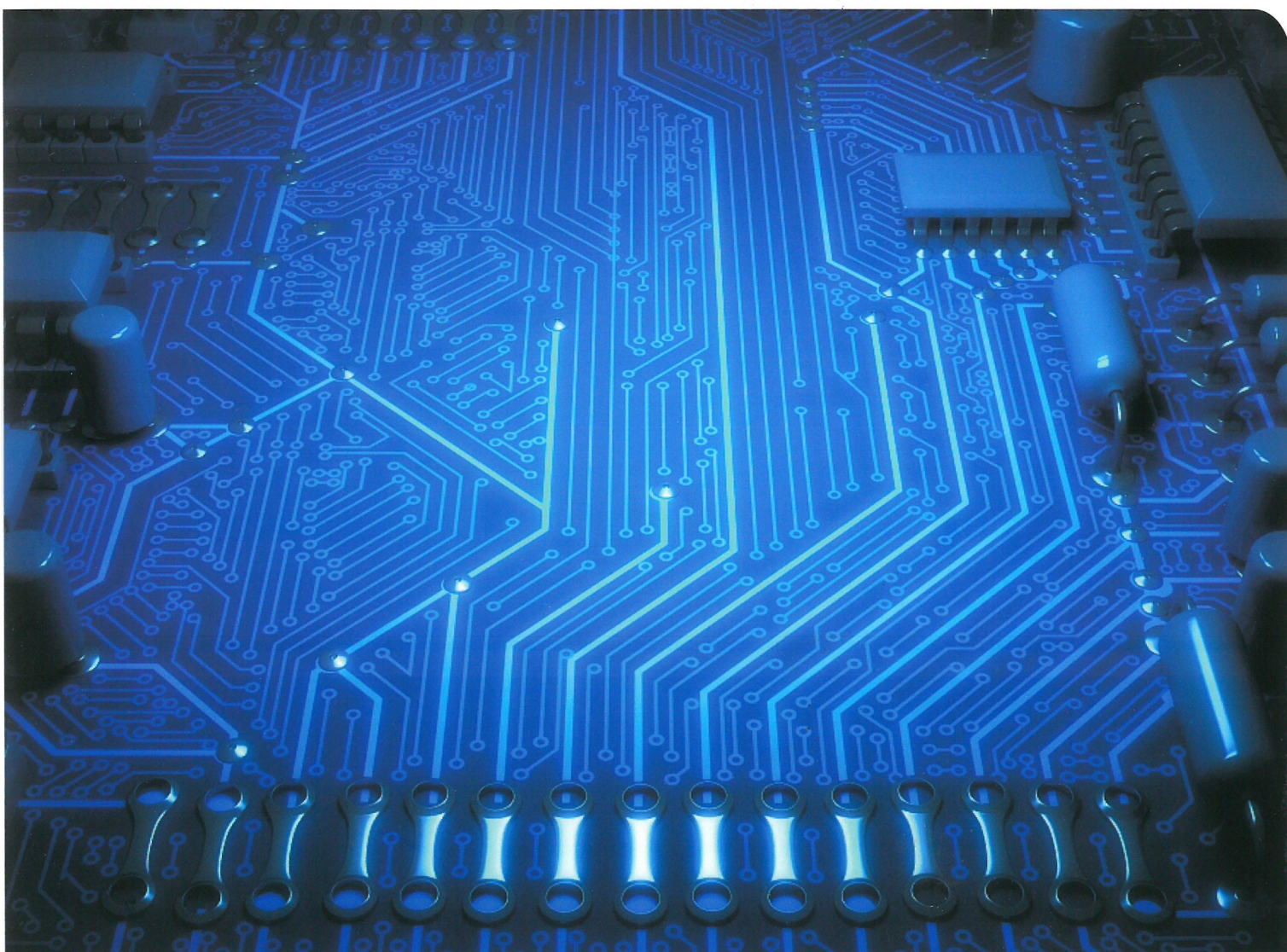




江苏奥凯电气有限公司
JIANGSU OKEY ELECTRIC CO., LTD.,



物联网柔性智能母线槽配电系统 (IFB BUSWAY)

企业简介

COMPANY PROFILE



江苏奥凯电气有限公司创建于1990年，是一家注重于新型电气设备研发、生产和销售的高科技企业，产品主要有高低压开关成套设备、配电箱、高压离相封闭母线、共相封闭母线和隔相封闭母线、低压空气型母线槽、低压节能智能密集型母线槽、物联网柔性智能母线槽、矿物耐火母线槽、浇注防水母线槽、太阳能光伏支架、抗震支吊架、节能组合式电缆桥架、钢制电缆桥架、铝合金电缆桥架、不锈钢电缆托架等。产品广泛用于发电厂、核电站、工业厂房、铁路、桥梁、光伏电厂、风力发电厂、高层楼宇、学校、医院、电信大楼和数据中心等。

物联网是由联网物品构成的一个网络，其中包括与这些物品进行互动的互联网服务，形成一个有限的数据传输载体；柔性智能母线槽是人性化将母线槽配电系统改良后结合测控技术和自动监察、记录、存贮并配置监测数据的分析、信号传送、故障报警和解除功能，实现工程配电系统的安全运行。产品广泛应用于核电棒控机房、电信中心、云数据中心IT机柜、IDC机房，机床密集型车间、大型会议中心、大型影剧院和大型楼宇、酒店的配电工程等。为客户的配电系统日常运维提供更便捷，更安全的服务。



Jiangsu Okey Electric Co., Ltd., founded in 1990, is a high-tech enterprise focusing on the research and development, production and sales of new electrical equipments. Its products mainly include complete sets of high and low switch equipment, distribution box, high-voltage isolated phase enclosed bus, common phase enclosed bus and isolated phase enclosed bus, low-voltage air type busway, low-voltage energy-saving intelligent intensive bus duct and Internet of Things flexible intelligent busway, mineral fire-resistant bus duct, cast waterproof bus duct, solar photovoltaic support, seismic support and hanger, energy-saving combined cable tray, steel cable tray, aluminum alloy cable tray, stainless steel cable bracket, etc. Products are widely used in power plants, nuclear power plants, industrial plants, railways, bridges, photovoltaic power plants, wind power plants, high-rise buildings, schools, hospitals, telecommunications buildings and data centers.

The Internet of Things (IoT) is a network composed of connected goods, including Internet services interacting with these goods, forming a limited data transmission carrier; flexible intelligent bus duct is a humanized improvement of bus duct distribution system, combined with measurement and control technology and automatic monitoring, recording, storing software system and Internet networking linkage, having the function of monitoring data analysis, signal transmission, failure warning and releasing., to realize the safe operation of engineering power distribution system. The products are widely used in power distribution engineering of nuclear power rod control room, telecommunication center, cloud data center IT cabinet, IDC room, machine tool intensive workshop, large conference center, large theater, large buildings and hotel. Provide more convenient and safe services for customers' daily operation and maintenance of distribution system.





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经营

理念

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◎ 物联网柔性智能母线槽IFB Busway 配电系统

Introduction of IoT flexible intelligent busway distribution system (IFB Busway)

人机界面完整解决方案

Complete solution for human-machine interface

测量监控配电方案

Solution for measuring and monitoring power distribution

干线监控配电方案

Trunk monitoring and distribution scheme

基础干线方案

Basic trunk line plan



母线给机柜供电

The bus bar supplies power to the cabinet



智能人机交互监控界面

Intelligent human-computer interaction monitoring interface

精确机柜能效管理

Accurate cabinet energy efficiency management

干线能效管理

Energy efficiency management of trunk lines

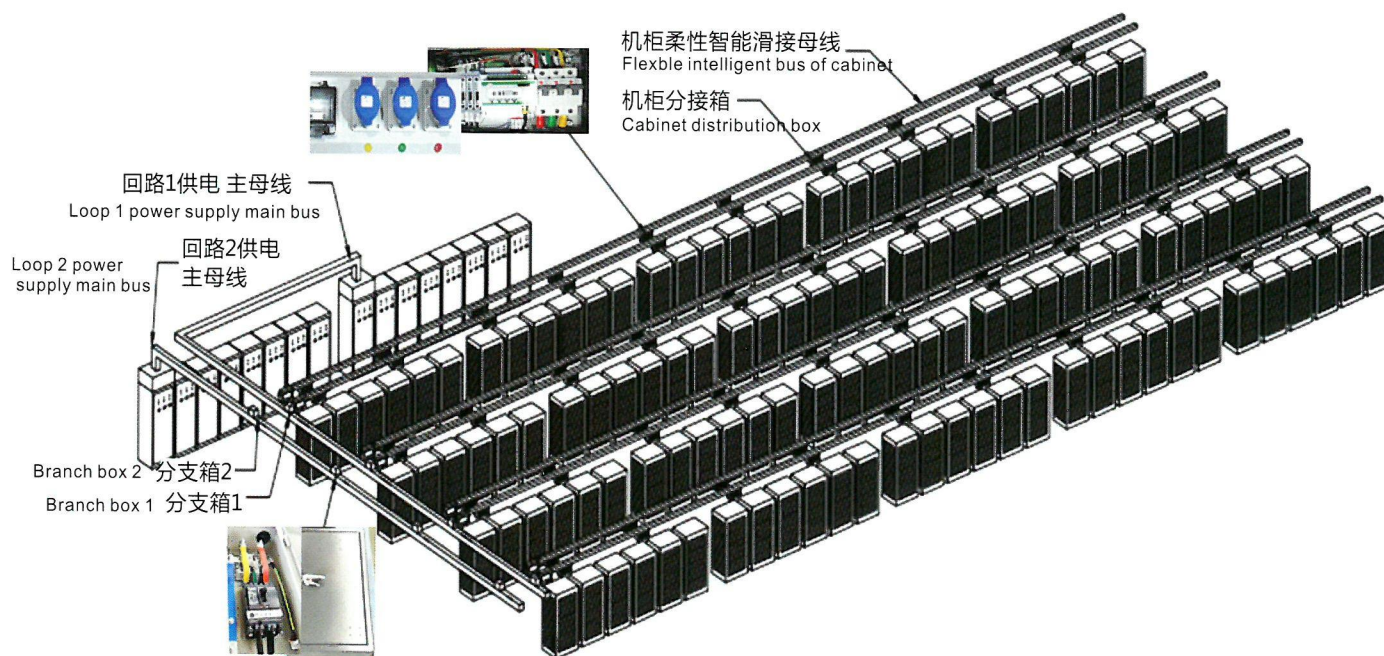


◎ 物联网柔性智能母线槽IFB Busway 配电系统设计应用

Design and application of IFB busway distribution system with flexible intelligent bus duct of Internet of Things

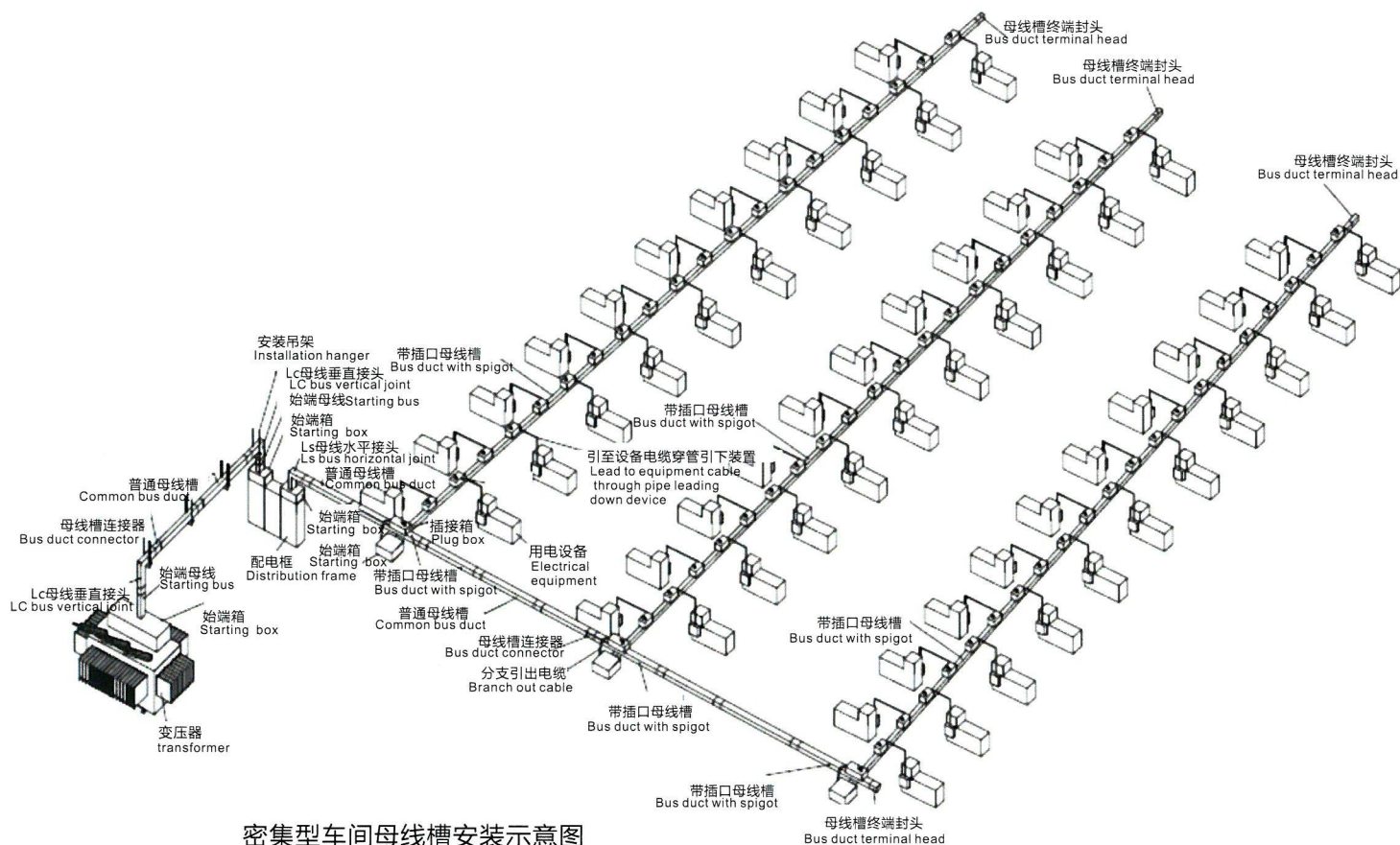
• 数据中心机柜主、次回路智能母线槽配电系统

Intelligent busway distribution system for primary and secondary circuits of data center cabinet



•大型设备密集型车间

Large equipment intensive workshops

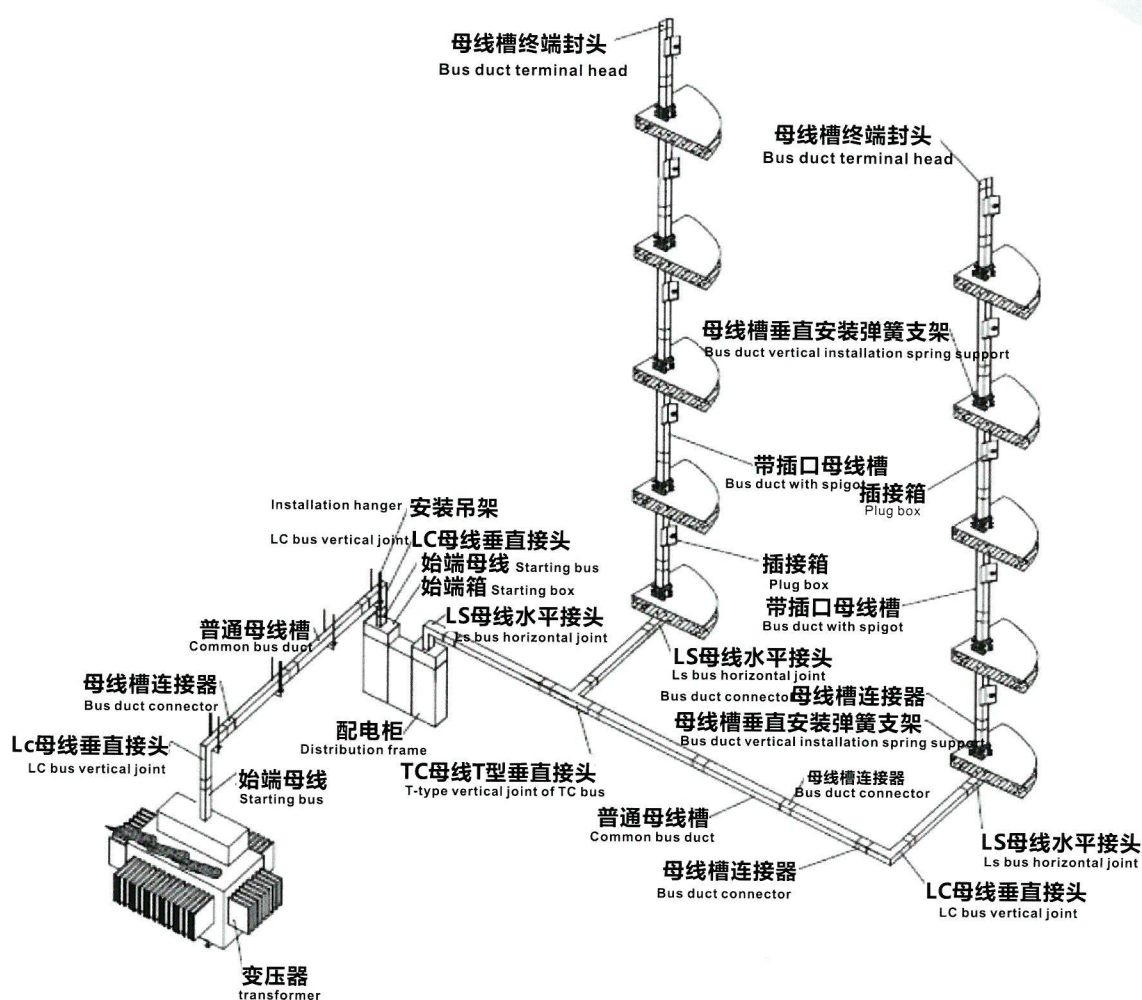


密集型车间母线槽安装示意图
Installation diagram of busway in intensive workshop



• 高层楼宇建筑配电母线系统

Distribution bus system of high rise building



高层建筑母线槽安装示意图

Installation diagram of bus duct in high rise building

◎ 物联网柔性智能母线槽技术支持

Technical support for IoT flexible intelligent busway

1、采用标准：

- 1.1 国家标准（GB7251.1-2013）《低压成套开关设备和控制设备》
- 1.2 国家标准（GB7251.6-2015）《低压成套开关设备和控制设备 第6部分：母线干线系统（母线槽）》
- 1.3 国家标准（GB7251.8-2005）《低压成套开关设备和控制设备 智能型成套设备通用技术要求》；
- 1.4 国家标准（GB 50054-95）《低压配电设计规范》；
- 1.5 国家标准（GB/T50314-2000）《智能建筑设计标准》
- 1.6 国家标准（GB4208-2008）《外壳防护等级（IP代码）》

1 Adoption of standards:

- 1.1 National Standard (GB7251.1-2013) " Low-voltage switchgear and controlgear assemblies "
- 1.2 National Standard (GB7251.6-2015) "Low-voltage switchgear and controlgear assemblies Part 6: Busbar trunking systems (busways) "
- 1.3 National Standard (GB7251.8-2005) " Low-voltage switchgear and controlgear assemblies- General Technology Requirement for Intelligent assemblies ";
- 1.4 National standard (GB 50054-95) "Code for design of low voltage electrical installations";
- 1.5 National Standard (GB/T50314-2000) " Standard for Design of Intelligent Building "
- 1.6 National Standard (GB4208-2008) "Degrees of Protection Provided by Enclosure (IP Code)"

2、产品主要功能

- 2.1 产品能提供对母线槽分支电气运行参数和运行温度的实时检测、实时显示、实时通讯、报警的功能
- 2.2 产品能提供对母线槽分支电气运行参数和运行温度历史数据记录、查询、统计报告的功能
- 2.3 产品能满足对测量精度、电击防护、外壳防护、电磁兼容方面的应用要求
- 2.4 产品与楼宇监控系统（BAS）无缝对接，实现远程监视、远程报警，界面友好，易于操作。

2. Main functions of the product

- 2.1 The product can provide the functions of real-time detection, real-time display, real-time communication and real-time alarm of the electrical operating parameters and operating temperature of the busway branch.
- 2.2 The product can provide the functions of recording, querying and statistical reporting of the electrical operating parameters and operating temperature historical data of the bus duct branch.
- 2.3 The product can meet the application requirements for measurement accuracy, electric shock protection, enclosure protection, and electromagnetic compatibility.
- 2.4 The product is seamlessly connected with the building monitoring system (BAS) to realize remotely monitoring and remotely alarm, with a friendly interface and easy to operation.

3、产品基本电气参数

- 3.1 系统应用环境要求
 - 3.1.1 海拔高度：2000m以下
 - 3.1.2 最高环境温度：+55℃
 - 3.1.3 最低环境温度：-25℃
 - 3.1.4 相对湿度：≤95%（25℃）

3.1.5 防护等级：≥IP54

3.2 测量参数选择

3.2.1 分支回路各相电压

3.2.2 分支回路各相电流

3.2.3 分支回路有功/无功功率

3.2.4 分支回路功率因数

3.2.5 分支回路谐波含量

3.2.6 分支回路节点各相运行温度

3.2.7 分支回路电量数据

3 Basic electrical parameters of the product

3.1 System application environment requirements

3.1.1 Altitude: Below 2000m

3.1.2 Highest ambient temperature: +40 °C

3.1.3 Lowest ambient temperature: -25 °C

3.1.4 Relative humidity: ≤95% (25°C)

3.1.5 Protection level: ≥IP54

3.2 Measurement parameter options

3.2.1 Voltage in each phase of branch circuit

3.2.2 Current in each phase of branch circuit

3.2.3 Active/reactive power of branch circuit

3.2.4 Branch circuit power factor

3.2.5 Harmonic content of branch circuit

3.2.6 Operating temperature in each phase of branch circuit node

3.2.7 Electricity data of branch circuit

4、仪表参数技术指标

Technical index of instrument parameters

序号 Number	技术参数 Technical parameter	指标 Index
1	电气仪表精度 accuracy of electrical instrument	1.5
2	互感器精度 transformer accuracy	1.0
3	测温范围 temperature measurement range	-20°C -120°C
4	温度传感器精度 accuracy of temperature sensor	B
5	测温响应时间 temperature measurement response time	10S
6	防护等级 protection level	IP54

5.系统实现能力

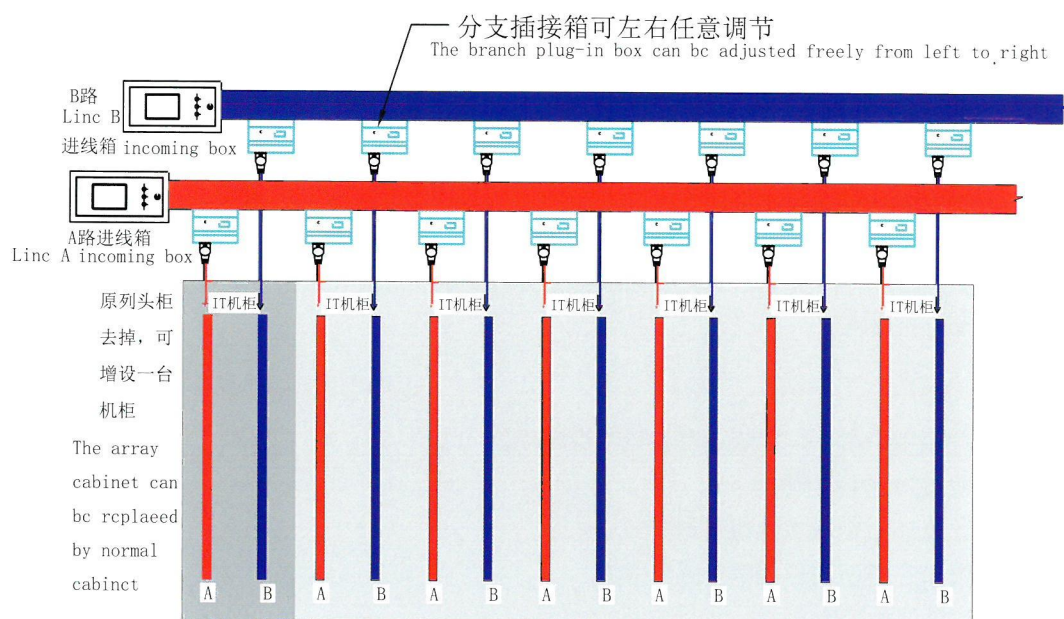
- 5.1 系统在各个子区域间符合TCP/IP协议的通讯方式，可采用网线
- 5.2 同一子区域内各个测试点间符合RS485 Modbus通讯协议，可采用lora通讯方式
- 5.3 子区域与控制中心BAS系统符合IEEE以太网的方式无缝连接
- 5.4 监控点和数据存储具有20%以上冗余以便扩展或作为备份容量
- 5.5 所有通讯电缆采取母线槽内单一屏蔽通道，保证不受外部电磁信号干扰
- 5.6 子区域中心可以采用PLC、DDC进行控制
- 5.7 系统可提供互联网通信接口，以便通过Web浏览器远程监视
- 5.8 系统软件设置温度显示和超温报警功能
- 5.9 系统软件可设置分合闸状态显示、过载、过压、谐波异常报警功能
- 5.10 系统软件可设置移动报警功能接口
- 5.11 系统软件可通过用户口令和校验，有效保证数据安全
- 5.12 系统软件可以方便查询各个参数的实时、历史数据、趋势，形成统计报表

5 System implementation capability

- 5.1 the communication mode of the system in accordance with the TCP / IP protocol can be adopted in each sub area
- 5.2 each test point in the same sub area conforms to RS485 Modbus communication protocol and can adopt Lora communication mode
- 5.3 The sub-regions are seamlessly connected to the control center BAS system in a manner consistent with IEEE Ethernet standard.
- 5.4 Monitoring sites and data stores have more than 20% redundancy to expand or to serve as backup capacity.
- 5.5 All communication cables assembled in a single shielded channel in the busway to protect them from external electromagnetic signal.
- 5.6 The subregion center can be controlled by PLC and DDC.
- 5.7 The system provides an Internet communication interface for remote monitoring through a Web browser.
- 5.8 The system software has the function of temperature display and overtemperature alarm.
- 5.9 The system software has the functions of opening and closing state display, overload, overvoltage and harmonic anomaly alarm.
- 5.10 The system software has the alarm function interface to mobile.
- 5.11 The system software can effectively guarantee data security through user password and verification.
- 5.12 The system software can easily query the real-time, historical data trend of each parameter, and can form statistical report.

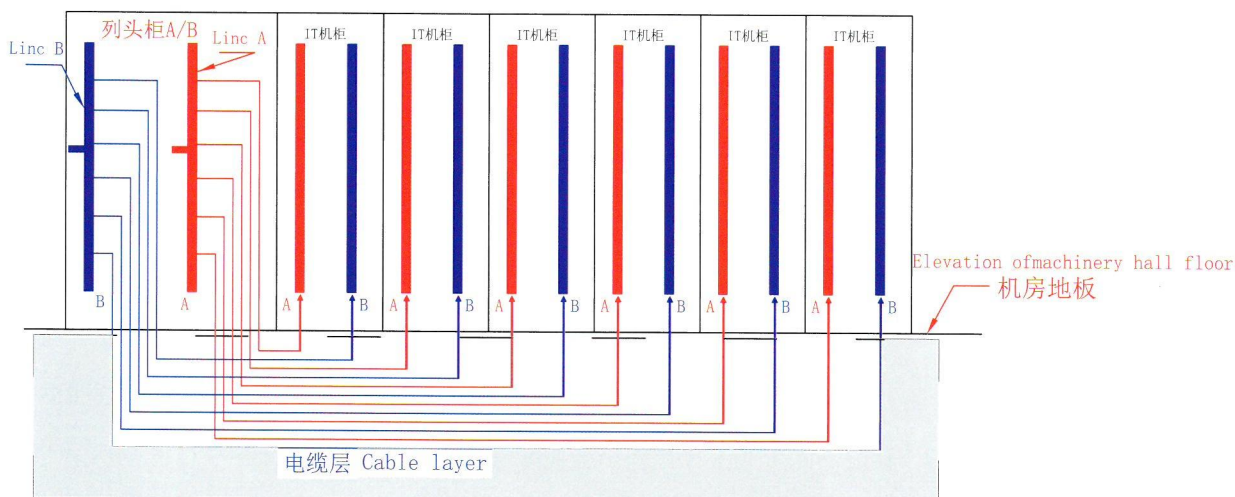
◎ 物联网柔性智能母线槽优势

Advantages of Internet of Things flexible intelligent bus duct



IFB柔性智能母线系统配电示意图

Distribution diagram of IFB flexible intelligent bus system



“列头柜+线缆”配电示意图

Power distribution diagram of Array cabinet+ cable

1. 节能性、安全性

- 母线干线采用铜排输电, 金属外壳快速散热。系统发热量降低, 散热性更好;
- 发热量的降低及空调制冷负担的降低, 达到双向节能效果;
- 母线系统温升更低、短耐能力更强, 安全性和使用寿命提高。
- 采用高阻燃性绝缘材料, 系统防火能力极大提高;
- 系统运行发热或着火情况下无卤化物产生, 符合环保要求;
- 分支箱插接点可配置温度监测模块, 提高关键节点预警能力。

1. Energy saving and safety

- The bus main line adopts copper bar for power transmission, and the metal shell can quickly dissipate heat. The heat output of the system is reduced and the heat dissipation is better;
- The reduction of calorific value and the cooling burden of air conditioning can achieve the two-way energy saving effect
- The bus system has lower temperature rise, stronger short-term resistance, and higher safety and service life.
- Using high flame retardant insulation material, the fire resistance of the system is greatly improved;
- No halide is produced when the system is running hot or on fire, which meets the requirements of environmental protection;
- The temperature monitoring module can be configured at the junction point of branch box to improve the early warning ability of key nodes.

2. 全生命周期成本优势

- “列头柜+线缆” 配电系统生命周期10-15年,母线系统生命周期25-30年;
- 列头柜的取消,为运营商增加5%的机柜位;
- 综上:按系统全生命周期计算,单机柜成本分摊节约30%;
- 可分步投资.先部署母线槽部分,插接箱根据需要逐渐部署;
- 日常维护更便捷,节约机房整体运维成本;
- 可重复利用,降低机房搬迁或重新布局的成本。

2. Energy saving and safety

- The life cycle of distribution system of "array cabinet + cable" is 10-15 years, and that of bus system is 25-30 years;
- The cancellation of array head cabinet will increase 5% cabinet space for operators;
- To sum up: according to the whole life cycle of the system, the cost sharing of single cabinet can be saved by 30%;
- It can be invested step by step. The bus duct part should be deployed first, and the plug-in box should be deployed gradually according to the needs;
- The daily maintenance is more convenient and saves the overall operation and maintenance cost of the computer room;

3. 便捷性、灵活性

- 模块化设计,大大缩短安装周期,后期变更(包括机柜在线扩容,增加或重新部署等)更简便
- 三相五线制干线系统,支持交流单相、交流三相,直流输出;
- 插接箱可在母线干线任意位置插接,且可实现带电插拔、快速更换;
- 可采用天花板吊装、机柜支撑等安装方式;
- 分支采用工业连接器馈出,相序自对应.

3. Convenience and flexibility

- Modular design, greatly shorten the installation cycle, later changes (including cabinet online expansion, increase or re deployment, etc.) are more simple;
- Three phase five wire system trunk wire system supports AC single-phase, AC three-phase, DC output;
- The plug-in box can be inserted at any position of the bus main line, and can realize hot plug and quick replacement;
- Ceiling hoisting, cabinet support and other installation methods can be adopted;
- The branch adopts industrial connector to feed out, and the phase sequence corresponds to itself

◎ 物联网柔性智能母线槽 (IFB) 配电系统的监测

IoT Flexible Intelligent Busway (IFB Busway) distribution system monitoring



◎ IFB物联网柔性智能母线槽系统结构说明及选型

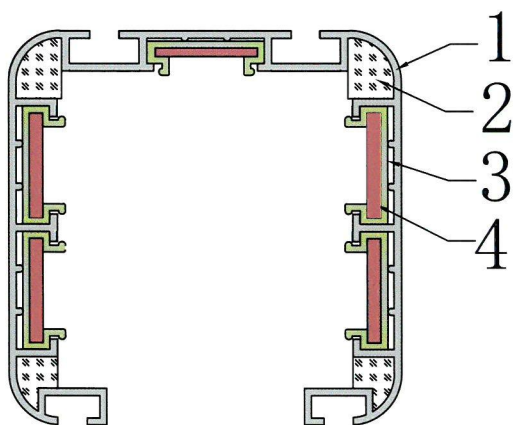
Structure description and selection of flexible intelligent busway system for IFB IoT

1. 物联网柔性智能母线槽系统 (额定电流100A~400A,额定电压500V,分支箱可滑动, 最小间距400mm)

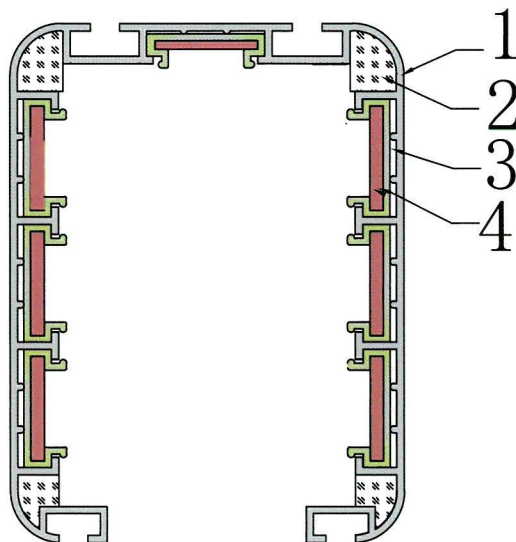
1.1 结构形式: 3P-5三相五线制母线槽 和 3P-7动力加照明七线制母线槽

1. IoT flexible intelligent bus duct system (rated current 100A ~ 400A, rated voltage 500V, sliding branch box, minimum gap 400mm)

1.1 Structure: 3p-5 three-phase five line bus duct and 3p-7 power plus lighting three-phase seven line bus duct



3P-5



3P-7



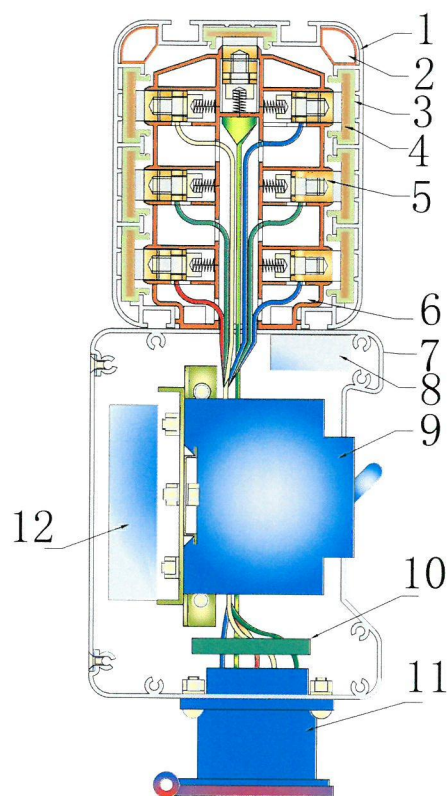
开口式滑触母线



封闭式滑触母线

1.2系统优点：分接箱任意位置安装、可调固定

1.2 System advantages: the junction box can be installed at any position, fixed adjustably



1. 母线槽通道外壳

2. 数据线管道

3. 母线绝缘护套

4. 铜导体

5. 集电器端子

6. 集电器组件

7. 插接分支箱

8. 测温模块

9. 三极（或二极）微型断路器

10. 电流、电压监测模块

11. 工业插座（三孔、四孔或五孔）

12. 集成处理器

1. Bus duct enclosure

2. Data cable pipeline

3. Bus insulation sheath

4. Copper conductor

5. Collector terminal

6. Collector components

7. Jack branch box

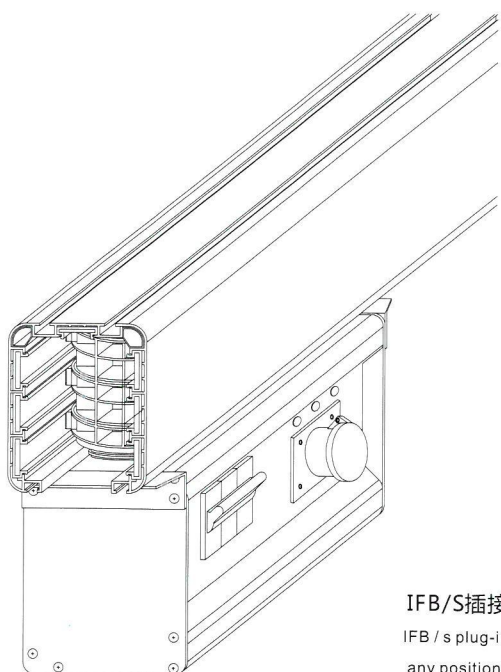
8. Temperature measurement module

9. Three-pole (or two-pole) miniature circuit breaker

10. Current and voltage monitoring module

11. Industrial socket (three-hole, four-hole or five-hole)

12. Integrated processor



IFB/S插接分支箱安装，直线任意位置移动固

IFB / s plug-in branch box installation, moving and fixing at any position in straight line

1.3结构性能说明：

1)智能母线槽通道外壳

- 材料：为6063-T5铝镁合金型材，厚度 $\geq 2.0\text{mm}$,布氏硬度 $\geq 65\text{HB}$
- 表面处理：阳极氧化或静电喷涂。常规色墨黑（利于吸热散热），或根据客户要求定制。
- 外观：流线型设计大方美观、机械强度高、散热快、耐腐蚀性强（盐雾试验耐受1800h）

1.3 Structural performance description:

1) Smart bus duct channel enclosure

- Material: 6063-T5 aluminum magnesium alloy profile, thickness $\geq 2.0\text{mm}$, Brinell hardness $\geq 65\text{HB}$
- Surface treatment: anodizing or electrostatic spraying. Conventional black color (be good for heat absorption and heat dissipation), or customized according to customer requirements.
- Appearance: beautiful generous style with streamlined design, high mechanical strength, quick heat radiation, high corrosion resistance (salt spray test upto 1800h)

2)铜导体

- 材料：高纯度无氧电工用铜排，纯度 $\geq 99.98\%$ ，导电率（IACS） $\geq 98\%$,电阻率 $\leq 0.0152 \times 10^{-6}\Omega\text{m}$
- 表面处理：整体镀锡或镀银

2) Copper conductor

- Material: high purity oxygen-free electrical copper bar, purity $\geq 99.98\%$, conductivity (IACS) $\geq 98\%$, resistivity $\leq 0.0152 \times 10^{-6}\Omega\text{m}$
- Surface treatment: integral tinning or silver plating

3) 绝缘护套

- 材料:阻燃增强纤维PC聚碳酸酯电工塑料
- 绝缘耐热等级B级
- 阻燃级别V0,不含卤化物，高温及火灾状态无有害气体产生

3) Insulating sheath

Material: antflaming reinforced fiber PC polycarbonate electrical plastic Insulation heat resistance class B Flame retardant grade V0, no halogen, no harmful gas produced in high temperature and fire state

4) 插接分支箱

- 铝合金金属壳体，主体材料6063-T5铝镁合金型材，强度高，质量轻，外形美观
- 高导铜集电端子，弹性应力持久，接触温升低
- 馈电参量+四点温度监测，对系统运行状态实时监测和报警
- 工业连接器馈出，安装快速、便捷
- 单回路、三回路、六回路选择，满足设计需求
- 配置防错相标色定位，保证分支箱与母线相序自对应
- 快速锁紧机构，安装及更换迅捷

4) Branch jack box

- Aluminum alloy metal shell, main material 6063-T5 aluminum magnesium alloy profile, high strength, light weight, beautiful appearance
- High conductivity copper collector terminal with long elastic stress and low contact temperature rise

- Feed parameters and four-point temperature monitoring, real-time monitoring and alarm of system operation state
- Industrial connector feed out, fast and convenient installation
- Selectable single-circuit, three-circuit and six-circuit to meet the design requirements
- Color positioning for error proofing of phase is configured to ensure the phase sequence of branch box and bus is self corresponding
- Quick locking mechanism, quick installation and replacement

1.4 物联网柔性智能母线槽防护等级大于IP43时，配置母线槽壳体下扣板，任意组合、现场安装，方便快捷。

1.4 When the protection level of the IoT flexible intelligent bus duct is greater than IP43, the lower gusset plate of the bus duct shell is provided, which can be combined arbitrarily and installed on the site expediently and quickly.

1.5 选型

1) IFB物联网柔性智能母线槽系统主要参数（额定电流100A~400A）

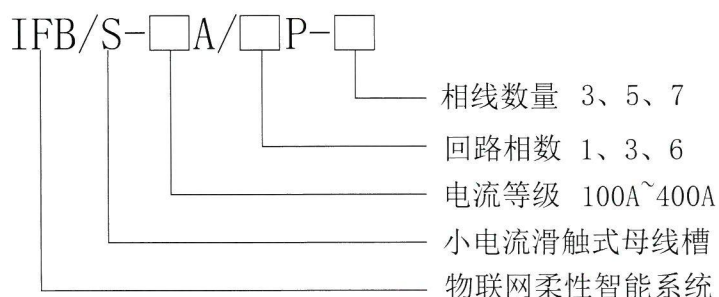
参数项目	参数值					
执行标准	IEC61439.1、IEC61439.6、GB/T7251.1-2013、GB/T7251.6-2015、GB/T7251.8					
系统规格	AC3P5W;AC3P7W;DC 双回路					
环境温度	-5~+40°，24 小时平均温度不超过+35°					
防护等级 IP	IP54/IP43					
额定绝缘电压	1000V/500V					
额定频率	50HZ/60HZ					
单元标准长度	3.0m; 2.4m; 2.0m; 1.8m; 1.2m; 1.0m; 0.6m					
支吊架间距	1.5m					
额定电流	100A	160A	200A	250A	315A	400A
外形尺寸	高 H*宽 W=115*115/115*152					
参考重量 (kg/m) 3P-5/3P-7	6.94/8.91	6.94/8.91	7.42/9.68	7.89/10.58	8.64/11.73	9.71/13.38
短耐有效值 I _{cw} (kA)	20	20	20	20	20	20
短耐峰值 I _{pk} (kA)	40	40	40	40	40	40
电阻 (20℃, MΩ/m)	0.318	0.318	0.257	0.182	0.158	0.122
电抗 (20℃, MΩ/m)	0.064	0.064	0.051	0.046	0.037	0.029
阻抗 (20℃, MΩ/m)	0.324	0.324	0.262	0.188	0.162	0.125
压降 (V/m cos=0.8)	0.08	0.08	0.09	0.07	0.075	0.075
接地系统	外壳整体接地或单独铜排接地，PE 接地排截面不小于相线截面的 50%					

1.5 model selection

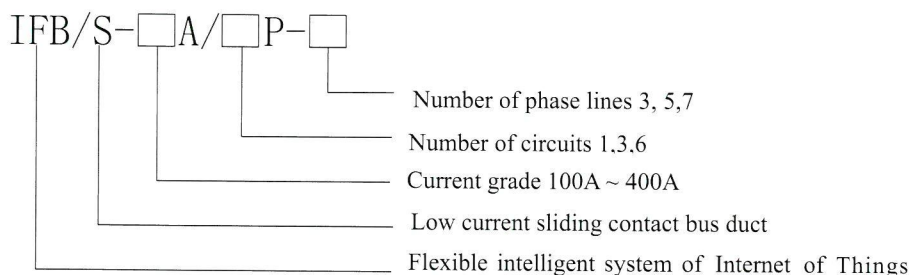
1) Main parameters of flexible intelligent bus duct system of IoT IFB (rated current 100A ~ 400A)

Parameter items	Parameter value					
Executive Standards	IEC61439.1、IEC61439.6、GB/T7251.1-2013、GB/T7251.6-2015、GB/T7251.8					
System specifications	Ac3p5w; ac3p7w; DC dual circuit					
Ambient temperature	-5~+40°, The average temperature in 24 hours is not more than + 35°					
Protection level IP	IP54/IP43					
Rated insulation voltage	1000V/500V					
Rated frequency	50HZ/60HZ					
Unit standard length	3.0m; 2.4m; 2.0m; 1.8m; 1.2m; 1.0m; 0.6m					
Spacing between supports and hangers	1.5m					
Rated current	100A	160A	200A	250A	315A	400A
Dimensions	High H * Width W = 115 * 115 / 115 * 152					
Reference weight (kg / M) 3p-5 / 3p-7	6.94/8.91	6.94/8.91	7.42/9.68	7.89/10.58	8.64/11.73	9.71/13.38
Effective value of short-circuit endurance ICW (kA)	20	20	20	20	20	20
Short-circuit endurance peak value IPK (kA)	40	40	40	40	40	40
Resistance (20 °C, M Ω / m)	0.318	0.318	0.257	0.182	0.158	0.122
Reactance (20 °C, M Ω / m)	0.064	0.064	0.051	0.046	0.037	0.029
Impedance (20 °C, M Ω / m)	0.324	0.324	0.262	0.188	0.162	0.125
voltage drop (V / M, cos = 0.8)	0.08	0.08	0.09	0.07	0.075	0.075
Grounding system	The shell is grounded as a whole or copper bar separately, and the cross section of PE grounding bar is not less than 50% of the section of phase line					

2) 物联网柔性智能母线槽系统IFB/S型号说明



2) IFB/S model description of flexible intelligent busway system of Internet of Things



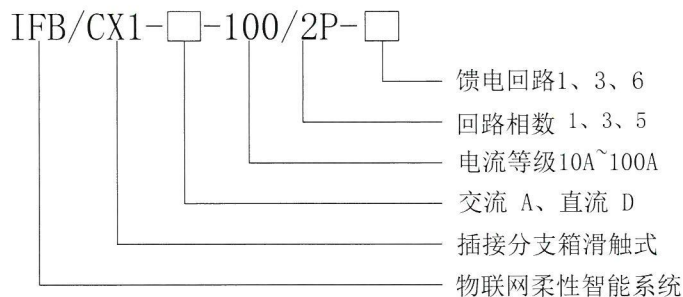
3) 插接分支箱外形尺寸参考

型号	额定电流 (A)	外形尺寸 (mm)	用途	备注
CX1-A-100/2P-1	10A 、 16A 、	200*135*240	箱体内可设置安装多种型号的断路器开关，馈电参量+四点温度监测，对系统运行状态实时监测和报警，能对分支电路作过载和短路保护	分支交流电源馈出可采用线缆或工业插座
CX1-A-100/2P-3	20A 、 25A 、	200*135*310		
CX1-A-100/2P-6	32A 、 40A 、	200*135*380		
CX1-A-100/2P-6	50A、63A、80A 100A	200*135*450		
CX1-D-100/2P-1	10A 、 16A 、	200*135*310	箱体内可设置安装多种型号的断路器开关，馈电参量+四点温度监测，对系统运行状态实时监测和报警，能对分支电路作过载和短路保护	分支直流电源馈出可采用线缆或工业插座
CX1-D-100/2P-3	20A 、 25A 、	200*135*380		
CX1-D-100/2P-6	32A 、 40A 、	200*135*450		
CX1-D-100/2P-6	50A、63A、80A 100A	200*135*520		

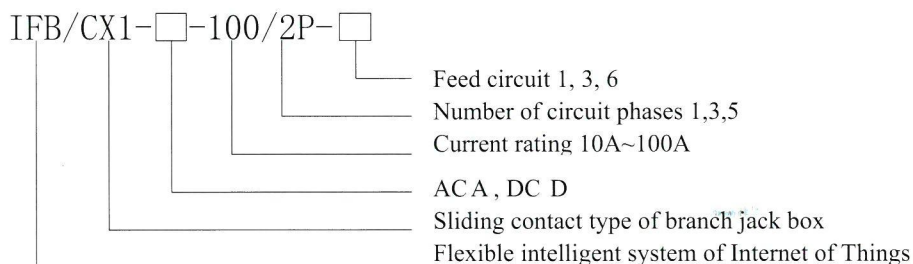
3) Reference for dimensions of branch jack box

Model	Rated current (a)	Overall dimension (mm)	purpose	Note
CX1-A-100/2P-1	10A、16A、20A、 25A、32A、40A、 50A、63A、80A 100A	200*135*240	The box can be equipped with various types of circuit breaker switches, feed parameters and four-point temperature monitoring, real-time monitoring and alarming of system operation status, and provides overload and short-circuit protection for branch circuits	The branch AC power supply can be fed out by cable or industrial socket
CX1-A-100/2P-3		200*135*310		
CX1-A-100/2P-6		200*135*380		
CX1-A-100/2P-6		200*135*450		
CX1-D-100/2P-1	10A、16A、20A、 25A、32A、40A、 50A、63A、80A 100A	200*135*310	The box can be equipped with various types of circuit breaker switches, feed parameters and four-point temperature monitoring, real-time monitoring and alarming of system operation status, and provides overload and short-circuit protection for branch circuits	The branch DC power supply can be fed out by cable or industrial socket
CX1-D-100/2P-3		200*135*380		
CX1-D-100/2P-6		200*135*450		
CX1-D-100/2P-6		200*135*520		

4)CX1插接分支箱型号说明



4) Reference for dimensions of branch jack box

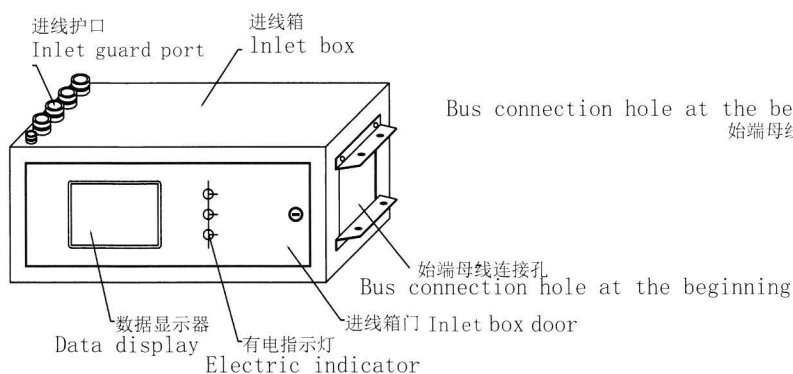


1.6物联网柔性智能母线槽系统（额定电流100A~400A,额定电压500V,分支箱可滑动，可任意位置安装，插接箱相邻间最小间距400mm）。

1.6 IoT flexible intelligent bus duct system (rated current 100A ~ 400A, rated voltage 500V, slidable branch box, can be installed in any position, the minimum distance between adjacent jack boxes is 400mm.)

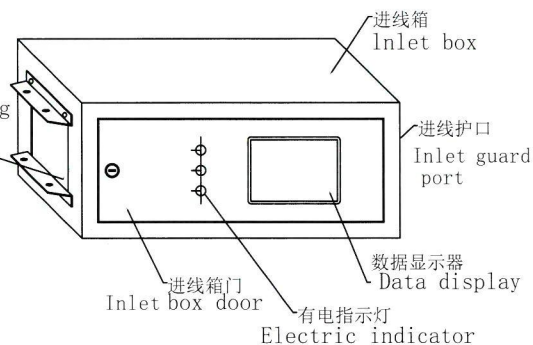
始端箱顶部进线

Line in from top of head box



始端箱端头进线

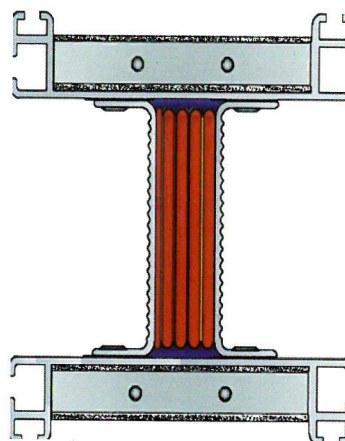
Side entry line of start box



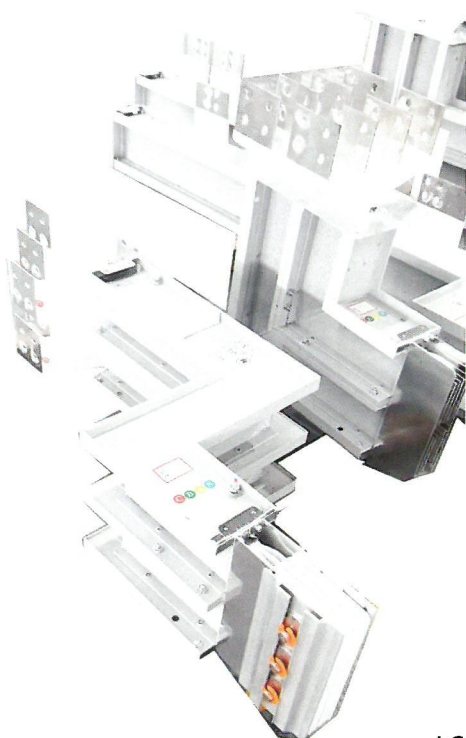
IFB□-S/S□A□□-□

交流A	T 顶部进线 T-Top entry
直流B	S 侧面进线 S-Side entry
400-400A	1 配置断路器 Configured with circuit breaker
315-315A	2 配置断路器、监测模块 Configured with CB(circuit breaker) and monitoring module
250-250A	3 配置断路器、监测模块、智能仪表 Configured with CB(circuit breaker), monitoring module and smart meter
200-200A	4 配置断路器、监测模块、避雷器 Configured with CB, monitoring module and arrester
160-160A	5 配置断路器、监测模块、避雷器、智能仪表 Configured with CB, monitoring module, arrester and smart meter
100-100A	6 其它非标配置 Other non-standard configuration

2. 物联网柔性智能密集型插接母线槽 (额定电流400A~6300A, 额定电压660V, 固定式插接箱, 最小间距600mm)



LCMC 密集型插接式母线槽400~2500A端面图
LCMC dense plug-in busway 400 ~ 2500 A end view drawing



LCMC密集型插接式母线槽3150~6300A端面图
LCMC dense plug-in bus duct 3150 ~ 6300 A end view drawing

2.1 结构说明：

1)智能母线槽通道外壳

- 材料：为6063-T5铝镁合金型材，厚度 $\geq 2.0\text{mm}$,布氏硬度 $\geq 65\text{HB}$
- 表面处理：阳极氧化或静电喷涂。常规色墨黑（利于吸热散热），或根据客户要求颜色定制。
- 外观：流线型设计大方美观、机械强度高、散热快、耐腐蚀性强（盐雾试验耐受1800h）

2.1 Structure description:

1) Smart bus duct channel enclosure

- Material: 6063-T5 aluminum magnesium alloy profile, thickness $\geq 2.0\text{mm}$, Brinell hardness $\geq 65\text{HB}$
- Surface treatment: anodizing or electrostatic spraying. Conventional color black (be good for heat absorption and heat dissipation), or custom-made color according to customer requirements.
- Appearance: elegant and beautiful with streamline design, high mechanical strength, heat dissipation quickly, strong corrosion resistance (salt spray test, 1800h)

2)铜导体

- 材料：高纯度无氧电工用铜排，纯度 $\geq 99.98\%$ ，导电率（IACS） $\geq 98\%$,电阻率 $\leq 0.0152 \times 10^{-6} \Omega\text{m}$
- 表面处理：整体镀锡或镀银

2) Copper conductor

- Material: high purity oxygen-free electrical copper bar, purity $\geq 99.98\%$, conductivity (IACS) $\geq 98\%$, resistivity $\leq 0.0152 \times 10^{-6} \Omega\text{m}$
- Surface treatment: overall tinning or silver plating

3) 绝缘护套

- 材料为阻燃增强电工塑料:PC聚碳酸酯或ABS增强纤维塑料
- 绝缘耐热等级B级
- 阻燃级别V0,不含卤化物，高温及火灾状态无有害气体产生

3) Insulating sheath

- The material is flame retardant reinforced electrical plastic: PC polycarbonate or ABS reinforced fiber plastic
- Insulation heat resistance class B
- Flame retardant grade V0, no halogen, no harmful gas produced in high temperature and fire state

4) 插接分支箱

- 金属壳体，主体材料镀锌铝合金板材制作，强度高，表面处理静电喷涂外形美观
- 高导铜镀银插脚，弹性应力持久，接触温升低
- 馈电参量+四点温度监测，对系统运行状态实时监测和报警
- 工业连接器馈出，安装快速、便捷

- 单回路、三回路、六回路选择，满足设计需求
- 配置防错相标色定位，保证分支箱与母线相序自对应
- 快速锁紧机构，安装及更换迅捷

4) Branch jack box

- Metal shell, the main material is made of galvanized aluminum alloy plate, with high strength, surface treatment by electrostatic spraying and beautiful appearance
- High conductivity copper silver plated pin with long elastic stress and low contact temperature rise
- Feed parameters and four-point temperature monitoring, real-time monitoring and alarming of system operation state
- Industrial connector feed out, fast and convenient installation
- Single-circuit, three-circuit and six-circuit selection to meet the design requirements
- Anti misoperation phase color positioning is configured to ensure the phase sequence of branch jack box and bus is self corresponding
- Quick locking mechanism, quick installation and replacement

2.2 选型

1) IFB- LCMC大电流物联网柔性智能母线槽系统主要参数（额定电流400A~6300A）

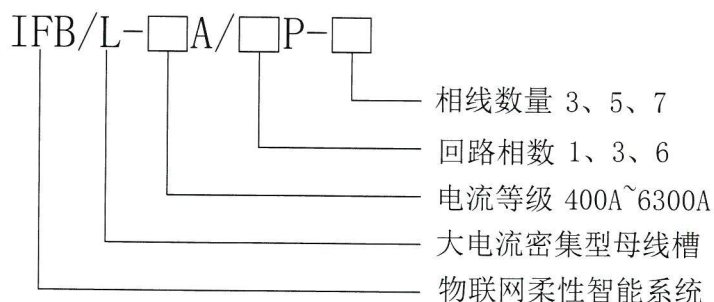
参数项目	参数值					
执行标准	IEC61439.1、IEC61439.6、GB/T7251.1-2013、GB/T7251.6-2015、GB/T7251.8					
系统规格	AC3P5W;AC3P7W;DC 双回路					
环境温度	-5~+40°，24 小时平均温度不超过+35°					
防护等级 IP	IP54/IP65					
额定绝缘电压	1000V/660V					
额定频率	50HZ/60HZ					
单元标准长度	3.0m; 2.4m; 2.0m; 1.8m; 1.2m; 1.0m; 0.6m					
支吊架间距	1.5m					
额定电流	400A	630A	800A	1000A	1250A	1600A
外形尺寸宽(W)mm	140					
外形尺寸高(H)mm	70	85	100	120	150	180
参考重量 (kg/m) 3P-5	10.2	12.5	14.5	19.6	25.4	31.5
短耐有效值 I _{cw} (kA)	30	30	30	50	50	50
短耐峰值 I _{pk} (kA)	70	70	70	105	105	105
电阻 (20℃, Ω/m)	0.089	0.070	0.046	0.047	0.033	0.024
压降 (V/m cos=0.8)	0.089	0.100	0.080	0.103	0.091	0.071
额定电流	2000A	2500A	3150A	4000A	5000A	6300A
外形尺寸宽(W) mm	140					
外形尺寸高(H) mm	200	260	332	422	520	560
参考重量 (kg/m) 3P-5	37.38	48.46	59.7	78	99	130
短耐有效值 I _{cw} (kA)	50	50	80	80	80	80
短耐峰值 I _{pk} (kA)	105	105	176	176	176	176
电阻 (20℃, Ω/m)	0.021	0.021	0.012	0.010	0.007	0.006
压降 (V/m cos=0.8)	0.091	0.106	0.082	0.081	0.078	0.071
接地系统	外壳整体接地或单独铜排接地，PE 接地排截面不小于相线截面的 50%					

2.2 model selection

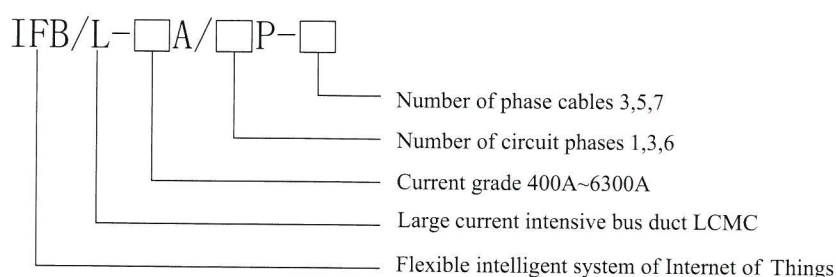
1) Main parameters of IFB-LCMC high current IOT flexible intelligent bus duct system (rated current 400A ~ 6300A)

Parameter items	Parameter value					
Executive Standards	IEC61439.1、IEC61439.6、GB/T7251.1-2013、GB/T7251.6-2015、GB/T7251.8					
System specifications	Ac3p5w; ac3p7w; DC dual circuit					
Ambient temperature	-The average temperature in 24 hours is not more than + 35 degrees					
Protection level IP	IP54/IP65					
Rated insulation voltage	1000V/660V					
Rated frequency	50HZ/60HZ					
Unit standard length	3.0m; 2.4m; 2.0m; 1.8m; 1.2m; 1.0m; 0.6m					
Spacing between supports and hangers	1.5m					
Rated current	400A	630A	800A	1000A	1250A	1600A
Overall dimension width (W)mm	140					
Dimension height (H)mm	70	85	100	120	150	180
Reference weight (kg / m) 3p-5	10.2	12.5	14.5	19.6	25.4	31.5
Effective value of short-circuit endurance ICW (KA)	30	30	30	50	50	50
Short-circuit endurance peak value IPK (KA)	70	70	70	105	105	105
Resistance (20 °C, Ω / m)	0.089	0.070	0.046	0.047	0.033	0.024
Voltage drop (V / m cos = 0.8)	0.089	0.100	0.080	0.103	0.091	0.071
Rated current	2000A	2500A	3150A	4000A	5000A	6300A
Overall dimension width (W)	140					
Dimension height (H)	200	260	332	422	520	560
Reference weight (kg / m) 3p-5	37.38	48.46	59.7	78	99	130
Effective value of short-circuit endurance ICW (KA)	50	50	80	80	80	80
Short-circuit endurance peak value IPK (KA)	105	105	176	176	176	176
Resistance (20 °C, Ω / m)	0.021	0.021	0.012	0.010	0.007	0.006
Voltage drop (V / M, cos = 0.8)	0.091	0.106	0.082	0.081	0.078	0.071
Grounding system	The shell is grounded as a whole or copper bar separately, and the cross section of PE grounding bar is not less than 50% of the section of phase line					

2) IFB/L型号说明



2) IFB / L model description



2.3 本系统馈电电流大，可预留分支插接口，插口为固定式，主要用于配电室至用电场所的动力箱回路或至机柜的小母线进线单元的回路供电

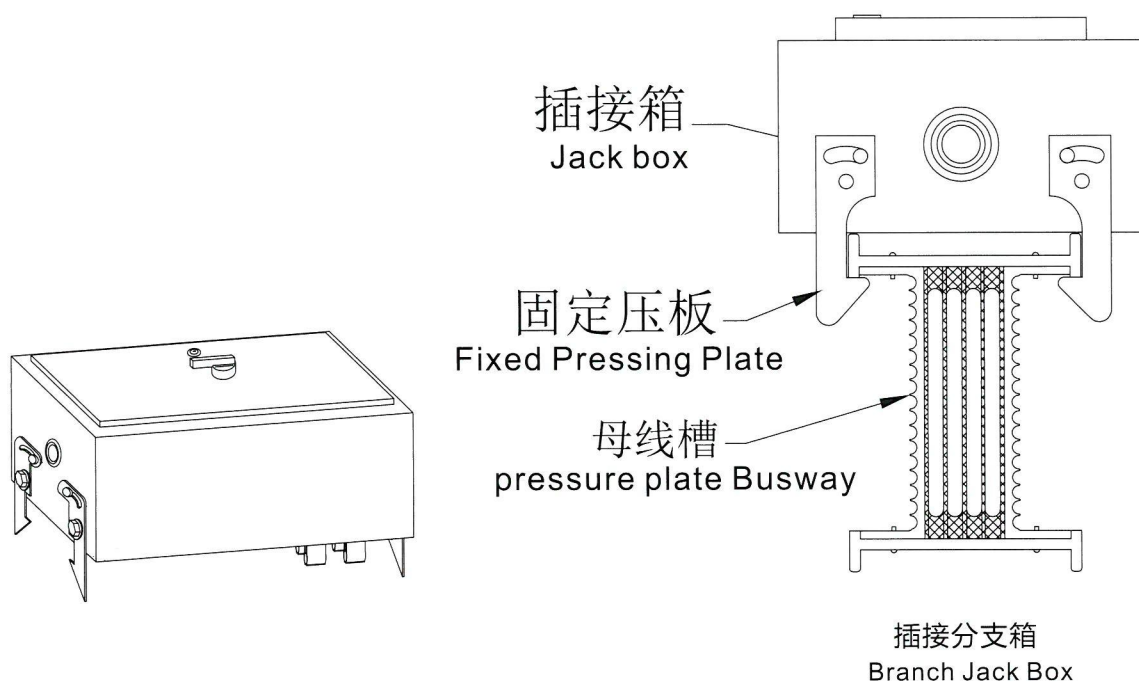
2.3 The system has large feed current, so branch interface can be reserved. The socket is fixed, mainly used for power supply of power box circuit from power distribution room to electric field station or to small bus incoming unit of cabinet

插接分支箱外形尺寸参考

型号	额定电流 (A)	外形尺寸 (mm)	用途	备注
CX2-A-100	10~100	295*305*550	箱体内可设置安装多种型号的断路器开关，馈电参量+四点温度监测，对系统运行状态实时监测和报警，能对分支电路作过载和短路保护	分支电源馈出 可采用线缆 或 125A 以下的工业插座
CX2-A-250	125~250	345*305*715		
CX2-A-400	250~400	445*305*915		
CX2-A-630	400~630	445*305*1015		

Reference for dimensions of branch jack box

Model	Rated current (a)	Outline dimension (mm)	Purpose	note
CX2-A-100	10~100	295*305*550	The box can be equipped with various types of circuit breaker switches, feed parameters and four-point temperature monitoring, real-time monitoring and alarming of system operation status, and can provide overload and short-circuit protection for branch circuits	Cable or industrial socket below 125A can be used for branch power feed out
CX2-A-250	125~250	345*305*715		
CX2-A-400	250~400	445*305*915		
CX2-A-630	400~630	445*305*1015		



◎ 设计方案

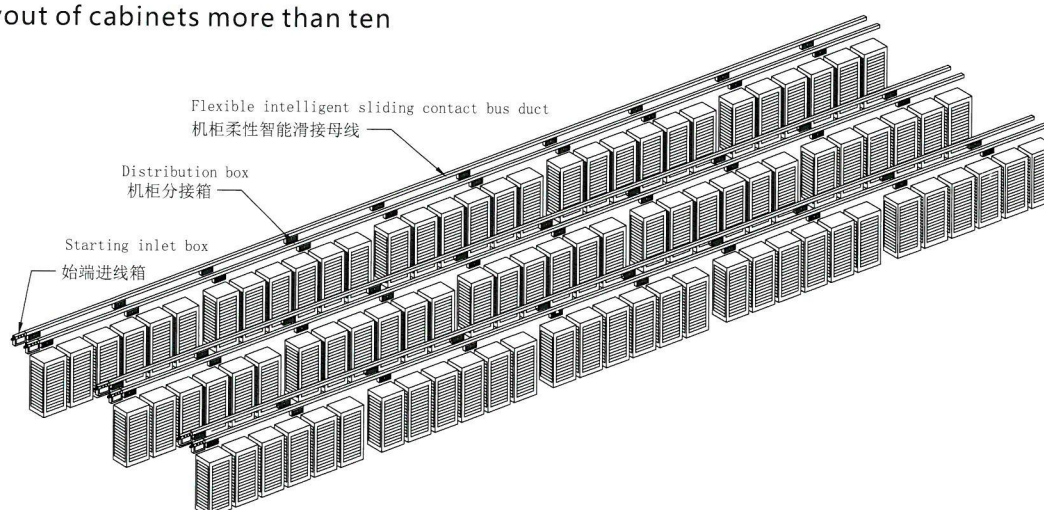
Devise scheme

1. 每一列机柜两路电源

- 标准配置，仅占用各列柜顶空间;
- 单条线容量较小;
- UPS输出回路配置清晰，管理方便;
- 适用于单列机柜10台以上的布局。

1. Each row of cabinets has two power supplies

- Standard configuration, occupying only the above space of the respective cabinet
- The capacity of single line is small
- The configuration of UPS output loop is clear and easy for management
- For the layout of cabinets more than ten



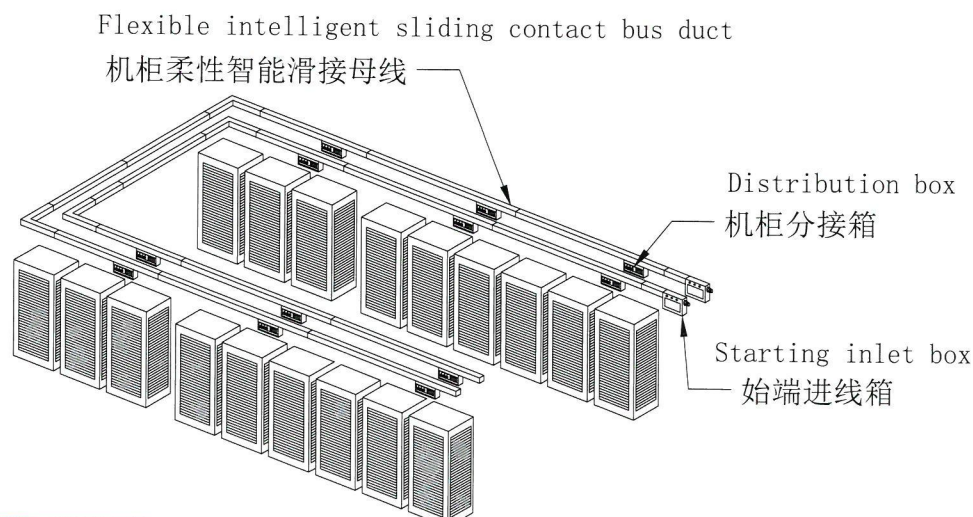
2. 每两列机柜两路电源

2. 每两列机柜两路电源

- 节省50%UPS输出回路;
- 节省50%母线进线箱;
- 适用于单列机柜少于10台的布局。

2. Two power supplies each two row of cabinets

- Save half of UPS output loop
- Save half amount of busbar inlet boxes
- Suitable for the layout of cabinets less than ten

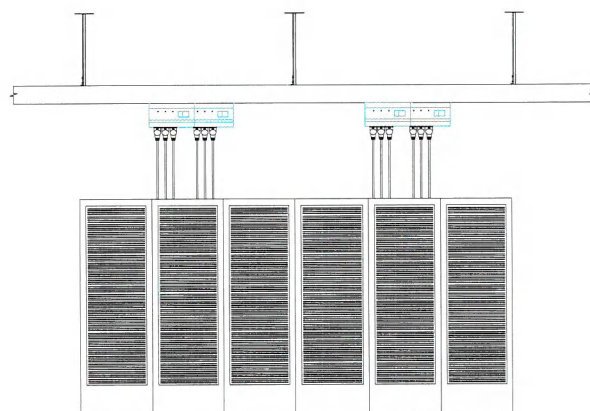
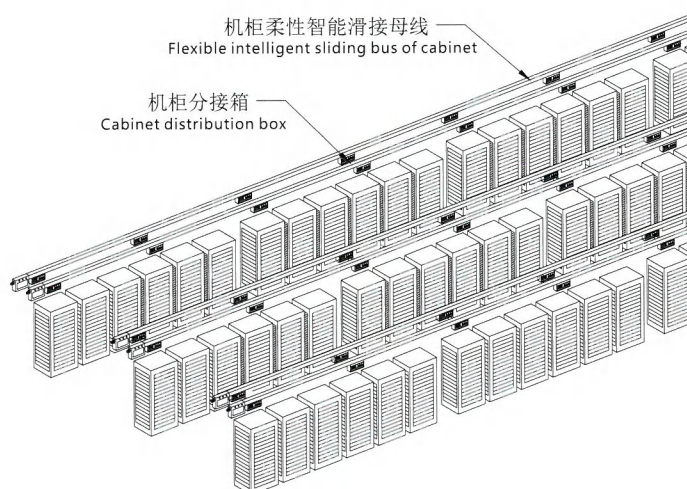


3.插接箱一对三供电

- 属于常规标准方案，性价比较高;
- 插接箱数量为机柜数量的2/3;
- 对于220V单相机柜，理论上三相平均分配;
- 单个插接箱检修影响3台机柜的供电。

3. Jack box provides one-to-three power supply

- Standard solution which is cost-effective
- The number of Jack boxes is 2/3 times of number of cabinets
- For a 220V single phase cabinet, each phase of three gets average distribution theoretically
- The power supply for three cabinets is affected when maintaining only one jack box

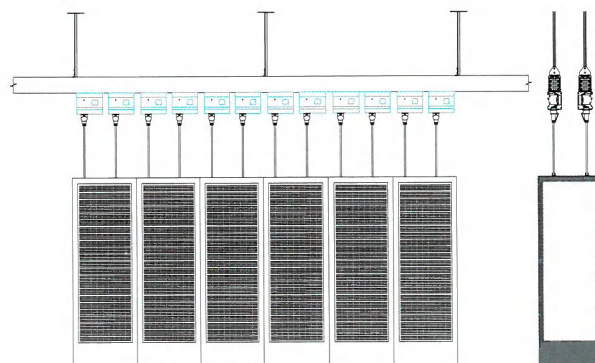
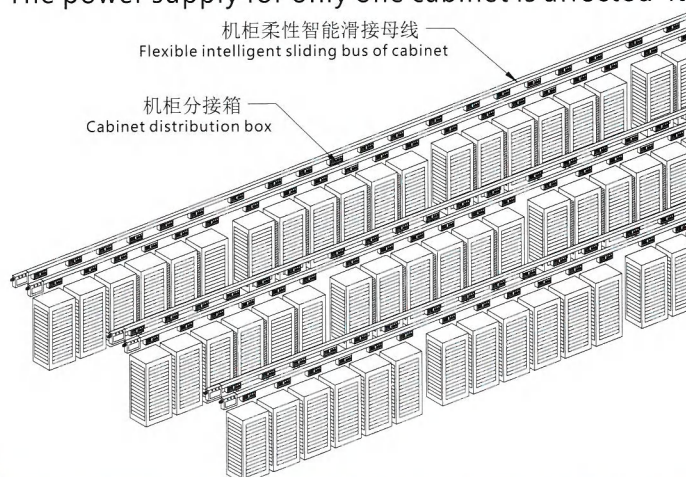


4.插接箱一对一供电

- 属于高配型方案
- 插接箱数量为机柜数量的2倍;
- 对于220V单相机柜，理论上三相平均分配;
- 单个插接箱检修影响单台机柜的供电。

4. Jack box provide one-to-one power supply

- It's the Solution with high configuration
- The number of Jack boxer is 2 times of number of cabinets
- For a 220V single phase cabinet, each phase of three gets average distribution theoretically
- The power supply for only one cabinet is affected itself when maintaining of one Jack box

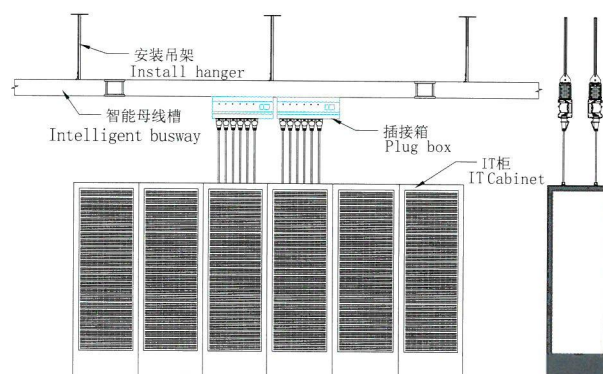
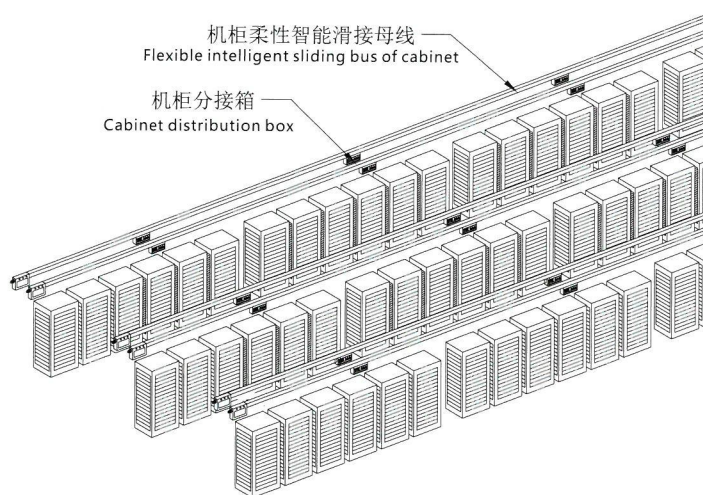


5. 插接箱一对六供电

- 属于经济型方案
- 插接箱数量为机柜数量的1/3;
- 对于220V单相机柜，理论上三相平均分配;
- 单机柜容量不超过6kw
- 单个插接箱检修影响6台机柜的供电。

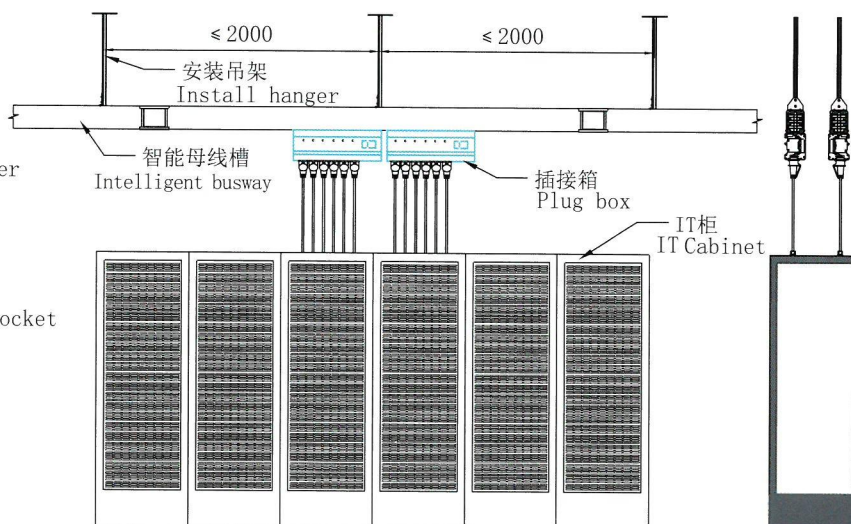
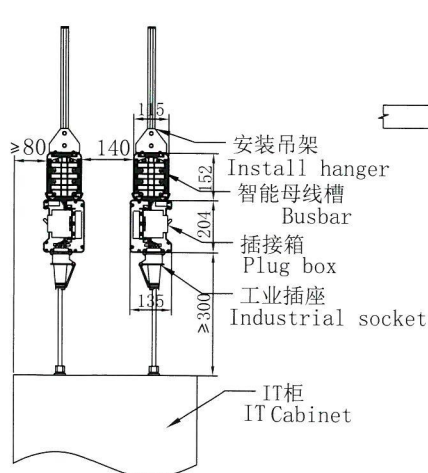
5. Jack box provides one-to-six power supply

- It is an economical solution
- The number of Jack boxes is 1/3 times of number of cabinets
- For a 220V single phase cabinet, each phase of three gets average distribution theoretically
- The capacity of single cabinet does not exceed 6kw
- The power supply for six cabinets is affected when maintaining only one jack box



6. 现场安装空间需求

Installation space requirements on-site

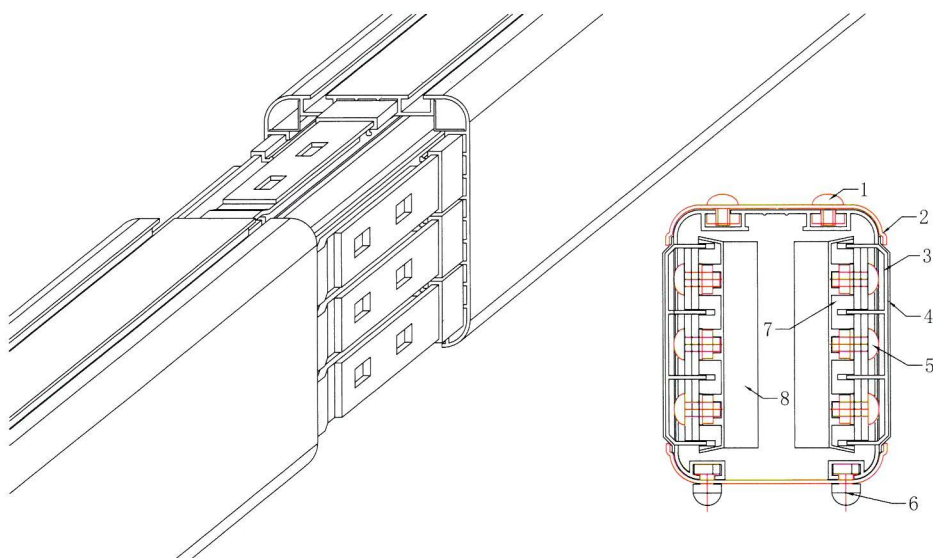
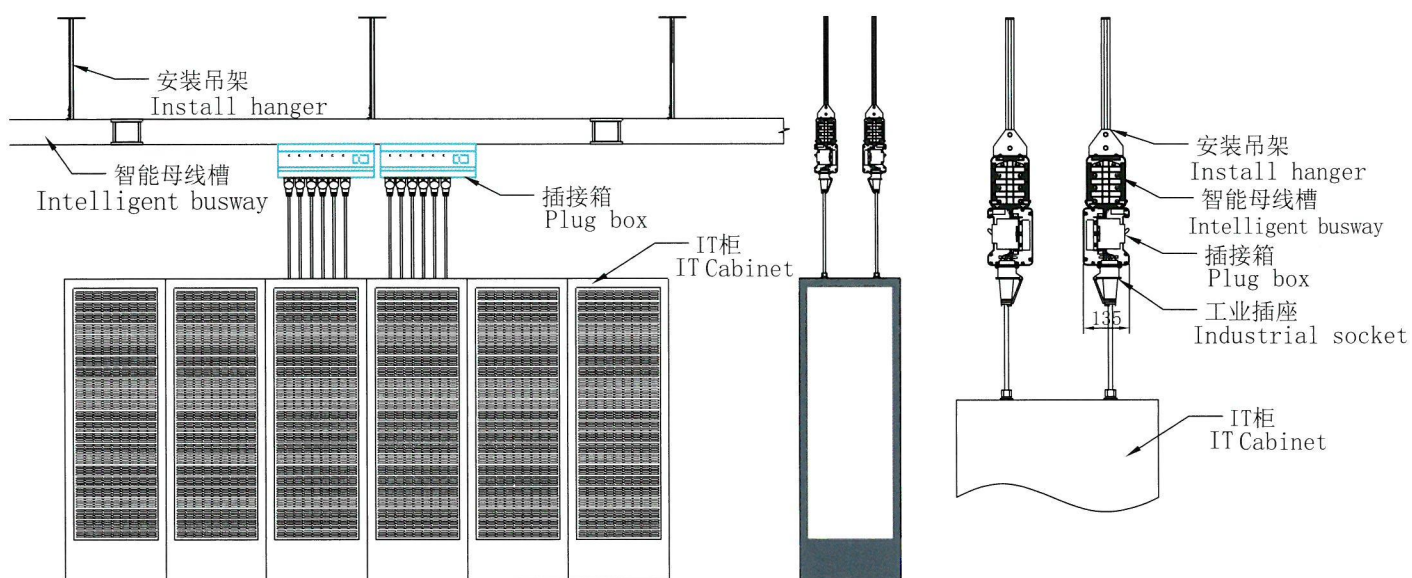


◎ 安装示例

Installation example

IFB/S工业插座下出线

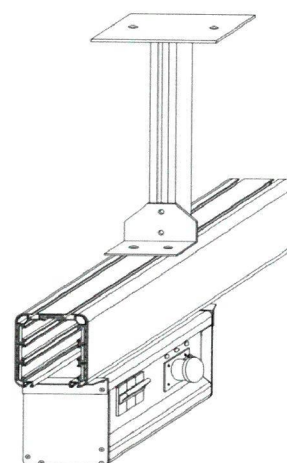
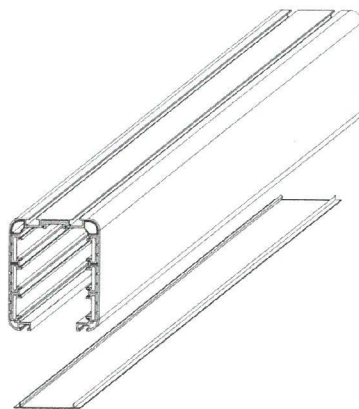
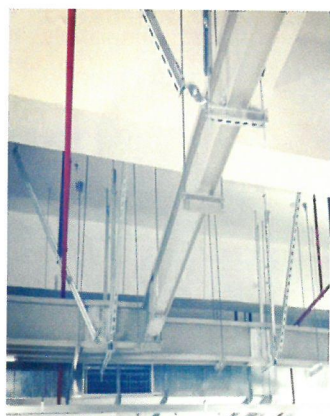
Cable outlet under industrial socket



- 1、母线外壳连接螺栓
- 2、连接盖板
- 3、连接器绝缘体
- 4、连接侧板
- 5、母线导体连接螺栓
- 6、连接T形螺栓
- 7、绝缘模块
- 8、数据采集器
- 9、连接下盖板

IFB/S母线槽连接器连接形式

IFB/S busway connector connecting format



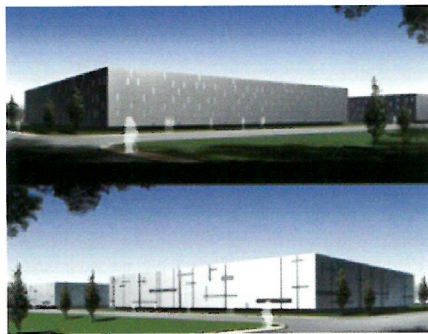
母线槽支吊架安装示意图（可配置抗震支架）为提高母线槽防护等级，插接箱安装完成后，空间底部加装扣板
IFB/S母线槽吊装形式

Installation diagram of bus duct support and hanger (seismic support can be configured) in order to improve the protection level of bus duct, gusset plate is installed at the bottom of space after the plug-in box is installed. IFB/S busway lifting format

◎ 工程应用 engineering application



数据中心
Data center



大型公共设施
Large scale public facilities



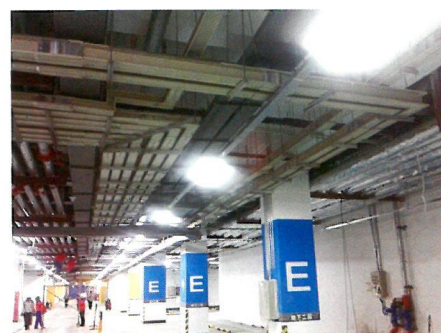
商业综合体
Commercial complex



企业厂房
Enterprise workshop



医院
hospital



超市
supermarket

项目介绍：

- ◆ 万达广场建造所用的母线槽主要分为：电气、动力和照明母线，受制于成本考虑，一般在业主在选择母线时不会留有太多余量，所以在用电负荷成倍增加时（例如，夏季三伏天），多数母线槽都会呈现出明显温升，运维人员只能采用人工巡检的方式，不定时用红外枪扫描母线槽，造成人工成本高，监控难以覆盖，主观因素过高，最后往往流于形式。

- ◆ 采用智能母线温升在线监测系统后，可以做到7x24小时无死角，全覆盖在线监测。

- ◆ 母线总长度：约12km。

- ◆ The bus ducts used in the construction of Wanda Plaza are mainly divided into electrical, power and lighting buses, Due to the cost consideration, the owner will not leave too much margin when selecting the bus. Therefore, when the power load is doubled (for example, in summer, dog days), most of the bus ducts will show obvious temperature rise. The operation and maintenance personnel can only use manual inspection and scan the bus duct with infrared gun from time to time, resulting in high labor cost, difficult monitoring coverage and high subjective factors, In the end, it is often a mere formality.

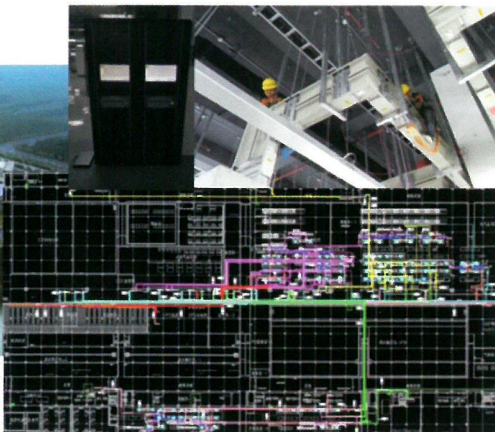
- ◆ The intelligent bus temperature rise online monitoring system can achieve 7×24 hours without dead angle and full coverage on-line monitoring.

- ◆ Total length of bus: About 12km



项目介绍：

- ◆ 作为国家集成电路产业的重大战略部署，国家存储器基地是新中国成立以来，湖北最大的单体投资项目，将为我国打破主流存储器领域国际垄断提供硬支撑。
- ◆ 项目一期母线长度：约35km。



- ◆ As a major strategic deployment of the national integrated circuit industry, the national memory base is the largest single investment project in Hubei since the founding of new China, which will provide hard support for China to break the international monopoly in the mainstream memory field.

- ◆ Bus length of phase I Project: About 35km.

项目介绍：

- ◆ 密集母线为园区重要供电设施，分布在园区七栋建筑内，主要用于高负荷大电流的低压主干线路。因密集母线总量大、分布广，难以依靠人工巡检及时发现隐患，为保证该园区安全稳定运行，需对园区密集母线加装在线监控系统，实时监测母线运行情况，确保银行园区用电安全。



- ◆ 园区母线长度：约18km。

- ◆ Dense bus is an important power supply facility in the park, distributed in seven buildings in the park, mainly used for low-voltage trunk lines with high load and high current. Due to the large amount and wide distribution of dense buses, it is difficult to find hidden dangers timely by manual inspection. In order to ensure the safe and stable operation of the park, it is necessary to install an online monitoring system for the dense buses in the park to monitor the bus operation in real time and ensure the power safety of the bank park.

- ◆ Bus length: About 18km.

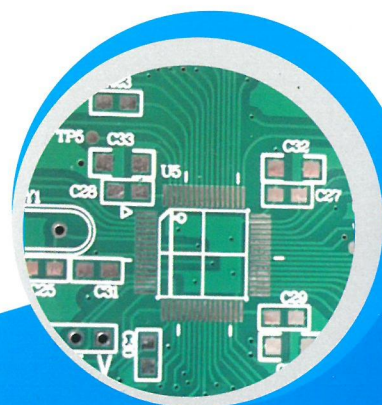
- ◆ 河北省电信公司的数据中心电力基础设施建设完成于2002年，按照当时的设计要求，母线槽的电流等级较小，这些年来，数据中心的处理能力和存储容量呈指数级增长，日益增加的用电负荷已经逼近母线槽的最大允许电流，加上封闭式母线槽长期运行在潮湿阴暗的环境下，加上内部绝缘层的逐渐老化，母线连接器部位的出现较为明显的温升。由于各种限制条件，母线扩容又非常困难，所以在母线上加装测温功能已经是刻不容缓。



- ◆ 母线总长度：约2.2km。

- ◆ The power infrastructure construction of the data center of Hebei telecom company was completed in 2002. According to the design requirements at that time, the current level of the bus duct was small. In recent years, the processing capacity and storage capacity of the data center increased exponentially. The increasing power load has approached the maximum allowable current of the bus duct. In addition, the enclosed bus duct has been operating in the humid and dark ring for a long time With the aging of the internal insulation layer, the temperature rise of the bus connector is obvious. Due to various restrictions, it is very difficult to expand the bus capacity, so it is urgent to install temperature measurement function on the bus.

- ◆ Total bus length: about 2.2km.



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电话(Tel): 0511-83370688

传真(Fax): 0511-83372966

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