

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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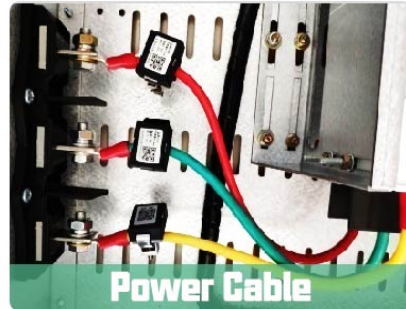
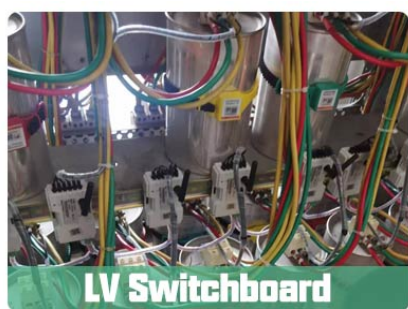
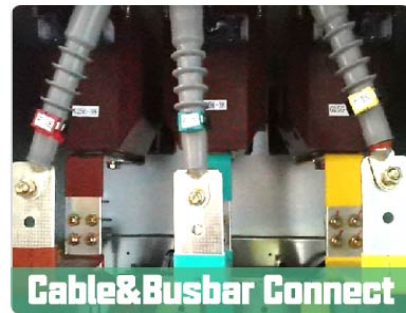
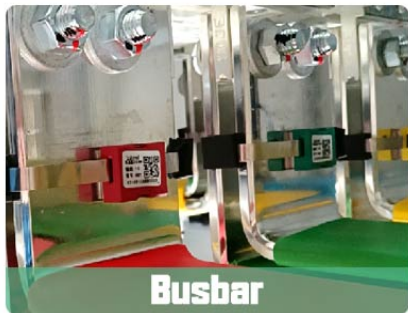
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0. Application Scenario

- (1) This **multi-channel wireless 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 solution which also has IoT cloud system monitoring function.
- (4) Unlike the traditional wired temperature monitoring solution, wireless temperature monitoring solution **make the connection between temperature sensor and temperature transceiver wireless**. This will largely ease the installation and make the overall solution more flexible.



(1) Major Temperature Monitoring Nodes Showcase



(4) Wireless Connection for esasy installation

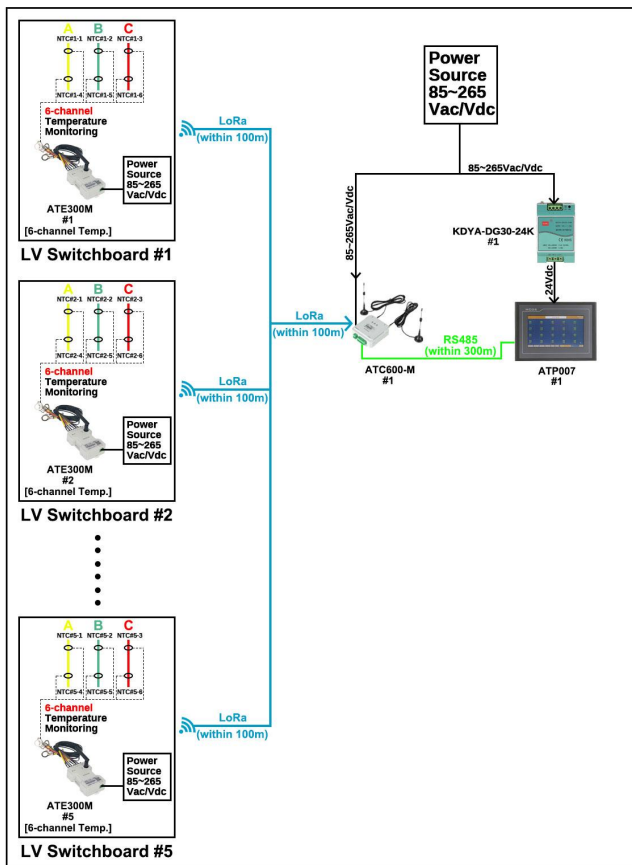
1. Scenario Preset

- (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 monitoring 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]

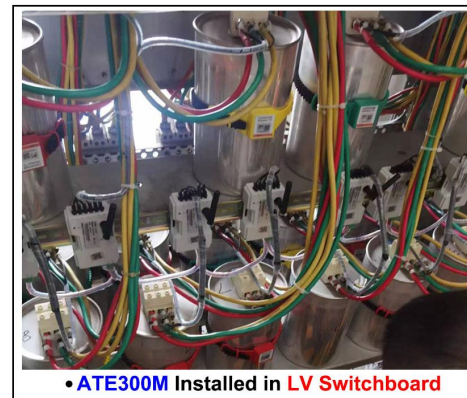
1. Devices Deployment

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 wirelessly 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]



Area #1



Switchboard Temperature Monitoring Point Showcase

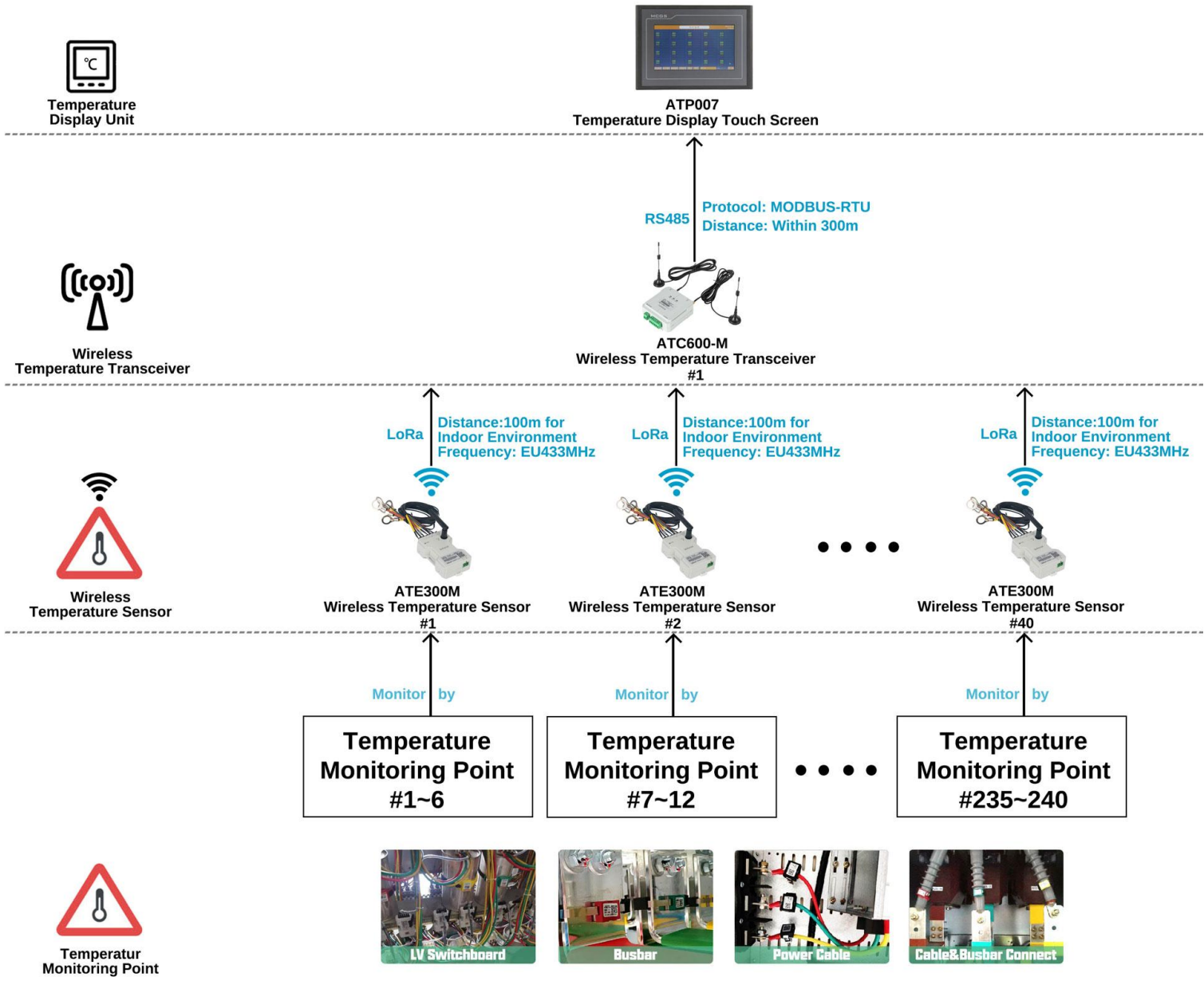
Note 1: Green line stand for RS485 Wired communication line
Note 2: LoRa is a type of Radio Wireless Comms. Methods

(1) Devices deployment plan Illustraton

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 wireless 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]**



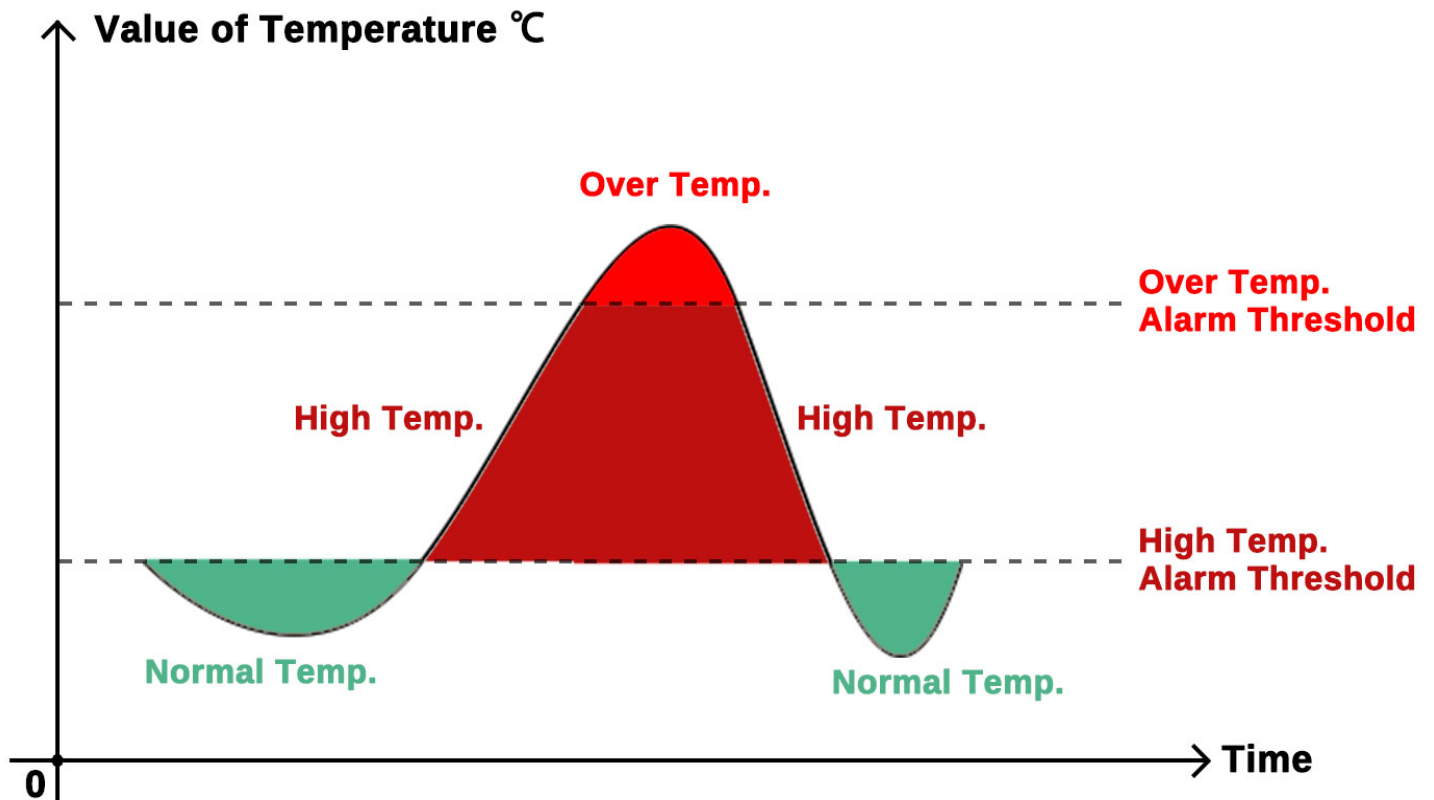
(1) Communication Structure

1. Temperature Alarm Function&Logic

ATP Seires Temperature 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 trigger 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

1. Hardware Devices Overview

Model 1: ATE300M Multi-channel Wireless Temperature Sensor

- Temperature Measuring Range: $-40 \sim +140$ [± 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
Temperature Sensor
6-Channel Temp.
-40°C~+140°C



Model 1: TPSNT503F415FAL1200 NTC Thermistor

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

NTC Thermistor
Temperature Sensor
2-wire
-40°C~+140°C



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: $-20 \sim +55$
- Working Humidity: $\leq 95\%$

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



1. Hardware Devices Overview

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 [$\pm 10\%$]; consumption 15W
- Screen Size: 7 inches [10 inches option available, module ATP010]
- Working Temperature: $-10 \sim +55$
- Working Humidity: $\leq 95\%$

Touch Screen

2-way RS485

Temp. Display

1-way Ethernet



Model 5: KDYA-DG30-24K Power Supply Module

- Rated Input Range: 100~240Vac/Vdc
- Rated Output Range: 24Vdc
- Application: paired with ATP007 for power supply input

Input Range

Output Range






100~240Vac/Vdc

24Vdc



1. Overall Model Selection&Quotation

(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 Supply: 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 thermistor Cable Length: 1.2m Probe Aperture Hole Size: φ12mm [diameter] Installation: Strap-tied/Screw-fixed HS Code: 8533400000	1 pcs		

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 produced by SEL S.P.A for adding safety feature to their switchgear products.
- Project Amount: About 400.000 USD



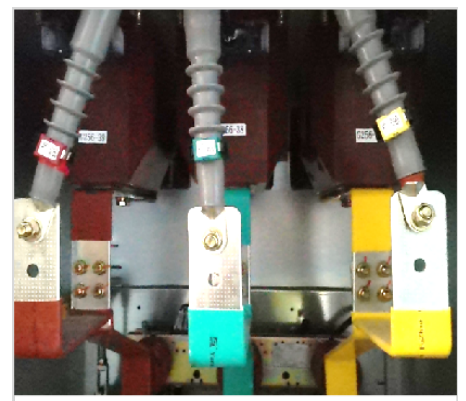
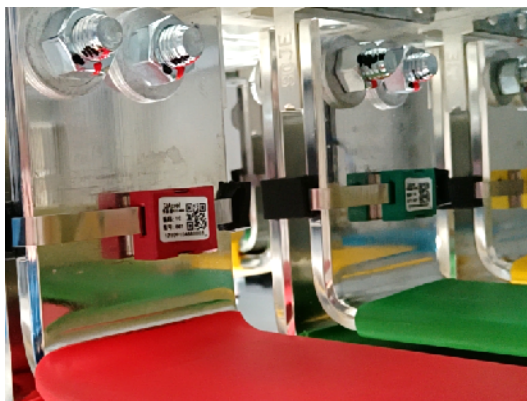
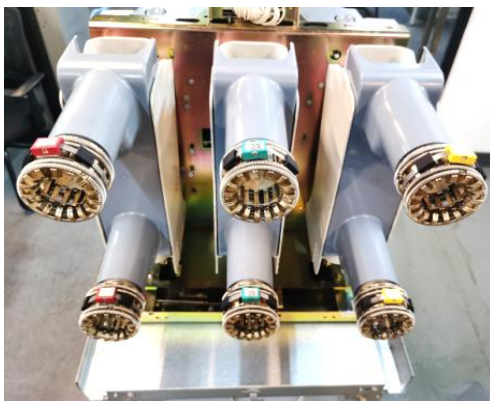
(1) Customer: SEL S.P.A
[Switchgear Complete set
factory]



(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 wireless Comms.]



(2) Site Installation Picture

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



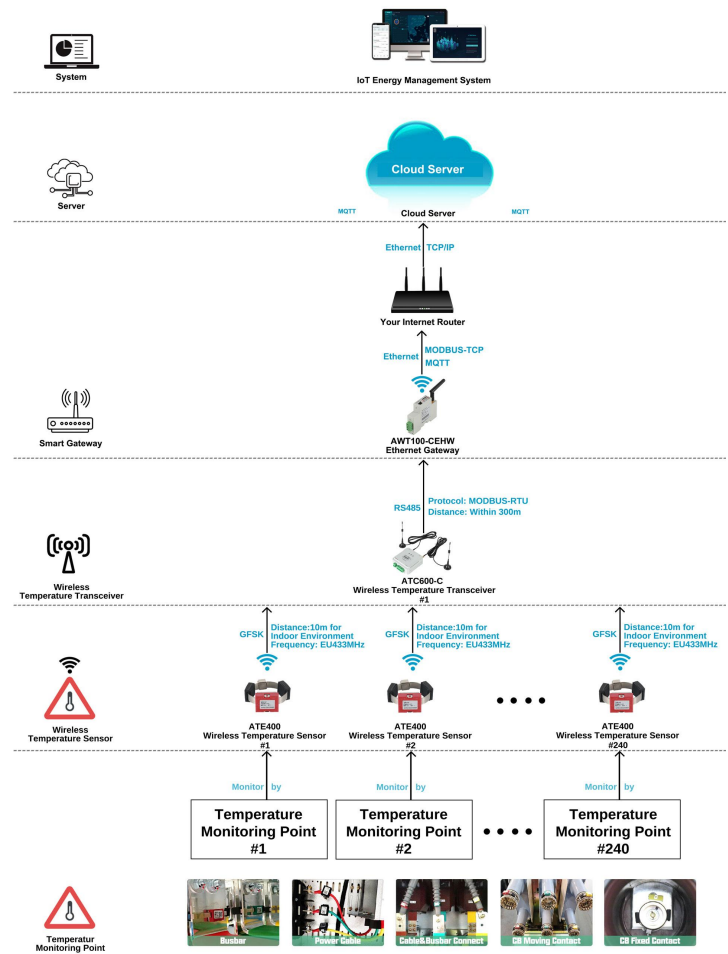
(1) Customer: V.T.E.C.H Electrical Technology Co., Ltd , EPC [Party A]



(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