

# Product Brochure

Medium Voltage switchgear || iPanel Cloud Management System || Low Voltage Switchgear



# iPanel Cloud Management System

## Introduction

"iPanel Cloud Management System" is the application that combines traditional switchgear with contemporary computing technology and communication technology.

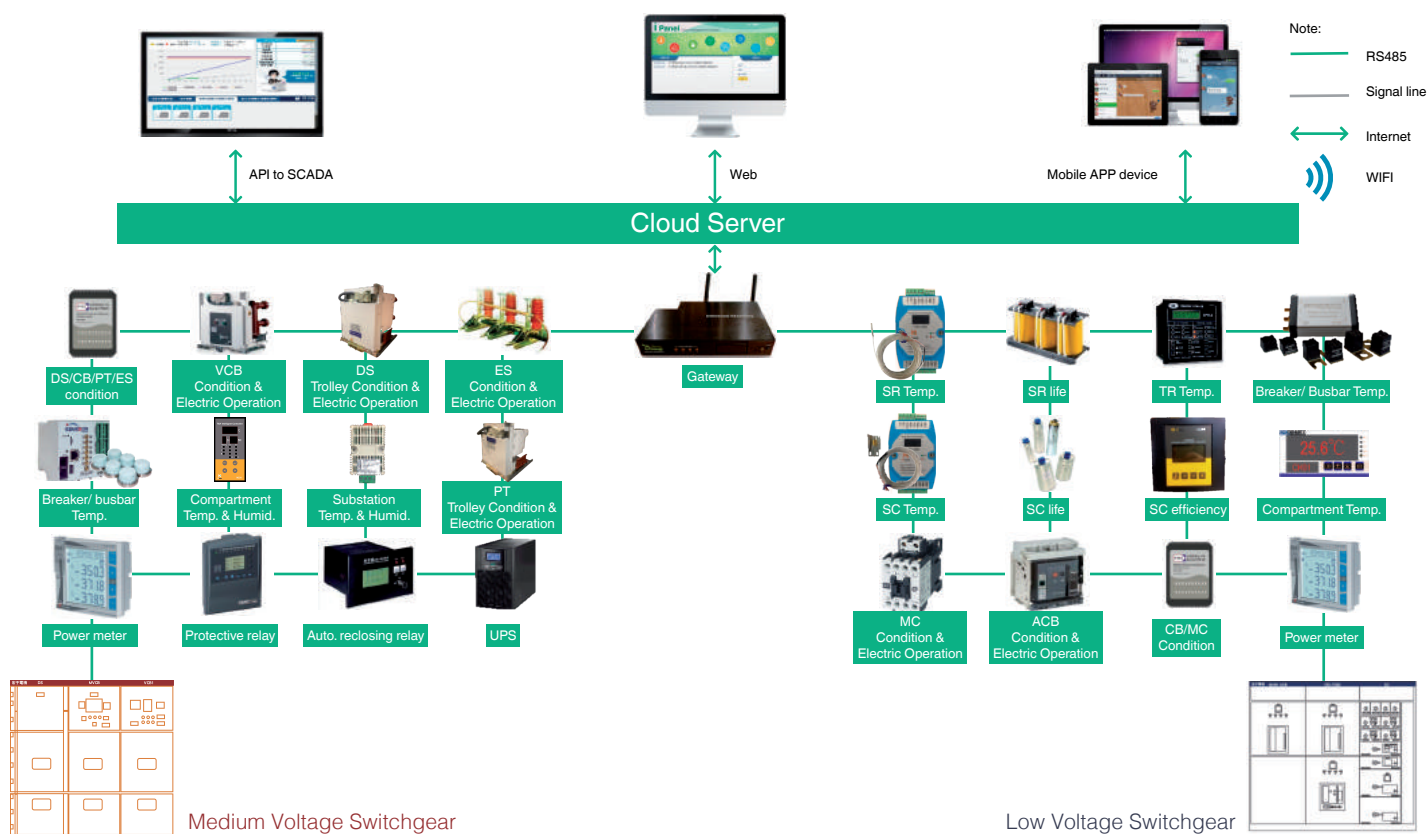
「Smart iPanel」 indicates switchgear can self-analyze and auto adjust control functions. In practical, smart iPanel increases switchgear reliability and reduces labor force. It brings a great benefit to clients.



## Feature

Safety	Increase switchgear safety and reliability, prevent damage while operation.
Cost	Reduce or without labor force to monitor for switchgear in substation, greatly decreasing enterprise cost.
Efficiency	Consolidated statistic function on power consumption and electricity cost enhances the efficiency of electricity management.
Alarm	Potential switchgear accident warning.
Message	Abnormal info. notification shorten the duration of troubleshooting and power outage.
Analysis	Switchgear operation condition can be daily or monthly analyzed in the format of chart or report.
Maintenance	Efficient regular maintenance can be planed with the statistics and analysis data which decreases maintenance cost.
Optimization	Optimize energy consumption distribution on the basis of historical power parameter and distribute power stably to system.
Remote Control	In case of natural disasters and inevitable accidents, switchgear can set "Trip" by APP with authorized account.
Database	Cloud system provides enterprises with an efficient and reliable platform for data storage and sharing which greatly influences modern business management.

## Structure

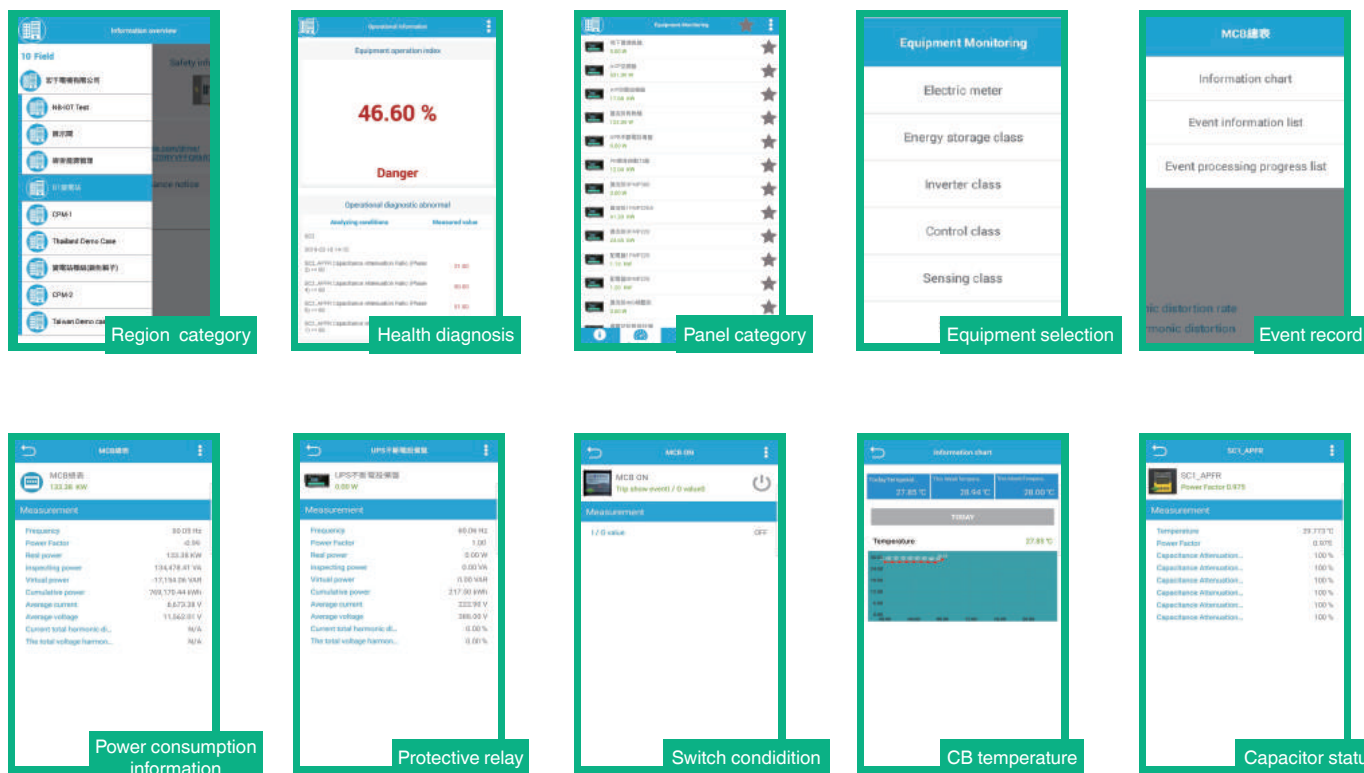


## System Specification

Item	iPanel monitor items	Equipment
Power value	Voltage, current, frequency	Power Meter
	Real power(R), Apparent power(S), Reactive power(Q)	Power Meter
	KWH, KVARH, Demand	Power Meter
	Power factor, Voltage harmonic, Current harmonic	Power Meter
	Other power value	Power Meter
Control value	CB operation & TRIP condition	DIO Controller
	CB overcurrent message (50/51, 50N/51N)	Protective Relay
	CB fault voltage message (27/59)	Protective Relay
	CB reclosing message (79)	Auto. reclosing relay
	DS/ PT trolley/ Earthing switch condition	DIO Controller
	Other control value	Controller
Safety value	Temp of CB contactor , cable connector, busbar joint point.	Wireless Temp. and Humi. monitor device
	Partial discharge value	Wireless Temp. and Humi. monitor device
	Temp. & Humi. of compartment	Temp. and Humi. detector
	Ambient Temp. & Humid. of substation	Temp. and Humi. detector
	Capacitor Surface Temp.	Temp. detector
	Reactor Core Temp.	Temp. detector
	Transformer Core Temp.	49 Relay
	Capacitor massage(degradation value, on-line capacity, closing time)	iAPFR
	UPS massage(battery capacity, remaining supply time)	UPS
	Other safety value	Sensor

# System Interface

## A. Mobile device operation interface (APP)



## B. Computer operation interface (Web)



Function

1. Substation and switchgear operation health board



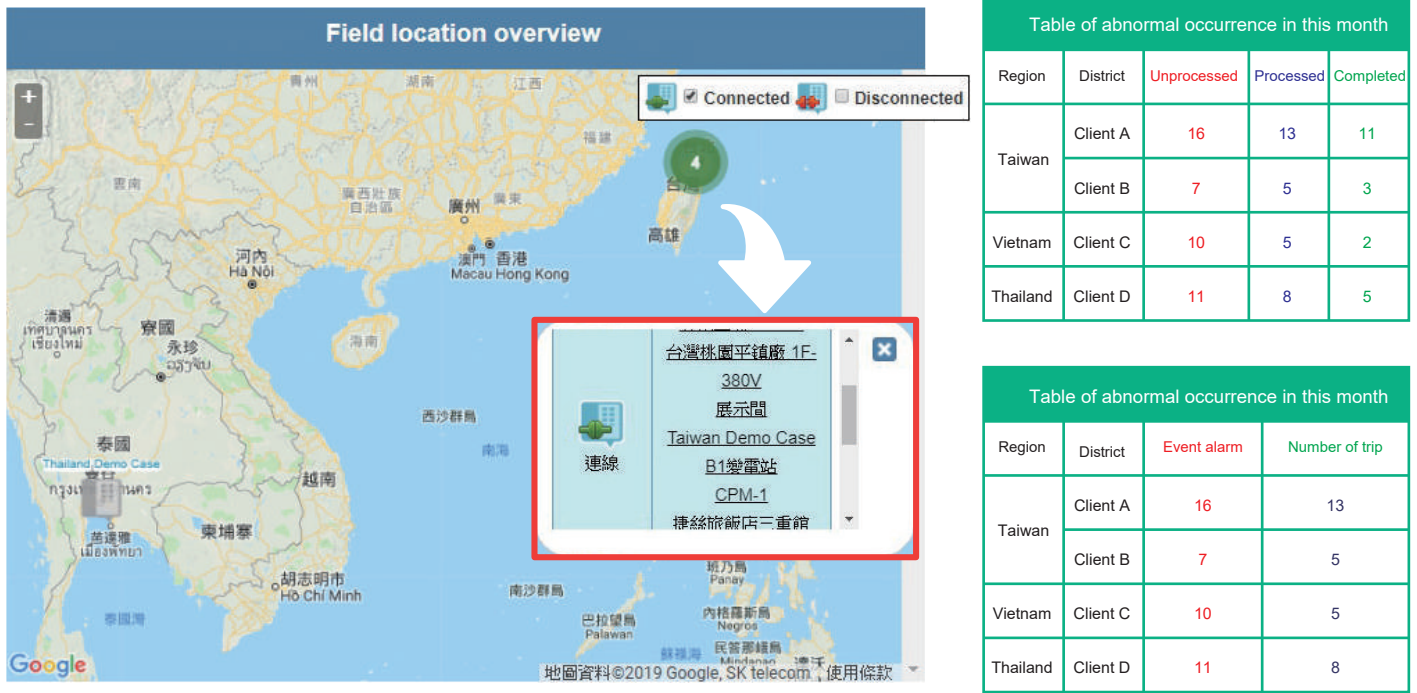
Switchgear health (AI diagnosis)

Health indication:

- Green Switchgear health is "Normal"
- Orange Switchgear health is "Warning"
- Red Switchgear health is "Abnormal"

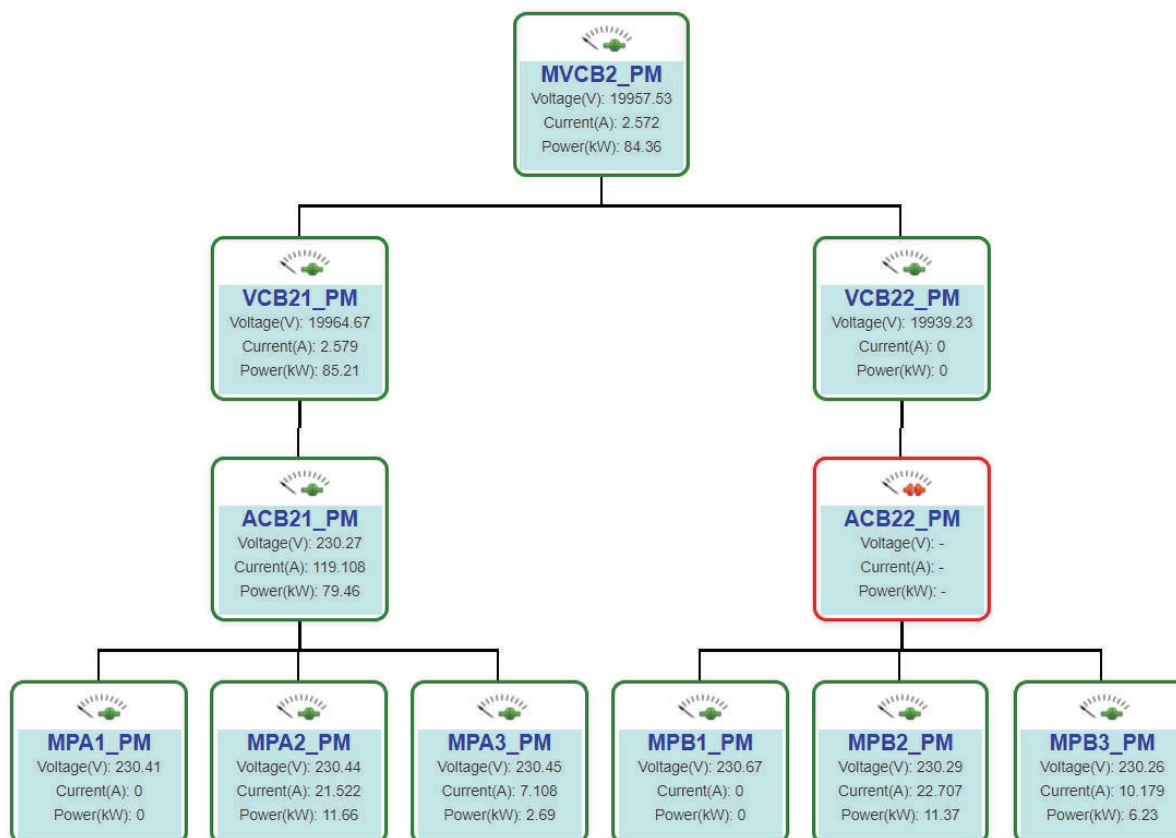
2. Substation and switchgear management

- Green All switchgear are in the online condition.
- Red One of the switchgear is disconnected.

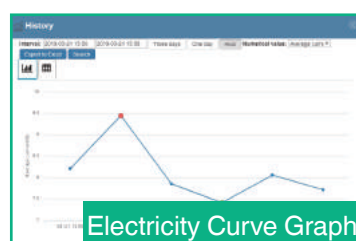
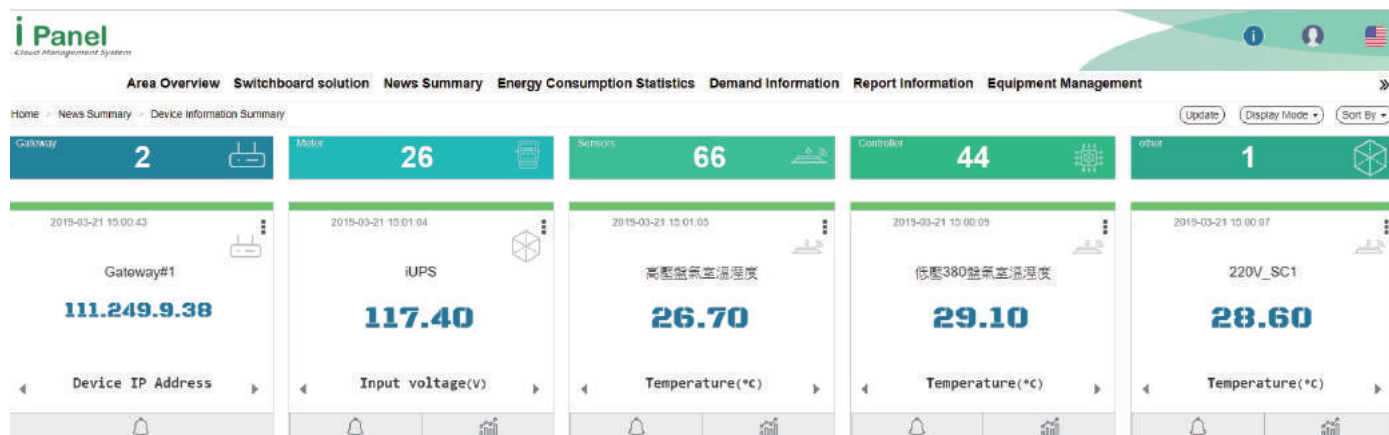




## 3. Single Line Diagram Board



## 4. Switchgear device management board



Equip. Info	
Equipment Type	Schneider relay protect station S20
Appliance Name	CB2_S20 <span>edit</span>
Group belonging to	B1集電站
Gateway ID	IIC31M

Device Type/ Name

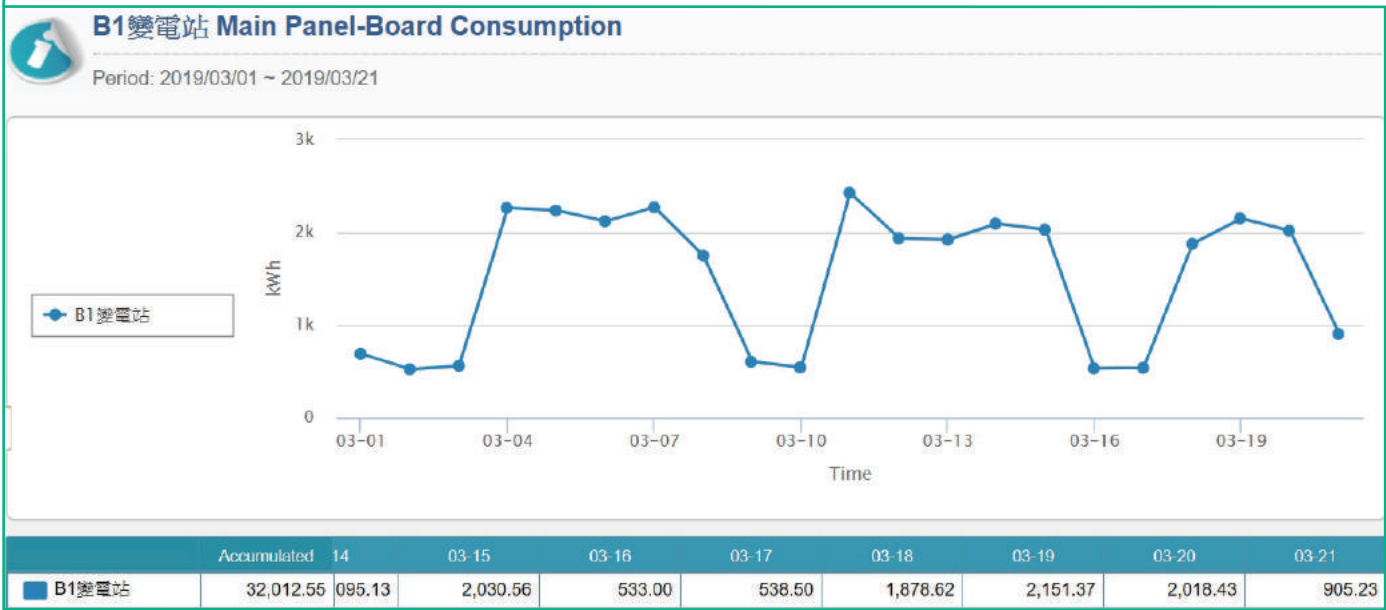
Function

5. Substation management board

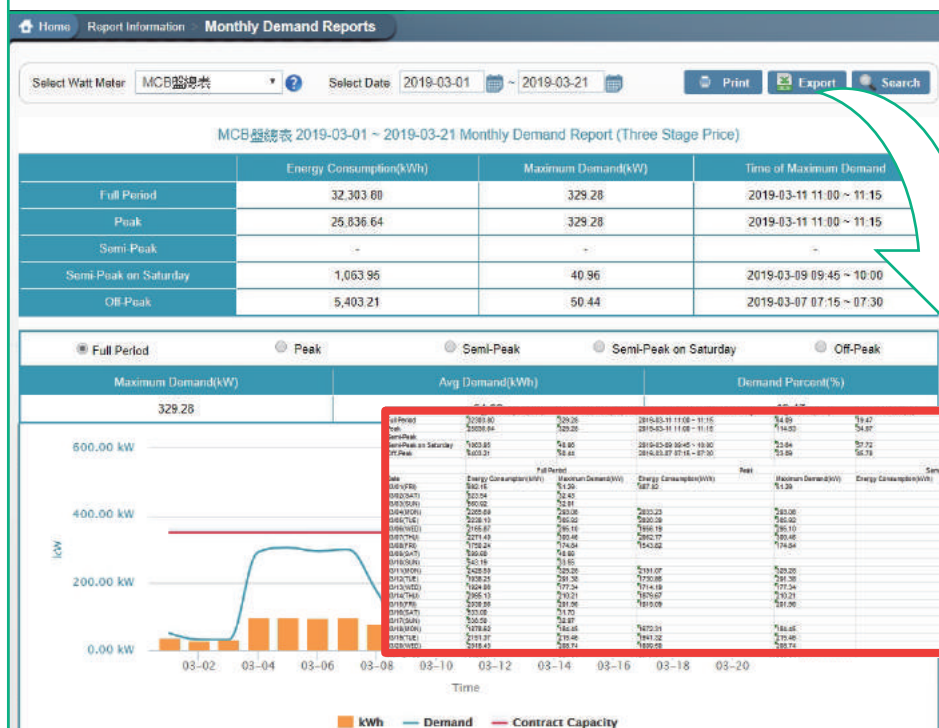
A. Power consumption statistics



B. Power consumption chart



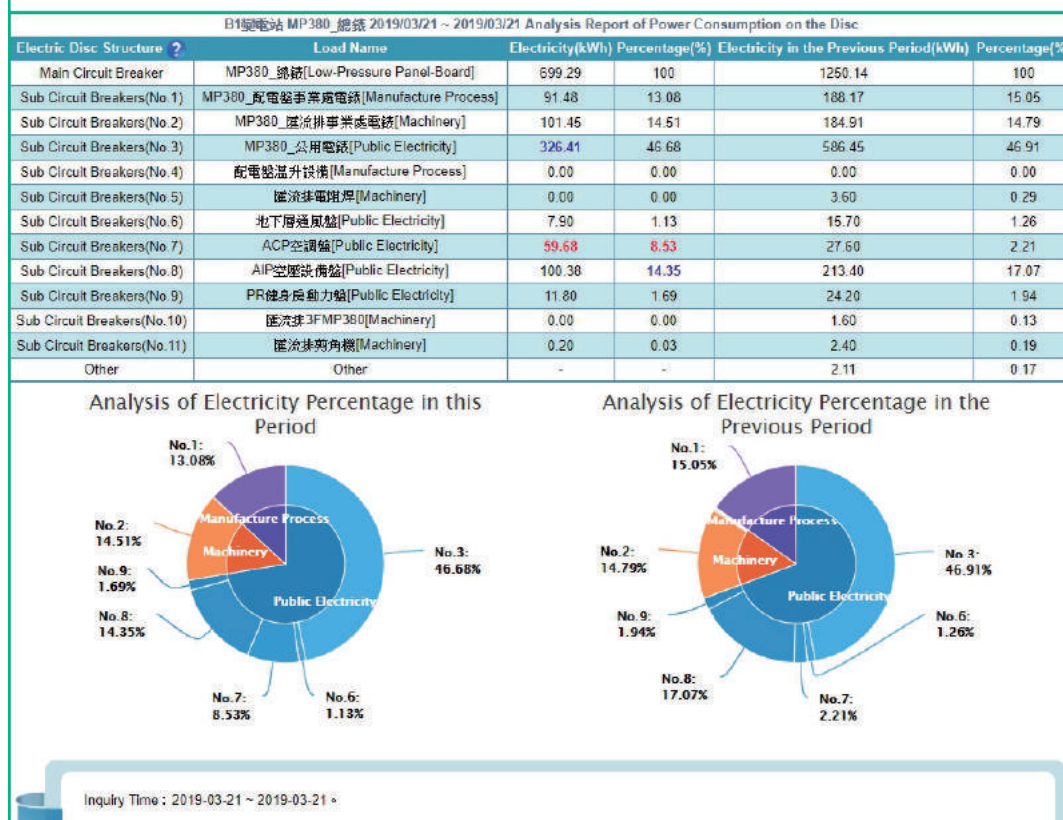
## C. Demand analysis



Daily report subscription:  
Daily mails are delivered to  
client mailbox automatically.

Available to export Daily / Monthly / Yearly  
report with Excel report.

## D. Current flow analysis



The cloud system can quickly analyze the proportion of electricity flow per unit in the plant, such as production process/mechanical/public class. And the information can be compared with the previous one.



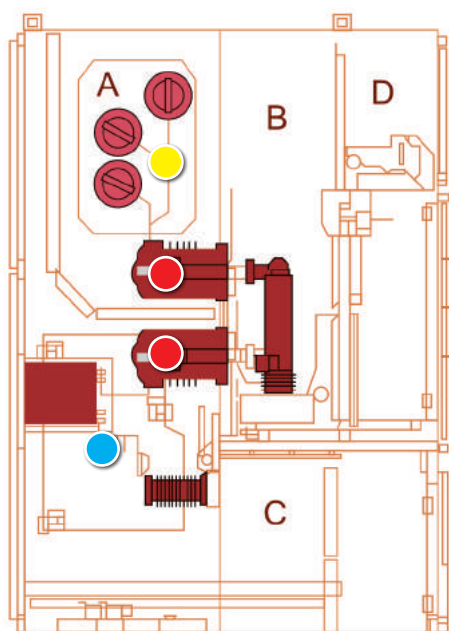
# Solution of switchgear Electricity Safety

## Switchgear Internal Temperature Rise Problem

Switchgear plays the role as mankind, when body gets fever (heat-up), the brain (detector) will instruct body (switchgear) to take a break (power-off), and go to see a doctor (maintenance engineering company) in time.

A quarter of switchgear failure occurrences result from connectors loosen or temperature rising. On average, switchgear insulating endurance reduces half in every 10°C increase.

Reference from  
ABB-Switchgear temperature monitoring Early hot spot detection enabling condition-based maintenance



Spots prone to temperature anomaly in medium voltage switchgear



### Busbar

Load error interferes current consumption to nearly the upper safety limitation. Copper connection screw loosen makes contact resistance rise.

### Circuit Breaker Joint

CB fixed and movable contactors are not connected completely that the over operation result in surface melting.

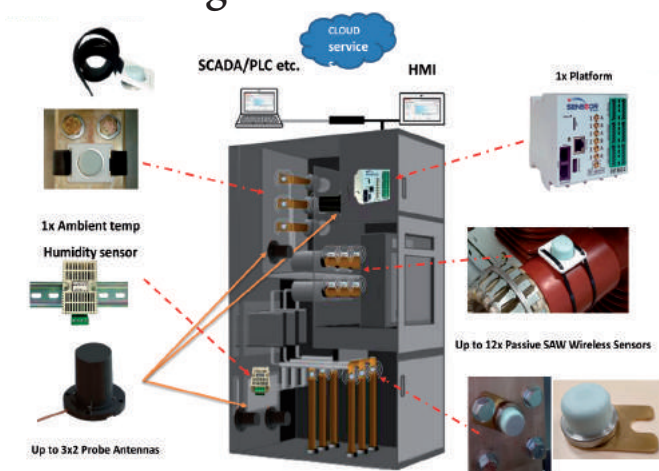
### Cable Terminal

The raise of contact resistance, and insulation degrades results from loose of cable terminal.

## Temperature and Humidity Online Monitoring

### A. Wireless thermal monitoring

Wireless thermal monitoring device, composed of wireless sensors, antenna and reader adopts Surface Acoustic Wave (SAW) to sense temperature variation. Indoor arrangement in the medium voltage switchgear, it features in continuous circuit breaker temperature online monitoring.



#### Battery-free

Adopting surface acoustic wave technique (SAW), self-powered by piezoelectric material.

#### Wireless transmission

Wireless reception and transmission with application of SAW.

#### Sensitive temp. sensing

Fast temperature measurement and free power consumption.

#### Insulating protection unrequired

Compact sensor which can be installed directly on medium voltage conductor.

#### Permanently maintenance-free

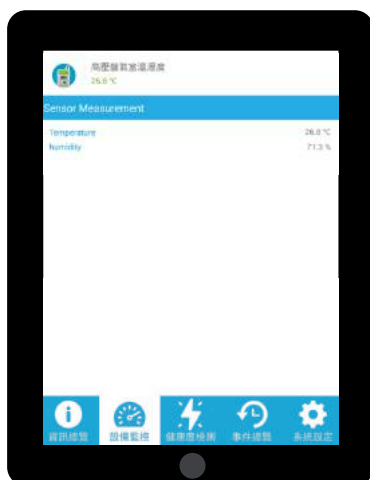
Battery-free sensor. Data reader is DC supply, no need to power off during replacement.

#### Partial discharge detecting

Ultra-high frequency (UHF) detecting function is used as an estimation of insulating degradation in the compartment, which enhances switchgear safety.

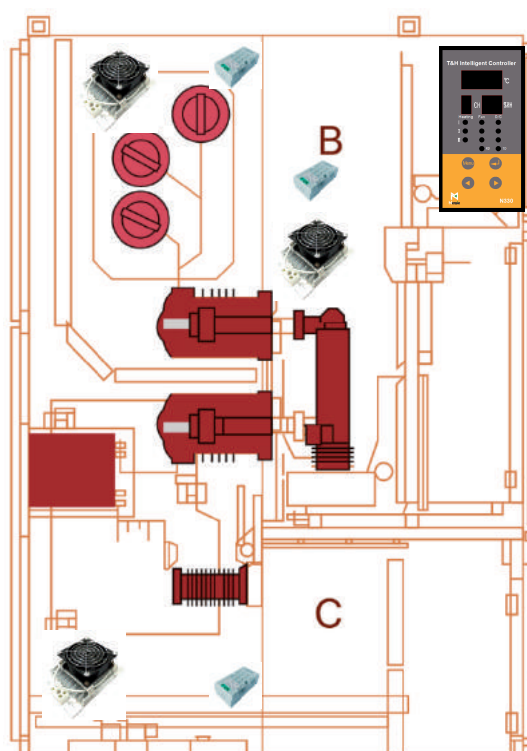
## B. Ambient temperature & humidity of substation monitoring

Humidity Sensor Reader (HSR) measures ambient temperature and relative humidity of substation. Value measured by HSR is adopted as an estimation on insulation degradation in the switchgear. It is equipped with RS-485 Modbus remote control.



## C. Temperature and Humidity Monitoring on switchgear compartment (Standard IEC 62271-200)

Equipped with 3-circuit sensors which can monitor and control temperature and humidity of three compartments (CB room、Cable room、Busbar room) at the same time. Additionally, it can automatically heat up, dehumidify, and cool down inside of the switchgear to prevent accidents result from moisture, creepage, and flashover. Thus, safety in power system is increased.

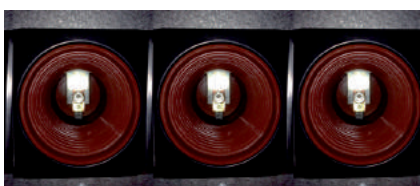


# Wireless Temperature Monitoring System Application

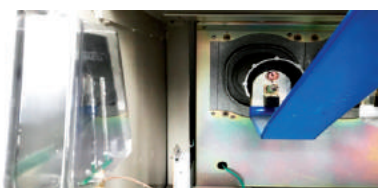
## Temperature monitoring on breaker contactor



VCB claw type contactor temp. detection



Contactor temp. detection

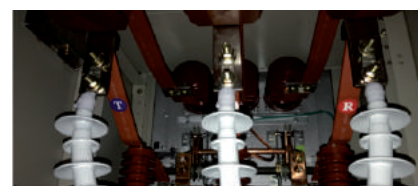


VCB Copper contactor temp. detection

## Temperature monitoring on cable



Temp. detection between cable and busbar joint point



Temp. detection between cable and busbar joint point

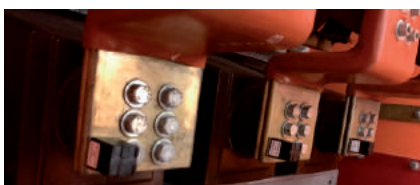


Temp. detection between cable and busbar joint point

## Temperature monitoring on busbar



Main busbar temp. detection



Busbar joint point temp. detection



Extending busbar temp. detection

## Temperature monitoring on transformer busbar



Joint point of transformer extending busbar temp. detection



Joint point of transformer extending busbar temp. detection



Joint point of transformer extending busbar temp. detection

