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概述 General

GCS 型低压抽出式开关柜，(以下简称装置) 是两部联合设计组根据行业主管部门、广大电力用户及设计单位的要求设计研制出的符合国情，具有较高技术性能指标、能够适应电力市场发展需要并可与现有引进产品竞争的低压抽出式开关柜。该装置目前已被电力用户广泛选用。

装置适用于发电厂、石油、化工、冶金、纺织、高层建筑等行业的配电系统，在大型发电厂、石化系统等自动化程度高，要求与计算机接口的场所，作为三相交流频率为 50(60)Hz、额定工作电压为 380(400)V, (660)V, 额定电流为 5000A 及以下的发、供电系统中的配电、电动机集中控制、无功功率补偿使用的低压成套配电装置。装置的基本组织形成见附图 1。装置的设计符合下列标准 IEC439-1《低压成套开关和控制设备》GB7251.1-2013《低压成套开关设备》。

GCS low-voltage withdrawable switchgear (hereinafter referred to as device) is designed by two joints according to the requirements from the departments in charge of industry, the majority of power users and design units in accordance with national conditions, with high technical performance indicators. It can adapt to the development requirements of the power market and can compete with the low voltage withdrawable switchgear from other countries. The device has been widely used by power users.

Device is suitable for power distribution system of power plant and petroleum, chemical, metallurgical, textile industries and high-rise building and other industries. Device (three phases; AC frequency: 50(60)Hz; rated working voltage: 380(400)V, (660)V; rated current: 5000A and below) can be used as the power distribution of power generating and supplying system and as the low voltage switchgear distribution device for motor centralized control and reactive power compensation. The basic organization form of the device sees picture 1. The design of the device meets the following standards: IEC439-1 "Low Voltage Whole Set Switching and Controlling Equipment" and GB7251.1-2013 "Low Voltage Switchgear".

型号含义 Type Designation

G C S

- S — 森源电气系统 Senyuan Electrical System
- C — 抽出式 Withdrawable Type
- G — 封闭式开关柜 Sealed Switchgear

正常使用条件 Working Conditions

◆周围空气温度不高于 +40℃ , 不低于 -5℃ , 24 小时内平均温度不得高于 +35℃。超过时，需根据实际情况降容运行。
Ambient temperature: -5~+40℃ and the average temperature in 24h must below 35℃ . If it is over the regulation, the device should be used by reducing capacity.

◆户内使用，使用地点的海拔高度不得超过 2000m。
Altitude: ≤ 2000m (outdoor type)

◆周围空气相对湿度在最高温度为 +40℃时不超过 50%, 在较低温度时允许有较大的相对湿度，如 +20℃时为 90%, 应考虑到由于温度的变化可能会偶然产生凝露的影响。
Humidity: ≤ 50% at the highest ambient temperature +40℃ , lower temperature with higher humidity, such as ≤ 90% at 20℃ , mild condensation occasionally happens for the variations of the temperature.

◆装置安装时与垂直面的倾斜度不超过 5° 且整组柜列相对平整。
The inclination to the vertical plane is not more than 5 ° and the whole set cabinets should be relatively level.

◆装置应安装在无剧烈震动和冲击以及不足以使用电器元件受到不应有腐蚀的场所。
It is applicable in the place without violet vibration and impulsion and corrosive pollutions.

◆用户有特殊要求时，可以与制造厂协商解决。
Other special requirements need to be discussed when ordering.

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主要技术参数 Specifications

名称 Item		参数 Data
主电路额定电压 (V)Rated Voltage of Main Circuit (V)		交流 380(400)、(660) AC 380(400)、(660)
辅助电路额定电压 Rated Voltage of Auxiliary Circuit (V)		交流 220、380(400)、直流 110、220 AC 220、380(400)、DC 110、220
额定频率 (Hz)Rated Frequency (Hz)		50(60)
额定绝缘电压 (V)Rated Isolation Voltage (V)		660(1000)
额定电流 (A) Rated Current (A)	水平母线 Horizontal Busbar	≤ 5000
	垂直母线 (MCC)Vertical Busbar (MCC)	1000
母线额定短时耐受电流 (kA/1s) Rated Short-time Withstand Current of Busbar (kA/1s)		50,80
母线额定峰值耐受电流 (kA/0.1s) Rated Peak Withstand Current (kA/0.1s)		105,176
工频试验电压 (V/1 min) Power Frequency Testing Voltage (V/1min)	主电路 Main Circuit	2500
	辅助电路 Auxiliary Circuit	2000
母线 Busbar	三相四线制 Three Phases and Four Lines	A.B.C.PEN
	三相五线制 Three Phases and Five Lines	A.B.C.PEN
防护等级 Protection Degree		IP30,IP40

主电路 Main Circuit

◆装置主电路方案共 36 组 87 个规格，不包括由于辅助电路控制与保护的变化而派生的方案和规格。

◆主电路方案是征求了广大设计、制造、试验和使用部门的意见而选编的，包括了发电、供用电和其它电力用户的需要，额定工作电流为 5000A, 适合 2500kVA 及以下的配电变压器选用。

◆此外，为适应供用电提高功率因数的需要而设计了电容器补偿柜，考虑综合投资的需要而设计了电抗器柜。

There is 36 sets and 87 regulations of the main circuit scheme of the device, not including the derived ones by changing the auxiliary circuit control and protection.

Main circuit scheme is selected from the opinions of the departments of design, manufacture, test and use, including power generation, power supply and other power users' needs. Its rated working current is 5000A, suitable for distribution transformer of 2500kVA and below.

In addition, in order to adapt to the needs of improving power factor of the power supply, the capacitor compensation cabinet is designed. The electric reactor cabinet is designed for considering the need of the comprehensive investment.

母线 Busbar

◆为提高母线动热稳定能力和改善接触面的温升，装置全部采用 TMY-T2 系列硬铜排、铜排的连接部分必须压麻、搪锡，推荐采用全长搪锡。也可选用全长镀银铜母线。

◆水平母线置于柜后部母线隔室内。3150A 及以上为上下双层布置，2500A 及以下为单层布置，每相由 4 条或 2 条母排组成，大大提高了母线的短路强度。

In order to improve the busbar moving and thermal stability and the temperature of the interface, the device adopts TMY-T2 series hard copper bar whose connection parts must be pressed and with hot dip coating tin. The total length of hot dip coating tin is recommended. And the total length of silver plated copper busbar is also for choosing.

The horizontal busbar is placed in busbar compartment at the back of the cabinet. 3150A and above is double arrangement with upper and lower busbar. 2500A and below is single arrangement. Each phase is composed of 4 or 2 busbars to improve short-circuit strength of busbar.

装置水平母线铜排选用如下表 Selection Chart of Horizontal Busbar Installation

额定电流 (A) Rated Current (A)	铜排规范 Specification of Copper Bar
630 1250	2(50x5)
1600	2(60x5)
2000	2(60x10)
2500	2(80x10)
3150	2x2(60x6)
4000	2x2(60x10)

垂直母线
用于抽屉柜的垂直母线采用“L”形硬铜母线。
L 形母线规格
(高 x 厚)+(底 x 厚) (50x5)+(30x5) 额定电流 1000A

Vertical Busbar
The vertical busbar for withdrawable cabinet uses “L” shape hard copper busbar.
Specification of “L” shape busbar:
(High x thickness) + (bottom x thickness) = (50 x 5) + (30 x 5) ; rated current:1000A

中性接地母线
采用硬铜排
贯通水平中性接地 (PEN) 或接地 + 中性线
(PE+N) 规格如表：

Neutral Grounding Busbar
Using hard copper bar
Cut–through with horizontal neutral grounding line (PEN) or grounding line+ neutral line

(PE+N)规格如表 (PE+N) Specification:

相导线截面积 (mm^2) Sectional Area of Phase Conductor (mm^2)	选用 PE(N) 线截面 (mm^2) Sectional Area of PE(N) Line (mm^2)
500~720	40x5
1200	60x6
>1200	60x10

装置内垂直 PEN 线或 PE+N 线的规格全部选用 40x5 Vertical PEN line or PE+N line in the device are all use 40X5.

主要电器元件选择 Main Electric Components

◆装置主要选用技术性能指标先进，采用引进技术国内已能批量生产的电器元件。
Device mainly chooses volume produced electric components with advanced technologies from other countries.

◆主开关 630A 及以下的电源进线及馈线开关 , 主选 AH 系列，也可以用 SW1(2)、CW1(2) 系列、AE 系列、3WE 系列或 ME 系列。认为有必要时 , 也可以选用进口的 M 系列或 F 系列。
Power supply inlet line and feeder line switch (630A and below) mainly chooses AH series and also can choose SW1(2) and CW1(2) series, AE series, 3WE series ot ME series, or imported M series or F series if necessary.

◆630 以下的馈线和电动机控制用开关，主要选用 RMM1 系列、CM1 系列，塑壳开关也可选用 NZM 系列、TM30A 系列塑壳断路器。
Feeder line and motor control switch (630A and below) mainly chooses RMM1 series, CM1 series. MCCB can choose NZM series and TM30A series.

◆交流接触器，主要选用 B 系列、LCI 系列、3TB 系列的接触器以及与之配套的热继电器、联锁机构。
AC contactor mainly chooses B series, LCI series and 3TB series and matched thermo relay and interlocking mechanism.

◆电流互感器全部采用 SDH 系列、 SDL 系列、SDLI 系列。
Current transformer all adopts SDH series, SDL series and SDLI series.

◆熔断器选用高分断能力 NT00 系列。
Fuse chooses NT00 series with high breaking capacity.

◆为提高主电路的动稳定能力，设计了 GCS 系列专用的 CMJ 型组合式母线夹和绝缘支撑件，采用高强度、阻燃性的合成材料压塑成型，绝缘强度高，自熄性能好，结构独特，只需调正积木式间隔即可适用不同规格的母线。
To improve the dynamic stability of the main circuit, CMJ type combined busbar clamp and insulating support parts are exclusively designed for the GCS series by using high strength and flame retardant synthetic material for molding with high dielectric strength, good self–extinguishing capabilty, unique structure which can be suit for any regulation busbar by adjusting the gap with building block type.

◆为降低功能单元的间隔板、接插件、电缆头的温升，设计了 GCS 柜专用的转接件，与同类产品比较转接件 热容量增大，温升低。
To reduce the temperature of spacing board, plug–in components and cable terminals in the function unit, transferring components are exclusively designed for the GCS switchgear with larger capacity and lower heat comparing with the similar products.

◆如设计部门根据用户需要，选用性能优良、技术更先进的新型电器元件时，因 VGCS 系列柜具有良好的通用性，不会因更新的元器件，造成制造和安装方面的困难。
Due to the excellent generality of VGCS series cabinets, there is no problem to replace the components with better quality and more advanced ones.

结构特点 Structure Features

◆装置的主构架采用 8MF 型钢，构架采用拼装和部份焊接两种结构形式。主构架上均有安装模数孔 E=20mm。
The main frame of the device adopts 8MF type steel. It has two structures: pieces together and partially weld. Installation hole is E=20mm in each main frame.

◆装置各功能室严格分开，其隔室主要分为功能单元室、母线室、电缆室，各单元的功能作用相对独立。
Every function compartments are strictly separated. Function unit compartment, busbar compartment, cable compartment and other compartments are relatively independent.

◆装置采用将水平主母线置于柜顶或柜后的最新设计方案，使电缆室上下均有出线通道。解决了老产品无法上出线的难题。
The device designs the horizontal busbar at the top of or at the back of the cabinet to make the outlet line access both in upper and lower cable compartment. It solves the problem of the old design which can not satisfy the requirement of outlet lines from the upper cable compartment.

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柜体的尺寸如下表 Cabinet Dimension

高 (mm) Height (mm)	宽 (mm) Width (mm)	深 (mm) Depth (mm)
2200	400	800
		1000
	600	800
		1000
	800	600
		800
		1000
	1000	600
		800
		1000

功能单元 Function Unit

◆一个抽屉为一个独立功能单元。
One drawer is one independent unit.

◆抽屉分为二分之一单元、一单元、三 / 二单元、二单元、三单元五个尺寸系列。回路的额定电流在 400A 及以下一个单元抽屉的尺寸为 :160(高) x560(宽)x410(深)，二分之一单元抽屉的宽为 :280，二单元、三单元均为高度做二倍、三倍的变化，其余尺寸均同一单元。
The drawer has five series: 1/2 unit, 1 unit, 3/2 units, 2 units and 3 units. The dimension of 1 unit drawer (rated current of the loop is 400A and below) is 160 x 560 x 410 (Height × Width × Depth). The width of the 1/2 unit is 280, and the height of 2 units and 3 units are double and triple it but other dimensions are same to 1 unit.

◆功能单元的抽屉可以方便的实现互换。
The drawer of function unit can be changed conveniently.

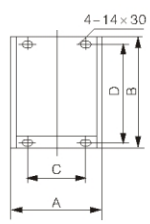
◆装置的每柜内可以配置 11 个一单元的抽屉或 22 个二分之一单元的抽屉。
Each cabinet can be quipped with 11 of 1 unit drawer or 22 of 1/2 unit drawer.

◆抽屉进出线根据回路电流大小采用不同片数的同一规格片式接插件，一般一片接插件≤ 220A。
The size of plug-in components is same. The quantity of plug-in components changes according to the loop current. Normally one plug-in component is no more than 220A

◆二分之一抽屉与电缆室的转接采用背板式结构的转接件。单元抽屉与电缆室转接采用棒式结构的转接件。
The transferring components of 1/2 unit drawer and cable compartment is back plate structure. The transferring components of 1 unit drawer and cable compartment are bar structure.

◆抽屉面板有合、断、试验、抽出等位置的明显标志，抽屉设有机械联锁装置。
The plate of the drawer with mechanical interlocking device shows closing, breaking, testing and draw-out position.

外形及安装基础示意图 Outline Overall and Installation Dimensions



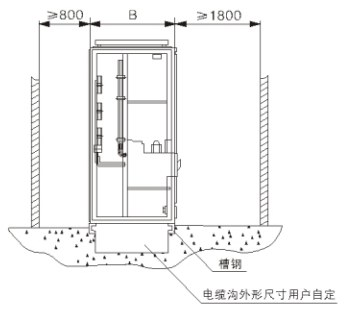
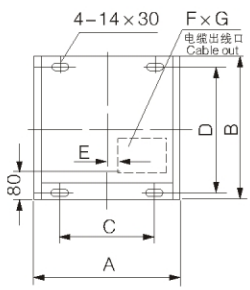
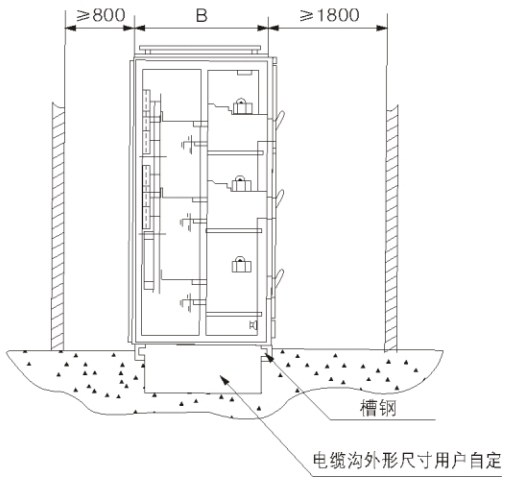


图 1 受电、联络柜安装示
Picture 1: Installation Dimensions of Power Receiving and Busbar Connecting Cabinet

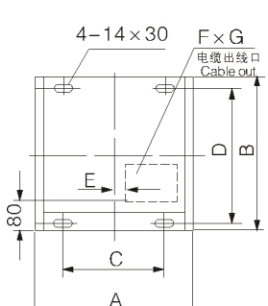
通用柜代号 General Cabinet Number	A	B	C	D	备注 Remarks
GCS	1000	1000	850	956	联络柜 Busbar Connecting Cabinet
GCS	800	1000	650	956	受电柜 Power Receiving Cabinet
GCS	800	800	650	756	受电柜 Power Receiving Cabinet
GCS	600	800	450	756	受电柜 Power Receiving Cabinet

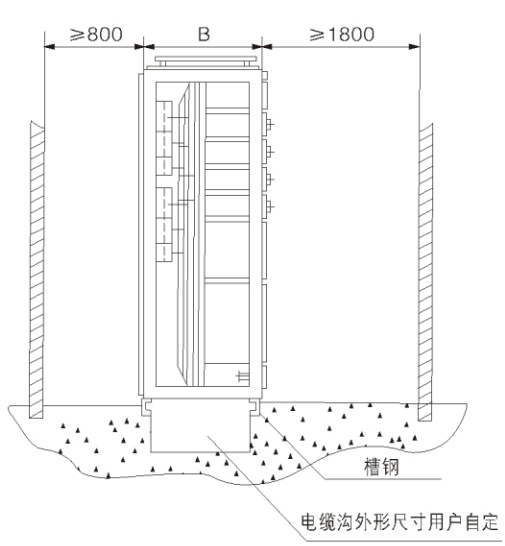
外形及安装基础示意图 Outline Overall and Installation Dimensions





通用柜代号 General Cabinet Numbe	A	B	C	D	E	FxG
GCS	1000	1000	850	956	60	400x400
GCS	800	1000	650	956	160	200x400
GCS	1000	800	850	756	60	400x400
GCS	800	800	650	756	160	200x400





通用柜代号 General Cabinet Numbe	A	B	C	D	E	FxG
GCS	1000	600	850	556	60	400x350
GCS	800	600	650	556	160	200x350