

# 瑞鑫母线槽系统应用概述

## System overview

### 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。

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。

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

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电产品。

### Overview

Creating a design concept for a power supply system, not only involves observing applicable standards and regulations, but also examining and clarifying economic and technical requirements. For electrical equipment selection should be based on whether the entire system can achieve the best configuration, but not limited to the integral features of equipments. For example, in choosing of connection between cabinets and transformers for the distribution, it should take into account the connections between devices as a whole rather than individual choice.

Components should not only be appropriate for rated operation, but should also be suitably dimensioned to withstand faults situations. A power distribution concept should also take the following points into consideration.

- Building type, use and form (for example, high-rise building, flat buildings and number of floors).
- Load centers and possible supply paths and location for transformers and main distribution boards
- Regulations and guidelines of building authorities ■ Power supply company guidelines.

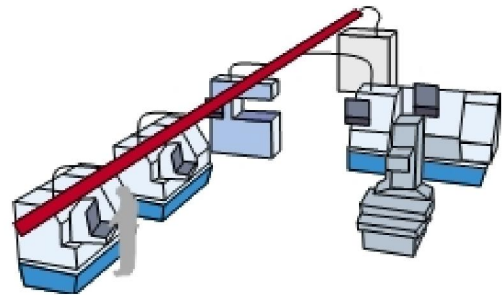
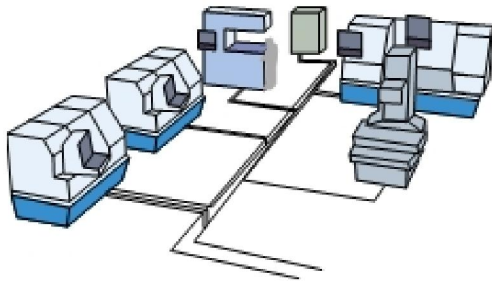
There will always be more than one possible solution which will have to be assessed in terms of its technical and economic advantages and disadvantages. In making this assessment, the following requirements should be a priority.

- Simple and transparent design
- Long service life
- High availability
- Low fire load
- Flexible adaptation to building modifications.

These requirements are generally easy to meet with appropriate busbar trunking systems. For this reason, engineers increasingly favor busbar trunking systems over cable installations for power transmission and distribution applications. ZSB offers busbar trunking systems for rated current from 140A to 6300A to meet the needs of different projects.

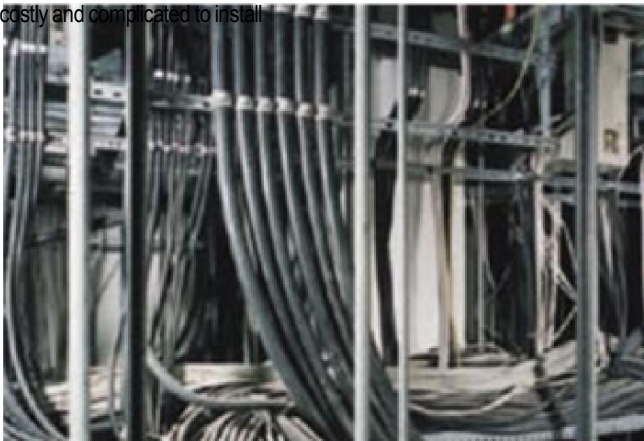
## 瑞鑫低压母线系统是替代 电缆配电的经济、理想型方案

As a substitute for the cable distribution system, Ruixin low-voltage busbar is the economic, ideal solution!



安装电缆时，新负载线路只能按照传统方法连接分配电屏，费用高且安装复杂。

When install cables, the new load lines only in accordance with traditional connection methods to connect branch distribution board, costly and complicated to install.



电缆布线复杂，火灾荷载高  
Cable layout is complex, high fire load

母线槽的插接单元接近负载设备，现场布局更清晰、灵活，经济实用。

The tap-off units of busbar system are close to the loading equipments, enjoying clearer site layout, flexible, economical and practical features.



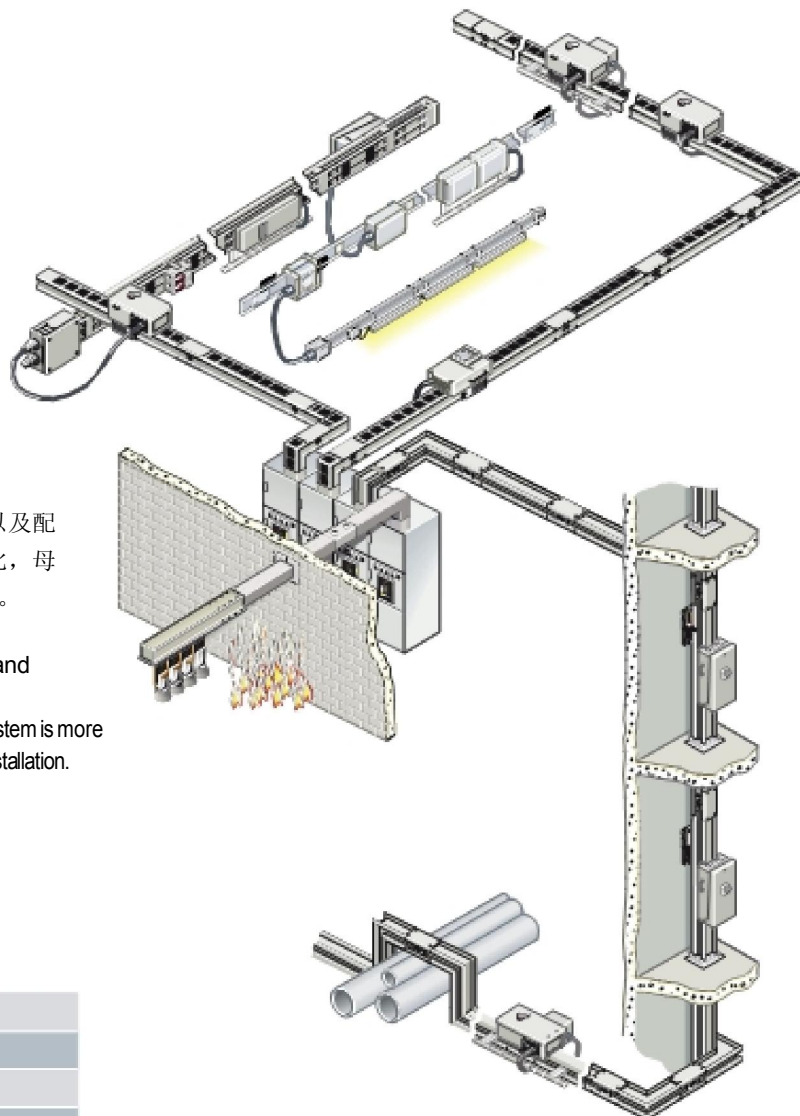
母线设计简单清晰，火灾荷载低  
Busbar planning is easy, low fire load

# 瑞鑫低压母线系统

Ruixin low voltage trunking system

母线槽系统主要作为变压器与配电柜之间的输电设备以及配电柜与负载之间的配电设备而被广泛使用，与电缆相比，母线槽系统不但安全，而且寿命长、性能可靠、使用方便。

As the power distribution equipment between transformer and switchgear, between switchgear and loading equipments, busbar trunking system is widely applied. Such system is more safe, long life-span, reliable and convenient to operate over cable installation.



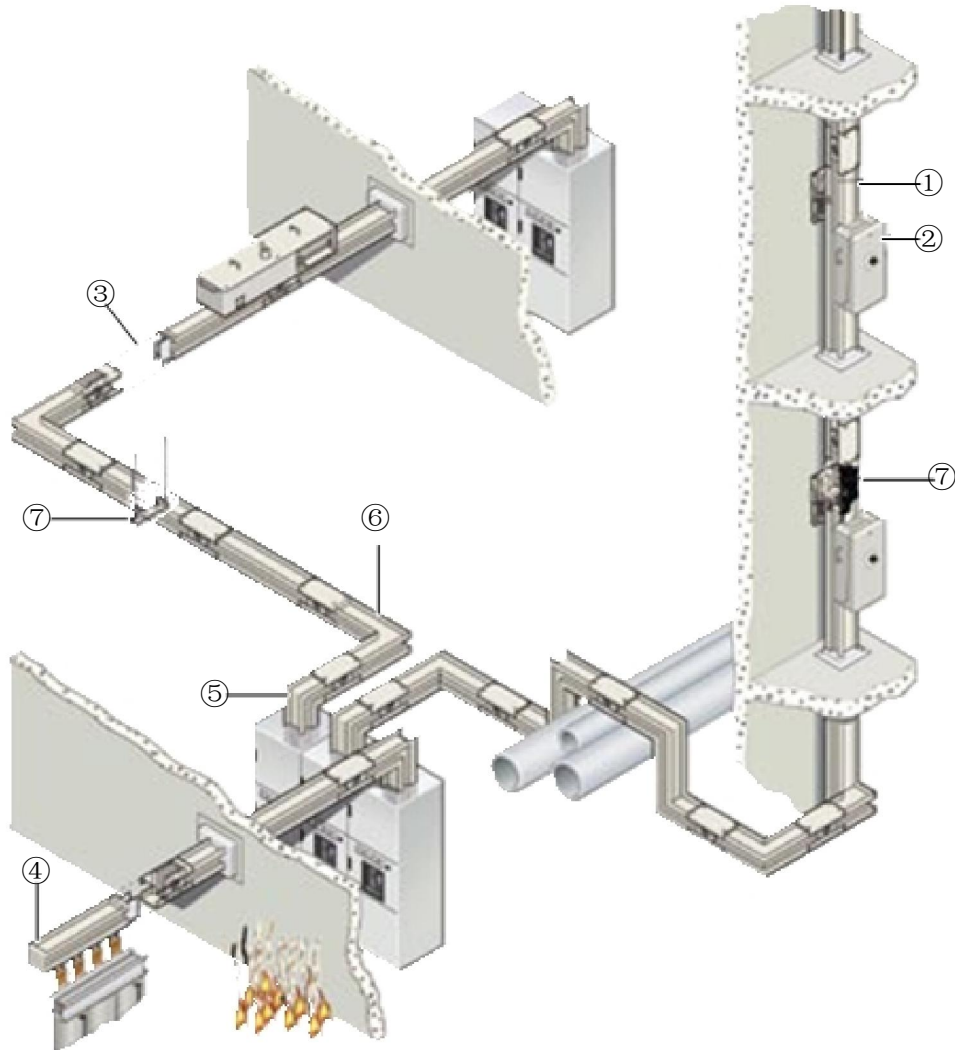
MCM系统      额定电流100A~6300A

公司生产的母线槽系统电流覆盖面广，产品种类齐全，能满足不同用户和工程项目的需求。所有母线槽系统均执行国际先进标准，并通过了国内权威机构的各项检测与认证。

Products of ZSB cover wide current range, varied products can meet the needs of different users and the demand for projects. All the busbar systems are type-tested low-voltage assembly (TTA) in accordance with international advanced standard IEC/EN, passed a series of international and domestic tests and certificates, such as Germany Bonn Electric Laboratory Test, ASTA from UK, CCC, etc. which guarantee our products performance. Meanwhile, ZSB bears the task of busbar standard reserching, auditing and revising, as the industry benchmarking largely promoting the busbar industry and leading the industrial development in the following time.

# 母线槽系统

## 系统描述 System overview



- ① 直线段单元 Straight trunking units (with or without tap-off points)
- ② 插接箱单元 Tap-off units, can be connected whilst live
- ③ 连接器单元 Joint pack units
- ④ 变压器连接 AS单元 Feeder units
- ⑤ 低压柜联络单元 Connection to power distribution boards
- ⑥ 换向单元 Junction units
- ⑦ 安装附件 Additional equipment for wall/ceiling mounting

MCM密集型母线槽是根据中国市场的特点而研制的更贴近用户需求的新型密集型母线系统。该系统在原有基础上进行升级，自动化生产程度更高，能满足不同用户群的配电需求。

Combining successful sales and manufacturing experience, ZSB makes MCM compact system much closer to customer. The system is upgraded on the original type, enjoying higher automation degree to meet different customers' requirements. And it will lead the new technical developing direction of busbar for sure.

# MCM密集型母线槽系统

## 系统部件 System components

### 系统部件基本描述

MCM母线槽系统既可应用在变压器与配电柜之间的连接，还可以为负载进行供电系统提供的防护等级最高可达IP65，能适应各种恶劣环境，插接箱输出电流最大可以达到1250A，为用户提供了可靠的负载环境，高的防护等级也为维护人员的安全提供了保证。

#### 1. 直线段单元

根据需要可以加装穿墙套单元，  
防护等级IP40、IP65，  
(最高可以达到IP65)

馈电式和插接式

标准长度

MCM: 5m/4m/3m/2m/1m

可选长度

MCM: 0.44 - 4.99 m

可垂直安装也可水平安装

插接母线

单面设插口

双面设插口

插口提供的防护等级为IP40

能有效防止错相安装

防火母线

通过JB/T10327-2002规定

阻燃性能试验

#### 2. 插接单元

采用断路器保护或熔断器保护

钢制外壳

具有良好的接地

防护等级高达IP40

安装方便

机械联锁装置和自动定位装置

能有效防止错相安装

插脚镀银处理

### System components overview

MCM system is the excellent choice to connect transformer and switchgear, and also to supply power for loading equipments. The highest protection degree of IP68 can meet different aggressive environment. The largest tapping current 1250A provides reliable power loading condition and higher personnel safety.

#### 1. Straight trunking units

If needed wall-through cover unit is available. Protection degree: IP40, IP65  
(The highest is IP65)

With or without tap-off points

Standard length

MCM: 5m, 4m, 3m, 2m, 1m

Optional length:

MCM: 0.44 - 4.99m

Optional for vertical and horizontal installation

With tap-off points straight trunking unit

Single side with tap-off points

Double sides with tap-off points

Tap-off point protection degree is IP40

Anti-wrong installation device

Anti-fire straight trunking unit

Passed the JB/T10327-2002 regulation

Anti-fire capability test

#### 2. Tap-off units

Adopts breaker or fuse switch as protection Steel enclosure

Excellent earth device

Protection degree: IP40

Easy installation

Mechanical inter-lock device and auto-positioning device Plug feet silver plated

# MCM密集型母线槽系统

## 系统部件 System components

### 3. 进线单元

#### 变压器进线单元

配置有专门的软连接装置

最大额定电流达到6300A

#### 低压柜进线单元

配置有专门的硬连接(连接铜排)装置

最大额定电流达到6300A

或采用电缆进线单元

### 4. 与瑞鑫低压柜进行连接

从顶端进线

从底部进线

### 5. 换向单元

方便的更改一段母线的走向

角度为70~175度

L型单元

T型单元

Z型单元

### 6. 附件

终端封

连接器

安装件

连接工具

### 3. Feeder Units

#### Transformer feeder units

Special flexible connection

Rated current up to 6300A

#### Distribution board feeder units

Special copper bar connection

Rated current up to 6300A

Or cable feeder unit

### 4. Connection to Ruixin power distribution systems

Above

Below

### 5. Junction units

Easily change the busbar system direction

70° ~ 175°

L unit

T unit

Z unit

### 6. Accessories

End cap

Joint pack

Fixing bracket

Tools for connection



# MCM密集型母线槽系统

加工设备



## 母线装配

与传统密集型产品不同，MCM密集型母线系统引进澳大利亚AJ自冲铆接技术，外壳整体结构采用铆钉铆接，自动化生产程度高。利用液压传动可获得较大、均匀的压力，使得母线槽整体强度得到大幅度提升，并且具备良好的密封效果和防渗功能，防护等级高，电气连续性优，外形整洁美观。

The world's leading British Henrob self-piercing riveting technology and ZSB cooperated out the international leading MCM busbar automatic assembly lines.

## Busbar assembly

Different with traditional compact products, MCM adopts the British Henrob self-piercing riveting technology, the overall structure of enclosure are riveted together automatically, ensuring high degree of automation. The use of hydraulic pressure makes the overall strength of busbar been substantially upgraded, and have a good sealing effect and anti-seepage feature, high-grade protection, excellent electrical continuity, clean and beautiful appearance.



# MCM密集型母线槽系统

## 技术数据

### 系统通用参数

Min./max./24 小时平均温度	-5/+40/35°C
防护等级	IP40、IP65
连接器力矩	70Nm
表面处理	铝合金氧化或喷塑
外壳材料	铝镁合金
外壳颜色	具体颜色也可用户确定
额定绝缘电压 $U_i$	1000VAC
额定工作电压 $U_e$	690VAC
额定频率 $f$	50Hz
额定电流 $I_e$	1)
额定短时耐受电流 $I_{cw}$	1)
额定峰值耐受电流 $I_{pk}$	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	CU
每相铜排数	1)
最大安装间距	
水平	
Horizontal, flat	2m
外形尺寸	1)
重量	1)

注： 1) 选择不同的电流等级，相对应不同的数据。  
2) 详细的数据可以参照下一节技术参数表部分。

Note: 1) Different current range gets its corresponding technical data.  
2) Detailed data please refer the technical parameter list in the next part.



MCM母线槽参数一览表

电流 (A)	短时耐受电流 (KA)	峰值耐受电流 (KA)	外型尺寸		每米重量 KG/米	
			宽度(W)	高度(H)	4 线制	5 线制
100A	15	30	132	85	6.3	6.7
160A			132	85	6.5	6.8
200A			132	95	7	7.4
250A			132	100	7.3	7.9
315A			132	120	8.6	9.1
400A			132	120	10.8	11.6
500A	30	63	132	120	11.3	12.2
630A			132	120	12.9	13.8
800A			132	120	15	16.2
1000A			132	140	17.2	18.7
1250A			132	160	20.7	22.5
1600A	70	154	132	185	27.6	30.2
2000A			132	205	35.6	39.2
2500A			132	265	48.9	52.7
3150A			132	375	62.2	68.1
3200A			132	375	62.5	68.6
4000A	100	220	132	415	77.3	85
5000A			132	535	98	108.3
6000A			132	675	124.5	127.6
6300A			132	690	126	129.2

# MCM密集型母线槽系统

## 系统配置

### 外壳

MCM系列母线槽采用优质铝镁合金型材作为外壳，为无磁性环保材料，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。

### Enclosure

MCM system adopts excellent alloy as enclosure material, enjoys non-magnetism, environment protection, light weight and fast heat dissipation capability. No-eddy current loss when system on loading. The large enough Cross-section can replace the PE as 100% integral earth. The surface is static painted and passed the 1200h salt withstand test, which can meet the high air humidity, salt separating, high pollution etc. Environment.

### 导体

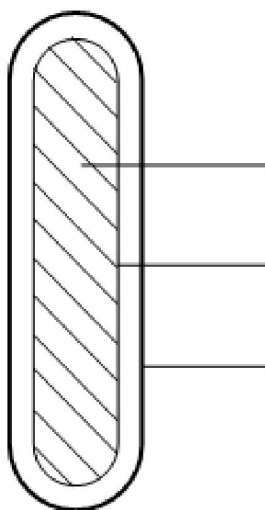
MCM母线槽系统表面镀铅锡或者镀银，全长整体包裹高性能绝缘材料聚酯薄膜；

### Conductor

The conductors of the MCM busbar system are normally tinned or silver plated, totally covered with highly insulation material.



高性能绝缘材料



MCM母线系统

- ①
- ②
- ③

- ① 导体，铜排；
- ② 镀层，镀锡层；镀银层
- ③ 高性能绝缘材料聚酯薄膜

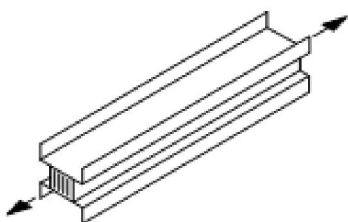
- ① Conductor, copper bar
- ② Coating. Tin coating (), nickel coating, copper
- ③ Insulation Material

## 母线安装

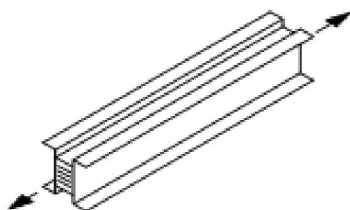
MCM母线系统的内部为典型的三明治结构，而且保持全长密集，这种特殊的结构决定了MCM母线系统的承载电流不会受安装位置及安装方式的影响，我们将会根据现场情况设计一个合适的走向。

## PRODUCTS

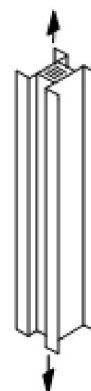
The sandwich-type construction of the MCM busbar system maintains a total length of compact structure, which means that its current loading capacity is not affected by the mounting position. ZSB offers the optimum flexibility in planning busbar layout according to the site condition.



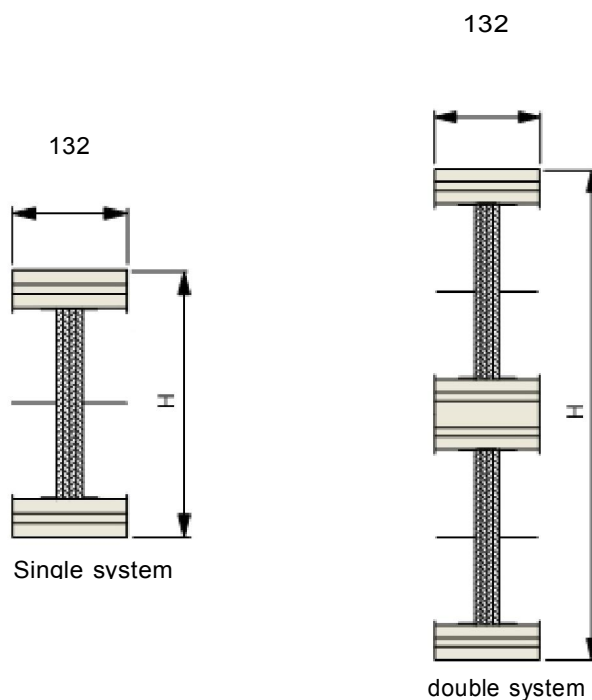
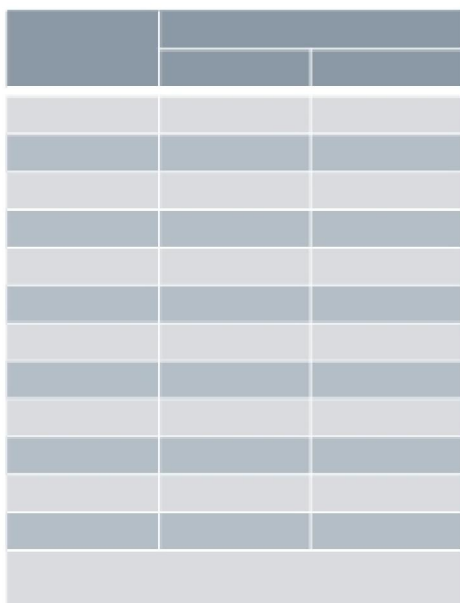
水平安装，立装  
Vertical installation



水平安装，侧装  
Horizontal installation



垂直安装  
Horizontal installation, Edgewise



# MCM密集型母线槽系统

## 系统配置

### 导体配置

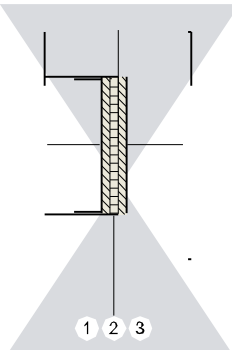
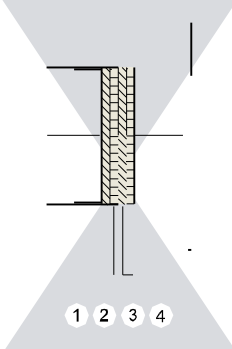
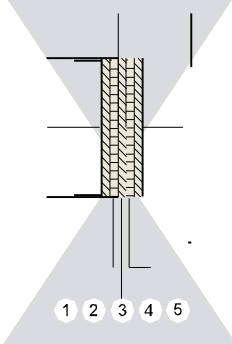
IEC364标准规定配电设备的系统配置需根据整套系统配置进行选择，而且所选择的设备要充分保证整个系统的安全。

MCM母线槽系统拥有多种导体配置系统，能适应不同工程对系统的要求。

### Conductor Configurations

The IEC standard regulates that the power distribution equipment system configuration should be based on the entire system configuration, and the choice of equipment should fully guarantee the security of the entire system.

MCM busbar system offers many different conductor configurations to meet per actual site requirement.

	系统 System	导体配置 Conductor configuration						外壳 Enclosure
		①	②	③	④	⑤	⑥	
	MCM	L1	L2	L3	-	-	-	外壳作 PE Is the PE conductor
	MCM	L1	L2	L3	PEN	-	-	外壳与 N 相连
	MCM	L1	L2	L3	N	-	-	外壳作 PE Is the PE conductor
	MCM	L1	L2	L3	N	PE	-	单独 PE 导体

外壳作PE：通过验证采用无磁性的铝镁合金外壳作为整体式接地导体，它的接地容量超过相线100%。当系统出现高容量的接地故障时，使系统直接与大地相通，它具备最短的接地途径。

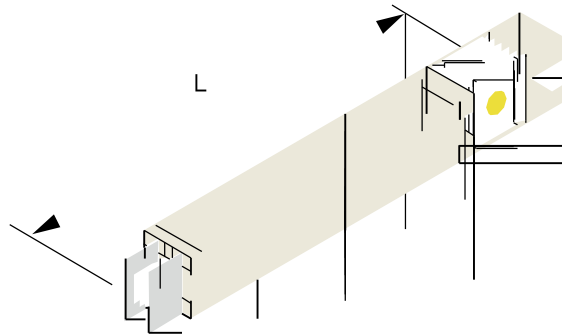
Enclosure as PE: adopting excellent non-magnetism alloy enclosure as integral conductor. The earth capability is more than 100% phase conductor. When there is a high earthing fault, it connect busbar with the ground directly, which offers the shortest earth approach.

# 功能单元

## 直线段单元 Straight trunking units

### 直线段单元

MCM密集绝缘型母线槽壳体结构为完全密封型，最高防护等级可达IP65，可在恶劣环境条件下使用。系统选择具有大于相线100%容量的整个外壳作接地系统，保证足够的安全性，为接地故障提供可靠的接地路径，为地线短路提供最短的路径。当发生高容量的接地故障时，可有效的接地和保护整个系统。馈电式母线槽可以垂直安装也可以水平安装。



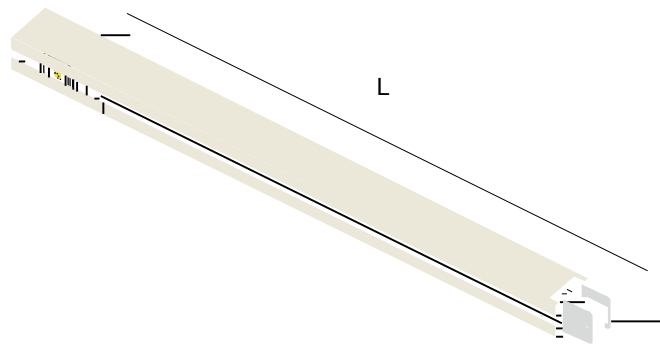


# 功能单元

## 直线段单元 Straight trunking units

插接式母线槽系统可以垂直安装也可以水平安装，插口的设置比较灵活，双面都可以设插接口，插口之间的最小间距为575mm，3米长标准段最多可以配置4个插口，用户可以根据具体情况预留插接口以便在设备负载更换位置或增加时，母线槽单元依然可以适应负载的要求，为用户提供安全可靠及便利的用电环境。

Straight trunking with tap-off units are available with vertical and horizontal installation. The tap-off point can be planned flexibly with double sides at the min span of 575mm. The 3m length straight unit can be planned with max 10 tap-off units. The users can reserve tap-off points in case of changing and increasing load equipment later according to the site condition.

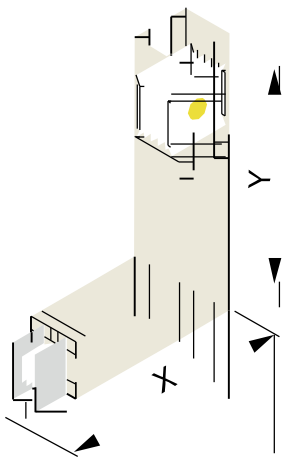
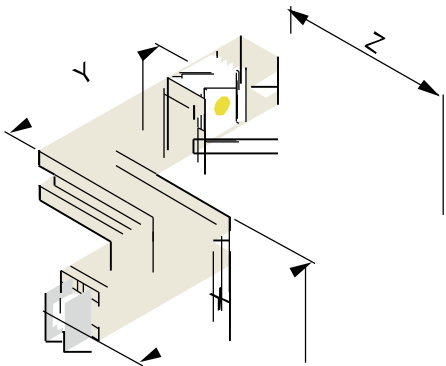
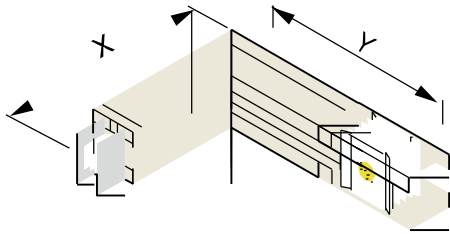


# 功能单元

## 换向单元 Junction units

### 换向单元

为了方便更改一段母线槽系统的走向，MCM系统设计有多种标准弯头，同时也可根据现场情况进行非标设计。



### Junction units

In order to change the direction easily, MCM busbar system plans with multi standard junction units, and is available with non-standard planning according to site condition.

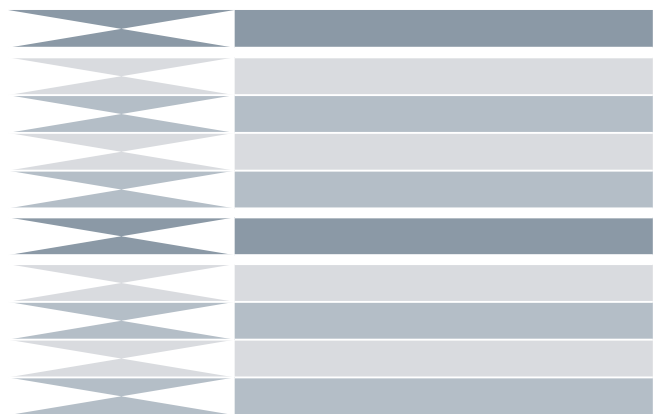
#### L型水平弯头(ER/EL) L Elbow (ER/EL)



#### 水平Z型弯头(RL/LR) Z unit (RL/LR)



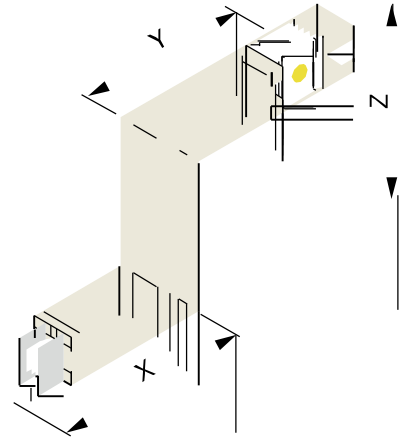
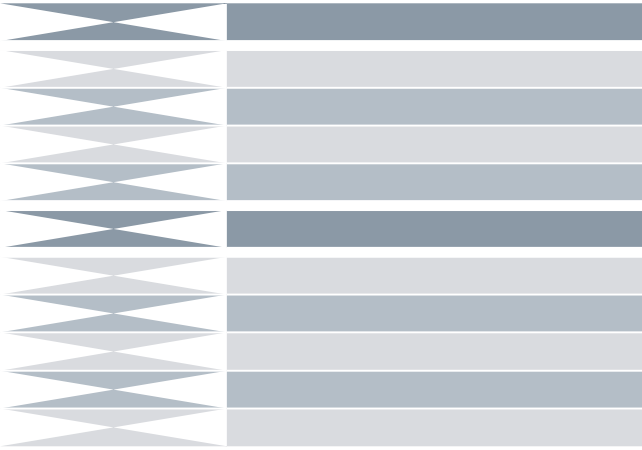
#### L垂直弯头(FO/FI) L Knee (FO/FI)



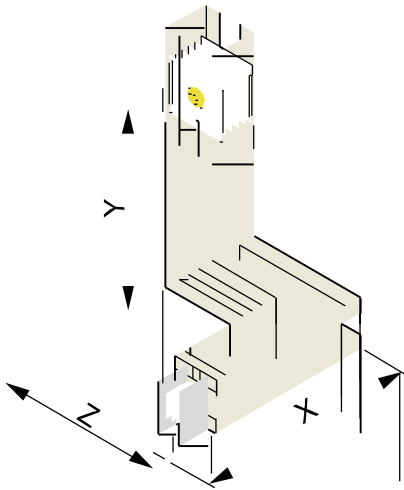
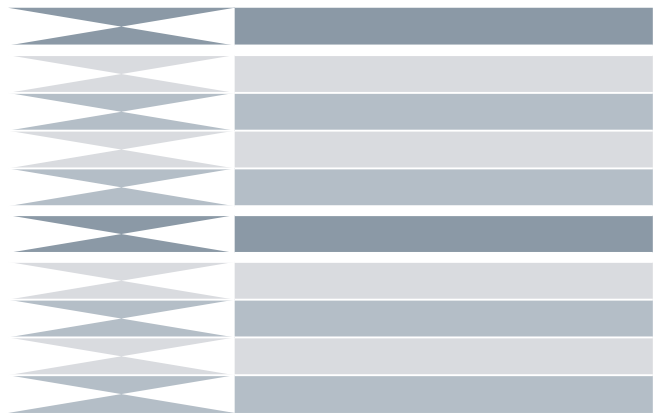
# 功能单元

## 换向单元 Junction units

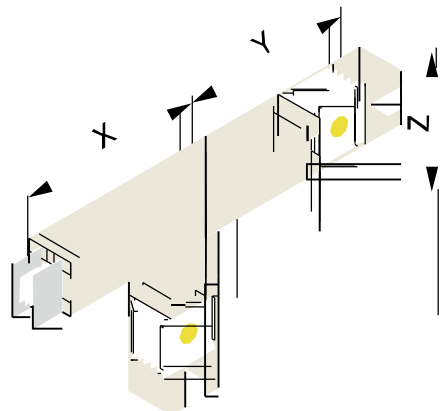
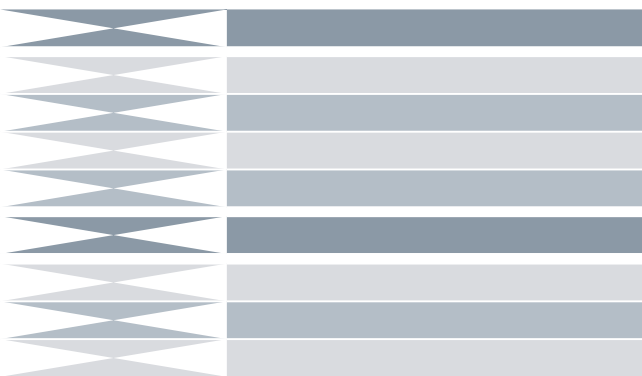
垂直 Z 型弯头(IO/OI) Z unit(IO/OI)



异型弯头(OL/IL) Offset unit (OL/IL)



T型垂直弯头(TE) T Unit (TE)

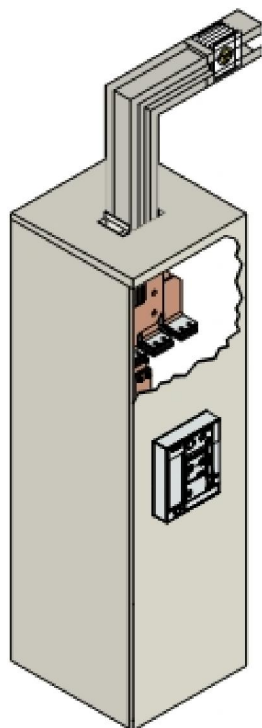


# 功能单元

## 与低压柜连接

### 与低压配电柜连接

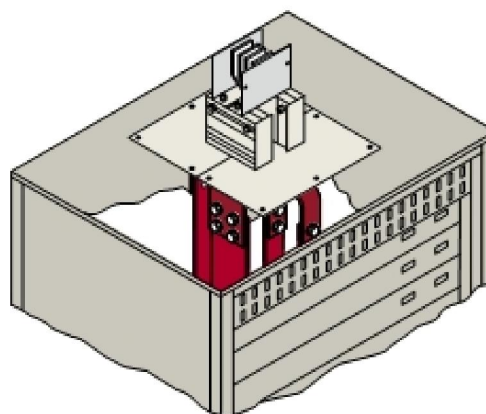
我们提供专门的始端进线单元和完整的连接单元实现MCM母线槽系统与配电柜的连接，连接时根据用户低压柜的具体出线方式进行调整设计，既可顶端出线，也可底端出线，电流最高达6300A，通常使用连接铜排进行转接，公司负责提供原材料及现场的指导安装，安装时保持现场连接最短路径及时间，进线单元中的始端母线配置有连接法兰，与设备密切结合，从而保证较高的防护等级。



与瑞鑫低压柜可直接对接  
Connect directly with Ruixin & Moeller low-voltage switchgear

### Connection with low-voltage switchgear

MCM busbar system adopts the special entry-unit and integral connection unit to connect between busbar and switchgear. This connection can be made from above or below, thus ensuring flexible connections (max current 6300A). The copper connections are provided between busbar and switchgear. ZSB offers the raw material and site installation instruction, ensuring the shortest connection and installation time. End flange in the feeder unit is collocated with connection flange to ensure a high protection degree.



与其他柜型连接  
Connect with other low-voltage switchgear

# 功能单元

## 插接箱单元 Tap-off unit

### 插接箱单元

MCM插接箱单元获得多项专利技术，其设计结构紧凑、外形美观、性能可靠，额定电流为16A~1250A，每种电流等级可提供5种不同外形尺寸，设计更贴切用户需求。

### 内部配置

根据用户对插接箱的配置要求，可以在插接箱内安装3极或4极断路器对负载进行保护，断路器可由用户自行选择，包括保护开关的附件，比如操作手柄、分励脱扣、热磁脱扣、漏电保护模块等，公司将按照用户的要求提供标准配置。同时公司可以在现场测量后，参照现场具体情况对插接箱的外形尺寸进行非标设计，以满足现场的要求。

### 电缆馈线

插接箱通过电缆引出电流给负载进行供电，出线方式灵活，在电缆出线口配置有专门的电缆保护套管，保护套管的直径可以根据电缆的直径进行配置。

### 插口装置

母排无间隙，真正实现了高密度，具有低阻抗、散热快等特点，且通用性强，适用于不同导体配置系统。

母线系统的插口装置与导电桩头之间设有超声波塑料焊接固定的高弹性橡胶防护垫，防护等级高，确保插接时安全可靠。

### 插接方式

“T”型插脚稳定、可靠，载流能力更强。16-630A为单插口

### 分接

800-1000A为双插口分接

1250A以上采用连接器分接

### 操作安全

防错相安装

提供IP40的防护等级

插脚均做镀银处理以保证系统可靠的电气连续性

插接箱内部多重联锁，防止在通电情况下插接箱门被打开，进一步保证了操作人员的人身安全。





## Tap-off unit

Tap-off unit of MCM busbar system gains many patents, enjoying structure compact, nice appearance, reliable performance. The rated current is 16A-1250A, 5 different dimensions as per current rating. The design is closer to users.

### Inside configuration

3 pole or 4 pole breaker is collocated according to user's requirements. The breaker is optional for RUIXIN or the other brand as well, including the switch accessories, e.g. operating handle, protection, shunt release (trips)ST, thermal-magnetic trip, leaking protection. In the meantime special design on sizes of tap-off units can be make according to site details after site measurements.

### Cable connection

The tap-off unit supplies power to loading equipments with flexible outputting line collocated with protection sleeves. The diameter depends on the cable size.

## Tap-off point

Tap-off point of MCM busbar system truly achieves high compact structure, low impedance and universal application for different kinds of conductor configuration. High elastic rubber protective pad fixed by Ultrasonic Plastic Welding is planned between tap-off device and conductor, ensuring high level of protection, safe and reliable plugging.

### Plugging method

International Patent supported T-pins ensure stable, reliable and large current-loading capacity.

16A to 630A is single side tapping;

800A to 1000A is double sides tapping;

1250 and above is joint pack connection.

### Safe operation

Anti-wrong installation;

Protection degree of IP54;

Silver-plated plug feet ensure reliable electrical continuity; Multi inter-lock prevents plugging on loading.



# 功能单元

## 连接器单元

### TM连接器

摒弃了传统的设计，使得安装速度较普通连接器快一倍。而且由于它不可翻转，两段母线在连接时不会发生错相，简化安装程序，更有助于安全快速的安装。

### 高压力均衡垫

螺栓锁紧时产生的压力通过特殊设计的碟型垫圈传递至与铜排等截面的高压力均衡垫，确保整个母线连接处面压力均匀、松紧适度，电气连接安全可靠。

### 双头力矩螺栓

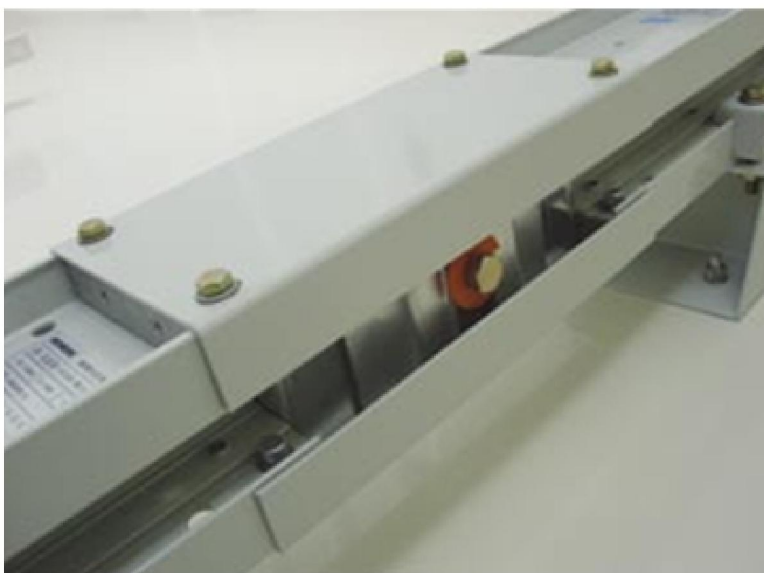
该通用件从英国原装进口，双头螺钉能保证在安装时，只需使用19mm普通扳手旋紧螺钉直至上面的螺栓头自动断裂，且螺钉上的黄色指示牌脱落，说明该接头力矩已达到最佳状态，可节约75%安装时间。安装完毕后剩余的螺栓头可在维修、拆装时二次利用。

### 膨胀补偿

接头的设计(对接式)满足由于热膨胀而引起母线槽的线性伸缩，在不降低母线的机械强度、电气连续性、载流容量及短路容量的前提下，每个连接器提供7mm的膨胀补偿，使得MCM母线槽系统的应用中无需安装特殊的膨胀节单元。

### 防护等级高

连接器各零部件之间均设计有防水措施，同时加有绝缘垫的连接盖板使得在母线连接处也能保证较高的防护等级。



### TM joint pack

By abandoning the traditional design, its installation speed is twice faster than ordinary connector. But also because it can not be overturned, wrong phase operation won't occur when connect two busbar units, simplifying the installation procedure, contributing to the rapid and safe installation.

### Double-headed torque bolt

The universal bolts are imported from UK. Only 19mm ordinary wrench than torque spanner is needed to tighten until the outside head as well as the yellow plate breaking off, which means the torque of the joints have reached the best condition. 75% time is saved. After installation, the rest head bolt can be reused in later maintenance and disassembly.

### High pressure balanced clamp

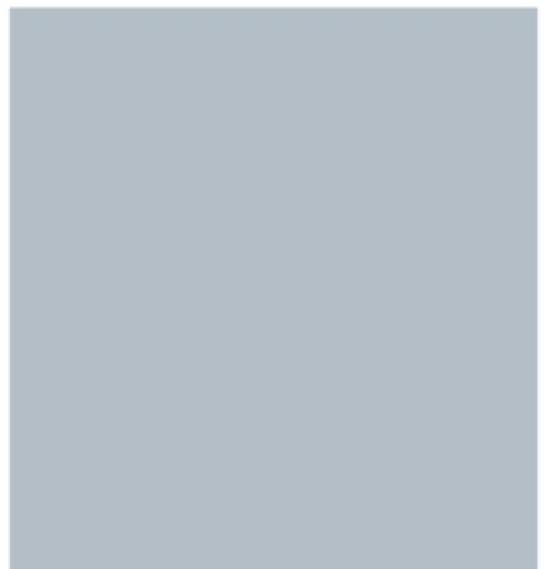
The pressure caused by bolt locking passes to the balanced clamp (the same section as copper) through a specially designed butterfly gasket, ensures that the appropriate pressure, uniform elastic, safe and reliable electrical continuity at system joints.

### Compensation for expansion

Joint pack (butt type) of MCM busbar system meets linear expansion due to thermal expansion. Under the premise of never lowering the mechanical strength, electrical continuity, current-loading capacity and short-circuit capacity. Each joint pack is provided 7mm compensation for expansion, making the MCM busbar system never need to collocate with any special expansion unit.

### High protection degree

Each part and component of joint pack is designed with waterproofing measures. Meanwhile, joint pack cover guarantees a higher level of protection.



# 功能单元

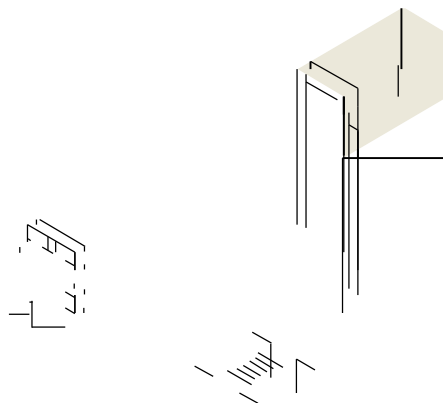
## 系统附件

### 终端单元

母线终端安装在母线槽系统的末端，用以防止导电部件的裸露。

#### End cap

End cap is mounted in the end to avoid exposing of conductors.



### 垂直安装支架

母线槽垂直安装时提供特殊的弹簧支撑件作为安装附件，每个弹簧支撑架都能承受母线及插接箱所带来的额外载重负荷。

#### Vertical installation

Special spring supports are available as installation accessories if requested.



### 水平安装支架

提供两种不同的安装支架

水平立装使用

水平侧装使用

安装支架上自带的定位装置能固定母线槽系统，使得安装好的系统更加稳固，同时这种定位装置是跟安装支架一起提供的。

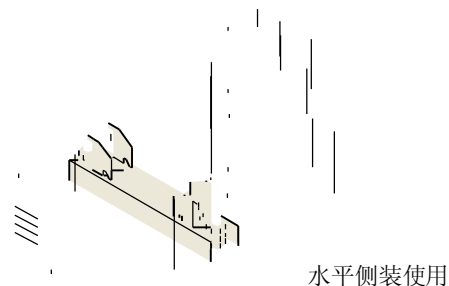
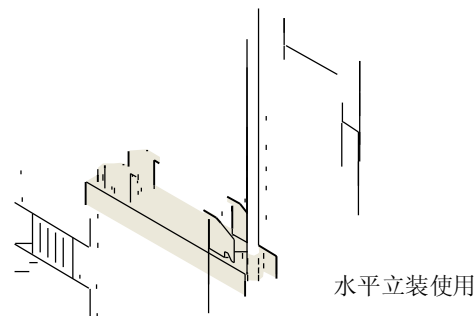
#### Horizontal mounting supports

two different mounting devices are available

For horizontal flatwise

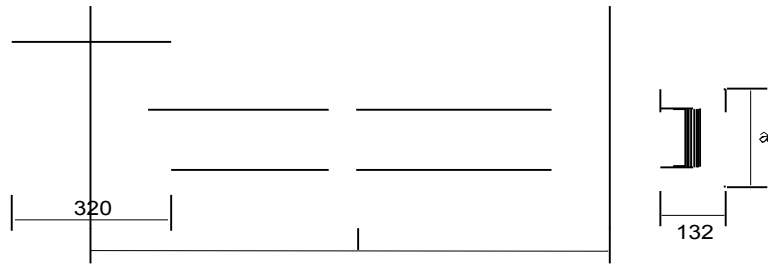
For horizontal edgewise

Clamps in the supports which make busbar trunking system stably are available if requested.

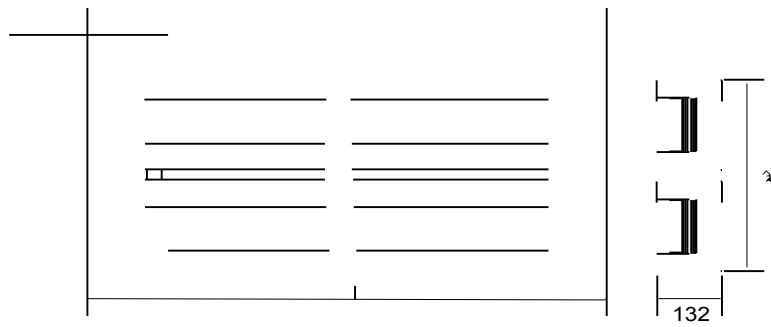


# 物理数据

Physical data

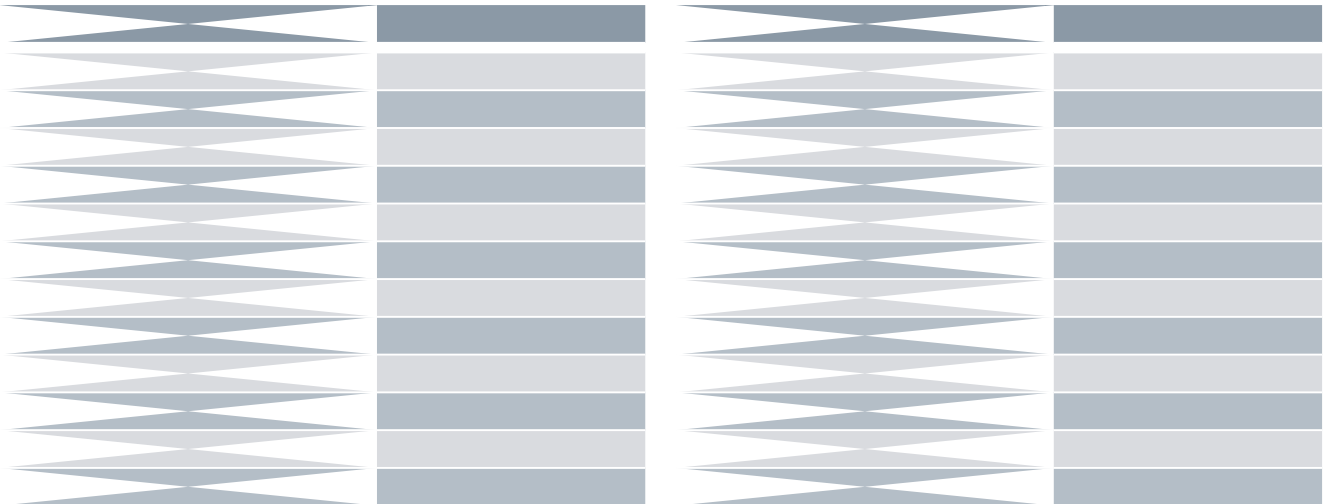


单排系统



双排系统

/









# 其他

## 计算及选型

### 计算及选型

#### 额定电流的计算

在安排母线槽系统布局时须注意以下几点:

- 负载或配电系统的场所、数量和连接方式
- 分散系数
- 设定的短路等级

与配电柜连接须提供

- 配电柜的型号
- 进线方式(顶端、底端或背面)

安装的地理位置和条件

- 空间尺寸
- 建筑物构造(针对悬挂和安装)
- 母线槽走向
- 环境条件(温度、湿度、空气质量等)
- 系统穿过的墙面

与其他系统配套-比如与母线槽系统安装配套的部分为:

- 供电线路的平面图
- 通风管道走向的位置
- 照明系统的平面图
- 需提供插接单元的数量和具体位置
- 母线槽系统严格按照上面提到的几点进行测量, 第一步是计算额定电流。

## PRODUCTS

### Calculating the rated current

The following information is important for planning busbar trunking for transporting and distributing power

- Location, number and connected loads of the consumers or subdistribution systems
- Rated diversity factor
- Information on the short-circuit level to be expected

Information on distribution board to be supplied ■

#### Distribution board type

- Supply(top, bottom, rear)

#### Type and structure of copper busbars

- Spatial dimensions
- Building structure (for suspension and fixing) ■

#### Transportation paths

- Ambient conditions (temperature, humidity, dirt, etc.) ■ Wall cut-outs

Coordination with other system sections - for example, required coordination with the busbar trunking

- system installation plan
- With planned power lines
- With the planned locations of ventilation duct runs ■ With lighting plans
- Required number and location of the tap-off points

$$I_b = \frac{\sum_{i=1}^n P_i \cdot b}{\sqrt{3} \cdot U_e \cdot \cos\phi} \cdot 10^3$$

$I_b$  = 额定电流(A)

$U_e$  = 额定工作电压(V)

$\cos\phi$  = 功率因数

$P_{inst}$  = 安装功率

$\alpha$  = 分散系数

$b$  = 馈电系数

$b = 1$  单面馈电

$b = 0.5$  双面馈电和中间馈电单元

The busbar trunking system is dimensioned taking into account the restrictions mentioned above. The first step is to determine the rated current.

$I_b$  = Rated current (A)

$U_e$  = Rated operational voltage (V)

$\cos\phi$  = power factor

$P_{inst}$  = Installed power (KW)

$\alpha$  = Diversity factor

$b$  = Feeder factor

$b = 1$  with single-ended feed

$b = 0.5$  with double-ended feed and centre feeder unit

主电路数	$\alpha$
2 与 3	0.9
4 与 5	0.8
6 至 9	0.7
10 及以上	0.6

除非特殊规定，一般情况下 $\alpha$ 都表示分散因数，这点可以参照IEC/EN 60439-1标准

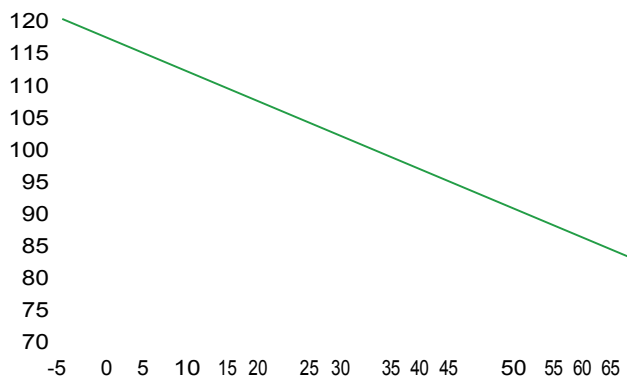
载荷容量与环境温度的关系。

额定电流 $I_b$ 是基于一定的环境温度而言的(24小时平均温度为35°C，不超过40°C，右面的图表就表明了载荷容量是随着环境温度的变化而变化的。

Frequently the diversity factor as per IEC/EN 60 439-1(see table) can be used for unless this is ruled out by particular application.

Dependence of load-carrying cappacity on the ambient temperature.

The rated current  $I_b$  is based on an ambient temperature of 35 celsiue.



# 其他

## 设计实例

### 电压降的计算

如果母线槽系统长距离输配电，就必须考虑到电压降对系统的影响，下面是电压降的具体计算公式：

$$\Delta U = a \cdot \sqrt{3} \cdot I_b \cdot l \cdot (R' \cdot \cos \varphi + X' \cdot \sin \varphi) \cdot 10^{-3}$$

$\Delta U$  = 电压降(V)

$I_b$  = 额定电流(A)

$l$  = 系统总长度(m)

$a$  = 载荷分配系数日

$R'$  = 电阻(mΩ/m)

$X'$  = 电抗(mΩ/m)

$\cos \varphi$  = 功率因数

For long busbar lines, it may be necessary to calculate the voltage drop.

$$\Delta U = a \cdot \sqrt{3} \cdot I_b \cdot l \cdot (R' \cdot \cos \varphi + X' \cdot \sin \varphi) \cdot 10^{-3}$$

$\Delta U$  = voltage drop(V)

$I_b$  = rated current(A)

$l$  = total length of the system(m)

$a$  = load distribution factor

$R'$  = resistive load(m /m)

$X'$  = inductive load(m /m)

$\cos \varphi$  = power factor

载荷分配系数须根据载荷分配的类型而定，下面的图表反映了在额定电流一定的情况下载荷分配的不同方式。

Factor a used in the equation for calculating the voltage drop is dependent on the load distribution.

	从A供电 B点插接配电	1
	A点供电 B、C、D、E插接配电	0.5
	从A供电 B、C点插接配电	0.25
	A点供电 B、C、D、E插接配电	0.125

最小单极接地故障电流的安全断开回线阻抗决定了一极短路电流的大小，需要计算：

相线导体和保护导体

相线导体和PEN导体之间的回线阻抗

阻抗值主要取决于：

检测结果

计算结果

模拟系统

The loop impedance determines the size of the 1-pole short-circuit current. The loop impedance is calculated between the phase conductor and protective conductor  
 Phase conductor and PEN conductor

This value may be determined by

Measuring with measuring instruments

Calculation

Simulating the network in the network model.

技术参数表中已经详细列明了MCM母线槽系统的阻抗值，因此可以根据阻抗值计算母线槽系统的回线阻抗，从而得到系统的总回线阻抗值。

通过整个母线槽系统的回线阻抗，很容易估算系统的1极最小短路电流，或通过计算得到。

The Technical Data includes a listing of the impedance values of the MCM busbar trunking system so that you can calculate the loop impedances of a busbar system which forms part of the total loop impedance.

With the aid of the loop impedance of the entire busbar trunking system it is easy to calculate the smallest 1-pole short-circuit current which can be expected.

$$I_{kmin} = \frac{c \cdot U_n}{\sqrt{3} \cdot Z_k}$$

$c$  = 电压系数 0.95

$U_n$  = 相间电压

$Z_k$  = 阻抗



## 过载及短路保护

母线槽系统在运行时必须进行过载及短路保护，通常情况下熔断器或断路器都是作为保护装置而在系统中广泛使用。选择时，需考虑短路电流的强度、系统的运行功能等因素。

在实际应用中由于熔断器的灵敏度非常高，而且当电流稍微超过额定电流时，熔断器就开始熔化，但熔化的时间比较长，所以熔断器不是很适合作为过载保护装置在系统中使用

若母线槽系统的过载保护装置使用熔断器，为了保证保护装置对母线槽系统提供合适的保护，熔断器的额定电流必须要比母线槽系统的额定电流低一个等级。

如果使用断路器进行保护，其保护单元可以根据母线槽系统的额定电流进行调整，也就是说母线槽系统可以达到 100% 的载流量。

若决定采用熔断器和断路器作为保护装置对母线槽系统进行短路保护时，所选型号的电流不要超过母线槽系统指定的保护电流，还需考虑短路电流的强度、是否需要带限流保护装置及所选保护装置的短路开关容量是多少等因素。

如下：

$$I^k \leq I_{cc} \leq I_{cu}$$

$I^k$  = 估计的安装位置的短路电流

$I_{cc}$  = 母线槽系统的额定短路电流

$I_{cu}$  = 断路器的额定短路容量

## Overload and short-circuit protection

Busbar trunking systems must be protected against short-circuits and overloads. Fuses and circuit-breakers are used as protective devices.

When selecting these protective devices, the strength of the expected short-circuit currents, selectivity requirements, operating and signalling functions may also be factors in your decision.

Fuses are in general less suitable as overload protection on account of their relatively high response characteristics (1.3 to 1.6 times the rated current) and their long melting time with small over-currents.

To ensure adequate protection of the busbar trunking system against overloads using a fuse, its rated current must be a step lower than the rated current of the busbar trunking system which is to be protected. This means that the busbar trunking system may not necessarily be used optimally.

If circuit-breakers are used, the thermally delayed overload release must be set to the value of the rated current of the busbar trunking system. This means that the busbar trunking system can be loaded 100%.

When you decide on your short-circuit protection via fuses and circuitbreakers you must not exceed the specified short-circuit ratings of the busbar trunking systems. It will depend on the strength of the shortcircuit current expected whether a current-limiting protective device is required and what short-circuit breaking capacity the protective device should have.

A tabular overview is provided below of the circuit-breakers which can provide short-circuit and overload protection(400V and 50Hz) for the corresponding trunking system.

The following applies:

$$K \leq I_{cc} \leq I_{cu}$$

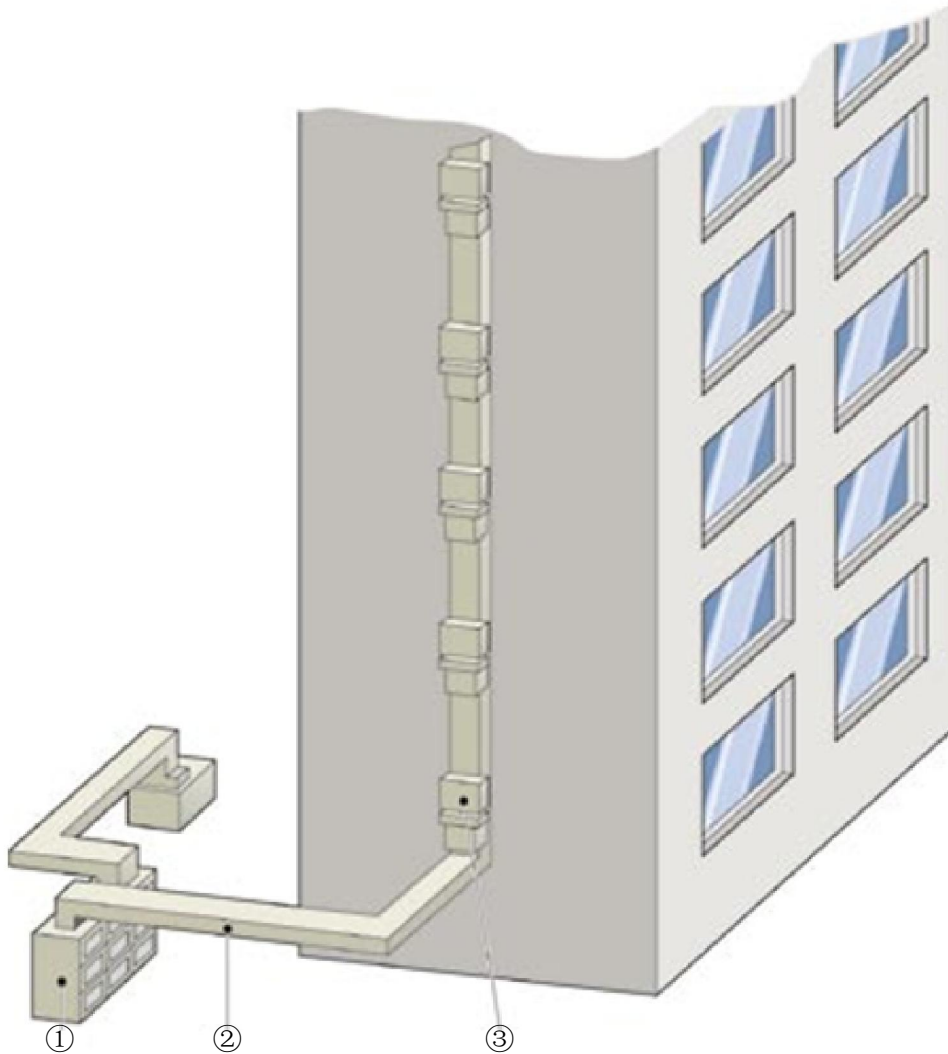
$K$  = the short-circuit current expected at the place of installation

$I_{cc}$  = conditional rated short-circuit current of the busbar run

$I_{cu}$  = rated short-circuit breaking capacity of the circuit breaker

# 其他

## 设计实例



1	配电柜
2	母线槽系统
3	插接箱

1	Power distribution board
2	Busbar trunking system
3	Tap-off point

楼层数	10层（每层8个房间）
每间房额定值	26KW
额定工作电压 $U_e$	400V
功率因数 $\cos(\text{符号})$	0.9
分散因数(符号)	0.6
利用系数(符号)	0.5
变压器供电	1×1250KVA, $U_k=6\%$
防护等级	IP54
系统型式	TN-S

### 每层楼额定电流的计算

$$I_{bs} = \frac{P_{inst}}{\sqrt{3} U_e \cdot \cos\beta} \cdot 10^3$$

$I_{bs}$  = 每层楼的额定电流 (A)

$U_e$  = 额定工作电压 (V)

$\cos\phi$  = 功率因数

$P_{inst}$  = 安装功率 (KW)

$\alpha$  = 功率因素

$$I_{bs} = \frac{82606}{\sqrt{3} \cdot 400 \cdot 0.9} \cdot 10^3 = 200A$$

### 直线段额定电流的计算

$$I_b = (I_{Ns} \cdot \beta)$$

$$I_b = 10 \cdot 200 \cdot 0.5 = 1000A$$

换算系数是总负载数的利用和分散系数，如果不知道具体的换算系数，可以咨询当地的供电公司，供电公司有详细的不同场合下的换算系数值。下面的图表列出了换算系数的平均值：

The reduction factor is the utilization and rated diversity factor for the total number of loads. If no precise figures are known, good typical values can be obtained from the local power companies. They do however vary regionally. The table shows average values:

	$\beta$
电炉室或蒸汽炉室	0.1-0.2
商业性的办公场所和建筑的照明	0.7-0.9
电梯和服务设施	0.6-0.8
会议室	0.6-0.8
小型办公场所	0.5-0.7
大型办公场所	0.4-0.8

从上面提到的几点，我们可以很容易就进行MCM母线槽系统的选择，例如：需三相五线制系统，100%中性线，所承载的电流为1250A，而相应的短时耐受电流为50KA。

母线槽系统为: MCM-0551

插接箱单元: 箱体规格为2#、母线系统为51、防护等级为IP54的插接箱，采用断路器保护并带有旋转操作手柄，断路器为3极、额定电流为250A。

插接箱单元代码为: MCM-2AK51M/LSH-250S-3

The collated results lead to the selection of an MCM busbar system, 5-conductor with full N conductor cross-section, a current carrying capacity of 1250A and a short-circuit rating of  $I_{cw}(t=1s)50kA$ .

Busbar System: MCM-0551

tap-off box specification is 2#, busbar system is 51, IP54, breaker protection and Rotary operating handle, breaker is 3 poles, and rated current is 250A.

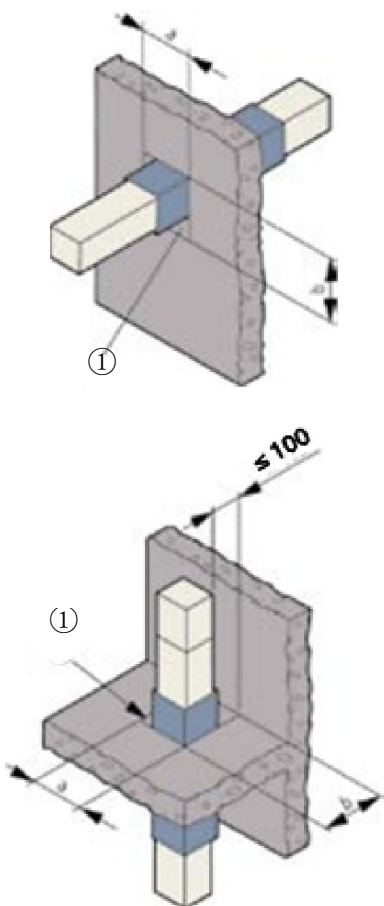
Tap-off unit code: MCM-2AK51M/LSH-250S-3

# 其他

## 母线槽系统的安装

下列图示表明了母线槽单元穿墙安装时的标准尺寸

Charts below shows the standard dimensions while installation through walls.



电流 A	a/mm	b/mm
MCM 100A~800A	350	320
MCM 800A~2000A	350	400
MCM 2500A	350	480
MCM 3150A~4000A	350	670
MCM 5000A	350	770
MCM 6000A~6300A	350	920

### 水平安装尺寸要求

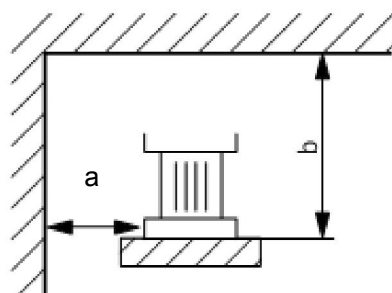
为了使母线槽系统和插接箱单元的安装更加简单方便，在进行设计时必须考虑到系统安装的最小尺寸。

MCM 母线槽系统 (不带插接箱)

MCM 馈电式母线槽系统的最小尺寸

Requirements of dimensions for horizontal installation

To ensure convenient installation of busbar trunking units and tap-off units your design work should take into account the recommended distances from building components.

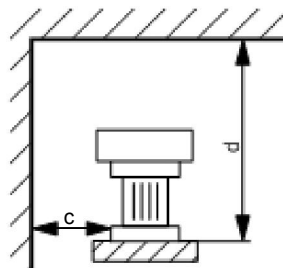


MCM 母线槽系统 (带插接箱)

MCM 馈电式母线槽系统的最小尺寸

Min. dimensions for MCM busbar trunking without tap-off units

Min. dimensions for MCM busbar trunking with tap-off units



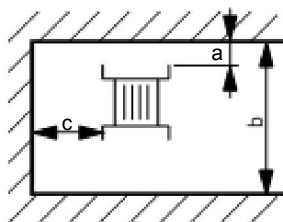
垂直安装尺寸要求

MCM 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。

Requirements of dimensions for vertical installation MCM busbar trunking without tap-off units

Min. dimensions for busbar trunking systems without tap-off units. The dimensions of system fixing brackets not shown in the diagram have been taken into account.

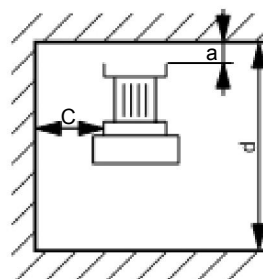


MCM 母线槽系统 (带插接箱)

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。

MCM busbar trunking with tap-off units

Min. dimensions for busbar trunking systems with tap-off units. The dimensions of system fixing brackets not shown in the diagram have been taken into account.



水平安装		MCM	
a	b	c	
400	100	214	350 914
630	100	214	350 914
800	100	214	350 914
1000	100	219	350 919
1250	100	234	350 934
1600	100	264	350 964
2000	100	299	350 999
2500	100	344	350 1044
3150	100	473	350 1173
4000	100	543	350 1243
5000	100	633	350 1333
6300	100	713	350 1413

垂直安装		MCM			
a	b	c	d		
400	100	314	50	1014	
630	100	314	50	1014	
800	100	314	50	1014	
1000	100	319	50	1019	
1250	100	334	50	1034	
1600	100	364	50	1064	
2000	100	399	50	1099	
2500	100	444	50	1144	
3150	100	573	50	1273	
4000	100	643	50	1343	
5000	100	733	50	1433	
6300	100	813	50	1513	

# 其他

## 母线槽系统的安装

### 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MCM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。

### Mounting position

The mode of installation is prescribed for tap-off units with vertical busbar runs. The tap-off cable must be connected from below. This will be the case when the L1 conductor is on the left-hand side(as seen from the front).

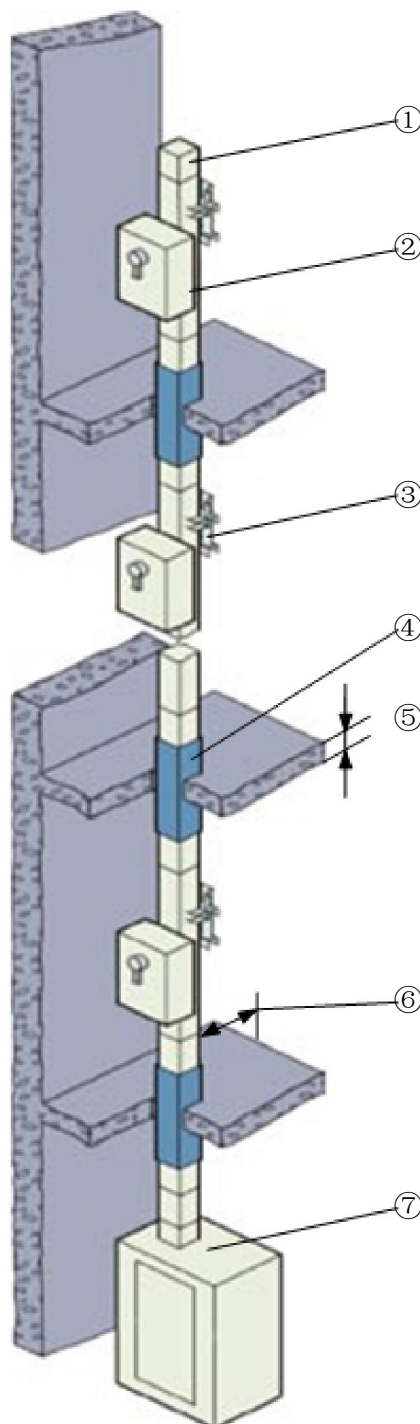
### Vertical fixing

Special spring brackets are required for installing vertical MCM busbar runs. Per storey at least one bracket should be used for single systems and two bracket for double systems. The spring bracket is designed to carry and secure the inherent weight and the linear extension of the busbar trunking systems load. Two versions with different dimensions and spring force are available for this. In order to allow for the additional weight of tap-off units, type selection should distinguish between power transmission and power distribution.

	电流 A	数量
输电	400 ~ 2500	1
	3150 ~ 6300	2
配电	400 ~ 2500	1
	3150 ~ 6300	2

注：每层楼至少一套插接箱单元

- 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

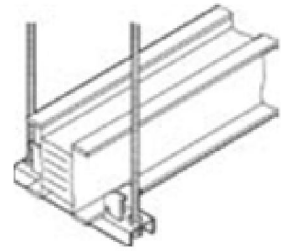
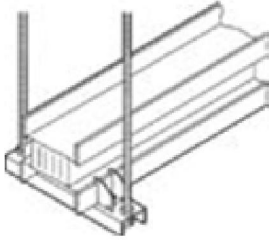


垂直安装的母线槽走向图

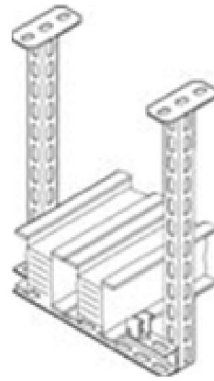
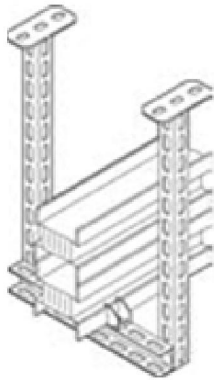


吊顶吊装

单排  
Single bar

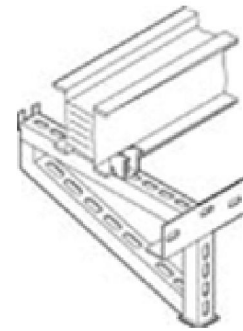
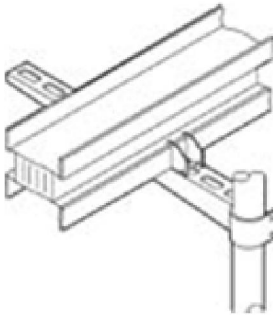


双排  
Double bar



支架支撑

单排  
Single bar



双排  
Double bar

