Treetech

TM

Temperature Monitor for Oil and Windings

PRODUCT CATALOG

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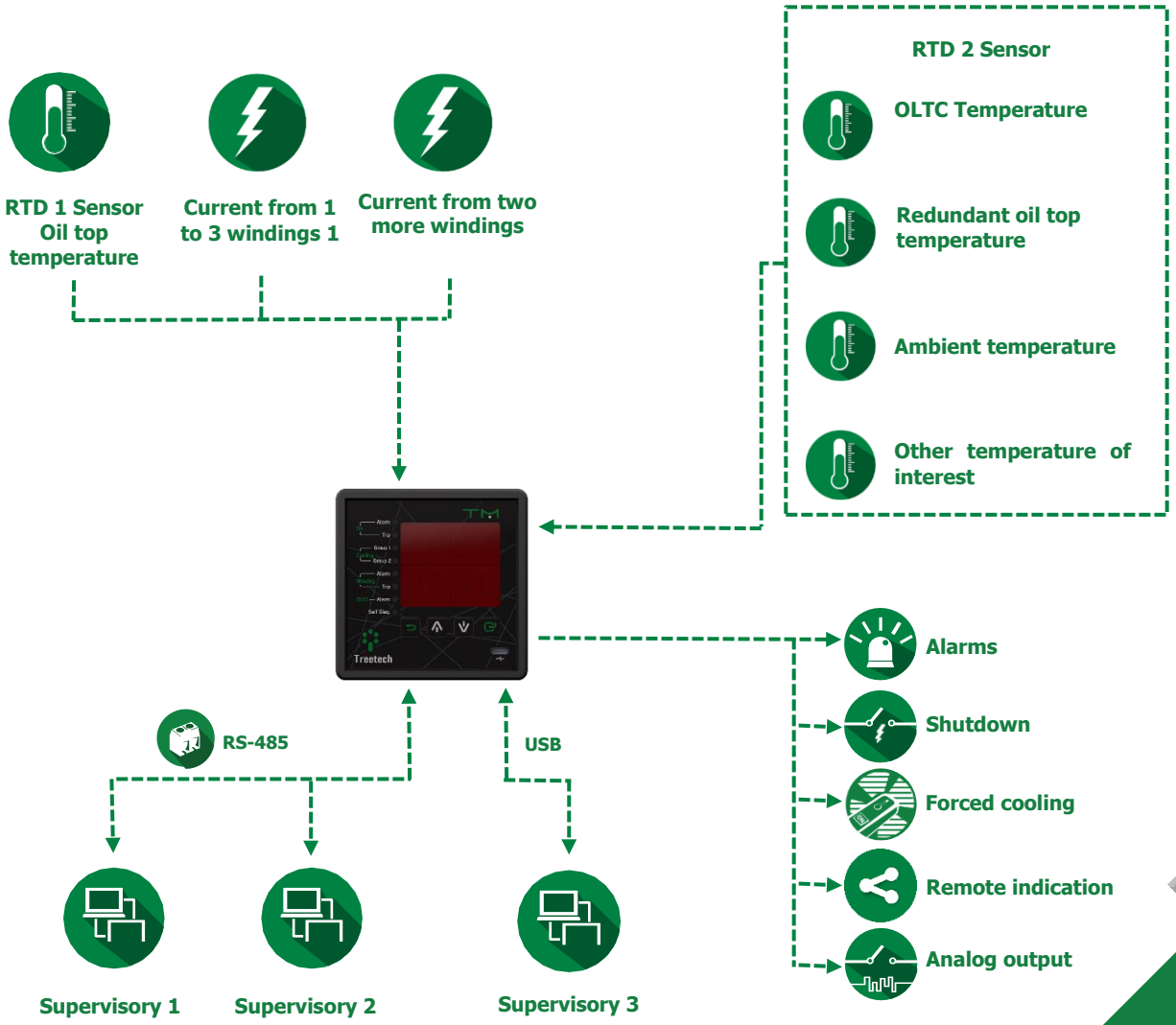
TEMPERATURE MONITOR

The Temperature Monitor for Oil and Windings – TM, BY Treetech, forms a complete system for monitoring temperatures in transformers and reactors immersed in oil.

This IED promotes all control, command and thermal protection of power transformers and reactors. It monitors oil, winding and on-load tap changer temperatures, as well as the refrigeration system. The measurement of the oil temperature is done directly, adding a Pt100 at 0ºC to the thermal well for accessing the equipment's oil, while the measurement of the winding temperature is done indirectly behind the thermal image calculation.

SYSTEM TOPOLOGY



FEATURES AND FUNCTIONS

IED

- ✓ This IED (Intelligent Electronic Device) has a modern and compact design, being specifically created for applications in transformers in substations and industrial or commercial installations.

DAILY COOLING ACTIVATION

- ✓ The daily cooling activation function prevents fan inactivity during periods of low load or low ambient temperature;
- ✓ 2 forced cooling groups that can act individually or together;
- ✓ Applicable as pre-cooling in transformers subject to predictable cyclic loads, and can act before a load peak;
- ✓ Automatic switching of forced cooling groups.

ALARMS AND SELF-DIAGNOSIS

- ✓ Issuance of alarms in case of abnormalities and self-diagnosis to detect internal faults and integration with other sensors.

COMMUNICATION PROTOCOL

- ✓ RS-485 serial communication port for integration into supervision or remote monitoring systems. Modbus® RTU or DNP3 open communication protocols.

INTERNAL CLOCK

- ✓ Adjustment maintained for at least 3 days in case of power failure, without the use of batteries – maintenance-free equipment.

MEASUREMENT OF TWO TEMPERATURES

- ✓ Measurement of up to two temperatures, in which it is possible to choose between: ambient temperature, transformer oil temperature and/or OLTC oil temperature.

FINAL GRADIENT FORECAST

- ✓ Calculation of final oil-winding temperature gradient prediction for current load.

MASS MEMORY (Default)

- ✓ Non-volatile memory for storing measurements and alarm events, shutdowns and others. User programming of the interval between recordings and temperature variation.

MULTIGRADIENT FUNCTION

- ✓ The TM has a multigradient function, as the thermal behavior of a transformer varies according to the activation of its cooling stages. This functionality allows the equipment to vary thermal parameters according to the active cooling stage.

OPTIONAL FUNCTIONS

TM FUNC 3ENR – 3-winding monitoring

This function allows choosing the number of windings to be activated. It is possible to select the desired number of windings:

- ✓ Temperature measurement of up to three windings – Based on the temperature readings of the insulating oil and one or more transformer load currents, the TM calculates (thermal image) the temperature of up to three windings.

PCOL - Pre-cooling

It extends the useful life of the insulation by activating the cooling groups when load levels previously selected by the user are reached. Forced cooling is triggered before the temperature rises excessively, providing greater efficiency and safety. The features/functions are:

- ✓ Load percentage for individual activation of each forced cooling stage;
- ✓ Hysteresis adjustment to turn off forced cooling stages when loading decreases.

OLTD – OLTC temperature differential

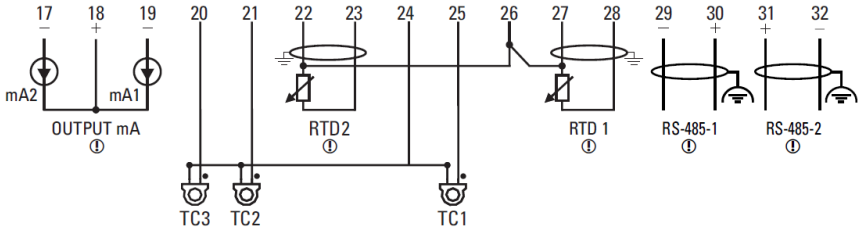
This function makes it possible to compare the temperature of the transformer oil with that of the on-load tap changer, so that abnormal temperature differentials can be detected. Monitoring is carried out in two different modes:

- ✓ Instantaneous Differential Monitoring – Provides alarms with quick response in the event of major defects, even if of short duration;
- ✓ Filtered Differential Monitoring – By subjecting the Instantaneous Differential to a low-pass filter, it is possible to detect evolution trends that indicate permanent defects of small intensity.

TECHNICAL DATA

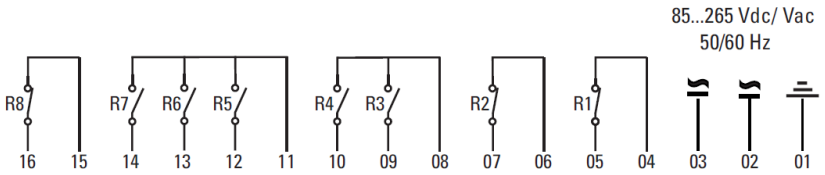
HARDWARE	RANGE/DESCRIPTION
Power supply voltage	85...265 Vac/Vdc
Maximum consumption	<12 W
Operating temperature	-40...85 °C
Degree of protection	IP20
Fixing	Panel
INPUTS	
2 RTD's	Pt100 Ω at 0 °C 3-wire, range: -55...200 °C
3 Current readings (CT)	External clip-on CT 0...10 Aca rms
Minimum value for current reading	100 mA
OUTPUTS	
Relay output	5 NO relays (Normally Open) + 3 NC relays (Normally closed)
Dielectric strength	300 Vrms in normally open 400 Vrms in normally closed
Maximum switching voltage	277 Vac / 125 Vdc in normally open 400 Vac / 300 Vdc in normally closed
Maximum switching current	5.0 A @ 250 Vac; 1250 VA in normally open 6.0 / 5.0 A @ 250 Vac; 1250 / 1500 VA in normally closed
Resistive load	0.4 A @ 125 Vdc; 50 W in normally open 0.50 A @ 125 Vdc; 62.5 W in normally closed
Current loop output ranges	0...1 mA, 10 kΩ 0...5 mA, 2 kΩ 0...10 mA, 1kΩ 0...20 mA, 500 Ω 4...20 mA, 500 Ω

COMMUNICATION INTERFACE	
Communication protocols	DNP3 Modbus® RTU
Communication ports	2 RS-485 (based on TIA-485-A standard) 1 USB Device type C
DIMENSION AND WEIGHT	
Dimension	98 mm x 36 mm x 98 mm
Weight	230 grams



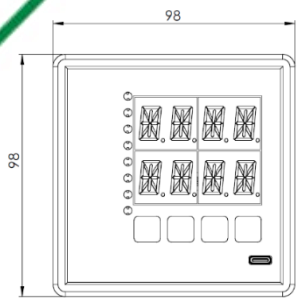
TM

ⓘ For more details and product usage, consult user manual.
⏚ Connect the cable shield to ground at the same point of TM grounding.
⏚ Connect only one end of the cable shield to a noiseless ground terminal.

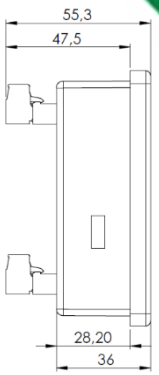


ELECTRIC DIAGRAM

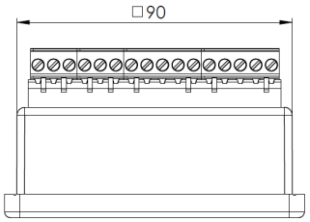
PRODUCT DIMENSIONAL



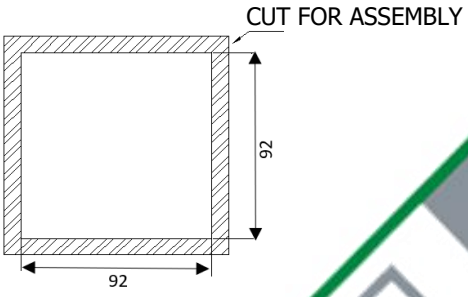
FRONT VIEW



SIDE VIEW



TOP VIEW



PANEL CUT-OUT

PRODUCT FRONT

ESSENTIAL ACCESSORIES

TEMPERATURE SENSOR Pt100 Ω AT 0 °C

Essential for measuring the temperature at the top of the power transformer oil, OLTC temperature, ambient temperature and other measurements in general.

EXTERNAL SECTIONABLE WINDOW TYPE CT

The use of external window-type CTs with sectionable cores is required to read the transformer load currents.

RECOMMENDED ACCESSORIES

SIGMA ECM® MONITORING SOFTWARE

In addition to online monitoring of the temperature of your assets, with our monitoring system and our specialized team, it is possible to monitor the status of your assets beyond reading data.

Monitoring based on analysis of information collected by IEDs installed in your assets.

WEATHER SHELTER

If ambient temperature measurement is desired in unsheltered locations, a meteorological shelter must be used to protect the Pt100 sensor, minimizing errors that exposure to sun, rain, wind, etc. would cause to the measurement.

THERMOMETRIC WELL FOR Pt100

Thermometric wells are used to provide total protection to sensors in the places where they are installed. They are also intended to completely seal the process against pressure losses, leaks or possible contamination.

ORDERING SPECIFICATION

In the product purchase order, it is necessary to specify:

- ✓ Product name;
- ✓ Quantity;
- ✓ Options;
  - PCOL – Pre-cooling;
  - OLTD – OLTC temperature differential;
  - TM FUNC 3ENR – 3-winding monitoring;
- ✓ Accessories.

Treetech

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