

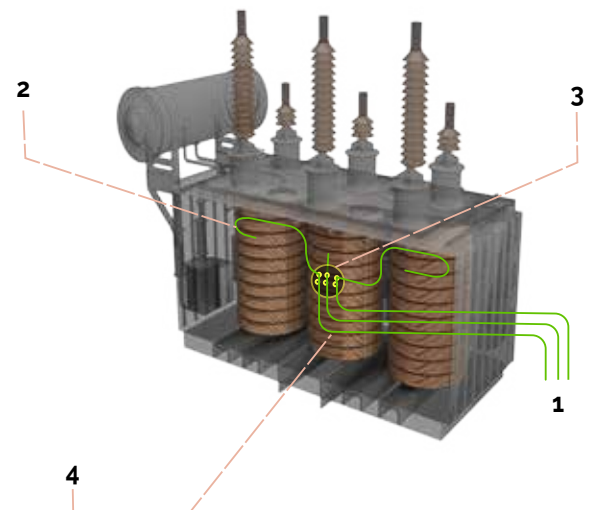
Transformer Hot Spot Monitoring System

We are an industry leading team of fiber optic experts with 100+ years of combined experience, and are committed to deliver customizable solutions for challenging applications. Our team of experts leads through product innovation to deliver best in class reliability. We deliver reliable, high performance, precision sensors and monitoring solutions. Our mission is to:

| | |
|------------------------------|---|
| • Customer Service | At Rugged Monitoring customers come first. Deliver best in class customer service, be first in mind and choice for customers. |
| • Rugged Design | Deliver Rugged, intrinsically safe sensors / solutions for the toughest applications. |
| • Innovation | Leading next generation product innovations with patented technologies. |
| • Fiber Optic Experts | Our team has extensive knowledge of Power Transformer Industry and viewed as leaders in fiber optic sensing technology. |
| • Quality Focus | Provide peace of mind to our customers by delivering quality products consistently. |

Start Here to Build Your System (Component Description)

| | | |
|---|---|---|
| 1 |  | T301 Monitor |
| 2 |  | T301 Sensors |
| 3 |  | <ul style="list-style-type: none"> • Feedthroughs • Tank Wall Plate |
| 4 |  | Extension Cables |



T301 Monitor

- Transformer dynamic loading response
- System Integrity Self Check
- Transformer life optimization
- Detect early life failures
- Thermal model reflecting operating conditions
- Accuracy of $\pm 1^\circ\text{C}$, resolution of 0.1°C
- Rugged cast aluminum construction
- Supports from 4 to 24 optical temperature sensors
- 8 programmable form-C relays (5A)
- Dedicated system fault relay
- Based on market leading GaAs technology for long term reliability
- Light sources have an estimated life of 300 years
- 8 GB memory (enough for at least 10 years of data, @10sec rate) industrial grade removable microSD card
- Standard USB and serial RS-485 interfaces (with Modbus)
- 24 to 48 VDC, ~ 20 watts
- Optional built in webserver, with 1 gigabit optical ethernet
- Optional advance communication protocols (i.e. 61850) / Optional fiber SFP transceiver



Ordering Code

Number of Channels

Ex: 08 = 8 Channels

Number of Analog Outputs

0 = No Analog Outputs
8 = 8 Analog Outputs

T 3 0 1 -

E A R M

Memory Size

4 = 4 GB
8 = 8 GB

Ethernet Protocols

0 = No Ethernet
1 = Ethernet Board RJ45
2 = Ethernet Board RJ45 & SFP

Number of Relays

0 = No Relays
8 = 8 Relays

Transformer Sensor (Tsens)

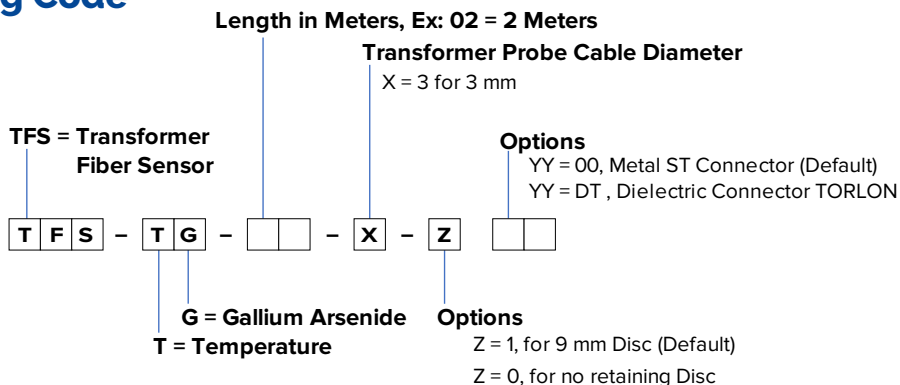
Features

- Suitable for dry-type and oil-filled transformers
- Compatible with all types of transformer oil, including ester type
- Meets and surpasses ASTM D3426 and D-149 standards
- Extremely low PD performance
- Compatible with kerosene vapor drying process
- With or without disk tip

Specifications

- Improved design (patent pending)
- Measuring range: -80°C to 250°C
- Response time of ~ 1 sec
- Available in any lengths, up to 25 meters
- With industry standard ST connector
- Solid Torlon disk tip, diameter 9 mm
- Designed to exceed Transformer life

Ordering Code



Feed Through



Features

- Easy installation
- No O-rings design
- Optional pre-installation in TWP
- Designed to reduce loss of light, critical to reliability

Specifications

- With zirconia connectors for better optical transmission
- Stainless steel 316L construction
- Wide temperature and pressure ranges

Ordering Code

T F F T - 014 = 1/4" NPT Feedthrough, SS 316
TFFT = Transformer Feedthrough

Tank Wall Plate



Features

- With O-Ring or customer supplied gasket
- Compatible with RM Interface Box (optional bolting provision)

Specifications

- Diameter of 275 mm
- Stainless steel 316L construction
- Up to 25 feedthroughs

Ordering Code

Number of OFT's
 Example: 08 = 8 OFT's

Assembly Options
 0 = Welded
 1 = Bolted with Viton O-ring
 2 = Bolted and Flat for gasket seal

Interface Box (i-Box)
 0 = No i-Box
 1 = With i-Box (bolting provision)

T P L T - - **A** - **I B**
TPLT = Transformer Tank Wall Plate

Extension Cable



Features

- PVC sheathing (outside transformer)
- Teflon sheathing is mandatory with dielectric connector (inside transformer)

Specifications

- 3 mm OD
- Maximum temperature: +85 °C
- Available in any lengths, up to 99 meters

Ordering Code

Length in Meters, Ex: 02 = 2 Meters

Cable Sleeve
 P = PVC (Default)
 T = PTFE Teflon

F O X T - - **P** - **S T X X**
FOXT = Fiber Optic Extension Cable

XX = ST, Metal Connector (Default)
 XX = DC, Dielectric Connector at one end

Interface Box



Features

- Leak proof design

Ordering Code

T I B X - A C C

Transformer Interface Box

Specifications

- Size 200 x 200 mm, 150 mm high
- With neoprene gasket
- Stainless steel 316L construction throughout

Configurations

| Equipment | | Non Critical Transformers | Standard Transformers | Critical Transformers |
|-----------------|-----------------------------------|---------------------------|-----------------------|-----------------------|
| Probe Positions | Central Winding - LV | 2 | 2 | 6 |
| | Central Winding - HV | 2 | 2 | 6 |
| | Lateral Windings - LV | 1 per Phase | 1 per Phase | 2 per Phase |
| | Central Winding - HV | 1 per Phase | 1 per Phase | 2 per Phase |
| | Top Yoke Core | | 1 | 1 |
| | Top Oil | | 1 | 1 |
| | Spare | | 2 | 2 |
| | Total Probes | 8 | 12 | 24 |
| | Optical Feedthroughs | 8 | 12 | 24 |
| | Tank Wall Plate | 8 hole version | 12 hole version | 24 hole version |
| | Interface Box(i-Box) | 1 | 1 | 1 |
| | Extension Cables | 8 | 12 | 24 |
| | Number of Channels in the monitor | 8 | 16 | 24 |



Rugged Monitoring Services

Rugged Monitoring provides customization of sensors, monitors & software. In addition we offer on-site commissioning services, maintenance contracts and technical support to all customers worldwide.



About Rugged Monitoring

Industry leading team of fiber optic experts with 100+ years of combined experience committed to delivering customizable solutions for challenging applications. We offer a range of reliable, high performance, customizable sensors and monitoring solutions that are immune to external influence.

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