

SIEMENS



Digital Grid Products

SICAM Fault Sensor Indicator (FSI)

The Guardian for your Overhead Line Networks

SICAM Fault Sensor Indicator (FSI)



Description

SICAM Fault Sensor Indicator (FSI) 6MD2314 detects the phase-to-phase (short circuit) fault and phase-to-earth fault on the MV overhead line network. The device indicates both the temporary fault and permanent fault via an optical indication.

SICAM FSI (6MD2314) device is developed using the latest generation of hardware technology and is a member of the Siemens SICAM® short-circuit indicator product family.

SICAM FSI is used to improve the distribution grid reliability and reduce the power outages on the MV overhead line.

SICAM FSI can be mounted (in groups of 3 or 6 or 9) on each phase after the branching points and sectionalizer.

The device is available in 2 variants:

- 6MD2314-1AB10 Stand-alone
The faults are signaled directly from the device by LEDs. Depending on the fault type, a specific flashing sequence is generated.
- 6MD2314-1AB11 with communication
In addition to local LED display, Phase-to-phase fault and phase-to-earth fault are transferred to SICAM Fault Collector Gateway (FCG) via a secured short-range radio communication.

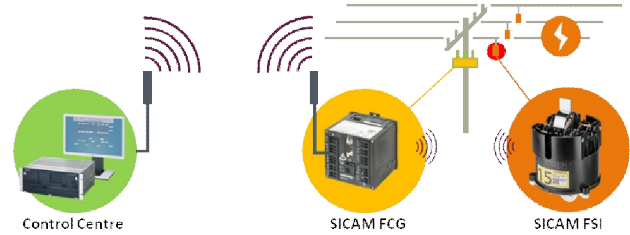
SICAM FCG communicates to a higher-level control center using the IEC 60870-5-104 protocol or via XMPP over a GPRS network.

Features

The salient features of SICAM FSI are:

- Higher availability of overhead line networks - Quick fault detection and localization, reduced downtime.
- Self sustained - Equipped to harvest power from the overhead line enhancing service life of the device (Battery life of 10 years for stand-alone variant and 8 years for communicable variant).
- Secure - Protection against unauthorized access. Authentication and encryption via AES 128, shared keys.
- Maintenance free - Robust design with IP65 and UV resistant housing.
- Simple configuration - Easy device configuration with QR code on SICAM FSI and via a web browser.
- High Sensitivity - Measurement starting from 50 A.

System Diagram of FSI and FCG



System Diagram of SICAM FSI and SICAM FSI with Control Center

SICAM FSI is configurable in coordination with upstream protection system (settings like permanent-fault verification time and auto reclosure time).

The communicable variant of SICAM FSI uses the short-range radio for transmitting the fault information instantaneously to the control center via SICAM FCG. The fault indication can also be reset remotely from the control center.

The fault parameters and other settings are remotely configurable.

Applications

SICAM FSI works in the MV overhead distribution line that ranges from 3.3 kV to 66 kV, 50 Hz/60 Hz networks.

SICAM FSI Configuration

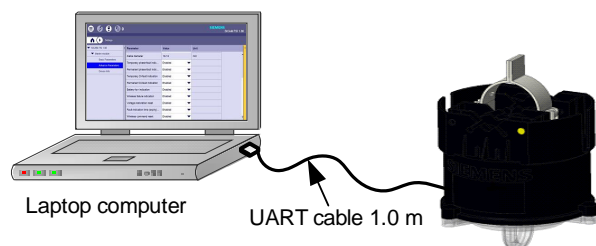
Stand-alone Variant

Before installing the stand-alone variant of SICAM FSI on the MV overhead line, configure the basic parameters and advanced device parameters and apply the device settings by using the SICAM FSI configurator.

Communicable Variant

Before commissioning the SICAM FSI and SICAM FCG, configure the SICAM FSI QR code in the SICAM FCG configuration page. After the configuration, the secure communication channel between SICAM FSI and SICAM FCG is established.

For more information about SICAM FCG and SICAM FSI commissioning, refer to E50417-H1040-C584-A1, SICAM FCG Manual.



SICAM FSI Connection using UART cable

Technical Data

For full technical data, refer to the technical specification section of the user manual.

Application Data

| | |
|-------------------------------|--|
| Rated voltage (V_{rated}) | 3.3 kV to 66 kV |
| Power frequency | 50 Hz/60 Hz |
| Conductor diameter | 5 mm to 25 mm |
| Measurement cycle period | 20 ms (For 50 Hz) 16.6 ms (For 60 Hz) |
| Voltage presence (%) | 0.70 of V_{rated} |
| Voltage absence (%) | 0.45 of V_{rated} |
| Rated current (I_{rated}) | 50 A up to 500 A (steps of 50 A) |
| Current measurement accuracy | ≤ 10 % from 50 A to 800 A |
| Power source | Energy harvesting + lithium - thionyl chloride battery |
| Total Fault indication time | 400 hours of LED flashing |

NOTE:

Energy harvesting starts if the line current exceeds 60 A.

Fault Detection Parameters

| | |
|-----------------------------------|---|
| di current | 5 A to 80 A (steps of 5 A), 120 A, 160 A |
| Current threshold | 1.5 I_{rated} to 3 I_{rated} (Steps of 0.5) |
| Fault-indication time | 2 h to 16 h (steps of 0.5 h) |
| Inrush restraint time | 3 s, 30 s, and 60 s |
| Permanent fault verification time | 3 s, 35 s, and 70 s |
| Auto reclosure time | 0.1 s to 99.9 s |

Communication

| | |
|--------------------|--|
| Communication mode | Short-range radio, Frequency band 2440 MHz (IEEE 802.15.4) |
|--------------------|--|

NOTE:

The communication mode is applicable for the communicable variant of SICAM FSI (6MD2314-1AB11).

Reset (Permanent Faults)

| | |
|---------------------------|--|
| Voltage restoration reset | $V_{rated} > 70\%$ |
| Manual reset | Using magnetic adapter |
| Remote reset | Via SICAM FCG (From control center) |

Fault Indication

| | |
|------------------|---------------------------------|
| Indication | Bright red LEDs |
| Luminous flux | 40 lumens |
| Visibility angle | 360° (from ground level) |
| Visibility range | 50 m day time, 300 m night time |

Mechanical

| | |
|------------|----------------------------|
| Weight | 0.7 kg |
| Dimensions | 116 mm dia x 193 mm height |



Indication of Conformity

This product complies with the directive of the Council of the European Communities on harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC Council Directive 2004/108/EC) and concerning electrical equipment for use within specified voltage limits (Low Voltage Directive 2006/95/EC).

This conformity has been proved by tests conducted by Siemens AG in accordance of the Council Directive in accordance with the product standard IEC/EN 61326-1 for the EMC directives, and with the standard IEC/EN 61010-1 for the low-voltage directive.

WPC certification is performed as per R&TTE directive.

Standards for short-range radio and mobile communication acc. to R&TTE directive:

- EMC testing acc. to EN 301489-1
- Short-range radio (spurious emission) acc. to EN 300 328

The device has been designed and produced for industrial use.

Type Testing

This section describes about the type testing performed on SICAM FSI.

Electrical Tests

| Test | Standards | Tests Requirements |
|--------------------------------------|------------|---------------------------------|
| Dielectric withstand | EN 61010-1 | 125 kV |
| Short-circuit current withstand test | IEEE 495 | 12.5 kA @ 1 s 25 kA @ 170 ms |

EMC Tests for Immunity (Type Tests)

| Test | Standards | Tests Requirements |
|---|---|--|
| Electrostatic discharge, Level 3 | EN 301 489-1, EN 301 489-3, IEC 61000-4-2 | 8 kV air discharge and 4 kV contact discharge |
| Radiated Radio frequency electromagnetic field, Level 3 | EN 301 489-1, EN 301 489-3, IEC 61000-4-3 | 80 MHz to 2.7 GHz (10 V/m, criteria A) |
| Power frequency magnetic field, Level 4 | IEC 61000-4-8 | 30 A/m (continuous) and 300 A/m (short time) on the X, Y, and Z axis of the product |

EMC Tests for Noise Emission (Type Tests)

| Test | Standards | Tests Requirements |
|---------------------------------|--|-------------------------------|
| Radiated emission test, Class A | EN 301 489-1, EN 301 489-3, EN 55011 | 150 kHz to 6 GHz (class A) |

Safety Testing

| Test | Standards |
|-------------|----------------|
| Safety test | IEC/EN 61010-1 |

| Test Description | Applicable Clause No. |
|--|-----------------------|
| Marking and Documentation | 5 |
| Protection against mechanical hazard | 7 |
| Resistance to mechanical stresses (shock and impact) | 8 |
| Protection against the spread of fire | 9 |
| Protection against liberated gases and substances, explosion and implosion | 13 |
| Components and sub assemblies | 14 |
| HAZARDS resulting from application | 16 |
| Risk Assessment | 17 |

Environmental Tests

| Test | Standards | Tests Requirements |
|----------------------------------|----------------|---|
| Operating Temperature | | |
| Dry cold test (4 days) | IEC 60068-2-1 | -25 ° C |
| Dry heat test (4 days) | IEC 60068-2-2 | +70 ° C |
| Damp heat steady (4 days) | IEC 60068-2-78 | 25 ° C to 40 ° C; 95% RH |
| Damp heat cyclic (6 days) | IEC 60068-2-30 | 25 ° C to 40 ° C; 95% RH (6 cycles with 12 h + 12 h) |
| Storage temperature | IEC 60068-2-48 | - 25 ° C to 70 ° C |
| Rainfall | - | 750 mm |
| Exposure to direct sunlight (UV) | ASTM G155 | |
| Wind resistance | - | 200 km per hour |
| Salt spray test | ASTM B117 | |
| Ingress protection | IEC 60529 | IP65 |

Mechanical Tests

| Test | Standards | Tests Requirements |
|----------------------------------|---------------------------------|--|
| Vibration response test, Class 1 | IEC 60068-2-6 | Sinusoidal Frequency: 10 Hz to 500 Hz Displacement: 0.7 mm peak to peak from 10 Hz to 59 Hz Amplitude: 5 g from 59 Hz to 500 Hz Sweep rate: 1 oct./min Number of sweeps: 01/axis Number of axes: 3 (X, Y, and Z) |
| Bump test | IEC60068-2-27/ IEC60068-2-29 | Acceleration: 40 g Duration: 6 ms Number of sweeps: 2000 positive and 2000 negative shocks Number of axes: 3 (X, Y, and Z) |

Short-Range Radio Testing

| Test | Standards | Tests Requirements |
|-------------------|------------|--|
| Spurious emission | EN 300 328 | Transmitter unwanted emissions in the spurious domain and receiver spurious emissions Operating frequency range: 2400 MHz to 2480 MHz No. of channel: 16 Modulation: Other than FHSS (DSSS) Channel Spacing: 5 MHz |

Optical Tests

| Test | Standards | Tests Requirements |
|-----------------|-----------|--------------------|
| Lumens test | LM79 | 40 lumens |
| Goniometry test | LM79 | 360 ° visibility |

Ordering Information - Device

Use the following MLFB series to order the SICAM FSI (stand-alone and communicable) devices:

| | |
|----------------|---|
| 6MD2314-1AB10 | Stand-alone variant - Fault current up to 1500 A, di/dt detection, UV stabilized polycarbonate, IP65, visual fault indication by 6 high luminous LEDs of 40 lumens. |
| 6MD2314-1AB11* | Communicable variant - Short-range radio communication for current measurement values and fault status, fault current up to 1500 A, di/dt detection, UV stabilized polycarbonate, IP65, visual fault indication by 6 high luminous LEDs of 40 lumens. |

* The Communicable variant of SICAM FSI must be associated with SICAM FCG (6MD2340-3JM70-8AA2).






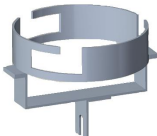
Ordering Information - Spares

Use the following MLFB series to order the SICAM FSI spares:

| | |
|-----------------|---|
| 6MD2318 - 4BB00 | Lithium-thionyl chloride battery (non-rechargeable) |
|-----------------|---|

Ordering Information - Accessories

Use the following MLFB series to order the SICAM FSI accessories:

| | |
|-----------------|---|
| 6MD2318 - 4AA00 | <p>UART cable for the device configuration</p>  |
| 6MD2318 - 4MA01 | <p>Hot stick with shotgun fitted for FSI mounting, 4 m</p>  |
| 6MD2318 - 4MA02 | <p>Hot stick (telescopic) for FSI mounting, 12 m</p>   |
| 6MD2318 - 4MA04 | <p>Magnetic reset assembly, accessory for hot stick with shotgun fitted</p>  |
| 6MD2318 - 4MA05 | <p>Device adapter for SICAM FSI mounting via hot stick (telescopic), accessory for hot stick (telescopic)</p>  |

Case Dimensions

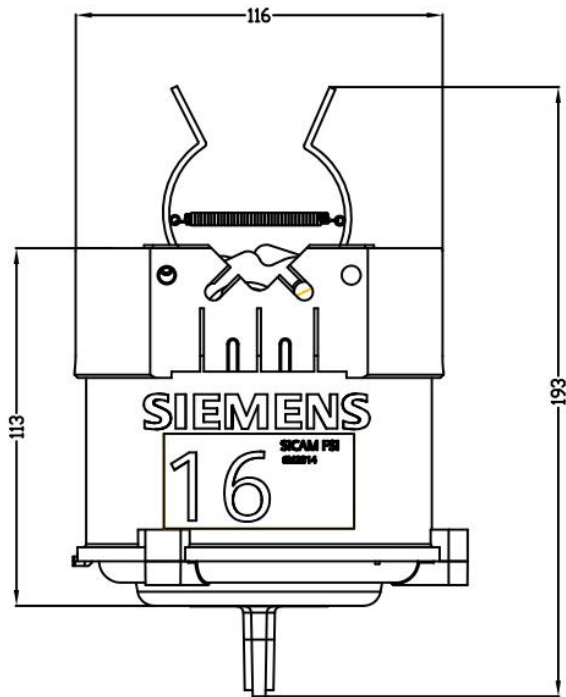


Fig 4. Front View

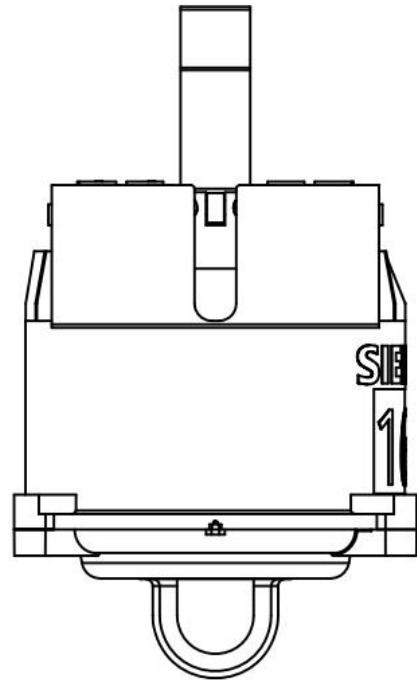


Fig 6. Side View

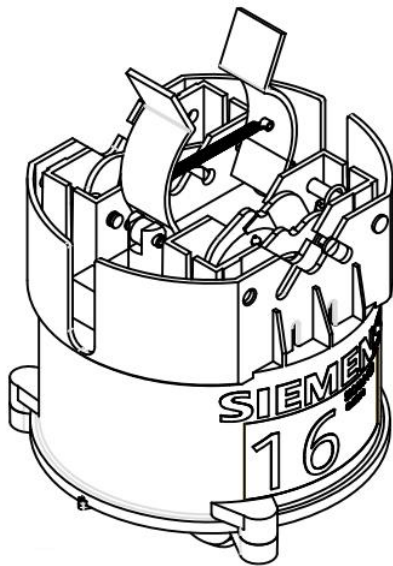


Fig 5. Isometric View

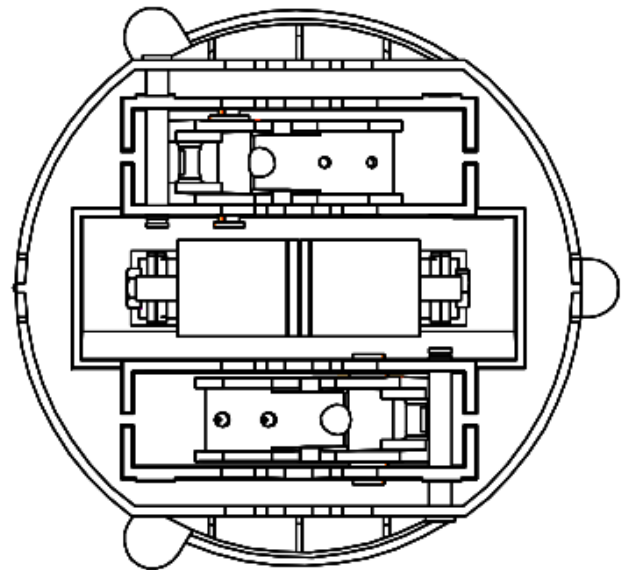


Fig 7. Top View

E50417-K1040-C587-A1

For any technical queries, please contact our customer support center

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