

MDT106/MDT107

Thermal Diagnosis Modules

User's manual
02/2012



Presentation

Advantages

Based on a circuit temperature measurement principle at medium voltage potential, with no insulation-related risks thanks to the use of optical fibers, the Thermal Diagnosis system ensures:

- continuous monitoring of temperature buildup in the power circuits on the busbar and cable connections
- triggering of a 'pre-alarm' and then an 'alarm' by the activation of outputs on dry contacts
- indication of the zone and circuit concerned

Principle

This Schneider Electric patented system is based on sensors made of sensitive material whose fluorescence time is temperature-dependent.

Via an optical fiber pair, an electronic module controls the transmission of calibrated light pulses and calculates the temperature according to the pulses received in return.

Description

The Thermal Diagnosis system comprises:

- a DIN-profile MDT electronic module which is mounted on a rail in the LV compartment of the MV panel.
2 references of MDT are available :
 - MDT106 as detailed hereafter
 - MDT107 same as MDT106 but with inverted front label, to be mounted with sensors outputs downstairs.
- 2 CFO temperature sensors, a factory-built assembly which includes 3 sensors to be mounted on the power circuit, the optical fibers and the connector for connecting to the module. The connector incorporates an optical-electric conversion mechanism, which eliminates the need for optical connection during implementation.
2 references of CFO sensor are available, CFO733 and CFO734 with different optical fiber lengths.
- accessories for factory-installation of the sensors in the MV panel.
Please refer to the installation manual of the panel concerned.

To extend the system to 3 zones, i.e. 9 points, it is necessary to install an additional MDT module equipped with a single CFO sensor.

Functions

The MDT106/MDT107 modules perform the following functions:

Monitoring of temperature buildup in 2 'zones'

Each CFO733/CFO734 sensor corresponds to a 3-point 'zone' to be monitored in the panel, monitoring being based on **temperature rise**. The module measures the temperature at 3 points of each sensor, as well as the ambient temperature in order to calculate the temperature buildup for each point.

Given the temperature differences between the inside of the LV compartment and the other parts of the panel, correction of the ambient temperature measured by the module is set up by means of an additional setting.

Monitoring is done by comparison with a maximum temperature buildup threshold, which may be adjusted separately for each zone and is common to the 3 measurement points. This form of monitoring is completed by a fixed maximum absolute sensor temperature threshold.

The module therefore includes 3 settings, access to which is lead-sealed on the front panel after factory-setting by the manufacturer.

Triggering of a 'pre-alarm'

When the temperature buildup at one of the 3 points reaches a first set point equal to **85%**⁽¹⁾ of the threshold set for the zone or when one of the 3 points reaches the maximum temperature of **115°C**⁽¹⁾, a 'pre-alarm' is generated and results in:


- activation of the 'pre-alarm' indication relay common to the 2 zones
- activation in flashing mode of one of the 6 front panel indicators which identify the zone and related point.



Triggering of an 'alarm'


When the temperature buildup at one of the 3 points reaches the maximum threshold ⁽²⁾ set for the zone or when one of the 3 points reaches the maximum absolute temperature of **120°C**⁽¹⁾, an alarm is generated and results in:

- activation of the 'alarm' power relay common to the 2 zones
- activation in fixed mode of one of the 6 front panel indicators which identify the zone and related point.

Self-monitoring of the module

The MDT106/MDT107 module has internal self-tests and is equipped with a  indicator which indicates its unavailability:



- each time the module is initialized:
 - The  indicator goes on in fixed mode when the module is switched on and then goes off after the module initialization phase is successfully completed, unless the required sensors are missing (see section below)
- in steady state operation:
 - If a fault is detected, the  indicator goes on in fixed mode.

In both cases, the 'pre-alarm' output contact is also activated when the  indicator is steadily on.

Self-monitoring of sensors

The module provides continuous monitoring of the connected sensor or sensors.

An "Off" position is included in the settings for each zone for that purpose, to deal with the various cases that may be envisaged:

- when no sensors are connected to the module
 - the  indicator is on and flashes
 - the 'pre-alarm' output contact is activated
 - the 6 sensor identification indicators are off.
- when one of the 3 points of each sensor is detected as being faulty (cut or damaged fibers, failure of sensor-embedded electronics)
 - the  indicator is on and flashes
 - the 'pre-alarm' output contact is activated
 - the indicator linked to the faulty measurement point flashes
- When only one sensor is connected, the unused sensor should be set to "Off". If this is not done, the 3 points of the related zone are detected as being faulty.

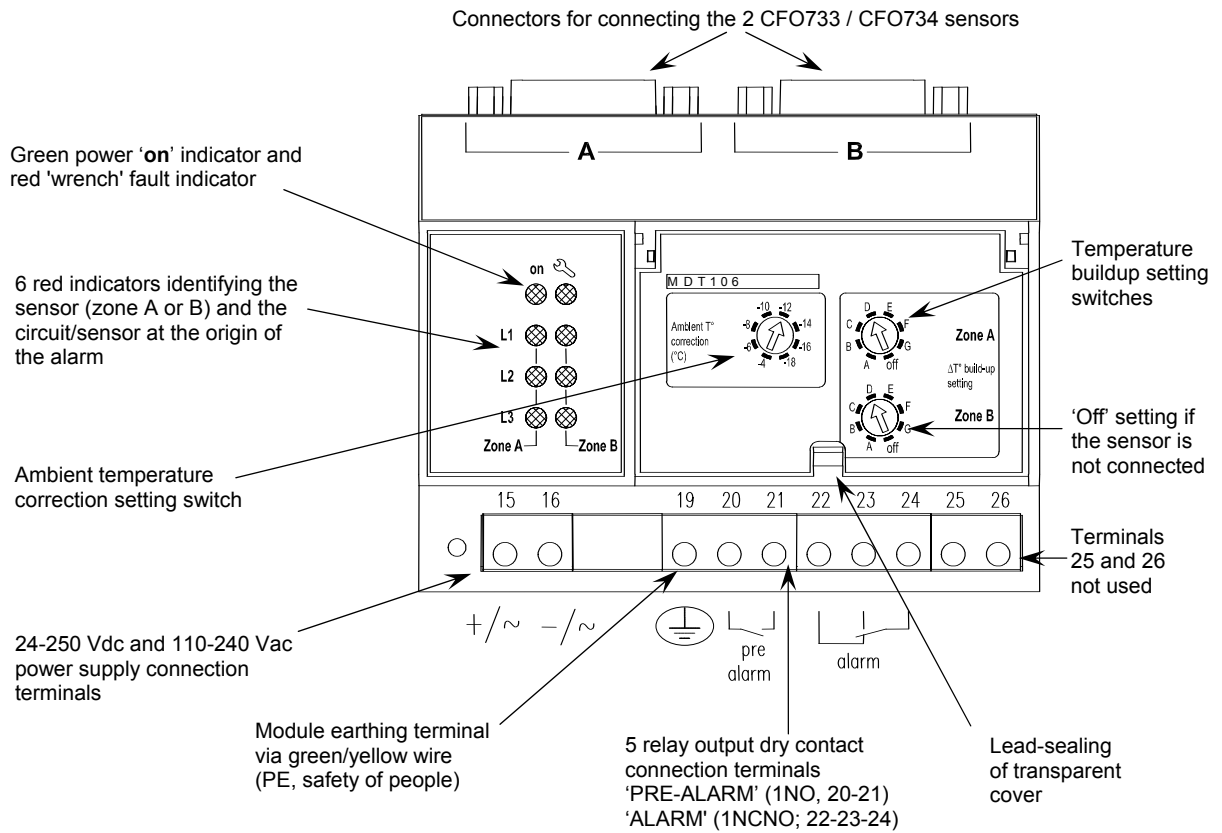
(1) fixed, non-modifiable value

(2) 7 factory settings, identified as A to G

Description

Front panel and connections

(Front label of MDT106 represented)

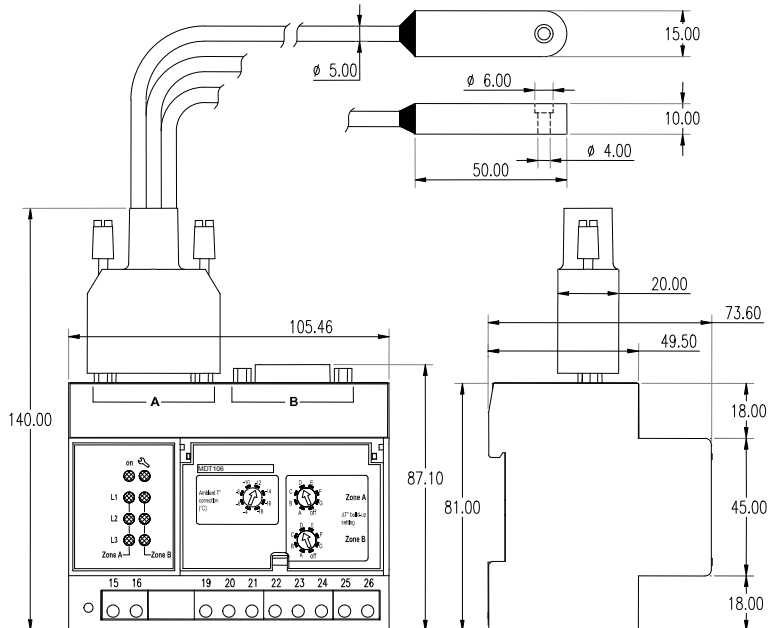


The module's screw type connectors can receive 2 wires with maximum cross-section 0.2 to 2.5mm² (AWG 24-12) with or without fittings.

Weights

- MDT106/MDT107: 360 g
- CFO733/CFO734: 300 g

Dimensions



MDT106/MDT107 electrical characteristics

Power supply					
Voltage		24...250 VDC		110...240 VAC	
Range		-20% / +10%		-20% / +10%	
Deactivated consumption		< 1.2 W		< 4.4 VA	
Maximum consumption		< 3.4 W		< 6.6 VA	
Inrush current		< 10 A for 10 ms		< 15 A for first half-period	
Brownout withstand		10 ms or 1/2 period (according to IEC 60255-1)			
'PRE-ALARM' 1NO output contact (indication)					
Voltage	DC	24 / 48 VDC	127 VDC	220 VDC	-
	AC (47.5... 63 Hz)	-	-	-	110...240 VAC
Continuous current		5 A	5 A	5 A	5 A
Breaking capacity	L/R load < 20 ms	2 / 1 A	0.5 A	0.15 A	-
	Cosφ load > 0.3	-	-	-	1 A
'ALARM' 1NCNO output contacts (power)					
Voltage	DC	24 / 48 VDC	127 VDC	220 VDC	-
	AC (47.5... 63 Hz)	-	-	-	100...240 VAC
Continuous current		8 A	8 A	8 A	8 A
Breaking capacity	Resistive load	8 / 4 A	0.7 A	0.3 A	8 A
	L/R load < 20 ms	6 / 2 A	0.5 A	0.2 A	-
	L/R load < 40 ms	4 / 1 A	0.2 A	0.1 A	-
	Cosφ load > 0.3	-	-	-	5 A

MDT106/MDT107 environmental characteristics

Insulation ⁽¹⁾	Standard	Level/Class	Value
Power frequency dielectric withstand	IEC 60255-5		2 kV rms / 1 min
1.2 / 50 μs impulse wave	IEC 60255-5		5 kV
Electromagnetic compatibility according to EN50263			
Fast transient bursts	IEC 60255-22-4	Class IV	
1 MHz damped oscillating wave	IEC 60255-22-1	Class III	
Immunity to radiated fields	EN 60255-22-3	Class III	10 V/m
Immunity to conducted RF disturbances	IEC 61000-4-6	Class III	
Electrostatic discharge	EN 60255-22-2	Class III	6kV / 8kV (contact /air)
Emission of disturbances	EN 60255-25		
Impulse wave (lightning)	EN 61000-4-5	power supply input and outputs	
Mechanical robustness			
Degree of protection	IEC 60529	IP20	IP52 on front panel ⁽²⁾
Vibrations	IEC 60255-21-1	Class II	
Shocks / jolts	IEC 60255-21-2	Class II	
Earthquakes	IEC 60255-21-3	Class II	
Climatic withstand			
Operation and storage	IEC60068-2-1 and 2		-25...+70°C
Damp heat	IEC60068-2-78		93% RH at 40°C 56 days (storage) 10 days (operation)
Salt mist	IEC60068-2-52		Severity 2
Certification			
CE marking			

CFO733/CFO734 optical fiber sensor characteristics

Environment	Standard	Value
Maximum voltage applied to sensors		17.5 kV
Rated power frequency withstand voltage	IEC 60298, IEC60694	38 kV routine testing
Rated impulse withstand voltage	IEC 60298, IEC60694	98 kV
Characteristics		
Length of the 3 optical fiber sensors	CFO733: 3.65 m; 3.85 m and 4.05 m CFO734: 2.49 m; 2.64 m and 2.69 m	
Maximum fiber / sensor temperature	120°C	
Maximum bending radius	3 cm	

(1) insulated circuits: power supply input, output contacts.

(2) front panel with lead-sealing cover, mounted in electricity panel with connection terminals inaccessible.



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