LV Switchboard Electrical Nodes Multi-channel Wireless Temp. Monitoring Solution

Multi-channel Wireless Temperature Monitoring, for LV switchboard/ switchgear, local display, electrical nodes temp. monitoring
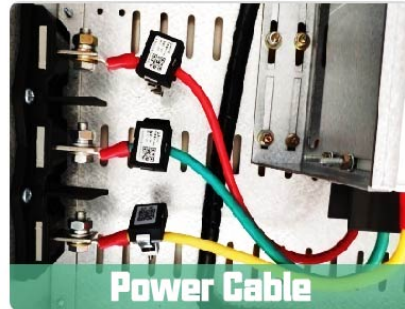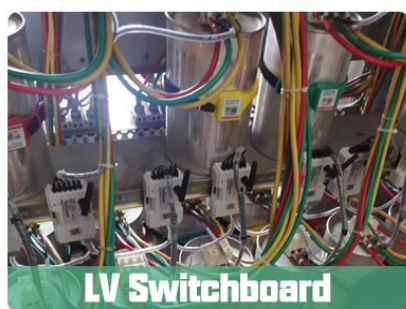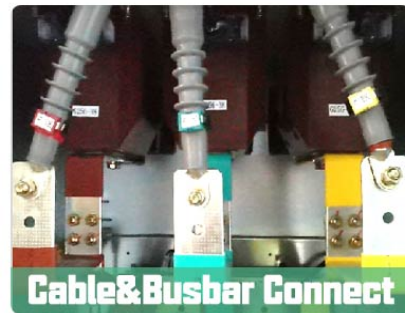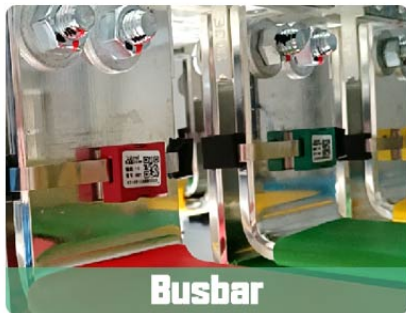
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Wireless Temperature Monitoring Solution [Local Display]

Acrel®

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0. Application Scenario

(1) This multi-channel wiressless temperature monitoring solution was majorly designed for monitoring & alarming temperature of crucial electrical connection nodes in LV Switchboard or LV Switchgear like busbar, power cable, cable&busbar connection/joints and etc.

(2) Such electrical connection nodes have the potential threat of fire hazard due to the aging of material, slackness of connection and etc. Thus a real-time temperature monitoring and alarm system will be necessary to prevent it from potential fire hazard causing by the rising of temperature.

(3) Solution here was major designed for local temperature display and alarm only. Distinguish from other Acrel wireless temperature monitoring soloution which also has IoT cloud system monitoring function.

(4) Unlike the traditional wired temperature monitoring solution, wireless temperature monitoring solution make the connection between temeperature sensor and temperature transceiver wireless. This will largely ease the installation and make the overall solution more flexible.

Busbar

Cable&Busbar Connect

LV Switchboard

Power Cable

(1) Major Temperature Monitoring Nodes Showcase

LoRa

Wireless Temperature Sensor
[Multi-channel]

Wireless Temperature Transceiver

(4) WIreless Connection for esasy installation

Wireless Temperature Monitoring Solution [Local Display]

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## 1. Scenario Preset

(1) The target was to monitor and alarm the temperature of 5 switchboards deployed in a single room. Only local display and alarm of temperature was requested.

(2) Each switchgear require 6 temperature moniotoring points for electrical connection nodes. Thus there will be 30 temperature monitoring points in total.

(3) The system voltage of switchgear will be 0.4kV.

(4) The distance between ATE300M sensor mainbody and temperature monitoring points was less than 1.2m. [This will influence calbe length of paired NTC thermistor]

1. Devices Deployment

Area #1 - LV Switchboard #1 ~ #5:

- 1* ATP007 Temperature Display Touchscreen [For display and alarm for all temperature data]
- 1* ATC600-M Wireless Temperature Transciever [For collecting the temperature data from ATE300M wireless temp. sensors and further upload the data to ATP007]
- 5* ATE300M Multi-channel Wireless Temperature Sensor [For monitoring up to 6-channel temperature of electrical connection nodes and send the data to ATC600-M via LoRa wirelesss Comms.]
- 30* TPSNT503F415FAL1200 NTC Thermistor [Paired with ATE300M for temp. signal input]
- 1* KDYA-DG30-24K Power Supply Module [Paired with ATP007 for 85~265Vac/Vdc Power Supply input]

- ATE300M Installed in LV Switchboard
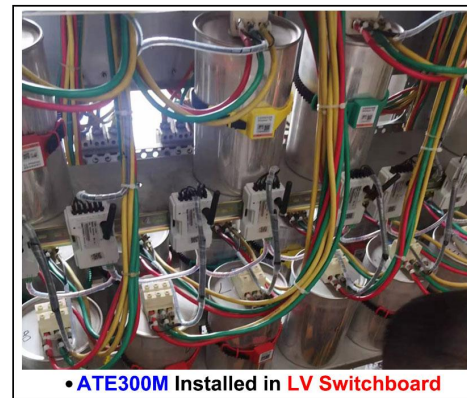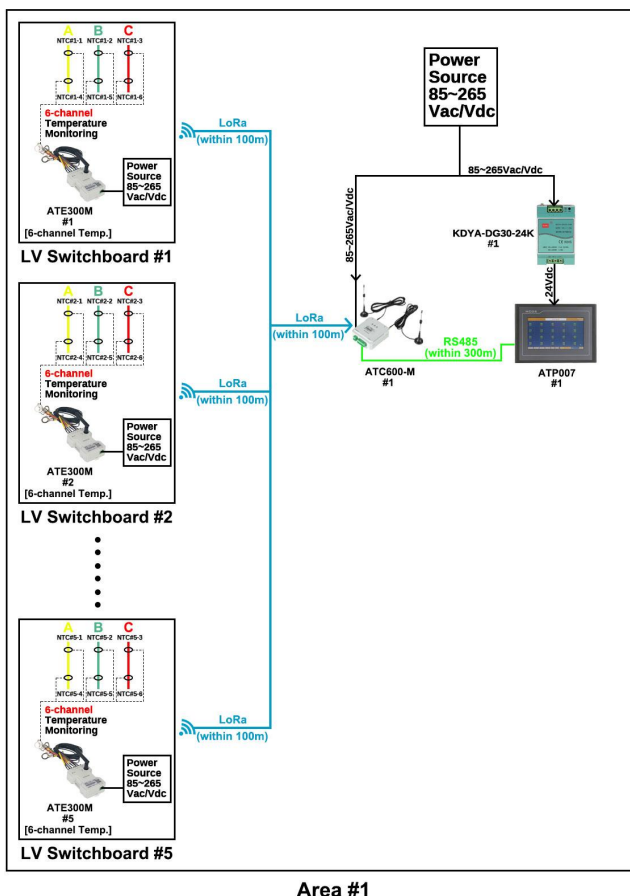
Switchboard Temperature Monitoring Point Showcase
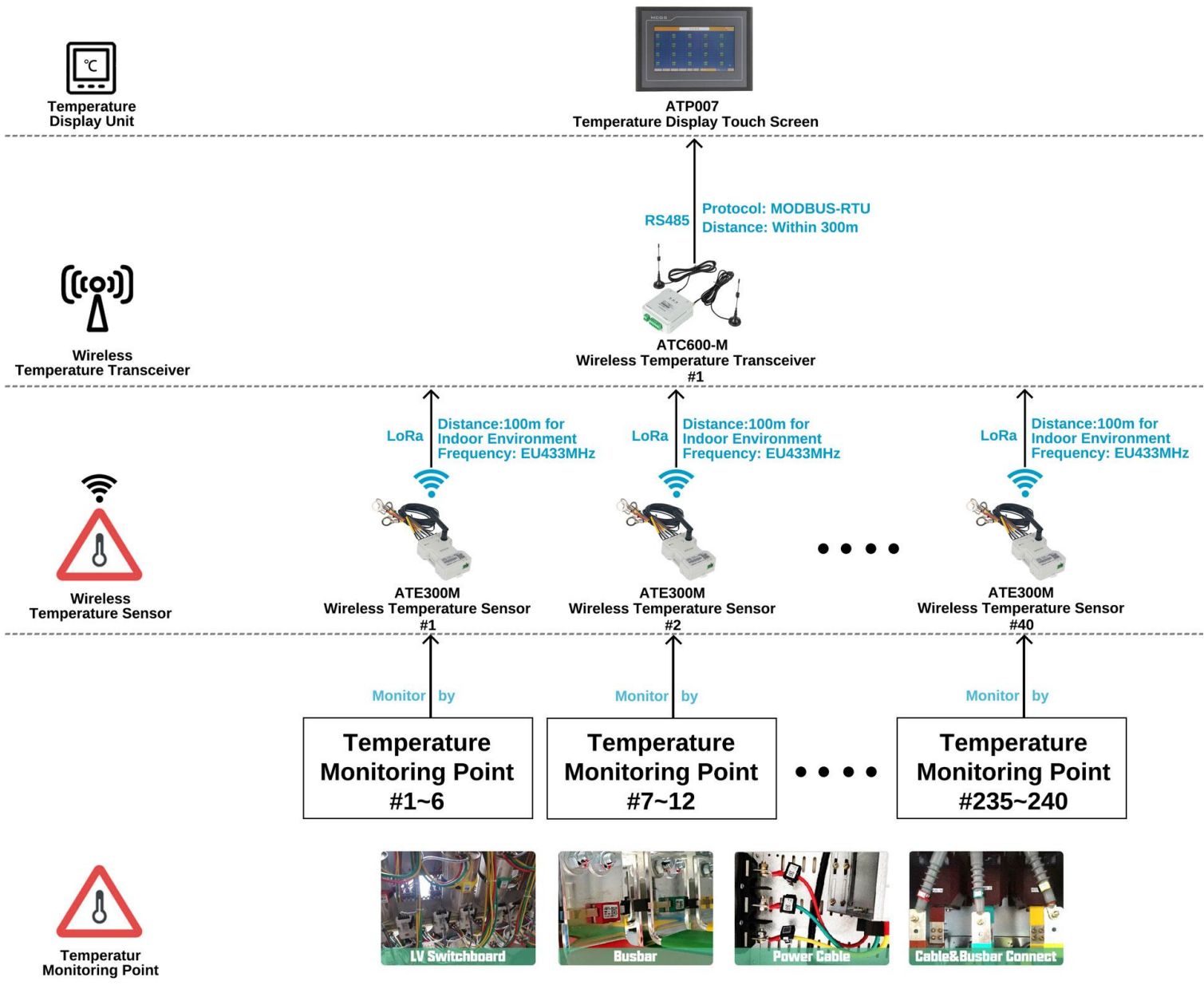
Note 1: Green line stand for RS485 Wired communcation line
Note 2: LoRa is a type of Radio Wireless Comms. Methods

(1) Devices deployment plan Illustraton

Wireless Temperature Monitoring Solution [Local Display]

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1. Communication Structure & Logic

(1) Between ATE300M wireless temperature sensor and ATC600-M wireless temperature transceiver, we are using a radio wireless communications called LoRa. The communication distance is within 100m [when in indoor environment and penetrate 1 layer of metal cover of switchgear]. The communication protocol is self defined protocol. [1 ATC600-M can support up to 240 pcs ATE300M if comms. distance allowed.]

(2) Between ATP007 smart touch screen and ATC600-M wierless temperature transceiver, we are using common RS485 communications based on MODBUS-RTU protocol. Although for this RS485 communication, it's wired comms. But normally the ATP007 and ATC600-M was installed closedly to each other, so that remain the most part of communication structure still wireless. [1 pcs ATP007 can support and display the temp. data of up to 240 points]
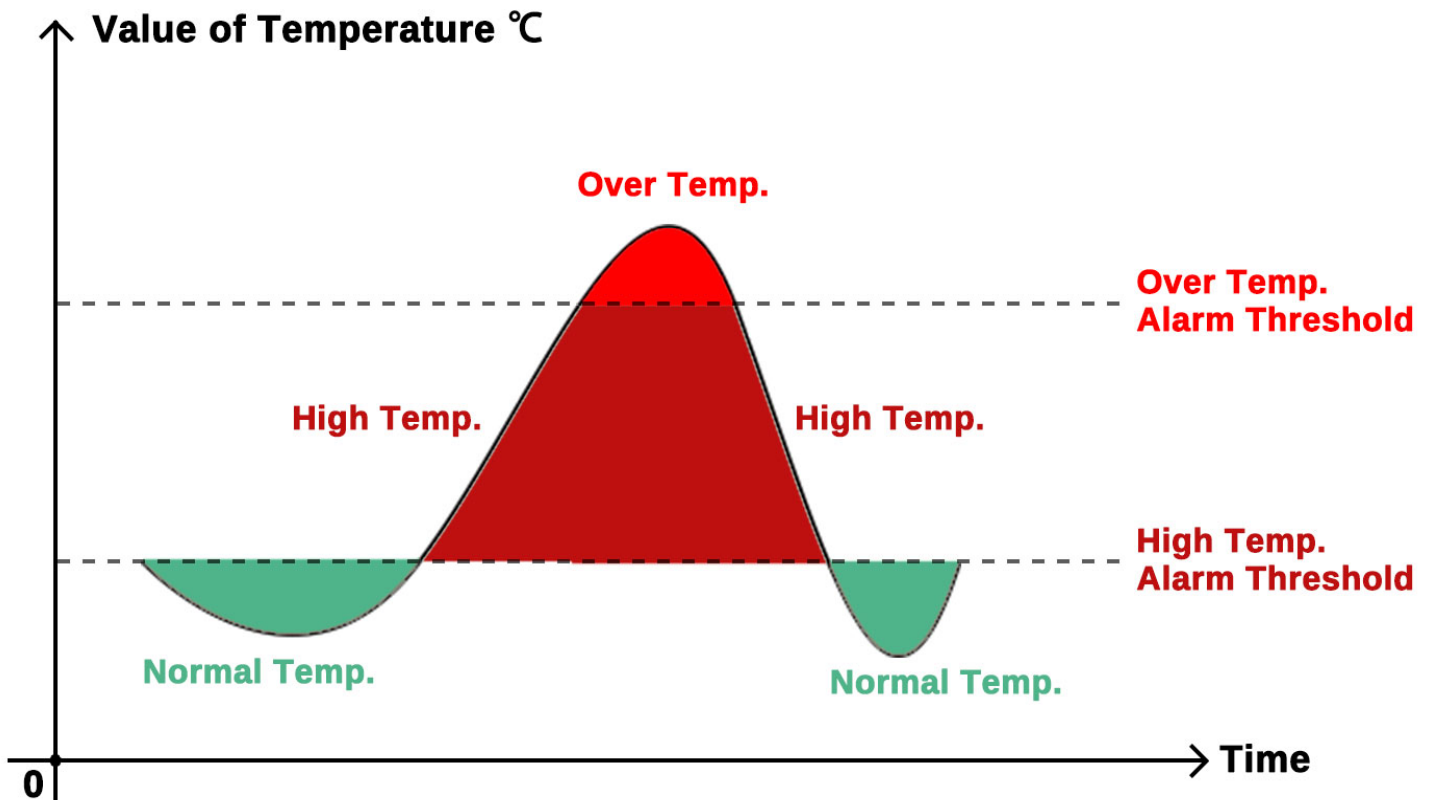
Temperature Display Unit

ATP007 Temperature Display Touch Screen

RS485 — Protocol: MODBUS-RTU Distance: Within 300m

Wireless Temperature Transceiver

ATC600-M Wireless Temperature Transceiver #1

Wireless Temperature Sensor

LoRa Distance:100m for Indoor Environment Frequency: EU433MHz

ATE300M Wireless Temperature Sensor #1

LoRa Distance:100m for Indoor Environment Frequency: EU433MHz

ATE300M Wireless Temperature Sensor #2

LoRa Distance:100m for Indoor Environment Frequency: EU433MHz

ATE300M Wireless Temperature Sensor #40

Monitor by

Temperature Monitoring Point #1~6

Monitor by

Temperature Monitoring Point #7~12

Monitor by

Temperature Monitoring Point #235~240

Temperatur Monitoring Point

LV Switchboard | Busbar | Power Cable | Cable&Busbar Connect

(1) Communication Structure

Wireless Temperature Monitoring Solution [Local Display]

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1. Temperature Alarm Function&Logic

ATP Seires Tempearture Display Devices support 2 types of major temperature alarm logic. When any of the below alarm logic was set and triggered, it will alarm the buzzer up.
(1) High Temperature Alarm: When temperature of certain monitoring node was higher than a certain preset threshold value, this will twigger high temperature alarm. [Normally used as a pre-alarm for mentioning related person to take care of temperature rising issue in monitoring places]
(2) Over Temperature Alarm: Similar like high temperature alarm, but over temperature alarm normally will be preset a higher alarm threshold. [Normally used for alarming the related person that there are severe temperature rising issue happened and need to be solved immediately]


(1&2) High&Over Temperature Alarm

Wireless Temperature Monitoring Solution [Local Display]

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1. Hardware Devices Overview

Model 1: ATE300M Multi-channel Wireless Temperature Sensor

- Temperature Measuring Range: -40℃~+140℃ [±1℃]
- Monitoring: Up to 6-channel Temperature
- Wireless Comms: LoRa Radio Comms. [433~510MHz, self-defined protocol]
- LoRa Comms. Distance: within 100m [when in indoor environment, penetrate 1 layer of metal cover of switchboard/switchgear]
-Sampling Frequency: 1~240s
- Power Supply: 85~265Vac/Vdc
- Installation: DIN-rail/Strap-tied

LoRa Wireless | **6-Channel Temp.**
Temperature Sensor | **-40℃~+140℃**
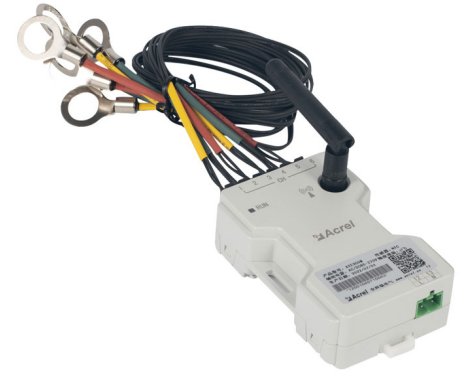
Model 1: TPSNT503F415FAL1200 NTC Thermistor

- Temperature Measuring Range: -40℃~+140℃ [±1℃]
- Type: 2-wire NTC termistor
- Cable Length: 1.2m [0.5m optional, model will be TPSNT503F4150FAL500-03]
- Probe Aperture Hole Size: 12mm [diameter]
- Applicaiton: paired with ATE300M for temperature signal input
- Installation: Strap-tied/Screw-fixed

NTC Thermistor | **2-wire**
Temperature Sensor | **-40℃~+140℃**

Model 2: ATC600-M Wireless Temperature Transceiver

- Wireless Comms.: LoRa Radio Comms. [433~510MHz, self-defined protocol]
- LoRa Comms. Distance: within 100m [when in indoor environment, penetrate 1 layer of metal cover of switchboard/switchgear]
- Wired Comms.: 1-way RS485 [MODBUS-RTU protocol]
- Support: up to 240 pcs ATE300M Wireless Temperature Sensors based on LoRa
- I/O Function: 2-way DO output
- Power Supply: 100~265Vac/Vdc
- Working Temperature: -20℃~+55℃
- Working Humidity: <=95%

Temp. Transceiver | **Up to 240 Sensors**
GFSK Wireless | **1-way RS485**

Wireless Temperature Monitoring Solution [Local Display]

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1. Hardware Devices Overview

Touch Screen | **2-way RS485**
Temp. Display | **1-way Ethernet**

Model 4: ATP007 Temp. Display&Alarm Touch Screen
- Comms.: 2-way RS485 [MODBUS-RTU]; 1-way Ethernet [MODBUS-TCP]
- Support: Display the temperature data of up to 240 pcs temperature monitoring points.
- Power Supply: 24Vdc [±10%]; consumption 15W
- Screen Size: 7 inchs [10 inchs option available, module ATP010]
- Working Temperature: -10   +55
- Working Humidity: <=95%

Input Range | **Output Range**
100~240Vac/Vdc | **24Vdc**

Model 5: KDYA-DG30-24K Power Supply Module
- Rated Input Range: 100~240Vac/Vdc
- Rated Outpu Range: 24Vdc
- Application: paired with ATP007 for power supply input

Wireless Temperature Monitoring Solution [Local Display]

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1. Overall Model Selection&Quoation

(1) This Quotation doesn't include freight charge. To gain a complete quotation, please refer the actual quantity that you want to request for the actual order, once we receiving it. We will issue a Official Proforma Invoice with Acrel Stamps on it for later procedure.

Temp. Display&Alarm Touch Screen					
Overview Picture	USAGE&MODULE NAME	DESCRIPTION & SPECIFICATION	QUANTITY	FOB UNIT PRICE (USD)	AMOUNT (USD)
	Touch Screen **ATP007**	**Comms.:** 2-way RS485 (MODBUS-RTU); 1-way Ethernet [MODBUS-TCP] **Support:** Up to 240 ATE series Transceiver. **Auxiliary Power Supoply**: 24Vdc **HS Code:** 8471609000	1 pcs		
Power Supply Module					
Overview Picture	USAGE&MODULE NAME	DESCRIPTION & SPECIFICATION	QUANTITY	FOB UNIT PRICE (USD)	AMOUNT (USD)
	Power Module **KDYA-DG30-24K**	**Rated Input:** 100~240Vac/Vdc **Rated Output:** 24Vdc **Application:** Paired with ATP007 for power supply **HS Code:** 8473309000	1 pcs		
Wireless Temperature Transceiver					
Overview Picture	USAGE&MODULE NAME	DESCRIPTION & SPECIFICATION	QUANTITY	FOB UNIT PRICE (USD)	AMOUNT (USD)
	Temperature Transceiver **ATC600-M**	**Upstream:** RS485 (MODBUS-RTU) **Downstream:** LoRa (433~510 MHz) **Support:** Up to 240 ATE300M series wireless temperature sensors using LoRa communication. **Power Supply:** 100~265Vac **HS Code:** 9025191010	1 pcs		
Wireless Temperature Sensor					
Overview Picture	USAGE&MODULE NAME	DESCRIPTION & SPECIFICATION	QUANTITY	FOB UNIT PRICE (USD)	AMOUNT (USD)
	Temperature Sensor **ATE300M**	**Communication:** LoRa Wireless (433~510MHz) **Monitoring:** Up to 6-channel Temperature **Measuring Range:** -40℃~+140℃ [via NTC Thermistor] **Power Supply:** 85~265Vac/Vdc **HS Code:** 9025191010	1 pcs		
	NTC Thermistor **TPSNT503F415FAL1200**	**Temperature Measuring Range:** -40℃~+140℃ [±1℃] **Type:** 2-wire NTC termistor **Cable Length:** 1.2m **Probe Aperture Hole Size:** φ12mm [diameter] **Installation:** Strap-tied/Screw-fixed **HS Code:** 8533400000	1 pcs		

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Wireless Temperature Monitoring Solution [Local Display]

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3. Project Sample #1 - Italy Enel Green Power Project

(1) Project Overview:
· **Customer:** SEL S.P.A [Switchgear Complete set factory]
· **Country:** Italy
· **Project Aim:** Integrate Acrel wireless temperature monitoring devices with switchgear s produced by SEL S.P.A for adding satety feature to their switchgear products.
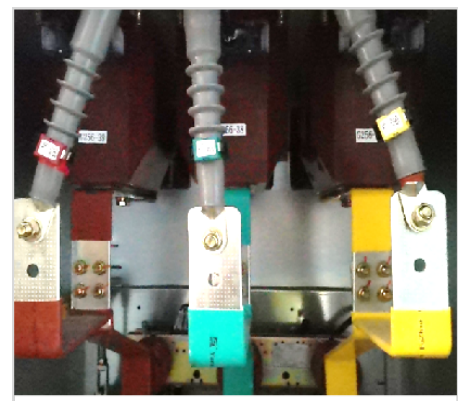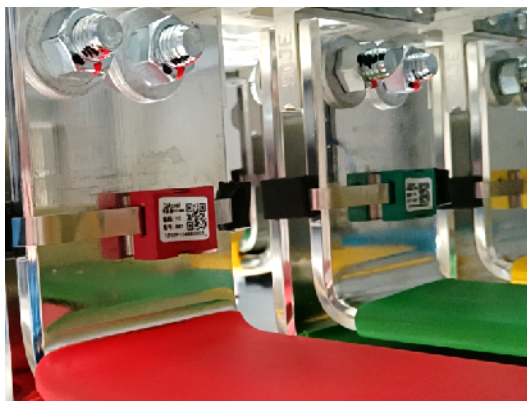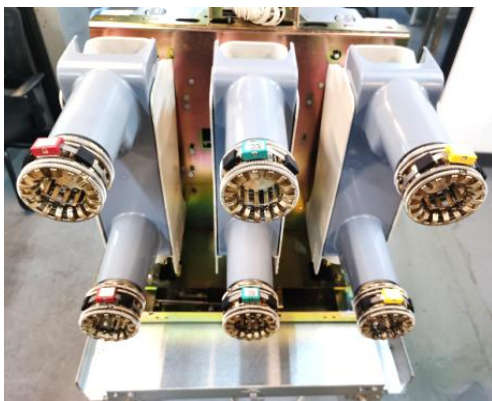· **Project Amount:** About 400.000 USD

Wireless Temperature Sensor

GFSK

Wireless Temperature Transceiver and Display Unit

(1) Customer: SEL S.P.A
[Switchgear Complete set factory]

(1) Project Aim:
Switchgear Wireless Temperature Monitoring

(2) Applied Product Combination:
- **ARTM-P30-400 Wireless Temperature Transceiver and Display Unit**
[For collecting, displaying and alarming for all temperature data collected from ATE400]
- **ATE400 Wireless Temperature Sensor**
[For monitoring the temperature of electrical connection nodes and send the data to ARTM-P30-400 via GFSK wirelesss Comms.]

(2) Site Installation Picture

Wireless Temperature Monitoring Solution [Local Display]

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3. Project Sample #2 - Vietnam Lotte Mart Project

(1) Project Overview:
· **Customer:** V.T.E.C.H Electrical Technology Co., Ltd , EPC [Party A]
· **Country:** Vietnam
· **Project Aim:** Client use Acrel complete Cloud Wireless Temperature Monitoring Solution for monitoring and alarming electric cabinet in Lotte Mart to ensure electricity safety.
· **Project Amount:** About 100.000 USD

Wireless Temperature Sensor

Wireless Temperature Transceiver

(1) Customer: V.T.E.C.H Electrical Technology Co., Ltd , EPC [Party A]
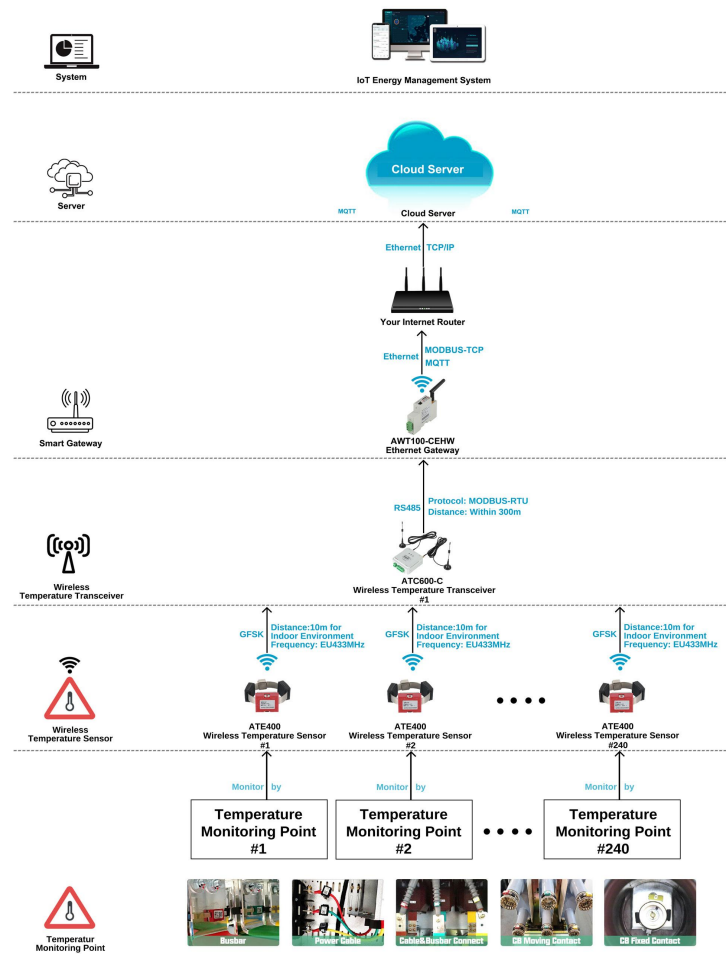
(1) Project Aim:
Online IoT based Wireless Temperature Monitoring&Alarming

(2) Applied Product Combination:
- AWT100-CEHW Ethernet IoT Gateway
- AWT100-POW Power Supply Module
- ATC600-C Wireless Temperature Transceiver
- ATE400 Wireless Temperature Sensor

(2) Site Picture Gallery

(2) Solution Overall Structure