Catalog
HA 25.73 · 2023

MEDIUM-VOLTAGE SWITCHGEAR

Medium-Voltage Switchgear **Type NXAIR up to 17.5 kV, up to 40 kA, Air-Insulated**

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Application

Typical uses

NXAIR circuit-breaker switchgear is used in transformer and switching substations, mainly at the primary distribution level, e.g.:

Application
Public power supply

- Power supply companies
- Energy producers
- System operators.

Application
Industry and offshore

- Automobile industry
- Traction power supply systems
- Mining industry
- Lignite open-cast mines
- Chemical industry
- Diesel power plants
- Electrochemical plants
- Emergency power supply installations
- Textile, paper and food industries
- Iron and steel works
- Power plants
- Petroleum industry
- Offshore installations
- Petrochemical plants
- Pipeline installations
- Data centers
- Shipbuilding industry
- Steel industry
- Rolling mills
- Cement industry.

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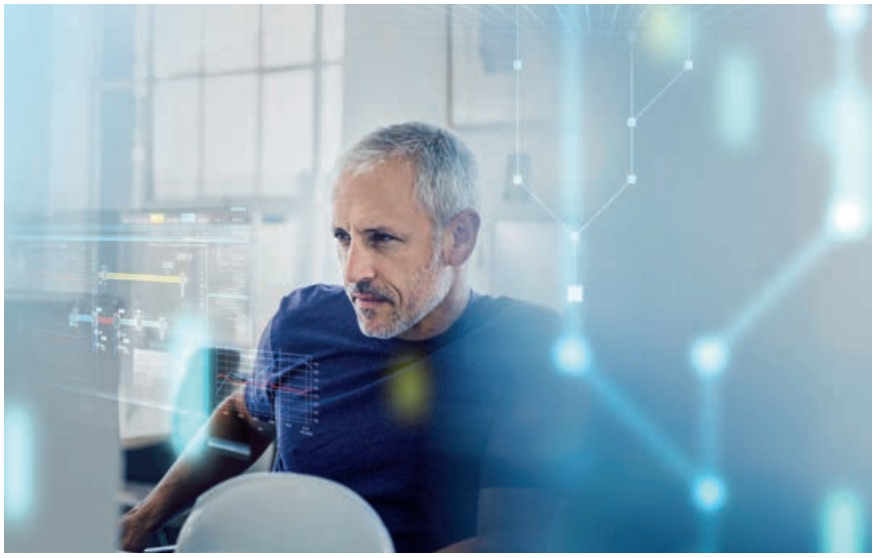
Contents

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

Customer benefit

Ensures peace of mind



Ensures peace of mind

For power supply companies and industrial plants, the platform concept of the NXAIR family introduced at all production locations has very concrete advantages:

Smooth operation, exemplary availability, and optimal safety.

Features

- No handling of insulating gas and no pressure monitoring required
- As insulating medium, air is always available
- Factory-assembled, type-tested switchgear according to IEC 62271-200
- Platform concept introduced worldwide, centrally controlled development, local manufacture
- Use of standardized block-type current transformers
- Use of standard components available worldwide, locally manufactured components, in consideration of regional standards
- More than 610,000 air-insulated switchgear panels of Siemens in operation worldwide
- Use of maintenance-free vacuum circuit-breakers or vacuum contactors
- Type testing of the main switching devices and the make-proof earthing switch in the panel
- Pressure-resistant partitions
- Flexibility regarding the low-voltage equipment (removable compartment, plug-in wires)
- Quality assurance in accordance with DIN EN ISO 9001.

Saves lives

All switchgear types of the NXAIR family are approved with internal arc classification IAC A FLR, loss of service continuity category LSC 2B, and partition class PM.

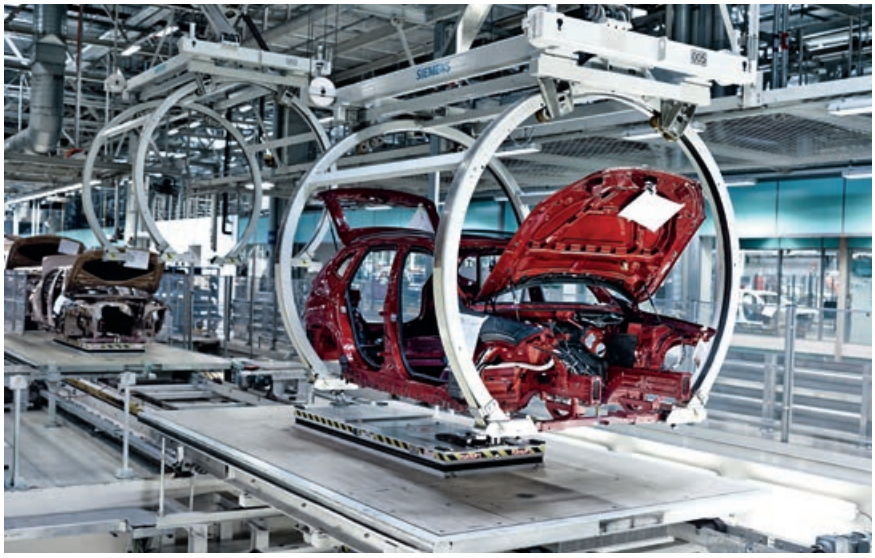
This makes them suitable for universal installation, meeting the highest requirements regarding personal safety.

Features

- All operations can only be performed with closed and interlocked high-voltage door
- Metallic enclosure, earthed shutters and partitions
- Internal arc classified switchgear according to IAC A FLR (front, lateral and rear accessibility) for all short-circuit currents and an arc duration of 1 s
- Loss of service continuity category LSC 2B (separate partitioning of the busbar, connection and switching-device compartments)
- Partition class PM (metal-clad in pressure-resistant design)
- Unambiguous position indicators and control elements on the high-voltage door
- Use of vacuum circuit-breakers or vacuum contactors
- Standard degree of protection IP3XD; different degrees of protection possible as an option
- Positively driven shutters (separately lockable)
- Logical mechanical interlocking system.

Customer benefit

Increases productivity



Increases productivity

Properties such as modular design, type tests of the switching devices in the switchgear, confinement of an internal arc to the respective compartment, and thus maximum operational reliability, contribute to optimum operation and a remarkable increase of productivity.

Features

- Loss of service continuity category LSC 2B
- Partition class PM
- Maximum degree of protection IP51 possible
- Positively driven shutters
- Use of standardized block-type current transformers
- Cable testing possible without isolating the busbar
- Functions such as establishment of the isolating distance, as well as feeder and busbar earthing, can be completely controlled from remote
- Confinement of an internal arc to the respective compartment up to 31.5 kA
- Use of maintenance-free vacuum circuit-breakers or vacuum contactors
- Control cables in metallic wiring ducts
- Easy access to all switchgear components
- Rapid interruption of an internal arc optionally possible by installation of arc detection systems.

Saves money

The compact design of the NXAIR family pays twice for owners thanks to the use of the new SION circuit-breaker series.

On the one hand, building costs can be reduced in this way, and on the other hand, the maintenance-free circuit-breakers and the modular design enable continuous operation without expensive downtimes.

Features

- Use of maintenance-free vacuum circuit-breakers or vacuum contactors
- Maintenance-free switchgear for up to 10 years
- Interruption of operation reduced to a minimum by logical mechanical interlocking system
- Minimized space requirements (reduced building investments) thanks to compact design and flexible cable connection options, and/or flexible pressure relief duct systems.

Customer benefit

Preserves the environment

Preserves the environment

Air used as insulating medium, local production locations with short transportation ways and times, as well as a service life of more than 30 years, optimize the total energy balance.

Features

- Air as insulating medium is absolutely neutral to the environment
- Local production presence in all regions, minimized energy consumption (CO_2) regarding transport
- A service life of more than 30 years optimizes the energy balance additionally
- The materials used are fully recyclable without special knowledge
- Easy disposal.

NXAIR: A sustainable investment for today and tomorrow

At Siemens, we believe in sustainable development that meets current needs without compromising the future.

Siemens supports sustainability with a customized program, our "DEGREE framework". Our DEGREE framework guides our efforts in six crucial areas of action that drive sustainability and continuously evolve.

Decarbonization: Support the 1.5 °C target to fight global warming
Ethics: Foster a culture of trust, adhere to ethical standards, and handle data with care
Governance: Apply state-of-the-art systems for effective and responsible business conduct
Resource efficiency: Achieve circularity and dematerialization
Equity: Foster diversity, inclusion, and community development to create a sense of belonging
Employability: Enable our people to stay resilient and relevant in a permanently changing environment.

Air-insulated medium-voltage switchgear NXAIR is a prime example for our commitment to sustainability. Decades of experience have made **NXAIR** a leader in **resource efficiency and decarbonization**:

- Use of natural air as insulating medium and vacuum interrupters for switching
- Free of all materials harming the environment (e.g., asbestos, mercury, SF_6 gas or other F-gases)
- Reduced fire load by using a minimum of insulating material
- Easily recyclable and reusable thanks to the use of homogenous material
- Use of maintenance-free vacuum circuit-breakers, and 10-year maintenance intervals for the switchgear
- Long product lifetime and serviceable life of more than 30 years
- For discontinued products, functionally equivalent replacement parts supply for a defined period
- Short transportation routes to customers thanks to global manufacturing network
- Global service network close to the customer
- Possibility for remote factory acceptance tests (FAT) and remote support for commissioning, service and maintenance
- Upgradable with condition monitoring systems for predictive maintenance
- Continuous improvement of durability by means of simulation software for development, testing and production based on the corresponding international standards and design directives.

Sustainability

NXAIR: A sustainable investment for today and tomorrow

NXAIR: A sustainable investment for today and tomorrow

Low-power instrument transformers (aka. NCITs) support making our switchgear even more sustainable. In the use phase, they help to reduce energy consumption and CO_2 emissions, as well as operating costs.

Additionally, we as Siemens commit ourselves to comply with all legal provisions and regulations like REACh, the Minamata Convention, the Responsible Minerals Initiative, as well as the Stockholm Convention consequently to ensure a sustainable future for all.

For NXAIR, Life Cycle Assessments (LCA) are performed, and Environmental Product Declarations (EPD) for reference installations are available.

With its environmentally friendly design, resource-efficient production, and long-lasting performance, NXAIR is the ideal solution for your power supply.

NXAIR – Enjoy the Air

Explanations:

REACh (Registration, Evaluation, Authorization and Restriction of Chemicals)
REACh - Regulation (EC) 1907/2006 is the European Chemicals Regulation concerning the registration, evaluation, authorization and restriction of chemicals. It has been in force since 2007 and replaces 40 individual laws.
The REACh Regulation is considered to be one of the world's most stringent chemicals laws.

Environmental Product Declaration (EPD)
An Environmental Product Declaration (EPD) is used to provide the customer with information about the "ecological footprint" of a product. Siemens has a clearly formulated strategy for the development of EPDs. EPDs are based on independently verified data from life cycle assessments, life cycle inventory analyses, or information modules, which comply with the ISO 14040 series of standards.

Life Cycle Assessments (LCA)
We use Life Cycle Assessments (LCA) to help us calculate the ecological footprint of our products and systems over their entire life cycle. Siemens follows the strict requirements of the ISO 14040 and ISO 14044 standards when applying an LCA.

Classification

Circuit-breaker switchgear NXAIR is factory-assembled, metal-enclosed and type-tested switchgear for indoor installation according to IEC 62271-200, and corresponds to the following classifications.

Loss of service continuity category and partition class	
Loss of service continuity category	LSC 2B
Partition class	PM
Accessibility to compartments	
– Busbar compartment	Tool-based
– Switching-device compartment	Interlock-controlled
– Connection compartment	Interlock-controlled or tool-based

Internal arc classifications

The following internal arc classifications are fulfilled: IAC A FLR, I_{sc}, t

IAC	Internal Arc Classification
A	300 mm distance of indicators for test (installation in closed electrical service location)
F	Front arrangement of indicators for test
L	Lateral arrangement of indicators for test
R	Rear arrangement of indicators for test
I_{sc}	Test current for NXAIR up to 40 kA
t	Arc duration 1 s

In this way, NXAIR switchgear is suitable for unrestricted application (wall- or free-standing arrangement) in electrical service locations up to the maximum short-circuit current ratings.

Type approval

NXAIR switchgear has been type-approved by the following classification societies:

- Lloyd's Register
- DNV

The switchgear is therefore also approved for application on ships and platforms.

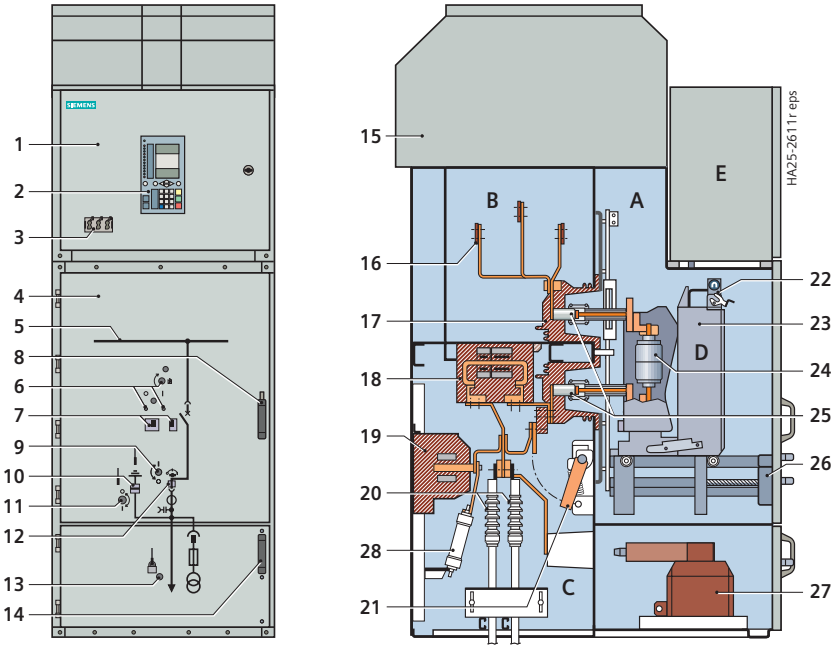
Lloyd's Register Marine

TYPE APPROVED PRODUCT DNV DNV.COM/AF

Design

Basic panel design

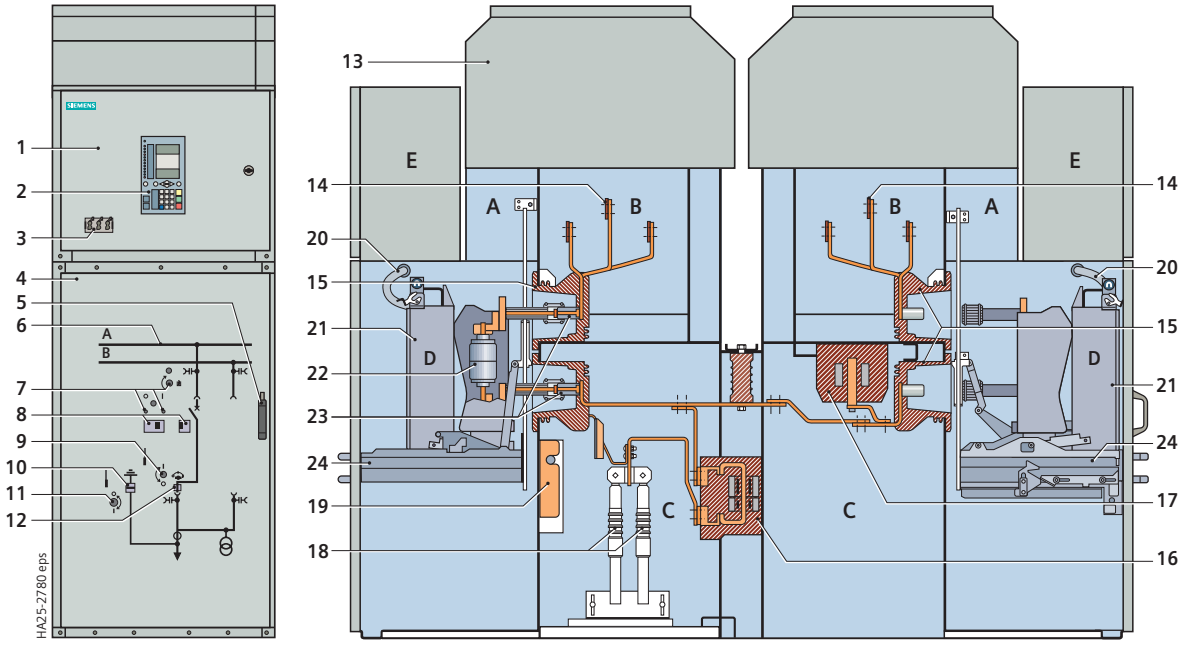
Basic panel design – circuit-breaker panel (example)



1 Door to low-voltage compartment
2 Protection device
3 Option: Capacitive voltage detecting system for feeder and busbar
4 High-voltage door
5 Mimic diagram
6 "CLOSE-OPEN" actuating openings for the circuit-breaker, opening for spring charging
7 Inspection window to recognize the "CLOSED-OPEN" indicator of the circuit-breaker, "closing spring charged" indicator, operation counter
8 Handle for opening the high-voltage door
9 Actuating opening for racking the switching device
10 Mechanical position indicator for feeder earthing switch
11 Actuating opening for feeder earthing switch, manual or optionally motor operation
12 Mechanical position indicator for withdrawable part position
13 Actuating opening for withdrawable voltage transformers
14 Handle for opening the door to the withdrawable voltage transformers
15 Pressure relief duct
16 Busbars
17 Bushing-type insulator
18 Block-type current transformer
19 Voltage transformer
20 Cable connection
21 Make-proof earthing switch
22 Low-voltage connection, plug-in type
23 Operating and interlocking unit for circuit-breaker
24 Vacuum interrupter
25 Contact system
26 Operating and interlocking unit for racking the switching device and for earthing, manual or optionally motor operation
27 Option: Withdrawable voltage transformers
28 Option: Surge arresters

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

Basic panel design – circuit-breaker panel (example) – duplex (back-to-back)

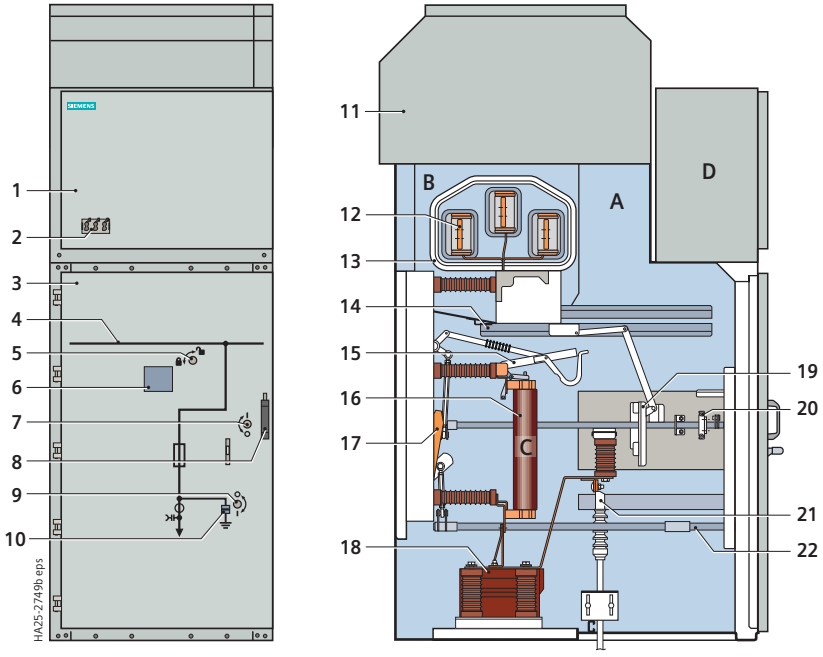


1 Door to low-voltage compartment
2 Protection device
3 Option: Capacitive voltage detecting system for feeder and busbar
4 High-voltage door
5 Handle for high-voltage door
6 Mimic diagram
7 "CLOSE-OPEN" actuating openings for the circuit-breaker, opening for spring charging
8 Inspection window to recognize the "CLOSED-OPEN" indicator of the circuit-breaker, "closing spring charged" indicator, operation counter
9 Actuating opening for racking the switching device
10 Mechanical position indicator for feeder earthing switch
11 Actuating opening for feeder earthing switch, manual or optionally motor operation
12 Mechanical position indicator for withdrawable part position
13 Pressure relief duct; with top-mounted arc absorber, if required
14 Busbars
15 Bushing-type insulator
16 Block-type current transformer
17 Voltage transformer
18 Cable connection
19 Make-proof earthing switch
20 Low-voltage connection, plug-in type
21 Operating and interlocking unit for circuit-breaker
22 Vacuum interrupter
23 Contact system
24 Withdrawable part for racking the switching device and for earthing, manual or optionally motor operation

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

Design
Basic panel design

Basic panel design – switch-disconnector panel with HV HRC fuses (example)



1 Door to low-voltage compartment
2 Option: Capacitive voltage detecting system for feeder and busbar
3 High-voltage door
4 Mimic diagram
5 Interlocking of high-voltage door
6 Inspection window to recognize the switch position of the switch-disconnector and the "HV HRC fuse tripped" indication
7 Actuating opening for operating the switch-disconnector
8 Handle for opening the high-voltage door
9 Actuating opening for feeder earthing switch, manual operation
10 Mechanical position indicator for feeder earthing switch
11 Pressure relief duct
12 Busbars
13 Bushing plate
14 Shutter
15 Switch-disconnector
16 HV HRC fuse
17 Make-proof earthing switch
18 Block-type current transformer or post insulator
19 Operating unit for shutter
20 Operating and interlocking unit for switch-disconnector
21 Cable connection
22 Operating and interlocking unit for earthing, manual operation

A Switching-device / connection compartment
B Busbar compartment
C Switch-disconnector/ fuse combination
D Low-voltage compartment

Compartments of circuit-breaker panel

Switching-device compartment

- Enclosure made of sendzimir-galvanized sheet steel, alternatively with cast-resin powder-coated sheet steel
- Pressure relief upwards
- Panel front powder-coated with epoxy resin
- Standard color RAL 7035
- Separate shutter mechanism for opening and closing the
  - Busbar compartment
  - Connection compartment
- Metallic shutters
- High-voltage door pressure-resistant in the event of internal arcs in the panel
- Pressure-resistant partitions to connection and busbar compartments
- Lateral metallic wiring duct for laying the control cables
- Low-voltage plug connector for connection of control cables between primary part and secondary part
- Switching-device compartment for the different panel versions with withdrawable devices:
  - Vacuum circuit-breaker
  - Vacuum contactor
  - Withdrawable disconnector link
  - Withdrawable metering part
- Endurance classes for
  - Circuit-breaker: E2, M2, C2
  - Isolating distance (withdrawable part): M0, manual or optionally motor operation for withdrawable circuit-breaker and withdrawable disconnector link
  - Vacuum contactor 500,000 × I_n.

Busbar compartment

- Enclosure made of sendzimir-galvanized sheet steel, alternatively with cast-resin powder-coated sheet steel
- Pressure relief upwards
- Option: Transverse partition from panel to panel
  Standard: Transverse partition from panel to panel for NXAIR with 40 kA
- Busbars made of flat copper, bolted from panel to panel
  - Option: Insulated
- Pressure-resistant partitions to connection and switching-device compartments, pressure-resistant rear wall
- Shutters can be opened and locked separately
- Bushing-type insulators for supporting the busbars and for accommodating the upper fixed contacts for the switching device
- Option: Coupling electrode for capacitive voltage detecting system.

Additional compartments (option) for busbar components[1)]

- Top-mounted compartment over the busbar compartment, within the pressure relief duct
- Separate pressure relief of the additional compartment via pressure relief flaps
- Options: Possibility of installing the following components (but not for panels with natural and forced ventilation, see also product range)
  - Voltage transformers
  - Make-proof earthing switch (endurance classes: M0, E1), manual or optionally motor operation
  - Bar or cable connection
  - Surge arresters
  - SIQuench arc quenching device.

Connection compartment

- Enclosure made of sendzimir-galvanized sheet steel, alternatively with cast-resin powder-coated sheet steel
- Pressure relief upwards through rear pressure relief duct
- Pressure-resistant partitions to switching-device and busbar compartments
- Shutters can be opened and locked separately
- Earthing busbar
- Option: Installation of bushing-type insulators or block-type current transformers
- Option: Coupling electrode for capacitive voltage detecting system.
- Pressure-resistant floor cover
- Connection from front/bottom, or from rear/bottom, or from rear/top
- Suitable for connection of:
  - Single-core XLPE cables up to 6 × 500 mm² per panel depending on the rated continuous current and other built-in components
  - Three-core XLPE cables up to 3 × 240 mm² per panel depending on the rated continuous current and other built-in components
  - Flat copper bars with bushings in a base plate, or fully-insulated bars including floor cover.

1) See also product range.

Design

Compartments of circuit-breaker panel, switch-disconnector panel with HV HRC fuses

Compartments of circuit-breaker panel

- Installation of voltage transformers
  - Cast-resin insulated
  - 3 × 1-pole
  - Fixed-mounted, without primary fuses
  - Or withdrawable with primary fuses in a separate compartment, with bushings and shutters to the connection compartment
- Make-proof earthing switch
  - With manual operation, optionally motor operation
  - In addition to the standard interlocking: Earthing switch optionally lockable or electromagnetically interlocked against the withdrawable switching device
- Endurance classes for earthing switch: M0, E1
- Surge arresters
  - For protecting the switchgear against external overvoltages
  - For protecting consumers against switching overvoltages while operating motors with starting currents ≤ 600 A.

Compartments of switch-disconnector panel with HV HRC fuses

Busbar compartment

- Enclosure made of sendzimir-galvanized sheet steel, alternatively with cast-resin powder-coated sheet steel
- Pressure relief upwards
- Transverse partition from panel to panel
- Busbars made of flat copper and insulated
- Positively driven shutter between busbar compartment and switching-device / connection compartment
- Shutter made of insulating material, partition class PI
- Option: Coupling electrode for capacitive voltage detecting system.

Switching-device / connection compartment

- Enclosure made of sendzimir-galvanized sheet steel, alternatively with cast-resin powder-coated sheet steel
- Pressure relief upwards
- Panel front powder-coated with epoxy resin
- Standard color RAL 7035
- Shutter mechanism coupled with switch-disconnector operation
- High-voltage door pressure-resistant in the event of internal arcs in the panel
- Lateral metallic wiring duct for laying the control cables
- Firmly wired cable harness for connection of control cables between primary part and secondary part
- Switching-device / connection compartment with fixed-mounted switch-disconnector/fuse combination (LSC 2)
- Endurance classes for switch-disconnector/ fuse combination:
  - Mechanical endurance: M1
  - Electrical endurance: E1
- HV HRC fuses tested according to IEC 60282-1
  - 1 fuse per phase
  - Reference dimension: 442 mm
- Earthing busbar
- Option: Installation of post insulators or block-type current transformers
- Option: Coupling electrode for capacitive voltage detecting system
- Pressure-resistant floor cover
- Connection from front/bottom or from rear/top
- Suitable for connection of:
  - Single-core XLPE cables up to 2 × 300 mm² per panel depending on the rated continuous current and other built-in components
  - Three-core XLPE cables up to 2 × 100 mm² per panel depending on the rated continuous current and other built-in components
- Make-proof earthing switch
  - With manual operation
  - In addition to the standard interlocking: Earthing switch optionally lockable or electromagnetically interlocked against the withdrawable switching device
- Endurance classes for earthing switch: M0, E1.

Operation – circuit-breaker panel

Features

- Integrated mimic diagram
- Indication of the respective switch positions for circuit-breaker CLOSED/OPEN, disconnected position, and earthing switch CLOSED/OPEN on the integrated mimic diagram
- Unambiguous assignment of actuating openings and control elements to the corresponding position indicators
- All switching operations can only be performed with closed high-voltage door
- Ergonomically favorable height for all control elements and indicators
- Option: Verification of safe isolation from supply for feeder or busbar by means of the capacitive voltage detecting system with panel front closed.

Interlocks

- Interlocking conditions specified according to IEC 62271-200 are fulfilled
- Feeder earthing switch can only be operated with switching device in disconnected position
- Switching device can only be racked on the movable part with the associated switching device in OPEN position and with earthing switch OPEN
- Switching device can only be operated in interlocked disconnected or service position.

Beyond the specifications of the standards

- Coding prevents insertion of switching devices with a lower rated continuous current into panels with a higher rated continuous current
- Interlocking between the high-voltage door and the position of the withdrawable part
- Option: Electromagnetic interlocks, mechanical key interlocking systems, padlocks.

Operation – switch-disconnector panel with HV HRC fuses

Features

- Integrated mimic diagram
- Indication of the respective switch positions for switch-disconnector CLOSED/OPEN, disconnected position via inspection window in the high-voltage door, and earthing switch CLOSED/OPEN on the integrated mimic diagram
- Unambiguous assignment of actuating openings and control elements to the corresponding position indicators
- All switching operations can only be performed with closed high-voltage door
- Ergonomically favorable height for all control elements and indicators
- Option: Verification of safe isolation from supply for feeder or busbar by means of the capacitive voltage detecting system with panel front closed
- "HV HRC fuse tripped" visible with closed door
- Option: Electrical signal "HV HRC fuse tripped" via signaling switch.

Interlocks

- Interlocking conditions specified according to IEC 62271-200 are fulfilled
- Feeder earthing switch can only be operated with switching device in disconnected position
- Switching device can only be operated with earthing switch OPEN.

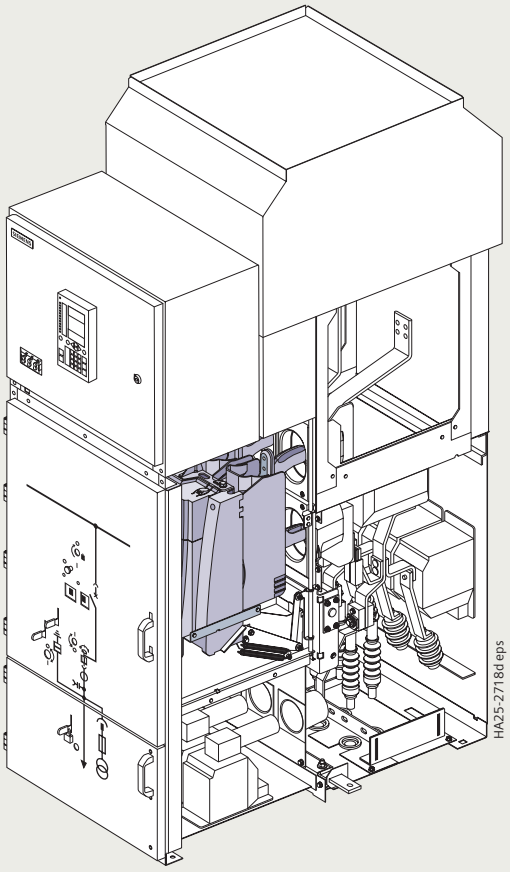
Beyond the specifications of the standards

- Interlocking between the high-voltage door and the position of the switch-disconnector
- Option: Electromagnetic interlocks, mechanical key interlocking systems, padlocks.

Vacuum circuit-breaker

Features

- The circuit-breakers conform to the following standards:
  - IEC 62271-1
  - IEC 62771-100
- All circuit-breakers fulfill the endurance classes C2, E2, M2 and S1 according to IEC 62271-100, as well as the shortest rated operating sequence O – 0.3 s – CO – 15 s – CO
- In NXAIR up to 15 kV 31.5 kA, they are also available as generator circuit-breakers according to IEC/IEEE 62271-37-013
- Suitable for all switching duties
- Stored-energy spring mechanism with motor operation, manual operation always possible
- Racking the circuit-breaker with manual operation, optionally with motor operation
- 64-pole low-voltage plug connection between circuit-breaker and fixed part
- The circuit-breakers are maintenance-free:
  - Under normal ambient conditions according to IEC 62271-1
  - Up to 10,000 operating cycles, maintenance-free
    - No regreasing
    - No readjusting
  - Up to 30,000 operating cycles, with maintenance work.



Vacuum circuit-breaker

Electrical data for	NXAIR
Rated operating voltage	up to 17.5 kV
Rated short-circuit breaking current	up to 40 kA
Rated short-time withstand current	up to 40 kA / 3 s
Rated short-circuit making current	up to 100 / 104 kA
Rated peak withstand current	up to 100 / 104 kA
Rated continuous current	up to 4000 A
Endurance class	E2, M2, C2

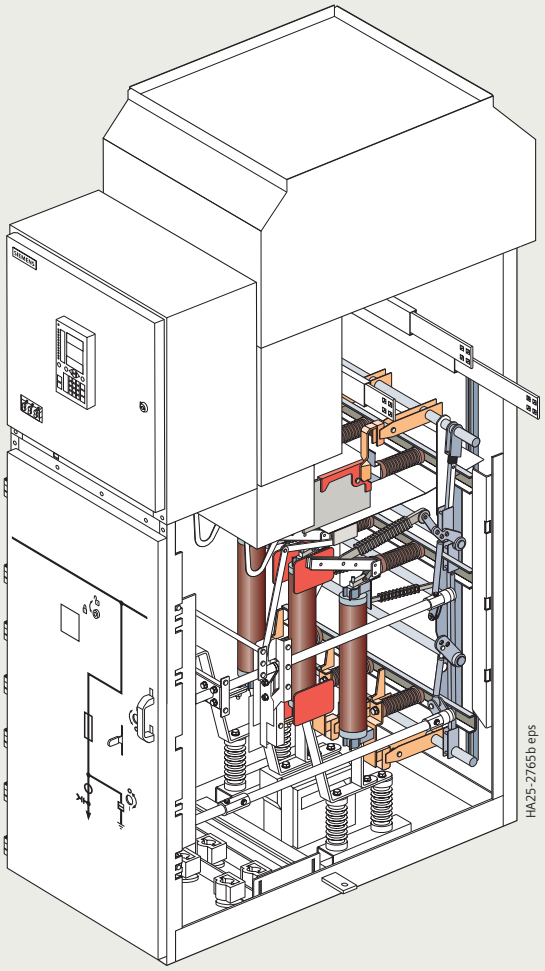
SION vacuum circuit-breaker 3AE5
with withdrawable module

Switch-disconnector/fuse combination

Features

Switch-disconnector/fuse combination according to IEC 62271-105

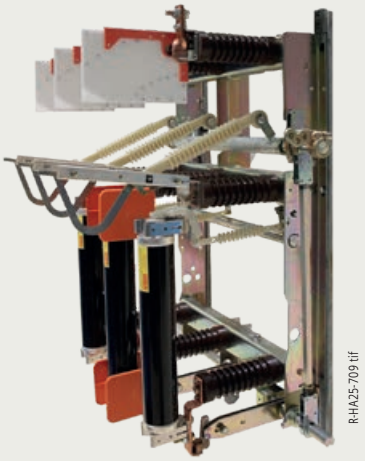
- For switching and protecting auxiliary transformers and small distribution transformers up to 1250 kVA
- Fixed-mounted switch-disconnector, endurance classes M1 and E1
- Stored-energy mechanism, manual operation
- Use of HV HRC fuses with a reference dimension of 442 mm
- With all-pole mechanical tripping through the striker of the HV HRC fuse
- Option:
  - Tripping through electrical shunt release
  - Fuse trip indication through signaling switch (electrical)
- Earthing switch with short-circuit making capacity, manual operation, endurance classes M0, E1
- Maintenance-free operating mechanisms under normal ambient conditions and for the max. permissible number of operating cycles.



Switch-disconnector/fuse combination

Electrical data for	Switch-disconnector/ fuse combination		
Rated voltage	7.2 kV	12 kV	17.5 kV
Rated short-circuit breaking current (max.), 3 s	31.5 kA	31.5 kA	31.5 kA
Rated peak withstand current (max.)	82 kA	82 kA	82 kA
Rated short-circuit making current (max.)	82 kA	82 kA	82 kA
Rated continuous current	200 A [1)]	200 A [1)]	200 A [1)]
Rated transfer current (max.)	800 A	800 A	800 A
Transformer rating (max.)	500 kVA	800 kVA	1250 kVA
Earthing switch			
Rated short-time withstand current (max.), 1 s	16 kA	16 kA	16 kA
Rated peak withstand current (max.)	40 kA	40 kA	40 kA
Rated short-circuit making current (max.)	40 kA	40 kA	40 kA

1) Depending on the HV HRC fuses installed



Switch-disconnector/fuse combination

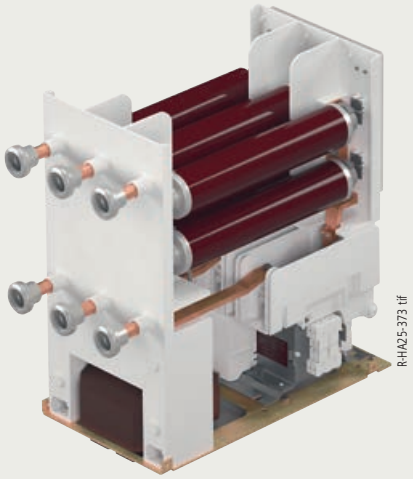
Vacuum contactor

Features

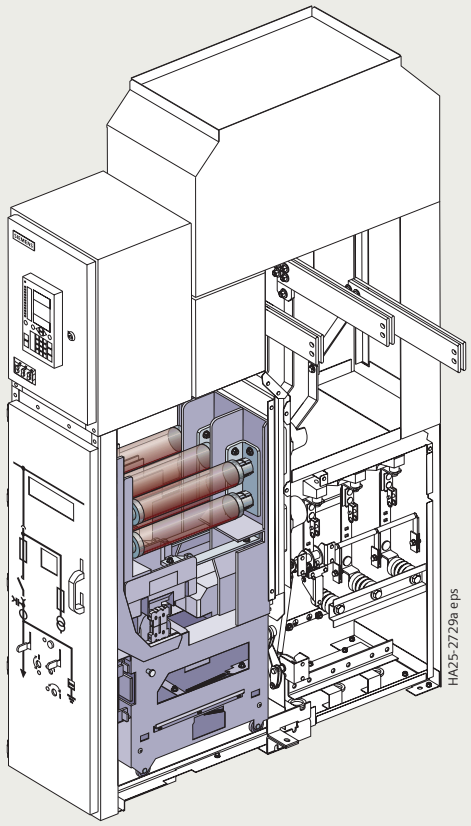
- According to IEC 62271-106
- Suitable for operating consumers with high switching rates
- For switching and protecting MV motors up to 3 MW
- Short-circuit protection via up to 2 HV HRC fuses connected in parallel
- Voltage supply of vacuum contactor coil via primary-fused control transformer or via external power supply
- Optional latching module for the vacuum contactor
- Racking the vacuum contactor via manual operation
- 64-pole low-voltage plug connection between vacuum contactor and fixed part
- Maintenance-free operating mechanisms under normal climatic conditions and for the max. permissible number of operating cycles.

Electrical data for	3TM3
Rated operating voltage	up to 12 kV
Rated short-time withstand current [1]	up to 8 kA
Rated continuous current [2]	450 A
Number of operating cycles:	
of the vacuum contactor, mechanically	up to 1,000,000
of the interrupters, mechanically	up to 500,000
of the vacuum contactor, electrically I_n	up to 500,000

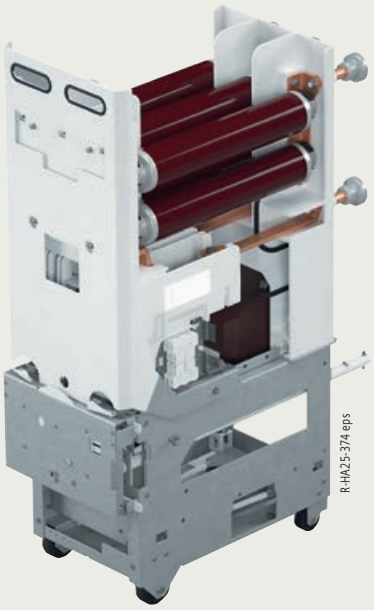
1) Can be used in switchgear with short-time withstand currents up to 40 kA due to the current limitation provided by HV HRC fuses.
2) Depending on the HV HRC fuses installed.



Vacuum-contactor/fuse combination 3TM3



Vacuum contactor



Withdrawable vacuum contactor 3TM3,
HV HRC fuses, and control transformer (option)

Components

Current transformers according to IEC/EN 61869-1 and -2

Block-type current transformer 4MA72

Features

- Inductive indoor support-type current transformer in block-type design
- Cast-resin insulated
- Insulation class E
- Standardized
- Narrow design according to DIN 42600 Part 8
- Secondary connection by means of screw-type terminals

Options

- With coupling electrode for capacitive voltage detecting systems
- Secondary multiratio possible
- Current transformer with type approval and declaration of conformity

Mounting location

- Factory-assembled
- In the connection compartment
- In the busbar metering panel, in the course of the busbar.

Block-type current transformer 4MA72

Bushing-type current transformer 4MD17

Features

- Inductive indoor bushing-type current transformer
- Cast-resin insulated
- Insulation class E
- Secondary connection by means of screw-type terminals

Options

- With coupling electrode for capacitive voltage detecting systems

Mounting location

- Factory-assembled
- In the busbar compartment, between the busbar and the circuit-breaker.

Bushing-type current transformer 4MD17

Electrical data for	Block-type current transformer 4MA72	Bushing-type current transformer 4MD17
Rated operating voltage	up to 17.5 kV	up to 17.5 kV
Rated primary current	up to 4000 A	up to 2500 A
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Rated short-time thermal current	up to 40 kA	up to 31.5 kA
Rated peak withstand current	up to 104 kA	up to 82 kA
Duration of short-time withstand current	1 s or 3 s	1 s or 3 s
Number of secondary cores	up to 3	up to 3
Rated secondary current	1 A or 5 A	1 A or 5 A
Accuracy classes – Measuring – Protection	 0.2 / 0.5 / 1.0 5P / 10P	 0.2 / 0.5 / 1.0 5P / 10P
Rating	up to 30 VA	up to 30 VA

Zero-sequence current transformer 4MC96

Features

- Inductive indoor ring-core current transformer
- Cast-resin insulated
- Insulation class E
- For earth-fault current detection
- Divisible
- Secondary connection by means of screw-type terminals

Mounting location

- At the cable connection
- Inside a deep bottom pan or below the panel.

Zero-sequence current transformer 4MC96

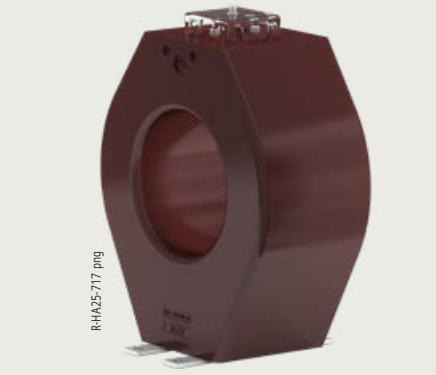
Zero-sequence current transformer KAT/ZCT-130

Features

- Inductive indoor ring-core current transformer
- Cast-resin insulated
- Insulation class E
- For earth-fault current detection
- Closed
- Secondary connection by means of screw-type terminals

Mounting location

- At the cable connection
- Inside a deep bottom pan or below the panel.



Zero-sequence current transformer KAT/ZCT-130

Electrical data for	Zero-sequence current transformer 4MC96	Zero-sequence current transformer KAT/ZCT-130
Rated insulation level	0.72 / 3 / – kV	0.72 / 3 / – kV
Rated primary current	up to 100 A	up to 100 A
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Rated short-time thermal current	up to 25 kA	up to 25 kA
Rated peak withstand current	up to 65 kA	up to 65 kA
Duration of short-time withstand current	1 s or 3 s	1 s or 3 s
Number of secondary cores	1	1
Rated secondary current	1 A	1 A
Accuracy classes – Measuring – Protection	 1FS10 –	 1FS10 –
Rating	1.25 VA	1.25 VA

Components

Current transformers according to IEC/EN 61869-1 and -2

Zero-sequence current transformer MC4_40

Features

- Indoor ring-core current transformer
- Cast-resin insulated
- Insulation class E
- For earth-fault current detection
- Closed
- Cast-in secondary wire

Mounting location

- At the cable connection around the cables
- Inside the panel.

Zero-sequence current transformer MC4_40

Electrical data for	Zero-sequence current transformer MC4_40
Rated insulation level	0.72 / 3 / – kV
Rated primary current	60 A
Rated frequency	50 Hz / 60 Hz
Rated short-time thermal current	up to 25 kA
Rated peak withstand current	up to 65 kA
Duration of short-time withstand current	1 s or 3 s
Number of secondary cores	1
Rated secondary current	1 A
Accuracy classes – Measuring – Protection	 1FS5 –
Rating	2.5 VA

Voltage transformer 4MR

Features
- Inductive indoor support-type voltage transformer in block-type design
- Single-pole
- Cast-resin insulated
- Insulation class E
- Standardized
- Narrow design according to DIN 42600 Part 9
- Without primary fuse
- Secondary connection by means of screw-type terminals

Options
- With earth-fault winding
- Also as two-pole voltage transformer
- Voltage transformer with type approval and declaration of conformity

Mounting location
- Factory-assembled
- In the connection compartment
- In the additional compartment, at the busbar
- In the air-insulated metering panel, on withdrawable part with primary fuses.

Voltage transformer 4MR

Voltage transformer, withdrawable with primary fuse

Features
- Inductive indoor support-type voltage transformer in “revolver” design
- Single-pole
- Cast-resin insulated
- Insulation class E
- With exchangeable primary fuse
- Secondary connection by means of screw-type terminals

Options
- With earth-fault winding

Mounting location
- Factory-assembled
- Withdrawable, with primary fuses, in particular compartment with bushings and shutters to the connection compartment.

Voltage transformer, withdrawable with primary fuse

Electrical data for	Voltage transformer 4MR	Voltage transformer, withdrawable with primary fuse
Rated operating voltage	up to 17.5 kV	up to 17.5 kV
Rated secondary voltage	up to 120 V or up to 120 V /√3	up to 120 V or up to 120 V /√3
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Accuracy classes – Measuring – Protection	 0.2 / 0.5 / 1.0 3P / 6P	 0.2 / 0.5 / 1.0 3P / 6P
Rating	up to 150 VA	up to 150 VA

Components

Passive low-power instrument transformers (current sensors (LPCT) according to IEC/EN 61869-1 and -10)

Bushing-type low-power instrument transformer 4ME

Features

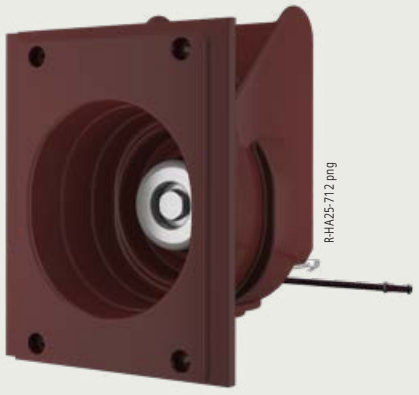
- Indoor bushing-type current sensor
- Current measurement through cast-in Rogowski coil
- Cast-resin insulated
- Insulation class E
- Cast-in secondary wire
- Connection with RJ45 plug connector

Options

- With coupling electrode for capacitive voltage detecting systems
- Additionally available with voltage sensor as a combined sensor

Mounting location

- Factory-assembled
- In the busbar compartment, between the busbar and the circuit-breaker
- In the connection compartment, between the circuit-breaker and the connection.



Bushing-type low-power instrument transformer 4ME

Electrical data for	Bushing-type low-power instrument transformer 4ME
Rated insulation level	0.72 / 3 / – kV
Rated primary current	80 A to 4000 A
Rated frequency	50 Hz / 60 Hz
Rated short-time thermal current	up to 40 kA
Rated peak withstand current	up to 104 kA
Duration of short-time withstand current	1 s or 3 s
Secondary signal	22.5 mV at 80 A and 50 Hz 27 mV at 80 A and 60 Hz
Accuracy classes Measuring / Protection	0.5 / 5P630

Zero-sequence current transformer GAE120/SENS-JW1003

Features

- Indoor ring-core current transformer
- Current measurement through cast-in measuring shunt
- Cast-resin insulated
- Insulation class E
- For earth-fault current detection
- Divisible
- Secondary connection by means of screw-type terminals
- Connection with RJ45 plug connector

Mounting location

- At the cable connection around the cables
- Inside a deep bottom pan or below the panel.

Zero-sequence current transformer GAE120/SENS-JW1003

Electrical data for	Zero-sequence current transformer GAE120/SENS-JW1003
Rated insulation level	0.72 / 3 / – kV
Rated primary current	60 A
Rated frequency	50 Hz / 60 Hz
Rated short-time thermal current	up to 25 kA
Rated peak withstand current	up to 65 kA
Duration of short-time withstand current	1 s
Secondary signal	225 mV at 60 A and 50 Hz 270 mV at 60 A and 60 Hz
Accuracy classes Measuring / Protection	1 FS10

Components

Passive low-power instrument transformers (current sensors (LPCT) according to IEC/EN 61869-1 and -10)

Zero-sequence current transformer MC4_40

Features

- Indoor ring-core current sensor
- Current measurement through cast-in measuring shunt
- Cast-resin insulated
- Insulation class E
- For earth-fault current detection
- Cast-in secondary wire
- Connection with RJ45 plug connector

Mounting location

- At the cable connection around the cables
- Inside the panel.

Zero-sequence current transformer MC4_40

Electrical data for	Zero-sequence current transformer MC4_40
Rated insulation level	0.72 / 3 / – kV
Rated primary current	60 A
Rated frequency	50 Hz / 60 Hz
Rated short-time thermal current	up to 25 kA
Rated peak withstand current	up to 65 kA
Duration of short-time withstand current	1 s
Secondary signal	225 mV at 60 A and 50 Hz 270 mV at 60 A and 60 Hz
Accuracy classes Measuring / Protection	0.5

Bushing-type low-power instrument transformer 4ME

Features

- Indoor bushing-type voltage sensor
- Voltage measurement through cast-in resistor divider
- Cast-resin insulated
- Insulation class E
- Cast-in secondary wire
- Connection with RJ45 plug connector

Options

- With coupling electrode for capacitive voltage detecting systems
- Additionally available with current sensor as a combined sensor

Mounting location

- Factory-assembled
- In the busbar compartment, between the busbar and the circuit-breaker
- In the connection compartment, between the circuit-breaker and the connection.

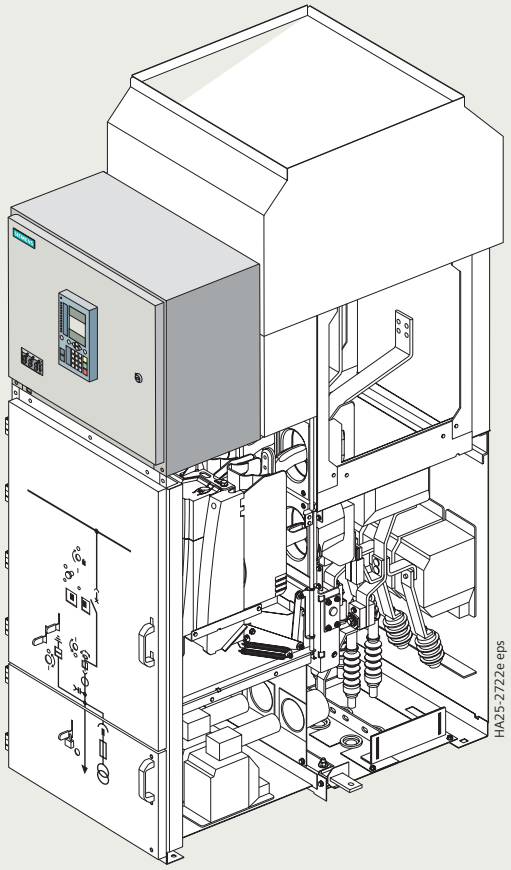
Bushing-type low-power instrument transformer 4ME

Electrical data for	Bushing-type low-power instrument transformer 4ME
Rated operating voltage	3.0 kV to 15.4 kV
Rated secondary voltage	3.25 V/√3 at 17.5 kV /√3
Rated frequency	50 Hz/60 Hz
Rated voltage factor	1.9
Rated time	8 h
Rated phase offset (phi)	0°
Accuracy classes – Measuring – Protection	 0.5 3P

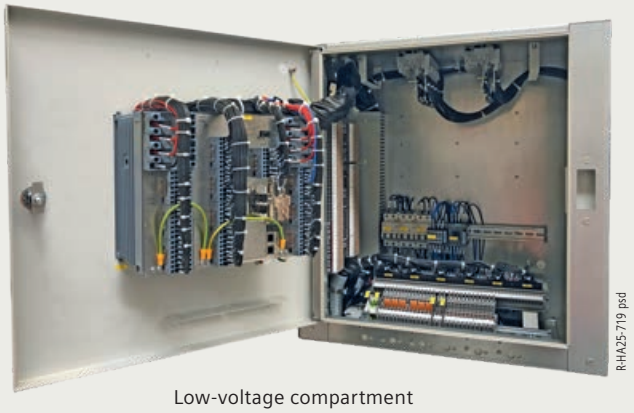
Low-voltage compartment

Features

- Low-voltage compartment for accommodation of all protection, control, measuring, and metering equipment
- Partitioned safe-to-touch off the high-voltage part
- Low-voltage compartment can be removed, as all bus wires and control cables are plugged in
- Option: Higher low-voltage compartment
- Option: Separation wall from panel to panel
- Low-voltage cables are flexible and protected by metal covers
- Connection of withdrawable part wiring and panel wiring to low-voltage compartment via 10-pole, coded plug connections
- Bus wires can be plugged from panel to panel.



Low-voltage compartment



Low-voltage compartment
with built-in components (example)

Door of low-voltage compartment (example)

Optical arc detection systems

Description

- Optical arc detection systems recognize internal arcs by means of optical sensors. This allows to detect arising internal arcs reliably and quickly. Accordingly, the protection device can trip quickly and without delay times.
- The internal arc is interrupted within 100 ms and prevents damage to the switchgear, which would otherwise occur due to the thermal phase of the internal arc.

Benefits

- Reliable detection of internal arcs
- Extremely fast break times ≤ 100 ms
  incl. the total break time of the circuit-breaker
- Clear reduction of the arc energy
- Minimization of thermal damage
- Increase of personal safety
- Minimization of downtimes
- EMC-safe thanks to purely optical sensors.

Design and function

- Basic components
  - Optical sensors in every compartment
  - Bay controller
  - Circuit-breaker
- Internal arcs are detected optically, almost without delays and by using an additional current criterion for preventing overfunctioning, e.g. due to external light
- Tripping of the circuit-breaker and interruption of the arc fault current within 100 ms.

Versions

Siemens SIPROTEC 5 with arc protection module

- Optical point sensors with optical fiber for signal transmission
- Line sensors in the busbar compartment possible as an option
- Arc protection module with three inputs for connection of optical point sensors or line sensors
- SIPROTEC 5 with protection function.

On request, selected optical arc detection systems can be installed as autonomous devices.

Bay controller of the SIPROTEC 5 series

Arc protection module ARC-CD-3FO

Point sensor with optical fiber and connection

Supply cable for line sensor with connection

Line sensor

Components
SIQuench arc quenching device

SIQuench arc quenching device

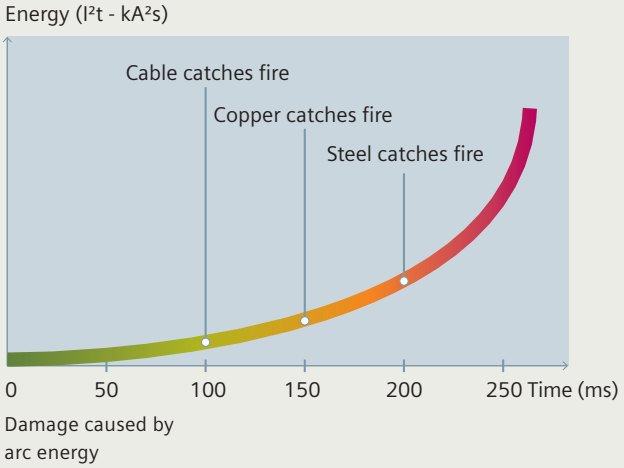
Description
- SIQuench is an active arc detection system by Siemens, which quenches the internal arc in a time span of less than 5 milliseconds.

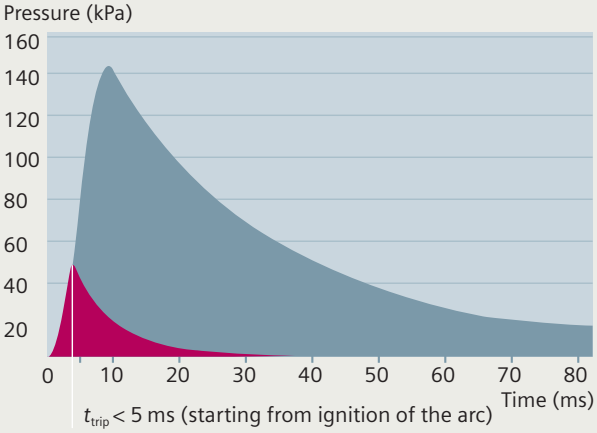
Benefits
- Considerable reduction of pressure and arc energy
- Prevents thermal, contamination and toxicity effects from damaging the equipment with its surroundings
- Fast restart
- Minimization of switchgear downtimes and reduction of economic losses.

Design and function
- Basic components
  - SIQuench main switch unit
  - Controller
  - Optical sensors
  - Time-overcurrent protection
- Continuous monitoring of light and overcurrent; in the event of an internal arc, SIQuench earths the switchgear quickly by means of a controlled mechanical 3-phase short circuit.
- Definitive breaking of the short-circuit current through the circuit-breaker of the incoming feeder.

Technical data
- Up to 17.5 kV, up to 40 kA
- Fast mechanical stored-energy spring mechanism
- Continuous self-monitoring
- 5 switching operations at full rated short-time withstand current (with peak withstand current)
- 30 switching operations without load possible for testing or commissioning purposes
- Maintenance-free for 20 years
- Service life of 30 years as a minimum.

Installation possibilities
- In top box at the busbar (fixed-mounted)
- Factory-assembled and -tested.





Sample pressure curve in a compartment for an arc fault current of 80 kA (peak)/31.5 kA (r.m.s.)

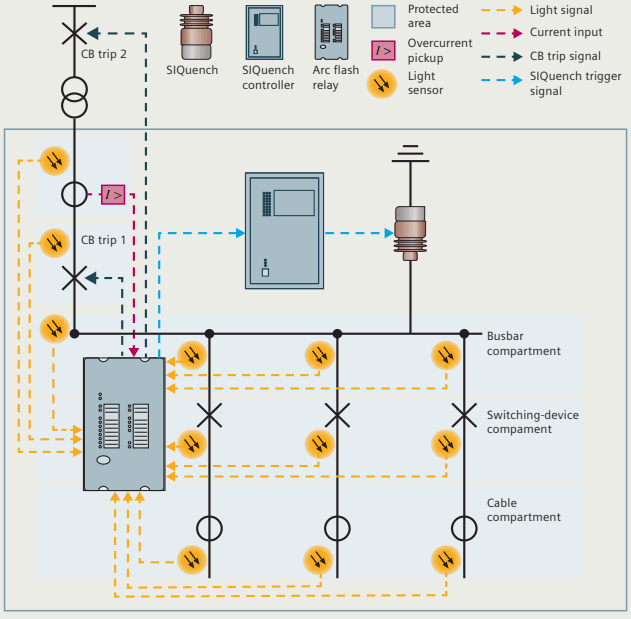


Illustration of the system integration in an exemplary arc protection application (one incoming feeder with single protection zone)

Electrical data

Rated values up to 40 kA

Rated voltage		kV	7.2	12	17.5
Rated frequency		Hz		50/60	
Rated short-duration power-frequency withstand voltage (phase-to-phase, phase-to-earth)		kV	20[1]	28[1]	38
Rated lightning impulse withstand voltage (phase-to-phase, phase-to-earth)		kV	60	75	95
Rated short-circuit breaking current		max. kA		40	
Rated short-time withstand current, 3 s		max. kA		40	
Rated short-circuit making current[2]		max. kA		100 / 104	
Rated peak withstand current[2]		max. kA		100 / 104	
Rated continuous current of the busbar		max. A		4000	
Rated continuous current of the feeders	With circuit-breaker	max. A		4000	
	With withdrawable vacuum contactor[3]	max. A	450	450	–
	With withdrawable disconnector link	max. A		4000	
	With switch-disconnector / fuse combination[3][4]	max. A		200	
	Bus sectionalizer	max. A		4000	
	Busbar connection panel	max. A		4000	

Internal arc classification

Rated voltage	kV	7.2	12	17.5
Arc fault current	max. kA		40	
Arc fault duration	s		1	
Classification			A FLR	

Degree of protection

Enclosure	Standard	IP3XD
	Options	IP4X
		IP31 / IP32
		IP41 / IP42
		IP50 / IP51
Between the compartments	Standard	IP2X
	Option	IP3X

Loss of service continuity category

Panel with circuit-breaker	LSC 2B
Panel with withdrawable disconnector link	LSC 2B
Panel with vacuum-contactor / fuse combination	LSC 2B
Panel with fixed-mounted switch-disconnector / fuse combination	LSC 2
Busbar connection panel	LSC 1
Panels without connection compartments are not assigned a loss of service continuity category according to IEC 62271-200.	

Partition class

Panels in withdrawable design	PM	Partitions made of metallic material
Panel with fixed-mounted switch-disconnector / fuse combination		Partitions made of non-metallic material

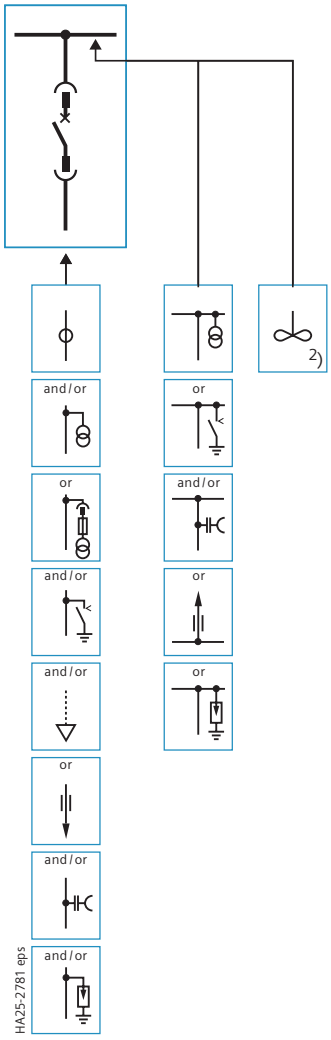
1) 32 kV or 42 kV optional for GOST standard
2) Values for 50 Hz: 100 kA, 60 Hz: 104 kA
3) Current values dependent on HV HRC fuses, for GOST standard max. 32 kV short-duration power-frequency withstand voltage
4) Switch-disconnector/fuse combination only up to 31.5 kA

Technical data

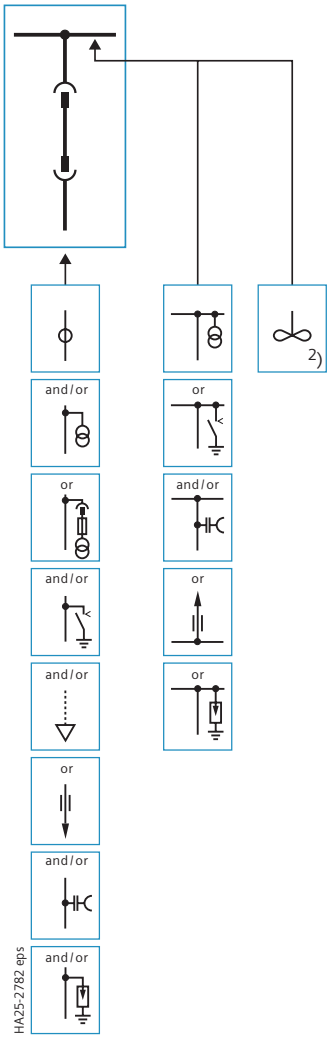
Product range, single busbar

- Current transformer
- Voltage transformer
- Withdrawable voltage transformers with primary fuses
- Make-proof earthing switch, optionally manual or motor operation
- Capacitive voltage detecting system
- Cable sealing ends [1] max. 6 × 500 mm² per phase
- Outgoing bar feeder
- Withdrawable circuit-breaker, optionally manual or motor operation
- Withdrawable disconnector link with manual operation
- Forced ventilation
- Bar connection
- Arrester

Circuit-breaker panel

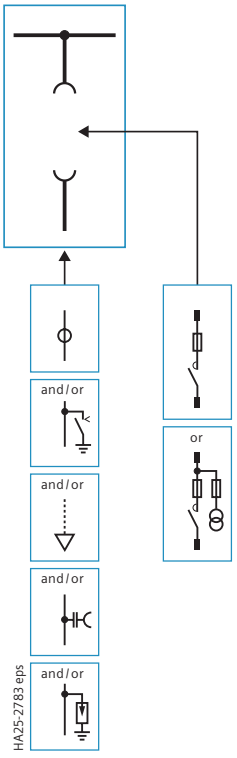


Disconnecting panel

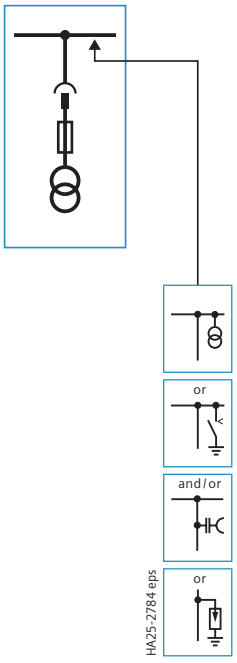


1) The details refer to conventional single-core sealing ends and depend on the rated continuous current and other built-in components.
2) (optionally with redundant fans) Only required for 4000 A with 1000 mm panels.

Vacuum contactor panel



Metering panel



- Current transformer
- Voltage transformer
- Withdrawable voltage transformers with primary fuses
- Make-proof earthing switch, optionally manual or motor operation
- Capacitive voltage detecting system
- Cable sealing ends [1] max. 2 × 240 mm² per phase
- Withdrawable vacuum contactor with HV HRC fuses
- Withdrawable vacuum contactor with control transformer and HV HRC fuses
- Arrester

For other components in the busbar and connection compartments, see page 15.

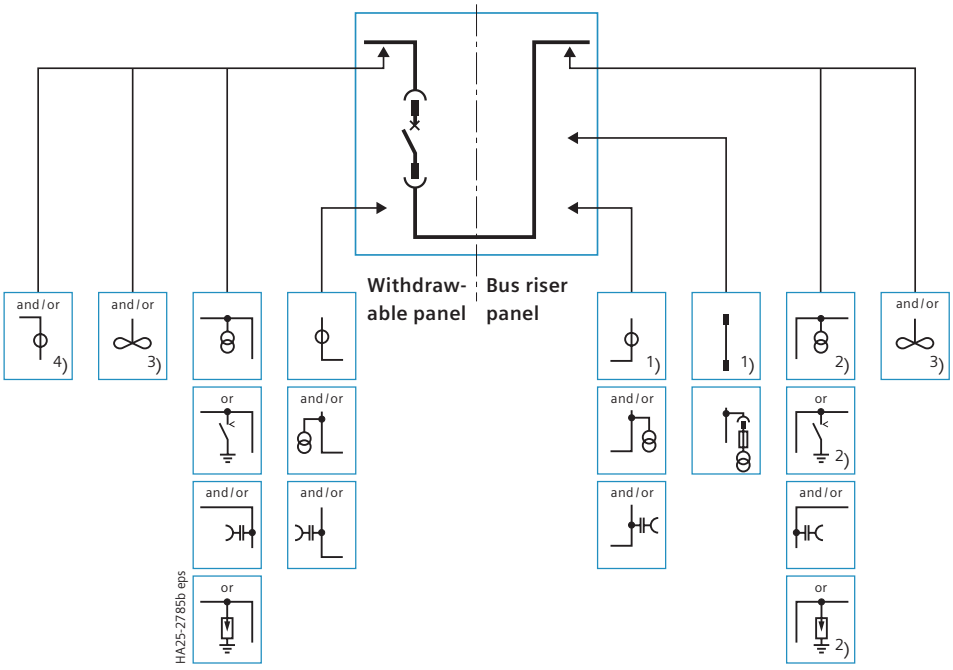
1) The details refer to conventional single-core sealing ends and depend on the rated continuous current and other built-in components.

Technical data

Product range, single busbar

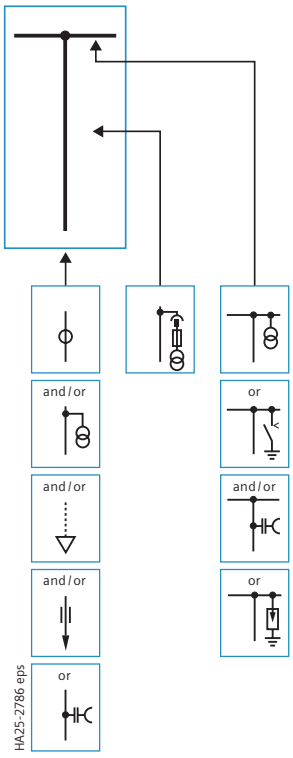
- Current transformer
- Voltage transformer
- Make-proof earthing switch, optionally manual or motor operation
- Capacitive voltage detecting system
- Withdrawable circuit-breaker, optionally manual or motor operation
- Withdrawable disconnector link with manual operation
- Withdrawable voltage transformers with primary fuses
- Forced ventilation
- Arrester

Bus sectionalizer (mirror-image installation also possible)



1) Current transformers only possible in combination with withdrawable disconnector link.
2) Voltage transformers, earthing switch, or surge arresters at the busbar not possible for busbar currents ≥ 2000 A.
3) (optionally with redundant fans)
Only required for 4000 A with 1000 mm panels.
4) Bushing-type current transformer up to 31.5 kA, up to 2500 A.

Busbar connection panel



For other components in the busbar and connection compartments, see page 15.

Current transformer

Voltage transformer

Make-proof earthing switch, optionally manual or motor operation

Capacitive voltage detecting system

Cable sealing ends [1] max. 6 × 500 mm² per phase

Outgoing bar feeder

Withdrawable voltage transformers with primary fuses

Arrester

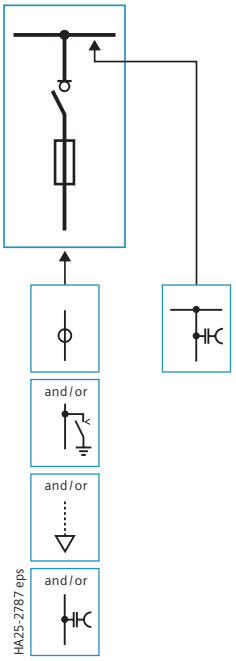
1) The details refer to conventional single-core sealing ends and depend on the rated continuous current and other built-in components.

Technical data

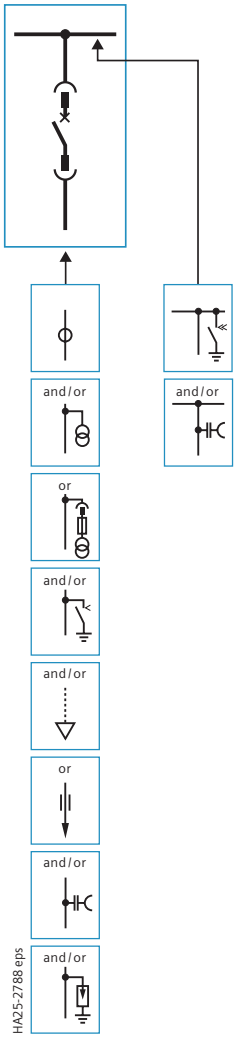
Product range, single busbar

- Current transformer
- Voltage transformer
- Withdrawable voltage transformers with primary fuses
- Make-proof earthing switch, optionally manual or motor operation
- Capacitive voltage detecting system
- Cable sealing ends [1] max. 6 × 500 mm² per phase
- Outgoing bar feeder
- Withdrawable circuit-breaker, optionally manual or motor operation
- SIQuench arc quenching device
- Switch-disconnector with HV HRC fuses
- Arrester

Switch-disconnector panel with HV HRC fuses

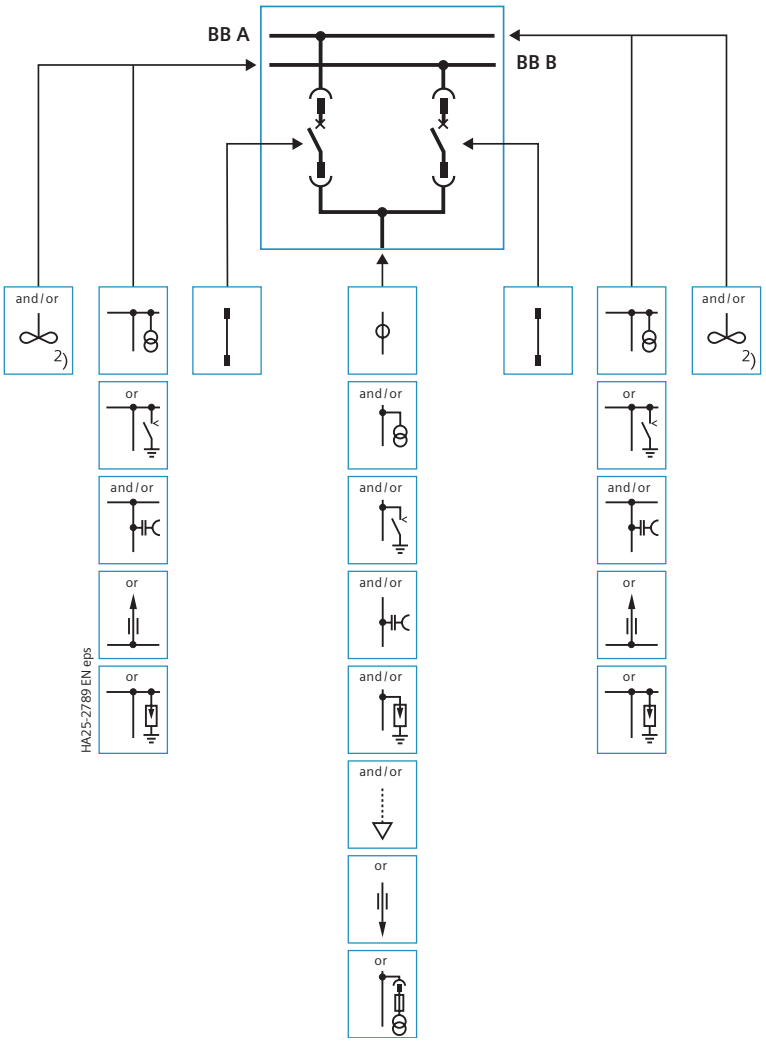


Panels with SIQuench arc quenching device as fixed-mounted design



1) The details refer to conventional single-core sealing ends and depend on the rated continuous current and other built-in components.

Circuit-breaker panel (incoming sectionalizer)



For other components in the busbar and connection compartments, see page 15.

BB A = Busbar A

BB B = Busbar B

Current transformer

Voltage transformer

Withdrawable voltage transformers with primary fuses

Make-proof earthing switch, optionally manual or motor operation

Capacitive voltage detecting system

Cable sealing ends [1] max. 6 × 500 mm² per phase

Outgoing bar feeder

Withdrawable circuit-breaker, optionally manual or motor operation

Withdrawable disconnector link with manual operation

Forced ventilation

Bar connection

Arrester

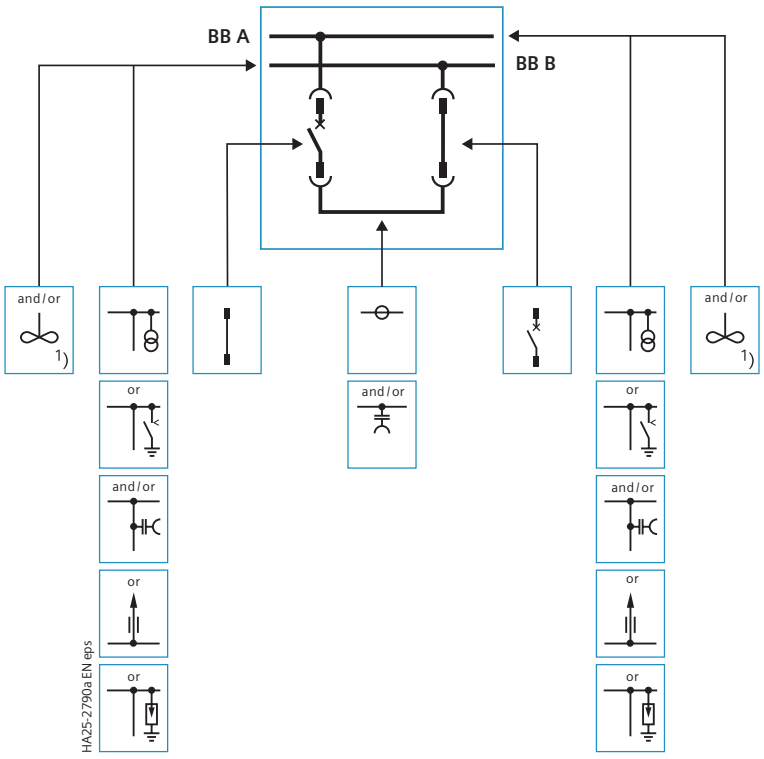
1) The details refer to conventional single-core sealing ends and depend on the rated continuous current and other built-in components.
2) (optionally with redundant fans) Only required for 4000 A with 1000 mm panels.

Technical data

Product range, duplex (back-to-back)

- Current transformer
- Voltage transformer
- Make-proof earthing switch, optionally manual or motor operation
- Capacitive voltage detecting system
- Withdrawable circuit-breaker, optionally manual or motor operation
- Withdrawable disconnector link with manual operation
- Forced ventilation
- Bar connection
- Arrester

Bus coupler

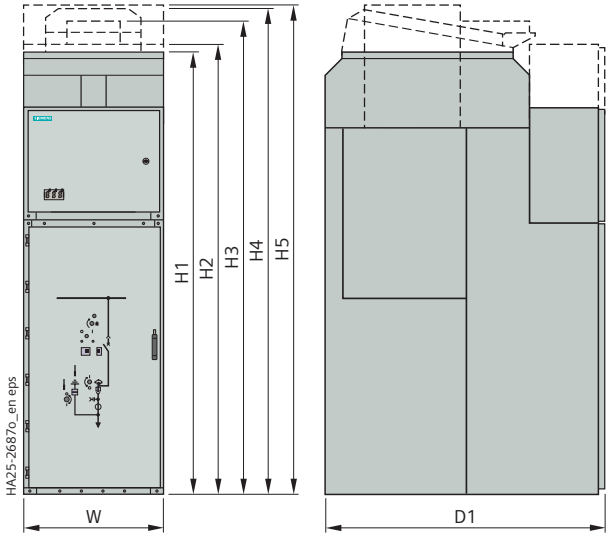


BB A = Busbar A

BB B = Busbar B

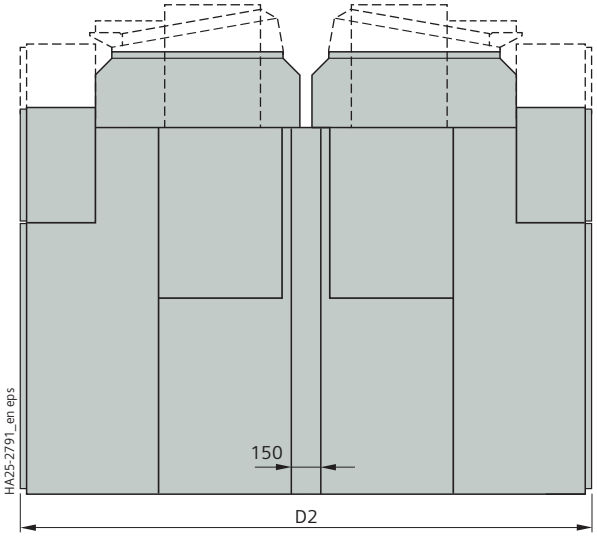
1) (optionally with redundant fans)
Only required for 4000 A with 1000 mm panels.

Single busbar



Double busbar

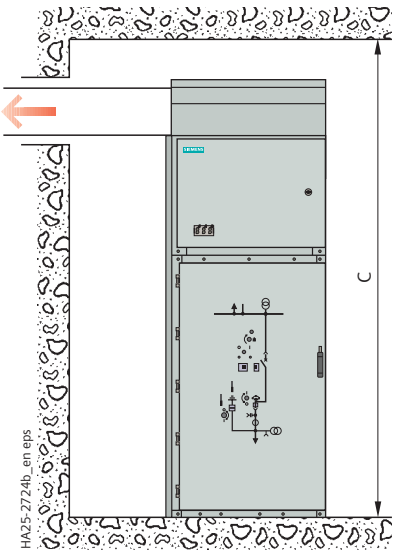
(back-to-back arrangement)

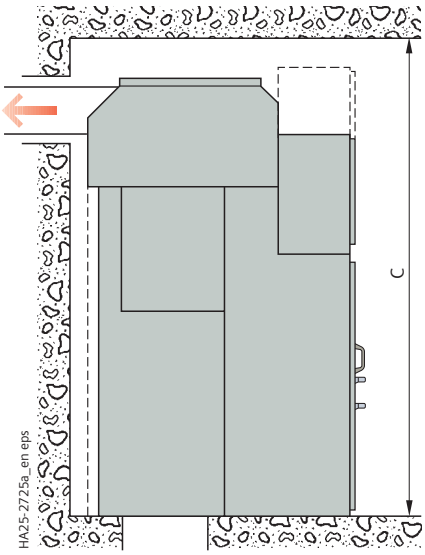


Dimensions		Panel type	Rated continuous current	Short-time withstand current ≤ 31.5 kA	Short-time withstand current 40 kA
Width	W	Circuit-breaker panel, disconnecting panel	630 A	600 mm[3]	–
			1000 A	600 mm[3]	–
			1250 A	800 mm	800 mm
			2000 A	800 mm	800 mm
			2500 A	1000 mm	1000 mm
			3150 A	1000 mm	1000 mm
			4000 A	1000 mm	1000 mm
		Bus sectionalizer	1250 A	2 × 800 mm	2 × 800 mm
			≥ 2000 A	2 × 1000 mm	2 × 1000 mm
				1 × 800 mm	1 × 800 mm
				1 × 1000 mm	1 × 1000 mm[1]
		Metering panel	–	600 mm	800 mm
		Vacuum contactor panel	450 A[5]	435 mm	435 mm
		Switch-disconnector panel with HV HRC fuses	≤ 200 A[5]	800 mm	–
		Busbar connection panel	1250 A	800 mm	800 mm
			2500 A	800 mm	800 mm
			3150 A	1000 mm	1000 mm
			4000 A	1000 mm	1000 mm
Height	H1	Standard panel or standard panel with natural ventilation		2300 mm	2300 mm
	H2	With higher low-voltage compartment or additional compartment for busbar components		2350 mm	2350 mm
	H3	With forced ventilation		2450 mm	2450 mm
	H4	With optional arc absorber[2] for 12 kV, > 25 kA, or generally for 17.5 kV		2500 mm	2500 mm
Depth	D1	Single busbar, all panel types (except vacuum contactor panel)	–	1350 mm[4]	1500 mm[4]
		Vacuum contactor panel	–	1400 mm	1500 mm
	D2	Double busbar	≤ 2500 A	2850 mm	3150 mm
		Busbar current	> 2500 A	3150 mm	3150 mm

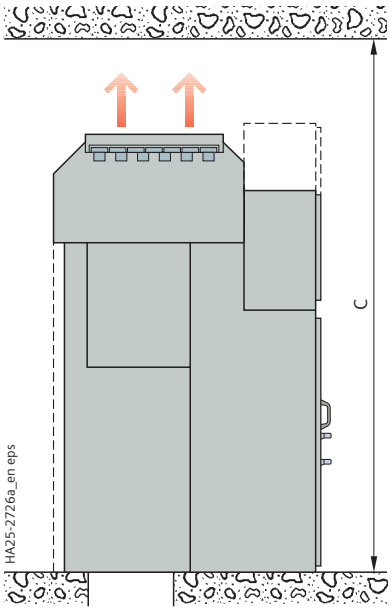
1) Depending on rated continuous current and design of bus riser panel
2) Number of absorbers dependent on switchgear configuration
3) Disconnecting panel not with 600 mm
4) Panels with a rated continuous current of 3150 A or 4000 A and a depth of 1540 mm
5) Depending on the HV HRC fuse installed

Pressure relief out of the switchgear room through a pressure relief duct





Pressure relief into the switchgear room through absorbers

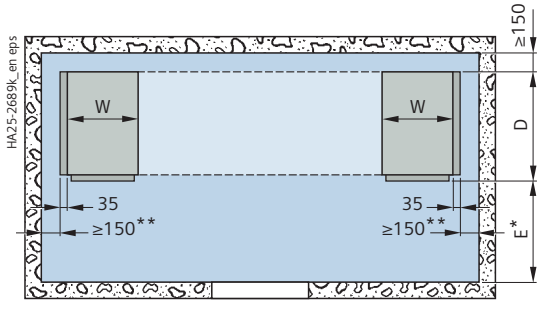


Type of pressure relief	Rated voltage	Ceiling height C at short-circuit current Short-time withstand current 25 kA	Short-time withstand current 31.5 kA	Short-time withstand current 40 kA
Pressure relief into the switchgear room through absorbers	12 kV 17.5 kV	≥ 2800 mm ≥ 3500 mm	≥ 3000 mm ≥ 3500 mm	≥ 3500 mm ≥ 3500 mm
Pressure relief out of the switchgear room through a pressure relief duct [1)]	≤ 17.5 kV	≥ 2500 mm	≥ 2500 mm	≥ 2500 mm

Type of pressure relief	Rated voltage	Ceiling height C for panels with an additional roof for upgrading the degree of protection IPX1/IPX2 with Short-time withstand current 25 kA	Short-time withstand current 31.5 kA	Short-time withstand current 40 kA
Pressure relief into the switchgear room through absorbers	12 kV 17.5 kV	≥ 3000 mm ≥ 3500 mm	≥ 3000 mm ≥ 3500 mm	≥ 3500 mm ≥ 3500 mm
Pressure relief out of the switchgear room through a pressure relief duct [1)]	≤ 17.5 kV	≥ 2800 mm	≥ 2800 mm	≥ 2800 mm

1) For designs with a closed pressure relief duct to the outside, a distance of ≥ 500 mm is required on this side.
In case of a lower ceiling height, please contact your Siemens partner.

Wall-standing arrangement for single busbar

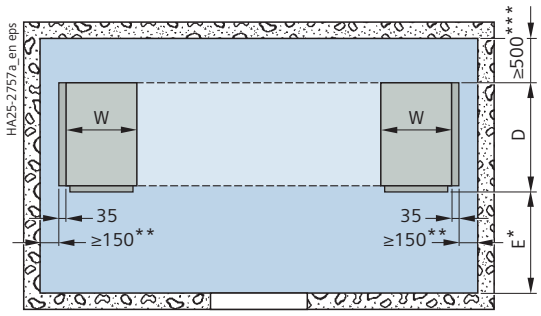


All panels with cable connection at the front

* Control aisle E depending on national requirements:
- For replacement of switching devices
  ≥ 1250 mm recommended
- For extension / panel replacement
  ≥ 1700 mm recommended

** Lateral wall distances on the left or on the right:
  ≥ 150 mm recommended (acc. to IEC 62271-200)
- For installation and maintenance
  ≥ 500 mm recommended (acc. to IEC 61936-1)

Free-standing arrangement for single busbar



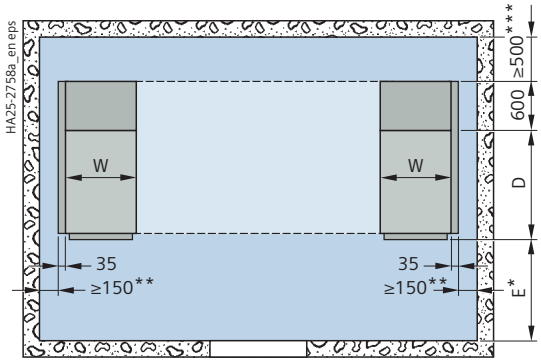
All panels with cable connection at the front or at the rear

* Control aisle E depending on national requirements:
- For replacement of switching devices
  ≥ 1250 mm recommended
- For extension / panel replacement
  ≥ 1700 mm recommended

** Lateral wall distances on the left or on the right:
≥ 150 mm recommended (acc. to IEC 62271-200)
- For installation and maintenance (acc. to IEC 61936-1)
  ≥ 500 mm recommended

*** ≥ 500 mm aisle for installation and maintenance
(acc. to IEC 61936-1)
≥ 800 mm aisle for operation (acc. to IEC 62271-200)

Free-standing arrangement for single busbar



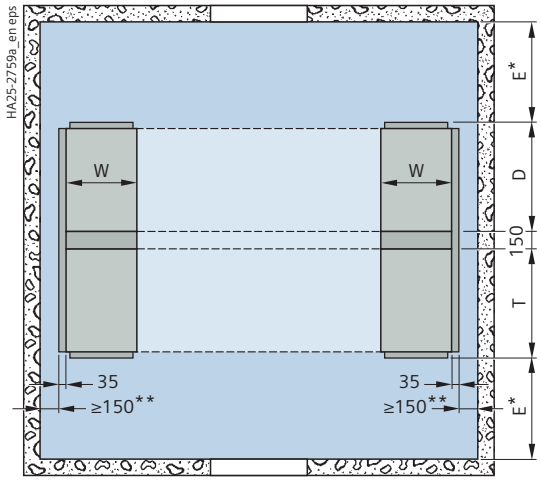
All panels with top-rear cable connection and rear cable duct

* Control aisle E depending on national requirements:
- For replacement of switching devices
  ≥ 1250 mm recommended
- For extension / panel replacement
  ≥ 1700 mm recommended

** Lateral wall distances on the left or on the right:
≥ 150 mm recommended (acc. to IEC 62271-200)
- For installation and maintenance (acc. to IEC 61936-1)
  ≥ 500 mm recommended

*** ≥ 500 mm aisle for installation and maintenance
(acc. to IEC 61936-1)
≥ 800 mm aisle for operation (acc. to IEC 62271-200)

Free-standing arrangement in duplex design (back-to-back)



All panels with cable connection at the front

* Control aisle E depending on national requirements:
- For replacement of switching devices
  ≥ 1250 mm recommended
- For extension / panel replacement
  ≥ 1700 mm recommended

** Lateral wall distance ≥ 150 mm optionally possible on the left or on the right:
≥ 500 mm for installation and maintenance
(acc. to IEC 61936-1) recommended
≥ 800 mm aisle for operation (acc. to IEC 62271-200)
≥ 1000 mm for panel replacement (panels of 435 mm, 600 mm, 800 mm)
≥ 1200 mm for panel replacement (panels of 1000 mm)

Technical data

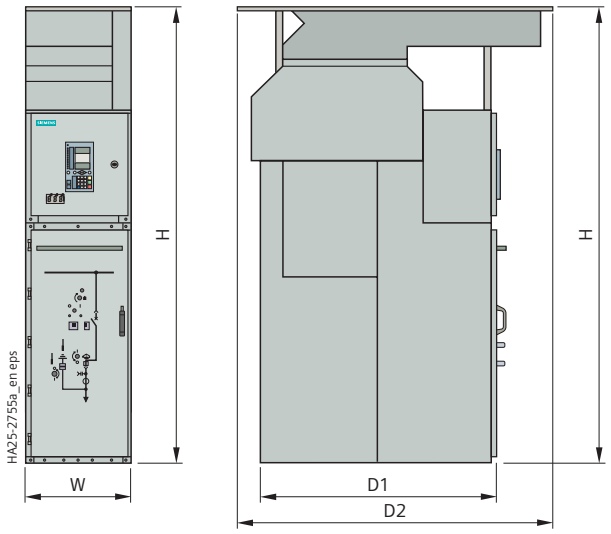
Typical for marine/offshore

Typical for marine/offshore

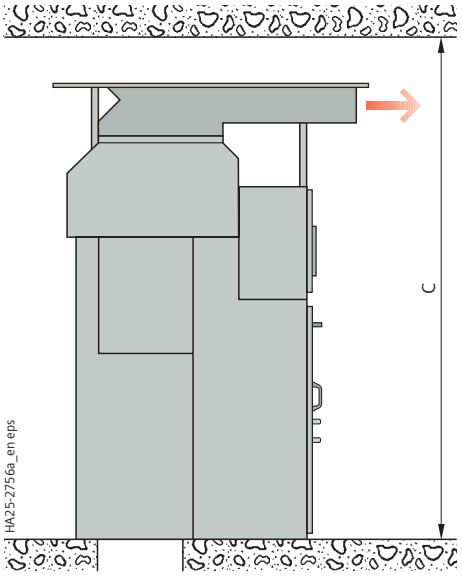
Features

- Special design for application in marine and offshore areas, based on the NXAIR standard product range
- Available up to 12 kV, up to 40 kA, and up to 2500 A
- Factory-assembled, metal-enclosed and type-tested switchgear according to IEC 62271-200
- Type approvals from DNV and LRS
- Internal arc classification IAC A FLR up to 40 kA for 1 second
- Pressure relief into the switchgear room through absorbers and exhaust, with an optimized ceiling height of 2800 mm
- Compact design and low panel heights allow for installation even in rooms with a low ceiling height or in rooms with girders
- Degrees of protection IP31, IP32, IP41 or IP42 are possible
- Verification by an inclination test with an inclination angle of ± 22.5 ° in all directions
- Verification of vibration or shock tests in conformity with the main shipping registers
- Operation possible at ambient air temperatures from –5 °C to +55 °C
- For temperature supervision of cable connections, IR-permeable inspection windows or wireless temperature sensors can optionally be used
- Minimum used of insulating material as well as halogen-free wires reduce the possible fire load.

Dimensions



Pressure relief into the switchgear room through absorbers



NXAIR ≤ 12 kV; ≤ 40 kA; ≤ 2500 A with roof for upgrading the degree of protection IPX1/IPX2

Dimensions		Panel type	Rated continuous current	Short-time withstand current ≤ 31.5 kA	Short-time withstand current 40 kA
Width	W	Circuit-breaker panel, disconnecting panel	630 A	600 mm [2]	–
			1000 A	600 mm [2]	–
			1250 A	800 mm	800 mm
			2000 A	800 mm	800 mm
			2500 A	1000 mm	1000 mm
		Bus sectionalizer	1250 A	2 × 800 mm	2 × 800 mm
			2500 A	2 × 1000 mm	2 × 1000 mm
				1 × 800 mm	1 × 800 mm
				1 × 1000 mm	1 × 1000 mm [1]
		Metering panel	–	600 mm	800 mm
		Vacuum contactor panel	≤ 450 A [4]	435 mm	435 mm
		Switch-disconnector panel with HV HRC fuses	≤ 200 A [4]	800 mm	–
		Busbar connection panel	1250 A, 2500 A	800 mm	800 mm
			3150 A, 4000 A	1000 mm	1000 mm
Height	H	Standard panel or standard panel with natural ventilation with higher low-voltage compartment, or additional compartment for busbar components, or with forced ventilation		2600 mm	2600 mm
Depth	D1	Single busbar, all panel types (except vacuum contactor panel)	–	1350 mm [3]	1500 mm [3]
		Vacuum contactor panel	–	1400 mm	1500 mm
	D2	Single busbar, all panel types with roof for IPX1 / IPX2	–	1820 mm	1970 mm

1) Depending on rated continuous current and design of bus riser panel
2) Disconnecting panel not with 600 mm
3) Panels with a rated continuous current of 3150 A or 4000 A and a depth of 1540 mm
4) Depending on the HV HRC fuse installed

Type of pressure relief	Rated continuous current	Ceiling height C at short-circuit current		
		Short-time withstand current 25 kA	Short-time withstand current 31.5 kA	Short-time withstand current 40 kA
Pressure relief into the switchgear room through absorbers	12 kV	≥ 2800 mm	≥ 2800 mm	≥ 2800 mm

Single-row arrangement (plan view) for single-busbar switchgear, see pages 42 and 43.

Technical data
Transport and packing

Transport and packing

Transport

NXAIR switchgear is delivered in form of individual panels.
The following must be observed:

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

Packing

Means of transport: Rail and truck

- Panels on pallets
- Open packing with PE protective film.

Means of transport: Seafreight

- Panels on pallets
- Sealed in PE protective film, with closed wooden box
- With desiccant bags
- With sealed wooden base
- Max. storage time: 12 months.

Means of transport: Airfreight

- Panels on pallets
- In wooden latticed crate with sealed upper and lower PE protective film.

These transport and packing stipulations apply to the complete NXAIR product family. More information on transport dimensions / transport weights is given in the corresponding table.

Dimensions, weights

Transport	Panel spacing	Transport dimensions			Transport weight [1]	
	mm	Width mm	Height mm	Depth mm	with packing kg	without packing kg
NXAIR up to 40 kA						
Truck or rail	1 × 435	800	2510	1610	800	770
	1 × 600	800	2510	1610	980	950
	1 × 800	1000	2510	1610	1240	1200
	1 × 1000	1200	2510	1610	1390	1350
	1 × 1000 mm [2]	1200	2510	1610	1690	1650
Seafreight or airfreight	1 × 435	820	2541	1830	900	770
	1 × 600	820	2541	1830	1080	950
	1 × 800	1020	2541	1830	1350	1200
	1 × 1000	1220	2541	1830	1510	1350
	1 × 1000 mm [2]	1220	2541	1830	1810	1650

1) Average values, depending on the degree to which panels are equipped
2) 4000 A panels (with forced ventilation) and 3150 A panels

Type of service location

- The switchgear can be used at the following locations as an indoor installation according to IEC 61936
  - Outside lockable electrical service locations at places which are not accessible to the public. Enclosures of switchgear can only be removed with tools.
  - In 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.

Dielectric strength

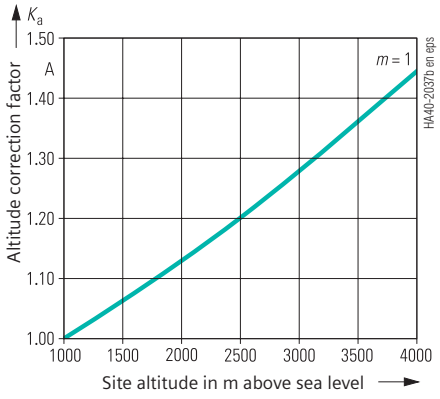
- The dielectric strength is verified by testing the switchgear with rated values of short-duration power-frequency withstand voltage and lightning impulse withstand voltage according to IEC 62271-1 (see table "Dielectric strength").
- The rated values are referred to sea level and to normal atmospheric conditions (1013 hPa, 20 °C, 11 g/m³ water content according to IEC 60071.
- 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, but leave this to the scope of special agreements.
- Site altitude
  - The dielectric strength of air insulation decreases with increasing altitude due to low air density. This reduction is permitted up to a site altitude of 1000 m according to IEC.
  - 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 for dielectric strength

Rated voltage (r.m.s. value)	kV	7.2	12	15	17.5	24
Rated short-duration power-frequency withstand voltage (r.m.s. value)						
– Between phases and to earth	kV	20	28	36	38	50
– Across isolating distances	kV	23	32	40	45	60
Rated lightning impulse withstand voltage (peak value)						
– Between phases and to earth	kV	60	75	95	95	125
– Across isolating distances	kV	70	85	105	110	145

Altitude correction factor K_a

For site altitudes above 1000 m, the altitude correction factor K_a is recommended, depending on the site altitude above sea level.



Rated short-duration power-frequency withstand voltage to be selected for site altitudes > 1000 m

≥ Rated short-duration power-frequency withstand voltage up to ≤ 1000 m · K_a

Rated lightning impulse withstand voltage to be selected for site altitudes > 1000 m

≥ Rated lightning impulse withstand voltage up to ≤ 1000 m · K_a

Example:

3000 m site altitude above sea level,
17.5 kV switchgear rated voltage,
95 kV rated lightning impulse withstand voltage

Rated lightning impulse withstand voltage to be selected =
95 kV · 1.28 = 122 kV

Result:

According to the above table, switchgear for a rated voltage of 24 kV with a rated lightning impulse withstand voltage of 125 kV is to be selected.

Standards

Standards, specifications, guidelines

Standards

		IEC standard / EN standard	Title
Switchgear		62271-1	High-voltage switchgear and controlgear: Common specifications for alternating current switchgear and controlgear
		62271-200	High-voltage switchgear and controlgear: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
Switching devices	Circuit-breakers	62271-100	High-voltage switchgear and controlgear: Alternating-current circuit-breakers
	Vacuum contactors	62271-106	High-voltage switchgear and controlgear: Alternating current contactors, contactor-based controllers and motor-starters
	Disconnectors and earthing switches	62271-102	High-voltage switchgear and controlgear: Alternating current disconnectors and earthing switches
	Switch-disconnectors	62271-103	High-voltage switchgear and controlgear: Switches for rated voltages above 1 kV up to and including 52 kV
	Switch-disconnector/ fuse combinations	62271-105	High-voltage switchgear and controlgear: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV
Voltage detecting systems		62271-213	Voltage detecting and indicating system (VDIS)
		62271-215	Phase comparator used with VDIS
HV HRC fuses		60282-1	High-voltage fuses: Current-limiting fuses
Surge arresters		60099-4	Surge arresters
Degree of protection		60529	Degrees of protection provided by enclosures (IP code)
		62262	Degree of protection provided by enclosures (IK code)
Insulation		60071	Insulation co-ordination
Instrument transformers		61869-1	Instrument transformers
		61869-2	Current transformers
		61869-3	Voltage transformers
		61869-6	Low-power instrument transformers
		61869-10	Low-power passive current transformers
		61869-11	Low-power passive voltage transformers
Installation		61936-1	Power installations exceeding 1 kV a.c.
Environmental conditions		60721-3-3	Classification of environmental conditions
Operation		EN 50110	Operation of electrical installations

Standards

The 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.

Current-carrying capacity

- According to IEC 62271-200 or IEC 62271-1, the rated continuous 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 shall be ensured by means of tests for verifying the internal arc classification
- Internal arcing tests must be performed in accordance with IEC 62271-200
- Definition of criteria:
  - Criterion 1: Correctly secured doors and covers do not open, limited deformations are accepted
  - Criterion 2: No fragmentation of the enclosure, no projection of small parts above 60 g
  - 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
- Beyond the specifications of the above-mentioned standards, NXAIR switchgear up to 31.5 kA/1 s is optionally designed with confinement of internal arcs to the respective compartment.

Seismic withstand capability (option)

NXAIR switchgear can be upgraded for regions at risk from earthquakes. For this upgrade, earthquake qualification testing has been carried out in accordance with the following standards:

- IEC/TS 62271-210 "Seismic qualification for metal enclosed switchgear and controlgear for rated voltages above 1 kV"
- IEC 60068-3-3 "Guidance – seismic test methods for equipment"
- IEC 60068-2-57 "Test Ff: Vibration – Time-history method"
- IEC 60068-2-6 "Environmental testing – Part 2–6: Test Fc: Vibration (sinusoidal)"
- IEEE 693-2005 "Recommended Practice for Seismic Design of Substations".

For installation on even and rigid concrete or steel structure (without considering building influences), the tested ground accelerations meet the following requirements:

- Uniform Building Code 1997 (UBC) – Zone 4
- IEEE 693-2005 – High required response spectrum (Fig. A.1).

Shock, vibration (option)

NXAIR switchgear can be upgraded to withstand stress caused by shock and vibration. For this upgrade, shock and vibration tests have been carried out in accordance with the following standards:

- ETSI EN 300 019-2-2; T2.3 Public Transportation
- IEC 60721-3-2 "Classification of environmental conditions Section 2: Transport".

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.

Terms

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

1) Secondary devices (e.g. protection devices, meters, measuring transducers, etc.) must be suitable for the given service conditions
2) Heater in the LV compartment and in the operating mechanism box of the circuit-breaker

Protection against solid foreign objects, electric shock and water

NXAIR switchgears fulfill according to the standards

IEC 62271-1	EN 62271-1
IEC 62271-200	EN 62271-200
IEC 60529	EN 60529
IEC 62262	EN 50102

the following degrees of protection:

Panel	NXAIR
Degree of protection for the enclosure, optional	IP3XD, IP31, IP32 IP4X, IP41, IP42 IP50, IP51
Degree of protection for the enclosure, with ventilation	IP3XD, IP31, IP32 IP4X, IP41, IP42
Degree of protection for the partitions	IP2X
Degree of protection for the enclosure against mechanical impacts from outside	IK07

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.

Color of the panel front

RAL 7035 (light gray).

NXAIR switchgear is suitable for application in indoor installations under normal service conditions as defined in the standard IEC 62271-1.

- Temperature
  - –5 °C to +55 °C
  - –25 °C to +55 °C[1] (option)
- Rel. air humidity
  - Mean value over 24 h[1]: ≤ 95 %
  - Mean value over 1 month: ≤ 90 %
- Condensation
  - Occasionally
  - Frequently (with min. degree of protection IP31D, with anti-condensation heater in LV part[2])
- Site altitude
  - Observe altitude correction (see page 47)
- No significant pollution of the ambient air (dust, gases, vapors, salts).

Furthermore, the high-voltage part of NXAIR switchgear can be used in environmental conditions of the climatic categories 3K3 and 3K5 according to the standard IEC 60721-3-3. NXAIR switchgear has been subjected to a climatic test according to IEC 60932, Level 2, and is suitable for service conditions according to "Design Class 2".
This test also meets the requirements of IEC 62271-304 for "Design Class 2".

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Medium-voltage systems

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Smart Infrastructure
Electrification & Automation
Mozartstrasse 31 C
91052 Erlangen, Germany

For further information, please contact
our Customer Support Center:
Phone: +49 180 524 70 00
Fax: +49 180 524 24 71
E-mail: support.energy@siemens.com
siemens.com/medium-voltage-switchgear
siemens.com/nxair

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