



Treotech



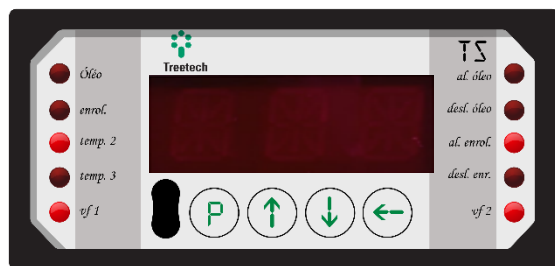
TS

Temperature Supervisor

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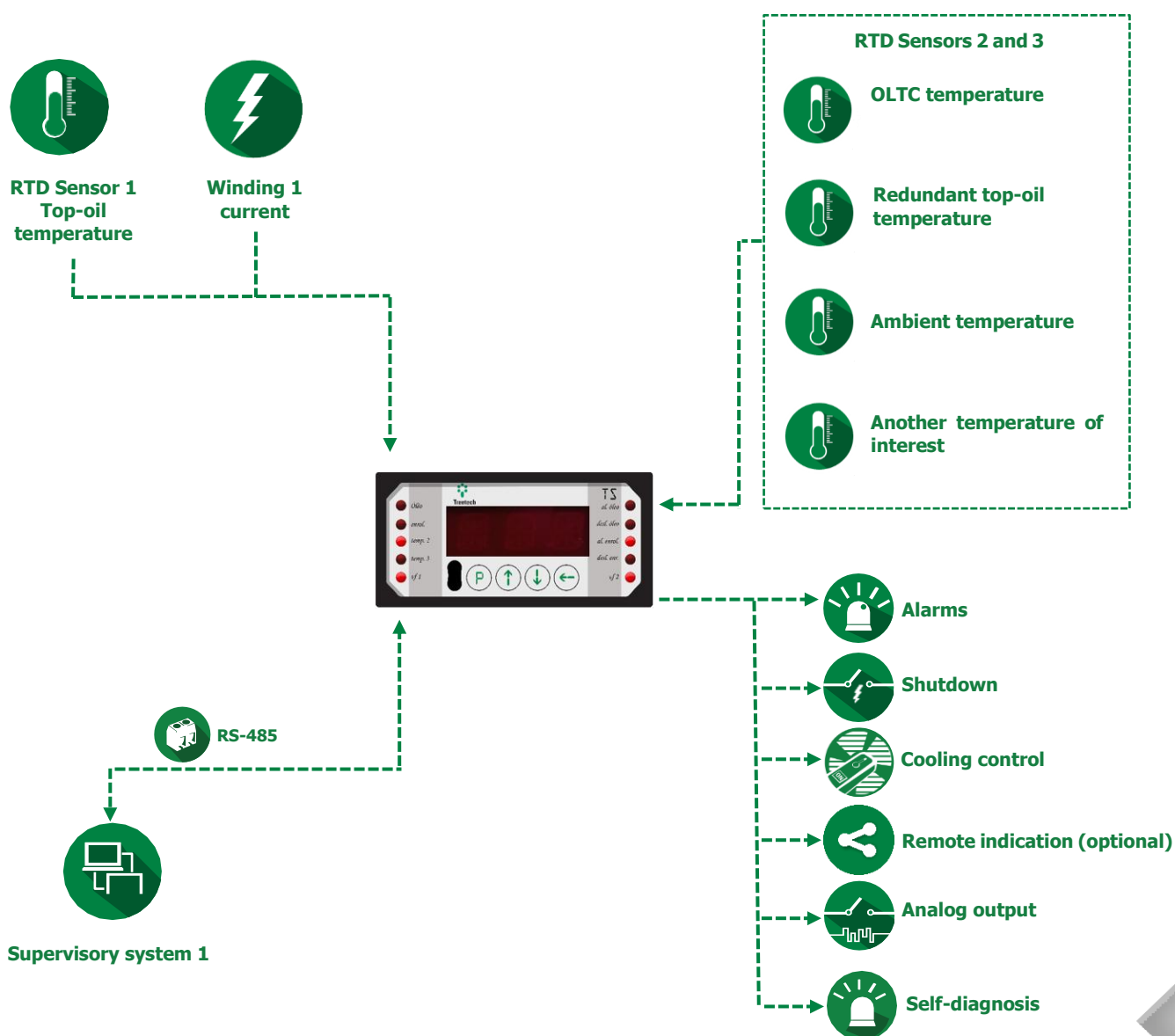
**PRODUCT
CATALOG**

TEMPERATURE SUPERVISOR



The Temperature Supervisor - TS is a solution that makes digital monitoring of oil and winding temperatures accessible for smaller equipment at a cost appropriate for the application. This eliminates the need for measurements using electromechanical devices, resulting in significantly higher accuracy and reliability, while also providing connectivity through optional communication ports.

SYSTEM TOPOLOGY



FEATURES AND FUNCTIONS

LOCAL TEMPERATURE INDICATION

Local temperature indication with programmable display mode: display of the highest temperature, automatic screen scrolling, or display of a fixed channel.

IED

This IED (Intelligent Electronic Device) is specifically designed for substation yard conditions (interference, extreme temperatures).

SENSOR INPUT

Inputs for up to three Pt100 Ω (at 0 °C) RTD temperature sensors with self-calibration, ensuring high accuracy and stability across the entire ambient temperature range.

COMPACT AND VERSATILE

The TS features compact dimensions, offering space and installation cost savings.

ROBUST HARDWARE

The TS design exceeds EMC (Electromagnetic Compatibility) standards to withstand the harsh electromagnetic conditions of substations and an operating temperature range of -40 to 85°C.

RS-485 SERIAL COMMUNICATION PORT

RS-485 serial communication port for integration with remote supervision systems, enabling the creation of a temperature monitoring network for the entire facility. User-selectable communication protocol: Modbus-RTU or DNP3.

FORCED COOLING

Two independent, potential-free NC contacts for controlling two forced-cooling groups, as programmed by the user.

LOCAL COOLING CONTROL

Cooling operation selectable via front keypad (automatic or manual) or remotely via communication protocol.

ANALOG OUTPUT

A programmable analog output for remote temperature indication, user-selectable to indicate either the highest temperature or a pre-defined temperature. Programmable output range: 0...1, 0...5, 0...10, 0...20, or 4...20 mA.

MASS MEMORY

Non-volatile memory for storing temperature measurements and records of alarms, shutdowns, and forced cooling activations, based on an internal real-time clock. A memory recording can be triggered by:

- ✓ Time interval between recordings selected by the user, or;
- ✓ Variation in any of the temperatures greater than the deadband value selected by the user, in °C, or;
- ✓ Change of state of any of the output relays (cooling control, alarms, shutdowns, or self-diagnosis).

OPTIONAL FUNCTION

RTDs – Additional Temperature Measurement

Two additional temperature measurement inputs (for Pt100 Ω sensors at 0 °C), allowing for the measurement of ambient temperature, on-load tap changer temperature, or other temperatures.

PREC – Pre-cooling

It extends insulation life by activating cooling units when user-selected load levels are reached. Leveraging the oil's high thermal inertia, forced cooling is triggered before the temperature rises excessively, thereby reducing the winding's exposure to high temperatures and limiting the loss of insulation life. These settings are user-programmable:

- ✓ Loading percentage for the individual activation of each forced cooling stage;
- ✓ Hysteresis for switching off forced cooling stages when the load decreases.

FEXE – Daily Cooling Activation

The Daily Cooling Activation function prevents fans and/or pumps from remaining idle for extended periods in lightly loaded transformers or during times of low ambient temperature. This prevents shaft seizure caused by dirt accumulation or the drying out of grease. The cooling equipment is activated daily based on the unit's internal clock, according to user-selected settings:

- ✓ Hour and minute of fan operation start;
- ✓ Total daily fan operation time, from 0 to 999 minutes.

The second cooling group will be activated with a 10-second delay after the activation of the first group to reduce the total motor starting current.

The cooling system's operational capability can also be utilized for pre-cooling transformers subject to cyclic loading by scheduling the cooling startup for a time prior to the daily peak load, with the desired lead time.

TECHNICAL DATA

INFORMATION	RANGE/DESCRIPTION
Supply voltage:	38...265 VAC/VDC 50/60 Hz
Maximum consumption:	< 5 W
Operating temperature:	-40...+85 °C
Protection rating:	IP20
Electrical connections:	Removable terminals 0.3...2.5 mm ² , 22...12 AWG
Mounting:	Flush panel mounting
Analog outputs (optional):	One
Maximum error:	0.5% of full scale
Options (selectable) and maximum load:	0...1 mA, 10 kΩ 0...5 mA, 2 kΩ 0...10 mA, 1 kΩ 0...20 mA, 500 Ω 4...20 mA, 500 Ω
Relay outputs:	Seven potential-free contacts
Maximum switching power:	70 W (DC) / 250 VA (AC) - resistive
Maximum switching voltage:	250 VDC / 250 VAC
Maximum carrying current:	5 A
Winding temperatures:	Calculated
Applied mathematical models:	NBR 5416 (1997), IEEE C57.91 (1995), IEC 60076-7 (2005)
AC current measurement inputs:	One (optional), via clip-on CT
Measurement range:	0...10 A
Maximum error at 20 °C:	1.0% of full scale
Temperature-induced drift:	50 ppm/°C
Communication protocols:	Modbus RTU
Serial communication ports:	1 RS-485 for supervisory system

TYPE TESTS

IMMUNITY TO SURGES (IEC 60255-22-5)

Phase-to-neutral surges:	1 kV, 5 per polarity (+/-)
Phase-to-ground and neutral-to-ground surges:	2 kV, 5 per polarity (+/-)

IMMUNITY TO ELECTRICAL TRANSIENTS (IEC 60255-22-1 and IEEE C37.90.1)

1st cycle peak value:	2.5 kV
Frequency:	1.1 MHz
Repetition time and rate:	2 seconds, 400 bursts/sec.
50% decay:	5 cycles

VOLTAGE IMPULSE (IEC 60255-5)

Waveform:	1.2 / 50 sec.
Amplitude and energy:	5 kV
Number of pulses:	3 negative and 3 positive, 5-second interval

APPLIED VOLTAGE (IEC 60255-5)

Power-frequency withstand voltage:	2 kV 60 Hz 1 min. to ground
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IMMUNITY TO RADIATED ELECTROMAGNETIC FIELDS (IEC 61000-4-3 / IEC60255-22-3)

Frequency:	26...1000 MHz
Field strength:	10 V/m

IMMUNITY TO CONDUCTED ELECTROMAGNETIC DISTURBANCES (IEC 60255-22-6)

Frequency:	0.15...80 MHz
Field strength:	10 V/m

ELECTROSTATIC DISCHARGE (IEC 60255-22-2 and IEEE C37.90.3)

Air mode:	8 kV, ten discharges per polarity
Contact mode:	6 kV, ten discharges per polarity

IMMUNITY TO FAST ELECTRICAL TRANSIENTS (IEC60255-22-4 and IEEE C37.90.1)

Power supply, input, and output test:	4 kV
Serial communication test:	2 kV

CLIMATIC TEST (IEC 60068-2-14)

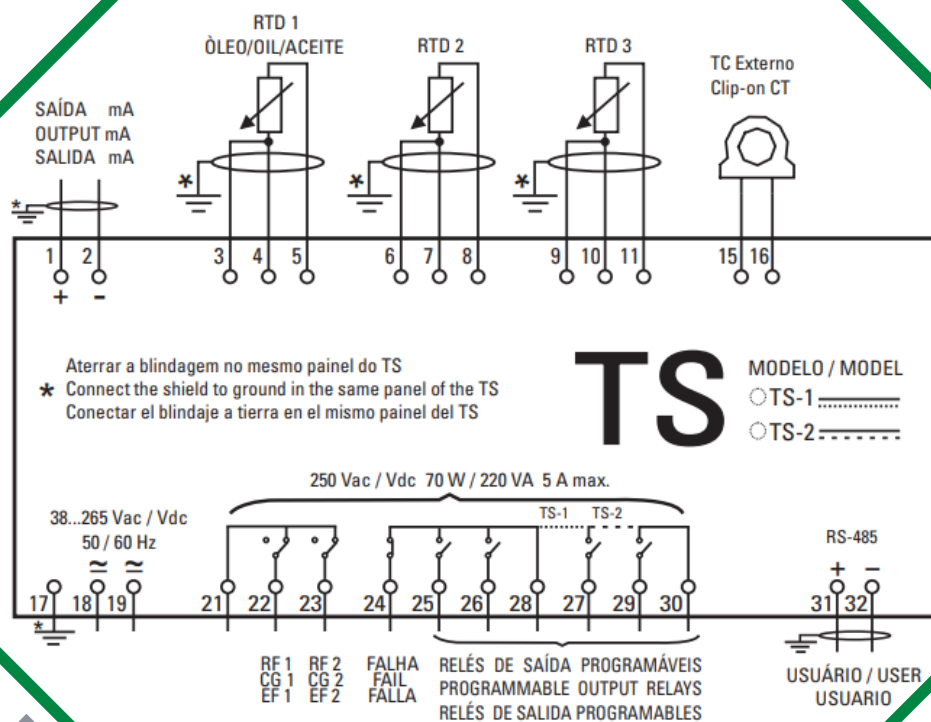
Temperature range:	-40...+85°C
Total test duration:	96 hours

VIBRATION RESPONSE (IEC 255-21-1)

Application mode:	3 axes (X, Y and Z), sinusoidal
Amplitude:	0.075mm 10...58Hz 1G 58...150Hz
Duration:	8 min/axis

VIBRATION RESISTANCE (IEC 255-21-1)

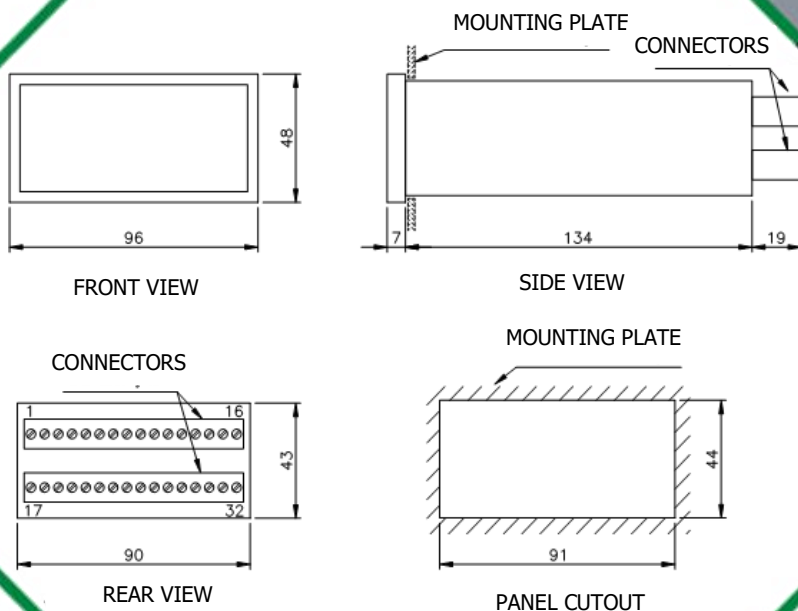
Application mode:	3 axes (X, Y, and Z), sinusoidal
Frequency:	10...150 Hz
Intensity:	2 g
Duration:	160 min/axis



WIRING
DIAGRAM

TS

Temperature Supervisor



PRODUCT
DIMENSIONS

PRODUCT
FRONT VIEW



ESSENTIAL ACCESSORIES

TEMPERATURE SENSOR Pt100 Ω AT 0 °C

Essential for measuring power transformer top-oil temperature, tap-changer temperature, ambient temperature, and other general measurements.

SPLIT-CORE WINDOW-TYPE EXTERNAL CT

The use of external split-core window-type current transformers 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 track the status of your assets beyond reading data.

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

WEATHER SHELTER

If ambient temperature measurement in unsheltered locations is required, a meteorological shelter must be used to protect the Pt100 sensor, thereby minimizing measurement errors caused by exposure to sun, rain, wind, etc.



QUICK-INSTALL PANEL - PIR

IEDs must always be installed sheltered from the elements and can be supplied in a weather-resistant, easy-to-install enclosure.

ORDER SPECIFICATION

When ordering the product, it is necessary to specify:

- ✓ Product name;
- ✓ Quantity;
- ✓ Optional items;
- ✓ Model;
 - TS-1;
 - TS-2.





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Check the list of our distributors at:

www.treotech.com.br/contato/representantes/