

Приложение № 1 към техническото предложение

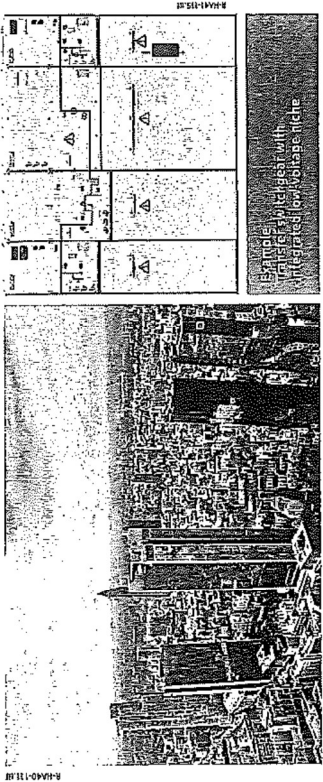




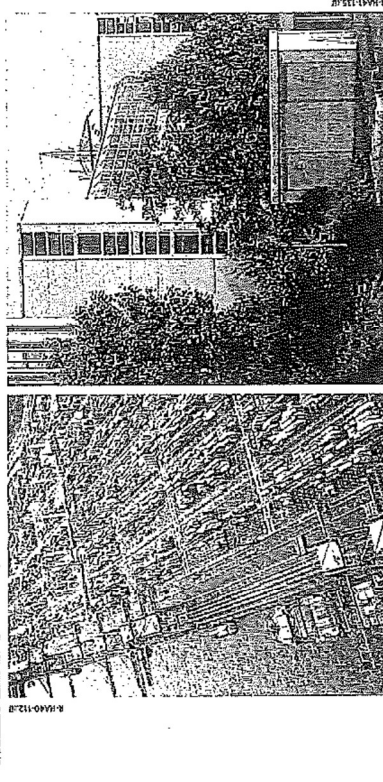


**SIEMENS**

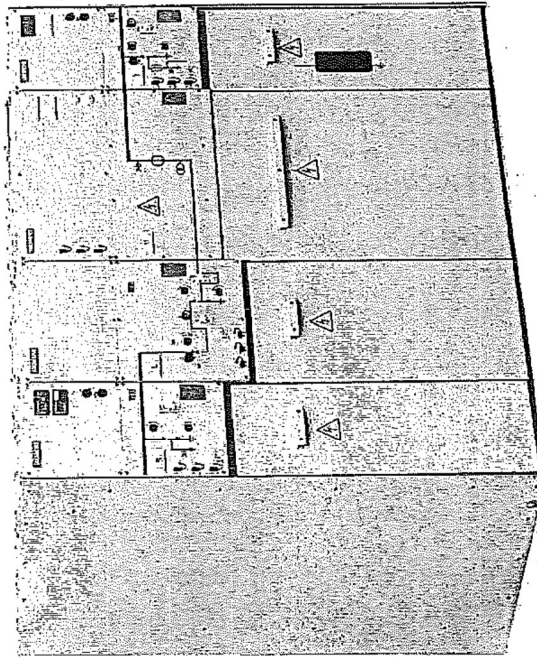
Application  
Typical uses



Example  
Application in contact with  
interfaced or Abtbaas-Netze



Utility transfer substation  
for industrial plants



Switchgear Type SIMOSEC,  
Up to 24 kV, Air-Insulated, Extendable  
Medium Voltage Switchgear

siemens.com/SIMOSEC



Сопос  
ИХ 41.48  
Edition 2018

стр-ТД-5

*Handwritten signature*

# Switchgear Type SIMOSEC, up to 24 kV, Air-Insulated, Extendable

Medium-Voltage Switchgear

Catalog HA 41.43 - 2018

Imaging: Canabg 04.43 - 2017

siemens.com/medium-voltage-switchgear  
siemens.com/SIMOSEC

## Contents

Application, Requirements Typical uses Features classification	Pages 2 4-6
Technical Data Technical data of the switchgear Technical data switching capacity and classification of switching devices	7-10 11-13
Product Range Product range overview, options for panels Product range overview, equipment features panels	14-15 16-17 18-22
Design Panel design Operation (examples)	23-24 25
Components Three-position switch-disconnector Opening mechanisms, equipment vacuum circuit-breaker, busbars Cable connection Cable cross-sections, HV, HVC, use assembly Instrument transformers Indicating and measuring equipment Protection systems Low-voltage compartment	26 27-28 29-32 33-34 35-40 41-43 44-53 54 55 56
Dimensions Switchgear installation panels Floor openings and lifting points	57-59 60-65 66-68
Installation Shipping data, transport	69-71
Standards Standards, specifications, guidelines	72-75

## Application, Requirements

Features

SIMOSEC switchgear is a factory-assembled, type-tested, three-phase, metal-enclosed, indoor switchgear according to IEC 62271-200 \*) and GB 3906 \*\*) for single busbars.

### Typical uses

- SIMOSEC switchgear is used for power distribution in distribution systems with busbar currents up to 1250 A.
- The modular, space saving design enables application in substations, customer transfer substations, distribution substations and switching substations of power supply and public utilities
- Public buildings, such as high-rise buildings, railway stations, hospitals
- Industrial plants.

### Typical applications

- Wind power stations
- High-rise buildings
- Airports
- Underground railway stations
- Sewage treatment plants
- Port facilities

- Traction power supply systems
- Automobile industry
- Petroleum industry
- Chemical industry
- Unit-type heating power stations
- Textile, paper and food industries
- Emergency power supply installations
- Shopping centers and data centers.

### Modular design

- Individual panels, for free combination and extension
- Option: Low-voltage compartments can be supplied in two overall heights
- Circuit-breaker panels for various applications.

### Reliability

- Type and routine-tested \*)
- No cross insulation between phases
- Standardized and manufactured using numerically controlled machines
- Quality management system according to DIN EN ISO 9001
- More than 100,000 switchgear components in operation worldwide for many years.

- Personal safety
  - All switching operations can be performed with closed panel front
  - Metal-enclosed LSC 2 panels
  - HV HRC fuses and cable sealing ends are only accessible when the outgoing feeders are earthed
  - Logical mechanical interlocking
  - Capacitive voltage detecting system for verification of safe isolation from supply
  - Earthing of outgoing feeders by means of make-proof earthing switches
  - Partition class: PM (metallic partition).

### Compact design

Thanks to the use of gas-insulated switching-device vessel compact dimensions are possible.

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

### Security of operation

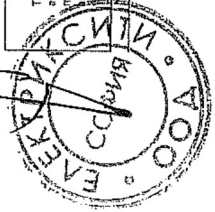
- Components, e.g. operating mechanisms, three-position switches, vacuum circuit-breakers proven for years
- LSC 2 panels:
  - Panels with metallic partition (metal-clad) between busbar and switching device and between switching device and cable compartment (R, T, L)
  - Panels with metallic partition between switching device and busbar compartment
- Metal-enclosed switching-device vessel with three-position switch, gas-insulated
  - Welded sealed-for-life switching-device vessel
  - No cross insulation between phases
  - With welded-in rotary bushings for operation
  - Three-position switch-disconnector with gas-insulated switching functions
- Three-position disconnector, gas-insulated
  - Switching functions CLOSE-OPEN-EARTH
- Operating mechanisms of switching devices accessible outside the switching-device vessel
- Maintenance-free operating mechanism parts (IEC 62271-1/VDE 0671-1 \*) and GB 11022 \*\*)
- Mechanical position indication integrated in mimic diagram
- Switchgear interlocking system with logical mechanical interlocks
- Partition class: PM (metallic partition).

### Reavailability

- Three-position switch-disconnector with gas-insulated, maintenance-free quenching principle
- Metallic partition between busbar compartment, switching devices and cable compartment
- Separate pressure relief for each compartment
- Cable testing without the need to isolate the busbar
- Mounting location of three-phase current transformer for selective disconnection of circuit-breaker feeders.

\*) For standards, see page 72

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





# Technical Data

Electrical data of the switchgear

## Common electrical data

Rated insulation level	7.2	17.5	24
Rated voltage $U_n$	12	17.5	24
Rated short-circuit power-frequency withstand voltage $U_{sc}$	20	28.42 (1)	38
Rated lightning impulse withstand voltage $U_{li}$	23	32.48 (2)	45
Rated short-circuit power-frequency withstand voltage $U_{sc}$	60	75	95
Rated lightning impulse withstand voltage $U_{li}$	70	85	110
Rated normal current $I_n$	50/60		125
Rated normal current $I_n$	65		145

Rated insulation level	7.2	17.5	24
Rated voltage $U_n$	12	17.5	24
Rated short-circuit power-frequency withstand voltage $U_{sc}$	20	28.42 (1)	38
Rated lightning impulse withstand voltage $U_{li}$	23	32.48 (2)	45
Rated short-circuit power-frequency withstand voltage $U_{sc}$	60	75	95
Rated lightning impulse withstand voltage $U_{li}$	70	85	110
Rated normal current $I_n$	50/60		125
Rated normal current $I_n$	65		145

Rated insulation level	7.2	17.5	24
Rated voltage $U_n$	12	17.5	24
Rated short-circuit power-frequency withstand voltage $U_{sc}$	20	28.42 (1)	38
Rated lightning impulse withstand voltage $U_{li}$	23	32.48 (2)	45
Rated short-circuit power-frequency withstand voltage $U_{sc}$	60	75	95
Rated lightning impulse withstand voltage $U_{li}$	70	85	110
Rated normal current $I_n$	50/60		125
Rated normal current $I_n$	65		145

# Technical Data

Electrical data of the switchgear

## Common electrical data of the switchgear panels

Rated insulation level	7.2	17.5	24
Rated voltage $U_n$	12	17.5	24
Rated short-circuit power-frequency withstand voltage $U_{sc}$	20	28.42 (1)	38
Rated lightning impulse withstand voltage $U_{li}$	23	32.48 (2)	45
Rated short-circuit power-frequency withstand voltage $U_{sc}$	60	75	95
Rated lightning impulse withstand voltage $U_{li}$	70	85	110
Rated normal current $I_n$	50/60		125
Rated normal current $I_n$	65		145

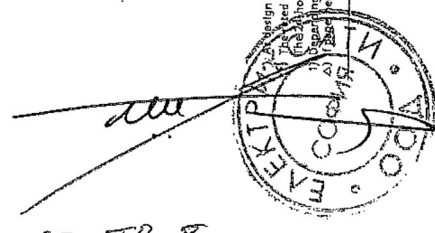
  

Rated insulation level	7.2	17.5	24
Rated voltage $U_n$	12	17.5	24
Rated short-circuit power-frequency withstand voltage $U_{sc}$	20	28.42 (1)	38
Rated lightning impulse withstand voltage $U_{li}$	23	32.48 (2)	45
Rated short-circuit power-frequency withstand voltage $U_{sc}$	60	75	95
Rated lightning impulse withstand voltage $U_{li}$	70	85	110
Rated normal current $I_n$	50/60		125
Rated normal current $I_n$	65		145

Rated insulation level	7.2	17.5	24
Rated voltage $U_n$	12	17.5	24
Rated short-circuit power-frequency withstand voltage $U_{sc}$	20	28.42 (1)	38
Rated lightning impulse withstand voltage $U_{li}$	23	32.48 (2)	45
Rated short-circuit power-frequency withstand voltage $U_{sc}$	60	75	95
Rated lightning impulse withstand voltage $U_{li}$	70	85	110
Rated normal current $I_n$	50/60		125
Rated normal current $I_n$	65		145

2) As design option, on request according to some national requirements (e.g.: GOST, GB, ...)  
 3) The rated normal currents apply to ambient air temperatures of max. 40 °C.  
 The 2-hour mean value is max. 35 °C (according to IEC 62271-1/VDI 0671-1)  
 4) Depending on HV HRC fuse-link (depending on the let-through current of the HV HRC fuse-link), earthing switch at the feeder: see page 11.  
 5) On request: Panel bypass K and KT, each with make-proof earthing switch  
 6) Busbar



CP TP 8









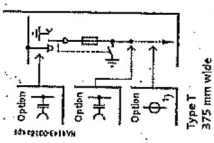






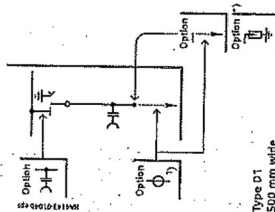
**Product Range**  
Transformer panels and disconnector panels

Transformer panels as feeder panels

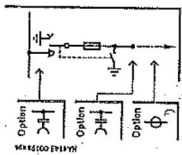


Type T  
375 mm wide

Disconnector panels as feeder panels

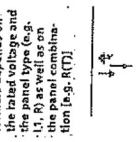


Type D1  
500 mm wide

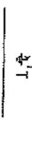


Type T1  
500 mm wide

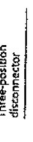
Panel equipment with devices and current and voltage transformers depends on the panel type (e.g. L1, L2, R) as well as on the panel combination (e.g. RCT)



Three-position switch-disconnector



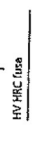
Three-position disconnector



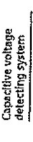
Discharge switch



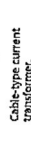
HV/HRC fuse



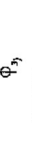
Capacitive voltage detecting system



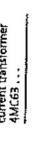
Cable-type current transformer



On-load tap changer transformer



Cable

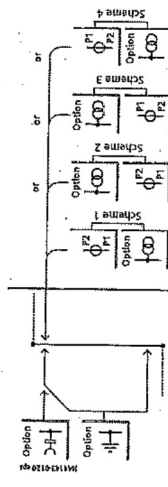


Surge arrester

1) On request  
Δ) In preparation

**Product Range**  
Metering panels as billing metering panel

Billing metering panels 630 A, 800 A, 1250 A Standard



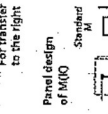
Type M 750 mm wide

Panel design of M



Standard Transfer panel

Standard: For transfer to the right

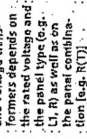


Panel design of M(O)

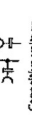


Panel design of M(BK)

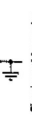
Panel equipment with devices and current and voltage transformers depends on the panel type (e.g. L1, L2, R) as well as on the panel combination (e.g. RCT)



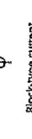
Capacitive voltage detecting system



Fixed earthing point



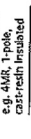
Block-type current transformer



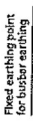
Voltage transformer



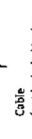
Fixed earthing point for busbar earthing



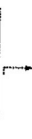
Cable



Surge arrester



Option



Option



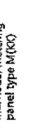
Option



Option



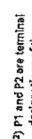
Option



Option



Option



Option



Option



Option

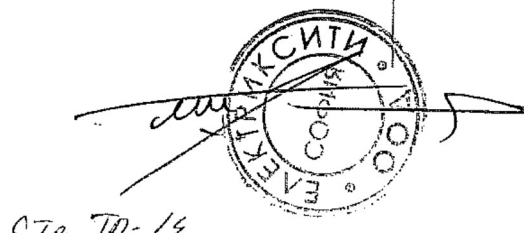


Option



Option

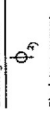
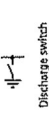
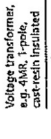
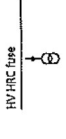
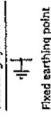
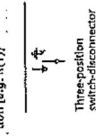
1) P1 and P2 are terminal designations of the current transformer



## Product Range

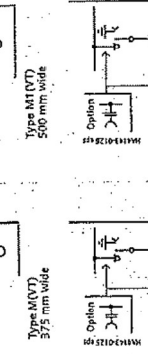
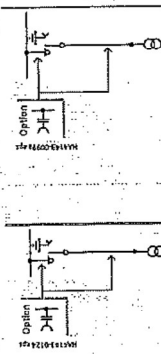
Busbar voltage metering panels and bus riser panels

Panel equipment with devices and current transformers depends on the rated voltage and the panel type (e.g. L1, L2, T) as well as on the panel combination (e.g. R(T)).

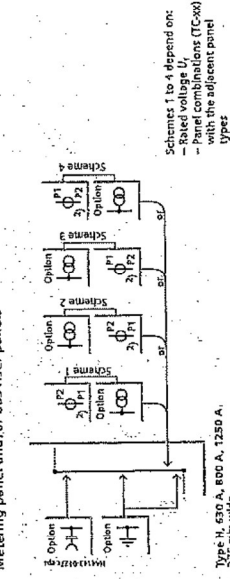


## Busbar voltage metering panels

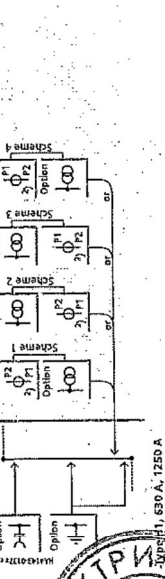
up to 17.5 kV



Metering panel and/or bus riser panels



Schemes 1 to 4 depend on:  
- Rated voltage U<sub>r</sub>  
- Panel combinations (TCxxx) with the adjacent panel type

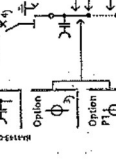
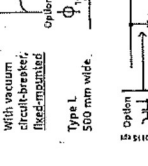
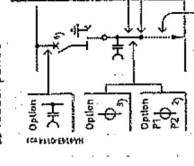


Type H 630 A, 800 A, 1250 A, 375 mm wide

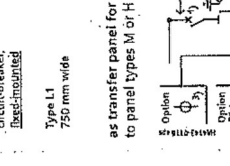
## Product Range

Circuit-breaker panels

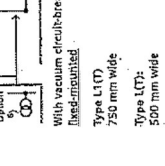
Circuit-breaker panels 630 A, 1250 A as feeder panels



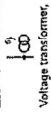
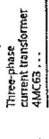
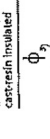
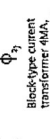
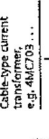
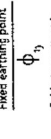
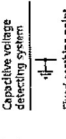
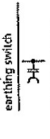
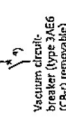
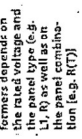
as transfer panel for attachment to panel types M1 or H or R(T), D1(T)



Type L2(G, T), 1250 A, 875 mm wide

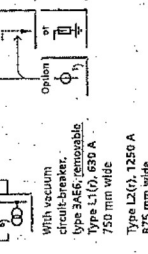
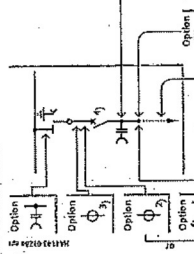


Panel equipment with devices and current transformers depends on the rated voltage and the panel type (e.g. L1, L2, T) as well as on the panel combination (e.g. R(T)).



P1 and P2 are terminal designations of the current transformer

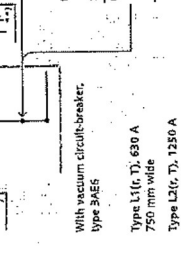
Circuit-breaker panels 630 A, 1250 A as transfer panel for attachment to panel types, see table below



as transfer panel for attachment to panel types, see table below

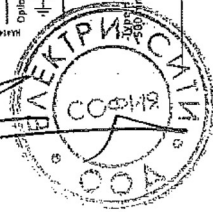


Type L2(G, T), 1250 A, 875 mm wide



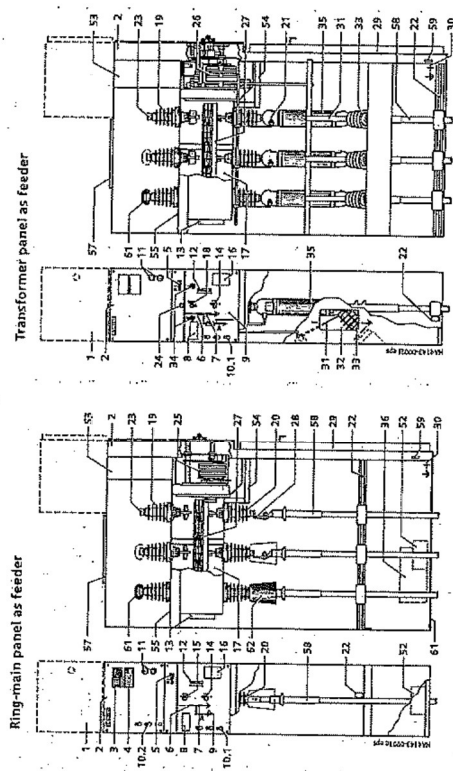
\*\*1) Standard: Feeder earthing via the vacuum circuit-breaker type 3AE6 (with interlocks, without earthing switch)

U <sub>r</sub> (kV) D + HT	Standard	630 A
L1(G, T) + H(T)	Standard	630 A
L2(G, T) + D(T)	Standard	1250 A
L2(G, T) + H	Standard	1250 A

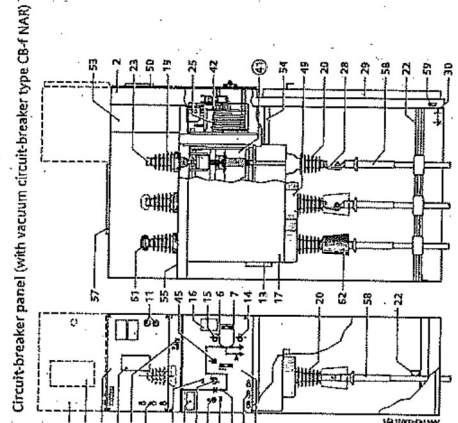


07P-TT-15

Design  
Panel design (examples)



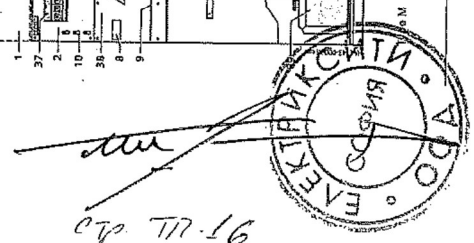
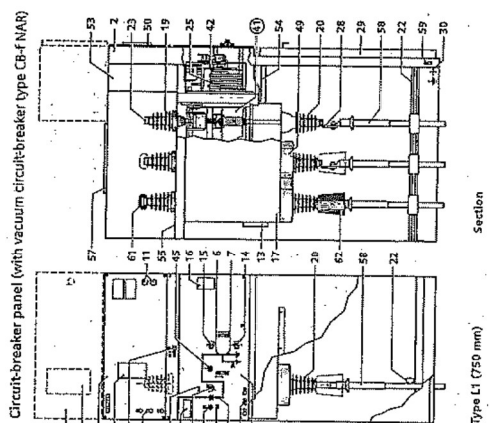
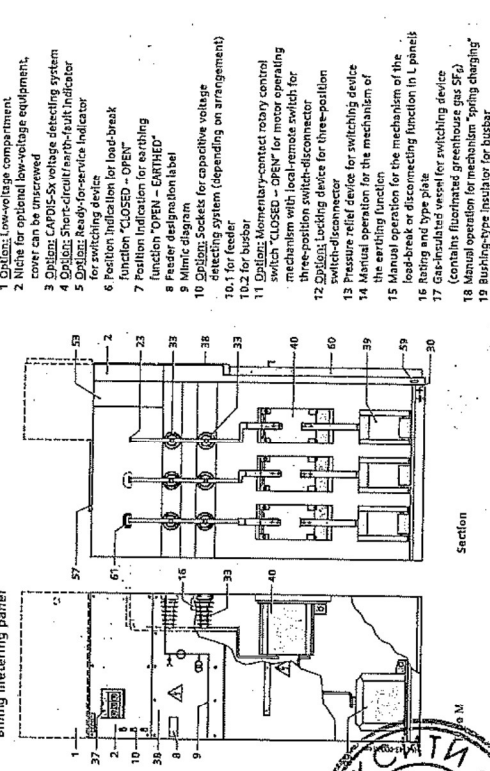
Design  
Panel design (examples)



- Legend for pages 23 and 24
- 20 Bushing type insulator for feeder
  - 21 Terminal for HV/lv cable assembly (with ripping)
  - 22 Cable bracket with cable clamps (optional) for feeding cables
  - 23 Busbar
  - 24 Spring charged indicator for stored-energy "OPEN" switch-disconnector
  - 25 Spring-operated mechanism for three-position switch-disconnector
  - 26 Spring-operated stored-energy mechanism for three-position switch-disconnector
  - 27 Three-position switch-disconnector
  - 28 Cable connection
  - 29 Cable compartment cover
  - 30 Earthing connection (for location, see dimension drawings)
  - 31 Earthing switch for cable connection
  - 32 Inspection window
  - 33 Position indicator for stored-energy mechanism
  - 34 Operating mechanism for stored-energy mechanism - stored-energy "CLOSED" (black)
  - 35 Option: HV IHC fuse-link (black) (e = 252 mm or 442 mm)
  - 36 Option: Heating in the panel
  - 37 Option: Secondary protection for voltage transformer
  - 38 Cover, screwed on
  - 39 4MVA voltage transformer
  - 40 4MVA 700V class-type current transformer

- Section
- 1 Option: Low-voltage compartment cover can be unscrewed
  - 2 Niche for optional low-voltage equipment
  - 3 Option: CAPDIS-SX voltage detecting system
  - 4 Option: Short-circuit earth-fault indicator
  - 5 Option: Ready-for-service indicator for switching device
  - 6 Position indication for load-break function "CLOSED - OPEN"
  - 7 Position indication for earthing function "OPEN - EARTHED"
  - 8 Feeder designation label
  - 9 Name diagram
  - 10 Option: sockets for capacitive voltage detector system (depending on arrangement)
  - 10.1 for feeder (depending on arrangement)
  - 10.2 for busbar
  - 11 Option: Momentary-contact rotary control switch "CLOSED - OPEN" for motor operating mechanism with local-remote switch for three-position switch-disconnector
  - 12 Option: Locking device for three-position switch-disconnector
  - 13 Pressure relief device for switching device
  - 14 Manual operation for the mechanism of the earthing function
  - 15 Manual operation for the mechanism of the load-break or disconnecting function in L panels
  - 16 Bushing-type plate for switching device (contains fluorinated greenhouse gas SF6)
  - 17 Gas-insulated enclosure for switching device
  - 18 Manual operation for mechanism "Spring charging"
  - 19 Bushing-type insulator for busbar

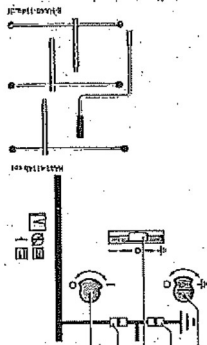
- Section
- 1 Vacuum circuit-breaker (VCB) fixed-mounted
  - 12 Operating mechanism box
  - 49 Manual operation for "spring charging" mechanism
  - 49 Manual operation with manual operating mechanism - for emergency operation with motor operating mechanism
  - 44 Mechanical "OFF" pushbutton
  - 45 Mechanical "ON" pushbutton (not supplied with spring-operated mechanism)
  - 46 "Spring charged" indicator
  - 47 Operations counter (option for VCB type: CB-F NAR)
  - 48 Position indicator
  - 49 Option: Three-phase current transformer 4MVA/63 (Type 73M63 or similar)
  - 50 Option: Overcurrent-time protection relay (Type 73M63 or similar)
  - 51 Option: Overcurrent-time protection relay (Type 73M63 or similar)
  - 52 Cable-type current transformer
  - 53 Niche applicable for control cables and/or bus wires
  - 54 Option: Additional earthing busbar for switching-device vessel
  - 55 Metallic partition of busbar compartment
  - 57 Busbar compartment cover for panel extension
  - 58 Cable sealing end (not included in scope of supply)
  - 59 Earthing busbar
  - 60 Cover for transformer connection compartment
  - 61 Insulating cap on the busbar (for  $U_n > 17.5$  kV)
  - 62 Insulating cap for cable connection (for  $U_n > 17.5$  kV)



## Design (examples)

**Control board**  
 The control boards are function-related. They integrate more, the respective indicating, measuring and monitoring equipment as well as locking devices and control elements (e.g. local-remote switch) are arranged there according to the panel type and version. The ready-for-service indicator and rating plates are also located at the operating front. Operation is identical for transformer and circuit-breaker feeders. First, the operating mechanism must be charged; then, closing/opening is done through separate pushbuttons. The condition of the energy store is indicated. All actuating openings are functionally interlocked against each other and are optionally lockable. The operating lever carries two plug inserts, separately for the disconnecting and earthing function.

### Operation of three-position switch



1 Manual operation of load-break function (R, T) or disconnecting function (L)

2 Operating function (option for ring-main feeders)

3 Manual operation of earthing function

4 Designation label

5 Position indicator for switch-disconnector

6 Position indicator for earthing switch

7 Sockets of capacitive voltage detecting system

8 "Five trigger" indicator

9 ON pushbutton for transformer or circuit-breaker function

10 OFF pushbutton for transformer or circuit-breaker function

11 Manual operation for "spring charging"

12 "Spring charger" indicator

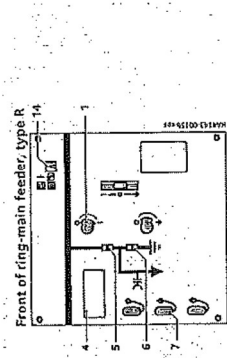
13 Position indicator for circuit-breaker

14 Ready-for-service indicator

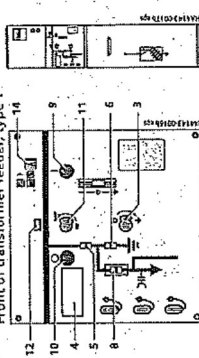
15 Operations counter

16 Preselection for manual charging of circuit-breaker panels

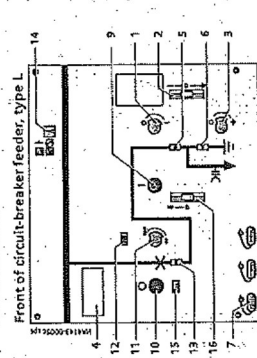
<sup>1)</sup> AB - Automatic reclosing  
<sup>2)</sup> NS - Non automatic reclosing



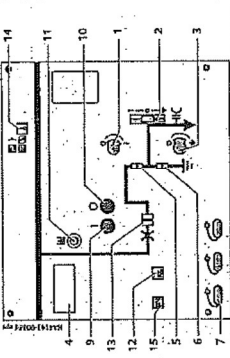
Front of ring-main feeder, type R  
 Panel width: 375 mm



Front of transformer feeder, type T  
 Panel width: 375 mm



Front of circuit-breaker feeder, type L  
 Panel width: 500 mm



Front of circuit-breaker feeder, type CB/AR  
 Panel width: 500 mm, with circuit-breaker type CB/AR<sup>1)</sup>

## Components

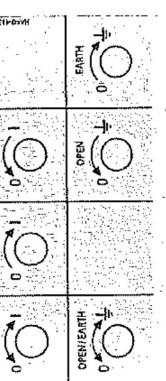
- Three-position switch-disconnector
- Features**
- Switch positions: CLOSED - OPEN - EARTHED
  - Switching functions as general-purpose switch-disconnector (Class E3) according to IEC/EN 62271-103/VDE 0671-103<sup>\*)</sup>
  - IEC/EN 62271-102/VDE 0671-102<sup>\*)</sup>
  - Designed as a three-position switch with the functions - Switch-disconnector and - Make-proof earthing switch
  - Operation via rotary bushing welded gas-tight into the front of the switching-device vessel
  - Climate-independent contact in the gas-filled switching-device vessel
  - Maintenance-free according to IEC/EN 62271-1/VDE 0671-1
  - Individual secondary equipment
  - No cross insulation between phases.
- Mode of operation**
- The operating shaft forms one unit together with the three contact blades. Due to the arrangement of the fixed contacts (earth - busbar), it is not necessary to interlock the CLOSE and EARTHING functions.
- Closing operation**
- During the closing operation, the operating shaft with the moving contact blades changes from the "OPEN" to the "CLOSED" position. The force of the spring-operated mechanism ensures a high closing speed and a reliable connection of the main circuit.

**Opening operation**

During the opening operation, the arc is caused to rotate by the arc-suppression system. This rotation movement prevents the development of a fixed root. The isolating distance in gas established after breaking in accordance with IEC/EN 62271-102/VDE 0671-102<sup>\*)</sup> and IEC/EN 62271-103/VDE 0671-103<sup>\*)</sup>. Due to the arc rotation caused by the arc-suppression system, both load currents and minor no-load currents are safely interrupted.

**Earthing operation**

The EARTHING operation is implemented by changing from the "OPEN" to the "EARTHED" position.



Switch positions:	CLOSED	OPEN	Feeder EARTHED
35 three-position switch-disconnector up to 630 A			
35 three-position switch-disconnector up to 1250 A			

<sup>\*)</sup> For standards, see page 72





*Handwritten mark*

- Features**
- According to IEC/EN 62271-100/VDV 0671-100/GB 1984 \*)
  - Application in hermetically welded switching-device vessel in conformity with the system
  - Climate-independent vacuum interrupter poles in the hermetically welded switching-device vessel
  - Operating mechanism located outside the switching-device vessel (in the front operating mechanism box)
  - Maintenance-free for indoor installation according to IEC/EN 62271-1/VDV 0671-1 \*)
  - Individual secondary equipment.

**Operating mechanism functions**

The closing spring is charged by means of the operating lever of the hand crank supplied, or by the motor (option), until the latching of the closing spring is indicated ("Spring charged" indicator). Then, the vacuum circuit-breaker can be closed manually or electrically.

In operating mechanisms provided for automatic reclosing or automatically in case of motor operating mechanism. Thus, the "closing option" is available again.

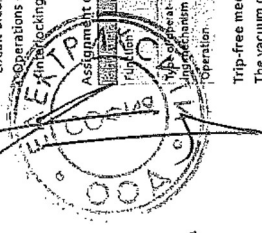
**Operating mechanism**

The operating mechanism assigned to a circuit-breaker feeder consists of the following components:

- Operating mechanism for circuit-breaker
- Operating mechanism for three-position disconnecter
- Motor operating mechanism (optional)
- Position indicators
- Pushbuttons for CLOSING and OPENING the circuit-breaker
- Operations counter (optional)
- Mechanical interlocking between circuit-breaker and disconnecter.

**Trip-free mechanism**

The vacuum circuit-breaker is fitted with a trip-free mechanism according to IEC/EN 62271-100/VDV 0671-100 \*). In the event of an opening command being given after a closing operation has been initiated, the moving contacts return to the open position and remain there even if the closing command is sustained. This means that the contacts are momentarily in the closed position, which is permissible according to the mentioned standard.



*Handwritten: cyp. 11-19*

**Components**  
Vacuum circuit-breaker

**Technical data of the vacuum circuit-breaker**

Short-circuit breaking current	up to 25 kA	up to 25 kA	up to 25 kA	up to 25 kA
Rated operating sequence:	0 - 0.3 s - CO - 1.5 s - CO	0 - 0.3 s - CO - 1.5 s - CO	0 - 0.3 s - CO - 1.5 s - CO	0 - 0.3 s - CO - 1.5 s - CO
Number of breaking operations	10 000	10 000	10 000	10 000
Number of short-circuit breaking operations	30	30	30	30
Individual pole	500 mm	500 mm	500 mm	500 mm
Type L...	750 mm	750 mm	750 mm	750 mm
Type L...	975 mm	975 mm	975 mm	975 mm

**Explanations:**

- Design option
- Not available
- \*) AE - Automatic reclosing; MAB - Non automatic reclosing
- Δ) In preparation; circuit-breaker design - CB-F removable

**Vacuum circuit-breaker type CB-F**

The vacuum circuit-breaker consists of a vacuum interrupter unit with integrated three-position disconnecter located in the switching-device vessel, and the associated operating mechanisms.

**Circuit-breaker secondary equipment**

	Motor operating mechanism	Closing solenoid	Spring release	Circuit-breaker tripping signal	Vacuum module	Auxiliary switch	Anti-pumping	Low-energy magnetic release	Undervoltage release	Operations counter	Position switch	Mechanical interlocking
Motor operating mechanism	•	•	•	•	•	•	•	•	•	•	•	•
Closing solenoid	•	•	•	•	•	•	•	•	•	•	•	•
Spring release	•	•	•	•	•	•	•	•	•	•	•	•
Circuit-breaker tripping signal	•	•	•	•	•	•	•	•	•	•	•	•
Vacuum module	•	•	•	•	•	•	•	•	•	•	•	•
Auxiliary switch	•	•	•	•	•	•	•	•	•	•	•	•
Anti-pumping	•	•	•	•	•	•	•	•	•	•	•	•
Low-energy magnetic release	•	•	•	•	•	•	•	•	•	•	•	•
Undervoltage release	•	•	•	•	•	•	•	•	•	•	•	•
Operations counter	•	•	•	•	•	•	•	•	•	•	•	•
Position switch	•	•	•	•	•	•	•	•	•	•	•	•
Mechanical interlocking	•	•	•	•	•	•	•	•	•	•	•	•

**Abbreviations:**

- Standard
- Option
- o.r. = on request
- NC - Normally closed contact
- NO - Normally open contact

1) Depending on the selected secondary components

**Components**  
Secondary equipment of the vacuum circuit-breaker

**Motor operating mechanism (option)**

Operating voltages for motor operating mechanisms:

- 24, 48, 60, 110, 220 V DC
- 110 and 230 V AC, 50/60 Hz.

Further values on request.

Motor rating for circuit-breaker operating mechanism at:

CB-F (AR): \*)

- Maximum 80 W
- Maximum 500 VA

CB-F (MAB): \*)

- Maximum 80 W
- Maximum 80 VA

**Secondary components**

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

**Closing solenoid**

- For electrical closing.
- Standard: Magnet coil
- Option: Magnet coil with energy store
- Tripping by protection relay or electrical actuation.

**C.t.-operated release**

- For tripping pulse 0.1 Ws in conjunction with suitable protection systems, e.g. Protection system 75J465, make Woodward/SEG type WIC; other designs on request
- Used if external auxiliary voltage is missing, tripping via protection relay.

**Low-energy magnetic release (for CB-F MAB)**

- For tripping pulse 0.02 Ws, tripping via transformer monitor (IK-130).

**Undervoltage release**

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

**Anti-pumping (standard for CB-F AR) \*)**

Function: If constant CLOSE and OPEN commands are present at the vacuum circuit-breaker at the same time, the vacuum circuit-breaker will return to the open position after closing. It remains in this position until a new CLOSE command is given. In this manner, continuous closing and opening (= pumping) is avoided.

**Circuit-breaker tripping signal**

- For electrical signaling (as pulse > 10 ms), e.g. to remote control systems, in the case of automatic tripping (e.g. protection)
- Via limit switch and cutout switch.

**Varistor module**

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

**Auxiliary switch**

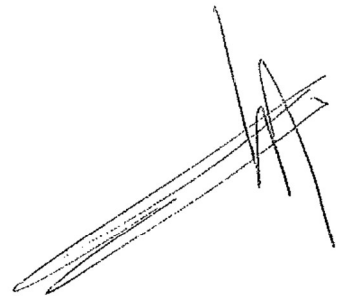
- For electrical position indication.
- Position switch
- For signaling "closing spring charged".

**Mechanical Interlocking**

- Dependent on the type of operating mechanism
- Logical mechanical interlock between the three-position disconnecter and the circuit-breaker (option: Closing lock-out for the three-position disconnecter in circuit-breaker panels)
- Option: Operating mechanism with mechanical interlocking as
- Spring-operated mechanism: Opening for operating crank is blocked
- Stored-energy mechanism with closing solenoid and pushbutton: The pushbutton operated by the mechanical interlock prevents a continuous command to the closing solenoid

**Operations counter**

- As numeric indicator, 5 digits, mechanical.



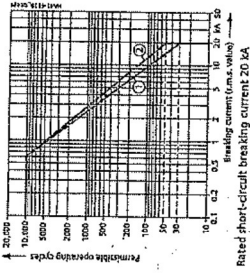
\*) AE - Automatic reclosing  
MAB - Non automatic reclosing

*Handwritten mark*

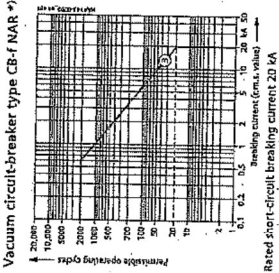
### Components Vacuum circuit-breaker

#### Electrical service life

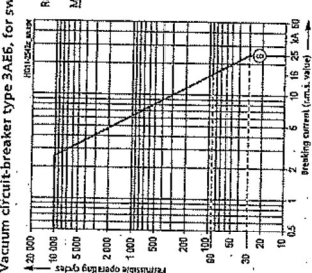
Vacuum circuit-breaker type CB-f AR \*)



Vacuum circuit-breaker type CB-f AR \*)

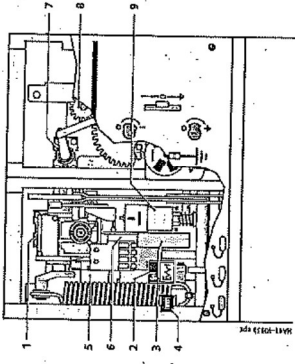


Vacuum circuit-breaker type 3AEE, for switchgear type SIMOSEC as CB-f AR \*)



### Components Secondary equipment of the vacuum circuit-breaker, busbars

Vacuum circuit-breaker type CB-f AR \*)



- Maximum secondary equipment
- 1 Auxiliary switch at the circuit-breaker
  - 2 Position switch "spring charged"
  - 3 2nd release
  - 4 Operations counter
  - 5 1st release
  - 6 Motor operating mechanism, circuit-breaker
  - 7 Auxiliary switch at the three-position disconnect
  - 8 Motor operating mechanism, three-position disconnect
  - 9 Closing solenoid, circuit-breaker

#### Busbars

- Safe-to-touch due to metallic enclosure
- Metal-clad busbar compartment
- Three-pole design, bolted from panel to panel
- Easy switchgear extension
- Made of copper; Round E-Cu.

#### Busbars



Busbar compartment extending over 3 panels (example 17.5 kV)  
Side view



Busbar compartment extending over 3 panels (example 24 kV)  
Side view

\*) AR = Automatic reclosing



## Components

### 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 feeder has been isolated and earthed.

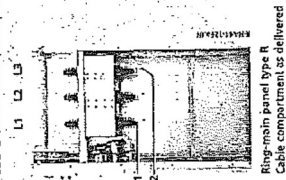
#### Special features

- In cable panels (type K)
- In ring-main panels (type R)
- In circuit-breaker panels (type L)
- For thermoplastic-insulated cables
- For paper-insulated impregnated cables with adapter systems
- For connection cross-sections up to 300 mm<sup>2</sup>
- Cable routing downwards.
- In transformer panels (type T)
- For thermoplastic-insulated cables
- For connection cross-sections up to 120 mm<sup>2</sup>; Cable lug max. 32 mm wide
- For transformer panels (type T) with high inrush currents of up to 200 A

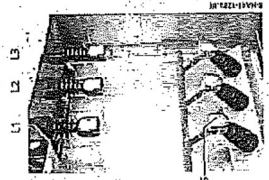


ср. ТП-21

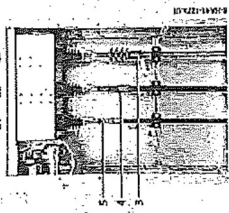
#### Cable connection (examples)



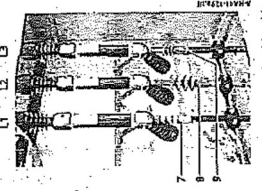
Ring-main panel type R  
Cable compartment as delivered



Transformer panel type T  
Cable compartment as delivered



Cable compartment with cable sealing ends (options A, B, C, D) and D 1), see below



Cable compartment with cable sealing ends (options A, B; see below)

- Options:
- A Mounted cable clamps<sup>2)</sup>
  - B Short-circuit/earth-fault indicator

- Cable sealing ends (examples):
- As-delivered condition
  - Connection for cable
  - Phase L1: Make Lovink-EnerTech, type IAEW 20; 240 mm<sup>2</sup> (20 kV)
  - Phase L2: Make Prysmian Kabel und Systeme (Pirelli Elektrik) type ELT1 mb-1C-2h-C13; 240 mm<sup>2</sup> (24 kV)
  - Phase L3: Make Tyco Electronics Raychem type EPKT 24 C13; 185 mm<sup>2</sup> (24 kV), as shunt-con sealing end, for severe ambient conditions

- Options:
- A As-delivered condition, prepared for cable sealing end
  - B Double cable connection suitable for connection of surge arresters<sup>3)</sup>

- 6 As-delivered condition, prepared for cable sealing end

- 7 Phase L1: Make Lovink-EnerTech, type IAEW 20; 95 mm<sup>2</sup> (20 kV)

- 8 Phase L2: Make Tyco Electronics Raychem type EPKT 24 C13; 185 mm<sup>2</sup> (24 kV), as push-on sealing end

- 9 Phase L3: Make Lovink-EnerTech, type IAEW 20; 95 mm<sup>2</sup> (20 kV)

## Components

### Selection data for various cable sealing ends 1)

Make	Type	Cross-section in mm <sup>2</sup>
Europanel	AIN 10, AIN 10	25-300 (500 *)
	AIS, AP	160-300; 50-300
	12 MONOI	25-300 (500 *)
	TK-212 -1	50-300 (400 *)
Prysmian Kabel und Systeme	ELT1 mb-1C12	35-240
	ELT1-TC12	25-300
	IXSUL-F	16-300 (500 *)
	MVTI-51xx	25-240 (500 *)
Lovink-EnerTech	EPKT	16-300
	IAEW 10	25-300 (500 *)
	93-EB 6x1	25-300 (600 *)
	SEH1 10, 2	35-300 (500 *)
3M	TI 12	25-240 (500 *)
	10 T2	25-300 (500 *)
	AIN 10, AIN 10 <sup>2)</sup>	25-300 (500 *)
	12 MONOI	35-300 (500 *)
Prysmian Kabel und Systeme	ELT1-3C12	25-300
	IXSUL-F53xx	16-300 (500 *)
	IAEW 10	25-300
	GHKI	16-300 (400 *)
Single-core thermoplastic-insulated cables for > 12 kV to ≤ 24 kV (12/20 kV) 2)	AIN 20, AIN 20	25-300 (500 *)
	AIS, AP	70-300; 25-300
	24 MONOI	25-300 (500 *)
	36 MSC 3)	95-300 (500 *)
Prysmian Kabel und Systeme	ELT1 mb-1C24	25-240
	IXSUL-F	35-240
	MVTI-51xx	25-300 (500 *)
	IAEW 20	16-300 (500 *)
Lovink-EnerTech	EPKT	25-300
	IAEW 20	25-300
	93-EB 6x1	25-300 (500 *)
	SEH1 20, 2	25-240
3M	TI 24	25-240
	10 T24	25-300 (500 *)
	AIN 20, AIN 20	35-300 (500 *)
	GHKI	25-300 (500 *)

\*) On request: Max. connection cross-section of cable sealing end types  
 \*\*) Due to the installation of 41MA cast-resin insulated block-type current transformer, cable lugs must be in to account (8 mm) in the corresponding panel types (e.g. L1, L3, M (K), ...)

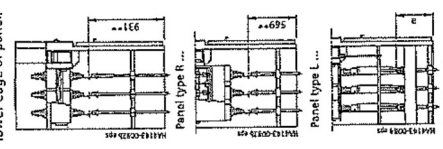
1) NOTE:  
 For cable connections, the manufacturer's information about the cable type must be taken into account (e.g. operating voltage, rated power-frequency withstand voltage, cable type, core material)

2) Transformer panels type T...  
 - Lower edge of sealing end partly underneath the panel cable basement. This must be taken into account in panels with floor cover (option).

3) Circuit-breaker panel types L...  
 - Lower edge of sealing end below panel cable basement. This must be taken into account in panels with floor cover (option).

4) Cable sealing end type IAEW 20 with requirements according to the GB standard (China): Type suitable for rated short-duration power-frequency withstand voltage  $U_m = 42$  kV according to IEC 62271-1 and  $U_m = 42$  kV according to EN/HB 529

Connection height \*\*) of cables above floor or above lower edge of panel:



Dimensions:  
 For fuses with  $e = 44.2$  mm (standard for 24 kV)  
 - 534 mm:  
 For fuses with  $e = 29.2$  mm

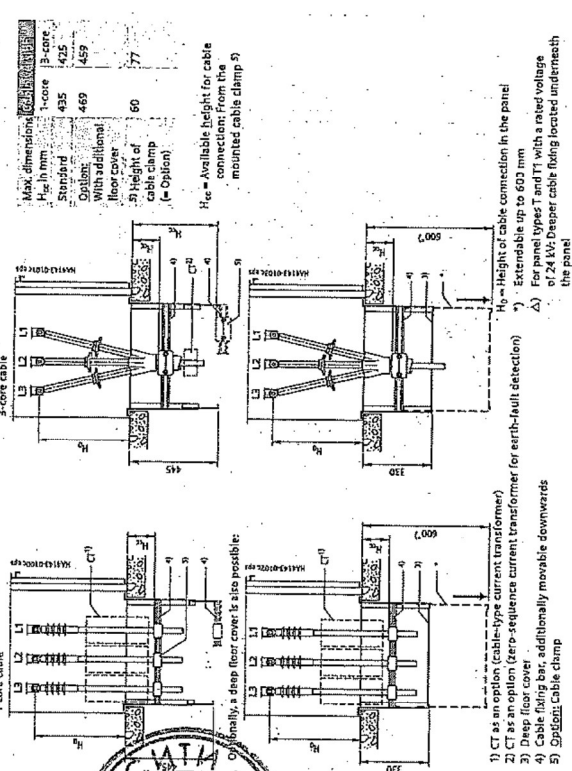
NOTE:  
 Depending on make and type, the termination of the cable sealing end (= shield earth) for the 3-core thermoplastic-insulated cable and the fitted cable clamp (option) may be located underneath the panel in the cable basement. This must be taken into account in panels with floor cover (option).

Handwritten signature or mark.

## Components Cable cross-sections

Cable cross-sections Panel type	Panel width	Version	Connected cables x connection cross-section		Transformer combination in the connection compartment	
			Number x mm <sup>2</sup>	for rated voltage	Current transformer	4MA
K	375	Standard	1 x 300	24 kV	4M(C)70	4MA
		On request	1 x 300	1 x 300		
		Option	1 x 300	1 x 300		
K1	500	Standard	2 x 300	24 kV		
		On request	2 x 300	1 x 300		
		Option	2 x 300	2 x 300		
R	375	Standard	1 x 300	1 x 300		
		On request	1 x 300	1 x 300		
		Option	1 x 300	1 x 300		
R1, D1	500	Standard	1 x 300	1 x 300		
		On request	1 x 300	1 x 300		
		Option	1 x 300	1 x 300		
L	500	Standard	1 x 300	1 x 300		
		On request	1 x 300	1 x 300		
		Option	1 x 300	1 x 300		
L1	750	Standard	2 x 240	2 x 240		
		On request	2 x 240	1 x 300		
		Option	2 x 240	1 x 300		
W(K), M(K), M(K)0	750	Standard	1 x 400	1 x 300		
		On request	1 x 400	1 x 300		
		Option	1 x 400	1 x 300		
M(K)0	750	Standard	1 x 400	1 x 300		
		On request	1 x 400	1 x 300		
		Option	1 x 400	1 x 300		
L10	750	Standard	1 x 300	1 x 300		
		On request	1 x 300	1 x 300		
		Option	1 x 300	1 x 300		
L20	875	Standard	2 x 300	2 x 300		
		On request	2 x 300	2 x 300		
		Option	2 x 300	2 x 300		

o possible — not possible  
 Cable fixings: Depending on the cable type (1-core cable, 3-core cable) or the associated panel type (type Δ) and its components, the cable may also be fixed in the cable basement (for local installation):



## Components HV HRC fuse assembly

### HV HRC fuse assembly

- Application for
  - Transformer panel types T (375 mm) and T1 (500 mm)
  - Rusbar voltage metering panel type M(V-F), M1(V-F-F)
  - HV HRC fuse-links acc. to DIN 43625 (main dimensions) with strike version medium acc. to IEC 60282-1 VDE 0670-4
  - As short-circuit protection before transformers
  - With selectivity (depending on correct selection) to upstream and downstream connected equipment
  - Requirements according IEC 62271-105 fulfilled as HV alternating current switch-fuse combination
  - Selection of HV HRC fuses for transformers
  - Fuse replacement possible only when feeder is earthed
  - Option: Shunt release on operating mechanism of three-position switch-disconnector
  - Option: "Tripped indication" of three-position switch-disconnector in transformer feeder (transformer switch) for remote electrical indication with one normally-open contact (1 NO).

### Mode of operation

**"HV HRC fuse tripped"**  
 Following the tripping of an HV HRC fuse-link, the mechanism for earthing the spring must be set to the "OPEN" position.  
 Subsequently, earthing can be implemented by means of the three-position switch-disconnector and e.g. the fuse can be replaced.

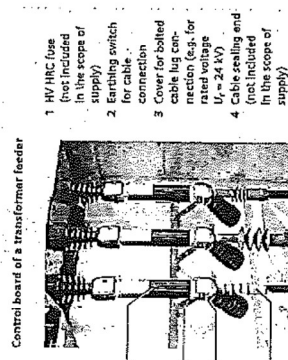
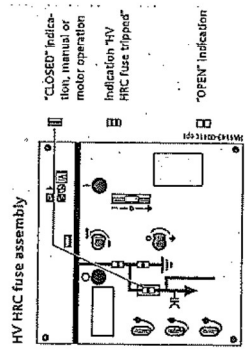
### Replacement of HV HRC fuse-links (without any tools)

- Isolating and earthing of the transformer feeder
- Opening the connection compartment cover
- Subsequent manual replacement of the HV HRC fuse-link.

### Note to HV HRC fuse-links

According to IEC 60282-1 (2009) Clause 6.6, the breaking capacity of HV HRC fuses is tested within the scope of the type test at 87% of their rated voltage.  
 In three-phase systems with resonance-earthed or isolated neutral, under double earth fault and other conditions, the full phase-to-phase voltage may be available at the HV HRC fuse during breaking. Depending on the size of the operating voltage of such a system, this applied voltage may then exceed 87% of the rated voltage.  
 It must therefore already be ensured during configuration of the switching devices and selection of the HV HRC fuse that only such fuse-links are used, which either satisfy the above operating conditions, or whose breaking capacity was tested at least with the maximum system voltage. In case of doubt, a suitable HV HRC fuse must be selected together with the fuse manufacturer.

\*) For standards, see page 72



- 1 HV HRC fuse (not included in the scope of supply)
- 2 Earthing switch for cable connection
- 3 Cover for bolted cable lug connection (e.g. for rated voltage U<sub>r</sub> = 24 kV)
- 4 Cable sealing and (not included in the scope of supply)

### Components

Allocation of HV HRC fuses and transformers  
Recommended HV HRC fuses for switchgear type SIMOSEC

**Fuse protection table**  
The following table shows the recommended HV HRC fuse-links (make SIBA) (electrical data valid for ambient air temperatures of up to 40 °C) for fuse protection of transformers. The three-position switch-disconnector in the transformer feeder in panel type "T" was combined and tested according to IEC 62271-102.

#### Standards

- HV HRC fuse-links "medium" version with stirrer and for tripping energy I = 0.5 Joule according to
  - IEC/EN 60282-1/VDE 0670-4
  - IEC/EN 60787/VDE 0670-402
  - DIN 43625 main dimensions.

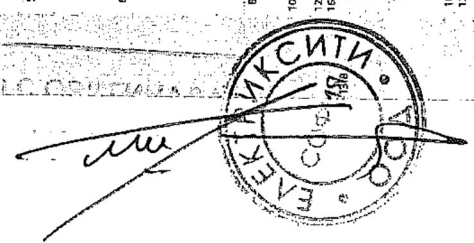
Operating voltage U <sub>o</sub>	Rated power S <sub>r</sub>	Relative tripping energy U <sub>tr</sub>	Rated current I <sub>r</sub>	Min. operating / Dimension e	Outside diameter d	Order No. Make SIBA
3.3 to 3.6	30	4	6.3	3 to 7.2	292	30 088 13.16
3.3 to 3.6	50	4	10	3 to 7.2	292	30 088 13.16
3.3 to 3.6	80	4	16	3 to 7.2	292	30 088 13.16
3.3 to 3.6	125	4	25	3 to 7.2	292	30 088 13.16
3.3 to 3.6	200	4	40	3 to 7.2	292	30 088 13.16
3.3 to 3.6	315	4	63	3 to 7.2	292	30 088 13.16
3.3 to 3.6	400	4	80	3 to 7.2	292	30 088 13.16
3.3 to 3.6	500	4	100	3 to 7.2	292	30 088 13.16
3.3 to 3.6	630	4	125	3 to 7.2	292	30 088 13.16
3.3 to 3.6	800	4	160	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1000	4	200	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1250	4	250	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1600	4	315	3 to 7.2	292	30 088 13.16
3.3 to 3.6	2000	4	400	3 to 7.2	292	30 088 13.16
3.3 to 3.6	2500	4	500	3 to 7.2	292	30 088 13.16
3.3 to 3.6	3150	4	630	3 to 7.2	292	30 088 13.16
3.3 to 3.6	4000	4	800	3 to 7.2	292	30 088 13.16
3.3 to 3.6	5000	4	1000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	6300	4	1250	3 to 7.2	292	30 088 13.16
3.3 to 3.6	8000	4	1600	3 to 7.2	292	30 088 13.16
3.3 to 3.6	10000	4	2000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	12500	4	2500	3 to 7.2	292	30 088 13.16
3.3 to 3.6	16000	4	3150	3 to 7.2	292	30 088 13.16
3.3 to 3.6	20000	4	4000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	25000	4	5000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	31500	4	6300	3 to 7.2	292	30 088 13.16
3.3 to 3.6	40000	4	8000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	50000	4	10000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	63000	4	12500	3 to 7.2	292	30 088 13.16
3.3 to 3.6	80000	4	16000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	100000	4	20000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	125000	4	25000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	160000	4	31500	3 to 7.2	292	30 088 13.16
3.3 to 3.6	200000	4	40000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	250000	4	50000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	315000	4	63000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	400000	4	80000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	500000	4	100000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	630000	4	125000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	800000	4	160000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1000000	4	200000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1250000	4	250000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1600000	4	315000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	2000000	4	400000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	2500000	4	500000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	3150000	4	630000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	4000000	4	800000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	5000000	4	1000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	6300000	4	1250000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	8000000	4	1600000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	10000000	4	2000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	12500000	4	2500000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	16000000	4	3150000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	20000000	4	4000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	25000000	4	5000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	31500000	4	6300000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	40000000	4	8000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	50000000	4	10000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	63000000	4	12500000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	80000000	4	16000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	100000000	4	20000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	125000000	4	25000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	160000000	4	31500000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	200000000	4	40000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	250000000	4	50000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	315000000	4	63000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	400000000	4	80000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	500000000	4	100000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	630000000	4	125000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	800000000	4	160000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1000000000	4	200000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1250000000	4	250000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1600000000	4	315000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	2000000000	4	400000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	2500000000	4	500000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	3150000000	4	630000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	4000000000	4	800000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	5000000000	4	1000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	6300000000	4	1250000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	8000000000	4	1600000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	10000000000	4	2000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	12500000000	4	2500000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	16000000000	4	3150000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	20000000000	4	4000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	25000000000	4	5000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	31500000000	4	6300000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	40000000000	4	8000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	50000000000	4	10000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	63000000000	4	12500000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	80000000000	4	16000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	100000000000	4	20000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	125000000000	4	25000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	160000000000	4	31500000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	200000000000	4	40000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	250000000000	4	50000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	315000000000	4	63000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	400000000000	4	80000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	500000000000	4	100000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	630000000000	4	125000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	800000000000	4	160000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1000000000000	4	200000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1250000000000	4	250000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	1600000000000	4	315000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	2000000000000	4	400000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	2500000000000	4	500000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	3150000000000	4	630000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	4000000000000	4	800000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	5000000000000	4	1000000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	6300000000000	4	1250000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	8000000000000	4	1600000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	10000000000000	4	2000000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	12500000000000	4	2500000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	16000000000000	4	3150000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	20000000000000	4	4000000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	25000000000000	4	5000000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	31500000000000	4	6300000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	40000000000000	4	8000000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	50000000000000	4	10000000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	63000000000000	4	12500000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	80000000000000	4	16000000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	100000000000000	4	20000000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	125000000000000	4	25000000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	160000000000000	4	31500000000000	3 to 7.2	292	30 088 13.16
3.3 to 3.6	200000000000000	4	4000000000			

**Components**  
Allocation of HV HRC fuses and transformers  
Recommended HV HRC fuses for switchgear type SIMOSEC

Operating voltage U <sub>o</sub>	Rated power S <sub>r</sub>	Relative impedance voltage U <sub>k</sub>	Rated current I <sub>r</sub>	Min. operating rated voltage U <sub>o</sub>	Dimension e	Outside diameter d	Order No.
10 to 12	200	4	25	6 to 12	292	53	30 006 13 25
			35	6 to 12	442	53	30 101 13 25
10 to 12	250	4	14,5	6 to 12	292	53	30 231 13 25
			25	6 to 12	442	53	30 006 13 25
10 to 12	315	4	18,3	6 to 12	292	53	30 101 13 25
			35	6 to 12	442	53	30 231 13 25
10 to 12	400	4	23,1	6 to 12	292	53	30 006 13 25
			40	6 to 12	442	53	30 101 13 25
10 to 12	500	4	29	6 to 12	292	53	30 006 13 25
			40	6 to 12	442	53	30 101 13 25
10 to 12	690	4	36,4	6 to 12	292	53	30 006 13 25
			40	6 to 12	442	53	30 101 13 25
10 to 12	1000	5 (5,5)	58	6 to 12	292	53	30 006 13 25
			63	6 to 12	442	53	30 101 13 25
10 to 12	1250	5 (5,5)	72,2	6 to 12	292	53	30 006 13 25
			77	6 to 12	442	53	30 101 13 25
10 to 12	1600	5 (5,5)	87,8	6 to 12	292	53	30 006 13 25
			93	6 to 12	442	53	30 101 13 25
10 to 12	2000	5 (5,5)	105	6 to 12	292	53	30 006 13 25
			110	6 to 12	442	53	30 101 13 25
10 to 12	2500	5 (5,5)	125	6 to 12	292	53	30 006 13 25
			130	6 to 12	442	53	30 101 13 25
10 to 12	315	4	16,3	6 to 12	292	53	30 006 13 25
			20	6 to 12	442	53	30 101 13 25
10 to 12	400	4	21,1	6 to 12	292	53	30 006 13 25
			25	6 to 12	442	53	30 101 13 25
10 to 12	500	4	27,2	6 to 12	292	53	30 006 13 25
			32	6 to 12	442	53	30 101 13 25
10 to 12	690	4	35,4	6 to 12	292	53	30 006 13 25
			40	6 to 12	442	53	30 101 13 25
10 to 12	1000	5 (5,5)	58	6 to 12	292	53	30 006 13 25
			63	6 to 12	442	53	30 101 13 25
10 to 12	1250	5 (5,5)	72,2	6 to 12	292	53	30 006 13 25
			77	6 to 12	442	53	30 101 13 25
10 to 12	1600	5 (5,5)	87,8	6 to 12	292	53	30 006 13 25
			93	6 to 12	442	53	30 101 13 25
10 to 12	2000	5 (5,5)	105	6 to 12	292	53	30 006 13 25
			110	6 to 12	442	53	30 101 13 25
10 to 12	2500	5 (5,5)	125	6 to 12	292	53	30 006 13 25
			130	6 to 12	442	53	30 101 13 25

**Components**  
Allocation of HV HRC fuses and transformers  
Recommended HV HRC fuses for switchgear type SIMOSEC

Operating voltage U <sub>o</sub>	Rated power S <sub>r</sub>	Relative impedance voltage U <sub>k</sub>	Rated current I <sub>r</sub>	Min. operating rated voltage U <sub>o</sub>	Dimension e	Outside diameter d	Order No.
10 to 12	200	4	25	6 to 12	292	53	30 231 13 25
			35	6 to 12	442	53	30 006 13 25
10 to 12	250	4	14,5	6 to 12	292	53	30 101 13 25
			25	6 to 12	442	53	30 231 13 25
10 to 12	315	4	18,3	6 to 12	292	53	30 006 13 25
			35	6 to 12	442	53	30 101 13 25
10 to 12	400	4	23,1	6 to 12	292	53	30 006 13 25
			40	6 to 12	442	53	30 101 13 25
10 to 12	500	4	29	6 to 12	292	53	30 006 13 25
			40	6 to 12	442	53	30 101 13 25
10 to 12	690	4	36,4	6 to 12	292	53	30 006 13 25
			40	6 to 12	442	53	30 101 13 25
10 to 12	1000	5 (5,5)	58	6 to 12	292	53	30 006 13 25
			63	6 to 12	442	53	30 101 13 25
10 to 12	1250	5 (5,5)	72,2	6 to 12	292	53	30 006 13 25
			77	6 to 12	442	53	30 101 13 25
10 to 12	1600	5 (5,5)	87,8	6 to 12	292	53	30 006 13 25
			93	6 to 12	442	53	30 101 13 25
10 to 12	2000	5 (5,5)	105	6 to 12	292	53	30 006 13 25
			110	6 to 12	442	53	30 101 13 25
10 to 12	2500	5 (5,5)	125	6 to 12	292	53	30 006 13 25
			130	6 to 12	442	53	30 101 13 25



с. 77. 70-24

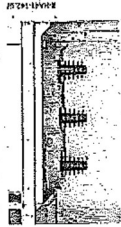
## Components

Three-phase current transformer 4MC63

- According to IEC 61869-2 / DIN EN 61869-2 \*)
- Designed as a three-pole ring-core current transformer
- 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 in the panel.



Three-phase current transformer 4MC63 ... installed on bushing-type insulators



Primary data		0.72 kV		0.72 kV		0.72 kV	
Highest voltage for equipment $U_n$	A	150	100	75	50	400	300
Rated current $I_n$	3 kV	630 A	630 A	630 A	630 A	630 A	630 A
Rated short-circuit power-frequency withstand voltage (withstand test)		25 kA/1 s, 2.5 V or 20 kA/3 s	25 kA/1 s, 2.5 V or 20 kA/3 s	25 kA/1 s, 2.5 V or 20 kA/3 s	25 kA/1 s, 2.5 V or 20 kA/3 s	25 kA/1 s, 2.5 V or 20 kA/3 s	25 kA/1 s, 2.5 V or 20 kA/3 s
Rated short-time thermal current $I_{th}$		630 A	630 A	630 A	630 A	630 A	630 A
Rated continuous thermal current $I_c$		1.5 x $I_n$ / 1 h	1.5 x $I_n$ / 1 h	1.5 x $I_n$ / 1 h	1.5 x $I_n$ / 1 h	1.5 x $I_n$ / 1 h	1.5 x $I_n$ / 1 h
Transient overload current		2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$
Rated dynamic current $I_{dyn}$		2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$

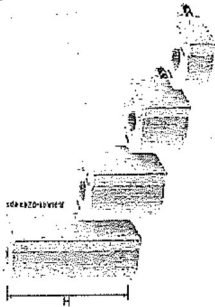
Secondary data		VA 1		VA 5		VA 10	
Rated current	Class	0.67	0.5	0.33	0.25	0.167	0.125
Measuring class		3	3	3	3	3	3
Overcurrent factor		5	5	5	5	5	5
Protection class		10 P	10 P	10 P	10 P	10 P	10 P
Core factor		10	10	10	10	10	10

\*) Other values on request, e.g. as additional type 4MC63 6A (complementary types)

## Components

Cable-type current transformers 4MC70 33 and 4MC70 31

- According to IEC 61869-2 / DIN EN 61869-2 \*)
- Designed as a single-pole ring-core current transformer
- Climate-independent
- Free of dielectrically stressed cast-resin parts (due to design)
- Insulation class E
- Inductive type
- Secondary connection by means of a terminal strip inside the panel.



Cable-type current transformer 4MC70 33, 4 overall heights



Cable-type current transformer 4MC70 31

On request: Cable-type current transformer



Primary data		0.72 kV		0.72 kV		0.72 kV	
Highest voltage for equipment $U_n$	A	20 A to 600 A	20 A to 600 A	20 A to 600 A	20 A to 600 A	20 A to 600 A	20 A to 600 A
Rated current $I_n$	3 kV	3 kV	3 kV	3 kV	3 kV	3 kV	3 kV
Rated short-circuit power-frequency withstand voltage (withstand test)		up to 25 kA/1 s or 25 kA/3 s	up to 25 kA/1 s or 25 kA/3 s	up to 25 kA/1 s or 25 kA/3 s	up to 25 kA/1 s or 25 kA/3 s	up to 25 kA/1 s or 25 kA/3 s	up to 25 kA/1 s or 25 kA/3 s
Rated short-time thermal current $I_{th}$		1.0 x $I_n$	1.0 x $I_n$	1.0 x $I_n$	1.0 x $I_n$	1.0 x $I_n$	1.0 x $I_n$
Rated continuous thermal current $I_c$		1.5 x $I_n$ / 1 h	1.5 x $I_n$ / 1 h	1.5 x $I_n$ / 1 h	1.5 x $I_n$ / 1 h	1.5 x $I_n$ / 1 h	1.5 x $I_n$ / 1 h
Transient overload current		2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$
Rated dynamic current $I_{dyn}$		2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$	2.5 x $I_n$

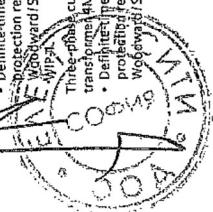
Secondary data		1 A or 5 A		1 A or 5 A		1 A or 5 A	
Rated current	Class	0.2	0.5	0.2	0.5	0.2	0.5
Measuring class		FS10	FS10	FS10	FS10	FS10	FS10
Overcurrent factor		2.5 VA to 30 VA	2.5 VA to 30 VA	2.5 VA to 30 VA	2.5 VA to 30 VA	2.5 VA to 30 VA	2.5 VA to 30 VA
Protection class		10 P	10 P	10 P	10 P	10 P	10 P
Core factor		10	10	10	10	10	10

\*) For standards, see page 72

- 1) Depending on the core data
  - 2) Available installation spaces for cable-type current transformers inside the panel depends on make, type and cross-section of sealing end.
- Example: Panel Type R or K; Installation space approx. 285 mm

*[Handwritten signature]*

*[Handwritten signature]*



100. 70-25



## Components

Current transformers 4MA7 and voltage transformers 4MR for air-insulated billing metering panels

### Features

- Current transformer 4MA7
  - According to IEC 61869-2; DIN EN 61869-2 \*
  - Dimensions according to DIN 42600-8
  - Designed as a single-pole indoor block-type current transformer
  - Cast-resin insulated
  - Insulation class E
- Secondary connection by means of screw-type terminals.



Current transformer 4MA7, single-pole



Voltage transformer 4MR14, single-pole

- Voltage transformer 4MR
  - According to IEC 61869-3; DIN EN 61869-3 \*
  - Dimensions according to DIN 42600-9 (small model)
  - Designed as an indoor voltage transformer
  - Option: Type 4MR, two-pole
  - Cast-resin insulated
  - Insulation class E
- Secondary connection by means of screw-type terminals.

### Technical data

Primary data	
Highest voltage for equipment $U_n$	kV 3,6
Rated short-circuit current $I_{sc}$ (withstand voltage $U_n$ )	kV 10 20 28 38 50
Rated lightning impulse withstand voltage $U_{li}$	kV 20 30 42 55 75
Rated current $I_n$	A 20 to 1200
Rated short-circuit thermal current $I_{th}$	KA up to 20 KA/3 s, or up to 25 KA/1 s
Rated short-circuit thermal current $I_{th}$	KA up to 10 x $I_n$ (option: 1,2 x $I_n$ )
Rated dynamic current $I_{dyn}$	max. 2,5 x $I_n$
Secondary data	
Rated current	A 1 or 5
Measuring error	Class 0,2 0,5 1
Overcurrent factor	without PES F50
Protection core	Class 2,5 to 30
Overcurrent factor	Class 57 or 107
Rated voltage factor (8 h)	Class 10
Rated voltage factor (30 h)	Class 2,5 to 30

Primary data	
Highest voltage for equipment $U_n$ (= 12 kV)	kV 3,6
Rated short-circuit current $I_{sc}$ (withstand voltage $U_n$ )	kV 10 20 28 38 50
Rated lightning impulse withstand voltage $U_{li}$	kV 20 30 42 55 75
Rated current $I_n$	A 20 to 1200
Rated short-circuit thermal current $I_{th}$	KA up to 20 KA/3 s, or up to 25 KA/1 s
Rated short-circuit thermal current $I_{th}$	KA up to 10 x $I_n$ (option: 1,2 x $I_n$ )
Rated dynamic current $I_{dyn}$	max. 2,5 x $I_n$
Secondary data	
Rated current	A 1 or 5
Measuring error	Class 0,2 0,5 1
Overcurrent factor	without PES F50
Protection core	Class 2,5 to 30
Overcurrent factor	Class 57 or 107
Rated voltage factor (8 h)	Class 10
Rated voltage factor (30 h)	Class 2,5 to 30

Primary data	
Highest voltage for equipment $U_n$ (= 12 kV)	kV 3,6
Rated short-circuit current $I_{sc}$ (withstand voltage $U_n$ )	kV 10 20 28 38 50
Rated lightning impulse withstand voltage $U_{li}$	kV 20 30 42 55 75
Rated current $I_n$	A 20 to 1200
Rated short-circuit thermal current $I_{th}$	KA up to 20 KA/3 s, or up to 25 KA/1 s
Rated short-circuit thermal current $I_{th}$	KA up to 10 x $I_n$ (option: 1,2 x $I_n$ )
Rated dynamic current $I_{dyn}$	max. 2,5 x $I_n$
Secondary data	
Rated current	A 1 or 5
Measuring error	Class 0,2 0,5 1
Overcurrent factor	without PES F50
Protection core	Class 2,5 to 30
Overcurrent factor	Class 57 or 107
Rated voltage factor (8 h)	Class 10
Rated voltage factor (30 h)	Class 2,5 to 30

Primary data	
Highest voltage for equipment $U_n$ (= 12 kV)	kV 3,6
Rated short-circuit current $I_{sc}$ (withstand voltage $U_n$ )	kV 10 20 28 38 50
Rated lightning impulse withstand voltage $U_{li}$	kV 20 30 42 55 75
Rated current $I_n$	A 20 to 1200
Rated short-circuit thermal current $I_{th}$	KA up to 20 KA/3 s, or up to 25 KA/1 s
Rated short-circuit thermal current $I_{th}$	KA up to 10 x $I_n$ (option: 1,2 x $I_n$ )
Rated dynamic current $I_{dyn}$	max. 2,5 x $I_n$
Secondary data	
Rated current	A 1 or 5
Measuring error	Class 0,2 0,5 1
Overcurrent factor	without PES F50
Protection core	Class 2,5 to 30
Overcurrent factor	Class 57 or 107
Rated voltage factor (8 h)	Class 10
Rated voltage factor (30 h)	Class 2,5 to 30



ср. 11-26

## Components

Indicating and measuring equipment

### Ready-for-service indicator

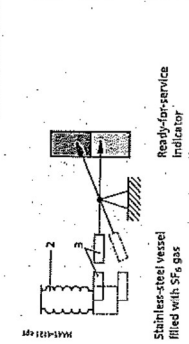
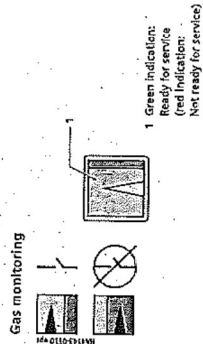
#### Features

- Self-monitoring: easy to read
- Independent of temperature and pressure variations
- Independent of the site altitude
- Only responds to changes in gas density
- Option: Alarm switch "1 NO" for remote electrical indication.

#### Mode of operation

For the ready-for-service indicator, a gas-tight measurement box is installed inside the switching-device vessel. A coupling magnet, which is fitted to the bottom end of the measurement box, transmits its position to an outside armature through the non-magnetizable stainless-steel switching-device vessel. This armature moves the ready-for-service indicator of the switchgear.

While changes in the gas density during the loss of gas, which are decisive for the dielectric strength, are displayed, temperature-dependent changes in the gas pressure are not. The gas in the measurement box has the same temperature as that in the switching-device vessel. The temperature effect is compensated via the same pressure change in both gas volumes.



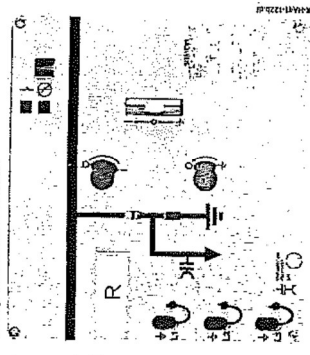
### Ready-for-service indicator

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

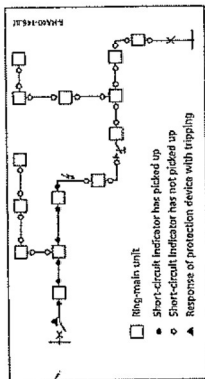
- 1 Green indication: Ready for service
- 2 Measurement box
- 3 Magnetic coupling

Ready-for-service indicator

Stainless-steel vessel filled with SF6 gas



Short-circuit/earth-fault indicators make Horstmann Ring-main, cable and feeder feeders can optionally be equipped with short-circuit or earth-fault indicators in different designs. The equipment features are shown in the table on page 46. Short-circuit and earth-fault indicators reduce the downtime of a power system by delimiting the fault locations in medium-voltage systems.



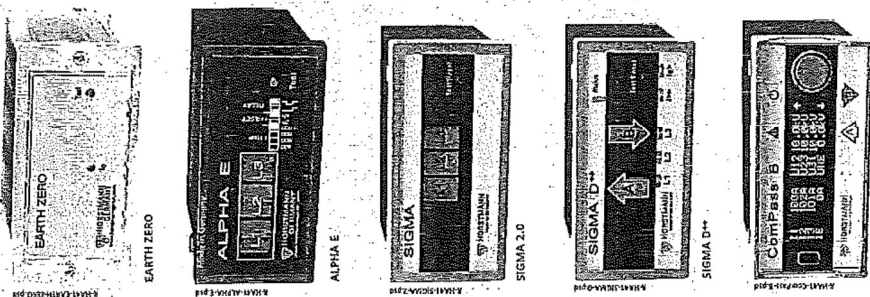
Short-circuit/earth-fault indicators can be used in all kinds of power systems. In impedance-earthed and solidly earthed systems, as well as in isolated and compensated (resonant-earthed) systems, earth-fault detection is also possible.

- SIGMA 2.0 with basic functions
  - Adjustable pickup values
  - Phase-selective fault indication
  - Reset of the fault indication: manually, automatically, from remote
  - Earth-fault detection in impedance-earthed or solidly earthed systems
  - Remote indication with relay contacts
- SIGMA D++ with directional function
  - Directional short-circuit indication
  - Directional earth-fault indication for all types of neutral treatment
  - Unambiguous indication of the fault direction
  - Monitoring with "SIGMA Explorer" software.

- ComPass 2.0 with monitoring
  - Voltage detection via WEGA voltage detecting system and resistive sensor system for up to 4 devices
  - High-precision current and voltage measurement up to 15%
  - Monitoring of the values: U, I, P, Q, S, E, cos φ, load
  - Flow-direction, power meter with direction
  - Temperature measurement with PT100
  - Limit values according to U, I, P, Q, T
  - The measured values, fault indications and events via RS485, MODBUS.
- ComPass 2.0 with control function
  - Remote control of a switch-disconnector or circuit-breaker
  - Prely programmable logic to define the switching conditions
  - 6 binary inputs for recording relevant state information from the switchgear/substation.

## Components

indicating and measuring equipment



All indicators (except ALPHA E) use the same phase current sensors.

## Components

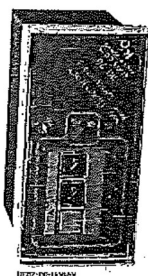
indicating and measuring equipment

Function	Earth Zero	Alpha E	Sigma 2.0	Sigma D++	ComPass 2.0
Short-circuit/earth fault	Yes	Yes	Yes	Yes	Yes
Direction indication	Yes	Yes	Yes	Yes	Yes
Monitoring: U, I, P, Q, S, E, cos φ, load direction	Yes	Yes	Yes	Yes	Yes
Control via GPRS	Yes	Yes	Yes	Yes	Yes
Logic	Yes	Yes	Yes	Yes	Yes
Applicable for the following neutral treatments	Yes	Yes	Yes	Yes	Yes
Impedance earthed	Yes	Yes	Yes	Yes	Yes
Solidly earthed	Yes	Yes	Yes	Yes	Yes
Isolated	Yes	Yes	Yes	Yes	Yes
Compensated	Yes	Yes	Yes	Yes	Yes
Short-circuit pickup values	400, 500, 800, 1000 A	200, 300, 400, 600, 800, 1000, 1200 A, self-adjustment	40, 60, 200, 300 mA	20, 40, 60, 80, 100, 120 or 160 A	20, 40, 60, 80, 100, 120, 160 A, Software (SW): 20 - 1000 A
IB+ pickup delay	100 ms	40, 60, 200, 300 ms	20, 40, 60, 80, 100, 120 or 160 A	10 - 500 A, 5 - 200 A, 5 - 200 A, 1 - 100 A	10 - 500 A, 1 - 200 A, 1 - 100 A, 1 - 100 A, Software (SW): 40 ms - 60 s
Earth-fault pickup values	20, 40, 60, 80, 100, 120 or 160 A	20, 40, 60, 80, 100, 120 or 160 A	20, 40, 60, 80, 100, 120 or 160 A	20, 40, 60, 80, 100, 120, 160 A, Software (SW): 20 - 1000 A	20, 40, 60, 80, 100, 120, 160 A, Software (SW): 20 - 1000 A
IES - Triangulation fault	Yes	Yes	Yes	Yes	Yes
IEZ - Active neutral current sensing	Yes	Yes	Yes	Yes	Yes
IEQ - Reactive current sensing	Yes	Yes	Yes	Yes	Yes
IEU - Zero-sequence current sensing	Yes	Yes	Yes	Yes	Yes
IEP - Phase current sensing	Yes	Yes	Yes	Yes	Yes
IEI - Phase current sensing (high impedance)	Yes	Yes	Yes	Yes	Yes
Pickup delay	80, 60, 80, 200, 300 ms	200 ms	200 ms	200 ms	80, 160 ms
Reset	Manually/From remote	Manually/From remote	Manually/From remote	Manually/From remote	Manually/From remote
Auto. time reset	Yes	Yes	Yes	Yes	Yes
Current/voltage recovery	Yes	Yes	Yes	Yes	Yes
Test	Manually/From remote	Manually/From remote	Manually/From remote	Manually/From remote	Manually/From remote
Communication	Relay contact	Relay contact	Relay contact	Relay contact	Relay contact
Relay contact	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable
RS485/MODBUS-RTU	Yes	Yes	Yes	Yes	Yes
USB connection	Yes	Yes	Yes	Yes	Yes
Parameterizing	Manually/From remote	Manually/From remote	Manually/From remote	Manually/From remote	Manually/From remote
Supply	24-230V AC/DC	24-230V AC/DC	24-230V AC/DC	24-230V AC/DC	24-230V AC/DC
Urbium cell, 3-20 years	Yes	Yes	Yes	Yes	Yes
Current transformer operated	Yes	Yes	Yes	Yes	Yes
External auxiliary voltage	Yes	Yes	Yes	Yes	Yes
Binary inputs	30	30	30	30	30
Number of phase current/summation current sensors	3	3	3	3	3
Short-circuit/earth fault	30 or 31 (6)	30	30	30	30 or 31 (6)
Voltage coupling	Capacitive	Capacitive	Capacitive	Capacitive	Capacitive
Resistive	Resistive	Resistive	Resistive	Resistive	Resistive

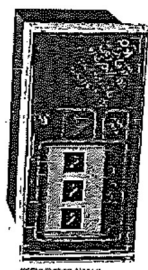
CP. 11-27

## Components

Indicating and measuring equipment



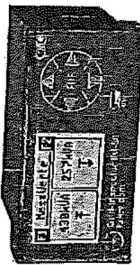
IKI-20



IKI-20PULS



IKI-22



IKI-50



IKI-10light

Short-circuit / short-circuit-to-earth and earth-fault indicators, make Kries

Ring-main, cable and circuit-breaker feeders can optionally be equipped with short-circuit or earth-fault indicators in different designs. The equipment features are shown in the table on page 48.

The three most common types of faults in medium-voltage systems are earth faults in cables and switchgear, faults and overloads of distribution transformers, as well as short-circuits in cables and switchgear. For fast fault location and minimization of downtimes, electronic fault indicators are used:

- Selective fault detection, and thus minimization of downtimes
- Reliable fault detection through electronic measured-value acquisition
- Remote indication of fault events and measured values.

### 1. Short-circuit and short-circuit-to-earth indicator IKI-20

- Universally adjustable
- Current transformer supported battery version or auxiliary voltage versions available
- Extended commissioning and testing functions.

### 2. Short-circuit and earth-fault indicator IKI-20PULS

- Short-circuit detection same as IKI-20
- Earth-fault detection via pulse location in compensated systems.

### 3. Short-circuit and earth-fault indicator IKI-20C(PULS)

- Current-transformer operated (No battery, no auxiliary voltage)
- Optionally with pulse location for earth-fault detection in compensated systems.

### 4. Directional fault detection and earth-fault indicator IKI-22

- Directional fault detection for all system types
- Directional detection combined with the voltage detecting system CXPDIS-Sxx.

### 5. Grid-inspector IKI-50

- Directional measured-value acquisition
- Monitoring of values U, I, P, Q, S, E, cos φ, power factor, load flow direction (momentary value, mean value and min/max value, directional)
- Directional fault detection for all system types
- Switchgear control or automation through an integrated, programmable logic component
- Directional detection combined with the voltage detecting system CXPDIS-Sxx.

### Directional detection system CXPDIS-Sxx

- One device controls two cable panels and the load flow total
- Directional detection combined with resistor dividers (accuracy 1.0%)

### 6. Short-circuit-to-earth indicator IKI-10light

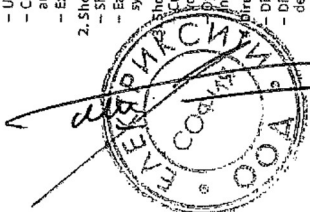
- Earth-fault detection in systems with impedance-earthed neutral or temporarily impedance-earthed neutral
- Adjustable.

## Components

Indicating and measuring equipment

Function	IKI-20	IKI-20PULS	IKI-20C(PULS)	IKI-22	IKI-50	IKI-10light
Short-circuit indication	■	■	■	■	■	■
Earth-fault indication	■	■	■	■	■	■
Short-circuit-to-earth indication	■	■	■	■	■	■
Direction indication	■	■	■	■	■	■
Applicable for the following neutral earthing options	■	■	■	■	■	■
Impedance	■	■	■	■	■	■
Solid	■	■	■	■	■	■
Isolated	■	■	■	■	■	■
Compensated	■	■	■	■	■	■
Pickup current	100, 200, 400, 600, 800, 1000, 2000 A	400, 600, 800, 1000 A	100, 200, 400, 600, 800, 1000, 2000 A	100, 200, 400, 600, 800, 1000, 2000 A	100, 200, 400, 600, 800, 1000, 2000 A	100, 200, 400, 600, 800, 1000, 2000 A
Short-circuit current	100 ... 1000 A (steps of 100 A)	40, 80, 100, 150 A	100, 200, 300, 400, 600, 800, 1000, 2000 A	100, 200, 300, 400, 600, 800, 1000, 2000 A	100, 200, 300, 400, 600, 800, 1000, 2000 A	100, 200, 300, 400, 600, 800, 1000, 2000 A
Earth-fault current	40, 80, 100, 150 A	40, 80, 100, 150 A	40, 80, 100, 150 A	40, 80, 100, 150 A	40, 80, 100, 150 A	40, 80, 100, 150 A
Short-circuit-to-earth current	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms
Pulse location	100 ms	100 ms	100 ms	100 ms	100 ms	100 ms
Pickup time	60 - 1600 ms	60 - 1600 ms	60 - 1600 ms	60 - 1600 ms	60 - 1600 ms	60 - 1600 ms
Short-circuit-to-earth current	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms
Earth-fault current	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms	60, 80, 100, 150, 200 ms
Reset	Manual	Manual	Manual	Manual	Manual	Manual
Automatic	■	■	■	■	■	■
From remote	■	■	■	■	■	■
Remote indication	■	■	■	■	■	■
Flashing contact	■	■	■	■	■	■
Maintained contact	■	■	■	■	■	■
Interface	AS/RS/MODBUS IEC 60870-5-104 (optional)	AS/RS/MODBUS IEC 60870-5-104 (optional)	AS/RS/MODBUS IEC 60870-5-104 (optional)	AS/RS/MODBUS IEC 60870-5-104 (optional)	AS/RS/MODBUS IEC 60870-5-104 (optional)	AS/RS/MODBUS IEC 60870-5-104 (optional)
Power supply	■	■	■	■	■	■
lithium battery	■	■	■	■	■	■
External auxiliary voltage	■	■	■	■	■	■
Current inputs	3	3	3	3	3	3
Phase current	1	1	1	1	1	1
Neutral current	1	1	1	1	1	1
Voltage inputs	3	3	3	3	3	3
Via CAPDIS	■	■	■	■	■	■
Via resistor divider (optional)	■	■	■	■	■	■
Release outputs	1-3	1-3	1-3	1-3	1-3	1-3
Supplied by internal capacitor (optional)	■	■	■	■	■	■
Potential-free	■	■	■	■	■	■
Binary inputs	2 (test + reset)	2 (test + reset)	2 (test + reset)	2 (test + reset)	2 (test + reset)	2 (test + reset)
Number	4	4	4	4	4	4

1) Optional: automatic detection of earth-fault direction  
 2) Ground or signal via 3 transformers mounted around the conductor  
 3) 0.1 W, 24 V DC  
 4) Momentary value, mean value and min/max value, directional  
 5) Short-circuit to earth - Earth fault in impedance-earthed system



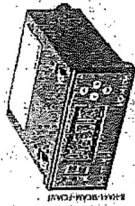
ср. 77-28

## Components

Indicating and measuring equipment



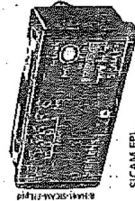
Components  
Indicating and measuring equipment



SICAM FCM

**1. SICAM FCM**  
The short-circuit and earth-fault indicator SICAM FCM (Feeder Condition Monitor) with direction indication enables fast and precise fault location, thus reducing the downtimes in the power system. The possibility to determine and telecommunicate the values U, I, I', Q, S, E, cos φ and load flow direction supports efficient operational management and network planning.

- Usable in earthed, isolated and resonance-earthed systems
  - Directional short-circuit and earth-fault detection
  - Selective fault information with direction indication as a basis for "self-healing" applications
  - Usable with current and voltage sensors according to IEC 60044 for precise measurement without calibration and adjustment to the primary values
  - Alternatively usable with an integrated capacitive voltage detecting system
  - Flexible earth-current detection as from 0.4 A
  - Integrated MODBUS-RTU interface:
  - Remote parameterization via SICAM A8000 and MODBUS
  - Self-test function of the communication connection.
- 2. SICAM FPI (Fault Passage Indicator)**
- Detection of short circuits and earth faults
  - Indication of phase and earth faults via 4 separate LEDs
  - Enhanced diagnostics, self and sensor cable diagnostics is supported
  - Configurable binary outputs, for remote indication to SCADA via RTU for faults and for diagnostics.



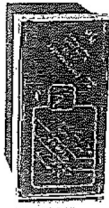
SICAM FPI

1) Measuring sensor 3-0 (summing current is calculated).  
2) Optional

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.



Transformer monitor IK5-30

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

Example for selection of transformer protection

Short-circuit current (kA)	Rated current (A)	Rated current (kA)	Rated current (MVA)
5	≥ 160	≥ 160	≥ 160
6	≥ 160	≥ 160	≥ 160
6.6	≥ 160	≥ 160	≥ 160
10	≥ 200	≥ 250	≥ 160
11	≥ 200	≥ 250	≥ 160
13.8	≥ 250	≥ 315	≥ 160
15	≥ 315	≥ 400	≥ 160
20	≥ 400	≥ 500	≥ 250

- Output
- 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.

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

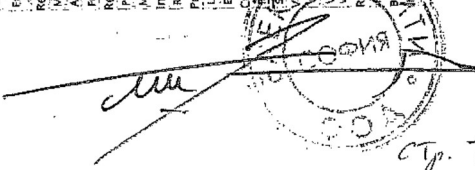
- Tripping of the switch in case of overload (current smaller than the rated current of the switch)
- Blocking of the tripping function in the short-circuit range (here, the fuse takes over the disconnecting function).

**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

*Handwritten signature*

*Handwritten signature*



ср. ТП-29

## Components

Indicating and measuring equipment

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

- For verification of safe isolation from supply
- Rk or LRM detecting systems with plug-in indicator
- LRM detecting systems with integrated indicator type VOIS-4, VOIS-R4, CAPDIS-S14, CAPDIS-S24, WEGA 1.2 C, WEGA 2.2 C or WEGA 3.

Plug-in voltage indicator

- Verification of safe isolation from supply phase by phase
- Indicator suitable for continuous operation
- Measuring system and voltage indicator can be tested, repeat test according to local specifications and standards
- Voltage indicator flashes if high voltage is present.

VOIS-4, VOIS-R4

- Without auxiliary power
- Display indication "A1" to "A3" (see legend)
- Repeat test according to local specifications and standards
- With integrated 3-phase LRM test socket for phase comparison
- With integrated signaling relay (only VOIS-R4).

Common features of CAPDIS-Sxx

- Without auxiliary power
- Integrated repeat test of the interfaces (self-monitoring)
- With integrated function test by pressing the "Test" button
- Adjustable for different operating voltages (adjustable capacitance C2)
- With integrated 3-phase LRM test socket for phase comparison
- With overvoltage monitoring and signaling (1,2 times operating voltage).

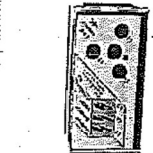
CAPDIS-S14

- Without auxiliary power
- Display indication "A1" to "A7" (see legend)
- Without ready-for-service monitoring
- Without signaling relay
- Without auxiliary contacts.

CAPDIS-S24

- Display indication "A0" to "A8" (see legend)
- Only by pressing the "Test" pushbutton: "ERROR" indication (A8), e.g. in case of missing auxiliary voltage
- With ready-for-service monitoring (auxiliary power required)
- With signaling relay for (auxiliary power required).

Indicators and detecting systems



Symbols shown

	VOIS-4, VOIS-R4	CAPDIS-S14	CAPDIS-S24
A0	L1 L2 L3	L1 L2 L3	L1 L2 L3
A1	f f f	f f f	f f f
A2	f f f	f f f	f f f
A3	f f f	f f f	f f f
A4	f f f	f f f	f f f
A5	f f f	f f f	f f f
A6	f f f	f f f	f f f
A7	f f f	f f f	f f f
A8			

CAPDIS-Sxx: The red and green LEDs show the state of the relay contact

- LED doesn't light up
- LED lights up
- Operating voltage

A0 CAPDIS-S24: Operating voltage not present

A1 Operating voltage present

A2 - Operating voltage not present

A3 Failure in phase L1, operating voltage at L2 and L3 (for CAPDIS-Sxx also earth-fault indication)

A4 Voltage (not operating voltage) present

A5 Indication "Test" passed (lights up shortly)

A6 Indication "Test" not passed (lights up shortly)

A7 Voltage present (lights up continuously)

A8 "ERROR" indication (lights up in case of missing auxiliary voltage)



## Components

Indicating and measuring equipment

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

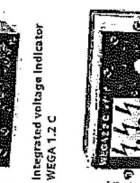
WEGA 3

- Display indication "A1" to "A6" (see legend)
- 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.

WEGA 1.2 C

- Display indication "A0" to "A7" (see legend)
- 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
- With two integrated signaling relays (auxiliary power required \*)

WEGA 2.2 C



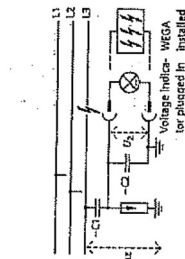
Symbols shown

	WEGA 3	WEGA 1.2 C	WEGA 2.2 C
A0	L1 L2 L3	L1 L2 L3	L1 L2 L3
A1	f f f	f f f	f f f
A2	f f f	f f f	f f f
A3	f f f	f f f	f f f
A4	f f f	f f f	f f f
A5	f f f	f f f	f f f
A6	f f f	f f f	f f f
A7	f f f	f f f	f f f

L: display gray; not illuminated  
 L: display white; illuminated  
 L: display red and green; LEDr show the state of the relay contact

- LED doesn't light up
- LED lights up
- Operating voltage

- A0 For WEGA 2.2 C: Operating voltage not present, auxiliary power present, LCD illuminated
- A1 Operating voltage present For WEGA 2.2 C: Auxiliary power present, LCD illuminated
- A2 Operating voltage not present For WEGA 2.2 C: Auxiliary power not present, LCD not illuminated
- A3 Failure in phase L1, operating voltage at L2 and L3 For WEGA 2.2 C: Auxiliary power present, LCD illuminated
- A4 Voltage present, current monitoring of coupling section below limit value For WEGA 2.2 C: Auxiliary power present, LCD illuminated
- A5 Indication "Display Test" passed For WEGA 2.2 C: Auxiliary power present, LCD illuminated
- A6 Indication "Display Test" passed For WEGA 2.2 C: Auxiliary power present, LCD illuminated
- A7 For WEGA 2.2 C: LCD for missing auxiliary voltage is not illuminated



Voltage indication via capacitive voltage divider (principle)

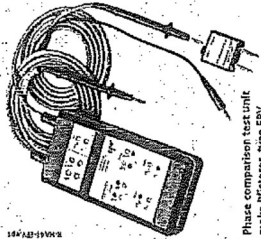
- C1 Capacitance integrated into bushing and the voltage indicator to earth
- $U_{1x} = U_{N/3}$  during rated operation in the three-phase system
- $U_2 = U_N$  - Voltage at the capacitive interface of the switchgear or at the voltage indicator

\* Shows the function of the relay via the LED indications (U=0, U=0)

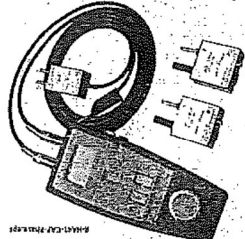
Handwritten signature and stamp: "EVEKPRK" and "OOP" with "30" written below.

### 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.



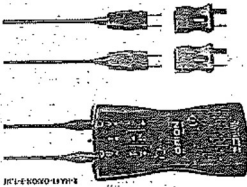
- Phase comparison test unit make Pfisterer, Type EPV as combined test unit (FR and LRM) for:
- Voltage detection
  - Phase comparison
  - Interface self-test
  - Indication via LED.



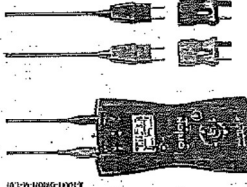
- Phase comparison test unit make Kieck, Type CAP-Phase as combined test unit (FR and LRM) for:
- Voltage detection
  - Repeat test
  - Phase comparison
  - Phase sequence test
  - Self-test.
- The unit does not require a battery.

### Components

Indicating and measuring equipment



- Phase comparison test unit make Orion, Type ORION 3.1 as combined test unit (FR and LRM) for:
- Phase comparison
  - Interface testing at the switchgear
  - Voltage detection
  - Integrated self-test
  - Indication via LED and acoustic alarm
  - Phase sequence indication.



- Phase comparison test unit make Horstmann, Type ORION MT as combined test unit (FR and LRM) for:
- Voltage detection
  - Phase comparison
  - Interface testing at the switchgear
  - Integrated self-test
  - Indication via display and acoustic alarm
  - Phase sequence indication and status LED up to 25 µA
  - Measurement of interface current
  - Measurement of phase angle from 180° to +180°
  - Measurement of harmonic up to 4th harmonic
  - Storing the measured values via PC software (ORION explorer) and USB.

### 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 with c.t.-operated release (low-energy 0.1 Ws)
- Siemens Reyrolle 75SR45
- Woodward/SEG WIC 1-2P, WIC 1-3P, WIC-1
- Protection device with auxiliary voltage supply with shut release (r)
- Siemens Reyrolle 75R10 (Siemens SIPROTEC 75J46)
- Instrument transformer as
- Cable-type current transformer (standard)
- Three-phase current transformer as option for SIMOSEC switchgear panels type L.....

#### Mounting location

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

#### Application of simple protection systems

Phase	160	250	400	500
6	≥ 160	≥ 250	≥ 400	≥ 500
10	≥ 200	≥ 250	≥ 400	≥ 500
13,8	≥ 315	≥ 400	≥ 500	≥ 500
15	≥ 400	≥ 500	≥ 500	≥ 500
20	≥ 400	≥ 500	≥ 500	≥ 500

#### Multifunction protection (selection)

##### SIPROTEC Compact series

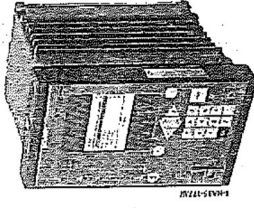
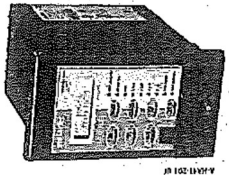
- Overcurrent protection SIPROTEC 75J80
- 9 programmable function keys
- 6-line display
- USB port at the front
- 2 additional communication ports
- IEC 61850 with integrated redundancy (electrical or optical).

##### SIPROTEC 5 series, overcurrent protection SIPROTEC 75J82

- Directional and non-directional time-overcurrent protection with additional functions
- Time optimization of the tripping times by direction comparison and protection data communication
- Frequency protection and rate-of-frequency change protection for load shedding applications
- Overvoltage and undervoltage protection in all required variations
- Power protection, configurable as active or reactive power protection
- Central, synchrocheck and switchgear interlocking system
- Firmly integrated, electrical Ethernet port J for DIGSI
- Complete IEC 61850 (reporting and GOOSE) via integrated port J
- Two optional, pluggable communication modules usable for different and redundant protocols (IEC 61850, IEC 60870-5-103, DNP3, Gseal-1CP, MODBUS RTU Slave, protection data communication).

#### 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.



Handwritten signature and stamp: **ЕКІРІКСІМ** (EKSIM) with a date stamp **07.11.21**.

## Components

### Low-voltage compartment

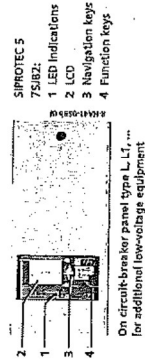
#### Features of low-voltage compartment (option)

- Overall heights
  - 350 mm
  - 550 mm
- Partitioned 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
  - Standard for heights of 350 and 550 mm
  - Option: Door with hinge on the right.

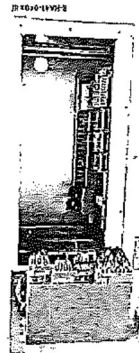
#### Low-voltage cables

- 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.

#### Low-voltage compartment (option)



#### Low-voltage compartment (example 750 x 350 mm)



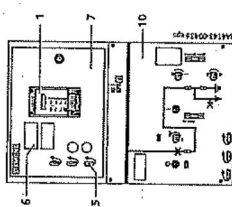
## Components

### 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 75M45, 75R10;
  - For type L and LI
  - Make Woodward/SEG, type WIC1; For type L and LI
  - 75I80
  - 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 (500 mm) (with CB-1 (NAR\*))

In circuit-breaker panel type LI (750 mm)

#### Protection relay as option:

- 1 Protection relay type 75M45
- 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 in-bar operating mechanism of the three-position switch-disconnector
- 10 Panel front
- 11 Low-voltage niche open
- 12 Option: Installed equipment

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

\* AB = Automatic reclosing  
NAR = Non automatic reclosing

## Components

### Low-voltage compartment

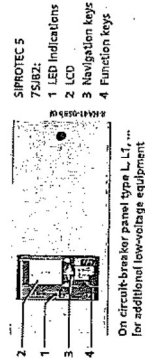
#### Features of low-voltage compartment (option)

- Overall heights
  - 350 mm
  - 550 mm
- Partitioned 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
  - Standard for heights of 350 and 550 mm
  - Option: Door with hinge on the right.

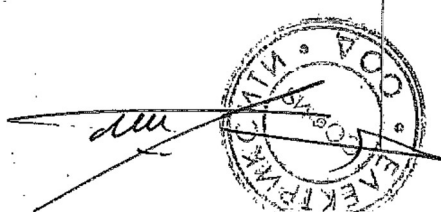
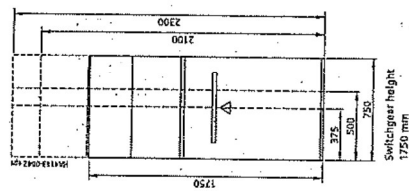
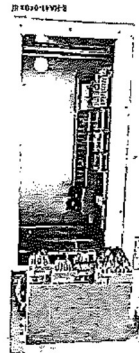
#### Low-voltage cables

- 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.

#### Low-voltage compartment (option)

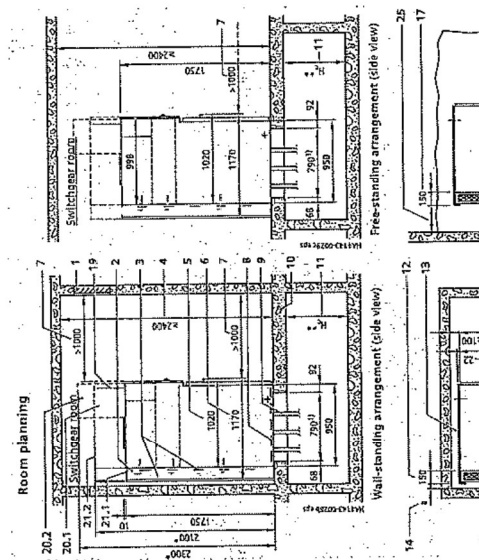
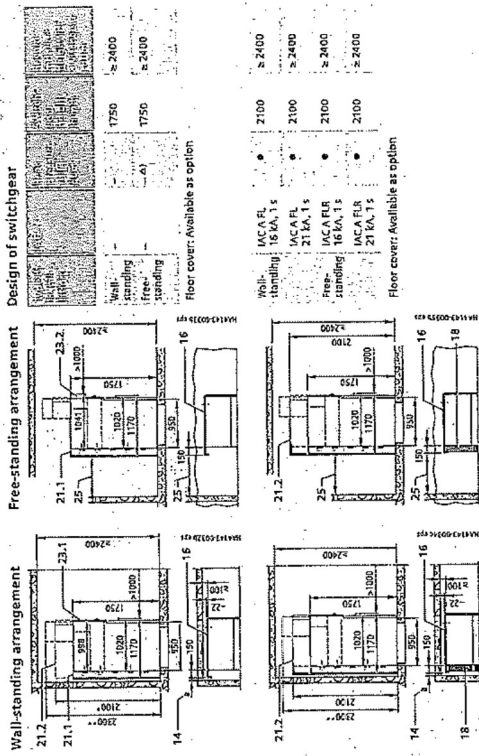


#### Low-voltage compartment (example 750 x 350 mm)



CTP TP-3.2

## Dimensions Switchgear installation



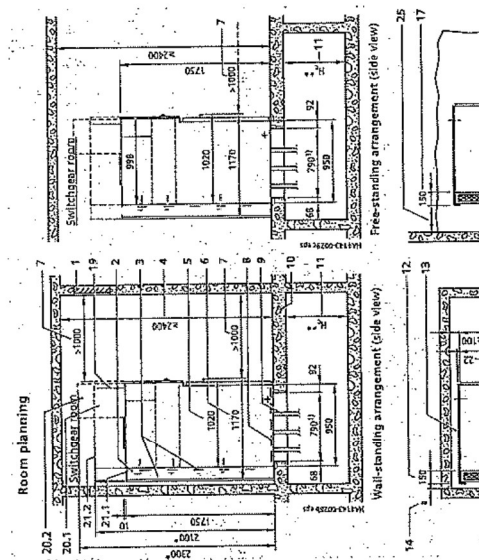
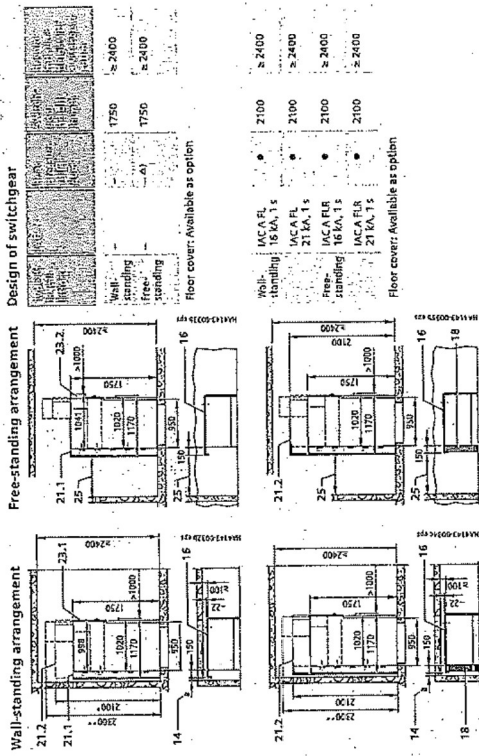
- Room planning**
- Switchgear installation**
- Wall-standing arrangement:
    - 1 row
    - 2 rows (for face-to-face arrangement).
  - Room dimensions
  - See opposite dimension drawings
  - Door dimensions
  - The floor dimensions depend on the
    - Number of panels in a transport unit
    - Design with or without low-voltage compartment.
  - Switchgear fastening
  - For floor openings and fixing points of the switchgear, see pages 66 to 68
  - Foundations:
    - Steel girder construction
    - Steel-reinforced concrete.
  - Panel dimensions
  - See pages 60 to 65

**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 69.

- 1 Relief opening
  - 2 Direction of pressure relief
  - 3 Pressure relief of switchgear
  - 4 Room height
  - 5 Individual panel depth (a)
  - 6 Panel depth including end wall (a)
  - 7 Depending on national requirements:
    - Germany: 800 mm.
    - switchgear depth: 1230 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<sub>1</sub> in table):
    - bending radius of cable
    - Cable laying underneath the panel
    - Use of deep floor cover
  - 12 Wall distance, dimension of pressure relief duct (a option)
  - 13 Side-wall distance
  - 14 Wall distance a (see also page 59)
  - 15 Panel width
- Continued on next page

## Dimensions Switchgear installation

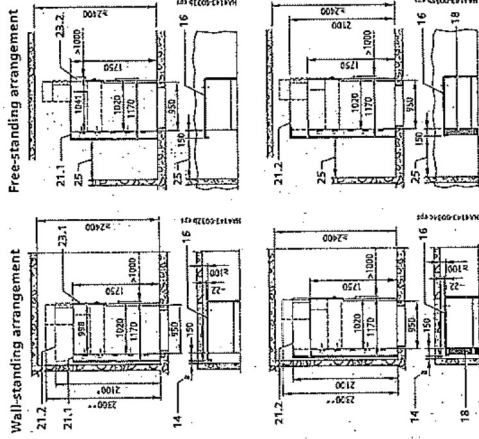
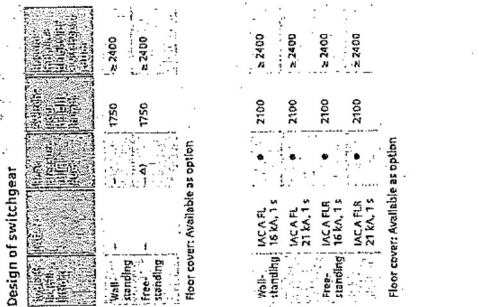


- Room planning**
- Switchgear installation**
- Wall-standing arrangement:
    - 1 row
    - 2 rows (for face-to-face arrangement).
  - Room dimensions
  - See opposite dimension drawings
  - Door dimensions
  - The floor dimensions depend on the
    - Number of panels in a transport unit
    - Design with or without low-voltage compartment.
  - Switchgear fastening
  - For floor openings and fixing points of the switchgear, see pages 66 to 68
  - Foundations:
    - Steel girder construction
    - Steel-reinforced concrete.
  - Panel dimensions
  - See pages 60 to 65

**Weight**

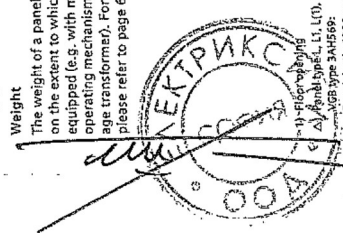
The weight of a panel depends on the extent to which it is equipped (e.g. with motor operating mechanism, voltage transformer). For details, please refer to page 69.

- 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 (panel without low-voltage compartment)
- 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 (standard for IAC design, without IAC = 2100 mm high)
- 21.2 End wall: 2100 mm high
- 22 Earthing terminals
- 23 Cover for low-voltage niche
- 23.1 Standard: Cover screwed-on (panel depth: 998 mm)
- 23.2 Option: Door (= 45 mm, panel depth: 1041 mm)
- 25 Distance to rear wall:
  - ≥ 800 mm (for free-standing arrangement)



- Continued from page 57
- 21.1 End wall: 1750 mm high (standard for IAC design, without IAC = 2100 mm high)
  - 21.2 End wall: 2100 mm high
  - 22 Earthing terminals
  - 23 Cover for low-voltage niche
  - 23.1 Standard: Cover screwed-on (panel depth: 998 mm)
  - 23.2 Option: Door (= 45 mm, panel depth: 1041 mm)
  - 25 Distance to rear wall:
    - ≥ 800 mm (for free-standing arrangement)

- 21.1 End wall: 1750 mm high (standard for IAC design, without IAC = 2100 mm high)
- 21.2 End wall: 2100 mm high
- 22 Earthing terminals
- 23 Cover for low-voltage niche
- 23.1 Standard: Cover screwed-on (panel depth: 998 mm)
- 23.2 Option: Door (= 45 mm, panel depth: 1041 mm)
- 25 Distance to rear wall:
  - ≥ 800 mm (for free-standing arrangement)



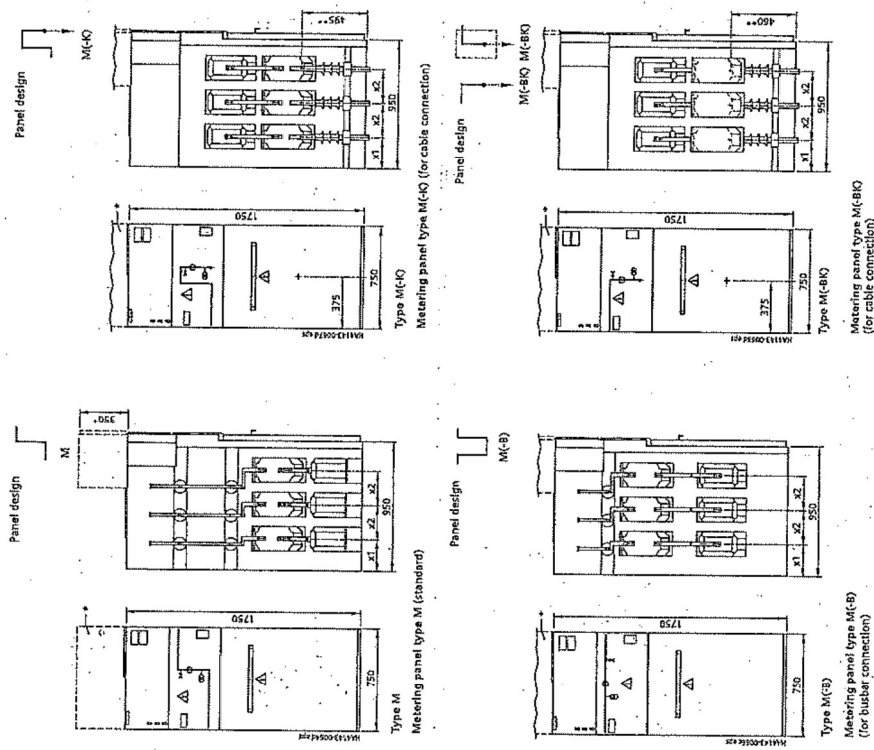
07. 7P-33







**Dimensions**  
Metering panels, as billing metering panel

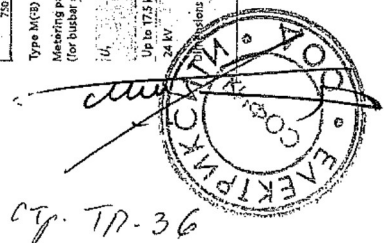
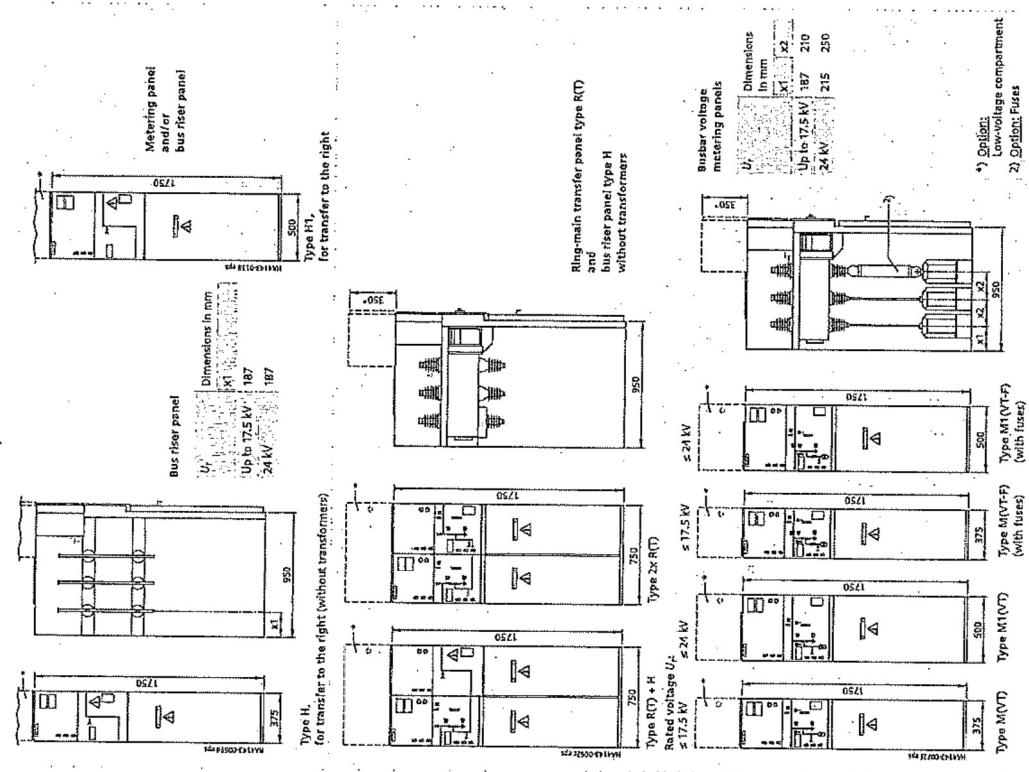


\*) **Dimensions**  
Low-voltage compartment  
The cable connection height depends on the rated voltage, the transformer design and the number of cable connections

Dimensions in mm	
x1	210
x2	210
x1	187
x2	187
x1	215
x2	215

Dimensions x1 and x2 for cable connection: See pages 66 and 67

**Dimensions**  
Metering/bus riser panels, busbar voltage metering panels

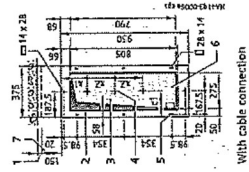




### Dimensions

Floor openings (dimensions in rse) and fixing points

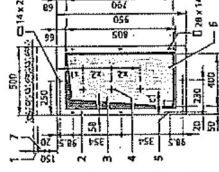
For panel width 375 mm



For panel type	Position of cables in mm	X1	X2	X1	X2
R	12.5 kV	187	187	17.5 kV	24 kV
K	187	187	210	17.5 kV	24 kV
T	187	187	210	17.5 kV	24 kV

With cable connection

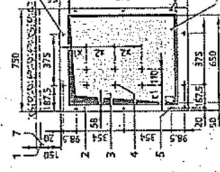
For panel width 500 mm



For panel type	Position of cables in mm	X1	X2	X1	X2
R1, D1	17.5 kV	187	187	24 kV	24 kV
K1	187	187	210	17.5 kV	17.5 kV
T1	187	187	210	17.5 kV	17.5 kV
L	187	187	210	17.5 kV	17.5 kV
L with CTs	187	235	210	230	250
V15	187	235	210	230	300

With cable connection

For panel width 750 mm



For panel type	Position of cables in mm	X1	X2	X1	X2
L1	17.5 kV	187	187	24 kV	24 kV
L1 with CTs	187	187	210	17.5 kV	17.5 kV
V15	187	215	210	250	235
	187	215	210	250	335

With cable connection

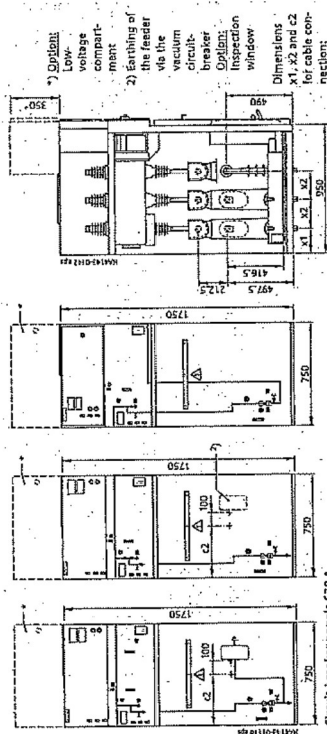
- 1 Wall distance (see page 59)
- 2 Fixing frame (base) of an individual panel or panel block
- 3 Floor opening for high-voltage cables and, where applicable, control cables

NOTE:  
Connection of double cables: Depending on the panel type and version of the sealing end, the cable distance is approx. 110 mm.

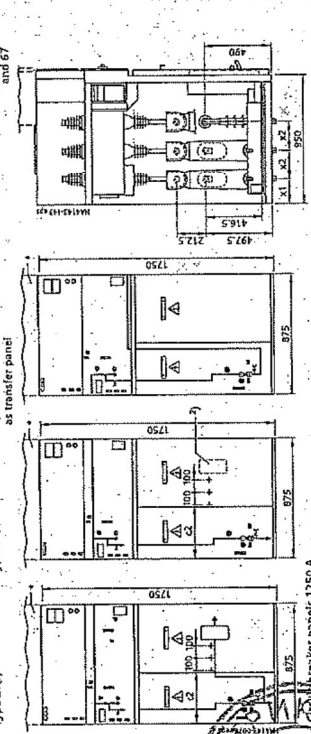
- 4 Position of the led-in cables for the feeder 1)
  - 5 Fixing points
  - 6 Floor opening if required for panels without cable connection
  - 7 ~~Optional~~ Pressure relief duct
- 1) The position of the cables in the panel depends on the additional built-in panel components, e.g. current and voltage transformers. Therefore, the dimensions X1, X2, C1, C2 may be different.

### Dimensions

Circuit-breaker panels (for removable circuit-breaker type CB-r), overview of panel combination "TC"



Dimensions:  
1) Dynamic low-voltage compartment  
2) Termination of the feeder  
3) No tie circuit breaker  
4) Inspection window  
5) Dimensions X1, X2 and C2 for cable connection.  
See pages 66 and 67



Rating (kV)	Rating (A)	Panel width (mm)	Panel depth (mm)	Panel height (mm)	Panel weight (kg)	Panel type
17.5	630	750	875	1750	1125	TC1
17.5	630	750	875	1750	1125	TC2
17.5	630	750	875	1750	1125	TC3
17.5	630	750	875	1750	1125	TC4
17.5	630	750	875	1750	1125	TC5
17.5	630	750	875	1750	1125	TC6
17.5	630	750	875	1750	1125	TC7
17.5	630	750	875	1750	1125	TC8
17.5	630	750	875	1750	1125	TC9
17.5	630	750	875	1750	1125	TC10
17.5	630	750	875	1750	1125	TC11
17.5	630	750	875	1750	1125	TC12
17.5	630	750	875	1750	1125	TC13
17.5	630	750	875	1750	1125	TC14
17.5	630	750	875	1750	1125	TC15
17.5	630	750	875	1750	1125	TC16
17.5	630	750	875	1750	1125	TC17
17.5	630	750	875	1750	1125	TC18
17.5	630	750	875	1750	1125	TC19
17.5	630	750	875	1750	1125	TC20
17.5	630	750	875	1750	1125	TC21
17.5	630	750	875	1750	1125	TC22
17.5	630	750	875	1750	1125	TC23
17.5	630	750	875	1750	1125	TC24
17.5	630	750	875	1750	1125	TC25
17.5	630	750	875	1750	1125	TC26
17.5	630	750	875	1750	1125	TC27
17.5	630	750	875	1750	1125	TC28
17.5	630	750	875	1750	1125	TC29
17.5	630	750	875	1750	1125	TC30
17.5	630	750	875	1750	1125	TC31
17.5	630	750	875	1750	1125	TC32
17.5	630	750	875	1750	1125	TC33
17.5	630	750	875	1750	1125	TC34
17.5	630	750	875	1750	1125	TC35
17.5	630	750	875	1750	1125	TC36
17.5	630	750	875	1750	1125	TC37
17.5	630	750	875	1750	1125	TC38
17.5	630	750	875	1750	1125	TC39
17.5	630	750	875	1750	1125	TC40
17.5	630	750	875	1750	1125	TC41
17.5	630	750	875	1750	1125	TC42
17.5	630	750	875	1750	1125	TC43
17.5	630	750	875	1750	1125	TC44
17.5	630	750	875	1750	1125	TC45
17.5	630	750	875	1750	1125	TC46
17.5	630	750	875	1750	1125	TC47
17.5	630	750	875	1750	1125	TC48
17.5	630	750	875	1750	1125	TC49
17.5	630	750	875	1750	1125	TC50

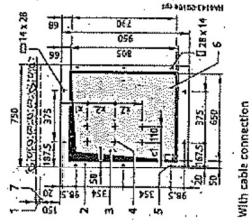
*Handwritten signature*

*Handwritten text: 37-TT-37*

## Dimensions

Floor openings (dimensions in red) and fixing points

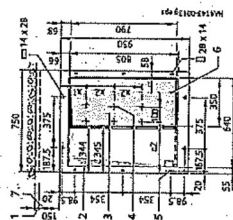
Metering panels: Panel width 750 mm



Position of cables 1)	Dimensions in mm	For panel type
1	187	ME-C
2	187	ME-BK
3	210	24 kV
4	210	17.5 kV
5	250	24 kV
6	250	17.5 kV
7	375	24 kV
7	375	17.5 kV

With cable connection

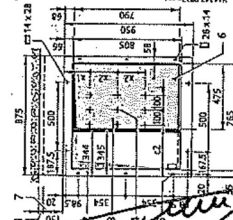
For panel type L1(r), width 750 mm



Position of cables 1)	Dimensions in mm	For panel type
1	187	L1(r)
2	187	L1(r)
3	210	24 kV
4	210	17.5 kV
5	230	24 kV
6	230	17.5 kV
7	377	24 kV
7	377	17.5 kV

Without cable connection

For panel type L2(r), width 875 mm



Position of cables 1)	Dimensions in mm	For panel type
1	187	L2(r)
2	187	L2(r)
3	210	24 kV
4	210	17.5 kV
5	230	24 kV
6	230	17.5 kV
7	377	24 kV
7	377	17.5 kV

Without cable connection

- 1) Wall distance (see page 59)
- 2) Fixing points
- 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 for high-voltage cables and, where applicable, control cables
- 7) Options: Pressure relief duct

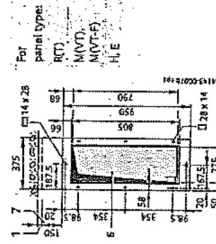
1) The position of the cables in the panel depends on the additional built-in panel components, e.g. current and voltage transformers. Therefore, the dimensions x1, x2, c1, c2 may be different.

Switchgear Type SIMOSEC, up to 24 kV, All-insulated, Extendable - Siemens HA 41.43 - 2018

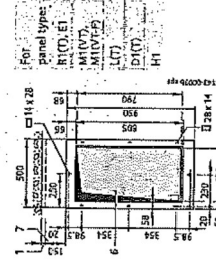
## Dimensions

Floor openings (dimensions in red) and fixing points

For panel width 375 mm



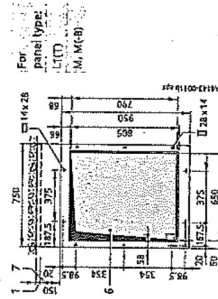
For panel width 500 mm



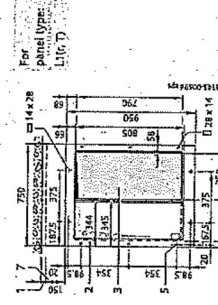
Without cable connection

Without cable connection

For panel width 750 mm

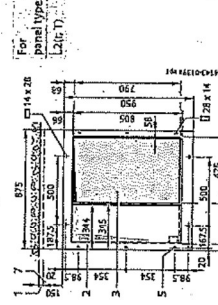


For panel width L1(r, T), width 750 mm



Without cable connection

For panel type L2(r, T), width 875 mm



- 1) Wall distance (see page 59)
- 2) Fixing points
- 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 for high-voltage cables and, where applicable, control cables
- 7) Options: Pressure relief duct

1) The position of the cables in the panel depends on the additional built-in panel components, e.g. current and voltage transformers. Therefore, the dimensions x1, x2, c1, c2 may be different.

Switchgear Type SIMOSEC, up to 24 kV, All-insulated, Extendable - Siemens HA 41.43 - 2018

ср. ТП-38

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)			Transport unit (TU) (including packing) for standard panels (without/with pressure relief duct, option)		
		Width B1 mm	Net weight approx. kg without/with LVCS (LVCS)	Height H2 m	Depth T2 m	Volume m³ without/with LVCS (LVCS)	Width B2 m	Height H2 m	Depth T2 m	Volume m³ without/with LVCS (LVCS)
Ring main panel	R	375	160/220	1,08	1,95/2,3	1,40	2,85/3,48	1,40	2,20/2,80	
Ring main transfer panel	RT	500	180/240	1,08	1,95/2,3	1,40	2,85/3,48	1,40	2,20/2,80	
Transformer panel	T	375	250/310	1,08	1,95/2,3	1,40	3,10/3,70	1,40	3,10/3,70	
Cable panel	K	500	200/260	1,08	1,95/2,3	1,40	2,60/3,20	1,40	2,60/3,20	
Cable panel with make-good	K1	500	160/220	1,08	1,95/2,3	1,40	2,10/2,70	1,40	2,10/2,70	
Cable panel with make-good	K2	375	150/210	1,08	1,95/2,3	1,40	2,10/2,70	1,40	2,10/2,70	
Cable panel with make-good	K3	500	170/230	1,08	1,95/2,3	1,40	2,30/2,90	1,40	2,30/2,90	
Busbar-mounted circuit-breaker type "CB-1"	B1	500	300/360	1,08	1,95/2,3	1,40	3,60/4,20	1,40	3,60/4,20	
Circuit-breaker panel	B2	500	300/360	1,08	1,95/2,3	1,40	3,60/4,20	1,40	3,60/4,20	
Removable circuit-breaker	L20	750	350/410	1,08	1,95/2,3	1,40	4,10/4,70	1,40	4,10/4,70	
Disconnecter panel	D1	875	380/440	1,08	1,95/2,3	1,40	4,40/5,00	1,40	4,40/5,00	
Disconnecter transfer panel	D2	500	180/240	1,08	1,95/2,3	1,40	2,40/3,00	1,40	2,40/3,00	
Maintaining panel	M1	500	250/310	1,08	1,95/2,3	1,40	3,10/3,70	1,40	3,10/3,70	
Maintaining panel	M2	750	270/330	1,08	1,95/2,3	1,40	3,40/4,00	1,40	3,40/4,00	
Maintaining panel	M3	750	270/330	1,08	1,95/2,3	1,40	3,40/4,00	1,40	3,40/4,00	
Busbar voltage metering panel	M4	375	210/270	1,08	1,95/2,3	1,40	2,70/3,30	1,40	2,70/3,30	
Maintaining panel	M5	375	230/290	1,08	1,95/2,3	1,40	2,90/3,50	1,40	2,90/3,50	
Maintaining panel	M6	500	240/300	1,08	1,95/2,3	1,40	3,10/3,70	1,40	3,10/3,70	
Maintaining panel	M7	500	250/310	1,08	1,95/2,3	1,40	3,30/3,90	1,40	3,30/3,90	
Maintaining panel	M8	375	170/230	1,08	1,95/2,3	1,40	2,30/2,90	1,40	2,30/2,90	
Maintaining panel	M9	375	280/340	1,08	1,95/2,3	1,40	3,40/4,00	1,40	3,40/4,00	
Maintaining panel	M10	375	180/240	1,08	1,95/2,3	1,40	2,40/3,00	1,40	2,40/3,00	
Pressure relief duct (optional) for wall (re-arranging arrangement) of switchgear					1,95/2,3	1,40	2,85/3,48		530/630	
Additional weight per duct and per panel approx. kg										
Panel width mm		375	500	600						
Panel height mm		375	500	600						
Panel depth mm		375	500	600						

- 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
- Net weight and the gross weight depend on the extent to which the panels are equipped (e.g. current transformers, motor operating mechanisms) and are therefore given as mean value
- 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. additional 120 kg per panel)
- 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)			Transport unit (TU) (including packing) for standard panels (without/with pressure relief duct, option)		
		Width B1 mm	Net weight approx. kg without/with LVCS (LVCS)	Height H2 m	Depth T2 m	Volume m³ without/with LVCS (LVCS)	Width B2 m	Height H2 m	Depth T2 m	Volume m³ without/with LVCS (LVCS)
Individual panels or combinations thereof for standard switchgear										

Transport dimensions for combinations of different individual panels

- Transport unit (TU) (including packing) for standard panels (without/with pressure relief duct, option)
- On request: As multi-panel transport unit.
  - Standard packing for:
    - Truck: ≤ 1500 mm
    - Sea transport, air freight: ≤ 2123 mm
    - Container packing, standard (other dimensions on request): ≤ 2000 mm
- Transport unit (TU) (CN):
- Standard: As individual panels arranged side by side and not screwed together
  - On request: As multi-panel transport unit.
  - Standard packing for:
    - Truck: ≤ 1125 mm
    - Sea transport, air freight: ≤ 2000 mm
    - Container packing, standard (other dimensions on request): ≤ 2000 mm



- T1 = Depth of individual panel
- Individual panel dimension B1 x T1
- Transport unit, dimension B2 x T2
- B3 = Overall width of combination of different individual panels
- B2 = Width of the transport unit
- T2 = Depth of the transport unit

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

- 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
- Other heights "H" of "TU" possible (depending on the equipment of the panel type and the packing type)
- Depending on the delivering factory (CN, PT)

## Installation

Shipping data, transport

### Packing types (examples)

For size and weight of the transport units, see page 69.

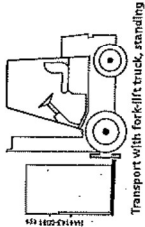
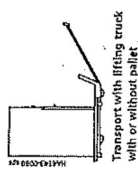
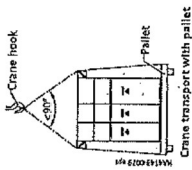
Place of destination, and means of transport	Examples for packing ①
China / Europe by rail and truck	Type: Open PE protective foil pulled over the switchgear with wooden base
Overseas by seafreight	Type: Sawworthy crate (standard) Wadded PE protective foil, with closed wooden crate, with desiccant bag
Overseas by airfreight	Type: Open, for container PE protective foil pulled over the switchgear, with wooden base
Overseas by airfreight	Type: Open, for container 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 compartment: 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.

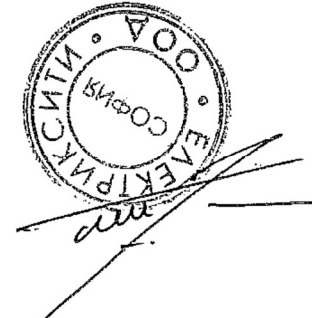
### Overview of standards (2018)

Device	IEC standard	EN standard	GB standard
Switchgear	IEC 62271-1	EN 62271-1	GB 11022
	IEC 62271-200	EN 62271-200	GB 3906
	IEC 62271-100	EN 62271-100	GB 1984
	IEC 62271-102	EN 62271-102	GB 1985
	IEC 62271-103	EN 62271-103	GB 3904
	IEC 62271-105	EN 62271-105	GB 18925
	IEC 60283-1	EN 60283-1	DL/T 538-2006 (acc. to IEC 51958-2006, similar to Chinese standard)
	IEC 61495	EN 61495	GB 4208
	IEC 62271-205	EN 62271-205	
	IEC 60529	EN 60529	
	IEC 62262	EN 60071	GB 17312
	IEC 61869-1	EN 61869-1	
	IEC 61869-2	EN 61869-2	GB 1208
	IEC 61869-3	EN 61869-3	GB 1207
	IEC 61936-1	EN 61936-1	
	IEC 60376	EN 60376	

### 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.



① depending on the delivering factory

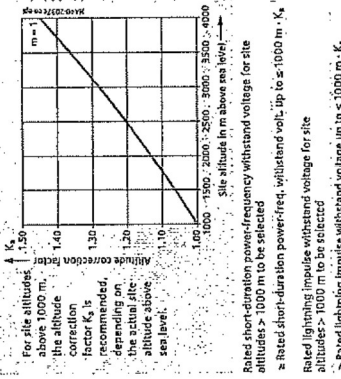


170 TA-40

## Standards

Standards, specifications, guidelines

- Criterion 2: No fragmentation of the enclosure, no projection of small parts above 60 g
  - Criterion 3: No holes in accessible sides up to a height of 2 m
  - Criterion 4: No ignition of indicators due to hot gases
  - Criterion 5: The enclosure remains connected to its earthing point.
- Resistance to internal faults (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  $K_A$



- 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 19822 (see table "Dielectric strength").
  - The rated values are referred to sea level and to normal atmospheric conditions (1013 hPa, 20 °C, 11 g/m<sup>3</sup> 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 (r.m.s. value), kV	15	17.5	24
Rated short-duration power-frequency withstand voltage (r.m.s. value)	23	27	36
Rated lightning impulse withstand voltage (peak value)	39	45	60
Rated lightning impulse withstand voltage (peak value) across the bushing	20	24	32
Rated lightning impulse withstand voltage (peak value) across the bushing	28	34	45
Rated lightning impulse withstand voltage (peak value) across the bushing	36	43	57
Rated lightning impulse withstand voltage (peak value) across the bushing	45	54	72
Rated lightning impulse withstand voltage (peak value) across the bushing	60	72	96
Rated lightning impulse withstand voltage (peak value) across the bushing	80	96	128

- 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

## Standards

Standards, specifications, guidelines

- Cable testing
  - For circuit-breaker and switch-disconnector feeders
  - DC voltage test:
    - Remove or disconnect any voltage transformers at the cable disconnection 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 \*)
    - the information on manufacturer-dependent cable sealing ends
    - the cable version (e.g. paper-insulated mass-impregnated cables, PVC cables or XLPE cables)

**Test voltages:**

Rated voltage	$U_1$ (kV)	$U_2$ (kV)	$U_3$ (kV)	Max. test voltage applied to the connected cable
12	12	12	12	VLF 1, 0.1 Hz, acc. to IEC 3-4/5
24	24	24	24	$U_1$
36	36	36	36	$U_1$
48	48	48	48	$U_1$
72	72	72	72	$U_1$
110	110	110	110	$U_1$
175	175	175	175	$U_1$
252	252	252	252	$U_1$
363	363	363	363	$U_1$
525	525	525	525	$U_1$
725	725	725	725	$U_1$
1050	1050	1050	1050	$U_1$
1500	1500	1500	1500	$U_1$
2200	2200	2200	2200	$U_1$
3200	3200	3200	3200	$U_1$
4600	4600	4600	4600	$U_1$

- Color of the switchgear
  - Panel front: RAL 7035 (light grey)
  - 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.

- Climate and environmental influences
  - Indoor installation:
    - The SIMOSEC switchgear is suitable for application in indoor installations under normal operating conditions as defined in the standard IEC 62271-1:
      - Temperature:
        - -5 °C up to +55 °C (optional, with panel heating)
        - Mean value over 24 h:  $\leq 95\%$
        - Occasionally use a heater as anti-condensation protection (in the panel)
      - Condensation:
        - Mean value over 1 month:  $\leq 90\%$
        - Altitude correction to be considered (see page 73)
    - SIMOSEC switchgear is largely insensitive to climate and environmental influences by virtue of the following features:
      - No corrosion protection 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.

- Climate classes
  - The climate classes are defined according to IEC 60721-3-3.
  - The SIMOSEC switchgear has been subjected to a climatic test according to IEC 60932, Level 2, and is suitable for operating conditions according to "Design Class 1". This test also meets the requirements of IEC 62271-304 for "Design Class 1".
- 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
- Recycling
  - The switchgear can be recycled in ecological manner in compliance with existing legislation. Auxiliary devices such as short-circuit indicators have to be recycled as electronic scrap. Batteries have to be recycled professionally. Insulating gas SF<sub>6</sub> has to be evacuated professionally as a reusable material and recycled (SF<sub>6</sub> must not be released into the environment).

- Cable testing
  - For circuit-breaker and switch-disconnector feeders
  - DC voltage test:
    - Remove or disconnect any voltage transformers at the cable disconnection 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 \*)
    - the information on manufacturer-dependent cable sealing ends
    - the cable version (e.g. paper-insulated mass-impregnated cables, PVC cables or XLPE cables)
- Color of the switchgear
  - Panel front: RAL 7035 (light grey)
  - 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.

Handwritten signature

- 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 19822 (see table "Dielectric strength").
  - The rated values are referred to sea level and to normal atmospheric conditions (1013 hPa, 20 °C, 11 g/m<sup>3</sup> 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 (r.m.s. value), kV	15	17.5	24
Rated short-duration power-frequency withstand voltage (r.m.s. value)	23	27	36
Rated lightning impulse withstand voltage (peak value)	39	45	60
Rated lightning impulse withstand voltage (peak value) across the bushing	20	24	32
Rated lightning impulse withstand voltage (peak value) across the bushing	28	34	45
Rated lightning impulse withstand voltage (peak value) across the bushing	36	43	57
Rated lightning impulse withstand voltage (peak value) across the bushing	45	54	72
Rated lightning impulse withstand voltage (peak value) across the bushing	60	72	96
Rated lightning impulse withstand voltage (peak value) across the bushing	80	96	128

- 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

Handwritten signature



Handwritten text: 07. 11-11

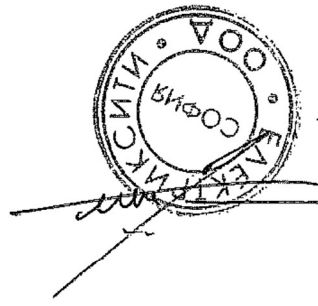
**Standards**  
Standards, specifications, guidelines

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.  
Protection against solid foreign objects,  
electric shock and water  
SIMOSEC switchgear fulfills according to the standards \*)  
IEC 62271-1 EN 62271-1 VDE 0671-1  
IEC 62271-200 EN 62271-200 VDE 0671-200  
IEC 60529 EN 50529 VDE 0470-1  
IEC 62262 EN 50102 VDE 0470-100

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

Degree of protection (IP)	Type of protection
IP2X (optional)	for switchgear enclosure (optional)
IP3XD (optional on request)	for switchgear enclosure (on request)
IP5S	for parts of the primary circuit of the power service vessels under high voltage
Degree of protection (IK)	Type of protection for switchgear enclosure
IK 07	

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.



\*) For standards, see page 72.

IEC/EN 60529:

Type of protection

Standard:

Protection against solid foreign objects

Protected against solid foreign objects of 12.5 mm diameter and greater (the object probe, sphere of 12.5 mm diameter, shall not fully penetrate)

Protection against access to hazardous parts

(the jointed test finger of 12 mm diameter, 80 mm length, shall have adequate clearance from hazardous parts)

Protection against water

No definition

Definition:

Protection against solid foreign objects

Protected against solid foreign objects of 2.5 mm diameter and greater (the object probe, sphere of 2.5 mm diameter, shall not penetrate at all)

Protection against access to hazardous parts

(the access probe of 2.5 mm diameter shall not penetrate)

Protection against water

No definition

Definition on request:

Protection against solid foreign objects

Protected against solid foreign objects of 2.5 mm diameter and greater (the object probe, sphere of 2.5 mm diameter, shall not penetrate at all)

Protection against water

No definition

Protection against access to hazardous parts

Protected against access with a wire (the access probe of 1.0 mm diameter, 30 mm length, shall have adequate clearance from hazardous parts)

Protection against solid foreign objects

Dust-tight (No ingress of dust)

Protection against access to hazardous parts

Protected against access to hazardous parts with a wire (the access probe of 1.0 mm diameter shall not penetrate)

Protection against water

Protected against water jets (water projected in jets against the enclosure from any direction shall have no harmful effects)

Published by  
Siemens AG 2018

Energy Management Division  
Medium Voltage & Systems  
Mozartstraße 31 C  
91052 Erlangen, Germany

For further information please contact  
our Customer Support Center

Phone: +49 180 324 70 00

Fax: +49 180 324 74 71

E-mail: support\_mv@siemens.com  
siemens.com/medium-voltage-switchgear

Article No. EMMS-K1441-AM31-487-6000

Dispo 40401

PU 002927 KG 01\_18

Subject to changes and errors. The information given in this document only contains general descriptions and/or performance features which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products.

The requested performance features are binding only when they are expressly agreed upon in the concluded contract.

SIMOSEC is a registered trademark of Siemens AG. Any unauthorized use is prohibited. All other designations in this document may represent trademarks whose use by third parties for their own purposes may violate the proprietary rights of the owner.



сгп - ТП - 42



Приложение № 2 към техническото предложение





**SIEMENS**

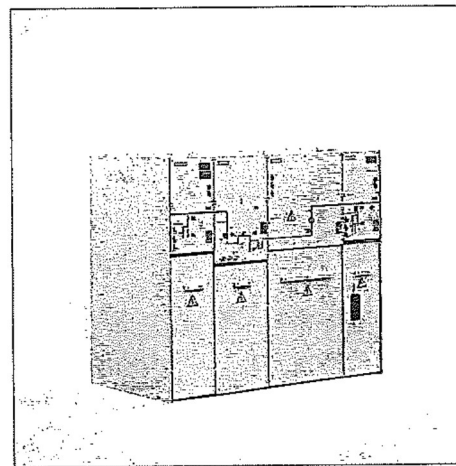
Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

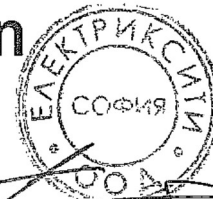
SIMOSEC-20417

# SIMOSEC

Air-Insulated, Metal-Enclosed  
Medium-Voltage Switchgear



## Technical Description



ВЯРНО С ОРИГИНАЛА

стр. 11 - 13

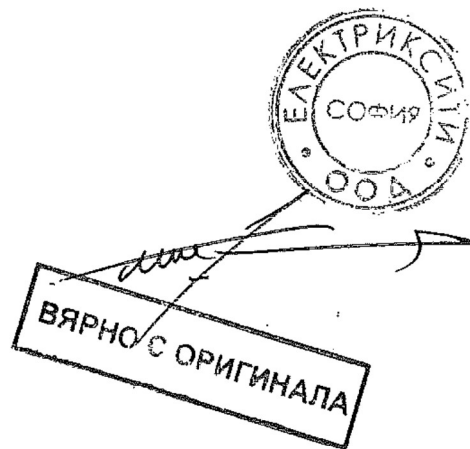
# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC  
SIMOSEC-20417

## Contents

1. Technical data .....	3
2. Scope of supply .....	6
3. Documentation.....	20



от 70-44

# SIEMENS

Customer: CEZ  
 Project: VS Ferma Dragalevtsi  
 Reference: 20180

Specification for medium-voltage  
 switchgear SIMOSEC

SIMOSEC-20417

## 1. Technical data

### Voltages

Rated voltage .....	24.0 kV
Operating voltage .....	20.0 kV
Rated short-duration power-frequency withstand voltage .....	50 kV
Rated lightning impulse withstand voltage .....	125 kV
Rated frequency .....	50 Hz
Cable testing voltage (AC) .....	38 kV
Cable testing voltage (DC) .....	72 kV

### Short-circuit ratings

Rated short-time withstand current $I_k$ .....	20.0 kA
Rated duration of short circuit $t_k$ .....	3 s
Rated peak withstand current $I_p$ .....	50 kA
Rated short-time withstand current $I_{ke}$ .....	20.0 kA
Rated duration of short circuit $t_{ke}$ .....	1 s
Rated peak withstand current $I_{pe}$ .....	50 kA

### Current ratings

Rated normal current of the busbar .....	630 A
Max. permissible normal current of busbar at ambient air temperature .....	715 A

### Dimensions

Panel height .....	1750 mm
Switchgear height .....	1750 mm
Panel depth (standard) .....	1020 mm
Overall switchgear depth (with end wall) .....	1170 mm
Rear wall distance of the panels, for wall-standing arrangement .....	≥ 35 mm
Rear pressure relief duct .....	150 mm
Width of control aisle (depending on national specifications)	
• For SIMOSEC switchgear .....	≥ 1000 mm
• Recommended for extension or panel replacement .....	≥ 1000 mm
Depth of cable basement (according to cable bending radius) .....	≥ 600 mm
Depending on the type of cable sealing end (single-core cable or three-core cable) and possible transformer installation on the cable, the depth of the cable basement must be designed by the customer accordingly. ....	> 1400 mm
Depth of cable basement with deeper floor cover (up to 600 mm) or cable fixing underneath the panel in the cable basement (according to cable bending radius) .....	≥ 1400 mm

### Switchgear enclosure

Partition class .....	PM
Internal arc classification .....	without
Direction of pressure relief .....	to the rear
Degree of protection of the panels (primary part) .....	IP 2X
Degree of protection of the switching-device vessel .....	IP65
Degree of protection of the low-voltage compartment .....	IP 3X

Loss of service continuity

Frei verwendbar Issue: 23.01.2020

Printout: 23.01.2020

Page: 3 / 26

Revision:

**ВЯРНО С Оригинал**



ср. ТП-45

# SIEMENS

Customer: CEZ  
 Project: VS Ferma Dragalevtsi  
 Reference: 20180

Specification for medium-voltage  
 switchgear SIMOSEC  
 SIMOSEC-20417

Loss of service continuity category: LSC

- for panels ..... LSC 2  
 (see also specification of typicals)

## Operating conditions (according to IEC 62271-1)

Site altitude..... ≤ 1000 m  
 Maximum ambient air temperature of the switchgear (24-hour mean value max. 35 °C): ..... 55 °C  
 Lowest ambient air temperature of the switchgear: ..... -5 °C  
 The temperature range for operation of the switchgear depends on the secondary equipment and low-voltage devices used and their operating conditions  
 The rated currents apply to an ambient air temperature of 40° C  
 (24-hour mean value max. 35° C)  
 Minimum ambient air temperature for storage and transport: ..... 70 °C  
 Maximum ambient air temperature for storage and transport: ..... -25 °C

## Insulation: Air

Insulation for switching devices in gas-insulated switching-device vessels: ..... SF<sub>6</sub>  
 Rated filling level (absolute) for insulation p<sub>re</sub> ..... 140 kPa  
 Rated filling level (absolute) for operation p<sub>rm</sub> ..... 140 kPa  
 Minimum filling level (absolute) for insulation p<sub>me</sub> ..... 120 kPa  
 Alarm level for insulation p<sub>ae</sub> ..... 120 kPa  
 Minimum functional level (absolute) for switching p<sub>sw</sub> ..... 120 kPa

## Endurance classes of the switching devices

Corresponding number of operating cycles: See also description of typicals

### Circuit-breaker CB-f AR (IEC 62271-100)

- Mechanical endurance (IEC 62271-100), class ..... M2 (10.000)
- Breaking, electrically (IEC 62271-100), class ..... E2
- Breaking, capacitively (IEC 62271-100), class ..... C2

### Three-position switch-disconnector

Number of operating cycles 1000

- Disconnecting, mechanically (IEC 62271-102), class ..... M0 (1000)
- Load breaking, mechanically (IEC 62271-103), class ..... M1 (1000)
- Load breaking, electrically (IEC 62271-103), class ..... E3
- Breaking, capacitively (IEC 62271-103), class ..... C2
- Earthing, mechanical endurance (IEC 62271-102), class ..... M0 (1000)
- Earthing (IEC 62271-102), class (electrical) ..... E2

### Three-position switch-disconnector for transformer feeder as switch-fuse combination (IEC 62271-105)

Number of operating cycles 1000

- Disconnecting, mechanically (IEC 62271-102), class ..... M0 (1000)
- Load breaking, mechanically (IEC 62271-103), class ..... M1 (1000)
- Load breaking, electrically (IEC 62271-103), class ..... E3
- Breaking, capacitively (IEC 62271-103), class ..... C2
- Earthing, mechanical endurance (IEC 62271-102), class ..... M0 (1000)



Frei verwendbar Issue: 23.01.2020

Printout: 23.01.2020

Page: 4 / 26

Revision:

**ВЯРНО С ОРИГИНАЛА**

СТР. ТД - 46



# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

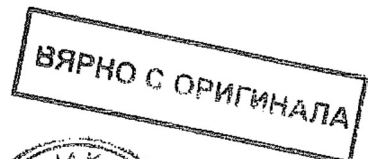
- Earthing (IEC 62271-102), class (electrical) ..... E2
- Earthing: Number of operating cycles with  $I_{ma}$  (IEC 62271-102) ..... 5 x 5 kA

### Three-position disconnecter in circuit-breaker feeder

Number of operating cycles 1000

- Disconnecting, mechanically (IEC 62271-102), class ..... M0 (1000)
- Earthing, mechanical endurance (IEC 62271-102), class ..... M0 (1000)
- Earthing (IEC 62271-102), class (electrical) ..... E2

21



24

стр. 11 - 47

Customer: CEZ  
 Project: VS Ferma Dragalevtsi  
 Reference: 20180

Specification for medium-voltage  
 switchgear SIMOSEC  
 SIMOSEC-20417

## 2. Scope of supply

A complete medium-voltage switchgear assembly SIMOSEC is delivered. The panel arrangement and panel-related equipment features are described in

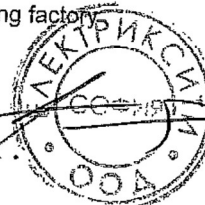
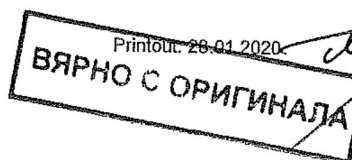
Row	Loc.	Typ. no.	Typ. ID	Typical name - Panel designation 1 - Panel designation 2
A	+J01	=JZ02	T	Transformer panel
A	+J02	=JZ02	T	Transformer panel
A	+J03	=JZ06	L	Circuit-breaker panel
A	+J04	=JZ07	L	Circuit-breaker panel
A	+J05	=JZ08	K	Cable panel
A	+J06	=JZ03	L(T)	Circuit-breaker panel as transfer panel
A	+J07	=JZ04	R(T)	Ring-main panel as transfer panel
A	+J08	=JZ06	L	Circuit-breaker panel
A	+J09	=JZ07	L	Circuit-breaker panel
A	+J10	=JZ07	L	Circuit-breaker panel
A	+J11	=JZ07	L	Circuit-breaker panel
A	+J12	=JZ08	K	Cable panel
A	+J13	=JZ03	L(T)	Circuit-breaker panel as transfer panel
A	+J14	=JZ04	R(T)	Ring-main panel as transfer panel
A	+J15	=JZ08	K	Cable panel
A	+J16	=JZ07	L	Circuit-breaker panel
A	+J17	=JZ06	L	Circuit-breaker panel
A	+J18	=JZ07	L	Circuit-breaker panel
A	+J19	=JZ02	T	Transformer panel

List of SIMOSEC switchgear panels

Product range: Detailed overview described in the annex to this specification.

The delivery comprises the following additional features and supplies:

- Design for free-standing arrangement
- Painting of panel front in color
- Type plate in Bulgarian
- Actuating openings of the three-position switches  
Standard (for 1 universal operating lever)
- Doors of low-voltage compartments with cutouts according to the devices in the component list of the secondary part, or according to customer specifications
- Doors of low-voltage compartments without device cutouts
- Delivery of low-voltage compartments mounted on the panels
- Assembly of panel interconnections per transport unit at the delivering factory
- Mounted busbars per transport unit (TU): with



# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

- Busbars or connecting bars as loose delivery, for interconnection of the individual transport units (TU)
- Factory acceptance test in the delivering factory: without
- Packing as: Universal packing: For truck, container, seafreight, airfreight ("IPPC", treated wooden base and sealed PE protective foil, with desiccant agent)

Furthermore, the switchgear is equipped with the following customer-specific designs (Kuko):

*Handwritten mark*

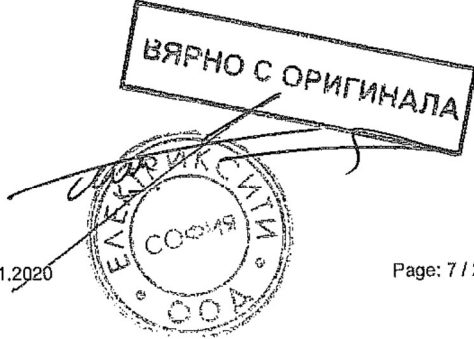
*Handwritten signature*

Frei verwendbar Issue: 23.01.2020

Revision:

Printout: 23.01.2020

Page: 7 / 26



*Handwritten mark*

*Handwritten text: ст. 77-49*

# SIEMENS

Customer: CEZ  
 Project: VS Ferma Dragalevtsi  
 Reference: 20180

Specification for medium-voltage  
 switchgear SIMOSEC  
 SIMOSEC-20417

Item No.	Quantity	Description	Typical no.
----------	----------	-------------	-------------

2.1	3	<b>Transformer panel</b> Short designation: T Panel width: 375 mm Panel depth: 1035 mm Rated feeder current: 200 A Loss of service continuity category LSC: LSC 2 equipped with the following components:	=JZ02
-----	---	--	-------

2.1.1		<b>Three-position switch-disconnector/fuse combination</b> Switching device for disconnecting and earthing the feeder (disconnecting function with load breaking capacity, and earthing function) Rated normal current 200 A Rated transfer current I4: 1400 A for the following maximum transformer rating SN: 2500 kVA Mode of operation for the switch-disconnector: with manual operating mechanism for disconnecting function (CLOSE-OPEN) Mode of operation for the earthing switch: with manual operating mechanism Design of operating mechanism: Spring-operated/stored-energy mechanism Functions (for manual or motor operation): Stored-energy CLOSE-OPEN CLOSE / OPEN operation: mechanical, operation by pushbuttons With locking device: for padlock With auxiliary switch Design of auxiliary switch Disconnecting CLOSED-OPEN: 1 NC + 1 NO + 2 CH, earthing CLOSED-OPEN: 1 NC + 1 NO + 2 CH Number of operating cycles (DISCONNECTING - EARTHING): 1.000 - 1.000 Number of breaking operations at mainly active load-breaking current (rated normal current): 100 with shunt release Rated supply voltage of opening release: AC 230 V	
-------	--	---	--

### HV HRC fuse assembly

Rated voltage: 24.0 kV  
 Fuse assembly, reference dimension e in mm: 442 mm  
 with three-pole tripping for HV HRC fuse

2.1.2		<b>with 2nd earthing switch at HV HRC fuse assembly</b> For earthing both ends of the HV HRC fuse; actuation by operating the make-proof earthing switch of the three-position switch. Technical data: Rated short-time withstand current: $I_k = 2 \text{ kA} / 1\text{s}$ Rated short-circuit making current: $I_{ma} = 5.0 \text{ kA}$	
-------	--	---	--

2.1.3		<b>Panel connection</b> Possibility of connection for conventional air-insulated cable sealing end	
-------	--	---	--

Frei verwendbar Issue: 23.01.2020

Printout: 23.01.2020

Page: 8 / 26

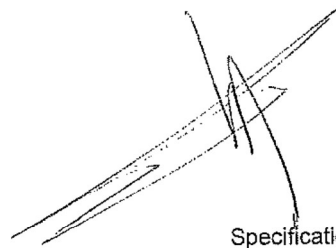
Revision:

**ВЯРНО С ОРИГИНАЛА**

СТП-ТН-50

# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180



Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

Connection to:  
lower HV HRC fuse assembly  
provided for: 1 cable  
Cable routing: downwards  
Cable compartment cover: standard  
with inspection window in the cover  
Position of cable fixing (cable bracket):  
underneath the panel, in the cable basement  
Due to additional devices (e.g. instrument transformers) or the cable  
design, the cable fixing is arranged underneath the panel in the cable  
basement (installation by the site).  
A sufficient cable basement to be provided by the site must be considered  
underneath the switchgear (depending, among others, on the bending  
radius of the cables).  
Recommendation: >1400 mm  
The "set for cable bracket underneath the panel" is delivered as loose  
delivery, and must be mounted on site.  
Cable connection height in panel (H0 in mm) 384 mm  
Available installation dimension for cable sealing end (incl. cable lug) 809  
mm  
The length of the cable sealing end depends on:  
Make/supplier, type of sealing end, cross-section, design of cable lug and  
cable (1-core cable, 3-core cable)  
Max. possible width of cable lug at the sealing end: 32 mm

2.1.4

#### Capacitive voltage detecting system at the feeder

Design:  
Capacitive voltage detecting system HR with HR module including  
installation and wiring  
Mounting location:  
in the operation front

2.1.5

#### Low-voltage niche

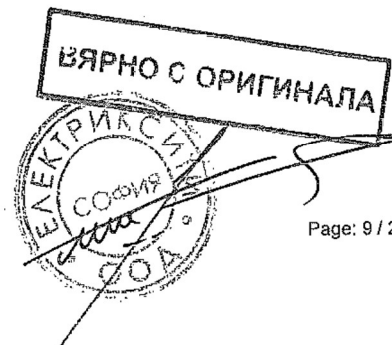
The panel is equipped with an integrated low-voltage niche.  
Depending on the as-delivered version of the panel, the corresponding  
terminals (e.g. for motor operating mechanisms, current and voltage  
transformers, auxiliary switches, heating,...), cap. voltage detecting system  
or short-circuit indicator are arranged in this niche.  
Additionally, the niche can also be used for installation of further customer-  
specific low-voltage devices if this is possible with the space available in  
the niche (depending on the configured panel components such as current  
and voltage transformers, SC indicators, etc.).  
with cover, screwed on (delivered by factory)

Frei verwendbar Issue: 23.01.2020

Printout: 23.01.2020

Page: 9 / 26

Revision:



сфр. ТП-51

# SIEMENS

Customer: CEZ  
 Project: VS Ferma Dragalevtsi  
 Reference: 20180

Specification for medium-voltage  
 switchgear SIMOSEC  
 SIMOSEC-20417

Item No.	Quantity	Description	Typical no.
----------	----------	-------------	-------------

2.2	2	<b>Circuit-breaker panel as transfer panel</b> Short designation: L(T) Panel width: 500 mm Panel depth: 1080 mm Rated feeder current: 630 A Loss of service continuity category LSC: LSC 2 equipped with the following components:	=JZ03
-----	---	---	-------

2.2.1		<b>Switching-device vessel, with the following switching devices and equipment:</b> Rated normal current: 630 A	
-------	--	--	--

**Three-position disconnecter**

Switching device for disconnecting and earthing the feeder (make-proof earthing function)

Mode of operation for the disconnecter:  
 with manual operating mechanism for disconnecting function (CLOSE-OPEN)

Mode of operation for the make-proof earthing switch:  
 with manual operating mechanism

Design of operating mechanism: Spring-operated mechanism

Functions (for manual or motor operation):

Spring-operated CLOSE-OPEN

With locking device: for padlock

With auxiliary switch

Design of auxiliary switch

Disconnecting CLOSED-OPEN: 1 NC + 1 NO + 2 CH, earthing CLOSED-OPEN: 1 NC + 1 NO + 2 CH

Number of operating cycles (DISCONNECTING - EARTHING): 1.000 - 1.000

With closing lockout (the closing lockout prevents the three-position switch from being switched to CLOSED position when the cable compartment cover is open. De-earthing is possible)

**Vacuum circuit-breaker**

Switching device with short-circuit breaking capacity for switching the feeder, fixed-mounted in the vessel

Type of circuit-breaker: CB-f AR

Rated voltage: 24.0 kV

Rated normal current: 630 A

Rated short-circuit breaking current I<sub>sc</sub>: 25.0 kA

Number of operating cycles for rated short-circuit breaking current I<sub>sc</sub>: 30

Rated operating sequence: O-0.3 s-CO-3 min-CO

Number of mechanical and electrical operating cycles: 10000

With operations counter

Type of circuit-breaker operating mechanism: Motor operating stored-energy mechanism

with mechanical "spring charged" indicator

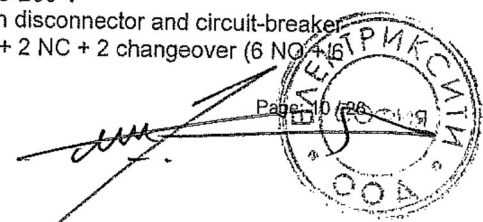
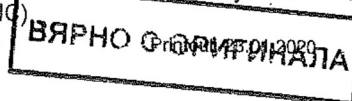
Rated supply voltage for 1st release: AC 230 V

With interlocking between three-position disconnecter and circuit-breaker

Free contacts of auxiliary switch: 2 NO + 2 NC + 2 changeover (6 NO + 2 NC)

Frei verwendbar Issue: 23.01.2020

Revision:



07. 11-52



# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtzi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

Closing and opening the circuit-breaker: mechanically  
With routine test certificate  
With tripping signal  
prepared for installation of three-phase current transformer at the feeder  
(on the bushing)

2.2.2

### Panel connection

cable terminal bar, located at the bushing-type insulator of the switching-  
device vessel  
with bar interconnection to the adjacent panel (as busbar interconnection)  
Panel cover at the front: standard

2.2.3

### Capacitive voltage detecting system at the feeder

Design:  
HR system (high-resistance modified), for plug-in indicator for the selected  
operating voltage  
Mounting location:  
in the low-voltage niche

2.2.4

### Low-voltage niche

The panel is equipped with an integrated low-voltage niche.  
Depending on the as-delivered version of the panel, the corresponding  
terminals (e.g. for motor operating mechanisms, current and voltage  
transformers, auxiliary switches, heating,...), cap. voltage detecting system  
or short-circuit indicator are arranged in this niche.  
Additionally, the niche can also be used for installation of further customer-  
specific low-voltage devices if this is possible with the space available in  
the niche (depending on the configured panel components such as current  
and voltage transformers, SC indicators, etc.).  
with cover, screwed on (delivered by factory)

2.2.5

### Low-voltage compartment

Low voltage compartment H=350 mm  
Degree of protection for LV compartment: IP 3X

ВЯРНО С ОРИГИНАЛА



стр. ТП-53

# SIEMENS

Customer: CEZ  
 Project: VS Ferma Dragalevtsi  
 Reference: 20180

Specification for medium-voltage  
 switchgear SIMOSEC  
 SIMOSEC-20417

Item No.	Quantity	Description	Typical no.
----------	----------	-------------	-------------

- |       |   |   |       |
|-------|---|---|-------|
| 2.3   | 2 | <p><b>Ring-main panel as transfer panel</b><br/>                     Short designation: R(T)<br/>                     Panel width: 375 mm<br/>                     Panel depth: 1035 mm<br/>                     Rated feeder current: 630 A<br/>                     Loss of service continuity category LSC:<br/>                     LSC 2<br/>                     equipped with the following components:</p>  | =JZ04 |
| 2.3.1 |   | <p><b>Three-position switch-disconnector</b><br/>                     Switching device for disconnecting and earthing the feeder (disconnecting function with load breaking capacity, make-proof earthing function)<br/>                     Rated normal current: 630 A<br/>                     Mode of operation for the switch-disconnector:<br/>                     with manual operating mechanism for disconnecting function (CLOSE-OPEN)<br/>                     Mode of operation for the make-proof earthing switch:<br/>                     with manual operating mechanism<br/>                     Design of operating mechanism: Spring-operated mechanism<br/>                     Functions (for manual or motor operation):<br/>                     Spring-operated CLOSE-OPEN<br/>                     With locking device: for padlock<br/>                     With auxiliary switch<br/>                     Design of auxiliary switch:<br/>                     Disconnecting CLOSED-OPEN: 1 NC + 1 NO + 2 CH, earthing CLOSED-OPEN: 1 NC + 1 NO + 2 CH<br/>                     Number of operating cycles (DISCONNECTING - EARTHING): 1.000 - 1.000<br/>                     Number of breaking operations at mainly active load-breaking current (rated normal current) : 100<br/>                     With closing lockout (the closing lockout prevents the three-position switch from being switched to CLOSED position when the cable compartment cover is open. De-earthing is possible)</p> |       |
| 2.3.2 |   | <p><b>Panel connection</b><br/>                     cable terminal bar in the connection compartment<br/>                     with bar interconnection to the adjacent panel (as busbar interconnection)<br/>                     Panel cover at the front: standard</p>  |       |
| 2.3.3 |   | <p><b>Capacitive voltage detecting system at the feeder</b><br/>                     Design:<br/>                     HR system (high-resistance modified), for plug-in indicator for the selected operating voltage<br/>                     Mounting location:<br/>                     in the low-voltage niche</p>  |       |
| 2.3.4 |   | <p><b>Current transformers at the feeder</b><br/>                     Current transformer type: 4MA74<br/>                     Designed as an indoor block-type current transformer, single-pole inductive type, secondary connection via screw-type terminals</p>  |       |

Frei verwendbar Issue: 23.01.2020  
 Revision:

Printout: 23.01.2020

Page: 12 / 28

**ВЯРНО С ОРИГИНАЛА**



СТА Т17 - 54

# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

Current transformer arrangement (installation): in the panel  
Inside diameter: --  
Number and assignment of current transformer cores:  
3 x 2 cores in L1/L2/L3  
Number of post insulators: Without  
Primary current, core 1: 600 A  
Primary current, core 2: 600 A  
Secondary current, core 1: 5 A  
Secondary current, core 2: 5 A  
Rated short-duration power-frequency withstand voltage: 50 kV  
Rated lightning impulse withstand voltage: 125 kV  
Rated short-time thermal current I<sub>th</sub>: 20.0 kA / 3 s  
Rating, class and overcurrent factor  
of core 1: 5 VA / Cl. 0.5 --  
Rating, class and overcurrent factor  
of core 2: 5 VA / Cl. 10 P / 20  
Rated continuous thermal current: With primary rated current x 1.0 x rated  
current  
With routine test certificate  
Wiring: with

2.3.5

#### Low-voltage niche

The panel is equipped with an integrated low-voltage niche.  
Depending on the as-delivered version of the panel, the corresponding  
terminals (e.g. for motor operating mechanisms, current and voltage  
transformers, auxiliary switches, heating,...), cap. voltage detecting system  
or short-circuit indicator are arranged in this niche.  
Additionally, the niche can also be used for installation of further customer-  
specific low-voltage devices if this is possible with the space available in  
the niche (depending on the configured panel components such as current  
and voltage transformers, SC indicators, etc.).  
with cover, screwed on (delivered by factory)

Frei verwendbar Issue: 23.01.2020

Printout: 23.01.2020

Page: 13 / 26

Revision:

ВЯРНО С ОРИГИНАЛА



ст. 70-55

# SIEMENS

Customer: CEZ  
 Project: VS Ferma Dragalevtsi  
 Reference: 20180

Specification for medium-voltage  
 switchgear SIMOSEC  
 SIMOSEC-20417

Item No.	Quantity	Description	Typical no.
----------	----------	-------------	-------------

2.4	3	<b>Circuit-breaker feeder L (500 mm) - 600A ВЪВОД</b> Short designation: L Panel width: 500 mm Panel depth: 1080 mm Rated feeder current: 630 A Loss of service continuity category LSC: LSC 2 equipped with the following components:	=JZ06
-----	---	---	-------

2.4.1 **Switching-device vessel, with the following switching devices and equipment:**  
 Rated normal current: 630 A

**Three-position disconnecter**

Switching device for disconnecting and earthing the feeder (make-proof earthing function)

Mode of operation for the disconnecter:

with manual operating mechanism for disconnecting function (CLOSE-OPEN)

Mode of operation for the make-proof earthing switch:

with manual operating mechanism

Design of operating mechanism: Spring-operated mechanism

Functions (for manual or motor operation):

Spring-operated CLOSE-OPEN

With locking device: for padlock

With auxiliary switch

Design of auxiliary switch

Disconnecting CLOSED-OPEN: 1 NC + 1 NO + 2 CH, earthing CLOSED-

OPEN: 1 NC + 1 NO + 2 CH

Number of operating cycles (DISCONNECTING - EARTHING): 1.000 - 1.000

With closing lockout (the closing lockout prevents the three-position switch from being switched to CLOSED position when the cable compartment cover is open. De-earthing is possible)

**Vacuum circuit-breaker**

Switching device with short-circuit breaking capacity for switching the feeder, fixed-mounted in the vessel

Type of circuit-breaker: CB-f AR

Rated voltage: 24.0 kV

Rated normal current: 630 A

Rated short-circuit breaking current I<sub>sc</sub>: 25.0 kA

Number of operating cycles for rated short-circuit breaking current I<sub>sc</sub>: 50

Rated operating sequence: O-0.3 s-CO-3 min-CO

Number of mechanical and electrical operating cycles: 10000

With operations counter

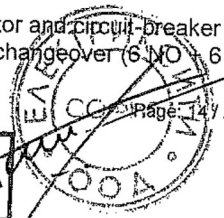
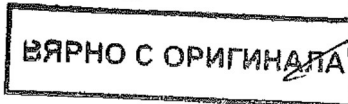
Type of circuit-breaker operating mechanism: Motor operating stored-energy mechanism

with mechanical "spring charged" indicator

Rated supply voltage for 1st release: AC 230 V

With interlocking between three-position disconnecter and circuit-breaker

Free contacts of auxiliary switch: 2 NO + 2 NC + 2 changeover (6 NO 6 NC)



Стр. 17-56

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

Closing and opening the circuit-breaker: mechanically  
With routine test certificate  
With tripping signal

## 2.4.2

### Panel connection

Possibility of connection for conventional air-insulated cable sealing end

Connection to:

cable terminal bar in the connection compartment

provided for: 1 cable

Cable routing: downwards

Cable compartment cover: standard

Position of cable fixing (cable bracket):

in cable compartment

Cable connection height in panel (H0 in mm) 559 mm

Available installation dimension for cable sealing end (incl. cable lug) 459 mm

The length of the cable sealing end depends on:

Make/supplier, type of sealing end, cross-section, design of cable lug and cable (1-core cable, 3-core cable)

## 2.4.3

### Capacitive voltage detecting system at the feeder

Design:

LRM system (low-resistance modified) with integrated indicator, with integrated signaling relay, type VOIS R+ for the selected operating voltage

Mounting location:

in the control board

## 2.4.4

### Cable-type current transformers on the cable

Current transformer type: 4MC7033

Designed as a ring-core current transformer, single-pole, inductive type, climate-independent, secondary connection via terminal strip.

Arranged outside the primary enclosure (switching-device vessel)

Current transformer installation: partly underneath the panel, in the cable basement

Note:

According to the as-delivered version of the panel (e.g. with current and voltage transformers, number of cable terminals, surge arresters, floor cover - if required) and depending on the design of the cable sealing end (single-core or three-core cable), the cable-type current transformers may be located in the cable basement

Inside diameter: 55 mm

Number and assignment of current transformer cores:

3 x 2 cores in L1/L2/L3

Primary current, core 1: 600 A

Primary current, core 2: 600 A

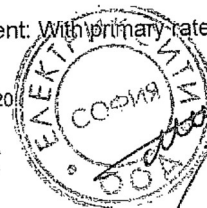
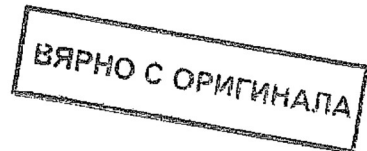
Secondary current, core 1: 5 A

Secondary current, core 2: 5 A

Rating, class and overcurrent factor of core 1: 5 VA / Cl. 0.5 / --

Rating, class and overcurrent factor of core 2: 5 VA / Cl. 10 P / 20

Rated continuous thermal current: With primary rated current x 1.0 x rated current



Стр. 11-57

# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

With routine test certificate  
Wiring: with

2.4.5

### Surge arresters / Surge limiters

The cable compartment is prepared for installation of a surge arrester. Depending on the arrester used, retrofitting may be required. The cable compartment is prepared for installation of the surge arrester. Note: before implementing of switchgear it must be provided by the customer the corresponding "Neutral point connection". For selecting the surge arresters/limiters, the type of power system must be observed.

The selected surge arrester is provided for following "Neutral point connection":  
unknown

Installation: Due to the combination of cable connection and surge arrester, installation of the surge arrester must be performed "on site" by the customer; this means, installation of cable sealing end and surge arrester is performed phase by phase.

Installation prepared, for type 3EK (installation at site)

2.4.6

### Low-voltage niche

The panel is equipped with an integrated low-voltage niche. Depending on the as-delivered version of the panel, the corresponding terminals (e.g. for motor operating mechanisms, current and voltage transformers, auxiliary switches, heating,...), cap. voltage detecting system or short-circuit indicator are arranged in this niche.

Additionally, the niche can also be used for installation of further customer-specific low-voltage devices if this is possible with the space available in the niche (depending on the configured panel components such as current and voltage transformers, SC indicators, etc.),  
with cover, screwed on (delivered by factory)

2.4.7

### Low-voltage compartment

Low voltage compartment H=350 mm

Degree of protection for LV compartment: IP 3X

2.4.8

1

### Customer-specific designs

Position 1:

Note:

1.ES = Y10;

Please mark the function you need, with the order.

L:

additional cost for interlocking device Y10;

-change the interlocking device;

-add the solenoid;

ВЯРНО С ОРИГИНАЛА





# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

Item No.	Quantity	Description	Typical no.
----------	----------	-------------	-------------

2.5	6	<b>Circuit-breaker feeder L (500 mm) - 400A Извод</b>	<b>=JZ07</b>
-----	---	---	--------------

Short designation: L  
Panel width: 500 mm  
Panel depth: 1080 mm  
Rated feeder current: 630 A  
Loss of service continuity category LSC:  
LSC 2  
equipped with the following components:

2.5.1

**Switching-device vessel, with the following switching devices and equipment:**  
Rated normal current: 630 A

**Three-position disconnecter**

Switching device for disconnecting and earthing the feeder (make-proof earthing function)

Mode of operation for the disconnecter:

with manual operating mechanism for disconnecting function (CLOSE-OPEN)

Mode of operation for the make-proof earthing switch:

with manual operating mechanism

Design of operating mechanism: Spring-operated mechanism

Functions (for manual or motor operation):

Spring-operated CLOSE-OPEN

With locking device: for padlock

With auxiliary switch

Design of auxiliary switch

Disconnecting CLOSED-OPEN: 1 NC + 1 NO + 2 CH, earthing CLOSED-

OPEN: 1 NC + 1 NO + 2 CH

Number of operating cycles (DISCONNECTING - EARTHING): 1.000 - 1.000

With closing lockout (the closing lockout prevents the three-position switch from being switched to CLOSED position when the cable compartment cover is open. De-earthing is possible)

**Vacuum circuit-breaker**

Switching device with short-circuit breaking capacity for switching the feeder, fixed-mounted in the vessel

Type of circuit-breaker: CB-f AR

Rated voltage: 24.0 kV

Rated normal current: 630 A

Rated short-circuit breaking current I<sub>sc</sub>: 25.0 kA

Number of operating cycles for rated short-circuit breaking current I<sub>sc</sub>: 50

Rated operating sequence: O-0.3 s-CO-3 min-CO

Number of mechanical and electrical operating cycles: 10000

With operations counter

Type of circuit-breaker operating mechanism: Motor operating stored-energy mechanism

with mechanical "spring charged" indicator

Rated supply voltage for 1st release: AC 230 V

With interlocking between three-position disconnecter and circuit-breaker

Free contacts of auxiliary switch: 2 NO + 2 NC + 2 changeover (6 NO + 6 NC)

Frei verwendbar Issue: 23.01.2020

Printout: 23.01.2020

Page: 17 / 26

Revision:

ВАРНО С ОРИГИНАЛА

стр. 17 - 59

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage switchgear SIMOSEC  
SIMOSEC-20417

Closing and opening the circuit-breaker: mechanically  
With routine test certificate  
With tripping signal

## 2.5.2

### Panel connection

Possibility of connection for conventional air-insulated cable sealing end  
Connection to:  
cable terminal bar in the connection compartment  
provided for: 1 cable  
Cable routing: downwards  
Cable compartment cover: standard  
Position of cable fixing (cable bracket):  
in cable compartment  
Cable connection height in panel (H0 in mm) 559 mm  
Available installation dimension for cable sealing end (incl. cable lug) 459 mm  
The length of the cable sealing end depends on:  
Make/supplier, type of sealing end, cross-section, design of cable lug and cable (1-core cable, 3-core cable)

## 2.5.3

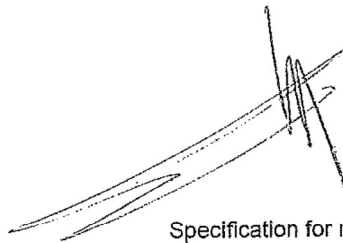
### Capacitive voltage detecting system at the feeder

Design:  
LRM system (low-resistance modified) with integrated indicator, with integrated signaling relay, type VOIS R+ for the selected operating voltage  
Mounting location:  
in the control board

## 2.5.4

### Cable-type current transformers on the cable

Current transformer type: 4MC7033  
Designed as a ring-core current transformer, single-pole, inductive type, climate-independent, secondary connection via terminal strip.  
Arranged outside the primary enclosure (switching-device vessel)  
Current transformer installation: partly underneath the panel, in the cable basement  
Note:  
According to the as-delivered version of the panel (e.g. with current and voltage transformers, number of cable terminals, surge arresters, floor cover - if required) and depending on the design of the cable sealing end (single-core or three-core cable), the cable-type current transformers may be located in the cable basement  
Inside diameter: 55 mm  
Number and assignment of current transformer cores:  
3 x 2 cores in L1/L2/L3  
Primary current, core 1: 400 A  
Primary current, core 2: 400 A  
Secondary current, core 1: 5 A  
Secondary current, core 2: 5 A  
Rating, class and overcurrent factor of core 1: 5 VA / Cl. 0.5 / ---  
Rating, class and overcurrent factor of core 2: 5 VA / Cl. 10 P / 20  
Rated continuous thermal current: With primary rated current x 1.0 x rated current



Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

With routine test certificate  
Wiring: with

## 2.5.5

### Surge arresters / Surge limiters

The cable compartment is prepared for installation of a surge arrester. Depending on the arrester used, retrofitting may be required. The cable compartment is prepared for installation of the surge arrester. Note: befor implementing of switchgear it must be provided by the customer the corresponding "Neutral point connection". For selecting the surge arresters/limiters, the type of power system must be observed.

The selected surge arrester is provided for following "Neutral point connection":  
unknown

Installation: Due to the combination of cable connection and surge arrester, installation of the surge arrester must be performed "on site" by the customer; this means, installation of cable sealing end and surge arrester is performed phase by phase.  
Installation prepared, for type 3EK (installation at site)

## 2.5.6

### Low-voltage niche

The panel is equipped with an integrated low-voltage niche. Depending on the as-delivered version of the panel, the corresponding terminals (e.g. for motor operating mechanisms, current and voltage transformers, auxiliary switches, heating,...), cap. voltage detecting system or short-circuit indicator are arranged in this niche. Additionally, the niche can also be used for installation of further customer-specific low-voltage devices if this is possible with the space available in the niche (depending on the configured panel components such as current and voltage transformers, SC indicators, etc.).  
with cover, screwed on (delivered by factory)



## 2.5.7

### Low-voltage compartment

Low voltage compartment H=350 mm  
Degree of protection for LV compartment: IP 3X

## 2.5.8

1

### Customer-specific designs Customer-specific designs

Position 1:  
Note:  
1.ES = Y10;

Please mark the function you need, with the order.

L:  
additional cost for interlocking device Y10;  
-change the interlocking device;  
-add the solenoid;



# SIEMENS

Customer: CEZ  
 Project: VS Ferma Dragalevtsi  
 Reference: 20180

Specification for medium-voltage  
 switchgear SIMOSEC  
 SIMOSEC-20417

Item No.	Quantity	Description	Typical no.
----------	----------	-------------	-------------

2.6	3	<p><b>Metering panel</b>            Short designation: K            Panel width: 375 mm            Panel depth: 1035 mm            Rated feeder current: 630 A            Loss of service continuity category LSC:            LSC 1            equipped with the following components:</p>	=JZ08
5.6.1		<p><b>Voltage transformers at the feeder</b>            Voltage transformer type: 4MR14            Designed as an indoor voltage transformer, primary connection with bolted contact, inductive type, secondary connection via screw-type terminals.            Mounting location: in the connection compartment, for direct connection to the bushing of the switching-device vessel            Design: 3 x single-pole with earth-fault winding and damping resistor            Cast-resin insulated            Rated voltage: 24.0 kV            Operating voltage: 20.0 kV            Rated short-duration power-frequency withstand voltage: 50 kV            Rated lightning impulse withstand voltage: 125 kV            Voltage of secondary winding: 100 / <math>\sqrt{3}</math> V            Rating and class of secondary winding: 50 VA / Cl. 0.5            Voltage of earth-fault winding: 100 / 3 V            Rating and class of earth-fault winding: 50 VA / 6P</p>	
2.6.2		<p><b>Panel connection</b>            Possibility of connection for conventional air-insulated cable sealing end            Connection to:            cable terminal bar in the connection compartment            provided for: 1 cable            Cable routing: downwards            Cable compartment cover: standard            Position of cable fixing (cable bracket):            in cable compartment            Cable connection height in panel (H0 in mm) 941 mm            Available installation dimension for cable sealing end (incl. cable lug) 841 mm            The length of the cable sealing end depends on:            Make/supplier, type of sealing end, cross-section, design of cable lug and cable (1-core cable, 3-core cable)</p>	
2.6.3		<p><b>Capacitive voltage detecting system at the feeder</b>            Design:            Capacitive voltage detecting system HR with HR module including installation and wiring            Mounting location:            in the operation front</p>	
2.6.4		<p><b>Low-voltage niche</b>            The panel is equipped with an integrated low-voltage niche</p>	

Frei verwendbar Issue: 23.01.2020

Printout: 23.01.2020

Revision:

ВЯРНО С ОРИГИНАЛА



стр. 20-62

# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

Depending on the as-delivered version of the panel, the corresponding terminals (e.g. for motor operating mechanisms, current and voltage transformers, auxiliary switches, heating,...), cap. voltage detecting system or short-circuit indicator are arranged in this niche. Additionally, the niche can also be used for installation of further customer-specific low-voltage devices if this is possible with the space available in the niche (depending on the configured panel components such as current and voltage transformers, SC indicators, etc.).  
with cover, screwed on (delivered by factory)

*Handwritten mark*

ВЯРНО С ОРИГИНАЛА



*Handwritten mark*

стр. 11-63

# SIEMENS

Customer: CEZ  
 Project: VS Ferma Dragalevtsi  
 Reference: 20180

Specification for medium-voltage  
 switchgear SIMOSEC

SIMOSEC-20417

## SIMOSEC busbars

Set	Description	Installation	Typ. ID
<b>Busbar set(s) (consisting of 3 units), according to switchgear design</b> The busbar is designed as standard for: Ur = 17.5 kV (42 kV, BIL=95 kV). With additional insulating covers (per panel) the busbar can be used up to: Ur = 24 kV (BIL=125 kV)			
2	Busbar 630 A, l = 375 mm	separately as loose delivery *)	K, K
5	Busbar 630 A, l = 375 mm	mounted	T, T, K, R(T), R(T)
2	Busbar 630 A, l = 500 mm	separately as loose delivery *)	L, L
7	Busbar 630 A, l = 500 mm	mounted	L, L, L, L, L, L, L
*) (in case of "individual panel transport" or "panel joint of a transport unit" or "panels not bolted together, delivered on transport unit")			
<b>Busbar assembly sets (for mounting the busbars in the panel):</b> One busbar assembly set is required per panel - depending on the busbar current (630 A or 1250 A) and the panel type (such as end panel or intermediate panel). It is used up to the rated voltage Ur = 24 kV.			
17	Busbar assembly set 630 A, for intermediate panel	-----	T, L, L, K, L(T), R(T), L, L, L, K, L(T), R(T), K, L, L, L
2	Busbar assembly set 630 A, for end panel (on the left or on the right), for transfer panel, type _ (T), for bus riser panel, type H, for metering panels, type M...	-----	T, T
<b>Insulating covers for Ur = 24 kV (BIL=125 kV), per panel:</b>			
2	Busbar assembly set 1250 A, for end panel (on the left or on the right), for transfer panel, type _ (T), for bus riser panel, type H, for metering panels, type M...	-----	T, T
17	Insulating covers (Ur = 24 kV), for intermediate panel	-----	T, L, L, K, L(T), R(T), L, L, L, K, L(T), R(T), K, L, L, L
<b>set(s) of interconnecting bars (consisting of 3 units), according to switchgear design:</b>			
1	Interconnecting bar 630 A For panel combination: L(T) - L(T)	-----	mounted
1	Interconnecting bar 630 A For panel combination: L(T) - L(T)	-----	mounted



стр. 11 - 64

# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

### Accessories

Item No.	Quantity	Description	Typical No. =JZ00
----------	----------	-------------	-------------------

**End walls, separately:**

2 End wall, 1750 mm high

For pressure relief:  
to the rear (without duct), upwards (via pressure relief duct)

2 Universal operating lever with black handle  
for three-position switch with rotary operating mechanism  
for DISCONNECTING function, for EARTHING function,  
and for charging the operating mechanism of  
circuit-breaker type "CB-f NAR"

1 Operating instructions SIMOSEC, Bulgarian

1 Construction Cost for KuKo No.000485

2 Hand-crank for circuit-breaker 3AH, 3AE

**ВЯРНО С ОРИГИНАЛА**



сф. ТП-05



# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

Specification for medium-voltage  
switchgear SIMOSEC

SIMOSEC-20417

## 3. Documentation

3.1 Single-line diagram  
3.2 Panel arrangement diagram  
3.3 Constructional data

Annex 1  
Annex 2  
Annex 3



Съп. ТА-66

# SIEMENS

## Specification for medium-voltage switchgear SIMOSEC

Customer: CEZ  
 Project: VS Ferma Dragalevtsi  
 Reference: 20180

SIMOSEC-20417

Row	Loc.	Typ. no.	Typ. ID	Typical name - Panel designation 1 - Panel designation 2	Panel type	Wall dist.	End wall	TU no.	LV compartment	Door hinge comp.	Door hinge LV niche	Basic typ.
A	+J01	=JZ02	T	Transformer panel	End panel left	100 mm	1750 mm	T*1	without	without	without	-
A	+J02	=JZ02	T	Transformer panel	Intermediate panel			T*1	without	without	without	-
A	+J03	=JZ06	L	Circuit-breaker panel	Intermediate panel			T*1	with	left (standard)	without	-
A	+J04	=JZ07	L	Circuit-breaker panel	Intermediate panel			T*1	with	left (standard)	without	-
A	+J05	=JZ08	K	Cable panel	Intermediate panel			T*2	without	without	without	-
A	+J06	=JZ03	L(T)	Circuit-breaker panel as transfer panel	Intermediate panel			T*2	with	left (standard)	without	-
A	+J07	=JZ04	R(T)	Ring-main panel as transfer panel	Intermediate panel			T*2	without	without	without	-
A	+J08	=JZ06	L	Circuit-breaker panel	Intermediate panel			T*2	with	left (standard)	without	-
A	+J09	=JZ07	L	Circuit-breaker panel	Intermediate panel			T*3	with	left (standard)	without	-
A	+J10	=JZ07	L	Circuit-breaker panel	Intermediate panel			T*3	with	left (standard)	without	-
A	+J11	=JZ07	L	Circuit-breaker panel	Intermediate panel			T*3	with	left (standard)	without	-
A	+J12	=JZ08	K	Cable panel	Intermediate panel			T*3	without	without	without	-
A	+J13	=JZ03	L(T)	Circuit-breaker panel as transfer panel	Intermediate panel			T*4	with	left (standard)	without	-

ВЪРНО С ОРИГИНАЛА

стр. 10 - 67



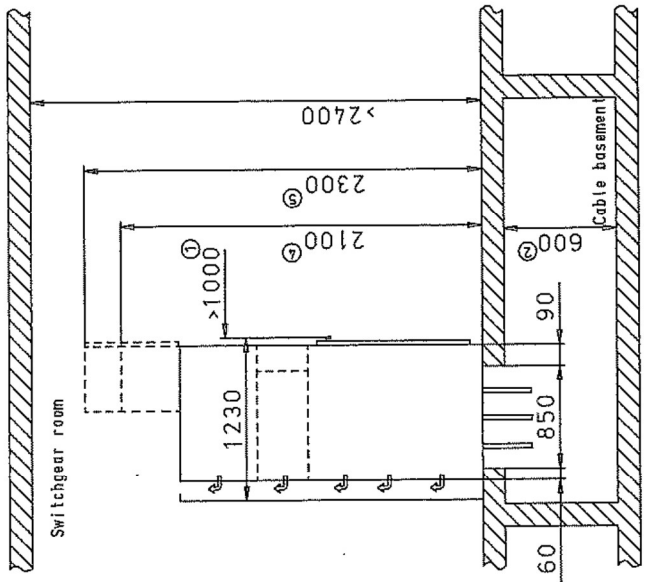
# SIEMENS

Customer: CEZ  
Project: VS Ferma Dragalevtsi  
Reference: 20180

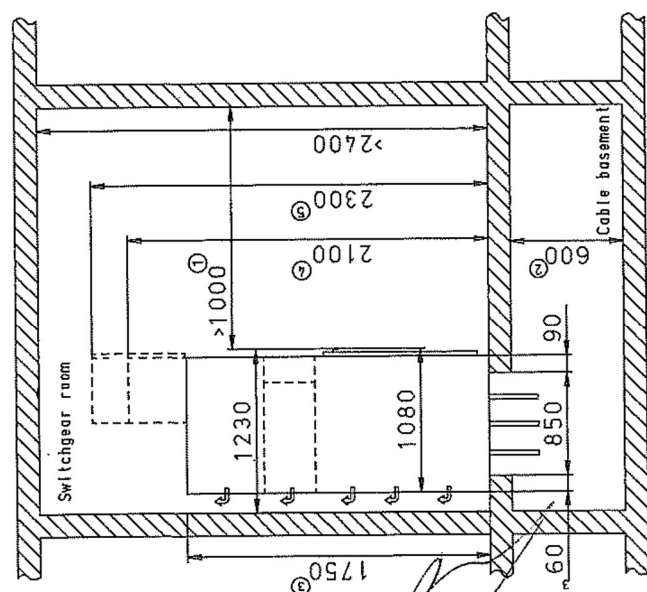
Specification for medium-voltage switchgear SIMOSEC  
SIMOSEC-20417

Row	Loc.	Typ. no.	Typ. ID	Typical name - Panel designation 1 - Panel designation 2	Panel type	Wall dist.	End wall	TU no.	LV compartment	Door hinge comp.	Door hinge LV niche	Basic typ.
A	+J14	=JZ04	R(T)	Ring-main panel as transfer panel	Intermediate panel			T*4	without	without	without	-
A	+J15	=JZ08	K	Cable panel	Intermediate panel			T*4	without	without	without	-
A	+J16	=JZ07	L	Circuit-breaker panel	Intermediate panel			T*5	with	left (standard)	without	-
A	+J17	=JZ06	L	Circuit-breaker panel	Intermediate panel			T*5	with	left (standard)	without	-
A	+J18	=JZ07	L	Circuit-breaker panel	Intermediate panel			T*5	with	left (standard)	without	-
A	+J19	=JZ02	T	Transformer panel	End panel	100 mm	1750 mm	T*5	without	without	without	-

Stamp: ВЯРНО С ОРИГИНАЛА  
Stamp: ЕЛЕКТРИКО  
Handwritten: 89-11-68

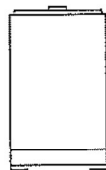


Free standing installation

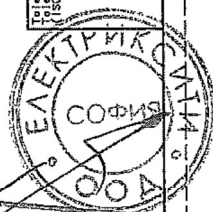


Wall mounted installation

- ① Floor width > 1000mm
- ② Dependent on bending radius of cable
- ③ Panel height 1750mm (standard)
- ④ Optional: panel height 2100mm with low voltage compartment 350mm
- ⑤ Optional: panel height 2300mm with low voltage compartment 550mm



Date Datum		13-12-2001		Designation Benennung		Room layout SIMOSEC Standard		Subproject Blatt	
Name		CHIMENTCHIKD		Item number Bestellnummer		832-5039.9		Page Blatt	
Version		PTD M2 PR3		Revision		SIEMENS		1-	
Drawing Standard		IFMKB		Change-Number/ A.-Z., Index		01		Revision	
22-01-2001		CHIME		22-01-2001		13-12-2001		13-12-2001	
Material/Hersteller		Material/Hersteller		Material/Hersteller		Material/Hersteller		Material/Hersteller	
Location 1: Standort 1		Location 2: Standort 2		Location 3: Standort 3		Location 4: Standort 4		Location 5: Standort 5	
Tolerance Toleranz (mm)		DIN ISO 2768 medium		Scale Maßstab		1:		Released Freigegeben	
Unit: Einheit		mm		Unit: Einheit		mm		Unit: Einheit	
Paper size Format		B/A3		Paper size Format		B/A3		Paper size Format	



ВАЖНО С ОРИГИНАЛОМ  
 Alle Rechte vorbehalten. All rights reserved.  
 Proprietary information, confidential. All rights reserved.

Confiance a titre de secret d'entreprise. Tous droits reserves.  
 Comunicado como segredo empresarial. Reservados todos os direitos.  
 Confiado como secreto industrial. Nos reservamos todos los derechos.







...

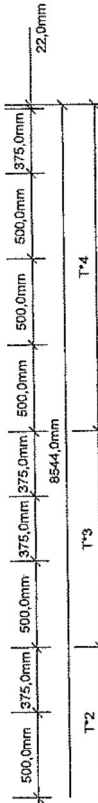
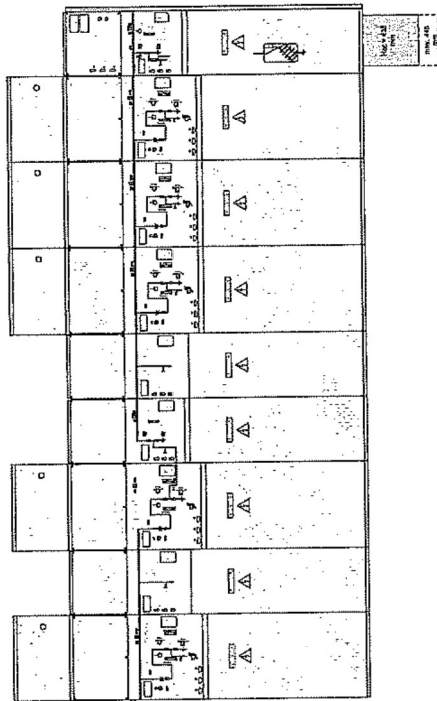
..

,



**FRONT VIEW**

- =J11      =J12      =J13      =J14      =J15      =J16      =J17      =J18      =J19
- =J207    =J208    =J209    =J204    =J205    =J207    =J206    =J207    =J208



**LOAD DATA AND MINIMUM DISTANCES**

1. PERMANENT LOADS	2.0 kN
VERTICAL SINGLE LOAD G <sub>v</sub>	3.5 kN
PANEL WIDTH:	500 mm
700 mm	5.0 kN
1000 mm	5.0 kN
2. NON PERMANENT LOADS	6 kN/m <sup>2</sup>
3. MINIMUM DISTANCES	1000 mm (1)
FRONT OPERATING ASLE	100 mm (2)
WALL DISTANCE ON THE LEFT	600 mm (3)
WALL DISTANCE ON THE RIGHT	800 mm (2)
WALL DISTANCE FRONT	≥ 35 mm
*WALL DISTANCE REAR (with rear door)	≥ 2400 mm
4. CABLE NO HEIGHT	

- Control cabinet, national requirements, for standardized replacement, a control cabinet is recommended if at least:
- 1) Recommended front-breaker remains a control cabinet 2: 1000 mm
  - 2) For free-standing arrangement a panel width distance (left or right) is recommended at least: 100 mm
  - 3) For free-standing arrangement a panel width distance (left or right) is recommended at least: 100 mm
  - 4) For free-standing arrangement with panel type „G2“ a end of the switching arrangement on the left or right side: 800 mm
  - 5) Position of cable trays (cable brackets, underneath the panel) in the cable basement: max. 500 mm (450 mm) max. 800 mm
  - 6) Position of cable trays (cable brackets), underneath the panel, in the cable basement: max. 500 mm (450 mm) max. 800 mm
  - 7) \* For installation „on site“ (Delivery in by parcel 08)
  - 8) For installation „on site“ (Delivery in by parcel 08)
- For emergency design with IEC 21 IAC the height of the switching will be at least: 2100 mm
- Height from top to cable tray diameter: 2100 mm
- \* Installation „on site“ (Installation preserve)

Note for installation: Acc. to delivery version of transport units, TU groups (TUs or panels) will be assembled on site.

Rated short-time withst. curr. 20.0 kA (3 s)

Rated normal current 630 A

13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020
Prepared by	Checked by	Checked by	Checked by	Checked by	Checked by	Checked by	Checked by	Checked by	Checked by
VS.Farma Dragcevtel	VS.Farma Dragcevtel	VS.Farma Dragcevtel	VS.Farma Dragcevtel	VS.Farma Dragcevtel	VS.Farma Dragcevtel	VS.Farma Dragcevtel	VS.Farma Dragcevtel	VS.Farma Dragcevtel	VS.Farma Dragcevtel
13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020	13.01.2020
Revizija	Revizija	Revizija	Revizija	Revizija	Revizija	Revizija	Revizija	Revizija	Revizija
2	2	2	2	2	2	2	2	2	2

**SIEMENS**

SIMOSEC  
SIMOSEC  
SIMOSEC-20417

Operating voltage 20.0 kV

Rated voltage 24.0 kV

Arrangement diagram



**ВЯРНО С ОРИГИНАЛА**

Стр. 7/1 - 7/1











Приложение № 3 към техническото предложение



A handwritten signature in black ink, consisting of stylized, overlapping letters, located at the bottom left of the page.

PPC 19-142

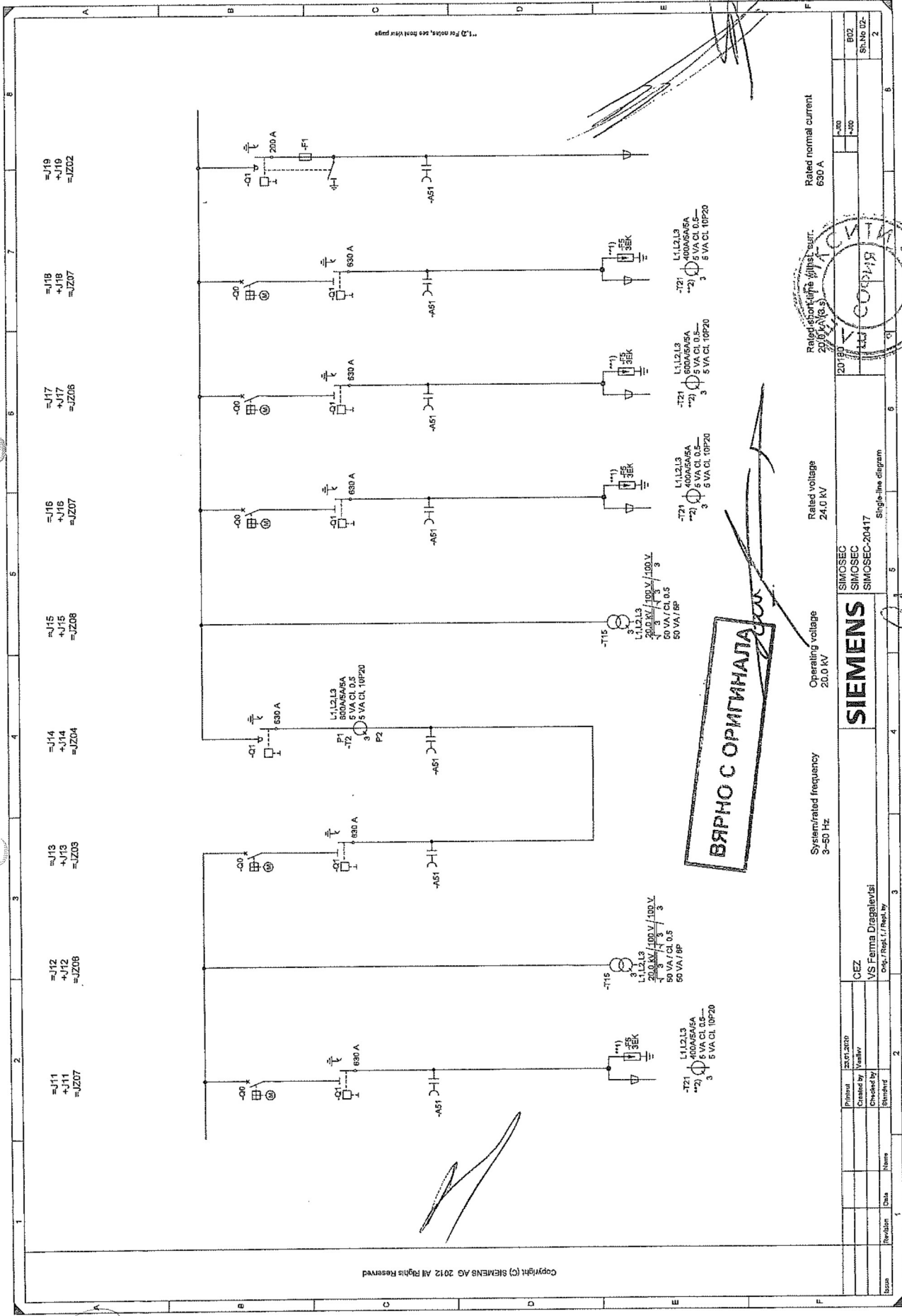






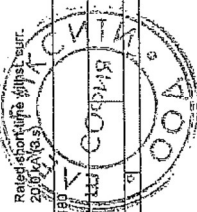






Copyright (C) SIEMENS AG 2012. All Rights Reserved

**ВРНО С ОРГИНАЛА**



Rated normal current  
630 A

Rated short-circuit fault cur.  
20.0 kV / 100 V / 100 V / 50 VA / 50 VA / 50 VA

Rated voltage  
24.0 kV

Operating voltage  
20.0 kV

System/rated frequency  
3-50 Hz

Project	2012-02-09	Sheet No.	12
Created by	Valeriy	Sheet No.	12
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	CEZ		
Created by	VS Femia Dragalevska		
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			
Original	SIEMENS		
Created by			
Checked by			
Standard			
Issue			
Revision			
Date			
Name			





































