

## Overhead Fault Indicators Introduction

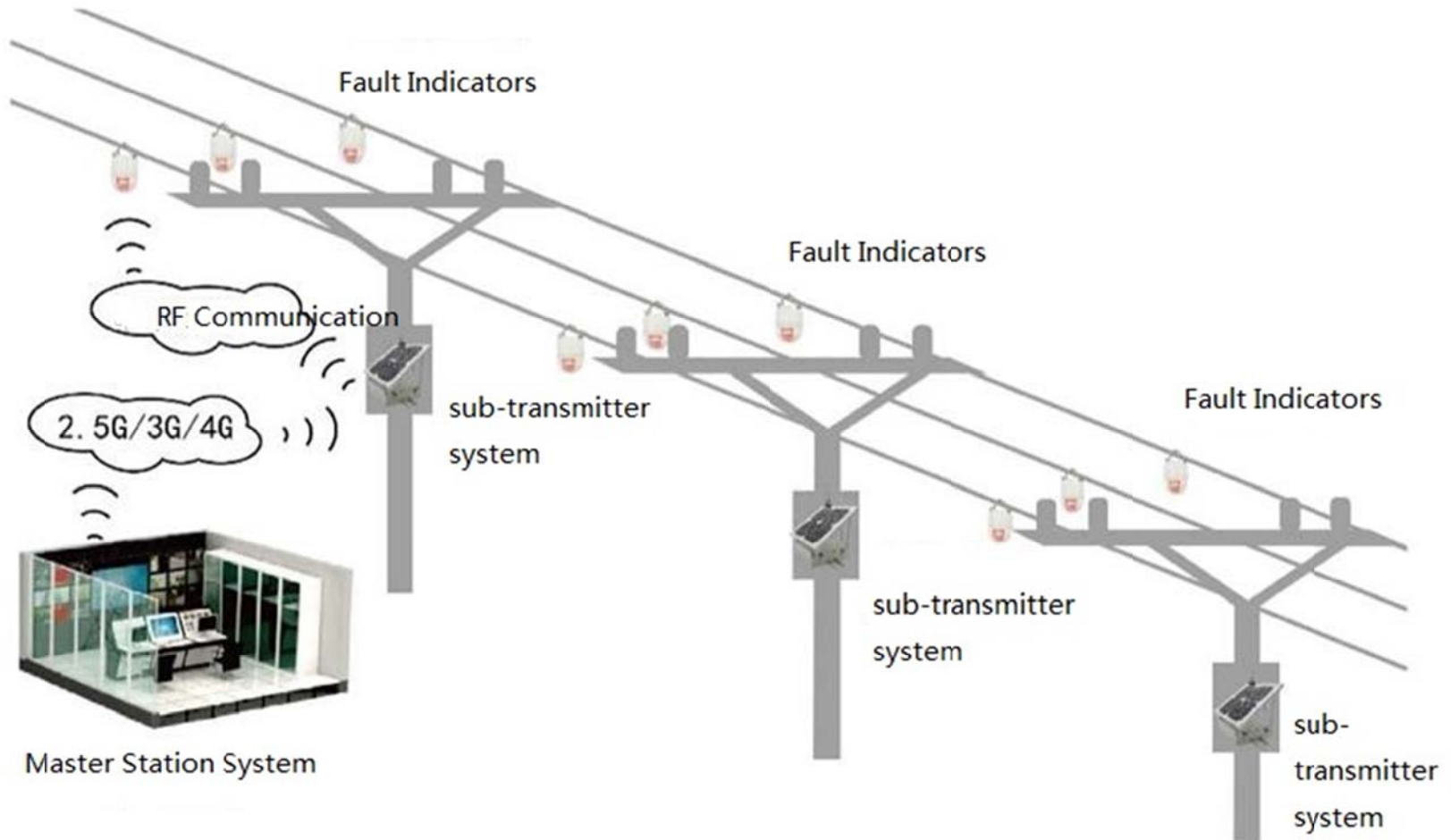


Figure 1 Diagram of the Fault Locating System

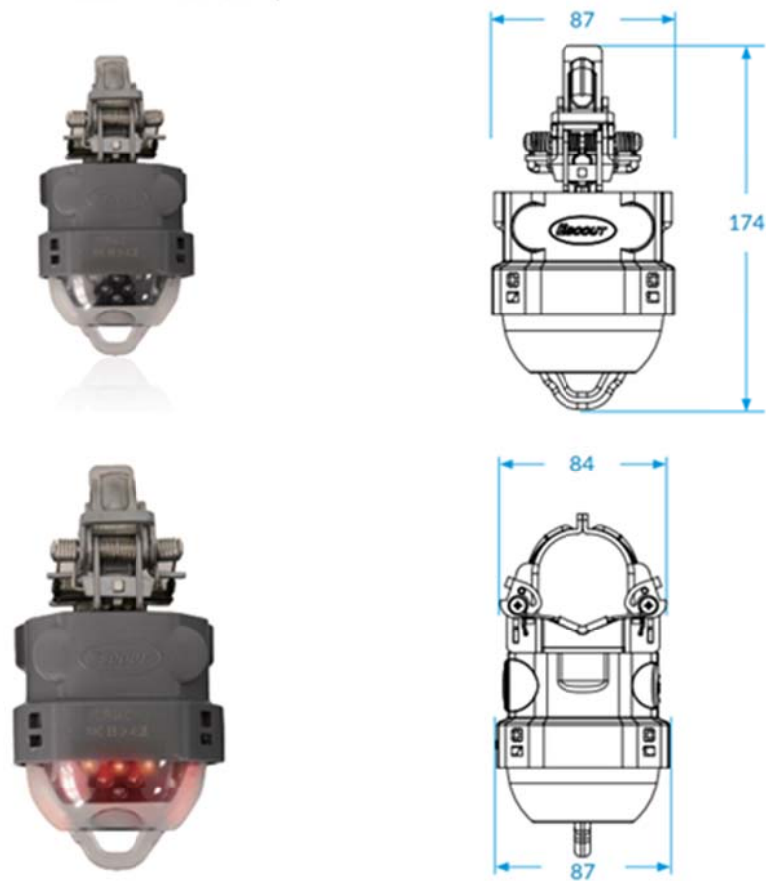


Figure 2 Diagram of the Fault Indicator

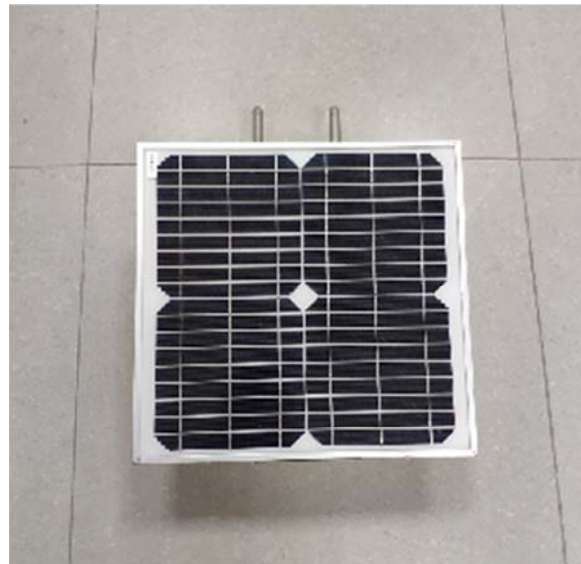


Figure 3 Diagram of the Sub-transmitter (main power supply: solar battery; backup power supply; rechargeable battery)



Figure 4 Illustration of Sub-transmitter (outdoor high-voltage PT power supply; PT output voltage 220V)



Figure 5 Diagram of Outdoor High-voltage PT



Figure 6 Diagram of Handheld Terminal

## Product portfolio

### 1. The fault indicator is equipped with a handheld terminal

The fault indicator supports local fault indication, and the corresponding fault information is indicated by the LED flashing state. The user can query the operating information and parameter settings of the fault indicator through the handheld terminal rod as required.



Figure 7 Fault Indicator and Handheld Terminal

### 2. The fault indicator with sub-transmitter ( 4G/3G/2G network data communication )

After the fault indicator is equipped with a sub-transmitter (using 4G/3G/2G network data communication), the fault can be indicated through local indication and master station fault location. The local indication is indicated by LED flashing status. At the same time, the fault information will be sent to the sub-transmitter through short-distance wireless communication. Then the sub-transmitter will send the fault information to the master station through 4G/3G/2G network data communication (the communication protocol follows IEC60870-5-101 requirement). The display interface of the master station displays the fault, and combines the topology information to locate the fault location range. Customers could also configure the handheld terminal to realize the data viewing and parameter setting of the fault indicators and sub-transmitter under the pole.

The sub-transmitter could choose solar energy as the main power supply or PT power supply, as

shown in Figure 8 and Figure 9:



Figure 8 the Fault Indicator with a Solar Power Sub-transmitter

When the solar power sub-transmitter has sufficient sunlight, the solar panel will serve as the working power source of the sub-transmitter and charge the standby power; when the sunlight is insufficient, the standby power is automatically turned on to supply power to the sub-transmitter.

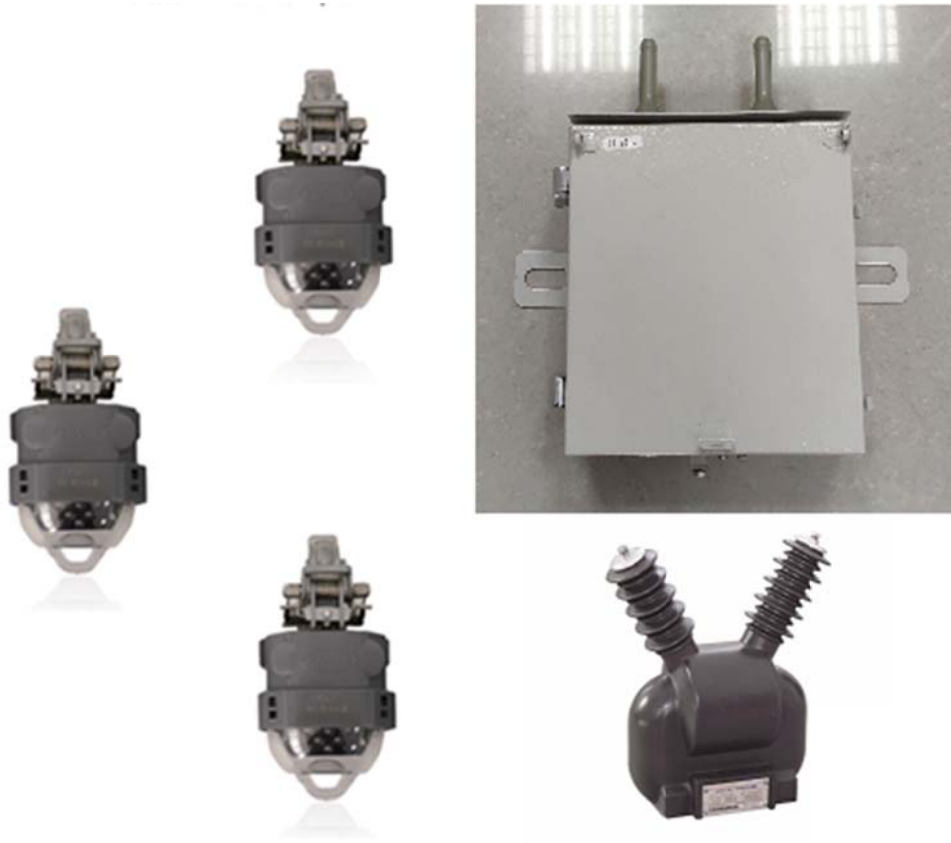


Figure 9 the Fault Indicator with PT Sub-transmitter

Before installing the sub-transmitter with PT power supply, you need to select an appropriate PT ratio according to the line voltage to ensure that the output voltage meets the requirements, and pay attention to personal safety during installation.

### 3. The fault indicator with sub-transmitter (SMS communication)

After the fault indicator is equipped with a sub-transmitter (SMS communication), the fault can be indicated via two methods: local indication and master station indication. The local indication is indicated by the LED flashing light status. At the same time, the fault information will be sent to the sub-transmitter through short-distance wireless communication, and the sub-transmitter will then send the fault information to the user's mobile phone via SMS communication. The user's mobile phone could not read and set information including fault indicator parameters, remote measurement values and etc. through

SMS communication. It can equip handheld terminals to realize the reading and setting of fault indicator parameters, remote measurement values and other information.

The sub-transmitter could also choose solar power or PT power supply as the main power supply, as shown in Figure 8 and Figure 9.



## 1. Fault Indicator Parameters

Short-circuit current (  $\Delta$  value ): 100A ~ 400A settable ;

Fault indication mode: LED light flashing ;

Fault indication LED light flashing visual range: 300m (night) ; 30m (daytime: tested under 50000lx light intensity) ;

Low battery warning LED light flashing visual range: 200m (night) ; 20m (daytime: tested under 50000lx light intensity) ;

LED flashing time: > 2000h (two 14505 batteries) ; flashing interval 50ms/5s ;

Fault types: phase-to-phase short-circuit fault; single-phase grounding fault (high-resistance grounding and ungrounded system, detection signals are injected through signal sources);

Fault reset method: timing reset, power-on reset, remote manual reset ;

Timing reset time: 1min ~ 1440min settable ;

Power-on current fixed value : 3A

Load current telemetry range: 0 ~ 630A ;

Load current telemetry accuracy:  $\pm 3A$  ( Load current  $\leq 100A$  );  $\pm 3\%$  ( Load current  $> 100A$  );

Wireless working frequency: 433 MHz ;

Wireless communication distance:  $\geq 30m$  (visible and unobstructed) ;

Withstand short-circuit impulse current capability: short-circuit fault current (effective value) 16kA/2s

Power supply: 3.6V lithium battery (Brand: MOLEX, 510050200 connector) , recommend to use 14505 battery , support 1 (working time halved) or 2 batteries;

Static operating current:  $< 30\mu A$  ;

Shell material: UV stable polycarbonate

Line jamming material: stainless steel

Protection level: IP67 ;

Size: 87mm ( diameter ) ×174mm ( height ) ;

Weight : 450g (exclude the batteries) ;

Features: The battery is detachable, and the 2 batteries are connected in parallel. With 1 battery it can also work normally, but the working time is halved.

System conditions:

Line frequency: 50Hz (default 50Hz, 60Hz products can also be provided, which need to be customized);

Line voltage: 6kV ~ 35kV ;

Cable diameter: 8 ~ 35mm ;

Environmental conditions:

Storage temperature: -40°C ~ 85°C

Working temperature: -40°C ~ 70°C

Environment humidity: 5 ~ 95%RH

Maximum absolute humidity: 35g/m<sup>3</sup>

Altitude: ≤2000m

**2、 Sub-transmitter (main power supply: solar battery; backup power supply: rechargeable lithium battery)**

### **Parameters**

#### **a) Solar panel parameters:**

Nominal peak power: 15 W

Maximum working voltage: 17.5 V

#### **b) Backup battery parameters:**

Battery voltage: 12V

Battery capacity: 12Ah (default lead-acid battery, lithium iron phosphate battery products can also be provided, which need to be customized)

### **c) Sub-transmitter Unity Parameters**

Unity static power consumption:  $\leq 1W$

Peak current:  $\leq 3A$

Working hours of the independent power supply by backup battery (normal operation, no faults reported during the working period):  $\geq 12$  天 ;

Wireless working frequency: 433 MHz ;

Wireless communication distance:  $\geq 30m$  (visible and unobstructed);

SIM card specification: standard SIM; card size: 25mm $\times$ 15mm

Data communication support network frequency band: support 4G/3G/2G network data communication (LTE FDD: B1, B3 , B5 , B8 ; LTE TDD: B38 , B39 , B40 , B41 ; UMTS: B1 , B8 ; GSM/GPRS/EDGE: 900/1800MHz);

Data communication protocol between the sub-transmitter and master station: the communication protocol follows the requirements of IEC60870-5-101;

The communication method between the sub-transmitter and the users' mobile phone: SMS communication.

### **3、 Sub-transmitter parameters (outdoor high-voltage PT power supply: PT output voltage 220V)**

#### **a) Outdoor high voltage PT parameters (self-provided by customers)**

PT transformation ratio: 10 : 0.22 (take 10KV lines for example)

Output power:  $\geq 10VA$

## b) Sub-transmitter unity parameters

Unity static power consumption:  $\leq 5W$

Peak current:  $\leq 0.1A$

Wireless working frequency: 433 MHz ;

Wireless communication distance:  $\geq 30m$  ( 可视无遮挡 );

SIM card specification: Micro-SIM; card size: 12×15mm

Data communication support network frequency band: support 4G/3G/2G network data communication (LTE FDD: B1, B3 , B5 , B8 ; LTE TDD: B38 , B39 , B40 , B41 ; UMTS: B1 , B8 ; GSM/GPRS/EDGE: 900/1800MHz);

Data communication protocol between the sub-transmitter and the master station: the communication protocol follows the requirements of IEC60870-5-101;

The communication method between the sub-transmitter and the users' mobile phone: SMS communication.

## 4、 Handheld Terminal Parameters

Display screen: 2.8 inch color LCD touch screen

Input method: support touch input and keyboard input

Power supply: three batteries structure design (rechargeable lithium battery, 14500, 3.7V), 3\*AA battery power supply is optional

Power supply voltage: 4.5V ( AA battery\*3 )

Working current:  $\leq 100mA$  ( 3.6V power supply )

Wireless working frequency band: 433 MHz ;

Wireless communication distance:  $\geq 20m$  (visible without obstruction);

Protection level: IP55 ;

Volume: 172mm (length) ×70mm (width) ×34mm (height)

Weight: 180g (exclude the battery)

### **System parameters supplied by the customers:**

#### 1、 Line operation information

System voltage:

System frequency:

Cable diameter:

Cable type: insulated cable, bare cable;

Neutral grounding form: high current grounding (direct grounding and low resistance grounding); low current grounding (non-grounding, high resistance grounding, arc suppression coil grounding).

Operation mode: single-circuit line, double-circuit line;

#### 2、 Protection Parameters

Outlet protection parameters of substation

Maximum overcurrent protection action delay: 10s (default value of the maximum duration of short-circuit fault current is 9.9s)

Reclosing time:

Maximum load current:

Current magnitude of protection section I, II and III:

Duration of protection section I, II and III: