

Monitoring module LFC107E

Monitoring module with single fault tolerance for medical IT systems featuring a built-in insulation fault location system



LFC107E – Typical example

Device features

- Complete solution for IT system monitoring and insulation fault location
- Factory-made, tested module for time and cost-saving installation
- IT system monitoring (insulation, load, transformer temperature)
- Connection monitoring
- Internal functional testing
- Fast localization of faulty subcircuits during operation
- Insulation fault location for 6...24 subcircuits
- Two-pole circuit breakers for each outgoing circuit
- Clear menu structure with LC display allows easy parameter setting
- Bus technology for easy installation and reduced fire load
- Power supply for MK2430/MK800
- Screwless-type connection technique
- Suitable for all common DIN rail systems

Product description

The factory-made modules of the LFC107E series are used to monitor IT systems in medical locations. The LFC107E features an insulation fault location system to localize insulation faults in 6, 12, 18 or 24 outgoing circuits during operation. Each outgoing circuit has a two-pole circuit breaker. Status indication and alarm texts on the alarm indicator and operator units takes place via bus technology. The module is suitable for mounting onto all common DIN rail systems (equipment racks have to be provided by the customer).

Functions in accordance with IEC 60364-7-710 / DIN VDE 0100-710 (VDE 0100-710)

- Cables laid to resist short-circuits and earth faults
- Control circuit with single fault tolerance
- Monitoring of the system/PE connections of the insulation monitoring device
- Insulation, load current and temperature monitoring for IT systems in group 2 medical locations
- Functional testing including checking of the operating times.

Further measures to increase the electrical safety

- Monitoring of essential connecting leads such as
 - current transformers
 - transformer temperature sensors

Description of the IT system monitoring function

In group 2 medical locations safe and reliable operation must be guaranteed in case of an insulation fault or transient overload. Therefore, in this case, IT systems are used for the supply of electrical loads to monitor the insulation, load and temperature of isolating transformers.

Insulation monitoring with the AMP measuring principle avoids that DC components which can be caused by electronic devices influence the measurement. If the insulation resistance falls below the set response value or if the load current or the transformer temperature exceed the threshold value, an alarm message is indicated and the common alarm contact switches.

Continuous self monitoring of the monitoring module, the measuring leads for insulation, load and temperature monitoring, provides high availability of the system. Interactive device monitoring via the bus informs about device failure.

The test button can be used to simulate faults and in this way check the function of the monitoring module.

Indications/messages

- Text display of all major operating, fault and alarm messages
- Information exchange between alarm indicator and operator units via BMS bus
- Common alarm contact with protective separation for the insulation fault location system

Insulation fault location system (EDS system)

In Group 2 medical locations featuring a large number of socket outlet circuits and/or loads (e.g. intensive care units), locating faulty circuits or loads can often be a time-consuming and difficult task for medical and technical personnel. The EDS insulation fault location system solves this problem by automatically locating the insulation fault during operation.

This results in two decisive advantages: fault location and availability are optimized in terms of both time and cost, because the system remains in operation during automatic fault location.

Insulation fault location

The insulation fault location process starts when the A-ISOMETER® 107TD47 reports an insulation fault. The PGH474 test device generates a test current of max. 1 mA. This test current flows via the insulation fault location and via the earth wire (PE wire) back to the test device. The test current is detected by a measuring current transformer located on the fault path and reported by the EDS461-L-2 evaluator via the bus. The faulty circuit or load is identified by means of an assignment between the measuring current transformer/subcircuit and a unique text message, e.g. on a TM alarm indicator and operator panel, on the MK800 or the MK2430 alarm indicator and test combination.

Technical data monitoring module LFC107E

Insulation coordination acc. to IEC 60664-1

Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	4 kV/3

Supply voltage devices

Supply voltage devices U_s	AC 230 V
Operating range of U_s	0.8...1.15 x U_e
Frequency range of U_s	50...60 Hz
Power consumption	see ordering information

A-ISOMETER® 107TD47

Display, characters	LCD, illuminated, 2 x 16 characters
Test button	internal/ external

Insulation monitoring 107TD47

Response value R_{an} adjustable	50...500 k Ω
Relative percentage error	0...+10 %
Hysteresis	≤ 25 %
Response time t_{an} at $R_f = 0.5 \times R_{an}$ and $C_e = 1 \mu F$	≤ 3 s
Measuring voltage U_m	≤ 12 V
Measuring current I_m (at $R_f = 0 \Omega$)	≤ 50 μA
Internal DC resistance R_i	≥ 240 k Ω
Impedance Z_i at 50 Hz	≥ 200 k Ω
Permissible extraneous DC voltage U_{fg}	≤ DC 375 V
Permissible system leakage capacitance C_e	≤ 1 μF

Load monitoring 107TD4

Response value, adjustable	5...50 A
Hysteresis	≤ 4 %
Temperature influence	≤ 0.15 % / °C

Temperature monitoring 107TD47

Response value/release value	4 k Ω /1.6 k Ω
PTC resistors acc. to DIN 44081	max. 6 in series

Test device PGH474

Test current I_T	≤ 1 mA
Test pulse/break	2 s / 4 s

Evaluator EDS461

Measuring current transformer type	W10/8000
Evaluating current I_E	≥ 0.5 mA
Number of measuring channels	12 (max. 1068)
Scanning time for 12 channels	≤ 72 s

Interface

Interface/protocol	RS-485/BMS
Baud rate	9.6 kbit / s
Cable length	≤ 1200 m
Recommended cable (shielded, shield connected to PE on one side)	min. J-Y(St)Y 2 x 0.6
Terminating resistor	120 Ω (0.25 W)
Device address, BMS bus	107TD47: 2...30 – PGH: 111...119 – EDS: 61...90
Factory-set device address	107TD47: 3 – PGH: 111 – EDS: 4 (5)

Switching elements (alarm contacts EDS)

Number of changeover contacts	1 changeover contact
Operating principle, adjustable	N/C operation

Contact data acc. to IEC 60947-5-1

Rated operational voltage U_e	AC 230 V / DC 220 V
Rated operational current I_e	AC 5 A / DC 0.2 A
Utilization category	AC 14/DC 12
Electrical service life, number of cycles	10.000
Minimum contact load	1 mA at AC / DC > 10 V

Terminals

Control unit

Connection	cage clamp spring terminal
Connection properties rigid/flexible/conductor sizes	0.08...2.5 mm ² /AWG 28-12
Stripping length	8...9 mm

Power supply unit

Connection	cage clamp spring terminal
Connection properties rigid/flexible/conductor sizes	6...16 mm ² /AWG 24-6
Stripping length	16...17 mm

Outgoing circuits

Connection	cage clamp spring terminal
Connection properties rigid/flexible/conductor sizes	0.08...2.5 mm ² /4 mm ² /AWG 28-12
Stripping length	6...7 mm

General data

EMC immunity / EMC emission	acc. to EN 61000-6-2 / EN 61000-6-4
Classification of climatic conditions acc. to IEC 60721	
Stationary use	3K5
Transport	2K3
Storage	1K4
Operating temperature	-10 °C...+55 °C
Classification of mechanical conditions acc. to IEC 60721	
Stationary use	3M4
Transport	2M1
Long-time storage	1M3
Operating mode	continuous operation
Mounting position	vertical
Degree of protection, internal components /terminal (DIN EN 60529)	IP30 / IP20
Mounting into standard distribution panels	see table "Dimensions and weights"
Flammability class	UL94V-0
Product standards	IEC 60364-7-710 / DIN VDE 0100-710 (VDE 0100-710)
Operating manual	T GH1378 + supplementary sheet
Weight	table "Dimensions and weights"

Ordering information

Type	Outgoing circuits	Circuit-breaker*	Max. power consumption	Art. No.
LFC107E06-B16	6	B16	16 W	B 9205 3000
LFC107E12-B16	12	B16	16 W	B 9205 3001
LFC107E18-B16	18	B16	19 W	B 9205 3002
LFC107E24-B16	24	B16	19 W	B 9205 3003

* Other circuit breakers on request

Dimension and weights

Type	Dimensions fields/rows (W/H/D mm)	Recommended cabinet depth	Weight approx.
LFC107E06-B16	1 / 4 (250/600/130)	300 mm	7 kg
LFC107E12-B16	1 / 5 (50/750/130)	300 mm	8 kg
LFC107E18-B16	1 / 7 (250/1050/130)	300 mm	9 kg
LFC107E24-B16	1 / 8 (250/1200/130)	300 mm	10 kg