

nuventura



Nu1 36kV Dry air GIS Technical Catalogue

Contents

1. INTRODUCTION	1
2. PRODUCT SPECIFICATION	3
2.1 STANDARDS:	3
2.2 TECHNICAL RATINGS	3
3. DESIGN	5
3.1 PRODUCT FEATURES	5
4. COMPONENTS	8
4.1 VACUUM CIRCUIT BREAKERS:	8
4.2 THREE POSITION DISCONNECTOR:	8
4.3 BUSBAR:	8
4.4 CURRENT AND VOLTAGE TRANSFORMERS:	8
4.5 CABLE COMPARTMENT:	9
4.6 VARIANTS:	10
5. INSTALLATION REQUIREMENTS	12

1. Introduction

Nu1 gas-insulated switchgear (GIS) is a medium voltage, dry air primary distribution level switchgear. A solid, insulated busbar can be connected to the exterior of the gas tank due to the airtight construction and the metal enclosure of the switchgear. Dry air is used by the switchgear in place of SF₆ as the insulating medium. Under IEC 62271/DIN EN 62271, a metal tank without phase isolation encloses the internal switching devices for each pole.



With our dry air technology, Nuventura preserves the key benefits of a GIS, including great dependability, small size, and low maintenance requirements, while doing away with the need for SF₆, one of the strongest greenhouse gases with stringent usage limitations.



Nu1 Switchgear is metal-enclosed, gas-insulated, withdrawable, and has been type tested to the relevant standards by internationally recognized STL approved testing laboratories. In our industrial complex, we research and produce our switchgear products.

Founded in Berlin in year 2017, the company has been on a journey of innovation and expansion. The pioneering spirit resulted in the successful pilot of

prototype in year 2018, which was a crucial milestone in the development. Building on this momentum, we carried out the first type testing of the product in year 2020, confirming its dependability and effectiveness. In 2021, we reached new heights by conducting a grid trial, which validated the technological potential. The same year, first commercial installation took place, demonstrating the actual implementation of technologies in real-world scenarios. The dedication to sustainability was obvious in year 2022, with the first renewable installation, confirming the role in spearheading the shift.



Applications:

Nuventura Nu1 switchgear is widely applicable in various industrial applications such as:

Wind and solar,



Energy utilities,



Mining/Transportation (Shipyard, Railways, Airport),



Industries,



Datacentres (Waste to energy)



• **Our expertise:**

- Expected lifetime of 30-40 years,
- Front access,
- As Compact design as SF₆ – GIS,
- No SF₆ gas handling – Climate friendly,
- 100% dry air insulation.

2. Product specification

2.1 Standards:

Nuventura Nu1 switch gear complies with international standards and specifications. In accordance with the European standards (IEC standards).

Components	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
Circuit breaker	62271-100	High-voltage switchgear and controlgear: Alternating-current circuit-breakers
Disconnecter / earthing switch	62271-102	High-voltage switchgear and controlgear: Alternating current disconnectors and earthing switches
Current transformers (CT)	61869-2	Current transformers
Voltage transformers (VT)	61869-3	Voltage transformers
Insulation	60071	Insulation co-ordination
IP code	60529	Degrees of protection provided by enclosures
IK code	62262	Degree of protection provided by enclosures
Voltage detection system (VDS)	62271-213	Voltage detecting system (VDS)
Operation	EN 50110	Operation of electrical installation
Installation	61936-1	Power installations exceeding 1 kV a.c.
Environmental conditions	60721-3-3	Classification of environmental conditions

2.2 Technical ratings

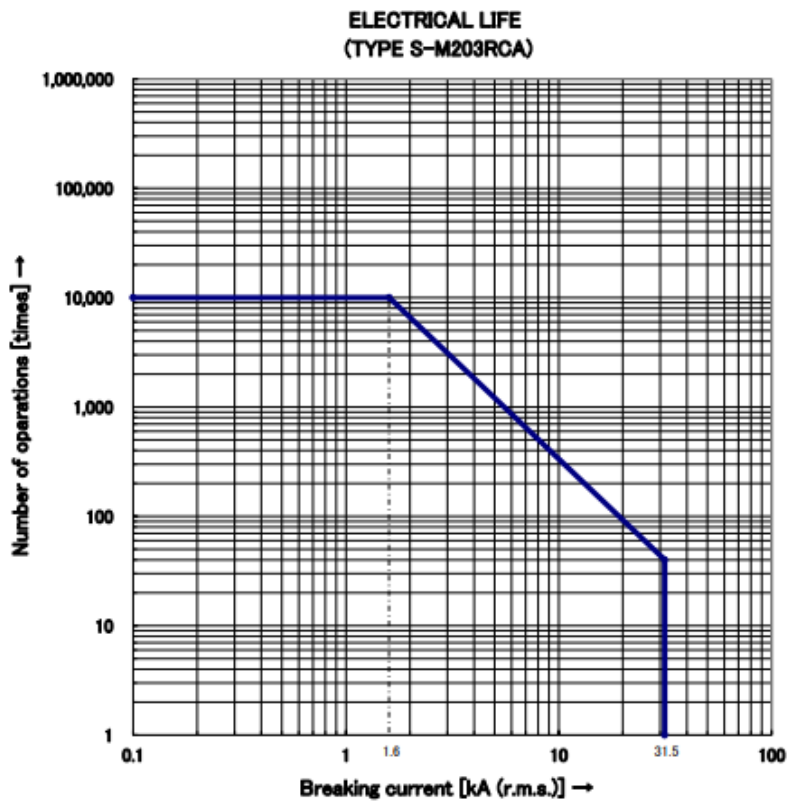
The switchgear complies with the standards and regulations specified in this document. Any specification not specified in this document may require additional compliance with the additional standards.

Electrical data	Units	IEC 62271-200 Data	
Rated voltage (U_r)	kV	24	36
Testing voltage (PF/Impulse) (U_d/U_p)	kV	50/125	70/170
Rated frequency (f_r)	Hz	50/60*	
Rated bus bar current (I_r)	A	2500**	
Rated feeder current	A	1250/2000*	
Rated peak withstand current (I_p)	kA	78.8/81.9	
Rated short time current (I_k)	kA / 3 sec	31.5	
Internal arc protection (AFLR)	kA / 1 sec	31.5	
Operating temperature	°C	-5 ... +40	

* Type-testing is in progress. ** 2000 A with bus sectionalizer

Dimensions			
Width	mm	650 (1250 A)	
		900 (2000 A)	
Height	mm	2300	
Depth	mm	1500	
Dry air insulation medium			
Filling pressure (rel.) (P _{re})	kPa	100 at 20 °C	200 at 20 °C
Min. Operating pressure (rel.) (P _{me})	kPa	80 at 20 °C	180 at 20 °C
Gas leakage rate	%/year	< 0.1 at 20 °C	
Operating pressure of burst disc	kPa	≥ 300	
Rated operating sequence	O-0.3s-CO-15s-CO		
Classification according to IEC 62271			
Endurance class of vacuum circuit breaker (according to IEC 62271-100)	at rated normal current	10,000 operating cycles	
Endurance classes of circuit breaker (according to IEC 62271-100)	M2, E2, C2		
Endurance classes of Disconnecter (according to IEC 62271-102)	M0, E0		

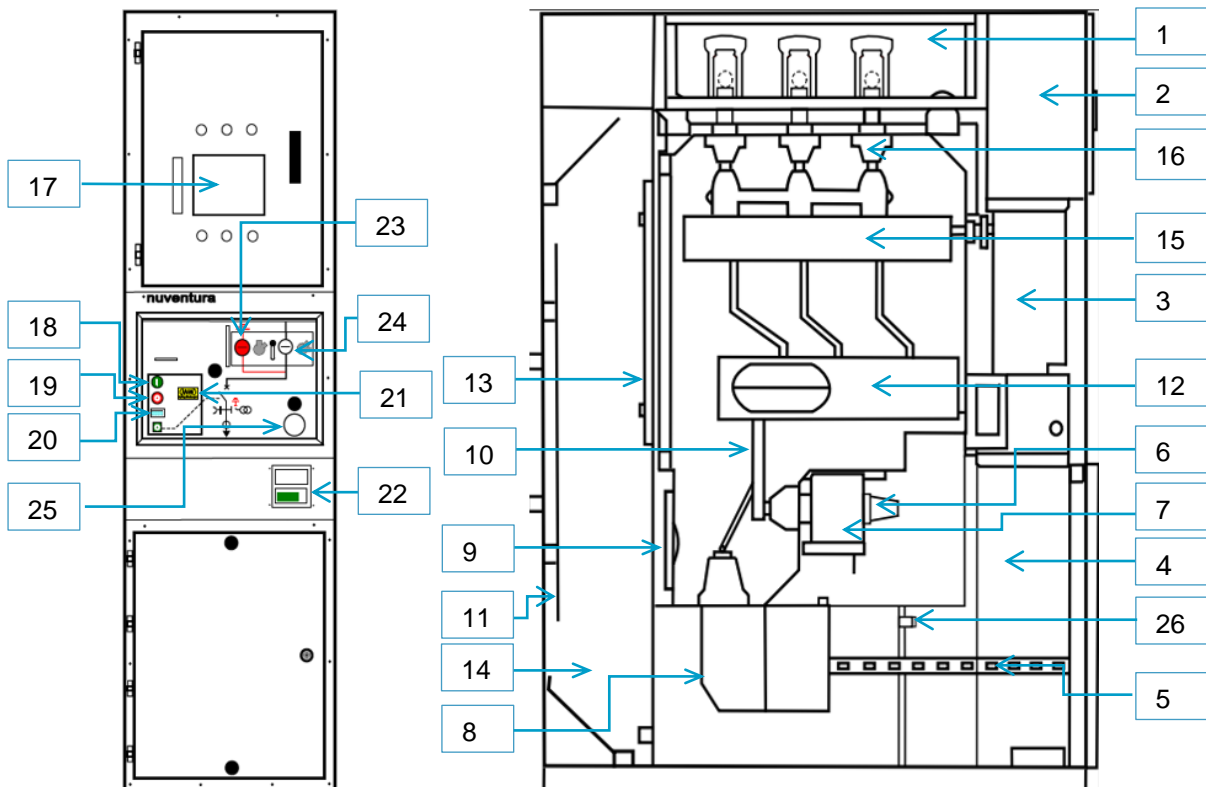
Electrical life of Vacuum interrupter:



Operation	“O”
Asymmetrical DC component	≤ 40%
Arcing time	≤ 8.0 ms
Initial opening speed (0-2 ms)	≥ 1.4 m/s
Average opening speed	1.4–1.8 m/s

3. Design

- | | |
|---|---|
| 1. Busbar compartment | 2. Low voltage compartment |
| 3. Drive | 4. Cable compartment |
| 5. Cable support system | 6. T-plug cable connections |
| 7. Current transformer | 8. Voltage transformer |
| 9. Pressure relief system | 10. Secondary two position switch |
| 11. Panel back door | 12. Vacuum circuit breaker |
| 13. Gas tank door | 14. Pressure relief duct |
| 15. Three position disconnector | 16. Busbar connector bushing |
| 17. Protection relay | 18. Circuit breaker actuation push buttons |
| 19. Circuit breaker operations counter | 20. Circuit breaker operations indicator |
| 21. Spring charge indicator | 22. Voltage detecting system |
| 23. ON/OFF disconnector operation tool slot and indicator | 24. OFF/EARTH Disconnector operation slot and indicator |
| 25. System pressure gauge | 26. Earthing bar |



3.1 Product features

- **General:**

- Hermetically sealed stainless-steel tank enclosing the switching devices.
- Dry air insulation medium reduces the gas handling process and avoids gas leakage.
- Compact dimensions equivalent to SF₆ insulation.
- Cable connection with outer-cone plug-in system for connection of solid-insulated busbars.

- The gas work or any changes to the existing panel is independent of installation, commissioning, and lifetime extension.
- Integrated pressure relief duct systems.
- Equipped with sensor updating the health of the switchgear in real time.
- User friendly:
 - compact design,
 - accessible control panels,
 - no SF₆ – handling – Climate friendly,
 - front access to the switchgear.

- **Accessibility:**

- Cable compartment, current transformer, and voltage transformer from front of the switchgear.
- The busbar isolation and cable earthing through vacuum circuit breaker providing safe operation.
- Metallized measuring instruments, screened touch proof cables and busbars provide safety.

- **Insulating medium:**

- Switchgear tank filled with dry air insulation gas.
- Features of dry air gas:
 - non-toxic,
 - no F-gases involved,
 - climate-neutral,
 - non-inflammable,
 - chemically neutral.

- **Panel design:**

- Factory-assembled, type-tested.
- Single-pole, solid-insulated, screened busbars, plug-in type.
- Maintenance-free.
- Vacuum circuit breaker.
- Three-position disconnecter for disconnecting and earthing by means of the circuit-breaker.
- Make-proof earthing by means of the vacuum circuit-breaker.
- Cable connections with outer cone plug-in system is according to DIN EN 50 181.
- Instrument transformers can be replaced without gas work.
- Degree of protection:
 - IP 65 for all high voltage parts of the primary circuit.
 - IP 3X for the switchgear enclosure.

- **Modular design:**

- Current and voltage transformers are provided outside the switchgear vessel allowing ease of maintenance.
- Voltage transformers are metal coated, plug-in and disconnectable.
- Panels can be replaced without additional gas work and moving other panels.
- Protection and measuring systems can be integrated.
- Low voltage compartment is removable, busbar and instrument transformers are plug-in.

- **Optional:** Numerical multifunction protection relay with integrated protection, control, communication, operating and monitoring functions.

- **Environmental independence:**

The Nu1 consists of switching device in hermetically sealed tank inside an enclosure. This enclosure protects the high voltage components from environmental impacts like:

- Aggressive ambient conditions,
- External parameters like:
 - Salt, dust
 - Humidity, corrosion
 - Insects, rodents
 - High installation altitudes.

- **Maintenance free design:**

The Nuventura switching devices are enclosed in a sealed vessel inside dry air insulation providing maintenance free lifetime ensuring:

- safety of the service personnel.
- reliable and un-interrupted supply.
- sealed pressure system that is designed for 30 years of lifetime.
- maintenance free under ambient conditions.
- reduces operation costs.

- **Automation and digitalization:**

On-time and conditional operation of the control devices is ensured by the automation system and relay. This ensures:

- one directional automation and integration of the devices into the central Supervisory Control and Data Acquisition (SCADA) system.
- cost efficient and operation of devices based on logic functions leading to flexible and integrated solution.

- **Sensor integration (optional):**

The sensor system is integrated in the switching devices. This ensures:

- real time health measurement,
- continuous monitoring of temperature, partial discharge, quality, and density of gas,
- save cost in periodic maintenance,
- failure occurrence is identified before occurrence.

- **Interlocks:**

- Electromechanical interlocks are according to IEC 62271-200 and VDE 0671-200 prevent maloperations.
- In circuit breaker panels, the disconnect switch positioning can prevent circuit breaker operations to ensure safety of product and personnel.
- Disconnect operation is separated into opening/closing and opening/earthing operations, both with separate tool access slots for individual tools.
- **Optional:** Tool access slots can be padlocked to prevent operations by non-qualified personnel.



- **Service life:**

- The Nu1 is designed for 30 years of service time, considering the dry air insulation medium.
- The switching compartment may additionally be opened for any service and lifetime extension review if necessary.
- The hermetically sealed system together with intelligent sensor system ensures to ensure service lifetime, and performance.

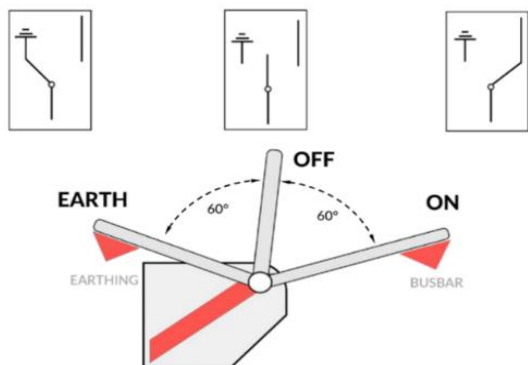
4. Components

4.1 Vacuum circuit breakers:

- Located inside the hermetically sealed and welded tank of switchgear.
- Climate independent
- Maintenance free, stored energy operation and trip free mechanism.
- Vacuum interrupters tested for X-ray emission.
- Breaker tested for C2 class, and operation is rated upto M2 class – 10.000 operations according to IEC 62271-100.
- Circuit breaker operation is linked to control and protection systems for logical operations.
- Circuit breaker operation is mechanically coupled to disconnector operation by means of electromechanical interlocking.

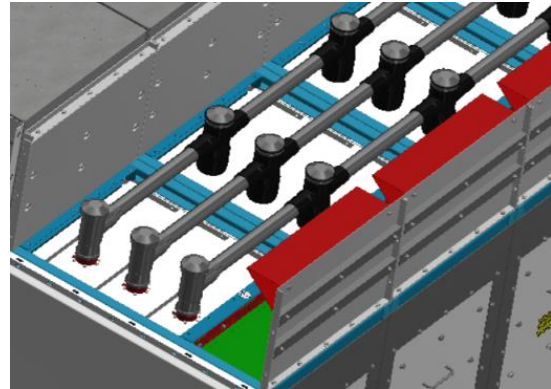
4.2 Three position disconnector:

- Located inside the hermetically sealed and welded tank of switchgear.
- Maintenance free and no lubrication is required for bearing lifetime.
- Manual or motorized operations.
- The disconnector is connected outside the hermetically sealed tank through a rotary bushing and operation is performed from the front of the switchgear.
- 1000 mechanical operating cycles for CLOSED/OPEN/EARTHED.
- The operation of the disconnector is separated into opening/closing and opening/earthing with individual tool access slots.
- Circuit-breaker cannot be closed unless disconnector is in CLOSED or EARTHED position and operating tool has been removed.
- Free release spring drive for fast and torque independent operation.



4.3 Busbar:

- Connection via single-pole solid insulated busbars.
- Section wise coupling using T-couplers for customized bay expansion.
- Touchproof earthing and field shielded design for electrical safety.
- Standardized connectors for possible connection of all Nu1 switchgear variations.
- Insusceptible to dust and corrosion.
- Busbar compartment is additionally protected with IP3XD cover.
- No gas handling is required in busbar handling.
- Easy installation.
- Capacitive measuring point.
- Screening by outer conductive layer.



4.4 Current and voltage transformers:

- Customer specific requirements.
- Plug-in design flexible operational based installation.
- Placement outside the hermetically sealed, welded switchgear tank.
- **Voltage transformer:**
 - Single pole, solid insulated and metal cladding design.
 - Maintenance free.
 - A low voltage pullout link located and accessible from the cable compartment.
 - Additional low voltage access via terminal strip ergonomically accessible within the overhead low voltage compartment from the panel front.
 - Transformers according to standards IEC 61869-2 and VDE 0414-9-2.
- **Current transformer:**
 - Ring type inductive design.
 - Solid insulated plug on variant.
 - Maintenance free.

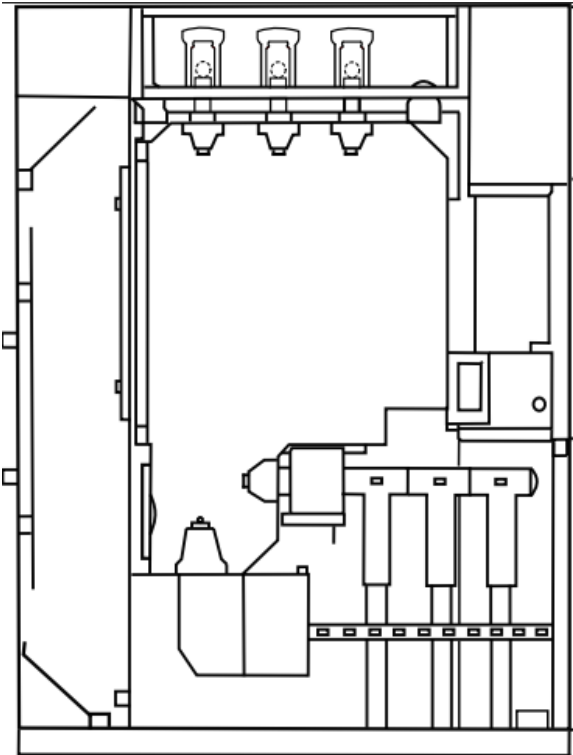
- Transformers for indoor application according to standards IEC 61869-2 and VDE 0414.

4.5 Cable compartment:

- Accessible from front of the switchgear with covered bottom opening for cable trench routing.
- The gas insulated tank is designed with three single pole cable bushing as the connection.
- Easy access by lockable, removable, and light weight door.

- Protection by an IP 3X classified metal housing and rubber cable sleeves. Protection for connectors and optional plug-in voltage transformers.

- Mounting rail system for cable supports, freely adjustable and extendable in height.
- Support system for cables up to a cross section of 630 mm² (size extendable if required).
- Copper earthing bar for common earthing.



Rating (kV)	Manufacturer	Cables per phase	Cross section(mm ²)	Insulation	Branch connector	Coupling connector	Surge arrester
36 (1250 A)	NKT*	1	240-630	Silicone	1 x CB 36-630 (1250)	-	1 x CSA M16
		2	240-630	Silicone	1 x CB 36-630 (1250)	1 x CC 36-630 M16	1 x CSA M16
		3	240-630	Silicone	1 x CB 36-630 (1250)	2 x CC 36-630 M16	-
36 (2000 A)		2	240-630	Silicone	1 x CB 36-630 (1250)	1 x CC 36-630 M16	1 x CSA M16
		4	240-630	Silicone	1 x CB 36-630 (1250)	2 x CC 36-630 M16	1 x CSA M16

*The cable connector/accessories from other manufacturers can also be checked (if required).

4.6 Variants:

The following are the panel variants:

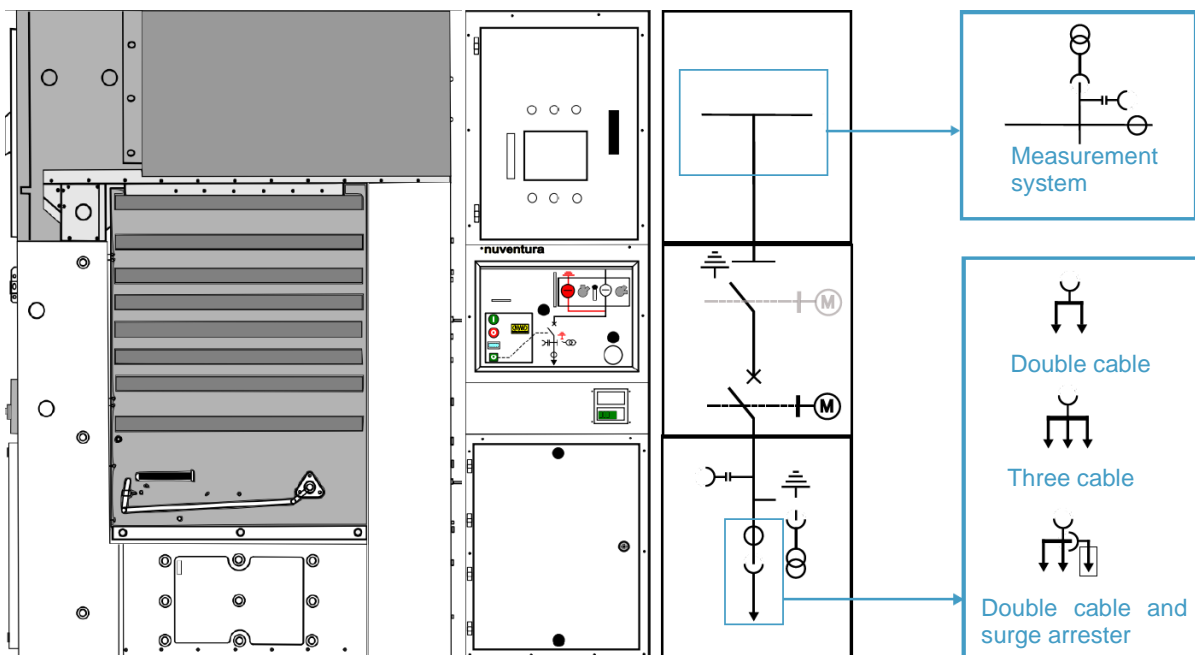
- Circuit breaker panel
- Disconnector panel
- Bus sectionalizer panel

*All panels shown below are available as versions of free-standing installation. On request, additional required variants can be provided.

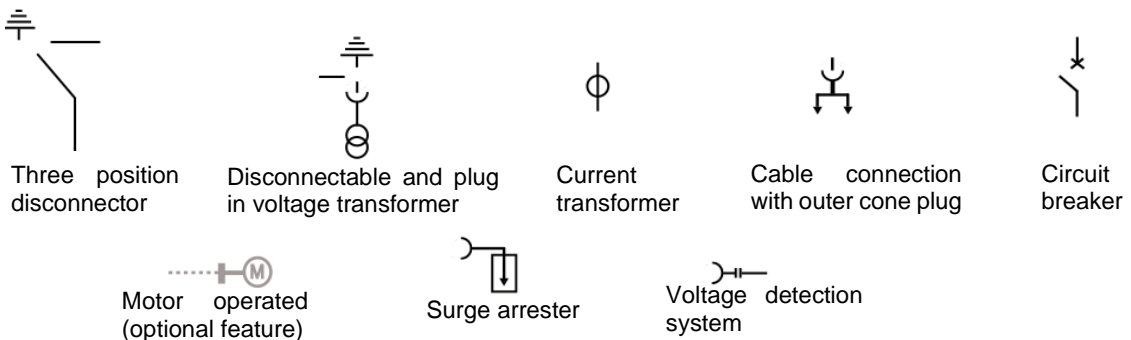
• Variants technical data:

Dimensions (W x H x D) (mm)	1250 A		(650 x 2300 x 1500)	
	2000 A		(900 x 2300 x 1500)	
variant	Busbar VT	Busbar CT	Cable VT	Cable CT
Circuit breaker panel	Optional	Optional	Optional	Optional
Disconnecter panel	Optional	Optional	Optional	Optional
Bus sectionalizer panel	Optional	Optional	-	-

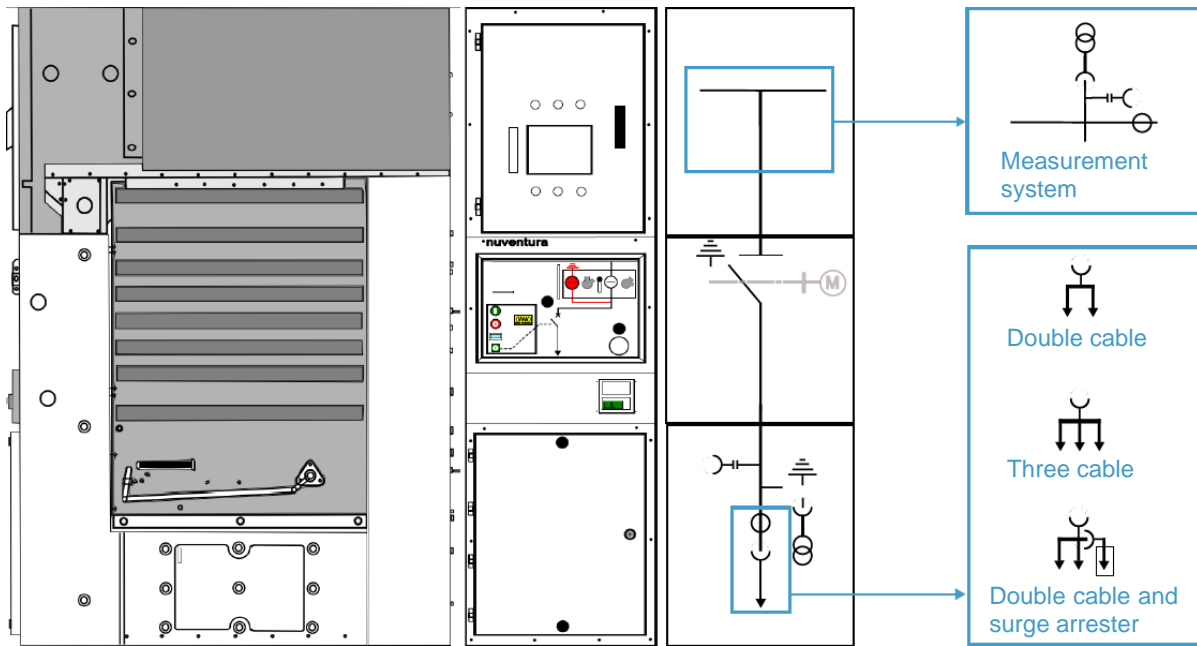
• Circuit breaker panel:



• Index:

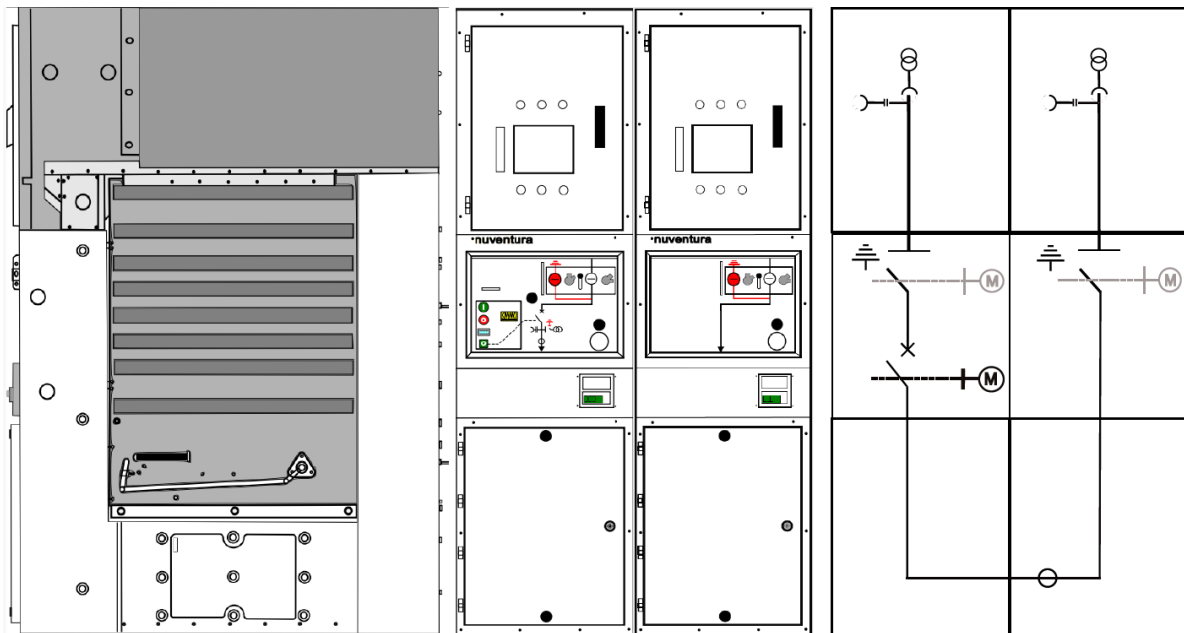


• **Disconnecter panel:**

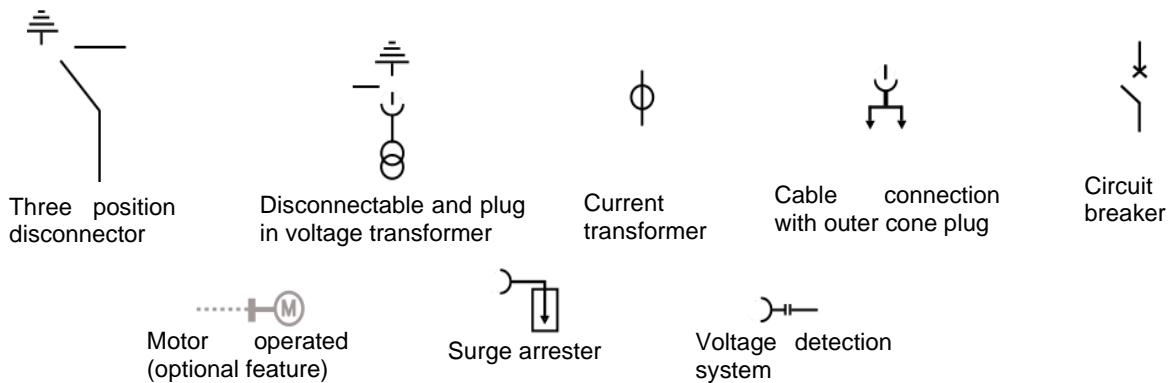


• **Sectionalizer panels:**

The Bus section panel and bus riser panel are coupled to form the bus sectionalizer panel.



• **Index:**



5. Installation requirements

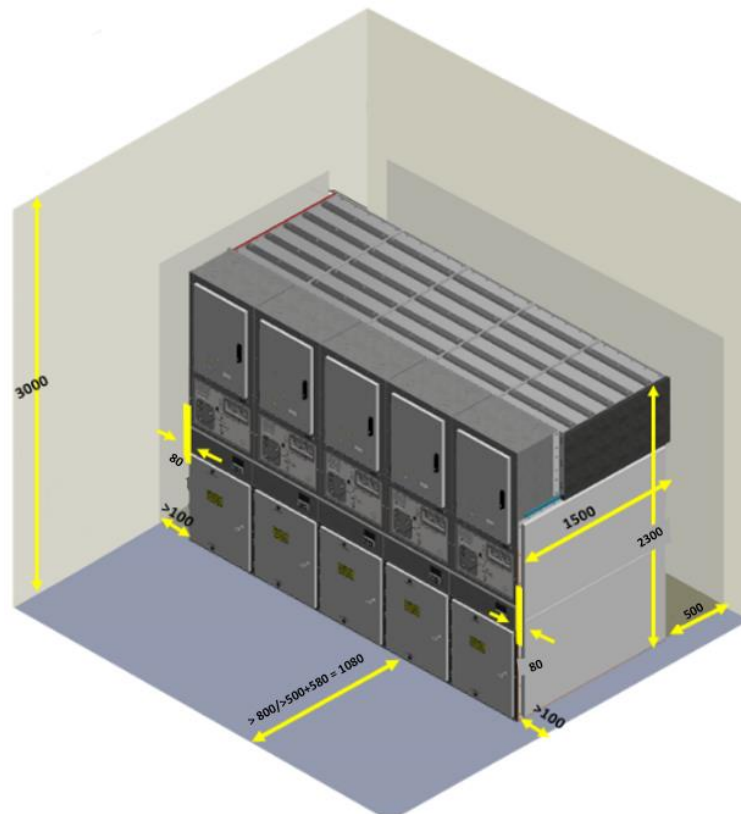
The installation area must be prepared accordingly and checked for suitability. The lateral wall distances on the left or right. For installation and maintenance in free standing and wall standing arrangement (according to IEC 61936-1):

- ≥ 500 mm recommendable,
- ≥ 500 mm for auxiliary transformer panels with lateral cable connection as end panels.

• Required space:

Addition to the base dimension of the panel:

Area	Dimension
Side covers	80 mm each
Operating area	800 mm min.
Door clearance	580 mm min.
Lateral wall distance	100 mm min.
Lateral wall distance for duct	≥ 500 mm rec.
Rear access	550 mm min.



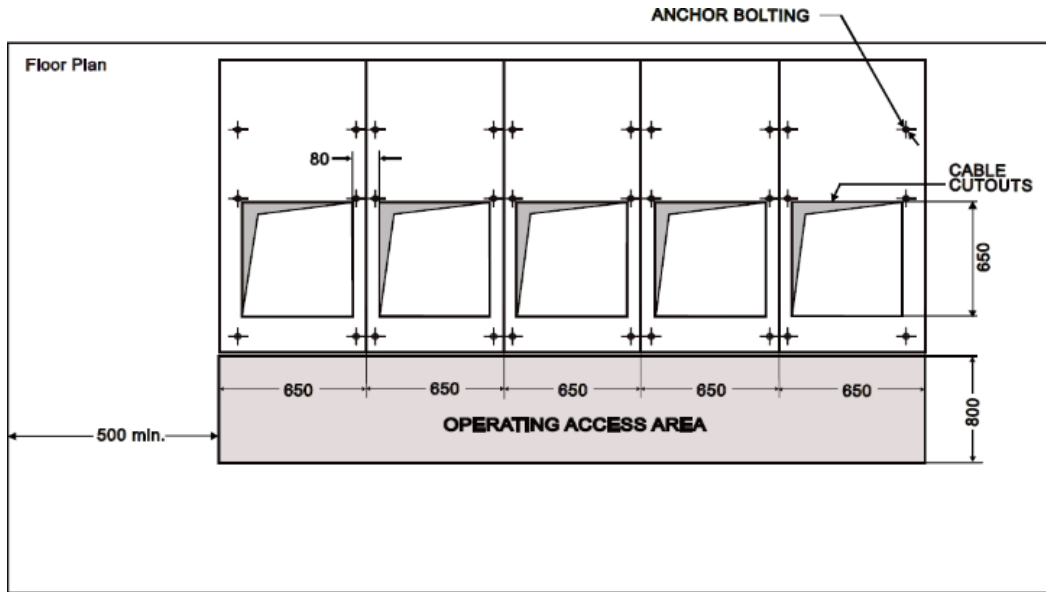
• Floor plan:

For details regarding the below see the project specific floor plan:

- Bolting points,
- Cut-outs,
- Room preparation,
- Duct installation.

Any base frame is to be aligned and levelled according to DIN 43661:

- Cable connection from the bottom
- A cable trench or cable basement is required.
- Cable trench minimum depth is dependent on the cables used, but commonly a minimum of 800mm is recommended.



Published by and copyright © 2024:
nuventura GmbH
Wollenberger Str. 4f,
13053 Berlin
Germany

For more information, please contact:

Phone: +49 30 120 87 375

E-Mail: info@nuventura.com

All rights reserved by Nuventura GmbH. If not stated otherwise on the individual pages of this catalog, we reserve the right to include modifications, especially regarding the stated values, dimensions, and weights. Drawings are not binding. All product designations used are trademarks or product names of Nuventura GmbH. If not stated otherwise, all dimensions in this catalog are given in mm. Subject to change without prior notice. The information in this document contains general descriptions of the technical options available, which may not apply in all cases. The required technical options shall therefore be specified in the contract.

Published by and copyright © 2024:
nuventura GmbH
Wollenberger Str. 4f,
13053 Berlin