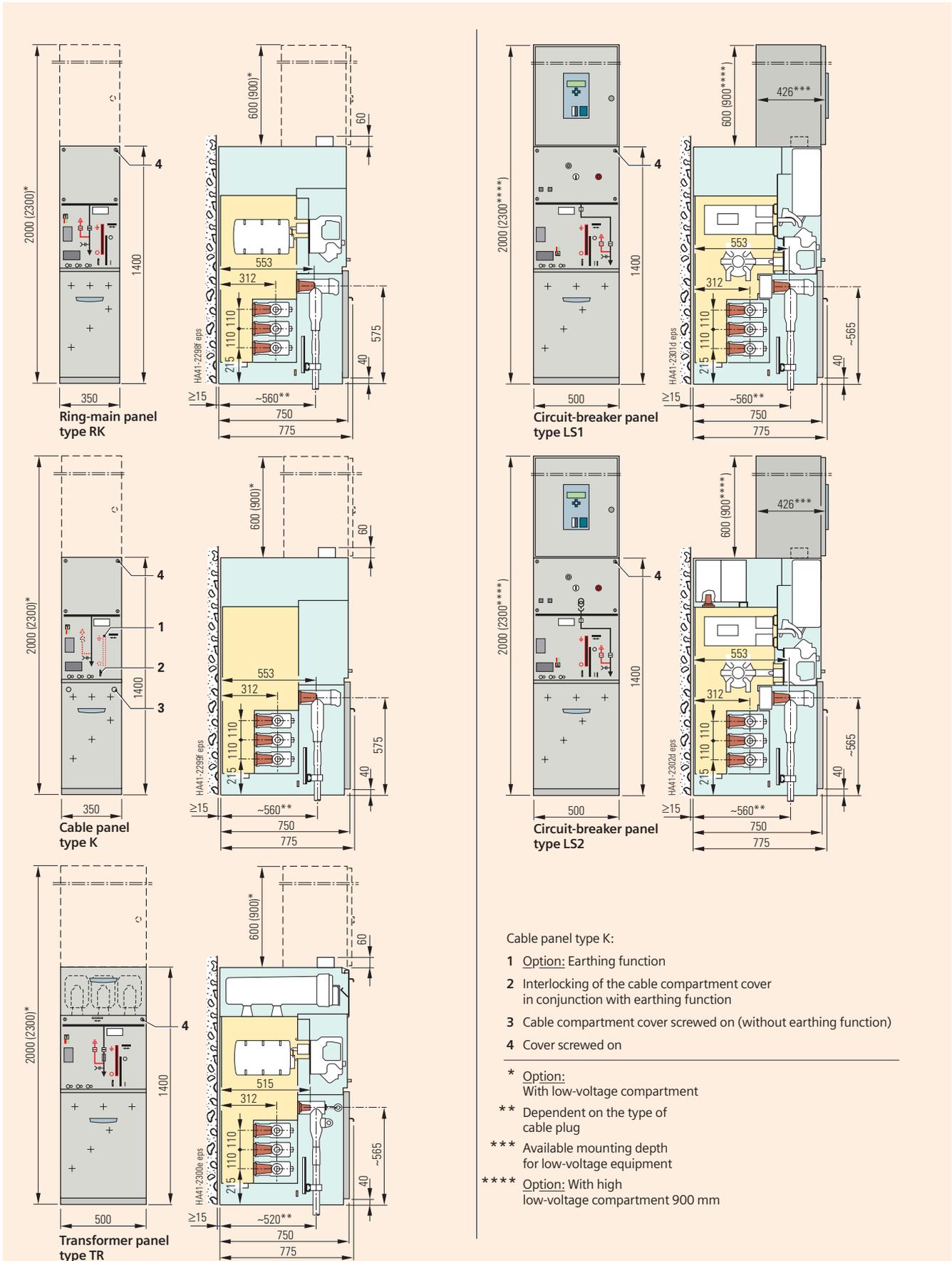


- 1 Low-voltage niche
- 2 Equipment (option)

Low-voltage niche of a billing metering panel type ME1 with open cover

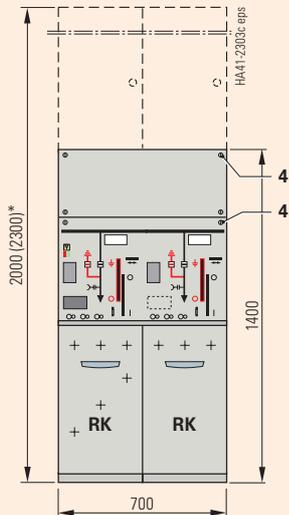
# Dimensions

## Ring-main, cable, transformer and circuit-breaker panels as individual panels

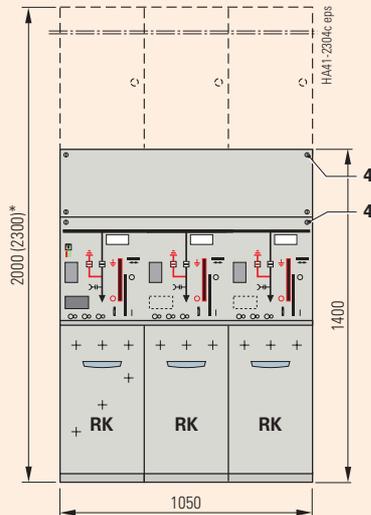


- Cable panel type K:
- 1 Option: Earthing function
  - 2 Interlocking of the cable compartment cover in conjunction with earthing function
  - 3 Cable compartment cover screwed on (without earthing function)
  - 4 Cover screwed on
- \* Option:  
With low-voltage compartment
- \*\* Dependent on the type of cable plug
- \*\*\* Available mounting depth for low-voltage equipment
- \*\*\*\* Option: With high low-voltage compartment 900 mm

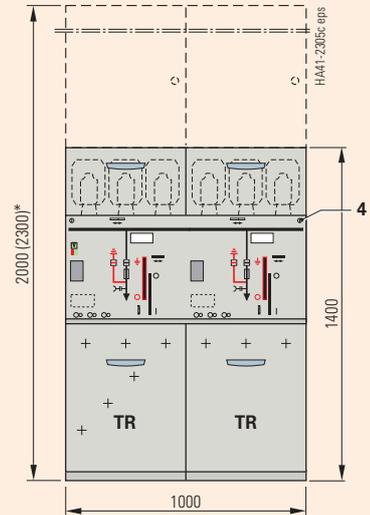
## Ring-main, cable and transformer panels in panel blocks



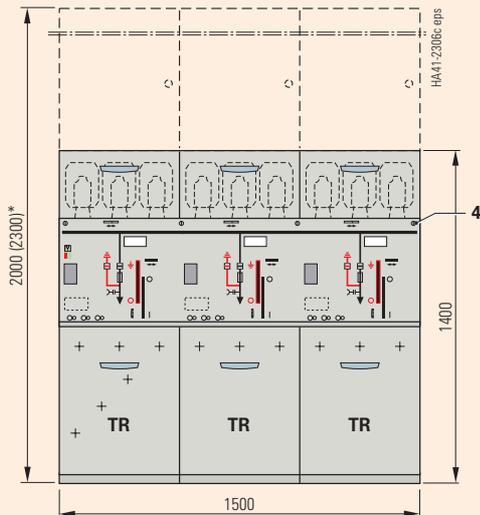
Ring-main panel block type R-B2



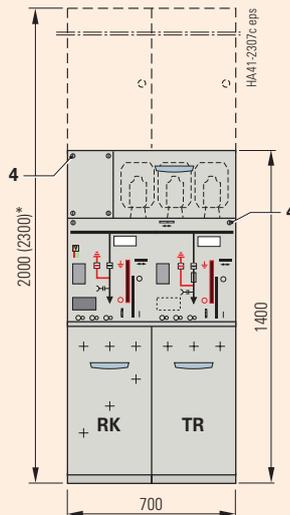
Ring-main panel block type R-B3



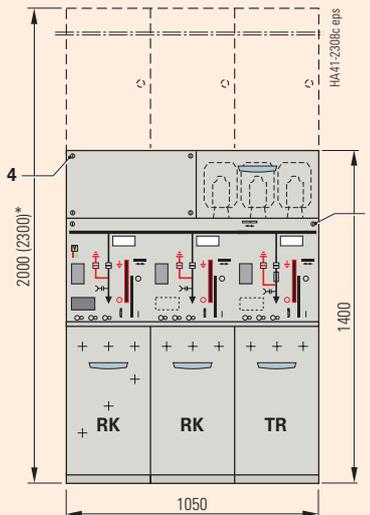
Transformer panel block type T-B2



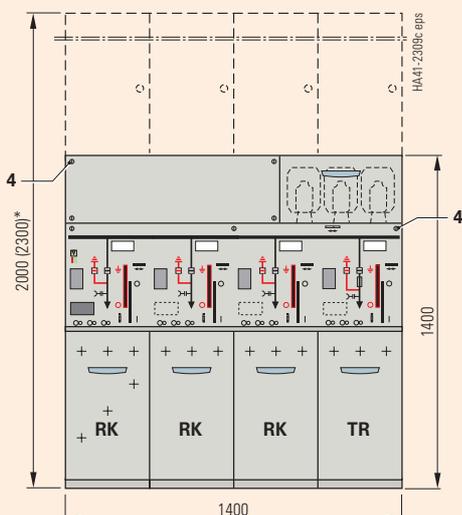
Transformer panel block type T-B3



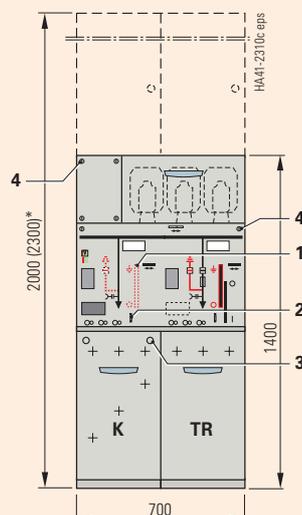
Ring-main/transformer panel block type RT-B2



Ring-main/transformer panel block type 2RT-B3



Ring-main/transformer panel block type 3RT-B4



Cable connection/transformer panel block type KT-B2

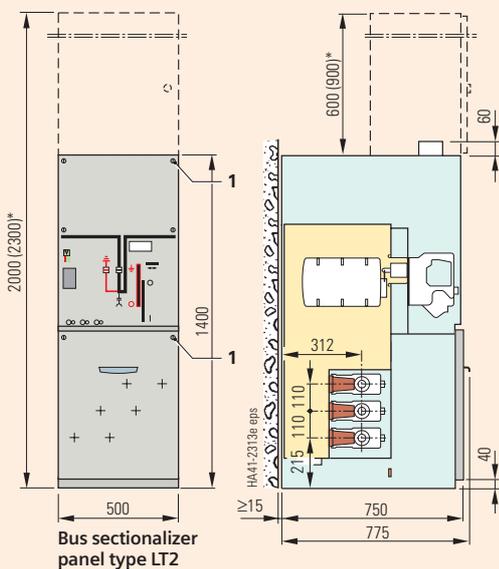
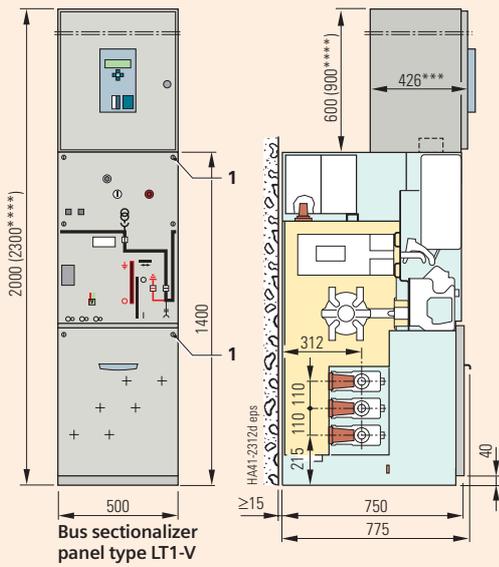
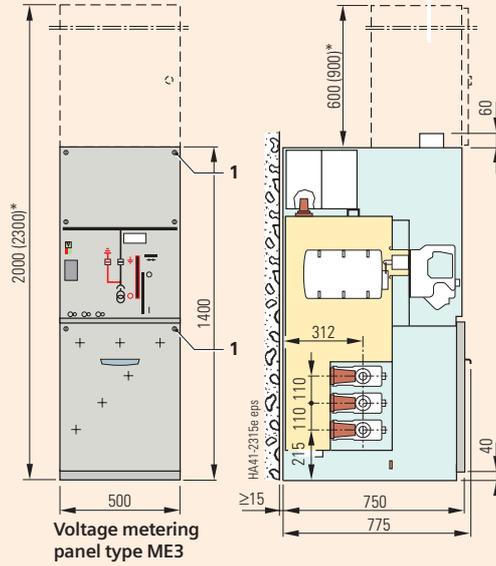
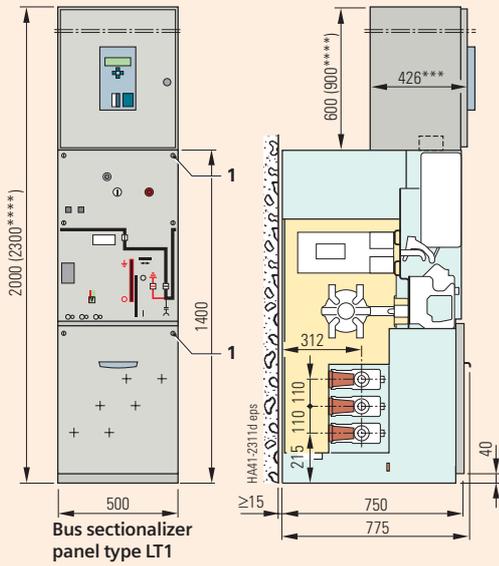
Cable panel type K:

- 1 Option: Earthing function
- 2 Interlocking of the cable compartment cover in conjunction with earthing function
- 3 Cable compartment cover screwed on (without earthing function)
- 4 Cover screwed on

\* Option:  
With low-voltage compartment

# Dimensions

## Bus sectionalizer panels and voltage metering panel as individual panels



1 Cover screwed on

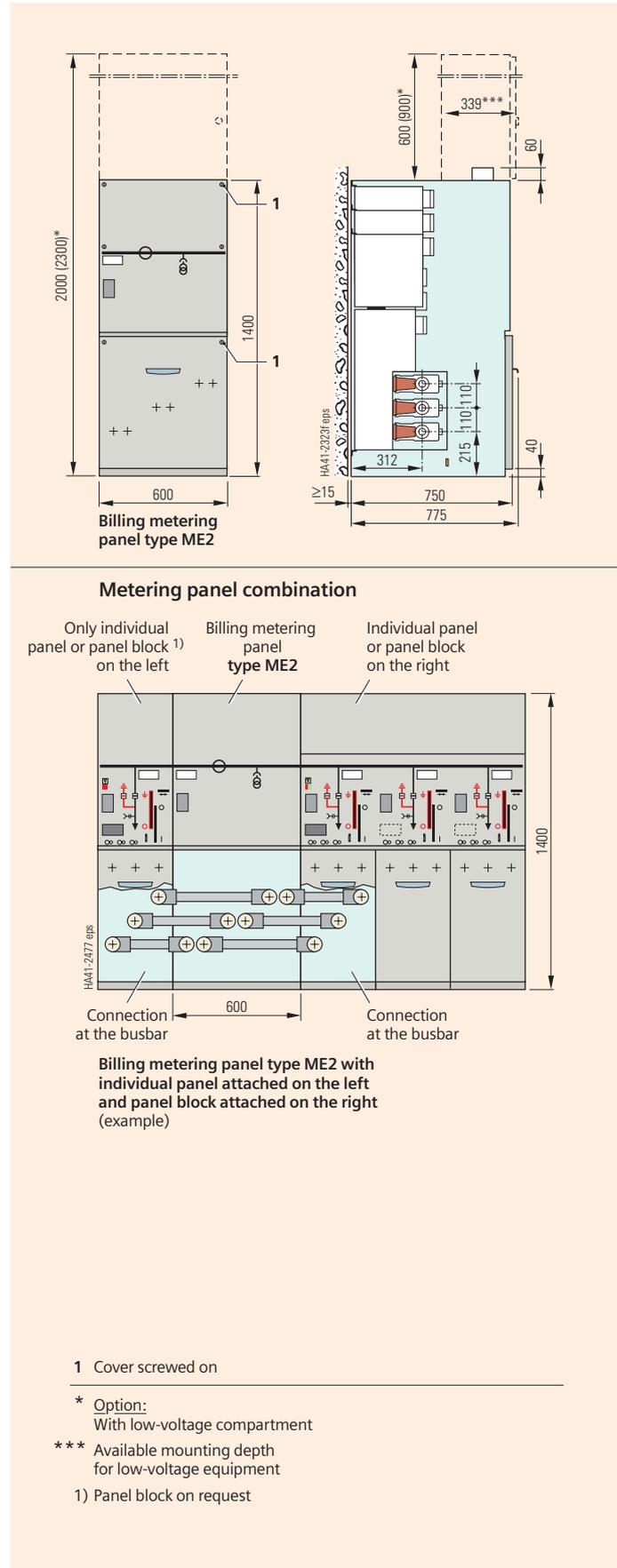
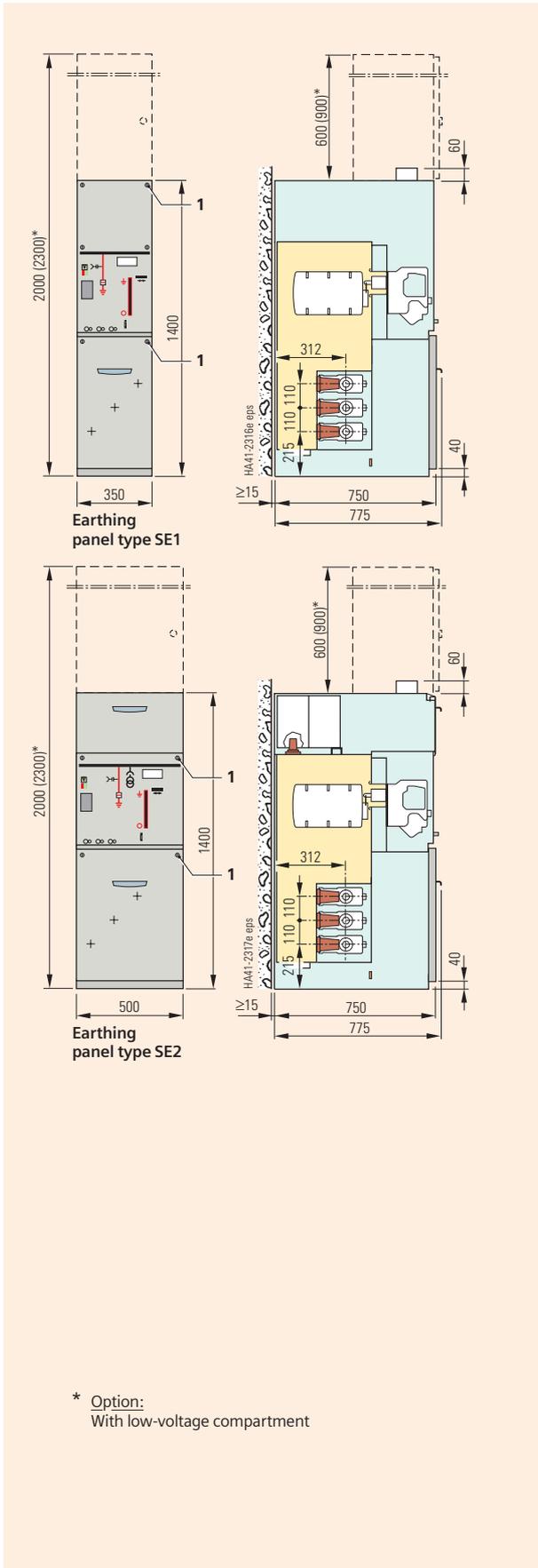
\* Option: With low-voltage compartment

\*\*\* Available mounting depth for low-voltage equipment

\*\*\*\* Option: With high low-voltage compartment 900 mm

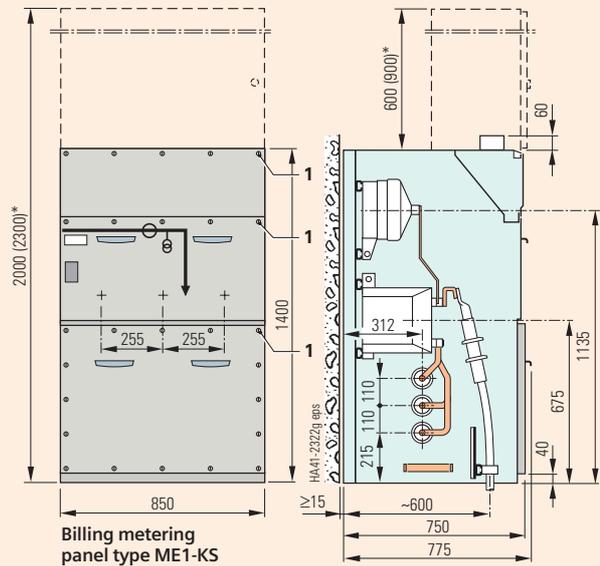
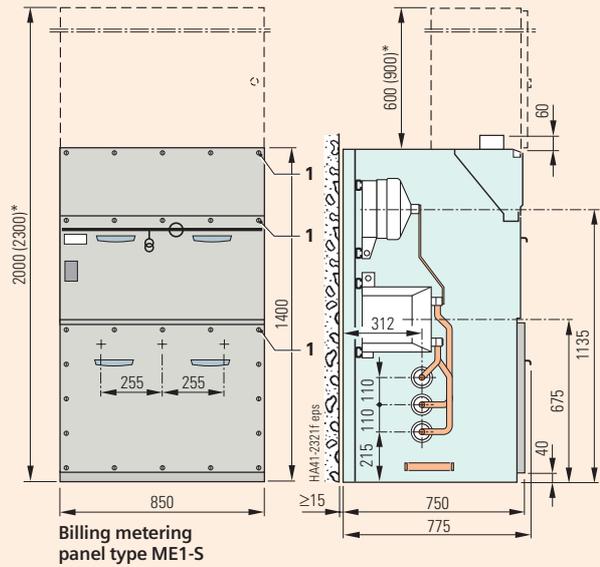
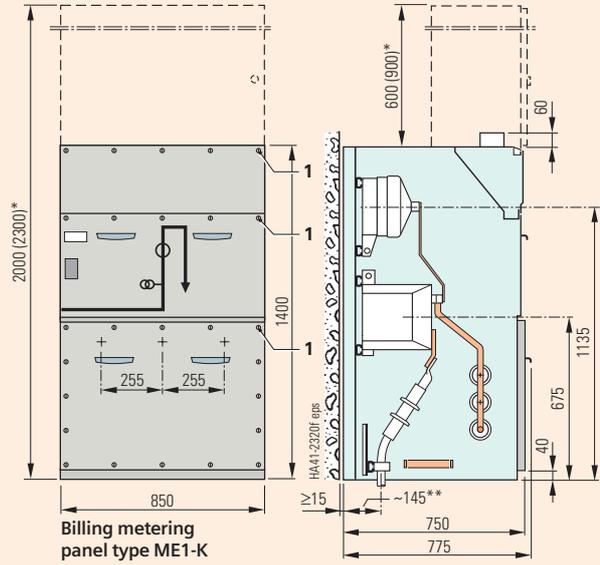
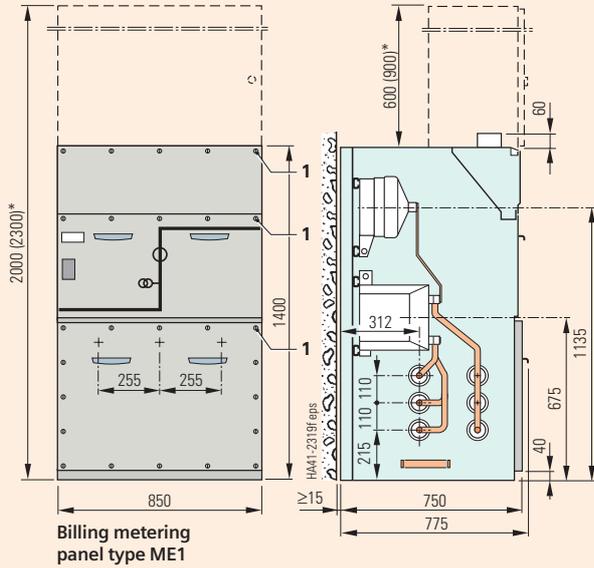
## Busbar earthing panels as individual panels

## Billing metering panel ME2 as individual panel and metering panel combin. with billing metering panel



# Dimensions

## Billing metering panels type ME1... as individual panels



1 Cover/cable compartment cover screwed on

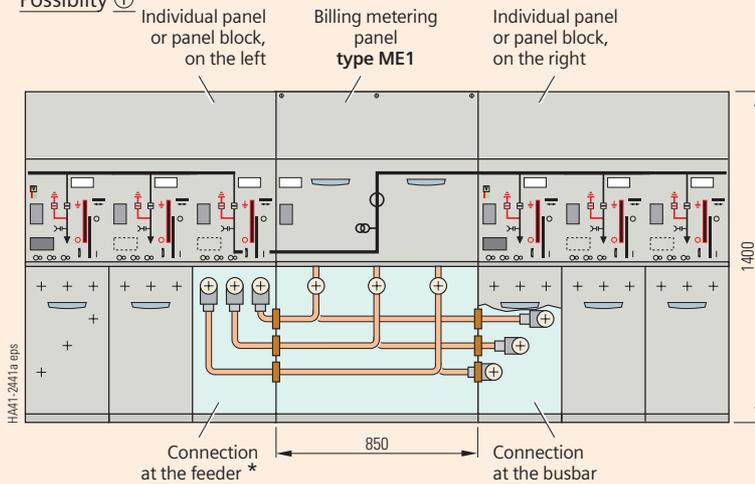
\* Option:  
With low-voltage compartment

\*\* Dimension for cable routing: 323 mm for combination of panel type ME1-K with pressure absorber duct

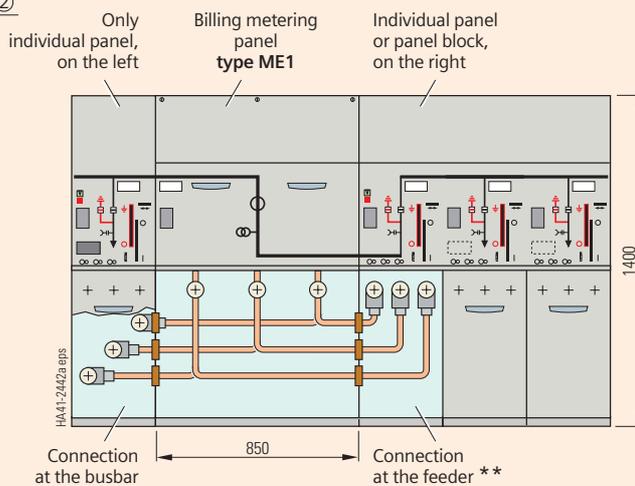
## Metering panel combinations with billing metering panels type ME1...

## Billing metering panels with individual panels or panel blocks attached on the left and right (examples)

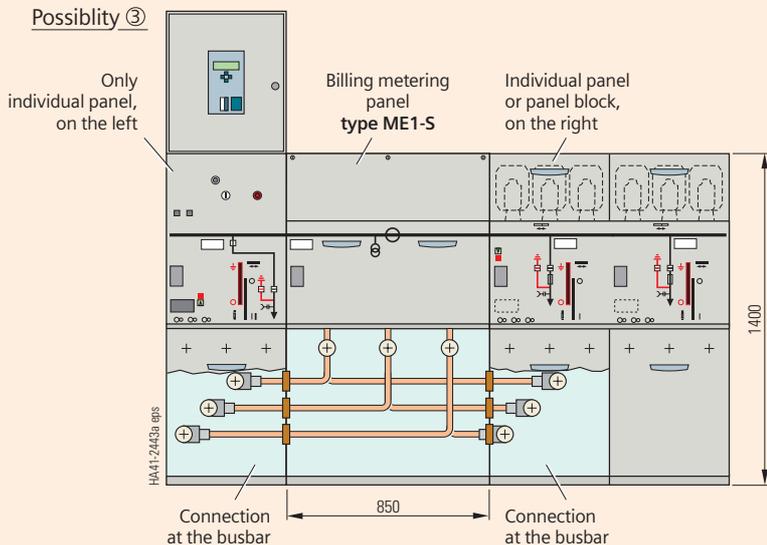
## Possibility ①



## Possibility ②



## Possibility ③



## Possible panel arrangements

The following types of individual panels or panel blocks can be attached to billing metering panels – on the right or left:

## Possibility ①

- Types attached on the left with connection at the feeder
  - Individual panel type RK-U, K-U, TR-U, LS1-U or LS2-U
  - Panel block type R-B2 or R-B3 (in RK-U panel), T-B2 or T-B3 (in TR-U panel), RT-B2, 2RT-B3 or 3RT-B4 (in TR-U panel) or KT-B2 (in TR-U panel)
- Types attached on the right with connection at the busbar
  - Individual panel type RK, K, TR, LS1, LS2, SE1, SE2, ME3 or LT
  - Panel block type R-B2, R-B3, T-B2, T-B3, RT-B2, 2RT-B3, 3RT-B4 or KT-B2

## Possibility ②

- Types attached on the left with connection at the busbar
  - Individual panel type RK, K, TR, LS1, LS2, SE1, SE2, ME3 or LT
  - Panel blocks cannot be attached
- Types attached on the right with connection at the feeder
  - Individual panel type RK-U, K-U, TR-U, LS1-U or LS2-U
  - Panel block type R-B2 or R-B3 (in RK-U panel), T-B2 or T-B3 (in TR-U panel), RT-B2, 2RT-B3 or 3RT-B4 (in RK-U panel) or KT-B2 (in K-U panel)

## Possibility ③

- Types attached on the left with connection at the busbar
  - Individual panel type RK, K, TR, LS1, LS2, SE1, SE2, ME3 or LT
  - Panel blocks cannot be attached
- Types attached on the right with connection at the busbar
  - Individual panel type RK, K, TR, LS1, LS2, SE1, SE2, ME3 or LT
  - Panel block type R-B2, R-B3, T-B2, T-B3, RT-B2, 2RT-B3, 3RT-B4 or KT-B2

Connection inside the panel block:

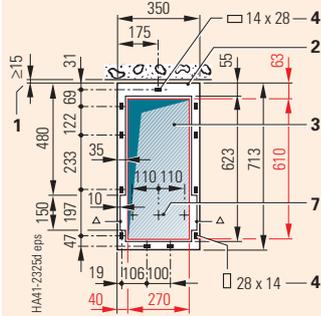
\* Only possible in the right-hand feeder

\*\* Only possible in the left-hand feeder

# Dimensions

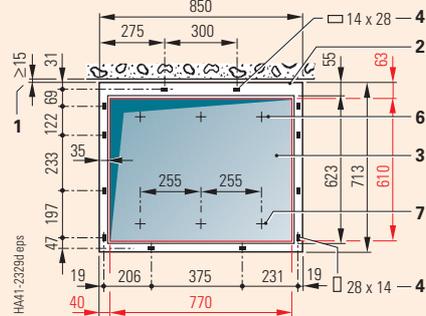
## Floor openings (dimensions in red) and fixing points

Standard (for special versions, see pages 38 and 39)



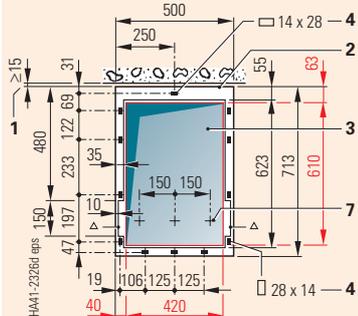
For individual panels

- For ring-main panels type RK
- For cable panels type K
- For busbar earthing panel type SE1



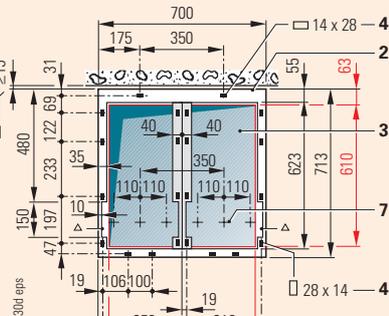
For individual panels

- For billing metering panels
  - Type ME1
  - Type ME1-K
  - Type ME1-S
  - Type ME1-KS
  - Type ME1-KK



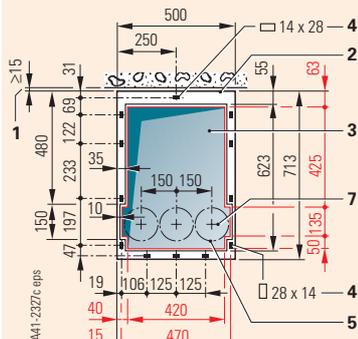
For individual panels

- For circuit-breaker panel types LS1 and LS2 each without cable-type current transformer
- For transformer panels type TR
- For bus sectionalizer panels type LT
- For busbar earthing panel type SE2
- For busbar voltage metering panel type ME3



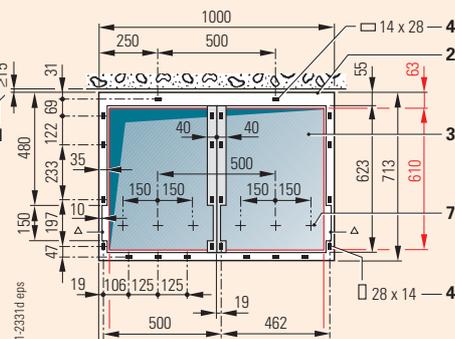
For panel blocks

- For ring-main panel block type R-B2
- For ring-main/transformer panel block type RT-B2
- For cable connection/transformer panel block type KT-B2



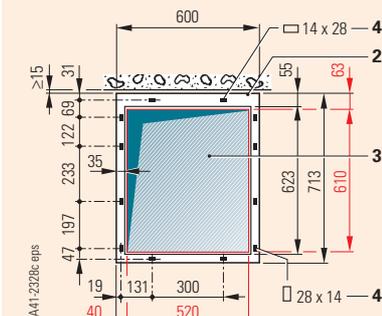
For individual panels

- For circuit-breaker panel types LS1 and LS2 each with cable-type current transformers



For panel block

- For transformer panel block type T-B2



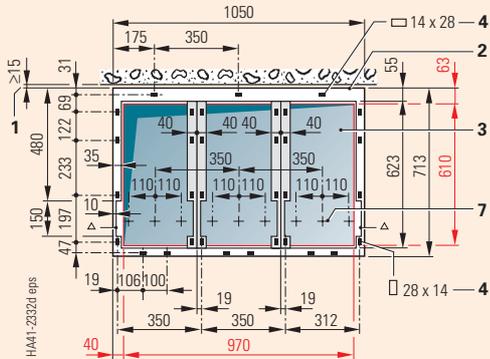
For individual panels

- For billing metering panels type ME2

- 1 Wall distance
- 2 Fixing frame (base) of an individual panel or panel block
- 3 Floor opening for high-voltage cables and, if applicable, control cables
- 4 Fixing points
- 5 For 4MC70 33 cable-type current transformer with outside diameter 145 mm for arrangement beneath the panel
- 6 Position of the incoming cables for metering panels type ME1...
- 7 Position of the incoming cables for the feeder

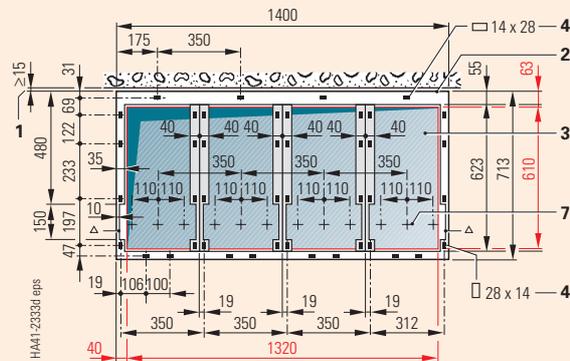
△ Cutout in the mounting frame for extended floor opening for panel with cable-type current transformers

## Floor openings (dimensions in red) and fixing points



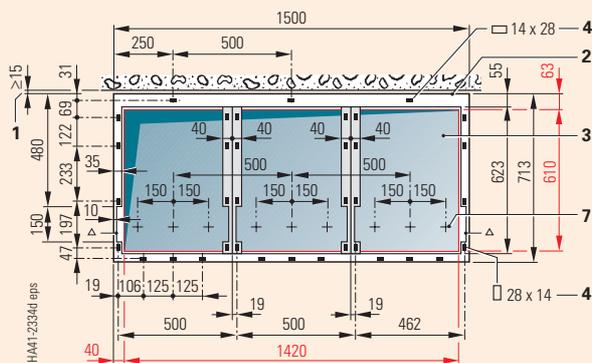
For panel blocks

- For ring-main panel block type R-B3
- For ring-main/transformer panel block type 2RT-B3



For panel block

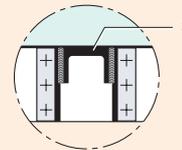
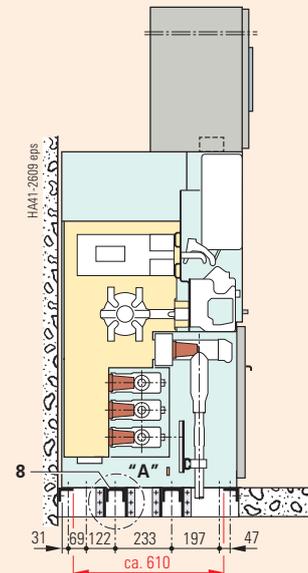
- For ring-main/transformer panel block type 3RT-B4



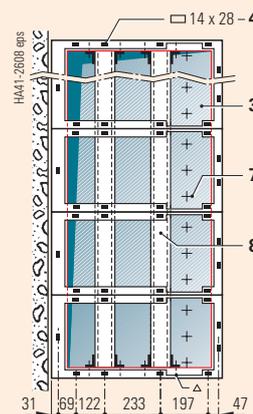
For panel block

- For transformer panel block type T-B3

### Example for fixing panels on the floor



### Detail "A"



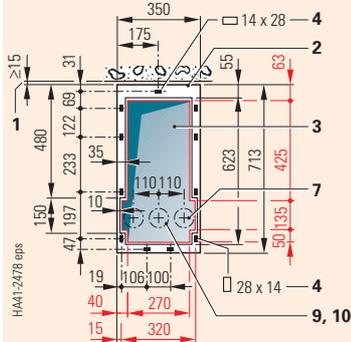
- 1 Wall distance
  - 2 Fixing frame (base) of an individual panel or panel block
  - 3 Floor opening for high-voltage cables and, if applicable, control cables
  - 4 Fixing points
  - 7 Position of the incoming cables for the feeder
  - 8 Fixing support
- Δ Cutout in the mounting frame for extended floor opening for panel with cable-type current transformers

# Dimensions

## Floor openings (dimensions in red) and fixing points

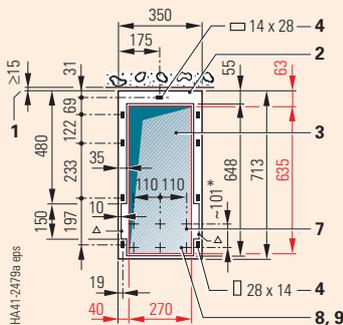
### Special versions

Legends and footnotes see page 39



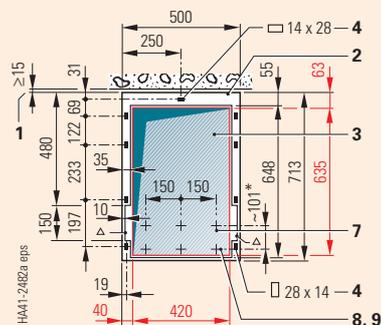
- For ring-main panels type RK
- For cable panels type K

For individual panels with cable-type current transformers or surge arresters

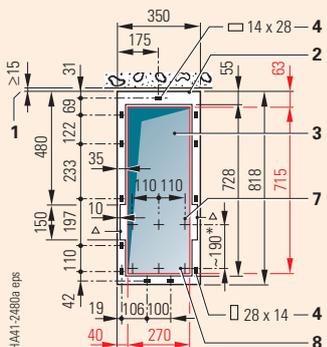


- For ring-main panels type RK
- For cable panels type K

For individual panels with double cable connection or surge arresters make Tyco Electronics Raychem, type RDA 24 (panel depth 775 mm), standard or 25 mm deeper cable compartment cover

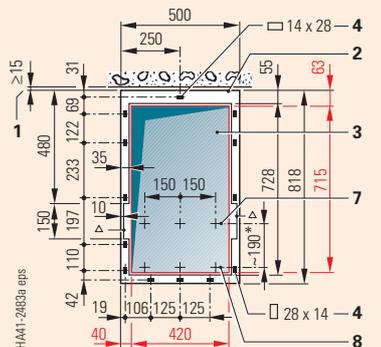


- For ring-main panels type RK1
- For circuit-breaker panels type LS1 and LS2

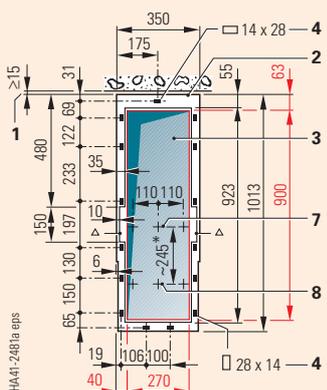


- For ring-main panels type RK
- For cable panels type K

For individual panels with double cable connection (panel depth 880 mm), 105 mm deeper cable compartment cover

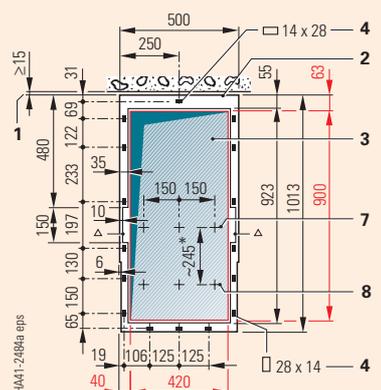


- For ring-main panels type RK1
- For circuit-breaker panels type LS1 and LS2



- For ring-main panels type RK
- For cable panels type K

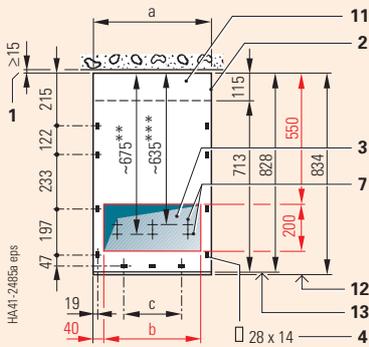
For individual panels with double cable connection (panel depth 1075 mm), 300 mm deeper cable compartment cover



- For ring-main panels type RK1
- For circuit-breaker panels type LS1 and LS2

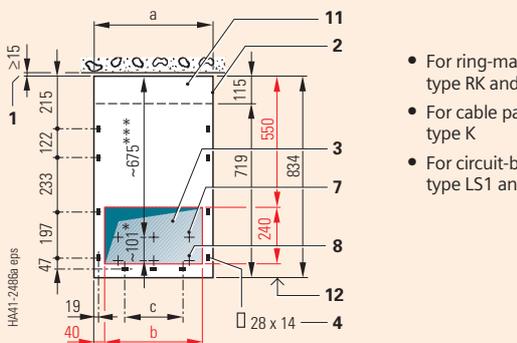
## Floor openings (dimensions in red) and fixing points

## Special versions in combination with pressure absorber system

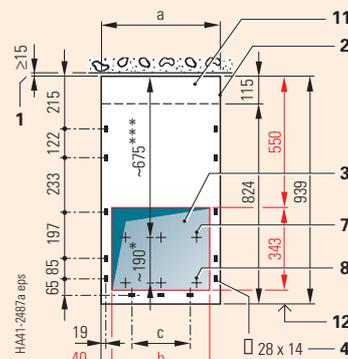


For individual panels with single cable connection

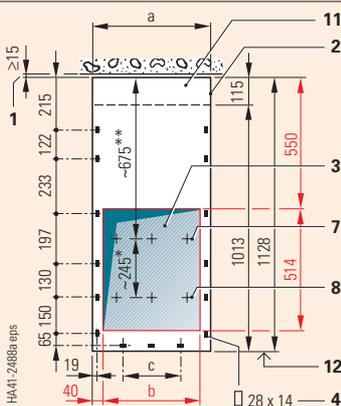
- For ring-main panels type RK and RK1
- For cable panels type K
- For circuit-breaker panels type LS1 and LS2
- For transformer panels type TR

For individual panels with double cable connection  
standard or 25 mm deeper  
cable compartment cover

- For ring-main panels type RK and RK1
- For cable panels type K
- For circuit-breaker panels type LS1 and LS2

For individual panels with double cable connection  
105 mm deeper cable compartment cover

- For ring-main panels type RK and RK1
- For cable panels type K
- For circuit-breaker panels type LS1 and LS2

For individual panels with double cable connection  
300 mm deeper cable compartment cover

- For ring-main panels type RK and RK1
- For cable panels type K
- For circuit-breaker panels type LS1 and LS2
- For transformer panels type TR, however connection with bolted contact (M16)

- 1 Wall distance
- 2 Fixing frame (base) of an individual panel or panel block
- 3 Floor opening for high-voltage cables and, if applicable, control cables
- 4 Fixing points

- 7 Position of the incoming cables for the feeder
- 8 Position of 2<sup>nd</sup> cable
- 9 For surge arrester
- 10 For cable-type current transformers with outside diameter up to 90 mm
- 11 Pressure absorber duct
- 12 Front edge of base of the pressure absorber system
- 13 Front edge of panel without cable compartment cover

## Dimensions

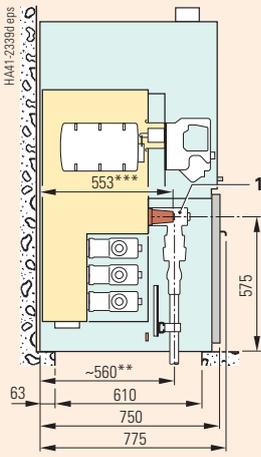
a = Panel width  
b = Width of floor opening  
c = Fixing  
(values see pages 36 and 37)

- \* Dependent on the type of cable plug employed
- \*\* For panel types RK, K and LS
- \*\*\* For panel types TR, connection with plug-in contact

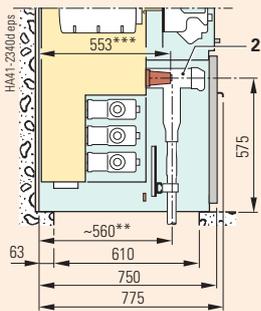
# Dimensions

## Examples for cable connection in ring-main, cable and circuit-breaker panels (non-binding examples, for further examples see Catalog HA 40.1)

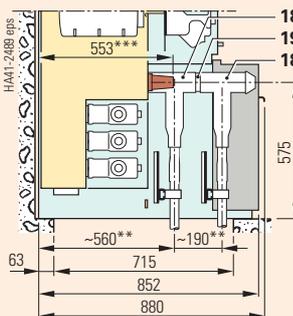
### Cable connection in ring-main panel



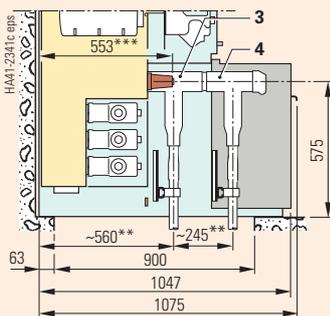
Standard cable compartment cover



Standard cable compartment cover

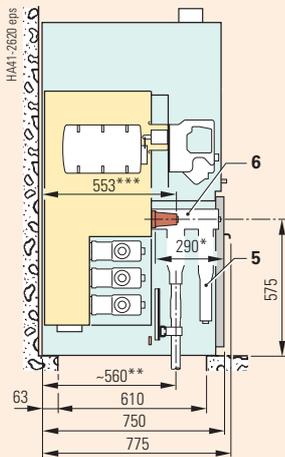


105 mm deeper cable compartment cover

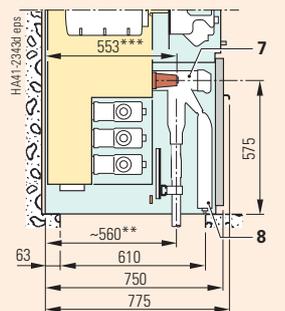


300 mm deeper cable compartment cover for double cable connection

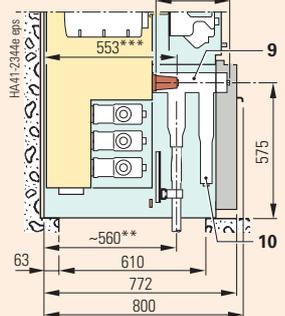
### Cable connection with surge arresters



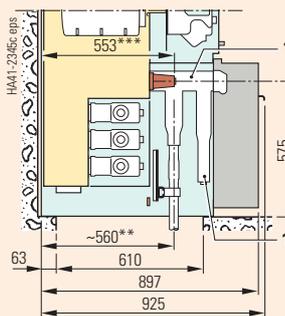
Standard cable compartment cover



Standard cable compartment cover

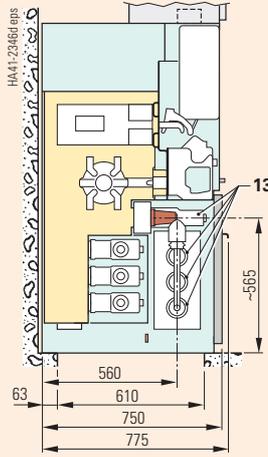


25 mm deeper cable compartment cover

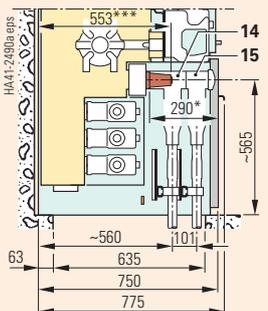


150 mm deeper cable compartment cover

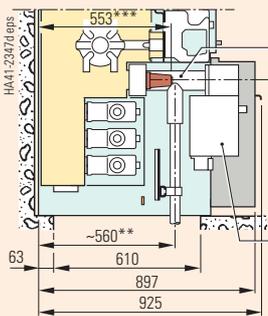
### Connection in circuit-breaker panel



Standard cable compartment cover



Standard cable compartment cover



150 mm deeper cable compartment cover

- 1 Elbow adapter, make: Siemens, type AKE 20/630 with conventional cable sealing end, make: Lovink Enertech, type IAE 20
- 2 Cable T-plug, make: Euromold, type (K)400 TB/G
- 3 Cable T-plug, make: Euromold, type (K)400 TB/G
- 4 Cable T-plug, make: Euromold, type (K)400 TB/G as 2<sup>nd</sup> cable (option: cable elbow plug type (K)400 LB/G); always same make required
- 5 Surge arrester, make: Euromold, type 300 SA-5 or 300 SA-10
- 6 Cable plug, make: Euromold, type 430 TB
- 7 Cable plug, make: Tyco Electronics Raychem, type RICS 5139
- 8 Surge arrester, make: Tyco Electronics Raychem, type RDA 21 (for type RDA 24, a floor opening of 635 mm instead of 610 mm is required)
- 9 Cable T-plug, make: Südkabel (ABB), type SET (12/24) and
- 10 Surge arrester, make: Südkabel (ABB), type MUT (13/23) or:
- 9 Cable connector, make: nkt cables, type AB 24-630 and
- 10 Surge arrester, make: nkt cables, type ASA 24-5
- 11 Cable T-plug, make: Euromold, type (K)400 TB/G
- 12 Surge arrester, e.g. make: Euromold, type 400 Pb or similar designs
- 13 Busbar system for billing metering panel type ME1
- 14 Cable T-plug, make: nkt cables, type CB 24-630
- 15 Coupling connector, make: nkt cables, type CC 24-630
- 16 Cable T-plug, make: Euromold, type (K)400 TB/G
- 17 4MT8 plug-in voltage transformer
- 18 Cable T-plug, make: Südkabel (ABB), type SET 24
- 19 Coupling insert, make: Südkabel (ABB), type KU 23.2

- \* Max. mounting space for cable plugs
- \*\* Dependent on the type of cable plug
- \*\*\* Dimension for bushing as interface type "C" with bolted contact (M16)
- \*\*\*\* Mounting depth for combination of cable T-plug and surge arrester

## Standards, specifications, guidelines

## Overview of standards (July 2006)

		IEC standard	VDE standard	EN standard
Switchgear	8DH10	IEC 60 694	VDE 0670-1000	EN 60 694
		IEC 62 271-200	VDE 0671-200	EN 62 271-200
Devices	Circuit-breaker	IEC 62 271-100	VDE 0671-100	EN 62 271-100
	Disconnecter and earthing switch	IEC 62 271-102	VDE 0671-102	EN 62 271-102
	Switch-disconnector	IEC 60 265-1	VDE 0670-301	EN 60 265-1
	Switch-disconnector / fuse combination	IEC 62 271-105	VDE 0671-105	EN 62 271-105
	HV HRC fuses	IEC 60 282-1	VDE 0670-4	EN 60 282
	Voltage detection systems	IEC 61 243-5	VDE 0682-415	EN 61 243-5
Degree of protection	–	IEC 60 529	VDE 0470-1	EN 60 529
Insulation	–	IEC 60 071	VDE 0111	EN 60 071
Transformers	Current transformers	IEC 60 044-1	VDE 0414-1	EN 60 044-1
	Voltage transformers	IEC 60 044-2	VDE 0414-2	EN 60 044-2
	Combined transformer	IEC 60 044-3	VDE 0414-5	EN 60 044-3
Installation	–	IEC 61 936-1	VDE 0101	–

## Standards

The 8DH10 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 Community, their national specifications conform to the IEC standard.

For insulating capacity, see also Catalog HA 40.1 "Standards".

## Terms

"Make-proof earthing switches" are earthing switches with short-circuit making capacity according to IEC 62 271-102/ VDE 0671-102.

## Type of service location

8DH10 switchgear can be used as indoor installations in accordance with IEC 61 936 (Power installations exceeding 1 kV AC) and VDE 0101:

- Outside lockable electrical service locations at places which are not accessible to the public. Enclosures of switchgear can only be removed with tools.
- Inside 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.

## Internal arc classification (option)

The possibility of faults in gas-insulated switchgear type 8DH is improbable and a mere fraction of that typical of earlier switchgear types, due to:

- Use of gas-filled switchgear compartments
- Use of suitable switching devices such as three-position switches with make-proof earthing function
- Logical mechanical interlocks
- Use of metal-coated voltage transformers and three-phase ring-core current transformers.

Optionally, switchgear type 8DH can be designed with internal arc classification:

- Internal arc classification **IAC**
- Degree of accessibility **A** (for authorized personnel only)
  - Accessible side **F** (front)
  - Accessible side **L** (lateral)
  - Option for switchgear with pressure absorber **R** (rear)
- Arc-fault test current up to 21 kA/1 s

## Climate and ambient conditions

8DH10 switchgear types are fully enclosed and insensitive to climatic conditions.

- Climatic tests fulfilled in accordance with IEC 60 932 (report)
- All medium-voltage devices (except for HV HRC fuses) are installed in a gas-tight, welded stainless steel switchgear vessel which is filled with SF<sub>6</sub> gas
- Live parts outside the switchgear vessel are provided with single-pole enclosure
- At no point can creepage currents flow from high-voltage potentials to earth
- Operating mechanism parts which are functionally important are made of corrosion-proof materials
- Bearings in operating mechanisms are designed as dry-type bearings and do not require lubrication
- Suitable CT and PT design types
- Plug-in busbar system, insulated or screened
- Operating conditions according to IEC 62 271-200, among other, relative air humidity: 95 % (24-hour-mean value)
- Metering panel ME1 (air-insulated) according to IEC 60 694: "Normal operating conditions"

# Standards, Shipping

## Shipping data, classification

### Transport

8DH10 switchgear is delivered in transport units containing individual panels or several panels.

The following must be noted:

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

### Packing

Place of destination inside Germany or other European countries

- Method of transport:  
Rail and truck
- Type of packing:  
– Panels on open pallets  
– Open packing with PE protective foil

Place of destination overseas

- Method of transport:  
Ship
- Type of packing:  
– Panels on open pallets  
– In closed crates with sealed upper and lower PE protective foil  
– With desiccant bags  
– With sealed wooden floor  
– Max. storage time: 6 months

### Classification of the 8DH10 switchgear according to IEC 62 271-200

#### Internal arc classification (option)

Designation of internal arc classification Class IAC at	Rated voltage 7.2 kV to 24 kV
– Wall-standing arrangement (standard)	IAC A FL 21 kA, 1 s
– Free-standing arrangement (option)	IAC A FLR 21 kA, 1 s
Degree of accessibility A	Switchgear in closed electrical service location, access only for "authorized personnel" (acc. to IEC 62 271-200)
– F	Front
– L	Lateral
– R	Rear (for free-standing arrangement)
Arc-fault test current	Up to 21 kA
Test duration	1 s

#### Construction and design

Partition class	PM (partition of metal)
Loss of service continuity category <sup>1)</sup> Panels	LSC 2B LSC 2A
– Without HV HRC fuses	
– With HV HRC fuses	
Accessibility to compartments (enclosure)	Access possibility
– Busbar compartment	– Tool-based
– Switching-device compartment	– Not accessible
– Low-voltage compartment	– Tool-based
– Cable connection compartment <sup>2)</sup>	
– Panel without HV HRC fuses	– Interlock-based
– Panel with HV HRC fuses (TR...)	– Interlock-based
– Panel type K	– Tool-based

1) The loss of service continuity category always refers to the complete switchgear, i.e. the panel with the lowest category determines the loss of service continuity category of the complete switchgear.

2) For 8DH10 switchgear with pressure absorber:  
Tool-based and interlock-based access possibility to cable connection compartment.  
For metering panels type ME1...:  
Tool-based access possibility to cable connection compartment.

If not stated otherwise on the individual pages of this catalog, we reserve the right to include modifications, especially regarding the stated values, dimensions and weights.

Drawings are not binding.

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If not stated otherwise, all dimensions in this catalog are given in mm.

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