Catalog
HA 25.81 · 2023

MEDIUM-VOLTAGE SWITCHGEAR

Medium-Voltage Switchgear **Type NXAIR C up to 24 kV, up to 25 kA, Air-Insulated**

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Application

Typical uses

NXAIR C 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

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

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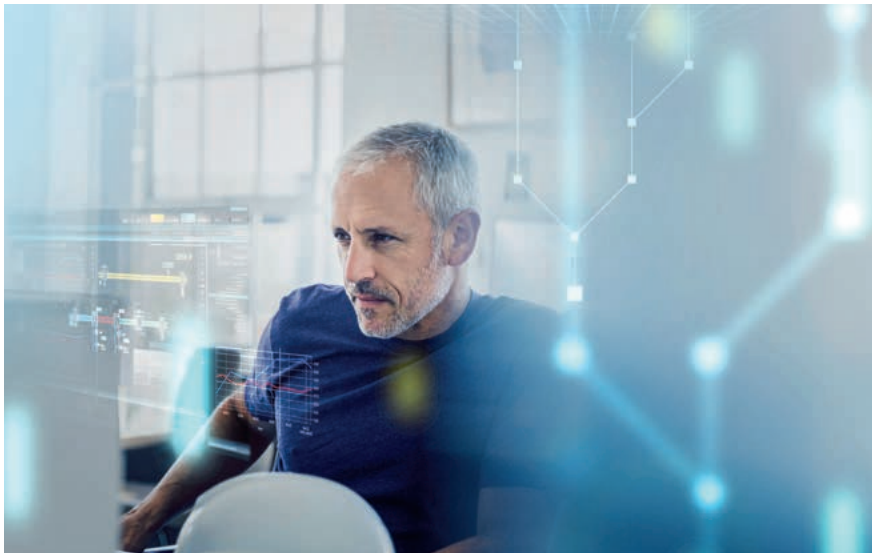
Contents

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 introduced with the NXAIR family 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
- Use of standardized block-type current transformers
- Use of standard components available worldwide
- More than 610,000 air-insulated switchgear panels of Siemens in operation worldwide
- Use of maintenance-free vacuum circuit-breakers
- Type testing of the main switching devices and the make-proof earthing switch in the panel
- Flexibility regarding the low-voltage equipment (removable compartment, plug-in wires)
- Quality assurance in accordance with DIN EN ISO 9001.

Saves lives

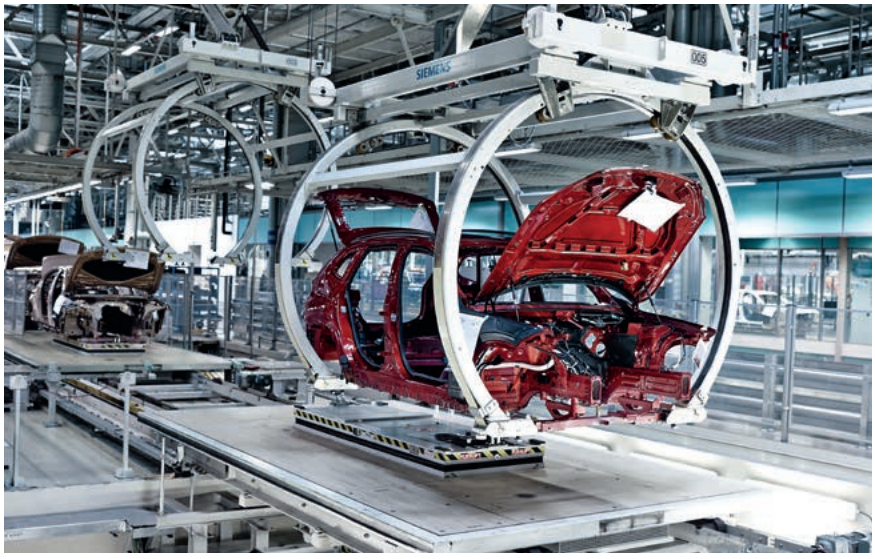
Ensures personnel safety and uninterrupted operation with an arc-fault classification IAC A FLR and a service continuity category LSC 2, allowing to access the medium-voltage connection compartment while keeping the busbar energized, enabling maintenance on one part while the rest of the system remains operational.

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 an arc duration of 1 s
- Loss of service continuity category LSC 2 (separate partitioning of the busbar- and combined connection and switching-device compartments)
- Partition class PM
- Unambiguous position indicators and control elements on the high-voltage door
- Use of vacuum circuit-breakers or switch-disconnectors
- Standard degree of protection IP3X. IP4X is possible as an option
- Positively driven busbar shutter (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, resistance to internal arcing, and thus maximum operational reliability, contribute to optimum operation and a remarkable increase of productivity.

Features

- Loss of service continuity category LSC 2
- Partition class PM
- Positively driven shutter
- Use of standardized block-type current transformers
- Cable testing possible without isolating the busbar
- Use of maintenance-free vacuum circuit-breakers or switch-disconnectors
- 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 NXAIR C 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 switch-disconnectors
- 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 pressure relief duct systems.

Customer benefit

Preserves the environment

Preserves the environment

Air used as insulating medium and a service life of more than 30 years optimize the total energy balance.

Features

- Air as insulating medium is absolutely neutral to the environment
- 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 C is a prime example for our commitment to sustainability. Decades of experience have made **NXAIR C** 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
- 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

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 C, 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 C is the ideal solution for your power supply.

NXAIR C – Your natural choice

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 C 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 2
Partition class	PM
Accessibility to compartments – Busbar compartment – Combined switching-device and connection compartment	 Tool-based Interlock-controlled

Internal arc classifications

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

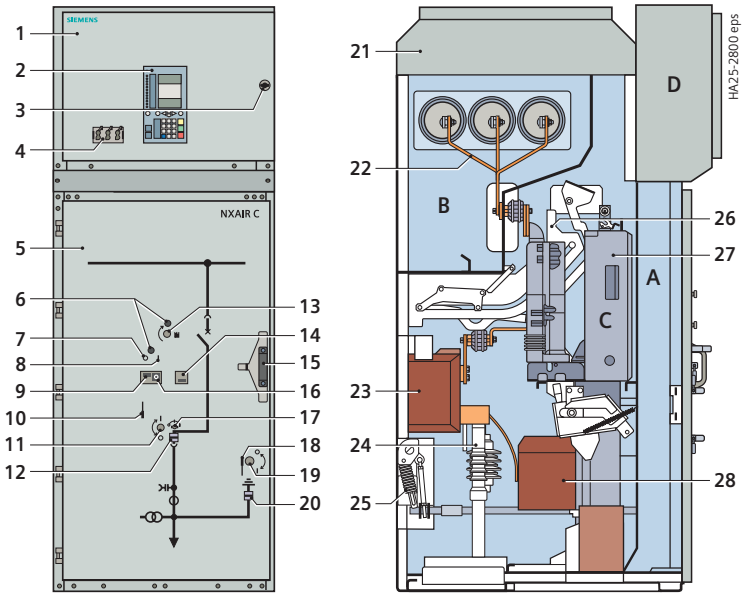
IAC	Internal Arc Classification
A	300 mm distance of indicators for test (installation in closed electrical service location)
F	Front arrangement of indicators for test
L	Lateral arrangement of indicators for test
R	Rear arrangement of indicators for test
I_{sc}	Test current for NXAIR C up to 25 kA
t	Arc duration 1 s

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

Design

Basic panel design

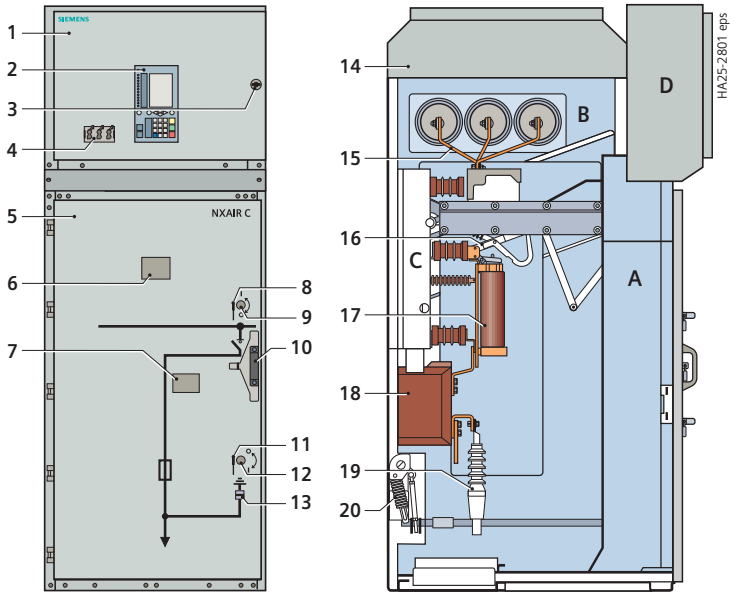
Basic panel design – circuit-breaker panel (example)



1 Door to low-voltage compartment
2 Protection device
3 Locking device for the door to the low-voltage compartment
4 Option: Capacitive voltage detecting system for feeder and busbar
5 High-voltage door
6 Rotary button to close and open the actuating opening located below
7 Actuating opening for opening the circuit-breaker
8 Actuating opening for closing the circuit-breaker
9 Operation counter for circuit-breaker
10 Operating slide for opening and closing the actuating opening for racking the withdrawable circuit-breaker / circuit-breaker truck
11 Actuating opening for racking the withdrawable circuit-breaker / circuit-breaker truck
12 Mechanical position indicator for withdrawable circuit-breaker / circuit-breaker truck
13 Opening for charging the spring energy store in the circuit-breaker manually (covered)
14 Spring state indicator for the closing spring
15 Handle for opening the high-voltage door
16 CLOSED/OPEN indicator of the circuit-breaker
17 Actuating opening for inserting the double-bit key to control racking of the withdrawable circuit-breaker / circuit-breaker truck
18 Operating slide for opening and closing the actuating opening for operating the feeder earthing switch
19 Actuating opening for operating the feeder earthing switch
20 Mechanical position indicator for feeder earthing switch
21 Pressure relief duct
22 Busbar
23 Block-type current transformer
24 Cable connection
25 Feeder earthing switch
26 Metallic shutters
27 Operating and interlocking unit for circuit-breaker
28 Voltage transformer (optional)

A Switching-device / connection compartment
B Busbar compartment
C Withdrawable circuit-breaker / circuit-breaker truck
D Low-voltage compartment

Basic panel design – switch-disconnector panel with or without HV HRC fuses (example)



1 Door to low-voltage compartment
2 Protection device (optional)
3 Locking device for the door to the low-voltage compartment
4 Option: Capacitive voltage detecting system for feeder and busbar
5 High-voltage door
6 Inspection window to identify the switch positions of the switch-fuse combination / switch-disconnector
7 Instruction label for operating the switch-disconnector
8 Operating slide for opening and closing the actuating opening for operating the switch-disconnector
9 Actuating opening for operating the switch-disconnector
10 Handle for opening the high-voltage door
11 Operating slide for opening and closing the actuating opening for operating the feeder earthing switch
12 Actuating opening for operating the feeder earthing switch
13 Mechanical position indicator for feeder earthing switch
14 Pressure relief duct
15 Busbars
16 Blades of the switch-disconnector
17 HV HRC fuse-links
18 Block-type current transformer
19 Cable connection
20 Feeder earthing switch

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

Design
Compartments of circuit-breaker panel

Compartments of circuit-breaker panel

Switching-device/connection compartment

- Enclosure made of sendzimir-galvanized 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
- Metallic shutter
- High-voltage door pressure-resistant in the event of internal arcs in the panel
- Lateral metallic wiring duct for laying the control cables
- Low-voltage plug connector for connection of control cables between primary part and secondary part
- For different panel versions with withdrawable devices:
  - Vacuum circuit-breaker
  - Withdrawable disconnector link
  - Withdrawable metering part
- Endurance classes for
  - Circuit-breaker: E2, M2, C2
  - Isolating distance (withdrawable part): M0
- Earthing busbar
- Option: Installation of bushing-type insulators or block-type current transformers
- Option: Coupling electrode for capacitive voltage detecting system
- Connection from front/bottom
- Suitable for connection of:
  - Single-core XLPE cables up to 4 × 500 mm² per panel depending on the rated continuous current and other built-in components
  - Three-core cables up to 2 × 300 mm² per panel depending on the rated continuous current and other built-in components
- Installation of voltage transformers
  - Cast-resin insulated
  - 3 × 1-pole
  - Fixed-mounted, without primary fuses
- Make-proof earthing switch
  - 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.

Busbar compartment

- Enclosure made of sendzimir-galvanized sheet steel
- Pressure relief upwards
- Transverse partition from panel to panel
- Busbars made of flat copper, bolted from panel to panel
- Shutter can be locked in both positions (open or closed)
- Bushing-type insulators for supporting the busbars and for accommodating the upper fixed contacts for the switching device
- Options: Possibility of installing the following components (for possible versions, see also section product range):
  - Voltage transformers
  - Current transformers in the course of the busbar
  - Coupling electrode for capacitive voltage detecting system
  - Make-proof earthing switch (endurance classes: M0, E1).

Note: See also product range

Compartments of switch-disconnector panel with or without HV HRC fuses

Busbar compartment

- Enclosure made of sendzimir-galvanized sheet steel
- Pressure relief upwards
- Transverse partition from panel to panel
- Busbars made of flat copper
- 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
- 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-disconnectors
- Endurance classes for switch-disconnectors
  - Mechanical endurance: M1
  - Electrical endurance: E1
- HV HRC fuses tested according to IEC 60282-1
  - 1 fuse per phase
  - Reference dimension: 292 mm or 442 mm depending on the rated voltage
- Earthing busbar
- Option: Installation of post insulators or block-type current transformers
- Option: Coupling electrode for capacitive voltage detecting system
- Connection from front/bottom
- Suitable for connection of:
  - Single-core XLPE cables up to 2 × 300 mm^2 per panel depending on the rated continuous current and other built-in components
- Make-proof earthing switch with endurance classes: 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
- Interlocking between the high-voltage door and the position of the cable earthing switch
- Option: Electromagnetic interlocks, padlocks.

Operation – switch-disconnector panel with or without 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.

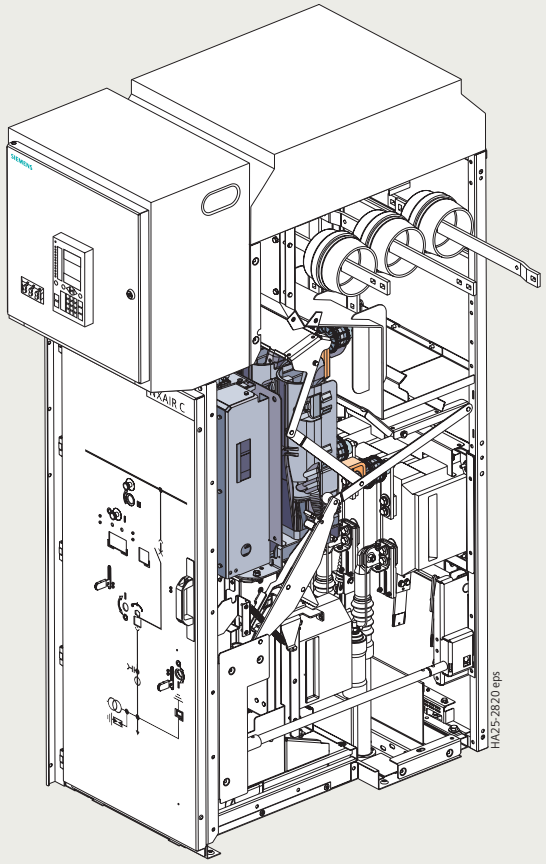
Beyond the specifications of the standards

- Interlocking between the high-voltage door and the position of the switch-disconnector
- Interlocking between the high-voltage door and the position of the cable earthing switch.

Vacuum circuit-breaker

Features

- The circuit-breakers conform to the following standards:
  - IEC 62271-1
  - IEC 62271-100
- 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
- Suitable for all switching duties
- Stored-energy spring mechanism with motor operation, manual operation always possible
- 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.



Vacuum circuit-breaker

Electrical data for	NXAIR C
Rated operating voltage	up to 24 kV
Rated short-circuit breaking current	up to 25 kA
Rated short-time withstand current	up to 25 kA / 3 s
Rated short-circuit making current	up to 63 kA
Rated peak withstand current	up to 63 kA
Rated continuous current	up to 2000 A
Endurance class	E2, M2, C2

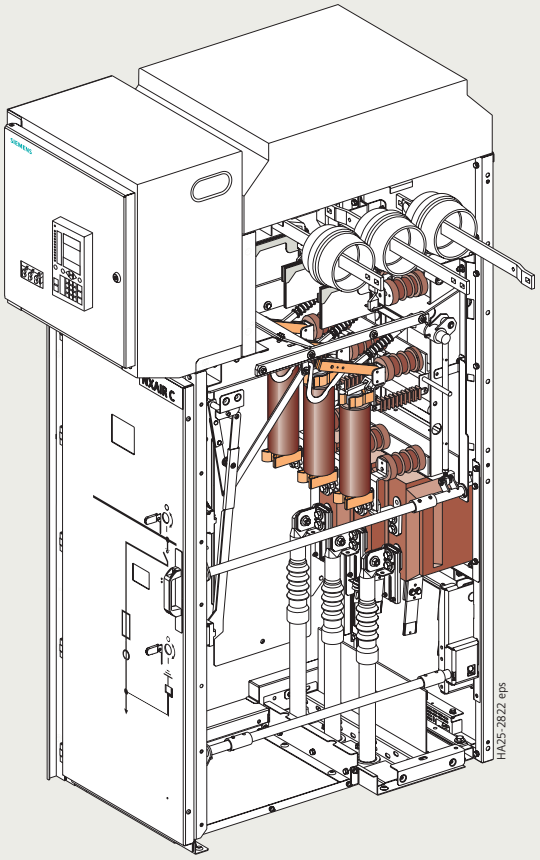
SION vacuum circuit-breaker 3AE5 with withdrawable module

Switch-disconnector

Features

Switch-disconnector with or without fuse combination according to IEC 62271-105 or IEC 62271-103.

- For switching and protecting auxiliary transformers and small distribution transformers up to 2250 kVA with fuse combination
- Also as cable switch without fuse combination
- Fixed-mounted switch-disconnector, endurance classes M1 and E1
- Stored-energy mechanism, manual operation
- Use of HV HRC fuses with a reference dimension of 292 mm or 442 mm depending on the rated voltage
- 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, 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		
Rated voltage	7.2 kV	12 kV	24 kV
Rated short-circuit breaking current (max.), 3 s	25 kA	25 kA	25 kA
Rated peak withstand current (max.)	63 kA	63 kA	63 kA
Rated short-circuit making current (max.)	63 kA	63 kA	63 kA
Rated continuous current with fuse combination	200 A [1)]	200 A [1)]	200 A [1)]
Rated continuous current without fuse combination	630 A	630 A	630 A

1) Depending on the HV HRC fuses installed

Switch-disconnector/fuse combination

Components

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

Block-type current transformer 4MA7

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

- Secondary multiratio possible
- Current transformer with type approval and declaration of conformity

Mounting location

- Factory-assembled
- In the connection compartment
- In the course of the busbar, without requiring a special panel.

Block-type current transformer 4MA72

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

- Inside a deep bottom pan or below the panel.

Zero-sequence current transformer 4MC96

Electrical data for	Block-type current transformer 4MA7	Zero-sequence current transformer 4MC96
Rated insulation level	up to 24 kV	0.72 / 3 / – kV
Rated primary current	up to 2000 A	up to 100 A
Rated frequency	50 Hz	50 Hz
Rated short-time thermal current	up to 25 kA	up to 25 kA
Rated peak withstand current	up to 63 kA	up to 63 kA
Duration of short-time withstand current	1 s or 3 s	1 s or 3 s
Number of secondary cores	up to 3	1
Rated secondary current	1 A or 5 A	1 A
Accuracy classes – Measuring – Protection	 0.2 / 0.5 / 1.0 5P / 10P	 1FS10 –
Rating	up to 30 VA	1.25 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
- Voltage transformer with type approval and declaration of conformity

Mounting location

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

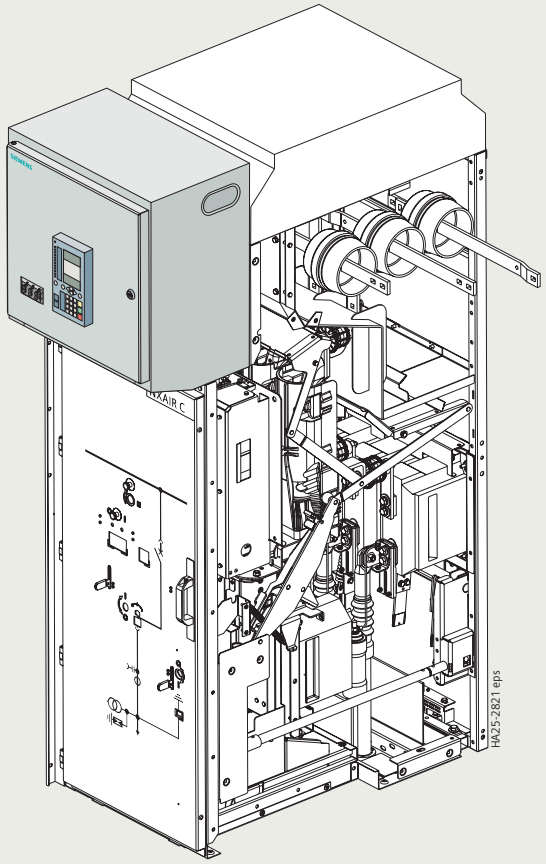
Voltage transformer 4MR

Electrical data for	Voltage transformer 4MR
Rated operating voltage	up to 24 kV
Rated secondary voltage	up to 120 V or up to 120 V / √3
Rated frequency	50 Hz
Accuracy classes – Measuring – Protection	 0.2 / 0.5 / 1.0 3P / 6P
Rating	up to 150 VA

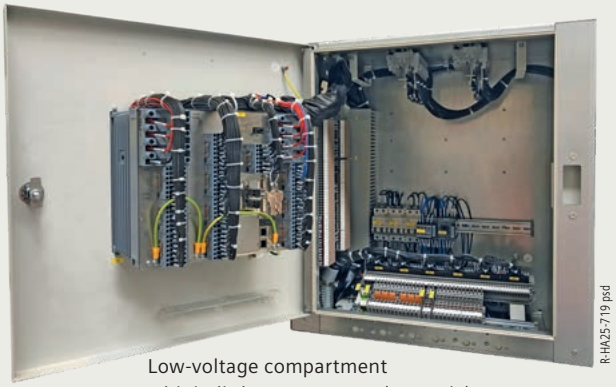
Low-voltage compartment

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.

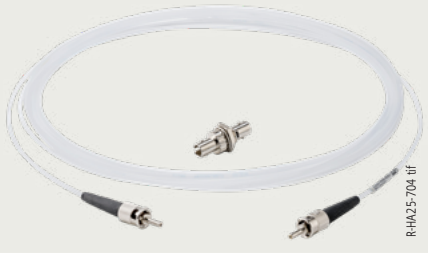
On request, selected optical arc detection systems can be installed as autonomous devices.

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

Technical data

Electrical data

Electrical data

Rated values up to 25 kA

Rated voltage		kV	7.2	12	24
Rated frequency		Hz		50	
Rated short-duration power-frequency withstand voltage (phase-to-phase, phase-to-earth)		kV	20	28	50
Rated lightning impulse withstand voltage (phase-to-phase, phase-to-earth)		kV	60	75	125
Rated short-circuit breaking current		max. kA		25	
Rated short-time withstand current, 3 s		max. kA		25	
Rated short-circuit making current		max. kA		63	
Rated peak withstand current		max. kA		63	
Rated continuous current of the busbar		max. A		2000	
Rated continuous current of the feeders	With circuit-breaker	max. A		2000	
	With withdrawable disconnector link	max. A		2000	
	With switch-disconnector / fuse combination [1)]	A		200	
	With switch-disconnector without fuse combination	A		630	
	Bus sectionalizer	max. A		2000	
	Busbar connection panel	max. A		2000	

Internal arc classification

Rated voltage	kV	7.2	12	24
Arc fault current	max. kA		25	
Arc fault duration	s		1	
Classification			A FLR	

Degree of protection

Enclosure	Standard	IP3XD
	Option	IP4X
Between the compartments	Standard	IP2X

Loss of service continuity category

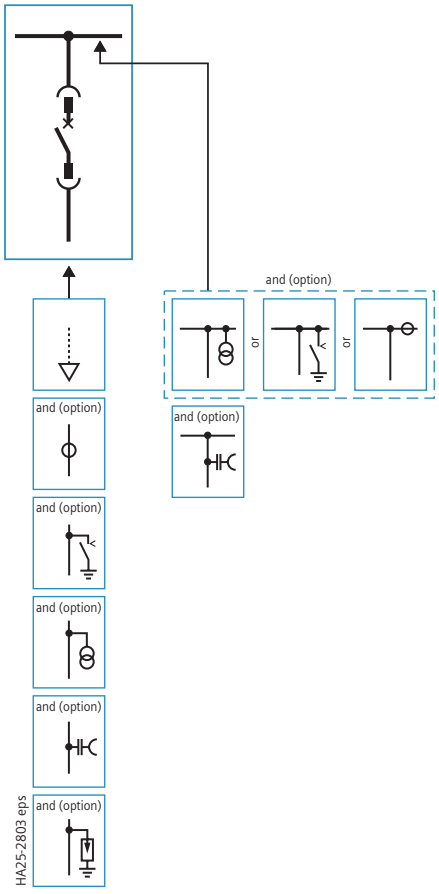
Panel with circuit-breaker	LCS 2
Panel with withdrawable disconnector link	LCS 2
Panel with fixed-mounted switch-disconnector	LSC 2
Busbar connection panel	LSC 1
Panels without connection compartments are not assigned a loss of service continuity category according to IEC 62271-200.	

Partition class

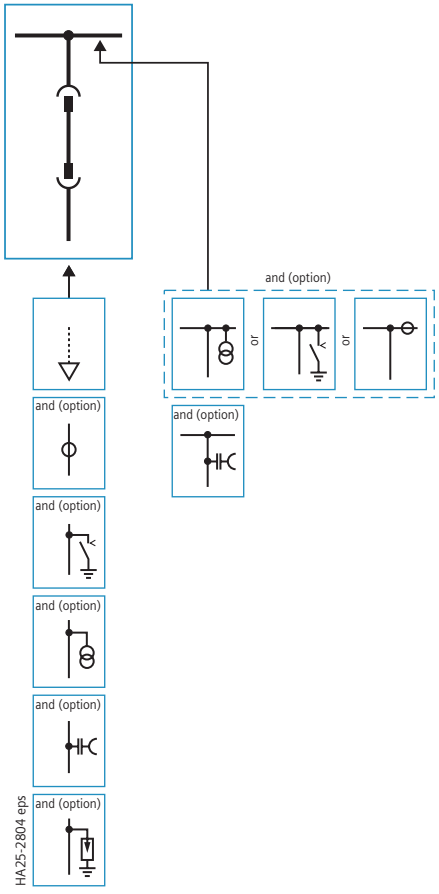
Panels in withdrawable design	PM	Partitions made of metallic material
Panel with fixed-mounted switch-disconnector	PI	Partitions made of non-metallic material

1) Current values dependent on HV HRC fuses

Circuit-breaker panel



Disconnecting panel



- Cable sealing ends [1] max. 4 × 500 mm² per phase
- Current transformer
- Make-proof earthing switch
- Voltage transformer
- Capacitive voltage detecting system
- Arrester
- Withdrawable circuit-breaker
- Withdrawable disconnector link

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

Cable sealing ends [1)] max. 4 × 500 mm² per phase

Current transformer

Voltage transformer

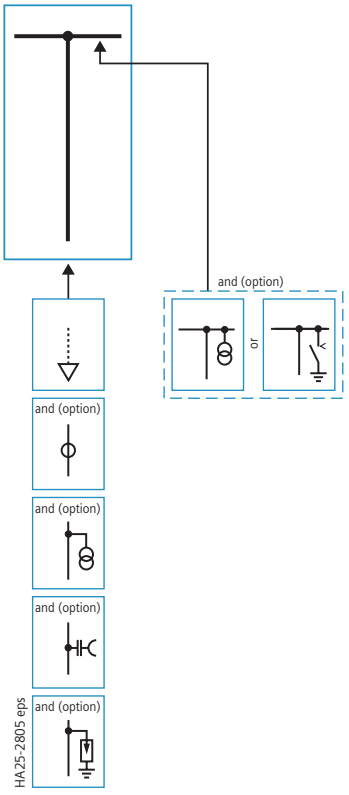
Capacitive voltage detecting system

Arrester

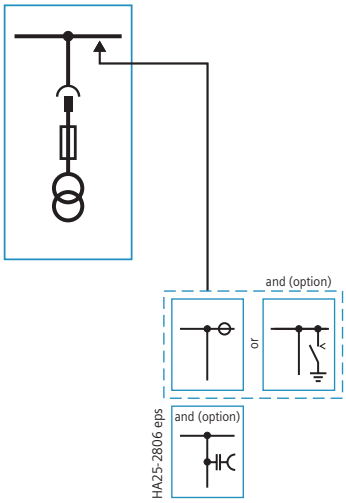
Withdrawable voltage transformers with primary fuses

Make-proof earthing switch

Busbar connection panel

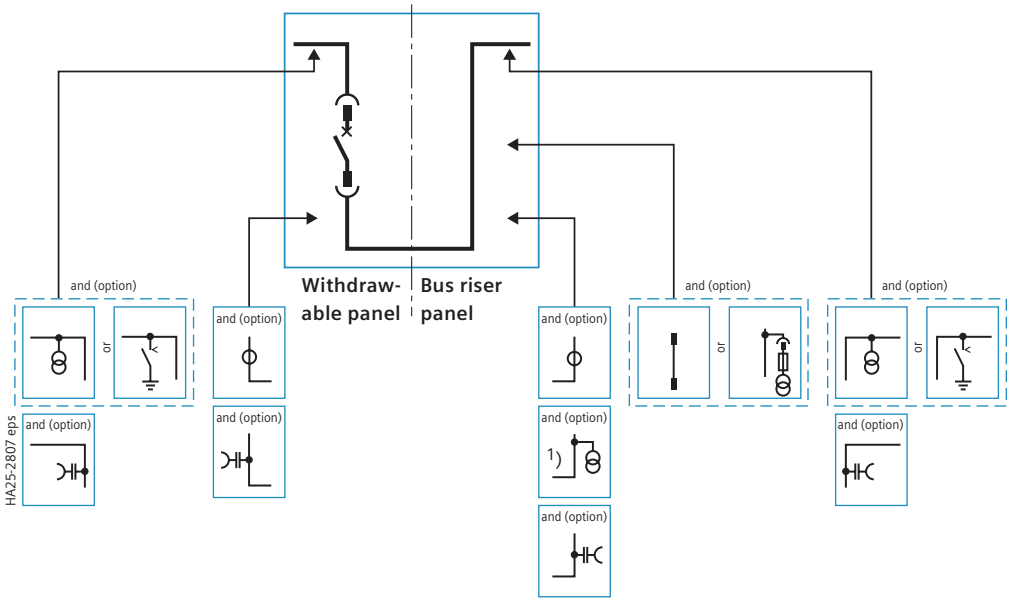


Metering panel



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

Bus sectionalizer (mirror-image installation also possible)



Current transformer

Voltage transformer

Make-proof earthing switch

Capacitive voltage detecting system

Withdrawable circuit-breaker

Withdrawable disconnector link

Withdrawable voltage transformers with primary fuses

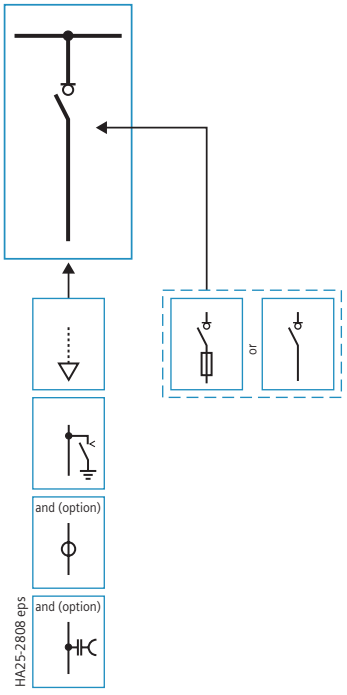
1) Voltage transformers not possible with withdrawable disconnector link.

Technical data

Product range

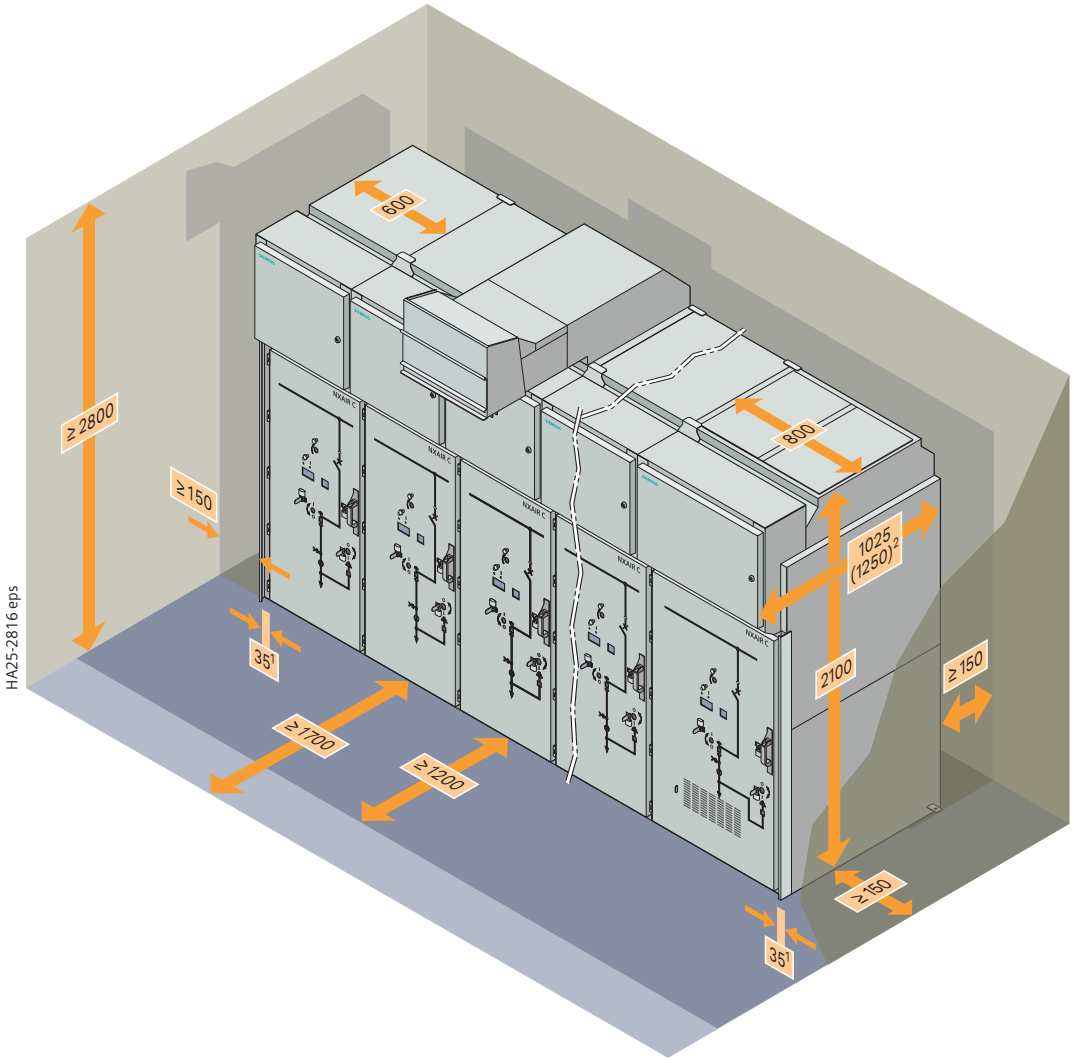
- Current transformer
- Make-proof earthing switch
- Capacitive voltage detecting system
- Cable sealing ends [1] max. 1 × 240 mm² per phase
- Switch-disconnector with HV HRC fuses
- Switch-disconnector without HV HRC fuses

Switch-disconnector panel with / without HV HRC fuses



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

12 KV Pressure relief inside switchgear room



1 Width of the end wall
2 1250 mm including LV compartment

Switchgear installation

- For single-busbar application:
  - Wall-standing arrangement
  - Free-standing arrangement.

Room and door dimensions

See dimension drawings above.

Weight

12 kV panels: 600 mm: approx. 410 kg
12 kV panels: 800 mm: approx. 505 kg

Recommended control aisle

(depending on national requirements)

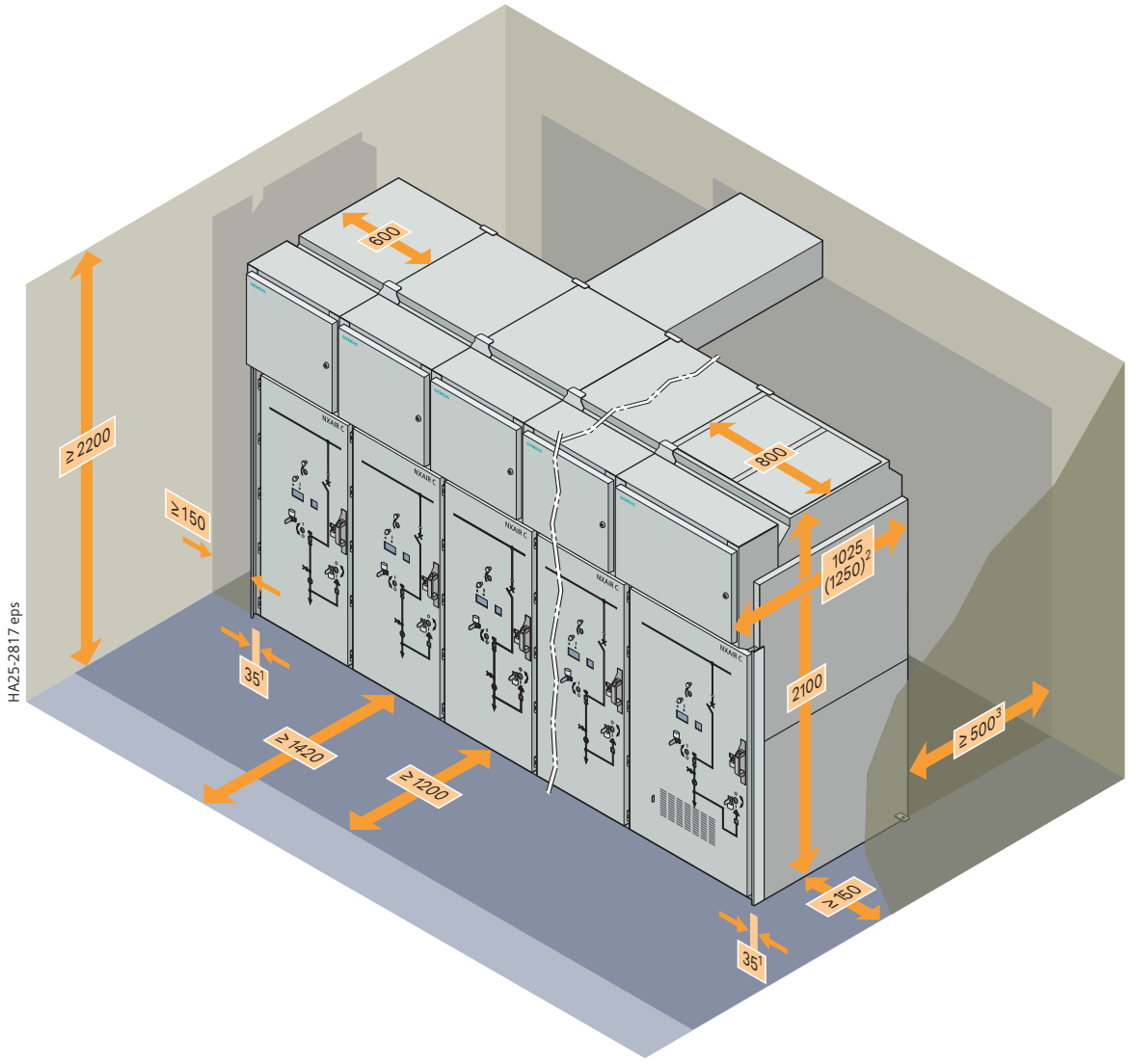
For replacement of switching devices

For extension / panel replacement

Technical data

Room planning

12 KV Pressure relief outside switchgear room



Switchgear installation

- For single-busbar application:
  - Wall-standing arrangement
  - Free-standing arrangement.

Room and door dimensions

See dimension drawings above.

Weight

12 kV panels: 600 mm: approx. 410 kg

12 kV panels: 800 mm: approx. 505 kg

1 Width of the end wall
2 1250 mm including LV compartment
3 Pressure relief channel outgoing duct could also be configured on the left or on the right side of the switchgear. In that case, minimum distance to wall from that side shall be ≥ 500 mm.

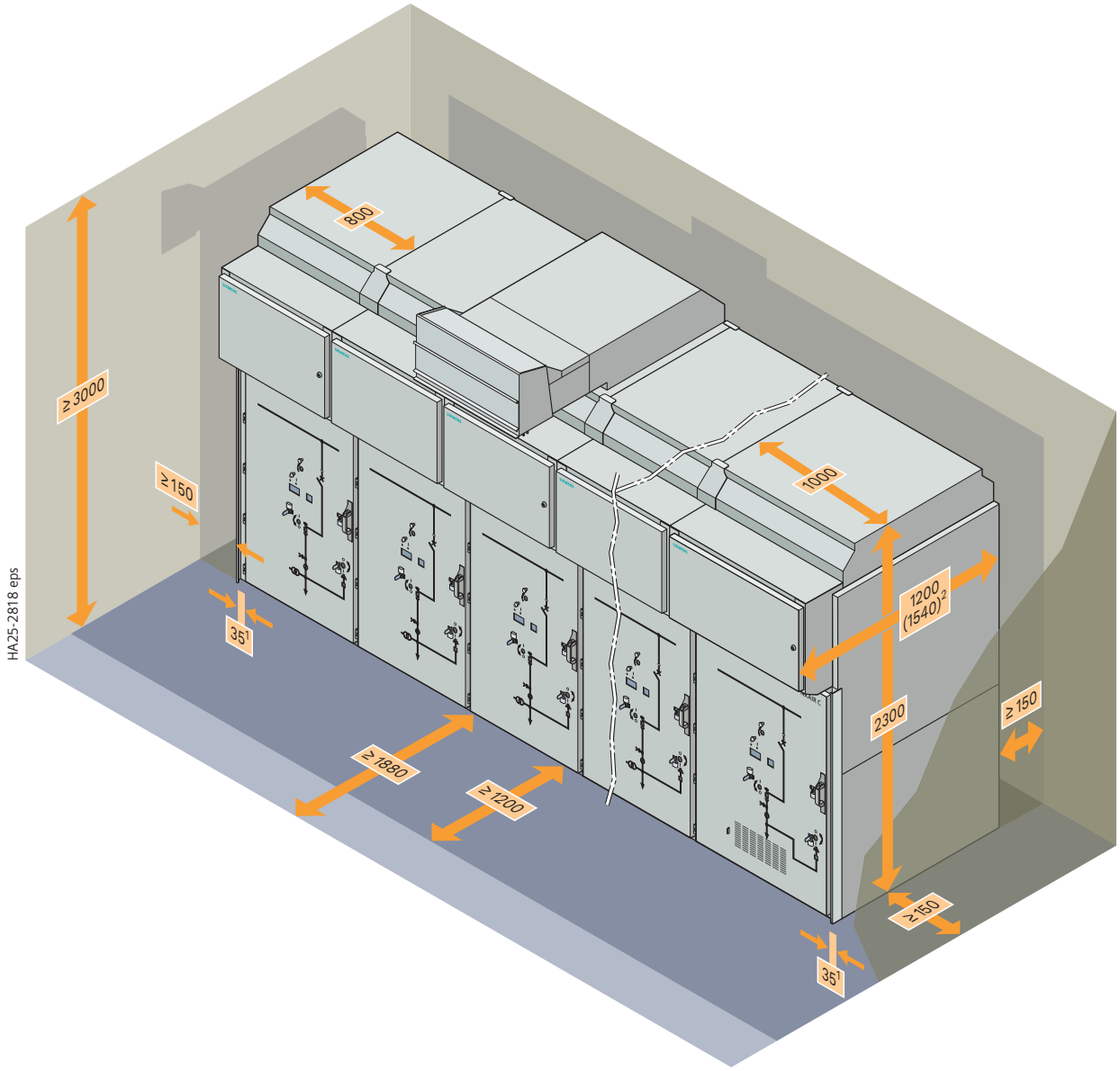
Recommended control aisle

(depending on national requirements)

For replacement of switching devices

For extension / panel replacement

24 KV Pressure relief inside switchgear room



1 Width of the end wall
2 including LV compartment

Switchgear installation

- For single-busbar application:
  - Wall-standing arrangement
  - Free-standing arrangement.

Room and door dimensions

See dimension drawings above.

Weight

24 kV panels: 800 mm: approx. 596 kg
24 kV panels: 1000 mm: approx. 625 kg

Recommended control aisle

(depending on national requirements)

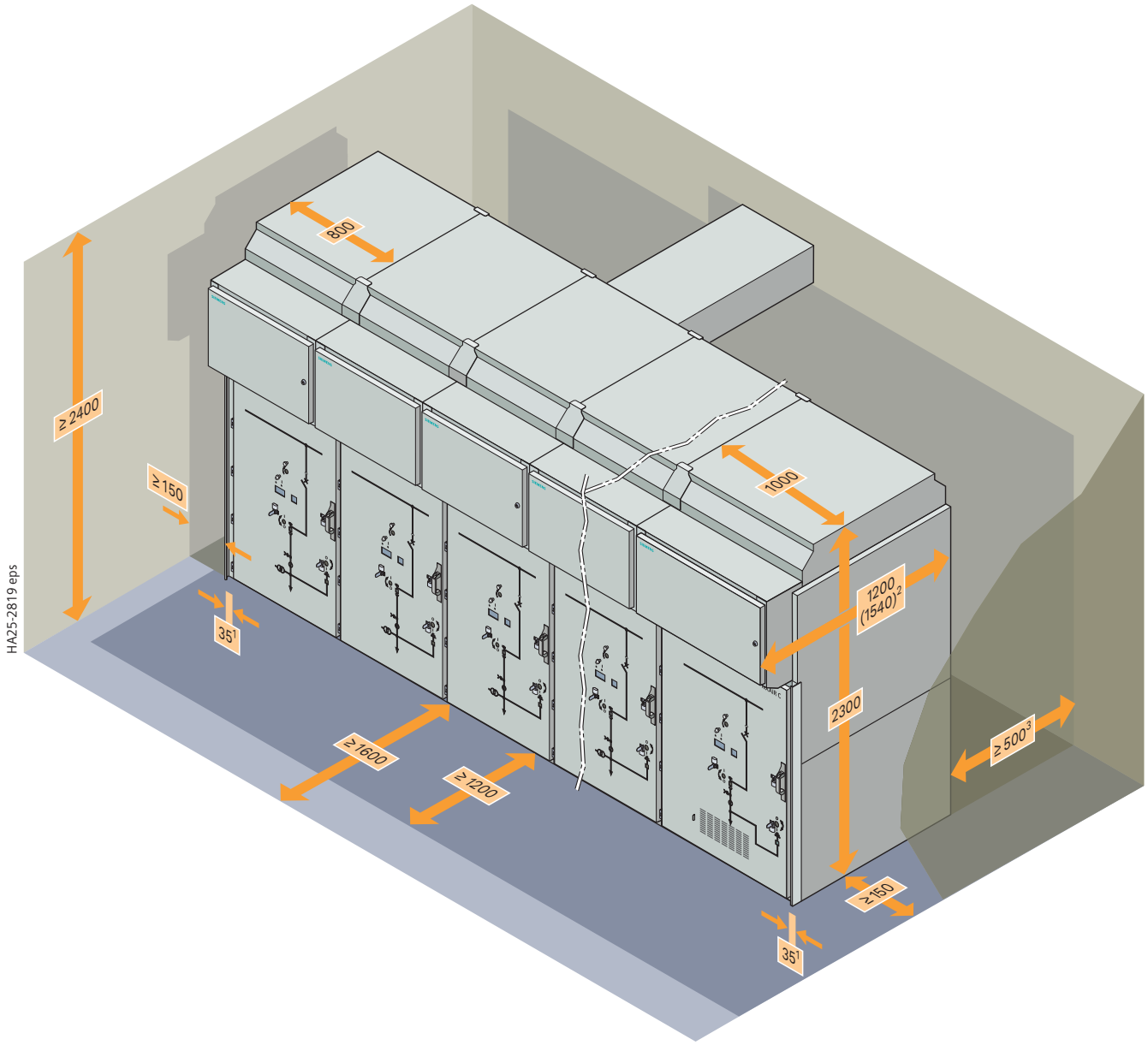
For replacement of switching devices

For extension / panel replacement

Technical data

Room planning

24 KV Pressure relief outside switchgear room



Switchgear installation

- For single-busbar application:
  - Wall-standing arrangement
  - Free-standing arrangement.

Room and door dimensions

See dimension drawings above.

Weight

24 kV panels: 800 mm: approx. 596 kg

24 kV panels: 1000 mm: approx. 625 kg

1 Width of the end wall
2 1540 mm including LV compartment
3 Pressure relief channel outgoing duct could also be configured on the left or on the right side of the switchgear. In that case, minimum distance to wall from that side shall be ≥ 500 mm.

Recommended control aisle

(depending on national requirements)

For replacement of switching devices

For extension / panel replacement

Transport and packing

Transport

NXAIR C 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.

Dimensions, weights

Transport	Panel spacing	Transport dimensions			Transport weight [1]	
	mm	Width mm	Height mm	Depth mm	with packing kg	without packing kg
≤12 kV						
Truck or rail	1×600	760	2320	1375	440	410
	1×800	930	2320	1375	558	505
Seafreight or airfreight	1×600	830	2380	1605	640	410
	1×800	1030	2380	1605	778	505
24 kV						
Truck or rail	1×800	930	2550	1600	640	596
	1×1000	1230	2550	1600	925	625
Seafreight or airfreight	1×800	1030	2610	1830	860	596
	1×1000	1230	2610	1830	1145	625

1) Average values, depending on the degree to which panels are equipped

Standards

Standards, specifications, guidelines

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

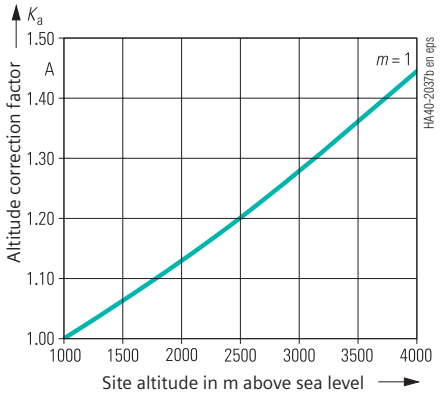
- The dielectric strength is verified by testing the switchgear with rated values of short-duration power-frequency withstand voltage and lightning impulse withstand voltage according to IEC 62271-1 (see table "Dielectric strength").
- The rated values are referred to sea level and to normal atmospheric 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

		IEC standard / EN standard	Title
Switchgear	NXAIR C	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
	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.

Standards

Standards, specifications, guidelines

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.

Protection against solid foreign objects, electric shock and water

NXAIR C switchgear fulfills 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 C
Degree of protection for the enclosure, optional	IP3X IP4X
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 C 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
- Rel. air humidity:
  - Mean value over 24 h[1]: ≤ 95 %
  - Mean value over 1 month: ≤ 90 %
- Condensation:
  - Occasionally
  - Frequently (with min. degree of protection IP4X, with anti-condensation heater in LV part[2])
- Site altitude:
  - Observe altitude correction (see page 34)
- No significant pollution of the ambient air (dust, gases, vapors, salts).

Furthermore, the high-voltage part of NXAIR C switchgear can be used in environmental conditions of the climatic categories 3K3 and 3K5 according to the standard IEC 60721-3-3.

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

Notes

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