

FPI-Hand User Manual	Document Version	Confidential
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FPI-Hand User Manual

The user manual is suitable for the following model:

Model	Product Type
FPI-Hand	



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Appearance



Content

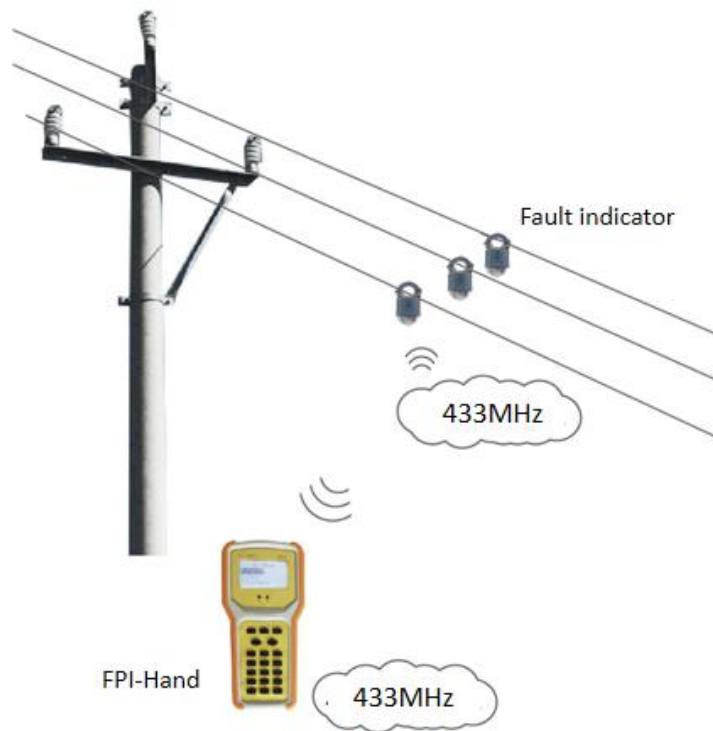
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Chapter1 Introduction of Product

1.1 General

FPI-Hand is portable operating equipment which is for remote management of the front-end products. It suitable for all the overhead line fault indicators in our company. It can not only read the operating status, battery voltage, load current, electric field and other information of the fault indicator, but also manage the fault indicator. Such as reading and setting operating parameters, upgrade online, remote control, fault simulation and fault reset.

1.2 Application topology



1.3 Product Features

Main Features

- ◆ Adopt hand - held structure, easy to carry
- ◆ LCD display
- ◆ Separate buttons, operate easily
- ◆ Lower consumption sleeping mode and automatic shutdown function, increase the battery life, reduce the number of battery replacement

- ◆ Support both Chinese and English languages
- ◆ Data transfer and receive indicator light which displays status information
- ◆ Support reading indicator operation parameters and setting parameters
- ◆ Support a variety of types of indicators

Performance Parameters

- ◆ Power supply: Four no. 7 AAA dry batteries
- ◆ Standby: <10uA
- ◆ Weight: Less than 250g
- ◆ Protection grade: IP54
- ◆ Working temperature: -20°C~70°C
- ◆ Size:165×80×31cm
- ◆ Working humidity: ≤95%, unfreezing
- ◆ RF transmission distance : 60 meters

Chapter2 Technical specification

2.1 Working environment

Item	Content
Temperature	Working temperature:-20℃~70℃ Storage temperature:-40℃~70℃
relative humidity	5~95% (Unfreezing)
Altitude	≤2000m

2.2 Hardware system

Item	Content
CPU	Industrial-grade ultra-low power MCU
FLASH	512MB
SRAM	64KB
wireless communication	433MHz

2.3 Physical Characteristics

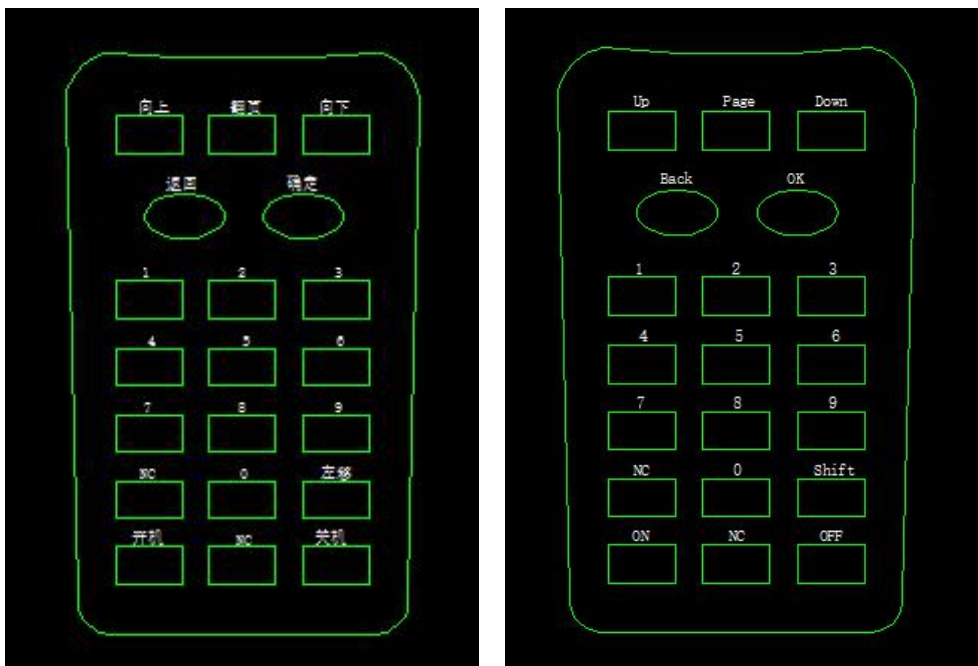
Item	Content
Housing	Plastic, IP54
Weight	Less than 250g

Chapter3 Function description

3.1 Keyboard

Layout of keys is as follows:

- ◆ ON : Long press for 3 seconds to turn on the machine when it is off .
- ◆ OFF : Press [OFF] to turn off the machine.
- ◆ UP、Down: Direction key which can be used to moved up and down in the LCD, when move to the row, the row will display black.
- ◆ Page: If pages with more than 3 lines, when flip over, the cursor will on second line by default and the line will be black.
- ◆ Back: Press the key at any page to return to the main menu or a upper menu.
- ◆ OK: Press the key at any page to confirm the operation or go to the next menu.
- ◆ 0-9: Number key which was used to set parameters, you can modify the value at the cursor (Blink in black) .
- ◆ Shift:: Direction key which can be used in setting parameters, users can move the cursor to select the numbers



3.2 Power on

Install the battery and close the cover (If not used for a long time, please take out the battery, because wireless communication requires a strong battery voltage, so if the battery voltage is lower than 5.6V, the battery should be replaced)

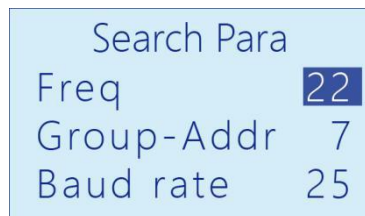
- **Power on**--Press [ON] button in the left bottom for 3 seconds, power on, enter the interface of the left picture first, then enter and stop on the interface of the right picture(Language selection page), showing as below; In order to extend the battery life, the backlight will automatically turn off after 5 seconds, press any key to

turn on again, without any operation, the device will automatically shut down after 3 minutes;



3.3 Communicate with fault indicators

Press the [UP] or [DOWN] button to select the language, then press [OK] to enter “Search parameters ” to view or set local RF parameters, showing as below:



Search parameters are described as follows:

Search Para	
Freq	14
Group-Addr	1
Baudrate	25
Synctype	1
RF-MODE	1
Call-Time	2
Active-Time	60

- ◆ Freq (Frequency) : Range :1-30, the same with indicator
- ◆ Group-Addr (Group address):Range:1-65535,the same with indicator
- ◆ Baudrate (Baud rate):100 or 25, the same with indicator;
- ◆ Synctype (Synchronization Type):1 means: Overhead line fault indicator;0 means: Transient wave recording fault indicator;
- ◆ RF-MODE (Searching mode): 1 means: Search all indicators which have same frequency; 0 means : Search indicators which not only have same

frequency but also have same group address.

- ◆ Call-Time (Duration of calls): According to indicators' requirement.
- ◆ Active-Time (Activation time): Activation time of indicators.

Viewing: Press [Up], [Down] or [Page];

Setting: Press [OK] to enter setting mode, the number where the cursor on will anti-black flashing, input what users want to set (0-9), press [shift] to move the cursor, press [OK] to enter saving page after modifying, showing as below:



Press [Confirm] to save modified parameters, it will note "Writing ", then note "Success!" after saving. Press any button to back to the upper page.

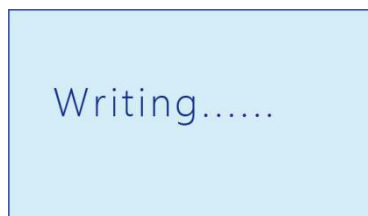
Press [Cancel] to back to the upper page;

Press [Return] to back to searching page, showing as below:



In this page, users can search indicators, write or set parameters, and battery voltage and version of FPI-HAND can be viewed. Press [Back] to back to main menu., press[Back] again to back searching page.

Searching indicators: Move cursor to [Search FI] , press [OK] to enter the following page:



Press any button to back to searching page if stay in this page too long;

The indicator should be searchable within 20 seconds, then enter "MAC-Addr " page, it can display MAC address, line number and phase number of 9 pcs at most. Indicators that have been searched were displayed on the page, showing as below. Press [Up], [Down] or

[Page] to move the cursor to corresponding indicator, press [OK] (it indicates that all subsequent operation are for this indicator), then back to main menu. Please pay attention that indicators have activation time, it means If the inactive time after searching exceeds the active time, the indicator will enter sleeping mode, and it will no longer respond to any reading, writing, modification or operation of the indicator. So if you need to operate on the indicator again, you should **search again**.

MAC-Addr	L	P
F8-03-F0-01	1	1
F8-03-F0-02	1	2
68-04-00-0F	1	3

If no indicator is searched within 1 minute, it will prompt "Timeout!", press any button to enter search page. If that happens, users need to confirm whether frequency and group address are right or not, or the indicator is normal or not.

3.4 Menu Description

3.4.1 Main menu

Enter the main menu, showing as below, there is battery voltage displaying on the top right corner, if battery voltage is too low, please replace it so that make the device work well.



The main menu details are described as follows:

MainMenu
RealData
Para
Ctrl Operation
Program Update
Version

- ◆ RealData (Real-time data): Viewing real-time data for the corresponding MAC indicator.
- ◆ Para (Parameters query and setting): Users can query and set parameters of

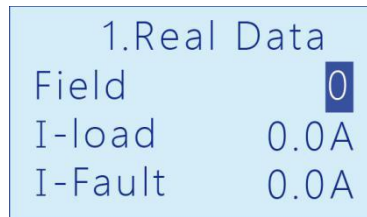
indicators, such as operation parameters, current etc.

- ◆ Ctrl Operation (Remote control for indicators): Such as light the LED, reset the indicator.
- ◆ Program Update (Upgrade online): Upgrade online for indicators.
- ◆ Version: Users can query the version of the indicator.

(Note: “Para” can view and set parameters, other only support viewing function.)

3.4.2 Real-time Data

Move the cursor to “RealData” , press [OK] to enter the following page.



Details of the real-time data are given below:

1.Real Data	
Field	0
I-load	0.0A
I-Fault	0.0A
Batvalue	3.623V
Temperature	27.8
FieldDrop	0
Pro-State	0
Flag-State	0
Tran-Reason	Call
Fault-Info	
RecordSta	0
CapVolt	0V
Record-Nocall	0

- ◆ Field (Electric field): Electric field of the indicator;

- ◆ I-load (Load current): Load current of the indicator;
- ◆ I-Fault (Fault current): Fault current of the indicator;
- ◆ Batvalue (Battery voltage value): Battery voltage value of the indicator;
- ◆ Temperature: Temperature of the indicator;
- ◆ FieldDrop (Electric field drop): Electric field drop of the indicator;
- ◆ Pro-State (Protection state): Protection state of the indicator;
- ◆ Flag-State: Flag-State of the indicator;
- ◆ Tran-Reason (Transmission reason):

The reason that the indicator upload data

- ◆ Fault-Info ((Fault information): There are three pages showing the status of each failure information;
- ◆ RecordSta (Record state): Wave record state of transient wave recording fault indicator;
- ◆ CapVolt (Capacity voltage): Capacity voltage of transient wave recording fault indicator.

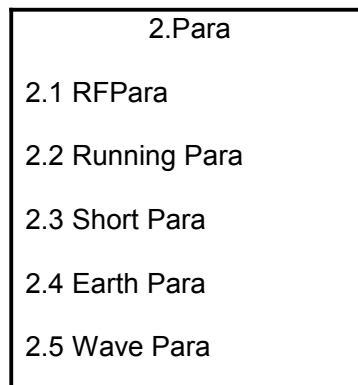
Note: “RecordSta”, “CapVolt” and “Record-Nocall” only for transient wave recording fault indicator.

3.4.3 Parameters query and setting

Move the cursor to “2. Para” , then press [OK] to enter the following page:



Description of “Para” are showed as below:



2.6 FPI Para

- ◆ RFPara (RF parameters): RF parameters of the indicator;
- ◆ Running Para: Running Parameters of the indicator;
- ◆ Short Para: Short circuit protection parameters of the indicator;
- ◆ Earth Para: Earth protection parameters of the indicator;
- ◆ Wave Para: Wave recording parameters of the indicator;
- ◆ FPI Para: FPI-HAND parameters of the indicator.

3.4.4 RF parameters

Move the cursor to “2.1 RFPara” , press [OK] to enter the following page:



Description of “RFPara” are showed as below:

2.1 RFPara	
Group-Addr	1
Line-seq	01
Phase	1
WakeUpT1	10000ms
WakeUpT2	10ms
BaudRate	025
Tran-Level	00
Freq	06
Data-Mode	1

- ◆ Group-Addr (Group address):1-65535;
- ◆ Line-seq/Phase: Line sequence 1/2/3, phase sequence A/B/C;

- ◆ Freq (Frequency):1-30;
- ◆ WakeUpT1 (Automatic wake up cycle):1-65535ms;
- ◆ WakeUpT2 (Hold time for wake up): 1-65535ms;
- ◆ BaudRate (Baud rate): 100/25/10;
- ◆ Tran-Level (Transmission power): 0:12dBm,2:10dBm,4:7dBm;
6:4dBm;8:1dBm;10:-2dBm
- ◆ Data-Mode:0/1/2

3.4.5 Running Para

Move the cursor to “2.2 Running Para” ,press [OK] to enter the following page:



Description of “Running Para” are showed as below:

2.2 Running Para	
BatThres	3.2000V
FieldThres	9
I-Thres	5.0A
Down-Time	2800ms
Flash-Time	5s
Light-Time	200ms
Upload-T1	60s
Upload-T2	300s
HeartBeat	120min
Interval-I	20.0A
Relative-I	10%
Absolute-I	10.0A
Resend-Num	5
ResetMode	2

Resend-Time	2s
WorkStatus	0

- ◆ BatThres (Battery low voltage threshold):2000-4000mV;
- ◆ FieldThres (Electric field threshold): 1-65535;
- ◆ I-Thres (Current threshold): 1-25.5A;
- ◆ Down-Time:100-65535ms;
- ◆ Flash-Time (Cyclic flashing time): 1-255s;
- ◆ Light-Time (Duration of light on): 20-5000ms;
- ◆ Upload-T1 (Interval of uploading): T1,10-65535s;
- ◆ Upload-T2 (Interval of uploading): T2,10-65535s;
- ◆ HeartBeat (Heartbeat time): 1-65535min;
- ◆ Interval-I (Telemetry interval for current) : 1-25.5A;
- ◆ Relative-I (Relative mutation value): 1-100%;
- ◆ Absolute-I (Absolute mutation value): 1-600A;
- ◆ Resend-Num (Data retransmission times):1-255;
- ◆ ResetMode (Permanent reset mode) :0-Power on,1-Timing,2-Both;
- ◆ Resend-Time (Retransmission interval): 1-255S;
- ◆ WorkStatus (Working status): Only for transient wave recording fault indicator and only support reading.

3.4.6 Short-circuit protection parameters

Move the cursor to “2.3 Short Para” ,press [OK] to the following page:

2.3 Short Para	
Reset-T	120s
Repower-T	30s
Short-T	150.0A

Description of “2.3 Short Para” are showed as below:

2.3 Short Para

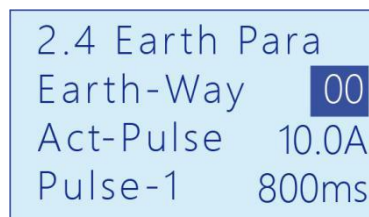
Reset-T	120s
Repower-T	30s
Short-I	150.0A
ShortIMax	0.0A
Over-I	900.0A
Steady-T	10s
PerDelay	3000ms
ShortTMax	3000ms
Short-T	20ms
Reclose-T	0ms

- ◆ Reset-T (Timing reset delay) : 1-172800s;
- ◆ Repower-T (Reset delay for power on): 1-65535;
- ◆ Short-I (Short-circuit mutation): 1-1200A;
- ◆ ShortIMax (Short-circuit mutation maximum):0-1200A;
- ◆ Over-I (Over current threshold): 0-1200A;
- ◆ Steady-T(Stable state time): 1-1200s;
- ◆ PerDelay (Delay for permanent fault judgement):20-1200s;
- ◆ ShortTMax (Maximum delay time of short-circuit) :20-60000ms;
- ◆ Short-T (Short-circuit protection delay):20-60000ms
- ◆ Reclose-T (Reclosing delay): 20-60000ms;

3.4.7 Earth protection parameters

Move the cursor to “2.4 Earth Para”, press [OK] to the following page:

Note: “2.4 Earth Para” is not for transient wave recording fault indicator.



Description of “2.4 Earth Para” are showed as below:

2.4 Earth Para	
Earth-Way	00
Act-Pulse	10.0A
Pulse-T1	800ms
Pulse-T2	1000ms
Act-Drop	10%
Relative-T	5%
Absolute-T	40ms
Pas-pulse	10.0A
Pas-Drop	30%
FieldDrop-T	10s

- ◆ Earth-Way (Earth-fault judgement): 0-Passive,1-Active,0x81-Active U;
- ◆ Act-Pulse (Active pulse): 1-600A;
- ◆ Pulse-T1(Pulse delay 1): 20-60000ms;
- ◆ Pulse-T1(Pulse delay 2): 20-60000ms;
- ◆ Act-Drop (Active field drop ratio): 1-100%;
- ◆ Relative-T (Relative time error): 1-100%;
- ◆ Absolute-T (Absolute time error): 20-5000ms;
- ◆ Pas-pulse (Passive pulse): 1-600A;
- ◆ Pas-Drop (Passive field drop ratio): 1-100%;
- ◆ FieldDrop-T (Delay of passive field drop): 1-1200s;

3.4.8 Wave parameters

Move the cursor to “2.5 Wave Para” , press [OK] to enter the following page:

Note: This parameter only for transient wave recording fault indicator.

2.5 Wave Para	
Start-I	0.0A
Stop-I	0.0A
Lock-T	0s

Description of “2.5 Wave Para” are showed as below:

2.5 Wave Para	
Start-I	6.0A
Stop-I	5.0A
Lock-T	60s
Upload-T	4000ms
Charge-T	10000s
NumPre-W	6
NumAfter-W	10
Mutation-I	50.0A
Mutation-U	30%
Fault-I	00030
Fault-U	00030
EnableFlag	3
A-I	07500

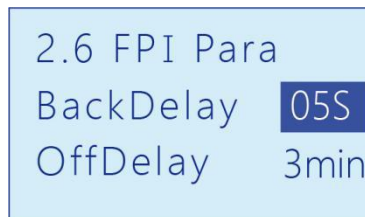
- ◆ Start-I (Start current): Current threshold for start recording wave;
- ◆ Stop-I: Current value for stop recording wave;
- ◆ Lock-T (Lock time): Lock time for recording wave;
- ◆ Upload-T (Delay time for uploading): Delay time for uploading wave;
- ◆ Charge-T (Delay time of charging): Delay time of charging for recording wave;
- ◆ NumPre-W (Numbers of wave before fault): Numbers of wave before fault;
- ◆ NumAfter-W (Numbers of wave after fault): Numbers of wave after fault;
- ◆ Mutation-I (Mutation current): Mutation current of recording wave;
- ◆ Mutation-U(Mutation electrical field): Percentage of electric field mutation of

recording wave;

- ◆ Fault-I (Fault current): Current value that can judge fault;
- ◆ Fault-U(Fault voltage): Voltage value that can judge fault;
- ◆ EnableFlag (Enable flag): Enable flag that can start recording wave;
- ◆ A-I: A coefficient that used to calculate.

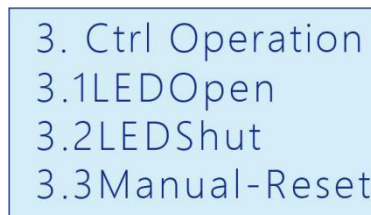
3.4.9 FPI-HAND Parameters

Move the cuosor to “2.6 FPI Para” , press [OK] to the following page:

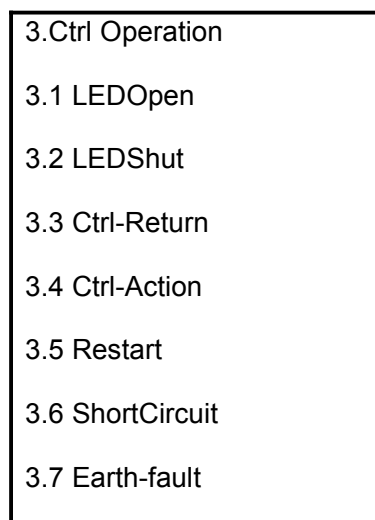


3.4.10 Remote control

Move the cursor to “3. Ctrl Operation” , press [OK] to the following page:



Description of “3.Ctrl Operation ” are showed as below:



- ◆ LEDOpen (Light up LED): The corresponding indicator light is on

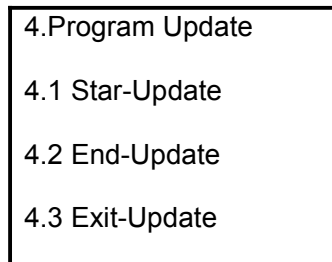
- ◆ LEDShut (Shutdown LED): The corresponding indicator light is off
- ◆ Ctrl-Return (Flag reset): Reset the flag of the indicator
- ◆ Ctrl-Action (Control flag): Control the indicator flag
- ◆ Restart: Restart the indicator
- ◆ ShortCircuit (Analog short circuit): The indicator will have short circuit action
- ◆ Earth-fault (Analog earth fault): The indicator will have earth fault action

3.4.11 Upgrade online

Move the cursor to “4. Program Update” , press [OK] to enter the following page (This function is not enabled currently):



Description of “4.Program Update ” are showed as below:



- ◆ 4.1 Star-Update : The indicator restart and enter upgrade mode;
- ◆ 4.2 Star-Update: The indicator start upgrade;
- ◆ 4.3 Exit-Update: If the indicator just enter upgrade mode and not start, can stop upgrading.

3.4.12 View version

Move the cursor to “5. Version” ,press [OK] to enter the following page:

