

# Sentinel™ FPI-BFZ-MK8

## FAULT PATH INDICATOR

### USER'S MANUAL



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## 1. SAFETY NOTICE

Review the following safety precautions to avoid serious injury or death and to prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified. This equipment could contain high voltages. Electrical shock can cause serious or fatal injury.

### PRECAUTIONS



**WARNING:** Use extreme caution during the installation and use of the fault Path Indicator as high voltages and currents may be present in the circuits it is monitoring.

- Ensure that the fault path indicator is installed at earth potential and at least five metres (5 m) from any high voltage conductors or power lines.
- Use caution during the installation and use of this product; high voltages and currents may be present in the circuit being monitored.
- This product must be used only by qualified personnel practicing applicable safety precautions.
- Wear protective clothing and gloves as required.
- Do not install this product on live conductors.
- Always inspect the fault path indicator for any damage before using the product.
- Do not use the product if damaged.

## 2. OVERVIEW

The Sentinel FPI-BFZ-MK8 is one of a family of Fault Path Indicator (FPI) products that is designed to assist in the rapid location and isolation of faults on high voltage power lines. The FPI's can be installed on a power line pole or held by an operator below the line. When it detects the passage of fault current in the overhead line it will trip and indicate the fault condition by means of an electromechanical flag indicator. Usually several FPI's are used along a length of power line. The path of the fault current from the feeding point to the fault location is marked by the tripped FPI's. The defective power line segment is located between the last FPI which has been tripped and the first FPI which is still inactive.

## 3. FEATURES

- Detects OHL phase to phase and earth faults
- Detects permanent and transient faults
- Inrush-restraint feature
- User-selectable sensitivity setting
- Permanent bright red flag indication
- Battery and self-test function
- Replaceable long-life lithium battery
- Lightweight and portable
- Reliable and robust
- Weatherproof to IP65
- Rugged and reliable electronics
- ISO9001:2000 based quality assurance
- Electromagnetic compatibility

## 4. BENEFITS

- Faster fault location
- Can be operated manually from ground level
- Extremely durable and weatherproof
- Ultra-low power consumption

## 5. INSTALLATION

The FPI-BFZ-MK8 should be mounted on a clean intermediate pole symmetrically below the line conductors and at about 5m below the lowest conductor. An elasticized strap is provided to wrap around the pole and hook into holes on either side of the device backplate. Alternatively the device can be held by an operator below the line or placed on a support surface. The top of the device must face the power line and the front of the device (flag side) must face down the length of the power line.

## 6. OPERATION

When the device is in place the following procedure should be followed:

1. Switch on the instrument by moving the right-hand toggle switch downwards. The device will carry out a self-test which also checks the battery. If it is healthy the flag indicator will flip to (or remain) black for 1s, then flip to red for 1s, and then flip to and remain black again. The unit is now armed and ready to sense and indicate fault current. (The testing must be carried out in an area of low electromagnetic field strength, otherwise the unit may trip. Sources of electromagnetic fields apart from current carrying conductors are transformers, motors, magnets, cellular phones etc.)
2. Select the sensitivity switch to high or low depending on the power line fault level and loading. As a general rule select "HIGH" for fault levels up to 150MVA and select "LOW" for fault levels above 150MVA.
3. If there is a fault on the power line, the path of the fault current from the feeding point to the fault location is marked by the tripped FPI's. The defective power line segment is located between the last FPI which has been tripped and the first FPI which is still inactive. The FPI circuitry has inrush restraint and will only respond to faults that are sustained for at least 2½ cycles (50ms @ 50Hz; 40ms @60Hz).

## 7. TESTING

The Sentinel FPI can be fully tested by injecting test current through a conductor held near to the device. Place the unit on a conductor carrying a current of at least 1A. The conductor should be parallel with the top face of the unit and perpendicular with the front face (flag side) of the unit. (The unit can also be nominally tested by spinning a small DC motor near the top face of the unit.)

## 8. BATTERY SUPPLY

The Sentinel FPI-BFZ-MK8 is powered by a replaceable, long-life, ½AA, 3.6V lithium battery. The battery has a shelf-life which easily exceeds 10 years. With the unit switched off the battery is completely disconnected from any loading. With the device switched on and armed with the flag in the black (reset) position, the quiescent current of the device is so low that it approaches the self-discharge rate of the battery. With the device switched on but tripped with the flag in the red position, the quiescent current of the device is even lower.

Complete battery technical details are provided below.

|                           |   |
|---------------------------|---|
| Battery type:             | 3.6V Lithium, size ½AA                    |
| Specification:            | Model TL-2150/S or similar                |
| International size refs:  | ½AA, 1/2R6, 1/2UM-3                       |
| Capacity:                 | 850 mAH                                   |
| Open circuit voltage:     | 3.7 V                                     |
| Quiescent drain current:  | 0 µA (OFF); <10µA (RESET); <2µA (TRIPPED) |
| Minimum operation life:   | 6-10 years depending on usage             |
| Temperature effects:      | no adverse effects -55° C to +85° C       |
| Shelf-life:               | >10 years                                 |
| Manufacturers:            | TADIRAN                                   |
| Manufacturer's reference: | 74/02778/07                               |
| Supplier:                 | Arrow Altech                              |
| Alternate Manufacturer:   | SAFT                                      |
| Alternate Supplier:       | Battery Terminal                          |

## 9. SPECIFICATIONS

|                          |  |
|--------------------------|--|
| Network voltage range:   | 1-36kV                                 |
| Sensitivity:             | 14A / 70A at 5m from line, selectable  |
| Minimum fault duration:  | 2.5 cycles (50ms @ 50Hz / 40ms @ 60Hz) |
| Fault current withstand: | 25kA for 1s                            |
| Primary indication:      | Electromechanical flag                 |
| Manual test:             | Toggle switch initiates self-test      |
| Operating temperature:   | -20°C to 70°C                          |

|                       |                                    |
|-----------------------|------------------------------------|
| Enclosure             |                                    |
| -dimensions           | 115mm × 65mm × 40m                 |
| -material             | ABS, grey                          |
| -mounting             | Flush-mounting using elastic strap |
| -degree of protection | IP65                               |
| -mass:                | 250g                               |

|                     |   |
|---------------------|---|
| Battery             |   |
| -type:              | 3.6 V, ½AA, lithium battery               |
| -capacity:          | 850 mAH                                   |
| -quiescent current: | 0 µA (OFF); <10µA (RESET); <2µA (TRIPPED) |
| -shelf life:        | >10 years                                 |
| -operating life:    | 6-10 years depending on usage             |

## 10. ORDERING

Table 1 below shows the codes to be used for product ordering.

**TABLE 1: ORDERING CODES**

| Group 1 | Product Range            | FPI | Fault Path Indicator |
|---------|--------------------------|-----|----------------------|
|         |                          |     |                      |
| Group 2 | Symbol 1: Power source   | B   | Battery powered      |
|         | Symbol 2: Indicator type | F   | Flag                 |
|         | Symbol 3: Enclosure      | Z   | Rectangular          |
|         |                          |     |                      |
| Group 3 | Model                    | MK8 | MK8 variant          |

**NOTE:**

- The EFI unit ships in a brown corrugated cardboard box.

## 11. WARRANTY

The Sentinel earth fault indicator electronic hardware and software is copyrighted to Cybertronix cc.

This product is warranted to be free from defects in material and workmanship for a period of twelve months (12) from the date of shipment. Correction shall be in the form of repair or replacement of the defective items or components, freight paid by the customer both ways. Such correction shall constitute a fulfillment of all Cybertronix cc liabilities in respect to said items and components. In no event shall Cybertronix be liable for consequential damage.

No other warranties:

To the maximum extent permitted by applicable law, Cybertronix cc disclaims all other warranties, either express or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the Sentinel product and accompanying product manual. Cybertronix cc makes no representation or warranty that the product is 'error free', or meets any user's particular standards, requirements or needs.

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