NATUS

INDUSTRIAL SOLUTION SYSTEMS

NATUS ELECTRIC GROUP CO.,LTD.

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NRTs-24

NRTs MV GIS Ring Main Uints

NATUS ELECTRIC GROUP CO.,LTD.

Company Profile

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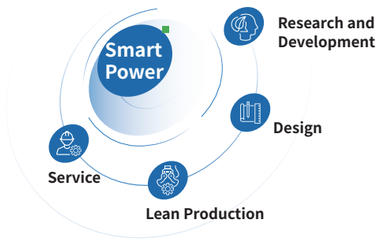
Group Business



The Group specializes in system integration, EPC turnkey services, and the R&D, production, and salesof core products within the medium and low-voltage power industry. In the field of power equipment, we have deep expertise in intelligent electrical switchgear system , high-end power components, advanced powerquality management products, intelligent control instruments, and control systems. Leveraging accumu-lated expertise in artificial intelligence and big data analytics, we provide comprehensive solutions formeteorological disaster prevention equipment and the safe operation of substations and transmission lines.In the domain of new technologies, we focus on small-area, low-altitude meteorological high-precision prediction technology, offering integrated products and services to support the development of the low-altitude economy.

Group Vision

Natus Electric Group originates from Germany, is firmly rooted in China, and serves the global market . Since its establishment in 1956, the group has built upon German technology deeply integrating Chinese expertise and a global perspective . Supported by a robust Chinese R&D and manufacturing team, we precisely respond to global market demands, delivering professional intelligent powersolutions for clients across various industries. Adhering to a customer-centric approach, the group is committed to innovative products , reliable technology, and lean manufacturing.

Working hand-in-hand with global users to build a smarter, more efficient, and sustainable future for the power and energy sector.

Catalogues

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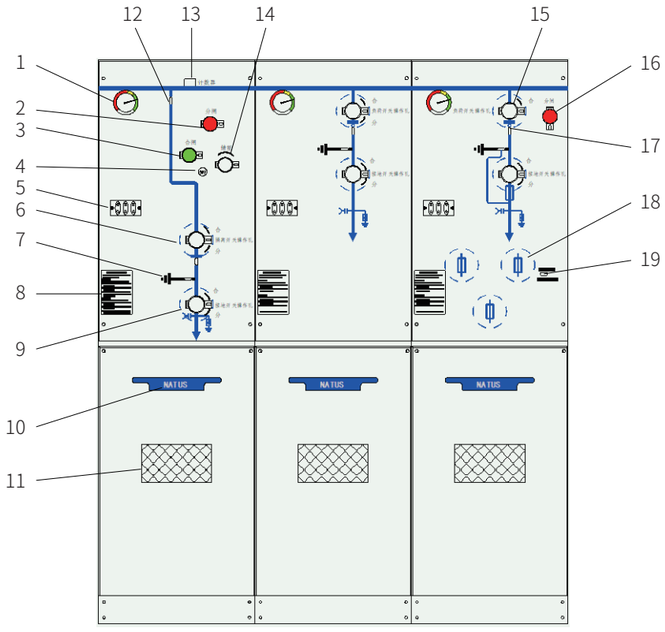
General Information

The NRTs-24 SF☒ gas-insulated compact metal-enclosed switchgear adopts a modular design. Its enclosure is fabricated from aluminum-zinc coated steel plates processed by CNC machines and assembled on site.The switchgear mainly consists of the busbar chamber, main switch, cable chamber, operating mechanism, interlocking mechanism, and low-voltage control compartment.The front panel is finished with a coating process and equipped with a pressure gauge viewing window, drive mechanism cover, live-line indicator, mimic circuit diagram, and nameplate.The grounding copper bar in the lower cable chamber runs through the entire cabinet, enabling safe earthing of the cabinet body and the shielding layer of the incoming cable.It meets the requirements of both end-users and network nodes, and is also suitable for various distribution stations, box-type substations, and cable branch boxes.The product features a compact structure, high safety and reliability, long service life, and maintenance-free operation.



Switchgear Structure Schematic

1、Pressure Indicator
2. Opening Button
3. Closing Button
4. Energy Storage Status Indicator Hole
5. Capacitive Voltage Indicator
6. Disconnecting Switch Operating Hole
7. Earthing Switch Status Indicator Hole
8. Operating Instructions
9. Earthing Switch Operating Hole
10. Lower Door Lift Handle
11. Viewing Window
12. Circuit Breaker Status Indicator Hole
13. Counter Indicator Hole
14. Circuit Breaker Energy Storage Operating Hole
15. Load Switch Operating Hole
16. Trip Button
17. Load Switch Status Indicator Hole
18. Fuse Chamber
19.Fuse Status Indicator Hole

Product Characteristics

NRTs type switchgear is a type-tested, factory-assembled indoor metal-enclosed, metal-clad, single-busbar switchgear.

- Rated voltage: 24 kV
- Maximum feeder current: up to 630 A
- Maximum busbar current: up to 630 A

Typical Applications

NRTs type switchgear is suitable for various secondary distribution systems, even under extremely harsh environmental conditions, such as:

Substations, customer substations, substations and switching stations for power systems and public utilities.

Industrial fields, such as

- Wind power stations
- High-rise buildings
- Open-pit coal mines
- Subway stations
- Wastewater treatment plants
- Port equipment
- Traction power supply system
- Automotive industry
- Petroleum industry
- Chemical industry
- Cement industry
- Thermal power plant
- Textile industry

Modular design

- Unit cabinets and combined cabinets can be flexibly assembled and expanded. On-site assembly does not involve gas-related operations.
- Two extended low-voltage chambers of different heights are available to meet actual on-site requirements.

Reliability

- Passes full series type tests and routine tests
- Modular and standardized design
- Manufactured with CNC equipment
- Many years of operational experience

Quality and Environmental Protection

The quality and environmental management systems comply with the standards of DIN EN ISO 9001 and ISO 45001.

Personnel Safety

- Primary components are completely gas-sealed in a stainless steel gas tank and can be safely touched.
- High-voltage HRC fuses and cable sealing ends may only be accessed when the feeder is earthed.
- Operation is only permitted with the cabinet door closed.
- Mechanical interlocking with logical sequence.
- Capacitive voltage detection system for verifying safe isolation from the power supply.
- Fast earthing switch is used for feeder earthing.

Product Characteristics

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Operational Safety

- The primary components are fully sealed and protected against external influences such as dirt, moisture and small animals.
- Lifetime sealing:

  The gas tank is manufactured using laser welding.

  Bushings are welded by laser.
- Maintenance-free operating mechanism.
- The operating mechanism of the switchgear is installed outside the main circuit for easy maintenance and inspection.
- Reliable logical and mechanical interlocking system.
- Mechanical switch position indication is provided on the mimic diagram, integrated with the panel mimic diagram.

Technology

- Maintenance-free components (e.g. gas tank, operating mechanism)
- Metal-enclosed three-phase main circuit cabinet
- SF6 gas insulation
- Switchgear gas tank welded from stainless steel sheet; bushings for electrical and mechanical connections are welded type.
- Three-position switch with load-breaking capability, and the earthing switch has short-circuit making capacity.
- External cone cable connection bushings
- Downward gas pressure relief
- Wall-mounted or freestanding installation available

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ISO 9001
UKAS
QUALITY MANAGEMENT
043-A

Product Structure

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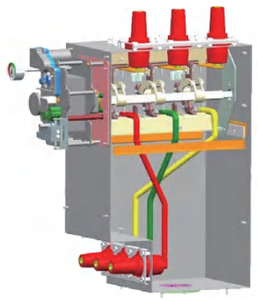
Gas tank

- As a core component of the NRTs-24, the gas tank is manufactured from 304 stainless steel using laser static sealing welding technology. It contains the main switch, busbars and fuse barrels.
- It is filled with SF6 gas at an absolute pressure of 138–145 kPa (gauge pressure at 20 °C).
- The main circuit inside the gas tank adopts high-voltage shielding rings and a new type of knife-switch assembly to uniformize the electric field intensity in the chamber.
- Safe operation of the switch is guaranteed without gas refilling over the entire service life.
- The gas tank has an ingress protection rating of IP67.
- The gas tank is equipped with a bursting diaphragm.
- In the event of an internal arc fault, the fault gas is discharged through the bursting diaphragm from the lower part of the gas tank, effectively preventing damage to personnel, cables and other switchgear in the substation.
- Rectangular contact springs are adopted, featuring stable force and long service life.

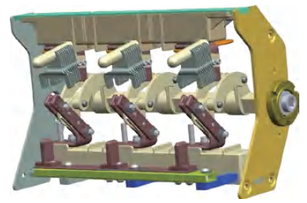


Three-position load break switch

- The load switch adopts a three-position design and is equipped with logical mechanical interlocking to prevent misoperation.
- The three-position load switch has three positions: closed, open, and earthed. One operating handle can be used to perform closing and opening operations on two different operating shafts for the main switch and earthing switch respectively. Mechanical interlocking is provided between the main switch and the earthing switch.
- High-performance disc springs ensure stable contact pressure, and the contact design is conducive to closing performance, thus guaranteeing the reliability of earthing closing.
- Reliable mechanical interlocking is provided between the earthing switch and the front panel of the cable compartment.

Circuit breaker / Disconnector

- The conventional vacuum circuit breaker is installed on the busbar side, and can also be installed on the incoming/outgoing line side.
- Reliable mechanical interlocking is provided between the vacuum circuit breaker and the three-position disconnector.
- Reliable mechanical interlocking is provided between the earthing switch and the front panel of the cable compartment.



Operating mechanism

- Spring operating mechanisms include three types: load switch operating mechanism, combined apparatus operating mechanism, and circuit breaker operating mechanism, which can realize manual / electric operation.
- The operating mechanism is equipped with a dual anti-misoperation system, ensuring that the operator must follow the specified operating procedures; otherwise, operation cannot be performed.
- For applications without an earthing switch, the earthing operation function can be omitted.

Busbar connection

- It adopts a fully insulated, fully enclosed standard European-style extended top busbar system for easy installation.
- Special connectors are used to realize busbar connection without involving SF6 gas.
- Flexible expansion is available.

High-voltage Fuse for Combined Apparatus Cabinet

- The high-voltage fuses of the combined apparatus cabinet are first installed on the fuse supports, then inserted into the fuse insulation cylinders.
- The fuse insulation cylinders, arranged in a delta layout, are located inside the gas tank and hermetically sealed with it.
- After the fuse supports are inserted into the insulation cylinders, the cylinders are isolated from the outside, ensuring protection against external contamination.
- When any phase fuse blows, the striker is triggered, which drives the quick interlocking mechanism to trip the load switch in all three phases simultaneously.

Cable connection

- The bushings comply with DIN EN 50181 and are connected by M16 bolts.
- Touch-proof, flood-proof silicone rubber cable plugs are installed on the standard bushings.
- A surge arrester can be added and connected to the rear of the T-type cable connector.

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Operation

- ### Manual operation

  Operation is performed on the front of the switchgear using a dedicated operating handle. There are two operating holes on the switchgear panel, upper and lower: the upper one is for the load switch, and the lower one is for the earthing switch. During operation, the rotation direction of the handle shall be consistent with the diagram on the panel.

  In the combined apparatus configuration, the mechanism equipped with the switch features the load switch opening tripping function. After the load switch is closed, pressing the opening button or fuse blowing will trigger the tripping mechanism to open the load switch.

- ### Motor operation

  When the switchgear is equipped with a motor operating mechanism, there are two buttons, namely OPEN and CLOSE, on the cabinet operation panel. After connecting the operating power supply, pressing the CLOSE button will close the load switch and put it into operation; pressing the OPEN button will open the load switch.

  If the operating power supply of the switchgear fails to supply power normally, the switching operation can be completed by manual operation, as described previously.

  During motor operation, it is strictly forbidden to insert the operating handle into the operating holes, otherwise the motor operation will be disabled (relevant interlocks are provided).

  The earthing switch can only be operated manually and is not equipped with a motor operating mechanism.

Interlock

- When the load switch is closed, the earthing switch cannot be closed, and the lower door cannot be opened.
- The earthing switch can only be closed after the load switch is open,

  and the lower door can only be opened after the earthing switch is closed.
- When the earthing switch is closed, the load switch cannot be closed.
- The load switch can be closed only after the earthing switch is open and the cabinet door is closed.
- In the combined apparatus cabinet, when any phase fuse blows, its striker will trip the load switch reliably, and the load switch cannot be closed at this time.

Product Structure

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NRTs-C, Cable Incoming/Outgoing Unit

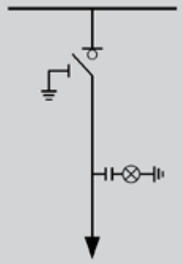
Function

Equipped with a three-position load switch, it connects or disconnects the incoming and outgoing cables from the busbar.

It enables three-phase earthing of the incoming and outgoing cables simultaneously for maintenance.

The earthing circuit has short-circuit making capability.

It is commonly used for the control of incoming and outgoing cables.



Standard configuration

- 630A busbar
- Three-position load switch
- SF6 gas pressure indicator
- Spring operating mechanism
- Live-line indicator
- Mechanical five-prevention interlock device
- Maintenance padlock device

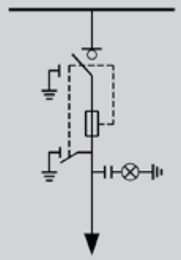
NRTs-F, Combined apparatus unit

Function

Combined apparatus with three-position load switch in series with high-voltage fuses, commonly used for the control and protection of transformers.

Standard configuration

- 630A busbar
- Three-position load switch
- SF6 gas pressure indicator
- Manual spring operating mechanism
- Live-line indicator
- Mechanical five-prevention interlock device
- Maintenance padlock device
- Fuse trip indicator
- Auxiliary earthing switch on cable side of fuse



Product Structure

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NRTs-V, Circuit breaker unit

Function

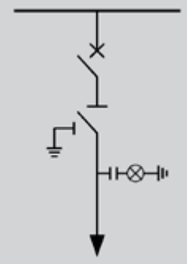
Vacuum circuit breaker in series with three-position disconnector.

The circuit breaker is installed on the busbar side, and the disconnector is on the line side.

It is commonly used for control and protection of lines or transformers.

Standard configuration

- 630A busbar
- Vacuum circuit breaker
- Three-position disconnector
- SF6 gas pressure indicator
- Circuit breaker operating mechanism
- Live-line indicator
- Mechanical five-prevention interlock device
- Maintenance padlock device



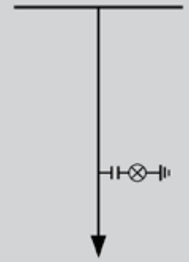
NRTs-D, Direct cable connection incoming/outgoing unit

Function

Incoming and outgoing cables are directly connected to the busbar, with a metal stainless steel protective gas tank. It is commonly used for the connection of incoming and outgoing cables or as a contact/boost cabinet.

Standard configuration

- 630A busbar
- Live-line indicator



NRTs-PT, Busbar Voltage Transformer Unit

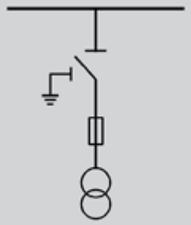
Function

Busbar voltage transformer cabinet, also known as busbar equipment cabinet, is used for voltage measurement and protection of the busbar system.

It can also extract operating power from the PT to serve as the operating power supply cabinet and metering cabinet for the switchgear.

Standard configuration

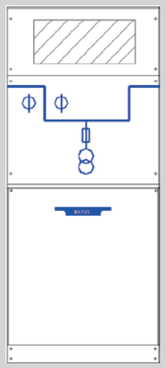
- 630A busbar
- Voltage transformer
- Mechanical five-prevention interlock device



NRTs-M, Metering Unit

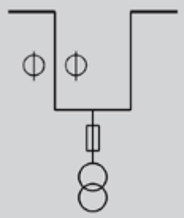
Function

Metering cabinet, used for measurement and billing by the power supply department.

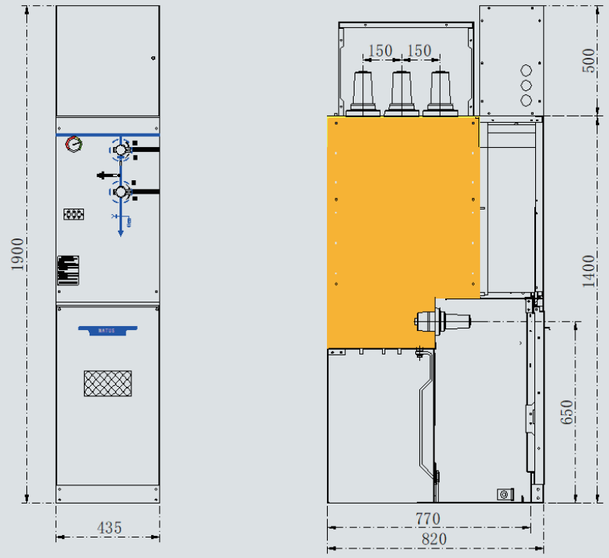


Standard configuration

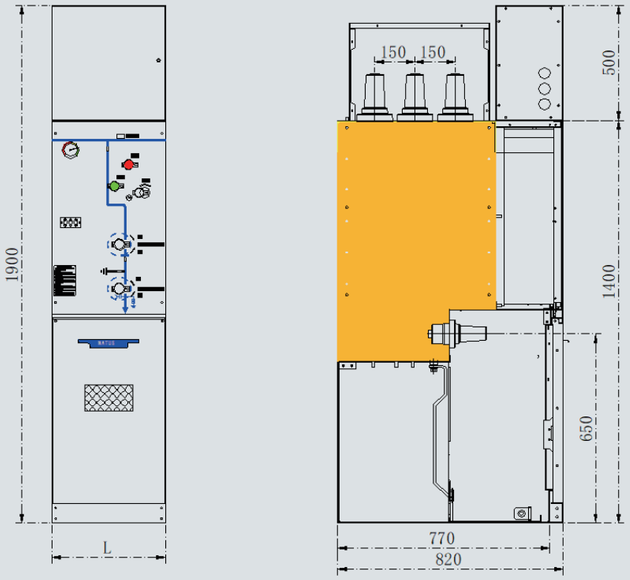
- 630A busbar
- Voltage transformer
- Current transformer
- PT protection fuse
- Secondary instrument compartment (with sealing device)
- Mechanical five-prevention interlock device



Applicable Scheme: (Common Tank Scheme) —— C, F, V

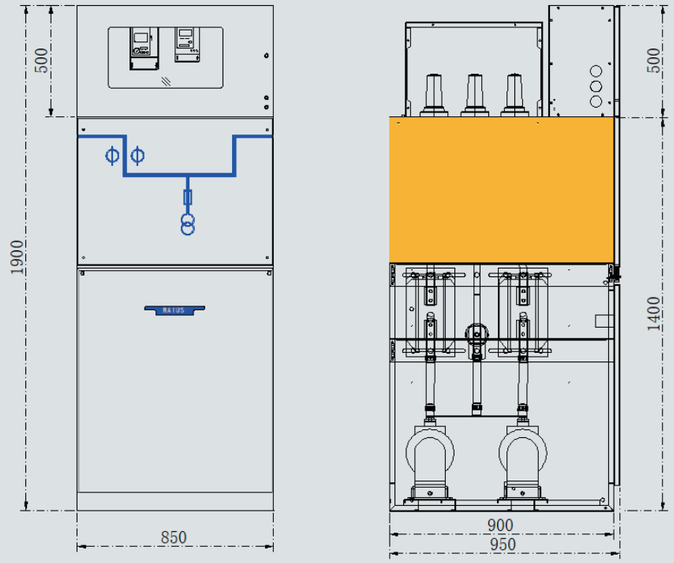


Applicable Scheme: (Single Tank Scheme)—— C, F, V

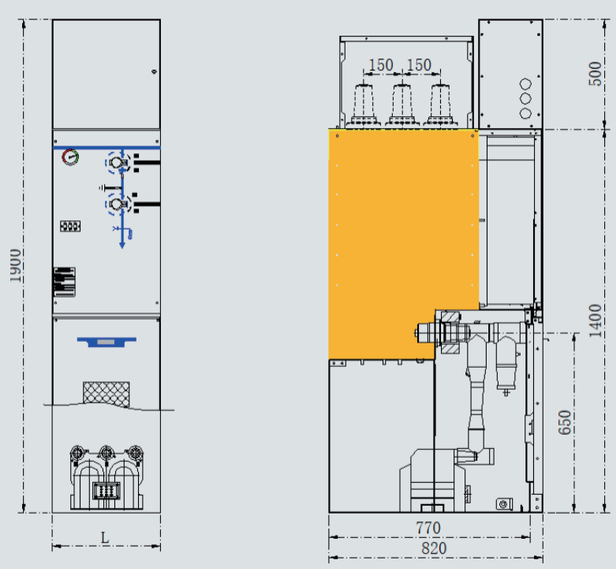


Scheme	Dimensions—— L
C、F、V、D	435（or 600）

Applicable Scheme: (Single Tank Scheme)—— M

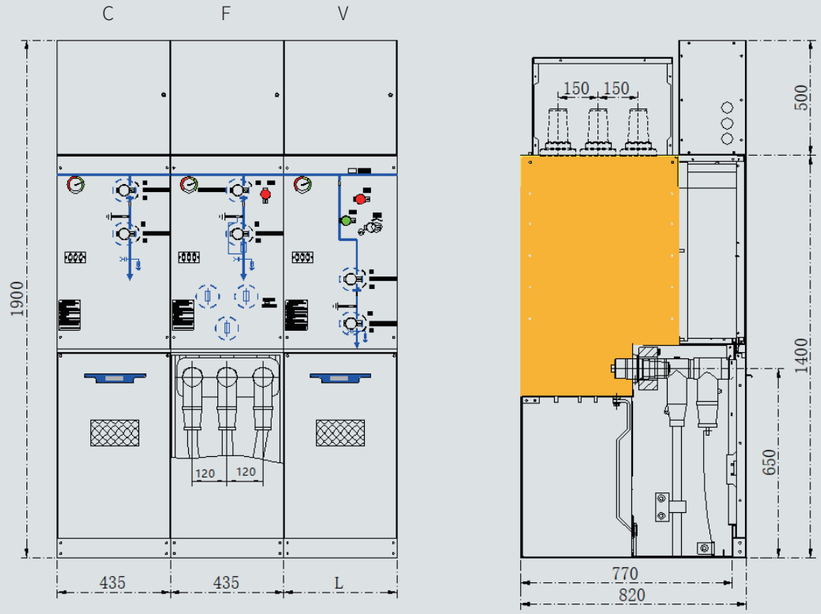


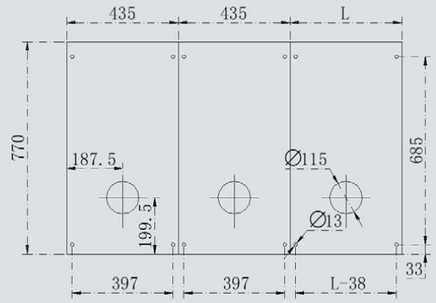
Applicable Scheme: C(PT)、G(PT)、PT



Scheme	Dimensions—— L	Remark
C(PT)、G(PT)、PT	550（or 600）	Cabinet width is configured according to the dimensions of the transformer

Dimensions of Single Gas Tank Unit Assembly Scheme (Diagram: C+F+V)





Scheme	Dimensions—— L
C、V	435（or 600）

Note : Both single gas tank units and common gas tank units can be extended leftwards and rightwards. The extended dimensions shall be in accordance with the corresponding overall dimensions and foundation opening dimensions.

Product Structure

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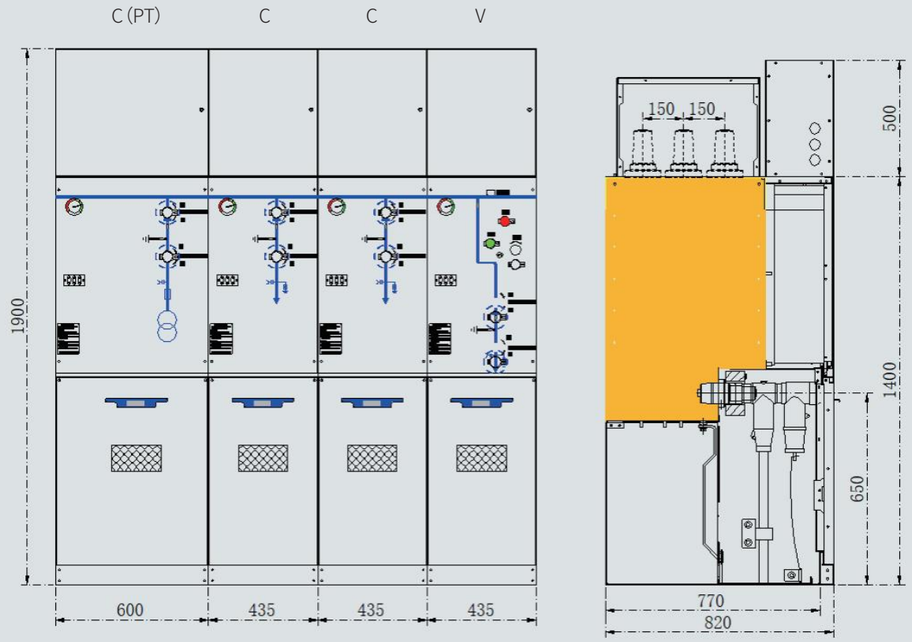
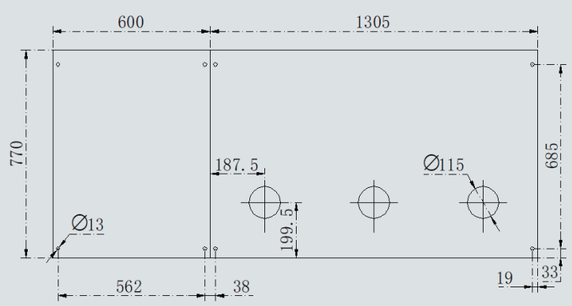
Dimensions of Common Gas Tank Unit Assembly Scheme (Diagram: C(PT)CCV)





Note : Both common gas tank units and single gas tank units can be extended left and right. The extended dimensions shall comply with the corresponding overall dimensions and foundation opening dimensions.

Technical Specifications

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General Electrical Parameters	Rated Insulation Voltage	Rated Voltage	kV	24
		Rated Short-time Power-frequency Withstand Voltage		
		Phase-to-phase, phase-to-earth	kV	65
		Isolating break	kV	79
		Rated Impulse Withstand Voltage		
		Phase-to-phase, phase-to-earth	kV	125
		Isolating break	kV	145
	IP	Enclosure		IP4X
		Gas-filled compartment		IP67
	Rated Current	Busbar	A	630
	Rated Frequency		Hz	50/60Hz
	Internal Arc		kA/s	20/1
	Annual Gas Leakage Rate		%	⩽0.01
	Pressure of the gas-filled compartment		Mpa	0.045
	Electromagnetic Compatibility (EMC)			Class 3

Ring Main Cable Feeder Cabinet Coupler Cabinet Direct Cable Connection Cabinet (Load Switch)	Rated Current		A	630
	Rated short-time withstand current	Main circuit (RMS value)	kA/s	20/4
		Earthing circuit (RMS value)	kA/s	20/4
	Rated short-circuit making current	Peak	kA	50
	Number of closing and breaking operations	Load switch		Class E3
	Mechanical endurance	Load switch	times	10000
		Earthing switch	times	3000
Transformer Feeder Cabinet (Combined Electrical Apparatus)	Rated current		A	125
	Rated short-circuit breaking current		kA	31.5
	Rated transfer current		A	1750
	Rated transfer current		A	1500
	Mechanical endurance	Load switch	times	10000
		Earthing switch	times	3000
	High Voltage HRC Dimensions	Length (L)	mm	460
Circuit-breaker cabinet	Rated current		A	630
	Rated short-time withstand current	Main circuit (RMS value)	kA/s	20/4
		Earthing circuit (RMS value)	kA/s	20/4
	Rated short-circuit making current	Peak	kA	63
	Number of closing and breaking operations			Class E3
	Mechanical endurance	Circuit breaker	times	10000
		Disconnector	times	3000
		Earthing switch	times	3000

Main Wiring Scheme Diagram

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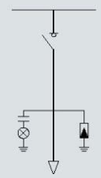
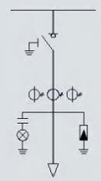
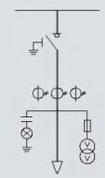
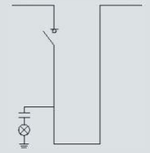
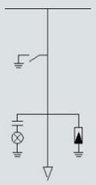
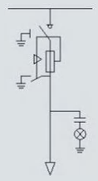
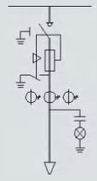
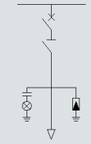
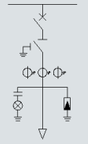
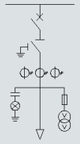
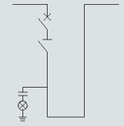
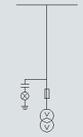
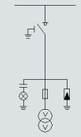
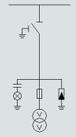
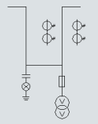
Scheme No.		01	02	03	04
Main circuit scheme diagram					
Type		NRTs-24/C	NRTs-24/C	NRTs-24/C	NRTs-24/CL
Main components	Load switch / Disconnector	1	1	1	1
	Vacuum circuit breaker				
	High-voltage fuse			3	
	Current transformer		Optional for 2~3	Optional for 2~3	
	Voltage transformer			2	
	Arrester	3	3		
	Voltage presence indicator	1	1	1	1
	Operating mechanism	Manual / Electric	Manual / Electric	Manual / Electric	Manual / Electric
Cabinet width (Unit: mm)		435/600*	435/600*	435/600*	870
Application		Cable incoming and outgoing	Cable incoming and outgoing	Cable incoming	Bus tie
Remarks		"*" Dimensions represent customizable independent single gas tank dimensions. For miniaturized dimensions, please contact the manufacturer.			

Scheme No.		05	06	11	12
Main circuit scheme diagram					
Type		NRTs-24/D	NRTs-24/De	NRTs-24/F	NRTs-24/F
Main components	Load switch / Disconnector			1	1
	Vacuum circuit breaker				
	High-voltage fuse			3	3
	Current transformer				Optional for 2~3
	Voltage transformer				
	Arrester	3	3		
	Voltage presence indicator	1	1	1	1
	Operating mechanism		Manual	Manual / Electric	Manual / Electric
Cabinet width (Unit: mm)		435/600*	435/600*	435/600*	435/600*
Application		Cable incoming and outgoing	Cable incoming and outgoing	Transformer outgoing	Transformer outgoing
Remarks		The "*" dimension indicates customizable independent single gas tank dimensions. For miniaturized dimensions, please contact the manufacturer.			

Main Wiring Scheme Diagram

NATUS
INDUSTRIAL SOLUTION SYSTEMS

Scheme No.		21	22	23	24
Main circuit scheme diagram					
Type		NRTs-24/V	NRTs-24/V	NRTs-24/V	NRTs-24/VL
Main components	Load switch / Disconnector	1	1	1	1
	Vacuum circuit breaker	1	1	1	1
	High-voltage fuse			3	
	Current transformer		Optional for 2~3	Optional for 2~3	
	Voltage transformer			2	
	Arrester	3	3		
	Voltage presence indicator	1	1	1	1
	Operating mechanism	Manual / Electric	Manual / Electric	Manual / Electric	Manual / Electric
Cabinet width (Unit: mm)		435/600*	435/600*	435/600*	870
Application		Cable incoming and outgoing	Cable incoming and outgoing	Cable incoming and outgoing	Bus tie
Remarks		The "*" dimension indicates customizable independent single gas tank dimensions. For miniaturized dimensions, please contact the manufacturer.			

Scheme No.		51	52	53	54
Main circuit scheme diagram					
Type		NRTs-24/PT	NRTs-24/CPT	NRTs-24/GPT	NRTs-24/M
Main components	Load switch / Disconnector		1	1	
	Vacuum circuit breaker				
	High-voltage fuse	3	3	3	3
	Current transformer				Optional for 2~3
	Voltage transformer	2	2	2	2
	Arrester		3	3	
	Voltage presence indicator	1	1	1	1
	Operating mechanism		Manual / Electric	Manual / Electric	
Cabinet width (Unit: mm)		550/600*	550/600*	550/600*	850
Application		Busbar voltage transformer	Busbar voltage transformer	Busbar voltage transformer	Metering
Remarks		The "*" dimension indicates customizable independent single gas tank dimensions. For miniaturized dimensions, please contact the manufacturer.			

Main Wiring Scheme Diagram

NATUS
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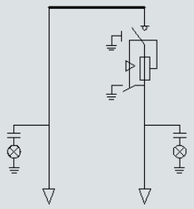
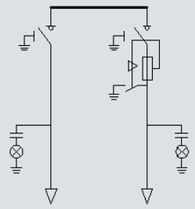
Typical Common-Box Scheme

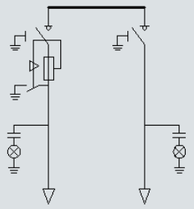
Scheme No.: DF



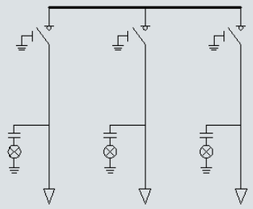
Scheme No.: CF



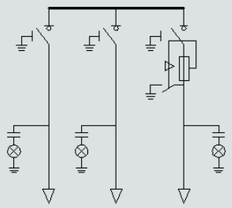
Scheme No.: FC



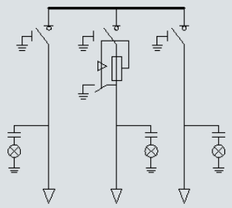
Scheme No.: CCC



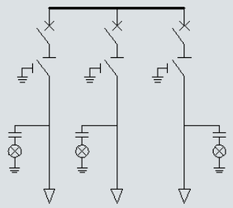
Scheme No.: CCF



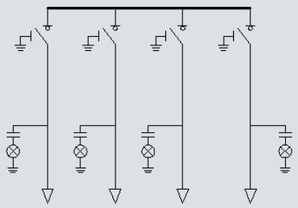
Scheme No.: CFC



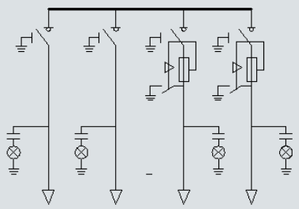
Scheme No.: VVV



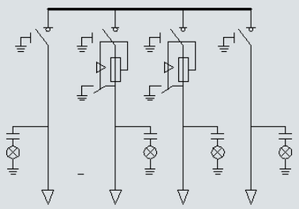
Scheme No.: CCCC



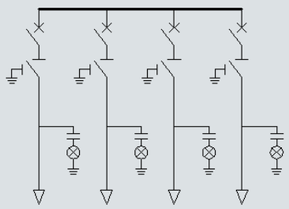
Scheme No.: CCFF



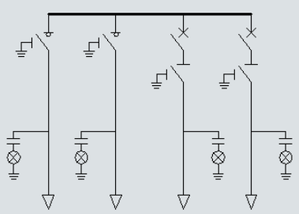
Scheme No.: CFFC



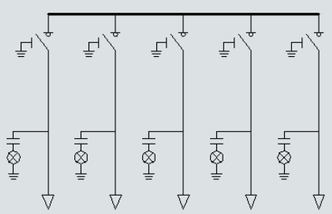
Scheme No.: VVVV



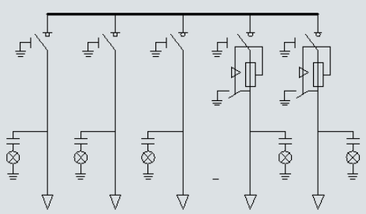
Scheme No.: CCVV



Scheme No.: CCCCC



Scheme No.: CCCFF



PRECISION IN DETAIL