SIEMENS

SICAM Earth Fault Indicator (EFI)

Catalog · Edition 2

SICAM Earth Fault Indicator (EFI)

Catalog

SICAM Earth Fault Indicator (EFI)

Description and Functions

1.1

Description

SICAM Earth Fault Indicator (EFI) is a device that is used for detection and signaling of ground-fault on medium-voltage underground distribution cable networks. It uses an external current sensor to detect ground-fault (E). The device together with the current sensor detects the unbalance current in the underground cables and indicate it as ground-fault. The fault indications are based on the ground-fault current threshold set in the device.

SICAM EFI provides quick detection and localization of faults. This decreases fault outage times and helps in maintaining the medium voltage feeder availability. This device is used in the distribution automation systems having voltage ratings up to 36 kV (+10%) with highest withstandable voltage for equipment up to 40.5 kV.

Functions

Power On Options

- Self-sustained using internal Li-$SOCl_2$ battery.
- Dual-powered using auxiliary (AC/DC) power supply.

Safety

- The device complies with the IEC 61010-1 safety standards.

Simple

- Supports easy device configuration using DIP switch based settings.

Configurable and changeover type binary outputs

- Configurable ground-fault binary output as latch/wipe type
- Providing remote indications of ground fault and battery health via FRTU/RTU

Self-test diagnostic

- Supports self-test locally using the push-button and remotely using the Low-Voltage Reset (LVR) contact.

Local indication

- 1 red LED and 1 red mechanical flag for indicating ground fault.
- 1 green LED for AC/DC auxiliary power status
- 1 amber LED for battery health state
- 1 signal lamp output for local ground-fault indication

Multiple fault reset functionality

- Remote reset/low-voltage reset (LVR), push-button reset, AC/DC voltage reset via binary input, AC auxiliary recovery reset, ground current-based reset, and auto reset using timer.

Extended battery life

- Enhanced power management leading up to 2000 h of fault indication operation (single blink/second).

Ground-fault indication pattern

- Simple blinking pattern for easier identification of fault current.
- Single blink pattern: Fault current was present.
- Double blink pattern: Fault current is still present.

[sc_EFI_device, 1, --_--]

Figure 1.1/1 SICAM EFI

Certifications

- Complies with IEC 62689-1 standard for short circuit indicators.
- Complies with IEC 61869-1, 61869-2, 61869-10 standard for sensors.

Sensors

- Split core sensors with easy locking mechanism. Retrofit on 3-core/single core cable along with 3.5 m, 5 m, and 16 m wire length.

Built-In Restraints

- Avoids false fault detection due to ground-current inrush and auto-reclosure operations.

Applications

- SICAM EFI is used in 50 Hz/60 Hz networks.
- The device is primarily intended for radial or open ring medium-voltage cable networks.
- Supports application on solidly grounded or low-resistive grounded networks.
- SICAM EFI and signal lamp material are UV stabilized, flame retardant grade, and weatherproof polymeric material.
- Split core encapsulated low-power sensor with insulation for outdoor applications – UV stabilized, flame retardant grade, corrosion-resistant, and weatherproof polymeric material.
- SICAM EFI fault LED visibility up to 20 m during day time (under bright sunlight) and 200 m during night time.
- Siemens signal lamp visibility up to 70 m during day time (under bright sunlight) and 300 m during night time.

This section describes the different SICAM EFI variants and the available functionalities as per the ordering information:

- **Battery-Powered SICAM EFI with LED**: 6MD2311-1BB00-0AA3 and 6MD2311-1BE00-0AB6
- **Battery-Powered SICAM EFI with LED and Flag**: 6MD2311-2BB10-0AA5
- **Dual-Powered SICAM EFI with LED**: 6MD2311-1DC00-0AB6, 6MD2311-1DD00-0AB6, and, 6MD2311-1DE00-0AB6
- **Dual-Powered SICAM EFI with LED and Flag**: 6MD2311-1DC10-0AB6

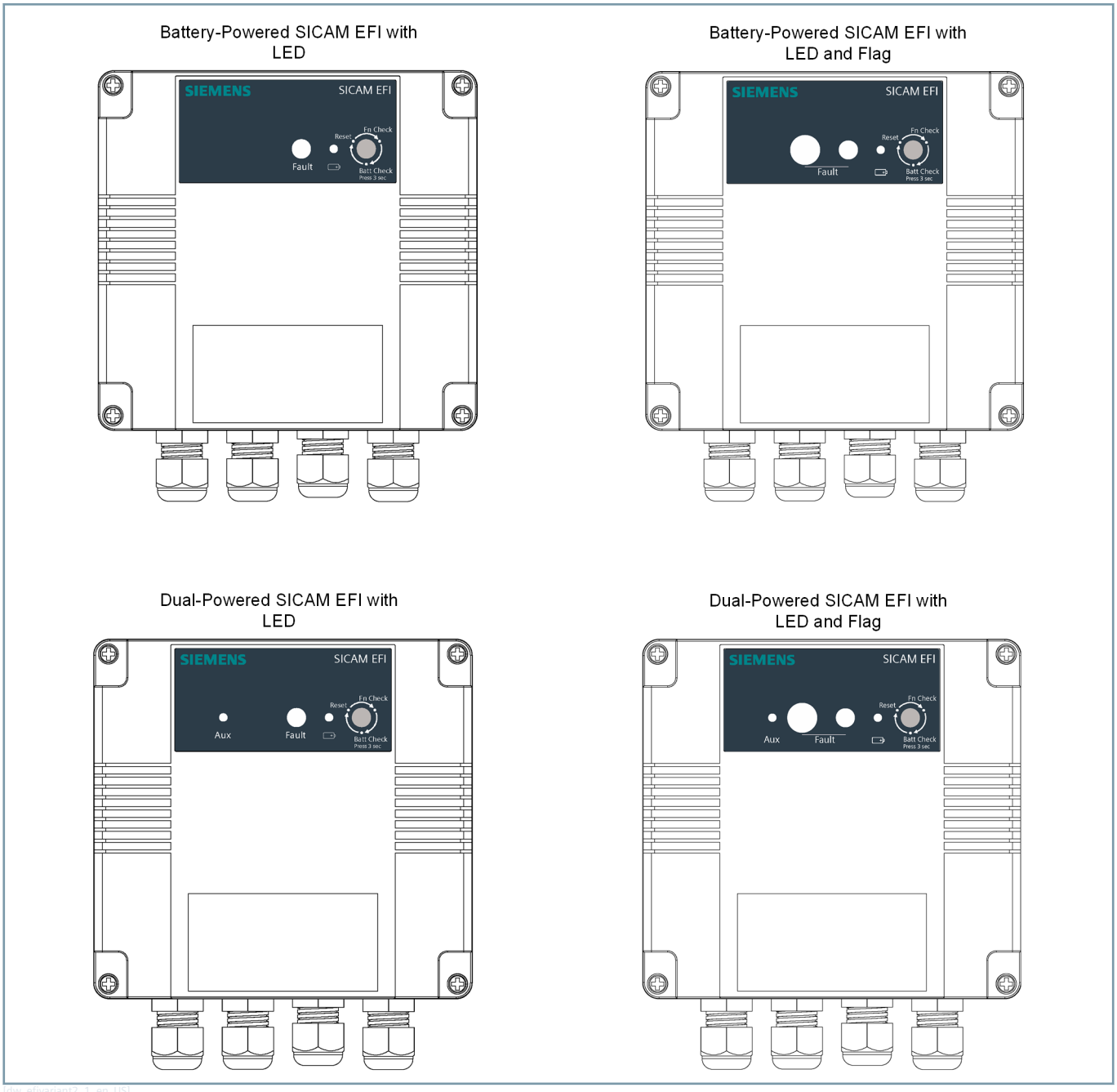
		Battery-Powered SICAM EFI		Dual-Powered SICAM EFI	
Function Block	Functional Elements	with LED	with LED and Flag	with LED	with LED and Flag
Internal battery	AA battery	●	●	●	●
Auxiliary power supply	AC 110 V to 230 V, ± 20 % tolerance			●	●
	DC 12 V to 24 V, ± 20 % tolerance			●	●
Binary output (BO)	Ground fault BO (CO type)	●	●	●	●
	Ground fault BO (NO type)	●[1]	●		
	Battery health BO (NO type)		●	●	●
Output	Signal lamp output (NO type)	●[1]	●	●	●
Fault Reset	Remote reset (LVR)	●	●	●	●
	AC BI reset	●	●	●	●
	DC BI reset			●	●
	Manual reset	●	●	●	●
	Auxiliary AC recovery reset			●	●
	Ground current-based reset	●	●	●	●
	Auto reset using timer	●	●	●	●
Indications	Fault LED (red)	●	●	●	●
	Auxiliary Power LED (green)			●	●
	Battery Health LED (amber)	●	●	●	●
	Mechanical flag		●		●

		Battery-Powered SICAM EFI		Dual-Powered SICAM EFI	
Function Block	Functional Elements	with LED	with LED and Flag	with LED	with LED and Flag
Self-diagnostic	Self-test (locally by push-button)	●	●	●	●
	Self-test (remotely by LVR)	●	●	●	●
Fault current setting	25 A	●	●	●	●
	40 A	●	●	●	●
	50 A	●	●	●	●
	80 A	●	●	●	●
	100 A	●	●	●	●
	120 A	●[2]		●	●
	160 A	●[2]		●	●
	240 A	●[2]		●	●
Response time setting	40 ms	●	●		
	50 ms			●	●
	60 ms	●	●		
	80 ms	●	●	●	●
	100 ms	●		●	●
	150 ms			●	●
	160 ms		●		
Auto reset using timer	1 h	●	●		
	2 h	●	●		
	4 h	●	●	●	●
	8 h	●	●	●	●
	10 h				●
	16 h			●	●
	32 h			●	
Auto reclosure		●	●	●	●
Ground current inrush		●	●	●	●
BO type (ground fault)	Latch or Wipe (selectable)	●	●	●	●
Sensor type	Type 1 with 3.5 m wire	●[3]			
	Type 1 with 5 m wire		●		
	Type 2 with 16 m wire			●[4]	●
	Type 3 with 16 m wire			●[5]	
	Type 4 with 16 m wire	●[6]		●[7]	

1 For battery-powered SICAM EFI variants (6MD2311-1BB00-0AA3 and 6MD2311-1BE00-0AB6), the spare BO can be used as ground fault BO or signal lamp output.
2 Only available in 6MD2311-1BE00-0AB6
3 Only available in 6MD2311-1BB00-0AA3
4 Only available in 6MD2311-1DC00-0AB6
5 Only available in 6MD2311-1DD00-0AB6
6 Only available in 6MD2311-1BE00-0AB6
7 Only available in 6MD2311-1DE00-0AB6

SICAM EFI Variants

Variant wise Views



[dw_efivariant2, 1, en_US]

Figure 2.2/1 SICAM EFI Variants

Indication of Conformity

This product complies with the directive of the Council of the European Communities on the harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC Directive 2014/30/EU) and concerning electrical equipment for use within specified voltage limits (Low Voltage Directive 2014/35/EU) as well as restriction on usage of hazardous substances in electrical and electronic equipment (RoHS Directive 2011/65/EU).

This conformity has been proved by tests conducted by Siemens AG in accordance of the Council Directive in accordance with the generic standard IEC/EN 61326-1 and IEC/EN 61000-6-2 for EMC directive and with the standard IEC/EN 61010-1 and IEC/EN 61010-2-30 for Low Voltage Directive.

The device is designed and manufactured for application in an industrial environment.

RoHS directive 2011/65/EU is met using the standard IEC/EN 63000.

The product conforms with IEC 62689-1.

Technical Data

Medium-voltage distribution	Up to 36 kV (+10%)
Highest withstandable voltage	Up to 40.5 kV
System frequency	50 Hz/60 Hz networks, ± 10 % tolerance
Internal battery	Field replaceable lithium thionyl chloride battery (Li-$SOCl_2$) type AA cell size/3.6 V/2700 mAh • Either up to 15 years expected operational life • Or up to 2000 h of fault indication flashing (single blink/ second) under standard operating temperature of 25 °C
Auxiliary power supply	AC 110 V to 230 V, ± 20 % tolerance Power rating: 6 VA
	DC 12 V to 24 V, ± 20 % tolerance Power rating: 0.5 W Operating range: 9 V to 38 V (Safety extra low voltage - SELV)
Sensor input interface	Ground sensor input: S1 and S2 (via an electrical cable)

NOTE

When operating a SICAM EFI with an external DC power supply, make sure that the external DC power supply meets the safety criteria for the environment where the SICAM EFI is operated. The external DC power supply must be able to supply a safety extra low voltage (SELV) power to the SICAM EFI under the conditions at the place of operation.

Binary Output

Maximum switching voltage	AC 250 V/DC 220 V
Maximum switching power	62.5 VA/30 W
Maximum carry current	2 A
Maximum switching current:	0.25 A, AC 250 V/0.13 A, DC 220 V

Operating Temperature

Operating temperature and Ambient storage temperature	Device • -20 ° C to +75° C – 6MD2311-1BB00-0AA3 – 6MD2311-1BE00-0AB6 – 6MD2311-1DC00-0AB6 – 6MD2311-1DD00-0AB6 – 6MD2311-1DE00-0AB6 • -30 ° C to +75° C – 6MD2311-2BB10-0AA5 – 6MD2311-1DC10-0AB6 Signal Lamp • -30 ° C to +75° C

Mechanical Data

Dimensions (W x H x D)	140 mm x 150 mm x 41 mm (with glands)
Weight	447 g
Mounting position	Surface mounting position (on RMU panel or wall)

Ground-Fault Current Range (for all sensors)

Ground-Fault current range	25 A to 100 A (For Type 1 sensor) 25 A to 240 A (For Type 2, Type 3 and Type 4 sensor)
Typical accuracy	±10% of the selected setting

Type 1 Sensor (for three-core cable)

Sensor ∅	150 mm
Sensor Wire Length	3.5 m or 5 m
Current cable ∅ supported	60 mm to 150 mm
Material	Flexible insulated and UV stabilized material

Type 2 Sensor (for three-core cable)

Sensor ∅	140 mm
Sensor Wire Length	16 m
Current cable ∅ supported	90 mm to 140 mm
Material	Flexible insulated and UV stabilized material

Type 3 Sensor (for single-core cable)

Sensor ∅	280 mm
Sensor Wire Length	16 m

Current cable ∅ + pitch ∅ supported	220 mm - 340 mm
Material	Flexible insulated and UV stabilized material

Type 4 Sensor (for three-core cable)

Sensor ∅	120 mm
Sensor Wire Length	16 m
Current cable ∅ supported	60 mm to 120 mm
Material	Flexible insulated and UV stabilized material

Fault Current Setting[8] across SICAM EFI Variants

MLFB	Fault Current Setting
6MD2311-1BB00-0AA3	25 A, 40 A, 50 A, 80 A, 100 A
6MD2311-2BB10-0AA5	25 A, 40 A, 50 A, 80 A, 100 A
6MD2311-1BE00-0AB6	25 A, 40 A, 50 A, 80 A, 100 A, 120 A, 160 A, 240 A
6MD2311-1DC00-0AB6	25 A, 40 A, 50 A, 80 A, 100 A, 120 A, 160 A, 240 A
6MD2311-1DD00-0AB6	25 A, 40 A, 50 A, 80 A, 100 A, 120 A, 160 A, 240 A
6MD2311-1DE00-0AB6	25 A, 40 A, 50 A, 80 A, 100 A, 120 A, 160 A, 240 A
6MD2311-1DC10-0AB6	25 A, 40 A, 50 A, 80 A, 100 A, 120 A, 160 A, 240 A

Response Time Setting[8] across SICAM EFI Variants

MLFB	Response Time Setting
6MD2311-1BB00-0AA3	40 ms, 60 ms, 80 ms, 100 ms
6MD2311-1BE00-0AB6	40 ms, 60 ms, 80 ms, 100 ms
6MD2311-2BB10-0AA5	40 ms, 60 ms, 80 ms, 160 ms
6MD2311-1DC00-0AB6	50 ms, 80 ms, 100 ms, 150 ms
6MD2311-1DD00-0AB6	50 ms, 80 ms, 100 ms, 150 ms
6MD2311-1DE00-0AB6	50 ms, 80 ms, 100 ms, 150 ms
6MD2311-1DC10-0AB6	50 ms, 80 ms, 100 ms, 150 ms

Binary Inputs (for fault reset functions)

Push-button reset	Manual press of push-button for 1 s on the device
Remote reset	Low-voltage reset (LVR) for 1 s
AC BI reset	AC BI (110 V to 230 V, ± 20 % tolerance) input signal for 2 s
DC BI reset	DC BI (DC 9 V to 38 V) input signal reset for 2 s
Auxiliary AC recovery reset	Automatic fault reset when auxiliary AC voltage restores to (110 V to 230 V, ± 20 % tolerance) level for 15 s.
Ground current-based reset	Automatic fault reset on recovery of zero sequence current in the range of 5 A ± 3 A for 15 s.
Auto reset using timer	Auto reset timer setting. Up to 4 settings are available in each MLFB variant. These settings are MLFB-specific. 1 h, 2 h, 4 h, 8 h, 10 h, 16 h and 32 h

Auto Reset Timer Setting[8] across SICAM EFI Variants

MLFB	Auto Reset Timer Setting
6MD2311-1BB00-0AA3	1 h, 2 h, 4 h and 8 h
6MD2311-1BE00-0AB6	1 h, 2 h, 4 h and 8 h
6MD2311-2BB10-0AA5	1 h, 2 h, 4 h and 8 h
6MD2311-1DC00-0AB6	4 h, 8 h, 16 h and 32 h
6MD2311-1DD00-0AB6	4 h, 8 h, 16 h and 32 h
6MD2311-1DE00-0AB6	4 h, 8 h, 16 h and 32 h
6MD2311-1DC10-0AB6	4 h, 8 h, 10 h and 16 h

General Device Data

In accordance with IEC 61010-1	
Overvoltage category	III
Degree of pollution	2
Humidity range	0 % to 100 %, non-condensing
Maximum altitude above sea level	Up to 2000 m
Material group	IIIa
Enclosure material (SICAM EFI and Signal Lamp)	Polycarbonate with 10 % fiberglass

Signal Lamp Output Rating

Signal lamp BO rating in the following MLFBs: 6MD2311-1BB00-0AA3 and 6MD2311-1BE00-0AB6

Contact Rating (resistive load)	1 A, DC 30 V 0.3 A, AC 125 V
Maximum switching voltage	AC 250 V/DC 220 V
Maximum switching power	62.5 VA/30 W
Maximum carry current	2 A

Signal lamp BO rating in the following MLFBs: 6MD2311-2BB10-0AA5, 6MD2311-1DC00-0AB6, 6MD2311-1DD00-0AB6, 6MD2311-1DE00-0AB6 and 6MD2311-1DC10-0AB6.

Contact Rating (resistive load)	2 A, DC 30 V 3 A, DC 30 V 0.5 A, AC 125 V
Maximum switching voltage	AC 277 V/DC 220 V
Maximum switching power	62.5 VA/90 W
Maximum switching current	4 A

8 The fault current setting, response time setting, auto reset timer setting, and DIP switch setting vary in the SICAM EFI device depending on the selected MLFB and sensor type.

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

EMI/EMC Tests for Immunity (for SICAM EFI with signal lamp)

Test	Reference Standard	Test Requirement
Harmonic and Inter-harmonic[9]	IEC 61000-4-13, Level 2 IEC 62689-1	Performance criterion: A
Voltage dips[9]	IEC 61000-4-11 IEC 62689-1	Dips and Interruptions 0 %: 2.5 cycles Performance criterion: A
Voltage dips[10]	IEC 61000-4-29 IEC 62689-1	Dips and Interruptions 0 %: 0.05 s Performance criterion: A
Surge immunity[11]	IEC 61000-4-5, Level 3 IEC 62689-1	Common mode (CM): ± 2 kV Differential mode (DM): ± 1 kV Direct application 2 Ω: Auxiliary AC power port 40 Ω, 0.5 uF: sensor input, DC binary input, AC binary input, binary outputs Performance criterion: B
Electrical fast transient/burst	IEC 61000-4-4, Level 3 IEC 62689-1	± 2 kV on AC power port and sensor input port, Burst frequency 5 kHz ± 1 kV on DC binary input, AC binary output, binary output, signal lamp output Performance criterion: B
Oscillatory waves immunity[12]	IEC 61000-4-18, Level 3 IEC 62689-1	± 2.5 kV CM on AC power port, AC/DC binary input, binary output ± 1 kV DM on AC power port, DC power port, sensor input port, AC/DC binary input, binary output Frequency: 100 kHz, 1 MHz Performance criterion: B
Ring wave[12]	IEC 61000-4-12, Level 3 IEC 62689-1	± 2 kV CM ± 1 kV DM Frequency: 100 kHz Performance criterion: B
Electrostatic discharge	IEC 61000-4-2, Level 3 IEC 62689-1	8 kV air discharge and 6 kV contact discharge Performance criterion: B
Power frequency magnetic field immunity	IEC 61000-4-8, Level 4 IEC 62689-1	30 A/m (continuous field) and 300 A/m pulsed (short duration for 3 s) on the X, Y, Z axis of the product Performance criterion: A
Pulse magnetic field immunity	IEC 61000-4-9, Level 4 IEC 62689-1	300 A/m pulsed on the X, Y, Z axis of the product Performance criterion: B
Damped oscillatory magnetic field immunity	IEC 61000-4-10, Level 4 IEC 62689-1	Oscillation frequency: 0.1 MHz and 1 MHz Repetition rate: 40 transients/s at 0.1 MHz, 400 transients/s at 1 MHz Test duration: 2 s 30 A/m peak Performance criterion: B
Radiated, radio frequency, electromagnetic field immunity	IEC 61000-4-3, Level 3 IEC 62689-1	10 V/m (80 MHz to 2.7 GHz) and 3 V/m (2.7 GHz to 6 GHz) Performance criterion: A
Conducted disturbances, induced by radio frequency fields	IEC 61000-4-6, Level 3 IEC 62689-1	Frequency: 0.15 MHz to 80 MHz Modulation: 80% AM; 1 kHz Test voltage: 10 Vrms Performance criterion: A
Power frequency conducted disturbances	IEC 61000-4-16 IEC 62689-1	30 V continuously 300 V for 1 s Performance criterion: A

9 Only applicable to the AC supply power port

10 Only applicable to the DC supply power port

11 On the auxiliary DC power supply port (Non isolated SELV circuit), Surge test and electrical fast transient (EFT) test are not applicable.

12 On auxiliary DC power supply port, only differential mode (DM) is applicable.

Type Test Specifications

EMI/EMC Tests for Emission (for SICAM EFI with signal lamp)

Test	Reference Standard	Test Requirement
Conducted emission	IEC 61326-1 CISPR32	150 kHz to 30 MHz (Class A)
Radiated emissions	IEC 61326-1 CISPR32	30 MHz to 6 GHz (Class A)

Climatic Test (for SICAM EFI with signal lamp and sensor)

Test	Reference Standard	Test Requirement
Dry heat	IEC 60068-2-2 IEC 62689-1	+ 75° C; duration: 16 h (with device turned off) + 16 h (with device turned on)
Damp heat, steady state	IEC 60068-2-78 IEC 62689-1	(40 ± 2)° C; 98 % RH; duration: 4 days (with device turned off) + 4 days (with device turned on)
Damp heat, cyclic (12 h + 12 h)	IEC 60068-2-30 IEC 62689-1	25° C to 40° C. 98 % RH, duration: 21 days
Cold	IEC 60068-2-1 IEC 62689-1	-20° C; duration: 16 h (with device turned off) + 16 h (with device turned on)
Change of temperature	IEC 60068-2-14	+75° C & -20° C, 0 % RH 3 h + 3 h, 5 cycles
Salt spray test	IEC 60068-2-11	96 h, NaCl 5 % with DM water
Exposure to solar radiation	IEC 60068-2-5 IEC 62689-1	1000 W/m², Duration: 8 h
Rainfall test	-	330 mm
Storage temperature and transportation temperature[13]	IEC 60068-2-2 IEC 60068-2-1 IEC 62689-1	-20° C to +75° C

Insulation Test (for SICAM EFI)

Test	Reference Standard	Test Requirement
Dielectric test (50 Hz/60 Hz)	IEC 61010-1 IEC 60255-27	2.2 kV for 1 min 1.5 kV for 1 min between X6 and X7 terminal for 6MD2311-1BB00-0AA3 and 6MD2311-1BE00-0AB6 MLFB.
Impulse voltage test 1.2 µs/50 µs	IEC 61010-1 IEC 60255-27	4 kV, 5 positive cycles, 5 negative cycles
Insulation resistance	IEC 61010-1 IEC 60255-27	DC 500 V, 60 s, ≥100 MΩ

Safety Test (for SICAM EFI)

Test	Reference Standard	Test Requirement
Product safety test	IEC 61010-1	Marking and Documentation as per Clause No. 5 Protection against electric shock as per Clause No. 6 Protection against mechanical hazard as per Clause No. 7 Resistance to mechanical stresses as per Clause No. 8 Protection Against Spread of Fire as per Clause No. 9 Equipment Temperature Limits and Resistance to heat as per Clause No. 10 Protection against liberated gases and substances, explosion, and implosion as per Clause No. 13 Components and subassemblies as per Clause No. 14 HAZARDS resulting from application as per Clause No. 16 Risk Assessment as per Clause No. 17

Ingress Protection (for SICAM EFI with signal lamp and sensor)

Test	Reference Standard	Test Requirement
Degree of protection	IEC 60529	IP 65W (for EFI and signal Lamp) IK07 (for EFI and signal Lamp) IP 68W (for sensor)

Electrical Test (for SICAM EFI with signal lamp and sensor)

Test	Reference Standard	Test Requirement
Short-circuit current withstand test	IEC 62689-1	25 kA @ 3 s 12.5 kA @ 1 s
Rated dynamic current	IEC 62689-1	31.25 kA peak for 1 s 62.5 kA peak for 3 s
Temperature rise	IEC 62689-1	for sensors only Class B, up to 105 °C

[13] For optimum battery capacity, Siemens recommends storing the device below 30° C; 30 % RH.

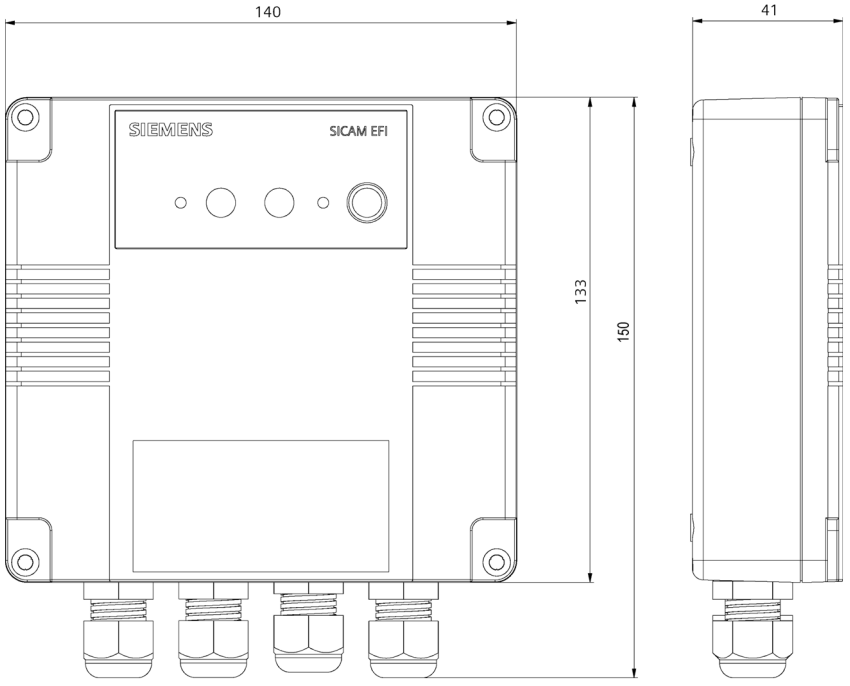
Mechanical Tests (for SICAM EFI with signal lamp and sensor)

Test	Reference Standard	Test Requirement
Vibration response test, Class 1	IEC 60068-2-6 IEC 62689-1	Sinusoidal Frequency: 10 Hz to 500 Hz 10 m/s2 amplitude 0.075 mm, 23 min. Sweep rate: 1 oct./min Number of sweep cycles: 2 cycles/axis Number of axes: 3 (X, Y, and Z) Performance Criterion: B
Mechanical Impact	IEC 62262:2002 IEC 62689-1:2016	IK07, Impact energy: 2 J
Seismic test	IEC 60068-3-3	Frequency: 1 Hz to 8 Hz (horizontal), ± 7.5 mm amplitude Frequency: 1 Hz to 8 Hz (vertical), ± 3.5 mm amplitude Frequency: 8 Hz to 35 Hz (horizontal), 2 g acceleration Frequency: 8 Hz to 35 Hz (vertical), 1 g acceleration Sweep rate: 1 oct./min Number of sweeps: 1/ axes (3 directions)

Service Conditions (for SICAM EFI with signal lamp and sensor)

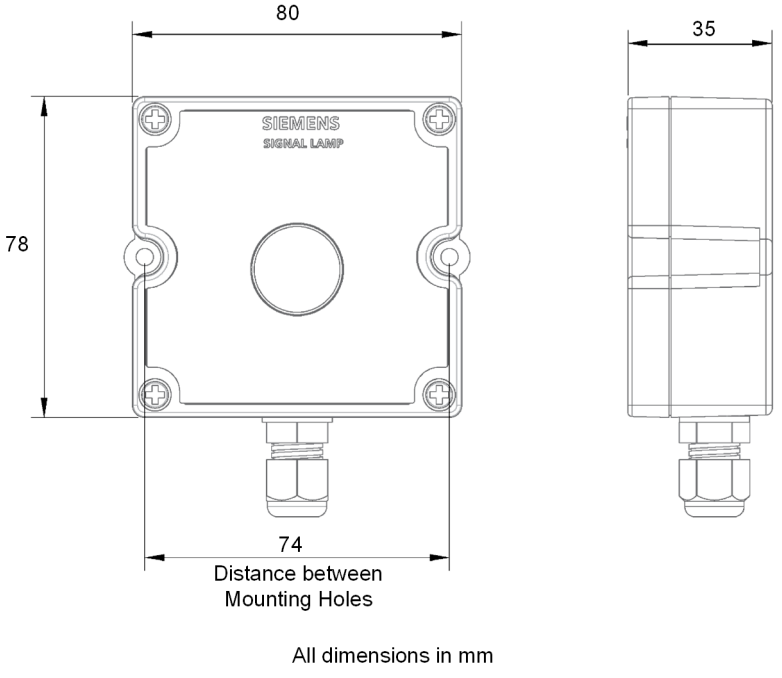
Test	Reference Standard	Test Requirement
Service Conditions	IEC 60721-3-4	Applicable Classification: 4K25, 4K26, 4Z2, 4Z13, 4Z10, 4Z16, 4B3, 4S13, 4M11

Dimensions



[dw_efi_casedimensions_frontview, 1, en_US]

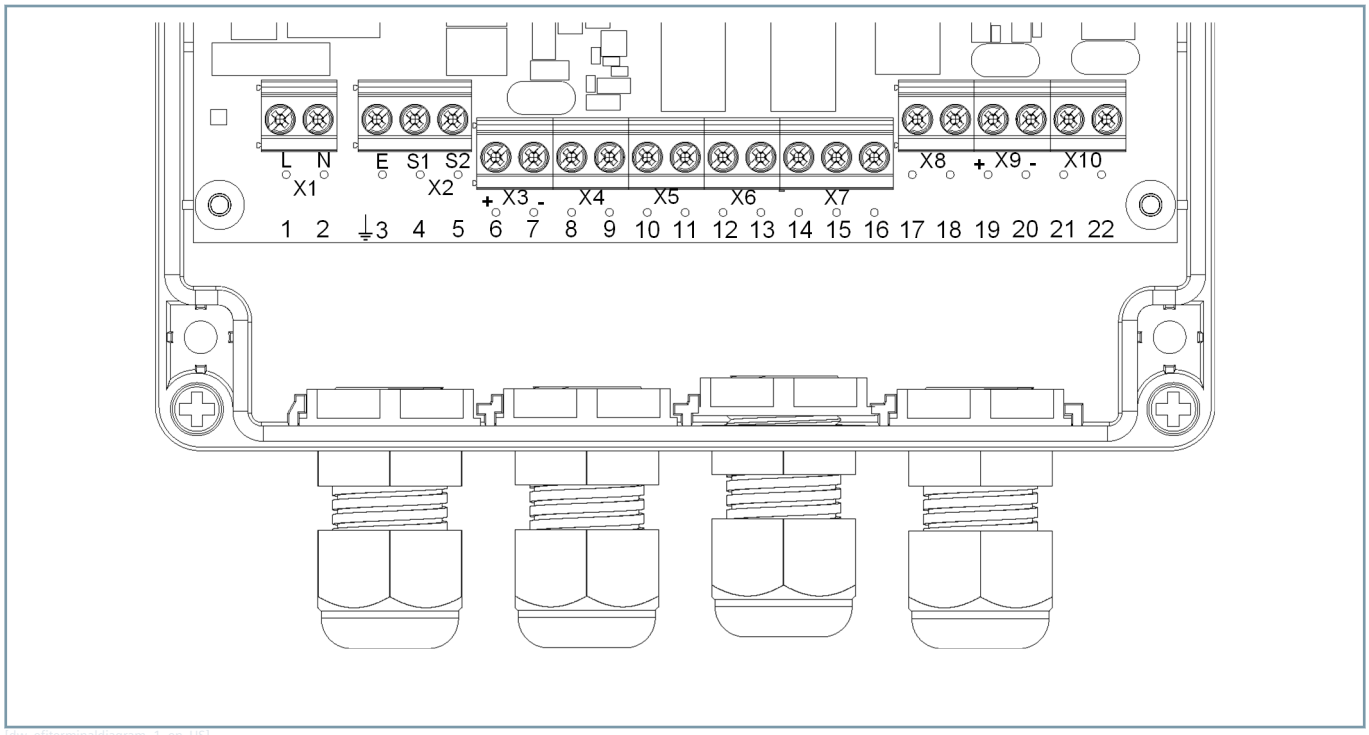
Figure 3.3/1 SICAM EFI Front View and Side View



[dw_efi_signallmap_casedimensions_frontview, 1, en_US]

Figure 3.3/2 Siemens Signal Lamp Front and Side View

SICAM EFI Terminal Details



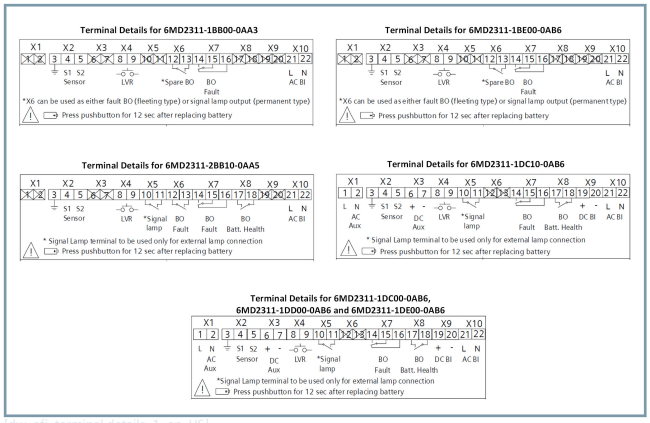
[dw_efiterminaldiagram; 1; en_US]

Figure 3.4/1 SICAM EFI Terminal Details

Terminal Block	Pin No.	Description
X1	1, 2	Auxiliary supply input (AC)
E	3	Terminal connector for functional ground. This terminal needs to be connected irrespective of whether the device is powered using AC/DC supply or battery.
X2	4	Sensor input terminal 1 (S1)
	5	Sensor input terminal 2 (S2)
X3	6 (+) 7 (–)	Auxiliary supply input (DC)
X4	8, 9	Remote reset/Low voltage reset (LVR) input
X5	10 (C) 11 (NO)	Signal lamp output
X6	12 (C) 13 (NO)	NO type binary output for ground fault (spare) For 6MD2311-1BB00-0AA3 and 6MD2311-1BE00-0AB6 MLFB device variants, this terminal can be used for connecting signal lamp.
X7	14 (NO) 15 (C) 16 (NC)	Changeover type binary output for ground fault (main)
X8	17 (NO) 18 (C)	NO type binary output for battery health
X9	19 (+) 20 (–)	DC BI reset input
X10	21, 22	AC BI reset input

Table 3.4/1 Terminal Specifications

SICAM EFI Variant Wise Terminal Details



[dw_efi_terminal details; 1; en_US]

Figure 3.4/2 Terminal Details for SICAM EFI Variants

Ordering Information

Ordering Information - SICAM EFI

Ordering Information – SICAM EFI

Description		Order No.																
		1	2	3	4	5	6	7		8	9	10	11	12		13	14	15	16
SICAM Earth Fault Indicator		6	M	D	2	3	1	1	-	□	□	□	□	0	-	0	A	□	□
										▲	▲	▲	▲					▲	▲
Device Hardware										|	|	|	|					|	|
Battery-Powered	Ground-fault indicator (Li-$SOCl_2$ battery) with:									1	B	B	0					A	3
	• 1 BO (CO type for ground fault) • 1 signal lamp BO (NO type) • 2 BI (Potential-free, AC 110 V/230 V, ± 20 % tolerance) • LED indications									1	B	E	0					B	6
	Ground-fault indicator (Li-$SOCl_2$ battery) with: • 3 BO (1 CO type and 1 NO type spare for ground fault, 1 NO type for battery health) • 1 signal lamp BO (NO type) • 2 BI (Potential-free, AC 110 V/230 V, ± 20 % tolerance) • LED and flag indications									2	B	B	1					A	5
Dual-Powered	Ground-fault indicator (Li-$SOCl_2$ battery + auxiliary power supply: DC 12 V to 24 V, ± 20 % tolerance (operating range: 9 V to 38 V), AC 110 V/230 V, ± 20 % tolerance) with: • 2 BO (1 CO type for ground fault, 1 NO type for battery health) • 1 signal lamp BO (NO type) • 3 BI (Potential-free, DC 9 V to 38 V, AC 110 V/230 V, ± 20 % tolerance) • LED indications									1	D	C	0					B	6
										1	D	D	0					B	6
										1	D	E	0					B	6
	Ground-fault indicator (Li-$SOCl_2$ battery + auxiliary power supply: DC 12 V to 24 V, ± 20 % tolerance (operating range: 9 V to 38 V), AC 110 V/230 V, ± 20 % tolerance) with: • 2 BO (1 CO type for ground fault, 1 NO type for battery health) • 3 BI (Potential-free, DC 9 V to 38 V, AC 110 V/230 V, ± 20% tolerance) • LED and flag indications									1	D	C	1					B	6
Sensor Details												|						|	|
Type 1 Sensor	• Ground-fault trip current range: 25 A to 100 A • Sensor ∅: 150 mm • Sensor secondary wire length: 3.5 m or 5 m • Used for three-core cable • Supports cable ∅ range: 60 mm to 150 mm (10 % Accuracy)											B						A	3/5
Type 2 Sensor	• Ground-fault trip current range: 25 A to 240 A • Sensor ∅: 140 mm • Sensor secondary wire length: 16 m • Used for three-core cable • Supports cable ∅ range: 90 mm to 140 mm (10 % Accuracy)											C						B	6
Type 3 Sensor	• Ground-fault trip current range: 25 A to 240 A • Sensor ∅: 280 mm • Sensor secondary wire length: 16 m • Used for 3 single-core cable • Supports cable pitch range: 220 mm to 340 mm (10 % Accuracy)											D						B	6
Type 4 Sensor	• Ground-fault trip current range: 25 A to 240 A • Sensor ∅: 120 mm • Sensor secondary wire length: 16 m • To be used for three-core cable • Supports cable ∅ range: 60 mm to 120 mm (10 % Accuracy)											E						B	6
Sensor Connecting Wire Length (Refer description before ordering sensor wire length)																		|	|
3.5 m	3.5 m wire length is only available for 6MD2311-1BB00-0AA3 MLFB variant																	A	3
5 m	5 m wire length is only available for 6MD2311-2BB10-0AA5 MLFB variant																	A	5
16 m	16 m wire length is available for the remaining MLFB variants.																	B	6

Table 4.1/1 SICAM EFI Selection and Ordering Data

SICAM EFI - Spares and Accessories

MLFB	Description	
6MD2301-1BA00-0AA3 Type 1 Sensor	• Ground-fault trip current range: 25 A to 100 A • Sensor Ø: 150 mm • Sensor secondary wire length: 3.5 m • Used for 3-core cable • Supports cable Ø range: 60 mm to 150 mm (10 % Accuracy)	
6MD2301-1BA00-0AA5 Type 1 Sensor	• Ground-fault trip current range: 25 A to 100 A • Sensor Ø: 150 mm • Sensor secondary wire length: 5 m • Used for 3-core cable • Supports cable Ø range: 60 mm to 150 mm (10 % Accuracy)	
6MD2301-1CA00-0AB6 Type 2 Sensor	• Ground-fault trip current range: 25 A to 240 A • Sensor Ø: 140 mm • Sensor secondary wire length: 16 m • To be used for 3-core cable • Supports cable Ø range: 90 mm to 140 mm (10 % Accuracy)	
6MD2301-1DA00-0AB6 Type 3 Sensor	• Ground-fault trip current range: 25 A to 240 A • Sensor Ø: 220 mm • Sensor secondary wire length: 16 m • Used for 3 single core cable • Supports cable pitch range: 220 mm to 340 mm (10 % Accuracy)	
6MD2301-1EA00-0AB6 Type 4 Sensor	• Ground-fault trip current range: 25 A to 240 A • Sensor Ø: 120 mm • Sensor secondary wire length: 16 m • To be used for 3-core cable • Supports cable Ø range: 60 mm to 120 mm (10 % Accuracy)	
6MD2301-0AB00-0AA0	Flush mounting bracket (L-clamp)	
6MD2301-0AA00-1LA5	Signal lamp with 5 m wire length	
6MD2301-0AA00-1LB5	Signal lamp with 15 m wire length	

E50417-X8940-C600-A2

For any technical queries, please contact our customer support center
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