

Circuit-Breaker Switchgear Type SIMOPRIME A4 up to 24 kV, Air-Insulated

Medium-Voltage
Switchgear
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Benefits (see also page 10 for details)

- Saves lives
- Peace of mind
- Increases productivity
- Saves money



The circuit-breaker switchgear type SIMOPRIME A4 is a factory-assembled, type-tested switchgear for indoor installation according to IEC 62 271-200 and VDE 0670-6.

SIMOPRIME A4 panel
Maximum ratings 24kV / 25 kA / 2500 A

Typical uses

The SIMOPRIME A4 circuit-breaker switchgear can be used in transformer and switching substations, e.g.:

Application: Power supply system

- Power supply companies

Application: Industry

- Power stations
- Cement industry
- Automobile industry
- Iron and steel works
- Rolling mills
- Mining industry
- Textile, paper and food industries

- Chemical industry
- Petroleum industry
- Pipeline installations
- Offshore installations
- Electrochemical plants
- Petrochemical plants
- Shipbuilding industry
- Diesel power plants
- Emergency power supply installations
- Lignite open-cast mines
- Traction power supplies



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Typical uses

Application
Industry



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Application
Public power
supply system



SIMOPRIME A4 switchgear



Application
Industry

Technical Data

Ratings

Electrical data (maximum values) of SIMOPRIME A4

Ratings	Rated values (max.)
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Switchgear up to 24kV

Rated voltage	24 kV
Rated frequency	50/60 Hz
Rated short-duration power-frequency withstand voltage	50 kV
Rated lightning impulse withstand voltage	125 kV
Rated short-time withstand current, 3 s	25 kA
Rated peak withstand current at 50/60 Hz	63 kA
Rated short-circuit breaking current	25 kA
Rated short-circuit making current at 50/60 Hz	63 kA
Rated normal current of busbar	2500 A
Rated normal current of feeders	2500 A 630 A ¹⁾
– with circuit-breaker	
– with switch-disconnector	

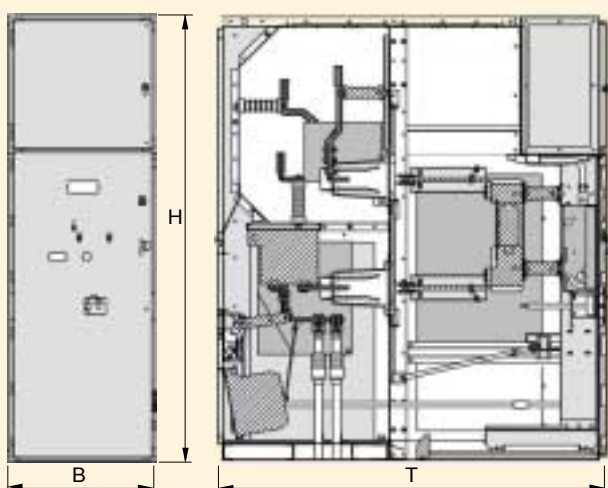
Classification, dimensions, room planning

Classification of the SIMOPRIME A4 switchgear according to **IEC 62 271-200**

Resistance to internal arcs	
Classification	IAC
Accessibility	
– Front	Type A
– Rear	Type A
– Lateral	Type A
Test current	kA 25
Test duration	s 0.1/1.0

Construction and design	
Class of partitions	PM
Service continuity category	LSC2B
Compartment accessibility (standard)	
– Busbar compartment	Tool-based
– Switching-device compartment	Interlock-based
– Low-voltage compartment	Tool-based
– Connection compartment	
– Front connection	Interlock-based and
– Rear connection	Tool-based

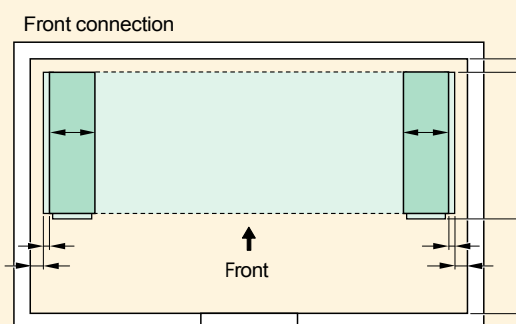
Dimensions



All panel types

		Dimensions in mm
Width B	For 1250 A vacuum circuit-breaker	800
	For 2000 A vacuum circuit-breaker	1000
	For switch-disconnector	800
Height H	With standard low-voltage compartment	2250
Depth T	Standard	1900

Room planning (room height W 2850 mm)



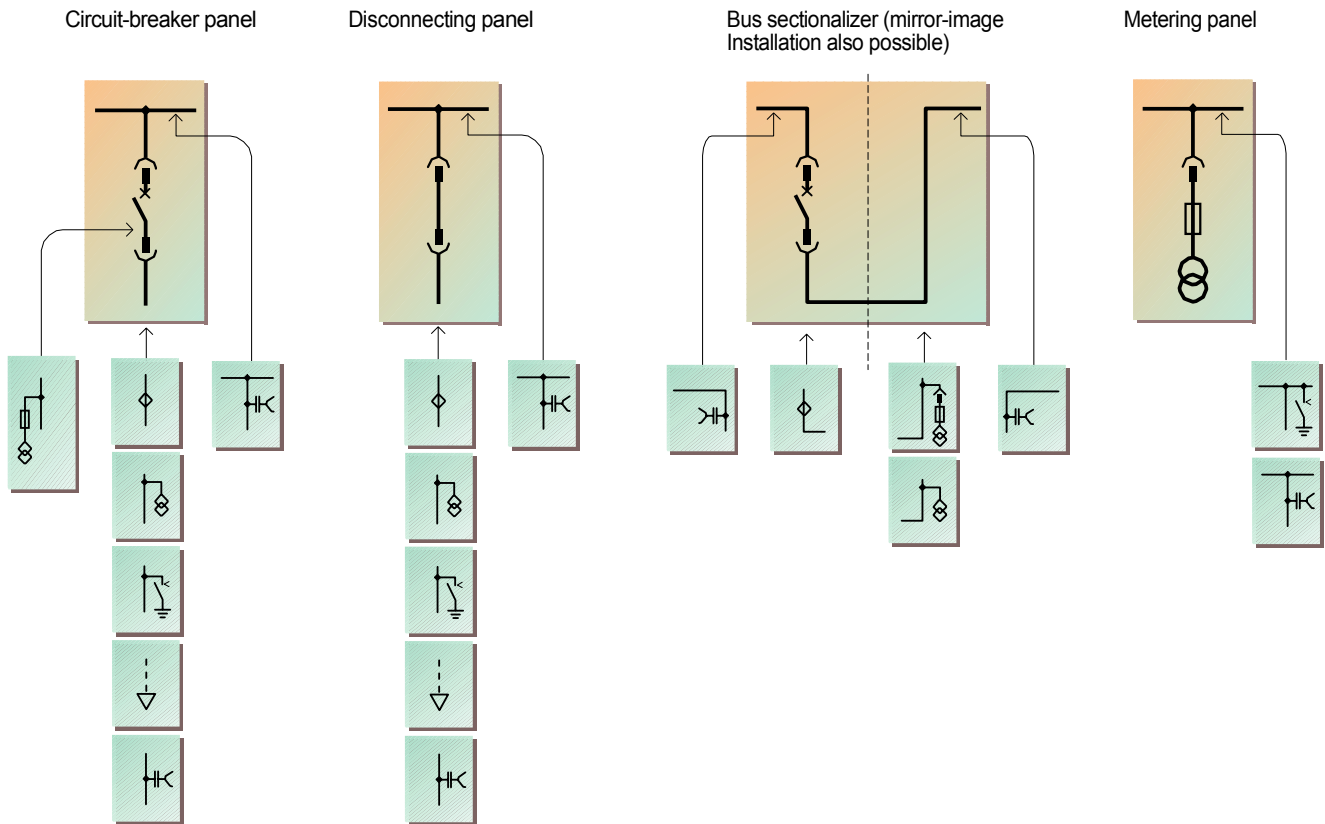
Single-row arrangement (plan view)

For dimensions B (width) and T (depth) refer to table on this page

1) For panel replacement: Control aisle W 2000 mm

Product Range

Panels



Components

	Current transformer
	Voltage transformer without primary fuses
	Voltage transformer with primary fuses
	Capacitive voltage detection system

	Withdrawable voltage transformer with primary fuses
	Make-proof earthing switch
	Disconnecter
	Cable sealing ends ¹⁾ max. 4 x 500 mm ² per phase

	HVC fuse
	3AH5 vacuum circuit-breaker
	Switch-disconnector

1) The details refer to conventional RXS single-core sealing ends for XLPE cables or other makes with similar dimensions.

Design

Panel design

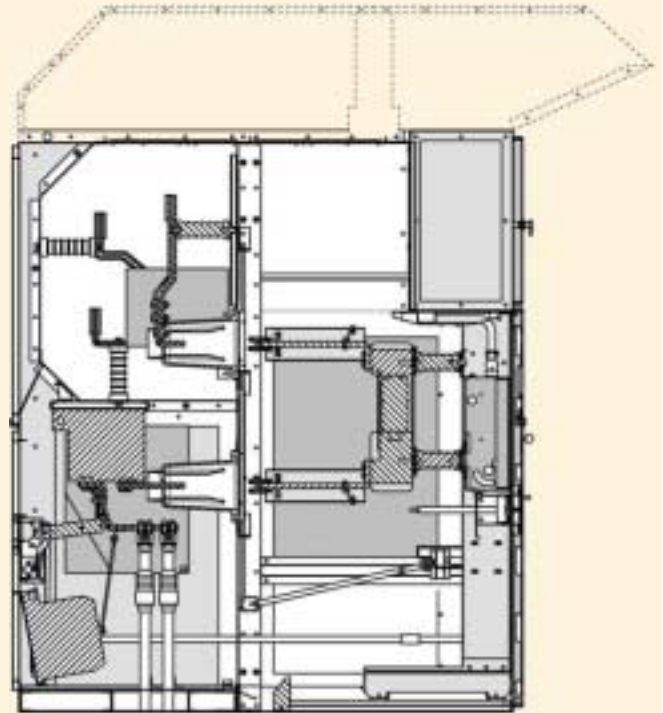
Legend for panel design:

- 1 Door of low-voltage compartment
- 2 Opening for locking or unlocking the low-voltage compartment door
- 3 Option: Capacitive voltage detection system for feeder and busbar
- 4 High-voltage door of switching-device compartment
- 5 Inspection window for checking the switching-device truck
- 6 Opening for locking or unlocking the high-voltage door
- 7 Opening for mechanical charging of circuit-breaker closing spring
- 8 Openings for manual operation (ON/OFF) of the circuit-breaker
- 9 Inspection window for reading the indicators
- 10 Door handle
- 11 Openings for switching-device truck operation
- 12 Opening for earthing-switch operation
- 13 Pressure relief duct
- 14 Busbars
- 15 Bushings
- 16 Post insulators
- 17 Block-type current transformer
- 18 Option: Make-proof earthing switch
- 19 Cable sealing ends
- 20 Option: Voltage transformer
- 21 Earthing busbar
- 22 Low-voltage plug connector
- 23 Vacuum interrupters

Basic panel design (example)



Circuit-breaker panel



Design: Connection from front with ring-core current transformer, optionally with block-type current transformer

- A Switching-device compartment
- B Busbar compartment
- C Connection compartment
- D Vacuum circuit-breaker truck
- E Low-voltage compartment

Compartments, interlocks, operation

Switching-device compartment

- All switching operations with high-voltage door closed
- Pressure relief upwards
- Panel powder-coated with epoxy resin
- Shutter operating mechanisms separately for
 - Busbar compartment
 - Connection compartment
- Metallic, earthed shutters and partitions ensure partition class PM
- High-voltage door pressure-resistant in the event of internal arcs in the panel
- Metallic ducts for laying control cables
- Interlocking between high-voltage door and circuit-breaker truck ensures interlock-based access
- Switching-device compartment to accommodate components for implementing various panel versions with
 - Vacuum circuit-breaker with or without voltage transformers on the truck
 - Disconnecter truck
 - Metering truck

Busbar compartment

- Pressure relief upwards and through rear pressure relief duct.
- Option: Busbar transverse partition between panels
- Busbars made of flat copper, bolted from panel to panel
 - For rated normal currents up to 2500 A
 - Option: Insulated busbars
- Bolted top covers provide tool-based access
- Option: Coupling electrode for capacitive voltage detection system
- Options: Possibility of installing the following components
 - Voltage transformers
 - Busbar earthing switch
 - Current transformers in the run of busbars

Connection compartment

- Pressure relief upwards through rear pressure relief duct
- Suitable for connection of
 - Single-core cables
 - Three-core cables
- Independent opening shutters to permit cable testing
- Earthing busbar
- Connection from front or rear
- Use of block-type current transformers
- Interlocked high-voltage door and bolted partitions between connection compartment and switching-device compartment provide interlock-based and tool-based access for panels with connection from front

Components at the panel connection (option)

- Single-core XLPE cables up to max. 4 x 500 mm² per phase
- Three-core XLPE cables up to max. 3 x 300 mm² per phase
- Coupling electrode for capacitive voltage detection system
- Voltage transformers
 - Cast-resin insulated
 - Max. 3 x 1-pole
 - Fixed-mounted, without primary fuses
- Make-proof earthing switch
 - With manual operating mechanism
 - In addition to standard interlocking of earthing switch/circuit-breaker truck, optionally lockable or with electromagnetic interlock
- Surge arresters
 - Surge arresters for protecting the switchgear against external overvoltages

Interlocks

- Interlocking conditions are satisfied according to IEC 62 271-200 / VDE 0670-6
- Earthing switch can only be operated with circuit-breaker truck in test position
- Circuit-breaker truck can only be moved with circuit-breaker

"OPEN" and earthing switch "OPEN"

- Mechanical coding on the circuit-breaker truck prevents insertion of similar circuit-breaker trucks for lower rated normal currents into panels with higher rated normal currents
- Interlocking of high-voltage door against circuit-breaker truck
- The high-voltage door can only be opened when the circuit-breaker truck is in test position
- Option: Electromagnetic interlocks

Low-voltage compartment

- Accommodates equipment for protection, control, measuring and metering
- Separated from the high-voltage part of the panel, safe-to-touch
- Low-voltage compartment can be removed, bus wires and control cables are plugged in

Low-voltage cables

- Control cables of the panel are flexible and have metallic covers
- Connection between switching device truck and panel wiring to low-voltage compartment via 64-pole coded plug connectors
- Bus wires pluggable from panel to panel
- Option: Fire-resistance control wiring 1

Design

Benefits and features

Benefits	Features
<ul style="list-style-type: none"> • Saves lives 	<ul style="list-style-type: none"> • All switching operations including emergency manual operations with high-voltage door closed • Interlocking between high-voltage door and switching devices • Rack-in, rack-out operations of the circuit-breaker truck with high-voltage door closed • Metallic, earthed shutters and partitions, partition class: PM • Internal arc tested design up to 25 kA, 1 s, according to IEC 62 271-200, Annex A • Use of vacuum circuit-breakers
<ul style="list-style-type: none"> • Peace of mind 	<ul style="list-style-type: none"> • Factory-assembled, type-tested switchgear according to IEC 62 271-200 • Type testing of the circuit-breaker inside the panel • Use of standard, worldwide available components • Use of maintenance-free vacuum circuit-breakers • Quality management according to DIN EN ISO 9001 • Design based on global best practice sharing and experience
<ul style="list-style-type: none"> • Increases productivity 	<ul style="list-style-type: none"> • Use of metallic, earthed shutters and partitions between the compartments ensures highest service continuity of the switchgear (LSC2B according to IEC 62 271-200) during maintenance • Use of maintenance-free vacuum circuit-breakers
<ul style="list-style-type: none"> • Saves money 	<ul style="list-style-type: none"> • Use of maintenance-free vacuum circuit-breakers



Standards, specifications, guidelines

Standards

The switchgear complies with the relevant standards and specifications applicable at the time of type tests.

Type of service location

The switchgear can be used for indoor installation in accordance with IEC 61 936 (Power installations exceeding 1 kV AC) and VDE 0101

- Outside lockable electrical service locations at places which are not accessible to the public. Enclosures of switchgear can only be removed with tools.
- Inside lockable electrical service locations. A lockable electrical service location is a place outdoors or indoors that is reserved exclusively for housing electrical equipment and which is kept under lock and key. Access is restricted to authorized personnel and persons who have been properly instructed in electrical engineering. Untrained or unskilled persons may only enter under the supervision of authorized personnel or properly instructed persons.

Terms

"Make-proof earthing switches" are earthing switches with short-circuit making capacity according to

- IEC 62 271-102 and
- VDE 0671-102 / EN 62 271-102

Current-carrying capacity

- According to IEC 60 694 / VDE 0670-1000 and IEC 62 271-200 current-carrying capacities refer to the following ambient temperatures:
 - Maximum of 24-hour mean +35°C
 - Maximum +40°C
- The current-carrying capacity of the panels and busbars depends on the ambient temperature outside the enclosure.
- To attain the maximum rated normal currents, the panels are provided with natural or forced ventilation.

Overview of standards (August 2004)

	IEC standard		VDE standard		EN standard
	current	in future	current	in future	current
Switchgear	IEC 60 694	IEC 62 271-1	VDE 0670-1000	VDE 0671-001	EN 60 694
	IEC 62 271-200	IEC 62 271-200	VDE 0670-6	VDE 0671-200	EN 62 271-200
Devices	1) IEC 62 271-100	IEC 62 271-100	VDE 0671-100	VDE 0671-100	EN 62 271-100
	2) IEC 62 271-102	IEC 62 271-102	VDE 0671-102	VDE 0671-102	EN 62 271-102
	3) IEC 62 265-1	IEC 62 271-103	VDE 0670-301	VDE 0671-103	EN 60 265-1
	4) IEC 62 271-105	IEC 62 271-105	VDE 0671-105	VDE 0671-105	EN 62 271-105
	5) IEC 61 243-5	IEC 61 243-5	VDE 0682-415	VDE 0682-415	EN 61 243-5
	6) IEC 60 282	IEC 60 282	VDE 0670-4	VDE 0670-4	EN 60 282
Degree of protection	IEC 60 529	IEC 60 529	VDE 0470-1	VDE 0470-1	EN 60 529
Insulation	IEC 60 071	IEC 60 071	VDE 0111	VDE 0111	EN 60 071
Current transformers	IEC 60 044-1	IEC 60 044-1	VDE 0414-1	VDE 0414-1	EN 60 044-1
Voltage transformers	IEC 60 044-2	IEC 60 044-2	VDE 0414-2	VDE 0414-2	EN 60 044-2

1) Circuit-breaker

2) Disconnecter and earthing switch

3) Switch

4) Switch-fuse combination

5) Voltage detection systems

6) HV HRC fuses

Table - Insulating capacity

Rated voltage (rms value)	kV	24
Rated short-duration power-frequency withstand voltage (rms value)		
- Across isolating distances	kV	60
- Between phases and to earth	kV	50
Rated lightning impulse withstand voltage (peak value)		
- Across isolating distances	kV	145
- Between phases and to earth	kV	125

Climate and ambient conditions

The switchgear may be used, subject to possible additional measures, under the following ambient conditions and climate classes:

Ambient conditions

- Natural foreign materials
- Chemically active pollutants
- Small animals

Climate classes

- 3K3
- 3K5

The climate classes are classified according to IEC 60 721-3-3.

Protection against solid foreign bodies, electric shock and ingress of water SIMOPRIME A4 switchgear fulfills acc. to the standards

- IEC 62 271-200

- IEC 60 529

- VDE 0470-1

- VDE 0670-6

the following degrees of protection:

- Enclosure: IP 3XD

- Compartments: IP 2X

Resistance to internal arc faults

- Safety of operating personnel ensured by tests to verify resistance to internal arc faults.
- Internal arc tests in accordance with IEC 62 271-200, Annex A.
- The switchgear complies with criteria 1 to 5 specified in the mentioned standards for the basic version up to 25 kA.
- Definitions of the criteria:
 - **Criterion 1**
Correctly secured doors and covers do not open. Deformations are accepted conditionally.
 - **Criterion 2**
No fragmentation of enclosures occurs within the time specified for test. Projections of small parts up to 60 g are accepted.
 - **Criterion 3**
Arcing does not cause holes in the accessible sides up to a height of 2 m.
 - **Criterion 4**
Indicators do not ignite due to the effect of hot gases. Ignition caused by glowing particles rather than hot gases is allowed. Ignitions as a result of paint or sticker burning are also excluded.
 - **Criterion 5**
The enclosure remains connected to its earthing point.

Notes

Notes

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

All product designations used are trademarks or product names of Siemens AG or other suppliers.

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

The information in this document contains general descriptions of the technical options available, which do not always have to be present in individual cases.

The required features should therefore be specified in each individual case at the time of closing the contract.

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