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# WIRELESS TEMPERATURE MONITORING SOLUTIONS



# BACKGROUND



The ARTM series electrical contact on-line temperature measuring device is suitable for temperature monitoring at cable joints/circuit breaker contacts/knife switches/high-voltage cable intermediate heads, dry-type transformers, low-voltage high-current equipment, etc. in high and low voltage switch cabinets to prevent them from running. If the contact resistance of the contacts is too large due to oxidation, looseness, dust and other factors, heat generation becomes a safety hazard. This improves equipment safety, timely, continuous and accurate reflection of equipment operation status, and reduces equipment accident rate.



# STANDARD

GB/T 11022-2011 Common technical requirements for high-voltage switchgear and control equipment standards

DL/T 664-2016 Application Specification for Infrared Diagnosis of Live Equipment

IEEE C37.20.3 Switchgear test standards

NB/T 42086 2016 Technical requirements for wireless temperature measuring devices

NB/T 10091-2018 Technical specification for temperature online monitoring device of high voltage switchgear

GB/T 7261-2016 Basic test methods for relay protection and safety automatic devices

GB/T 14598.26-2015 Measuring relays and protection devices. Part 26: Electromagnetic compatibility requirements

IEC 60255-26: 2013, IDT Measuring relays and protection equipment-Part 26: Electromagnetic compatibility requirements

GB/T 14598.27-2008 Measuring relays and protection devices. Part 27: Product safety requirements

IEC 60255-27:2005, MOD Measuring relays and protection equipment Part 27:  
Product safety requirements-Part 27: Product Safety requirements

(APPLICATION)

(FUNCTION)

(EMC)



# STANDARD

## Selection criteria for Switchgear Temperature Monitoring System

The temperature monitoring solution for a Medium Voltage Switchgear must meet the following criterion:

- The temperature sensor must be safe and not pose any risk of electrocution.
- The temperature sensors must meet the IEEE C37.20.3 test standard for Switchgears
- The temperature monitoring must have an adequately short response time so that it gives enough time for an operator to react
- The temperature monitoring solution must be durable. The sensor must last for the lifetime of the Switchgear and monitor (datalogger) at least for 15 years.
- The temperature monitoring solution must not require frequent calibration / compensation
- The temperature monitoring solutions must have minimal maintenance requirement.

## IEEE C37.20.2-2015

### IEEE Standard For Metal-Clad Switchgear

Metal-clad (MC) medium-voltage switchgear that contains drawout electrically operated circuit breakers is covered. MC switchgear is compartmentalized to isolate components such as instrumentation, main bus, and both incoming and outgoing connections with grounded metal barriers. Rated maximum voltage levels for metal-clad switchgear range from 4.76 kV to 38 kV with main bus continuous current ratings of 1200 A, 2000 A, 3000 A, and 4000 A. MC switchgear also contains associated control, instruments, metering, relaying, protective, and regulating devices, as necessary. Service conditions, ratings, temperature limitations and classification of insulating materials, insulation (dielectric) withstand voltage requirements, test procedures, and applications are discussed.

引用的标准：《GB/T 11022-2011 高压开关设备和控制设备标准的共用技术要求》

### 温度的规定

二、对高压开关柜设备触头部份			
缺陷分尖	标准	对应措施	备注
危急热缺陷	表面温度超过 90℃，或温升超过 75℃或相对温差（温差）超过 55℃；	需立即安排停电处理	
严重热缺陷	表面温度超过 75℃，或温升超过 65℃或相对温差（温差）超过 50℃；	需联系停电尽快处理	
	对同一柜内不同相间或同类负荷柜间测温比较，当温差超过允许温差值 30%时		
一般热缺陷	表面温度超过 60℃，或温升超过 30℃或相对温差（温差）超过 25℃；	需安排修，尽快停电处理	
热隐患	表面温度超过 50℃，或相对温差（温差）超过 20℃；	跟踪监视或安排计划处理	

引用的标准：《DL/T 664-2016 带电设备红外诊断应用规范》

### 中关于温度的规定

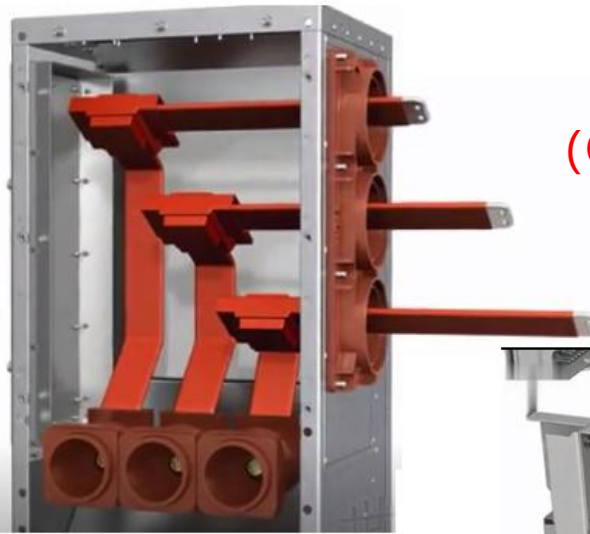
12.2.3.6 定期用红外测温设备检查隔离开关设备的接头\导电部分，特别是在重负荷或高温期间，加强对运行设备温升的监视，发现问题应及时采取措施。

12.3.3.3 加强开展开关柜温度检测，对温度异常的开关柜强化监测、分析和处理，防止导电回路过热引发的柜内短路故障。

13.1.3.1 运行部门应加强电缆线路负荷和温度的检（监）测，防止过负荷运行，多条并联的电缆应分别进行测量。巡视过程中应检测电缆附件、接地系统等的关键接点的温度。



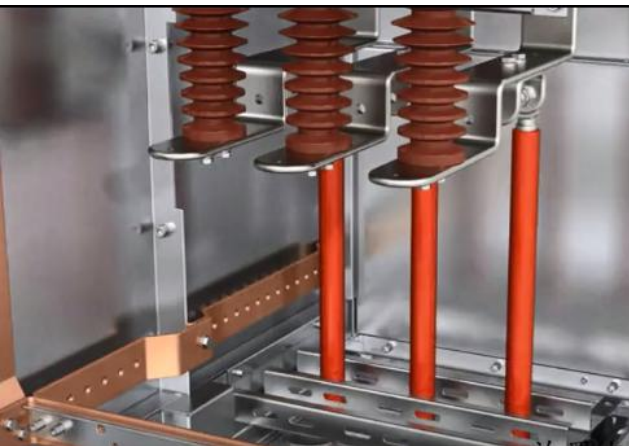
FOR HIGH VOLTAGE CABINET



(Copper Busbar connector)



(Circuit breaker contacts)



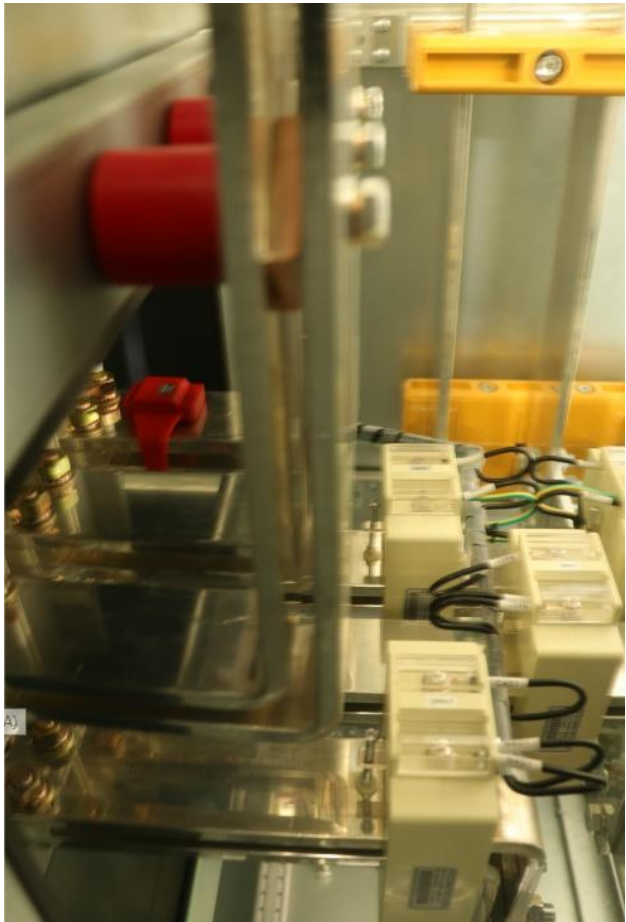
(Cable Connector)



# FOR LOW VOLTAGE CABINET



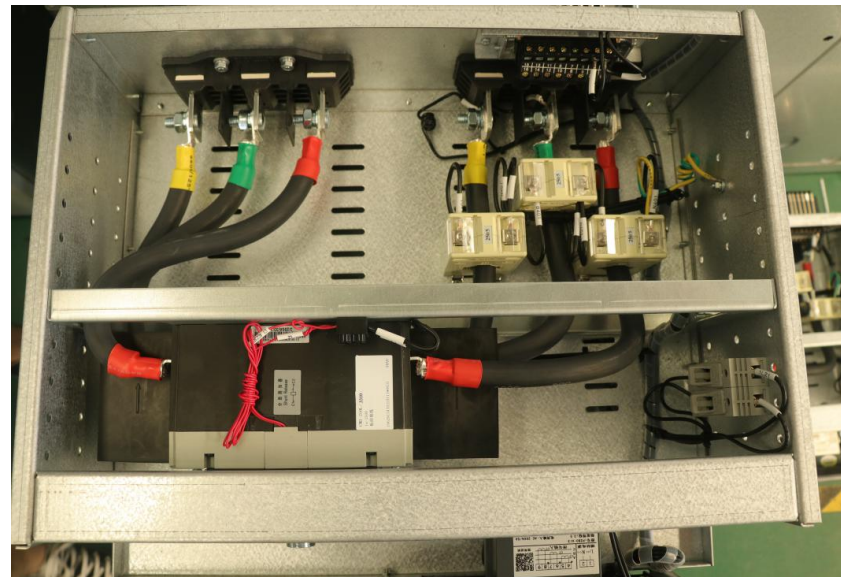
(Frame circuit breaker connector)



(Drawer cabinet outlet connector)



(Drawer cabinet connector)



(Capacitor surface)





# FOR HIGH CURRENT EQUIPMENT



Temperature measurement of terminal distribution box



(Motor shell, internal temperature measurement)



Bridge, longer cable



(Transformer shell, connector, internal temperature measurement)








Data room temperature measurement





# WIRELESS TEMPERATURE SENSORS

## BATTERY TYPE

Model	Shape	Specifications	Installation
ATE100M		32.4*32.4*16mm -50°C ~+125°C Accuracy:± 1°C Lifetime>5 years 470Mhz, Open space distance:150m	Magnetic fixation
ATE100		62.4*32.4*16mm,Φ13.5mm, -50°C ~+125°C Accuracy:± 1°C Lifetime>5 years 470Mhz, Open space distance:150m	Bolted
ATE200		35*35*17mm, -50°C ~+125°C Accuracy:± 1°C Lifetime>5 years 470Mhz, Open space distance:150m	Strap binding
ATE100P		62.4*32.4*16mm,Φ13.5mm, -50°C ~+125°C <b>Accuracy:± 0.5°C</b> Lifetime>5 years 470Mhz, Open space distance:150m, <b>IP68</b>	Outdoor Bolted
ATE200P		35*35*17mm, L=330mm, -50 ° C ~+125 ° C <b>Accuracy: ± 0.5 ° C</b> Lifetime>5 years 470Mhz, Open space distance:150m, <b>IP68</b>	Outdoor strap binding

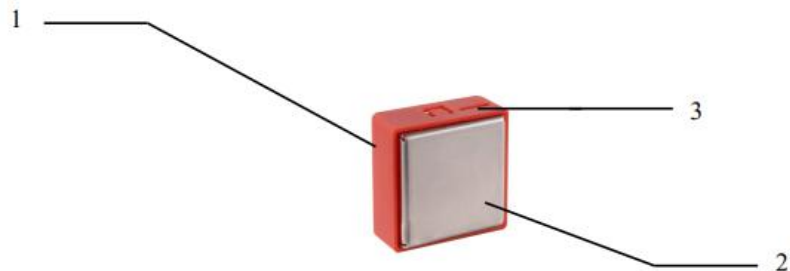


# WIRELESS TEMPERATURE SENSORS

磁吸式无线温度传感器 ATE100M 结构说明:

Structure introduction of ATE100M:

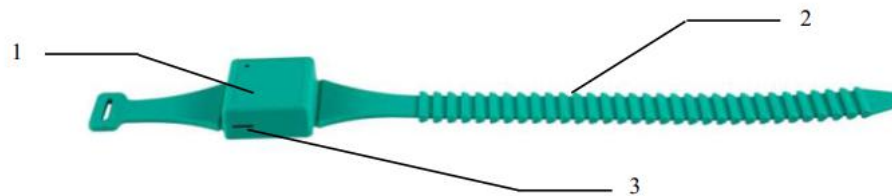
- 1 —— 无线温度传感器主体 The core of wireless temperature sensor ATE100M
- 2 —— 测温部位 Thermo-sensitive part
- 3 —— 电池开关 battery switch



表带式无线温度传感器结构说明:

ATE200 structure introduction:

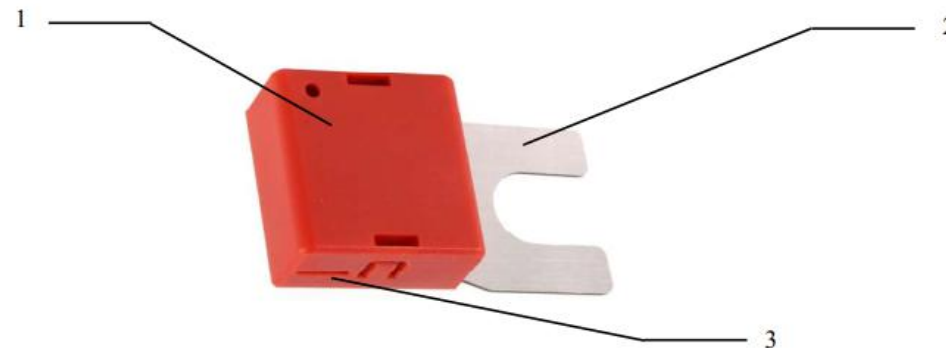
- 1 —— 无线温度传感器主体，测温探头在背面 The core of wireless temperature sensor ATE200, temperature measuring probe is on the other side
- 2 —— 表带及锁扣 strap and hasp
- 3 —— 电池开关 battery switch



ATE100 螺栓式无线温度传感器结构说明:

ATE100 structure introduction:


- 1 —— 无线温度传感器主体 The core of wireless temperature sensor ATE100
- 2 —— 测温部位 Thermo-sensitive part
- 3 —— 电池开关 battery switch





# WIRELESS TEMPERATURE SENSORS

## CT INDUCTION POWERD TYPE

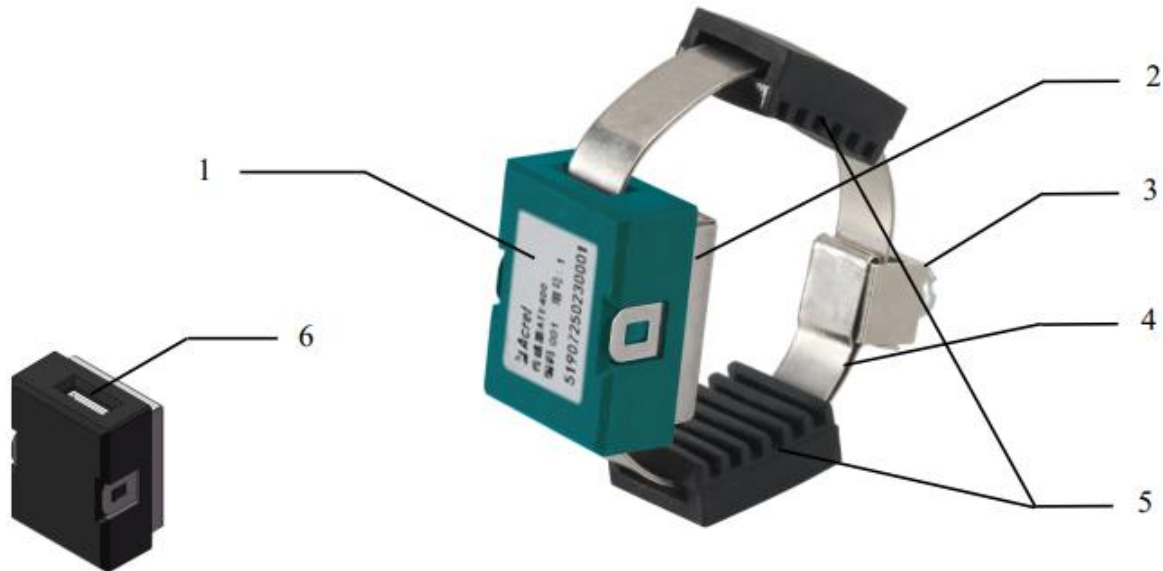
MODEL	SHAPE	SPECIFICATION
ATE400	 The image shows a yellow ATE400 CT induction powered wireless temperature sensor. It has a yellow plastic housing with a silver metal band that can be clamped around a conductor. A black connector is attached to the top of the sensor. A white label on the front of the sensor contains the following text: 'Acrel', 'ATE400', '编号: 003', '规格: 3', and '51907250230003'.	25.82*20.42*12.8mm CT indcution powered, start curent $\geq 5A$ ; 470MHz open distance 150m

# WIRELESS TEMPERATURE SENSORS

无源无线温度传感器结构说明:

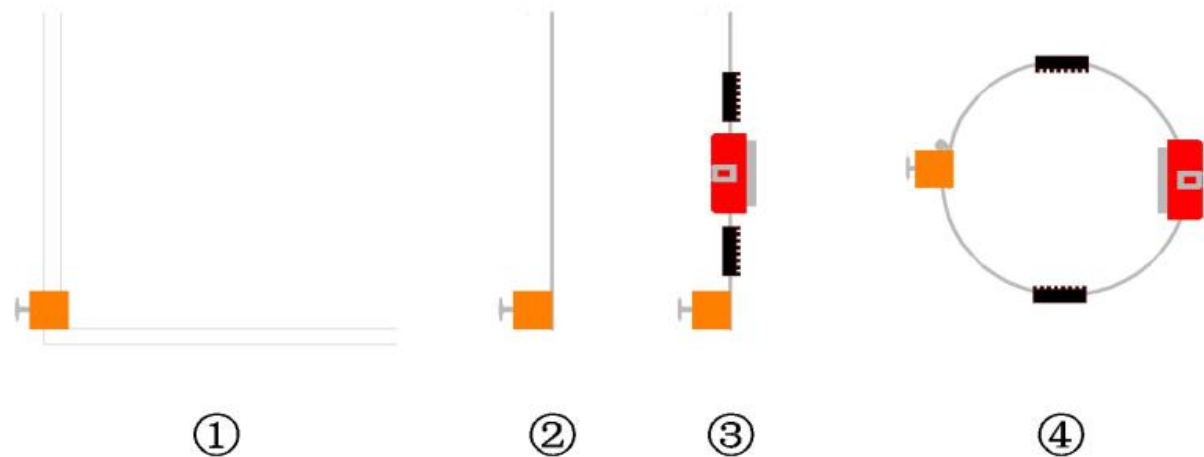
passive temperature sensor structure introduction:

- 1 —— 温度传感器主体 The core of wireless temperature sensor ATE400
- 2 —— 合金底座，与温度探头接触 alloy bottom, touched with temperature probe
- 3 —— 锁扣，用于固定合金片 metal hasp, for fixing alloy chip
- 4 —— 取电合金片，用于感应取电 alloy chip, for CT-powered
- 5 —— 硅胶垫片，用于支撑合金片 silicone gasket, used to support the alloy chip
- 6 —— 合金片安装孔，用于安装合金片 alloy chip hole, used to install the alloy chip



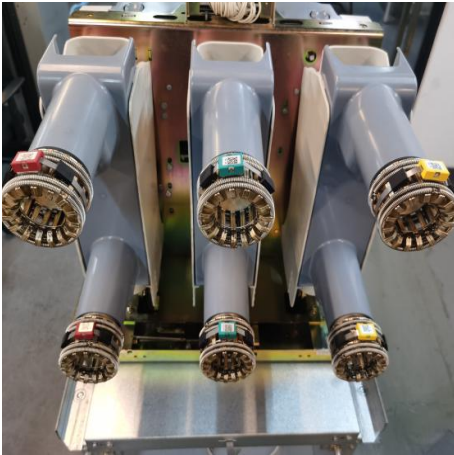
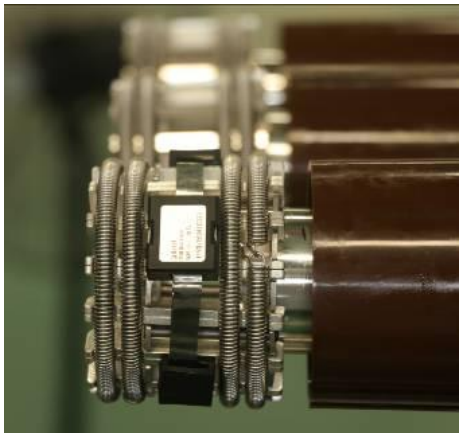
取 2 根合金片穿过锁紧件安装孔，将合金片居中对折后锁紧件固定在折弯处；将对折后的 4 层合金片分别穿过硅胶垫片-传感器主体-硅胶垫片；将整体传感器环绕安装部位一圈后拉紧合金片并旋紧螺丝；合金片多余部分留取适当长度并折叠压紧。合金片安装示意过程如下：

Firstly, take 2 pieces of alloy chips through the mounting hole of metal hasp, meanwhile fold the alloy chips and fix the metal hasp in the middle of alloy chips. Secondly, take the folded alloy chips through one silicone gasket, the core of ATE400 and another silicone gasket in turn. Thirdly, circle the whole alloy chips around the mounting position and tension the alloy chips, then tighten the screw on the metal hasp. Finally, subtract the excess alloy chips. The complete installation process is shown in Figures 1 to 4.





# INSTALLATION





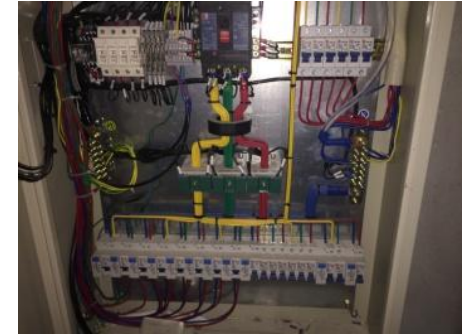
# INSTALLATION



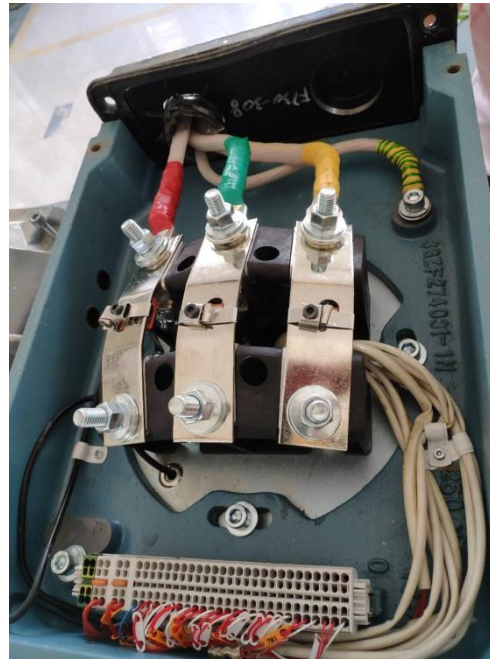
ATE100M



ATE200/400



ATE400



ATE200



ATE100M



# INSTALLATION— RECEIVER



ATC450-C



ATC600



ARTM-Pn



ATP007、Acrel-2000T/A

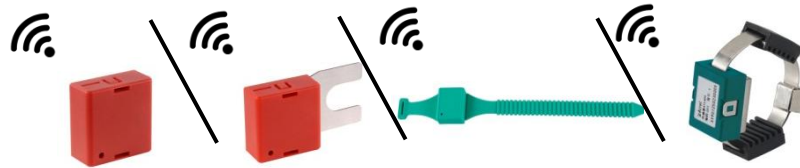
# MODEL SELECTION

## 1. in high and low voltage cabinets--with display



ARTM-Pn

1



ATE100M\ATE100\ATE200\ATE400\ATE100P\ATE200P

60

(within 10 cabinets)

### ARTM-Pn Function:

Panel: 96\*96\*17mm, depth65mm, opencut 92\*92mm;

Power supply:AC85-265V or DC100-300V;

one channel RS485 Modbus;

receive max.60pcs ATE100/200/300/400;

3 phases electric measurement.

### Sensors match:

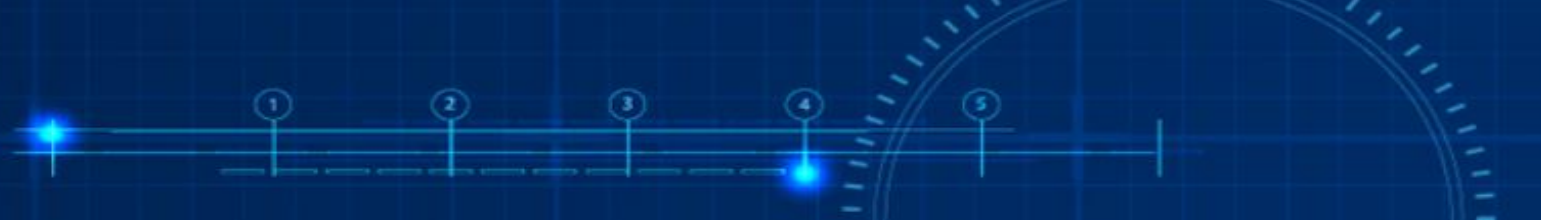
1. quantity:up to 60;

2. distance: can receive within 10 cabinets.

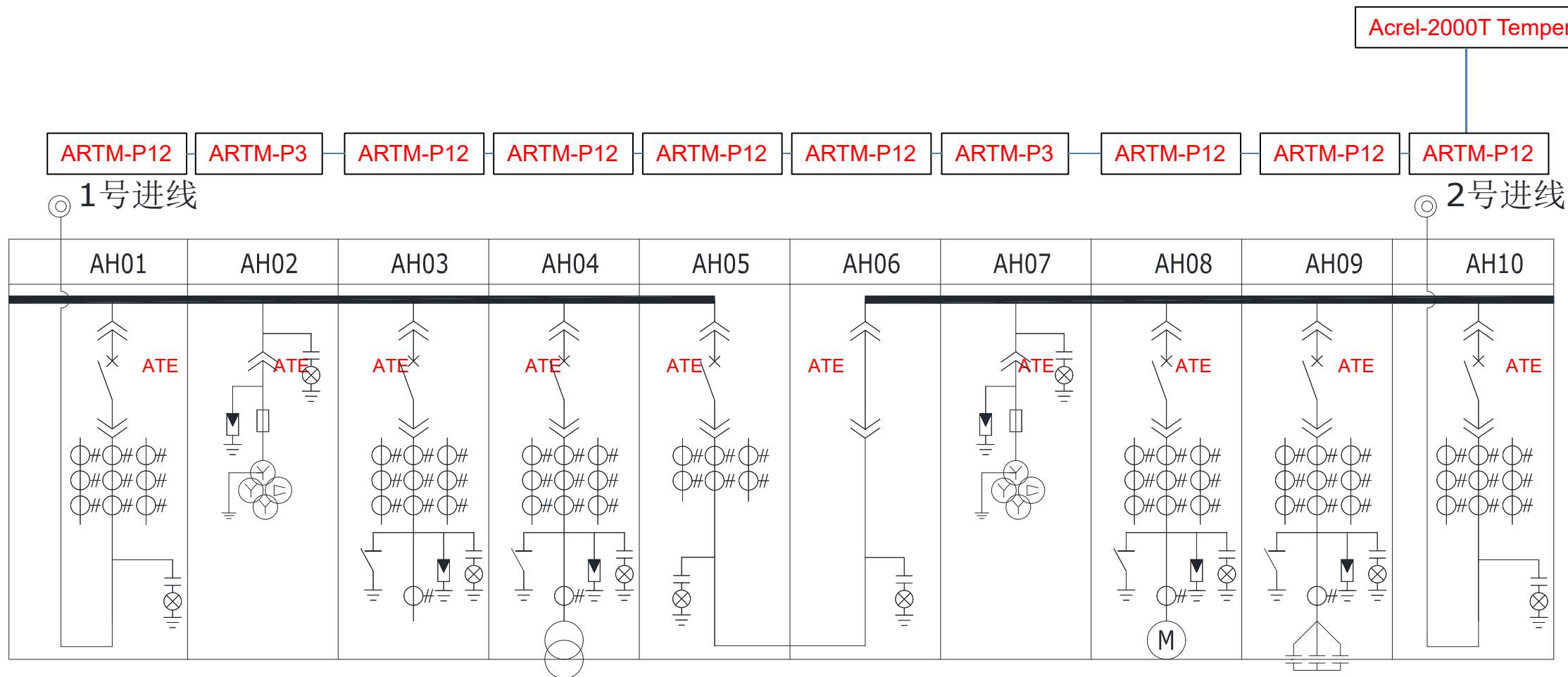




# MODEL SELECTION



Acrel-2000T Temperature system

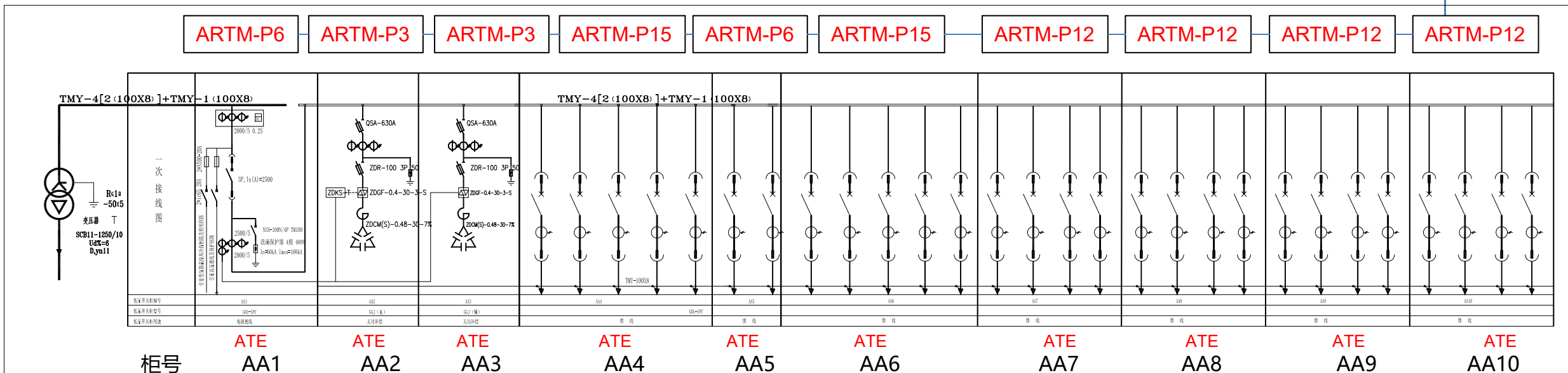


## Suggestion:

Incoming cabinet, outgoing cabinet, bus tie cabinet, isolation cabinet are equipped with 12 points; PT cabinet is equipped with 3 points.

# MODEL SELECTION

Acrel-2000T无线测温系统

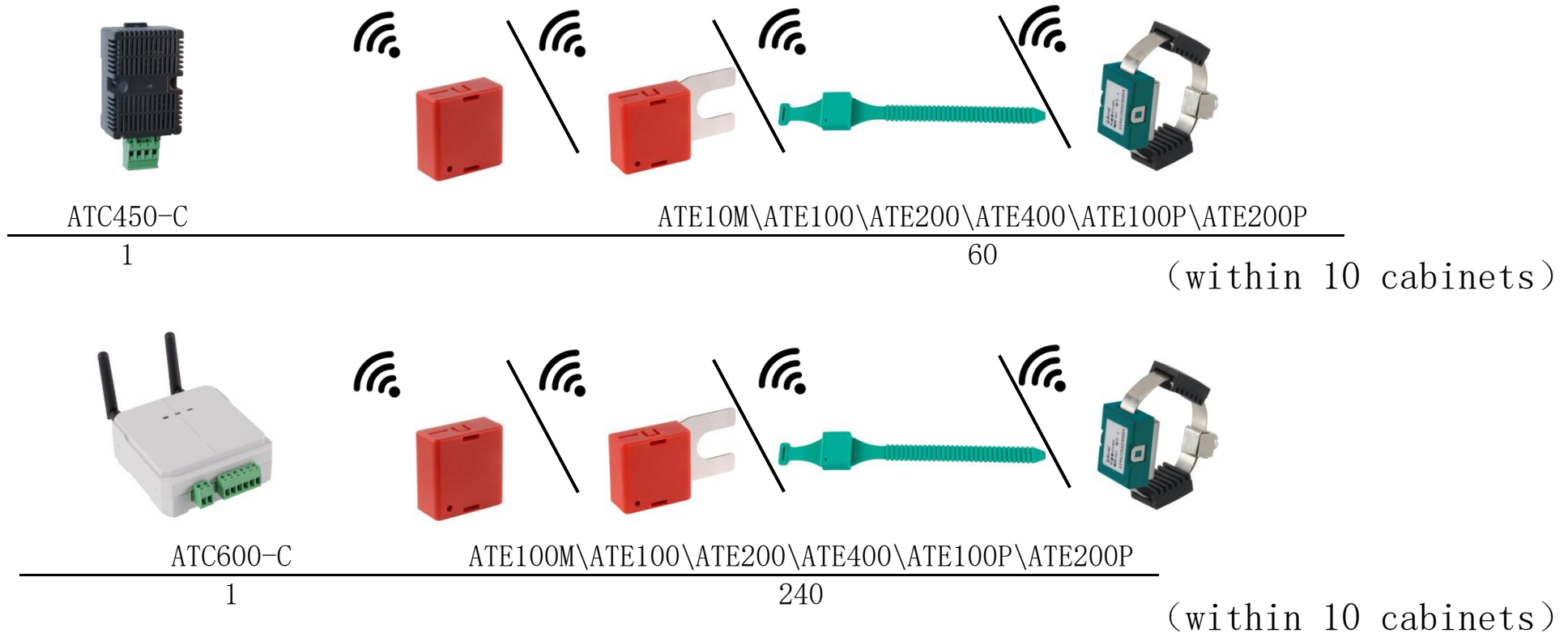


## Suggestion:

The low-voltage main incoming cabinet is equipped with 6 points; the capacitor cabinet is equipped with 3 points; the outgoing cabinet is equipped with 3 points for each circuit.



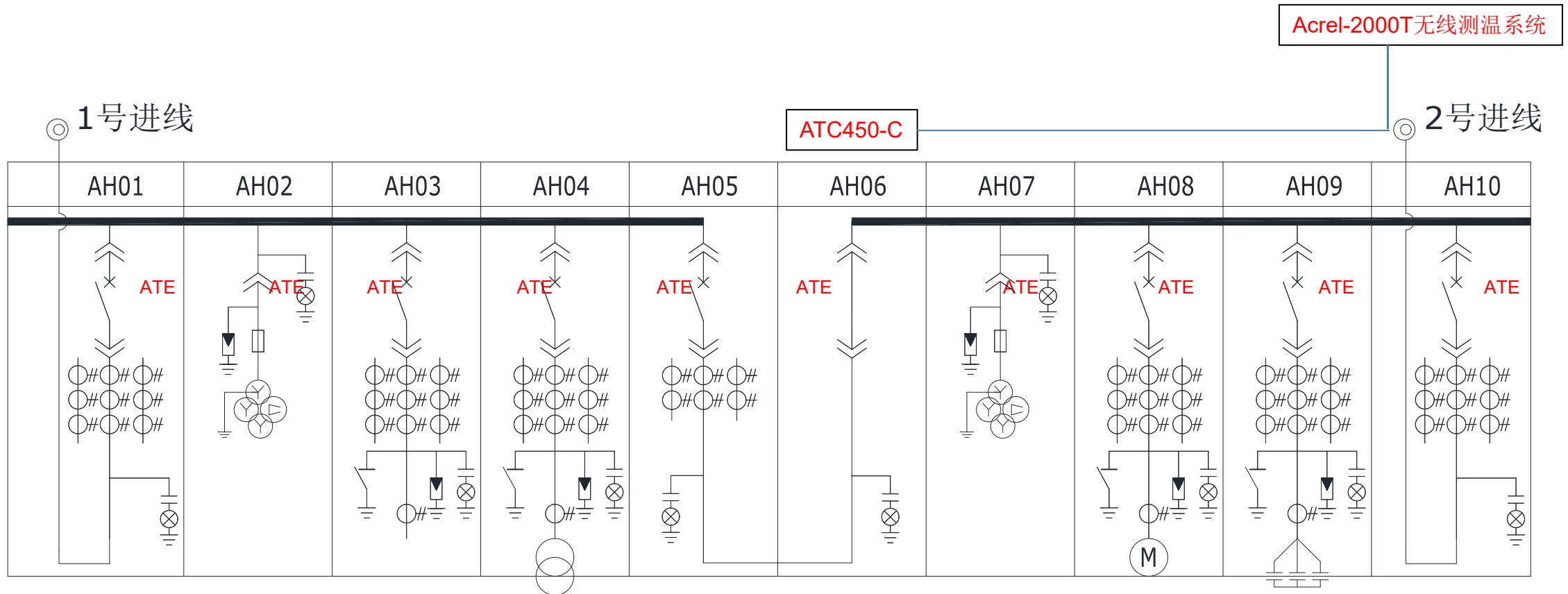
## 2. in high and low voltage cabinets--without display



### ATC600-C:

Power supply: AC/DC85V~264V; 1 channel RS485 Modbus; 2DO; 35mm Din rail Installation.

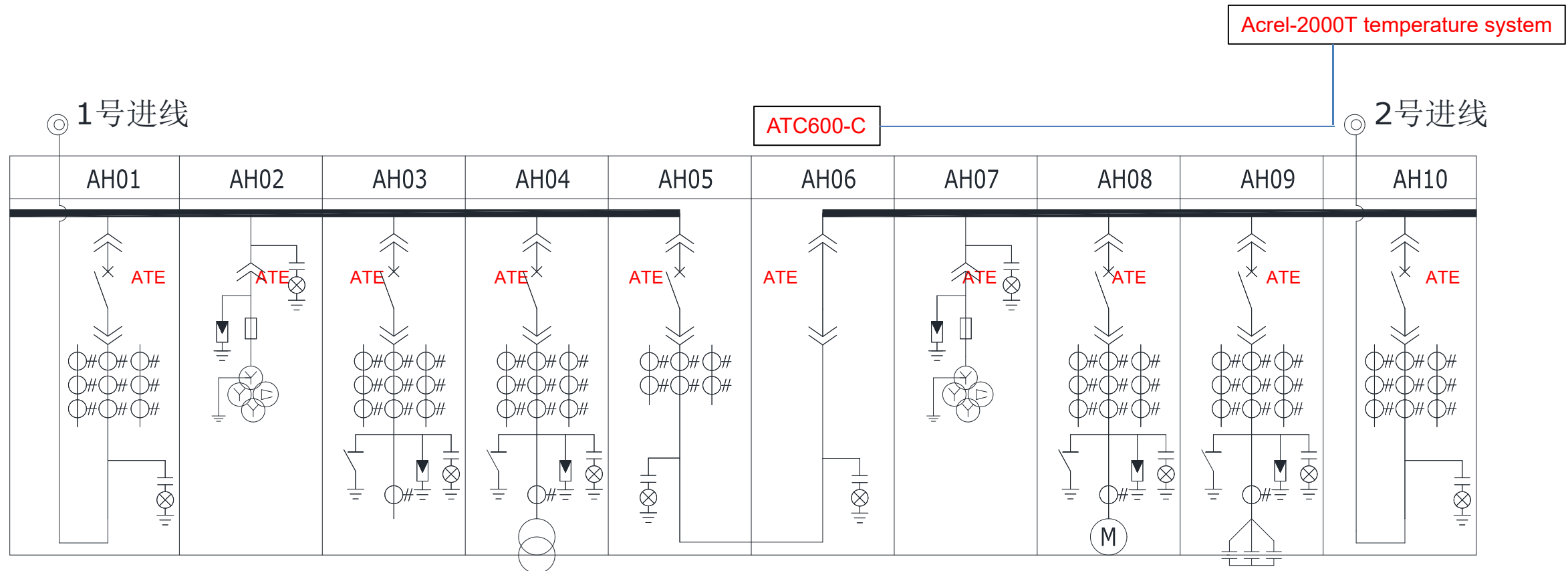
# MODEL SELECTION



## Suggestion:

There are 6 points for incoming cabinet, outgoing cabinet, bus tie cabinet and isolation cabinet; 3 points for PT cabinet.

# MODEL SELECTION

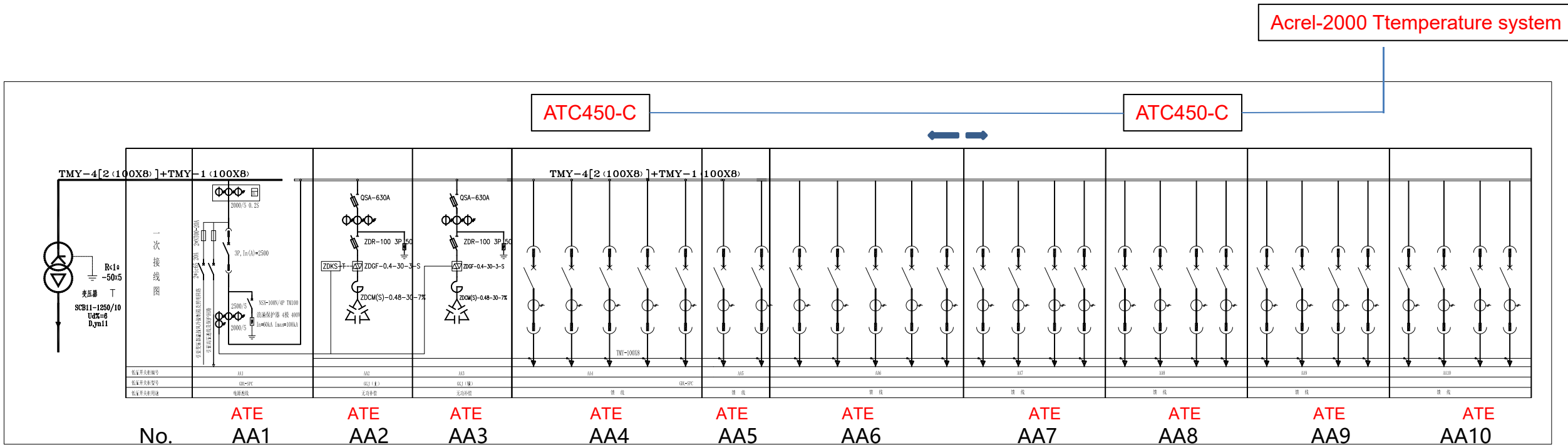


## Suggestion:

Incoming cabinet, outgoing cabinet, bus tie cabinet, isolation cabinet are equipped with 12 points; PT cabinet is equipped with 3 points.



# MODEL SELECTION



## Suggestion:

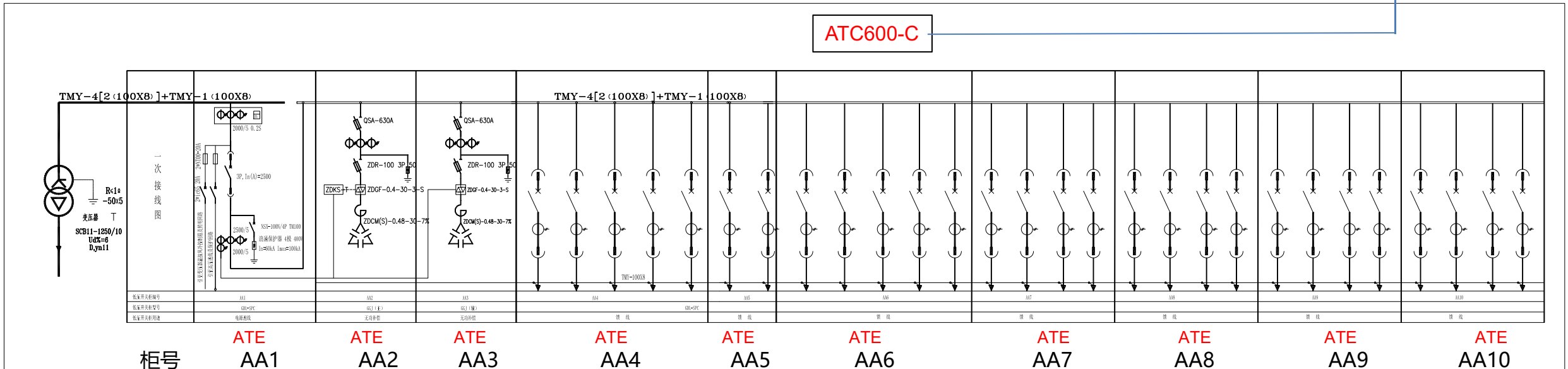
The low-voltage main incoming cabinet is equipped with 6 points; the capacitor cabinet is equipped with 3 points; the outgoing cabinet is equipped with 3 points for each circuit.

# MODEL SELECTION



Acrel-2000T temperature system

ATC600-C

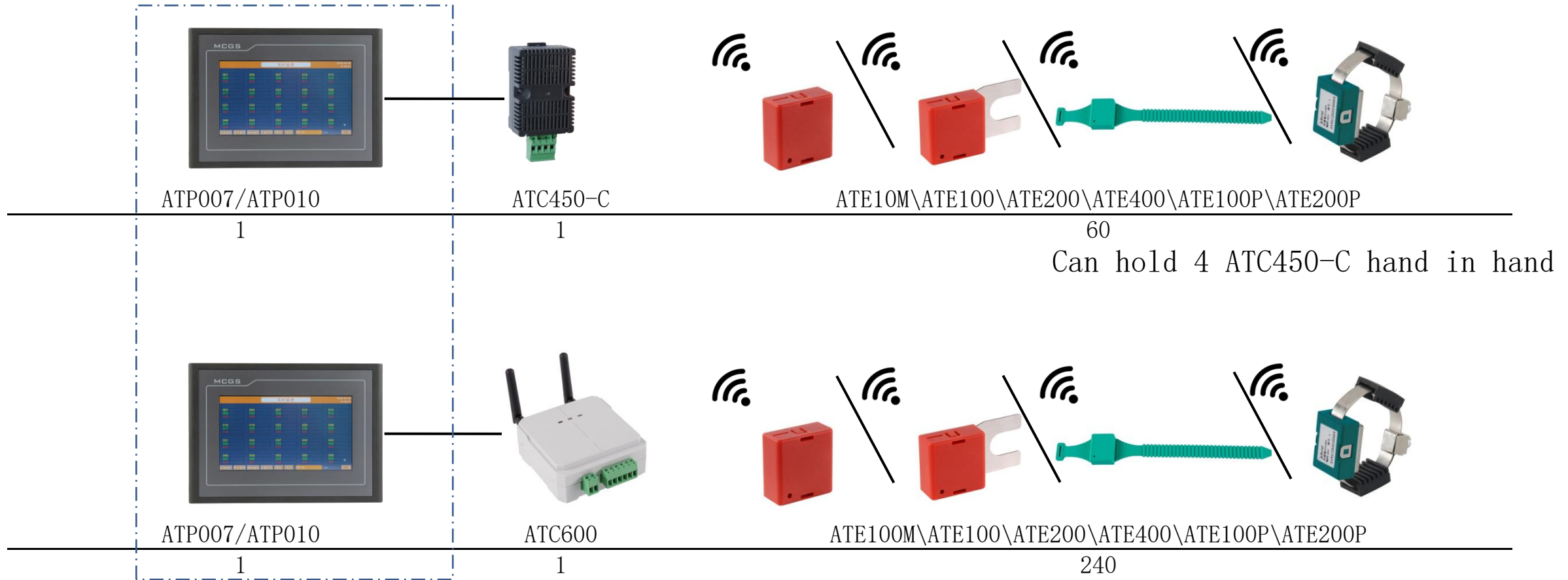


## Suggestion:

The low-voltage main incoming cabinet is equipped with 6 points; the capacitor cabinet is equipped with 3 points; the outgoing cabinet is equipped with 3 points for each circuit.

# MODEL SELECTION

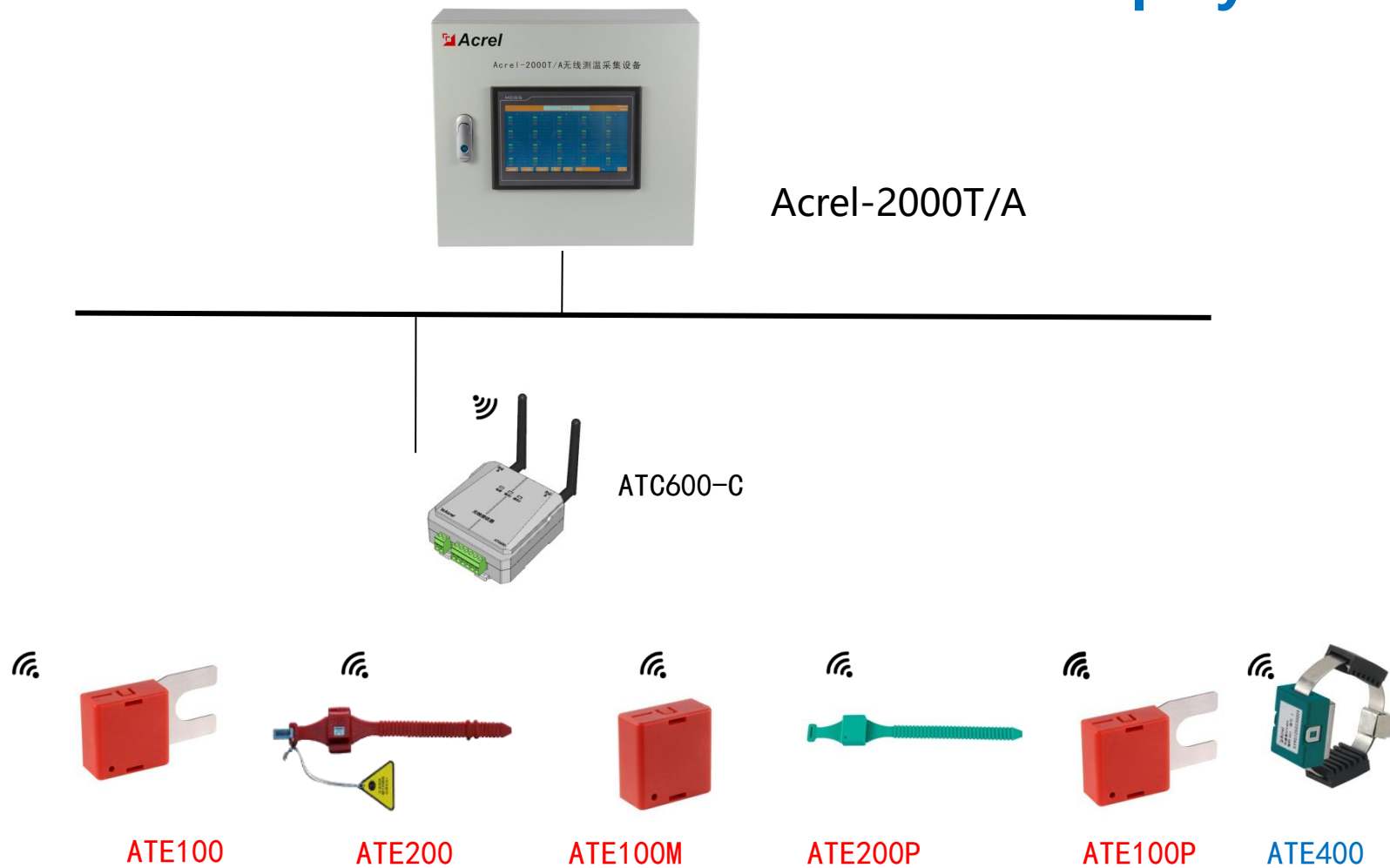
## 3.in high and low voltage cabinets (centralized on-site display/on-site no display)



ATP007、ATP010: DC24V power supply, One channel upstream RS485 interface; one channel downstream RS485 interface.

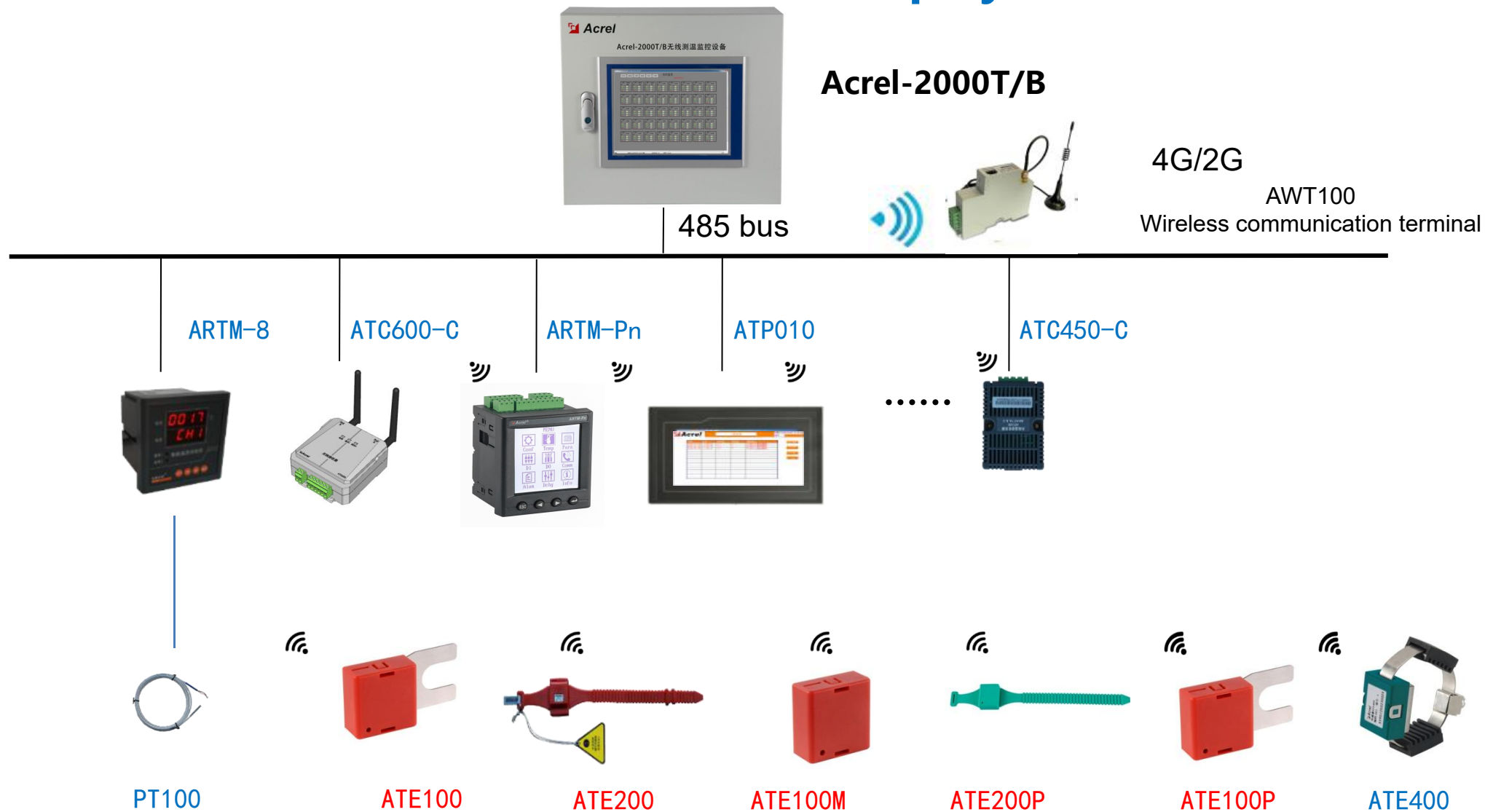


## 4. On-site wall-mounted centralized display solution



# MODEL SELECTION

## 5. On-site wall-mounted centralized display solution



# DISPLAY UNIT



**Acrel-2000T/A**

Wall mounted

RS485、Ethernet

Built-in buzzer alarm

Size: 480\*420\*200mm

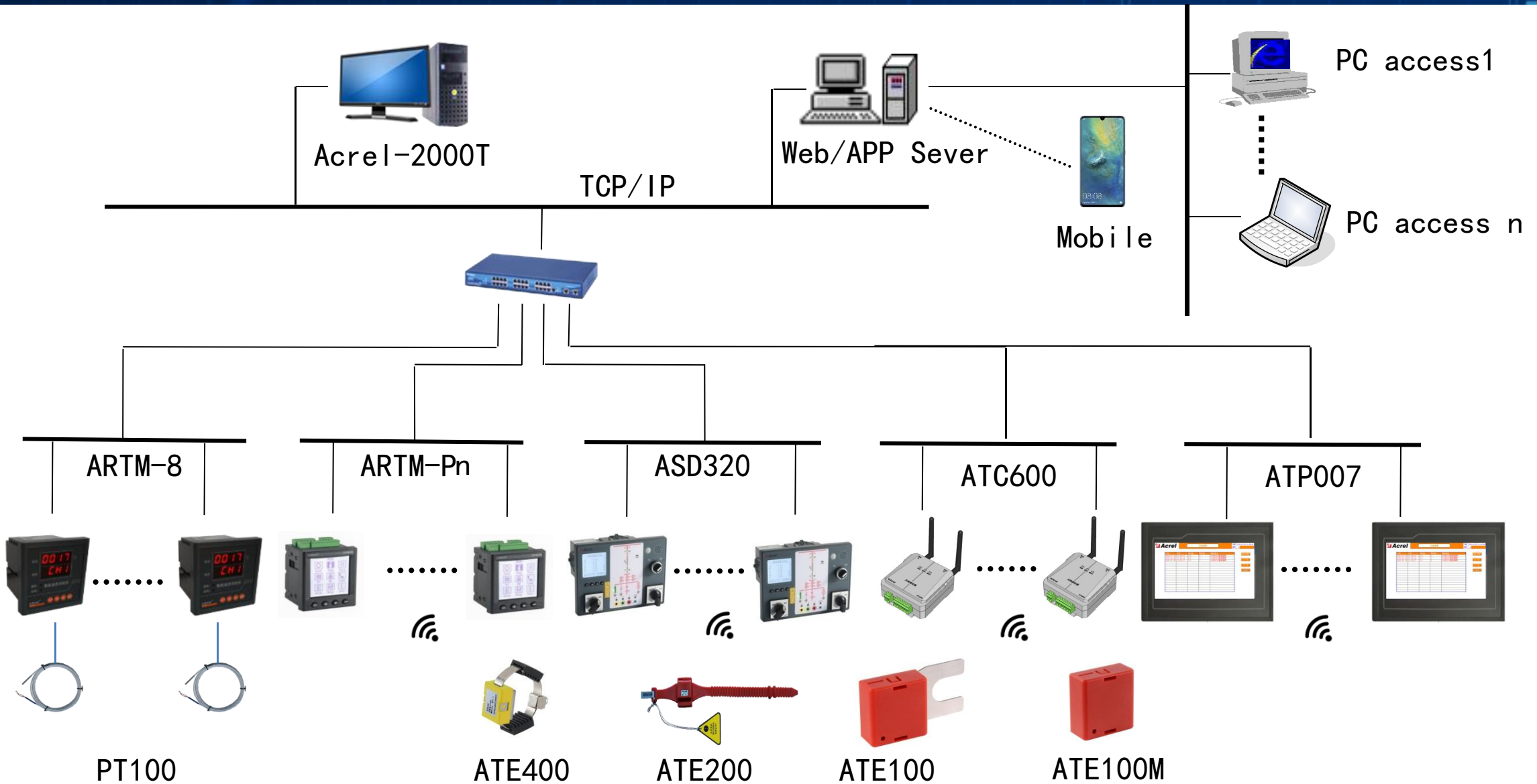


**Acrel-2000T/B**

- Hardware: Memory4G, hard disk128G, Ethernet
- Display: 12inches, resolution 800\*600
- Operating system: Windows 7
- Database system: Microsoft SQL Server 2008 R2
- I/O interface: GLAN×2、USB×4、COM×6
- Web/APP optional
- Size: 480\*420\*200 mm



# STRUCTURE



# CERTIFICATE

中国认可  
国际互认  
检测  
TESTING  
CNAS L0223

MA 180008223616

ILAC-MRA

CNAS

**XIHARI**  
No. 200419G

ATE400+ARTM-Pn : XIHARI Test Report **检验报告**

**TEST REPORT**

试品型号: ATE400  
TYPE  
试品名称: 无线测温传感器  
DESIGNATION WIRELESS TEMPERATURE SENSOR  
委托单位: 安科瑞电气股份有限公司  
APPLICANT ACREL CO., LTD.  
制造单位: 江苏安科瑞电器制造有限公司  
MANUFACTURER JIANGSU ACREL APPLIANCE MANUFACTURE CO., LTD.  
检验类别: 性能试验  
PERFORMANCE TEST

西安高压电器研究院有限责任公司  
XI'AN HIGH VOLTAGE APPARATUS RESEARCH INSTITUTE CO., LTD.

ATE400+ARTM-Pn : XIHARI Test Report **检验报告**

ARTM8: CE

UDM

**CERTIFICATE**

**ATTESTATION CERTIFICATE  
OF MACHINERY AND ELECTROMAGNETIC  
COMPATIBILITY DIRECTIVES**

Technical file of the company mentioned below has been observed  
2006/42/EC Machinery Directive and 2014/30/EU Electromagnetic Compatibility Directive  
have been taken as references for these processes

Company Name : Acrel Co., Ltd.  
Company Address : No.253, Yulv Road, Jiading District, Shanghai, China  
Manufacturer Name : Jiangsu Acrel Electrical Manufacturing Co., Ltd.  
Manufacturer Address : No.5, Dongmeng Road, Nanzha Street, Jiangyin City, Jiangsu Province, China  
Related Directives and Annex : 2006/42/EC Machinery Directive  
2014/30/EU Electromagnetic Compatibility Directive  
Related Standards : EN 61010-1:2010+A1:2019, EN 61326-1:2013  
EN 61000-3-2:2019, EN 61000-3-3:2013+A1:2019  
Product Name : ARTM Multi-Channel Temperature Controller  
Report No and Date : 582505C00031501/582505EC00009301  
Product Brand/Model/Type : Acrel, ARTM-8, ARTM-8/JC

Certificate Number : M.2020.206.C8071  
Initial Assessment Date : 29.07.2020  
Registration Date : 30.07.2020  
Reissue Date/No : -  
Expiry Date : 29.07.2025

UDM International Certification  
Auditing Training Centre Industry  
and Trade Inc. Co.

CE UDEM

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E-mail: [info@udemtd.com.tr](mailto:info@udemtd.com.tr) [www.udem.com.tr](http://www.udem.com.tr)

