SICAM short-circuit indicators

Fast fault location in medium-voltage cable and overhead line networks
SICAM short-circuit indicators for cable and overhead line networks:

Greater reliability, higher efficiency, lower costs

For modern distribution networks to operate efficiently, faults must be quickly detected, packed in messages, and made available for further processing. With its SICAM short-circuit and ground-fault detection devices, Siemens now offers devices for recording and reporting faults in medium-voltage power systems.

Highlights at a glance
- Fast fault location
- Improved efficiency
- Flexible use
- High availability
- Easy installation and commissioning
- No maintenance

Prevent critical network situations – and seamlessly monitor the status of your distribution network.

SICAM short-circuit indicators help you reduce downtimes and optimize network quality.

Efficiently increase the availability of your distribution network – and benefit from the continuous improvement of your power supply.
Detect, report, benefit

1. **SICAM FSI & SICAM FCG**
   Detect short-circuits and ground faults in medium-voltage overhead line networks with SICAM FSI (Fault Sensor Indicator).

2. **SICAM FPI & SICAM FCG**
   The SICAM Fault Passage Indicator (FPI) is used to detect and report phase and ground faults in medium-voltage cable networks.

3. **SICAM FCM & SICAM FCG**
   As a short-circuit and ground-fault indicator with direction indication, SICAM FCM offers additional, precise measured values for monitoring the load of distribution networks.

With SICAM FCG (Fault Collector Gateway), you can transfer all reported faults to a control center via GPRS or to a service team via SMS. Our cloud solution also allows you to work independently of a control center.

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**The power team:**

Low investment, high power

- **SICAM FSI** (Fault Sensor Indicator)
- **SICAM FCG** (Fault Collector Gateway)
- **SICAM FCM** (Feeder Condition Monitor)
- **SICAM FPI** (Fault Passage Indicator)
Everything under control
Do you want to improve the quality of your network? Then take advantage of a complete portfolio of products for network monitoring, power quality recording, fault recording, phasor measurement, and system software applications.

SICAM FCM (Feeder Condition Monitor) is a short-circuit and ground-fault indicator with direction indication that uses protection algorithms and low-power sensor technology according to IEC 60044. Alternatively, SICAM FCM can also be connected to a capacitive voltage tap to allow cost-effective directional fault detection in the cable network. Another possibility is the provision of up-to-date measured values via the integrated Modbus RTU interface, which permits you to make an accurate assessment of your distribution system.

SICAM FCM can be used with all medium-voltage switchgear types in grounded, isolated, and resonant-grounded systems.

Take advantage of high measuring accuracy and use SICAM FCM for investment planning in your distribution network.
We find your faults

To remedy faults – for example, cable faults due to excavation work – you must be able to locate them in the distribution network as quickly as possible.

Order no. (MLFB):

6MD2321-1AA00-1AA0
Resistive voltage measurement

6MD2322-1AA00-1AA0
Capacitive voltage measurement

only in conjunction with

6MD2322-0AA80-0AB3
connection cable to voltage detecting system (VDS)

Take advantage of these benefits

• Universal short-circuit and ground-fault recording with directional fault detection in grounded, isolated, and resonant-grounded MV cable networks

• Minimal loss of network fees/end customer fees thanks to service restoration times ranging in minutes or even seconds (depending on the primary equipment).

• High measuring accuracy guaranteed by the use of high-quality measurement equipment and low-power sensor technology according to IEC 60044.

• Reduced commissioning effort enables the use of low-power sensors and the associated automatic adjustment to primary values (without calibration or adjustment effort).

• Simplified parametrization and measured value transmission by connecting to the SICAM A8000 remote terminal unit via Modbus.
Resistor dividers enable precise, linear measurements
Can also be used to connect 1 A and 5 A transformers in existing systems

Standard-compliant sensors:
For every process connection

High measuring accuracy for all medium-voltage switchgear types

Your configuration options, depending on your requirements

Order nos. (MLFB)

**6MD2320-0GA00-1AA0**
Phase current sensor
Type 225 mV@300 A, IEC 60044-8
Accuracy class 1; ext. 200 %; 5P10

**6MD2320-0AF00-1AA0**
Summation current sensor
Type 225 mV@60 A, IEC 60044-8
Accuracy class 1

**6MD2320-0AA10-1AA0**
1 A adapter
3 inputs
1 A to 225 mV low-power signal

**6MD2320-0AA20-1AA0**
5 A adapter
3 inputs
5 A to 225 mV low-power signal

**6MD2320-0AA04-1AA0**
10 kV voltage sensor
10 kV / √3 → 3.25 V / √3, IEC 60044-7
Accuracy class 1
for T-plug with symmetric C cone

**6MD2320-0AA04-1AA0**
10 kV voltage sensor
10 kV / √3 → 3.25 V / √3, IEC 60044-7
Accuracy class 1
for T-plug with short asymmetrical C cone

**6MD2320-0AA07-1AB0**
20 kV voltage sensor
20 kV / √3 → 3.25 V / √3, IEC 60044-7
Accuracy class 1
for T-plug with short asymmetrical C cone

**6MD2320-0AA07-1AA0**
20 kV voltage sensor
20 kV / √3 → 3.25 V / √3, IEC 60044-7
Accuracy class 1
for T-plug with symmetric C cone

**6MD2322-0AA080-0AB3**
Four-wire cable for connecting SICAM FCM to capacitive LRM voltage testing systems
SICAM FCM for reliable measured values:
Innovative and high-precision

A first for sensors

SICAM FCM is the first short-circuit indicator that supports standard-compliant sensors for measuring current and voltage according to IEC 60044-7/-8. The excellent result: It enables high-precision measurement without calibration or adjustments to the primary values.

SICAM FCM:
Developed for practical use

99,5 % accuracy
- Reliable measured values
- High-quality measurement technology

Standard-compliant sensors for current and voltage
- Flexibly usable
- IEC 60044-7/-8

No adjustment to primary values
- Efficient installation and commissioning
SICAM FPI: The guardian of underground cable networks

Save time and money thanks to reduced downtimes:
Rely on SICAM FPI (Fault Passage Indicator) – the simple, economical solution for efficiently operating modern distribution networks.

SICAM FPI reliably detects and reports ground and phase faults in radial and open ring cable networks.
The threshold values of the permissible currents can be set at the four current sensors (L1, L2, L3, and E). In the event of a fault, the sensors send an optical signal to SICAM FPI via a fiber-optic cable – fail-safe and isolated.

The LEDs on SICAM FPI permit local indication. Using the binary contacts, they can forward fault messages to connected remote terminal units.

Take advantage of these benefits
• Reduced fault-related costs and increased availability thanks to the fast detection of phase and ground faults in MV cable networks.
• Minimal operating costs with a maintenance-free, self-sufficient system that reliably operates with the aid of the back-up battery in SICAM FSI even if the main supply is tripped.
• Economical installation and a long service life guaranteed by easy-to-retrofit, IP67-compliant sensors with an interference-immune fiber-optic connection to SICAM FPI.
### Short-circuit indicators for cable networks

**Sensor type 1 (< 10 % accuracy)**
- Current sensor for phase faults: AC 200 A to 1,200 A
- Current sensor for ground faults: AC 10 A to 100 A

**Order nos. (MLFB):**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6MD2310-0AA00-0AA0</td>
<td>Ground-fault and short-circuit indicator with 2 binary outputs, 3 phase-fault + 1 ground-fault current sensor (for L1 / L2 / L3 / E)</td>
</tr>
<tr>
<td>6MD2310-0BB00-0AA0</td>
<td>Short-circuit indicator with 1 binary output, 3 phase-fault current sensors (for L1 / L2 / L3)</td>
</tr>
<tr>
<td>6MD2310-0CC00-0AA0</td>
<td>Ground-fault indicator with 1 binary output, 1 ground-fault current sensor (for E)</td>
</tr>
<tr>
<td>6MD2310-0EC00-0AA0</td>
<td>Ground-fault indicator with 2 binary outputs, 1 ground-fault current sensor (for E)</td>
</tr>
</tbody>
</table>

**Sensor type 2 (< 15 % accuracy)**
- Current sensor for phase faults: AC 200 A to 800 A
- Current sensor for ground faults: AC 40 A to 300 A

**Order nos. (MLFB):**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6MD2310-0AE00-0AA0</td>
<td>Ground-fault and short-circuit indicator with 2 binary outputs, 3 phase-fault + 1 ground-fault current sensor (for L1 / L2 / L3 / E)</td>
</tr>
<tr>
<td>6MD2310-0BF00-0AA0</td>
<td>Short-circuit indicator with 1 binary output, 3 phase-fault current sensors (for L1 / L2 / L3)</td>
</tr>
<tr>
<td>6MD2310-0CG00-0AA0</td>
<td>Ground-fault indicator with 1 binary output, 1 ground-fault current sensor (for E)</td>
</tr>
<tr>
<td>6MD2310-0EG00-0AA0</td>
<td>Ground-fault indicator with 2 binary outputs, 1 ground-fault current sensor (for E)</td>
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</tbody>
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SICAM FSI:
Fault control in overhead line networks

Boost the performance of your overhead line network by reducing downtimes:

With the SICAM FSI (Fault Sensor Indicator) short-circuit and ground-fault detection system, we offer you the right solution for reliable fault recording in medium-voltage overhead line networks from 3.3 kV to 66 kV.

Choose between two device versions: without communication and with local indication only; with communication and with local indication.

SICAM FSI reliably communicates with SICAM FCG via the encrypted, wireless network ZigBee.

Even installation is incredibly easy: The device is clamped onto the overhead line via the hotstick.

Order nos. (MLFB):

6MD2314-1AB10
Local display only

6MD2314-1AB11
With integrated communication

Take advantage of these benefits

- **Better service performance by the maintenance team** thanks to precise fault location and local fault indication by means of a flashing light (depending on fault type) and remote indication.
- **Low maintenance costs** thanks to self-sustained sensors in the device, a high backup-battery life, and no maintenance for 10 years.
- **Quick and easy commissioning** using the QR code on the device and a Web browser.
SICAM FCG:
Reliable transmission of messages

1. Direct connection to a control center:
Messages are sent to a control center using a standardized telecontrol protocol.

SICAM FCG (Fault Collector Gateway) establishes the connection to a control center via GPRS and sends messages using the standardized telecontrol protocol IEC 60870-5-104. To locate a fault more quickly, SICAM FCG can also send an SMS directly to the cell phone of a service technician.

2. Fault message in the cloud
Messages are sent directly to maintenance teams, without the need for a control center.

An alternative is the "cloud solution": Using the XMPP protocol, fault messages and locations are visualized in the FLiC application on a smartphone. Maintenance teams are immediately informed – without control centers, without complex IT hardware, and incredibly economically.

For more information, visit: siemens.com/flic

Order nos. (MLFB):
6MD2340-3JM70-8AA2
Without antenna

6MD2340-3JM71-8AA2
With antenna

Take advantage of these benefits:

- **Minimized commissioning effort** thanks to simple connection to a control center via GPRS using the standardized telecontrol protocol IEC 60870-5-104.
- **Reduced service costs** thanks to direct fault messages from the overhead line to the maintenance team via SMS or the FLiC application on a smartphone.
- **Low operating costs** thanks to a fully autonomous power supply via a PV buffered battery.
Subject to changes and errors. The information given in this document only contains general descriptions and/or performance features which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products. The requested performance features are binding only when they are expressly agreed upon in the concluded contract.

For all products using security features of OpenSSL, the following shall apply:

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (www.openssl.org).

This product includes cryptographic software written by Eric Young (eay@cryptsoft.com).

This product includes software developed by Bodo Moeller.