

FI-3A2F SMART-DETECT FAULT CIRCUIT INDICATOR

SMART fault indicators that take the guesswork out of fault locating and feeder switching

FEATURES

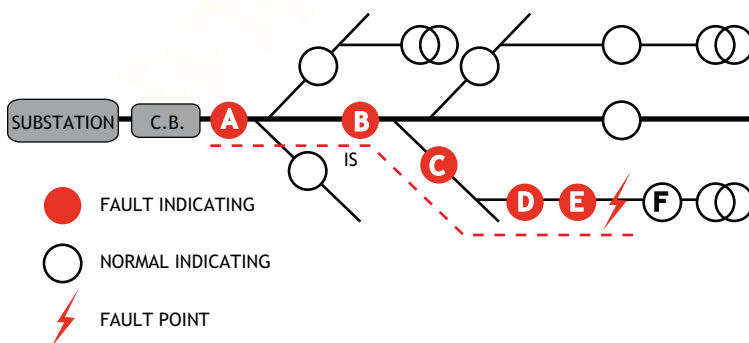
- Real Time Load Tracking
- Self-Adapting Trip Point
- Permanent and Temporary Fault Indication
- Robust Design
- Automatic Inrush Restraint
- Easy Installation with Hot-stick
- 360-degree Visibility
- High-Intensity LED Indication (Easy Visibility in Bright Sunlight)
- Self-Diagnostic Battery Circuit
- IEEE-495 Compliant and ISO-9001 Certified



PRINCIPLES OF OPERATION

1. A fault triggers a group of indicators to start flashing along the feeder line.
2. The lineman simply follows the path of flashing fault indicators all the way to the first un-flashed fault indicator, thereby identifying the fault location.

NO MORE GUESSWORK
on fault location and feeder switching



In the figure, the fault location is between indicators E and F.

- **REDUCE** outage duration
- **IMPROVE** reliability
- **REDUCE** burden on linemen
- **INCREASE** SAIDI and CAIDI benchmarks
- **COST** effective
- **5-YEAR** manufacturer's warranty

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SPECIFICATIONS

Trip Current Range	auto-adapting trip level with real time load tracking
Temperature Range	-40°C to +85°C
Accuracy	± 5%
Auto Reset Time	customer specified (4, 8, 12, or 24)
Current Reset	>1A load current
Power Source	2 lithium metal cells, replaceable, 20-year shelf life
Indication	a) fault - 10 red LEDs; low battery - 2 yellow LED b) permanent fault - 6 red LEDs; temporary fault - 4 blue LED; low battery - 2 yellow LED
Total Indicating Time	>2,000 hours
Flashing Frequency	22 per minute
Maximum Operating Voltage	40 kV
Current Withstand	25 kA for 0.17 sec
Adjacent Cable Immunity	3 inches @ 10 kA
Cable Diameter Range	0.25 inches to 1.26 inches
Casing Material	UV stable polycarbonate
Current Transformer	closed-core ferrous stainless steel
Visibility	1,200 ft day; 2,400 ft night
Weight	19.5 oz
Reset Options	a) current, time, manual b) time, manual
LED Options	a) 10 red LEDs, 2 yellow LED b) 6 red LEDs, 4 blue LED, 2 yellow LED
Analysis Options	a) standard - 120A delta, regular feeder b) custom - current delta per customer specification (50A delta minimum), single phase long distance feeder

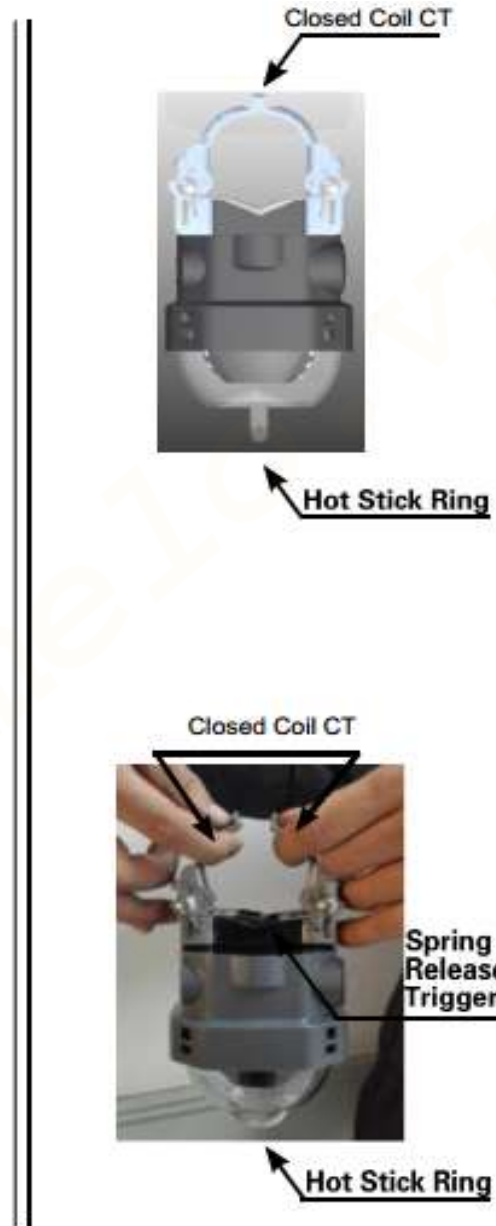


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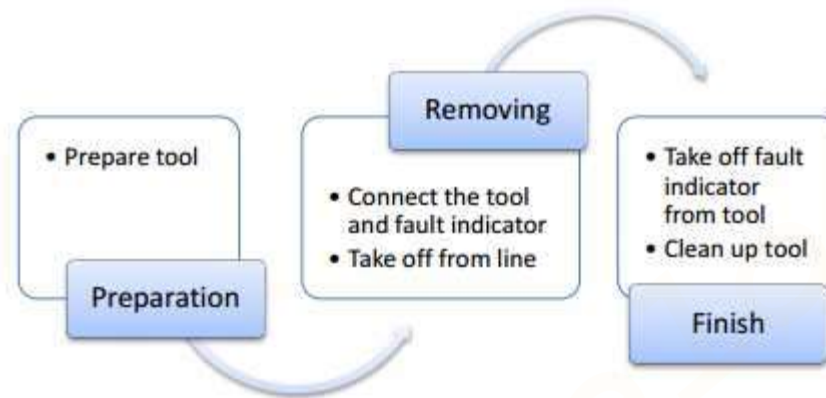
INSTALLATION

- 1) Pull open the Split Coil CT using thumbs until they lock into place (see fig.1)
- 2) Once the Split Coil CT has been cocked, the unit will lock in the “open” position (see fig.2)
- 3) Attach the device to a hot stick (see fig.3)
- 4) Position the conductor between the open Split Coil CT, and with a forceful upward movement, install the device to the line. When the Spring Release Trigger receives sufficient pressure, the spring will release clamping the conductor and setting the device into place (see fig.4)
- 5) Open the hot stick and remove it from the device (see fig.5)



REMOVAL

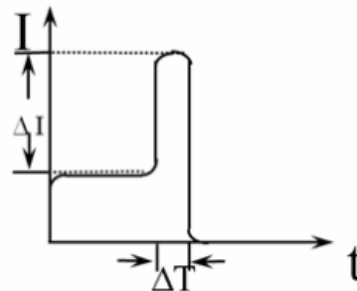
Attach open hot stick to hot stick ring; close hot stick; and pull the hot stick downwards forcefully. This will cause the spring mechanism to open and allow for the removal of the fault indicator



PRINCIPLE OF OPERATION

1. Current sudden variation principle

When short circuit fault occurred, the line current variation characteristic is that there is a plus sudden variation, and the duration is very small. The high voltage switch will cut off the line power under protection replay controlling, the line current will drop to zero, as below figure shown :



Sudden variation principle description :

- Fault indicator will be charged in line with more than 3A load current for 10s, during this time, the fault indicator is blocked.

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- b. Detect the current plus variation
After discharging, fault indicator will detect the current sudden variation ΔI , when ΔI is more than 120A, and the ΔI is more than half load current, the duration is accordance the setting TCC, the fault indicator will detect if the line current drop to zero.

$$\Delta I > I_{set} \quad t > T_{set}$$

- a. Detect the line power off, during the 10 seconds from fault beginning, if the fault indicator detect the current drop to zero, it will send the fault signal.
- b. Trip to indicate the fault

2. Over current principle

3 classes setting :

Item	Current setting (A)	Time Setting (ms)
Over current II class	I_{setII}	T_{setII}
Over current I class	I_{setI}	T_{setI}
Instantaneous trip	I_{setSD}	T_{setSD}

The above setting need to be wrote before deliver base on up stream protection setting.

Over current principle :

- a. Fault indicator will be charged on the line with more than 3A load current, duration is 10s, during this time, the fault indicator is blocked.
- b. Detect the current sudden variation, start sampling real time
- c. Detect the fault current, the fault current should be more than setting value, time should be more than setting duration time
- d. Detect the line power off, during 10s from fault beginning, the line voltage and current should drop to zero
- e. Trip to indicate the fault

Note :

- 1. In step d), the voltage detection can be switch off;
- 2. In step b), current variation should be higher than trip current;
- 3. When fault current higher than instantaneous setting, fault indicator will trip directly, not detect the power off

3. Switch on to fault

Principle:

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- a. Detect the current sudden variation, start to selection;
- b. Detect the current and duration, to compare with the setting;
- c. If the detection value was bigger than setting, detect the line power off; the line current or voltage should drop to zero during 10s from fault beginning;
- d. Trip to indicate fault.

Note : 1. Customer can choose if the voltage will be detected in d) ;
2. If the fault current was bigger than instantaneous setting, the fault indicator will trip directly, did not detect the line voltage and current drop;
3. I II classes setting is 200A, instantaneous setting is 650A ; duration is 50ms

LED INDICATION

A permanent fault event will cause the red LEDs to flash
A temporary fault event will cause the blue LEDs to flash
Low battery will cause the yellow LEDs flash