F-FTU200 Series Operation Instruction

Foreword

Please read this chapter carefully before using this product!

This chapter introduces the safety precautions before using this product. Please make sure the content of this chapter is fully read and understood before installation and usage. Our company will not undertake any responsibilities for any damage or injury caused by improper operations because of ignoring relevant warning in this operation instruction.

Before operating this device, relevant professional personnel shall read this instruction carefully and well understand the content.

Operation instructions and warnings:

The following standard definitions will be adopted in this operation instruction.

Danger! Ignoring of safety precautions may cause personal death, serious personal injury or serious equipment damage.

Warning! Ignoring of safety precautions may cause personal death, serious personal injury or serious equipment damage.

Caution! Ignoring of safety precautions may cause a slight personal injury or equipment damage, especially the damage of device or the equipment protected by the device.

- **Danger!**

When the primary system is live working, secondary open circuit for the current transformer connected to the device is absolutely forbidden, and the open of this circuit may cause extremely dangerous high voltage.

- **Warning!**

Some parts of the device may have high voltage when the electrical device is running. Improper operation may cause serious personal injury or equipment damage.

Only qualified professional personnel are allowed to operate the device or work nearby the device. The operators professional shall well understand the precautions, working flows and safety regulations mentioned in this instruction.

- **Caution!**

Grounding terminals of the device shall be firmly grounded.

The device is only permitted to run in atmospheric environment that specified in the technical specifications, and abnormal vibrations shall be avoided in its running environment.

When connect the AC voltage current circuit or power circuit, please make sure they conform to the rated parameters of the device.

When the output terminals of the device are connected to external circuit, please check carefully the voltage of external power to prevent overheating of the circuit.

Carefully check the cable connected to the device, preventing applying too much external force on it.

Contents

Chapter 1: Overview

1.1 Description

F-FTU200 overhead line protection switch intelligent controller is medium voltage overhead line grid monitoring unit, it can be equipped with F-OCB100 type vacuum circuit breaker for achieve of automatic monitoring, fault analysis and event records.

Its given to us a safety power grid for cutting line fault and automatic recovery operation and power automation.
F-FTU200 series is suitable for up to 35kV outdoor switchgear using, include: vacuum circuit breakers, oil circuit breakers and gas circuit breakers.
F-FTU200 intelligent controller is gathering with line protection, control, measurement and monitoring of voltage and current signals integrated automation and control devices outdoors.

F-FTU200 is an automatic management unit for single way/multi ways/ring network/two power sourcing, provided with all voltage and current signals and all functions.
F-FTU200 column switch intelligent controller supports:
Wireless (GSM/GPRS/CDMA), Ethernet mode, WIFI, optical fiber, power line carrier, RS232/485, RJ45 and other forms of communication, and can access other station premises equipment (such as TTU, FTU, DTU, etc.).

1.2 Protection

49	Thermal Overload (Over load)
50	Instantaneous Overcurrent (Ph.OC)
50G/N/SEF	Instantaneous Sensitive Earth Fault (SEF)
27/59	Under/Over Voltage (Ph.OV/Ph.UV)
51c	Cold load pickup (Cold load)

1.3 Supervision

60CTS	CT Supervision
60VTS	VT Supervision

1.4 Control

79	Auto Reclose
86	Lockout
	CB Control

1.5 Features

Password Protection – 2 levels.

50Hz systems and two phase/three phase wiring method are available, so that the use scope of device is extended.

Protection configuration is complete, and all protection functions can be switched on and off flexibly.

4-way intellectual switching value input.

Large capacity flash memory can record at least 100 times of historical events, and no data will loss even the power is off.

Circuits operating loop can be used both the direct or alternating current, self-adaptation open/close brake function, which can co-work with various of breakers, and the operation is simple and reliable.

The device has complete self-inspection function to in-service monitor the working conditions of various parts of the device, ensuring the reliability of the device.

1.6 Monitoring Functions

Primary Currents Phases and Earth Direction

Secondary PT Voltage

Frequency

Binary Input/Output status

Trip circuit healthy/failure

Time and date

Fault records

Event records

1.7 Hardware

4CT 1 VT 7 Binary Inputs 2 Binary Outputs

4CT 2 VT 7 Binary Inputs 2 Binary Outputs

1.8 Data Storage and Communication

RS485, RS232, RJ45 port

Protocols –IEC60870-5-101, IEC60870-5-104, DNP3.0 or Modbus RTU

Event Records

Fault Records

Measurands

Commands

Time Synchronism

Viewing and Changing Settings

Chapter 2: Technical Performance Index

2.1 Inputs and Outputs

Phase Current Inputs

Quantity	3
Rated Current In	5A
Measuring Range	20 x In
Instrumentation≥ 0.1xIn	±1% In
Frequency	50Hz
Thermal Withstand:	
Continuous	2 x In
10 Second	10 x In
1 Second	40 x In
Burden @ In	≤0.2VA (5A Phase element)

Sensitive Earth Current Inputs

Quantity	1
Rated Current In	5A
Measuring Range	2 x In
Instrumentation≥ 0.1xIn	±1% In
Frequency	50/60Hz
Thermal Withstand:	
Continuous	2 x In
10 Second	10 x In
1 Second	40 x In
Burden @ In	≤0.02VA (1A Earth element)

Voltage Inputs

Quantity	1 PT voltage
Nominal Operating Range	40…120 Vrms 0...200 Vrms
Instrumentation≥0.8xVn Burden @ 110V	±1% Vn 0.06 VA
Overvoltage Withstand	240 Vrms

Auxiliary Supply

DC Voltage AC Voltage	220V Range 165 to 365V 220 V AC 50Hz Range 165 to 265Vrms AC 50/60Hz ±5%
Power consumption	≤10W

Binary Inputs

Number	7
Operating Voltage Maximum dc current for operation	24V DC 2mA

Binary Outputs

Number	2
Operating Voltage Operating Mode	220V DC User selectable - Self or Hand/Electrical Reset or pulsed
Operating Time from Energizing Binary Input	<20ms

2.2 Unit Design

Indication User Interface	16 Character 4 line Display 10 LED's 11 Navigation Keys
Weight	18kg

2.3 Serial Interface

Communication Port	RS485, RS232, RJ45
Protocols	IEC60870-5-101 IEC60870-5-104 DNP3.0 MODBUS RTU

2.4 Data Storage

Events	100 times

2.5 Mechanical Tests

Vibration (Sinusoidal) --- IEC 60255-21-1 Class I

Type	Level	Variation
Vibration response	0.5gn	≤5%
Vibration withstand	1.0gn	≤5%

Shock and Bump --- IEC 60255-21-2 Class I

Type	Level	Variation
Shock response	0.5gn, 11ms	≤5%
Shock withstand	15gn, 11ms	≤5%
Bump test	10gn,16ms	≤5%

Shock and Bump --- IEC 60255-21- 3 Class I

Type	Level	Variation
Seismic response	X-plane-3.5mm Displacement below crossover freq (8-9Hz) 1gn and above Y-plane-1.5mm Displacement below crossover freq (8-9Hz) 0.5gn above	≤5%

Mechanical Classification

Durability	>106 operations

2.6 Electrical Tests

Insulation --- IEC 60255-5

Type	Level
Between any terminal and earth	2.0 kV AC RMS for 1 min
Between independent circuits	2.0 kV AC RMS for 1 min
Across normally open contacts	kV AC RMS for 1 min

High Frequency Disturbance --- IEC 60255-22-1 Class Ⅲ

Type	Level	Variation
Common (longitudinal) mode	2.5 kV	≤5%
Series (transverse) mode	1.0 kV	≤5%

High Frequency Disturbance --- IEC 60255-22-2 Class Ⅳ

Type	Level	Variation
Contact discharge	8.0 kV	≤5%

Fast Transients --- IEC 60255-22-4 Class A (2002)

Type	Level	Variation
5/50 ns 2.5 kHz repetitive	4 KV	≤5%

Surge Immunity --- IEC 60255-22-5

Type	Level	Variation
Analog Inputs: Line to Earth	4.0 kV	≤10%
Case, Aux Power & I/O: Line to Earth	2.0 kV	≤10%
RS485 Comms port: Line to Earth	1.0 kV	No Data Loss
Analog Inputs: Line to Line	1.0 kV	≤10%
Case, Aux Power & I/O: Line to Line	1.0 kV*	≤10%

* Note 45ms DTL pick-up delay applied to binary inputs

Conducted Radio Frequency Interference --- IEC 60255-22-6

Type	Level	Variation
0.15 to 80 MHz	10 V	≤5%

Radiated Radio Frequency --- IEC 60255-25

Type	Limits at 10 m, Quasi-peak
30 to 230 MHz	40 dB(μV)
230 to 10000 MHz	47 dB(μV)

Conducted Radio Frequency

Type	Limits	
	Quasi-peak	Average
0.15 to 0.5 MHZ	79 dB(μV)	66 dB(μV)
0.5 to 30 MHZ	73 dB(μV)	60 dB(μV)

Radiated Immunity --- IEC 60255-22-3 Class III

Type	Level
80 MHz to 1000 MHz Sweep	10 V/m
1.4GHz to 2.7GHz Sweep	10 V/m
80,160,380,450,900,1850,2150 MHz Spot	10 V/m

2.7 Climatic Tests

Temperature --- IEC 60068-2-1/2

Operating Range	-55°C to +70°

Humidity --- IEC 60068-2-78

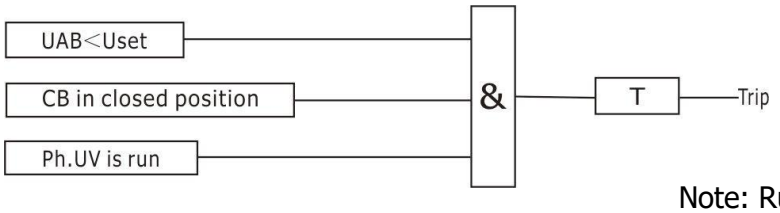
Operational test	56 days at 40°C and 93% relative humidity

Chapter 3: Protection Functionality

3.1 Function Description

Under Voltage (Ph.UV)

PT voltage is used as the criterion of undervoltage protection. There are two sections of undervoltage protection here.
Action Logic diagram：

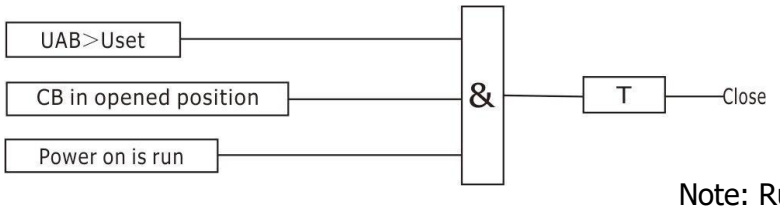


Note: Run is "√", Stop is "×".

UAB—Secondary PT voltage Uset—Pickup voltage T—Delay time

Power on

The device will control the CB to close when the PT voltage greater than pickup voltage.
Action Logic diagram：

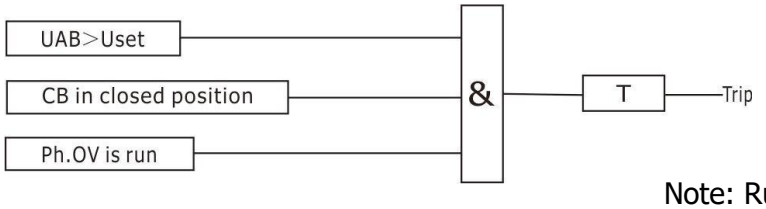


Note: Run is "√", Stop is "×".

UAB—Secondary PT voltage Uset—Pickup voltage T—Delay time

Over Voltage (Ph.OV)

PT voltage is used as the criterion of over-voltage protection. There are two sections of overvoltage protection here.
Action Logic diagram：

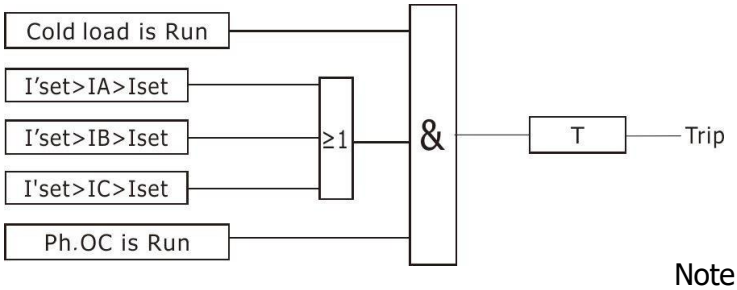


Note: Run is "√", Stop is "×".

UAB—Secondary PT voltage Uset—Pickup voltage T—Delay time

51c Cold Load Pickup (Cold Load)

If a circuit breaker is closed onto a "cold" load, i.e.one that has not been powered for a prolonged period, this can impose a higher than normal load-current demand on the system which could exceed normal settings. These conditions can exist for an extended period and must not be interpreted as a fault. To allow optimum setting levels to be applied for normal operation, the cold load pickup feature will apply alternative current settings for a limited period. The feature resets when either the circuit breaker has been closed for a settable period, or if the current has reduced beneath a set level for a user set period.
Action Logic diagram：



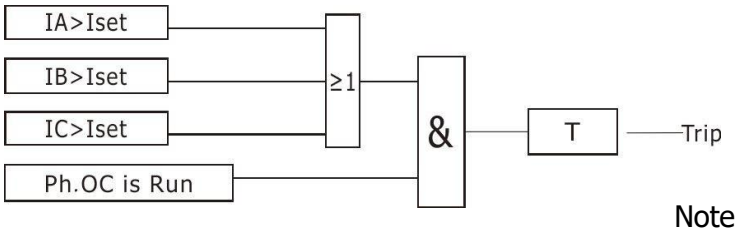
Note: Run is "√", Stop is "×".

IA IB IC—Measured current　　I'set—Cold load pickup current

Iset—Ph.OC pickup current　　T—Delay time

50P Phase Fault (Ph.OC)

Three sections phase overcurrent protection for lines include Ph.OC1 (instantaneous overcurrent protection), Ph.OC2 (definite time overcurrent protection) and Ph.OC3 (overcurrent protection). All of which are definite time actuate features.
Action Logic diagram：



Note: Run is "√", Stop is "×".

IA IB IC—Measured current　Iset—Pickup current　T—Delay time

50G/50N Sensitive Earth Fault (SEF)

When the switch is set at the end of the line, the zero sequence current can be used to protect the earth fault when the capacitance of the power supply side to the earth is large and the capacitance of the load side to the earth is small.

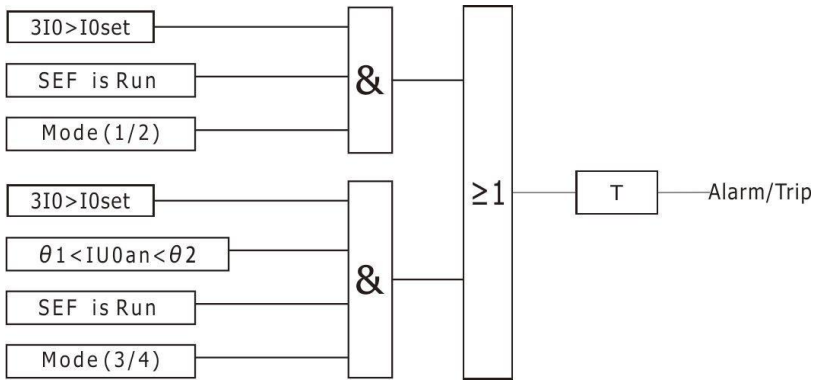
When the switch is set at the end of the line, the ground fault on the load side of the switch can be detected only according to the zero sequence current. However, if there is a large capacitance to ground on the load side, it is possible to detect the zero sequence current and misoperate when there is a ground fault on the power side. Therefore, it is necessary to judge the direction and fault point of the grounding current according to the amplitude of the zero sequence current and the phase angle

between the zero sequence voltage and the current, in order to prevent this unnecessary misoperation.

The angle between zero sequence directionality refers to the angle between zero sequence voltage and zero sequence current and the angle of zero sequence current leading to zero sequence voltage. When conducting zero sequence directionality test, the starting angle and ending angle of zero sequence action interval can be modified. After being put into operation, the zero sequence current in the section shall exceed the set value, and the zero sequence directional protection can only operate, otherwise it will not operate.

For example, the start angle of zero sequence action section is set to 240 ° and the end angle of zero sequence action section is set to 300 ° . At this time, enter the "VIEW" → "Meter" menu to check the angle of IU0an (IU0an is the angle of zero sequence current ahead of zero sequence voltage). Only when it is between 240 ° ~ 300 ° and the zero sequence current exceeds the set value, the zero sequence directional overcurrent will act, otherwise it will not act.

Action Logic diagram：



Note: Run is "√", Stop is "×".

3I0—SEF current I0set—Pickup current T—Delay time

θ 1—Start angle θ 2—End angle

IU0an—Angle of zero sequence current ahead of zero sequence voltage

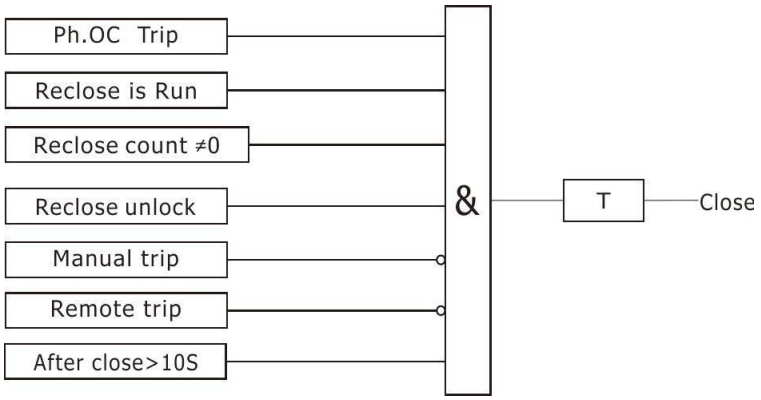
Note: If zero sequence directional overcurrent protection is required, it shall be specified when ordering. The normal delivery is zero sequence overcurrent without direction.

79 Auto - Reclose (Reclose)

A high proportion of faults on an overhead line network are transient and can be cleared quickly by high speed tripping followed by an automated circuit breaker reclose sequence.

The function provides phase fault and earth fault/sensitive earth fault sequences of up to 5 trip i.e.4 reclose attempts before lockout, and the charging period of the reclose is 10 seconds.

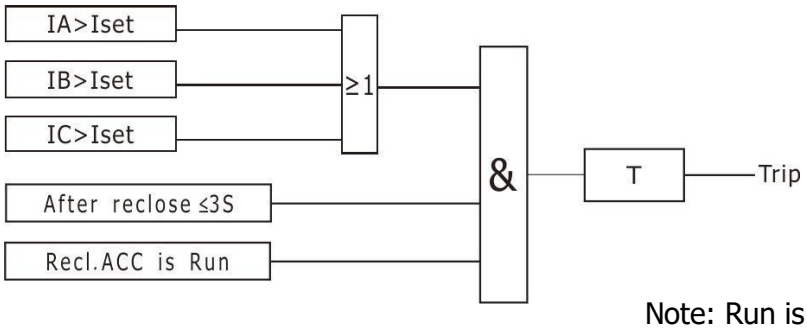
Action Logic diagram：



Note: Run is "√", Stop is "×".

Reclosing acceleration (Recl.ACC)

When switching on reclosing acceleration, if accidents happened in 3S after the reclose is operated, the phase over current protection will accelerate the operation.
Action Logic diagram：

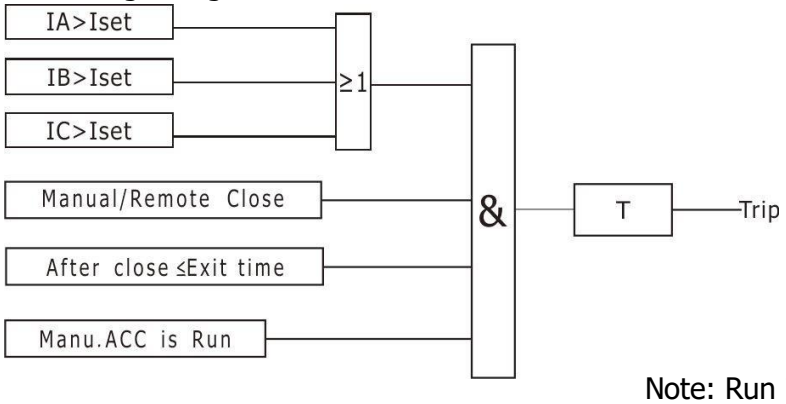


Note: Run is "√", Stop is "×".

IA IB IC—Measured current Iset—Pickup current T—Delay time

Manual closing acceleration (Manu.ACC)

When switching on manual closing acceleration, if accidents happened in the exit time after operated the close, the phase over current protection will accelerate the operation. The exit time of acceleration can be adjusted.
Action Logic diagram：

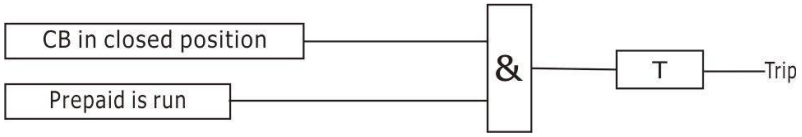


Note: Run is "√", Stop is "×".

IA IB IC—Measured current Iset—Pickup current T—Delay time

Prepaid (Optional features)

It is used to connect the dosing tank, the device will control the CB to trip when the dosing tank is in deficit.
Action Logic diagram：



Note: Run is "√", Stop is "×".

3.2 Constant Value Parameters

All values are given primary side.

Under Voltage (Ph.UV)

Description		Setting range	Step length
PH.UV	Operating mode	1. Trip 2. Alarm	
	Pickup voltage	0.01～42KV	0.01KV
	Delay time	0～99.99S	0.01S

Power on

Description		Setting range	Step length
Power on	Pickup voltage	0.01～42KV	0.01KV
	Delay time	0～99.99S	0.01S

Over Voltage (Ph.OV)

Description		Setting range	Step length
PH.OV	Pickup voltage	0.01～42KV	0.01KV
	Delay time	0～99.99S	0.01S

51C Cold Load Pickup (Cold load)

Description		Setting range	Step length
Cold load	Pickup current	1～6000A	0.1A
	Delay time	0～99.99S	0.01S

50P Phase Fault (Ph.OC)

Description		Setting range	Step length
PH.OC1	Pickup current	0.1～6000A	0.1A
	Delay time	0～9.99S	0.01S
PH.OC2	Pickup current	0.1～6000A	0.1A
	Delay time	0～9.99S	0.01S
PH.OC3	Pickup current	0.1～6000A	0.1A
	Delay time	0～99.99S	0.01S

50G/N Sensitive Earth Fault (SEF)

Description		Setting range	Step length
SEF	Operating mode	1.Alarm 2.Trip	

	Pickup current	0.1～999.9A	0. 1A
	Delay time	0～600S/M	0.1S/M
	Start angle	0～360°	1°
	End angle	0～360°	1°

79 Auto - Reclose (Reclose)

Description		Setting range	Step length
Reclose	Reclose count	1:One 2:Two 3:Three 4:Four	
	Delay time	0～99.99S	0.01S
	Reset time	1.2～180S	0.1S

Reclosing acceleration (Recl.ACC)

Description		Setting range	Step length
Recl.ACC	Pickup current	0.1～6000A	0.1A
	Delay time	0～9.99S	0.01S

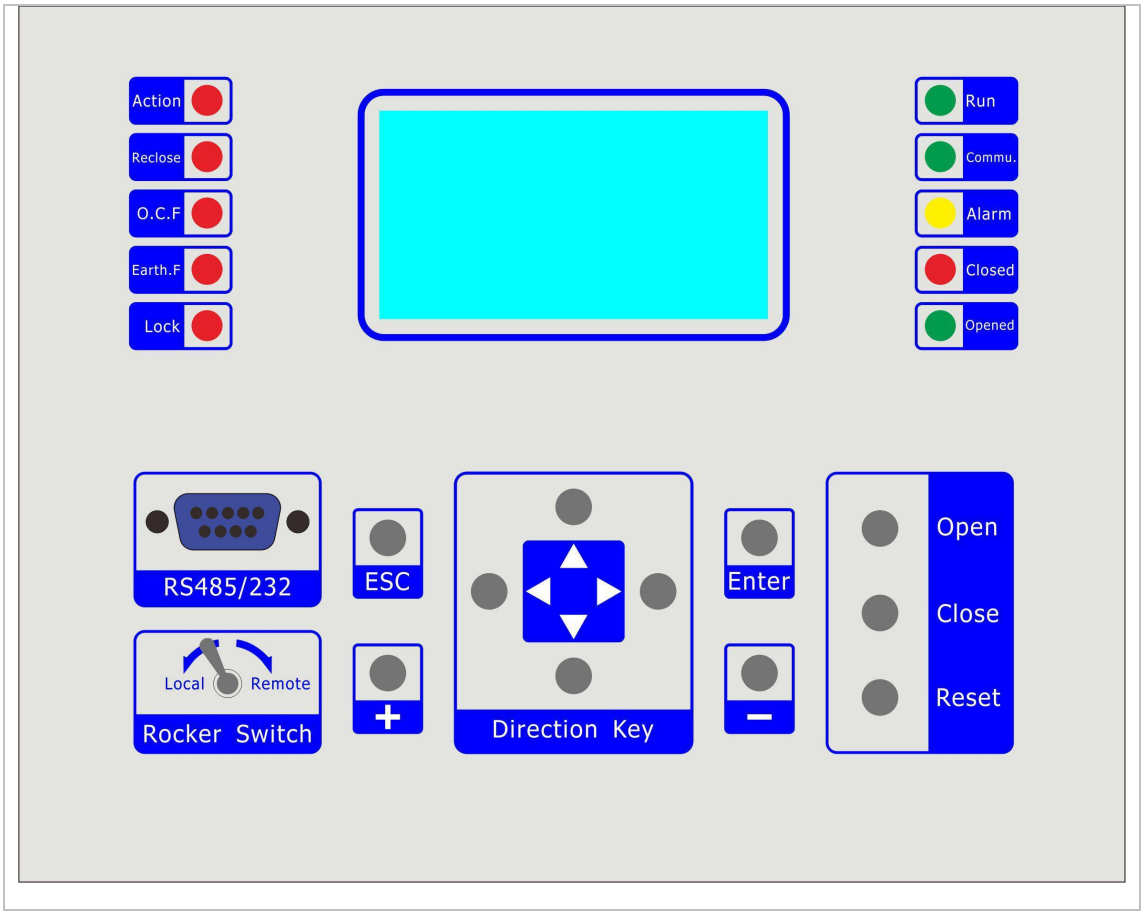
Manual closing acceleration (Manu.ACC)

Description		Setting range	Step length
	Exit time	0.1～9.99S	0.01S
Manu.ACC	Pickup current	0.1～6000A	0.1A
	Delay time	0～9.99S	0.01S

Prepaid (Optional features)

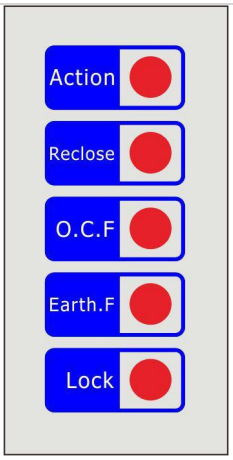
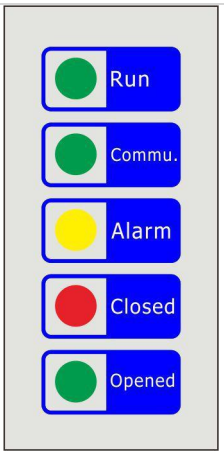
Description		Setting range	Step length
Prepaid	Delay time	0～99.99S	0.01S

Chapter 4: User Interface



The operator interface is designed to provide a user friendly method of controlling, viewing menus, entering settings and retrieving data from the relay. 11 buttons are provided for navigation around the menu structure.

4.1 LEDs

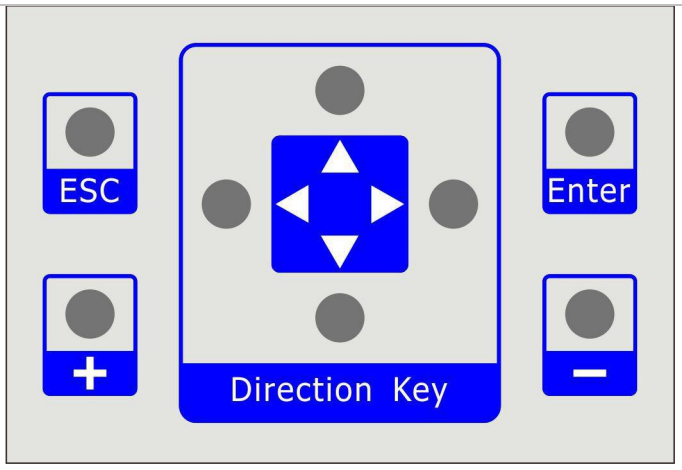
	
Operation Status	Operation Status

LED Categories		LED Status		
Name	Color	ON	OFF	Flashing
Run	Green	crash	crash	Working properly
Commu	Green	No communication	No communication	Normal communication
Alarm	Yellow	Device failure or protection alarm	Running normally	——
Closed	Red	Switch is on	Switch is not on	——
Opened	Green	Switch is off	Switch is not off	——
Action	Red	Protective action	No protective action	——
Reclos	Red	Reclose export	Normal	——
OC.F	Red	Over current alarm	Normal	——
Earth.F	Red	Ground fault action	Normal	——
Lockout	Red	Reclosing lockout alarm	Normal	——

4.2 Keypad

The main keys

User actions are mainly concentrated on the operation panel.



Key	Function

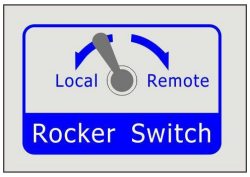
+	Increase the number
—	Reduce the number
↑	Move up or page up
↓	Move down or page down
←	Move left
→	Move right
ESC	Return to the superior or Cancel the operation
Enter	Enter the menu of confirm the operation
When you press the button，the buzzer of device will sing make a sound，so that the operation is valid; if not, please do it again.	

Operation buttons

Key	Function
Reset	Touch reset button, you can reset protect information
Close	Touch closing button, close switch
Open	Touch tripping button, trip switch
When you press the button，the buzzer of device will make a sound，so that the operation is valid; if not, please do it again.	

Note: When you press the closing-button or tripping-button, you must make sure the device is unlock; if the lockout-light is on, please press the reset-button to reset the device, so that you can close or trip the switch.

Switch rocker

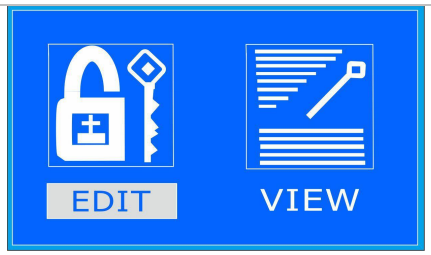
Key	Function
	When the rocker is switched to the local, only the opening and closing operation can be carried out on the panel or remote control; when the rocker is switched to the remote, only the communication opening and closing operation can be carried out.

4.3 LCD

A 4 line by 16 character liquid crystal display with power save operation indicates the relay identifier, settings, instrumentation, fault data and control commands.

4.4 The Main Menu

Press “Enter” when on the main screen, as shown below, including “EDIT” and “VIEW” menu item. Select the corresponding menu item with the [←] key, [→] and press "Enter" button to enter the corresponding sub-menu, press the “ESC” key to return to the previous screen.

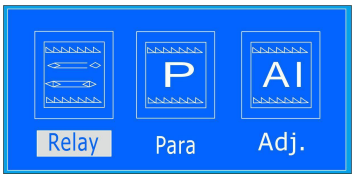


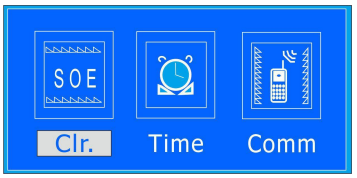
Primacy Menu

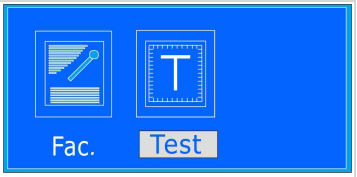
4.5 Submenu

Edit submenu

Choose the edit options, the screen will enter the submenu of the Edit menu, as shown below, the submenu includes "Relay"、"Para"、"Chnl"、"Clr"、"Time"、"Comm"、 "Fac"、 "Test".





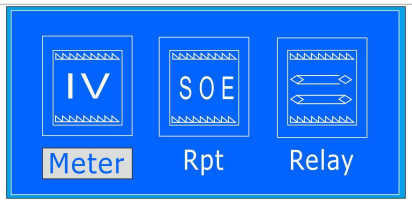


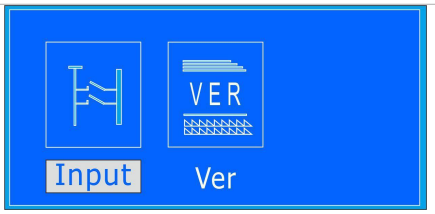
Submenu of edit

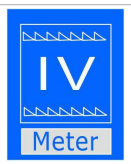
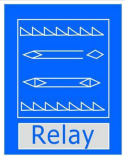
	Enter "Relay" submenu, you can modify the protection feature.
	Enter "Para" submenu, you can modify or view other parameters. Like communication address, baud rate, password, trip and close pulse time.
	Enter "Adj." submenu, current and voltage values can be corrected, press the function key "Enter" to be modified.
	Enter "Clr." submenu, you can clear out the trip report, the alarm report, the SOE report, the count report and all report.
	Enter the "Time" submenu will modify or check the time.
	Enter "Comm" Sub-menu, choose the way to communication, it include "GSM"and "GPRS".
	Enter "Fac." Sub-menu, modify and view the factory settings.

View submenu

Choose the view options, the screen will enter the submenu of the View menu, as shown below, the sub-menu includes "Meter", "RPT", "Relay", "Input", "Ver".





View submenu	
	Enter "Meter" submenu, you can view the primary side measurement data include: PT voltage, phase current, zero sequence current, frequency, phase angle.
	Enter "RPT" submenu, you can view trip report, alarm report, SOE report, count report.
	Enter "Relay" submenu, you can view each protection feature is invested and set up the parameters
	Enter the "Input" submenu, you can view the input signal. The input signal includes: Breaker close, Prepaid open, Prepaid close, Spring ready.
	Enter "Ver" submenu, you can view the product model, serial number and date of manufacture.

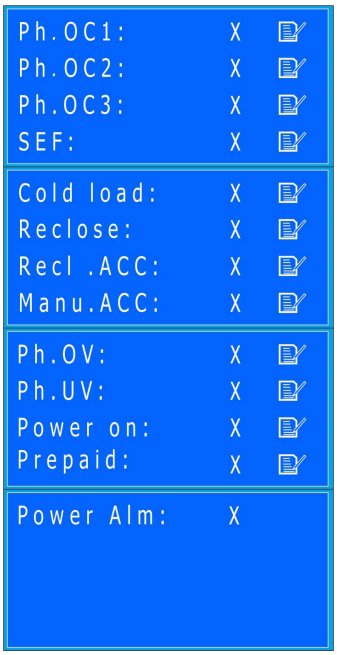
4.6 Entering the password interface

According to the above operation, before entering each item will first enter a password input interface to prevent professional staff misuse. The device original password is "0099", as shown below, press [←] and [→] keys to switch, press the [+] and [-] keys to increase and decrease the number of line with the correct password press "Enter" button to enter.

Password interface

4.7 Relay setting

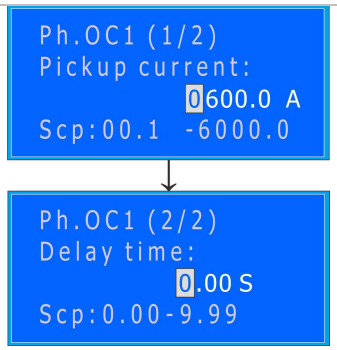
Select the "Relay" in the Edit submenu item, press the function key "Enter" to enter the password screen, enter the correct password to enter the "Relay" submenu, as Shown below, each item has a checkbox and set values.



1. Ph.OC1: instantaneous overcurrent Protection
2. Ph.OC2: definite time overcurrent protection
3. Ph.OC3: overcurrent protection
4. SEF: sensitive earth fault protection
5. Cold Load: cold load pickup
6. Reclose: OC reclose
7. Recl.ACC: reclosing acceleration protection
8. Manu.ACC: manual closing acceleration protection
9. PH.OV: overvoltage protection
10. PH.UV: low voltage protection
11. Power on: power on protection
12. Prepaid: debt protection
23. Power Alm: stored energy alarm

Three sections phase overcurrent

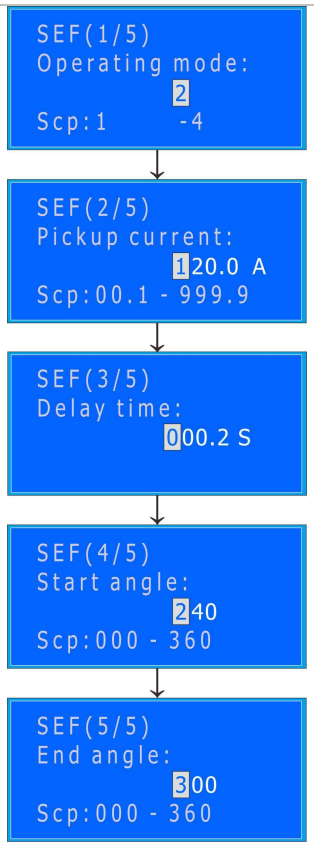
Select Ph.OC menu  option press "Enter" key to enter, operational processes as shown below:

	Step 1: Setting the overcurrent protection current value, the current value can be between 0.1A ~ 6000A. Step 2: Setting the overcurrent delay time, the delay time can be between 0S ~ 9.99S. Note: Press [↓] key to switch to next screen, press the [+] and [-] keys to switch the modified current value and delayed time.
The operational processes of simple overcurrent protection setting	

Note: Here are three-stage overcurrent protection, the use of the other two are the same.

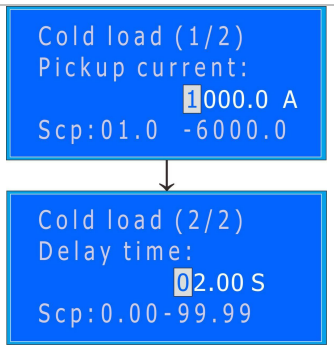
Sensitive earth fault

Select SEF menu  option press "Enter" key to enter, operational processes as shown below:

	Step 1: Choose the SEF operating mode (1: Alarm 2: Trip 3: Direction alarm 4: Direction trip). Step 2: Setting the SEF protection current value, the SEF current value can be between 0.1A ~ 999.9A. Step 3: Setting the SEF delay time, the delay time can be between 0 ~ 600.0S/M. Step 4: Setting the SEF start angle, the angle can be between 0 ~ 360. Step 5: Setting the SEF end angle, the angle can be between 0 ~ 360. Note: 1.Press [↓] key to switch to next screen, press the [+] and [-] keys to switch the modified current value and delayed time. 2. Step 4 and step 5 only need to be set when zero sequence direction overcurrent is required.
The operational processes of SEF protection setting	

Cold Load

Select Cold Load menu option press "Enter" key to enter, operational processes as shown below:



Step 1: Setting the cold load protection current value, the current value can be between 1A ~ 6000A.

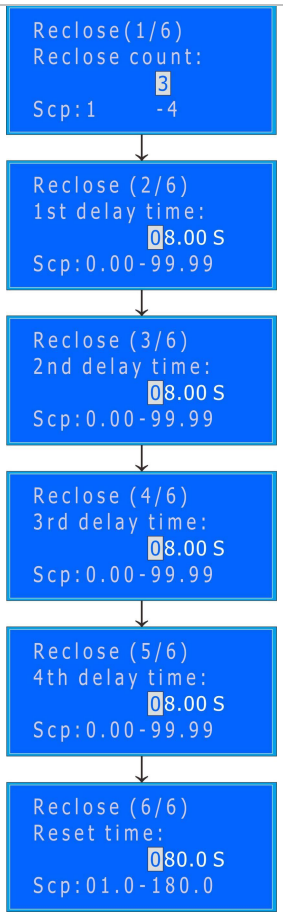
Step 2: Setting the cold load delay time, the delay time can be between 0S ~ 99.99S.

Note: Press [↓] key to switch to next screen, press the [+] and [-] keys to modified current value and delayed time.

The operational processes of cold load protection setting

Automatic reclosing (Reclose)

Select Reclose menu option press "Enter" key to enter, operational processes as shown below:



Step 1: Choose the automatic reclosing times (1: One, 2: Two, 3: Three, 4: Four).

Step 2: Setting the 1st delay time, the delay time can be between 0S ~ 99.99S.

Step 3: Setting the 2nd delay time, the delay time can be between 0S ~ 99.99S.

Step 4: Setting the 3rd delay time, the delay time can be between 0S ~ 99.99S.

Step 5: Setting the 4th delay time, the delay time can be between 0S ~ 99.99S.

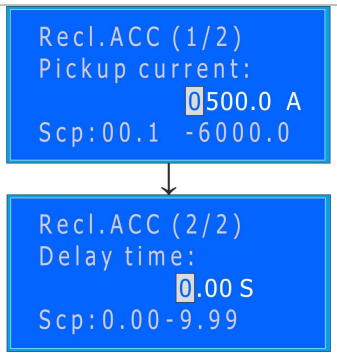
Step 6: Setting the automatic reclosing reset time, the reset time can be between 1.2S~ 180.0S.

Note: Press [↓] key to switch to next screen, press the [+] and [-] keys to switch the mode and modified delayed time/reset time.

The operational processes of automatic reclosing setting

Reclosing acceleration (Recl.ACC)

Select Recl.ACC menu option press "Enter" key to enter, operational processes as shown below:



Step 1: Setting the reclosing acceleration protection current value, the current value can be between 0.1A ~ 6000A.

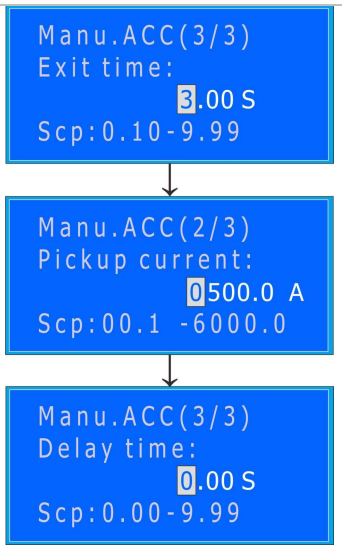
Step 2: Setting the delay time, the delay time can be between 0S ~ 9.99S.

Note: Press [↓] key to switch to next screen, press the [+] and [-] keys to switch the modified current value and delayed time.

The operational processes of reclosing acceleration protection setting

Manual closing acceleration (Manu.ACC)

Select Manu.ACC menu option press "Enter" key to enter, operational processes as shown below:



Step 1: Setting the manual closing acceleration exit time, the exit time can be between 0.1S ~ 9.99S.

Step 2: Setting the manual closing acceleration protection current value, the current value can be between0. 1A ~6000A.

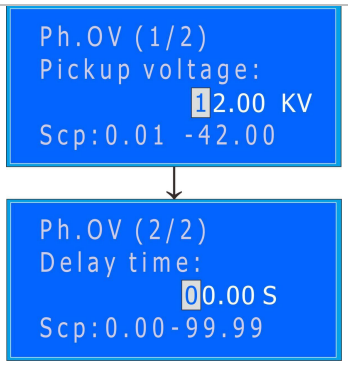
Step 3: Setting the delay time, the delay time can be between 0S ~ 9.99S.

Note: Press [↓] key to switch to next screen, press the [+] and [-] keys to switch the modified current value and delayed time.

The operational processes of manual closing acceleration protection setting

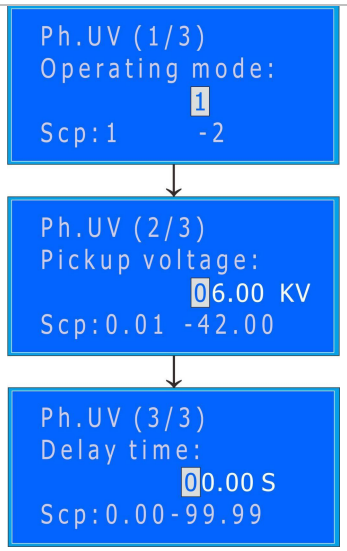
Over voltage protection (Ph.OV)

Select PH.OV menu option press "Enter" key to enter, operational processes as shown below:

	Step 1: Setting the overvoltage protection voltage value, the voltage value can be between 0.01KV ~ 42.0KV. Step 2: Setting the delay time, the delay time can be between 0S ~ 99.99S. Note: Press [↓] key to switch to next screen, press the [+] and [-] keys to switch the modified voltage value and delayed time.
The operational processes of overvoltage protection setting	

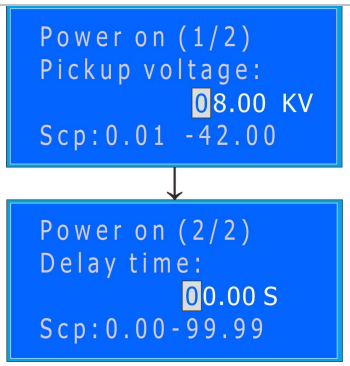
Low-voltage protection (Ph.UV)

Select PH.UV menu option press "Enter" key to enter, operational processes as shown below:

	Step 1: Choose the low voltage protection operating mode (1: Trip 2: Alarm). Step 2: Setting the low voltage protection voltage value, the voltage value can be between 0.01KV ~ 42.0KV. Step 2: Setting the delay time, the delay time can be between 0S ~ 99.99S. Note: Press [↓] key to switch to next screen, press the [+] and [-] keys to switch the modified voltage value and delayed time.
The operational processes of low voltage protection setting	

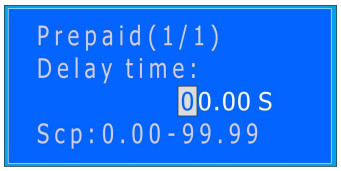
Power on

Select Power on menu  option press "Enter" key to enter, operational processes as shown below:

	Step 1: Setting the Power on protection voltage value, the voltage value can be between 0.01KV ~ 42.0KV. Step 2: Setting the delay time, the delay time can be between 0S ~ 99.99S. Note: Press [↓] key to switch to next screen, press the [+] and [-] keys to switch the modified voltage value and delayed time.
The operational processes of Power on protection setting	

Prepaid (Optional features)

Select Prepaid menu  option press "Enter" key to enter, operational processes as shown below:

	Step 1: Setting the delay time, the delay time can be between 0S ~ 99.99S. Note: Press the [+] and [-] keys to switch the delayed time.
The operational processes of prepaid protection setting	

4.8 Save parameter

After setting, press "ESC" key to exit, if modified below figure will show. If you need to save press "Enter" key and input password, otherwise press "ESC" key.

4.9 Parameter set

Press the EDIT → Para, enter the "parameter set". Press the [+] and [-] keys to modified parameter value.

CT, CT0 rate set

	CT rate is the three phase current rate. The value of CT ratio is equal to the primary side current value divided by the secondary side current value.
	CT0 rate is the real zero sequence current rate. The value of CT0 ratio is equal to the primary side current value divided by the secondary side current value.
	PT rate is the power voltage rate. The value of PT ratio is equal to the primary side voltage value divided by the secondary side voltage value.

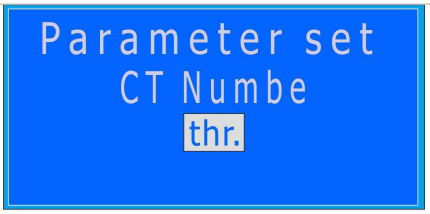
Note:

1 Different current transformer, CT ratio becomes different.

2 Different current transformer, CT0 ratio becomes different.

3 Different PT power voltage transformer, PT ratio becomes different.

Wiring mode set

	Phase current wiring mode. Thr.: Three-phase Two: Two-phase
	zero sequence current wiring mode. Comp: Synthetic zero sequence Real: Real mining zero sequence

Note: The wiring mode must be the same as that of the circuit breaker.

Close and trip pulse time set

"Close pulse time" is the discharge time for close coil. "Trip pulse time" is the discharge time for trip coil.

Note: Please do not modify the trip and close pulse time.

Password set

The device initial password is "0099", the password for the user to modify from the "0000" ~ "9999", when revised press "Enter" key to confirm, enter the password before the modification.

Set the communication parameter

Name	Setting range	Step length	Description
Comm1 Status	0～1	1	0: Close this channel 1: Open this channel
Comm1 Baud	0～38400	1	Default 9600
Comm1 Protocol	1～4	1	1: IEC60870-5-101 2: IEC60870-5-104 3: DNP3.0 4: MODBUS
Comm1 Balance	0～1	1	0: Unbalanced 1: Balance
Comm1 Address	1～65535	1	Source address
Comm1 Report	0～65535	1	Destination address
Comm1 Upload	0～1	1	0: Do not upload actively 1: Active upload
Comm2 Status	0～1	1	0: Close this channel 1: Open this channel
Comm2 Baud	0～38400	1	Default 9600
Comm2 Protocol	1～4	1	1: IEC60870-5-101 2: IEC60870-5-104 3: DNP3.0 4: MODBUS
Comm2 Balance	0～1	1	0: Unbalanced 1: Balance
Comm2 Address	1～65535	1	Source address
Comm2 Report	0～65535	1	Destination address
Comm2 Upload	0～1	1	0: Do not upload actively 1: Active upload

Signal type	1～2	1	1: Single point 2: Double point
Control type	1～2	1	1: Single point 2: Double point
Meter type	1～4	1	1: Normalized telemetry 2: Normalized telemetry without quality 3: Standardized telemetry 4: Short floating point telemetry
COT len	1～2	1	Address length COT length 1: 1 byte 2: 2 byte
I factor	0.01～100	0.01	Phase current multiplier
I deadband	0.1～1000	0.1	Phase current dead zone
I0 factor	0.01～100	0.01	Zero sequence current multiplier
I0 deadband	0.1～1000	0.1	Zero sequence current dead zone
U factor	0.01～100	0.01	Line voltage multiplier
U deadband	0.1～1000	0.1	Line voltage dead zone
U0 factor	0.01～100	0.01	Zero sequence voltage multiplier
U0 deadband	0.1～1000	0.1	Zero sequence voltage dead zone
P factor	0.01～100	0.01	Power multiplier
P deadband	0.1～1000	0.1	Power dead zone
COS factor	0.01～100	0.01	COS multiplier
COS deadband	0.1～1000	0.1	COS dead zone
OTH factor	0.01～100	0.01	Other multiplier
OTH deadband	0.1～1000	0.1	Other dead zone
CLASSA	0～3	1	Class for analog event data
CLASSB	0～3	1	Class for digital event data
Select Timeout	0～30	0.1	Select/operate time-out
Confirm Link	0～1	1	Enable confirm data link
Link Retry Times	0～15	1	Data link retries times
Link Timeout	0～50	0.1	Seconds to data link time-out
Upload Confirm	0～1	1	Enable upload confirmation
Upload Timeout	0～50	0.1	Seconds to upload time-out
Upload Retry Times	2～10	1	Upload retries times
Auto Refresh	0～1	1	Enable automatic reset of events
Refresh time	0～65535	1	Seconds to automatic reset event

4.10 Calibration

Select the Edit submenu in "Adj.", press "Enter" key to enter into the password screen, enter the correct password to enter the "Adj." submenu, press the [+] and [-] keys to correct the value of current and voltage.

Note: All voltage and current values in the factory have been corrected before. Please do not change the parameter values.

4.11 Clear report

Select the Edit submenu in "Clr", press "Enter" key to enter, as shown below:

1.Clear trip 2.Clear alarm 3.Clear SOE 4.Clear count 5.Clear all	Select "1": Clear the trip report. Select "2": Clear the alarm report. Select "3": Clear the SOE report. Select "4": Clear the count report. Select "5": Clear the all report （include trip record, alarm record, SOE record and count record）.

4.12 Factory setting

All the values in the factory have been corrected before. Please do not change the values.

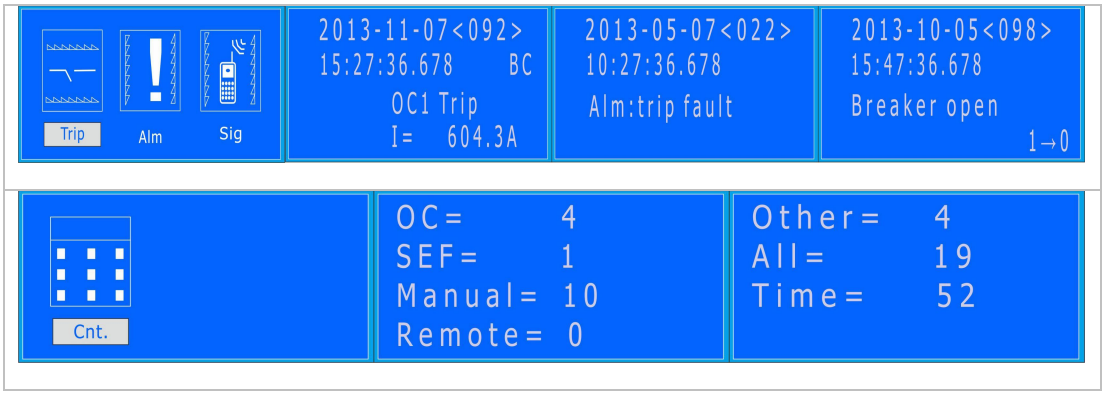
4.13 View primacy meter

Enter the main menu select the "VIEW" option press "Enter" key to enter, and then select the "Meter" option to press "Enter" key to enter the "Primacy Meter" submenu, you can view all the primacy meter value.

PrimacyMeter Ia= 0.000A Ib= 0.000A Ic= 0.000A PrimacyMeter 3I0= 0.000A UAB= 0.000KV UBC= 0.000KV PrimacyMeter F= 0.000 Hz P= 0.000 KW Q= 0.000 KVar PrimacyMeter AP=0.000 KVA COS= 0.00 Iaang= 0.000 PrimacyMeter Ibang= 0.000 Icang= 0.000 I0ang= 0.000 PrimacyMeter Uaang= 0.000 Ubang= 0.000	1. Ia: Primary side current of phase a 2. Ib: Primary side current of phase b 3. Ic: Primary side current of phase c 4. 3I0: Zero sequence primary current 5. UAB: Line voltage UAB primary side value 6. UBC: Line voltage UBC primary side value 7. F: Frequency 8. P: Active power 9. Q: Reactive power 10. AP: Apparent power 11. COS: Power factor 12. Iaang: Angle of phase a current 13. Ibang: Angle of phase b current 14. Icang: Angle of phase c current 15. I0ang: Angle of zero sequence current 16. Uaang: Angle of line voltage UAB 17. Ubang: Angle of line voltage UBC

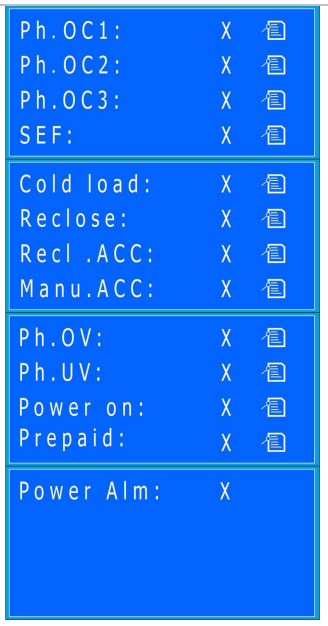
4.14 View SOE

Enter the main menu select the "VIEW" option press "Enter" key to enter, and then select "RPT" option press "Enter" key to enter the "RPT" submenu, you can view the SOE record events, recording events include: trip signal, alarm signal, telemetry signal (circuit breaker status, whether the manual or remote operation, fault trip, time and date, etc.) and count signal (the count of trip).



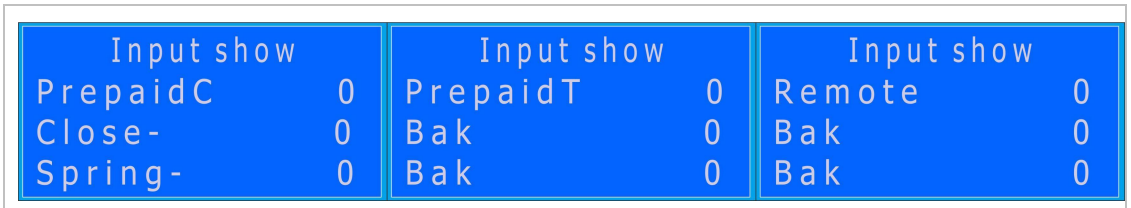
4.15 View relay and setting

Enter the main menu select the "VIEW" option press "Enter" key to enter, and then select the "Relay" option to press "Enter" key to enter the "Relay" submenu, you can view all the protection is enabled or disabled, select the  option press "Enter" key to enter the value you can view each protection, press the arrow keys to switch screens.



4.16 View input signal

Enter the main menu select the "VIEW" option press "Enter" key to enter, and then select the "Input" option press "Enter" key to enter the "Input" submenu, you can view the state of input signal.



4.17 View version information

Enter the main menu select the "VIEW" option press "Enter" key to enter, and then select the "Ver" option press "Enter" key to enter the "Ver" submenu, You can view the device type, version number, production date, and device ID.

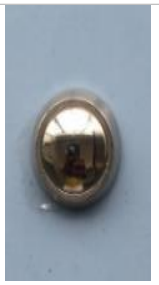
Chapter 5: Peripheral Accessories

5.1 RF remote controller

	Function of each key A:Close B:Trip C:Unlock D:Reset

Note:
1. In order to prevent misuse, press the unlock button for 3 seconds, before execution of the closing operation.
2. The effective distance of RF remote controller is 30 meters.

5.2 Features and the use of external sockets and switches

		
AC power switch	Backup switch	Activation button

Note: Before using the controller, ensure that the battery charge enough for 12 hours.

1. The AC power switch is for protecting the Auxiliary PT (Or utility incomer), and the BACKUP switch is for charging batteries.
2. After charging the batteries, turn off the power switch to protect the batteries for storage.
3. Activation button is not allowed for pressing last long time, or permanent damage of battery under-voltage may result.

5.3 The main secondary component parts

	
Cable plug, connect the controller and circuit breakers.	Cable plug, connect the controller to offer the power.

Note: For security norms, Surge protector has to be grounded (green line) to the earth.

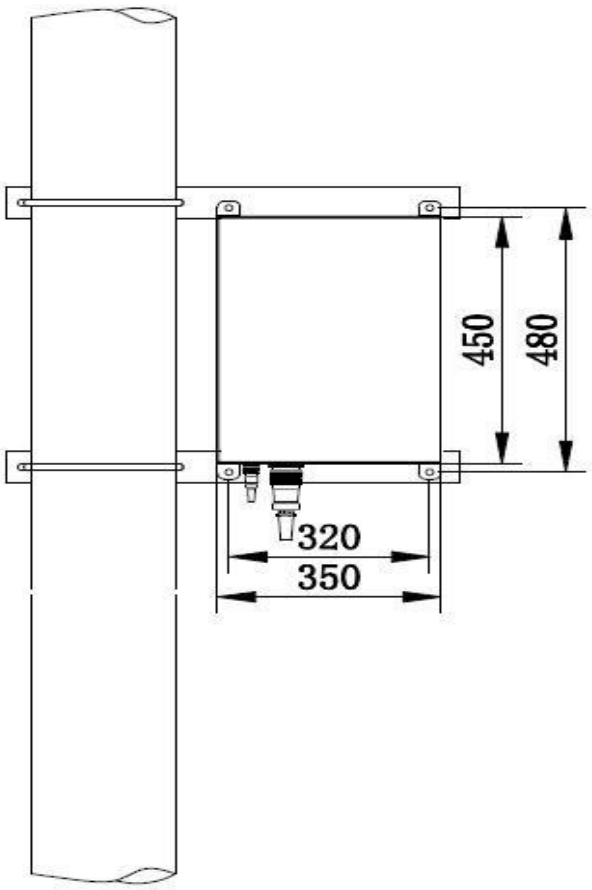
5.4 Battery

- F-FTU200 stand-by battery adopts two 7AH lead-acid free of maintenance batteries, the average battery life exceeds 3 years.
- Please replace the storage battery in time when the storage battery exceeds its usage life. Replace method as following: firstly push the stand-by power supply switch to trip position, and pull out the connection cable simultaneously, rotate the support bolt away, replace the used battery with new battery. Then recover the device to the original status according to the contrary sequence. Please deal with the used battery properly in order not to pollute the environment.

Chapter 6: Installation and Maintenance

Danger: The dangerous voltage with the device maybe result in the permanent damage of equipment or personnel casualty during installing F-FTU200. These voltages mainly distributes at terminal bar of device and circuits of AC current input, AC voltage input, digital input, IGBT output and operation power supply., etc. This device's installation, debugging and maintenance can only be operated by technical staff who has been authorized and trained strictly.

6.1 Installation



F-FTU200 series installation schematic and dimensions

Cabinet installation

Installation of Box Body

- Please fasten it upon support shelf with matched M10 × 20 stainless bolts during installing the product. (Support shelf is provided by user, please point it out if needed to be provided by manufacturer)
- As shown above, place it up side. Don't place it up side down or in slope.

6.2 Maintenance

- If the device is not used, it should be kept in dry and ventilated places indoors, and charged once every three months, the charging time should be more than 24 hours. Before the device is used, the charging time should not be less than 24 hours. Replace the storage battery each three years.
- This device has storage battery management module, which will automatically cut off the storage battery output circuit when the storage battery voltage is on the low side. You should check the storage battery each year, please replace the storage battery immediately when single storage battery voltage id lower than DC12V.
- Please firstly make sure the first system is power off before the device is maintained, forbid inserting or pulling out aeronautical connector under power, thus avoid CT short circuit happening.

6.3 Parts Attached with the Device

Name	Quantity	Collocation	Usage or Description
Box door key	2	Standard	Open the box
User Manual	1	Standard	Please read it carefully before use the device, MC501 wiring diagram is attached.
Inspection report	1	Standard	Factory inspection report
Hand-held telecontroller	1	Selectable	Telecontrol the close and trip of switch within 30 meters
Communication Interface	1	Selectable	RS485/USB converter or RS485/RS232 converter
Control Cable	1	Standard	20 cords (6 meters)
Control Cable	1	Standard	2 cords (6 meters)

Chapter 7: Decommission and Disposal

7.1 Decommission

Shut-down Power Supply

Shut-down Device Power Supply: Turn off external power supply switch of the device.

Disconnect All Power Cables

Disconnect all power cables connected to the device.

Danger: Before disconnecting all power cables connected to the device power module, it must confirm that the external power switch is turned off to avoid danger.

Danger: Disconnecting all power cables connected to the device alternating current module, it must confirm that the equipment corresponding to input alternating component has stopped operation to avoid danger.

Dismantle from Display Cabinet

When the above steps are completed, loosen the fix screws and dismantle the device from the display cabinet.

Danger: When neighboring equipment is in operation, it must strictly confirm the safety distance between the dismantled device and other device in operation and unskilled professional shall take particular caution.

7.2 Disposal

When dispose decommissioned device, please follow relevant regulations of the country where the product is used for the disposal of scrapped electronic products.

Caution: It must strictly adhere to relevant regulations of the country where the product is used for the disposal of scrapped electronic products.