

Components

Indicating and measuring equipment, transformer monitor systems

For circuit-breaker panels (type L, L1 ...)
Protection of distribution transformers with ratings that cannot or should not be protected with HV HRC fuses:

- Tripping of the circuit-breaker in case of overload (delayed)
- Tripping of the circuit-breaker when the short-circuit current arises.

On request: Application with switch-fuse combination (panel type T...)
Monitoring of the overload range of distribution transformers with

- Tripping of the switch in case of overload (current smaller than the rated current of the switch)
- Blocking of the tripping function in the short-circuit range (here, the fuse takes over the disconnecting function).

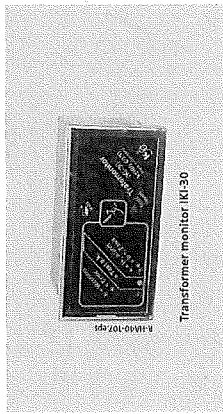
Features

- Current-transformer operated (cable-type transformer), alternatively auxiliary voltage 24 ... 230 V AC/DC

- Instrument transformer
- Special cable-type current transformer
- No direction-dependent installation required
- No earthing of a transformer pole required
- No short-circuit terminals required for maintenance
- Low-energy magnetic release (0.02 Ws)
- Mounting location
- In the low-voltage niche of the feeder panel
- In the low-voltage compartment (option) of the circuit-breaker feeder

- Response performance
- Definite-time overcurrent characteristic
- Definite-time overcurrent characteristic for earth-fault protection (additional sensor required)
- Inverse-time overcurrent characteristic
- extremely inverse
- normal inverse
- Externally undelayed instantaneous tripping
- Self-test function
- Display test LED (red)
- Battery test (under load) LED (green)
- Primary current test with tripping and with primary current injection into the transformers

- Indication
- LED indication for tripping (single flash: Starting, double flash: Tripping)
- Reset after 2 h, 4 h or automatically (after return of power) or manually with reset pushbutton



Transformer monitor IKI 30

Example for selection of transformer protection

Operating voltage (kV)	Transformer rating (kVA)		kRies
	Siemens	Woodward/SEG	
5	≥ 160	WIC 1-2P	IKI 30
6	≥ 160	≥ 160	≥ 160
6.6	≥ 160	≥ 160	≥ 160
10	≥ 200	≥ 250	≥ 160
11	≥ 200	≥ 250	≥ 160
13.8	≥ 250	≥ 400	≥ 160
15	≥ 315	≥ 500	≥ 160
20	≥ 400	≥ 500	≥ 250

- Outputs
- Tripping signal: 1 floating relay output (NC contact) for telecommunication as passing contact
- Starting signal: 1 floating relay output (NC contact) - IS activated as long as the starting criterion is reached, e.g. to block an upstream primary protection
- 1 watchdog (relay)
- 1 external tripping output for control of an existing release, e.g. via capacitor
- Tripping output designed as impulse output for direct control of the low-energy release
- Input
- Remote tripping signal, control via floating external contact
- Instantaneous tripping.

Components

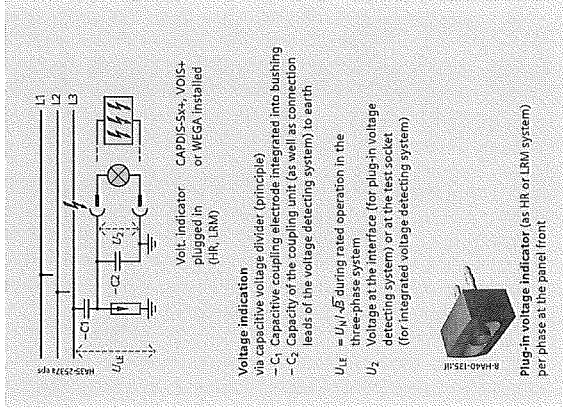
Indicating and measuring equipment

Voltage detecting systems according to IEC/EN 61243-5 or VDE 0682-415

- To verify safe isolation from supply
- Detecting systems
- HR or LRM system with plug-in indicator
- VOIS RA, WEGA ZERO
- LRM system with integrated indicator, with integrated repeat test of the interface and function) test:
 - type CAPDIS-S14, WEGA 1.2, WEGA 1.2 Vario; with additional integrated signaling relay
 - type CAPDIS-S24, WEGA 2.2.

Plug-in voltage indicator

- Verification of safe isolation from supply phase by phase through insertion in each socket pair
- Safe-to-touch
- Routine-tested
- Measuring system and voltage indicator can be tested
- Voltage indicator flashes if high voltage is present.



Technical data of voltage detecting systems

Version	HR system	LRM system	VOIS	VOIS+	VOIS R	-S14	-S24	IP54	IP54	WEGA	WEGA 1.2/1.2 Vario	2.2
Degree of protection	IP54	IP54	IP67	IP67	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54
Temperature range	-40 °C to +55 °C	-40 °C to +55 °C	-25 °C to +55 °C	-25 °C to +55 °C	-25 °C to +55 °C	-25 °C to +55 °C	-25 °C to +55 °C	-25 °C to +55 °C	-25 °C to +55 °C	-25 °C to +55 °C	-25 °C to +55 °C	-25 °C to +55 °C
Integrated signaling relays (auxiliary voltage required)	-	-	with	with	with	with	with	with	with	with	with	with

Legend for page 59

- VOIS+ and CAPDIS-Sx
- A0 Operating voltage not present: Active zero indication
 - A1 Operating voltage present
 - A2 Operating voltage not present: For CAPDIS-S24; Auxiliary power not present
 - A3 Failure in phase L1, e.g. earth fault, operating voltage at L2 and L3
 - A4 Voltage present, appears in the range from 0.10...0.45 x U_n
- WEGA
- A0 For WEGA 2.2: Operating voltage not present, auxiliary power present, LCD illuminated
 - A1 Operating voltage present
 - A2 For WEGA 2.2: Auxiliary power present, LCD illuminated
 - A3 Failure in phase L1, operating voltage not present, LCD not illuminated
 - A4 Voltage present, current monitoring or coupling section below limit
- Test button function
- A5 For WEGA 2.2: Auxiliary power present, LCD illuminated
 - A5 Indication "Display Test" passed (lights up briefly)
 - A6 CAPDIS-S24: ERROR indication, e.g. open circuit or missing auxiliary power
 - A7 Overvoltage present (lights up permanently)
 - A8 "ERROR" indication, e.g. in case of missing auxiliary voltage

Components

Indicating and measuring equipment, transformer monitor systems

For circuit-breaker panels (type L, L1 ...)
Protection of distribution transformers with ratings that cannot or should not be protected with HV HRC fuses:

- Tripping of the circuit-breaker in case of overload (delayed)
- Tripping of the circuit-breaker when the short-circuit current arises.

On request: Application with switch-fuse combination (panel type T...)
Monitoring of the overload range of distribution transformers with

- Tripping of the switch in case of overload (current smaller than the rated current of the switch)
- Blocking of the tripping function in the short-circuit range (here, the fuse takes over the disconnecting function).

Features

- Current-transformer operated (cable-type transformer), alternatively auxiliary voltage 24 ... 230 V AC/DC

- Instrument transformer
- Special cable-type current transformer
- No direction-dependent installation required
- No earthing of a transformer pole required
- No short-circuit terminals required for maintenance
- Low-energy magnetic release (0.02 Ws)
- Mounting location
- In the low-voltage niche of the feeder panel
- In the low-voltage compartment (option) of the circuit-breaker feeder

- Response performance
- Definite-time overcurrent characteristic
- Definite-time overcurrent characteristic for earth-fault protection (additional sensor required)
- Inverse-time overcurrent characteristic
- extremely inverse
- normal inverse
- Externally undelayed instantaneous tripping
- Self-test function
- Display test LED (red)
- Battery test (under load) LED (green)
- Primary current test with tripping and with primary current injection into the transformers

- Indication
- LED indication for tripping (single flash: Starting, double flash: Tripping)
- Reset after 2 h, 4 h or automatically (after return of power) or manually with reset pushbutton

Components Indicating and measuring equipment

- VOIS+, VOIS R+**
- Integrated display
 - With indication "A1" to "A3" (see legend, page 58)
 - Maintenance-free, repeat test required
 - With integrated 3-phase LRM test socket for phase comparison
 - With integrated signaling relays (only VOIS R+).

- CAPDIS-Sx+**
- Common features**
- Maintenance-free
 - Integrated display
 - Integrated repeat test of the interfaces (self-monitoring)
 - With integrated repeat test (without auxiliary power) by pressing the "Test" button
 - With integrated 3-phase LRM test socket for phase comparison.

- CAPDIS-S1+**
- With indication "A1" to "A7" (see legend, page 58)
 - Without auxiliary power
 - Without signaling relay (without auxiliary contacts).
- CAPDIS-S2+**
- With indication "A0" to "A8" (see legend, page 58)
 - Signaling relay (integrated, auxiliary power required).

- WEGA 1.1, 2 / WEGA 1.2 Vario / WEGA 2.2**
- Common features**
- Integrated display
 - Maintenance-free
 - Integrated repeat test of the interface (self-monitoring)
 - With integrated function test (without auxiliary power) by pressing the "Display" test button
 - With integrated 3-phase LRM test socket for phase comparison
 - Adjustable for different operating voltages (adjustable capacitance C2, only for WEGA 1.2 Vario).

- WEGA 1.2**
- With indication "A1" to "A5" (see legend, page 58)
 - Without auxiliary power
 - Without signaling relay.

- WEGA 2.2**
- With indication "A0" to "A6" (see legend, page 58)
 - Signaling relay (integrated, auxiliary power required).

Voltage presence indicating system
according to IEC/EN 62271-206 or VDE 0671-206

- WEGA ZERO**
- With indication "A1" to "A4" (see legend, page 58)
 - Maintenance-free
 - With integrated 3-phase LRM test socket for phase comparison.

Integrated voltage indicator VOIS+, VOIS R+

Symbols shown

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

For legend, see page 58

Integrated voltage detector system WEGA 2.2 (1.2)

Symbols shown

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

For legend, see page 58

Integrated voltage detector system WEGA ZERO

Symbols shown

WEGA ZERO	L1	L2	L3
A0	□	□	□
A1	⚡	⚡	⚡
A2	□	⚡	⚡
A3	⚡	⚡	⚡
A4	⚡	⚡	⚡
A5	⚡	⚡	⚡
A6	⚡	⚡	⚡

For legend, see page 58

LC display (gray):
Not illuminated
LC display white:
Illuminated (with auxiliary power)

Components Indicating and measuring equipment

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

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

Phase comparison test unit make Pfisterer, type EPV as combined test unit (HR and LRM) for:

- Voltage detection
- Phase comparison
- Interface test
- Integrated self-test
- Indication via LED

Phase comparison test unit make Horstmann, type ORON 3.1 as combined test unit (HR and LRM) for:

- Phase comparison
- Interface testing at the switchgear
- Voltage detection
- Integrated self-test
- Indication via LED and acoustic alarm
- Phase sequence indicator

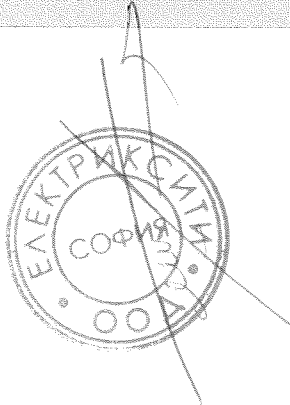
Phase comparison test unit make Kries, type CAP-Phase as combined test unit (HR and LRM) for:

- Voltage detection
- Repeat test
- Phase comparison
- Phase sequence test
- Self-test

The unit does not require a battery

Phase comparison test unit make Hachmann, type VisualPhase LCD as combined test unit (HR and LRM) for:

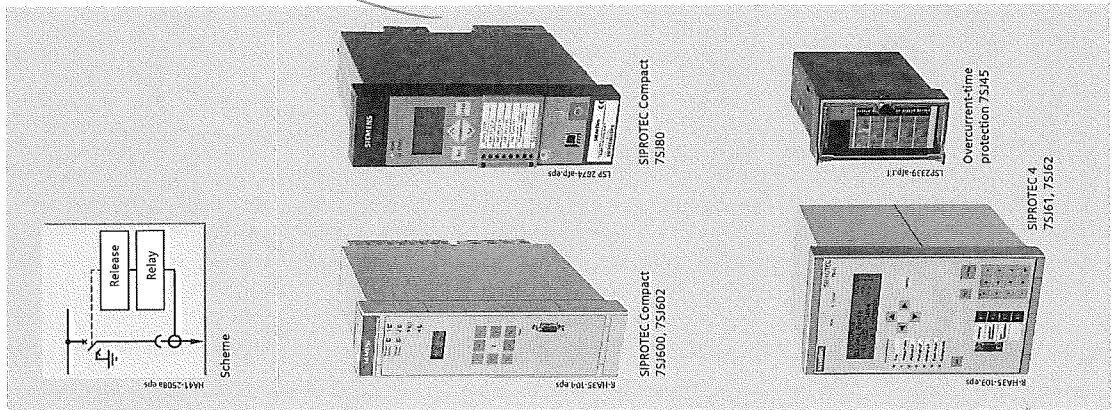
- Voltage detection with measured-value indication
- Interface test
- Low voltage detection
- Documentable repeat test
- Phase comparison with LED signal and measured-value indication
- Phase angle from –180° to +180°
- Frequency quality
- Complete self-test



55

Components

Protection systems



Simple protection systems
As a simple protection for distribution transformers and circuit-breaker feeders, standard protection systems are available, consisting of:

- Current-transformer operated protection device
- Siemens: Type 75J45
- Woodward/SEG: Type WIC 1-2P, WIC 1-3P, WIP-1
- Protection device with auxiliary voltage supply
- Siemens: Type 75J46
- Release at the circuit-breaker as
- Shunt release (f)

or

- C.T.-operated release (low-energy 0.1 Ws)
- Instrument transformer as
- Cable-type current transformer (standard)
- Three-phase current transformer (as option for SIMOSEC switching panels type L...

Mounting location

- In 350-mm-high top low-voltage compartment of the circuit-breaker feeder, or in the low-voltage niche.

Multifunction protection (selection):
SIPROTEC multifunction protection

- Common features
- User-friendly operating program, DIGSI 4 for parameterizing and analysis
 - Freely programmable LEDs for displaying any desired data
 - Communications and bus capability
 - Functions: Protection, control, signaling, communication and measuring
 - Operation and fault indication memory.

75J600/75J602

- LC text display (2 lines) and keyboard for local operation, configuration and indication
- Control of the circuit-breaker

75J180

- LC text display (6 lines) and keyboard for local operation, parameterizing and indication
- Control of circuit-breaker and disconnectors.

75J161/75J162

- For stand-alone or master operation
- LC text display (4 lines) for process and equipment data
- Four freely programmable function keys for frequently performed functions
- Keys for navigation in menus and for entering values.

Other types and makes on request

Mounting location

- In the 350-mm or 550-mm-high low-voltage compartment (option) of the circuit-breaker feeder.

Components

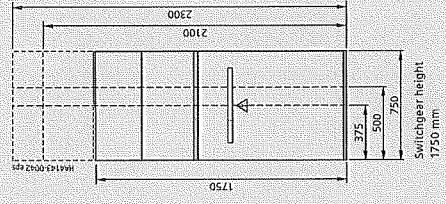
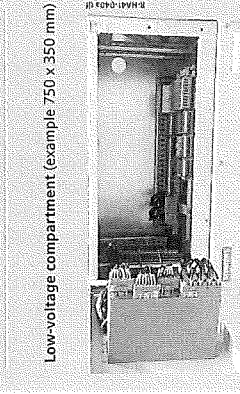
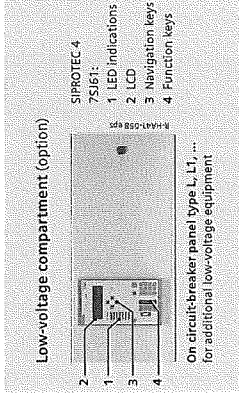
Low-voltage compartment

Features of low-voltage compartment (option)

- Overall heights
 - 350 mm
 - 550 mm
- Partioned safe-to-touch from the high-voltage part of the panel
- Installation on the panel:
 - Possible per-feeder
 - Customer-specific equipment
 - For accommodation of protection, control, measuring and metering equipment
- Overall height depends on the panel-specific configuration of primary and secondary equipment
- Door with hinge on the left
- Option: Door with hinge on the right.

Low-voltage cables

- Control cables of the panel to the low-voltage compartment via multi-pole, coded module plug connectors
- Option: Plug-in bus wires from panel to panel inside the low-voltage niche, or optionally in the separate wiring duct on the panel.



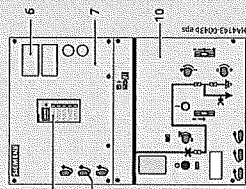
Components

Low-voltage niche

Low-voltage niche (standard)

- Inside the panel
- Cover for low-voltage niche:
 - Standard: Screwed-on cover
 - With door (option)
- For accommodation of terminals and standard protection devices, e.g. in circuit-breaker panels combined with frame cover for panels
- Protection relays (with max. 75 mm wide mounting frame), e.g.
 - Type 75I45, 75I46;
 - For type L and L1
 - Make Woodward/SEG;
 - type WIC1; For type L and L1
- On request:
 - 75I60, 75I80
 - Make Woodward/SEG, WIP-1
- For bus wires and/or control cables; niche open at the side to the adjacent panel
- Safe-to-touch, separated from high-voltage part of the panel
- Degree of protection IP3X (standard).

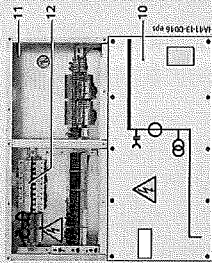
Low-voltage niche (examples)



In circuit-breaker panel type L (600 mm) (with CB+MAR*)

- Protection relay as option:
- 1 Protection relay type 75I45
 - 2 On request: Protection relay type 75I80 in LV niche
 - 3 Protection relay make Woodward (SEG), type WIC
 - 4 On request: Multifunction protection relay SIPROTEC 4 type 75I61 on swing-out frame

- 5 Option: Sockets for capacitive voltage detecting system for busbar
- 6 Short-circuit earth-fault indicator
- 7 Frame cover of low-voltage niche (can be unscrewed)
- 8 Option: Local remote switch for three-position switch-disconnector
- 9 Option: Momentary-contact rotary control switch ON-OFF for motor operating mechanism of the three-position switch-disconnector
- 10 Panel front
- 11 Low-voltage niche open
- 12 Option: Inclusive equipment



In billing metering panel Type M (750 mm) (low-voltage niche open)

*1) **Δ** = Automatic reclosing
BAR = Non automatic reclosing

Dimensions

Switchgear installation

Room planning

- Switchgear installation
- Wall-standing arrangement, free-standing arrangement
- Room height
- Panel depth including end wall (-)
- Control aisle ≥ 1000 mm recommended (in Germany ≥ 800 mm)
- When extending or replacing panels, it might be necessary – depending on the room dimensions – to disassemble the respective adjacent panels.
- Option: Floor cover (optionally deeper)
- Cable

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 78 to 80

Foundations:

- Steel girder construction
- Steel-reinforced concrete.

Panel dimensions

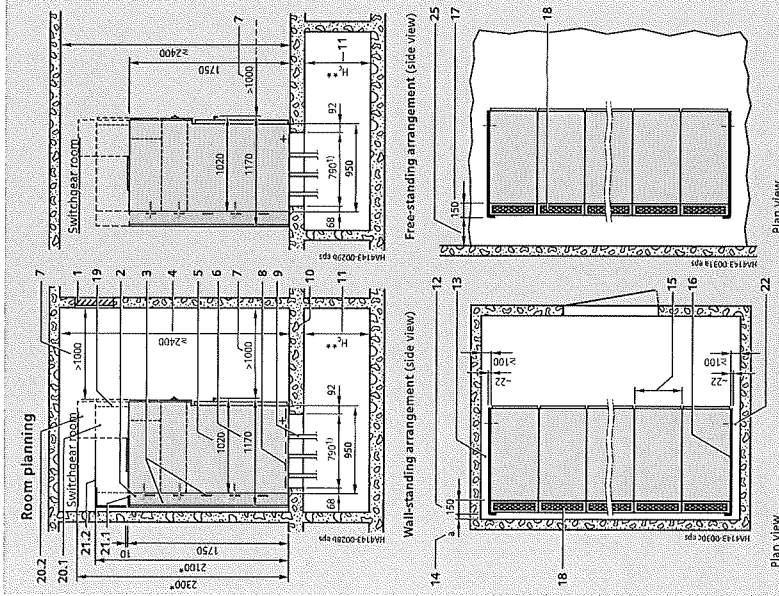
See pages 67 to 77

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 81.

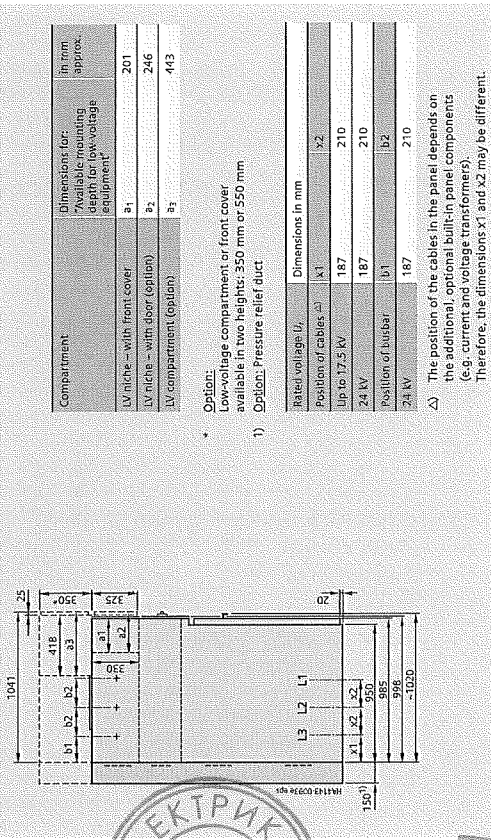
Floor opening

- Δ) Panel type L, L1, L(T), L(T) with VCB type 3AH569:
 - Panel depth: 1090 mm, switchgear depth: 1230 mm
 - *1) Switchgear height 2100 mm if height of low-voltage compartment 350 mm; switchgear height 2300 mm if height of low-voltage compartment 550 mm
 - **1) Cable fixing in the panel, without deep floor cover



- 1 Relief opening
- 2 Direction of pressure relief
- 3 Pressure relief of switchgear
- 4 Room height
- 5 Individual panel depth (-)
- 6 Panel depth including end wall (-)
- 7 Depending on national requirements: Control aisle ≥ 1000 mm recommended (in Germany ≥ 800 mm)
- 8 When extending or replacing panels, it might be necessary – depending on the room dimensions – to disassemble the respective adjacent panels.
- 9 Option: Floor cover (optionally deeper)
- 10 Foundation
- 11 Height of cable basement, depending on (recommendation for H_{cable}):
 - ≥ 600 mm**
 - ≥ 1400 mm
- 12 Cable fixing underneath the panel (in cable basement)
- 13 Use of deep floor cover ≥ 1400 mm
- 14 Wall distance, dimension of pressure relief duct (= option)
- 15 Side wall distance
- 16 Wall distance a (see also page 66)
- 17 Panel width

Dimensions Switchgear installation



Compartment	Dimensions for "Available mounting depth for low voltage equipment"	in mm approx.
LV niche - with front cover	B ₁	201
LV niche - with door (option)	B ₂	246
LV compartment (option)	B ₃	443

* Option: Low-voltage compartment or front cover available in two heights: 350 mm or 550 mm

1) Option: Pressure relief duct

Rated voltage U _r	Dimensions in mm
Position of cables →) x1	x2
Lip to 17.5 kv	187
24 kv	187
Position of busbar ↓) y1	y2
24 kv	187
	210

Δ) The position of the cables in the panel depends on the additional, optional built-in panel components (e.g. current and voltage transformers). Therefore, the dimensions x1 and x2 may be different.

Standard dimensions of switchgear

IAC - Design of switchgear	Pressure relief duct (solid duct for panel depth)	Direction of pressure relief	Panel depth →) in mm	Switchgear height in mm	Switchgear arrangement	Distance →) from switchgear to switchgear room in mm
- without IAC (standard)	Without with	to the rear/upwards to the rear upwards	1020 →)	1170 →)	wall-standing	wall-standing approx. ≥ 35 mm
				1750 →)	free-standing	free-standing approx. ≥ 35 mm
• with IAC A FL	with (duct is standard)	upwards	1020 →)	1170 →)	wall-standing	wall-standing approx. ≥ 35 mm
				1750 →)	free-standing	free-standing approx. ≥ 35 mm

Δ) Option: Low-voltage niche with door. Additionally 45 mm: Switchgear depth approx. 1041 mm

* Panel depth: additionally deeper by 60 mm

** Panel depth: 1080 mm, switchgear depth: 1230 mm

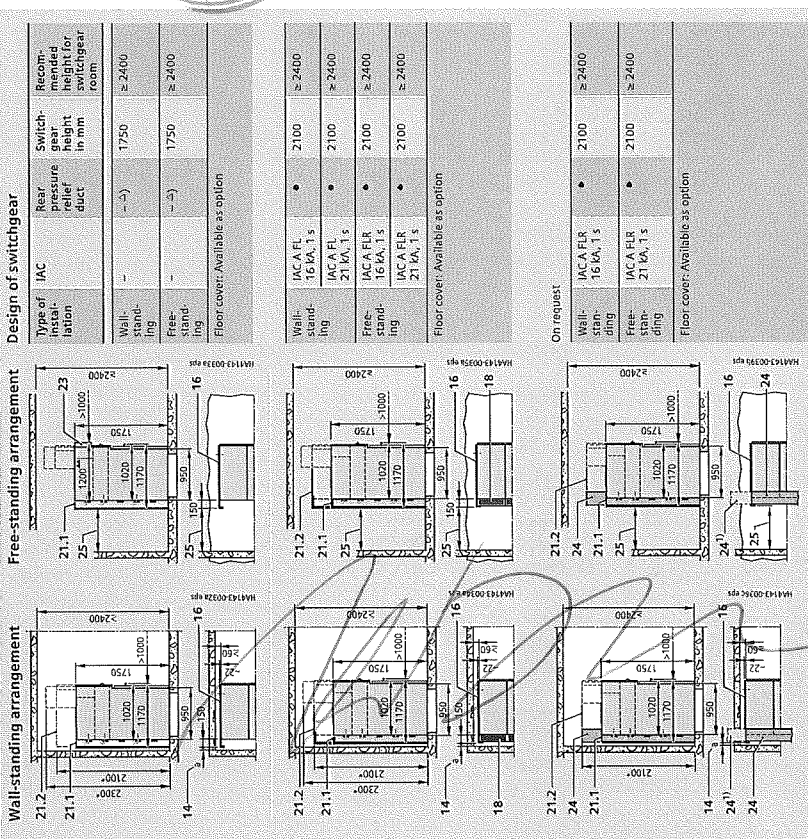
• Circuit-breaker panel types L, L1, LC1, LC2; with circuit-breaker type "CB-f AR (3AH569)"

• Circuit-breaker panel types L511, L531, L532; with circuit-breaker type 3AH6/ "CB-f"

***) In addition, a low-voltage compartment can be selected optionally. The switchgear height is changed respectively

66 Switchgear Type SIMOSEC, up to 24 kV, Air-Insulated, Extendable - Siemens HA 41.43 - September 2015

Dimensions Switchgear installation



Type of installation	IAC	Rear pressure relief duct	Switchgear height in mm	Recommended height in mm
Wall-standing	-	-	1750	≥ 2400
Free-standing	-	-	1750	≥ 2400

Type of installation	IAC	Switchgear height in mm	Recommended height in mm
Wall-standing	IAC A FL 16 kA, 1 s	2100	≥ 2400
Free-standing	IAC A FL 21 kA, 1 s	2100	≥ 2400
Free-standing	IAC A FL 16 kA, 1 s	2100	≥ 2400
Free-standing	IAC A FL 21 kA, 1 s	2100	≥ 2400

Type of installation	IAC	Switchgear height in mm	Recommended height in mm
Wall-standing	IAC A FL 16 kA, 1 s	2100	≥ 2400
Free-standing	IAC A FL 21 kA, 1 s	2100	≥ 2400

24 On request: Option: Pressure relief duct with pressure relief towards outside.

length ≥ 2.50 m; installation (for station building) on site

25 Distance to rear wall: ≥ 800 mm (for free-standing arrangement)

16 End wall

17 Depth of pressure relief duct

18 Option: Pressure relief duct for each panel, for wall-standing or free-standing arrangement

19 Option: Front cover

20.1 Option: Low-voltage compartment: 350 mm high

20.2 Option: Low-voltage compartment: 550 mm high

21.1 End wall: 1750 mm high

21.2 End wall: 2100 mm high (option)

22 Earthing terminal

23 Option: Low-voltage niche with door

Δ) Option: Rear pressure relief duct

• As standard

* Available as option

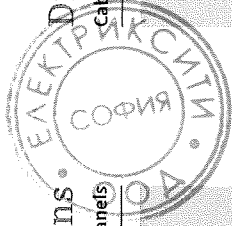
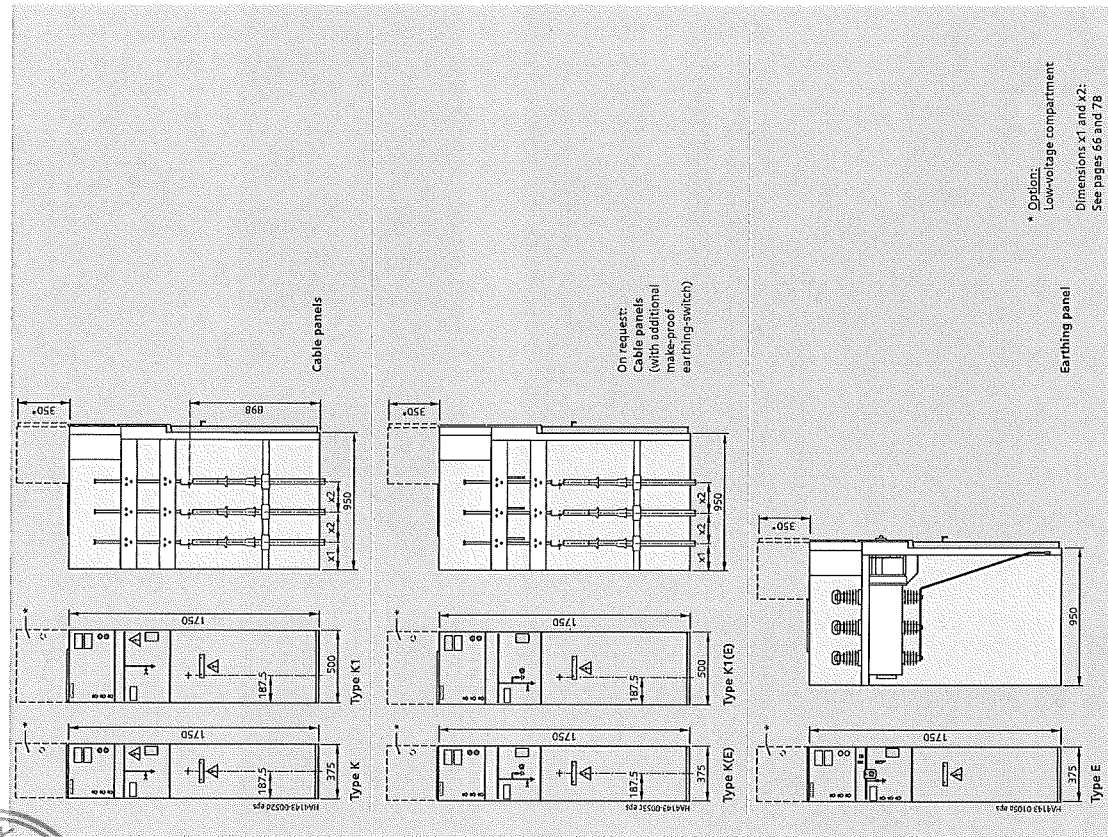
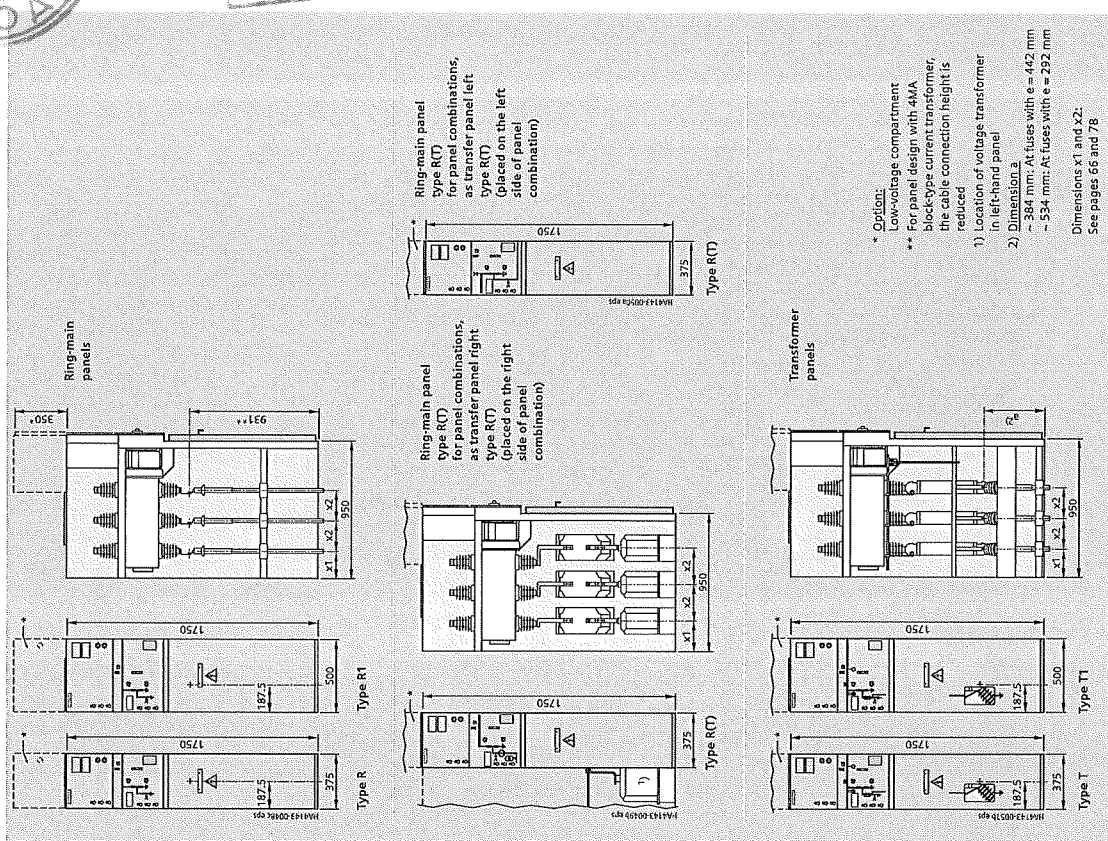
For standard dimensions and IAC design, see also page 66

Switchgear Type SIMOSEC, up to 24 kV, Air-Insulated, Extendable - Siemens HA 41.43 - September 2015

Dimensions

Ring-main panels, transformer panels

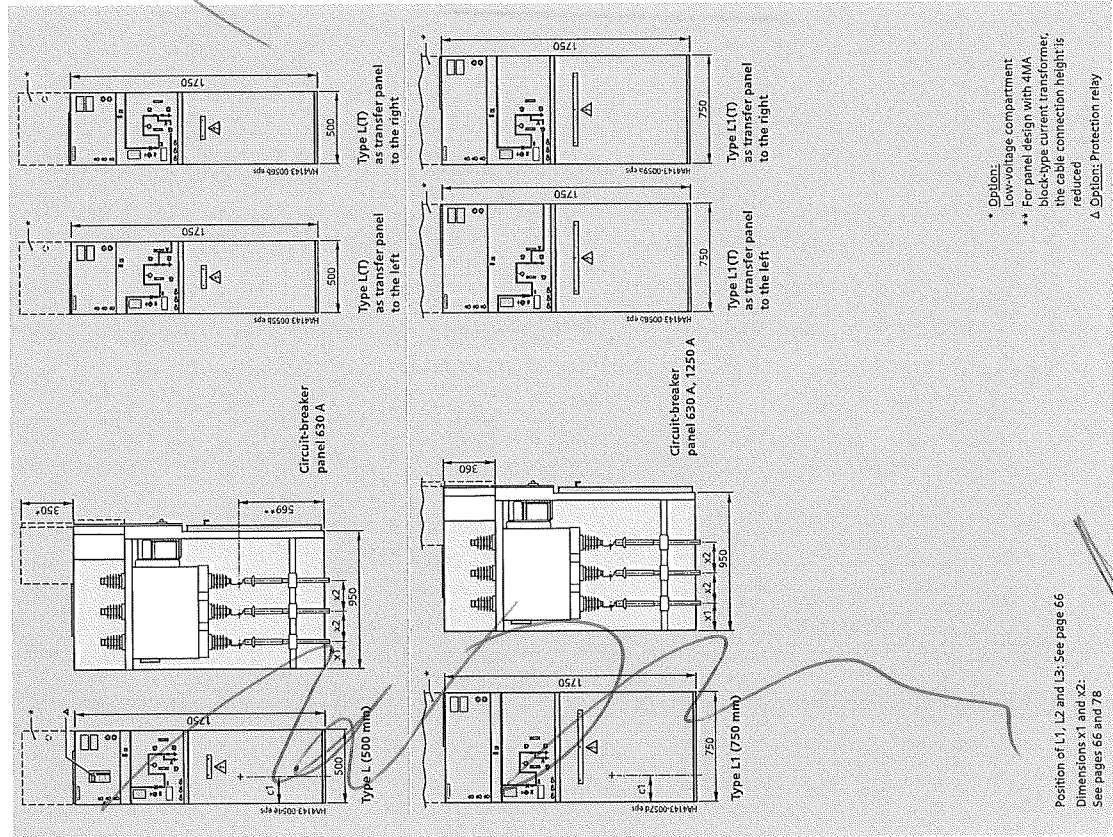
Cable panels



Handwritten signature

Dimensions

Circuit-breaker panels

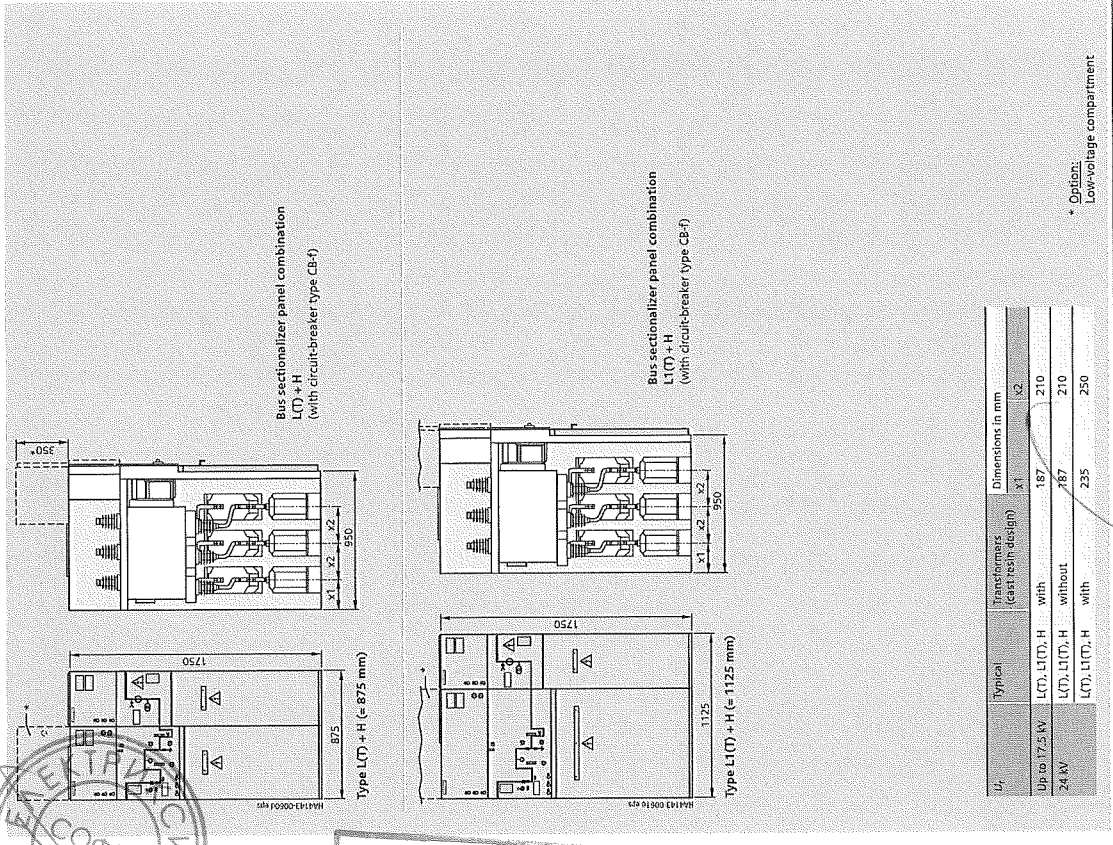


- * Option: Low-voltage compartment.
- ** For panel design with 4MA block-type current transformer, the cable connection height is reduced.
- △ Option: Protection relay.

Position of L1, L2 and L3: See page 66
Dimensions x1 and x2: See pages 66 and 78

Dimensions

Panel combinations: Bus sectionalizer panels (circuit-breaker panel and bus riser panel)

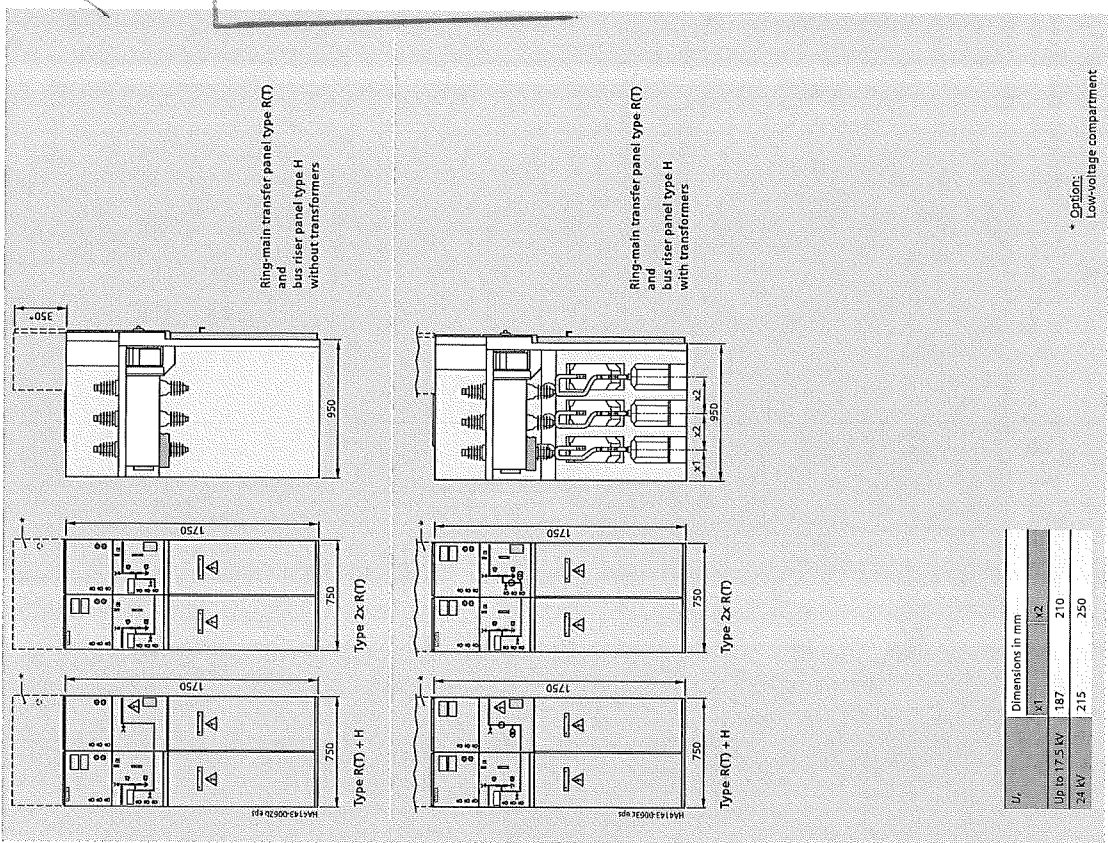


L1	Typical	Transformers (cast-resin design)	Dimensions in mm	
			x1	x2
Up to 17.5 kV	L(T), L1(T), H	with	187	210
24 kV	L(T), L1(T), H	without	187	210
	L(T), L1(T), H	with	235	250

* Option: Low-voltage compartment

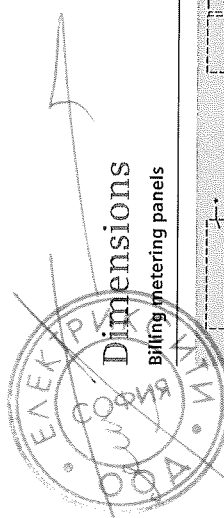
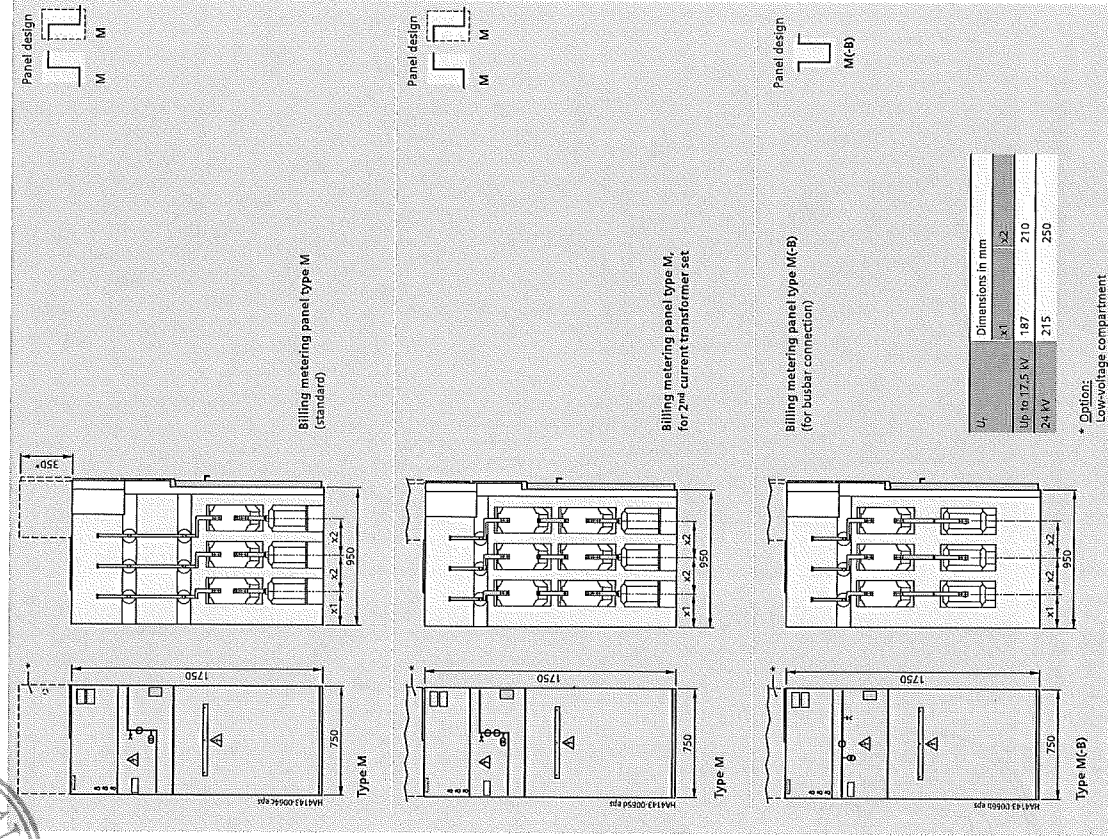
Dimensions

Panel combinations: Bus sectionalizer panels



Dimensions

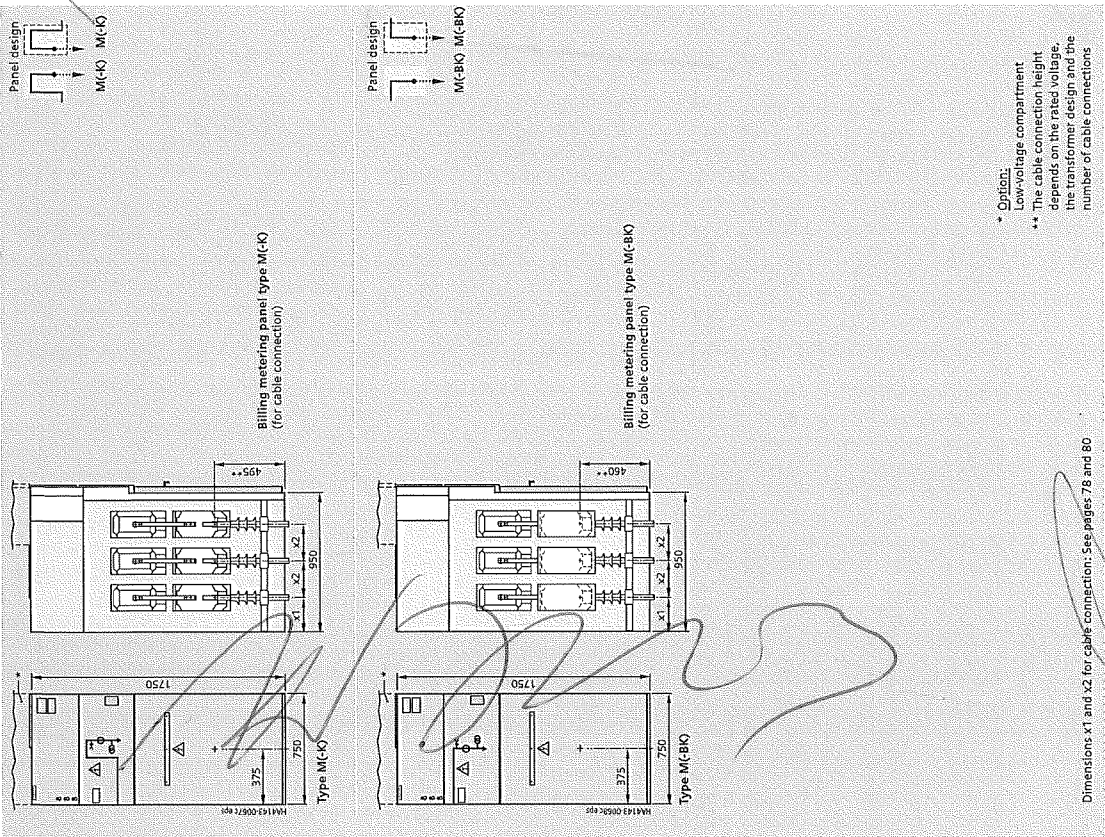
Billing metering panels



ΣΥΣΤΗΜΑ ΣΥΣΤΗΜΑ

Dimensions

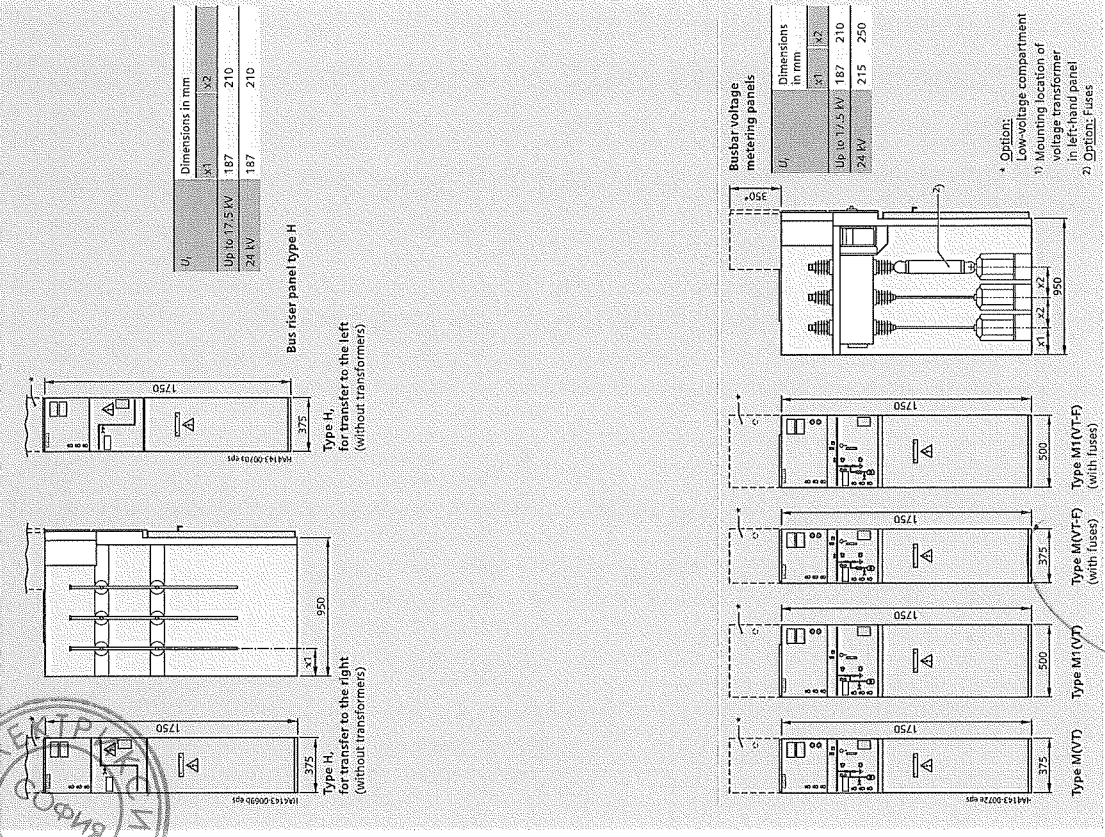
Billing metering panels

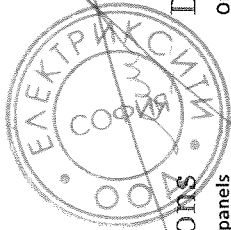


Dimensions x1 and x2 for cable connection: See pages 78 and 80

Dimensions

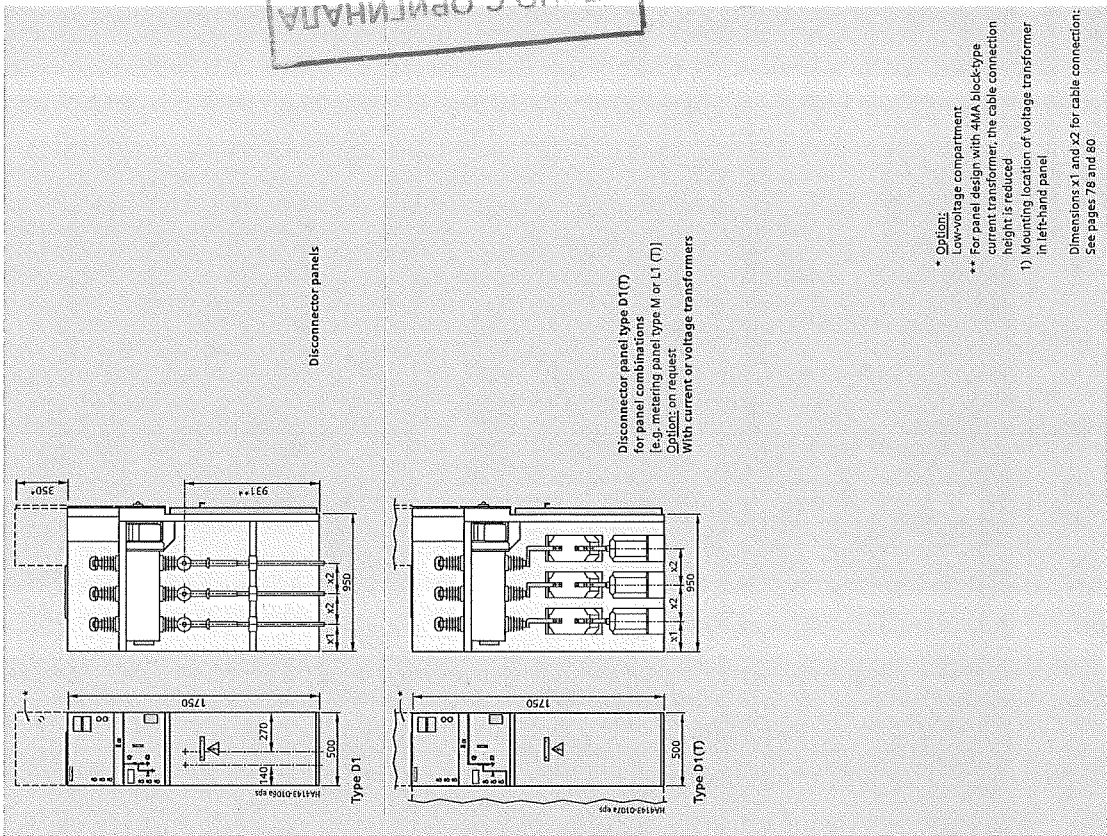
Bus riser panels, busbar voltage metering panels





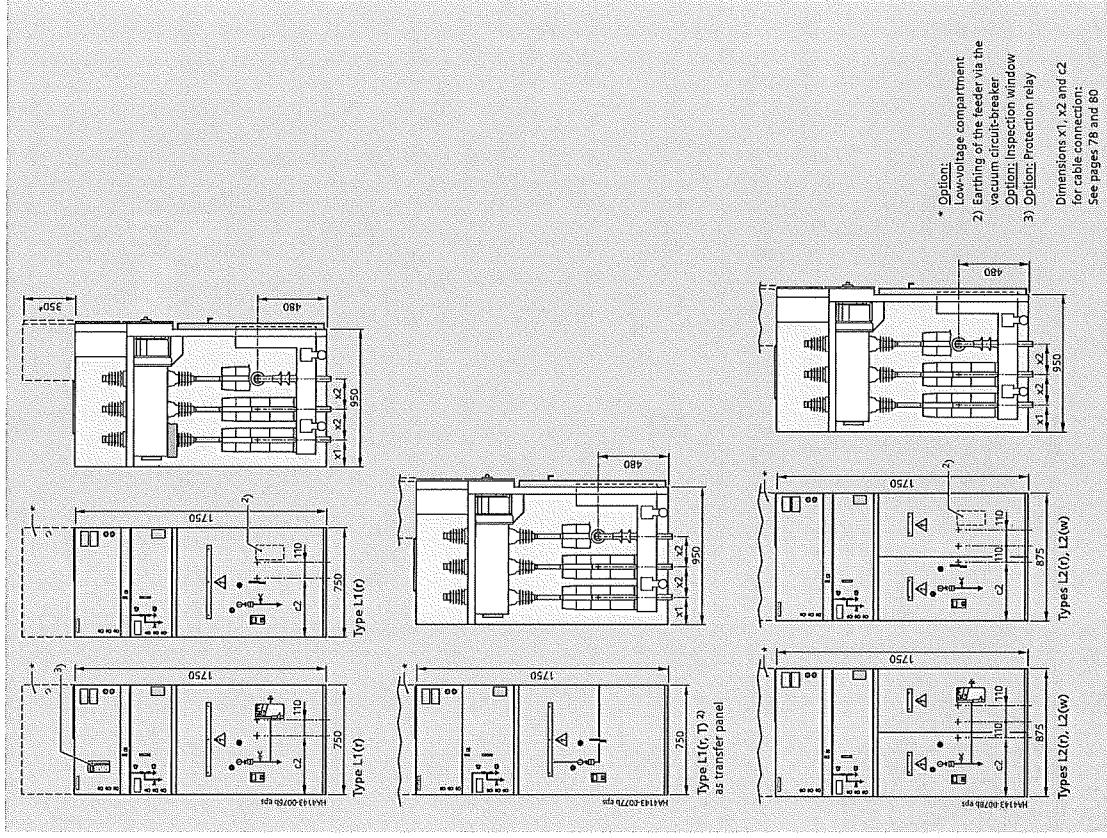
Dimensions

Disconnector panels



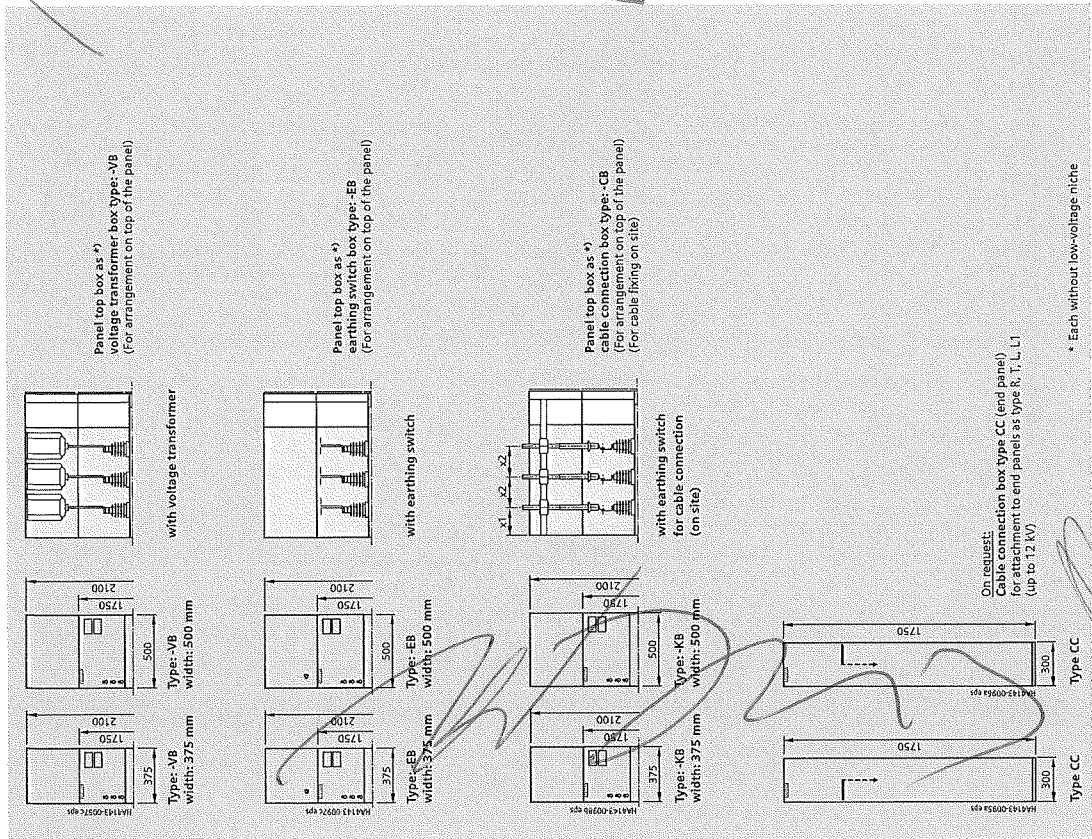
Dimensions

On request: Circuit-breaker panels (for removable circuit-breaker type CB-r)



Dimensions

On request: Panel top box, cable connection box

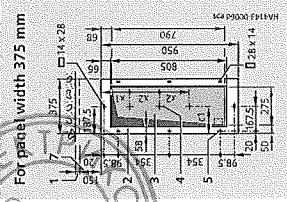


On request:
Cable connection box type CC (end panel)
for attachment to end panels as type R, T, L, L1
(up to 12 kV)

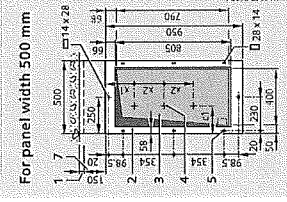
* Each without low-voltage niche

Dimensions

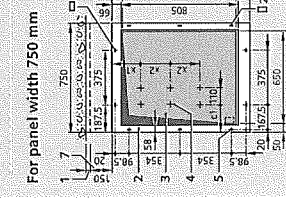
Floor openings (dimensions in red) and fixing points



For panel type	Position of cables 1)		
	X1	X2	Cl
R	187	187	210
K	187	187	210
T	187	187	210
D	187	187	210



For panel type	Position of cables 1)		
	X1	X2	Cl
R, D	187	187	210
K	187	187	210
T	187	187	210
L with CTs	187	187	210
VTS	187	235	210



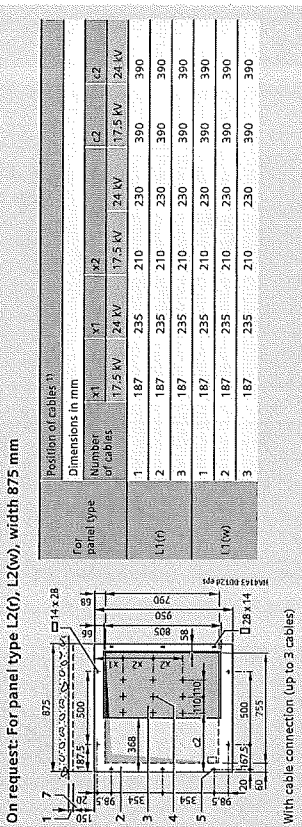
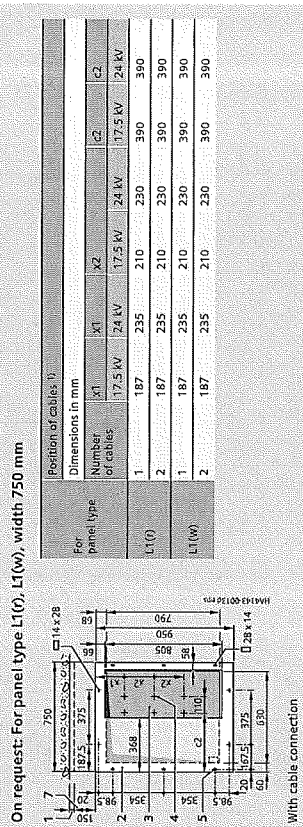
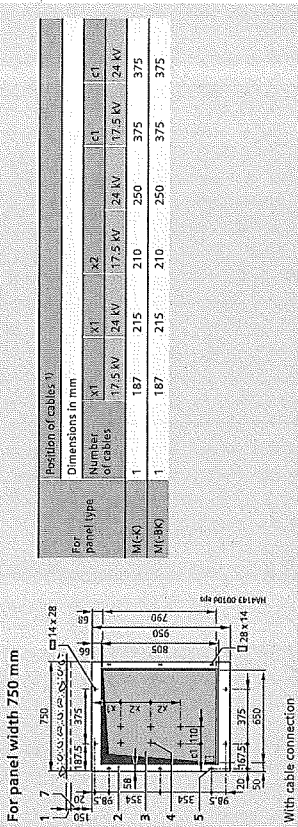
For panel type	Position of cables 1)		
	X1	X2	Cl
L1	187	187	210
L1 mit CTs	187	235	210
VTS	187	235	210

- Wall distance (see page 66)
- Fixing frame (base) of an individual panel or panel block
- Floor opening for high-voltage cables and, where applicable, control cables
- Position of the led-in cables for the feeder 1)
- Fixing points
- Floor opening if required for panels without cable connection
- Option: Pressure relief duct

Note:
Connection of double cables: Depending on the panel type and version in the cable compartment like e.g. current transformer and voltage of the sealing end, the cable distance is approx. 110 mm.

Dimensions

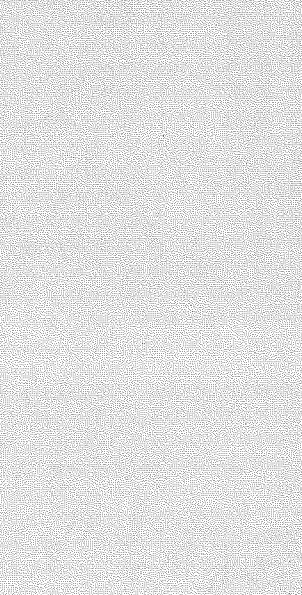
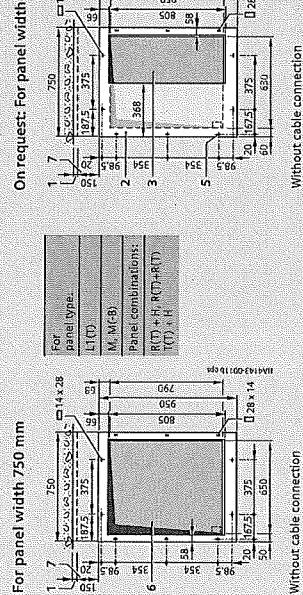
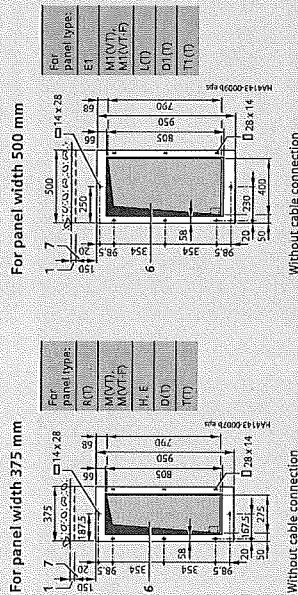
Floor openings (dimensions in red) and fixing points



- 1 Wall distance (see page 66)
 - 2 Fixing frame (base) of an individual panel or panel block
 - 3 Floor opening for high-voltage cables and, where applicable, control cables
 - 4 Position of the led-in cables for the feeder 1)
 - 5 Fixing points
 - 6 Floor opening if required for panels without cable connection
 - 7 Option: Pressure relief duct
- Note:
1) The position of cables depends on the additional installed equipment in the cable compartment like e.g. current transformer and voltage transformer. Therefore the dimensions x1, x2, c1, c2 can deviate.

Dimensions

Floor openings (dimensions in red) and fixing points



- 1 Wall distance (see page 66)
 - 2 Fixing frame (base) of an individual panel or panel block
 - 3 Floor opening for high-voltage cables and, where applicable, control cables
 - 4 Position of the led-in cables for the feeder 1)
 - 5 Fixing points
 - 6 Floor opening if required for panels without cable connection
 - 7 Option: Pressure relief duct
- Note:
1) The position of cables depends on the additional installed equipment in the cable compartment like e.g. current transformer and voltage transformer. Therefore the dimensions x1, x2, c1, c2 can deviate.

Installation

Shipping data, transport

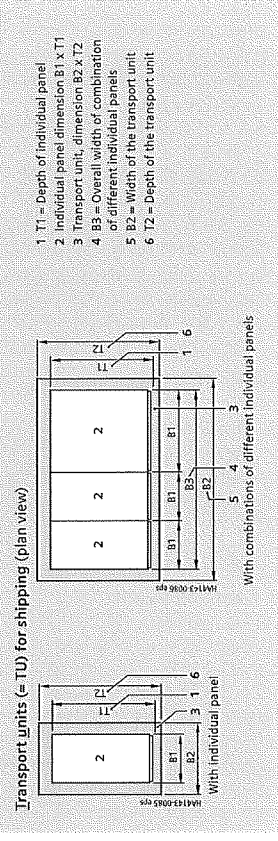
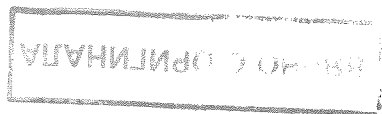
Individual panels or combinations thereof for standard switchgear	Panel type	Panel or panel combination	Transport unit "TU" (including packing) for standard panels (without/with pressure relief duct, option)			Gross weight (1) approx. kg	Volume m ³	Depth of "TU" m	Height H Δ, m		without/with IV C* / IIV C*
			Width B1 m	Width B2 m	without/with IV C* / IIV C*				with IV C* / IIV C*		
Ring-main panel	R	375	1,60/220	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	220/280	
Ring-main transfer panel	R1	500	1,80/240	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	240/300	
Transformer panel	T (TU)	375	2,50/310	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	310/370	
Cable panel	K	375	1,80/240	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	240/300	
Cable panel with make-proof earthing switch	K1	500	2,00/260	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	260/320	
Circuit-breaker panel (fixed-mounted circuit-breaker type "CB-F")	L	500	1,50/210	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	210/270	
Circuit-breaker panel (removable circuit-breaker)	L1	500	3,00/360	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	360/420	
Disconnector panel	D	375	1,60/220	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	220/280	
Disconnector transfer panel	D1	500	1,80/240	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	240/300	
Metering panel	M (M(K))	750	2,70/330	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	330/390	
Metering panel	M1 (M1(K))	750	2,70/330	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	330/390	
Busbar voltage metering panel	M(V)	375	2,10/270	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	270/330	
Switch-disconnector panel for auxiliary transformer	H (H1)	375	2,30/290	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	290/350	
Bus-riser panel	B (B1)	750	3,00/360	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	360/420	
Busbar earthing panel	E (E1)	375	1,70/230	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	230/290	
Panel combinations:	CC	300	1,00/160	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	130/190	
Bus sectionalizer panel (with circuit-breaker)	L(T) + H	875	4,70/570	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	530/630	
Bus sectionalizer panel (with circuit-breaker)	L(T) + Q(T)	875	5,00/600	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	560/660	
Bus sectionalizer panel (3 three-position switch-disconnector)	R(T) + H1)	750	2,50/350	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	310/410	
Bus sectionalizer panel (2 three-position switch-disconnector)	R(T) + R(T) 2)	750	3,10/410	1,08	1,95/2,3	2,95/3,48	1,40	1,95/2,3	1,40	370/470	
For individual panel			Additional width mm								
Pressure relief duct (option) for wall free-standing arrangement of switchgear			375	30							
			500	40							
			750	60							
			875	70							

- * Low-voltage compartment, 350 mm high, weight approx. 60 kg depending on the panel type and on the extent to which it is equipped, or optionally 550 mm high
- n.a. = not applicable
- Δ) Other heights "H" of "TU" possible (depending on the equipment of the panel type and the packing type)
-) Depending on the delivering factory
- 1) The net weight and the gross weight depend on the extent to which the panel is equipped (e.g. current transformers, motor operating mechanisms) and are therefore given as mean value
- 2) Sum of the net weights of individual panels
- 3) Panel types including CTs and VTs: Weight per CT or VT as cast-resin design: Approx. 20 kg (example: 3 CTs and 3 VTs, approx. additionally 120 kg per panel)
- 4) Add additional weight for pressure relief duct (according to table values)

Installation

Shipping data, transport

Individual panels or combinations thereof for standard switchgear	Panel type	Panel or panel combination	Transport unit "TU" (including packing) for standard panels (without/with pressure relief duct, option)			Gross weight (1) approx. kg	Volume m ³	Depth of "TU" m	Height H Δ, m		without/with IV C* / IIV C*
			Width B1 m	Width B2 m	without/with IV C* / IIV C*				with IV C* / IIV C*		
Transport of individual panels and top boxes			375	50/-	50/-	50/-				50/-	
Panel top box as earthing switch box	EB		375	50/-	50/-	50/-				50/-	
Panel top box as voltage transformer box	VB		375	50/-	50/-	50/-				50/-	
Panel top box as cable connection box	CB		375	50/-	50/-	50/-				50/-	



- * Low-voltage compartment, 350 mm high, weight approx. 60 kg depending on the panel type and on the extent to which it is equipped, or optionally 550 mm high
- ** Packing weight
- Δ) Other heights "H" of "TU" possible (depending on the equipment of the panel type and the packing type)
-) Depending on the delivering factory
- 1) The net weight and the gross weight depend on the extent to which the panel is equipped (e.g. current transformers, motor operating mechanisms) and are therefore given as mean value
- 2) Sum of the net weights of individual panels
- 3) Panel types including CTs and VTs: Weight per CT or VT as cast-resin design: Approx. 20 kg (example: 3 CTs and 3 VTs, approx. additionally 120 kg per panel)
- 4) Add additional weight for pressure relief duct (according to table values)

66

Installation

Shipping data, transport

Packing types (examples)

For size and weight of the transport units, see page 81.

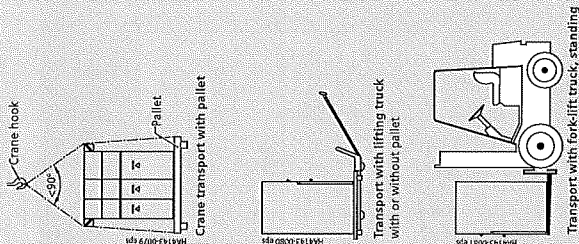
Place of destination and means of transport	Examples for packing (9)
China / Europe by rail and truck	Type: Open PE protective foil pulled over the switchgear, with wooden base
Overseas by sea/flight	Type: Seaworthy crate (standard) Welded PE protective foil, with closed wooden crate, with desiccant bag Type: Open for container PE protective foil pulled over the switchgear, with wooden base
Overseas by air/flight	Type: Open PE protective foil pulled over the switchgear, with wooden base and lattice or cardboard cover

Transport

SIMOSEC switchgear is completely delivered in transport units. Please observe the following:

- Transport facilities on site
- Transport dimensions and weights
- Size of door openings in building
- Switchgear with low-voltage compartments: Please observe other transport dimensions and weights.

Types of transport (examples)



Standards

Standards, specifications, guidelines

Standards

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

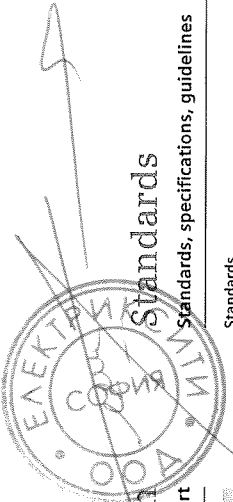
Overview of standards (September 2015)

	IEC standard	VDE standard	EN standard	GB standard
Switchgear	IEC 62271-1-1	VDE 0671-1	EN 62271-1	GB 11022
	IEC 62271-200	VDE 0671-200	EN 62271-200	GB 3906
Circuit-breakers	IEC 62271-100	VDE 0671-100	EN 62271-100	GB 1984
Disconnectors and earthing switches	IEC 62271-102	VDE 0671-102	EN 62271-102	GB 1985
Switch-disconnectors	IEC 62271-103	VDE 0671-103	EN 62271-103	GB 3804
Switch-disconnector/fuse combination	IEC 62271-105	VDE 0671-105	EN 62271-105	GB 16926
HV-HRC fuses	IEC 60282-1	VDE 0670-4	EN 60282-1	GB 15166.2
Voltage detecting systems	IEC 61243-5	VDE 0682-415	EN 61243-5	DL/T 538-2006 (acc. to IEC 61958-2008, similar to Chinese standard)
Voltage presence indicating systems	IEC 62271-206	VDE 0671-206	EN 62271-206	GB 4208
IP code	IEC 60529	VDE 0470-1	EN 60529	GB 4208
IK code	IEC 62282	VDE 0470-100	EN 50102	GB 1711.2
Insulation	IEC 60071	VDE 0111	EN 60071	GB 1711.2
Transformers	Instrument transformers: IEC 61869-1	VDE 0414-9-1	EN 61869-1	GB 1208
	General requirements: IEC 61869-2	VDE 0414-9-2	EN 61869-2	GB 1207
Current transformers	IEC 61869-3	VDE 0414-9-3	EN 61869-3	GB 1207
Voltage transformers	IEC 61953-1	VDE 0101-1	EN 61953-1	-
Common rules, earthing of power installations	IEC 61953-1	VDE 0101-2	EN 50321	-
Insulating gas	IEC 60376	VDE 0973-1	EN 60376	-
SF ₆				

Type of service location

SIMOSEC switchgear can be used as an indoor installation in accordance with IEC 61936 (Power installations exceeding 1 kV AC) and VDE 0101:

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



67

Standards

Standards, specifications, guidelines

- Cable testing**
 - For circuit-breaker and switch-disconnector feeders
 - DC voltage test
 - Before the test:
 - Remove or disconnect any voltage transformers at the cable connection in SIMOSEC switchgear
 - SIMOSEC switchgear, e.g. for rated voltages up to 17.5 kV can be subjected to cable tests at a max. DC test voltage of 38 kV according to VDE. The voltage at the busbar may be 17.5 kV in this case
 - SIMOSEC switchgear for rated voltages up to 24 kV can be subjected to cable tests at a max. DC test voltage of 72 kV or according to VDE at 70 kV, 15 min. The voltage at the busbar may be 24 kV in this case.
 - For cable testing
 - The installation and operating instructions of the switchgear
 - the standards IEC 62271-200/VDE 0671-200 Clause 5.105 + and the information on manufacturer-dependent cable sealing ends
 - the cable version (e.g. paper-insulated mass-impregnated cables, PVC cables or XLPE cables) must be observed.

- Climate and environmental influences**
- SIMOSEC switchgear may be used, subject to possible additional measures – e.g. panel heaters or floor covers – under the following environmental influences and climate classes:
 - Environmental influences
 - Natural foreign materials
 - Chemically active pollutants
 - Small animals
 - Climate classes
 - The climate classes are classified according to IEC 60721-3-3.
- SIMOSEC switchgear is largely insensitive to climate and environmental influences by virtue of the following features:
 - No cross insulation for isolating distances between phases
 - Metal enclosure of switching devices (e.g. three-position switch) in gas-filled stainless-steel switching-device vessel
 - Dry-type bearings in operating mechanism
 - Essential parts of the operating mechanism made of corrosion-proof materials
 - Use of climate-independent three-phase current transformers.

Test voltages:

Rated voltage U_r , U (U_n)	Max. test voltage applied to the connected cable	acc. to IEC	VDE 0278
$U_r/6$	$U =$		$6 \times U_r$
$U_r/6$			15 min, max. $U =$
U (kV)	AC (kV)	DC (kV)	DC (kV)
12	6.1/0.12	19	24
24	12/0.24	38	48

Color of the switchgear

Panel front:
 Siemens standard (SN) 47 030 G1, color no. 700/11ight basic (similar to RAL 7047/telegrey).
End walls:
 Standard: Steel (sendzimir galvanized)
 Option: Painted, color according to panel front.
Terms

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

PM

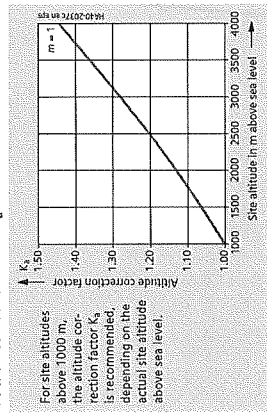
Metallic partition according to IEC 62271-200 (3.109.1).
 Metallic partitions between open, accessible compartments and live parts.
 The SIMOSEC switchgear is suitable for application in indoor installations under normal operating conditions as defined in the standard IEC 62271-1.

Standards

Standards, specifications, guidelines

- Criterion 3:**
 - No holes in accessible sides up to a height of 2 m
- Criterion 4:**
 - No ignition of indicators due to hot gases
- Criterion 5:**
 - The enclosure remains connected to its earthing point.
- Resistance to internal faults (option)**
 In SIMOSEC switchgear, the appearance of internal faults (internal arcs) is less compared with earlier designs due to:
 - Use of gas-insulated switching-device vessels
 - The fact that maloperation is practically excluded due to logical arrangement of operating elements and use of logical mechanical interlocks
 - Short-circuit-proof feeder earthing by means of the three-position switch (make-proof earthing switch) or the circuit-breaker.

Altitude correction factor K_a



Rated short-duration power-frequency withstand voltage for site altitudes > 1000 m to be selected
 ≥ Rated short-duration power-freq. withstand volt. up to ≤ 1000 m: K_a

Rated lightning impulse withstand voltage for site altitudes > 1000 m to be selected
 ≥ Rated lightning impulse withstand voltage up to ≤ 1000 m: K_a

Example 1:

3000 m site altitude above sea level
 17.5 kV switchgear rated voltage
 95 kV rated lightning impulse withstand voltage
 Rated lightning impulse withstand volt. to be selected 95 kV · 1.28 = 122 kV
Result:
 According to the above table, a switchgear for a rated voltage of 24 kV with a rated lightning impulse withstand voltage of 125 kV is to be selected.

Example 2:

2750 m site altitude above sea level
 7.2 kV switchgear rated voltage
 60 kV rated lightning impulse withstand voltage
 Rated lightning impulse withstand volt. to be selected 60 kV · 1.25 = 75 kV
Result:
 According to the above table, a switchgear for a rated voltage of 12 kV with a rated lightning impulse withstand voltage of 75 kV is to be selected.

- Dielectric strength**
 - The dielectric strength is verified by testing the switchgear with rated values of short duration power-frequency withstand voltage and lightning impulse withstand voltage according to IEC 62271-1/VDE 0671-1 and GB 11022 (see table "Dielectric strength").
 - The rated values are referred to sea level and to normal atmospheric conditions (1013 hPa, 20 °C, 11 g/m³ humidity in accordance with IEC 60071 and VDE 0111).
 - The dielectric strength decreases with increasing altitude. For site altitudes above 1000 m (above sea level) the standards do not provide any guidelines for the insulation rating. Instead, special regulations apply to these altitudes.
 - Site altitude
 - As the altitude increases, the dielectric strength of insulation in air decreases due to the decreasing air density. This reduction is permitted up to a site altitude of 1000 m according to IEC and VDE.
 - For site altitudes above 1000 m a higher insulation level must be selected. It results from the multiplication of the rated insulation level for 0 to 1000 m with the altitude correction factor K_a .

Table – Dielectric strength

Rated voltage (c.m.s. value)	72	72	72	15	17.5	24
Rated short-duration power-frequency withstand voltage (c.m.s. value)	23	32	48	39	45	60
Across the isolating distance	30	28	42	36	38	50
Between phases and to earth	70	85	105	110	145	175
Rated lightning impulse withstand voltage (peak value)	60	75	95	95	95	125

Current carrying capacity
 According to IEC 62271-200 or IEC 62271-1, VDE 0671-200 or VDE 0671-1, the rated normal current refers to the following ambient air temperatures:

- Maximum of 24-hour mean + 35 °C
- Maximum + 40 °C
- The current carrying capacity of the panels and busbars depends on the ambient air temperature outside the enclosure.

Internal arc classification

- Protection of operating personnel by means of tests for verifying the internal arc classification
- Internal arcing tests must be performed in accordance with IEC 62271-200 or VDE 0671-200
- Definition of criteria:

- **Criterion 1:**
 Correctly secured doors and covers do not open, limited deformations are accepted
- **Criterion 2:**
 No fragmentation of the enclosure, no projection of small parts above 60 g

• Value according to GB standard

• For standards, see page 84
 1) VLF = very low frequency
 2) Referred to: U_0/U_n ($U_m = 6.35/11$ (12) kV)

Standards

Standards, specifications, guidelines

Protection against solid foreign objects, electric shock and water

SIMOSEC switchgear fulfills according to the standards *

IEC 62271-1	EN 62 271-1	VDE 0671-1
IEC 62271-200	EN 62 271-200	VDE 0671-200
IEC 60529	EN 60 529	VDE 0470-1
IEC 62282	EN 50 102	VDE 0470-100

the following degrees of protection (for explanations, see opposite table):

Degree of protection	Type of protection
IP2X (standard)	for switchgear enclosure
IP3X (option)	for switchgear enclosure (optional)
IP3XD (option on request)	for switchgear enclosure (on request)
IP65	for parts of the primary circuit of switching-device vessels under high voltage

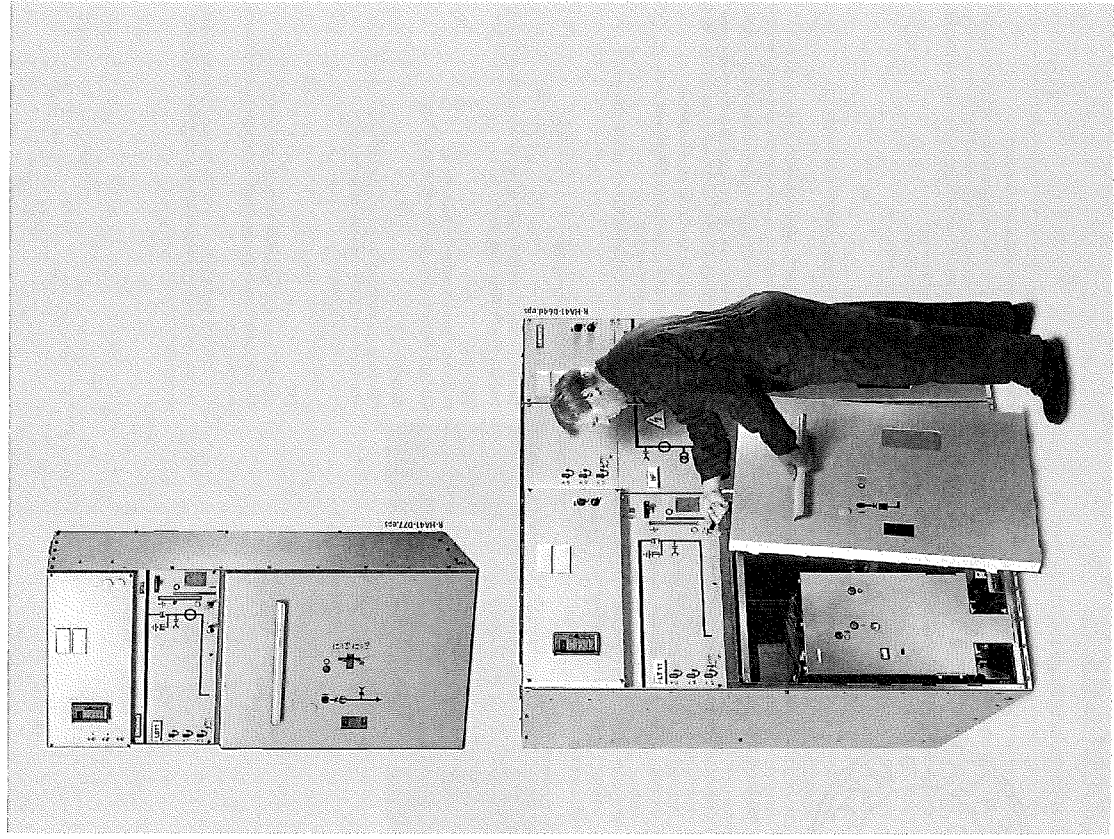
Degree of protection IK	Type of protection
IK 07	for switchgear enclosure

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



Product Range

Versions with removable circuit-breaker type 3AH6



* For standards, see page 84

Product Range

Electrical data of the switchgear

Common data to electrical data and filling pressure

Rated voltage U_n	kV	7.2	12	17.5	24
Rated short-circuit power frequency withstand voltage U_{sc}	kV	20	28.42**	38	50
Phase-to-phase, phase-to-earth, open contact gap across the isolating distance	kV	23	32.48**	45	60
Rated lightning impulse withstand voltage U_{li}	kV	70	75	95	125
Phase-to-phase, phase-to-earth, open contact gap across the isolating distance	kV	60	65	110	145
Rated frequency f_n	Hz	50/60			
Rated normal current I_n for busbar	A	630			
Rated normal current I_n for switchgear with $n = 1, 3$	up to kV	20	25	16	20
Rated short-circuit withstand current I_{sc} for switchgear with $n = 1, 3$	up to kA	50	63	40	50
Rated peak withstand current I_p for switchgear with $n = 3$	up to kA	50	63	40	50
Rated filling level P_{20} for insulation	absolute at 20 °C	1300 hPa			
Minimum functional level $P_{min,2}$ for insulation	absolute at 20 °C	1300 hPa			

Circuit-breaker panel type LS...

Rated voltage U_n	kV	7.2	12	17.5	24
Rated normal current I_n of feeders	A	630, 1250	630, 1250	630, 1250	630, 1250
Rated short-circuit making current I_{sc}	up to kA	50	63	40	50
Rated short-circuit breaking current I_b	up to kA	20	25	16	20

Vacuum circuit-breaker 3AH6

Rated voltage U_n	kV	7.2	12	17.5	24
Rated normal current I_n of feeders	A	630, 1250	630, 1250	630, 1250	630, 1250

Circuit-breaker 3AH6 (CB+AR)

Classification and number of operating cycles for circuit-breaker according to IECEN 62271-102/VDE 0671-102	h	10,000
Mechanical	Class	Class E2
Electrical	Class	Class C2
Number of operating cycles with $I_n = 10000$	Class	Class S1
Breaking of capacitive currents	h	30 ($I_{cc} = 25 \text{ kA}$) or 45 x
Number of short-circuit breaking operations with I_{sc}	O	0.3 s CO - 3 min CO
Rated operating sequence	O	0.3 s CO - 30 s CO
		0.3 s CO - 15 s CO on request

Three-position switch (for panel types LS...)

Classification for disconnectors according to IECEN 62271-102/VDE 0671-102	h	1000 (2000*)
Number of mechanical operating cycles	M	M0 (M1)**
Classification for earthing switches according to IECEN 62271-102/VDE 0671-102	h	1000 (100)
Number of mechanical operating cycles (Mechanical)	h	1000 (100)
Number of short-circuit making operations with I_{sc}	h	1000 (100)
Classification	Class	Class E1

Earthing switch at the feeder

Rated voltage U_n	kV	7.2	12	17.5	24
Rated short-circuit making current I_{sc}	up to kA	63	63	40	50
Rated short-circuit breaking current I_b	up to kA	25	25	16	20
Number of mechanical operating cycles (Mechanical)	h	1000 (100)			
Number of short-circuit making operations with I_{sc}	h	2	2	2	2
Classification	Class	E1	E1	E1	E1

* As design option, on request according to some national requirements (e.g.: GOST, GB, ...)

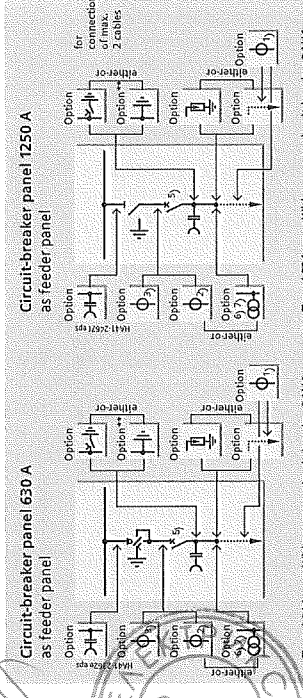
** Type designation of the vacuum circuit-breaker

1) The rated normal currents apply to ambient air temperatures of max. 40 °C. The 24-hour mean value P_{20} max 35 °C (according to IEC 62271-102/VDE 0671-1)

2) Pressure value for SF₆-filled vessels

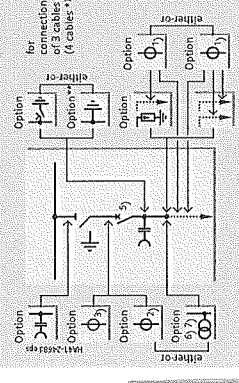
Product Range

Circuit-breaker panels

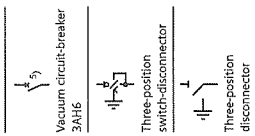


Circuit-breaker panel 630 A as feeder panel
Type LS11 With vacuum circuit-breaker 3AH6, 750 mm wide, removable

Circuit-breaker panel 1250 A as feeder panel
Type LS31 With vacuum circuit-breaker 3AH6, 750 mm wide, removable



Vacuum circuit-breaker 3AH6, 825 mm wide, removable



* On request
** Standard: Feeder earthing via the vacuum circuit-breaker type 3AH6 (without earthing switch at the feeder)
Option: Feeder earthing via the make-proof earthing switch at the feeder



Product Range

Panel design (examples)

Circuit-breaker panel (with vacuum circuit-breaker 3AH6)

Type LS11

- 17 Gas-insulated vessel for switching device
- 18 Manual operation for the mechanism of the earthing function
- 19 Manual operation for the mechanism of the load-break function
- 20 Racking and type plate
- 21 Pressure relief device for switching device
- 22 Interlocking of cable compartment cover in circuit-breaker panels
- 23 Metallic partition of cable compartment
- 24 Cover * for screwed joint of the cable connections
- 25 Cable connection
- 26 Post insulator
- 28 Cable sealing end
- 29 Cable bracket with cable clamps (option) for fastening cables
- 30 Option: Wiring duct removable for control cables and/or bus wires
- 31 Busbar compartment cover for panel extension
- 32 Busbar
- 33 Insulating cap * at the busbar
- 34 Bushing-type insulator for busbar
- 35 Metallic partition of busbar compartment
- 36 Spring-operated mechanism for three-position disconnect
- 37 Three-position disconnect
- 38 Cable compartment cover

Vacuum circuit-breaker:

- 39 Vacuum circuit-breaker 3AH6
- 40 Operating mechanism box
- 41 Manual operation for "spring charging" – for closing with manual operating mechanism – for emergency operation with motor operating mechanism
- 42 Mechanical "ON" pushbutton (not supplied with spring-operated mechanism)
- 44 "Spring charged" indicator
- 45 Operations counter
- 46 Position indicator

27 Option: Feeder earthing via make-proof earthing switch

or

- 47 Feeder earthing via vacuum circuit-breaker (in feeder-armed locking device with circuit-breaker "CLOSED")
- 48 Earthing busbar
- 49 Earthing connection (for location, see dimension drawing)

* for example for $U_N \geq 95$ kV, $U_i \geq 15$ kV

- 1 Option: Low-voltage compartment
- 2 Niche for optional low-voltage equipment, cover can be unscrewed
- 3 Option: CAPDIS voltage detecting system
- 4 Option: Overcurrent-time protection relay SIPROTEC easy 7S45
- 5 Option: Ready-for-service indicator for switching device
- 6 Position indicator for disconnecting function "CLOSE – OPEN"
- 7 Position indication for earthing function "OPEN – EARTHED"
- 8 Feeder designation label
- 9 Mimic diagram
- 10 Option: Sockets for capacitive voltage detecting system (depending on arrangement)
- 11 Insulating cap * at the bushing-type insulator
- 12 Bushing-type insulator for the feeder
- 13 Option: Three-phase current transformer 4MCG3
- 14 Logical mechanical interlock for three-position switch
- 15 Option: Momentary-contact rotary control switch "CLOSED – OPEN" for motor operating mechanism with local-remote switch for three-position disconnect
- 16 For panel types LS11, LS31, LS32: Logical mechanical interlock between circuit-breaker "OPEN" and three-position disconnect, as well as locking device for three-position disconnect

Product Range

Product range overview

Standard panel (example)

Circuit-breaker panel

Application	Panel designation	Panel type	Panel width mm
Feeder	Circuit-breaker panel 630 A, with 3AH6 V	LS11	750
	Circuit-breaker panel 1250 A, with 3AH6 V	LS31 LS32	750 875

- 1) Type designation of the vacuum circuit-breaker
- 2) Three-position switch as three-position disconnect in panel types LS11, LS31 and LS32
- 3) Deeper floor cover required in special cases for panels with cable feeder (on request)
- 4) Panel heating: wired to terminal (standard), option: version with thermostat
- 5) Lock-in not to be applied for versions with separate feeder earthing switch in panel types LS11, LS31 and LS32
- 6) Inspection window is a standard equipment in panel types LS11, LS31 and LS32 for versions with separate earthing switch

92 Switchgear Type SIMOSEC, up to 24 kV, Air-Insulated, Extendable - Siemens HA 41.43 - September 2015

Product Range

Cable connection

General features

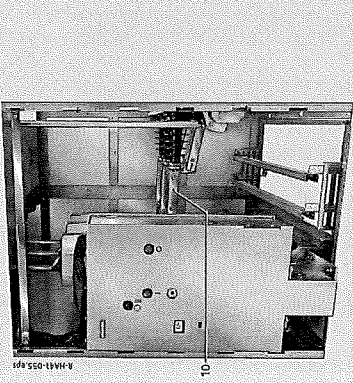
- Connecting lugs for sealing ends arranged one behind the other
- Uniform cable connection height for the respective panel types
- With cable bracket, e.g. type C40 according to DIN EN 50024
- Access to the cable compartment only if the feeder has been disconnected and earthed

Special features

- In the ring-main panel
- In the circuit-breaker panel
- In the cable panel
- For thermoplastic-insulated cables
- For paper-insulated mass-impregnated cables with adapter systems
- For connection cross-sections up to 300 mm² cable routing downwards
- In the transformer panel:
- For thermoplastic-insulated cables
- For connection cross-sections up to 120 mm²; Cable lug max. 32 mm wide
- For rated normal currents 200 A.

Cable cross-sections

Panel type	Connectable cables x connection cross-section	No. x mm ² for rated voltage
LS11, LS1	12 kV, 17.5 kV 24 kV	2 x 400 (2 x 400) 2 x 300
LS32 Standard	3 x 100 (3 x 400) 3 x 300	Option 4 x 300 (4 x 300) - inquiry



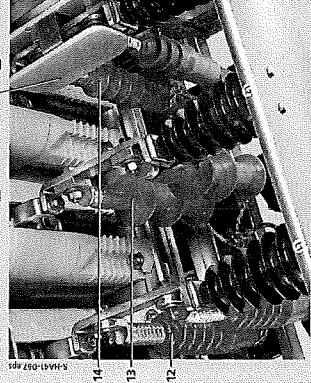
10 As-delivered condition, e.g. for $U_n < 95$ kV, prepared for cable sealing end

11 As-delivered condition, e.g. for $U_n \geq 95$ kV, additionally with insulating cap prepared for cable sealing end

12 Phase L1: Make Lovink-Energetsch, type IAES 20, 240 mm² (20 kV)

13 Phase L2: Proysman Kabel und Systeme (Priell Elektrik), type ELT1 (C-24-D-T3, 240 mm²) (24 kV), as indoor sealing end, for adverse ambient conditions

14 Phase L3: Make Euroformol, type AIN 20, 240 mm² (24 kV)



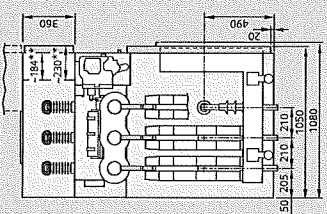
Cable compartment with cable sealing ends (options: A, C and D, see below)

Options

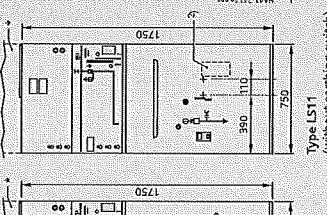
- A Cable clamps, mounted
- C Double cable connection
- D Suitable for connection of surge arresters, type 3EK, other makes on request

Product Range

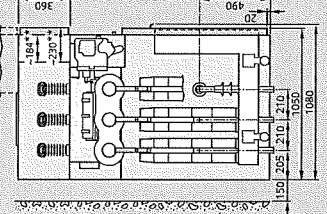
Dimensions of circuit-breaker panels (type LS..., with 3AH6)



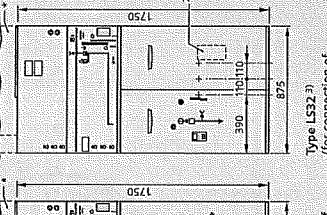
Type LS11 (with make-proof earthing switch)



Type LS11 (without earthing switch)



Type LS31 3 (for connection of max. 2 cables)



Type LS32 3 (for connection of 3 cables)

Circuit-breaker panels 630 A with 3AH6¹⁾

Circuit-breaker panels 1250 A with 3AH6¹⁾

* Option: Low-voltage compartment in heights 350 mm or 550 mm

** Usable mounting depth for low-voltage devices

- approx. 184 mm with cover
- approx. 230 mm with frame cover

1) Type designation of the vacuum circuit-breaker

2) Option: inspection window

3) Option: With make-proof earthing switch

73

Product Range

Floor openings (with dimensions marked in red) and fixing points

For panel width 750 mm

for panel type LS11-U, LS31-U, LTS1

For cable connection: 2 cables

For panel width 875 mm

for panel type LS32

For cable connection: 3 cables

Information about the dimensions of a SIMOSEC "panel base frame"

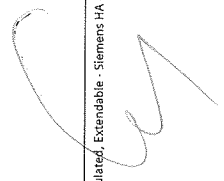
Panel type	Base frame Depth (in mm)	Floor opening Depth (in mm)	Distance to panel rear side rear/front (in mm)
P, T, K, D, E, L, L, M, M(VT), H, LS11, LS31, LS32-2)	950	750	68/92
	1000	750 (max.: 830)	68/142 (102)

- 1 Wall distance
- 2 Fixing frame (base) of an individual panel
- 3 Floor opening for high-voltage cables and, where applicable, control cables
- 4 Position of the led-in cables for the feeder
- 5 Fixing points

Δ) Note for combination of LS... panels to other SIMOSEC panels:
For adaptation of panel types LS11, LS31, LS32 to other SIMOSEC panel types, an adapter wall (2,5 mm) is integrated at panel types LS (thus, the panel width is 752.5 mm or 877.5 mm)

*) Floor opening also possible below floor cover (provided by the customer; additional foundation rails, if required)

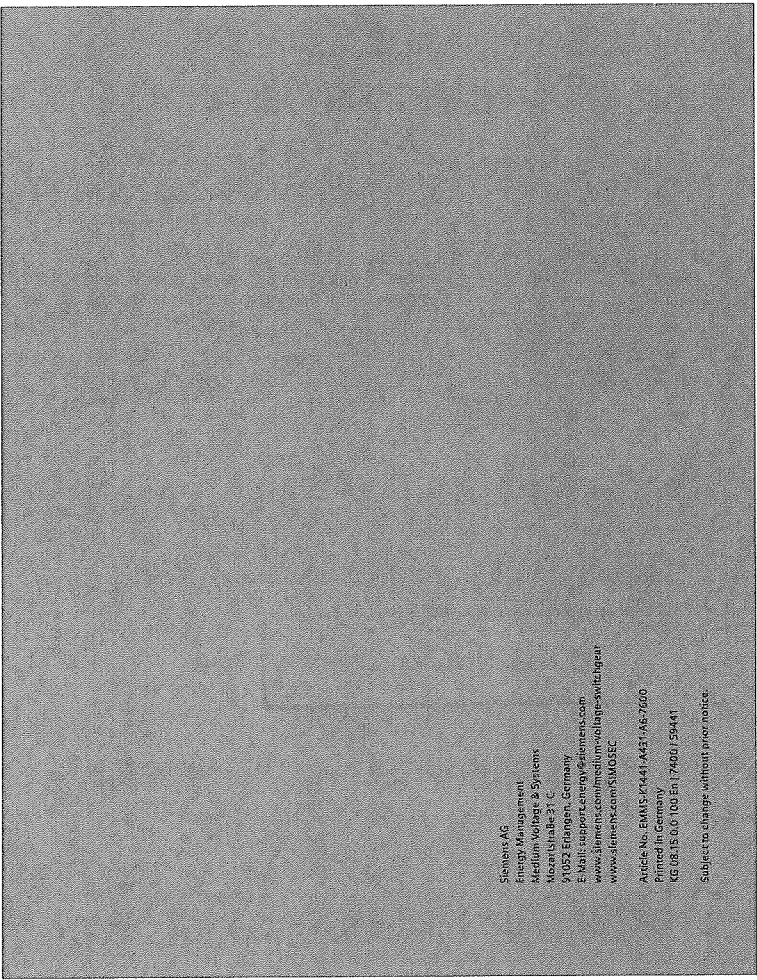
Notes





Handwritten signature
Handwritten arrow pointing to the right

ВЪРНО С ОПТИМАЛА



Siemens AG
Energy Management
Medium Voltage & Systems
Mozartstraße 37 C
91052 Erlangen, Germany
E-Mail: support.energy@siemens.com
www.siemens.com/medium-voltage-switchgear
www.siemens.com/SIMOSEC

Article No. EMAS 01441-A451/AS-7000
Printed in Germany
CE 0815.0.0100 En | 7900 | 59441

Subject to change without prior notice.

© 2015 Siemens. All rights reserved.
The information provided in this catalog contains descriptions or characteristics of performance which in case of actual use do not always apply as described or which may change as a result of further development of the products.

An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract.



www.siemens.com/medium-voltage-switchgear