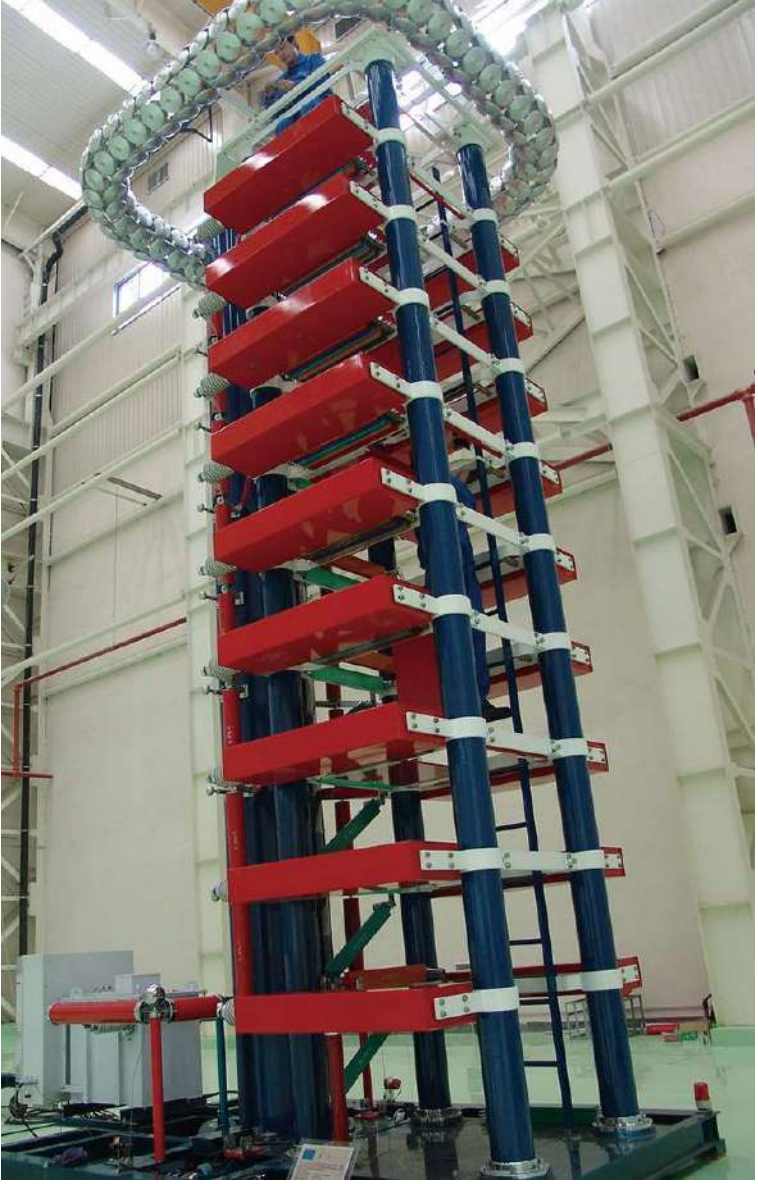
CHINT

CHINT GLOBAL

# 12kV~40.5kV

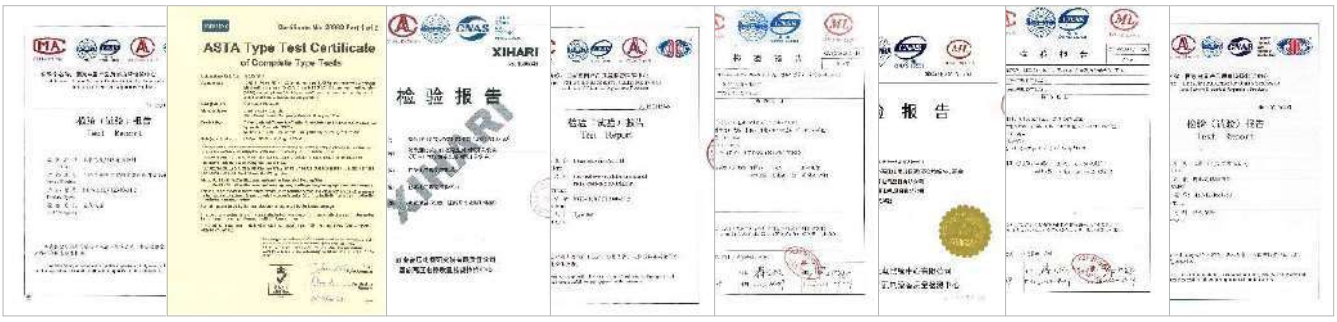
## Gas-insulated Metal-enclosed Switchgear (GIS)



# GIS Product Line

- The GIS product line, a wholly-owned subsidiary of CHINT Electric Co., Ltd., is specialized in producing indoor and outdoor insulation products of 12~40.5kV $SF_6$ inflatable ring main units, environment-friendly inflatable ring main units, solid-insulated ring main units, C-GIS HV switch cabinets, box-type switching stations and cable branch boxes, etc. Also, the Company is the first domestic manufacturer with a wide range of voltage class and a full range of insulation products. Furthermore, the products are awarded the first prize for "New-generation Intelligent Switchgear Assembly of Shanghai Major Technical Equipment Development Project" and "Songjiang Science and Technology Progress Award".
- A professional team that integrates research and development, design, production and quality control has been established for the product line. It's equipped with the first-class production equipment such as imported laser cutting machine, full-automatic robot welding station, automatic assembly line, helium leak detection equipment and partial discharge detector. The products have been reliably applied in large quantities in severe environments with high altitude, high salt fog, heavy pollution and damp, etc, and are sold well in 130 countries and regions.
- CHINT is keeping the promise that "CHINT ELECTRIC will utilize the electricity to its best" to transmit the electricity to thousands of households better and reliably.


WAYEE


ASTA Type Test Certificate
of Complete Type Tests
XIHARI
检验报告


安全生产


NG7
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NG7

# Contents

## RMU Series-Ring Main Unit



## C-GIS Series-Switch Cabinet

# NG7-12~24 $SF_6$ Gas Insulated and Sealed Metal-enclosed Switchgear

## Overview

With the acceleration of urbanization process in China, the requirements for the construction of urban power grid and the reliability of power supply are enhanced continuously, the power distribution way of outdoor distributed loop-network switch cabinet is increasingly adopted, and such regional secondary substation is able to distribute power to the user terminals.

Through introduction of the advanced technology at home and abroad, NG7 $SF_6$ gas insulated metal-enclosed switchgear(C-GIS) is a new generation of miniaturized gas insulated products designed and developed by our company. With an effective combination of fixed unit combination and flexible extension, the products meet both the requirements of loop network power distribution or user terminals and the requirements of various secondary substations for the flexible use of compact switchgear.

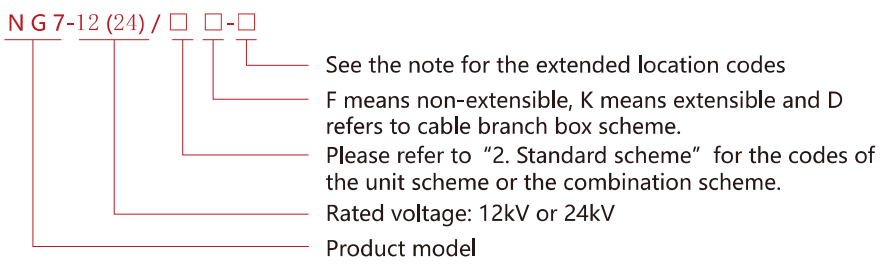
The NG7 switchgear employs a full seal structure scheme and modular design. All live parts are placed in the sealed stainless steel shell, which makes them free from the effect of external environment and ensures the requirements of high reliability and security. In addition, factorization automation solutions can be configured to realize intelligent control.

The NG7 switchgear can realize a common enclosure of 1~5 unit circuits and free combination of schemes. Moreover, the common enclosures can be freely combined according to the requirements of customers, which embodies the advantage of flexible extension.

### Executive Standards

- IEC62271-200: AC metal-enclosed switchgear and controlgear for rated voltages above 1kV and less than 52kV
- IEC 62271-100: 2017 (MOD) High voltage AC circuit breaker
- IEC 62271-100: High-voltage alternating-current circuit breakers
- IEC 62271-102: HV AC Disconnector and Grounding Switch
- IEC 62271-103: 3.6kV~40.5kV High-voltage AC load switch
- IEC 62271-200: Alternating-current metal-enclosed switchgear and controlgear for rated voltages above 3.6kV and up to and including 40.5kV
- IEC 60529: Degrees of Protection provided by enclosure (IP code)
- IEC 62271-1: Common Specifications for High-voltage Switchgear and Controlgear Standards
- IEC 62271-105: High-voltage alternating current switch-fuse combinations
- GB/T 11023-2018 Test guide of $SF_6$ gas tightness for high-voltage switchgear
- DL/T 791-2018 Specification of indoor AC HV gas-filled switchgear panel

## Model and Meaning




Note: extension codes are as follows: L means left extension, R means right extension, LR means left-right extension, and T means top extension.

# NG7-12~24 $SF_6$ Gas Insulated and Sealed Metal-enclosed Switchgear

## Operating Environment Condition

a) Environmental temperature: maximum temperature of +40°C, and minimum temperature of -25°C. The average value within 24 hours does not exceed 35°C.

b) Altitude: ≤5000m (it should be specified when the equipment operating altitude exceeds 1000m.)

c) Environmental humidity: relative humidity does not exceed 95% within 24 hours and monthly average humidity does not exceed 90%.

d) Electromagnetic interference: the amplitude of electromagnetic interference induced in the secondary system is less than or equal to 1.6kV.

e) Seismic intensity: magnitude 8.

f) Installation environment: no explosive or corrosive gas in the ambient air, no violent impact in the installation site, and pollution class not exceeding class III as specified in GB/T5582.

g) Please negotiate with the Company for customization when it's not within the above operating environment condition.

## Technical Parameters

| Name | | | Unit | Load switch unit | Combined electrical apparatus unit | Circuit breaker unit |
|---|---|---|---|---|---|---|
| Rated voltage | | | kV | 12/24 | 12/24 | 12/24 |
| Rated frequency | | | Hz | 50/60 | 50/60 | 50/60 |
| Rated current | | | A | 630 | ≤125 (depends on fuse) | 630/1250 (optional) |
| Rated insulation level | 1min power frequency withstand voltage | Power frequency withstand voltage (phase to phase and phase to ground) | kV | 42/65 | 42/65 | 42/65 |
| | | Power frequency withstand voltage (between breaks) | | 48/79 | 48/79 | 48/79 |
| | Lightning impulse withstand voltage (peak) | Power frequency withstand voltage (control and auxiliary circuits) | | 2/2 | 2/2 | 2/2 |
| | | Lightning impulse withstand voltage (phase to phase and phase to ground) | | 75/125 | 75/125 | 75/125 |
| | | Lightning impulse withstand voltage (between breaks) | | 85/145 | 85/145 | 85/145 |
| Rated short-time withstand current | | Main circuit/4s | kA | 20/20 | — | 20/25 (optional 25kA/1s) |
| | | Grounding circuit/4s | | 20/20 | — | 20/25 (optional 25kA/1s) |
| | | Grounding connection circuit/4s | | 17.4/17.4 | — | 17.4/21.7 |
| Rated peak withstand current | | Main circuit | kA | 50/50 | — | 50/63 |
| | | Grounding circuit | | 43.5/43.5 | — | 43.5/54.5 |
| Rated short-circuit making current | | | kA | 50 | 80 | 50/63 |
| Rated short-circuit breaking current | | | kA | — | 31.5 | 20/25 |
| Internal Arc Classification | | AFLR /1s | kA | 20 | 20 | 20 |
| Rated active load breaking current | | | A | 630 | — | — |
| Rated closed-loop breaking current | | | A | 630 | — | — |
| Rated cable charging breaking current | | | A | 10/25 | — | — |
| Mechanical life | | Load switch/Grounding switch | Time | 5000 | 5000 | 10000 |
| | | Disconnectors/Grounding switch | | 2000 | 2000 | 3000 |
| $SF_6$ gas (relative value of 20℃) | | Rated inflation voltage | Mpa | 0.04 | 0.04 | 0.04 |
| | | Minimum functional horizontal pressure | | 0.02 | 0.02 | 0.02 |
| Protection grade | | Sealed box | | IP67 | IP67 | IP67 |
| | | Switchgear housing | | IP4X | IP4X | IP4X |
| Annual relative gas leakage rate | | | %/Y | ≤0.01 | ≤0.01 | ≤0.01 |
| Loss of service continuity category | | | | LSC2 | LSC2 | LSC2 |

* For special requirement please contact us

# NG7-12~24 $SF_6$ Gas Insulated and Sealed Metal-enclosed Switchgear

## Technical Characteristics of Products

- All-insulation and full-seal design

The primary live parts of the NG7 series switchgear are completely sealed in a sealed gas box welded by stainless steel plates. The inlet-outlet lines are connected through fully insulated, fully sealed and shielded cable connectors, and the inflation pressure in the gas box is 0.14 Mpa, and the protection level is IP67. The products can be applied in severe environments with high altitude, high salt fog, heavy pollution and damp, etc.

- Standard modular design, flexible extension and convenient combination

Product standardization degree is rather high and modular design scheme is adopted, which contributes to flexible and fast combination. The gas box units can be extended randomly for the left and right, and various unit combinations can be carried out through special busbar connectors, so as to meet the diversified power distribution requirements of users to the greatest extent.

- Advanced welding and sealing technology

Stainless steel plates of gas box are welded using the laser cutting and ABB welding robot, thus ensuring the dimensional accuracy and welding quality of the plates. Isobaric vacuumizing and helium leak detection technology are applied for the assembled gas boxes to ensure that the annual gas leakage rate of the gas box is lower than 0.01%.

- Friendly user interface and perfect "five-prevention" design scheme

The switchgear can be operated manually and electrically with simple and reliable operation process. With perfect "five-prevention" interlocking design, the overall structural design is able to ensure operational safety.

- Online intelligent monitoring and protection scheme

The switchgear can be connected with the automatic system through the communication network, thus achieving remote control, remote measurement and remote communication of the switch cabinet. And also, fault isolation, recovery and network reconfiguration, etc. of the distribution network can be implemented.

- Special application scheme for cable branch box

Due to the increasing application of distributed loop network switching stations, a scheme that outgoing lines from the left and right can be passed through the sleeve for the busbar is adopted specially for the NG7 series switchgear, which is suitable for cable branch boxes with one or more load switches and provides users with flexible and economical distribution schemes.

## Main Structure Features

### Cabinet body

The cabinet body is assembled out of 2mm bent aluminized catalpa plates. And it supports the main gas box, and protects the operating mechanism and external components of the switch cabinet. Besides, primary scheme mimetic diagram, switching status indication and operating holes, etc., are provided on the front panel of the cabinet body.

### Gas box

The gas box is welded with 3mm 304# stainless steel plates and is equipped with primary live parts of the switchgear. The gas box is welded by a welding robot, and the airtightness of the product is ensured through isobaric vacuumizing and helium leak detection technology. And the box is equipped with a density relay to observe the gas pressure in the box. Also, the box is equipped with explosion-proof diaphragms. When the internal arcing faults occur, the explosion-proof diaphragm breaks, releasing fault gas and ensuring minimum loss of users.

### Master switch

The load switch has two structures, i.e. two-station (closing-opening) and three-station (closing-opening-grounding), and the switch break is insulated by $SF_6$.

Grounding switch: Between the grounding switch and the load switch, linked operation can be conducted and mechanical interlocking is arranged to guarantee safe operation.

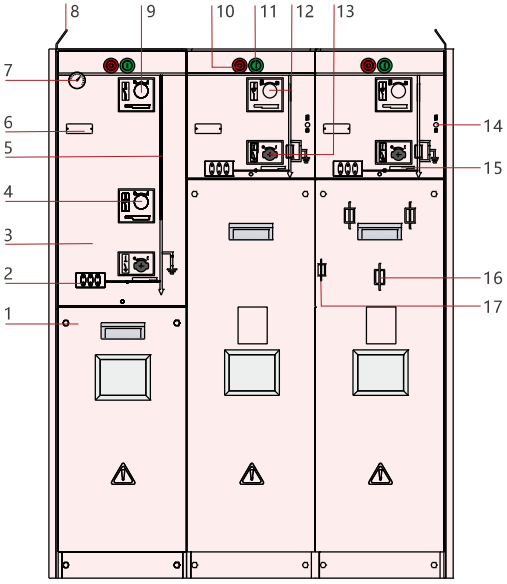
Vacuum circuit breaker/disconnector: 2 schemes for the circuit breaker: scheme V and scheme CB. In scheme V, the disconnector and the circuit breaker are integrated, and the circuit breaker is located at the busbar side. While in scheme CB, the vacuum circuit breaker and its operating mechanism are independent units, and the circuit breaker is located at the cable side.

# NG7-12~24 SF6 Gas Insulated and Sealed Metal-enclosed Switchgear

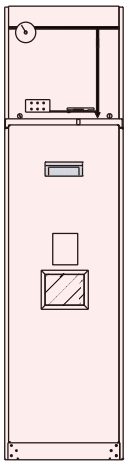
## Others

1 Cable chamber
2 Capacitive voltage indicator
3 RTU211 installation chamber
4 Disconnector operating hole
5 Analog circuit diagram
6 Label with a serial number
7 Pressure indicator
8 Lifting ring
9 Circuit breaker operating hole
10 Opening button
11 Closing energy storage button
12 Load switch operating hole
13 Grounding switch operating hole
14 Key lock (accessory)
15 Lock device on the panel
16 Fuse
17 Fuse indicator of the fuse

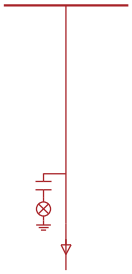
Note: outline structure of the sealed box




## Basic Unit Scheme



### Unit D



- The cable wiring unit has no switch, and the maximum busbar current can reach 1250A, which can realize the extension of inlet-outlet lines conveniently.

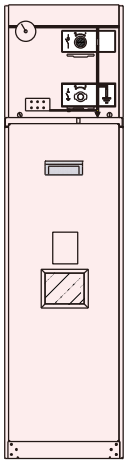
**Standard components of unit D**

- 630A busbar
- Live display (with nuclear phase test hole)
- Density meter (one gas density meter for each SF6 gas box)
- Cabinet body
- Grounding busbar
- Cable sleeve

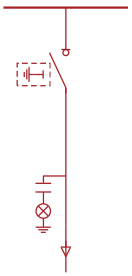
**Optional components**

- Short circuit and ground fault indicator
- Detachable connector (cable joint)
- Lightning arrester
- Reserved extension sleeve
- Extending busbar
- Ring current transformer and meter
- Auxiliary contact: density meter contact 1NO with signals

Note: it should be indicated in advance if more auxiliary contacts are required.



### Unit Co/C



- Unit Co is a load switch unit without the grounding switch, and it is also called the two-station load switch unit, namely, two working states of closing and opening inside the load switch. Unit C is a load switch unit with an grounding switch, also called the three-station load switch unit, i.e. three working states of closing, opening and grounding inside the load switch, and it is mainly applied to the connection, branching and control of the inlet-outlet lines of the loop cable.

**Standard components:**

- 630A busbar
- Load switch/grounding switch (standard configuration for Unit C)
- The three-station spring operating mechanism has independent operating shafts of the load switch and the grounding switch.
- Switch position indicator
- Live display (with nuclear phase test hole)
- Density meter (one gas density meter for each SF6 gas box)
- Lock device
- Cabinet body
- Grounding busbar
- Operating handle (one operating handle for each SF6 gas box)
- Cable sleeve

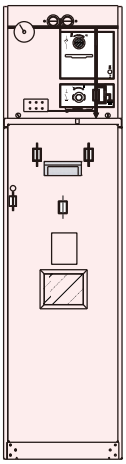
**Optional components:**

- Electric operating mechanism
- Short circuit and ground fault indicator
- Detachable connector (cable joint)
- Lightning arrester
- Key-based mechanical interlocking device
- Live grounding locking device for the incoming line
- Reserved extension sleeve
- Extending busbar
- Ring current transformer and meter
- Auxiliary switch: load switch 2NC, 2NO*
  Density contact 1NO with signals

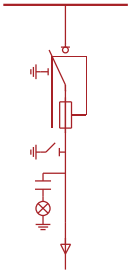
Note: it should be indicated in advance if more auxiliary contacts are required.

- Assembly area of secondary device (small chamber of secondary line and low-pressure cabinet on the top of the cabinet)

# NG7-12~24 $SF_6$ Gas Insulated and Sealed Metal-enclosed Switchgear



## Unit F



- It is combined electrical apparatus unit, i.e., the load switch + fuse combinations, which is mainly applied to the control and protection of medium and small distribution transformers.

**Standard components:**

- 630A busbar
- Three-station load switches/grounding switches at the head and end of the fuse
- Manual operating mechanism (with two independent operating shafts of the load switch and the grounding switch).
- Position indicators for the load switch and the grounding switch
- Live display (with nuclear phase test hole)
- Density meter (one gas density meter for each $SF_6$ gas box)
- Lock device
- Cabinet body
- Grounding busbar
- Operating handle (one operating handle for each $SF_6$ gas box)
- Cable sleeve

**Optional components:**

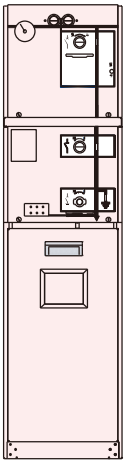
- Electric operating mechanism
- Short circuit and ground fault indicator
- Detachable connector (cable joint)
- Lightning arrester
- Key-based mechanical interlocking device
- Reserved extension sleeve
- Extending busbar
- Ring current transformer and meter
- Auxiliary switch: load switch 2NC, 2NO*
- Auxiliary contacts of grounding switch, 2NC, 2NO*

  Auxiliary contact of fuse, 1NO*

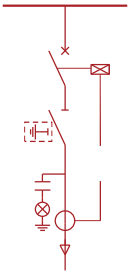
  Density contact with signals, 1NO

Note: it should be indicated in advance if more auxiliary contacts are required.

- Assembly area of secondary device (small chamber of secondary line and low-pressure cabinet on the top of the cabinet)



## Unit Vo/V



- Unit V, also known as a circuit breaker unit, is a combination of vacuum circuit breaker and three-station disconnector, and mainly used for control, connection, branching and protection of cable lines as well as control and protection of large containers. Reliable mechanical interlocking between the vacuum circuit breaker and the disconnector ensures opening or closing of the load current by the circuit breaker. The circuit breaker unit is equipped with a current transformer and a digital protection relay and has perfect security protection. Unit Vo is a combination of vacuum circuit breaker and two-station disconnector, and possesses the same functions with that of unit V except for grounding.

**Standard components:**

- 630A busbar
- Vacuum switch
- Electric operating mechanism of vacuum switch
- Disconnector/Grounding switch (V-shaped unit configuration)
- Manual operating mechanism of the disconnector/grounding switch
- Position indicators of the vacuum switch and the disconnector
- Live display (with nuclear phase test hole)
- Density meter (one gas density meter for each $SF_6$ gas box)
- Lock device
- Cabinet body
- Grounding busbar
- Operating handle (one operating handle for each $SF_6$ gas box)
- Cable sleeve
- Current transformer (for protection)
- Digital relay protection device

**Optional components:**

- Short circuit and ground fault indicator
- Detachable connector (cable joint)
- Lightning arrester
- Live grounding locking device for the incoming line
- Key-based mechanical interlocking device
- Extending busbar
- Ring current transformer and meter
- Auxiliary switch: auxiliary contacts of vacuum switch, 2NC, 2NO*

  Auxiliary contacts of disconnector, 2NC, 2NO*

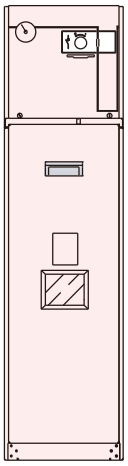
  Auxiliary contacts of vacuum switch trip signal, 1NC, 1NO*

  Pressure gauge contact with signal 1NO

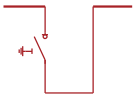
Note: it should be indicated in advance if more auxiliary contacts are required.

- Assembly area of secondary device (small chamber of secondary line and low-pressure cabinet on the top of the cabinet)

# NG7-12~24 $SF_6$ Gas Insulated and Sealed Metal-enclosed Switchgear



## Unit SL/So



- SL is a three-station busbar section load switch unit. The load switch is a three-station load switch with three positions of closing, opening and grounding. Unit So is a two-station busbar section load switch unit. The load switch adopts two stations without grounding position, and has the same functions with those of unit SL.

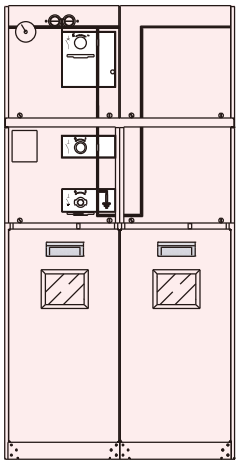
**Standard components:**

- 630A busbar
- Three-station load switch/grounding switch (optional two-station load switch)
- Manual operating mechanism (with two independent operating shafts of the load switch and the grounding switch)
- Position indicators for the load switch and the grounding switch
- Live display (with nuclear phase test hole)
- Density meter (one gas density meter for each $SF_6$ gas box)
- Lock device
- Cabinet body
- Grounding busbar
- Operating handle (one operating handle for each $SF_6$ gas box)
- Cable sleeve

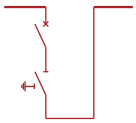
**Optional components:**

- Electric operating mechanism
- Live grounding locking device for cables at the grounding terminal
- Key-based mechanical interlocking device
- Extending busbar
- Current transformer and meter
- Auxiliary switch: auxiliary contacts of load switch, 2NC, 2NO*

Note: the installation position of the live indicator depends on the actual distribution scheme.



## Unit SV



- Vacuum circuit breaker and three-station disconnector section unit is adopted mainly for line busbar section. Reliable mechanical interlocking between the vacuum circuit breaker and the disconnector ensures opening or closing of the load current by the circuit breaker. The circuit breaker unit is equipped with a current transformer and a digital protection relay, thus having incomparable security protection.

**Standard components:**

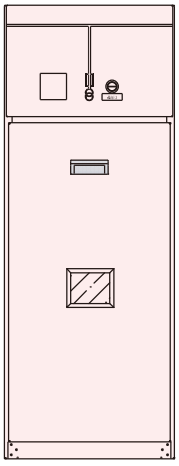
- 630A busbar
- Vacuum switch
- Electric operating mechanism of vacuum switch
- Three-station disconnector/grounding switch
- Manual operating mechanism of three-station disconnector/grounding switch
- Position indicators of vacuum switch and three-station disconnector
- Live display (with nuclear phase test hole)
- Density meter (one gas density meter for each $SF_6$ gas box)
- Cable sleeve
- Current transformer (for protection)
- Digital relay protection device

**Optional components:**

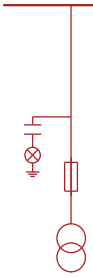
- Key-based mechanical interlocking device
- Reserved extension sleeve
- Extending busbar
- Auxiliary switch: auxiliary contacts of vacuum switch, 1NC, 1NO*
- Auxiliary contacts of disconnector, 2NC, 2NO*
- Auxiliary contacts for vacuum switch trip signal, 1NC, 1NO*

Note: the installation positions of the current transformer and the live indicator depend on the actual distribution scheme.

- Assembly area of secondary device (small chamber of secondary line and low-pressure cabinet on the top of the cabinet)



## Unit Apt



- Unit PT is also called a PT module. The insulated and enclosed voltage transformer unit is connected with the voltage transformer through the detachable connector with full insulation, full sealing and full shielding. It can be used for voltage acquisition of power supply PT cabinet and busbar

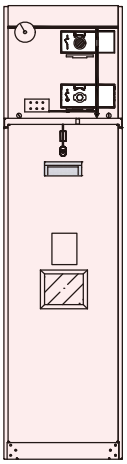
**Standard components:**

- Detachable connector (cable joint)
- Voltage transformer
- Protective fuse
- Live display (with nuclear phase test hole)
- Cabinet body
- Grounding busbar

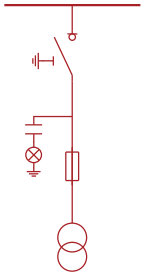
**Optional components:**

- Meter
- Power supply module
- Storage battery

# NG7-12~24 $SF_6$ Gas Insulated and Sealed Metal-enclosed Switchgear



## Unit Cpt



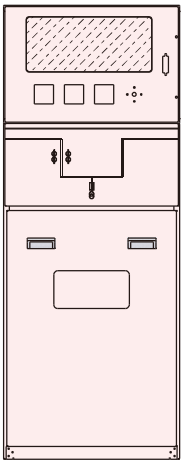
- PUnit PT is also called a PT module. It contains a three-station load switch. The insulated and enclosed voltage transformer unit is connected with the voltage transformer through the detachable connector with full insulation, full sealing and full shielding. And it can be used for voltage acquisition of power supply PT cabinet and busbar.

**Standard components:**

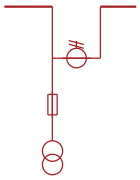
- Three-station load switch
- Detachable connector (cable joint)
- Voltage transformer
- Protective fuse
- Live display (with nuclear phase test hole)
- Cabinet body
- Grounding busbar

**Optional components:**

- Meter
- Power supply module
- Storage battery



## Unit M



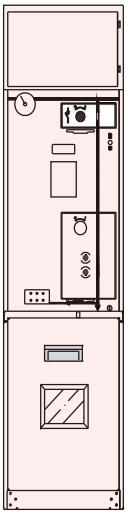
- The metering unit, also known as the metering unit module, adopts air insulation design and is able to replace current transformers with different transformation ratios at any time according to requirements.

**Standard components:**

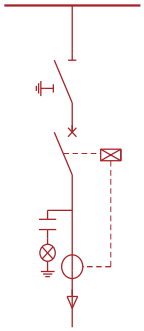
- 630A busbar
- Voltage transformers (two)
- Current transformers (two)
- Fuse protecting PT
- Cabinet body
- Grounding busbar

**Optional configuration:**

- Meter



## Unit CB



- An independent vacuum circuit breaker scheme is adopted with vacuum arc extinguishing and electric operation. The circuit breaker is located at the outgoing line side while the disconnector is located at the busbar side. The current class is 1250A.

**Standard configuration:**

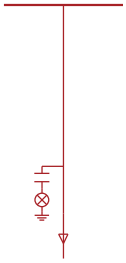
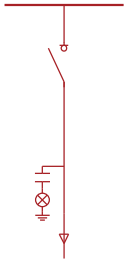
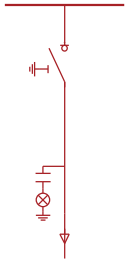
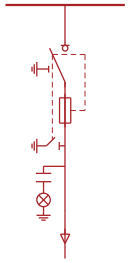
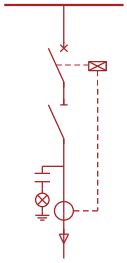
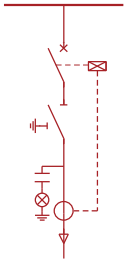
- 1250A/800A/630A busbar
- 1250A/800A/630A vacuum circuit breaker for line protection (including spring operating mechanism and control coil)
- 1250A/800A/630A three-station disconnector (electric operation)
- 1250A/800A/630A 1250 series sleeve
- Protection and control unit protector
- Live display (with nuclear phase test hole)
- 1250A/800A/630A reserved busbar sleeve
- Density meter (one operating handle for per $SF_6$ gas box)
- Rated operating sequence: 0-0.3s-CO-180s-CO

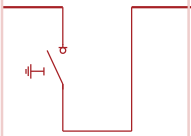
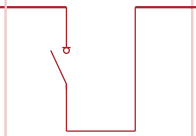
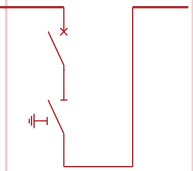
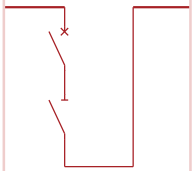
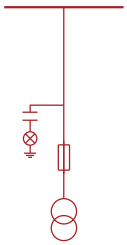
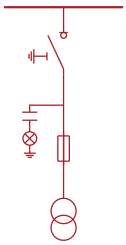
**Optional configuration:**

- Three-phase voltage transformer with disconnector for incoming cable
- Lightning arrester installed on the incoming cable

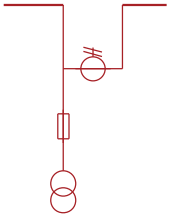
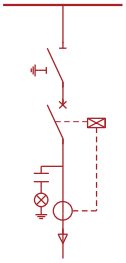
# NG7-12~24 SF6 Gas Insulated and Sealed Metal-enclosed Switchgear

## Selection Table of Basic Unit Scheme

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Primary wiring scheme | |  |  |  |  |  |  |
| Scheme code | | D | Co | C | F | Vo | V |
| Cabinet dimension (width×depth×height) | | 355×795×1400 | 355×795×1400 | 355×795×1400 | 355×795×1400 | 355×795×1400 | 355×795×1400 |
| Main configuration elements | Load switch/ Disconnector | | ●(Two-position) | ●(Three-position) | ●(Three-position) | ●(Two-position) | ●(Three-position) |
| | Vacuum switch | | | | | ● | ● |
| | Grounding switch | | | | ● | | |
| | Current transformer | ○ | ○ | ○ | ○ | ● | ● |
| | Voltage transformer | | | | | | |
| | High-voltage fuse | | | | ● | | |
| | Live display | ● | ● | ● | ● | ● | ● |
| | Cable fault indicator | ○ | ○ | ○ | ○ | ○ | ○ |
| | Lightning arrester | ○ | ○ | ○ | ○ | ○ | ○ |
| | Gas-pressure meter | ● | ● | ● | ● | ● | ● |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Primary wiring scheme | |  |  |  |  |  |  |
| Scheme code | | SL | SLo | SV | SVo | Apt | Cpt |
| Cabinet dimension (width×depth×height) | | 355×795×1400 | 355×795×1400 | 680×795×1400 | 680×795×1400 | 600×795×1400 | 500×795×1400 |
| Main configuration elements | Load switch/ Disconnector | ●(Three-position) | ●(Two-position) | ●(Three-position) | ●(Two-position) | | ● |
| | Vacuum switch | | | ● | | | |
| | Grounding switch | | | | | | |
| | Current transformer | | | | | | |
| | Voltage transformer | | | | | ● | ● |
| | High-voltage fuse | | | | | ● | ● |
| | Live display | ● | ● | ● | ● | ● | ● |
| | Cable fault indicator | | | | | | |
| | Lightning arrester | | | | | | |
| | Gas-pressure meter | ● | ● | ● | ● | | ● |

# NG7-12~24 $SF_6$ Gas Insulated and Sealed Metal-enclosed Switchgear

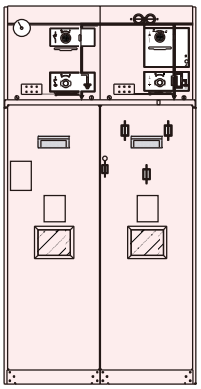
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Primary wiring scheme | |  |  | | | | |
| Scheme code | | M | CB | | | | |
| Cabinet dimension (width×depth×height) | | 700×900×1400<br>800×1100×1500 | 600×950×2300 | | | | |
| Main configuration elements | Load switch/ Disconnector | | ●(Three-position) | | | | |
| | Vacuum switch | | ● | | | | |
| | Grounding switch | | | | | | |
| | Current transformer | ● | | | | | |
| | Voltage transformer | ● | ● | | | | |
| | High-voltage fuse | ● | | | | | |
| | Live display | | ● | | | | |
| | Cable fault indicator | | ● | | | | |
| | Lightning arrester | | ● | | | | |
| | Gas-pressure meter | | ● | | | | |

Note: 1. The cabinet height does not include low-pressure cabinet height. Optional standard heights for the instrument box are 280mm, 340mm, 470mm and 570mm respectively, which can also be customized according to the requirements;

2. In the table, "●" refers to standard configuration elements, and "○" refers to optional configuration elements.

3. The cabinet dimensions in the Table are dimensions for the single cabinet.

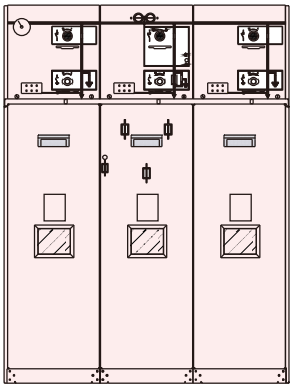
# NG7-12~24 $SF_6$ Gas Insulated and Sealed Metal-enclosed Switchgear



### Spacing common enclosure unit

External dimensions: width×depth×height 680×795×1400(mm)

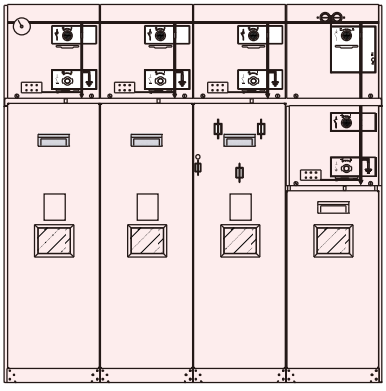
NG7-12/DF NG7-12/CC
NG7-12/DV NG7-12/CF
NG7-12/FF NG7-12/VV
NG7-12/CV



### Three-interval common enclosure unit

External dimensions: width×depth×height 1005×795×1400(mm)

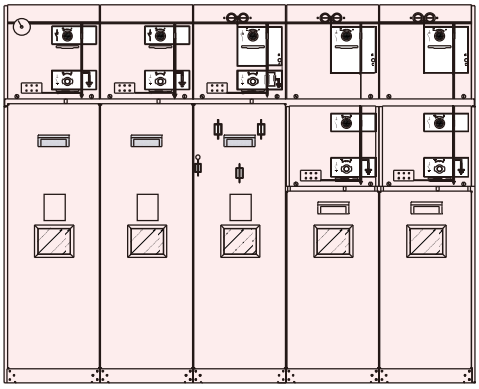
NG7-12/DFF NG7-12/CCC
NG7-12/CCF NG7-12/CFF
NG7-12/FFF NG7-12/CCV
NG7-12/CVV NG7-12/VVV
NG7-12/VFF NG7-12/VVF
NG7-24/CCV



### Four-interval common enclosure unit

External dimensions: width×depth×height 1330×795×1400(mm)

NG7-12/CCCC NG7-12/CCCF
NG7-12/CCFF NG7-12/CFFF
NG7-12/FFFF NG7-12/CCCV
NG7-12/CCVV NG7-12/CVVV
NG7-12/VFFF NG7-12/VVFF
NG7-24/CCCV



### Five-interval common enclosure unit

External dimensions: width×depth×height 1655×795×1400(mm)

NG7-12/CCCCC NG7-12/CCCCF
NG7-12/CCCFF NG7-12/CCFFF
NG7-12/CFFFF NG7-12/CCVVV
NG7-12/CCCVV NG7-12/CCCCV
NG7-12/VFFFF NG7-12/VVFFF
NG7-24/VCCCC

## Transformer and Line Protection

Two transformer protection methods for NG7 series switchgear are developed as follows: load switch + fuse combinations and circuit breaker with relay protection.

**Protection scheme of load switch-fuse combinations:**

The scheme of load switch + fuse combinations employs excellent breaking capacity of the fuse to cut off the fault current. And the fuse, as an external part of the gas box, is installed in the insulating cylinder, which is convenient for replacement. The fuse firing pin and the switching mechanism are interlocked, and the fused firing pin of any one-phase fuse will trip the mechanism. The selection of fuse shall be in accordance with DIN43625 standards, 292 mm for 12 kV and 442 mm for 24 kV. When 12 kV fuses are applied, adapters shall be installed.

The selection of the rated current of the fuse needs to match the capacity of the transformer. The following table lists the rated current reference of the transformer with the capacity below 1250 kVA and its corresponding fuse for reference:

| Transformer capacity-fuse comparison table (rated capacity of transformer) | | | | | | | | | | | | | | | Fuse |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | 50 | 75 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | |
| 6 | 16 | 16 | 25 | 25 | 25 | 40 | 40 | 50 | 50 | 63 | 80 | 100 | 1250 | | 7.2kV |
| 6 | 6 | 10 | 16 | 16 | 16 | 25 | 25 | 25 | 40 | 40 | 50 | 63 | 80 | 100 | 12kV |
| 6 | 6 | 6 | 10 | 10 | 10 | 16 | 16 | 25 | 25 | 25 | 40 | 50 | 50 | 63 | 17.5kV |
| 6 | 6 | 6 | 6 | 10 | 16 | 16 | 16 | 16 | 25 | 25 | 25 | 40 | 40 | 50 | 24kV |

**Transformer/Line Protection:**

The protection scheme is a vacuum circuit breaker unit with protection relays and current transformers, and the protection relays can be equipped with various domestic and imported models. Such relays are featured with inverse time characteristics and constant time characteristics, strong anti-electromagnetic interference capability, convenient adjustment and small volume.

| Technical parameters | |
|---|---|
| Constant time-lag action current | 0.9~2.5xIs |
| Action time | 0.04~300s |
| Inverse time-lag action current | Curve motion patterns of 0.9~2.5xIs N-INV、V-INV、E-INV、LI-INV、HV-FUSE |
| Short-circuit fault protection II>> | Constant time-lag action current 1~20xIs |
| Action time | 0.04~3s |
| Ground fault protectionIe> | Constant time-lag action current 0.2~2.5xIs |
| Action time | 0.1~20s |

Four configurable current transformers (CT) with different ranges for WIC1 protection relays

| CT categories | Primary current range rated |
|---|---|
| WIC1-W2 | 16~56A |
| WIC1-W3 | 32~112A |
| WIC1-W4 | 64~224A |
| WIC1-W5 | 128~448A |

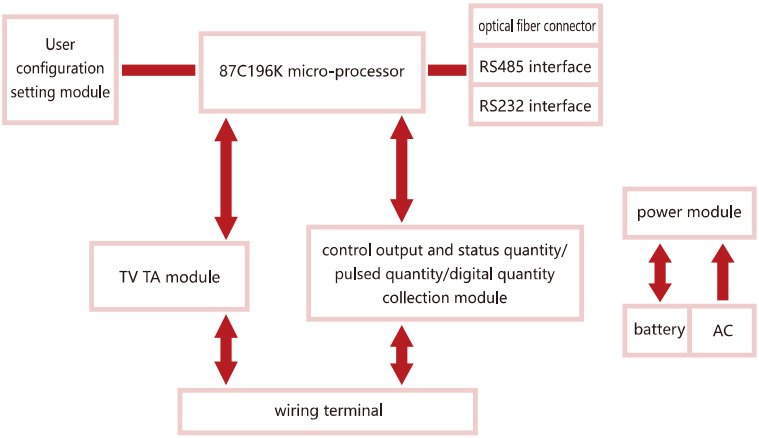
## Distribution Automation

Distribution automation refers to conducting the information integration to the online and offline data of distribution network, distribution network data and user data, and power network structure and geographic figure through modern electronic, computer, communication and network technologies, thus forming a complete automation system, and realizing the modernization of monitoring, protection, control, power utilization and distribution management of the distribution network and its equipment in normal operation and emergency conditions. The feeder terminal unit (FTU/DTU) implements fault recognition, fault isolation, network reconfiguration, reactive power/voltage control and optimized operation of distribution network. As an important part of the automation system, it plays a pivotal role in the whole system.

### The FTU system can realize the following functions

- From the control master station or substation, opening, closing or closing lockout of each ring main unit or circuit breaker can be conducted remotely or locally;
- The contact position status, fuse status, circuit breaker fault protection status, and grounding switch status, etc. of each switch can be obtained from the control master station or substation;
- The electrical parameters of each circuit, such as voltage, current, zero-sequence voltage, zero-sequence electric power and frequency, can be acquired from the control master station or substation;
- The parameter configuration of each distribution automation terminal can be optimized from the control master station or substation;
- Line fault information or abnormal information of each distribution automation terminal can be obtained, and based on the master station or substation software, fault isolation, restoration of power supply in non-fault areas, and optimized configuration and reconfiguration of network load can be implemented.

A typical FTU/DTU system chart is shown as follows.




## Accessories and Auxiliary Components

### Accessories

Cable accessory: It is used for connecting the switchgear and external circuits, and ensuring the security and reliability of electrical insulation. It mainly includes two types of front and rear cable joints, as shown in the following figure:


Front cable joint


Rear cable joint


Lightning arrester


Bushing type current transformer


Open-type current transformer


Voltage transformer


Panel-type cable fault indicator


Pressure gauge

The installation method of cable joint is shown in the figure:


1 Splicing sleeve
2 M16 bolt
3 Front joint
4 Flat washer
5 Spring washer
6 Nut
7 Plug
8 Sealing cap
9 Compression terminal
10 Stress cone

## Auxiliaries

- Operation power supply

a) AC 220V power supply can be directly provided through the secondary side of the voltage transformer;

b) The secondary side of the voltage transformer is equipped with UPS, which provides uninterrupted AC 220V operation power supply for the electric operation of the ring main unit. And UPS will provide operation power supply under power failure due to high voltage;

c) The rectification switching power supply installed on the secondary side of the voltage transformer provides DC operation power supply for the electric operating mechanism of the ring main unit;

d) The high-frequency rectification switching power supply and the valve-regulated fully-sealed lead-acid storage battery assembled on the secondary side of the voltage transformer provide DC operation power supply for the electric operating mechanism of the ring main unit, and manage intelligent equalizing and floating charge of the storage battery which offers operation power supply under power failure due to high voltage.

- Electric module

In the scheme of load switch (unit C) and load switch-fuse (unit F) combinations, the standard configuration is manual operation, but the user can install electric operating mechanism. The standard configuration of the vacuum switch unit (unit V) includes manual and electric operating mechanisms.

The motor operating mechanism and the control unit adopt modular design, and can be added or removed anytime as they're independent of the operating mechanism. Once the electric operating mechanism is installed, each functional unit can be incorporated into the remote control and distribution automation system.

The grounding switch can only be operated manually rather than operated electrically.

- Auxiliary contact

Through the change of the contact position status of the microswitch, the auxiliary contact, an essential part of the electrical control circuit, presents the status change of functional unit for each switch, thus providing status monitoring and control signals.

- Short circuit and ground fault indicator

The short circuit and ground fault indicator is composed of three short circuit fault sensors, one ground fault sensor and one display panel. The display panel is installed on the front panel of the switch. When there is a fault current in the switch circuit, the indicator will make an alarm.

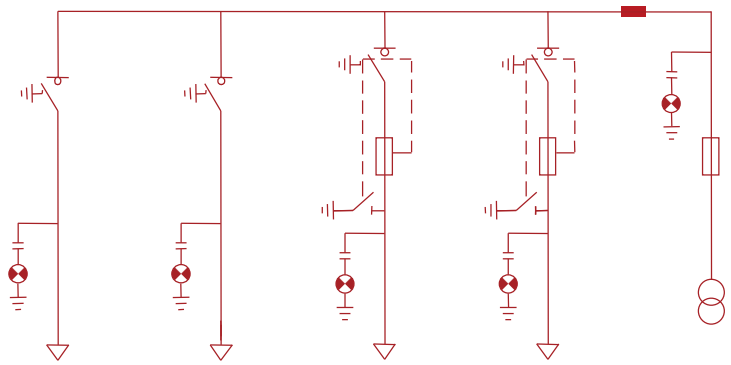
- Interlocking device

Mechanical interlocking is provided among the load switch, cable chamber door, fuse chamber door, and grounding switch, namely, when the load switch (or vacuum switch) is in the closing position, the grounding switch cannot be closed and the chamber doors cannot be opened. The grounding switch can be closed and the chamber doors can be opened only when the load switch (or vacuum switch) is opened. It can effectively prevent incorrect operation.

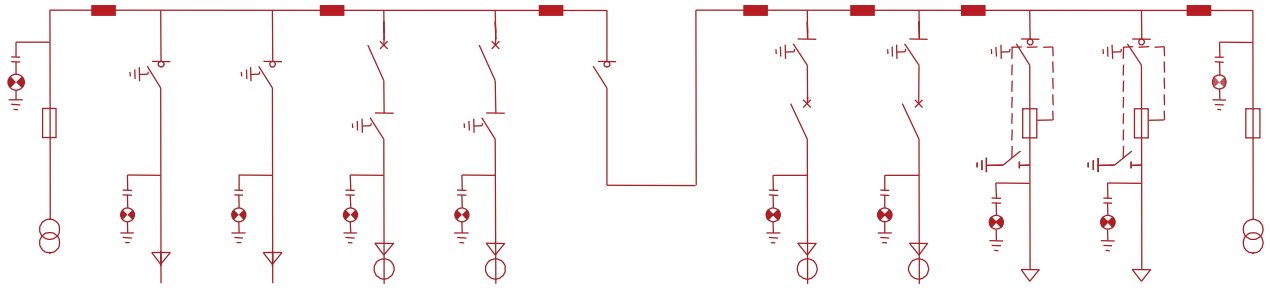
User optional part: grounding locking device on the incoming line side. When the incoming cable is charged, the locking device on the incoming line side will lock the grounding switch operating hole to prevent misoperation.

## Typical Example of Ring Network Scheme

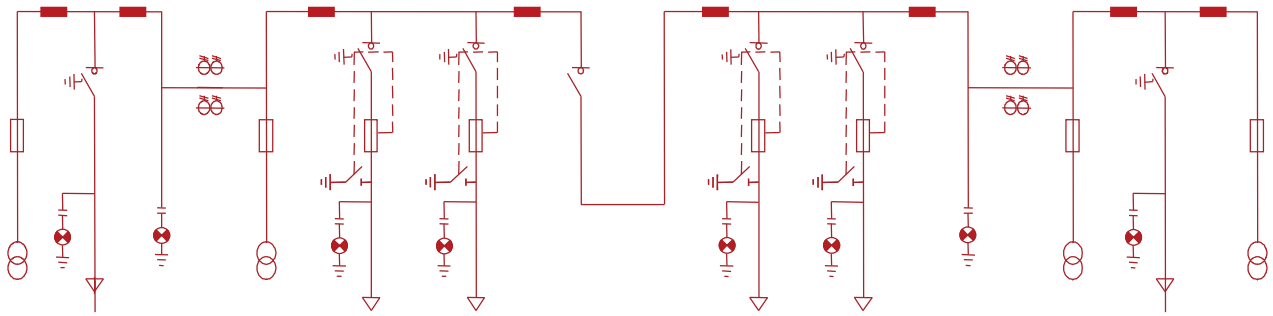
CCFF+Apt



Apt+CC+VV+SLo+CB+CB+FF+Apt

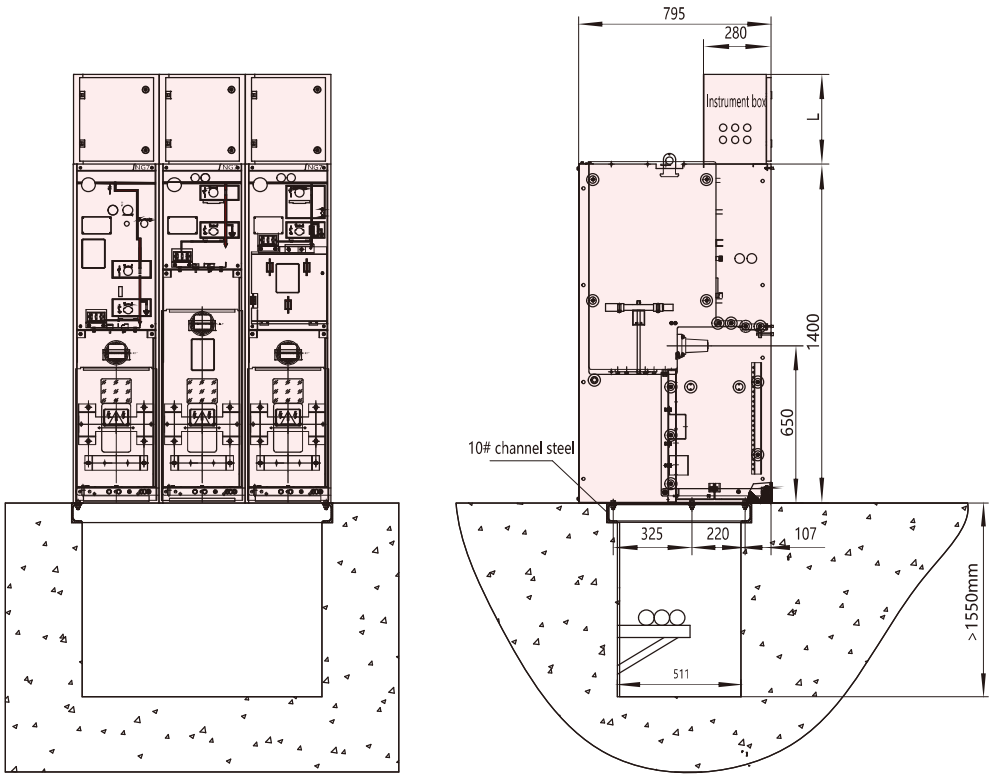


Apt+C+M+FF+SLo+FF+M+C+Apt

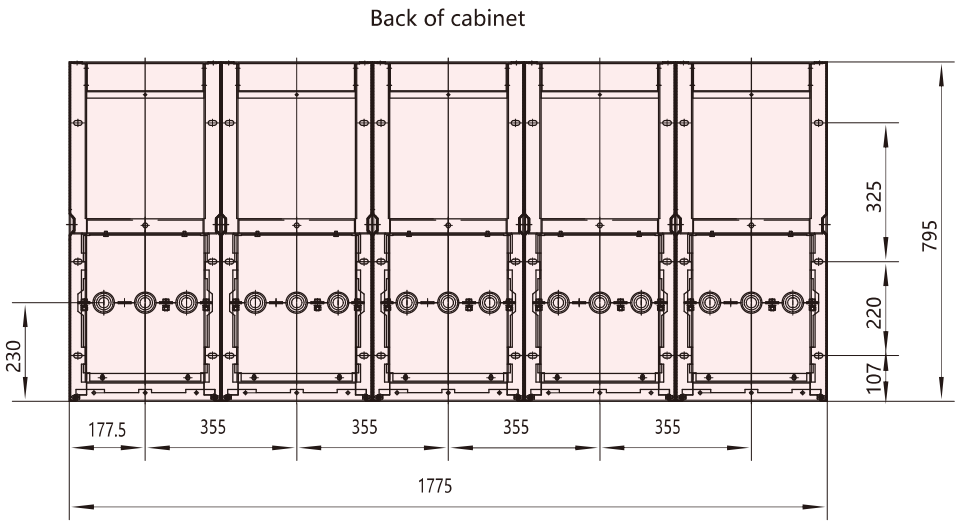


## Outline Dimensions and Base Installation Drawing

Dimension Drawing of Installation Base

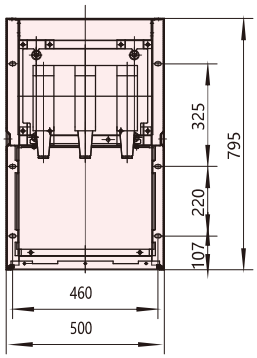



Dimension Drawing for Foundation of Unit Module



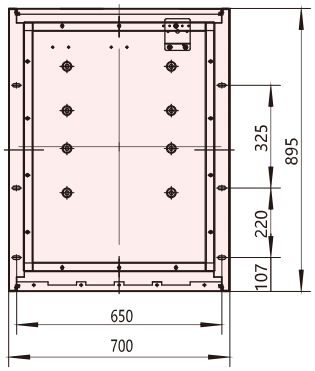
Drawing for Installation Dimension of CPT Module

Behind the cabinet



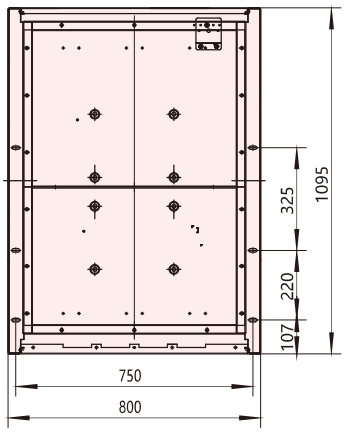

Drawing for Installation Dimension of 12kV Metering Module

Behind the cabinet




Drawing for Installation Dimension of 24kV Metering Module

Behind the cabinet




## Ordering Information

- Determine the product model, name and code, and technical parameters;
- Determine the product quantity and delivery cycle;
- Other special operating requirements;
- Name and quantity of spare parts.

## Product Storage and Maintenance

- No inversion, violent shaking or collision shall be allowed for the packaged products during transportation and loading and unloading;
- The product shall be stored in a dry, ventilated and moisture-proof room or warehouse. Long-term storage requires lubrication and protection treatment for the driving part and regular inspection of the environmental conditions. The storage life of the product is 15 years;
- The products in service shall be subjected to a small inspection every 3 to 5 years, including checking the wear conditions of some moving parts of the mechanism and the condition of fasteners, removing dust on the surface of insulation parts, and adding lubricants to the moving parts.

# NG7-40.5 Series SF6 Gas Insulated Metal Enclosed Switchgear

## Overview

With an effective combination of fixed unit combination and flexible extension, the products meet both the requirements of loop network power distribution or user terminals and the requirements of various secondary substations for the flexible use of compact switchgear, and they are widely used in wind farms, optical cable communication, rail transit and other fields.

The NG7 series switchgear employs a full-seal structure scheme and modular design. All live parts are placed in the sealed stainless steel shell, which makes them free from the impact of external environment and ensures the requirements of high reliability and security. Additionally, factorization automation solutions can be configured to realize intelligent control.

The development of NG7-40.5 conforms to the standards of GB3804-2004, GB3906-2006, GB/T16926-2009 and GB/T11022-2011, etc. The operating design life under normal operating conditions (room temperature of 30°C) exceeds 30 years.

### Executive standards

- IEC 62271-200:2011(MOD) AC metal-enclosed switchgear and controlgear for rated voltages above 1kV and less than 52kV
- IEC 62271-100:2017(MOD) High voltage AC circuit breaker
- GB/T 1984-2014 High-voltage alternating-current circuit breakers
- GB/T 1985-2014 HV AC Disconnector and Grounding Switch
- GB/T 3804-2017 High voltage alternating current switches for rated voltage above 3.6kV and less than 40.5kV
- GB/T 3906-2006 Alternating-current metal-enclosed switchgear and controlgear for rated voltages above 3.6kV and up to and including 40.5kV
- GB/T 4208-2017 Degrees of protection provided by enclosure (IP Code)
- GB/T 11022-2011 Common specifications for high-voltage switchgear and controlgear standards
- GB/T 11023-2018 Test guide of SF6 gas tightness for high-voltage switchgear
- GB/T 16926-2009 High-voltage alternating current switch-fuse combinations
- DL/T 404-2018 Alternating-current metal-enclosed switchgear and controlgear for rated voltages above 3.6kV and up to and including 40.5kV
- DL/T 791-2001 Specification of indoor AC HV gas-filled switchgear panel

## Model and its Meaning

NG7-40.5/□-□/□

- See the note for the extended location codes
- F means non-extensible, K means extensible and D refers to cable branch box scheme.
- Please refer to "2. Standard scheme" for the codes of the unit scheme or the combination scheme.
- Rated voltage: 40.5kV
- Product model

Note: extension location codes are as follows: L means left extension, R means right extension, LR is left-right extension, and T is top extension.

# NG7-40.5 Series SF6 Gas Insulated Metal Enclosed Switchgear

## Operating Environment Condition

- Environmental temperature: maximum temperature of +40°C, and minimum temperature of -25°C. The average value within 24 hours does not exceed 35°C.
- Altitude: 5,000m (it should be specially noted when the equipment operating altitude exceeds 1,000m)
- Environmental humidity: relative humidity does not exceed 95% within 24 hours and monthly average humidity does not exceed 90%.
- Electromagnetic interference: the amplitude of electromagnetic interference induced in the secondary system is less than or equal to 1.6kV.
- Seismic intensity: magnitude 8.
- Installation environment: no serious pollution or explosion hazard.

Please negotiate with the Company for customization when it's not within the above operating environment condition.

## Main technical parameters

| S/N | Name | | Unit | Coincidence switch | Combined electrical apparatus | Circuit breaker unit |
|---|---|---|---|---|---|---|
| 1 | Rated voltage | | kV | 40.5 | 40.5 | 40.5 |
| 2 | Rated frequency | | Hz | 50 | 50 | 50 |
| 3 | Rated cable | | A | 630 | 63 | 630 |
| 4 | Rated insulation level | 1min power frequency withstand voltage (phase to phase and phase to ground) | kV | 95 | 95 | 95 |
| | | 1min power frequency withstand voltage (isolating break) | kV | 118 | 118 | 118 |
| | | 1min power frequency withstand voltage (control and auxiliary circuits) | kV | 2 | 2 | 2 |
| | | Lightning impulse withstand voltage (phase to phase and phase to ground) | kV | 185 | 185 | 185 |
| | | Lightning impulse withstand voltage (isolating break) | kV | 215 | 215 | 215 |
| 5 | Rated short-circuit breaking current | | kA | — | 20 | 20 |
| 6 | Rated short-time withstand current (master switch/grounding switch) | | kA | 20/20 | — | 20/20 |
| 7 | Rated short-circuit duration | | S | 3 | — | 3 |
| 8 | Rated peak withstand current (master switch/grounding switch) | | kA | 50/50 | — | 50/50 |
| 9 | Rated short-circuit making current (master switch/grounding switch) | | kA | 50/50 | — | 50/50 |
| 10 | Rated short-circuit closing times (master switch/grounding switch) | | 次 | 3/2 | — | — |
| 11 | Rated transfer current | | A | — | 750 | — |
| 12 | Rated active load breaking current | | A | 630 | — | — |
| 13 | Experimental grade of inner arcing | | | IAC level AFL 20kA/0.5s | IAC level AFL 20kA/0.5s | IAC level AFL 20kA/0.5s |
| 14 | Mechanical life | Circuit breaker (M2) level | | — | — | 10000 |
| | | Load switch (M2) level | Time | 5000 | 5000 | — |
| | | Grounding switch (M1) level | Time | 3000 | 3000 | 3000 |
| 15 | Inflation pressure | Rated inflation pressure (gauge pressure at 20°C) | bar | 1.4 | 1.4 | 1.4 |
| | | Minimum inflation pressure (gauge pressure at 20°C) | bar | 1.2 | 1.2 | 1.2 |
| 16 | Annual relative gas leakage rate | | % / year | 0.01 | 0.01 | 0.01 |
| 17 | SF6 gas moisture content (environmental temperature of 20°C) | | ppm | ≤500 | ≤500 | ≤500 |
| 18 | Protection grade | Gas box part | | IP67 | IP67 | IP67 |
| | | Sealed box | | IP67 | IP67 | IP67 |
| | | Switchgear housing | | IP3X | IP3X | IP3X |

# NG7-40.5 Series $SF_6$ Gas Insulated Metal Enclosed Switchgear

## Technical Features

- Unity of stationary and flexibly expansion

The NG7 series product, adopting a common technology platform, enables the ring master unit to be a subset of a compact switch cabinet, so as to reduce complexity of the switch cabinet.

The NG7 series product is made of the ring master unit structure. One SF6gas box can be maximally configured with 3 modules, and the switch cabinets equipped with more than 3 units of modules shall be connected with a lateral extending busbar, so as to realize the semi-modular structure; or all the modules shall be connected with lateral extending busbar to realize wholly-modular configuration. The power distribution scheme can become complex by assembling modulus of different functions, thereby meeting various configuration requirement of a secondary power distribution station and a switching station.

- Compact structure

Except the supporting measuring cabinet, all modules adopt the normalized width.

- Full insulation and sealing design, without environmental influence

The primary live parts of the NG7 series switchgear are completely sealed in a sealed gas box welded by stainless steel plates. The inlet-outlet lines are connected through fully insulated, fully sealed and shielded cable connectors, and the inflation pressure in the gas box is 0.04 Mpa, and the protection level is IP67. The product can work in severe environments with high altitude, high salt mist, heavy pollution and humidity, etc.

- Highly reliable personal safety

All live high-voltage parts are enclosed in the $SF_6$ sealed gas box. The switch cabinet has a reliable pressure releasing pathway and passes the 20kA internal arcing test. The load switch and the grounding switch are connected by very reliable interlocking. The cable chamber door plate and the load switch are connected by very reliable mechanical interlocking.

- Reliable transformer protection scheme

The protection is provided by the load switch-fuse combinations that are applicable to 1,600 kVA transformers or below.

- Environmental protection

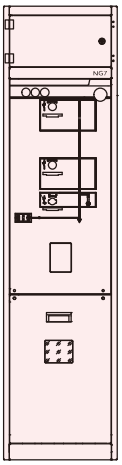
This product is developed in compliance with the environmental protection principles, that is, the product itself, the production process and the switch operation in the whole service life are not harm to the environment. The Company selects environmentally friendly materials and adopts zero leakage processing technology. The product is completely sealed throughout the whole service life, and more than 97% materials can be recycled at expiration.

## NG7-40.5 Standard Module and Combined Module

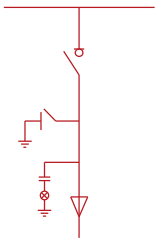
### Standard Module Scheme and Combined Module Scheme

Following modules are applicable toNG7-40.5

| | | | |
|---|---|---|---|
| C | Load switch module | D | Cable connection module |
| F | Load switch-fuse combinations module | Vo/V | Acuum switch module |



### Unit C



Unit C is a two-location load switch unit equipped with grounding switches, which is mainly applied to the connection, branching and control of the inlet-outlet lines of the loop cable.

**Standard components:**

- 630A busbar
- Load switch/grounding switch (standard configuration for Unit C)
- Spring operating mechanism, and independent operating shafts of the load switch and the grounding switch
- Switch position indicator
- Capacitive voltage indicator of indicating bushing (with nuclear phase test hole)
- Gas-pressure meter (one gas-pressure meter for each $SF_6$ gas box);
- Lock device
- Cabinet body
- Grounding busbar
- Operating handle (one operating handle for each $SF_6$ gas box)
- Cable sleeve

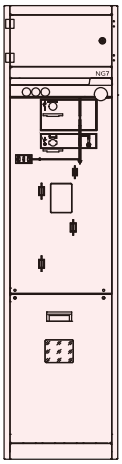
**Optional components:**

- Electric operating mechanism
- Short circuit and ground fault indicator
- Detachable connector (cable joint)
- Lightning arrester
- Key-based mechanical interlocking device
- Live grounding locking device for the incoming line
- Reserved extension sleeve
- Extending busbar
- Ring current transformer and meter
- Auxiliary switch: load switch 2NC, 2NO* Pressure gauge contact with signal 1NO

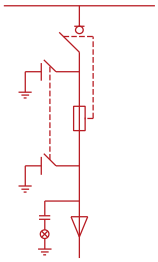
Note: it should be indicated in advance if more auxiliary contacts are required.

- Assembly area of secondary device (small chamber of secondary line and low-pressure cabinet on the top of the cabinet)

# NG7-40.5 Series $SF_6$ Gas Insulated Metal Enclosed Switchgear



## Unit F



It is the composite apparatus unit, i.e., the load switch + fuse combinations, which is mainly applied to the control and protection of medium and small distribution transformers.

**Standard components:**

- 630A busbar
- Two-station load switches/grounding switches at the head and end of the fuse
- Manual operating mechanism (with two independent operating shafts of the load switch and the grounding switch);
- Position indicators for the load switch and the grounding switch
- Capacitive voltage indicator of indicating bushing (with nuclear phase test hole)
- Gas-pressure meter (one gas-pressure meter for each $SF_6$ gas box)
- Lock device
- Cabinet body
- Grounding busbar
- Operating handle (one operating handle for each $SF_6$ gas box)
- Cable sleeve

**Optional components:**

- Electric operating mechanism
- Short circuit and ground fault indicator
- Detachable connector (cable joint)
- Lightning arrester
- Key-based mechanical interlocking device
- Reserved extension sleeve
- Extending busbar
- Ring current transformer and meter
- Auxiliary switch: auxiliary contacts of load switch, 2NC, 2NO*

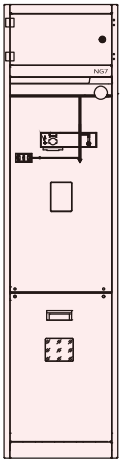
  Auxiliary contacts of grounding switch, 2NC, 2NO*

  Auxiliary contact of fuse, 1NO*

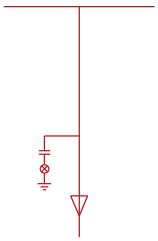
  Pressure gauge contact with signal, 1NO

Note: it should be indicated in advance if more auxiliary contacts are required.

- Assembly area of secondary device (small chamber of secondary line and low-pressure cabinet on the top of the cabinet)



## Unit D



The cable wiring unit has no switch, and the maximum busbar current can reach 1250A, which can realize the extension of inlet-outlet lines conveniently.

**Standard components:**

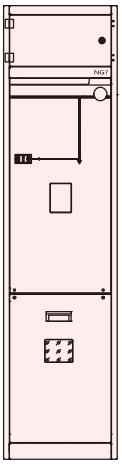
- 630A busbar
- Capacitive voltage indicator of indicating bushing (with nuclear phase test hole)
- Gas-pressure meter (one gas-pressure meter for each $SF_6$ gas box);
- Cabinet body
- Grounding busbar
- Cable sleeve

**Optional components:**

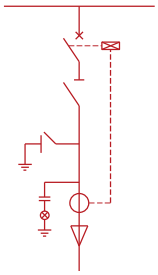
- Short circuit and ground fault indicator
- Detachable connector (cable joint)
- Lightning arrester
- Reserved extension sleeve
- Extending busbar
- Ring current transformer and meter
- Auxiliary contact: pressure gauge contact 1NO with signals

Note: it should be indicated in advance if more auxiliary contacts are required.

# NG7-40.5 Series $SF_6$ Gas Insulated Metal Enclosed Switchgear



## Unit Vo/V



Unit V, also known as a circuit breaker unit, is a combination of vacuum circuit breaker, two-station disconnector and grounding switch, and mainly used for control, connection, branching and protection of cable lines as well as control and protection of large containers. Reliable mechanical interlocking between the vacuum circuit breaker and the disconnector ensures opening or closing of the load current by the circuit breaker. The circuit breaker unit is equipped with a current transformer and a digital protection relay and has perfect security protection. Unit Vo is a combination of vacuum circuit breaker and two-station disconnector, and possesses the same functions with that of unit V except for grounding.

**Standard components:**

- 630A busbar
- Vacuum switch
- Electric operating mechanism of vacuum switch
- Disconnector/Grounding switch (V-shaped unit configuration)
- Manual operating mechanism of the disconnector/grounding switch
- Position indicators of the vacuum switch and the disconnector
- Capacitive voltage indicator of indicating bushing (with nuclear phase test hole)
- Gas-pressure meter (one gas-pressure meter for each $SF_6$ gas box)
- Lock device
- Cabinet body
- Grounding busbar
- Operating handle (one operating handle for each $SF_6$ gas box)
- Cable sleeve
- Current transformer (for protection)
- Digital relay protection device

**Optional components:**

- Short circuit and ground fault indicator
- Detachable connector (cable joint)
- Lightning arrester
- Live grounding locking device for the incoming line
- Key-based mechanical interlocking device
- Extending busbar
- Ring current transformer and meter
- Auxiliary switch: auxiliary contacts of vacuum switch, 2NC, 2NO*

  Auxiliary contacts of disconnector, 2NC, 2NO*

  Auxiliary contacts for vacuum switch trip signal, 1NC, 1NO*

  Pressure gauge contact with signal 1NO

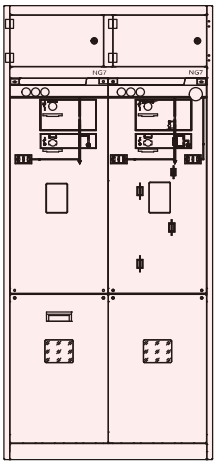
Note: it should be indicated in advance if more auxiliary contacts are required.

- Assembly area of secondary device (small chamber of secondary line and low-pressure cabinet on the top of the cabinet)

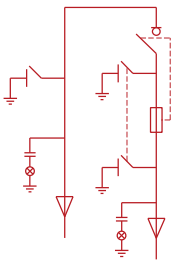
## Basic Unit Combination

Standard common enclosure scheme

In order to implement the combinatorial arrangement system scheme by users, we provide the units with 2 – 4 intervals, and all the units can be connected together, realizing system expansion.



## Two-interval common enclosure unit

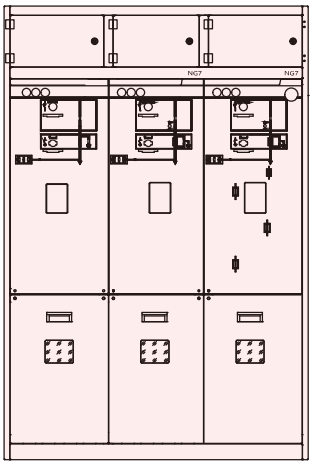


**Two-interval common enclosure unit:**

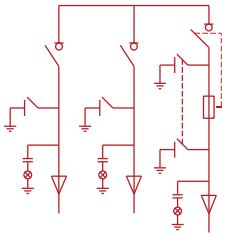
| | |
|---|---|
| NG7-40.5/DV | NG7-40.5CC |
| NG7-40.5/FF | NG7-40.5/CF |
| NG7-40.5/CV | NG7-40.5/VV |
| NG7-40.5/DF | |

Outline dimensions: D×W×H=900×920×1966(mm)

# NG7-40.5 Series SF6 Gas Insulated Metal Enclosed Switchgear



## Three-interval common enclosure unit



**Three-interval common enclosure unit:**

| | |
|---|---|
| NG7-40.5/CCF | NG7-40.5/CCC |
| NG7-40.5/DFF | NG7-40.5/CFF |
| NG7-40.5/FFF | NG7-40.5/CCV |
| NG7-40.5/CVV | NG7-40.5/VVV |
| NG7-40.5/VFF | NG7-40.5/VVF |

Outline dimensions: D×W×H=900×1340×1966(mm)

## Distribution Automation

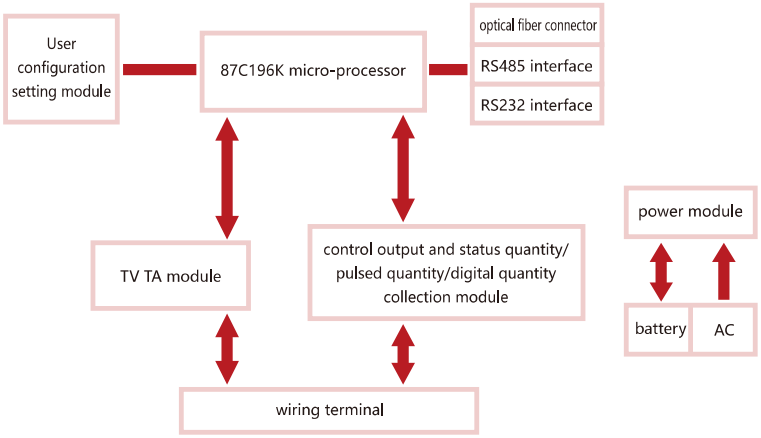
Distribution automation refers to conducting the information integration to the online and offline data of distribution network, distribution network data and user data, and power network structure and geographic figure through modern electronic, computer, communication and network technologies, thus forming a complete automation system, and realizing the modernization of monitoring, protection, control, power utilization and distribution management of the distribution network and its equipment in normal operation and emergency conditions. The feeder terminal unit (FTU) implements fault recognition, fault isolation, network reconfiguration, reactive power/voltage control and optimized operation of distribution network. As an important part of the automation system, it plays a pivotal role in the whole system.

A typical FTU system chart is shown as follows:

**The FTU system can realize the following functions:**

- From the control master station or substation, opening, closing or closing lockout of each ring main unit or circuit breaker can be conducted remotely or locally;
- The contact position status, fuse status, circuit breaker fault protection status, and grounding switch status, etc. of each switch can be obtained from the control master station or substation;
- The electrical parameters of each circuit, such as voltage, current, zero-sequence voltage, zero-sequence electric power and frequency, can be acquired from the control master station or substation;
- The parameter configuration of each distribution automation terminal can be optimized from the control master station or substation;
- Line fault information or abnormal information of each distribution automation terminal can be obtained, and based on the master station or substation software, fault isolation, restoration of power supply in non-fault areas, and optimized configuration and reconfiguration of network load can be implemented.

A typical FTU system chart is shown as follows



## Transformer and Line Protection

Two transformer protection methods for NG7 series switchgear are developed as follows: load switch + fuse combinations and circuit breaker with relay protection.

Protection scheme of load switch-fuse combinations:

The scheme of load switch + fuse combinations employs excellent breaking capacity of the fuse to cut off the fault current. And the fuse, as an external part of the gas box, is installed in the insulating cylinder, which is convenient for replacement. The fuse striker and the switch mechanism are interlocked, and activation of any fuse striker will trip the mechanism. The selection of fuse shall be in accordance with DIN43625 standards, 607 mm for 40.5 kV.

The selection of the rated current of the fuse needs to match the capacity of the transformer. The following table lists the rated current reference of the transformer with the capacity below 1600 kVA and its corresponding fuse for reference:

| Rated capacity of transformer (kVA) | Operating voltage (kV) | Length (mm) | Diameter (mm) |
|---|---|---|---|
| | 40.5 | | |
| | Rated current of high-voltage fuse(A) | | |
| 50 | 6.3 | 537 | 6.3-25A 53mm |
| 100 | 6.3-10 | | |
| 125 | 6.3-10 | | |
| 160 | 10-16 | | |
| 200 | 10-16 | | |
| 250 | 10-20 | | |
| 315 | 16-25 | | |
| 400 | 16-25 | | |
| 500 | 20-31.5 | | 31.5-40A 67mm |
| 630 | 20-40 | | |
| 800 | 25-50 | | 50-63A 85mm |
| 1000 | 31.5-50 | | |
| 1250 | 50 | | |
| 1600 | 63 | | |

**Transformer/Line Protection:**

The protection scheme is a vacuum circuit breaker unit with protection relays and current transformers, and the protection relays can be equipped with various domestic and imported models. Such relays are featured with inverse time characteristicsand constant time characteristics, strong anti-electromagnetic interference capability, convenient adjustment and small volume.

| Technical parameters | |
|---|---|
| Constant time-lag action current | 0.9~2.5xIs |
| Action time | 0.04~300s |
| Inverse time-lag action current | Curve motion patterns of 0.9~2.5xIs N-INV、V-INV、E-INV、LI-INV、HV-FUSE |
| Short-circuit fault protection II>> | Constant time-lag action current 1~20xIs |
| Action time | 0.04~3s |
| Ground fault protectionIe> | Constant time-lag action current 0.2~2.5xIs |
| Action time | 0.1~20s |

Four configurable current transformers (CT) with different ranges for WIC1 protection relays

| CT categories | Primary current range rated |
|---|---|
| WIC1-W2 | 16~56A |
| WIC1-W3 | 32~112A |
| WIC1-W4 | 64~224A |
| WIC1-W5 | 128~448A |

## Accessories and Auxiliary Components

**Accessories**
The cable accessory is used for connecting the switchgear and external circuits, and ensuring the security and reliability of electrical insulation. It mainly includes two types of front and rear cable joints, as shown in the figure at right:


Front cable joint


Rear cable joint


Lightning arrester


Open-type current transformer


Bushing type current transformer


Voltage transformer


Panel-type cable fault indicator


Pressure gauge

The installation method of cable joint is shown in the figure:


1 Splicing sleeve
2 M16 bolt
3 Front joint
4 Flat washer
5 Spring washer
6 Nut
7 Plug
8 Sealing cap
9 Compression terminal
10 Stress cone

## Auxiliaries

- Operation power supply

a) AC 220V power supply can be directly provided through the secondary side of the voltage transformer;

b) The secondary side of the voltage transformer is equipped with UPS, which provides uninterrupted AC 220V operation power supply for the electric operation of the ring main unit. And UPS will provide operation power supply under power failure due to high voltage;

c) The rectification switching power supply installed on the secondary side of the voltage transformer provides DC operation power supply for the electric operating mechanism of the ring main unit;

d) The high-frequency rectification switching power supply and the valve-regulated fully-sealed lead-acid storage battery assembled on the secondary side of the voltage transformer provide DC operation power supply for the electric operating mechanism of the ring main unit, and manage intelligent equalizing and floating charge of the storage battery which offers operation power supply under power failure due to high voltage.

- Electric module

In the scheme of load switch (unit C) and load switch-fuse (unit F) combinations, the standard configuration is manual operation, but the user can install electric operating mechanism. The standard configuration of the vacuum switch unit (unit V) includes manual and electric operating mechanisms.

The motor operating mechanism and the control unit adopt modular design, and can be added or removed anytime as they're independent of the operating mechanism. Once the electric operating mechanism is installed, each functional unit can be incorporated into the remote control and distribution automation system.

The grounding switch can only be operated manually rather than operated electrically.

- Auxiliary contact

Through the change of the contact position status of the microswitch, the auxiliary contact, an essential part of the electrical control circuit, presents the status change of functional unit for each switch, thus providing status monitoring and control signals.

- Short circuit and ground fault indicator

The short circuit and ground fault indicator is composed of three short circuit fault sensors, one ground fault sensor and one display panel. The display panel is installed on the front panel of the switch. When there is a fault current in the switch circuit, the indicator will make an alarm.

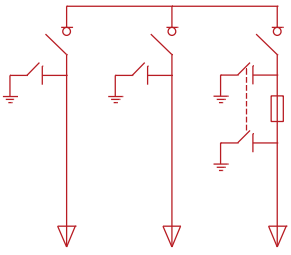
- Interlocking device

Mechanical interlocking is provided among the load switch, cable chamber door, fuse chamber door, and grounding switch, namely, when the load switch (or vacuum switch) is in the closing position, the grounding switch cannot be closed and the chamber doors cannot be opened. The grounding switch can be closed and the chamber doors can be opened only when the load switch (or vacuum switch) is opened. It can effectively prevent incorrect operation.

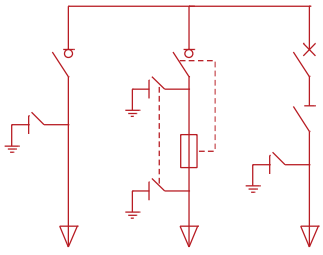
User optional part: grounding locking device on the incoming line side. When the incoming cable is charged, the locking device on the incoming line side will lock the grounding switch operating hole to prevent misoperation.

## Typical Example of Ring Network Scheme

**CCF**



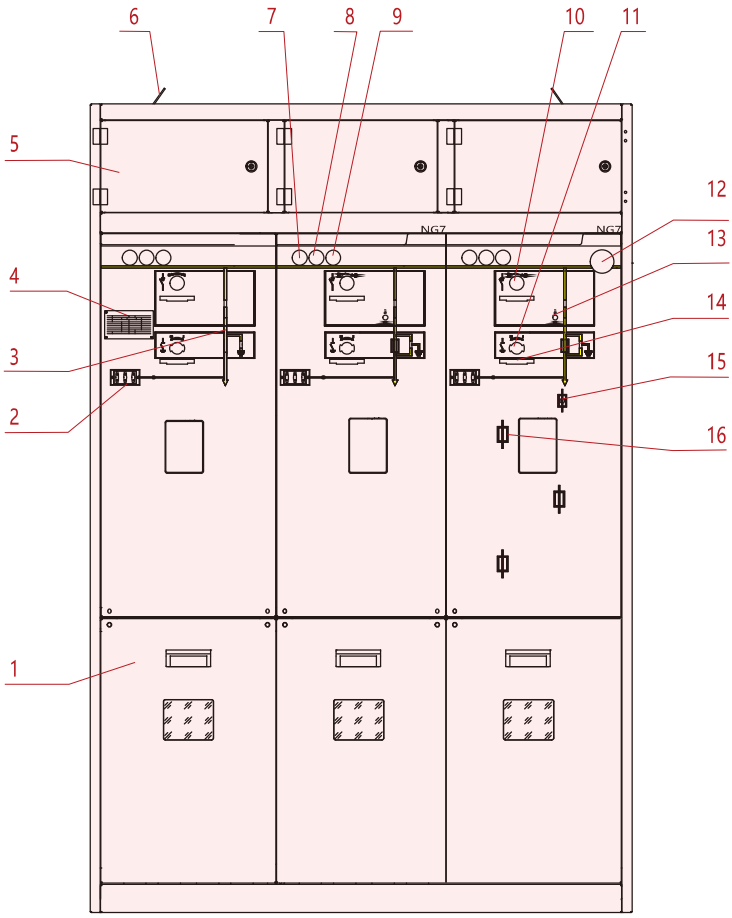
**CFV**



## NG7-40.5 Structure Chart

The following figure is the structure chart of a typical combined VCF of NG7-40.5 switch cabinet.

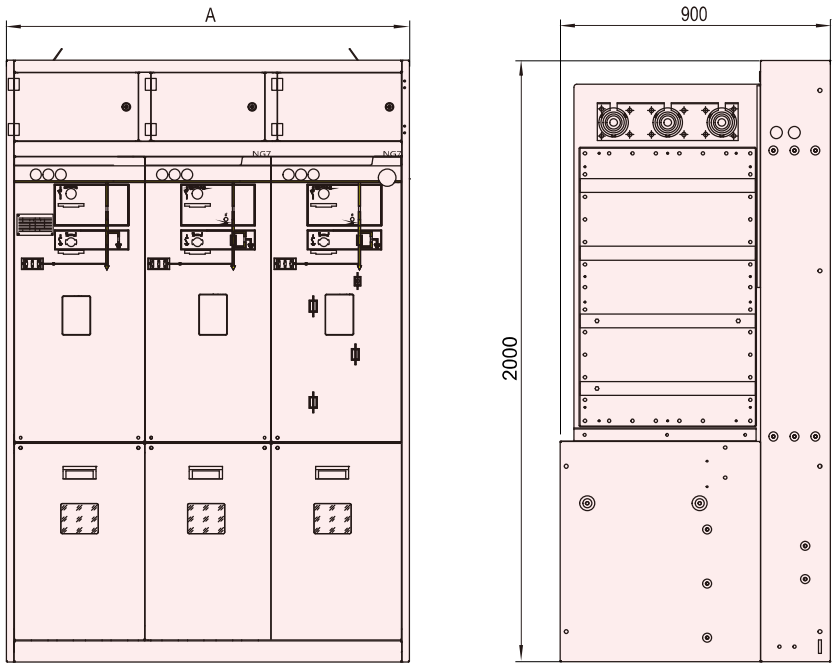
1. Cable chamber
2. Live display
4. Nameplate
5. Instrument box
6. Lifting ring
7. Remote/Local button
8. Opening button
9. Closing button
10. Load switch operating hole
11. Grounding switch operating hole
12. Gas-pressure meter
13. Energy storage indicator
14. Lock device on the panel
15. Fuse indicator of the fuse
16. Fuse



# NG7-40.5 Series SF6 Gas Insulated Metal Enclosed Switchgear

## NG7-40.5 Dimension Drawing

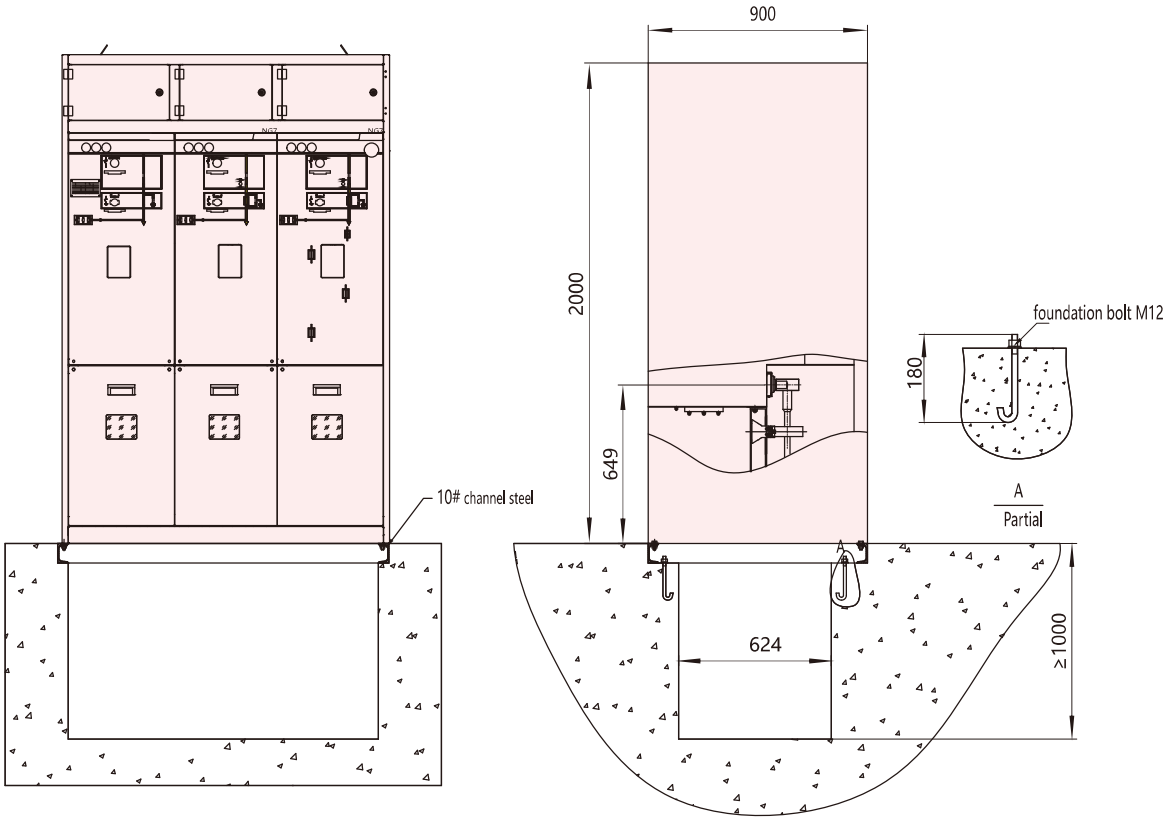
The following figure is the dimension drawing of a typical combined CCF of NG7-40.5 switch cabinet.




| UNIT | A (mm) |
|---|---|
| 1 channel | 500 |
| 2 channel | 920 |
| 3 channel | 1340 |

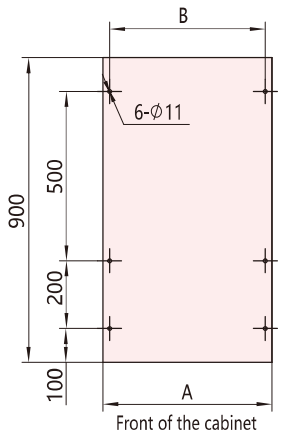
## NG7-40.5 Foundation Drawing

The following figure is the foundation drawing of a typical combined CCF of NG7-40.5 switch cabinet.



Dimension Drawing for Foundation of Unit Module

| UNIT | A (mm) | B (mm) |
|---|---|---|
| 1 channel | 500 | 460 |
| 2 channel | 920 | 880 |
| 3 channel | 1340 | 1300 |




## Ordering Information

- Determine the product model, name and code, and technical parameters;
- Determine the product quantity and delivery cycle;
- Other special operating requirements;
- Name and quantity of spare parts.

## Product Storage and Maintenance

- No inversion, violent shaking or collision shall be allowed for the packaged products during transportation and loading and unloading;
- The product shall be stored in a dry, ventilated and moisture-proof room or warehouse. Long-term storage requires lubrication and protection treatment for the driving part and regular inspection of the environmental conditions. The storage life of the product is 15 years;
- The products in service shall be subjected to a small inspection every 3 to 5 years, including checking the wear conditions of some moving parts of the mechanism and the condition of fasteners, removing dust on the surface of insulation parts, and adding lubricants to the moving parts.

# NG7-12~40.5(Z)/T(630~2500)-31.5

## NG7-12~40.5(Z)/T(630~2500)
## Gas Insulated Metal-enclosed Switchgear

### Overview

NG7-12-40.5(Z) series gas insulated metal-enclosed switchgear (C-GIS) is one of high-tech products developed and produced by the Company by introducing and absorbing sophisticated technologies at home and abroad in combination with international standards. Internally, low-pressure $SF_6$ gas is used as the insulation medium and primary elements are sealed in the gas chamber enclosed and welded by stainless steel plates, including circuit breaker, disconnector and grounding switch; in this way, it is able to fully prevent from the influence of any external environment, so that the product can reliably operate in severe environment such as basements, plateau, frozen earth, coast areas with high temperature, high humidity and high salt, etc. and can meet the requirements of new energy, plateau, subway, high-speed railway and urban power distribution projects with land shortage. It features high reliability, free maintenance, superior adaptability and less land occupation.

This product is the complete indoor device with three-phase AC, single & dual-busbar and busbar section and is mainly used in power stations, medium & small-sized power plant, substation, high-rise building, industrial and mining enterprises, subway, electrical railway and other power distribution systems, for the control, receiving, distribution, protection and monitoring of power supply systems and electric energy.

### Executive standards

- GB/T 1984-2014 High-voltage alternating-current circuit-breakers (IEC 62271-100: 2008 MOD)
- GB/T 1985-2014 High-voltage AC disconnector and grounding switch (IEC 62271-102:2001+A1: 2011 MOD)
- GB/T 3906-2006 Alternating-current metal-enclosed switchgear and controlgear for rated voltages (IEC 62271-200: 2003 MOD)
- GB/T 4208-2017 Degrees of protection provided by enclosure (IP code)
- GB/T 11022-2011 Common specifications for high-voltage switchgear and controlgear standards (IEC 62271-1: 2007 MOD)
- GB/T 11023-2018 Test Guide of SF6 gas tightness for high-voltage switchgear
- JB/T 3855-2008 High-voltage alternating-current vacuum circuit breakers
- DL/T 402-2017 Specification of high-voltage alternating-current vacuum circuit breakers
- DL/T 486-2010 Ordering specification for high voltage AC disconnectors and grounding switches
- DL/T 403-2017 Ordering specification for 12kV-40.5kV high voltage vacuum circuit breakers
- DL/T 404-2018 3.6kV~40.5kV Alternating-current metal-enclosed switchgear and controlgear
- DL/T 593-2016 Common specifications for high-voltage switchgear and controlgear standards

### Model and its Meaning

NG7-12-40.5(Z) / T □-□

- Rated short-circuit breaking current(kA)
- Rated current (A)
- Spring operating mechanism
- Vacuum circuit breaker
- Rated voltage (12~40.5kV)
- Design No.
- Mental-enclosed insulation switchgear
- Enterprise code

# NG7-12~40.5(Z)/T(630~2500)-31.5

## Operating environment condition

- Altitude: ≤5000m (it should be specified when the equipment operating altitude exceeds 1000m);
- Environmental temperature: maximum temperature of +40°C, and minimum temperature of -25°C. Average value within 24h ≤35°C;
- Environmental humidity: average relative humidity within 24h ≤95%; average relative humidity per month ≤90%;
- Electromagnetic interference: the amplitude of electromagnetic interference induced in the secondary system is less than or equal to 1.6kV.
- Installation environment: no explosive or corrosive gas in the ambient air, no violent impact in the installation site.

Note: please negotiate with the Company for customization when it's not within the above operating environment condition.

## Technical Features

- Primary elements of the product are designed as fully sealed in the gas chamber enclosed and welded by stainless steel plates, in which is filled with 0.04Mpa $SF_6$ gas as the insulation medium; its protective grade is up to IP67 and it is able to fully prevent from the influence of any external environment, so that the switchgear can reliably operate in severe environment such as basements, plateau, frozen earth, coast areas with high humidity, guaranteeing maintenance free.

The product is of modular design, plug-in type solid-insulated bus connector is used between chambers, it is easy to install and flexible in expanding, gas encapsulation is not necessary when connecting cabinets on site, the gas leakage is extremely low and the product is environmentally protective.

The product can be operated either manually or electrically, its operating mechanism is mature and reliable and complete mechanical and electrical interlocks are provided, therefore, it is able to prevent personal damage or equipment break due to incorrect operation.

The product is designed with compact structure; and compared with conventional air-insulated switchgear, its size is obviously smaller and the floor area is 30%-70% down, thus enhancing the use ratio of space and effectively reducing integrated engineering costs.

The microprocessor-based protection and system technology has integrated protection, control, metering, monitoring and communication functions, and is able to fulfill integrated automation requirements and realize unattended operation.

## Main Technical Parameters

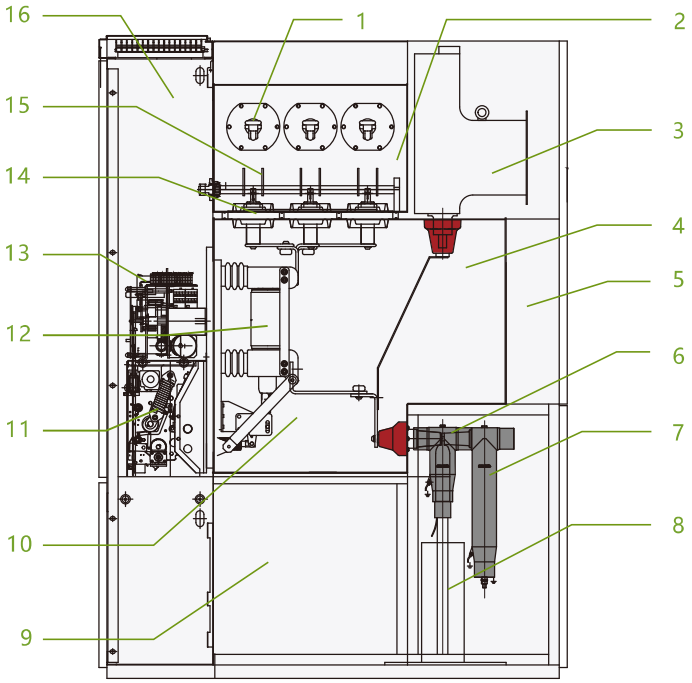
| Name | | Unit | Parameter | | |
|---|---|---|---|---|---|
| Rated voltage | | kV | 40.5 | 24 | 12 |
| Rated frequency | | Hz | | 50 | |
| Rated current | | A | | 630/1250/2000/2500 | |
| Rated insulation level | Power frequency withstand voltage (phase to phase, to earth, vacuum break) | kV | 95 | 65 | 42 |
| | Power frequency withstand voltage (isolating break) | kV | 118 | 79 | 48 |
| | Power frequency withstand voltage (control and auxiliary circuits) | kV | | 2 | |
| | Lightning impulse withstand voltage (phase to phase, to earth, vacuum break) | kV | 185 | 125 | 75 |
| | Lightning impulse withstand voltage (isolating break) | kV | 215 | 145 | 85 |
| Rated short-time withstand current/duration | Main circuit | kA/s | | 25/4 31.5/4 | |
| | Grounding switch | kA/s | | 25/4 31.5/4 | |
| | Grounding circuit | kA/s | | 21.7/4 27.4/4 | |
| Rated peak withstand current | Main circuit | kA | | 63/80 | |
| | Grounding switch | kA | | 63/80 | |
| | Grounding circuit | kA | | 54.8/69.6 | |
| Rated short-circuit breaking current | | kA | | 25/31.5 | |
| Short-circuit breaking times | | 次 | | 30 | |
| Rated short-circuit making current | | kA | | 63/80 | |
| Rated breaking current of capacitor banks | | A | | 630 | |
| Rated (single) drop-out current of back-to-back capacitor bank | | A | | 400 | |
| Rated cable charging breaking current | | A | | 50 | |
| Rated operation sequence | | | | O-0.3s-CO-3min-CO | |
| Mechanical life | Circuit breaker | Time | | 10000 | |
| | Three-position switch (disconnector/ grounding switch) | Time | | 3000 | |
| Rated pressure of $SF_6$ gas (20°C, relative value) | Rated inflating pressure | MPa | | 0.04 | |
| | Maximum horizontal pressure | MPa | | 0.02 | |
| Protection grade | Sealed box | | | IP67 | |
| | Switchgear housing | | | IP4X | |
| Annual leakage rate of $SF_6$ gas | | % | | ≤0.01 | |
| Rated supply voltage of auxiliary circuit | | V | | AC220 | |
| Rated supply voltage of control circuit | | V | | DC110, DC220, AC220 | |
| Overall dimension of cabinet | Width | mm | 600/800 | 600/800 | 600/800 |
| | Depth | | 1760 | 1250 | 1250 |
| | Height | | 2400 | 2300 | 2300 |

# NG7-12~40.5(Z)/T(630~2500)-31.5

## Product structure

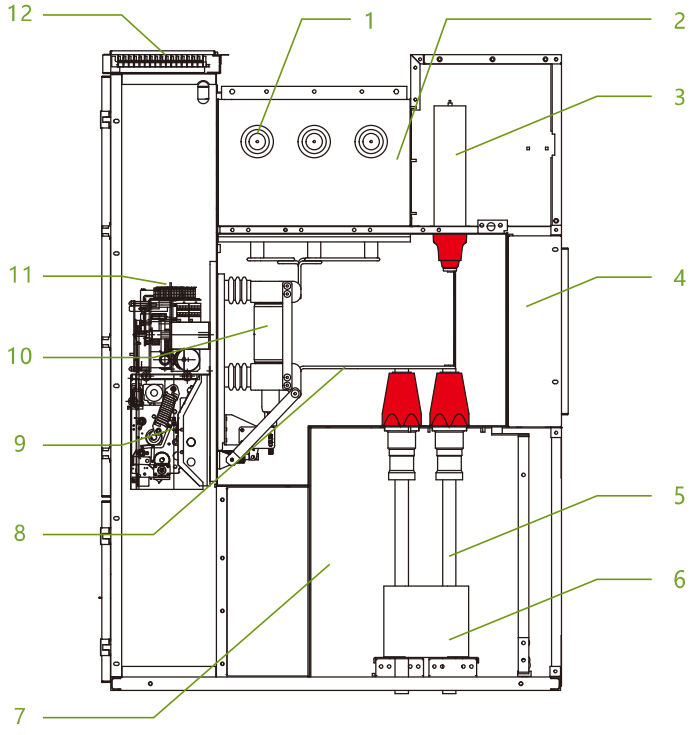
The product is of modular assembly construction as a whole and is composed of six modules (chambers) with independent functions, including the base, integrated inflating module, integrated protection control unit, operating mechanism chamber, cable chamber and pressure release channel, which are extremely convenient for assembling.

1. Side entry insulated sleeve
2. Gas chamber in busbar
3. Voltage transformer
4. Gas chamber in circuit breaker chamber
5. Pressure release chamber
6. Front cable terminal
7. Rear lightning arrester
8. Current transformer
9. Cable chamber
10. Connection copper bar
11. Circuit breaker mechanism
12. Vacuum interrupter Figure
13. Three-Position Mechanism
14. Intermediate insulated bushing
15. Dynamic contact
16. Secondary meter cabinet




Product Structure Diagram

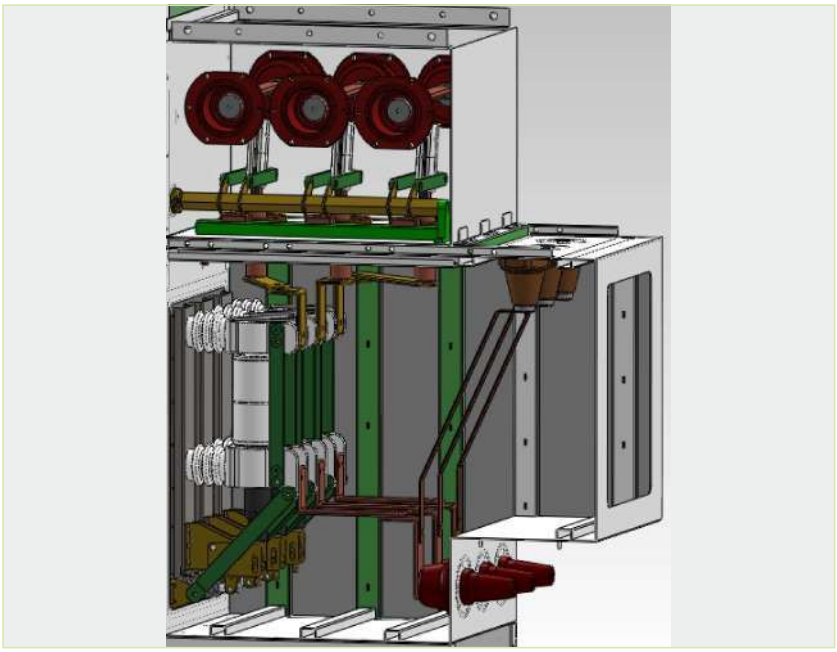
1. Side entry insulated sleeve;
2. Gas chamber in busbar
3. Surge arrester
4. Pressure release chamber
5. Front cable terminal
6. Current transformer
7. Cable chamber
8. Connection copper bar
9. Circuit breaker mechanism
10. Vacuum interrupter Figure
11. Three Mechanism
12. Secondary meter cabinet

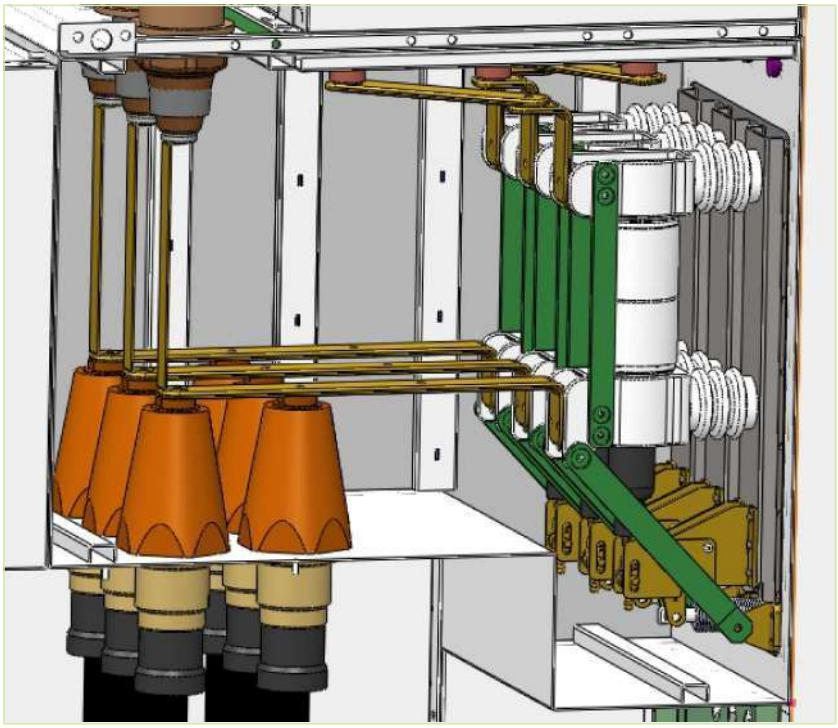



Product Structure Diagram

# NG7-12~40.5(Z)/T(630~2500)-31.5

## Gas box part



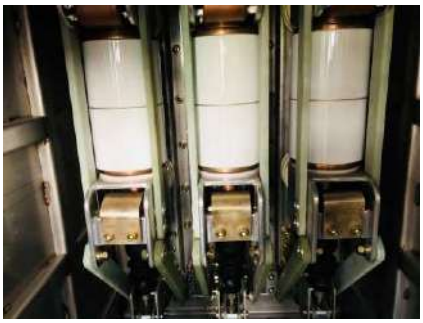


Structure of gas chamber

The gas chamber section is divided into two parts, including gas chamber in bus chamber and gas chamber in circuit breaker chamber. In the gas chamber in bus chamber, three-position switch, bus and side entry bus insulated bushing are installed, while in the gas chamber in circuit breaker chamber, vacuum circuit breaker and inner cone (outer cone) type cable socket are installed; both gas chambers are connected by intermediate insulated bushing; the entire gas chamber section is welded by 304 stainless steel plates and HV live parts are fully sealed in the stainless steel gas chamber, in which is inflated with 0.04MPa $SF_6$ gas, with the protection grade up to IP67. The gas chamber is furnished with explosion-proof equipment and pressure release channel, to minimize the effect on personal safety or equipment operation in case of burning arc fault internally.

# NG7-12~40.5(Z)/T(630~2500)-31.5

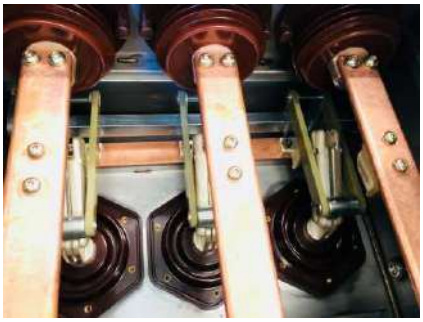
### Characteristics of vacuum circuit breaker



Vacuum circuit breaker

- Post terminals of the circuit breaker are laid vertically (or horizontally), fixed in the enclosed gas chamber and maintenance free.
- Vacuum arc extinction technique is applied and the insulating strength of $SF_6$ gas will not be affected due to connection / disconnection.
- Spring operating mechanism is capable of automatic re-closure and is installed outside of the inflating module, to facilitate dismounting and maintenance and the gas tightness of gas chamber will not be affected.
- Metallic bellows are provided between post terminals and mechanisms, for connection and transmission in and out of the gas chamber, ensuring high reliability.
- The performance of current connection and disconnection is more reliable.
- Frequent operation is permissible, with low fault rate.

### Characteristics of three-position switch

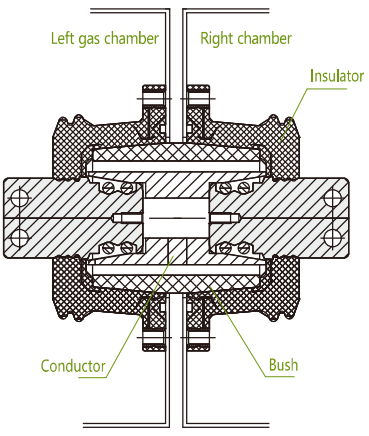


Three-position switch

- Three-position switch can function as bus disconnector or feeder grounding switch, accomplishing the functions of closure, isolation and grounding, which are mutually interlocked.
- When the three-position switch is used as the line side grounding switch, circuit breaker can be used for high speed grounding.
- Moving contact of three-position switch is composed of multiple contacts, with perfect heat dispersion effect.
- Inspection window can be installed on the gas chamber, to visualize the isolation of three-position switch and grounding break.

## Selection of and introduction to accessories

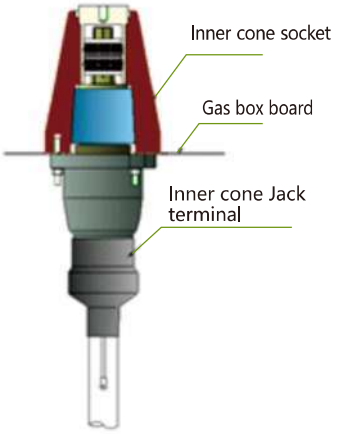
### Connection system of side parallel bus




Insulated bus connector is used for extension between chambers and tightly fit with side entry bushing of the switchgear. The configuration is compact and $SF_6$ gas inflating or discharging is not necessary during consolidation on site. It is not affected by dust or condensation and easy for assembly.

# NG7-12~40.5(Z)/T(630~2500)-31.5

## Inner cone plug-in type cable terminal




HV primary cable is of inner cone plug-in type construction, connected with inner cone type cable socket and installed at the bottom of gas chamber. Cable plug and sockets are provided as ancillary facilities and each is allowed to be connected with 4 single-core cables at most. It is recommended to take use of 3# inner cone plug-in type terminal and select cables with the cross section within 50mm$^2$-300mm$^2$.

## Inner cone type lightning arrester

### Characteristics:

Lightning arrester is of single-phase inner cone plug-in type construction and installed outside of the gas chamber. It is of fully sealed metallic enclosure, touchable, anti-electric shock, safe and maintenance free.

The main technical parameters are shown in the following table:

| al voltage of system (kV) | Rated voltage of lightning arreste (kV) | Uous running voltage (kV) | 1mA reference voltage (kV) | 2ms square wave discharge current capacity (A) | al voltage under lightning impulse current (kV) | al voltage at switching impulse current (kV) | urrent impulse withstand voltage (kA) |
|---|---|---|---|---|---|---|---|
| CM-35 | 51 | 40.8 | ≥73 | 400 | ≤134 | ≤114 | 100 |

## Shield type front plug

### Characteristics:

Its installation is not affected by severe environment, and the device is anti-condensation, sludge preventive and maintenance free. The level of partial discharge is high and the product is fully insulated, fully sealed and fully shielded.

# NG7-12~40.5(Z)/T(630~2500)-31.5

## Rear lightning arrester

**Characteristics:**

It is of special construction, formed via mould pressing as a whole, without air gap but superior gas tightness, damp-proof and explosive proof. Its creep distance is long, with perfect hydrophobic nature, strong stain resistance and stable performance, thus reducing maintenance during operation; with zinc oxide valve element of unique recipe, it is of high capacity and low leakage.

## Voltage transformer

**Characteristics:**

The product is the epoxy cast dry-type voltage transformer and is suitable for 40.5kV or larger voltage. Its enclosure is metallic and can be grounded directly. The transformer has rectangle (or C shaped) iron core; its primary and secondary windings are coaxial and wound on the framework; the body is fully enclosed and cast by epoxy resin; on the base plate, installation holes are provided, to facilitate user erection; plug-in type cables are used for connection with HV systems and the product is built with fuse protector.

**Characteristics:**

The product is the epoxy cast dry-type voltage transformer and is suitable for 12-24kV or larger voltage. Its enclosure is metallic and can be grounded directly. The transformer has rectangle (or C shaped) iron core; its primary and secondary windings are coaxial and wound on the framework; the body is fully enclosed and cast by epoxy resin; on the base plate, installation holes are provided, to facilitate user erection; and it is suitable for any altitude.

# NG7-12~40.5(Z)/T(630~2500)-31.5

## Current transformer

**Characteristics:**

Such current transformer is suitable for 40.5kV or larger voltage. Cross-core type cables are selected and its ring structure iron core and secondary winding are cast in fire-retardant stainless steel enclosure using superior epoxy resin in vacuum environment, with stable performance and maintenance free. Its specification can be flexibly configured and the inner diameter of cross-core type current transformer can be selected within 50-60mm subject to the specifications of cables.

**Characteristics:**

Such current transformer is suitable for 12-24kV or larger voltage. New magnetic conductive materials are used to make the iron core of measuring winding. With high permeability, relatively lower saturation flux density and perfect stability, it is able to guarantee high accuracy of measurement and lower safety factor. High-quality imported silicon steel sheets are processed through sophisticated technology, to be used as the iron core of protective winding, thus ensuring relatively higher accuracy limit factor.

## Intelligent-type integrated control unit

Intelligent-type integrated control unit has integrated protection, control, metering, monitoring, communication and warning functions, which is able to fulfill integrated automation requirements and realize unattended operation.

## Operation procedure

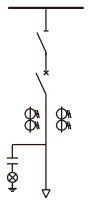
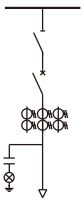
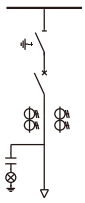
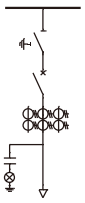
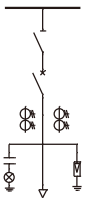
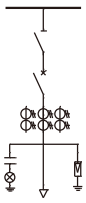
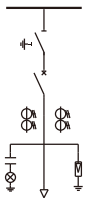
- Power transmission operation:
  Circuit breaker opening → Three-position switch switching from grounding position to isolated position → Three-position switch switching from isolated position to closed position → Circuit breaker closing
- Operations for power outage:
  Circuit breaker opening→ Three-position switch switching from closed position to isolated position → Three-position switch switching from isolated position to grounding position → Inspecting if cable side circuit is at power-losing state → Circuit breaker closing

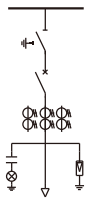
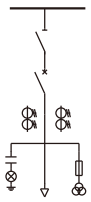
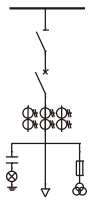
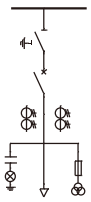
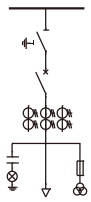
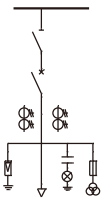
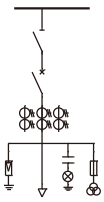
## Interlock function

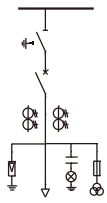
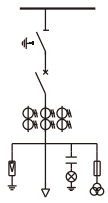
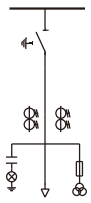
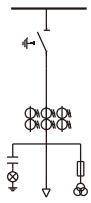
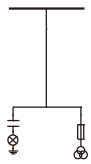
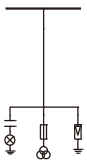
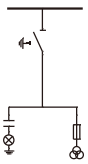
- Circuit breaker has "tripping preventive" functions;
- When the three-position switch is at any position (closed, isolation or grounding position), the circuit breaker can realize opening or closure operation. When the line side is live, the live display will interlock and disable the grounding switch, to prevent grounding switch from closing when the line side is live.
- When the circuit breaker is at closed position, the disconnector cannot be operated, to prevent disconnector from operating (or grounding switch from closing) under live state;
- When the circuit breaker is disconnected with operation power supply, both manual and electrical operations are interlocked, to close the circuit breaker; that is to say, circuit breaker is interlocked and closed under the loss of pressure; when secondary control circuit is disconnected with operating power and if the circuit breaker needs to be opened or closed as appropriate on site, the electromagnetic iron rod should be manually drawn out before it is allowed to manually opening or closing the circuit breaker.
- If special requirements are not mentioned at the time of placing order, the circuit breaker will be provided with electrical tripping preventive function at the time of delivery.

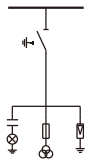
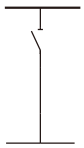
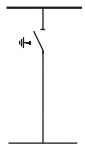
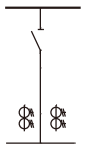
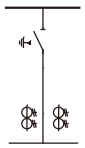
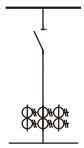
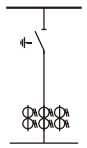
# NG7-12~40.5(Z)/T(630~2500)-31.5

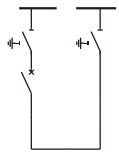
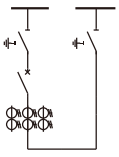
## Solution of main primary line (typical solution)

| 01 | 02 | 03 | 04 | 05 | 06 | 07 |
|---|---|---|---|---|---|---|
| Cable inlet-outlet lines | Cable inlet-outlet lines | Cable inlet-outlet lines | Cable inlet-outlet lines | Cable inlet-outlet lines | Cable inlet-outlet lines | Cable inlet-outlet lines |
|  |  |  |  |  |  |  |

| 08 | 09 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|
| Cable inlet-outlet lines | Cable inlet-outlet lines | Cable inlet-outlet lines | Cable inlet-outlet lines | Cable inlet-outlet lines | Cable inlet-outlet lines | Cable inlet-outlet lines |
|  |  |  |  |  |  |  |

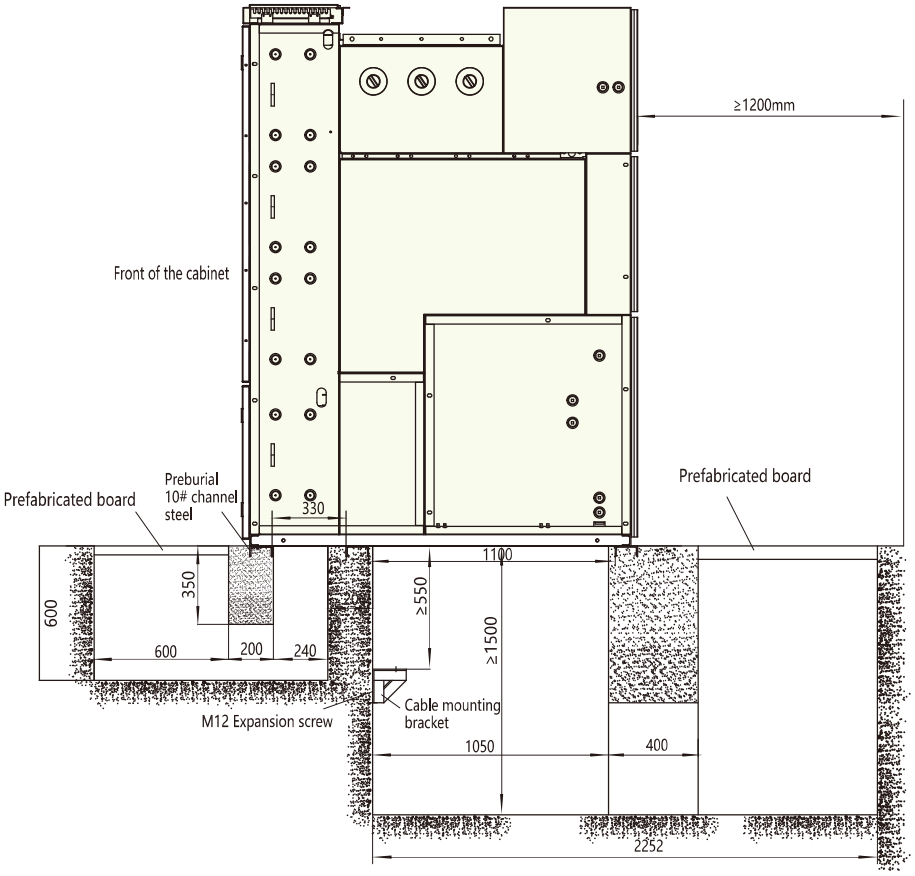
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|---|---|---|---|---|---|---|
| Cable inlet-outlet lines | Cable inlet-outlet lines | Metering | Metering | PT cabinet | PT cabinet | PT cabinet |
|  |  |  |  |  |  |  |

| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|
| PT cabinet | Left-right contact | Left-right contact | Left-right contact | Left-right contact | Left-right contact | Left-right contact |
|  |  |  |  |  |  |  |

| 29 | 30 | 31 | 32 | 33 | 34 | 35 |
|---|---|---|---|---|---|---|
| Busbar tie | Busbar tie | | | | | |
|  |  | | | | | |

# NG7-12~40.5(Z)/T(630~2500)-31.5

## Overall dimensions and reference diagram of foundations

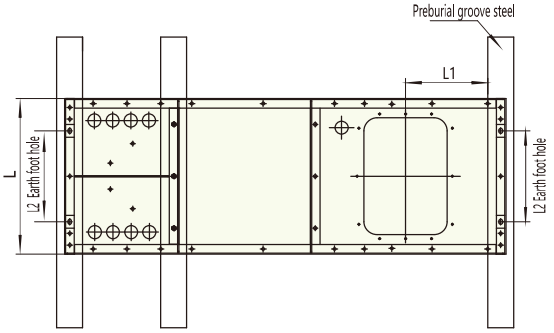



Foundation Reference Map

### Technical requirements

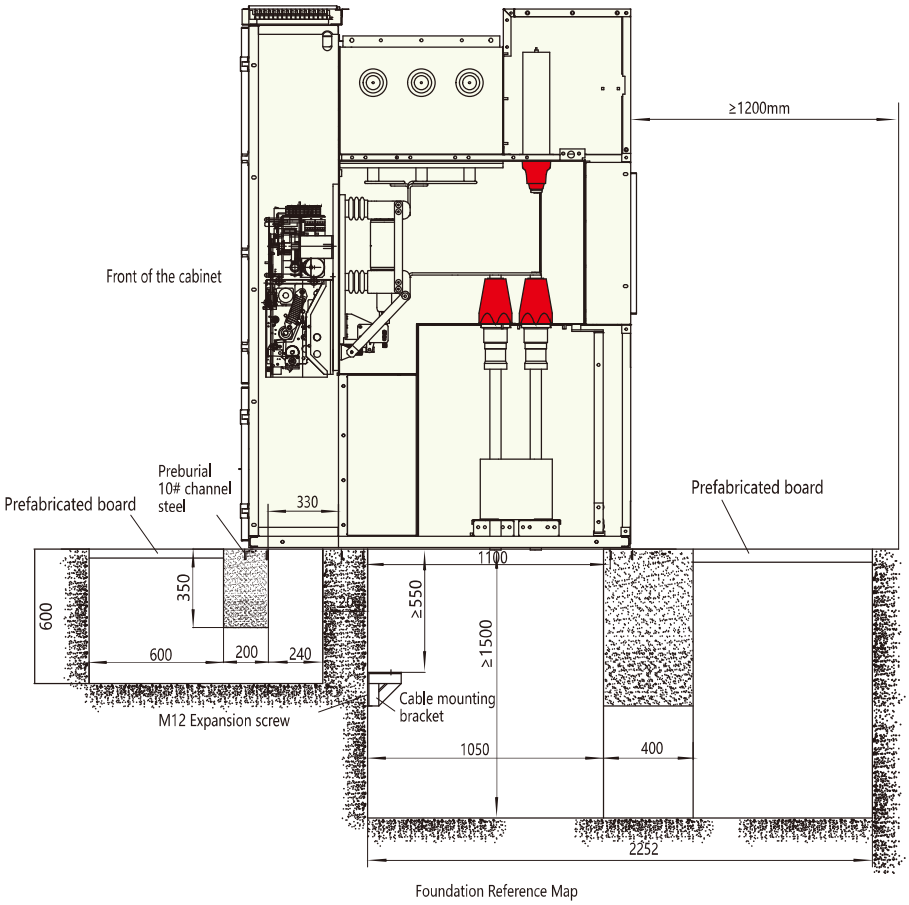
1. The frame is made of 10# U-steel and galvanized; and the allowable tolerance of planeness shall be ±1mm/m;
2. The fixing frame for U-steel foundation shall be in line with allowable tolerance requirements and the allowable tolerance of straightness shall be 1mm/m, but not exceeding 3mm in total.
3. Specific parameters are shown in the following table.

| Voltage level (kV) | L | L1 | L2 |
|---|---|---|---|
| 40.5 | 600/800 | 316/514.5 | 350/550 |




Reference Chart of Steel Dimensions for Cable Trench and Foundation Trough
(Specific Form Foundation Chart to be Provided for Specific Works Order)

# NG7-12~40.5(Z)/T(630~2500)-31.5




Foundation Reference Map

The drawings are for reference only.
The specific foundation plans are provided according to the specific project orders.

## Ordering Information

- Schematic Diagram of Primary Line, including rated voltage, rated current and short-circuit capacity of incoming line.
- Schematic Diagram of Secondary Line, including rated current of operating, signal and protection circuits and models & specifications of various electrical components.
- Switchgear layout plan and layout size.
- Model, specification and quantity of electrical components in cabinets.
- List of Spare Parts.
- Special requirements based on user demands, which shall be consulted with the Company at the placing of order.

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## Available Product Range from CHINT Electric