

nuventura



Next-generation GIS

Nu1 - Nuventura's 36 kV dry-air GIS

Catalogue

Version 10

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1. Scope of application

This specification applies to the dry air primary distribution level medium voltage gas insulated switchgear. The switchgear is metal-enclosed and the gas vessel is an airtight construction making it possible to connect a solid insulated bus bar to the outside of the gas vessel. The switchgear replaces SF₆ with dry air as the insulating medium. The interior switching devices for all poles are enclosed by a metal vessel without phase segregation according to DIN EN 62271-200.

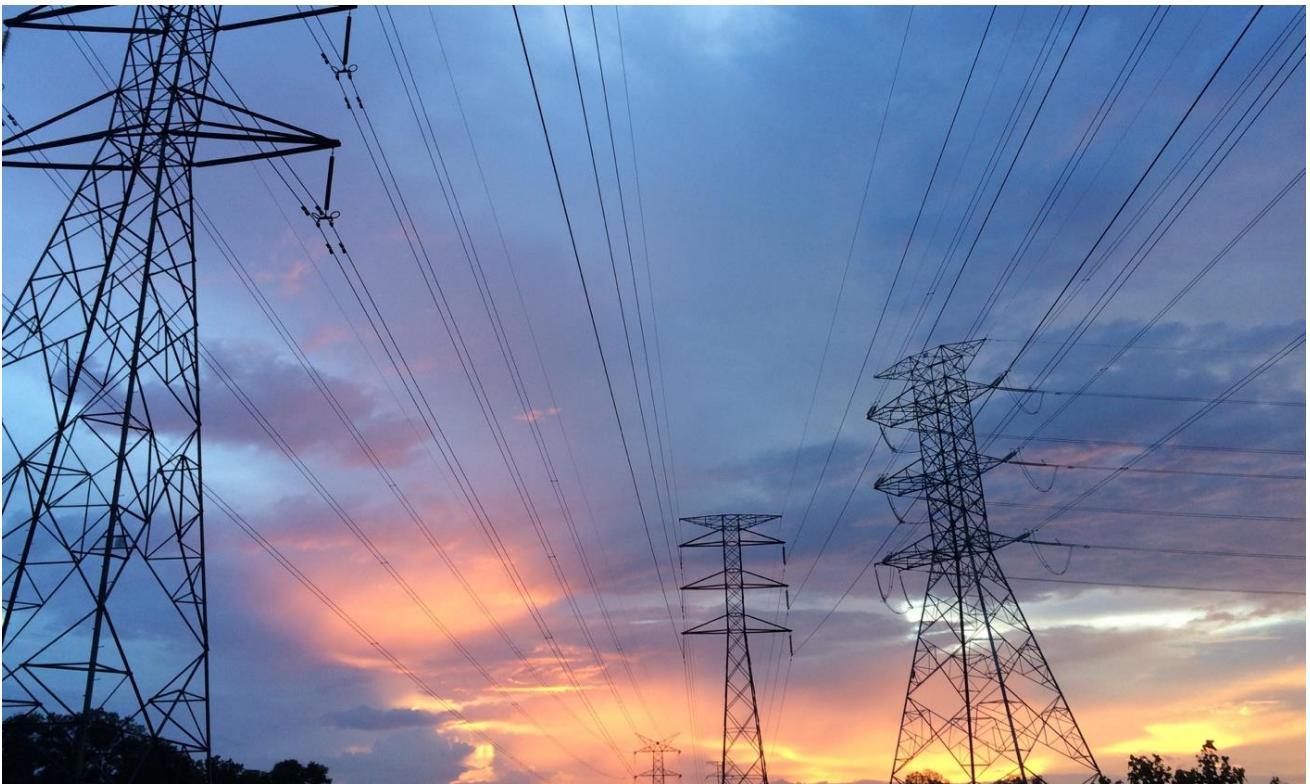
The panel is designed for indoor applications enabling the discharge of any exhaust gas outside the room in the case of an internal arc event. Special designs that discharge the gas outside of the room are also possible but need to be customized according to the request.

The switchgear complies with the requirements of the standards and regulations listed in this document. Any special requirements not specified in this document may require additional compliance with additional standards.

Application

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

- marine,
- oil and gas,
- nuclear,
- wind and solar,
- energy utilities,
- transport (shipyard, railways, airport),
- infrastructures and buildings.





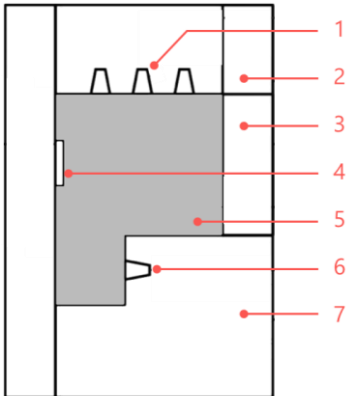
2. Product specification

2.1 Standards

Nuventura Nu1 is compliant with the international standards

Components	IEC standard	EN standard
Switchgear	IEC 62271-1	EN 62271-1
	IEC 62271-200	EN 62271-200
Circuit breaker	IEC 62271-100	EN 62271-100
Disconnecter / earthing switch	IEC 62271-102	EN 62271-102
Insulation	IEC 60071	EN 60071
IP code	IEC 60529	EN 60529
IK code	IEC 62262	EN 50102
Current transformers	IEC 61869-2	EN 61869-2
Voltage transformers	IEC 61869-3	EN 61869-3
Voltage detection system	IEC 62271-213	EN 62271-213

2.2 Technical specifications



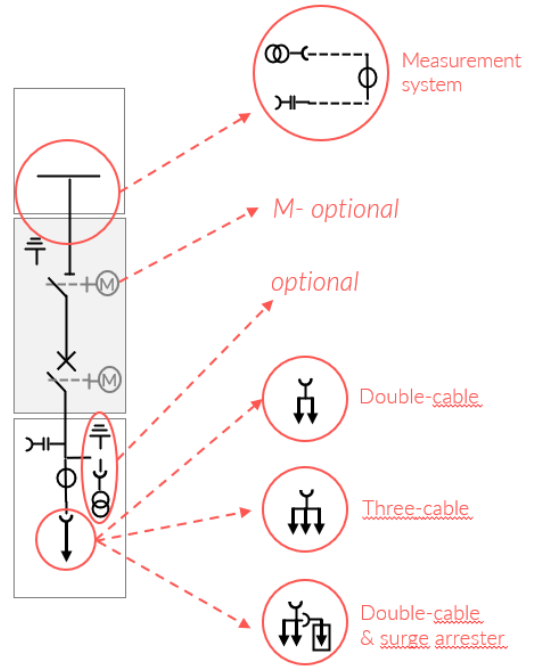
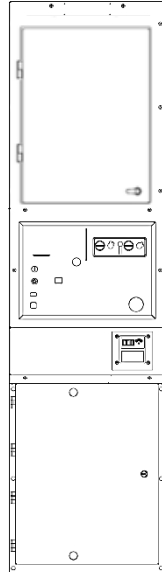
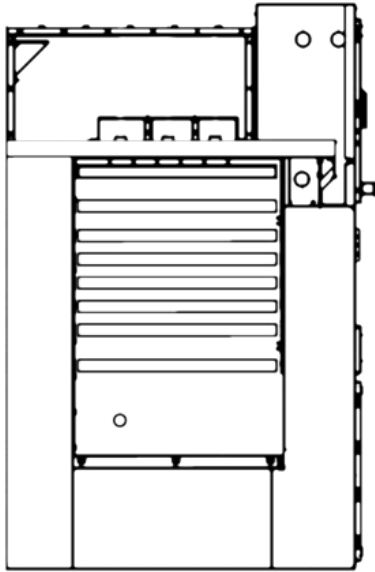
Main components of the nuventura switchgear:

1. Busbar bushing
2. Low-voltage compartment
3. Drive compartment
4. Pressure relief
5. Gas-insulated tank
6. Cable bushing
7. Cable compartment

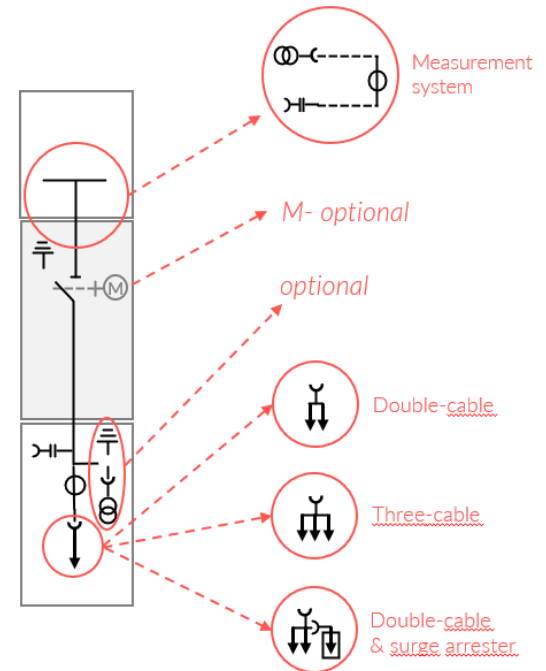
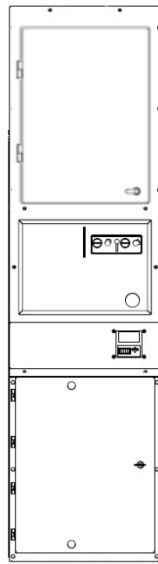
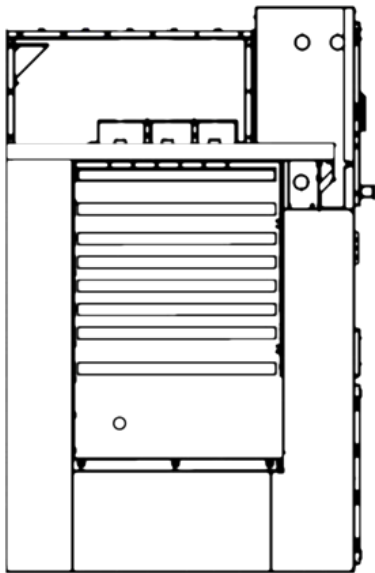
Technical data		IEC 62271-200 Data		
Rated voltage	kV	36	24	
Testing voltage (PF/Impulse)	kV	70/170	50/125	
Rated frequency	Hz	50/60	50/60	
Rated bus bar current	A	1250	1250	
Rated feeder current	A	1250	1250	
Rated peak withstand current	kA	78.8/81.9	78.8/81.9	
Rated short time current	kA	31.5	31.5	
Operating temperature	°C	-5 ... +40	-5 ... +40	
Dimensions				
Width	mm	650	650	
Height	mm	2300	2300	
Depth	mm	1500	1500	
Dry air insulation medium				
Filling pressure (rel.)	bar	2.0 at 20 °C	2.0 at 20 °C	
Min. operating pressure (rel.)	bar	1.8 at 20 °C	1.8 at 20 °C	

2.3 Variants

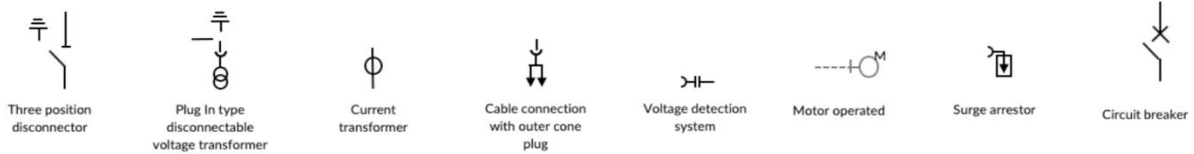
Circuit breaker panel



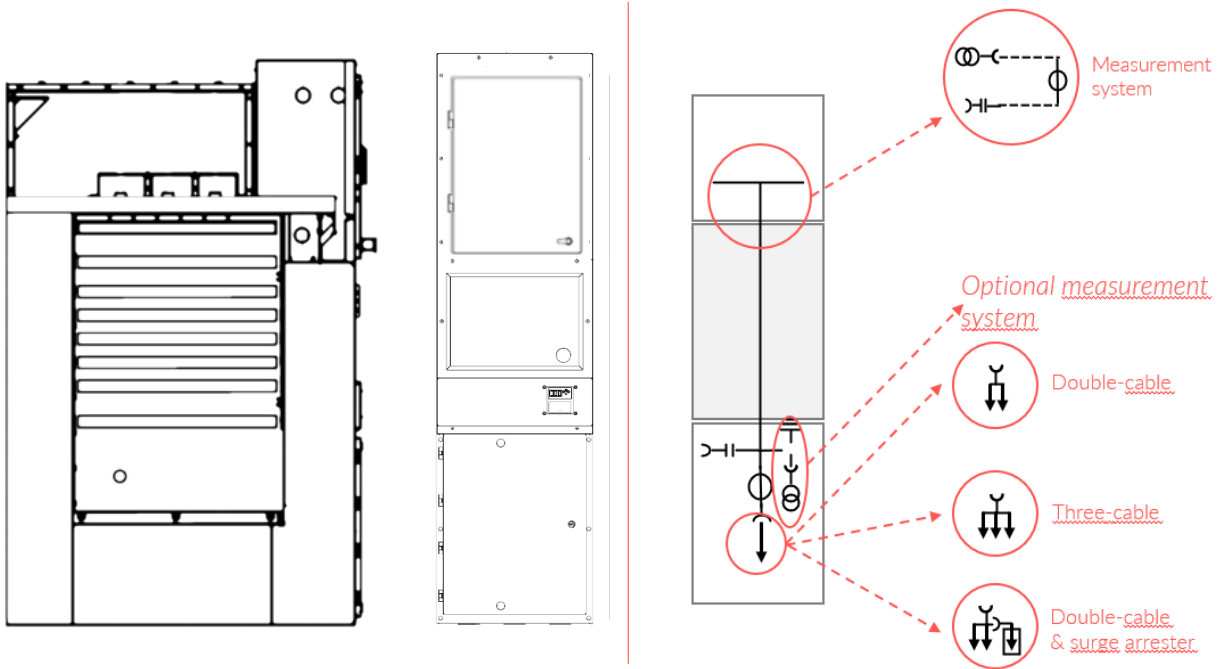
Disconnecter panel



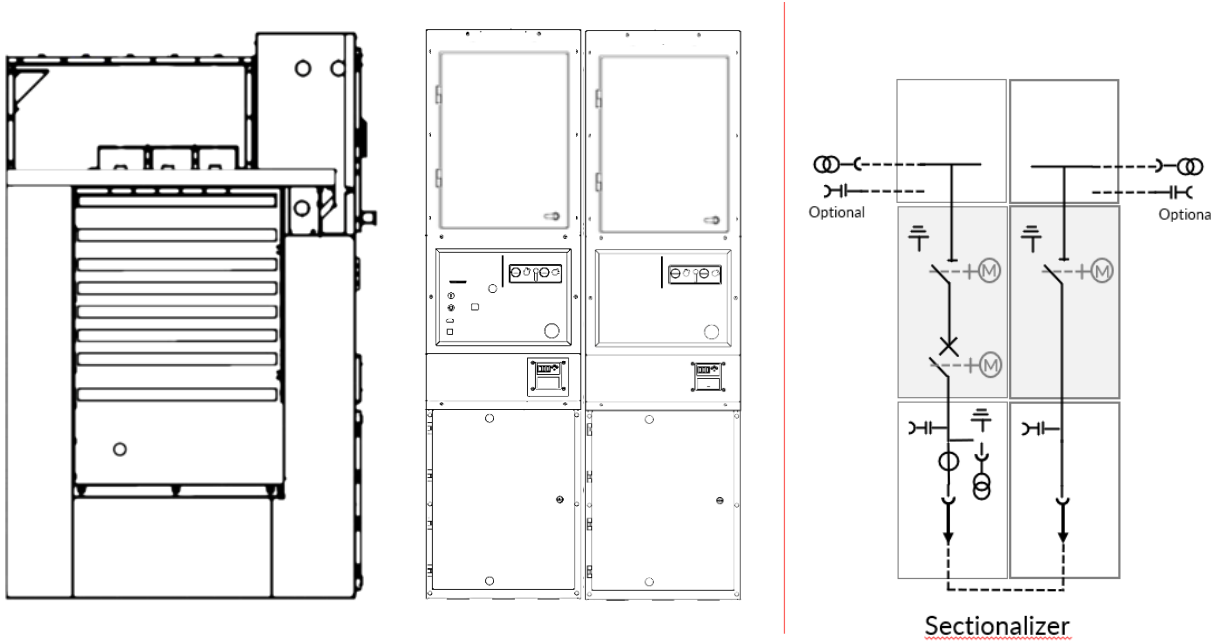
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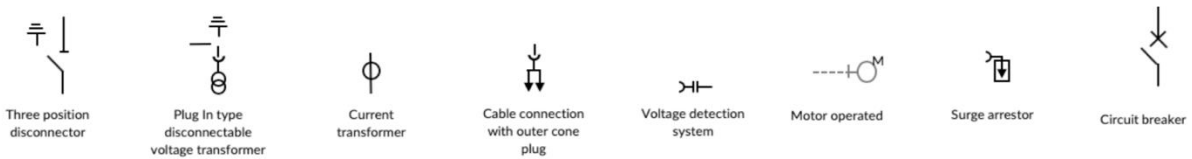
Bus riser panel



Sectionalizer panel



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2.4 Technical data

Technical data	Unit	IEC 62271-200 Data				
Rated voltage	kV	36		24		
Testing voltage (PF/Impulse)	kV	70/170		50/125		
Rated frequency	Hz	50/60		50/60		
Rated bus bar current	A	1250		1250		
Rated feeder current	A	1250		1250		
Rated peak withstand current	kA	78.8		78.8		
Rated short time current	kA	31.5		31.5		
Dimension			Busbar VT	Busbar CT	Cable VT	Cable CT
Circuit breaker panel						
Width	mm	650	Optional	Optional	Optional	Optional
Height	mm	2300				
Depth (including pressure duct)	mm	1500				
Filling pressure	bar	2.0				
Disconnecter panel						
Width	mm	650	Optional	Optional	Optional	Optional
Height	mm	2300				
Depth (including pressure duct)	mm	1500				
Filling pressure	bar	2.0				
Bus riser panel						
Width	mm	650	Optional	Optional	Optional	Optional
Height	mm	2300				
Depth (including pressure duct)	mm	1500				
Filling pressure	bar	2.0				
Bus sectionalizer panel						
Width	mm	1300	Optional	Optional	Optional	Optional
Height	mm	2300				
Depth (including pressure duct)	mm	1500				
Filling pressure	bar	2.0				

3. Product features

3.1 Technology

General

- Hermetically sealed stainless-steel vessel enclosing the switching devices.
- Dry air insulation medium reduces the gas handling process and avoids F-gas leakage.
- Compact dimensions as equivalent to SF₆ insulation.
- Cable connection with outer-cone plug-in system for connection of solid-insulated busbars.
- The installation, commissioning and extension of switchgear is independent of the gas work or any changes to the existing panel.
- Integrated pressure relief duct systems
- Access to cable compartment, current transformer and voltage transformer from the front of the switchgear.
- The busbar isolation and cable earthing through vacuum circuit breaker providing safe operation.
- Metallized measuring instruments and screened touch proof cables and busbars provide safety.
- Equipped with intelligent sensors updating the health of the switchgear in real time.

Interlocks

- Logical mechanical interlocks according to IEC 62271-200 and VDE 0671-200 prevents maloperation.
- 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.

- Tool slots mechanically prevent removal of operating tools before operation step has been completed.
- Optional: Tool access slots can be padlocked to prevent operation by non-qualified personnel.
- Optional: Electromechanical interlocks.

Modular design

- Current and voltage transformers are provided outside the switchgear vessel allowing ease of maintenance.
- Metal-coated, plug-in and disconnectable voltage transformers.
- Maintenance-free under normal ambient conditions No relubrication or readjustment required during the lifetime.
- Panel can be replaced without moving other panels and additional gas work.
- Protection and measuring system can be integrated.
- Low-voltage compartment removable, plug-in busbar and instrument transformers.
- Option: Numerical multifunction protection relay with integrated protection, control, communication, operating and monitoring functions.

3.2 Features

Environmental independence

The Nuventura Nu1 consists of switching devices inside a hermetically sealed stainless-steel vessel. This enclosure protects the high voltage parts from environmental impacts:

- independent of aggressive ambient conditions and external parameters like:
 - salt & dust,
 - humidity & corrosion,
 - insects & rodents,
 - high installation altitudes.

Compactness

Thanks to the use of Nuventura's innovative solution, the Nu1 is as compact as SF₆ insulated GIS. Designed mainly to ensure people's safety and reliability of service, the Nuventura Nu1 range contributes to improving electrical distribution in medium voltage networks up to 36 kV.

Climate-friendliness

By completely avoiding F-gases like SF₆ and only using dry air based on natural gases, Nuventura's GIS avoids any release of greenhouse gases to the atmosphere.

User-friendly

- Compact design;
- Accessible control panels;
- No SF₆-handling
- Front-access to the switchgear.

Maintenance-free design

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

- safety of the service personnel;
- reliable and uninterrupted supply;
- sealed pressure system that is designed for 30 - 40 years of lifetime;
- no additional gas handling work during installation, commissioning and extension of the switchgear bay;
- maintenance free operation;
- Reduction of operating cost.

Automation and digitization

The intelligent relay and automation system ensure the timely and conditional operation of the control devices. This ensures:

- automation and integration of the devices in to the central SCADA system;
- cost efficient and operation of devices based on logic functions leading to flexible and integrated solutions.

Sensor integration

The intelligent sensor system integrated inside the switching devices provides real time data about the vital parameters of the device. This ensures:

- real time health measurement of the vital health indicators for switchgear;
- continuous monitoring of temperature, partial discharge, gas quality and density in the switchgear vessel;
- save cost in periodic maintenance. The intelligent system identifies the failure mode before it occurs.

Service life

The Nuventura Nu1 is designed for 30 to 40 years of lifetime. Considering the dry air insulation medium, the switching compartment may additionally be opened for any kind of service and lifetime extension review if necessary. The hermetically sealed system together with intelligent sensor system ensures service lifetime. This ensures performance:

- for circuit-breakers according to the endurance class defined in IEC 62271-100.
- for three-position disconnectors and earthing switches according to the endurance class defined in IEC 62271-102;



3.3 Safety

No SF₆ gas handling

- No special technical training for gas handling required.
- Avoid administrative effort to report SF₆ emissions.
- Save operational cost in gas handling
- Ensures safety of environment and personnel during unforeseen leakage.

Operational safety

- Sealed pressure system with switching devices inside hermetically sealed stainless-steel vessels ensures personal safety and protection against environmental effects (pollution, humidity and rodents).
- Mechanism operation is accessible at the ergonomic position in front of the switchgear positioned outside the sealed switchgear vessel.
- Inductive voltage transformers mounted outside the dry air switchgear vessel as a removable pluggable solution. The earthing of voltage transformer allows for easy maintenance.
- Inductive current transformers as ring-core current transformers mounted outside the dry air switchgear vessel and accessible for maintenance.
- Logical mechanical and electrical interlocking ensures no wrong operation and ensures safety throughout the lifetime.
- Type and routine-tested.
- Quality assurance in accordance with DIN EN ISO 9001.
- Equipped with sensors to measure the switchgear health in real time.

Personal safety

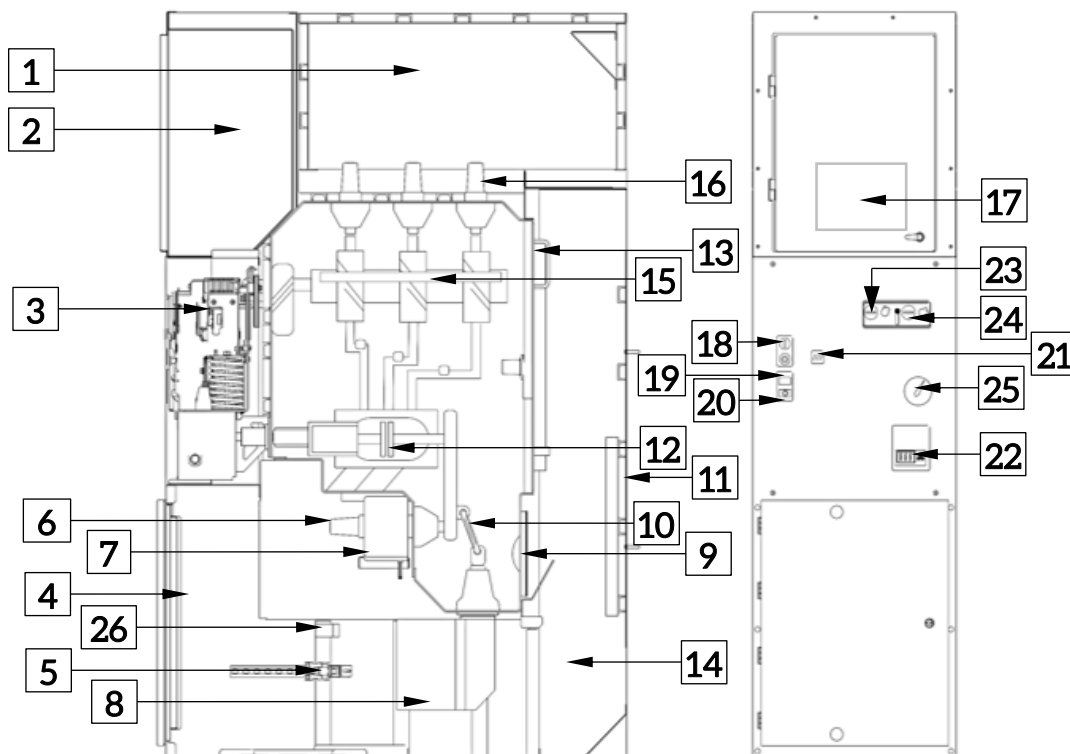
- Capacitive voltage detecting system are equipped to indicate the presence of voltage for the safety personnel.
- Hermetically sealed switchgear vessel together with shielded busbar ensures safe-to-touch possibility to personnel.
- Operating mechanisms and auxiliary switches safely accessible outside the primary enclosure (switchgear vessel).
- The cable terminations, busbars, current and voltage transformers and other high voltage components are metal enclosed.
- Safety of the operation is ensured by means of make-proof earthing achieved through vacuum circuit-breaker.
- The switching devices are hermetically sealed in stainless steel vessel providing IP65 protection. The switchgear enclosure provides IP3XD protection. The operating mechanism cover provides IP2XD protection according to IEC 60529 and VDE 0470-1.
- Cable terminations and busbars are earthed to the surrounding earthing bars.
- Switchgear enclosure tested and qualified to withstand the short circuit current without damage to surroundings during internal arcs up to 31.5 kA.
- Logical mechanical interlocks prevent mal operation.

Reliability

- Fully type tested product together with routine tests during manufacturing.
- Standardized production processes.
- Produced at DIN EN ISO 9001 certified factory.

4. Design

1. Busbar compartment
2. Low Voltage Compartment
3. Drive
4. Cable Compartment
5. Cable Support System
6. T-plug Cable Connection
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 Disconnecter
16. Busbar Connector Bushings
17. Protection Relay
18. Circuit Breaker Actuation Push Buttons
19. Circuit Breaker Operations Counter
20. Circuit Breaker Status Indicator
21. Spring Charge Indicator
22. Voltage Presence Indication System
23. ON/OFF Disconnecter Operation Tool Slot and Indicator
24. OFF/EARTH Disconnecter Operation Tool Slot and Indicator
25. System Pressure Gauge
26. Earthing bar



Insulating system

Switchgear vessel filled with dry air insulation gas:

- features of dry air gas:
 - non-toxic,
 - no F-gases involved,
 - climate-neutral,
 - non-inflammable,
 - chemically neutral.
- pressure of dry air gas in the switchgear vessel (relative values at 20 °C):
 - rated filling level: 1800 kPa,
 - rated minimum filling level: 1600 kPa,
 - operating pressure of burst disc: ≥ 3000 kPa,
 - gas leakage rate: < 0.1 % per year.
- Vacuum circuit-breaker
- Three-position disconnectors for disconnecting and earthing by means of the circuit-breaker.
- Make-proof earthing by means of the vacuum circuit-breaker.
- Cable connection with outer-cone plug-in system according to DIN EN 50 181
- Free-standing arrangement.
- Installation and possible later extension of existing panels without gas work.
- Replacement of instrument transformers without gas work.

Panel design

- Factory-assembled, type-tested.
- Hermetically tight, welded switchgear vessel made of stainless steel.
- Single-pole, solid-insulated, screened busbars, plug-in type.
- Maintenance-free.
- Degree of protection:
 - IP 65 for all high-voltage parts of the primary circuit.
 - IP 3XD for the switchgear enclosure.

5. Components

5.1 Vacuum circuit breakers

Features

- The switching device is situated inside the hermetically sealed, welded switchgear vessel in conformity with the system.
- Climate-independent vacuum interrupter poles in the dry air-filled switchgear vessel.
- Maintenance-free for indoor installation according to IEC 62271-1 & VDE 0671-1.
- The vacuum interrupters are tested for X-ray emission.
- The breaker is tested for C2 class of restrike possibility according to IEC 62271-100.
- The circuit breaker operation is linked to control and protection system for logical operations.
- The circuit breaker operation is mechanically coupled to disconnector operation by means of mechanical interlocking.

- The circuit breaker operation is rated up to M2 class - 10.000 operations according to IEC 62271-100.

Trip-free mechanism

The vacuum circuit-breaker is fitted with a trip-free mechanism according to IEC 62271 and VDE 0671.

The mechanism is located outside the switchgear vessel in the operating mechanism box and behind the control board.

Stored-energy operating mechanism.

The closing spring is charged by means of a motor and latched in the charged position ("spring charged" indication is visible). Closing is affected either by means of an ON push-button or a closing solenoid. The closing spring is recharged automatically.

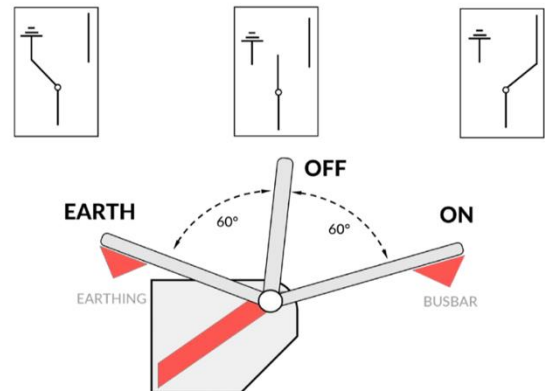
Class	Standard	Comment
M2	IEC 62271-100	10.000 mechanical operation without maintenance
E2	IEC 62271-100	10.000 times rated current without maintenance 20 times short circuit breaking current without maintenance
C2	IEC 62271-100	Low probability of restrike

Endurance class

5.2 Three position disconnecter

Common features

- Free-release spring drive for fast and torque-independent operation
- The switching device is situated inside the hermetically welded switchgear
- The disconnecter is connected outside the hermetically sealed vessel through a rotary bushing. Operation of disconnecter is performed at the front of the switchgear vessel.
- In circuit-breaker panels, earthing and circuit-closing the cable connection is completed by closing the vacuum circuit-breaker.
- Maintenance-free due to non-rusting design of parts subjected to mechanical stress. No lubrication required for bearing during lifetime.
- 1000 mechanical operating cycles for CLOSED/OPEN/EARTHED.
- Manual or motorized operating.
- Operating lever cannot be removed until switching operation has been completed.
- Operation of the disconnecter is separated into opening/closing and opening/earthing with separate individual tool access slots.
- Clearly indicated switch positions CLOSED, OPEN and EARTHED.
- Circuit-breaker cannot be closed unless disconnecter is in CLOSED or EARTHED position and operating tool has been removed.
- Operating the three-position disconnecter is only possible with circuit breaker in OPEN position.
- Additional electromechanical interlocks for motor operation are possible.



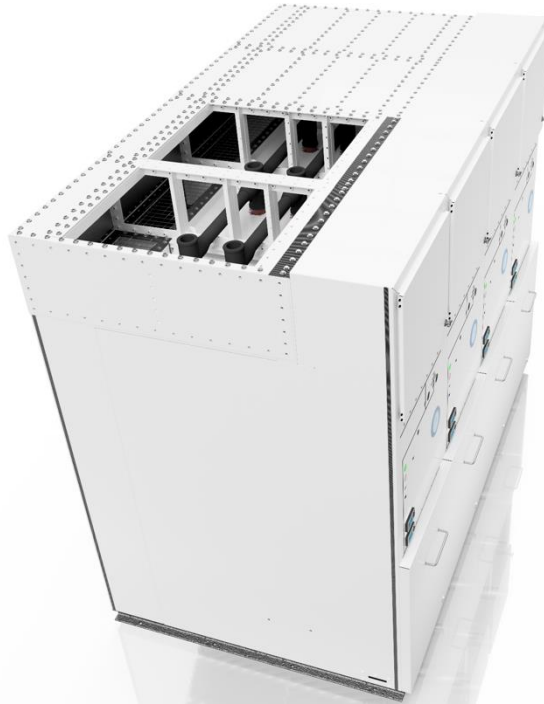
Interlocks

- The disconnecter operation is coupled with circuit breaker operation by means of interlocks.

Class	Function	Standard	Comment
M0	Disconnecting Earthing	IEC 62271-102	1000 mechanical operation without maintenance
E2	Earthing	IEC 62271-102	5 times rated short circuit current without maintenance

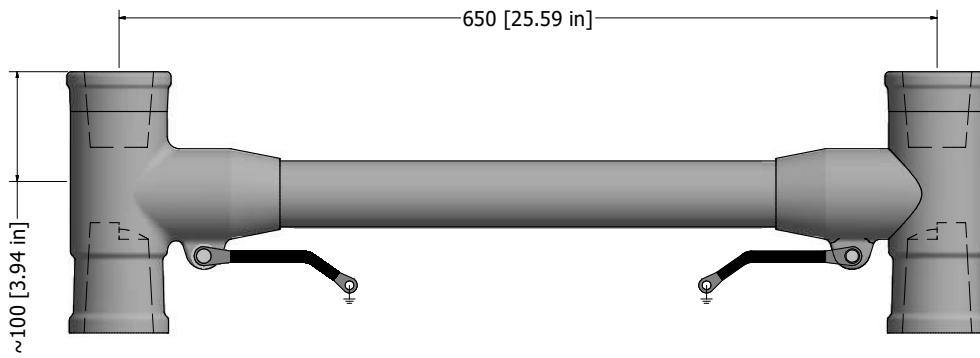
Endurance class

5.3 Busbars

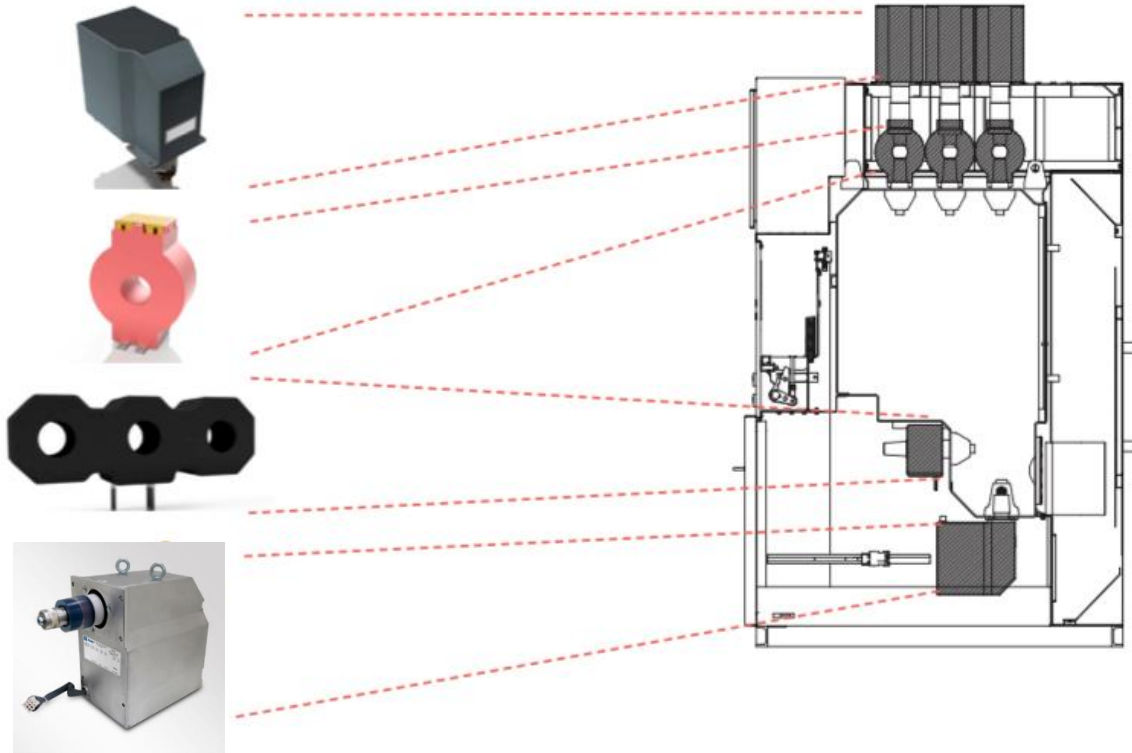


Features

- 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 during operation additionally protected with IP 3XD cover
- Optional busbar connectors with inner cone adapters allow for connection of plug-in voltage transformers.
- No gas handling necessary in busbar handling due to freely accessible positions outside of the gas insulated core tank.
- Easy installation due to plug-in connections with bolted mounting fixation.
- Screening by outer conductive layer.
- Integrated stress control system.
- Capacitive measuring point.



5.4 Current and voltage transformers



Features

- Current and voltage transformers according to customer specific requirements.
- Plug-in designs for flexible operation-based installation.
- Placement outside the gas-insulated core tank allows maintenance or replacement without disassembly of the switchgear.
- Climate protected and factory-assembled for low installation and maintenance requirements.

Voltage transformers

- Single pole, solid insulated design.
- Plug-in mounting with inner cone bushing in the cable compartment and support flange for bolted mounting.
- Voltage transformer with outer cone plug, size 1 according to EN 50181.

- Transformers according to standards IEC 61869-2 and VDE 0414-9-2.
- Low voltage takeout link freely accessible within the cable compartment.
- Additional low voltage access via terminal strip ergonomically accessible within the overhead low voltage compartment from the panel front.
- All side metalclad design for touchproof electrical insulation.
- Optional single pole solid insulated plug-in voltage transformers for mounting above overhead busbars via inner cone T-connectors within the busbar compartment.

Current transformers

- Ring shape inductive design.
- Solid insulated plug-on variant, mounted onto bushings in the cable compartment.

- Maintenance free transformers for indoor application according to standards IEC 61869-2 and VDE 0414.
- Support frames in cable and busbar compartment for stress free mounting.
- Cable guides to take secondary wires from current transformers to the low voltage compartment.

Parameters	IEC standard
Type	Indoor, 3 phase ring type
Insulation material	Polyurethane
Standard	IEC 61869-2
Insulation level (AC/Impulse)	0.72/3 kV
Frequency	50 Hz
Rated Short circuit current	31.5 kA
Peak short circuit current	82 kA
Rated continuous thermal current	Max 1.2 times rated current
Secondary cable length	3m, 2.5 mm ²
Rated current ratio - Core 1	800A/1A (example)
Rated current ratio - Core 2	400A/1A (example)
Class	0.2S metering class (example)
Burden	30 VA (example)

Current transformer specifications (cable compartment)

Parameters	IEC standard
Type	Indoor, 1 phase
Connection	Plug in type, inner cone size 2
Standard	IEC 61869-3
Insulation level (AC/Impulse)	70/170 kV
Frequency	50 Hz
Rated voltage	36 kV
Ratio	33 kV/ 100 V (example)
Voltage factor	1.9 times the rated voltage for 8 hours
Secondary cable length	3 m, 2.5 mm ²
Measurement class	30 VA, class 0.2 (example)
Protection class	60 VA, class 2P (example)

Voltage transformer specifications (cable compartment)

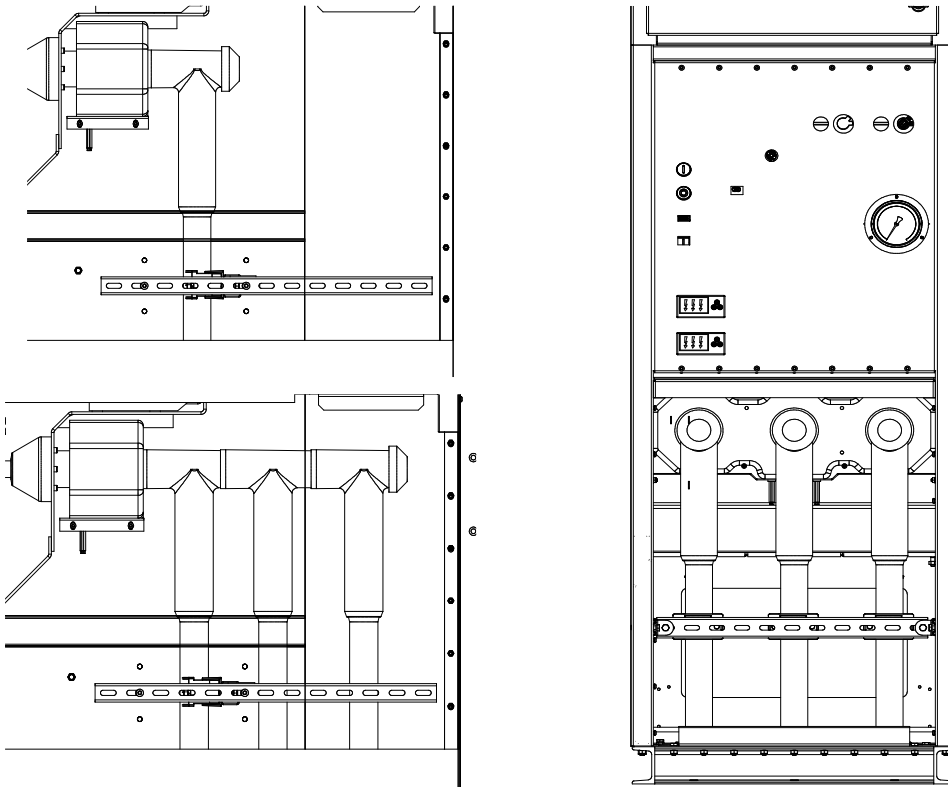
Parameters	IEC standard
Type	Indoor, 1 phase ring type
Standard	IEC 61869-2
Insulation level (AC/Impulse)	0.72/3 kV
Frequency	50 Hz
Rated short circuit current	31.5 kA
Peak short circuit current	82 kA
Rated continuous thermal current	Max 1.2 times rated current
Rated current ratio - Core 1	800A/1A (example)
Rated current ratio - Core 2	400A/1A (example)
Burden	30 VA (example)

Current transformer specifications (busbar).

Parameters	IEC standard
Type	Indoor, 1 phase
Connection	Plug in type, Outer cone size C
Standard	IEC 61869-3
Insulation level (AC/Impulse)	70/170 kV
Frequency	50 Hz
Rated voltage	36 kV
Ratio	33 kV/ 100 V (example)
Voltage factor	1.9 times the rated voltage for 8 hours
Rated current ratio - Core 1	30 VA, class 0.2 (example)
Rated current ratio - Core 2	60 VA, class 2P (example)

Voltage transformer specifications (busbar).

5.5 Cable compartment



Features

- Cable compartment accessible from the front of the switchgear with covered bottom opening for cable trench routing.
- Design with three single pole screened cable bushings as connection inside the gas-insulated vessel.
- Dirt and rodent protection by a IP 3XD classified metal housing and rubber cable sleeves. Protection for connectors and optional plug-in voltage transformers.
- Easy access by lockable, removable, light-weight door.
- Standardized cable connections with outer cone, type C2, up to 1250 A rated current with bolted electric connection.
- Bushings including capacitive voltage indicators for VDIS system on panel front.
- Mounting possibility for up to three cables per phase using T-couplings. Alternatively, application with up to two cables and surge arrester per phase. Use of surge arresters is recommended when the switchgear is outside of the protection zone of end-of-overhead-line surge arresters.
- Mounting rail system for cable supports, freely adjustable in depth and width, stepwise 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.

Cables per panel and phase	Make	Rating (kV)	Conductor size (mm ²)	Insulation	T Plug per phase	Coupling plugs	Surge arresters	Arrester coupling insert
1	Euromold	36	50 to 240	EPDM	1x 400 TB/G	-	1x 400PB 5(10) SA-xxx	-
	Euromold	36	50 to 240	EPDM	1x 430 TB/G	-	1x 300SA-10xx	-
	Euromold	36	50 to 240	EPDM	1x 440 TB/G	-	1x 400PB 5(10) SA-xxx	-
	Südkabel	36	70 to 500	Silicone	1x SEHT	-	1x MUT33	1x KU33
	NKT cables	36	25 to 300	Silicone	1x CB36-630	-	1x CSA36-10	-
	NKT cables	36	400 to 630	Silicone	1x CB36-1250	-	1x CSA36-10	-
	Tyco Raychem	36	25 to 300	Silicone	1x RSTI-66xx	-	1x RSTI-CC-665Axxx	-
	Tyco Raychem	36	25 to 300	Silicone	1x RSTI-68xx	-	-	-
	Tyco Raychem	36	25 to 300	Silicone	1x RSTI-66Lxx	-	1x RSTI-665Axxx	1x RSTI-66CP
	Tyco Raychem	36	25 to 300	Silicone	1x RSTI-69xx	-	-	-
2	Euromold	36	50 to 240	EPDM	2x M400 TB/G	1x M400CP	-	-
	Euromold	36	50 to 240	EPDM	1x M430 TB/G	1x M300PB	-	-
	Euromold	36	300 to 630	EPDM	2x M440 TB/G	1x M400CP	-	-
	Südkabel	36	70 to 500	Silicone	1x SEHT	1x KU33	-	-
	NKT cables	36	25 to 300	Silicone	1x CB36-630	1x CP-630C	-	-
	NKT cables	36	25 to 300	Silicone	2x CB36-630	1x CP 630C	-	-
	NKT cables	36	400 to 630	Silicone	1x CB36-630	1x CC36-630	-	-
	Tyco Raychem	36	25 to 300	Silicone	1x RSTI-66xx	1x RSTI-CC-66xx	-	-
	Tyco Raychem	36	25 to 300	Silicone	1x RSTI-68xx	1x RSTI-CC-68xx	-	-
	Tyco Raychem	36	400 to 630	Silicone	2x RSTI-66Lxx	1x RSTI-66CP	-	-
Tyco Raychem	36	400 to 630	Silicone	1x RSTI-69xx	1x RSTI-CC-66xx	-	-	
3	NKT cables	36	25 to 300	Silicone	1x CB36-630	2x CC36-630	-	-
	NKT cables	36	25 to 300	Silicone	3x CB36-630	2x CP 630C	-	-
	NKT cables	36	400 to 630	Silicone	1x CB36-630	2x CC36-630	-	-
	Tyco Raychem	36	25 to 300	Silicone	1x RSTI-66xx	2x RSTI-CC-66xx	-	-
	Tyco Raychem	36	25 to 300	Silicone	1x RSTI-68xx	2x RSTI-CC-68xx	-	-
	Tyco Raychem	36	400 to 630	Silicone	3x RSTI-66Lxx	2x RSTI-66CP	-	-
	Tyco Raychem	36	400 to 630	Silicone	1x RSTI-69xx	2x RSTI-CC-69xx	-	-

5.6 Indication & measuring instruments




Voltage detecting systems according to IEC 61243-5 (VDE 0682-415)

- To verify safe isolation from supply.

CAPDIS-S1+ Common features

- No battery and maintenance required.
- Integrated display, without auxiliary power.

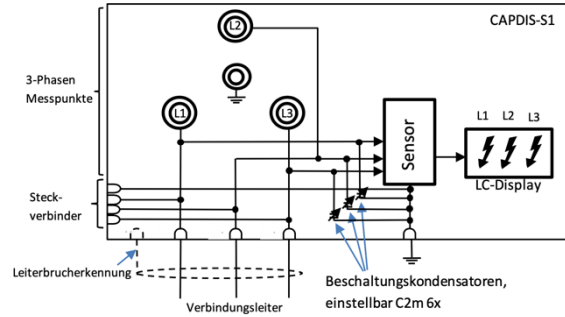
- Fail-Safe functions: complete insulation monitoring of capacitive divider, self-test which offers inherent safety.
- Secondary part of capacitive divider is adjustable by user. Six steps to set the correct value are available.
- With integrated 3-phase test point for phase comparison.

Indication LCD	Indication during normal operation with nominal voltage	Explanation	Indication during bringing into service with nominal voltage	Indication with pressed Test-button
	Overvoltage	Insulation problem at primary part of divider or $U \gg 1.2xU_n$	$C2 < \text{Min.}$	CAPDIS® OK
	Nominal voltage present	Signal OK Insulation OK $U > 0.45xU_n$	$C2m \text{ correct}$	Internal error
	Voltage present	Insulation problem at secondary part of divider $0.1xU_n < U < 0.45xU_n$	$C2m > \text{Max.}$	Internal error
No indication	No voltage	Short circuit at connecting leads $U < 0.1xU_n$	$C2m \gg \text{Max.}$	Internal error
ERROR	-	System error	System error	Broken lead (with optional broken lead detection)

Technical Data	Description
Housing	Front panel mount, h x w x d = 48 x 96 x 37 mm
Operating temperature	-25 °C to +75 °C, storage temperature: -30 °C to +70 °C, IP 54
Connectors for signal leads	Fast-on receptacles 4.8 x 0.8 mm

WEGA 1.2 Common features

- Voltage detecting system according to IEC 62271-213 (VDE 0671-213).
- Maintenance-free.
- Overvoltage indication: phase selective
- Retrofit ready.
- Fully enclosed electronics.



Indication LCD		Indication during normal operation with nominal voltage	
		Explanation	
	Voltage present	Threshold values for voltage presence indication: 0.1 - 0.45 x V _{nom}	
	Voltage present	Integrated maintenance test passed	
	Voltage present	Integrated maintenance test passed Voltage signal too high (overvoltage indication)	
No indication	No voltage present	-	

Technical Data	Description
Nominal frequency	50 - 60 Hz
Interface	3 LRM measuring sockets (one per Phase) and 1 earth socket LRM system, 14 mm distance between sockets, with captive anti-dust cap
Indication	LCD display with arrow, dot and wrench tool
Power supply	No auxiliary voltage needed LCD display: fed by measuring voltage
Temperature range	-25 to +65 °C
Housing	Polycarbonate, IP54
Dimensions	96 x 48 x 20 mm (w x h x d)

5.7 Gas handling

The insulation medium is dry air (also known as technical air or synthetic air), readily available at commonly accepted gas suppliers. It is filled into the gas tank via non-return inlet valves, using standard DN8 coupling connections.

During the filling procedure the filling pressure can be controlled via a manometer dial at the front side of the switchgear, attached via a second identical inlet. No specialized gas handling qualification is required.

Characteristic	Description
Composition	20/80 Oxygen O ₂ /Nitrogen N ₂ mixture
Features	Colorless, odorless, non-hazardous, non-flammable, non-toxic, non-reactive
Purity	≤ 10 ppm foreign particles
Moisture Content	≤ 20 ppm of H ₂ O
Mixture tolerance	≤ 1.5 %
CAS-Nr	7782-44-7
Gas pressure inside the gas tank	2.0 bar

Non-return valve

- The coupling allows to establish a connection by simply fitting both coupling parts into each other.
- Before load relieving of the coupling seats the pressure tight coupling is sealed inside with an O-ring during coupling process.
- The coupling is forced to be open in coupled position.
- If both coupling sides are separated again the sealing seats shut off automatically
- Coupling is temperature-resistant from -40 °C to +80 °C.
- M26 connection for gas inlet.

Manometer

- Relative gas pressure monitoring of the closed gas tank.
- Bourdon tube measurement system as per EN 837-1 with mechanical display and electronic angle encoder for analog signaling.
- Suited for harsh environmental conditions due to stainless steel case and optional additional silicone oil case filling.
- Wear-free non-contact measurement system for reliable leakage detection.

Technical Data	Description
Display Pressure	-1 ... +3 bar (rel.)
Signaling Trigger	1.7 bar (leakage risk), 1.6 bar (permissible minimum)
Materials	Stainless Steel Case, PC dial window, copper alloy pressure element
Ingress Protection	EN/IEC 60529 IP65
Type	EN 837-1 Bourdon tube
Output	50 mm optical check dial, 2-channel 4-Pin NPN or PNP trigger signal ≤ 1 A
Power Supply	DC 12...32 V
Accuracy Specifications	Accuracy Class 2.5, max. ± 0.4% / 10K temperature deviation
Temperature Range	-20 ... + 60 °C

6. Maintenance access

The switchgears are designed for maintenance free operation in indoor environments during their lifetime.

Due to the bolted housing design and safe insulation medium access to inner components for maintenance is possible. Additionally, components mounted outside the gas insulated tank are freely accessible when the switchgear is disconnected.

Free access:

- Low voltage compartment on the front side of the panel, overhead height access with non-lockable cover door.
- Access to protection relays, automation and sensor electronics.
- Connection options for additional measurement instruments or temporary monitoring devices.
- Cable compartment with removable maintenance door cover.
- Access to cable connections and optionally current and voltage transformers.
- Door cover lockable to prevent unqualified opening and opening during operation.
- Working space within cable compartment up to 800 mm height and depth for ergonomic handling position



Bolted access:

- Standardized bolts DIN EN ISO 4017 for all closing bolted connections. Unscrewing possible with electric powered or hand powered tools with tool diameter at least up to 20 mm.
- Access to pressure relief duct through bolted maintenance door on the backside of the switchgear.
- Pressure safety of back door by self-securing door mount design on the inside of the panel enclosure, mounting and de-mounting possible through access opening.
- Multiple ergonomic handles on the door cover for ease of handling. Door weight within 25 kg for lifting and removing. Handling meets risk class 1 (low load stress) for male personnel or risk class 2 (stress acceptable for able-bodied persons) for female personnel according to work safety guidelines by the Bundesanstalt für Arbeitsschutz (federal office for workplace safety).
- Working space within pressure relief duct at least 640 mm width and 270 mm depth.
- Secondary bolted maintenance lid on the core gas-insulated pressure vessel, accessible from the pressure relief duct.
- Airing out the core tank for de-pressurization is possible by valve on the frontside of the switchgear when it is disconnected. Depressurized tank allows access to core components for maintenance.

- Stainless steel back lid in ergonomic height with multiple handles a maximum weight within 30 kg. Carrying equipment and safety gear is recommended during handling of heavy components.
- Access to circuit breaker and disconnecter components for diagnostics and maintenance.
- In depressurized container no danger for service personnel due to use of non-hazardous insulation medium.
- Electrically earthed pressure tank is touchproof in the disconnected switchgear.
- Safe opening procedure requires time within one man-hour.
- Closing of the opened core tank requires evacuation down to at least 0.1 bar absolute pressure of remaining air for moisture reduction by means of standardized vacuum pump. After evacuation, the tank can be filled with the insulation medium up to the rated filling pressure. For both operations, a standardized inlet non-return valve is located at the front side of the pressure vessel.
- Gas-tight encapsulation by means of sealing elements and specified bolting connections.
- Access to busbar compartment through bolted side and top cover sheets. Access from sides and top of the panel.
- Access to drive unit, gas valve and status indicators (VDIS and manometer) by unscrewing the front panel cover.

7. GIS Installation requirements

The Nuventura nu1 is a product rated for use in indoor environments according to VDE 0671 part 200 and IEC 62271-200:

- -5°C to 40 °C,
- Dry,
- Clean
- Free of hazardous contaminants
- Non-publicly accessible

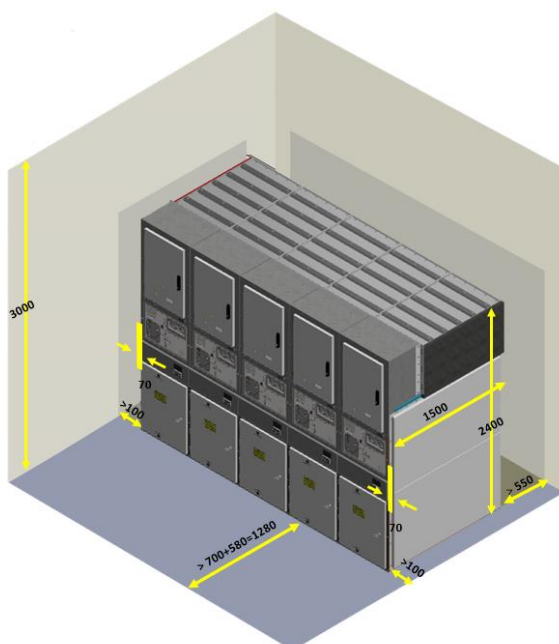
Before installing the systems, the installation area must be prepared accordingly and checked for suitability.

Required space:

Additional to base dimensions 650 × 1500 mm:

Side Covers	~70 mm [2.8 in] each
Wall Distance	100 mm [3.9 in] min.
Operating Area	700 mm [27.6 in] min.
Door Clearance	580 mm [22.8 in] min.
Rear Access (Optional for wall-standing)	550 mm [21.7 in] min. 700 mm [27.6 in] rec.

Free-standing arrangement



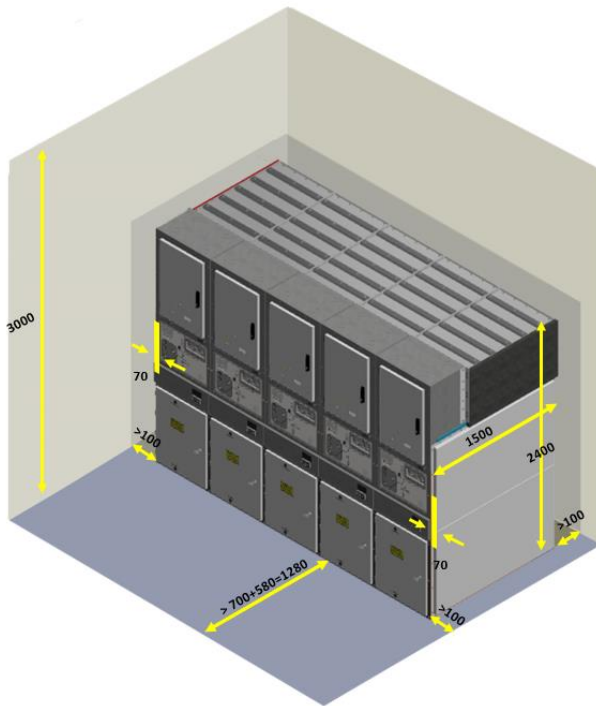
Lateral wall distances on the left or on the right.

For duct installation and maintenance (according to IEC 61936-1):

≥ 500 mm recommendable

≥ 500 mm required for auxiliary transformer panels
with lateral cable connection as end panels

Wall-standing arrangement



Lateral wall distances on the left or on the right.

For duct installation and maintenance (according to IEC 61936-1):

≥ 500 mm recommendable

≥ 500 mm required for auxiliary transformer panels
with lateral cable connection as end panels

- Additional space above the panel might be necessary for a higher low voltage compartment (1400 mm LV compartment requires 3200 mm room height) and for supply or signal cable routing above the switchgear.
- Ensure that walking space and emergency exit corridors are in accordance with local safety regulations.
- Additional electrical equipment can be placed directly next to the switchgears, as long as emergency pathways and operation area remain free, and health and safety is ensured.

Observe the foundation requirements in this document as well as the instructions in the equipment drawings. Ensure that the building requirements from this document and the installation drawings are

met.

It is also necessary to ensure that the room in which the switchgear is to be placed is sufficiently illuminated and ventilated and has a power connection for feed and control cables before the installation begins. If a high level of condensation is expected, ensure the placement of heaters to protect electrical connections.

Before the installation of the systems:

- A careful planning, design and production of a foundation or a support platform on which the switchgear is placed must be carried out.
- A comprehensive analysis and the careful construction of the equipment form the basis for a smooth installation and consequent operation of the switchgear.

The presence of a flat surface capable of supporting the installation's weight must be ensured. Each switchgear panel has a mass of up to 1.2 tons. If the underbody or stand profiles do not meet the requirements, the use of intermediate plates or frames is recommended to fix the switchgear into position. If intermediate plates are required, ensure that they run along the longitudinal side of the switchgear for optimal weight distribution.

Any base frame is to be aligned and leveled 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. In detail:
- Cable basements must follow the requirements of indoor electrical installations.
- For ergonomic reasons, the switchgear must not be placed on elevated surfaces. Technicians and operators must be able to stand freely on the same level as the panels.

Prepare the positioning area for the installation. A floor plan is provided with the project and should be consulted when in doubt. Ensure free accessibility to the installation area.

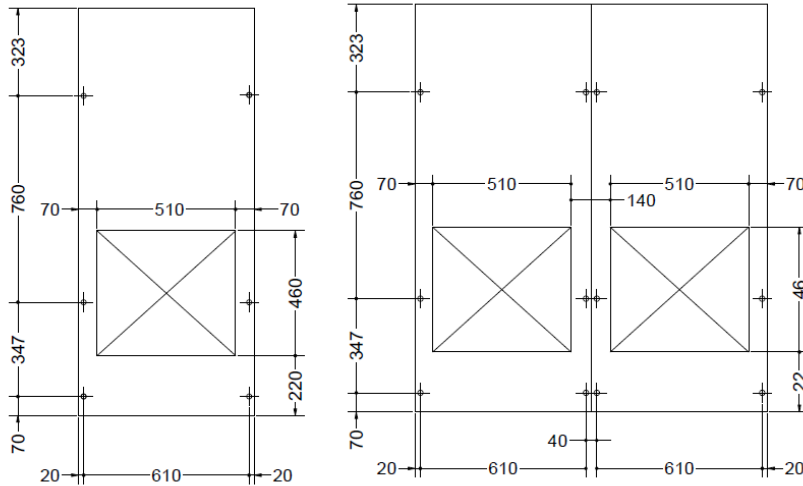
For cable access a trench or double floor are suitable. As a cable inlet for the panels, cutouts or opening must be provided with min. 460 × 510 mm (length × width) opening area. Openings will be covered by sheet metal enclosures of the switchgear for protection against dirt ingress and rodents.

Additionally, a bolting interface for each installed panel must be provided to anchor the panel to the ground. Anchoring can be done by bolting into concrete floor or through a support frame. Six bolting points are provided and recommended for use per panel for screws of size M16 or equivalent.

Position details of bolting points and cut-outs see project specific floor plan.

Additional room requirements may result from the setup of a gas exhaust system:

- Gas duct routing is to be discussed during the project planning phase. Every Nu1 setup comes with a gas exhaust duct, which needs to be led out of the room, either through a wall, ceiling or floor.
- Cut-outs in walls for duct routing might be required, as might support structures and safe zones in the ventilation area.

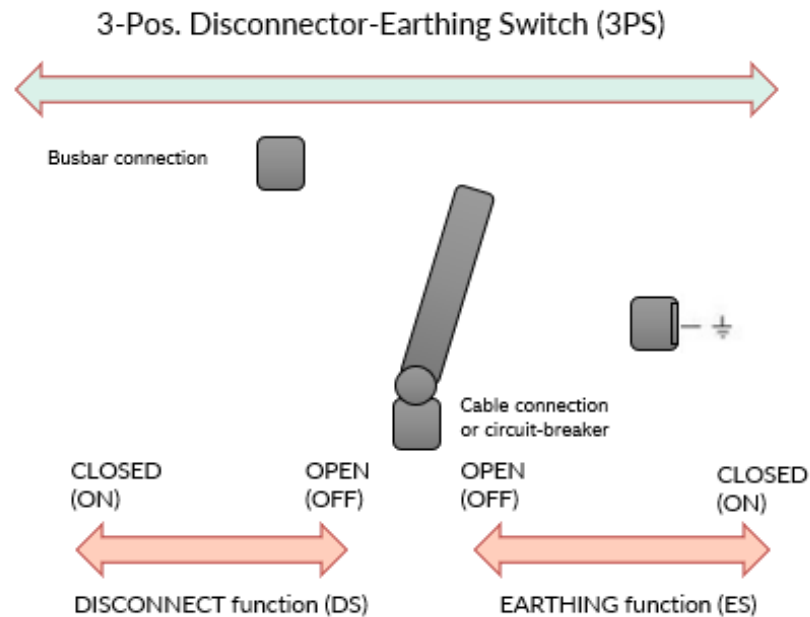


Floorplan with bolting points and cable openings for one- and two-panel configuration

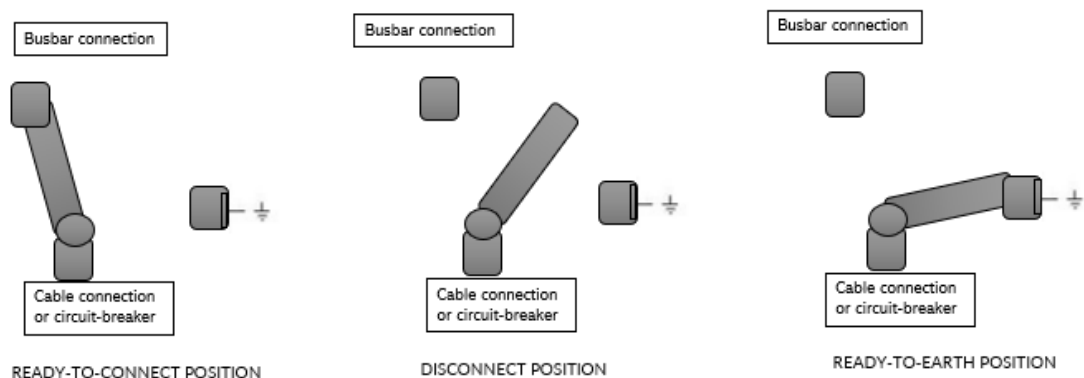
For detailed room preparation and duct installation instructions see project specific planning documentation and the project manual.

8. Interlocks

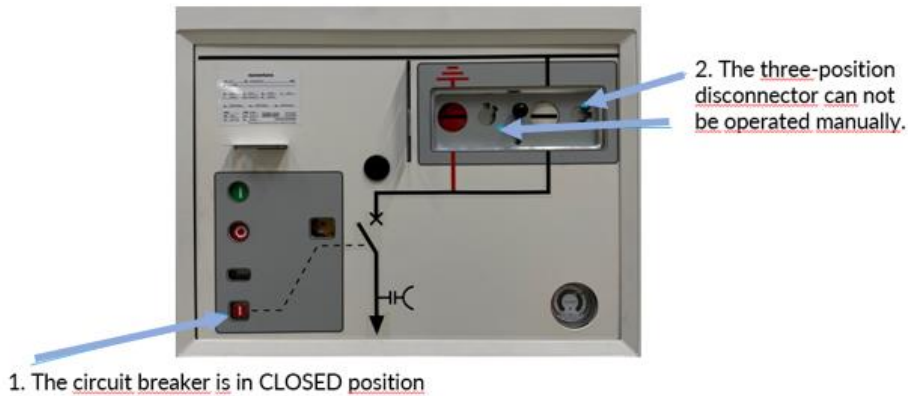
- Logical mechanical interlocks according to IEC 62271-200 and VDE 0671-200 prevents maloperation.
- Functions and design of three-position disconnecter
 - 3-position-disconnector operation is separated into two functions: The DISCONNECT and EARTHING operations, both with separate tool access slots for two individual tools.



- The Three positions of the 3-position- disconnecter are called: READY-TO-EARTH, DISCONNECT, READY TO CONNECT.



- **Standard mechanical Interlocking of three-position disconnecter and Circuit breaker**
 - Operating the three-position disconnecter is only possible with circuit breaker in OPEN position.



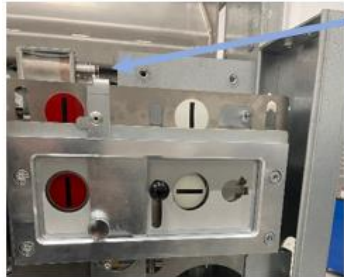
- The direct switching of the disconnector from "READY-TO-CONNECT" to "READY TO EARTH" position is not possible.



- Circuit-breaker cannot be closed unless operating tool has been removed.
- **Standard mechanical Interlocking of three-position disconnector**
 - Only one operating tool ("disconnector ON-OFF" or "disconnector OFF-Earth") can be inserted at a time.
 - Operating lever cannot be removed until switching operation has been completed. There are no intermediate positions possible other than " READY-TO-CONNECT ", "DISCONNECT" and " READY TO EARTH " positions.
- **Optional interlocks on Circuit breaker and 3PS:**
 - ON Blocking magnet for CB: The blocking magnet can prevent the Circuit breaker from

closing via an electrical signal. This function can be used for inter-panel interlockings like 2-out-of-3 or trip from an upstream CB.

- Blocking magnet for the 3PS: Blocking magnets can be fitted which prevent access to the tool slots for the Disconnecter or Earthing function via an electrical signal.



The optional blocking magnet equipment provides interlocks function via electrical signal.

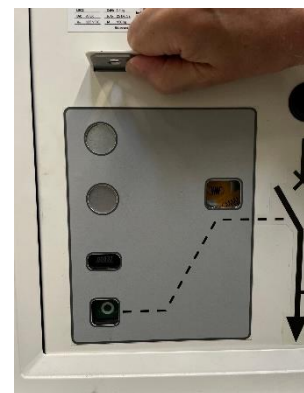
- Undervoltage release: If an undervoltage release is installed in the CB, a lack of supply voltage will automatically trip and open the Circuit breaker. If the CB receives a close command, the undervoltage release would immediately trip the CB again.

- **Optional Padlocking of 3PS and CB**

- The three-position-disconnector can be padlocked in READY TO EARTH/ DISCONNECT / READY TO CONNECT position against manual operation.



- The circuit breaker can be padlocked in OPEN and/or CLOSED position against manual operation.



- **Optional Interlocking of cable compartment door**
 - Mechanical: Cable door can only be opened when the cables are earthed, that is disconnecter is in EARTHED position and circuit breaker in CLOSED position.
 - Electrical interlock: A blocking magnet prevents the cable door from opening via an electrical signal.

Other customized interlocking solutions are available on request, e.g. based on VDIS signals, for interlinked, busbar sectionalizer consisting of 2 panels, ...

9. Shipping data

Transport switchgear is delivered in form of individual panels. Please observe the following:

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

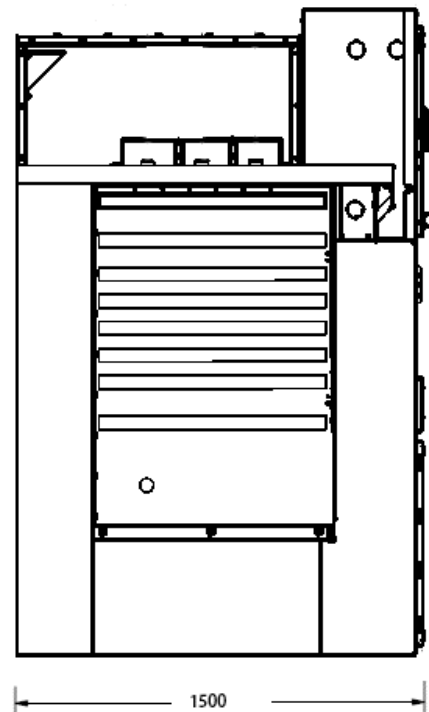
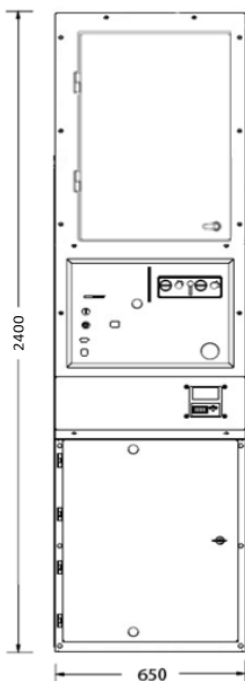
In case of double-busbar panels the A and B sides are supplied separately.

Each switchgear unit is packaged based on the mode of transport chosen. Depending on the delivery conditions, transport units may consist of:

- Single panels on pallets and a protective foil cover
- Sea-transport crates with one or two switchgears covered in protective foil.
- Case-dependent special packaging

Transport Unit	Single panel with package	Double panel with package
Width	900mm / 35.5in	1600mm/63in
Depth	1700mm / 67in	1700mm / 67in
Height	2000mm / 78.7in (Base panel with pallet) 2600mm / 102.4in (with LVC, pallet)	2000mm / 78.7in (Base panel with pallet) 2600mm / 102.4in (with LVC, pallet)
Weight	840kg (standard) 1200kg (assembled, max.)	1700kg (standard) 2300kg (assembled, max.)

Transport height usually differs from assembled height since top structures will be dismantled for ease of transport. Ensure door width/height and transport equipment suitable to manage transport units with dimensions given in above table.



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