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Smart Metering MCCB with Leakage Current Protection

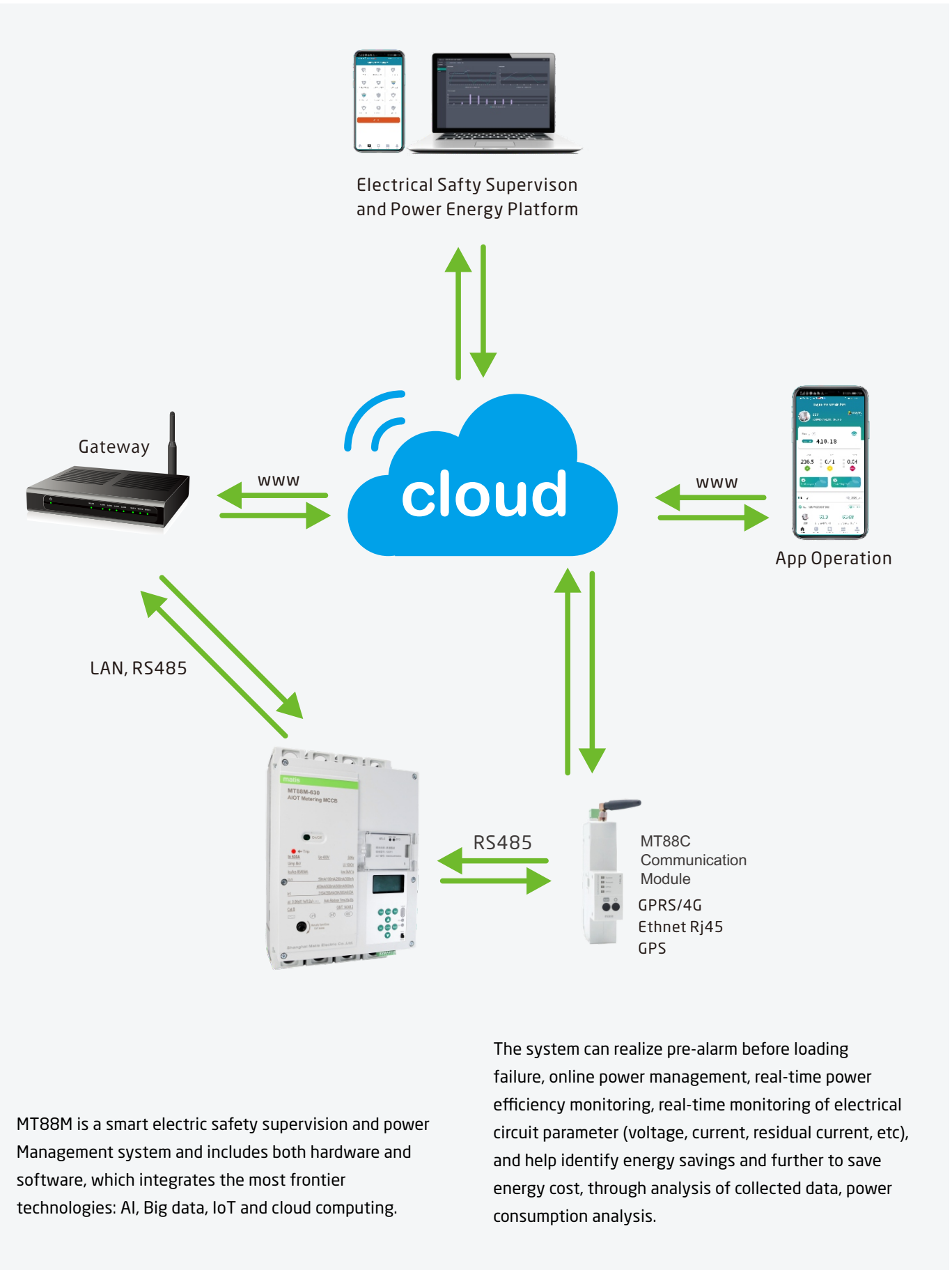
MT88M



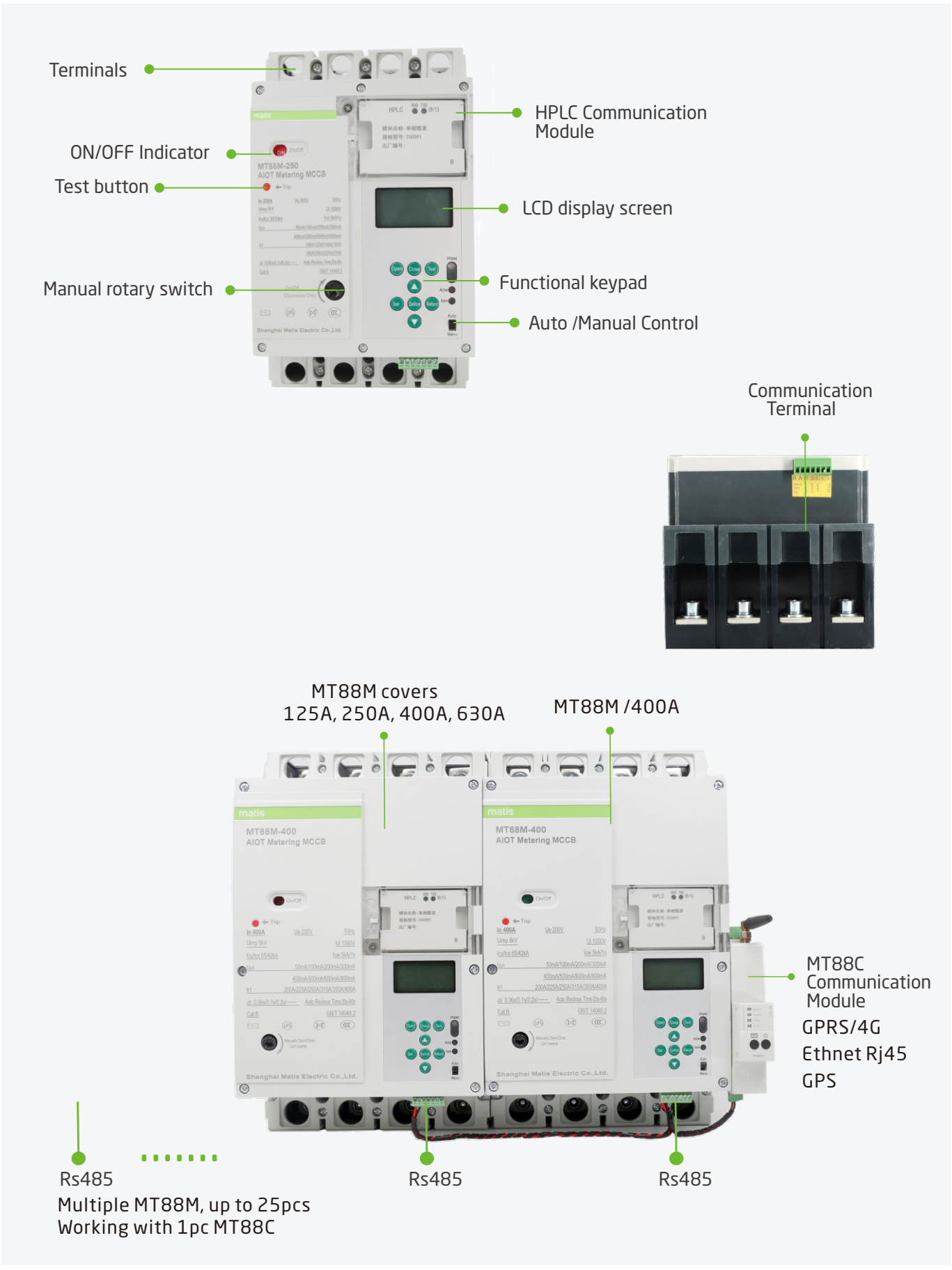
Focus on Smart Electricity



Overview



Structure



Features



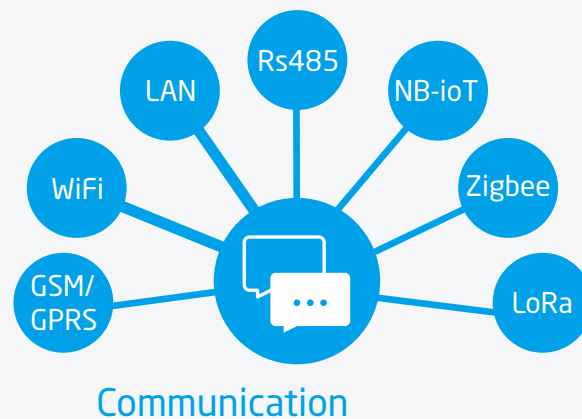
Full Protection

This device includes full protections: Overload, Short Circuit, Earth Leakage, Over/Under Voltage, Phase Loss, unbalance, High Temperature



Metering & Billing

Active energy (Class 1), Reactive energy (Class 2)
Multi-tariff measurement: 4 tariffs ;
Bi-directional Communication;
AMI & AMR meter
Data frozen: Daily, Monthly;
Data storage time: 30 days for daily data, 12 months for monthly data.
Prepayment or Postpayment
Tiered electric pricing system and time-of-use pricing system
Online Payment system



Electrical faults analysis

The device can realize real-time analysis, display of electrical faults and trip : Earth Leakage, overload, over voltage, undervoltage, phase loss, device locked. These electrical faults and trip information may be recorded in both device and platform.



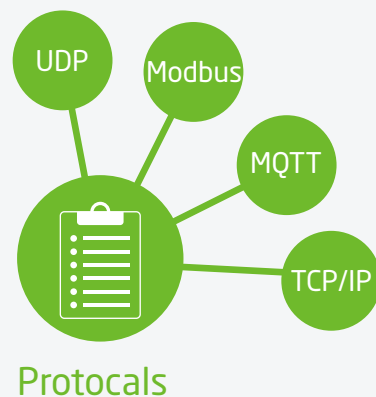
Monitoring electrical circuit parameter in real-time

The device can make realize real-time monitoring of electrical circuit parameters: three phase voltage, earth leakage current, Current, Power, temperature.



Protection function and parameter setting

The over voltage, undervoltage, short circuit, unbalance, overload, tripping characteristic ,earth leakage current, time and other parameters can be set in the device. And the protection value also be adjustable in the device.



Auto recloser

The device is reclosed after an untimely tripping of the circuit breaker and the device will be blocked when the new fault happen again within 5 seconds after reclosing.



Events record and push

All the events may be recorded, stored, inquired in the device and platform



Big current

The rated current is up to 630A



Man-machine interface

The device has big LCD display screen with man-machine interface, Main technical parameter can be showed and set in the LCD display screen easily.



Communication

RS485,Wifi,Ethernet port integrated in device of MTS3-EL250 only. For models of MTS3-EL125,400,630, they need add-on communication module of WiFi, TCP, GPRS 2G/4G, NB-IoT, LoRa, Zigbee for communication.



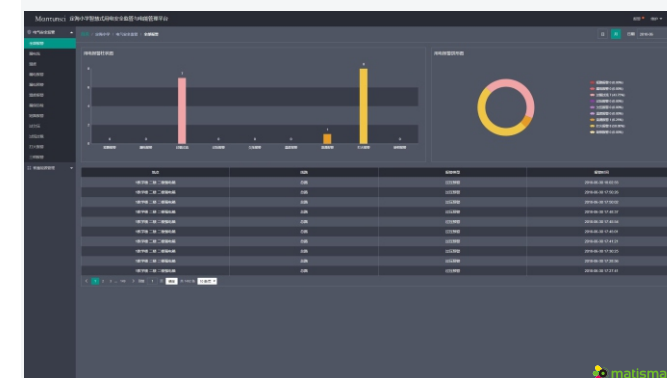
Add-on Surge protection module

Add-on Surge protection module is available.

Benefits



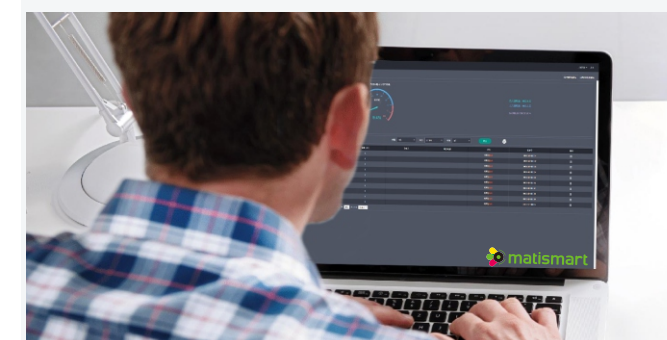
Electrical System Monitoring and Safety Supervision



The system can track and respond to power anomalies and gain valuable information about how the electrical distribution system delivers power to equipment and critical loads. Maintain easy control of electrical equipment while improving electrical system safety. With real time monitoring of electrical parameters, and robust alarm management features, The system help customers to attack potential problems before they become crises. Power monitoring and electrical system performance tracking helps to enhance system reliability.



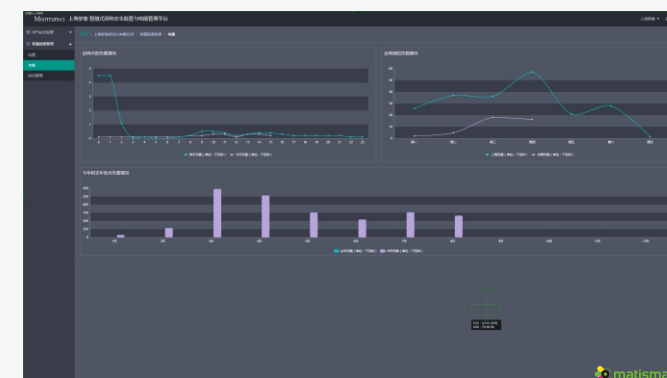
Remote control



The hardware device may be controlled by App and software anytime and anywhere, to make life easier and safer.



Power management



With energy data collection and visibility through easy-to-use dashboards and reports in APP and software platform, the system may help customers to improve energy efficiency and reduce energy costs. Manage, analyze and control the energy use.

- Monitor energy use and aggregate data from all energy assets
- Access real-time and historical data with easy-to-use analytics
- Energy cost allocation and billing
- Track energy performance
- Reduce peak demand and power factor penalties



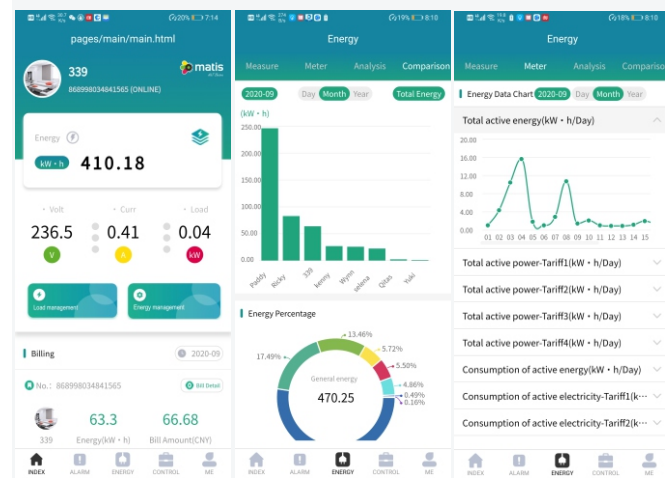
Software Introduction

The Matismart smart electric safety supervision and power management system is an innovative cloud-computing platform designed to monitor, optimize and control the electrical system. This system also provides access to multi-site level, simultaneously monitoring and comparing the performance of different of different facilities. It also can provide personal user profiles depending on the level of access they require. It mainly include App operation version in smart phone and software platform for Electric safety supervision and power management.

APP

It includes six functions:

Remote control, Real-time monitoring, Event alarm and push, Power consumption curve, Timer, Max. Power and Current setting, auto-test of Residual Current.



Remote control

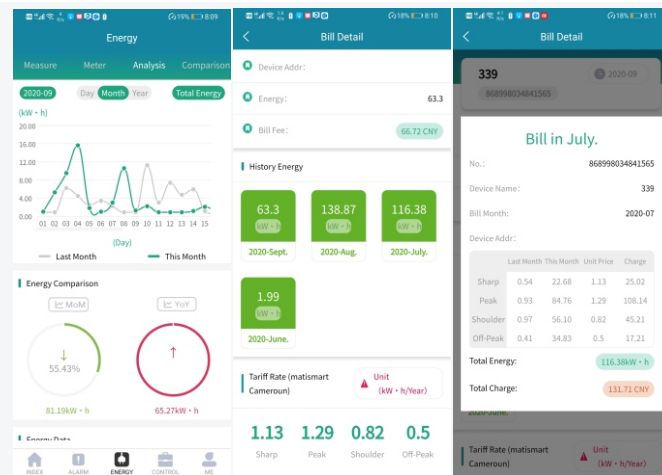
iMCCB can be operated individually or be switched on/off all together through App remotely. And for safety, it can not be switched on through APP after switching off manually.

Real-time monitoring

The system monitors electrical circuit parameters : voltage, current, Power ,temperature, Residual Current and KWH and these parameters may be showed in APP.

Max. Power and current setting

The max. power and current may be set through APP and the setting value must be lower than rated current and power.



Power consumption

Power consumption curve of main lines and each sub-lines may be showed in APP monthly and hourly.

Event alarm and push

All the events recorded and fault alarm will be pushed through App.

Auto-test of residual current

Auto-test of earth leakage current in fixed date each month in the App instead of manual test monthly

Timer

Users are able to remotely set the power demand they want to target with a weekly,daily or hourly resolution



Software Platform

The software platform includes two main parts: electrical safety supervision and power management.

Electrical Safety Supervision

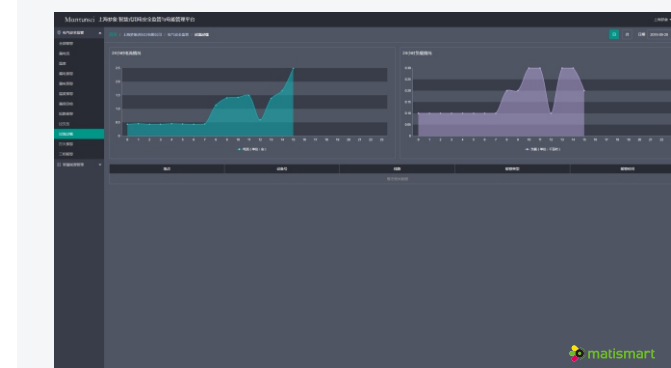
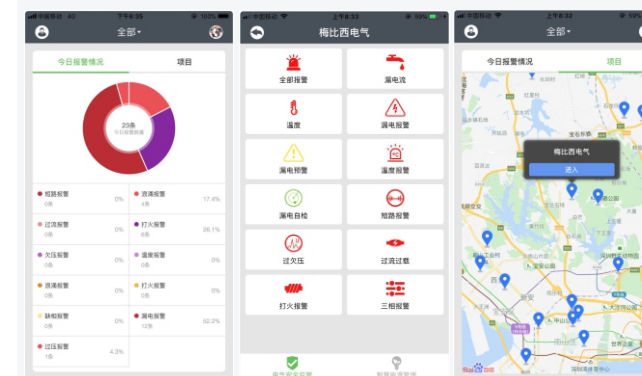
The system will monitor all the electrical circuit parameter of all main and branch lines in real-time such as voltage, current, Power ,temperature, residual current and KWH and it may do pre-judgement and action through these electrical data collection and analysis.

Device location montioring

After installation, the location information of each device will be recorded and showed in the map in software platform. The software platform may monitor the real-time status of all device installed all over the world, in case early warning or fault alarm happened, the supervisor may find the device and its location quickly, then solve it accordingly before any unforeseen event.

Information management

Through software platform, you can easily view contact information of technician of each project management site. If any warning and alarms happens, the software platform will inform the contact person to deal with it immediately.



Early warning and alarms

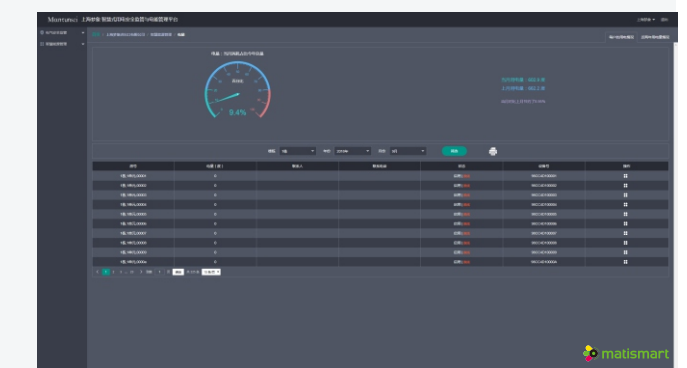
we can read the early warning and alarm information in software platform as follows:

- > Alarm of earth leakage current
- > Early warning of earth leakage current
- > Early warning of high temperature
- > Autotest function of earth leakage protection
- > Early warning and alarm of overload and over current
- > Early warning and alarm of over voltage and undervoltage
- > Alarm of short circuit
- > Alarm of unbalance
- > Alarm of electricity fraud

Electrical parameter monitoring

we can read the electrical parameter monitoring in software platform as follows:

- > Temperature monitoring
- > Current monitoring
- > Voltage monitoring
- > Power monitoring
- > Earth Leakage current monitoring



Software platform

Power Management

In this software platform, the user may find the basic analytic functions such as a dashboard data, instantaneous values, comparison functions and cost allocation by consumer group.

The building energy flows and costs are transparent, therefore, this solution is suitable for energy management and energy cost allocation application seeking energy efficiency improvement and cost reductions.

The platform realizes the collection, storage, management and efficient use of the terminal energy information. It analyzes, processes, handles all energy data, and output to keep the system run in best state, after system intelligent configuration.

In order to further provide conditions for mining, analyzing, processing and handling energy data, The energy efficiency management system we built, can not only effectively solve real-time energy balance and monitoring management, but also build up condition to further dig, analyze, process, handle data, through filing and management of a large amount of historical data.



Power consumption statistic, analysis and comparison

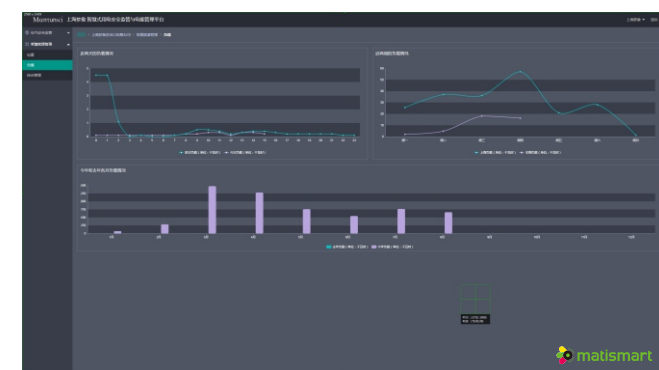
- > Power consumption comparison between current month and last month
- > Power consumption percentage of current month in the total amount of the whole year.
- > Power consumption statistic and sum of each classified divisions
- > Power consumption comparison monthly in last two years

Load statistic and comparison

- > Load status and comparison of today and yesterday
- > Load status and comparison of this week and last week
- > Load status and comparison of this year and last year

Control and Management

- > Rename of each device
- > Remote control
- > Scene setting with timer function
- > Password management



Applications

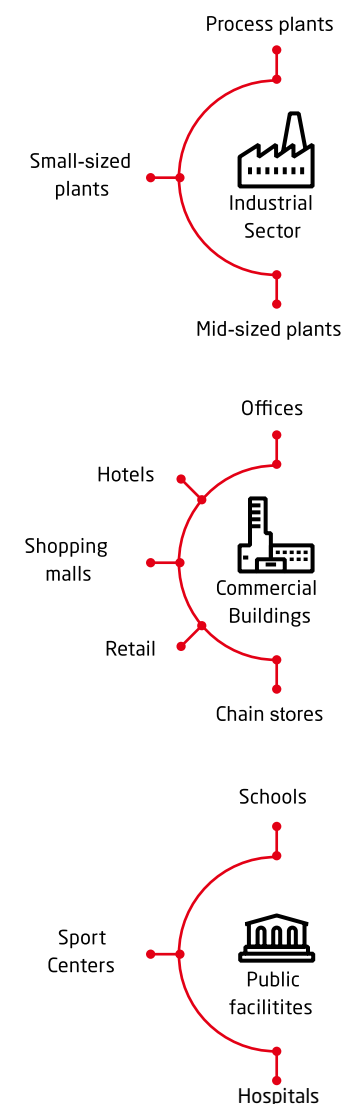
The device is based on a simple, integrated architecture. It guarantees high levels of flexibility, making it suitable for applications in different sectors.

In the industrial sector, solutions can be installed in small to mid-sized plants, in infrastructure facilities and process plants to monitor operations, using data analysis to minimize downtime.

Optimized management of assets creates a competitive advantage that enables customers to maximize business opportunities.

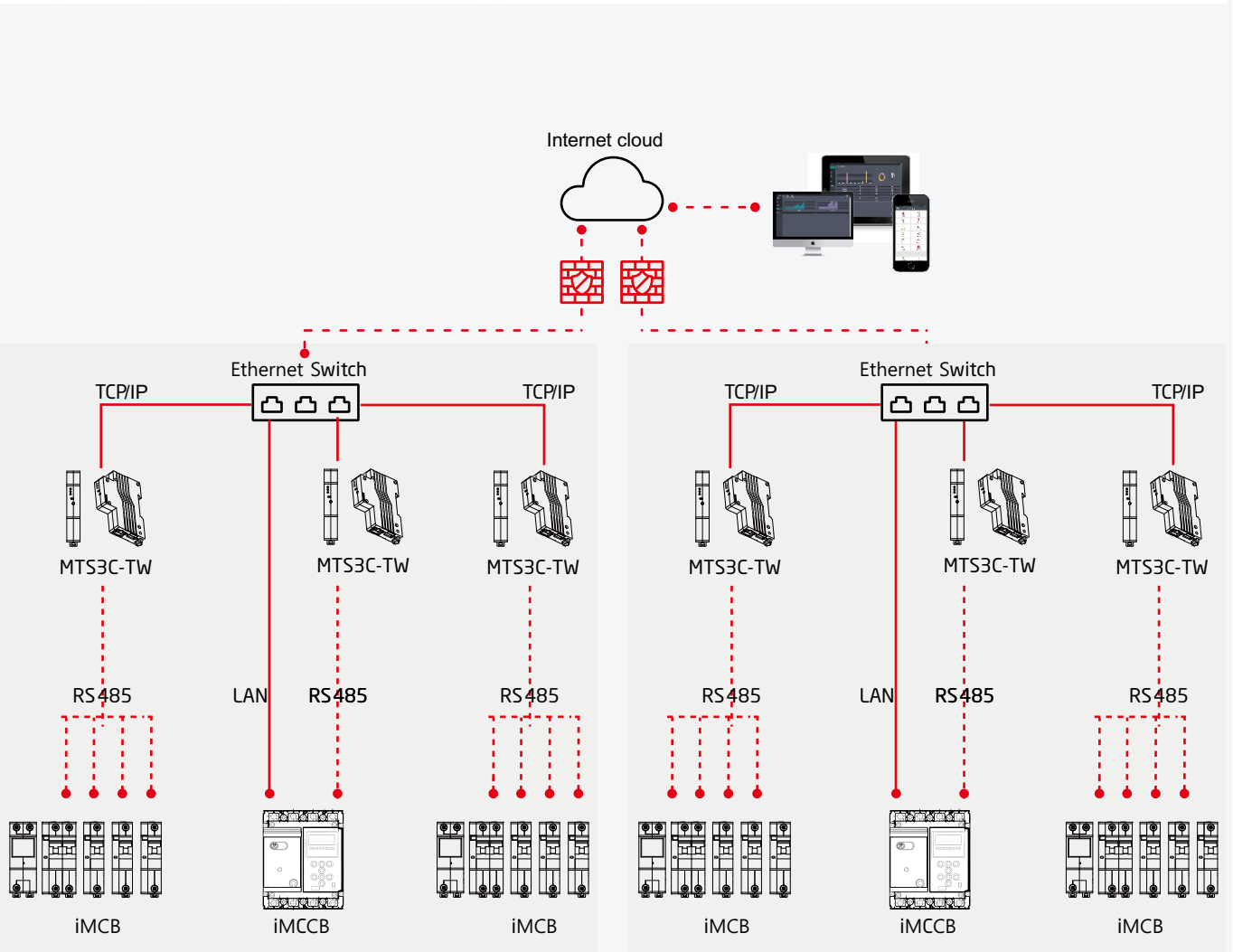
Commercial and public buildings can also leverage the scalable solution to achieve higher energy efficiency and to have more detailed monitoring and control of their facility. Offices, shopping malls, hotels, retail or chain stores can increase their awareness of energy consumption and cost allocation to improve performance.

Public facilities, such as schools, sport centers and healthcare facilities, can secure service continuity and develop predictive maintenance forecasts.



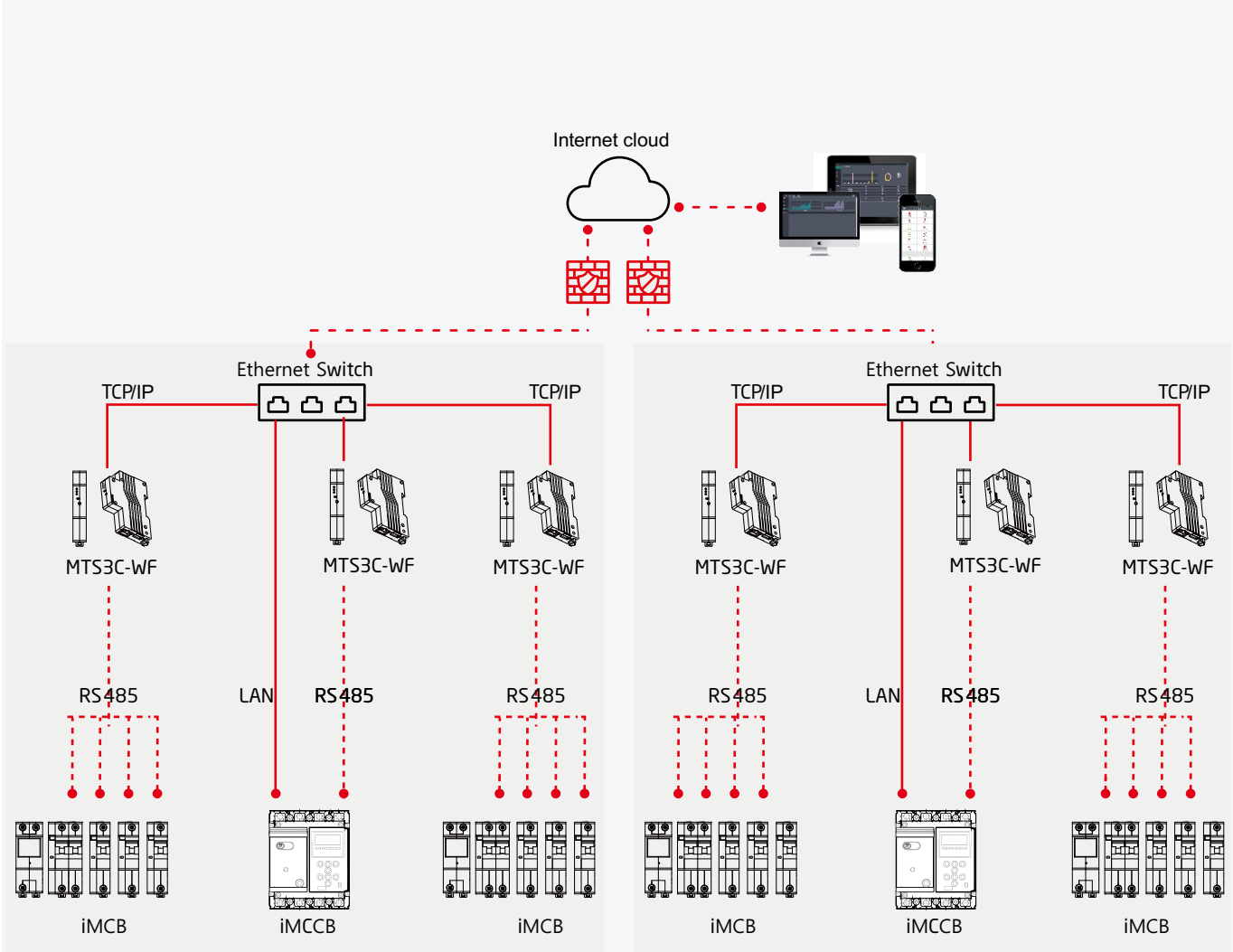
Application examples

SHANGHAI ELECTRIC POWER INDUSTRY SCHOOL



Application Examples

HOTEL



Application Examples

This smart electrical safety supervision and power management system has changed the traditional operation and maintenance mode. By establishing an automatic monitoring and management platform, it is easier to use electrical safety supervision to eliminate potential safety hazards and achieve scientific energy management.

Shenzhen People's Hospital



The "Smart Electricity" APP helps hospitals to realize terminal power collection, store large amounts of data in real time, acquire first-hand data in real time, develop data center to extract, dig, analyze and summarize data, and finally provide proof for important decisions.

Dazhou Shopping Mall



The mobile operation APP, with big data system, can digitally visualize all shop's power consumption, to graphically show and monitor the electrical operation.



Beijing Normal University Experimental Primary School



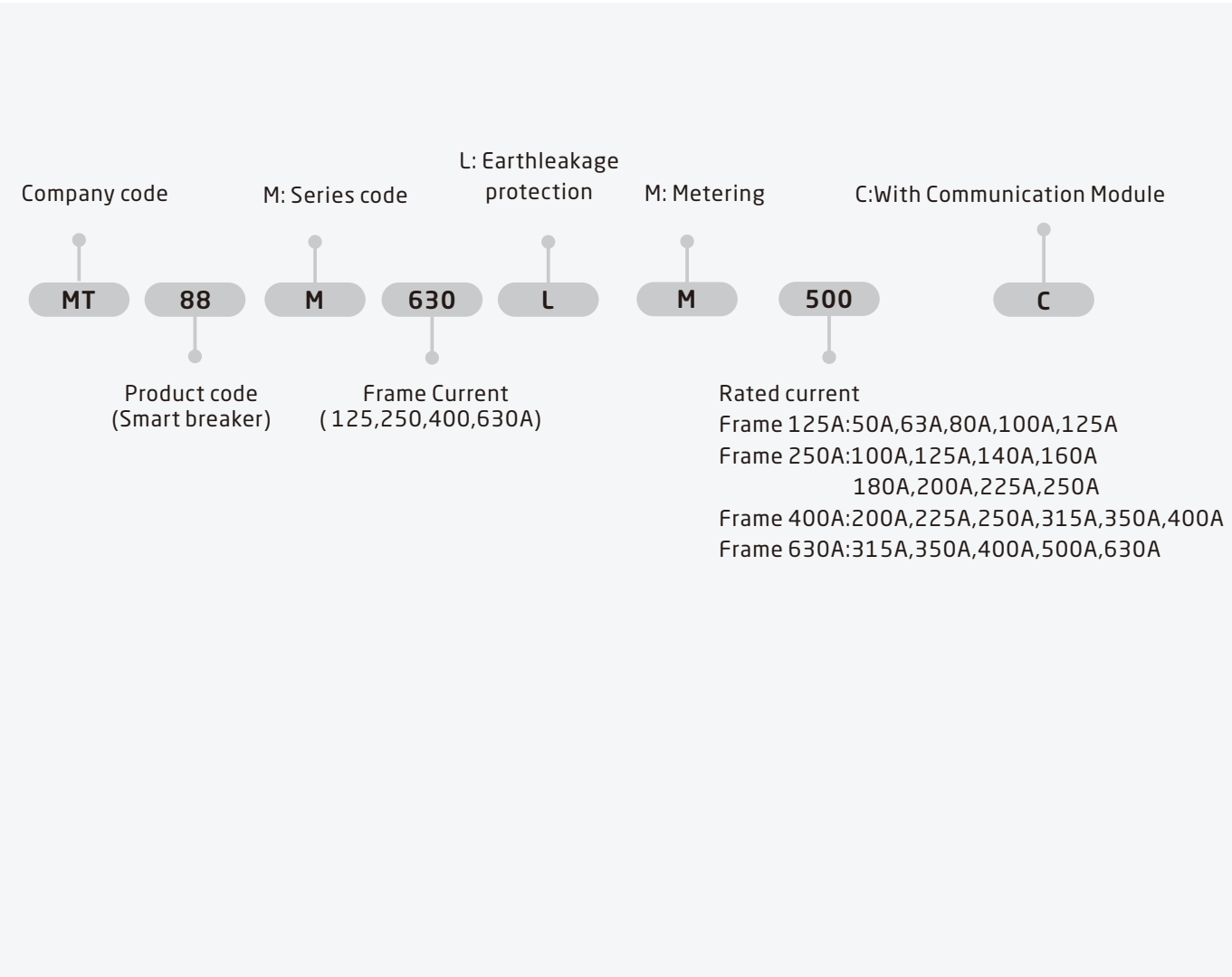
The "Smart Electricity" system can realize 7×24-hour school monitoring, get out of the limit and low efficiency of human work, and monitor the device operation status in real time through IoT system.

Changsha Bank







To realize the smart electrical management in bank, the system will activate alarm in time while there are potential hazard, such as abnormal lines or overload circuit. It will accurately report the fault cause, and timely check the safety hazards through technical means.

Instruction of type code for power supply module



Technical specification of iMCCB


Smart Breakers are the core part of MT88M smart system, it combine protection, metering, monitor, timer, automation, event record and notice.

Item Code:		MT88M-LM125	MT88M-LM250	MT88M-LM400	MT88M-LM630
Picture					
Standards:		IEC60947-2, IEC61009			
Approvals:		CE, CCC			
Poles		3P+N			
Frame Current	A	125	250	400	630
Rated Current	A	63,80,100,125	100,125,140,160,180,200,225,250	200,225,250,315,350,400	400,500,630
Rated Voltage	Vac	400			
Insulation Voltage	Vac	1000			
Frequency (HZ):	Hz	50/60			
Metering and Billing		Current,Voltage Accuracy 0.5% / Billing Active energy Accuracy 1%, Reactive Energy Accuracy : 2%			
Rated impulsed withstand voltage, Uimp	Vac mm	8000 >50			
Acing distance		50		70	
Rated ultimate short-circuit breaking capacity, Icu	kA	35		50	
Rated operating short-circuit breaking capacity, Ics	kA	12.5		20	
Rated residual making and breaking capacity (IΔm)		AC			
Type (wave form of the earth					
Rated residual current (IΔn)	mA	30,50,75,100, 200,300,500,800,1000mA, Auto			
Residual Action time characteristics		Delay type / Non Delay type			
Non action time under IΔn for Delay type	s	0.06/0.1/0.2 for option, 2 IΔn, Details refer to user manual			
Overload and short circuit		Electrical trip, three sector protection, voltage independent, Details refer to use manual			
Over voltage setting threshold(Vac)		265-350(+/-5%)			
Under voltage setting threshold(Vac)		100-200(+/-5%)			
Phase loss setting threshold (Vac)		100-200(+/-5%)			
Electrical life		1000	1000	1000	1000
Mechanical life		7000	7000	4000	4000
Accessories		Auxiliary(optional):			
Monitoring and measurement		Current, Voltage, Leakage current, active power, reactive power, apparent power, Frequency, Power factor, temperature of (optional), On/OFF status, Active energy accuacy :class 2			
Alarm and event		Over/under voltage, overload/overcurrent, short circuit, Residual current, phase loss, neutral loss, unbalance, power outage, temperature, manual swiching on/off , Remote on/off, auto reclose			
Protection threshold setting		Rated current Ir1, Delay Time Ir1-T; Short-Time delay current Ir2_N,Delay time setting Ir2_T; Instantaneous action current Ir3; Overvoltage; Undervoltage; Leakage current; Phase loss; Timer period; Unbalance			
Display		LCD Display and local operation			
Communication		RS485,Bluetooth, HPLC (local communication) , GPRS 4G, LAN RJ 45			
Communication Protocol		Modbus,DL/T645 (local protocol) ,MQTT			
Software		APP and Web software platform			
Pollution Degree		2			
Ambient/Storage temperature (°C)		-5 - +40 / -25 - +70			
Humidity		< 50%			
Altitude(m)		<= 2000			
Connection		From top to bottom			
Dimension		240*142*138	240*142*138	336*198*180	336*198*180



Ordering information

For Smart power safety supervision and power management system with many different communication and APP& software platform

Smart metering MCCB with Rs485 only

Pictures	Frame Current(A)	Phase	Rated current In (A)	Communication	Type Code
	250	3P+N Three phase four wires	100A, 125A, 140A 160A, 180A, 200A 225A, 250A (Adjustable)	RS485	MT88M-LM250
	400		200A, 225A, 250A 315A, 350A, 400A (Adjustable)		MT88M-LM400
	630		400A, 500A, 630A (Adjustable)		MT88M-LM630

Smart metering MCCB with communication module MT88C

Pictures	Frame Current(A)	Phase	Rated current In (A)	Communication	Type Code
 + 	250	3P+N Three phase four wires	100A, 125A, 140A 160A, 180A, 200A 225A, 250A (Adjustable)	Rs485, GPRS 4G, Ethnet(RJ45), GPS	MT88M-LM250C
	400		200A, 225A, 250A 315A, 350A, 400A (Adjustable)		MT88M-LM400C
	630		400A, 500A, 630A (Adjustable)		MT88M-LM630C

Trip characteristic

Long-Delay time setting for Overload protection

Parameter	Frame current (A)	Value setting(A)	Default (A)
Tripping value setting Ir1	125	50A, 63A, 80A, 100A, 125A	125A
	250	100A, 125A, 140A, 160A 180A, 200A, 225A, 250A	250A
	400	200A, 225A, 250A, 315A, 350A, 400A	400A
	630	315A, 350A, 400A, 500A, 630A	630A
Long-delay time value setting		3s, 4s, 6s, 8s, 10s, 12s, 14s, 16s, 18s, OFF	12 s

Trip Characteristic for overload

Standard	Starting Status	Test current	Test Request	Tripping Time	Ambient Temp
IEC60947-2	Cold	1.05Ir1	No Trip	>=2h	40°C
	Hot	1.3 Ir1	Trip	<2h	

Note:
The overload protection is carried out according to the anti-timing characteristics:
 $T = (6I_r/I) 2t_L$ Delay time accuracy: $\pm 10\%$
T is the tripping time value, Ir1 is the long-delay time protection value setting ,
It is the fault current, and tL is the long-delay time value setting

Short-delay time value setting

Standard	Parameter	Value setting	Factory Default	Ambient Temp
IEC60947-2	Ir2	2Ir1, 2.5Ir1,3Ir1, 4Ir1,5Ir1,6Ir1,7Ir1,8Ir1, 10Ir1,12Ir1	6Ir6	40°C
	Ts	0.1s,0.2s,0.3s,0.4s,0.6s,0.8s,1.0s,Off	0.4s	40°C

Trip Characteristic for Short-delay time

Standard	Starting Status	Test current	Test Request	Delay time Tolerance	Ambient Temp
IEC60947-2	Cold	$\leq 0.8 I_r2$	No Trip	+/-40ms	40°C
	Hot	$> 1.2 I_r2$	Trip with delay time	+/-40ms	

Short-delay time Protection for Short Circuit:
Short-delay time protection prevents the impedance short circuit of the power distribution system.
The delay of trip is to realize the selective protection.

Instantaneous time value setting

Standard	Parameter	Value setting	Factory Default	Ambient Temp
IEC60947-2	Ir3	4Ir1, 6Ir1,7Ir1, 8Ir1,10Ir1,11Ir1,12Ir1,13Ir1, 14Ir1,OFF	10Ir1	40°C

Trip Characteristic for Instantaneous time

Standard	Starting Status	Test current	Test Request	Tripping Time	Ambient Temp
IEC60947-2	Cold	≤ 0.85	No Trip		40°C
	Cold	> 1.15	Trip with delay time	+/-40ms	

Trip characteristic

Residual Current value setting

Standard	Item	Item	Value setting (mA)	Factory Default(mA)	Ambient Temperature for Test
IEC61009	MTS3-EL25,MTS3-EL250	Rated residual current (IΔn)	50,100,200,300,400, 500,600,800, OFF, Auto	500	40°C
IEC61010	MTS3-E400,MTS3-EL630		100,200,300,400,500, 600,800,1000,OFF, Auto		

Trip Characteristic for Residual current protection

Standard	Item	Value setting	Factory Default	Ambient Temp
IEC61009	Rated residual current (IΔn)	0.5 IΔn	No Trip	40°C
		$\geq 0.75 I_{\Delta n}$	Trip	

Standard	Starting Status	Tripping Time		
		IΔn	2IΔn	5IΔn
No delay time		$\leq 0.3s$	$\leq 0.15s$	$\leq 0.04s$
0.06s	$\geq 0.1s$	$\leq 0.5s$	$\leq 0.20s$	$\leq 0.15s$
0.1s	$\geq 0.2s$	$\leq 1.0s$	$\leq 0.40s$	$\leq 0.20s$
0.2s	$\geq 0.3s$	$\leq 1.5s$	$\leq 0.60s$	$\leq 0.30s$

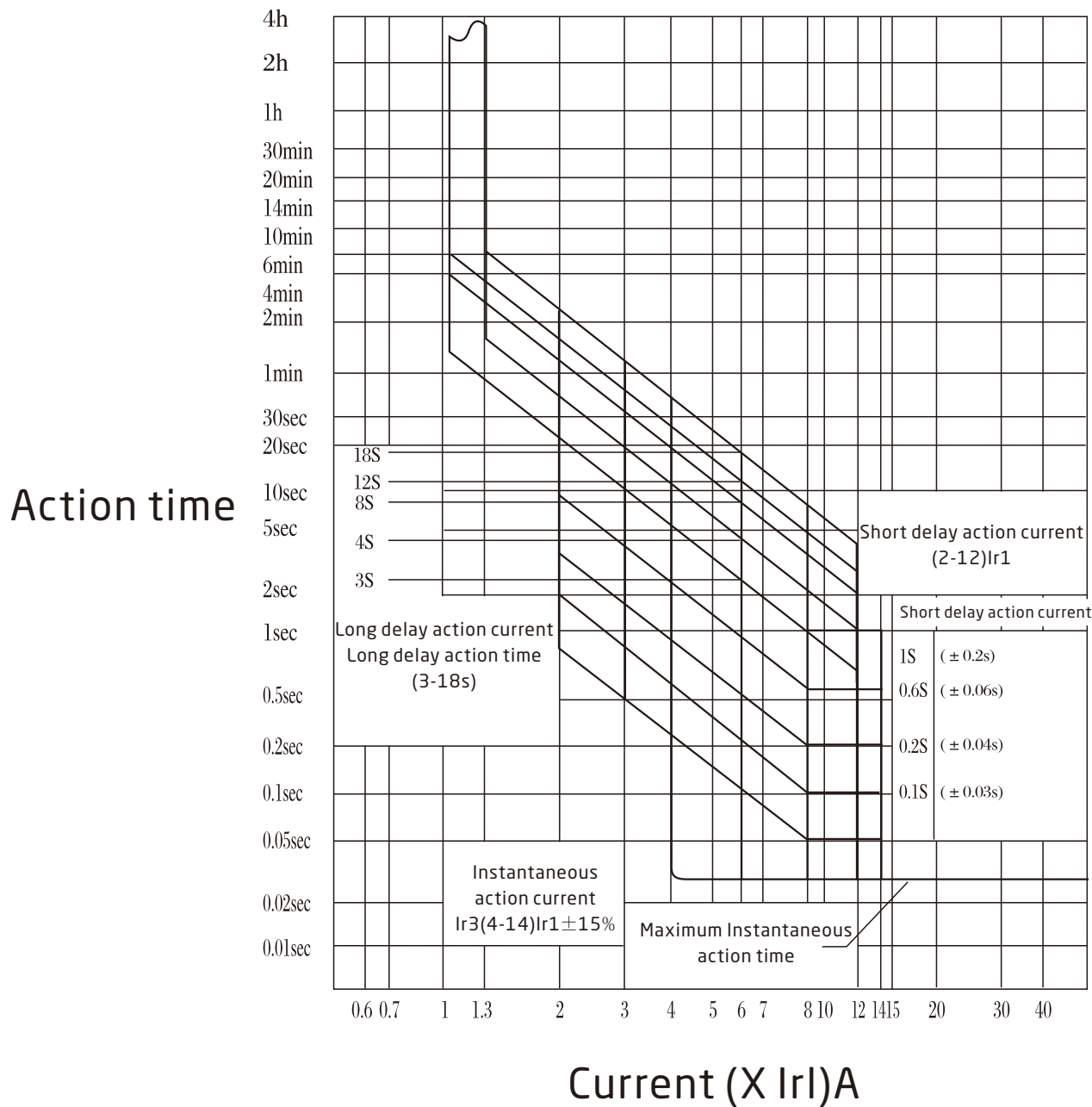
Automatic shift mode of earth leakage current

In the automatic shift mode, the shift values and the floating values are:

Shift value (mA)	200	300	400	500
Floating value (mA)	100	150	200	

- >Note:
- > When the residual current exceeds the floating value of the shift and fails to achieve its action value, and maintains stable for 60s, it will float up by one shift, and so on, until the maximum shift;
 - > When the residual current is less than the floating value of the next shift and remains stable for 120s,it will float down by one shift, and so on, until the minimum shift.
 - > Take the “automatic” shift, with the initial residual current of the line being 100mA, as example.
 - > The circuit breaker is energized and the shift setting is automatically fixed at 300mA. After the residual current increases to 150mA and above, and keep stable for 60s, the shift changes to 400mA;
 - > When the residual current decreases to 100mA and below, and keep stable for 120s, the shift changes to 200mA.

Trip Characteristic for overload



Main function introduction

> Automatic reclosing/locking

- > Automatic reclosing: When the residual current exceeds the trip current value and the device gets tripped, it can be reclosed automatically after 20~60 seconds, but the manual closing is not time-limited.
- > Locking: The locking time is 5s, that is, when there is another leakage fault within 5s after the product reclosing, the circuit breaker can trip again and lock in the trip time, and it is necessary to manually close instead of automatically reclosing; When the product has a leakage failure outside 5s after the re-closing, the circuit breaker is tripped but not locked during the action time, and it can be automatically reclosed within 20~ 60 seconds.

Technical specification of IMCCB

> Over-voltage protection

- > When the phase voltage is higher than the over-voltage protection value setting, the device trips for protection. When the phase voltage is restored to normal voltage, the device can be automatically re-closed. The setting value of over-voltage protection is 250V ~ 300V, and the factory default value is set to 265V. Users can set over voltage protection value or close this function by themselves.

> Under-voltage protection function

- > When the phase voltage is lower than the under-voltage protection setting value, the device trips for protection. When the line voltage is restored to normal voltage, the circuit breaker can be automatically closed and put into operation. The setting value of the under-voltage protection is 150V~200V, the factory setting value is 165V. Users can set or close this function by themselves.

> Phase loss protection

- > When there is a phase loss on the line power supply terminal, the circuit breaker performs protective tripping. When the line is restored to normal voltage, it can be automatically closed and put into operation. The factory default setting is closing.

> Linkage protection with other fire fighting equipments together

- > Through the linkage interface, it can be linked with other fire protection equipment for linkage protection, specifically as follows:

Standard		Value setting	Priority	Delay time (ms)
Input control	Short connection between IN1 and DCOM	Closing	Low	≤40ms
	Short connection between IN3 and DCOM	Opening	High	

> Communication

- > Through the linkage interface, it can be linked with other fire protection equipment for linkage protection, specifically as follows:

Communication interface	Interface type	Communication protocol	Communication address	Communication rate
Rs485	External terminal	DL/T-645 Modbus (adjustable)	1-255	600-38400 (adjustable)



Operation of LCD products

The circuit breaker is equipped with a test power-up function upon power-on (which can be turned off), which can effectively guarantee safety of the follow-up equipment.



Fig. 1

>Product commissioning

- > After the wiring is complete and correct through check, energize the circuit breaker. When the circuit breaker is in a disconnected state, set the parameters according to the operation instructions. After the setting is complete, perform the closing operation. The running states are shown in Fig. 2, Fig. 3 and Fig. 4. In the closing condition, press [test trip] key to carry on the residual current test trip, and perform reclosing within 20S-60S.

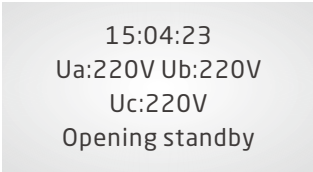


Fig. 2

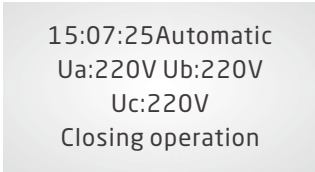


Fig. 3

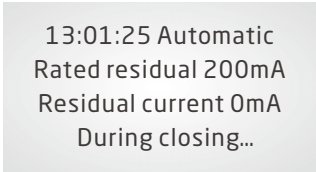


Fig. 4

>Closing operation of the circuit breaker

- > Automatic closing
Press [closing] key for 2 seconds, and LCD will display "during closing..". After the closing, the state of the LCD screen appears as "closing operation", and the circuit breaker enters the normal operation state.
- > Manual closing
Use the attached manual wrench, insert it into the hole, and rotate clockwise by around 360°. After the success of closing, the state of the LCD screen is automatically updated as "closing operation", and the circuit breaker enters the normal operation state.
Note: Manual switching can be performed when the circuit breaker's main contact is disconnected. The closing operation is shown in the above Method 2. Pay attention to the safety of load equipment and personnel during manual closing.

>Disconnection operation of circuit breakers

- > In the running state, press the [opening] key. After the successful opening, the state of the LCD screen is shown as "opening standby".
- > If manual opening is needed, use wrench, insert it into the hole, and rotate clockwise by around 180°. After the successful opening, the state opening/closing is shown as "opening".

Operation instructions of LCD products

>Main menu

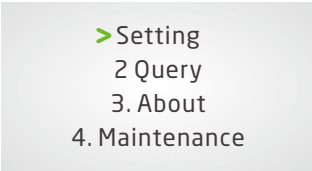


Fig. 5

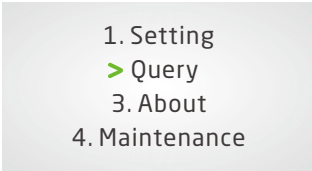


Fig. 6

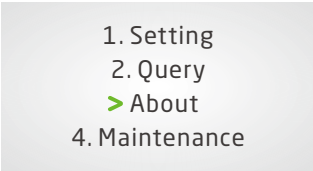


Fig. 7

In the real-time display status
Press [Setting] button to enter the main menu interface as shown above.
Press [Up/Down] button to control the highlighted display position.
Press [OK] button to enter the corresponding sub-menus.

> Setup menu

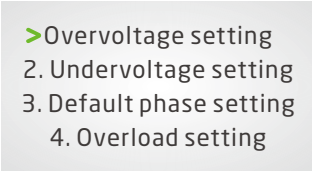


Fig. 8

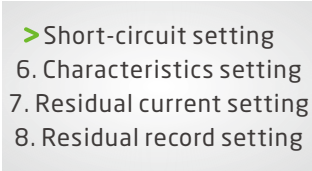


Fig. 9

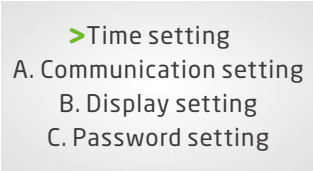


Fig. 10

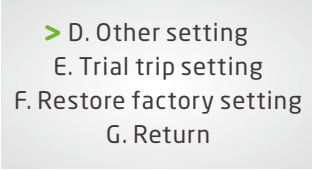


Fig. 11

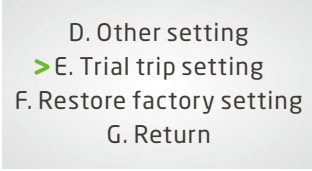


Fig. 12

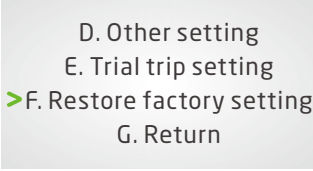


Fig. 13

As shown above.
[Up/Down] button to control the highlighted display position or page flip.
[OK] button to enter the corresponding setting menu.
[Return] button to return to the previous menu.

> Over voltage setting

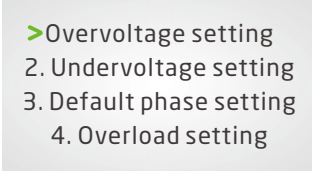


Fig. 14

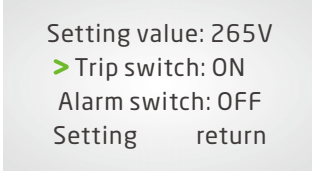


Fig. 15

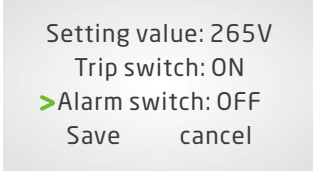


Fig. 16

As shown above.
[Up/Down] button to control the highlighted display position or adjust parameters.
[OK] button to enter the corresponding setting menu/switch setting options.
[Return] button to return to the previous menu.
Over voltage protection can be turned OFF or set as 250V to 300V.

Operation instructions of LCD products

>Undervoltage setting

1. Overvoltage setting
>Undervoltage setting
3. Default phase setting
4. Overload setting

Fig. 17

Setting value: 145V
> Trip switch: ON
Alarm switch: OFF
Setting return

Fig. 18

Setting value: 145V
Trip switch: ON
>Alarm switch: OFF
Save cancel

Fig. 19

As shown above.
[Up/Down] button to control the highlighted display position or adjust parameters.
[OK] button to enter the corresponding setting menu/switch setting options.
[Return] button to return to the previous menu.
Undervoltage protection can be turned OFF or set as 150V to 200V.

>Default phase setting

1. Over voltage setting
2. Undervoltage setting
>Default phase setting
4. Overload setting

Fig. 20

Setting value: 50V
> Trip switch: ON
Alarm switch: OFF
Setting return

Fig. 21

Setting value: 50V
Trip switch: ON
>Alarm switch: OFF
Save cancel

Fig. 22

As shown above.
[Up/Down] button to control the highlighted display position or adjust parameters.
[OK] button to enter the corresponding setting menu/switch setting options.
[Return] button to return to the previous menu.
Phase default protection can be turned OFF or set as 10V to 50V.

>Overload setting

1. Over voltage setting
2. Undervoltage setting
3. Default phase setting
> Overload setting

Fig. 23

Setting value: 2.0Ir1
Setting value: 100A
Delay time: 12S
> Setting return

Fig. 24

Setting value: 2.0Ir1
Setting value: 200A
Delay time: OFF <
Save cancel

Fig. 25

As shown above.
[Up/Down] button to control the highlighted display position or adjust parameters.
[OK] button to enter the corresponding setting menu/switch setting options.
[Return] button to return to the previous menu.
Delay time is OFF / (or) over current protection function is disabled when it is OFF
See the curve chart for the overload delay time curve.

Operation instructions of LCD products

>Short-circuit setting

>Short-circuit setting
6. Characteristics setting
7. Residual current setting
8. Residual record setting

Fig. 26

Setting value Ir3:10Ir1
Setting value Ir2: 4Ir1
Delay time: 0.10S
> Setting return

Fig. 27

Setting value Ir3:OFF
Setting value Ir2: 4Ir1OFF
Delay time: OFF <
Save cancel

Fig. 28

As shown above.
[Up/Down] button to control the highlighted display position or adjust parameters.
[OK] button to enter the corresponding setting menu/switch setting options.
[Return] button to return to the previous menu.
Delay time is OFF / (or) overcurrent protection function is disabled when it is OFF
Ir3: short-circuit instantaneous current
Ir2: short-circuit short-time delay current
Note: the Ir2 setting value cannot exceed the Ir3 setting value
[Return] button to return to the previous menu.
Delay time is OFF / (or) overcurrent protection function is disabled when it is OFF
Ir3: short-circuit instantaneous current
Ir2: short-circuit short-time delay current
Note: the Ir2 setting value cannot exceed the Ir3 setting value[Setting] button to enter the main menu interface as shown above.
Press [Up/Down] button to control the highlighted display position.
Press [OK] button to enter the corresponding sub-menus.

> Characteristics setting

5. Short-circuit setting
>Characteristics setting
7. Residual current setting
8. Residual record setting

Fig. 29

Common alarm: ON
Reclose: ON
Over current protection: ON
> Setting 1 return

Fig. 30

Gear Return: ON
Over current alarm: ON
Sound and light alarm
output: ON
Save 2: cancel

Fig. 31

As shown above.
[Up/Down] button to control the highlighted display position or adjust parameters.
[OK] button to enter the corresponding setting menu/switch setting options.
[Return] button to return to the previous menu.
Delay time is OFF / (or) over current protection function is disabled when it is OFF
Common alarm: short-circuit instantaneous current
Reclosing enablement: it will not automatically reclose after closing
Gear return: the residual current will not automatically float in auto mode after shutdown
Over current protection: all current-related faults will not be protected after shutdown
Over current alarm: all current-related faults will not be signaled after shutdown
Sound and light alarm: all alarms will not be output after shutdown

Operation instructions of LCD products

> Residual current setting

5. Short-circuit setting
6. Characteristics setting
> Residual current setting
8. Residual record setting

Fig. 32

Residual gear: 200mA
Non-driving time: 100ms
Action type: trip
> Setting return

Fig. 33

Residual gear: automatic
Non-driving time: -
Action type: trip <
Save cancel

Fig. 34

As shown above.

[Up/Down] button to control the highlighted display position or adjust parameters.

[OK] button to enter the corresponding setting menu/switch setting options.

[Return] button to return to the previous menu.

> Residual record setting

5. Short-circuit setting
6. Characteristics setting
7. Residual current setting
> Residual record setting

Fig. 35

Change difference: 50mA
Interval time: 60 minutes
Over limit alarm value: 400mA
> Setting return

Fig. 36

Change difference: 50mA
Interval time: 60 minutes
Over limit alarm value: 400mA
Save cancel

Fig. 37

As shown above.

[Up/Down] button to control the highlighted display position or adjust parameters.

[OK] button to enter the corresponding setting menu/switch setting options.

[Return] button to return to the previous menu.

> Time setting

> Time setting
B. Communication setting
C. Display setting
D. Password setting

Fig. 38

Time setting
October 12, 2014
12:12:34
> Setting return

Fig. 39

Time setting
October 12 <
12:12:34
Save cancel

Fig. 40

As shown above.

[Up/Down] button to control the highlighted display position or adjust parameters.

[OK] button to enter the corresponding setting menu/switch setting options.

[Return] button to return to the previous menu.

> Communication setting

9. Time setting
> Communication setting
B. Display setting
C. Password setting

Fig. 41

Protocol type: Modbus
Address: 001
Baud rate: 38400
> Setting return

Fig. 42

Protocol type: DL_T654
Address: 001 <
Baud rate: 24000
Save cancel

Fig. 43

Operation instructions of LCD products

> Display setting

9. Time setting
A. Communication setting
> Display setting
C. Password setting

Fig. 44

Display setting
Scroll time: 10S
Return time: 10S
> Setting return

Fig. 45

Display setting
Scroll time: 10S
Return time: 10S <
Save cancel

Fig. 46

As shown above.

[Up/Down] button to control the highlighted display position or adjust parameters.

[OK] button to enter the corresponding setting menu/switch setting options.

[Return] button to return to the previous menu.

> Password setting

9. Time setting
A. Communication setting
B. Display setting
> Password setting

Fig. 47

Level 0 password setting
- Please enter the password!! -
Original password: 0000New
password: 0000

Fig. 48

Level 2 password setting
--wrong password!! -
Original password: 1234New
password: 0000

Fig. 49

As shown above.

[Up/Down] button to control the highlighted display position or page flip.

[OK] button to enter the corresponding setting menu.

[Return] button to return to the previous menu.

Level 0 password default value: 0000

Level 1 password default value: 0000

Level 2 password default value: 0000

> Other settings

> Other setting
E. Trail trip setting
F. Restore factory setting
G. Return setting

Fig. 50

Other setting
Switch-on trial power: OFF
Power-off release: OFF
> Setting: return

Fig. 51

Other setting
Power-on trial power: OFF
Power-off release: ON <
Save cancel

Fig. 52

As shown above.

[Up/Down] button to control the highlighted display position or adjust parameters.

[OK] button to enter the corresponding setting menu/switch setting options.

[Return] button to return to the previous menu.

Switch-on trial power: ON-- if the circuit is energized and is faultless, the product will automatically close;

Power-off release: ON-- the product automatically trips when the circuit is de-energized

Operation instructions of LCD products

> Trial trip setting

D. Other settings
> Trial trip setting
F. Restore factory setting
G. Return

Fig. 53

Trial trip setting
Trial trip time: OFF
12:12 on the 12th
> Setting return

Fig. 54

Trial trip setting
Trial trip time: ON
12:12 on the 12th
Save cancel

Fig. 55

As shown above.

[Up/Down] button to control the highlighted display position or adjust parameters.

[OK] button to enter the corresponding setting menu/switch setting options.

[Return] button to return to the previous menu.

Level 1 password is required for restoring factory setting. No records and password parameters are allowed to be cleared when factory setting is restored and the maintenance mode can not be exited

> Restore factory setting

D. Other settings
E. Trial trip setting
> Restore factory setting
G. Return

Fig. 56

Restore factory setting
> Return OK

Fig. 57

As shown above.

[Up/Down] button to control the highlighted display position or adjust parameters.

[OK] button to enter the corresponding setting menu/switch setting options.

[Return] button to return to the previous menu.

> Query menu

1. Setting
> 2. Query
3. About
4. Maintenance

Fig. 58

1. Cumulative record
> 2. Peak record
3. Residual over-limit record
4. Self-inspection record

Fig. 59

5. Trip record
6. Residual alarm record
> 7. Line-residual record
8. System record

Fig. 60

As shown above.

[Up/Down] button to control the highlighted display position or adjust parameters.

[OK] button to enter the corresponding setting menu/switch setting options.

[Return] button to return to the previous menu.

> Cumulative record

Data reset: 00000 time
Fault trip: 00000 time
Blocking trip: 00001 time
Residual trip: 00001 time

Fig. 61

Current trip: 00001 time
Voltage trip: 00001 time
Manual trip: 00001 time
Zero-default trip: 00001 time

Fig. 62

Trial trip: 00001 time
Exit the residual: 00001 time
Operation time: 0000
minute12:12, October 12, 2014

Fig. 63

Operation instructions of LCD products

As shown above.

[Up/Down] button to flip for checking.

[Return] button to return to the previous menu.

12:12, October 12, 2014 is the time when the system is restarted

> Peak record

XXX.XV
XXX.XV
Type: phase B voltage
Peak date: 1st

Fig. 64

XXXX.XXA
XXXX.XXA
Type: phase
B current Peak date: 21st

Fig. 65

XXXXmA
XXXXmA
Type: residual current
Peak date: 12th

Fig. 66

As shown above.

[Up/Down] button to control the highlighted display position or adjust parameters.

[OK] button to enter the corresponding setting menu/switch setting options.

[Return] button to return to the previous menu.

The peak record of the three-phase voltage, the three phase current and the residual current from the 1st to the 31st (maximum and minimum occurrence time) can be queried

> Residual over-limit record

1. Cumulative record
2. Peak record
> 3. Residual over-limit record
4. Self-inspection record

Fig. 67

Over-limit phase: unknown
Over-limit value: XXXXmA
Start
End 00

Fig. 68

> Self-inspection record

1. Cumulative record
2. Peak record
3. Residual over-limit record
> 4. Self-inspection record

Fig. 69

Self-inspection: successful
Self-inspection mode: button
Date: October 12, 2014time:
12:11:11

Fig. 70

> Trip record

> 5. Trip record
6. Residual alarm record
7. Line-residual record
8. System record

Fig. 71

Cause of fault: over voltage
Fault phase: phase A
Date: October 10, 2014
01 time: 12:00:12

Fig. 72

> Residual alarm record

5. Trip record
> 6. Residual alarm record
7. Line-residual record
8. System record

Fig. 73

Start: January 10, 2014
Time: 12:33:10
End: October 11, 2014
01 Time: 12:35:50

Fig. 74

> Line-residual record

5. Trip record
6. Residual alarm record
> 7. Line-residual record
8. System record

Fig. 75

Residual phase: unknown
Residual value: 1000mA
Date: October 9, 2014
01 time: 12:35:50

Fig. 76

> System record

5. Trip record
6. Residual alarm record
7. Line-residual record
> 8. System record

Fig. 77

System record
Event 002: system start-up
00:00:00 ID:001
October 20, 2014 Return

Fig. 78

As shown above.

[Up/Down] button to query the record before and after.

[Return] button to return to the previous menu.

[OK] button to switch to the real-time status before fault.

01: represents the current record location

Operation instructions of LCD products

> About menu

XXXX- 250A
Fixed version: V01.01
Hardware version: V05.08
Factory: 20XX-XX-XX

Fig. 79

After-sales service:
Tel: XXXXXXXX
Company: XXXXXXXX
www. XX. Com

Fig. 80

Factory: 20XX-XX-XX
=====
No.: XXXXXXXA0000
=====

Fig. 81

As shown above.
[Up/Down] button to flip up and down.
[Return] button to return to the previous menu.

> Maintenance menu

1. Setting
2. Query
3. About
4. Maintenance

Fig. 58

----Level 2 password---
--Please enter the
password!--
0000-----

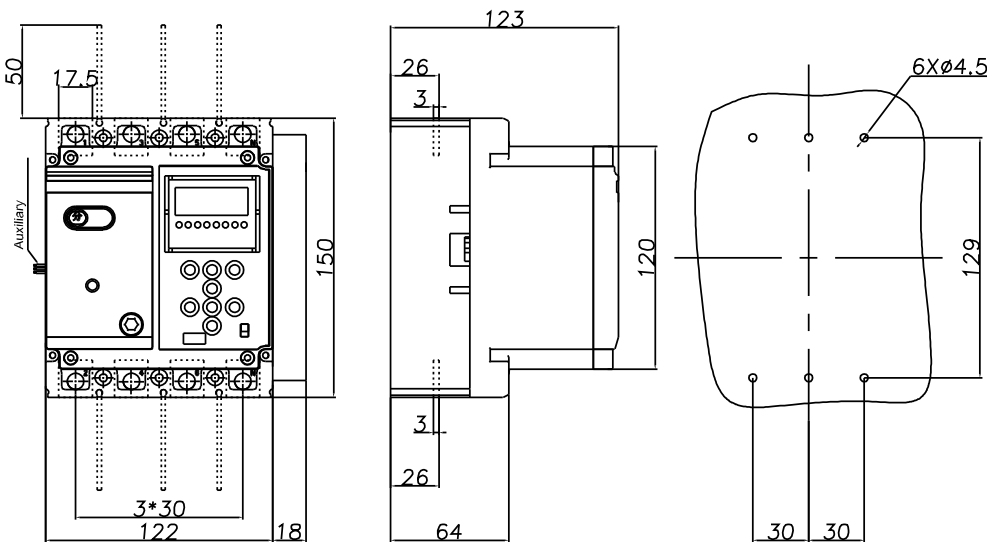
Fig. 59

1. Maintenance 5. Mechanical test
2.Capacity 6.Password reset
Trial trip 7. Logout return
4.Self-inspection 8.Return

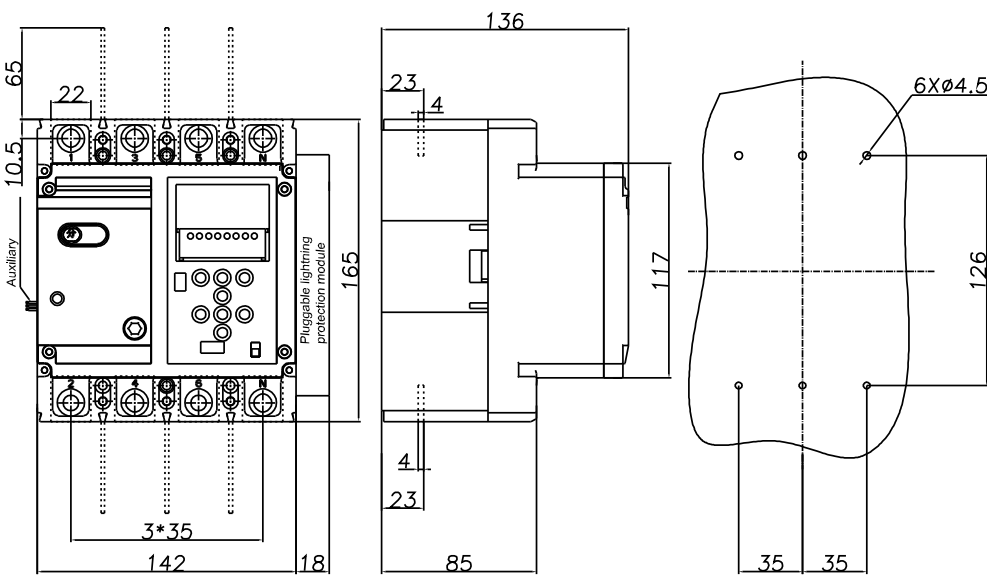
Fig. 60

As shown above.
[Up/Down] button to control the highlighted display position or adjust parameters.
[OK] button to enter the corresponding setting menu/switch setting options.
[Return] button to return to the previous menu.
Level 2 password is required to log in maintenance menu which will be automatically logged out when there is no keyboard operation within return time after logging in
Maintenance menu can check and operate the event record, login password and switch status, etc.
Trial trip: if the switch is in close status, the trial trip function will be started to check whether release can be normally carried out
Self-inspection: the switch starts the self-inspection program to check whether there are error parameters
Mechanical test: the switch automatically conducts the on and off operation, with an interval of 10 to 999 seconds/time

Outline and Installation Dimensions

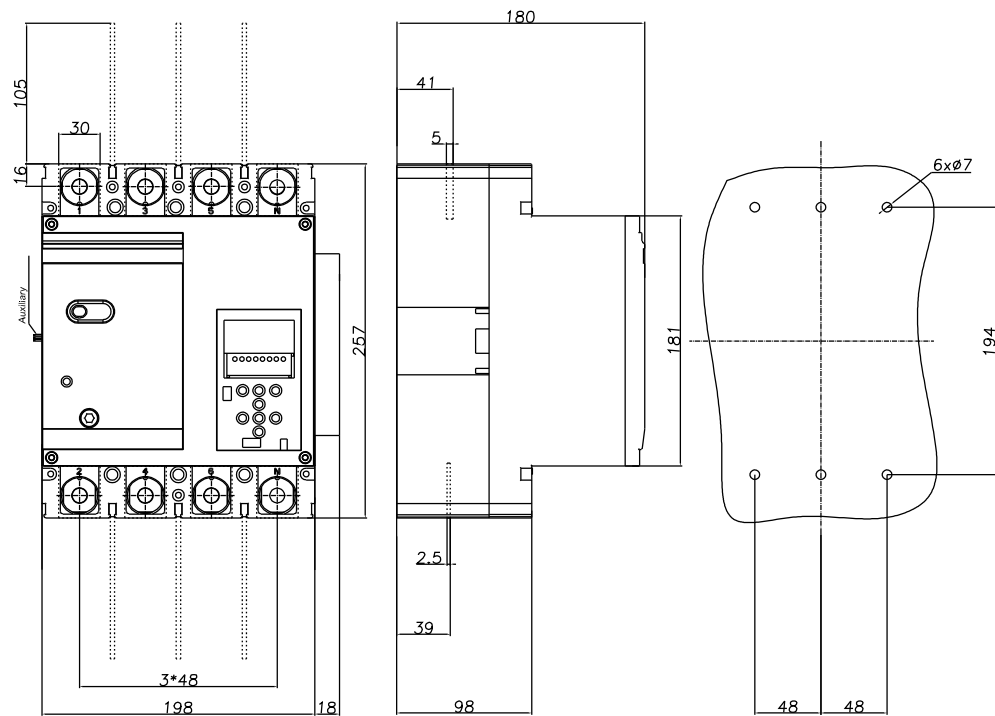


MT88LM-125

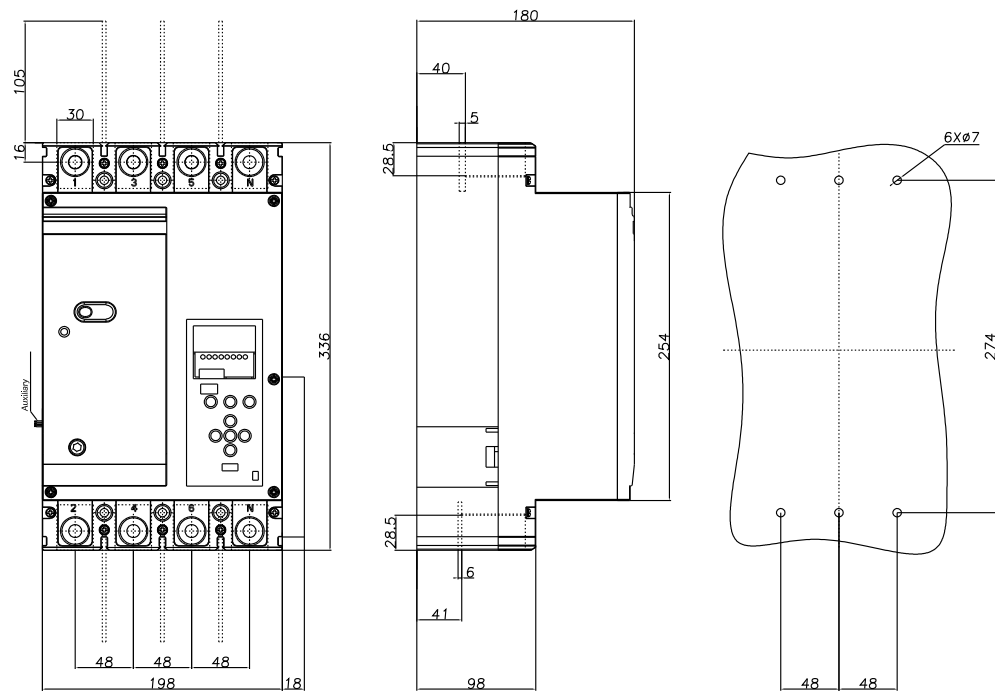


MT88LM-250

Outline and Installation Dimensions



MT88LM-400



MT88LM-630

Match of cross-sectional area and the rated current of connecting wire

Cross-sectional area with rated current not greater than 400A but matched with the connecting wire

Rated current (A)	16	20	25	32	40	50	63	80	100
Sectional area of wire (mm2)	2.5	2.5	4.0	6.0	10	10	16	25	35
Rated current (A)	125	140	160	180	225	250	315	350	400
Sectional area of wire (mm2)	50	50	70	95	95	120	185	185	240

Cross-sectional area with rated current greater than 400A but matched with the connecting wire

Rated current A	Cable		Copper bar	
	Cross-sectional area m2	Quantity	Dimension mmxmm	Quantity
500	150	2	30*5	2
630	185	2	40*5	2



NOTE

[illegible]