HORNG YU
ELECTRIC CO.,LTD.

Product Brochure

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

Contents

IS-24: IEC 62271-200
AC Metal Enclosed Switchgear and Controlling Device

Introduction

IS-24 AC Metal Enclosed Switchgear and Controlling Device (IS-24) is applied to 3-phase rated voltage AC 12/24KV power system as power transmission and distribution which also features control, monitoring, and protection on circuit.

IS-24 is in conformity of standard IEC 62271-200 (about medium voltage switchgear and controlgear in rated voltage range from 1kV to 52kV). And it has been fully tested by International Laboratory Accreditation Cooperation (ILAC) and Taiwan Electric Research & Testing Center (TERTEC). IS-24 is equipped with comprehensive and reliable device to prevent false operation. IS-24 is the best choice for power supply which provides safer power usage environement.

Feature

Modularization

- Modularized design for each part of panels that the assembly failure decrease dramatically.
- Modularized design makes materials stockable thus helping raise efficiency on production and shorten delivery time.

Enclosure

- 2.0t high corrosion resistant galvanized zinc alloyed steel adopts two-layer folding and bending technique which strengthen the structure.
- It is fully certified with performance on arc, earthquake resistance, salt spray, and ground continuity.

Compartment

- Seperated compartments for primary apparatus such as CB compartment, Cable compartment, Busbar compartment, and Meter compartment.
- Certification of LSC2B-PM, featuring interlock for safety.

Volume

- Compact cubicle, min. width is 800mm, increasing plot ratio and reducing accommodation of substation.

Eco-friendly

- Galvanized zinc alloyed steel cabinet held together with rivets without painting and welding which greatly reduces pollution to the environment.
- There is no need to reorganize and replace busbar and enclosure when replacing breaker, disconnecting switch, potential transformer components and so on.

Trolley

- Equipped with racking trolley, CB, DS, and PT can move easily and rapidly thus shorten the duration of maintenance.
- For high power consumption user, trolley can be equipped with electric operation to shorten duration of maintenance and labor cost.

Interlock

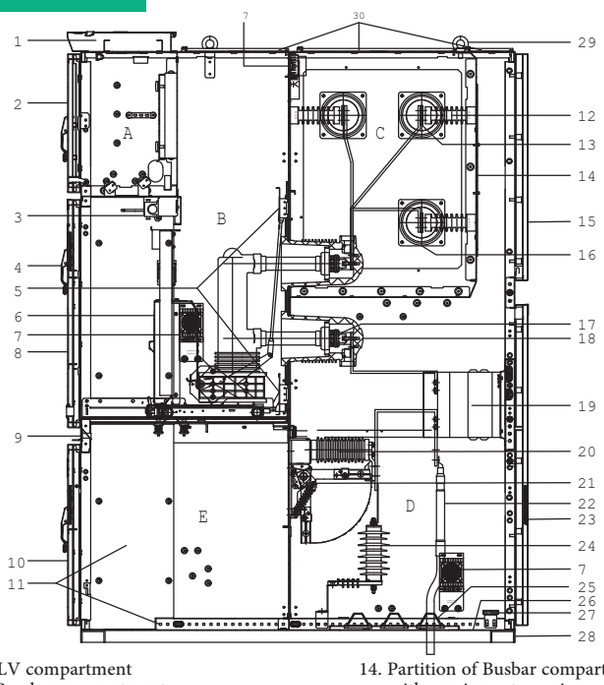
- CB, control unit, earthing switch, and door are equipped with interlocks which prevent false operation and improve safety on maintenance.
- Certified with the highest level of interlocking standard, the switchgear is secure and stable without further equipment.

Specification

No.	Rated specification		Unit	Rated parameter
1	Phase		Ph	3
2	Rated Voltage(Ur)		kV	12/24
3	Rated Current(Ir)		A	630 / 1250 / 1600 / 2000 / 2500
4	Rated Frequency(fr)		Hz	50/60
5	Rated Short Time withstand Current (Ik) (main circuit and earthing circuit)		kA	16/25/31.5
6	Rated Peak Short Circuit withstand Current (Ip) (main circuit and earthing circuit)		kA	42/65/82
7	Rated Duration of Short Circuit (tk) (main circuit and earthing circuit)		s	3
8	Rated Power Frequency Withstand Voltage(Ud)		kV	28/50
9	Rated Lightning Impulse Withstand Voltage(Up)		kV	75/125
10	IP rating (Cabinet door close/open)		Class	IP4X/IP2X
11	Rated supply voltage of closing and opening devices and of auxiliary and control circuits(Ua)		V	110~220 AC/DC
12	Internal arc-fault test	Rating of internal arc	Class	IAC
		Accessible Type	Class	A Type(F、L、R)
		Rated short time withstand current	kA	16/25/31.5
		Rated duration of short time withstand current	s	0.5/1
13	Loss of service continuity category		LSC2B	
14	Partition type		PM	
15	Compartment	CB compartment	Interlock	
		Bus compartment	Interlock	
		Cable compartment	Interlock	
16	Rating of earthing switch characteristics		Class	E1/E2
			Class	M1/M2
			kA	25
			s	3
17	Seismic(Earthquake) resistance		g	X-axis Y-axis Z-axis (Value up to 7)
18	Electromagnetic compatibility(EMC)		Class	3
19	Partial discharge		pC	≦100
20	Ground continuity of enclosure (DC 30A)		V	≦3
21	Corrosion resistance on salt spray		Hr	≦1000
22	Dimension(W*D*H)		mm	800×1910×2530 1000×1910×2530

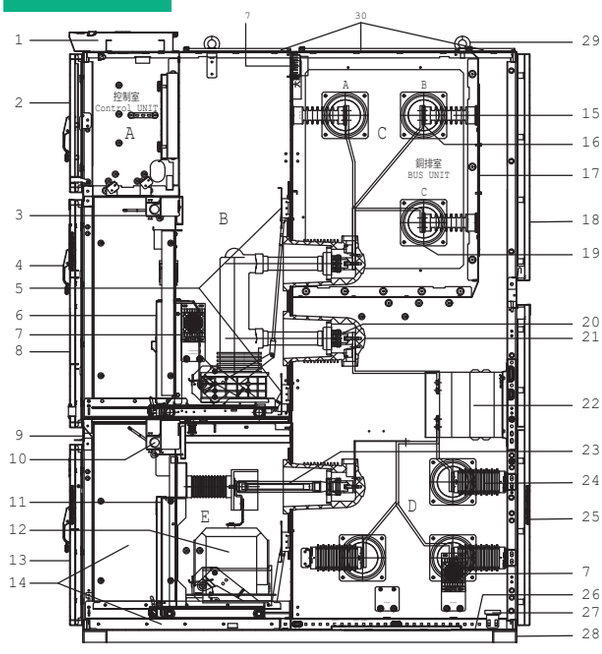
Structure

CB(DS)+ES

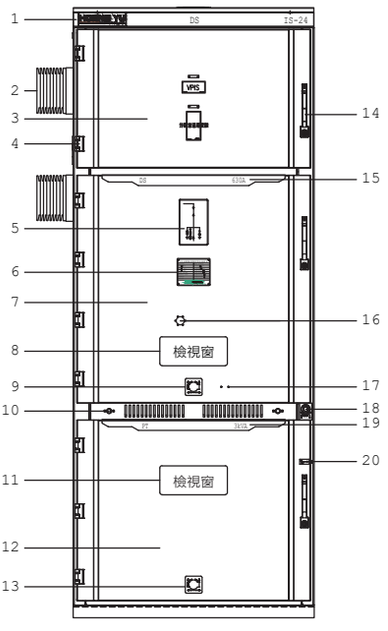


A. LV compartment
B. Breaker compartment
(Vacuum Circuit Breaker/Disconnecting Switch)
C. Busbar compartment
D. Cable compartment
E. Spare compartment
1. Namebar and cable tray
2. Door of LV control room (SPHC painting)
3. Plug and socket for Vacuum Circuit Breaker cable (Position interlock)
4. Door handle (With Lock)
5. Safety metal shutters
6. Withdrawable Vacuum Circuit Breaker
7. Heater and hygrostat (Optional: ventilation fan)
8. Front panel of Vacuum Circuit Breaker compartment (SPHC painting)
9. Cabinet (Galvanized zinc alloyed steel)
10. Front door of Spare compartment (SPHC Painting)
11. Metal cable tray for control line
12. Voltage insulator
13. Horizontal busbar
14. Partition of Busbar compartment with repairment opening
15. Upper rear panel
16. Wall Insulation bushing
17. Vacuum Circuit Breaker contactor (Silver plating)
18. Vacuum Circuit Breaker insulation bushing
19. Current Transformer
20. Capacitive insulator
21. Earthing switch
22. High Voltage cable
23. Below rear door
24. Lightning arrester (Silicone tube)
25. Tower shaped cable sheath
26. Soleplate
27. Horizontal earthing busbar
28. Mounting base
29. Eye bolt
30. Pressure relief device

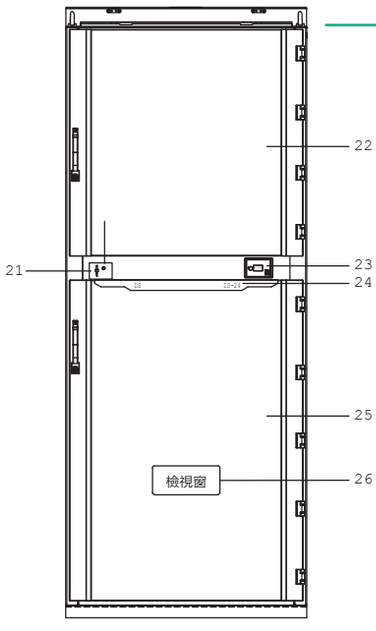
CB(DS)+PT



A. LV compartment
B. Breaker compartment
(Vacuum Circuit Breaker/Disconnecting Switch)
C. Busbar compartment
D. Cable compartment
E. PT compartment
1. Namebar and cable tray
2. Front panel of LV compartment (SPHC Painting)
3. Plug & socket for Vacuum Circuit Breaker cable (Position interlock)
4. Door handle (With Lock)
5. Safety metal shutters
6. Withdrawable Vacuum Circuit Breaker
7. Heater and hygrostat (optional: ventilation fan)
8. Front panel of CB compartment (SPHC painting)
9. Cabinet (Galvanized zinc alloyed steel)
10. Plug & socket for PT cable
11. PT trolley
12. PT(Potential transformer)
13. Front door of Spare compartment (SPHC painting)
14. Metal cable tray for control line
15. Voltage insulator
16. Horizontal busbar
17. Partition of Busbar compartment with repairment opening
18. Upper rear panel
19. Wall Insulation bushing
20. Vacuum Circuit Breaker contactor (Silver plating)
21. Vacuum Circuit Breaker insulation bushing
22. CT(Current transformer)
23. PT fuse
24. Capacitive insulator
25. Below rear panel
26. Soleplate
27. Horizontal earthing busbar
28. Mounting base
29. Eye bolt
30. Pressure relief device



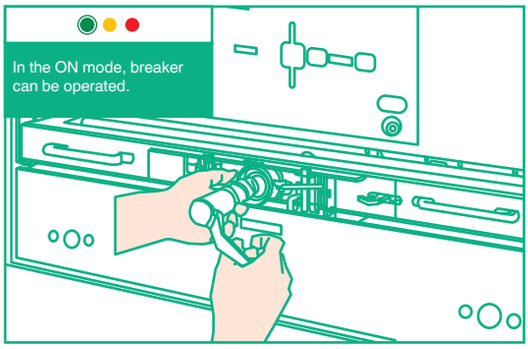
Front View



Back View

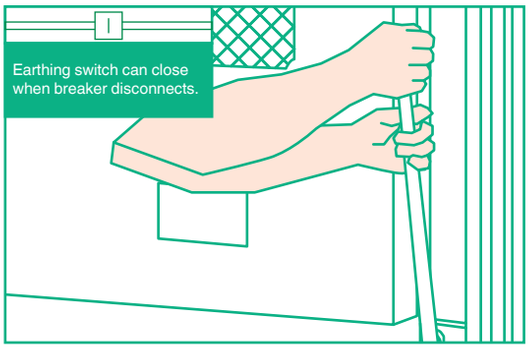
1. Namebar marked with manufacturer, panel name, and type
2. 24kV wall insulating bushing
3. Dashboard on LV compartment (explosion-proof front panel)
4. Door Hinge
5. Analog busbar system plate (Optional)
6. Nameplate
7. Explosion-proof front panel of CB compartment
8. Inspection window of CB compartment
9. Opening for CB operation (lockable)
10. Mortice of CB trolley fixed position
11. Inspection window of Spare compartment
12. Spare compartment door (SPHC Painting)
13. Opening for PT trolley operation (lockable)
14. Door handle (optional: lock or power theft prevention lock)
15. Nameplate of CB rated current
16. Emergency trip opening (optional)
17. Emergency dismantlement screw of door interlock device
18. Opening for earthing switch operation (lockable)
19. Nameplate of PT specification
20. Emergency dismantlement screw of front door of Spare compartment
21. Electromagnetic lock of below rear door (optional)
22. Upper rear panel
23. Luminaire for Cable compartment (optioinal)
24. Nameplate marked with panel name and type
25. Below rear panel
26. Inspection window of Cable compartment

Interlocking device



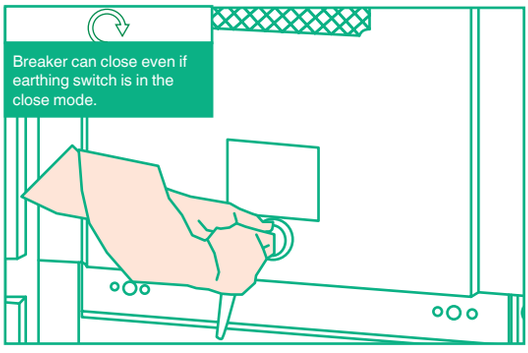
1 Prevent false CB operation when on load

The circuit breaker cannot be closed/tripped unless the racking trolley is completely in its test or service position. The trolley cannot be racked in or out while the circuit breaker is closed.



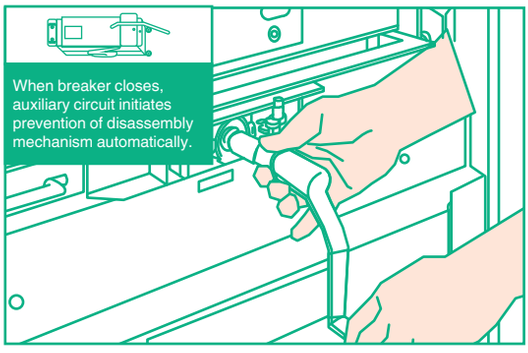
2 Prevent closing the earthing switch when on load

The earthing switch cannot be closed unless the trolley is in the Disconnecting or Testing position.
It could effectively prevent earthing switch from closing by error.



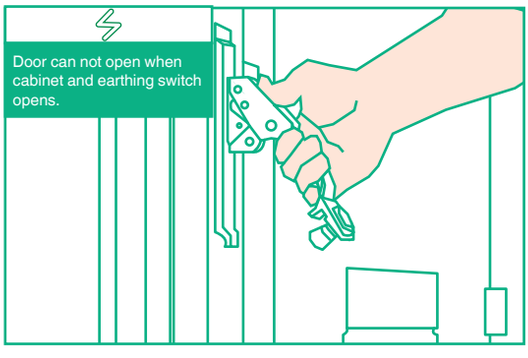
3 Prevent power supply when the earthing switch closes

The trolley cannot be racked into the ON position unless the earthing switch is in the OFF postion.



4 Prevent moving the movable portion when on load

The CB trolley cannot be moved when the door is opened or the breaker has left its Testing/ Service postion. And because of machenical interlock, secondary terminal blocks is locked on.

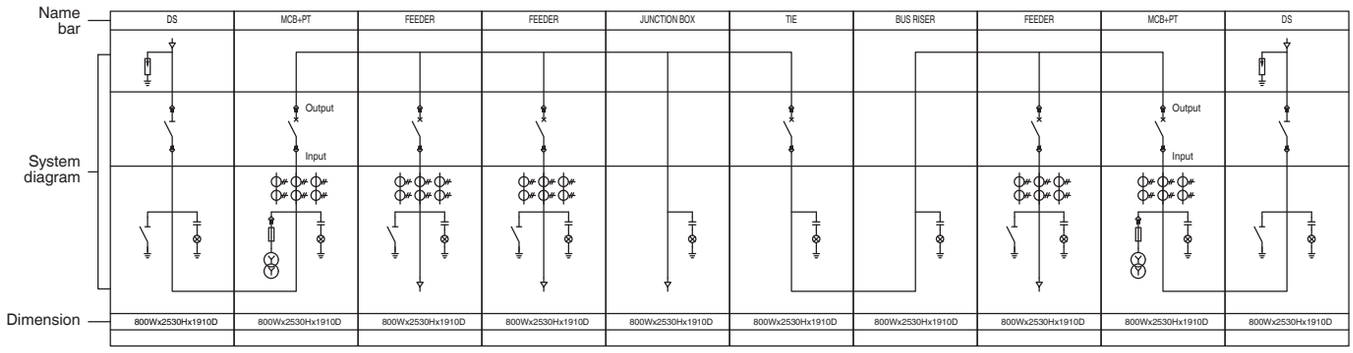


5 Prevent access to the compartment when on load

Cable terminial compartment can be opened when the breaker trolley in the disconnecting/ testing position and earthing switch closes.
(Or check it is without load.)

Cabinet Scheme

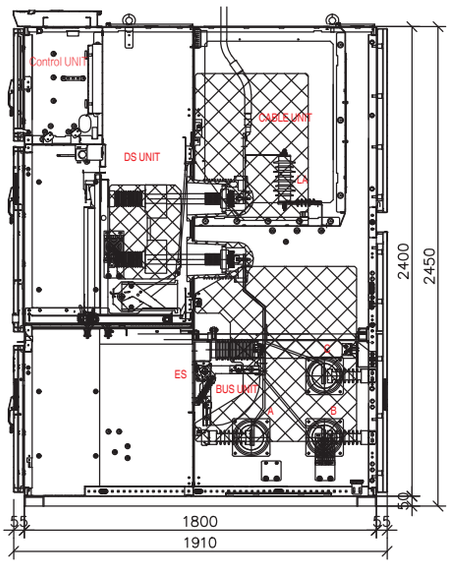
Standard type reference



1. This is standard incoming and outgoing design. Any inquiry or adjustment, please contact Horng Yu Electric.
2. Earthing Switch is optional

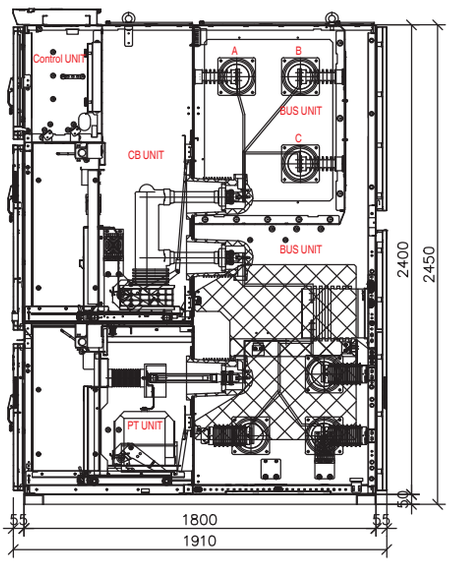
DS PANEL

(DS+ES)



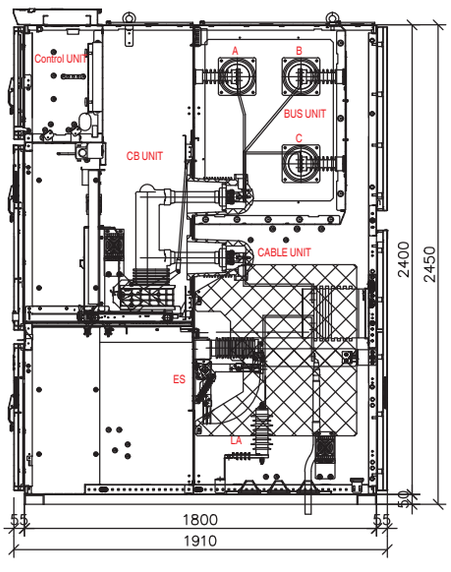
Main CB PANEL

(CB+PT)



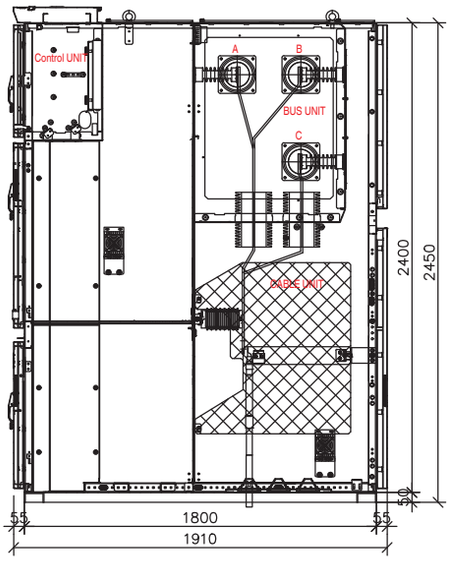
FEEDER PANEL

(CB+ES)



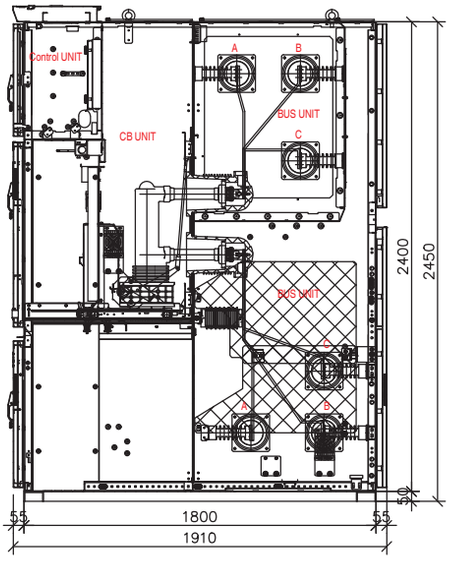
JUNCTION PANEL

(Busbar)



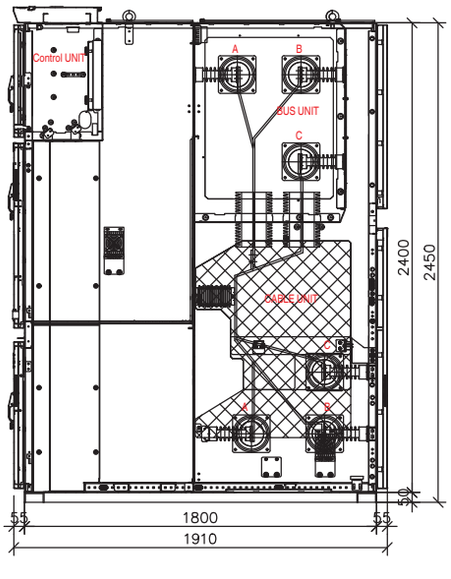
TIE PANEL

(CB)

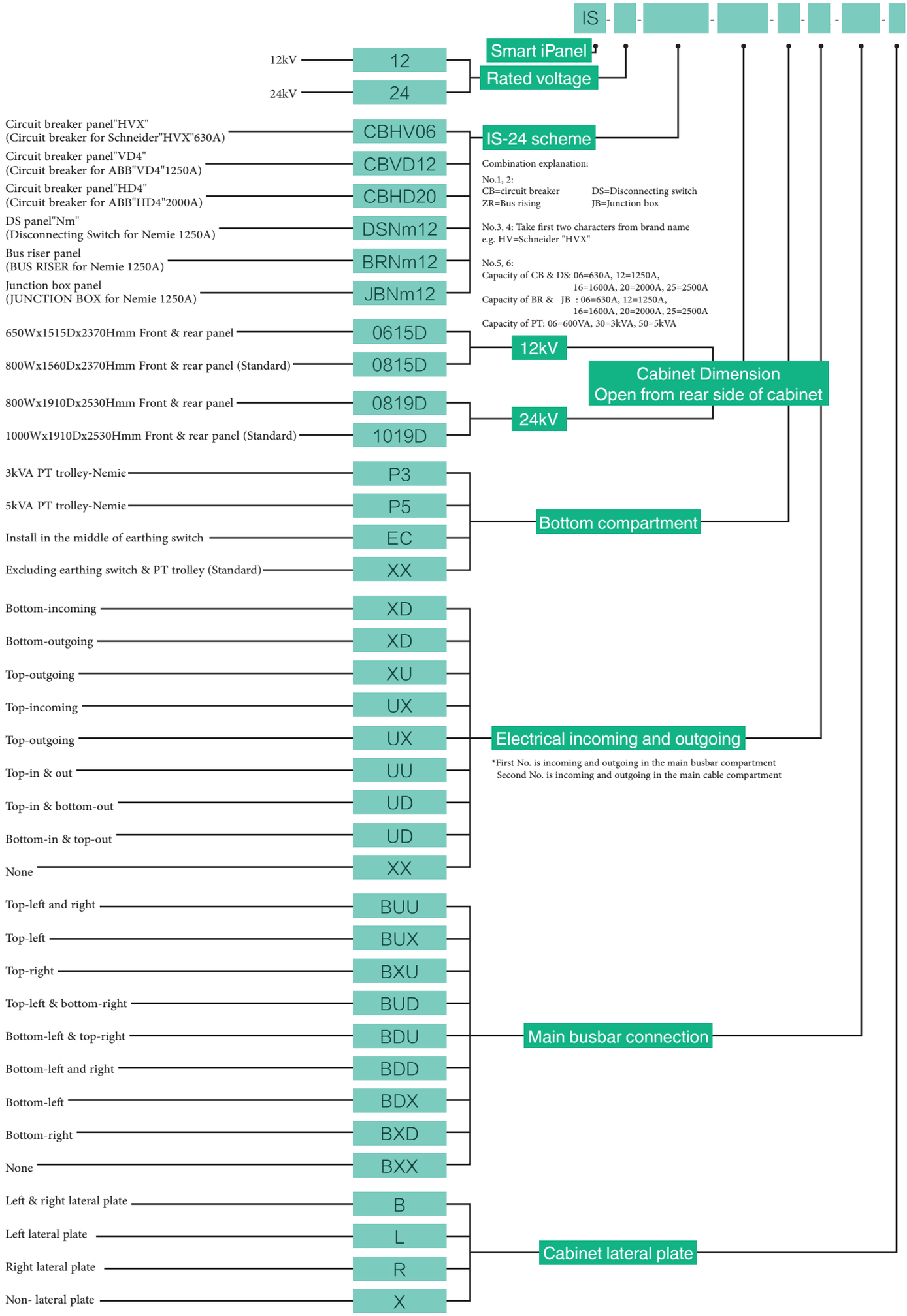


BUS RISER PANEL

(Busbar)



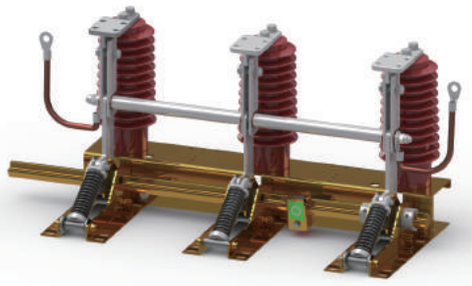
Type Selection



Accessories

Earthing Switch(ES)

Earthing Switch(ES), which is well-structured, user-friendly, and highly secure advantages. It is in conformity with IEC 62271-102. Earthing switch has closing function to protect other electrical equipments from breakdown while doing maintenance. It is equipped safety interlock device with breaker.



No.	Rated specification	Unit	Rated parameter
1	Rated Voltage(Ur)	kV	12/24
2	Rated Short Time Withstand Current(Ik)	kA	25
3	Rated Duration of Short Circuit(tk)	s	3
4	Rated Peak Withstand Current(Ip)	kA	65
5	Rated Power Frequency Withstand Voltage(Ud)	kV	50
6	Rated Lightning Impulse Withstand Voltage(Up)	kV	125
7	Electrical endurance	Class	E1/E2
8	Mechanical endurance	Class	M1/M2
9	ES status and position indication Modbus (RS 485)	-	Optional
10	Electric operation	-	Optional

Disconnecting Switch Trolley(DS)

Disconnecting Switch Trolley, which is well-designed, well-structured, user-friendly, and functioned-excellent, is in conformity with IEC 62271-102 standard.

It is designed for indoor withdrawable type AIS switchgear and used for transmitting main circuit under off-load condition; and for preventing accidental current when the equipment and cable are under inspection and maintenence. It is equipped with front panel interlock for safety.

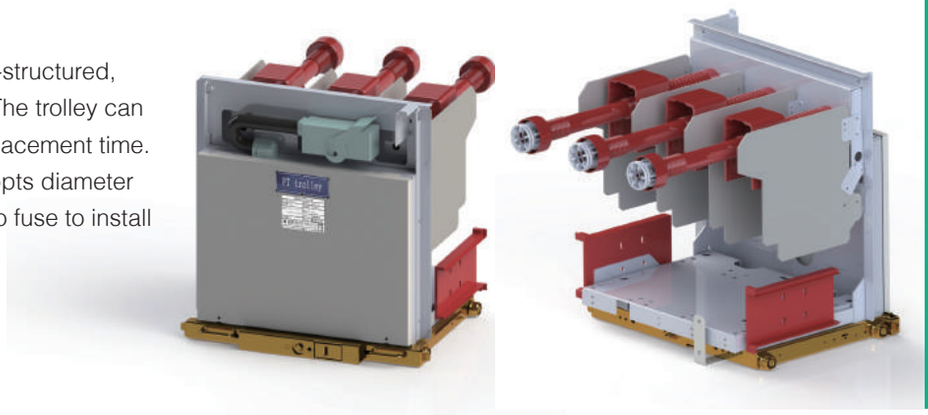
No.	Rated specification	Unit	Rated parameter
1	Rated Voltage(Ur)	V	12/24
2	Rated Current(Ir)	A	630/1250
3	Rated Short Time Withstand Current(Ik)	kA	25
4	Rated Duration of Short Circuit(tk)	s	3
5	Rated Peak Withstand Current(Ip)	kA	65
6	Rated Power Frequency Withstand Voltage(Ud)	kV	50
7	Rated Lightning Impulse Withstand Voltage(Up)	kV	125
8	Mechanical endurance	Class	M1/M2
9	DS trolley status and position indication Modbus (RS 485)	-	optional
10	Electric operation	-	optional

Accessories

PT Trolley

PT Trolley is well-designed, well-structured, user-friendly, and well-performed.The trolley can rack in and out rapidly to save replacement time.

Medium voltage power fuse adopts diameter of 25mm, in length of 324mm micro fuse to install in insulating arm.



No.	Designation	Unit	Specification(Value)
1	Rated Voltage(Ur)	kV	12/24
2	Fuse Rated Current(Ir)	A	2A
3	PT Rated Capacity	kVA	3~5
4	Rated Power Frequency Withstand Voltage(Ud)	kV	50
5	Rated Lightning Impulse Withstand Voltage(Up)	kV	125
6	Mechanical endurance	Class	M1/M2
7	Condition and position Indication of PT trolley (RS485)	-	optional
8	Electric operation	-	optional

CB/DS/PT Maintenance Trolley

When IS-24 is under maintenance and inspection, circuit breaker, disconecting switch, and PT can be easily pulled out and placed on the trolley, which also helps IS-24 reconnect to power rapidly and efficiently.

▲ CB/DS Maintenance Trolley

▲ PT Maintenance Trolley

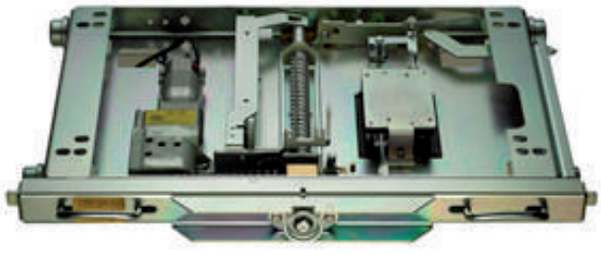
Optional

Emergency tripping device

In emergency, you can trip the breaker by pressing the button even if switchgear door is closed.

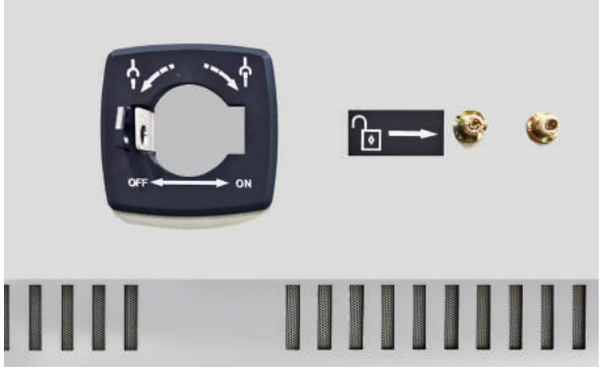
Electric operation device of CB/ES/DS/PT trolley

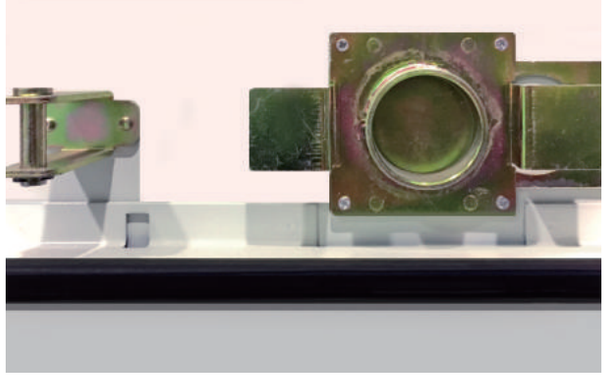
Trolley can rack in and out automatically by two operation modes "Local" and "Remote".



Interlock device of PT trolley

The interlock device can lock the trolley with the front door. The trolley can be racked in and out only when door is closed.





Certification

Certificate of High-voltage Electric Equipment Manufacturer

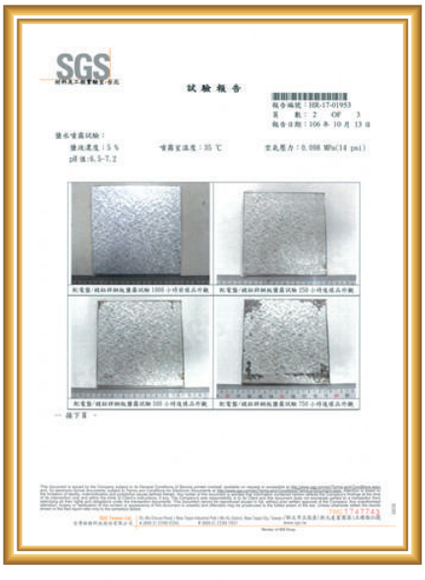
Type-test Performance accredited by Bureau of Energy, Ministry of Economic Affairs, R.O.C.

Type test Performance of Arc Fault, short circuit, and Insulativity

EMC Performance

Partial Discharge Performance

Seismic(Earthquake) Resistance Performance



Corrosion Resistance Performance on Salt Spray

Type-test on Earthing Switch

Type-test on Disconnecting Switch

Sales performance

- Taiwan Power Research Institute-Substation SSM、SS1、SS9、SSMV Replacement
- Taiwan Power Research Institute-Standard testing panels
- Terminal two of Taoyuan International Airport- Substation Replacement
- National Taiwan University of Science and Technology- Instruction Building Substation Replacement
- Water Resources Bureau, Tainan City Government-
  Anping Wastewater Treatment Facility Substation Replacement
- National Taiwan University Hospital, Yunlin Branch Substation Replacement
- Directorate General of Highways, MOTC-Western Coast Expressway Construction
- Changhua Lukang Christian Hospital Luke Medical Building Construction

IS-06: IEC 61439
Low-voltage Switchgear and Controlling Device

Introduction

IS-06 Low-voltage Switchgear and Controlling Device (Below called drawer type) is applied to 3-phase power system in the maximum of rated voltage AC 690V and rated current 6300A function as power transmission and distribution which also features control, monitoring, and protection to circuit.

Drawer type is in conformity of standard IEC 61439. And it has been fully tested by International Laboratory Accreditation Cooperation (ILAC) and Taiwan Electric Research & Testing Center (TERTEC). Withdrawable unit is equipped with comprehensive and reliable device to prevent false operation.

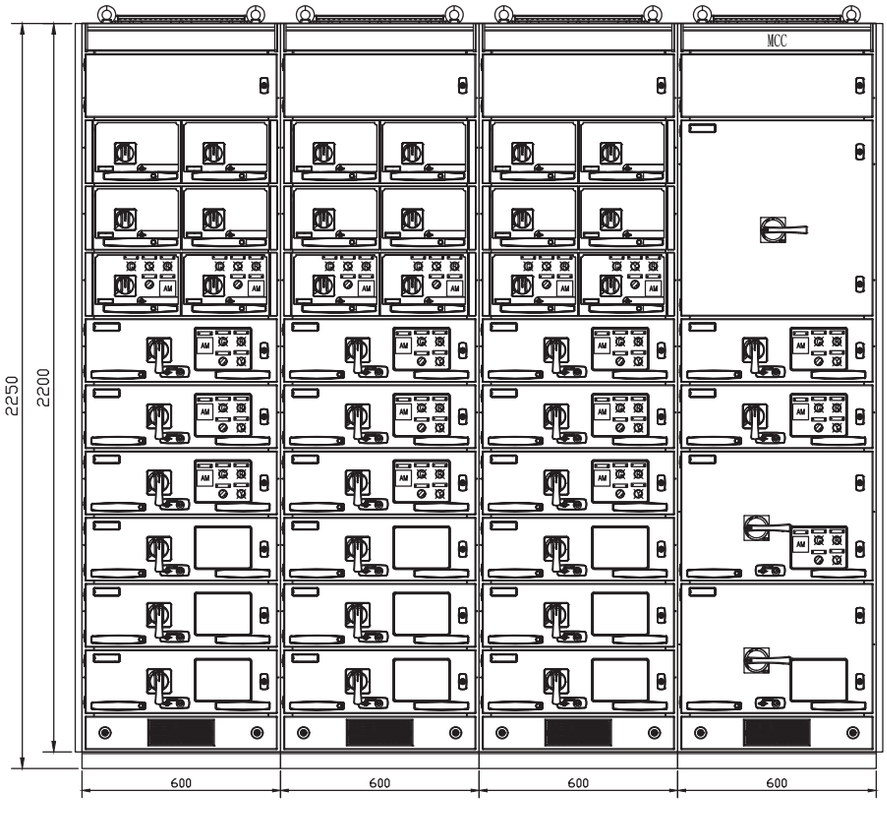
Drawer type is the best choice for power supply which provides safer power usage environement.

Feature

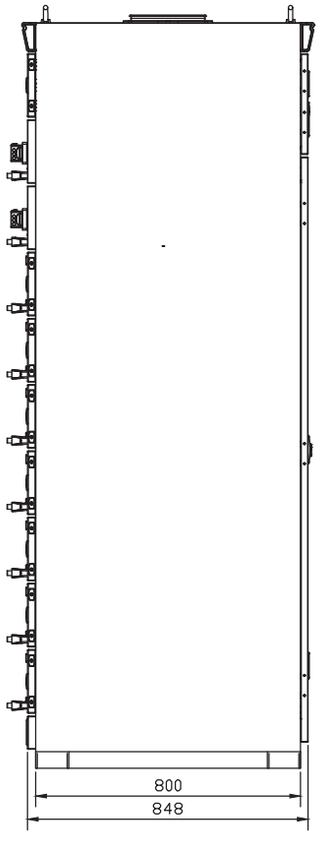
- Main circuit and secondary circuit 100% fully withdrawable type. Rapid replacement without power off.
- Hand-held and crank handled pull in-out mechanism saves maintenance time.
- Each drawer unit is interlocked and equipped with indication of "Disconnecting", "Testing", and "Connection" position.
- Spring of main circuit plug is made of steel featuring high mechanical endurance.
- Copper lamination type main circuit plug with seperated spring on each contact makes it better overcurrent endurance.
- The secondary plug-in socket separates top and down connection terminals.
  Incoming and outgoing do not interfere each other with beautiful wiring arrangement.
- Spare dashboard openings for different indicating instruments arrangement and inspection.
- Positioning function on drawers helps zero malfunction after drawn-out replacement.

Specification

No.	Rated specification	Unit	Rated parameter
1	Certification	-	CNS 15783-1/2、IEC 61439-1/2
2	Rated voltage(Ue)	V	≦690
3	Rated frequency	Hz	50/60
4	Rated insulation voltage(Ui)	V	≦1000
5	Rated Lightning Impulse Withstand Voltage(Uimp)	kV	≦12
6	Rated current of horizontal main busbar(InA)	A	≦630/800/100/1250/1600/2000/ 2500/3000/3200/4000/5000/6300
7	Rated current of vertical sub busbar(InA)	A	≦1800
8	Rated Short Time Current	kA	≦100
9	Rated Peak Short Circuit Current	kA	≦220
10	Type	-	Fixed/With drawable/Drawer
11	Ingress protection rating(IP)	Class	≦IP4X
12	Types of partition	Class	Form 2a/2b、3a/3b、4a/4b
13	Types of electrical incomng and outgoing	-	Up/Down
14	Color (Electrostatic powder coating)	-	RAL 7035(Standard)
15	Material	-	Galvanized Zinc Alloyed Steel (Front door painting SPHC)
16	Dimension	mm	Height: 2250 Width: 600/800/1000/1200 Depth: 800/1000/1200 (Depth of front panel 48mm is excluded)
17	Installation type	-	Indoor
18	Altitude	m	≦2000



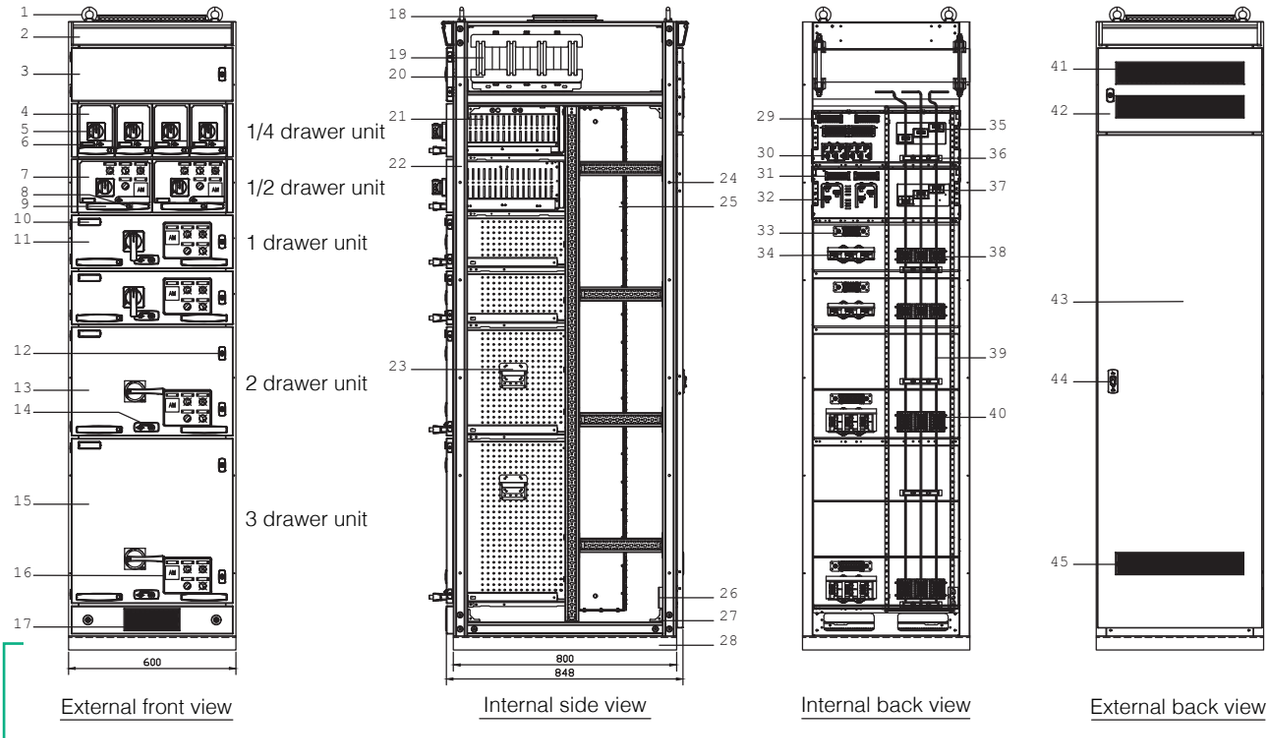
Front View



Side View

Structure

Drawer type cabinet



1. Eye bolt
2. Namebar (Manufacturer, panel name, and type)
3. Inspection door for front busbar
4. 1/4 drawer unit
5. Four-step (ON, TRIP, OFF, and RESET) switch for CB (lockable)
6. Position indicator of drawer (OPEN, DISCONNECTED, and CLOSE)
7. 1/2 drawer unit (200mm height)
8. Unlock button for drawer
9. Drawer Handle
10. Name plate of load
11. 1 unit drawer (200mm Height)
12. Door lock (min. 1 unit)
13. 2 unit drawer (400mm Height)
14. Opening for drawer raked in and out operation
15. 3 unit drawer (600mm Height)
16. Removable control panel for drawer (Min. 1 unit)
17. Dust-proof vent at the bottom of front panel
18. Dust-proof vent on the top of switchgear
19. Horizontal busbar
20. Insulated support of horizontal busbar
21. Lateral of drawer unit (Each unit has vents)
22. Enclosed reinforced framework
23. Side handle for drawer (400mm Height above)
24. Juncture of adjoining panel
25. Compartment of vertical busbar
26. Fixed mount of earthing busbar
27. Reinforced steel for framework
28. Mounting base (optional)
29. 1/4 drawer external control terminal at the rear side*4
30. 1/4 drawer load terminal*4
31. 1/2 drawer external control terminal at the rear side*2
32. 1/2 drawer load terminal*2
33. External control terminal at the rear of unit drawer
34. Load terminal for drawer unit
35. 4 in1 power clips for 1/4 unit drawer
36. Insulation clip of vertical busbar
37. 2 in1 power clips for 1/2 unit drawer
38. 1 unit power clip (Max.: 250AT)
39. Vertical busbar (Max.: 120*6t)
40. Power clip for min. 2 unit drawer (Max.: 630AT)
41. Dust-proof vent at upper rear of panel
42. Inspection panel of rear busbar
43. Rear door
44. Rear door lock
45. Dust-proof vent at rear bottom of panel

Unit types

Drawer type	Drawer display	Component description	Specificaiton
1/4		Current capacity of CB	Below 63AF
		Inlet and outlet contactor	63A
		Secondary side accesories (control circuit)	AWG #16
		CB operation device	Rotary switch(Lockable)
		Front panel	Cannot be opened
		Rack-in & out	Manual pull out

Drawer type	Drawer display	Component description	Specificaiton
1/2		Current capacity of CB	63AF-125AF
		Inlet and outlet contactor	125A
		Secondary side accesories (control circuit)	AWG #16/24
		CB operation device	Rotary switch(Lockable)
		Front panel	Cannot be opened
		Rack-in & out	Manual pull out

Drawer type	Drawer display	Component description	Specificaiton
1		Current capacity of CB	125AF-250AF
		Inlet and outlet contactor	250A
		Secondary side accesories (control circuit)	AWG #10/16/22/32
		CB operation device	Rotary switch(Lockable)
		Front panel	Openable
		Rack-in & out	Manual pull out

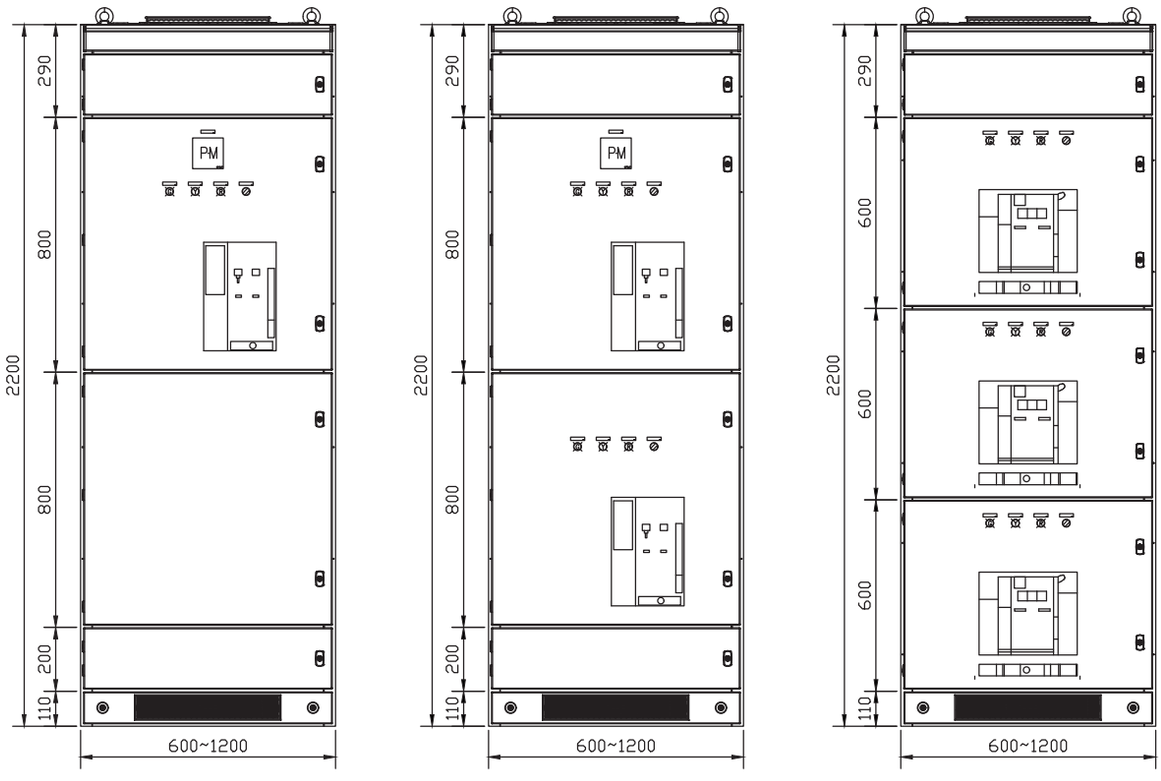
Drawer type	Drawer display	Component description	Specificaiton
2		Current capacity of CB	400AF
		Inlet and outlet contactor	400A
		Secondary side accesories (control circuit)	AWG #10/16/22/32
		CB operation device	Rotary switch(Lockable)
		Front panel	Openable
		Rack-in & out	Crank handle

Drawer type	Drawer display	Component description	Specificaiton
3		Current capacity of CB	630AF
		Inlet and outlet contactor	630A
		Secondary side accesories (control circuit)	AWG #10/16/22/32
		CB operation device	Rotary switch(Lockable)
		Front panel	Openable
		Rack-in & out	Crank handle

Design Scheme

ACB PANEL

Dimension unit: mm



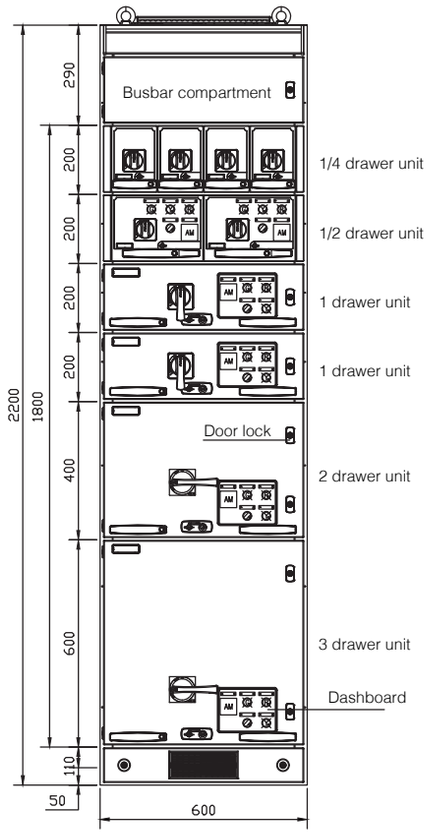
Front veiw of 1 unit　　Front veiw of 2 units　　Front veiw of 3 units

ACB panel												
Standard		IEC 61439 / CNS 15783										
Quantity of ACB		3	2	1	3	2	1	3	2	1	2	1
Width of ACB		600W			800W			1000W			1200W	
4000AF~6300AF High breaking capacity	3P	-	-	-	-	-	-	-	●	●	●	●
	4P	-	-	-	-	-	-	-	-	-	●	●
3200A~4000AF	3P	-	-	-	-	●	●	●	●	-	●	-
	4P	-	-	-	-	●	●	●	●	-	●	-
800AF~2000AF	3P	-	-	-	●	●	●	●	●	-	●	-
	4P	-	-	-	●	●	●	●	●	-	●	-
1600AF below (compact type)	3P	●	●	●	●	●	●	●	●	-	-	-
	4P	●	●	●	●	●	●	●	●	-	-	-
Dimension of switchgear	Width(W)	600mm、800mm、1000mm、1200mm										
	Heigth(H)	2250mm(Excluding base)										
	Depth(D)	848mm、1048mm、1248mm(Non-standardize)										
Remark												

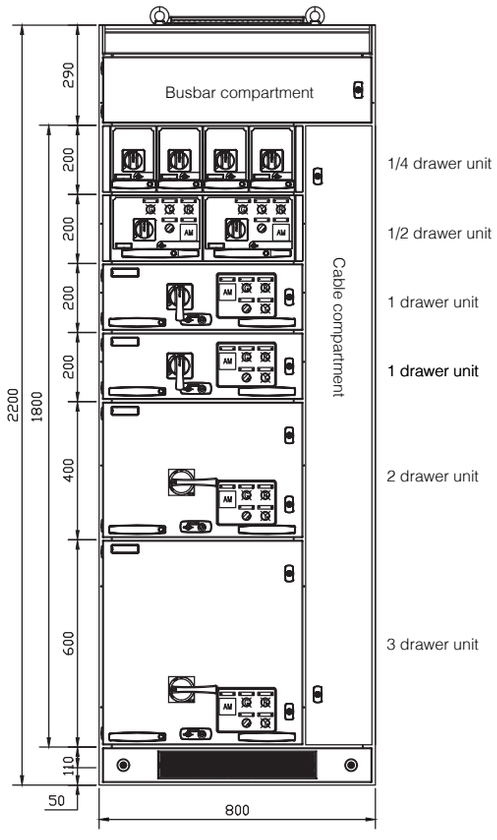
Remark： ●：Available　　－：Unavailable

Design scheme

MCCB PANEL



Outgoing type in width of 600mm cabinet



Lateral outgoing type in width of 800mm cabinet

Drawer unit of MCCB						
Standard		IEC 61439 / CNS 15783				
Type (Drawer Unit)		1/4	1/2	1	2	3
Dimension (mm)		150Wx200H	300Wx200H	600Wx200H	600Wx400H	600Wx600H
MCCB	63AF(75mmWx130mmH below)	●	△	-	-	-
	125AF	-	●	△	-	-
	250AF	-	-	●	△	-
	400AF	-	-	-	●	△
	630AF	-	-	-	●	△
Full voltage starting	3ψ 220V 11kW below	-	●	●	△	△
	3ψ 380V 18.5kW below	-	●	●	△	△
	3ψ 380V 37kW below	-	-	●	△	△
Star delta starting (Y-△)	3ψ 220V 18.5kW below	-	-	●	△	△
	3ψ 220V 45kW below	-	-	-	●	△
	3ψ 380V 30kW below	-	-	●	△	△
	3ψ 380V 55kW below	-	-	-	●	△
	3ψ 480V 37kW below	-	-	●	△	△
	3ψ 480V 75kW below	-	-	-	●	△
Dimension of switchgear		Width(W)	Rear-outgoing	600mm		
			Lateral-outgoing	800mm		
		Heigth(H)	2250mm			
		Depth(D)	848mm、1048mm、1248mm(Non-standard)			
Quantiy limitation of drawer		36				
Remarks:		1. 1/4 unit MCCB type cannot be installed with CT and meter. 2. Starter type can be installed with one unit of 3kVA CT and a set of meter in dimension of 48*48m (CL:1.5*1). 3. Special arrangement is recommended if there are requirements on accesories installment. 4. Any requirement on starters please contact Horng Yu. 5. Power supply can be sourced from the main switchgear or additional supplier.				

Note: ● : Available　　— : Unavailable　　△ : Special arrangement

iPanel
Cloud Management System

Introduction

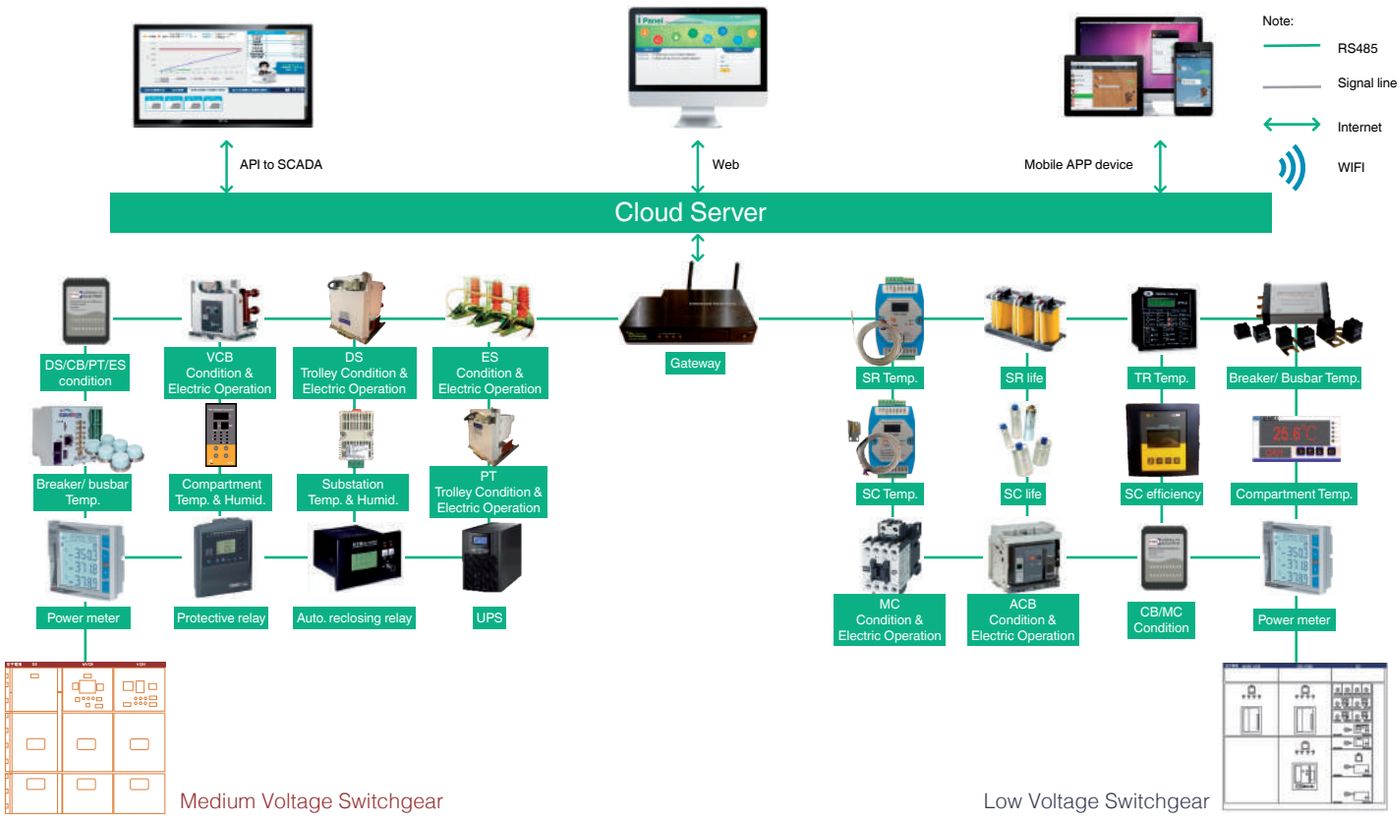
"iPanel Cloud Management System" is the application that combines traditional switchgear with contemporary computing technology and communication technology.

「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 relible 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

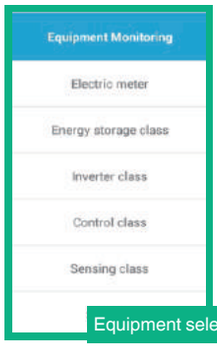
System Interface

A. Mobile device operation interface (APP)

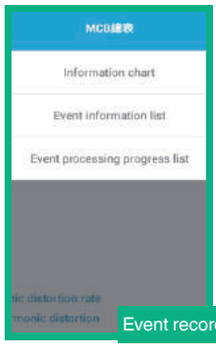

Region category

Health diagnosis


Panel category



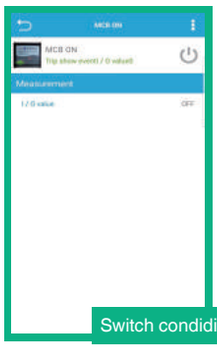
Equipment selection

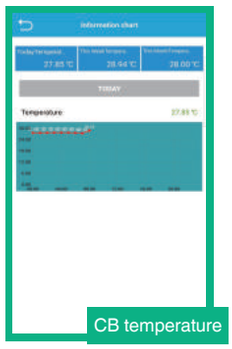


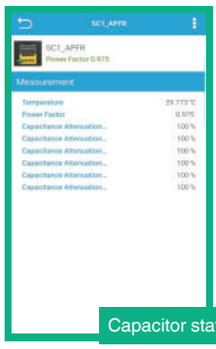
Event record


Power consumption information


Protective relay


Switch condidition

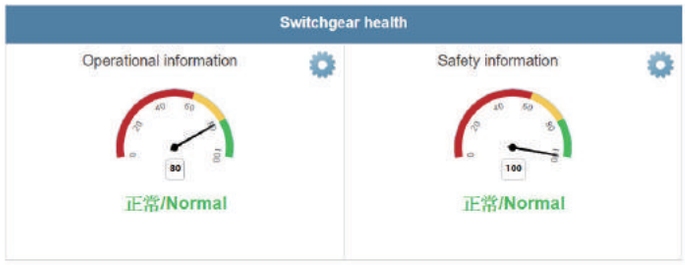

CB temperature


Capacitor status

B. Computer operation interface (Web)

Function

1. Substation and switchgear operation health board



Substation energy consumption overview

Switchgear	Hourly cumulative energy consumption (kWh)	Today's cumulative energy consumption (kWh)
MCB	149.6	382.62
CB1	94.62	275.31
CB2	54.68	97.75
MP220	52.68	83.72

Maintenance notice

switchboard	Inspection item (part)	Date to be inspected
Maintenance-free data		

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.

Table of abnormal occurrence in this month

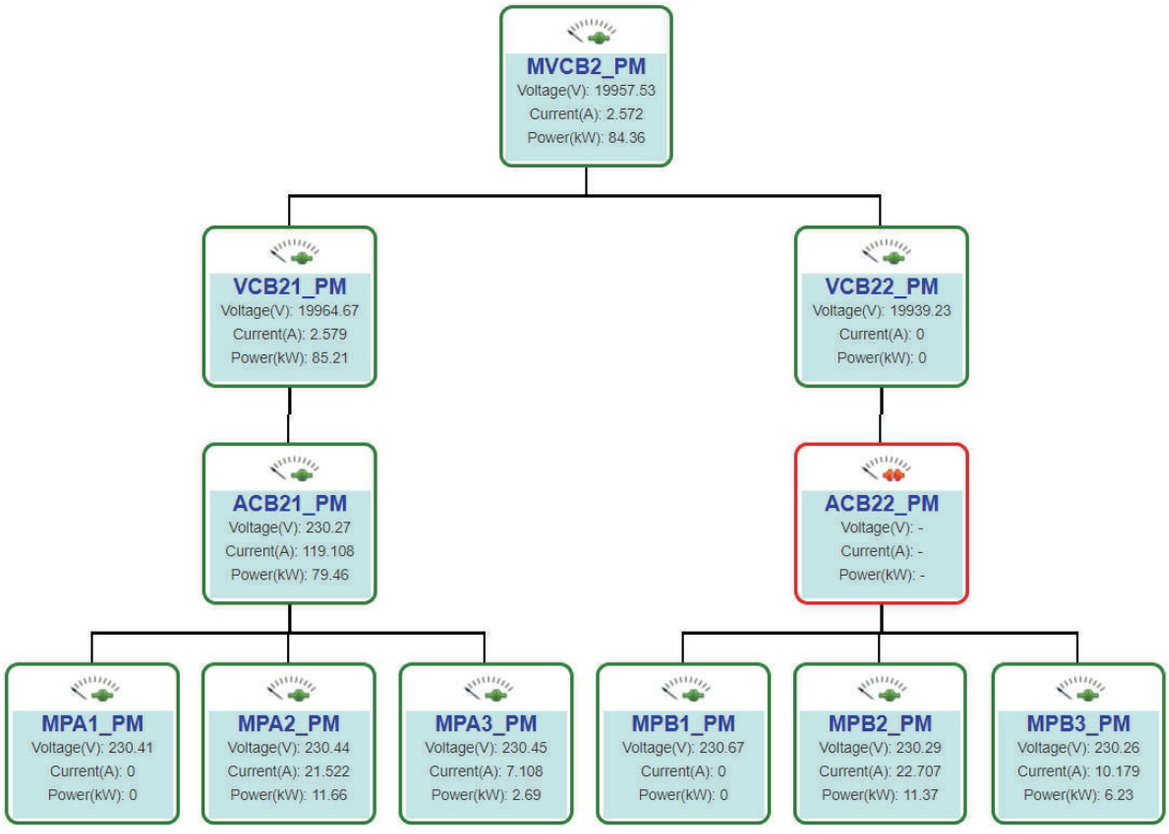
Region	District	Unprocessed	Processed	Completed
Taiwan	Client A	16	13	11
	Client B	7	5	3
Vietnam	Client C	10	5	2
Thailand	Client D	11	8	5

Table of abnormal occurrence in this month

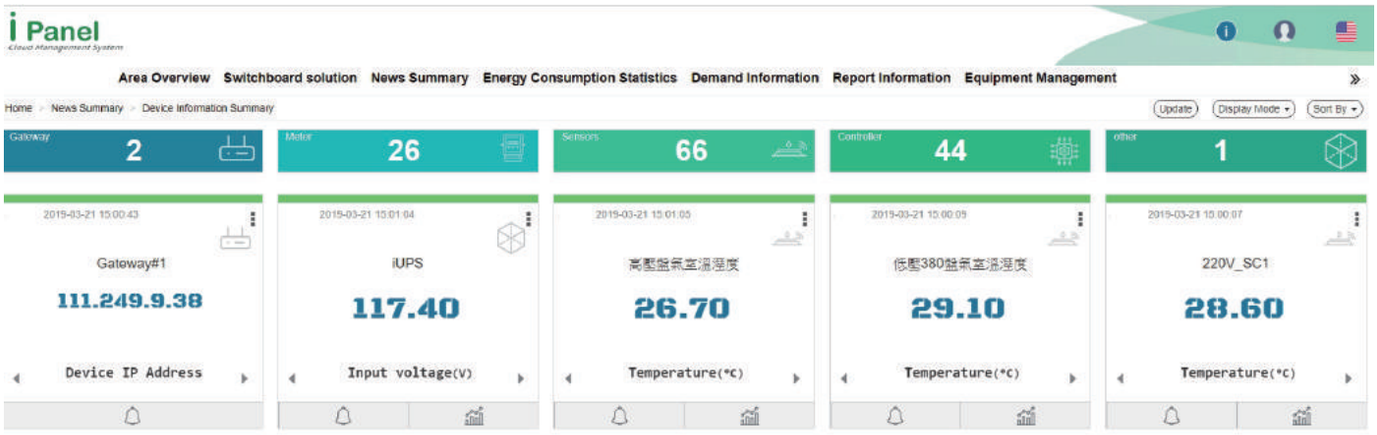
Region	District	Event alarm	Number of trip
Taiwan	Client A	16	13
	Client B	7	5
Vietnam	Client C	10	5
Thailand	Client D	11	8

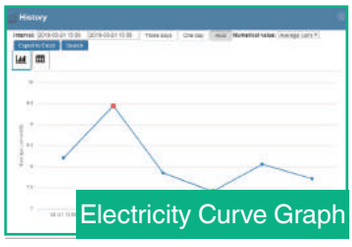
Function

3. Single Line Diagram Board



4. Switchgear device management board





Electricity Curve Graph

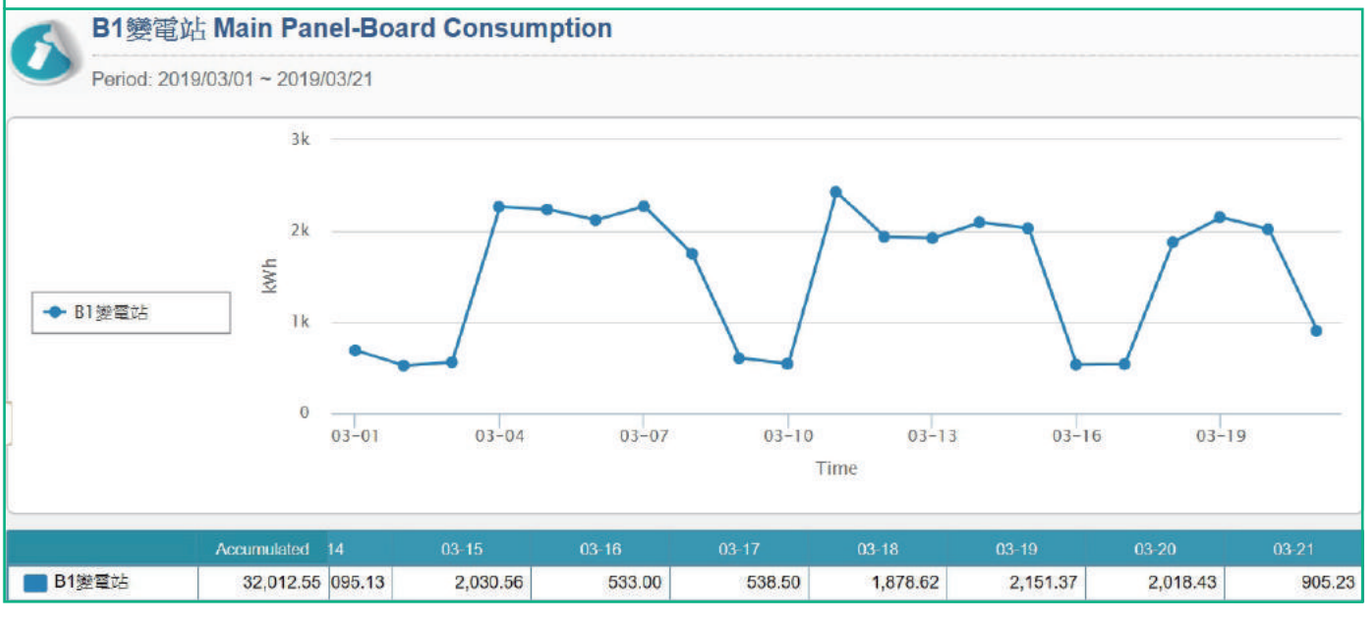
Device Type/ Name

Function

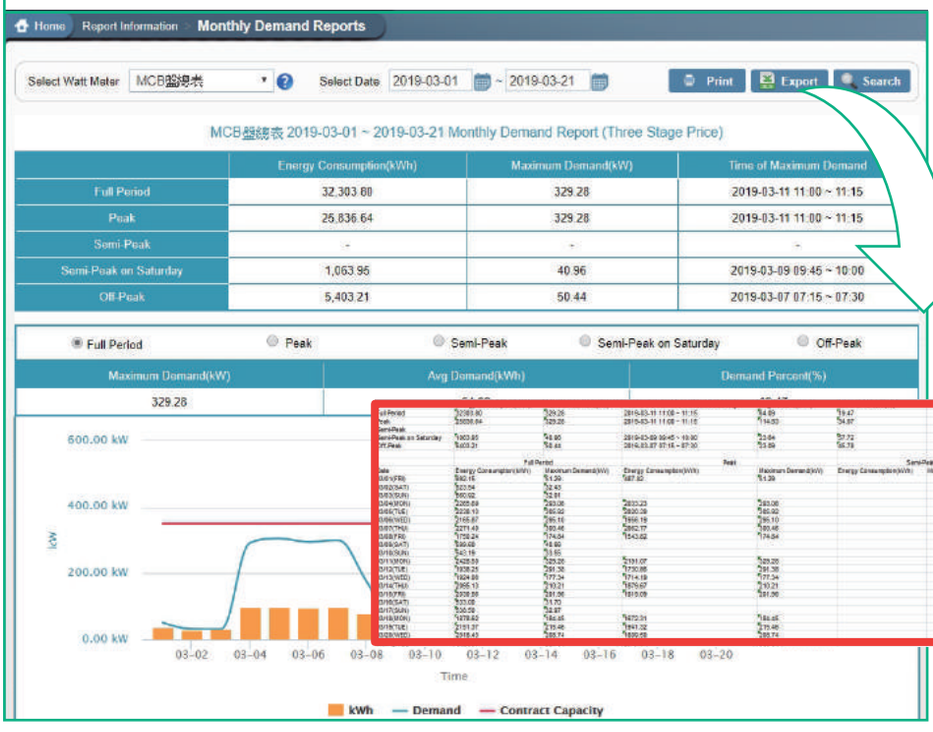
5. Substation management board

A. Power consumption statistics

B. Power consumption chart



C. Demand analysis



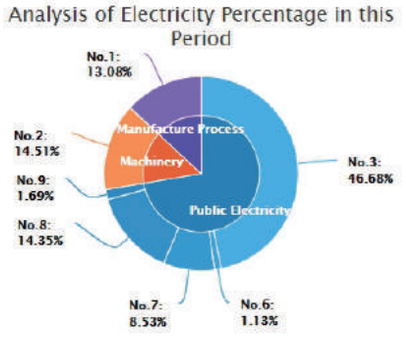
Daily report subscription:
Daily mails are delivered to client mailbox automatically.

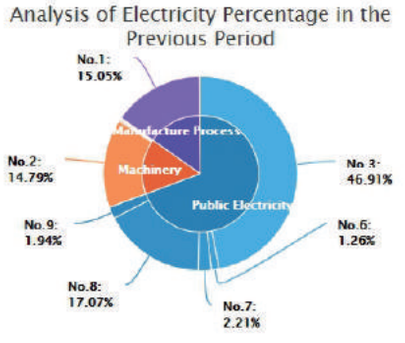
Available to export Daily / Monthly / Yearly report with Excel report.

D. Current flow analysis

B1變電站 MP380_總錶 2019/03/21 ~ 2019/03/21 Analysis Report of Power Consumption on the Disc

Electric Disc Structure	Load Name	Electricity(kWh)	Percentage(%)	Electricity in the Previous Period(kWh)	Percentage(%)
Main Circuit Breaker	MP380_總錶[Low-Pressure Panel-Board]	699.29	100	1250.14	100
Sub Circuit Breakers(No.1)	MP380_配電盤事業廢電錶[Manufacture Process]	91.48	13.08	188.17	15.05
Sub Circuit Breakers(No.2)	MP380_匯流排事業感電錶[Machinery]	101.45	14.51	184.91	14.79
Sub Circuit Breakers(No.3)	MP380_公用電錶[Public Electricity]	326.41	46.68	586.45	46.91
Sub Circuit Breakers(No.4)	配電盤溫升設備[Manufacture Process]	0.00	0.00	0.00	0.00
Sub Circuit Breakers(No.5)	匯流排電焊焊[Machinery]	0.00	0.00	3.60	0.29
Sub Circuit Breakers(No.6)	地下層通風盤[Public Electricity]	7.90	1.13	15.70	1.26
Sub Circuit Breakers(No.7)	ACP空調盤[Public Electricity]	59.68	8.53	27.60	2.21
Sub Circuit Breakers(No.8)	AIP空壓設備盤[Public Electricity]	100.38	14.35	213.40	17.07
Sub Circuit Breakers(No.9)	PR健身房動力盤[Public Electricity]	11.80	1.69	24.20	1.94
Sub Circuit Breakers(No.10)	匯流排3FMP380[Machinery]	0.00	0.00	1.60	0.13
Sub Circuit Breakers(No.11)	匯流排剪角機[Machinery]	0.20	0.03	2.40	0.19
Other	Other	-	-	2.11	0.17





Inquiry Time : 2019-03-21 ~ 2019-03-21

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.

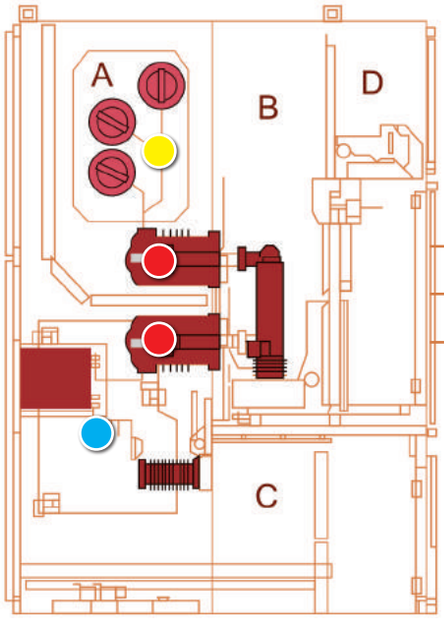
Solution of switehgear
Electricity Safety

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℃ increase.

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



Busbar connection
Breaker contactor
Cable connection

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

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

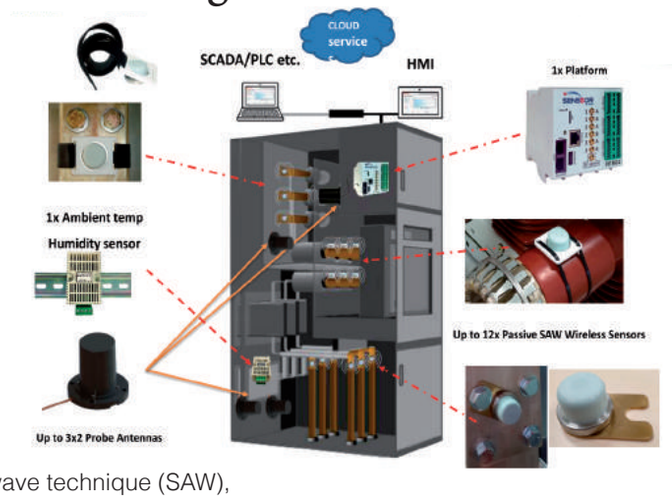
CableTerminal
The raise of contact resistance, and insulation degrades results from loose of cable terminal.

Spots prone to temperature anomaly in medium voltage switchgear

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.

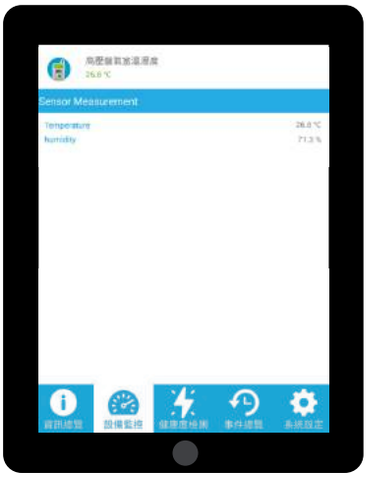


Battery-free	Adopting surface acoustic wave technique (SAW), self-powered by piezoelectric material.
Wireless transmission	Wireless reception and transmission with application of SAW.
Sensitive temp. sensing	Fast temperature measurement and free power consumption.
Insulating protection unrequired	Compact 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.

Temperature and Humidity Online Monitoring

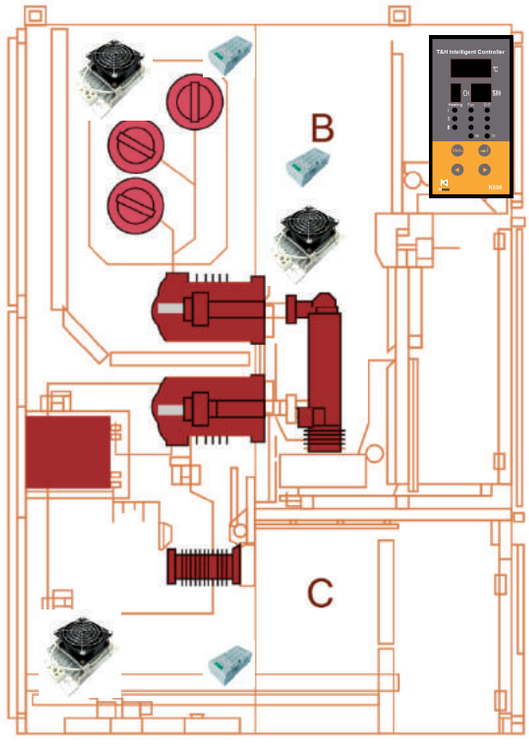
B. Ambient temperature & humidity of substation monitoring

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)

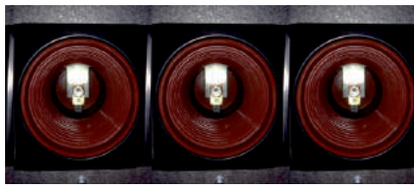
Equipped with 3-circuit sensors which can monitor and control temperature and humidity of three compartments (CB room、Cable room、Busbar room) at the same time. Additionally, it can automatically heat up, dehumidify, and cool down inside of the switchgear to prevent accidents result from moisture, creepage,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



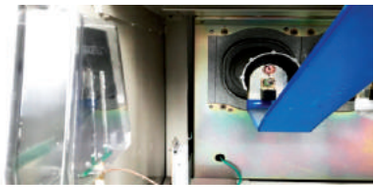
Wireless Temperature Monitoring System Application

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

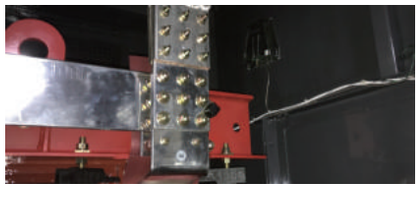
Main busbar temp. detection

Busbar joint point temp. detection

Extending busbar temp. detection

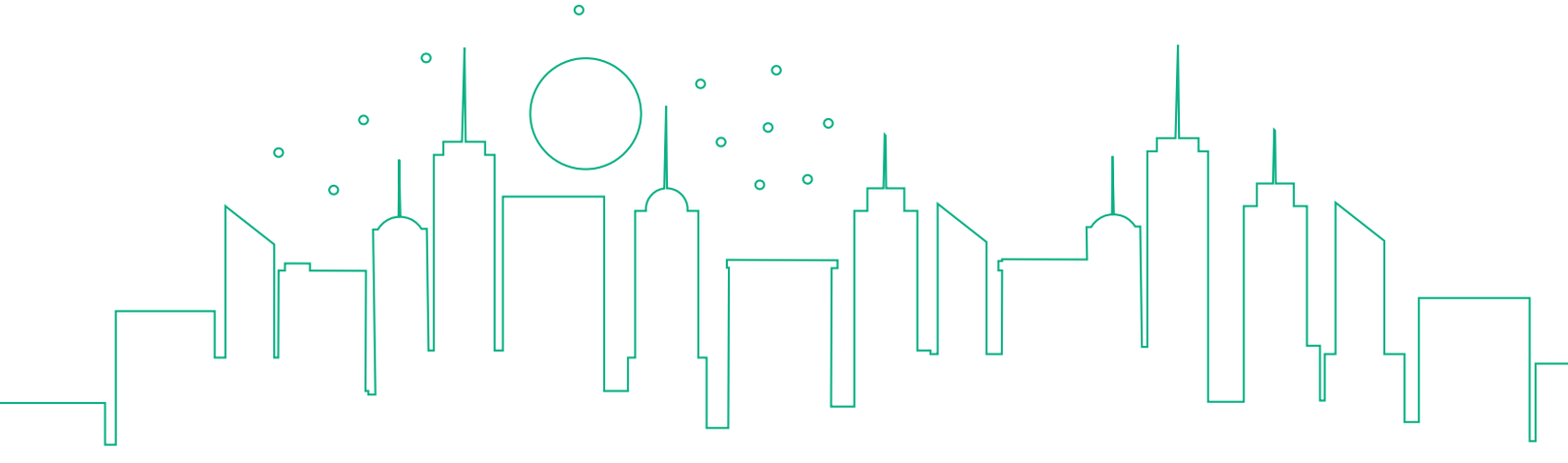
Temperature monitoring on transformer busbar

Joint point of transformer extending busbar temp. detection



Joint point of transformer extending busbar temp. detection

Joint point of transformer extending busbar temp. detection



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