smart grid solutions

FI Series
Fault Indicator

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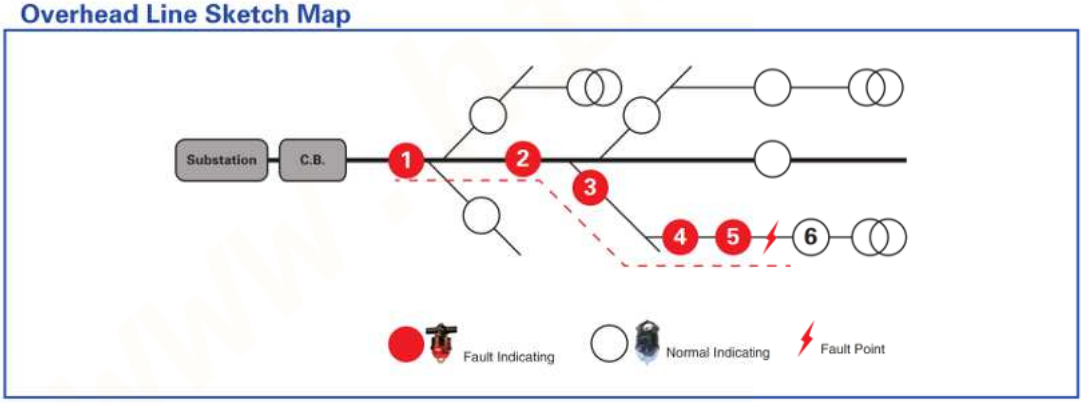
FI series fault indicator

Type instruction

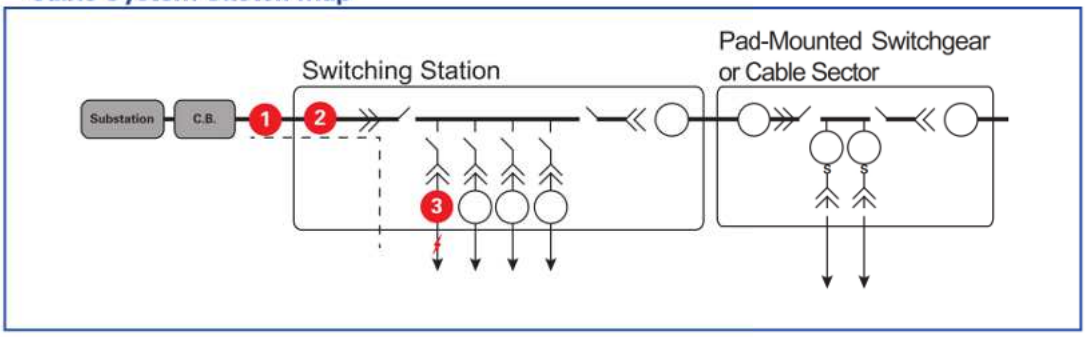
FI - □ □ □ □-□

- Serial NO.
- F: Flash
  O: Optical fiber transmission signal
  W: With the wireless communication
- Design Serial NO.
- A: Overhead type
  C: Underground type
  D: Overhead Insulated type
  P: Panel type
- 2: Line Charge
  3: Battery Charge
- Fault Indicator

Overhead Line Sketch Map



Cable System Sketch Map

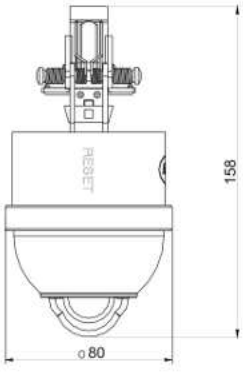


FI Series

Overhead Type

Features

- **Trip current self-adjustment.**
  The fault indicator can adjust the trip current as per different load current.
- **Advantage trip criteria.**
  The current surge ΔI and the fault current duration time Δt is accordance with the Time inverse curve.
- **Referrence standard.**
  Design, test and production are comptely accordance with IEEE495-2007.
- **Convenient operation means.**
  The fault indicator can be installed/removed to the overhead line or underground line directly by a hot-stick.The test/retest also can be operated by the hot-stick with tool.
- **Entirety sealed structure.**
  The fault indicator is sealed by the epoxy resin, the whole structure can withstand the long time aging, high temperature, and high humidity. The outside shell is made by UV material, can work for a long time in high ultraviolet environment.
- **Eliminate misact phenomenon.**
  Eliminate the reverse feeding misact base on the different feature between reverse feeding current and normal fault current.
- **Battery replacable.**
  Three batteries are assembled in a battery container to supply power for the fault indicator, the container can be removed to replace the batteries.
- **360° visible LED flash.**
  The high bright LED lamps were used, the 360°visible can be ensured.
- **Long life batteries.**
  The industry battery is used for power supplying and battery monitoring. The battery life is more than 8 years.
- **Temporary and permanent fault identification.**
  The temporary fault will be indicated by blue lamps, if the fault was not released in 7 minutes, the red lamps will flash to indicate permanent fault.
- **More than 20 years market operation experience.**
  SGS has started to research the fault indicator since 1992s, the fault indicator criteria was proved by more than 20 years market operation experience.



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FI Series

Fault Indicator

Overhead Type

Rating

Description	FI-3A1F	FI-3A1F-1	FI-3A1F-2	FI-3A1F-3
Line voltage	Up to 46kV	Up to 46kV	Up to 46kV	Up to 46kV
Temperature range	-40℃ to 85℃	-40℃ to 85℃	-40℃ to 85℃	-40℃ to 85℃
Tolerance	±10% at 20℃	±10% at 20℃	±10% at 20℃	±10% at 20℃
Current reset	—	—	>3A/30s	>3A/30s
Minimum load current	4A	4A	4A	4A
Indication	6 Red LEDs①	2 Blue LEDs③	6 Red LEDs	2 Blue LEDs
	2 Yellow LEDs②	4 Red LEDs	2 Yellow LEDs	4 Red LEDs
		2 Yellow LEDs		2 Yellow LEDs
Total indication time	>400 hours	>400 hours	>400 hours	>400 hours
Flashing frequency	22 per minutes	22 per minutes	22 per minutes	22 per minutes
Maximum operation voltage	69kV	69kV	69kV	69kV
Current withstand	35kA/4s	35kA/4s	35kA/4s	35kA/4s
Adjacent cables immunity	12inch @10kA	12inch @10kA	12inch @10kA	12inch @10kA
Cable diameter	8mm—42mm	8mm—42mm	8mm—42mm	8mm—42mm
Reset manners	Time/Manual	Time Manual	Time/Manual/Current	Time/Manual/Current
Reset time	4hrs/6hrs/8hrs/12hrs/24hrs/48hrs	4hrs/6hrs/8hrs/12hrs/24hrs/48hrs	4hrs/6hrs/8hrs/12hrs/24hrs/48hrs	4hrs/6hrs/8hrs/12hrs/24hrs/48hrs
Casing material	UV stable polycarbonat	UV stable polycarbonat	UV stable polycarbonat	UV stable polycarbonat
Weight	0.7kg	0.7kg	0.7kg	0.7kg
Clamping mechanism	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Visibility	50m at day; 150m at night	50m at day; 150m at night	50m at day; 150m at night	50m at day; 150m at night

① Indicate the permanent fault;
②Indicate the battery low voltage;
③Indicate the temperory fault.

FI Series

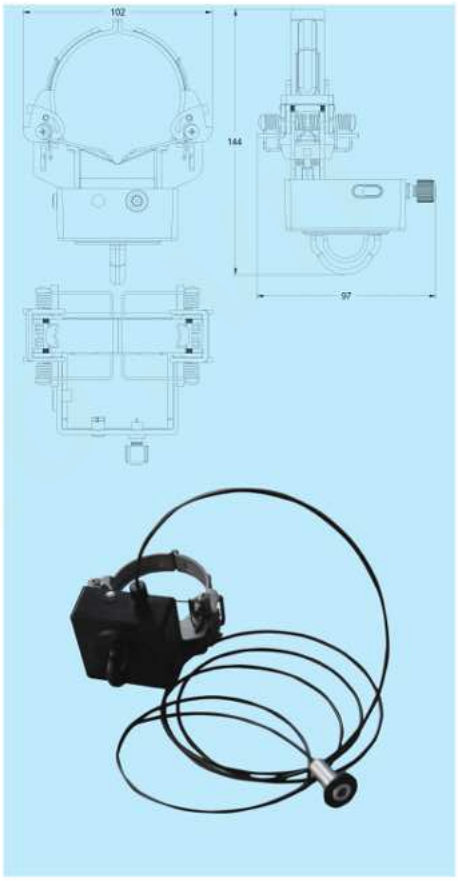
Fault Indicator

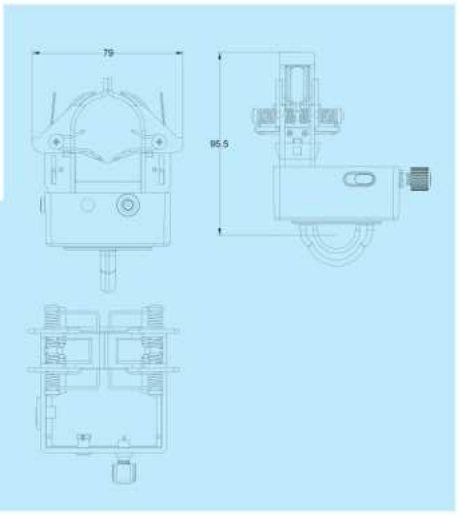
Underground Type

Underground Type

Features

- **Trip current self-adjustment.**
  The fault indicator can adjust the trip current as per different load current.
- **Advantage trip criteria.**
  The current surge ΔI and the fault current duration time Δt is accordance with the Time inverse curve.
- **Referrence standard.**
  Design, test and production are comptely accordance with IEEE495-2007.
- **Convenient operation means.**
  The fault indicator can be installed/removed to the overhead line or underground line directly by a hot-stick.The test/retest also can be operated by the hot-stick.
- **Entirety sealed structure.**
  The fault indicator is sealed by the epoxy resin, the whole structure can withstand the long time aging, high temperature, and high humidity. The outside shell is made by UV material, can work for a long time in high ultraviolet environment.
- **Eliminate misact phenomenon.**
  Eliminate the reverse feeding misact base on the different feature between reverse feeding current and normal fault current.
- **Long life batteries.**
  The industry battery is used for power supplying and battery monitoring. The battery life is more than 8 years.
- **One size fit all clamp.**
  The clamp used on FI-3C 3C1O-3 with a wide range, it can be used on the cable, that outside diameter from 8mm to 64mm.
- **More than 20 years market operation experience.**
  SGS has started to research the fault indicator since 1992s, the fault indicator criteria was proved by more than 20 years market operation experience.





FI Series

Fault Indicator

Underground Type

Underground Type

Rating

Description	FI-3C1O-1	FI-3C1O-2	FI-3C1O-3
Line voltage	Up to 46kV	Up to 46kV	Up to 46kV
Temperature range	-40℃ to 85℃	-40℃ to 85℃	-40℃ to 85℃
Tolerance	±2% at 20℃	±2% at 20℃	±2% at 20℃
Current reset	>3A/30s	>3A/30s	>3A/30s
Minimum load current	4A	4A	4A
Indication	1 Red LED	1 Red LED	1 Red LED
	Optical fiber	Optical fiber	Optical fiber
Total indication time	1000 hours	1000 hours	1000 hours
Flashing frequency	22 per minutes	22 per minutes	22 per minutes
Maximum operation voltage	49kV	49kV	49kV
Current withstand	35kA/4s	35kA/4s	35kA/4s
Adjacent cables immunity	12inch @10kA	12inch @10kA	12inch @10kA
Cable diameter	8mm—42mm	8mm—42mm	8mm—65mm
Reset manners	Time/Current	Time/Current/Manual	Time/Current/Manual
Reset time	4hrs/6hrs/8hrs/12hrs/24hrs/48hrs	4hrs/6hrs/8hrs/12hrs/24hrs/48hrs	4hrs/6hrs/8hrs/12hrs/24hrs/48hrs
Casing material	UV stable polycarbonat	UV stable polycarbonat	UV stable polycarbonat
Weight	0.5kg	0.5kg	0.7kg
Clamping mechanism	Stainless steel	Stainless steel	Stainless steel

FI Series

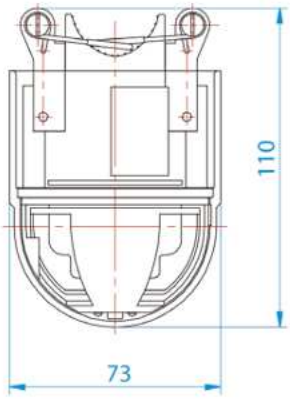
Fault Indicator

Communication fault indicator

Features

- **Both flag and LED indication.**
  The fault can be indicated by both flag and LED.
- **Communication**
  The overhead type fault indicator can transfer the fault information by wireless, and communicate with the sub transmitter by both receiving and sending. The underground type fault indicator transfer the signals with fiber optic.
- **Trip current self-adjustment.**
  The fault indicator can adjust the phase to phase and phase to earth trip current as per different load current, the minimum current surge should be 120A.
- **Entirety sealed structure.**
  The fault indicator is sealed by the epoxy resin, the whole structure can withstand the long time aging, high temperature, and high humidity. The outside shell is made by UV material, can work for a long time in high ultraviolet environment.
- **Eliminate misact phenomenon.**
  Eliminate the reverse feeding misact base on the different feature between reverse feeding current and normal fault current.
- **Convenient operation means.**
  The fault indicator can be installed to the overhead line or underground line directly by a hot-stick with tool.
- **Advantage trip criteria.**
  The current surge ΔI and the fault current duration time Δt is accordance with the Time inverse curve.
- **Long life batteries.**
  The industry battery is used for power supplying and battery monitoring. The battery life is 8 to 10 years.
- **High earthing fault detection ratio.**
  The signal source will reject a current to the earthing fault circuit, it can increase the earthing fault detection ratio to 90%.

3C2O



3A6W/1

Communication fault indicator

Rating

Description	FI-3A6W/1	FI-3C2O
Line Voltage	Up to 46kV	Up to 46kV
Temperature range	-40℃ to 85℃	-35℃ to 70℃
Tolerance	±2% at 20℃	±3% at 20℃
Current reset	>3A/30s	>3A/30s
Minimum Load Current	0A	8A
Minimum Tripping Current	3A	3A
Indication	3 red LED	1 red LED
	flag	flag
LED total Indication time	1000 hours	1000 hours
Flag operation number	4000	4000
Flash interval	5 S	5 S
Current Withstand	40KA/4s	40KA/4s
Communication distance	0—20 m	0—20 m
Radio communication frequency	433 MHz	
Adjacent cables immunity	12inch @10kA	12inch @10kA
Cable Diameter	6mm—29mm	8mm—29mm
Reset manners	Time/Current/Manual	Time/Current/Manual
Reset Time	4hrs/6hrs/8hrs/12hrs/24hrs	20 minutes
Casing Material	UV stable polycarbonat	UV stable polycarbonat
Weight	0.7kg	0.5kg
Clamping Mechanism	Stainless steel	Stainless steel
Visibility	50m at day; 150m at night	Local

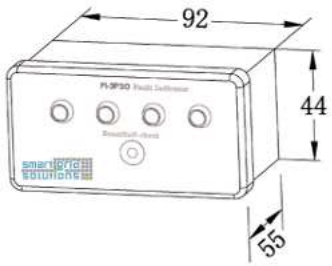
Panel Indicator

Features

- **Signal transmission.**
  The panel indicator receive the signals or data from detectors by fiber. Display the signals by LED flash and transfer the fault information to DTU via a electric switch internal assembly.
- **Multi Reset Methods.**
  The panel indicator can be reset by manual, time or current. On the panel, there is one button for manual reset, press it for a long time, the indicator will be reset; The indicator will reset after 9 hours flash; After 20 minutes of power recovery, the indicator will reset automatically.
- **Battery Test.**
  The internal battery status can be tested at any moments.

Rating

Description	FI–3P3O
Line Voltage	Up to 46kV
Temperature range	-35℃ to 70℃
Tolerance	±2% at 20℃
Current reset	>3A/30s
Electric Switch Rated Voltage	DC/AC 12 to 250V
Electric Switch Rated Current	1A
Indication	4 red LED
LED total Indication Time	1000 hours
Battery Capacity	2Ah
Flash interval	3 S
Current Withstand	40KA/4s
Fiber Length	5m
Reset manners	Time/Current/Manual
Casing Material	UV stable polycarbonat
Weight	0.32 kg



Earthing Fault Indicator

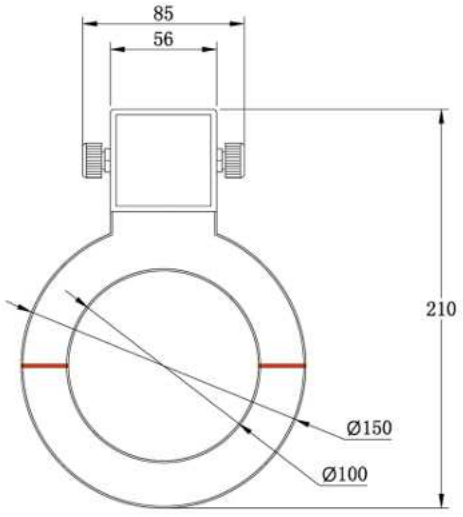
The grounding indicator is installed on the three phases cables, it received the signal send from signal source. Transfer the signals to 3P3O panel fault indicator by fiber optic. Transfer the zero-sequence current and earthing fault current to the underground sub transmitter. Then the sub transmitter can report the fault to SCADA system.

Features

- Detect the fault current code automatically, no need to set the tripping current.
- Prevent the mis-tripping caused by rush current due to the switch closing.
- Install on line by hot stick directely.
- Anti-corrosion clamping structure design.

Rating

Description	FI-3E1O
Line Voltage	Up to 46kV
Temperature range	-35℃ to 70℃
Tolerance	±3% at 20℃
Application Cable Outside Diameter	50—89mm(single cable)
Indication	1 red LED
Battery Capacity	2Ah
Current Withstand	40KA/4s
Weight	0.25 kg

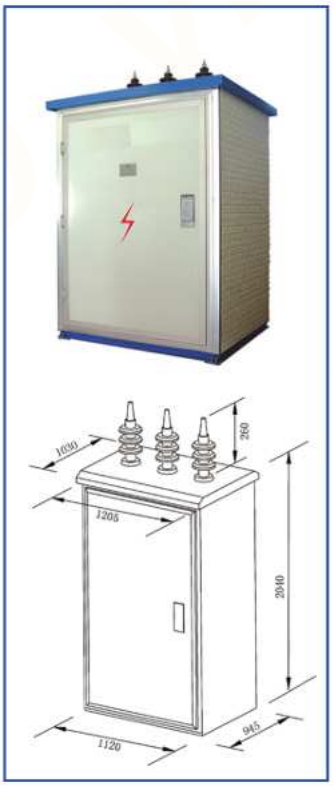


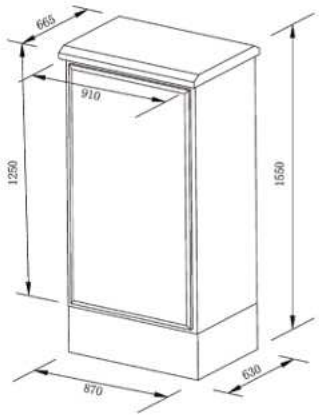
EFS Signal Source

When an earth fault occurred, a small current will flow the earth circuit, the current surge is less than the requirement of fault indicator. The fault indicator can not detect the earth current signal correctly.

The signal source is composed by a resistor, contactor, high voltage bushing and controller. It was installed in the substation, the bushing connected with the substation primary high voltage line, then the totally earthed. It can detect the earth fault. The resistor is used to generate a signal current, the controller will control the contactor to send a pulse current, the pulse current will flow the earth circuit via the bushing and high voltage line.

Description	EFS-1/2/3
Rated voltage	6-10kV
Power source voltage	220V AC
Consumption	5W
Environment temperature	-40—85℃
Withstand voltage	42kV/1min
Impulse voltage	75kV
Secondary circuit withstand voltage	2kV/1 min
Insulated resistor	300M/1000VDC
Time delay	Less than 10s
PT input rated voltage	100V
PT consumption	Less than 0.25VA per phase
Switch capacity	2000A
Application	Outdoor/indoor





Application