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I. System Introduction

Based on KNX bus technology, Acrel-BUS smart lighting control system originates from Europe and develops from the three bus control technologies for residences and buildings including EIB, Batibus and EHS, of which EIB (European Installation Bus) is the agent technology. It uses the dual-core shielded twisted pair as the bus cable to connect all control modules for system control.

The system can integrate various independent control functions and combine many advantages including comfort, flexibility, safety, energy conservation, economy, easy maintenance into one system. It is mainly used for the control areas of large pubic construction projects including residences and buildings.

II. System Functions

Manual control: smart panels and touchscreens installed in all areas can realize realtime control of light on/off and brightness according to actual needs.

Auto control: sensors of different functions (e.g. illuminance transducers and human motion sensors) can realize automatic control of light based on external environment.

Scenario control： different scenarios can be preset for switching between them.

Time control： the system will automatically complete the light control according to the preset operation time to ensure minimum energy consumption in idle period.

Central control： for all controls, realtime monitoring and effective control of the entire lighting area can be realized. It facilitates the control modes and saves labor and power.

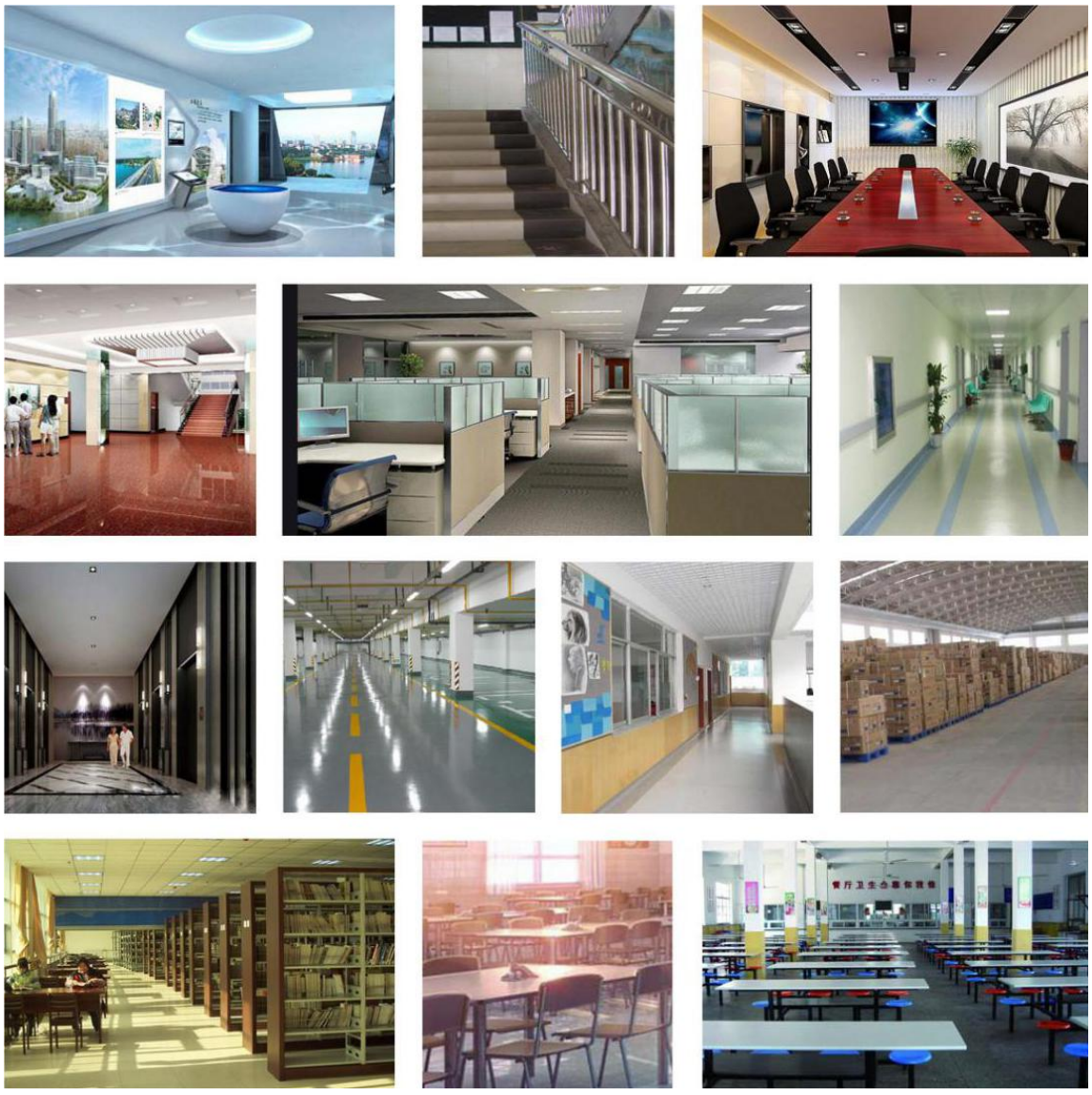
Status feedback: the system can give feedbacks on the on/off function of lighting fixtures on the site.

System linkage： the lighting system can form system linkage with the property management system, the building automation system and the security &fire system.

III. System Application Areas

Acrel-BUS smart lighting control system is committed to complete solutions of automation for homes and buildings and mainly applied in:

◆ Smart office buildings	◆ Smart home	◆ Smart hotel
◆ Smart stations and metros	◆ Smart airports	◆ Smart bridges and tunnels
◆ Smart hospitals	◆ Smart schools	◆ Smart shopping malls
◆ Smart sports stadiums	◆ Smart exhibition venues	◆ smart residential communities



IV. Control Advantages of the System

1.As long as the KNX standard is conformed to, different products from different manufacturers can be compatible with each other seamlessly and interchangeable for easy maintenance.

2. Distributed bus architecture is adopted so that various modules in the system can work independently without interdependence, making the system more reliable.

3. The bus components and field control panels operate under the low safety voltage of 30VDC thus the manual operation is safer.

4. When upgrading internal components of the system or updating system functions, there is no need for wiring again or shutdown of the entire system so it is easy to maintain.

5. To realize multiple-point control, there is no need to add connection lines. Just change the equipment parameters. The operation is simple.

6. Remote control can be realized via cellphones and ipads. The control mode is more convenient and comfortable.

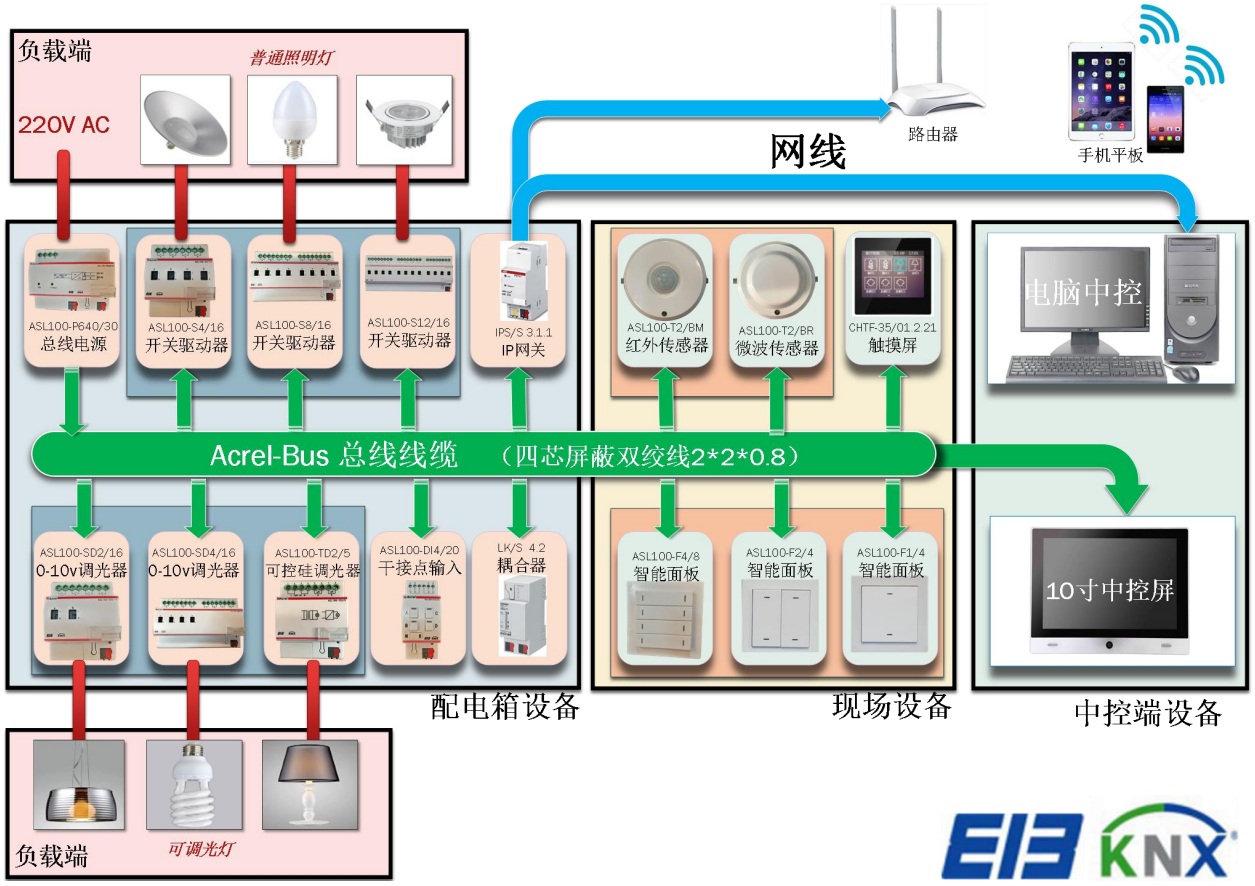
7. Various control modes are available, for example, local control, auto sensing control, time control, scenario control, and central control, enabling the control modes to be more flexible.

8. It can form a linkage with fire systems. When a fire alarm is made, the emergency circuit can be forced open to facilitate evacuation.

9. The system can serve as a system of its own or be connected with BA system via OPC.

Energy-saving comfortable efficient safe

V. System Composition



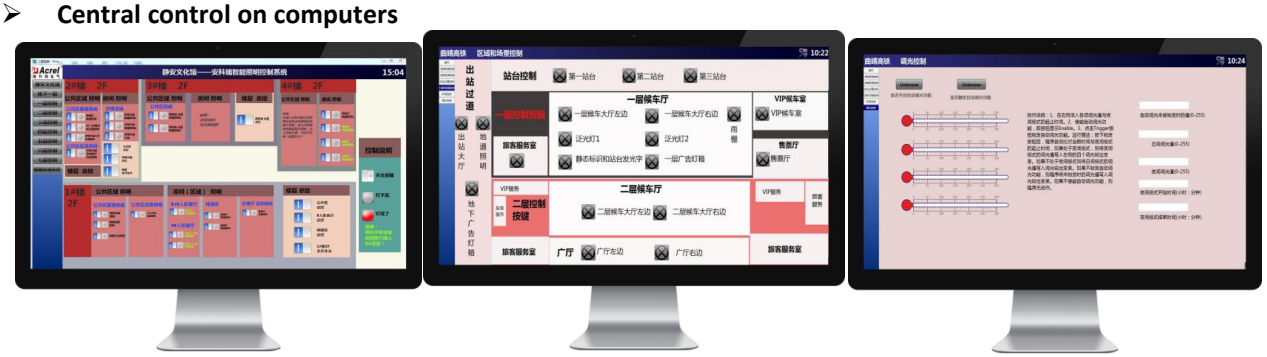
负载端	Load end		总线电源	Bus power
普通照明灯	Common lights		开关驱动器	Switch drive
可调光灯	Dimmable light		IP 网关	IP gateway
网线	Network cable		调光器	dimmer
路由器	Router		耦合器	Coupler
手机平板	Cellphones and tablets		干接点输入	Dry contact input
十寸中控屏	10 inch central control display		可控硅调光器	SCR dimmer
			智能传感器	Smart sensor
电脑中控	Central control via computer		微波传感器	Microwave transducer
总线电缆	Bus cable		智能面板	Smart panel
四芯屏蔽双绞线	Four-core shielded twisted pair cable		配电箱设备	Distribution box equipment
			现场设备	Field equipment
			中控端设备	Central control end equipment

- ✧ In the Acrel-bus smart lighting control system, all equipment is interconnected by the bus cables.
- ✧ The modules to be installed in the distribution box mainly include: bus power, switch drive, dimming drive, IP gateway, coupler, dry contact input module, time module. These modules are installed via 35mm standard guide rail.

- The modules needed to be installed on the control site mainly include sensors, panels and touchscreens. Sensors as automatic control sensing modules are embedded in the ceilings of passages. The panels and touchscreens as the main carriers of manual control shall be installed via 86 box in control sites including duty rooms.
- Control on central control end: for relatively small projects, 10 inch central control display is available. It direclty connects the system via bus cables without IP gateway to convert protocals. It is easy for setting and low in costs. For relatively large projects, the network cable from the IP gateway is connected to computers where control software is installed to realize remote terminal control.
- External routers will send wireless signals so the control can also be realized on mobile end including cellphones and tablets.

Common central control end and control interfaces

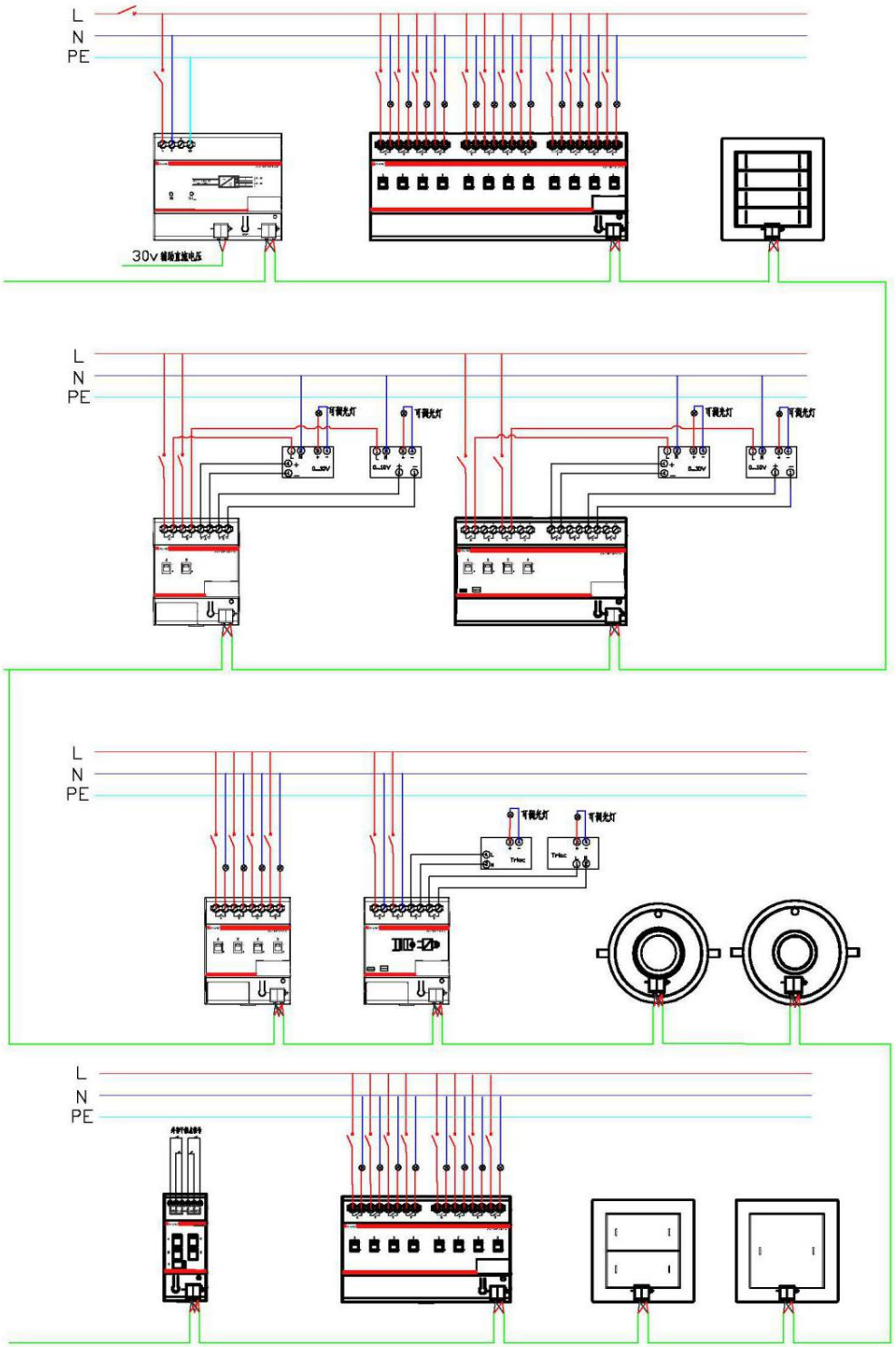
- **Central control on computers**



- **Central control on 10 inch touchscreens**

- **Control on cellphones and tablets**

VI. Wiring Diagram



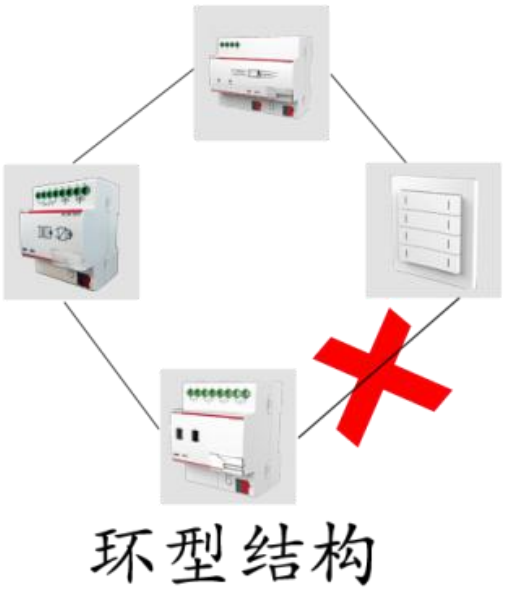
Acrel-bus smart lighting control system is a control system based on KNX/EIB technology. The system adopts a layered structure. In theory, one system can be connected to 58000 control modules at maximum.

In the Acrel-bussmart lighting control system, all control modules are interconnected by a unified communication media (4-core shielded twisted pair cable 2*2*0.8).

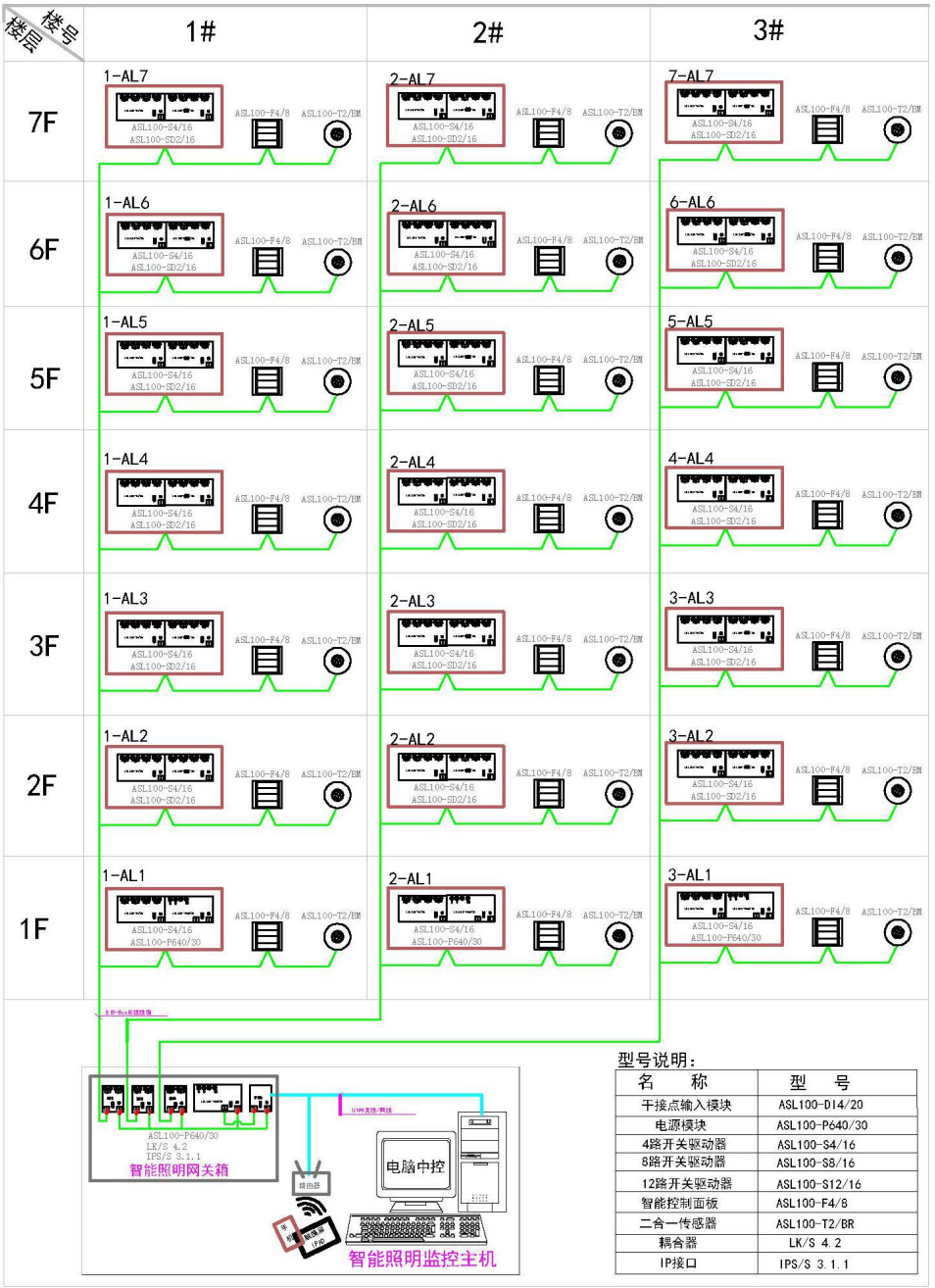
Important issues of wiring:

The wiring of each line can be of linear, star or tree shape,but round wiring is not allowed.

线型结构	Linear structure		星型结构	Star strucure
树型结构	Tree strucure		环型结构	Round strucure



VII. Structural Topology Diagram



名　称	型　号
干接点输入模块	ASL100-DI4/20
电源模块	ASL100-P640/30
4路开关驱动器	ASL100-S4/16
8路开关驱动器	ASL100-S8/16
12路开关驱动器	ASL100-S12/16
智能控制面板	ASL100-F4/8
二合一传感器	ASL100-T2/BR
耦合器	LK/S 4.2
IP接口	IPS/S 3.1.1

电脑中控	Central control via computer		智能照明网关箱	Smart lighting gateway box
楼号	Building number		智能照明监控主机	Smart lighting monitoring master
楼层	floor			

Model description：

Name	Model
Dry contact input module	ASL100-DI4/20
Power module	ASL100-P640/30
4-circuit switch drive	ASL100-S4/16
8-circuit switch drive	ASL100-S8/16
12-circuit switch drive	ASL100-S12/16
Smart control panel	ASL100-F4/8
Two-in-one sensor	ASL100-T2/BM
Coupler	LK/S 4.2
IP interface	IPS/S 3.1.1

The above is the structural typology diagram of Acrel-bus smart lighting control system. The system architecture adopts layered structure, advantageous mainly in the following three aspects:

1、Enhancing system reliability. As each area and each line is distributed with KNX power, the electric isolation enables other parts to continue with operation when something goes wrong with one part of the system.

2、The data communication within one line or one area will not affect communication in other areas.

3、During system commissioning and maintenance, a clear system structure will provides high maintenance efficiency .

VIII. Common Product Models

1. Power module

Product model	Module width	Output current	Installation method
ASL100-P640/30	6	640mA	Standard guide rail installation

Function description:

A standard power supply for the KNX/EIB system, coupling bus signals and monitoring currents in KNX/EIB systems. Besides, the power supply of this series provides an auxiliary DC voltage of 30V for the power supply of other peripheral equipment (e.g. touchscreens, IP gateways). The module can supply power to a maximum of 64 pieces of equipment with bus reset, overcurrent indication and short circuit protection.

2. Switch drive

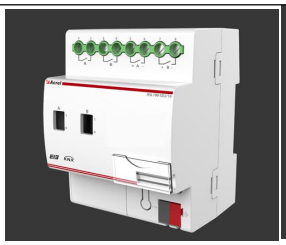
Product model	Number of circuits	Module width	Rated capacity of a single circuit	Installation method
ASL100-S4/16	4	4	16A	Standard guide rail installation
ASL100-S8/16	8	8	16A	Standard guide rail installation
ASL100-S12/16	12	12	16A	Standard guide rail installation

Function description:

The switch drive is a drive used for switch control of equipment. It supports KNX bus protocol and has functions including logic, delay, preset, scenario and threshold switching.

3. 0-10V dimming drive

Product model	Number of circuits	Module width	Rated capacity of a single circuit	Installation method
ASL100-SD2/16	2	4	16A	Standard guide rail installation
ASL100-SD4/16	4	8	16A	Standard guide rail installation




Function description:

The 0-10V dimming module supports KNX bus protocol and is used to control dimming circuits. It has soft on/off functions. Each circuit can be called by 8 scenarios simultaneously to check circuit status. It is especially suitable for the dimming of incandescent lamps, LED lights and low voltage halogen lamps. It also has functions including on/off, scenario and status feedback.

4. SCR dimming module

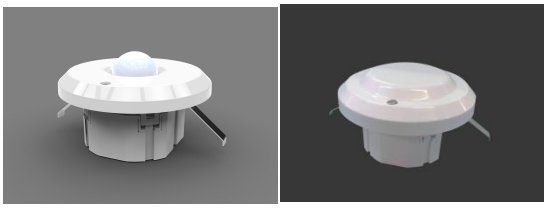
Product model	Module width	Current load	Installation method
ASL100-TD2/5	4	Max 5A	Standard guide rail installation

Function description:

The SCR dimming module supports KNX bus protocol. As a dimming module, it cannot only control the connection and disconnection of the load through direct control of the connection and disconnection of input power, but also adjust input voltage by phase control to realize LED dimming.

5. Human motion and illuminance sensor

Product name	Channel	Function	Installation method
ASL100-T2/BM	2	Illuminance and human motion sensing, logic function	Embedded installation
ASL100-T2/BR	2	Illuminance and microwave sensing, logic function	Embedded installation



Function description:

The smart lighting sensor supports KNX bus protocol. It can sense external signals and physical conditions (such as light, infrared and microwave) and tranmit the sensed information to other KNX modules (such as dimmers, switch drives) to realize its functions. It is mainly used for places in need of automatic control in the smart lighting control system including public passages, lobbies and garages.

6. Smart panel

Product model	Switch gang	Installation method
ASL100-F1/2	1 gang	86 box installation
ASL100-F2/4	2 gang	86 box installation
ASL100-F4/8	4 gang	86 box installation

Function description：

The smart panel supports KNX bus protocol. It is used to receive the signals triggered by button press. It can realize on/off, dimming, scenario, curtain control, temperature adjustment, alarm functiosn through the combination of short or long press and different parameter configuration.

7. Dry contact input module

Product model	Module width	Number of circuits	Installation method
ASL100-DI4/20	2	4	Standard guide rail installation

Function description:

The dry contact signal input module supports KNX bus protocol. It is used to receive external dry contact signal input. It can realize functions through different parameter configuration including on/off, dimming, scenario, curtain control, data transmission, count, temperature adjustment and alarm.

IX. Cases

1、Shanghai Jing'an Cultural Center

Shanghai Jing'an Cultural Center is located in No.459 Urumuqi North Road, neighboring Shanghai Hotel and west to Jing'an Temple in the city center. It covers an area of 6000 m^2. As a non-profit cultural institution established by the government, it is an important place for the public to carry out cultural activities. Our company is responsible for its smart lighting control system. Considering Party A's needs, as there are many areas in this project, we mainly realized single light control, area control, scenario control, fire linkage control, central control and BA system linkage control.

2、Shanghai Kunming Highspeed Railway

The connecting link project for Songming Station of Shanghai-Kunming High-speed Railway starts from the front square of the station and ends at 320 National Highway, extending about 4.44 km. Our company is mainly responsible for the smart lighting control systems of Qujing Highspeed Railway Station, Fuyuan Station and Songming Station. The three stations use three central control systems to meet different control needs of lighting circuits at highspeed railway stations.

3、Anqiu Maternal and Child Health Hospital

Anqiu Maternal and Child Health Hospital is the first batch of Grade II, Level A maternal and child health hospital approved by Weifang, Shangdong Province. It also has a Disabled Children Rehabiliation Center approved by the provincial association of physically disabled persons. It is the only demonstration unit of traditional Chinese medicine work for China's maternity and child care institutions in Shandong Province. Our company is responsible for the smart lighting control system. The system adopts control modules including panels, switch drives, power supplies, gateways. It combines field manual control and central control to make the lighting control more flexible.

4、Shanghai Squibb Pharmaceutical Co. Ltd.

Shanghai Squibb Pharmaceutical Co. Ltd. is a joint venture between Bristol-Myers Squibb and China National Pharmaceutical Foreign Trade Corporation and .Shanghai Medicine (Group) Corporatio. It was established on Oct. 14, 1982 and began formal production in Oct, 1985. It is the first pharmaceutical enterprise of sino-US joint venture in China. Our company is responsible for the renovation of part of its workshops. Considering actual needs, we mainly use modules of sensors, panels, switch drives and power supply to realize the need of smart control of lighting circuits.