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Circuit-Breaker Switchgear Type NXAIR H up to 36 kV, 31.5 kA, Air-Insulated

Medium-Voltage Switchgear

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Contents

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Circuit-breaker switchgear type NXAIR H is type-tested, metal-enclosed and metal-clad switchgear for indoor installation according to IEC 62271-200

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

Application: Industry
- Power stations
- Cement industry
- Iron and steel works
- Rolling mills
- Mining industry
- Textile, paper and food industries
- Chemical industry
- Petroleum industry
- Pipeline installations
- Electrochemical plants
- Diesel power plants
- Emergency power supply installations
- Traction power supplies
- Airports
- Wind parks

Classification
The NXAIR H switchgear corresponds to the following classifications according to IEC 62271-200

Loss of service continuity category and partition class	
Loss of service continuity category	LSC 2B (metal-clad)
Partition class	PM (metallic partition)
Accessibility to compartments	
Busbar compartment	Tool-based
Switching-device compartment	Interlock-controlled
Cable compartment	Interlock-controlled and tool-based
Internal arc classification	
The following internal arc classifications are fulfilled: IAC A FLR, I_{sc}, t IAC	Internal arc classification
A	Distance between the indicators 300 mm, i.e. installation in rooms with access for authorized personnel only, closed electrical service location
F	Accessibility: Front arrangement of indicators for test
L	Accessibility: Lateral arrangement of indicators for test
R	Accessibility: Rear arrangement of indicators for test
I_{sc}	Test current for NXAIR H up to 31.5kA
t	Internal arc duration (0.1s & 1.0s)


Application: Industry


Application: Traction power supplies


Applicaton: Power stations

Requirements

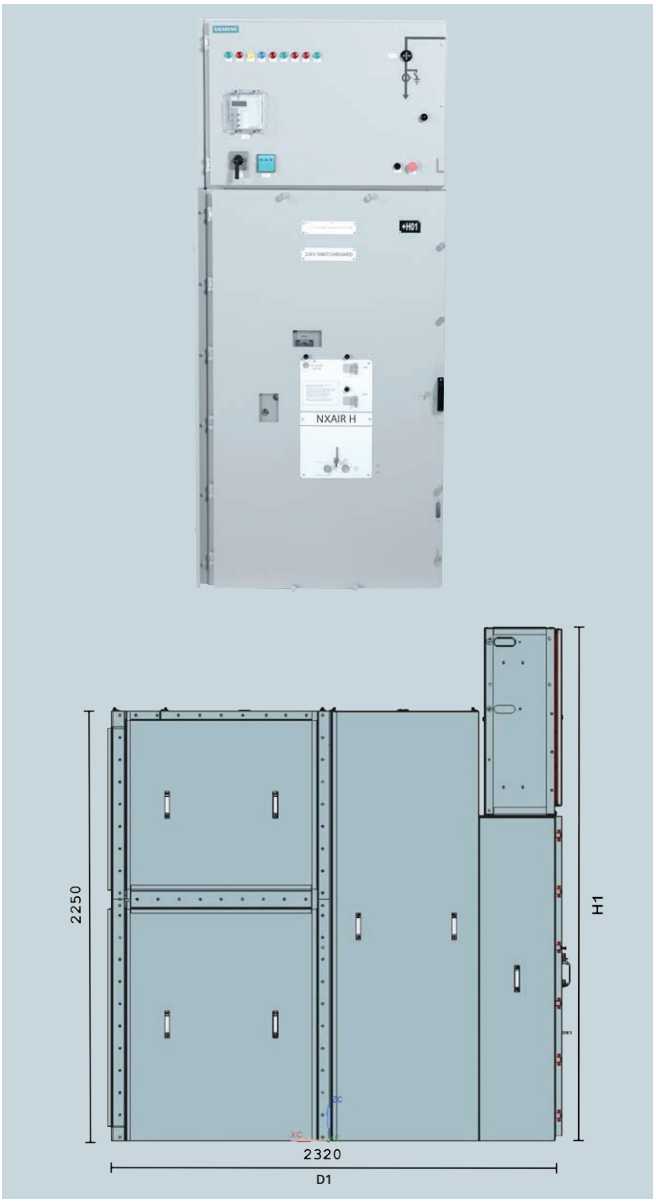
Customer benefits and features

Customer benefits	Features
• **Peace of mind** For power supply companies and industrial plants, the certification of the NXAIR H according to the latest standards has very concrete advantages: Smooth operation, exemplary availability and maximum safety.	– Type-tested switchgear according to IEC 62271-200 – Use of maintenance-free vacuum circuit-breakers – As insulating medium, air is always available; it requires no monitoring – Type testing of the vacuum circuit-breaker
• **Saves lives** NXAIR H is approved with internal arc classification IAC A FLR, loss of service continuity category LSC 2B, partition class PM. This makes it suitable for universal installation, meeting the highest requirements regarding personal safety.	– All switching operations with high-voltage door closed – Metallic enclosure, earthed shutters and partitions – Switchgear with internal arc classification according to IAC A FLR (front, lateral and rear accessibility) for all short-circuit currents and an arc duration of 0.1s & 1.0s – Loss of service continuity category LSC 2B (separate partitions for busbar, cable and switching device compartments) – Partition class PM – Clear switch position indicators and control elements on the high-voltage door – Use of vacuum circuit-breakers – Standard degree of protection IP4X – Logical mechanical interlocking system
• **Increases productivity** Use of metallic, earthed shutters and partitions between the compartments ensures highest service continuity of the switchgear during maintenance.	– Loss of service continuity category LSC 2B (separate partitions for busbar, connection and switching-device compartments) – Cable testing without isolating the busbar – Use of maintenance-free vacuum circuit-breakers
• **Saves money** Thanks to the use of the new circuit-breaker series 3AH, the economic design. On the one hand building costs can be reduced, and on the other hand, the maintenance-free circuit-breakers and the modular design enable continuous operation without expensive shutdown times.	– Use of maintenance-free vacuum circuit-breakers – Minimized space requirements (reduced building investments) due to compact design
• **Preserves the environment** Air used as insulating medium, local production locations with short transportation ways and times, optimize the local energy balance.	– As insulating medium, air is absolutely neutral to the environment – The materials used are fully recyclable without special knowledge

Rated values			
Rated – voltage	kV	36	
– frequency	Hz	50 / 60	
– short-duration power-frequency withstand voltage	kV	70	
– lightning impulse withstand voltage	kV	170	
– short-circuit breaking current	kA	26.3	31.5
– short-time withstand current, 3 s	kA	26.3	31.5
– short-circuit making current	kA	65	82
– peak withstand current	kA	65	82
– normal current of busbar	A	2900	
– normal current of feeders: with circuit-breaker	A	2900	

Dimensions			
Width	W	Circuit-breaker panel Disconnector panel Metering panel Bus sectionalizer Busbar connection panel	1000 mm 1000 mm 1000 mm 2x1000 mm 1000 mm
Height (Considering LT Ch. Height: 850mm)	H1	Panel height for IAC 0.1 s Panel Height for IAC 1.0 s (With Baffel)	2550 mm 3300 mm
Depth	D1 D2	Free-standing, IAC A FLR panel for 26.3 kA, 0.1 s Free-standing, IAC A FLR panel for 31.5 kA, 1 s	2320 mm 2620 mm

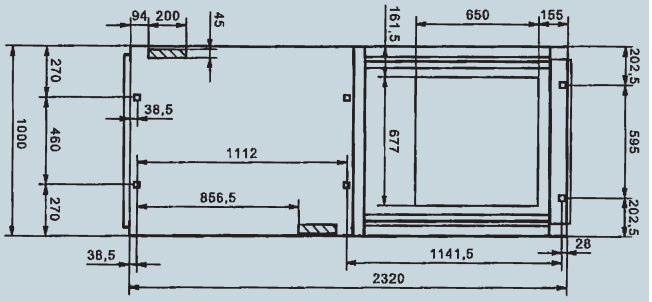
Higher ratings are possible on request



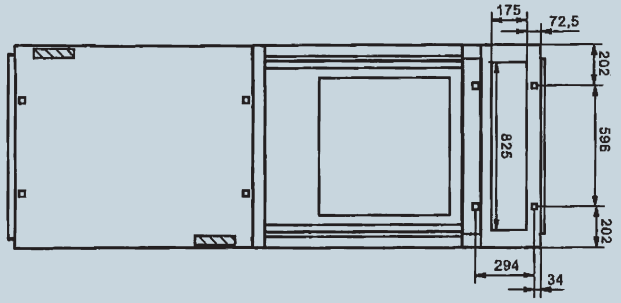
D2

Technical Data

Room planning



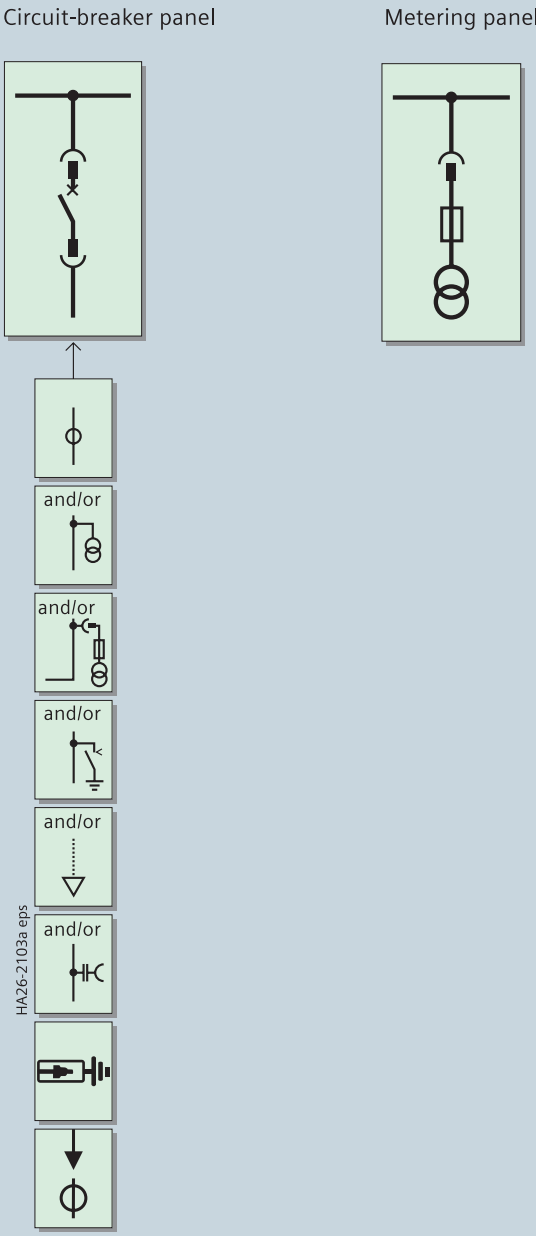
Foundation Plan for 26.3kA, IAC: 0.1s



Foundation Plan for 31.5 kA, 1 s

Switchgear room dimension

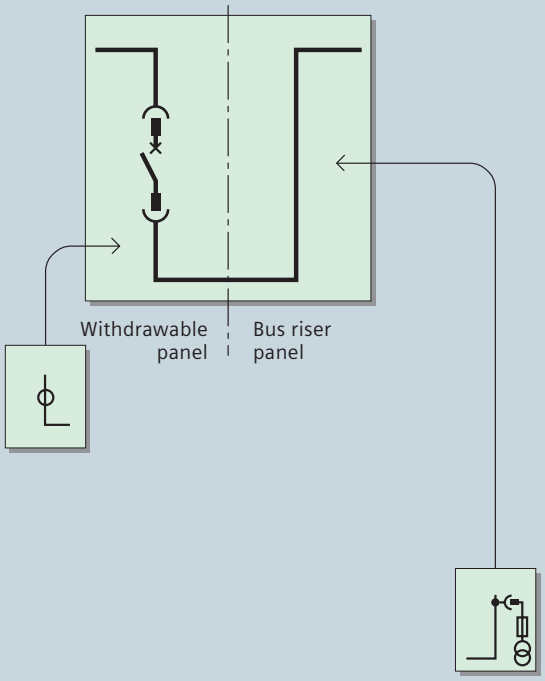
Switchgear room dimensions		26.3kA	31.5kA
		IAC 0.1s	IAC 1s
		All dimensions are in mm	
Height	Switchgear room height with LV chamber of height 850mm	>=3150	>=4000
Distance	Behind switchgear to wall (mm) cable connections from rear bottom	>=800	>=800
	Behind switchgear for withdrawble unit with cable connections from rear bottom	>=2000	>=2000
	Beside switchgear to wall	>=800	>=800
Aisle	For operating infront of the switchgear	>=1250	>=1250
	Width of control aisle infront of the panel for single row	>=2500	>=2500
	Width of control aisle infront of the panel for two rows facing each other	>=4000	>=4000



Components

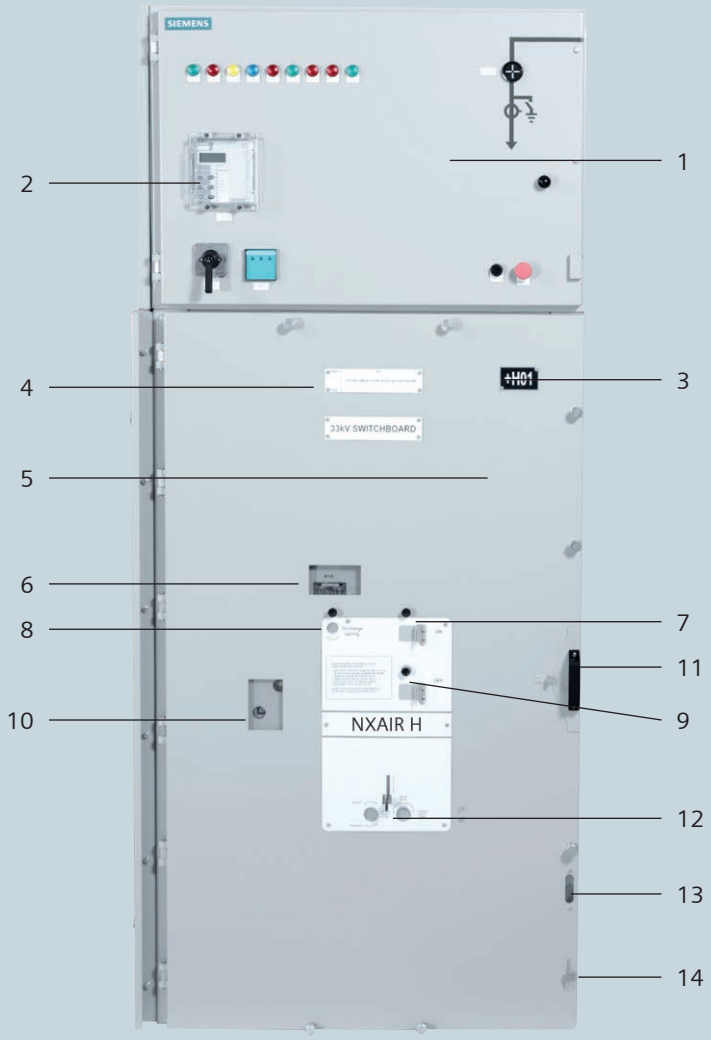
	Current transformer		Make-proof earthing switch		Cable connection
	Voltage transformer		Capacitive voltage detecting system		Withdrawable circuit-breaker
	Withdrawable voltage transformer with primary fuses		Surge Arrestor		HV HRC fuse
			CBCT		

Bus sectionalizer

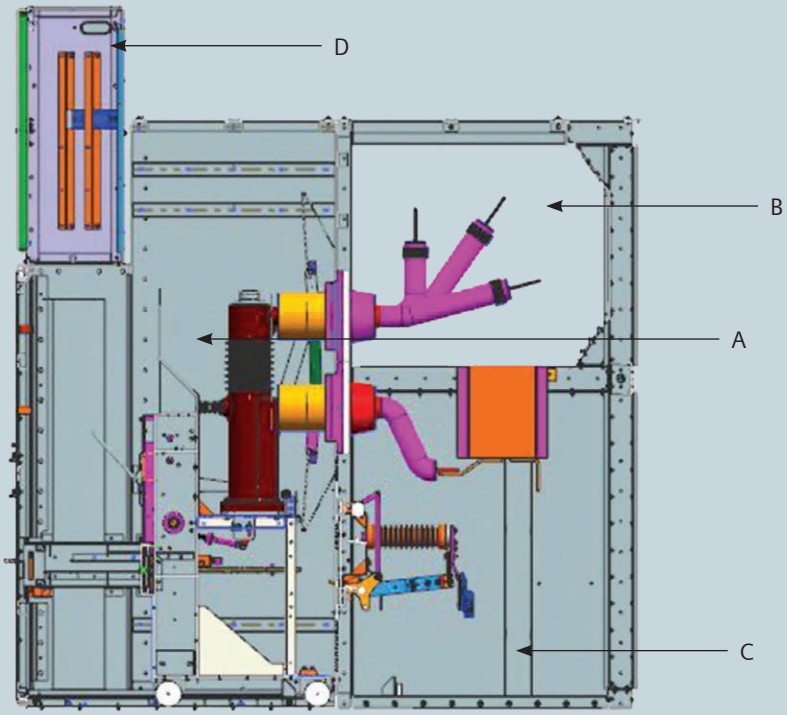


Components

	Current transformer
	Voltage transformer
	Withdrawable circuit-breaker
	Withdrawable voltage transformer with primary fuses
	Withdrawable voltage transformer



1 Door of low-voltage compartment
2 Protection device
3 Panel Number
4 Feeder Name Plate
5 High-voltage door
6 Inspection window for checking the switching device truck
7 Mechanical On
8 Spring charging
9 Mechanical Off
10 Viewing window for VCB status
11 Door handle
12 Slot to insert cranking handle & Double bit key for Rack in Rack out
13 Viewing window of earth SW status
14 Slot to insert Earth SW handle



A Switching-device compartment
B Busbar compartment
C Cable compartment
D Low-voltage compartment

Design

Panel design

Switching-device compartment
- All switching operations with high-voltage door closed
- Pressure relief upwards
- Panel powder-coated with epoxy resin
- Metallic, earthed shutters ensure partition class PM
- High-voltage door pressure-resistant in the event of internal arcs in the panel
- Interlocking between high-voltage door and circuit-breaker truck ensures interlock-controlled access
- Switching-device compartment to accommodate components for implementing various panel versions with

– Vacuum circuit-breaker truck
– Metering truck.

Busbar compartment
- Pressure relief upwards
- Hollow triangular busbars

– For rated normal current of up to 2900A
– With Insulation & shrouds at joints
- Bolted top covers provide tool-based access.

Cable compartment
- Pressure relief upwards through rear pressure relief duct
- Suitable for connection of single-core cables or Three core
- Earthing busbar
- Connection from rear
- Interlocked high-voltage door and switching-device compartment provide interlock-controlled tool-based access for panels with connection from rear

Components at the panel connection (option)
- Single-core XLPE cables
- Coupling electrode for capacitive voltage detecting system
- Voltage transformers

– Cast-resin insulated
– Max. 3x1-pole
– Fixed-mounted or Withdrawable
- Earthing switch or earthing truck

– Manual operating mechanism
– In addition to standard interlocking between earthing switch and circuit-breaker truck, optionally with padlock or electromagnetic interlocking
- Surge arresters

– Protection of the switchgear against external over - voltages.

Interlocks
- Interlocking conditions are satisfied according to IEC 62271-200
- Earthing switch can only be operated with circuit-breaker truck in test position
- Circuit-breaker can only be moved with circuit-breaker “OPEN” and earthing switch “OPEN”
- Interlocking of high-voltage door against circuit-breaker truck
- The high-voltage door can only be opened when the circuit-breaker truck is in test position
- Option: Electromagnetic interlocking
- Option: Mechanical key interlocking (based on interlocking scenarios).

Switching-device truck, low-voltage cables, low-voltage compartment

Switching-device truck

- 4 NO + 4 NC auxiliary switch contacts at the carriage mechanism indicate the service and test position of the truck
- Interlocks to the panel door and the earthing switch are integrated in the operating mechanism box
- The truck is mechanically interlocked with the circuit-breaker
- 26.3kA / 31.5 kA 3s, with silver-plated tulip contacts.

Low-voltage cables

- Low-voltage cables are flexible and have metallic covers
- Connection between switching-device truck and panel wiring to low-voltage compartment via 64-pole plug connectors
- Bus wires pluggable from panel to panel.

Low-voltage compartment

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

Standards

Standards, specifications, guidelines

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

Technical Standards

IEC 62271-1	Common clauses for high-voltage switchgear and control gear standards
IEC 60071-1	Insulation co-ordination for equipment in three-phase systems above 1kV
IEC 62271-200	A.C. metal-enclosed switchgear and control gear for rated voltages above 1kV and up to and including 52kV
IEC 62271-100	High-voltage alternating current circuit-breakers
IEC 62271-102	Alternating current disconnectors (isolators) and earthing switches
IEC 62271-105	High-voltage alternating current switch-fuse combinations
IEC 60529	Degree of production provided by encloseres (IP-code)
IEC 61243-5	Working under voltage - Voltage detectors - Part 5: Voltage detection systems
IEC 61869-1	General requirement for instrument transformers
IEC 61869-2	Additional requirement for current transformers
IEC 61869-3	Additional requirement for inductive voltage transformers

Type of service location

The switchgear can be used for indoor installation

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

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

Table – Dielectric strength

Rated voltage (rms value)	kV	36
Rated short-duration power-frequency withstand voltage (rms value)		
– Between phases and to earth	kV	70
Rated lightning impulse withstand voltage (peak value)		
– Between phases and to earth	kV	170

Standards

Standards, specifications, guidelines

Current-carrying capacity

- According to IEC 62271-1
  current-carrying capacities refer to the following ambient air temperatures:
  – Design ambient temperature : 40° C
  – Operating temperature range : - 5° C to +55° C
  for primary part
- The current-carrying capacity of the panels and busbars depends on the ambient air temperature outside the enclosure.

Protection against solid foreign objects, electric shock and ingress of water

The NXAIR H switchgear fulfills acc. to the standards

- IEC 62271-200
- IEC 60529

the following degrees of protection:

- Enclosure: IP4X
- Compartments: IP2X

Internal arc classification

- Safety of operating personnel ensured by tests to verify internal arc classification djbfjsdbfjs
- Internal arc tests performed in accordance with IEC 62271-200
- The switchgear complies with criteria 1 to 5 specified in the mentioned standards for the basic version for 26.3kA/ 0.1Sec and 31.5kA/1.0sec
- NXAIR H complies with the internal arc classification: IAC A FLR for 26.3kA/ 0.1Sec and 31.5kA/1.0sec, providing for maximum personal safety
- Definitions of criteria:

– Criterion 1
Correctly secured doors and covers do not open. Limited deformations are accepted.
– Criterion 2
No fragmentation of the enclosure. Projection of small parts up to an individual mass of 60 g, are accepted.
– Criterion 3
Arcing does not cause holes in the accessible sides up to a height of 2 m.
– Criterion 4
Horizontal and vertical indicators do no ignite due to the effect of hot gases.
– Criterion 5
The enclosure remains connected to its earthing point.

- If the switchgear is supplied with transverse partitions segregating adjacent panels (optional), internal arcing in any panel will not affect the adjacent panels. This means that the damage is limited to the panel where the fault has occured.

Notes

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