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## 母线槽系统应用概述

电力供电系统的设计,不仅要符合行业标准和设计规范,而且还要考虑到经济、安全、更能满足技术要求。对于电气设备的选择应以整个系统是否达到最佳配置为依据,而不受限于各个设备所具有的特性,比如说对于配电柜和变压器的选择,就应该考虑到设备之间的配套,将其作为一个整体,而不是单个进行选择。

Electric power supply system design, not only to comply with industry standards and design specifications, but also take into account the economic, security, more can meet the technical requirements. For the electrical equipment should be selected based on the whole system is the best configuration, but is not limited to each device has features, such as for power distribution cabinet and selection of transformer, should consider the matching between devices, as a whole, rather than a single selection.

元器件性能稳定,具有较强的适应能力,不仅适用于额定的工作环境,而且在相对恶劣的环境中也能使用;作为一套全新的电力输电系统应充分考虑到以下几点:

- ◆ 建筑物的类型、用途和形式(例如:高层建筑、平房和工业厂房等)。
- ◆ 变压器和配电柜的位置,
- ◆ 建筑管理部门的规定和指导方针。
- ◆ 供电部门的指导方针。

Components stable performance, strong adaptability, applies not only to the rated working environment, and in a relatively tough environment also can use: as a new set of power transmission system should fully consider the following: Pieces of the building type, purpose and forms (for example: high-rise buildings, bungalows and industrial factory building, etc.).

The location of the transformer and distribution cabinet,

Pieces of construction management department regulations and guidelines.

In pieces the guidelines of the power supply department.

一般情况下,都会尽可能多的作出好几种设计方案,通过对技术和商务的综合考虑,选择最适合用户需求的、最经济节省的方案供用户最终确认。在作预算方案的时候,会优先考虑以下几点:

- ◆ 设计简单清晰
- ◆ 使用寿命长
- ◆ 实用性强
- ◆ 防火性能
- ◆ 建筑物更改时,设备能经过重新组装后再次使用

In general, as much as possible to make many kinds of design scheme, through the comprehensive consideration of technology and business, select view for users demand, quantity of economic savings scheme for users to the final confirmation. In the budget, will give priority to the following:

Mixer design simple and clear

In pieces long service life

Mixer practical

Mixer fireproof performance

Mixer structure changes, the equipment can be used again after reassembling

以上问题在工程项目中会经常碰到,母线槽系统由于其自身的特点能充分满足上述要求,所以在实际应用中,母线槽系统已经逐步替代了电缆,而成为工程人员心目中的首选输配电产品。

Above problem often met in the engineering project, bus duct systems due to its own characteristics can fully meet the above requirements, so in practice, bus duct system has been gradually replacing the cable, and engineering personnel in mind become the preferred transmission and distribution products.

## 母线槽与电缆、分支电缆性价比对照表

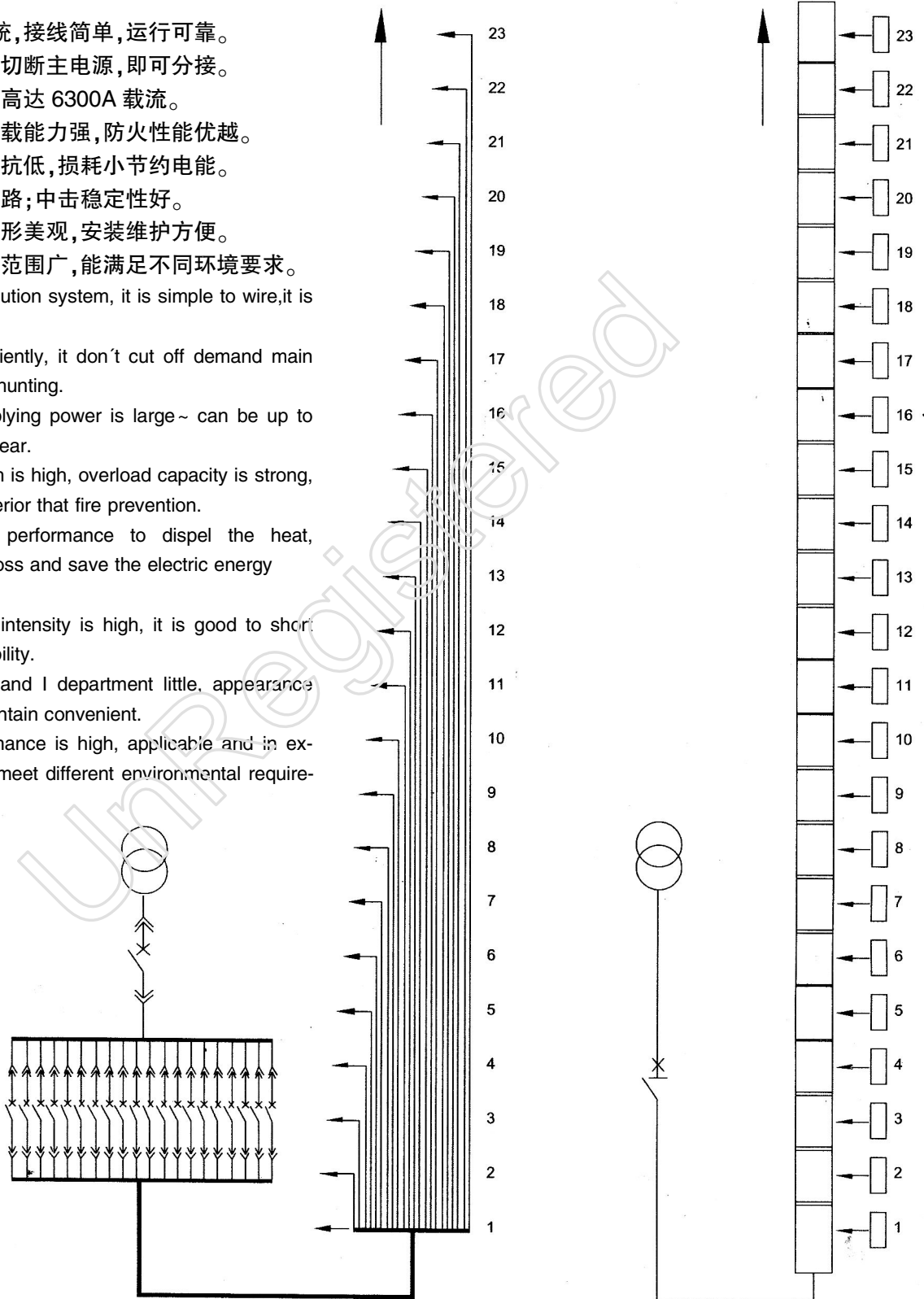
Bus bar rabbit and electric cable,branching cable performance table

序号	项 目	母 线 槽	电 缆	分 支 电 缆
1	长期投资成本	比电缆少 50~60%，比分支电缆少 60~70%。	比母线高 50~60%	比母线多 60~70%
2	折旧率/每年	2%	5~8%	5~8%
3	维修情况	维修容易,维修后性能与新产品一样。	难维修,维修后性能下降	难维修,维修后性能下降
4	使用寿命	50 年	15~20 年	15~20 年
5	绝缘性能	$\geq 20M\Omega$	$\geq 5M\Omega$	$\geq 5M\Omega$
6	改造损火率	10~20%	70~80%	70~80%
7	占用位置	少	中	大
8	载流能力	大,高达 5000A,适用于各种场所	小,最大 1600A,选择范围小。	小,最大 1600A,选择范围小。
9	产品维护	不需断开主电源,分支回路可带电检修,不影响其他回路供电。	不能带电检修,须断开总电源,停电范围大。	不能带电检修,须断开总电源,停电范围大。
10	机械强度	机械强度高,防护能力强,可满足大跨度安装。	机械强度低,需增加电缆桥架配套使用。	机械强度低,防护能力差。
11	外形与体积	外形美观,颜色可根据现场要求选配,体积小巧、结构紧凑布局整齐。	电缆桥架体积大,缺乏美感。	色调单一,体积大缺乏美感。
12	电流分支	可预留多个插接口,增加分支回路时,只需插入插接箱即可,不需断开电源,安装方便快速。	增加接头繁琐,必需断开主电源及电缆。	需增加专用设备,无法带电作业。
13	过载能力	绝缘材料工作温度在 130℃以上,过载能力强散热性好。	绝缘层和外皮工作温度最大在 105℃,过载能力差。	绝缘层和外皮工作温度最大在 105℃,过载能力差。
14	阻燃能力	外壳由钢板或铝合金制成,不会燃烧,绝缘材料阻燃、耐高温,可有效防止火灾的发生。	普通电缆的绝缘层和外皮可以燃烧,阻燃电缆在火焰下也会燃烧。	普通电缆的绝缘层和外皮可以燃烧,阻燃电缆在火焰下也会燃烧
15	安装使用	安装拆卸方便,可根据需要重新进行布置,可在主回路带电的情况下对分支回路进行改造,不影响整体供电。	如需变更布置,重复利用率低,无法带电分支作业。	如需变更布置,无法调整分支接头,无法带电作业。
16	互换备用	当系统出现故障可应急备用,利用备用回路插接箱能迅速恢复供电,提高系统供电稳定性。	出现事故需停电检修,无法及时恢复供电。	出现事故需停电检修,无法及时恢复供电。

## 母线槽供电系统特点

Trough electric power system characteristic of bus bar

- 1、树干式配电系统,接线简单,运行可靠。
  - 2、分接方便,勿需切断主电源,即可分接。
  - 3、供电容量大,可高达 6300A 载流。
  - 4、绝缘强度高,过载能力强,防火性能优越。
  - 5、散热性能好,阻抗低,损耗小节约电能。
  - 6、机械强度高,短路;中击稳定性好。
  - 7、占用空间少,外形美观,安装维护方便。
  - 8、性价比高,适用范围广,能满足不同环境要求。
1. Trunk type distribution system, it is simple to wire, it is reliable to run.
  2. Shunting conveniently, it don't cut off demand main power source, can shunting.
  3. Capacity of supplying power is large ~ can be up to 6300A and flow in year.
  4. Dielectric strength is high, overload capacity is strong, performance is superior that fire prevention.
  5. It is of good performance to dispel the heat, impedance is low, loss and save the electric energy small.
  6. The mechanical intensity is high, it is good to short out and assault stability.
  7. Take up empty and I department little, appearance esthetic, install, maintain convenient.
  8. The cost performance is high, applicable and in extensive range, can meet different environmental requirements.



■ 电缆供电系统

■ 母线槽供电系统

## 系统部件基本描述

HCC-XLC 母线槽系统既可应用在变压器与配电柜之间的连接，还可以为负数进行供电系统提供的防护等级最高可达 IP66, 以适应各种恶劣环境, 插接箱输出电流最大可以达到 1250A, 为用户提供可靠的负载环境, 高的防护等级也为维护人员的安全提供了保证。

Connect the XL-III busbar system not only can be used in between the transformer and power distribution cabinet, can also be negative supply system provides protection class up to IP66, to adapt to the harsh environment, the plug-in box the maximum output current can reach 1250A, and provide a reliable load environment for users, high protection level as well as for the maintenance personnel security provides a guarantee.

## 系统通用参数

环境温度	
Min/max./24 小时平均温度	-5/+40/日均 35℃
防护等级	IP54、IP66
连接器力矩	70Nm±6Nm
表面处理	喷塑或阳极氧化
外壳材料	铝镁合金
外壳颜色	国际标准色 (RAL7032), 具体颜色也可用户确定
额定绝缘电压	1000VAC
额定工作电压	1000VAC
额定频率 f	50/60Hz
额定电流 Ie	1)
额定短时耐受电流	1)
导体截面	1)
L1, L2, L3	1)
N	1)
PE	1)
单独一根导体作 PE	1)
导体材料	1)
每相铜排数	铜或铝 (TMY, LMY)
最大安装间距	1)
水平	
安装类别	2m
污染等级	IV
外形尺寸	3
重量	1)

注: (1) 选择不同的电流等级, 相对应不同的数据。

## HCC-XLC-参数一览表(铜母线系统)

电流	短时耐受电流(ICW)KA	峰值耐受电流(IPK)KA	交流电阻/米(mΩ/m)	感抗/米(mΩ/m)	阻抗/米(mΩ/m)	每米压降(V/m)	外形尺寸		每米重量 Kg/米	
							宽度(W)	高度(H)	四线制	五线制
400	30	63	0.151	0.012	0.157	0.10710	144	93	9.2	9.8
630			0.105	0.035	0.111	0.12	144	103	11.1	12.0
800			0.08	0.031	0.086	0.119	144	113	13.0	14.3
1000	50	105	0.061	0.027	0.067	0.1152	144	123	18.9	17.5
1250			0.044	0.022	0.05	0.1074	144	148	20.3	22.5
1600	65	143	0.033	0.018	0.037	0.1032	144	178	26.3	29.3
2000			0.025	0.014	0.023	0.0986	144	218	33.3	37.3
2500			0.018	0.009	0.02	0.0868	144	268	44.8	50.3
3150	100	220	0.016	0.007	0.017	0.0945	144	376	54.0	60.2
4000	120	264	0.012	0.003	0.013	0.0852	144	436	68.0	76.2
5000			0.009	0.002	0.009	0.0644	144	536	89.4	100.5

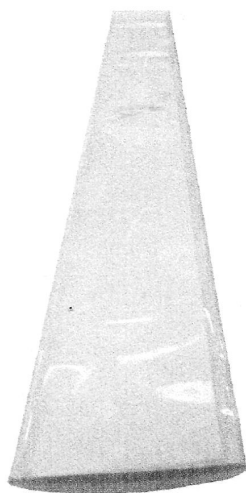
## 外壳

HCC-XLC 系列母线槽采用优质铝镁合金型材作为外壳,为磁性环保材料,重量轻,散热快,母线槽运行时无磁滞涡流损耗,并且其足够大的截面能取代 PE 线作为 100%整体式接地,表面静电粉末喷涂,通过 1200h 的耐盐雾实验,可长期应用于空气湿度大、盐分高、污染等级高的环境。

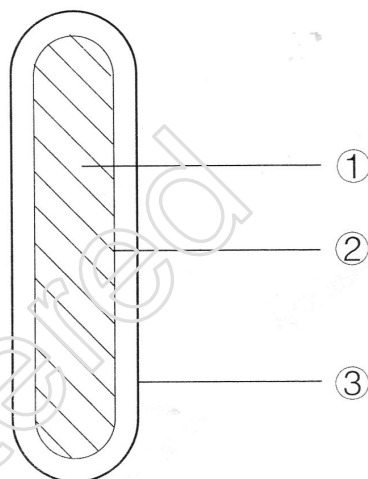
## 导体

HCC-XLC 母线槽系统表面镀锡或者镀银，全长整体包裹高性能绝缘材料聚酯薄膜；XLC 为铜导体系统，XLCA 为铝导体系统。铝导体表面镀锡前做镀铜处理。

XCC busbar system tin surface or galvanized, full-length the whole package high performance insulating material polyester film; XLC is a copper conductor system, XLCA for aluminum conductor system. Aluminum conductor tinning copper surface before.



高性能绝缘材料



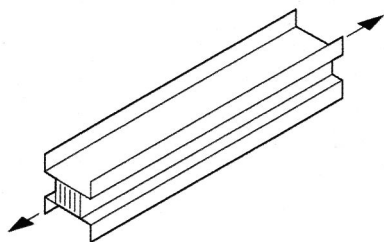
XLC 母线系统

- ①导体, 铜排(XLC); 铝排(XLCA)
- ②镀层, 镀锡层(XLC); 镀铜层, 镀锡层(XCCA)
- ③高性能绝缘材料聚酯薄膜

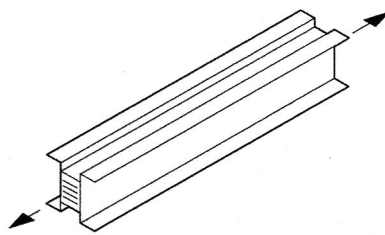
## 母线安装

HCC-XLC 母线系统的内部为典型的三明治结构,而且保持全长密集,这种特殊的结构决定了 XLC 母线系统的承载电流不会受安装位置及安装方式的影响,我们将会根据现场情况设计一个合适的走向。

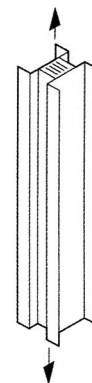
Internal XLC bus system for a typical sandwich structure, but also to maintain the full-length intensive, this special structure determines the effect of bearing current does not XLC busbar system is affected by the installation position and the installation methods, we will design a proper direction according to the scene.



水平安装, 立装



水平安装, 侧装



垂直安装

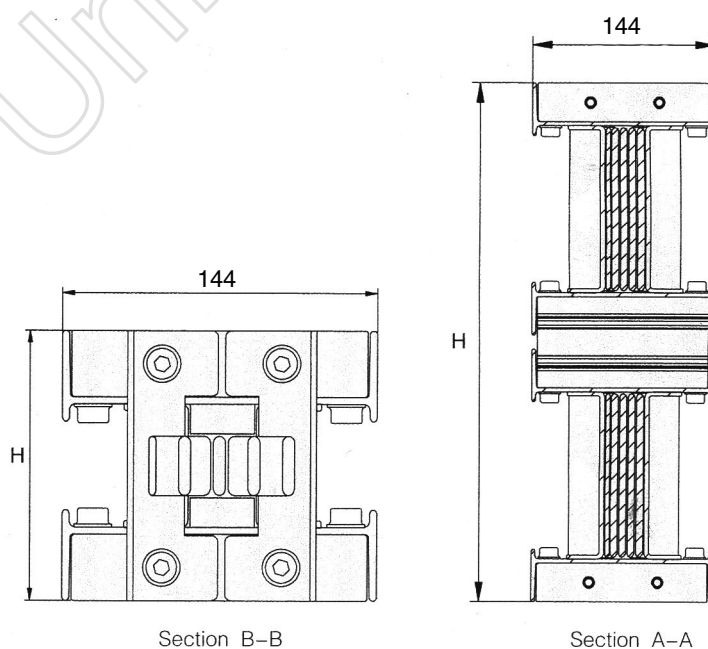
## 外形尺寸

外形尺寸主要决定于母线槽系统的额定电流和导体材料, HCC-XLC 系统总共分 11 个电流等级, 其中铜母线 400A-2500A 单排, 3150A-5000A 为双排, 铝母线 400A-2000A 单排, 2500A-4000A 为双排。

Rated current and the conductor material dimensions depend on busbar system, HCC-XLC system is divided into 11 currents, wherein the copper bus bar 400A-2500A single row, double row 3150A-5000A for aluminum bus 400A-2000A, single row, double row 2500A-4000A for.

电流 A	高 H(mm)
	XLC
400	93
630	103
800	113
1000	123
1250	148
1600	178
2000	218
2500	268
3150	376
4000	436
5000	536

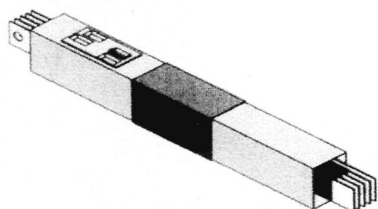
注: 宽度均为 144mm



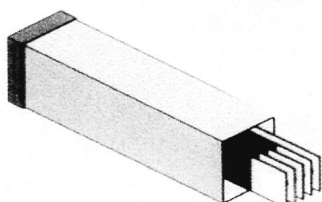


## 母线槽系列功能单元

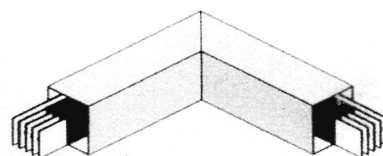
Series Bus bar rabbit composition function unit



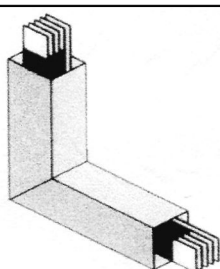
● 母线槽本体-B



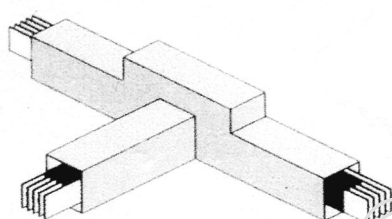
● 终端-Z



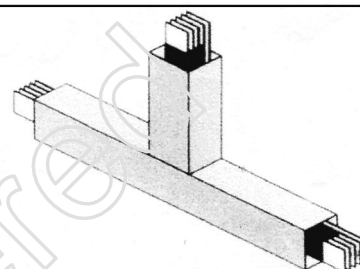
● L形水平弯-LS



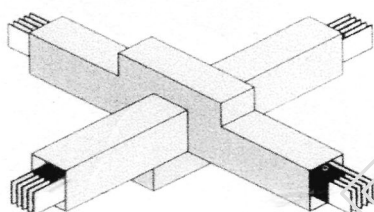
● L形垂直弯-LS



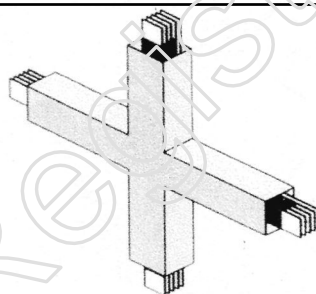
● T形水平弯-TS



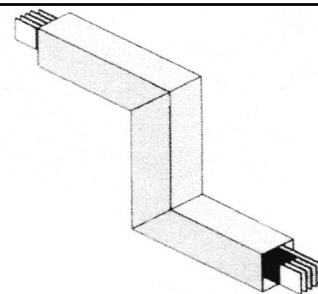
● T形垂直变-TC



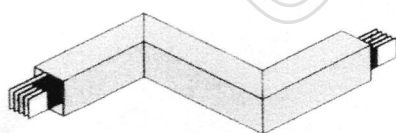
● 十字形水平弯-SS



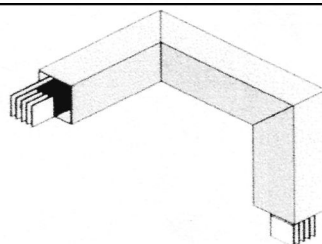
● 十字形垂直变-SC



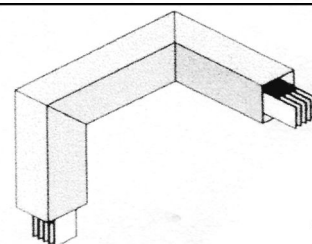
● Z形垂直弯-ZC



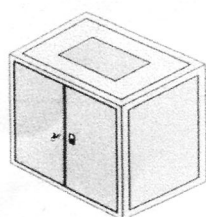
● Z字形水平变-ZS



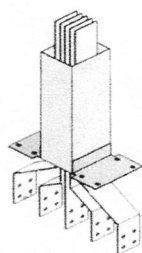
● 左向异形弯-YL



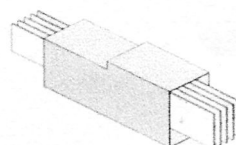
● 右向异形弯-YR



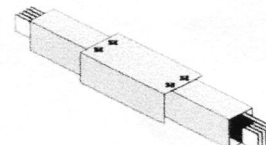
● 进线箱-JX



● 终端母线-S



● 变容节-BY



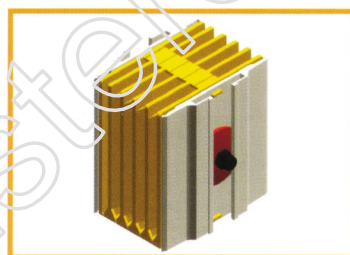
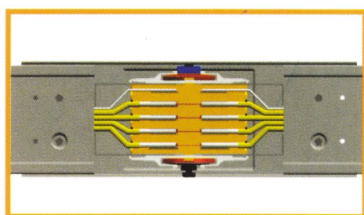
● 膨胀(伸缩)节-P

## 接头单元

采用现行国际通用的先进单臂螺栓锁紧设计,即只需用力矩扳手在装置一边对 M8.8 级高强螺栓进行锁紧,无需其他辅助工具,详见各规格螺栓规定力矩值。接头器内也可配备单臂双头力矩螺栓,当锁紧力矩达到定值,螺栓的一个端头将会自动脱落,螺栓尚有另一螺栓头留作将来维修或装拆用,操作时无须采用力矩扳手。

接头器合理的结构设计,可使母线各单元能从上面、侧面轻松插入;两侧压力板内部的大面积球型垫圈使整个接头内部析接触面压力均匀、防止震动,使整个装置各种环境内达到稳定的电气连通。每种相同规格的接头器均具有互换性,使母线系统在快速装卸中灵活使用。

钢制高强螺栓紧固建议力矩值为 80-108N.m

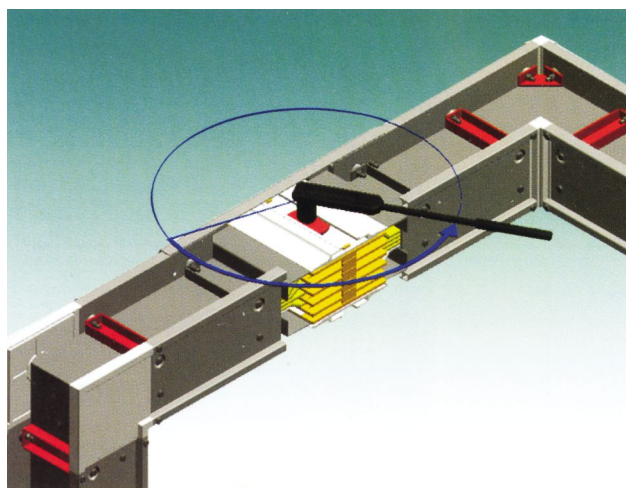


采用先进的先进单臂螺栓锁紧设计,使安装速度更加方便、快捷;具有专门的不可翻转性设计,可防止出现母线单元间的错相连接;

具有一定的单元连接膨胀间隙,以消除线性膨胀,不影响整条系统的各项导电性能和机械强度;

具有稳定的机械连接设计,组件内部无机械应力产生,且可保证较高的防护等级;

可配置特殊的双头力矩螺栓,无须力矩扳手即可方便快捷的将螺栓头拧掉,使整套接头锁紧;每种电流等级的母线槽配置专门的接头组件。



## 插接箱单元

### ——兼容性

HCC-XLC 系列插接箱单元可配套各种型号的断路器和熔断开关；

HCC-XLC 系列插接箱可根据不同开关,设置相应的箱体尺寸。

### ——安全性

HCC-XLC 插接箱带有灵活的内部连锁机构,在带电运行的情况下,箱门打开,机构会自动切断保护开关的电源,避免操作人员箱内带电操作的危险

HCC-XLC 插接箱可按客户要求,设置箱外手动、电动操作机构,方便操作人员的分合闸控制,无需打开箱门;

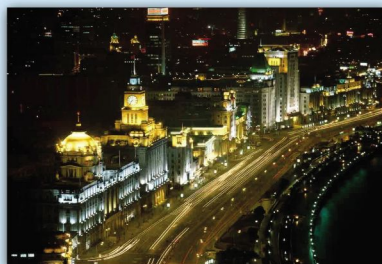
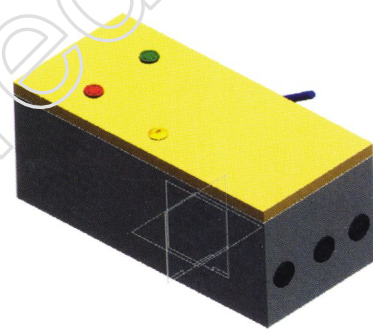
HCC-XLC 插接箱箱体防护等级 IP54;

HCC-XLC 插接箱拥有较大的电缆出线转弯半径,各种规格电缆可实际安全引出。

### ——规格齐全

100-630A 系列插接箱采用预制安全插爪;

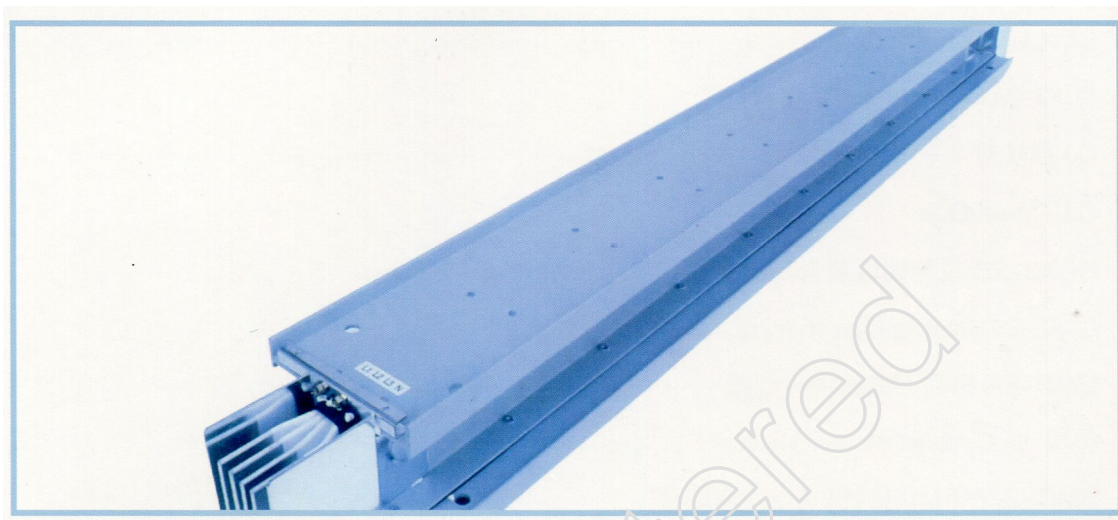
630A 以上系列采用特制分岔设计。



## HCC-CCX

HCC-CCX 密集型母线槽

HCC-CCX Intensive busway



### ■ 系统概述 General Introduction

HCC-CCX 系列母线槽适用于交流三相四线、三相五线制,频率 50~60Hz,额定电压至 690V,额定工作电流 100~5000A 的供电系统。作为一种供工业厂房、医院、商场、高层建筑或高科技环境用的低成本、高效益的输配电方案,从而使你在性价比方面进行权衡时,整个系统能实施高效配电。

HCC-CCX shell busbar channel is used in the system of 3 phases,4wires,3 phases 5 wires,50~60 Hz,with rated current 100~5000A power supply and distribuion,as a scheme of low cost and high efficiency for industrial factories,hospitals,tores,highrise buildings and those environment with high-tech,to achiev good cost performace.

### ■ 结构特点 Structure Features

#### 一、体积小、灵活性高 Small size,good flexibility

紧凑的“三明治”结构,既节省了占用空间,又具有优良的电压降特性。各种功能单元可运用于任何转角和高度的改变,安装于夹层、沿墙等任何建筑空间。

Close sandwich type of structure saves space,and has good performance of reducing voltage.Each functional unit,whose angle and height can be changed,can be installed in interlayer,alongside wall and other architecture.

#### 二、连接方便快捷 Convenient and fast connection

1、锥形绝缘板加强机械强度、模压外壳保证压力和边缘不翘起。

2、大规格碗形锰钢垫圈,确保了接触面压力均匀。

3、一把普通的“19”扳手就可紧固带有红色指示标志的双头单螺栓,当指示标志自然脱落时,无需任何检测工具就可判定连接接头已经紧固。

4、螺栓可以在维护时再次使用。

5、接头有 $\pm 16\text{mm}$ 可调节。

1 .Cone insulation plate reinforces mechanical strength,the modularized shell guarantees pressure without sharp adge.

2.Big scale bowl type manganese steel washer guarantees contact face even pressure.

3.Common 19 wrench can fix double heads single bolt with red indication, if the red indication fall off, we can judge that the connection joint is fixed without any other testing tols.

4.Bolts can be reused during maintenance.

5.The joint has adjustable place of  $\pm 16\text{mm}$ .

### 三、全铝外壳 Full Al shell

1、母线槽系统采用重量轻、模压成型的全封闭铝合金型材作为外壳,独特的结构让你不再需要考虑最佳安装位置和任何降容系数。

2、经过喷涂的全铝外壳能经受 1000 小时的盐雾试验。

3、全铝外壳具有极好的抗锈蚀、散热性能和导电性能(整体外壳具有 50%的接地容量)。

1 ,The shell is full close Al which is light and modularized,the special is fit for any installation place without thinking of any coefficient of reducing capacitance.

2.Sprayed full Al shell withstand 1000 hours of salt mist test.

3.Full Al shell features dust-proof performances good ventilation,and electric conduction.

### 四、优质的导电和绝缘材料 Good electric conduction and insulation

1、母线槽系统采用优质镀锡或镀银铜排、铝排作为导电材料,导电排的外表面均有良好的防腐保护。

2、导电排采用 B 级( $130^{\circ}\text{C}$ )的热成型聚酯薄膜绝缘材料整体包裹.极大地提高了母线的绝缘强度和抗冲击强度。

3、采用环保型绝缘材料,通过 ROHS 要求的 SGS 六项物性检测及 UL 认证。

1、The busbar adopts good copper and aluminum coated with tin or silvery,so the coating features good protection of anticorrosion.

2、The conductor is wrapped by B calss ( $130^{\circ}\text{C}$ )Mylinex,which is insulative.

3、Adopt environmental protection insulative material,which is ROH required SGS 6 items of tests and is UL certified.

### 五、插接箱结构 Jack box structure

1、插接箱的操作手柄可以安装在箱体的正面部或侧部,设置了更准确的分、合闸指示。

2、挂锁机构用于防止插接箱误合闸和阻止未经许可的接取电力行为。

3、带熔丝的插接箱设置了专门的熔丝提拉工具。

4、插口模制盖板防止手指无意触及导体。

5、内部接地和外壳接地采用专用触头。

1、The knob of jack box is installed in box body neck or side place ,clear indication of switch on/off is provided.

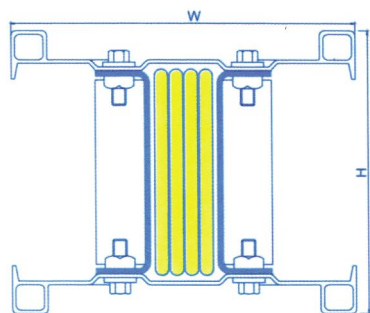
2、Interlock mechanism is provided for fault switch on or other activity of getting power without permission.

3、Jack box with special use tool to get fuse easily.

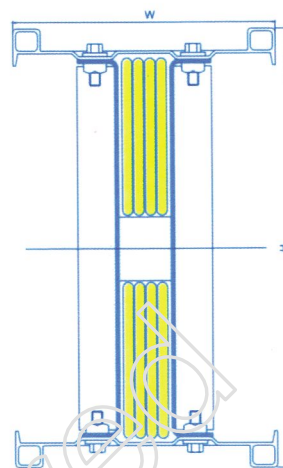
4、Modularized cover prevent ginger contact conductor unconsciously.

5、Special contactor is provided for internal earthing and shell earthing.

## ■ 技术参数



三相五线 250A-2000A



三相五线 2500A-3500A

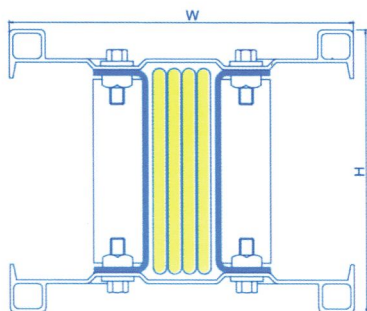
### 250A-1000A

额定电流	A	250	400	630	800	1000
外形尺寸 W*H	mm	150×120	150×130	150×145	150×160	150×195
重量	Kg/m	5.6	7.5	8.7	9.8	12.6
阻抗 Z(35℃)	mΩ/m	0.113	0.105	0.105	0.105	0.077
电阻 R(35℃)	mΩ/m	0.102	0.102	0.102	0.102	0.074
电抗 X	mΩ/m	0.028	0.026	0.026	0.026	0.020
电压降 (CosΦ=0.9)	V/m	0.010	0.098	0.113	0.088	0.096

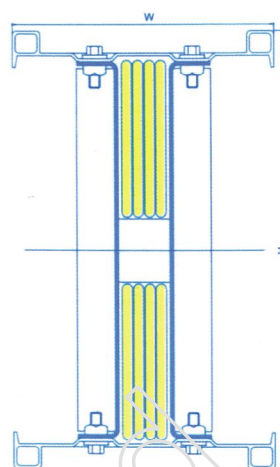
### 1250A-3500A

额定电流	A	250	400	630	800	800	1000
外形尺寸 W×H	mm	150×215	150×260	150×305	150×400	150×490	150×580
重量	Kg/m	16.1	20.3	24.4	30.9	39.4	47.9
阻抗 Z	mΩ/m	0.058	0.038	0.029	0.024	0.020	0.014
电阻 R	mΩ/m	0.056	0.037	0.028	0.023	0.019	0.014
电抗 X	mΩ/m	0.014	0.010	0.008	0.006	0.005	0.003
电压降 (CosΦ=0.9)	V/m	0.084	0.086	0.093	0.083	0.082	0.081

## ■ 技术参数



三相五线 100A-2500A



三相五线 3150A-5000A

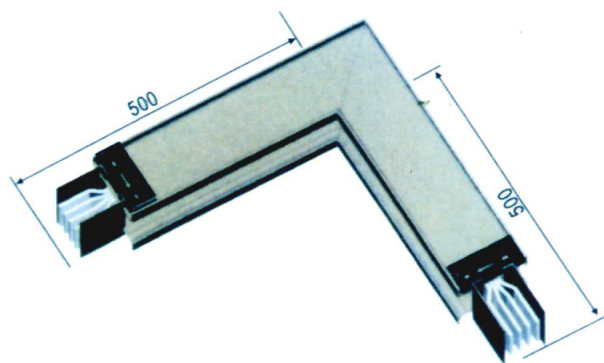
### 100A-1250A

额定电流	A	100	250	400	630	800	1000	1250	
外形尺寸 W*H	mm	150×110	150×120	150×120	150×120	150×130	150×145	150×160	
重量	kg/m	11.2	13.1	14.3	16.5	19.5	23	26	
额定短时耐受电流	KA(IS)	25	25	30	30	30	30	50	
阻搞 Z	mΩ/m	0.442	0.297	0.235	0.13	0.087	0.068	0.055	
电阻 R	mΩ/m	0.44	0.295	0.233	0.129	0.081	0.062	0.5	
电抗 X	mΩ/m	0.046	0.037	0.03	0.014	0.033	0.027	0.022	
电压降	cosΦ=0.7	v/m	0.06	0.06	0.034	0.034	0.083	0.09	0.08
	cosΦ=0.8	v/m	0.061	0.061	0.034	0.034	0.085	0.094	0.085
	cosΦ=0.9	v/m	0.06	0.06	0.033	0.033	0.088	0.096	0.084
	cosΦ=0.95	v/m	0.048	0.048	0.025	0.025	0.084	0.095	0.083

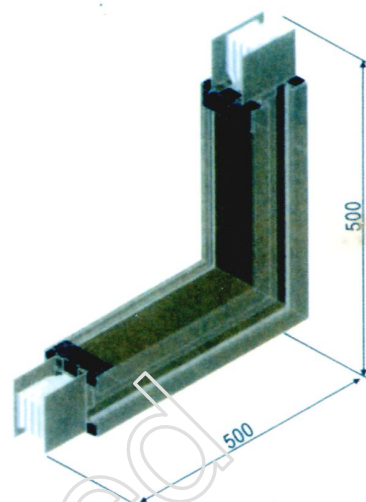
### 1600A-5000A

额定电流	A	100	250	400	630	1000	1250	
外形尺寸 W*H	mm	150×195	150×215	150×260	150×400	150×490	150×580	
重量	kg/m	36	41	58	95	136	165	
额定短时耐受电流	KA(IS)	50	65	65	80	80	80	
阻搞 Z	mΩ/m	0.032	0.025	0.017	0.016	0.012	0.009	
电阻 R	mΩ/m	0.29	0.023	0.015	0.014	0.011	0.008	
电抗 X	mΩ/m	0.014	0.011	0.008	0.007	0.005	0.004	
电压降	cosΦ=0.7	v/m	0.086	0.089	0.08	0.085	0.077	0.073
	cosΦ=0.8	v/m	0.095	0.092	0.085	0.087	0.081	0.075
	cosΦ=0.9	v/m	0.086	0.093	0.083	0.088	0.082	0.076
	cosΦ=0.95	v/m	0.084	0.092	0.081	0.086	0.081	0.074

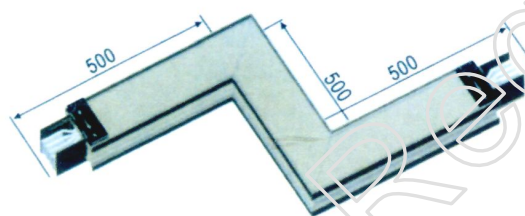
## ■ 换向单元 Commutation Unit



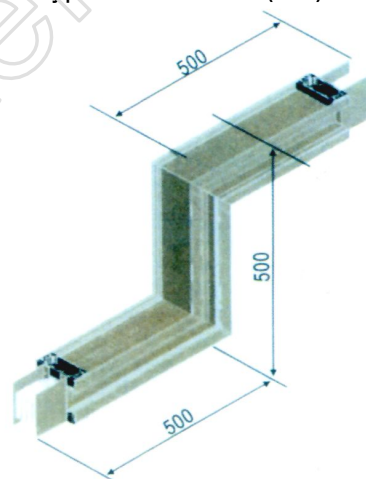
L 型水平弯通 (LS)  
L type horizontal bend (LS)



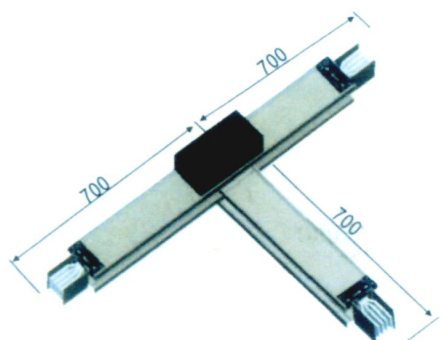
L 型垂直弯通 (LC)  
L type vertical bend (LC)



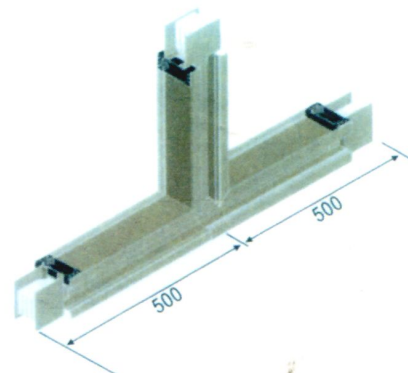
Z 型水平弯通 (ZS)  
Z type horizontal bend (ZS)



Z 型垂直弯通 (ZC)  
Z type vertical bend (ZC)



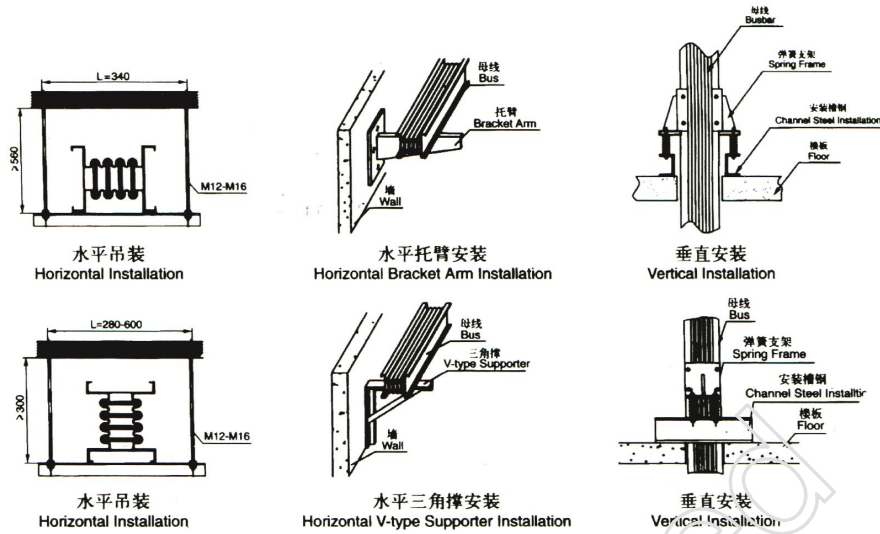
T 型水平弯通 (TS)  
T type horizontal bend (TS)



T 型垂直弯通 (TC)  
T type vertical bend (TC)



## 母线安装示意图 The Bus Duct Installation Diagram



## CJ 插接箱 Tap-off Box

插接箱是用户使用最为频繁,分支电流保护关键之部位,箱内装有自动空气开关确保分路过载及短路保护,规格分 100A、200A、400A、630A,整定电流根据用户选择。

插接箱的插脚是重要部件,本公司独有的工艺在插脚上另加二块 65Mn 弹簧钢片,确保插接 200 次以上仍具有良好的弹性接触,大于 250A 的插脚采用可靠的外力夹紧方法,使其具有良好的接触。

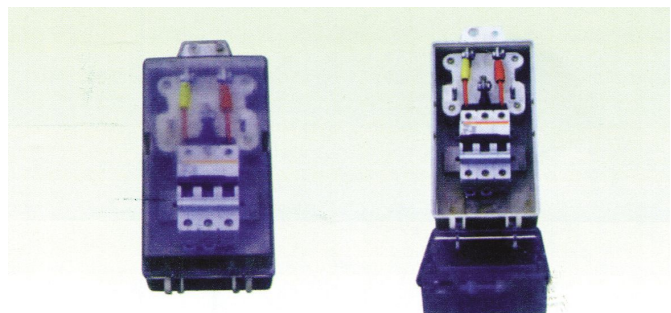
The tap-off box is a protection device for branch circuits, in which the automatic air switch will shut off electricity when overloading or short circuit occurs. Types include 100A, 400A and 630A, or rated current will be chosen on request by users.

The crucial part in the box is plugs. Our company has developed a technique to add two 65 Mn spring steel slices to the socket to improve contact effect when connection is over 200 times. For a socket loading current larger than 250A, the external clamping will guarantee the effective contacts.

## 插接箱外形尺寸

### Structure and Size for Connection Boxes

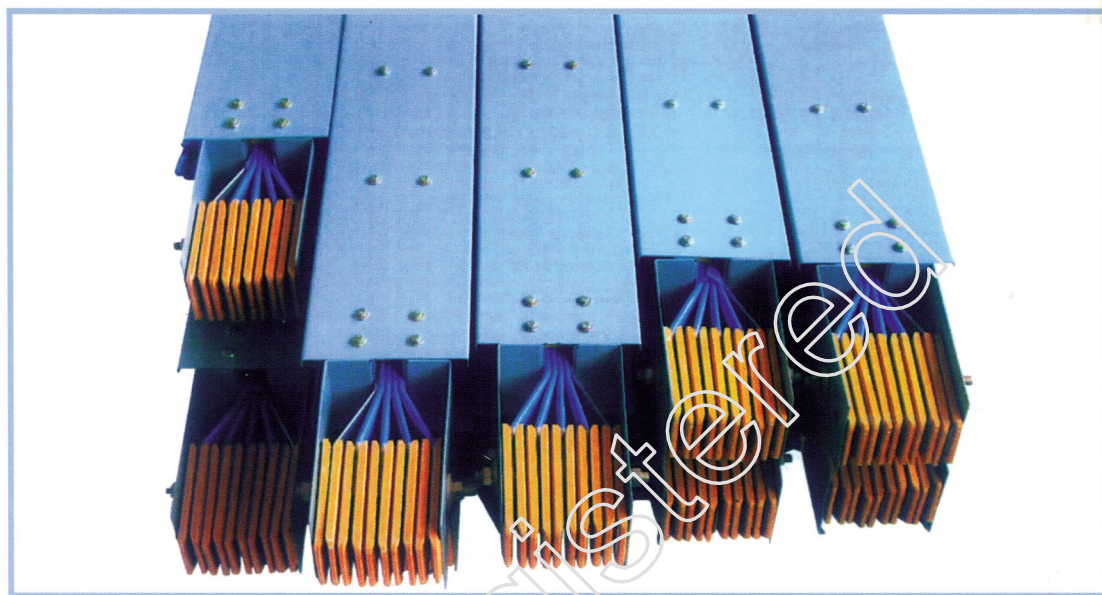
电流 (Current)	LxKxH
100A	480x240x152
200A	600x300x190
400A	700x320x192
630A	700x320x192



## HCC-CMC

HCC-CMC 系列密集型母线槽

HCC-CMC A series of intensive bus groove



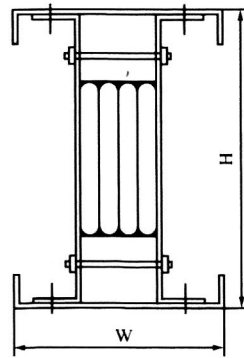
HCC-CMC系列型密集型母线槽适用于交流三相四线或三相五线输配电系统,额定电流 250A~5000A,结构采用优质钢制外壳,内部导体采用绝缘材料包覆后紧贴在一起并与外壳接触,具有结构紧凑、散热量大的特点,特别适用于电力变压器和低压配电柜以及重型负载的连接等大电流输电场所使用。

HCC-CMC系列型母线槽直线段标准节长度为 2m 或 3m,插接箱最大分接电流 630A,箱内安装元器件可按顾客要求任意选择。

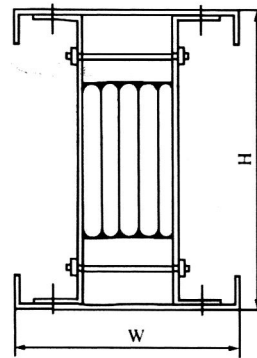
HCC-CMC compact insulation busbar used in AC 3 phase 4 lines or 3 phase 5 lines distribution system, rated current is 250A-5000A, the frame is good steel, inner conductor is covered with insulation material and after that they are merged in one and contact frame, it has compact structure, large abstract heat and so on features, it is special used in electrical transformer, LV distribution and heavy load and so on large power transmission place.

Standard node linear measurement is 2m or 3m of the CMC-2A type busbar, the Max. tap off current of the connecting container is 630A, users can choose different device to installation in the inner box at will.

# 母线槽系列



三相四线制  
3 phases 4lines



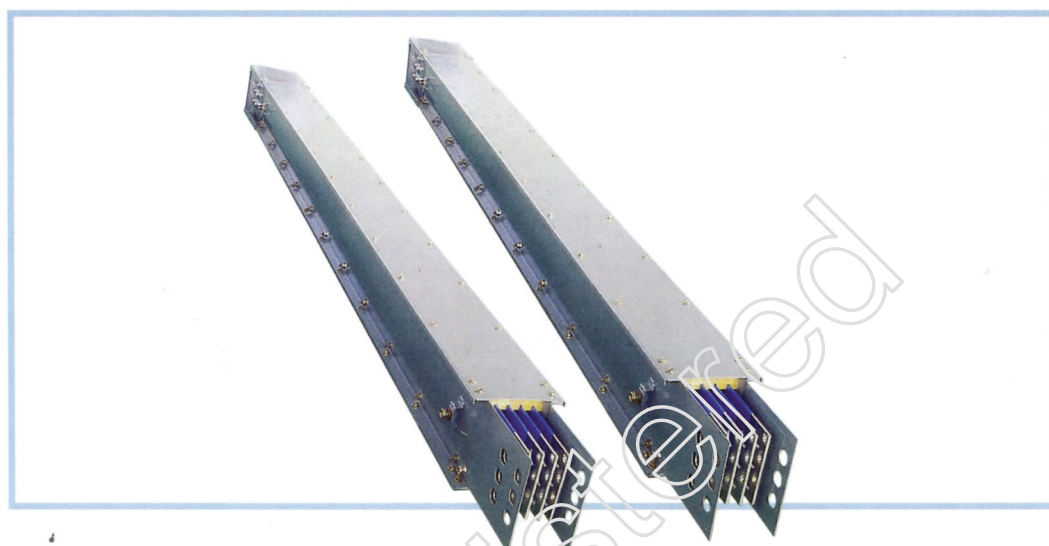
三相五线制  
3 phases 5lines

符合标准 Applicable standard	IEC60439-1~2,GB7251.1-2,JB/T9662												
额定电流 Rated current Ie (A)	250	400	630	800	1000	1250	1600	2000	2500	3150	4000	5000	
额定工作电压 Rated working voltage Ue (V)	380(400)												
额定绝缘电压 Rated insulation voltage Ue (V)	660(690)												
额定频率 Rated frequency(Hz)	50(60)												
额定短时耐受电流 Rated short time with stand current Ie (KA)	30							80			100		
过电压类别/污染等级 Over voltage category/ dirtiness degrees	III/3												
防护等级 Protection grade	IP40,IP54												
外形尺寸 Dimension W×H	三相四线制 3phase 4 lines	140×98	140×108	140×118	140×128	140×148	140×178	140×218	140×248	150×248	150×298	140×458	150×458
	三相五线制 3phase 5 lines	165×98	165×108	165×118	165×128	165×148	165×175	165×218	165×248	174×248	174×298	165×458	174×458
重量 Weight kgf/m	三相四线制 3phase 4 lines	20	22	23	25	31	39	51	55	63	98	126	161
	三相五线制 3phase 5 lines	22	25	26	28	35	43	57	62	71	107	148	174
在 50Hz 和 35℃环境温度时,相对中性线阻抗 When frequency is 50Hz and the temperature is 35℃,the impedance relatively to neutral line													
电阻 Resistance R(mΩ/m)	0.102	0.074	0.059	0.042	0.035	0.027	0.020	0.015	0.012	0.009	0.007	0.006	
电抗 Resistance X(mΩ/m)	0.120	0.106	0.059	0.050	0.039	0.033	0.025	0.023	0.023	0.024	0.014	0.010	
阻抗 Impedance Z (mΩ/m)	0.157	0.129	0.083	0.065	0.052	0.043	0.032	0.027	0.026	0.026	0.016	0.012	
介电强度 Media Strength	交流工频电压(有效值)3750V 1min AC Frequency Voltage:3750V 1min												
绝缘电阻 Insulation Resistance	相与相及外壳之间不小于 20mΩ Between Phase and phase and enclosure ≥20mΩ												

## HCC-KFM

HCC-KFM 空气绝缘母线槽

HCC-KFM Air Insulation Busbar Trunking



HCC-KFM 系列母线槽适用于交流三相四线、三相五线制、频率 50-60Hz、额定电压至 660V、额定工作电流 250-5000A 的供配电系统。承担配电任务，用于低压配电屏与大、中型负载的连接，作为大电流的输电，用于电力变压器与低压配电屏以及重型负载的连接。主要应用于现代化的车间、汽车制造厂、电机制造业的电焊线、工业用电炉、厂房和高层建筑等。

该系列母线槽适合大跨距安装且安装极为方便，结构安全可靠、布线灵活、互换性强。

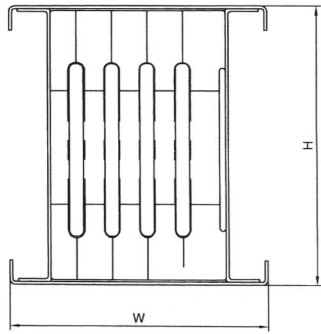
HCC-KFM series busbar applies to distribution system of AC 3 phases 4 lines, 3 phases 5 lines, frequency 50-60Hz, rated voltage 660V below, rated current 250-5000A. It is the connecting part between LV distribution board and heavy, medium load.

It is the connecting part between transformer and LV distribution board and heavy board. It mainly applies to modern workshop, auto manufactory, the welding cable for electrical manufacture, electric cooker used in industry, factory building and high building.

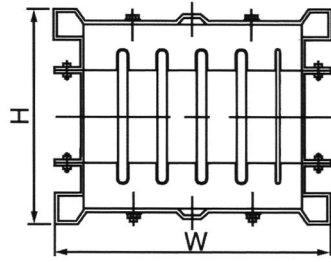
This busbar suit for long span installation, convenience installation, extremely safety reliable, flexible to arrange line, compatibility.



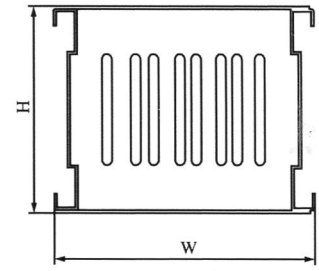
# 母线槽系列



HCC-KFM 五线制  
HCC-KFM 5 lines



250A-1000A



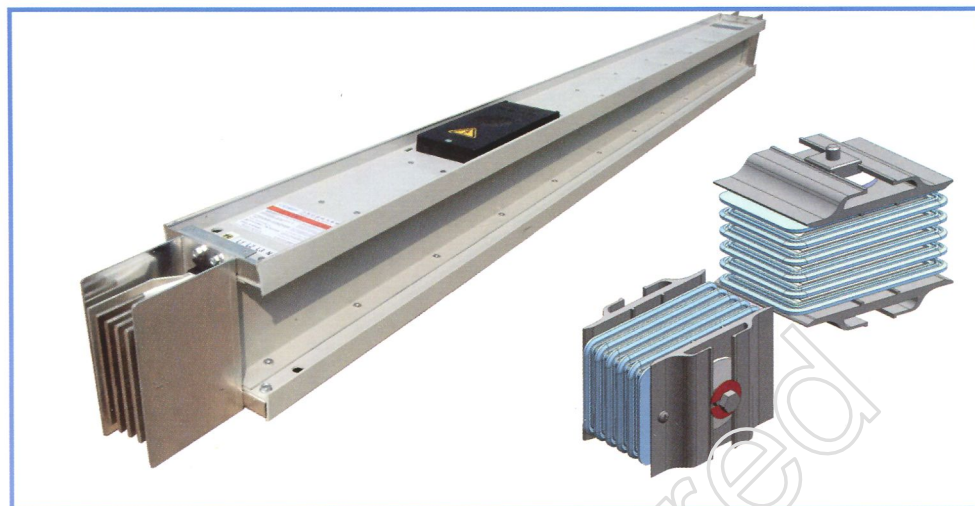
1250A-5000A

HCC-KFM 三相四(五)线制  
HCC-KFM 3 phases 4(5) lines

符合标准 Applicable standard		IEC60439-1~2,GB7251.1-2,JB/T9662											
额定电流 Rated current Ie (A)		250	400	630	800	1000	1250	1600	2000	2500	3150	4000	5000
额定工作电压 Rated working voltage Ue (V)		380(400)											
额定绝缘电压 Rated insulation voltage Ue (V)		660(690)											
额定频率 Rated frequency(Hz)		50(60)											
额定短时耐受电流 Rated short time with stand current Ie (KA)		30						80			100		
过电压类别/污染等级 Over voltage category/ dirtiness degrees		III/3											
防护等级 Protection grade		IP40											
外形尺寸 Dimension W×H	三相四线制 3phase 4 lines	180×102	180×112	180×122	180×132	180×152	180×182	180×222	180×252	210×254	210×304	195×300	195×370
	三相五线制 3phase 5 lines	185×102	185×112	185×122	185×132	185×152	185×182	185×222	185×252	216×254	216×304	200×300	200×370
重量 Weight kgf/m	三相四线制 3phase 4 lines	21	23	24	26	31	40	51	56	65	101	129	168
	三相五线制 3phase 5 lines	23	26	27	29	35	44	57	64	73	109	152	181
在 50Hz 和 35℃环境温度时,相对中性线阻抗 When frequency is 50Hz and the temperature is 35℃,the impedance relatively to neutral line													
电阻 Resistance R(mΩ/m)		0.118	0.099	0.065	0.048	0.036	0.030	0.024	0.020	0.017	0.012	0.008	0.0074
电抗 Reactance X(mΩ/m)		0.086	0.083	0.067	0.058	0.045	0.028	0.035	0.028	0.022	0.041	0.030	0.028
阻抗 Impedance Z (mΩ/m)		0.146	0.129	0.093	0.074	0.057	0.041	0.042	0.034	0.028	0.043	0.031	0.030
介电强度 Media Strength		交流工频电压(有效值)3750V 1min AC Frequency Voltage:3750V 1min											
绝缘电阻 Insulation Resistance		相与相及外壳之间不小于 20mΩ Between Phase and phase and enclosure ≥20mΩ											

## HCC-LMC 铝质母线槽

### HCC-LMC Aluminium Case Busbar



#### 简述

属于密集型母线,单元直线段全长密集,导体之间保持紧凑的“三明治”结构,无任何缝隙。

采用铝镁合金外壳,质量轻,强度大,表面静电粉末喷涂,具有较强的抗腐蚀能力和耐氧化性。而且由于铝镁合金外壳为无磁材料,所以能避免钢制外壳母线运行时产生的磁滞损耗现象。

电流:630A-1600A

母线防护等级高达 IP54,可在户外使用。

导体采用优质铝排,纯度高。

导体表面镀铜锡,该绝缘材料抗老化性强,达到 B 级绝缘,耐温 130℃。

HCC-LMC 母线槽插接灵活。工业水平安装时,长 4m 的母线上最多可带 9 个插口。选择在于你,购买时只须说明要求。

独特的防错相单螺栓连接器,有助于更加安全、快速的安装。插口间最小间距为 575mm,母线槽系统主要应用于变压器与配电柜之间的输电及配电柜为负载提供的配电。

#### Brief

Belong to the bus-intensive, unit-length straight-line para-graph, the conductor of the compact between the "sandwich" structure, without any gap.

Use of aluminum-magnesium alloy shell, light weight, strength, electrostatic powder coating on the surface, has strong anti-corrosion-resistant and oxidizing. But also because of aluminum-magnesium alloy shell for the non-magnetic materials, they are able to avoid the steel shell of the bus journey when the phenomenon of hysteresis loss.

Current: 630A - 1600A

Bus protection level up to IP54, can be used outdoors.

Use of high-quality aluminum conductor line of high purity.

The surface of copper-tin conductors, parcel of DuPont polyester film, the insulation resistance strong resistance to class B insulation, the temperature 130℃

HCC-LMC busbar trunking system offers the ultimate plug-in opening flexibility for industrial horizontal runs with up to nine openings on a standard three metre length at 575mm centres. The choice is yours, to purchase only the openings that you require.

Unique anti wrong with single-bolt connector, and contribute to a safer, faster to install. Minimum distance between the jack for 575mm, Busway system is mainly used in transformers and distribution of the cabinet between the transmission and distribution to counter the load to provide power distribution.

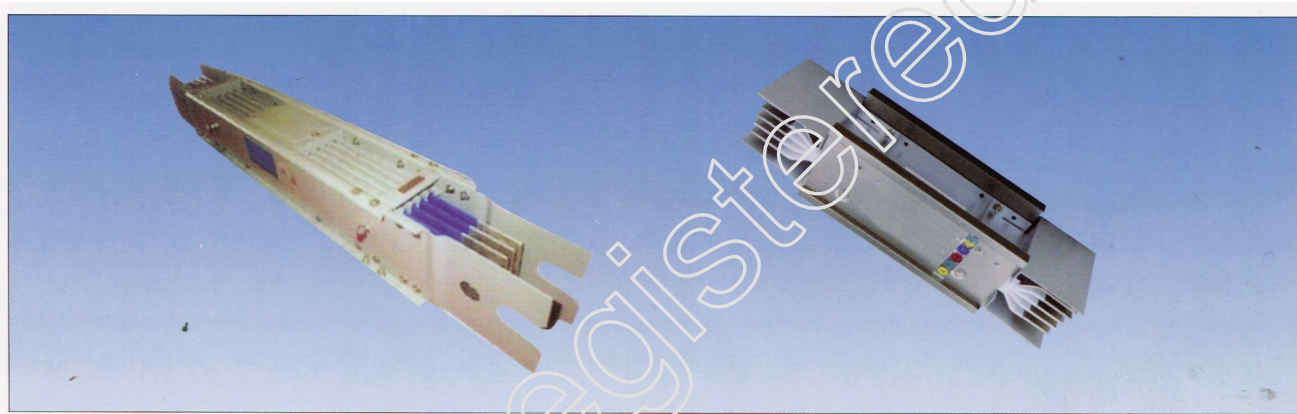
## HCC-TLMC 铜铝复合型绝缘母线槽

### HCC-TLMC Enclosed Busbar Channel

#### 适用范围 Application

HCC-TLMC 铜铝复合母线槽是我公司引进德国 SIEMENS 公司技术进行消化吸收并根据国内外相关标准设计的,主要类型有高强封闭型、密集型和空气型。它广泛适用于交流 50~60HZ,额定电压至 660V,额定工作电流 160--3150A 的供配电系统作传输电能之用。防护等级为 IP40。

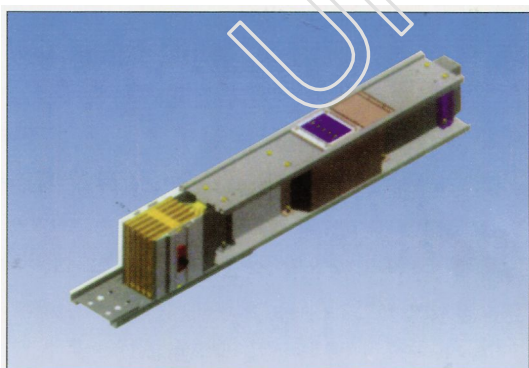
HCC-TLMC copper aluminium bus bar trough whether our company introduce Company technology, SIEMENS of Germany, go on, digest and assimilate and design according to domestic and international relevant standards. The main type has closing types, intensive and ai.It is extensively suitable for exchanging 50 ~ 60HZ, the specified voltage is to 660V, using to transmit electric energy by distribution system of electric current 160-3150A of specified job. The protecting grade comes up to IP40.



#### 产品综述 Products survey

●HCC-TLMC 母线槽, 采用了先进的铜铝复合母线排作为导体,载流能力强,损耗小、电抗平衡、分接方便,其电气性能与铜母线相同且可大幅降低投资成本,是替代铜母线的首选产品。

The HCC-TLMC bus bar rabet, has used the advanced copper duplicate aluminum generatrix row of achievement conductor, carries flows ability, its electrical specification and the copper generatrix are same, Loses, the reactance balance slightly, divides meets conveniently, but reduces the investment cost largely, is substitutes the copper generatrix the first choice product.



## HCC-FSMC 固体全封闭防水母线槽

HCC-FSMC totally enclosed solid waterproof busbar

### 产品说明 Product Description

#### 一、适用于各种复杂环境 Application for various environments

公司新研制成功的 HCC-FSMC 固体全封闭防水母线槽,在保留传统密集母线槽结构紧凑,安全可靠的基础上,利用树脂浇注固化的科研成果,加上耐腐蚀高强度铝合金外壳,解决了其它形式母线槽不能防潮、防水、防火、防腐蚀等问题。特别适合在船舶、港口、地下室、地沟、高层建筑竖井等水雾酸碱等复杂环境下使用。

With the enclosure made of al-alloy, HCC-FSMC Solid Enclosed Water-proof Bus Duct has many advantages such as: humidity-proof, water-proof, fire-proof, anti-corrosion, compared with the traditional types of bus duct. It is especially suitable for the complex environments such as: ships, ports, underground rooms, multi-layers buildings with water, fog, acid and alkali and etc.

#### 二、更高的防护等级 Higher IP Grade

固体全封闭母线槽内部采用高性能的合成树脂进行整体浇注,导电铜排之间用高性能的热缩套管和绝缘板定位,不但能有效的防水防尘,还能防止酸、碱等化合物对铜排的腐蚀及氧化。同时合成树脂还有阻燃性,经国家权威部门检测,防护等级达到 IP68。

The inside solid molding of the synthetic resin with high quality, the pyro-condensation bushing and insulating board orientation can protect the bus duct effectively from either water and dust or the corrosion or oxidization from acid or alkali. The IP grade can be up to IP68 tested by the national authorization.

#### 三、更优良的散热性能 Super Heat-sinking Capacity

传统密集母线使用过程中,铜排发热是通过空气传导至钢板外壳再散发到外界由于铜排与外壳之间的空气不流动导致热传导效率,因此我们采用具备更好热传导率的合成树脂在铜排和外壳之间浇注,使铜排与外壳之间不存在空气以达到直接传热、散热的效果,从而降低母线槽使用时的温升,提高使用效率和寿命。

For the traditional bus duct, the heat from the copper row is radiated to the steel enclosure by air conduction. The heat conduction efficiency is very low since the air between the copper row and the steel enclosure is statistic. We now design the solid molding of synthetic resin between the copper row and the enclosure to solve the problem, which can lower the temperature-rising while using.

#### 四、更可靠方便的安装和插接方式 More convenient and reliable installation and plug-in method

固体全封闭母线槽,能有效杜绝母线槽单元段运输安装过程中,母线槽相与相之间的松动错位和水汽异物的侵入,在单元段连接成线后,接头部位也采取整体浇注能有效降低整条母线槽的压损。插接箱采用独特的引出式插接方式设计,使母线槽插接箱的连接更加牢靠,克服插入式插接箱易掉电的观象。

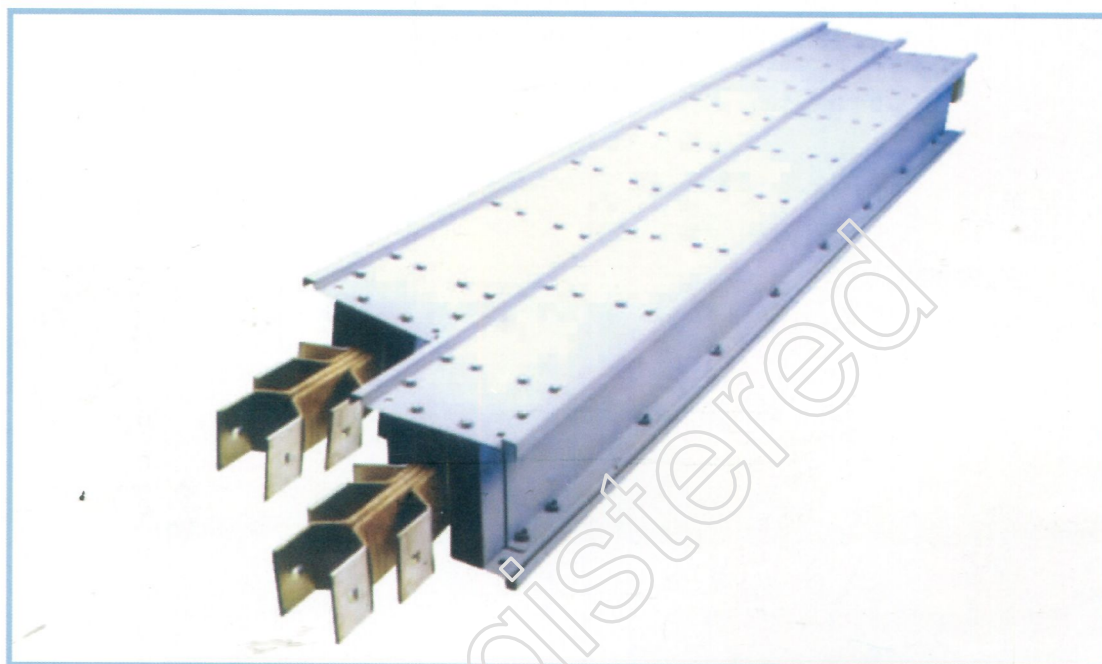
Solid enclosure bus duct can effectively protect itself from the loosing between the phases. After connecting together, the solid mo molding ding of the joint part can protect the bus duct well. The plug-in box is designed to be of leading-out mode to fasten the connection.



## HCC-NHMC

HCC-NHMC 系列耐火型母线槽

HCC-NHMC Series Fire Bearing Busbar



HCC-NHMC 系列耐火型母线槽是我公司结合密集型母线槽的结构特点,采用防火隔热、阻燃材料自行研制的产品。具有结构紧凑、体积小、耐高温、防火、传输容量大等优点。主要应用一坑层建造、重要的控制中心,地铁等人流量大的公共场所和其经防火要求更高的场所。使用该产品能保证在发生火灾时维持一段时间的供电,并有足够的时间启动灭火设备、排烟通风、排烟该产品能保证在发生火灾时维持一段时间的供电,并有足够的时间启动灭火设备、排烟通风、疏散人员,尽可能地减少人员伤亡和财产损失。

HCC-NHMC series fire bearing busbar used fire prevention and heat isolation, to make by themselves. Such products have many characteristics, such as compact structure, small volume, high temperature resistance, fire prevention. It is mainly used in public and other places where fire prevention is highly required and where people are in large numbers. Using such products can keep electricity supplying for a certain period of time, it has enough time to start fire extinguishers, smoke displacement and air ventilation, people scattering. It can reduce people injured and property damaged.

## HCC-FLD 风力发电母线槽

Busbar trunking HCC-FLD wind power



风吹动风电机叶片使其旋转，并推动发电机将动能转化成电能。

The wind rotates turbine blades and promotes kinetic energy into electrical energy.

通过变压技术，电能将通过电网传送到用电户。

Through voltage transforming technology, electrical energy will be sent to residents by national grids.

随着人类对资源的大规模开发与利用，现有的常规能源在不断地减少，并趋于枯竭，发展和利用风能等可再生资源已经成为国际电力发展的新趋势。风能作为清洁的可再生能源，越来越受到世界各国的重视，其蕴藏量巨大，比地球上可开发利用的水能总量还要大 10 倍。据预测，到 2015 年，风力发电可提供世界电力需求的 12%，可在全球范围内减少二氧化硫等废气的排放 100 多亿吨。随着全球经济的高速发展，风能市场已经迅速发展起来。

风能市场高速发展同时也带动了相关行业的发展，风力发电场的大量建造客观的推动了风力涡轮发电机组市场的需求。随着科技的发展，作为提高风能利用率和发电效益的有效途径，风力涡轮发

电机单机容量不断向大型化发展。兆瓦级风机逐步成为国际风电市场上的主流产品，而风力涡轮发电机所需要的配电回路随着单机容量的不断增加，风力发电母线槽将是不可被替代的最理想的解决方案。

本公司根据风力发电行业的诸多特性引进开发了新型 HCC-FLD 空气型母线槽系统，该产品设计理念先进，性能安全可靠，在技术方面解决了风场塔筒运行时的多项技术难题，填补了国内风力发电母线的空缺。

本公司一直致力于母线系统的升级及新产品的研发工作，愿与您协手为风力发电行业提供安全可靠、节能低耗的电力输送产品。

## 应用于风能的 HCC-FLD 母线系统

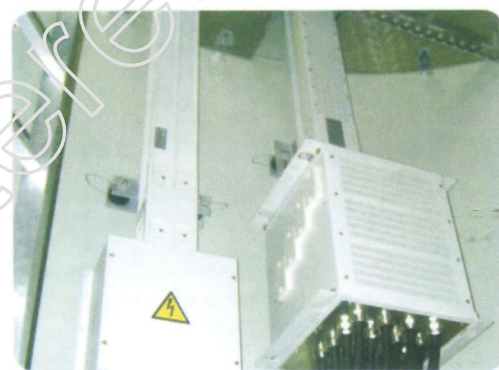
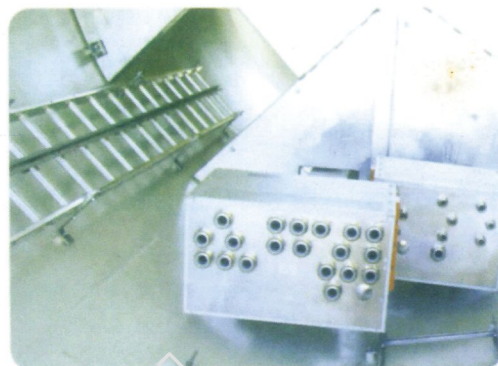


一台 1.5 兆瓦的风电机可以供应 1000 户四口之家的电力消耗。

A1.5MW wind turbine can supply electricity consumption for 1000 families each with 4 members.

As the large-scale resource development and utilization by human, the existing conventional energy sources continue to decrease and moving towards to running out. Develop and utilize renewable resources, such as wind energy has become a new international trend. As a clean and renewable energy, wind energy is focused by more and more attention around the world. Because of its huge store on globe, the energy it created is 10 times larger than that of water. It is projected that wind power could provide 12% of the world's electricity demand, which may be a global reduction in carbon dioxide emissions more than 100 million tons. With the high speed development of global economy, wind power market grows fast.

The development of wind power leads to the flourish of relative industry. The plentiful construction of wind power plant objectively drives the vast demand for wind power turbine. Meanwhile, with the development of technology, as an effective way to improve the efficiency of wind energy utilization, wind turbine generator capacity



constantly develops towards large-scale type, MW-class turbine gradually become mainstream product in the international wind power market. With the increasing capacity of single wind turbine, the required power distribution loop also increases rapidly, and wind power busbar trunking system will be the best alternative solution.

Basing on many features of wind power industry, The company (ZSB) developed the new HCC-FLD wind power busbar system with advanced concept of product design, safe and reliable performance. We solved a number of technical problems when wind cylinder is in operation, successfully filling vacancies for the domestic wind power busbar.

Company has been always devoted itself to update and develop new product, and is willing to cooperate with your part to provide the reliable, low consumption, energy-saving power transmission products for the wind power industry.

## HCC-FLD 系统优势 System Advantages

HCC-FLD 相关认证支持

CCC

通过德国 REpower 等全球著名的风力发电机公司的认证。

RErelative certification

CCC

HCC-FLD system is confirmed by many global wind turbine manufacturers such as REpower (Germany).

HCC-FLD 风力发电母线系统优势

HCC-FLD 风力发电母线系统可满足任何容量的风电机组的需求,设计先进、环保节能,对恶劣的环境有极强的适应性。

具有载流量大、动热稳定电流高、绝缘性能可靠、抗过电压能力强等电气性能优势。

HCC-FLD 风力发电母线系统在塔筒制造商就能完成主体安装。待塔筒连接完成后,只需在塔筒连接处安装两节连接段母线槽,快捷简单、周期短、费用低、质量可靠,母线槽本体寿命上能达到 40 年以上。



Advantages for HCC-FLD system

HCC-FLD wind power busbar system can satisfy wind turbine with any capacity, enjoying advanced planning, environmental protection, power saving and best adaptability to aggressive environment. And it also enjoys heavy loading, reliable insulation performance, high short circuit endure intension, excellent anti-overvoltage, etc.

The main trunks of HCC-FLD system can be installed in cylinder manufacturing company. There are only two units need to be joined when connect together the 3-part cylinders, which enjoys easy and fast, short term, low cost and reliable quality. The busbar trunks can be used more than 40 years.

电缆

电缆由于载流量限制以及在高落差垂直布局时的自重和固定等因素,将不能满足大容量兆瓦级风电机组的需求。

在塔筒内敷设难度大、周期长,电缆接头附件的制作工艺要求及费用较高,后期还存在故障测寻、修复困难等问题。

耐候性差,电缆绝缘层易老化,寿命只有 10-15 年,后期投入大。



电 缆

Cable

Due to the loading limit, deadweight caused by high fall, vertical layout and fix, etc. factors, cable can't satisfy large scale MW-class wind turbines. Cable Installation inside cylinder is a hard and time-spending work. Besides cable connecting accessories require high craft and cost, and still the problems in later fault checking, maintenance, etc. With poor aggressive condition resistance, cable insulation layer is easy to aging, and the life expectancy is only 10-15 years, so the later cost input is large.

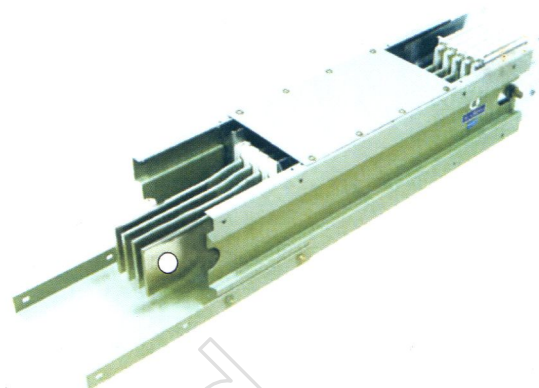
## 产品特点 Product features

可满足不同容量风电机组需求

HCC-FLD 风能母线系统载流量大,我们会根据项目实际情况配套相应电流等级的定子和转子母线。

Meet different capacity requirements of wind turbine

HCC-FLD wind power system enjoys heavy load,we will plan the corresponding current busbar for connection with stator and rotor according to actual project situation.

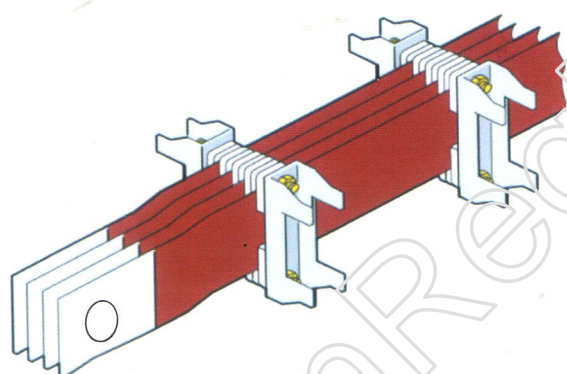


绝缘性能可靠

HCC-FLD 风电母线绝缘方式为空气附加绝缘型:以空气作为主绝缘介质,母排表面特殊粉末喷涂作为附加绝缘,绝缘性能则更为可靠,避免了塔筒长期运行过程中的摆动造成的绝缘材料磨损,从而消除安全隐患。

Reliable insulation Performance

HCC-FLD system is of additional air-insulated type busbar:air as the main insulation media, surface of bar is sprayed with special powder as additional insulation,which makes more reliable insulation by avoiding insulation material abrasion in long-term operation.



防电磁干扰

HCC-FLD 风力发电母线系统采用热镀锌钢板,具有低导磁、防腐蚀等特性,能减少母线外壳的涡流损耗,同时对于电磁场有一定的屏蔽作用,确保整个系统的稳定性。

Resistant to electromagnetic interference

The enclosure of HCC-FLD system adopts hot galvanized steel sheet,enjoying low magnetic conductivity, anti-corrosion properties etc.which can decrease the eddy current loss of enclosure and also has a certain role in shielding the electromagnetic field, ensuring steady performance of the entire system.

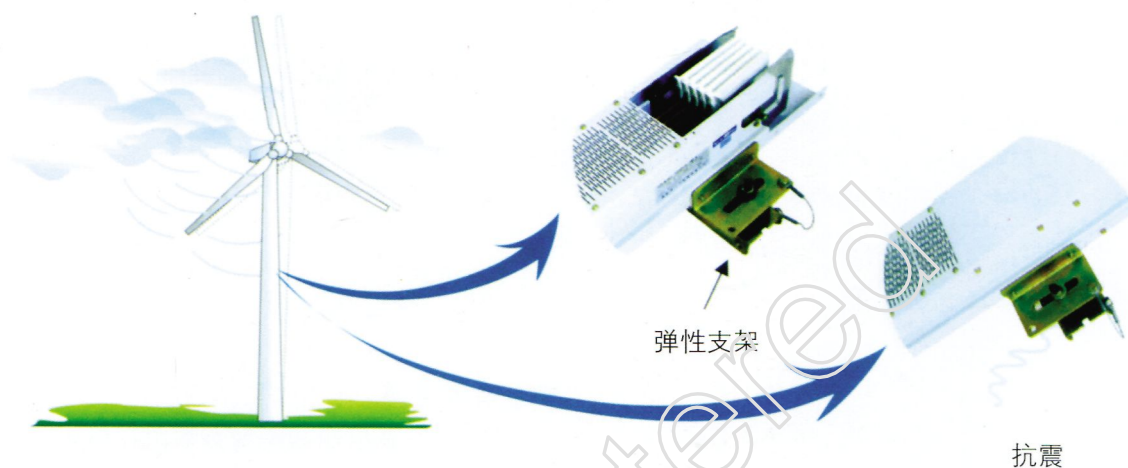
# 母线槽系列

## 抗震

HCC-FLD 系统设计有专用固定件，能缓解强风、地震等情况下塔筒晃动对母线槽系统造成的应力损害。

## Anti-seismic

HCC-FLD wind power system adopts special supporting accessories, which can alleviate the damage caused by strong wind and earthquake shaking.



## 耐候性强

HCC-FLD 系统台柜在 $-50^{\circ}\text{C}$ ~ $+65^{\circ}\text{C}$ 的环境下正常运行。

## Excellent aggressive condition resistance

HCC-FLD system can running normally in temper-ature of  $-50^{\circ}\text{C}$  to  $+65^{\circ}\text{C}$



## 技术参数 Technical parameters

### 通用参数 General Parameters

1	符合标准	IEC/EN60439~1.2 GB7251-1.2
2	电流	630A-5000A
3	额定工作电压	1000V
4	额定绝缘电压	1000V
5	电网频率	50Hz
6	矢量频率(转子回路)	60KHz-3KHz
7	转子回路电流	1)
	定子回路电流	1)
8	导体材质	铝
9	风能母线防护等级	主干 IP31/IP55 电缆进线箱 IP55
10	耐压	3500V
11	运行温度	-50℃...+50℃
	生存温度	-50℃...+65℃(无电源)
12	最大空气温度	95%

注释:1)根据不同容量风机组,请参照下一切具体技术表。

Note:1)According to wind turbine with different capacity,please refer to the specific technical parameters of the next section.

### HCC-FLD 风力发电母线技术参数表 Technical Parameters

机组容量 MW	变频器下置式				变频器上置式
	1.5MW 风电机组		2MW 风电机组		1.5MW 风电机组
额定电流(Ie)A	630A	1250A	800A	1700A	2500A
外型尺寸 mm	195×180	195×180	195×180	262×180	262×180
短时耐宏观世界电流(Icw)KA	35	60	40	80	110
峰值耐受电流(Ipk)KA	66	143	88	176	240
电阻(R20)m/Ωm	0.059	0.031	0.054	0.022	0.016
电抗(X20)m/Ωm	0.056	0.039	0.053	0.033	0.026
电抗(Z20)m/Ωm	0.081	0.050	0.075	0.040	0.031
电压降 V/M	0.08	0.09	0.09	0.10	0.11
重量 Kg/m	19.1	26.4	20.7	31.2	37.5

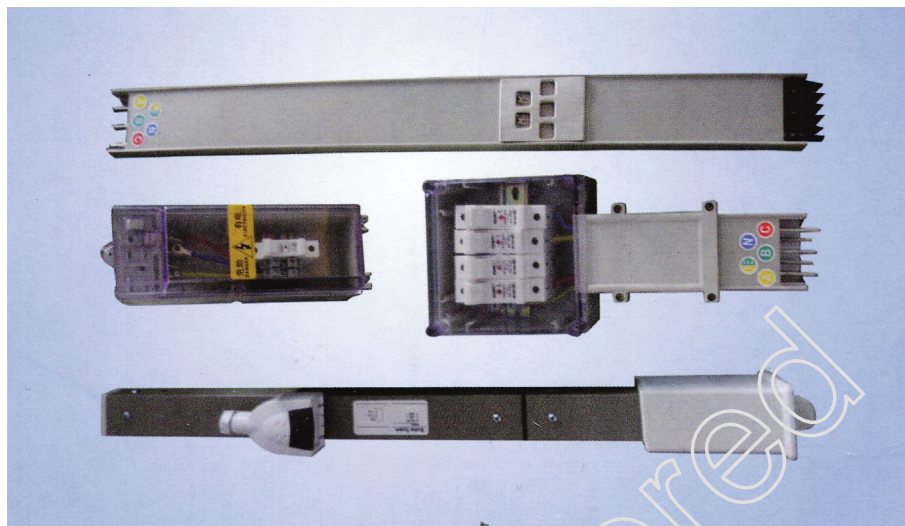
注:我们会根据不同容量的风电机组以及项目的特殊需求配套相应的母线解站方案。

Note:Different busabr solutions will be made according to different capacity wind turbine and special demand as per project.

## HCC-ZM 照明母线 HCC-ZM Lighting Busway

快速安装、流线化设计的 HCC-ZM 型照明母线系统

Faster Installation, HCC-ZM Type Lighting Busway System of Flow Line Design



HCC-ZM 型照明母线系统额定工作电流为 16A~250A, 该系统特别适用于大开间场所的照明供电, 如: 大型商场、超市、展览厅、车站、机场、办公楼、工业厂房等。该系统提供的防护等级为 IP55, 能在比较潮湿或较多粉尘的环境中使用。

The rated working current of HCC-ZM type lighting busway system is 16A-250A, it is used it lighting of big house, such as: big emporium, supermarket, exposition hall, station, airport, office building, factor house and so on. The system's protection grade is IP55, it can work in the environments of most moisture or lots of fragment.

可靠的流线化设计 Reliable streamiline design

HCC-ZM 型照明母线外壳为铝镁合金一次成形, 外形美观、结构紧凑, 具有极佳的承载能力。单元间连接采用专用连接器, 插接口分布均匀, 用户可就近取电。系统配置齐全, 配置有专用吊架及灯具吊架等, 可满足各种类型灯具的吊装。

HCC-ZM lighting busway shell for aluminum magnesium alloy a shape, beautiful appearance, compact structure, high bearing capacity of excellent. Units are connected by the connector, plug interface distribution, the user may nearby to take power. System configuration is complete, equipped with special hanger and a hanging lamps and so on, can meet the lifting of various types of lamps and lanterns.



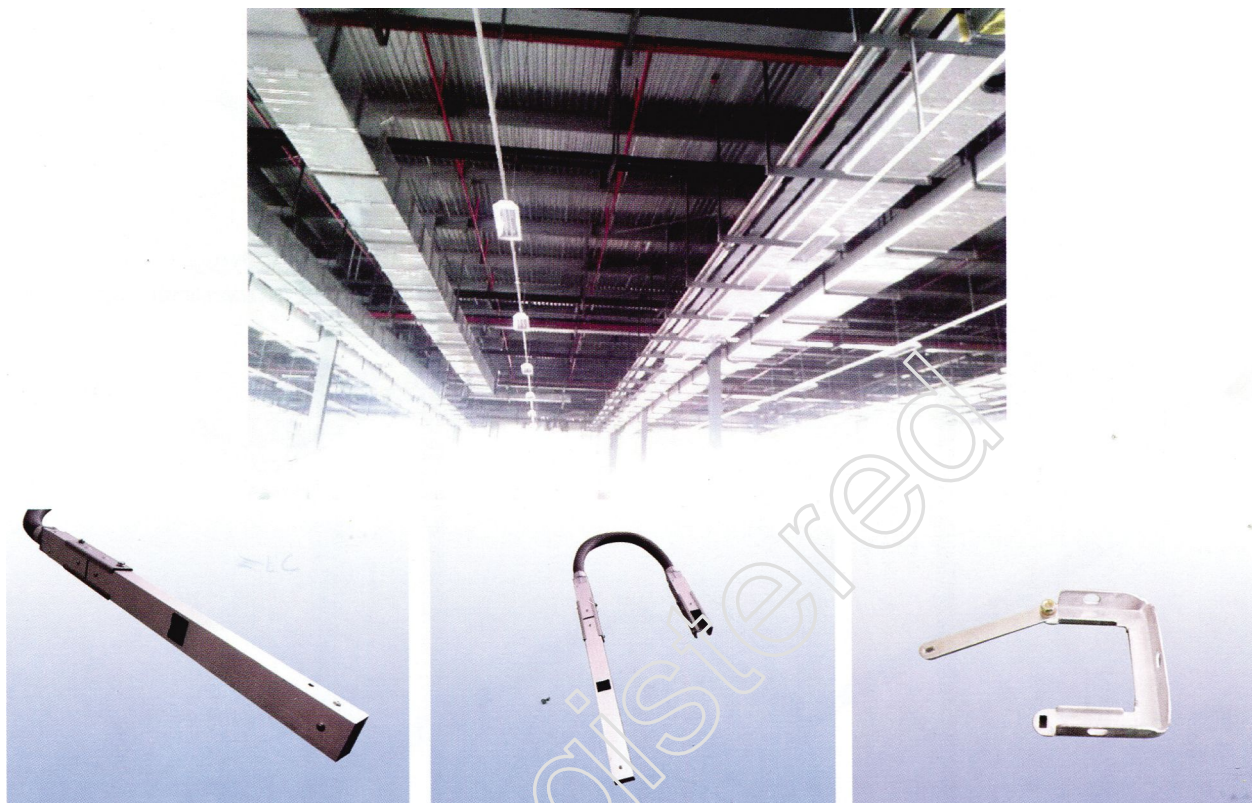
插接可靠、安装快捷 Relialble socket, faster installation

HCC-ZM 型照明母线电流分接插头设有机械联锁装置, 可有效保证插接可靠性, 专用连接器使用安装过程简单、快捷, 不需专用工具。

HCC-ZM lighting bus current tap plug is provided with a mechanical interlock device, can effectively guarantee the reliability of special connector plug, the installation process is simple, fast, no need of special tools.



## HCC-ZM 照明母线 HCC-ZM Lighting Busway



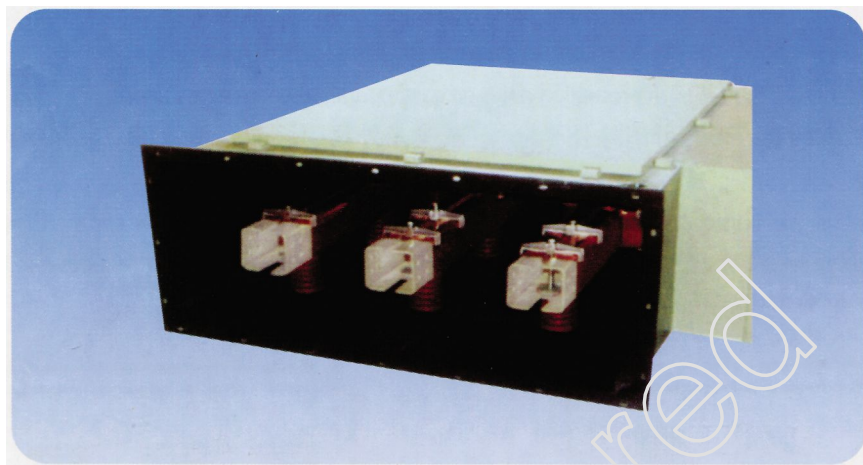
### 技术参数 Technical references

(1) 主要电气技术参数 Main electrical technical references see table

符合标准 Conform to Standard		IEC60439-1.2;GB7251.1-2-1997	
防护等级 Protection Grade		IP55	
额定工作电流 Rated Current	A	40	63
动稳电流 Dynamic Current	KA	3.75	4.5
热稳电流 Thermal Current	KA	2.5	3
温升 Temperature Rise	K	连接端子 60K, 金属外壳 30K Connecting Terminal 60K. Metal Enclosure 30K	
介电强度 Media Strength		交流工频电压 2000V 有效值/min AC frequency voltage 2000V/min	
绝缘电阻 Insulation Resistance		相与相及外壳之间不小于 20MΩ Between Phase and enclosure ≥ 20MΩ	

## GM-1 系列共箱封闭母线系统

### GM-1 Three Phase in One Box Sealing Busway



#### 高压大电流设备的理想选择 It is the best choice of HV large current

GM-1 三相共箱封闭母线系统外壳采用铝合金或弱磁钢板(不锈钢)制造,内部导体为矩形、槽形母排(铜或铝),系统额定电流可达 6300A,额定工作电压达 35KV。该系统可广泛应用于发电机出线与变压器之间或变压器与高压配电柜之间的电流传输,也可应用于发电机交、直流励磁回路,变电所所用电引入或其它工业、民用设施的电源引线。

The frame of GM-1 three phases in one sealing busway is aluminum alloy or weak magnetic steel plate (stainless steel), inner shape conductor is rectangle, channel type (copper or alloy), system current can up to 6300A, rated working current up to 35KV. It is widely used between outgoing of power and transformer or between transformer and HV switchgear to transmission current, it can also be used in DC or AC circuit of power, it can be used as power lead wire of electric substation or other industry, domestic facilities.

#### 安全可靠 Safety and reliable

母线导体选用高强度大爬距绝缘子支撑,使系统具有较高的抗短路电动性能,合理的绝缘子支撑间距的设置,充分避免了系统共振的危险,全连续外壳并多点接地方式杜绝了人身触电危险。

Support busway conductor is high strength large span insulator porcelain, it can make the system has good ability of prevent short circuit, and the possible installation support distance of insulator porcelain avoid the danger of system resonance, all over continuous frame and multiple earthing point prevent people contact power.

## 温升高 Lower temperature rise

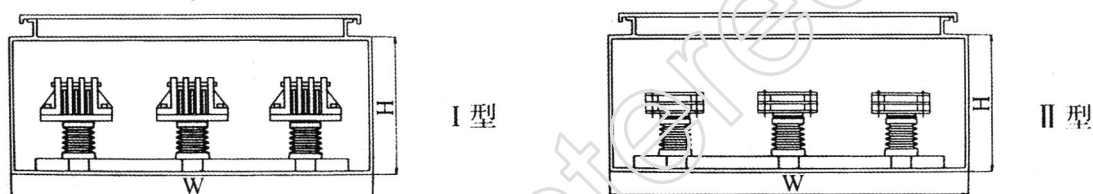
母线外壳采用铝合金或弱磁材料可避免感应涡流发热,降低其温升,同时提高了散热性能,导体接头表面采用镀银处理,降低了接触电阻,使导体接头处拥有较小的温升,提高了导电性能。

The frame of busway is aluminum alloy or weak magnetic material can prevent induction eddy current heat, lowering temperature rises, and improves abstract heat ability, conductor connection face is covered with silver, it can lowering contact resistance, make the connection point has litter temperature rise, and improved the conducting power.

防护等级高,运行维护方便 High protection degrees.easy operation and maintain

母线外壳防护等级达 IP54,可消除外界潮气、灰尘及外物引起的接地故障。在系统两端或重要部位、可设置观察窗、温度警示标记、或测温远程监控装置等,运行维护方便。

Protection degrees of the frame up to IP54, it cans elimination outside moisture, dust and earthing trouble because of outside objects. Watching window, temperature remind tap or long distance supervisory control device of temperature test and so on to the two point of system or important area.



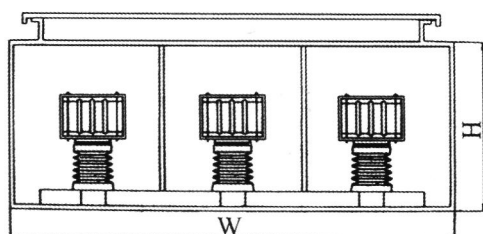
符合标准 Applicable standard		IEC363-5-54、GB/T8349-2000、JB/T9639-1999			
环境温度 Enviroment temperature	℃	-40~+40			
相对湿度 Relatine humidity		日平均不大于 95%,月平均值不大于 90% daily the average is not above 95%,monthly the average is not zbove 90%			
防护等级 Pretendable grade		IP40、IP54			
额定电压 Rated volatge	kV	3.15	6.3	10.5	35
最高工作电压 Best work voltage	kV	3.45	6.9	11.5	40.5
绝缘等级 Isolated grade	kV	18/40	23/60	35/75	80/185
额定频率 Rated Frequency(Hz)	Hz	50(60)			
额定工作电流 Rated vprk electric current	A	外型尺寸(W×H) (mm×mm) contour size			
1000~3000		I 750×400 II 850×350	I 900×560 II 1060×460	I 900×560 II 1060×460	I 1500×920 II 1800×880
3500		I 750×440 II 850×480	I 900×560 II 1060×460	I 900×560 II 1060×460	
4000		I 750×440 II 850×480	I 900×560 II 1060×460	I 900×560 II 1060×460	
4500		I 750×440	I 900×560	I 900×560	
5000		I 1350×500	I 1500×600	I 1500×600	
6300		I 1350×500	I 1500×660	I 1500×600	

## GM-2 隔箱封闭母线

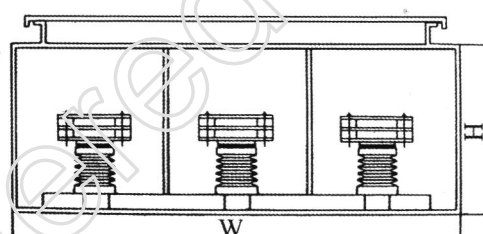
### GM-2 Non-Segregated Isolated Phase Enclose Busway

可提供电流达 4500A、工作电压达 10.5kV 的产品,由于三相间被单独隔开,形成三个独立的空间,因而形成了比共箱封闭母线小的外部磁场,也可避免相间短路。

The busway is suitable for current within 4500A and the voltage within 10.5kV. Because 3-phase buses are isolated each other, there form 3 independent spaces, therefore: the separated-phase forms the outer magnetic field smaller than the non-segregated phase enclosed busway. The form makes the phase-to-phase short circuit avoided.



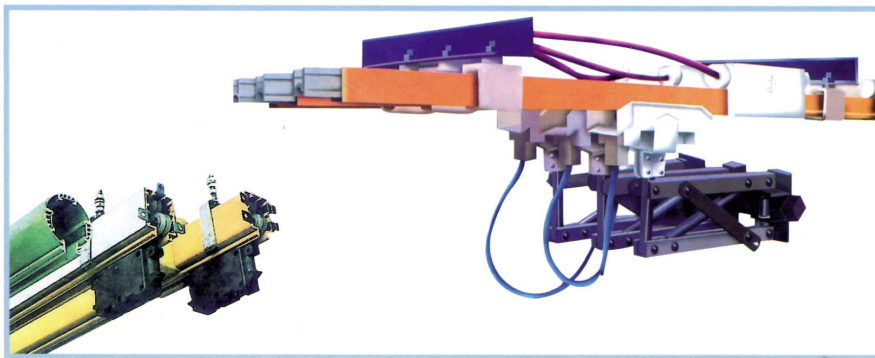
I 型



II 型

符合标准 Applicable standard	IEC363-5-54、GB/T8349、JB/T9639-1999		
额定电压 (KV) Rated voltage	3.15	6.3	10.5
绝缘等级 (KV) Insulation Grade	18/40	23/60	35/75
额定电流 (KV) Rated Current	外型尺寸 Contour size (W×H) (mm×mm)		
1000	I 800×500 II 1000×440	I 1200×560 II 1400×500	I 1200×560 II 1400×560
1600	I 800×500 II 1000×440	I 1200×560 II 1400×500	I 1200×560 II 1400×560
2000	I 800×500 II 1000×440	I 1200×560 II 1400×500	I 1200×560 II 1400×560
2500	I 800×500 II 1000×440	I 1200×560 II 1400×500	I 1200×560 II 1400×560
3000	I 800×500 II 1000×440	I 1200×560 II 1400×500	I 1200×560 II 1400×560
3500	I 800×500 II 1000×440	I 1200×560 II 1400×500	I 1200×560 II 1400×560
4000	I 800×500 II 1000×440	I 1200×560 II 1400×500	I 1200×560 II 1400×560
4200	I 800×500 II 1000×440	I 1200×560 II 1400×500	I 1200×560 II 1400×560

## HF 滑触线 HF Sliding contact line



安全供电滑触线装置广泛用于电动葫芦、电动梁式和桥式起重机、龙门式起重机、装卸机、堆垛机等欠储设备、移动式电动工具、自动生产线、检测线等一切需要移动受电的设施与场所。

我公司生产 HFP 多极塑管式、HFJ 多极铝外壳式、HFD 单极铝合金组式、HFG 钢导体四大系列安全滑触线。工作电流最小为 50A，最大为 2200A。同时还为防爆移动设备配套生产 DHC 电缆滑车线。公司产品能满足各行业对安全滑触线的需求。

Sliding contact busbar is widely used in electric gourd, cranes loading and unloading machine. Moving type electric tool automatic production line, testing line and other arena.

The "HFP" multipolar plastic cannulation, "HFJ" multipolar aluminum crust, "HFD" single-polar alnico compounding, "HFG" steel conductor four series safe slide cable, the minimum working current is 50A and the max is 2200A. We also provide DHC slide cable for blast transfer equipment. Our products can meet your request for safe slide cable.

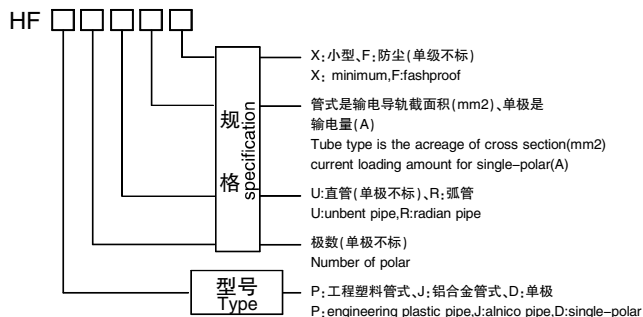
### 产品主要技术指标 Main technical specification of the products

- |  |  |  |
|--|--|--|
| 1、使用地区海拔高度 (Marimunsite altitude):<br>H≤2000m                                | HFP>120m/min<br>HFJ>200m/min<br>HFD>600m/min   | 13、抗冲击(Anti-concussion).t: 1ms,<br>a:500g  |
| 2、极地、极间绝缘电阻(Insulation resistancebetweenpolars,polarIthe earth)R≥5MΩ         | 8、电动稳定性 (Electromotion stability):50 倍额定电流、0.1 秒(50 times of rated current 0.1 second) | 14、工作寿命(Life for using): 室内 10 年. 室外 8 年 (10 years for indoor; 8 years for outdoor)  |
| 3、绝缘介电强度(Insulation media intensity):<br>AC3000V、50Hz、1min 无击穿闪络 (Noflicker) | 9、耐腐蚀性(Caustionness): 耐酸雾、碱雾、盐雾腐蚀(Acidproof,alkaliproof, salinefog)                    | 15、电刷有效工作压力(Effectiveworking pressure of rbrush):2+0.5N/cm <sup>2</sup>  |
| 4、相对漏电起痕指数(Relativecreepage exponent).CTI>600V                               | 10、气温条件(Temperature);<br>HFP(-30℃~+55℃)<br>HFJ(-30℃~+65℃)<br>HFD(-30℃~+80℃)            | 16、导体电阻率:符合国标《电线电缆导体》<br>Resistance rate of conductor;according with nternational((cableconductor~GB3952—3953—83<br>Pcu≤0.02Ω·mm <sup>2</sup> ·M <sup>-1</sup><br>Pcu≤0.02Ω·mm <sup>2</sup> ·M <sup>-1</sup> |
| 5、防火性能(Fire capability): 阻燃自熄 (本身生灯法) (Anti;burn)                            | 11、相对湿度(Relativehumidity):<br>95%(+25℃)  |  |
| 6、外壳防护等级 (Protection degree cor-crustaceous):<br>IPI3、IP53(防尘)(Ashpreof)     | 12、大气压力 (Barometric):86 - 106Kpa   |  |
| 7、最大运行速度(Max.runing velocity):   |  |  |

### 型号和规格 Size & spec

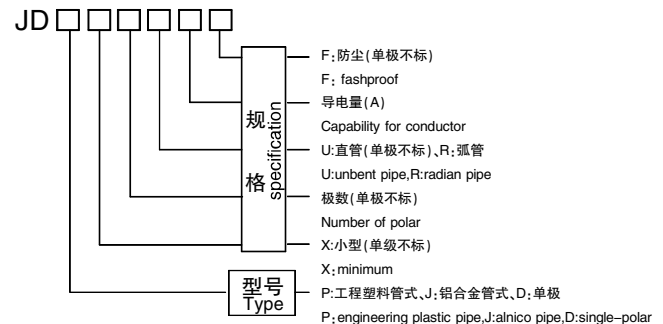
A: 滑触线的型号和规格, 由符号 HF 加后缀组成:

Size and spec of sliding cable, is composed by HF with a suffix:



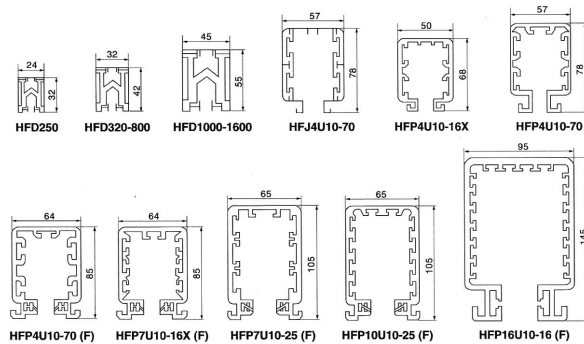
B: 集电器的型号和规格, 由符号 JD 加后缀组成:

Size and spec for collector, is composed by JD with a suffix:



## 滑触线导管截面图

Drawing for section  
of sliding pipe



## HFP 工程塑料管式滑触线基本技术参数

The basic parameter of "HFP" engineering plastic slide cable

序号 Item	型号 规格 Size & spec	35℃载流量(A) 35℃ current loading amount	35℃百米直流电阻 (Ω) 35℃ creistance/ 100m	35℃ 50Hz 百米交流阻搞(Ω) 35℃ 50Hz impedance/100m	导管外形 H×W(mm) Dimension	起重机适用吨位 Ton in point for the lift	集电器配用型号 Spec of the collector
1	HFP4U10X	50	0.2	0.04030	68×50	<5	JDP×4U80
2	HFP4U16X	80	0.125	0.03652	78×57	5~10	JDP4U160 JDP4U80 JDP4R80 JDP4R30
3	HFP4U10	50	0.2	0.04083		<5	
4	HFP4U16	80	0.125	0.03701		5~10	
5	HFP4U25	100	0.08	0.03279		10~20	
6	HFP4U35	130	0.057	0.02909		15~30	
7	HFP4U50	180	0.04	0.02479		50/10	
8	HFP4U70	230	0.0286	0.02049		35~70	
9	HFP4U10(F)	50	0.2	0.04149		<5	
10	HFP4U16(F)	80	0.125	0.03732	50~10		
11	HFP4U25(F)	100	0.08	0.03332	10~20		
12	HFP4U35(F)	130	0.057	0.02954	15~30		
13	HFP4U50(F)	180	0.04	0.02513	50/10		
14	HFP4U70(F)	230	0.0286	0.02072	35~7		
15	HFP7U10X(F)	50	0.2	0.03923	<5	JDP×7U25F	
16	HFP7U16X(F)	80	0.125	0.03552	5~10		
17	HFP7U10(F)	50	0.2	0.03948	<5	JDP7U50F	
18	HFP7U16(F)	80	0.125	0.03575	5~10		
19	HFP7U25(F)	100	0.08	0.03169	10~20		
20	HFP10U10(F)	50	0.2	0.03470	<5		JDP10U50F JDP8R25F
21	HFP10U16(F)	80	0.125	0.03126	5~10		
22	HFP10U25(F)	100	0.08	0.02766	10~20		
23	HFP10U10(F)	50	0.2	0.03154	<5	JDP16U45F	
24	HFP10U16(F)	80	0.125	0.02854	5~10		

HFP 系列产品定尺 4 米。导电轨材料 T2 电工铜。序号 9-24 可提供普通型和防尘型二种规格滑触线。

对应的集电器通用；序号 1-8, 15, 16, 20, 21, 22 可加工制作半径大于 1.2 米的弧管。

The length for HFP products is 4m, and the material for conductor is T2 electrolysed copper. No 9-24 can provide both conamon and ashproof type sliding cables. The collectors are all-purposed. No 1-8, 15, 16, 20, 21, 22 can be used for radian pipe which radius is over 1.2m.

## HFJ 铝合金管式滑触线基本技术参数

The basic parameter of "HFJ" al-alloy slide cable

序号 Item	型号 规格 Size & spec	35℃载流量(A) 35℃ current loading amount	35℃百米直 流电阻 (Ω) 35℃ creistance/ 100m	35℃ 50Hz 百米交流阻搞 (Ω) 35℃ 50Hz impedance/ 100m	导管外形 H×W(mm) Dimension	起重机适 用吨位 Ton in point for the lift	集电器配 用型号 Spec of the collector
1	HFJ4U10	50	0.2	0.04083	78×57	<5	JDJ4U80 JDJ4U160 JDJ4R30
2	HFJ4U16	80	0.125	0.03701		5~10	
3	HFJ4U25	100	0.08	0.03279		10~20	
4	HFJ4U35	130	0.057	0.02909		15~30	
5	HFJ4U50	180	0.04	0.02479		50/10	
6	HFJ4U70	230	0.0286	0.02049		35~70	

HFJ 系列产品定尺 4 米，并可加工制作半径大于 1.2 米的弧管。导电轨材料 T2 电工铜。

HFJ 系列产品适用于室外露天场所及高温环境下的起重机的使用。

The length for HFJ products is 4m, and it can be used for radian pipe which radius is over 1.2m, the material for conductor is T2 electroiyised copper.

HFJ products can be used outdoor or high temperature condition,

## HFD 铝合金单极滑触线基本技术参数

The basic parameter of "HFD" al-alloy slide polar slide cable

序号 Item	型号 规格 Size & spec	35℃载流量 (A) 35℃ current loading amount	35℃百米直 流电阻 (Ω) 35℃ creistance/ 100m	35℃ 50Hz 百米交流阻 搞(Ω) 35℃ 50Hz impedance/ 100m	导管外形 H×W(mm) Dimension	起重机适 用吨位 Ton in point for the lift	起重机适 用吨位 Ton in point for the lift	集电器配 用型号 Spec of the collector	
1	HFD250	250	0.023076	0.01919	32×24	35~70	80	JDD160	
2	HFD320	320	0.014423	0.01323	42×32	50~70		80	JDD240
3	HFD500	500	0.010381	0.009848		>70			
4	HFD800	800	0.006928	0.006733	55×45	>70	85	JDD600	
5	HFD1000	1000	0.004378	0.004319		>100			
6	HFD1250	1250	0.003120	0.003095		>120			
7	HFD1600	1600	0.002455	0.002441	>150				

HFD 系列产品定尺 6 米 导电轨为 LD3 铝型材；

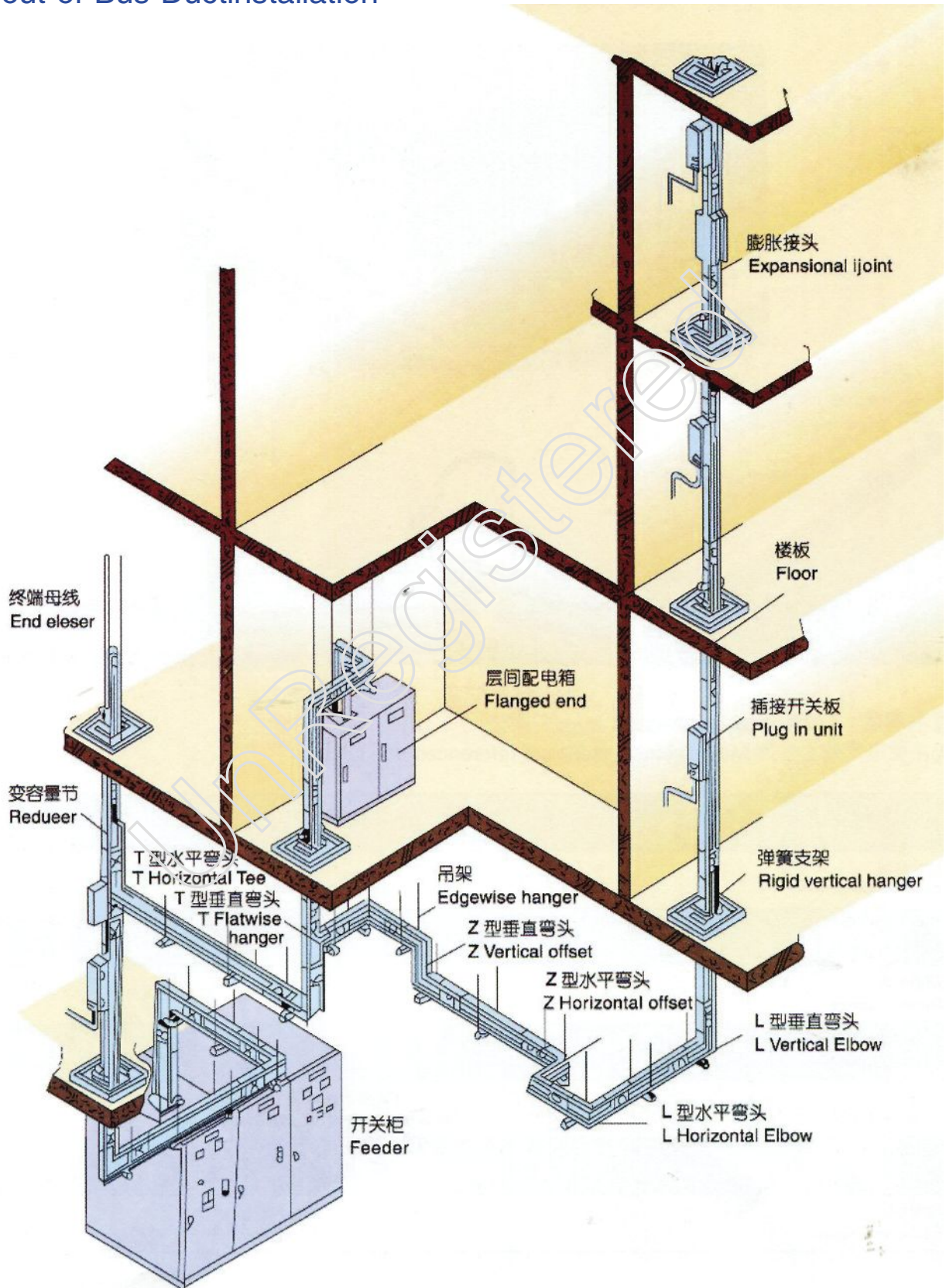
HFD 单极 H 型滑触线适宜大功率起重设备使用 导电槽中压入 1Cr18Ni9 不锈钢条抗磨损

The length of HFD products is 6m, conductor is LD3 aluminium.

H type HFD single-polar sliding cable can be used for high-power device. The 1Cr18Ni9 stainless steel in the slot is wearable.

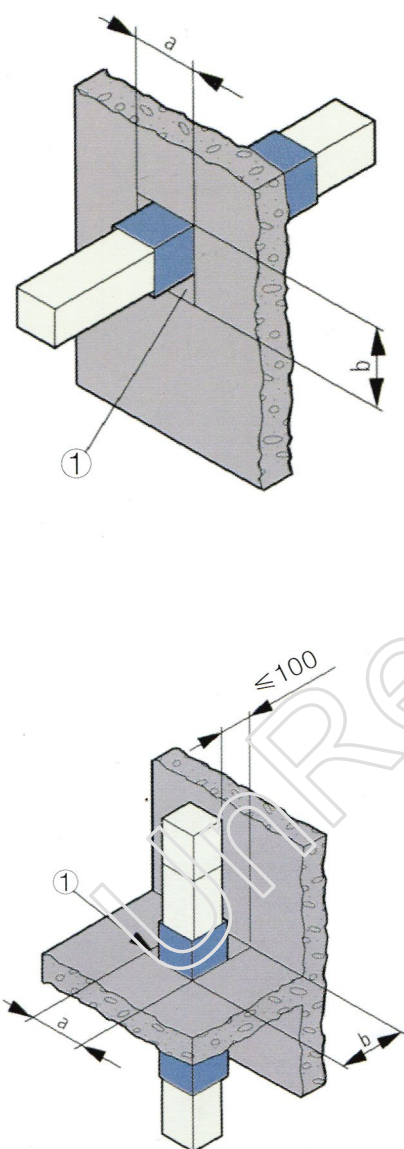
## 母线槽安装示意图

Layout of Bus Duct installation



下列图示表明了母线槽单元穿墙安装时的标准尺寸。

## 穿墙



电流 (A)	a/mm	b/mm
XLC-III 400A XLA-III 400A	340 340	324 324
XLC-III 630A XLA-III 630A	340 340	324 324
XLC-III 800A XLA-III 800A	340 340	324 345
XLC-III 1000A XLA-III 1000A	340 340	332 370
XLC-III 1250A XLA-III 1250A	340 340	355 400
XLC-III 1600A XLA-III 1600A	340 340	385 450
XLC-III 2000A XLA-III 2000A	340 340	421 495
XLC-III 2500A XLA-III 2500A	340 340	480 604
XLC-III 3150A XLA-III 3150A	340 340	582 714
XLC-III 4000A XLA-III 4000A	340 340	654 794
XLC-III 5000A	340	764

a-表示母线宽度方向 a-Show the busbar width

b-表示母线高度方向 b-Show the busbar height



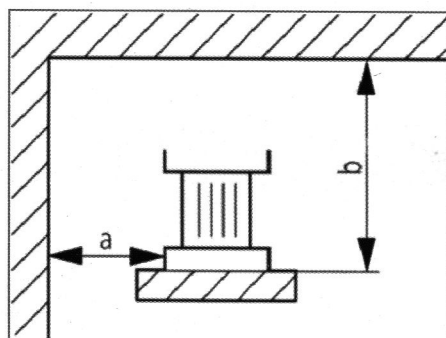
## 母线槽系统的安装

### 水平安装尺寸要求

为了使母线槽系统和插接箱单元的安装更加简单方便,在进行设计时必须考虑到系统安装的最小尺寸。

XL-III 母线槽系统(不带插接箱)

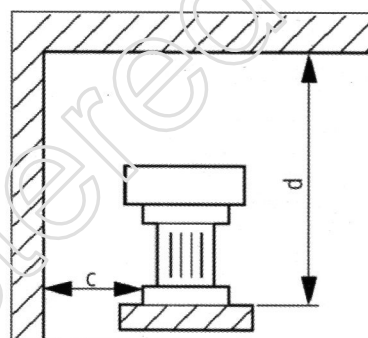
XL-III 馈电式母线槽系统的最小尺寸



不带插接箱单元

XL-III 母线槽系统(带插接箱)

XL-III 馈电式母线槽系统的最小尺寸

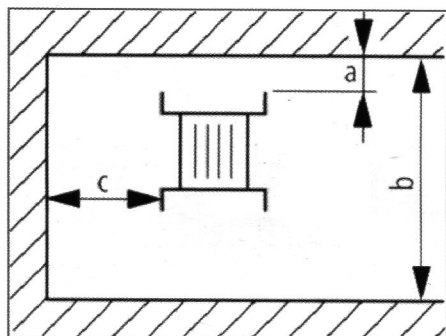


带插接箱单元

### 垂直安装尺寸要求

XL-III 母线槽系统(不带插接箱)

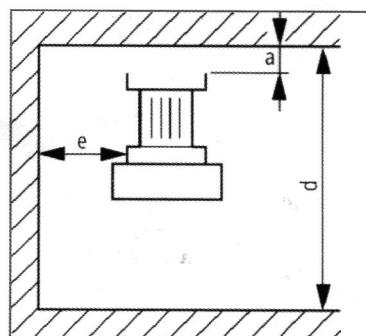
下面的图示表明了母线槽系统安装时的最小尺寸,并没有反映安装附件的尺寸,在工程项目中安装时要充分考虑到。



不带插接箱单元

XL-III 母线槽系统(带插接箱)

下面的图示表明了母线槽系统安装时的最小尺寸,并没有反映安装附件的尺寸,在工程项目中安装时要充分考虑到。



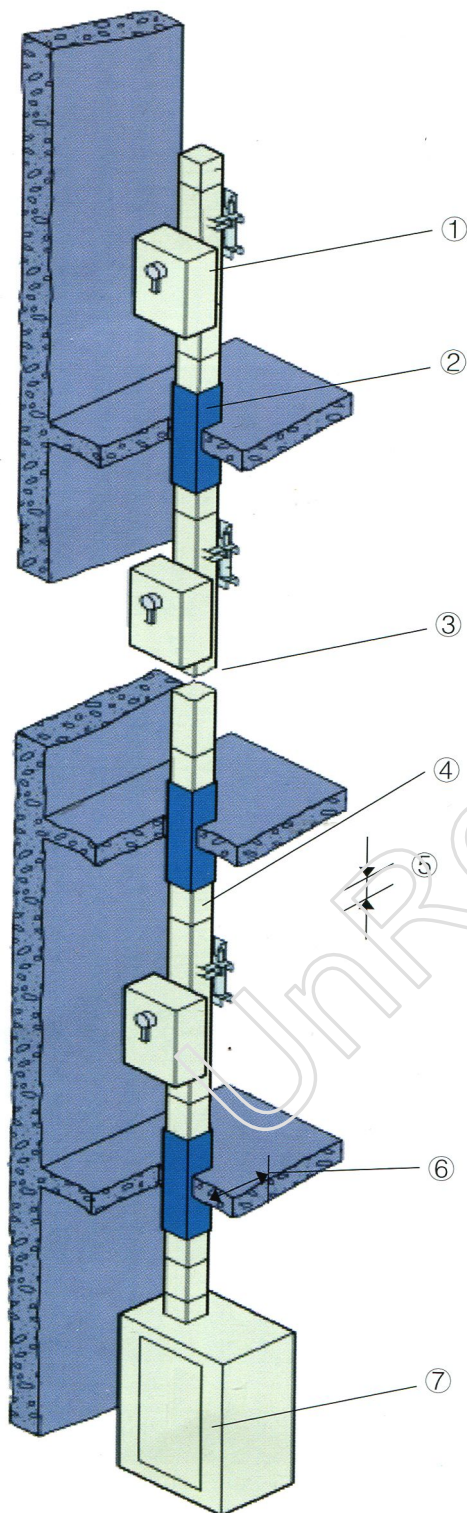
带插接箱单元

## 母线槽系统的安装

水平安装		XLC-III 铜母线	XLA-III 铝母线		XLC-III 铜母线	XLA-III 铝母线
电流等级	a	b		c	d	
400A	100	218	218	350	918	918
630A	100	218	218	350	918	918
800A	100	218	239	350	918	939
1000A	100	226	264	350	926	964
1250A	100	249	294	350	949	994
1600A	100	279	344	350	979	1044
2000A	100	315	389	350	1015	1089
2500A	100	374	498	350	1074	1198
3150A	100	476	603	350	1176	1308
4000A	100	548	688	350	1248	1388
5000A	100	658	/	350	1358	/

垂直安装		XLC-III 铜母线	XLA-III 铝母线		XLC-III 铜母线	XLA-III 铝母线	
电流等级	a	b		c	d		e
400A	100	318	318	100	1018	1018	400
630A	100	318	318	100	1018	1018	400
800A	100	318	339	100	1018	1039	400
1000A	100	326	364	100	1026	1064	400
1250A	100	349	394	100	1049	1094	400
1600A	100	379	444	100	1079	1114	400
2000A	100	415	489	100	1115	1189	400
2500A	100	474	598	100	1174	1298	400
3150A	100	576	708	100	1276	1408	400
4000A	100	648	788	100	1348	1488	400
5000A	100	758	/	100	1458	/	400

## 母线槽系统的安装



- ① 终端
- ② 插接箱单元
- ③ 弹簧支架
- ④ 防火栅
- ⑤ 天花板厚度
- ⑥ 安装支架距离墙面需 10cm
- ⑦ 配电柜

### 安装方式

母线槽系统垂直安装时,对于插接箱的安装方式有着明确的规定,需采用底出线的方式,当 L1 导体在左手侧的时候,插接箱也要采用底出线的安装方式。

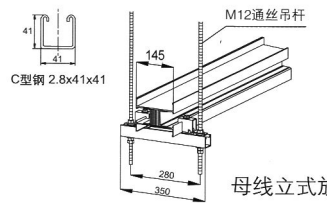
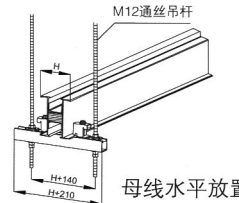
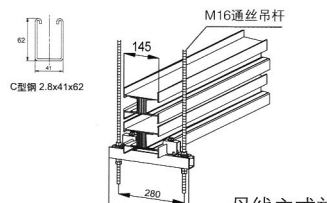
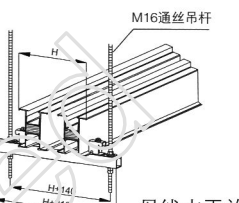
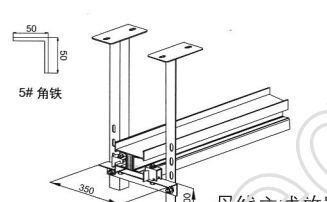
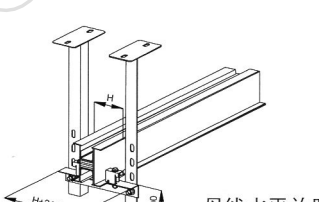
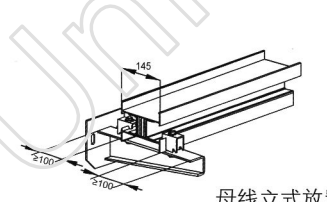
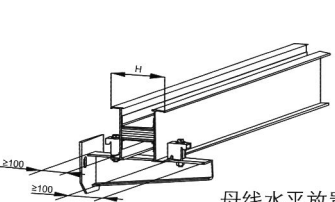
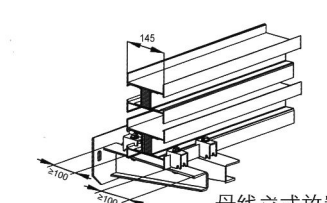
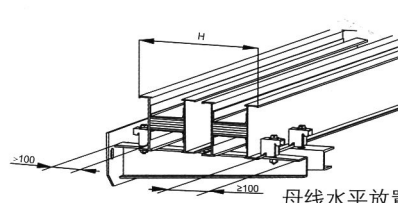
### 垂直安装

当 XL—III 母线槽垂直安装时需要特殊的安装附件(弹簧支架),而且如果是单套系统,每层楼则至少需加装一套弹簧支架装置,如果是双套系统,则至少需要加装两套弹簧支架装置,弹簧支架的作用主要是为了承载母线槽自身的重量及运行时产生的线性膨胀有两种不同的规格型号可供选择,在选择时要考虑到插接箱所带来的额外重量,同时对于输电母线和配电母线要有区别,针对不同的母线槽型号进行不同的选择。

	电流 (A)	数量
输电	400~2500	1
	3150~5000	2
配电	400~2500	1
	3150~5000	2

注:每层楼至少一套插接箱单元

## 母线槽系统的安装

通丝吊架		
适用于轻载且震动的场合	 <p>M12通丝吊杆 C型钢 2.8x41x41 母线立式放置</p>	 <p>M12通丝吊杆 母线水平放置</p>
适用于重载且震动的场合	 <p>M16通丝吊杆 C型钢 2.8x41x62 母线立式放置</p>	 <p>M16通丝吊杆 母线水平放置</p>
角钢吊架		
适用于重载或轻载且震动的场合	 <p>5#角铁 母线立式放置</p>	 <p>母线水平放置</p>
支架托臂		
轻载 (单托臂)	 <p>母线立式放置</p>	 <p>母线水平放置</p>
重载 (双托臂)	 <p>母线立式放置</p>	 <p>母线水平放置</p>
<p>注: 上示图片为示意图, 具体形式请以测量或工程设计与客户确认的图纸为准。</p>		

通丝吊架	
适用于轻载且震动小的场合	
适用于重载且震动小的场合	
角钢吊架	
适用于重载或轻载且震动小的场合	
注: 上示图片为示意图, 具体形式请以测量或工程设计与客户确认的图纸为准。	

母线槽的高度(H)

电流等级	400A	630A	800A	1000A	1250A	1600A	2000A	2500A	3150A	4000A	5000A
XLC-III	118	118	118	126	149	179	215	274	376	448	558
XLA-III	118	118	139	164	194	244	289	398	508/	588	/

## 部分业绩

- 西柏坡电厂  
恒基达鑫(珠海)国际化工仓储有限公司  
江苏环亚建设工程有限公司  
云南省昆明市第一人民医院  
上海市第六人民医院  
天津空港医院  
北京广安门医院  
福建肿瘤医院  
浙江肿瘤医院  
嘉兴新嘉爱斯热电有限公司  
江苏富春江环保热电有限公司  
重庆市华晨鑫源汽车制造厂  
重庆市博览中心  
上海世博会  
广西水利电力集团有限公司  
大连机场  
武汉电器销售公司  
常熟农商行  
昆山聚亨机电有限公司  
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江南起重运输机械有限公司  
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陕西省化肥厂  
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乌鲁木齐石化总厂  
贵州化肥厂  
岳阳石化总厂  
上海地铁九号线  
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山东聊城鲁西化工厂  
江苏仪征化纤厂  
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武汉光谷  
武汉市图书馆  
深圳地铁  
南京地铁  
郑州火车站  
安徽省高等级公路  
中央人民广播电台  
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昆明新闻中心  
武汉日报社东省  
中国长江三峡水电枢纽  
黄河小浪底水电枢纽  
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镇江谏壁电厂  
浙江长兴华能电厂  
宁波光耀热电有限公司  
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浙江嘉兴新嘉爱斯热电有限公司  
河南洛阳万基热电有限公司  
山东日照电厂  
兰州西固热电厂  
太原热电厂
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杭州火炬大厦  
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上海三菱电机三菱空调电器有限公司  
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沈阳医科大学  
重庆市急救中心  
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广州市电信局  
金华市证券大楼  
广州邮电大厦  
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宁夏发电集团红寺堡光伏发电厂  
苏州高创特新能源发展有限公司  
安徽振发新能源科技有限公司  
黄河上游水电开发有限责任公司  
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