

GCS

Low-voltage
drawer switchgear



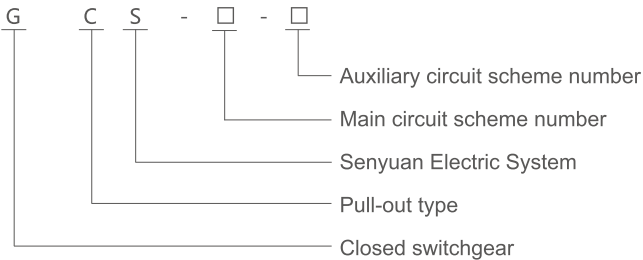
Description

GCS low-voltage drawer switchgear (hereinafter referred to as the device) is designed and developed by the two joint design groups according to the requirements of the industry competent department, the majority of power users and design units. It is a low-voltage extraction switchgear that conforms to the national conditions, has high technical performance indicators, can meet the development needs of the power market and can compete with the existing imported products. This device has been widely used by power users.

The device is suitable for power distribution systems in power plants, petroleum, chemical industry, metallurgy, textile, high-rise buildings and other industries. It is a low-voltage complete set of power distribution equipment used for power distribution, motor centralized control, and reactive power compensation in power generation and supply systems with three-phase AC frequency of 50 (60) Hz, rated working voltage of 380V (400), (660), rated current of 4000A and below in places with high degree of automation, such as large power plants and petrochemical systems.

The basic organization of the device is shown in Figure 1.
Devices are designed to meet the following criteria
IEC439-1 "Low Voltage Switches and Control Equipment"
Gb7251 Low Voltage Switchgear Set
JB/T9661 "Low Voltage Extraction Switchgear"

Model No.



Main technical parameter

1. Basic technical parameter to see table 1

Table 1

Rated voltage of main circuit (V)		AC 380 (400), (660)
Rated voltage of auxiliary circuit(V)		AC 220, 380(400), DC110, 220
Rated frequency (Hz)		50 (60)
Rated insulation voltage (V)		660(1000)
Rated current (A)	Horizontal wiring	≤ 4000
	Vertical busbar (MCC)	1000

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Table 2

Rated short-time withstand current of busbar (kA/1s)		50 , 80
Rated peak value withstand current of busbar (kA/0.1s)		105 , 176
Power frequency testing voltage (V/1min)	Main circuit	2500
	Auxiliary circuit	1760
Busbar	Three phase four wire	A. B. C. PEN
	Three phase five wire	A. B. C. PE.N
Protection grade		IP3L0. IP4L0

2. Main circuit scheme

The main circuit scheme of the device has 32 groups and 118 specifications, excluding the schemes and specifications derived from the change of the control and protection of the auxiliary circuit. It includes the needs of power generation, power supply and other power users. The rated working current is 4000A, which is suitable for the selection of distribution transformers below 2500kVA. In addition, a capacitor compensation cabinet is designed to meet the needs of power supply and power factor improvement; Considering the need of comprehensive investment, the reactor cabinet is designed.

Remarks:

01. DW914 is the main circuit breaker, and other circuit breakers with more advanced performance or RDSW6 (RDW1), F, M series can also be selected.

02.01, 02, 04 solutions If the PE N cable needs to enter the power cabinet, the width of the cabinet should be sized in brackets.

03. SDL and SDH are special power transformers for GCS cabinets.

3. Auxiliary circuit scheme

There are 120 auxiliary circuit schemes in GCS Auxiliary Circuit Atlas, which are divided into two volumes. The first volume "AC Operation Part" is divided into 63 schemes, and the second volume "DC Operation Part" is divided into 57 schemes.

The auxiliary circuit scheme of the DC operation part is mainly used in the low voltage power plant (station) system of the power plant and substation. It is suitable for the low voltage power plant system of the unit with the capacity of 200MW and below and 300MW and above, and the general control mode of the working (backup) power supply incoming line, power supply feeder line and motor feeder line.

The auxiliary scheme of AC operation part is mainly used for low voltage system of substation in factories, mines, enterprises and high-rise buildings. There are 6 combined schemes suitable for double power supply operation control, and there are control circuits such as operation electric interlock backup self-switching and self-recovery, which can be directly used in engineering design.

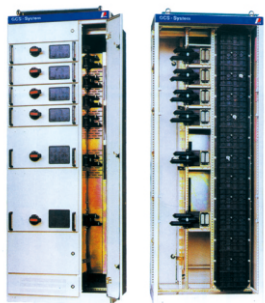
The DC control power supply is DC 220V or 110V, and the AC control power supply is AC 380V or 220V. The 220V control power supply is drawn from the public control power supply supplied by the special control transformer in the cabinet. The public control power supply adopts the ungrounded mode to control the transformer, and the 24V power supply is reserved for the use of weak electric signal lamps. For the installation location of the watt-hour meter, the introduction method of voltage and other installation and use requirements, please refer to the "Compilation Instructions" of the auxiliary circuit diagram.

4. Bus

In order to improve the dynamic thermal stability of the bus bar and improve the temperature rise of the contact surface, TMY-T2 series hard copper bars are used in all devices. The connecting parts of the copper bars must be tin-enameled. Full-length tin-enameled copper bars are recommended, and full-length silver-plated copper busbars can also be used.

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Electrical structure form of cabinet

a. Horizontal busbar level

The bus bar is located in the bus bar compartment at the back of the cabinet, and the upper and lower double layers are arranged for 3150A and above, and the single layer is arranged for 2500A and below. Each phase is composed of 4 or 2 busbars, which greatly improves the short-circuit strength of the bus bar.

The selection of horizontal busbar of the device is shown in Table 3.

Table 3

Rated current A	Busbar specification
630 1250	2 (50×5)
1600	2 (60×6)
2000	2 (60×10)
2500	2 (80×10)
3150	2×2 (60×6)
4000	2×2 (60×10)

b. Vertical busbar

The vertical busbar used for the drawer adopts "L"-shaped hard enameled-tin busbar. L-shaped busbar specification (mm): (height × thickness) + (bottom × thickness) (50 × 5) + (30 × 5) Rated current 100A

C. Neutral grounding bus

Use hard copper bars. Through horizontal neutral ground wire (PEN) or ground +neutral wire (PE + N) specifications are shown in Table 4.

Table 4

Phase conductor cross sections each mm ²	Select PE (N) wire cross section mm ²
500-720	40×5
1200	60×6
>1200	60×10

* The specifications of vertical PEN wires or PE + N wires in the device are all 40 × 5

5. Selection of electrical components

The equipment mainly selects electrical components with advanced technical performance index and imported technology, which can be mass-produced in China.

a. Main switch

For 630A and above power supply inlet and feeder switches, the main selection is DW914 series, and RDSW6 (RDW1), DW40, DW48 series, AE series, 3WE or RDW17 series can also be used. If necessary, imported M series or F series can also be used.

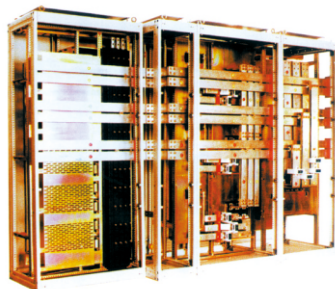
b. For 630A and below feeders and motor control switches, mainly choosing RDM949 series and RDM1 series MCCB, and can also use the NZM Series and TM30 Series MCCB.

c. AC contactor, mainly choose CJX8 series, CJX2 (RDC6) series, CJX1 series contactors and their matching thermal relays and interlocking mechanisms.

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Main busbar

- d. All current transformers adopt SDH series, SDL series and SDL1 series supervised by Senyuan Electric Co., Ltd.
- e. Fuse selects HH15 series knife-fuse disconnecter and NT00 series with high breaking capacity.
- f. In order to improve the dynamic stability of the main circuit, the special CMJ bus clamp and insulation support for GCS series are designed. It is thermoplastic formed with high strength flame retardant composite material, which has high insulation strength, good self-extinguishing performance and unique structure. It is only necessary to adjust the building block block to be suitable for different specifications of the bus.
- g. In order to reduce the temperature rise of the spacer, connector and electric head of the functional unit, the special adapter for GCS cabinet is designed. Compared with the same kind of products, the heat capacity of the adapter increases and the temperature rise decreases.
- h. If the design department selects new electrical components with better performance and more advanced technology according to the needs of users, because the GCS series cabinets have good versatility, it will not cause difficulties in manufacturing and installation due to updating electrical components.

Structure characteristics

- 1. The main frame of the device adopts 8MF section steel, and the frame adopts two structural forms: assembly and partial welding. There are installation modulus holes $E = 20\text{mm}$ on the main frame
- 2. Each function room of the device is strictly separated, and the compartments are mainly divided into function unit room, bus room and electrical system room. The functions of each unit are relatively independent.
- 3. The size series of the device cabinet is as shown in the table

Height	2200									
Width	400		600		800			1000		
Depth	800	1000	800	1000	600	800	1000	600	800	1000

- 4. Functional units
 - A. The module of the drawer layer height is 160mm, which is divided into five size series: unit, unit 1, unit 1, unit 2, and unit 3.
Unit circuit rated current 400A and below.
 - b. The drawer changes only in height and size, and its width and depth are unchanged. Drawers with the same functional unit have good interchangeability.
 - c. Each MCC cabinet can install up to 11 one-unit drawers or 22-unit drawers. More than one unit drawer adopts multi-functional rear panel
 - d. The inlet and outlet lines of the drawer adopt connectors with the same specification and chip structure with different numbers of chips according to the current.
 - e. The adapter between the unit drawer and the cable room adopts the back plate structure ZJ-2 adapter.
 - f. The adapter between the unit drawer and the cable room adopts the same size rod or tube structure ZJ-1 adapter according to the current classification.
 - g. The drawer panel has obvious marks for the positions of splitting, closing, testing, and withdrawing.
 - h. The drawer unit is provided with a mechanical interlocking device.
- 5. Feeder cabinets and motor control cabinets are equipped with special cable compartments, and the connection between functional unit cabinets and cable rooms is realized by adapting parts or copper bars, which not only improves the reliability of cable use, but also greatly facilitates the installation and maintenance of cables by users.
The cable compartment has two widths (240mm and 440mm) to choose from, depending on the number of cables, the cross section and the user's requirements for easy installation and maintenance.

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6. The number of auxiliary contacts of the functional unit of the device is 32 pairs for one unit or more, and 20 pairs for the unit, which can meet the needs of the interface between automation users and computers.
7. Considering the common safety of dry-type transformer and the economy of oil-immersed transformer, the device can be conveniently formed into a group with dry-type transformer, and can also be conveniently connected with the low-voltage bus of oil-immersed transformer.
8. The drawer is the main body, it has the drawer type and fixed type at the same time, which can be mixture combined, and can be selected arbitrarily.
9. The device is designed according to three-phase five-wire system and three-phase four-wire system. The design department and users can easily choose PE + N or PEN mode.
10. The protection level of the cabinet is IP3LO and IP4LO, which can also be selected according to the needs of the user.

General purpose cabinet frame

