

# QUALITROL T/GUARD LINK

Fiber Optic Power Transformer Winding Temperature Monitoring System



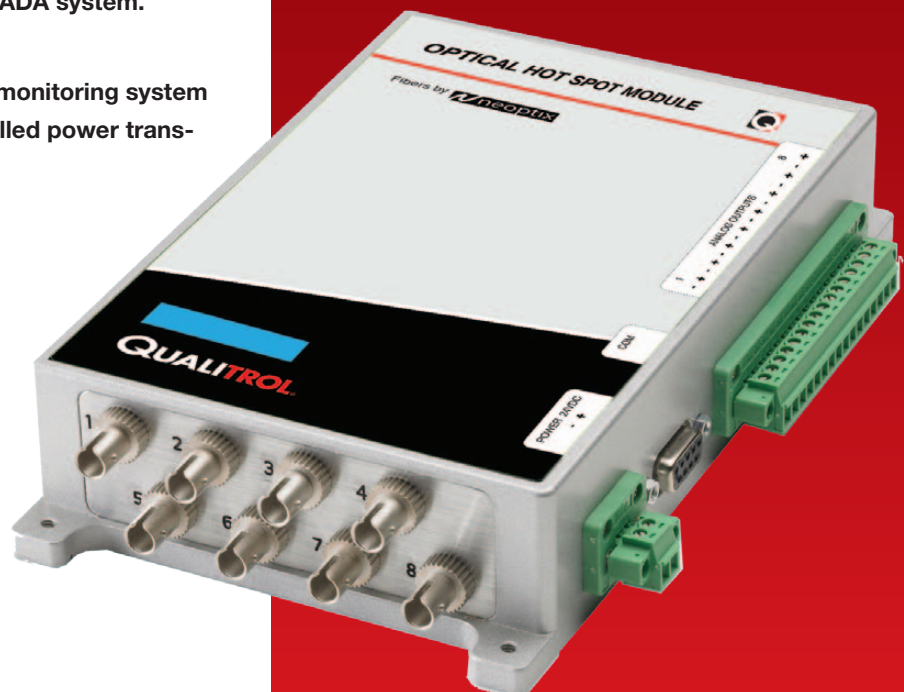
## A small form factor and cost oriented fiber optic hot spot monitoring system for dry type and oil filled power transformers

- Small and sturdy enclosure
- Tough and ruggedized sensors
- No gage factor or calibration
- Modbus communication over RS-232 or RS-485 serial port
- Voltage or current output
- Accuracy of  $\pm 1^{\circ}\text{C}$
- Available with 1 to 8 channels
- Detachable connector blocks for easy installation

### Product Summary

**Description** A small form factor and cost oriented fiber optic hot spot monitoring system for dry type and oil filled power transformers. Its Modbus communication protocol allows a quick and easy integration into a SCADA system.

**Application** Fiber optic hot spot monitoring system for dry type and oil filled power transformers.



Fibers by 

**QUALITROL**<sup>®</sup>  
Defining Reliability

- The Qualitrol T/Guard™ Link is a cost-oriented multi-channel fiber optic temperature monitoring system for dry-type or oil-filled power transformer hot spot measurements. The T/Guard Link has a small footprint and has been developed with long-term performance and stability in mind. This fiber-optic temperature monitoring system for small and medium size power transformers is accurate, rugged and designed for the long-term life of the transformer.

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- Coupled with the T/Guard Link system, the Neoptix T2™ fiber-optic temperature probe provides accurate and direct temperature monitoring of transformer windings. This solution provides a realistic, real-time view of winding conditions that is quicker and more accurate than top oil thermocouple measurements, and greatly complements indirect measurements based on thermal models.

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- T/Guard Link gives the exact temperature of optical probes in 200 milliseconds per channel. Peak load or emergency overloads are thus detected almost instantaneously. With Neoptix technology, you have a new tool to optimize high-voltage transformer performance and life expectancy.

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- The T/Guard Link system is specifically designed to meet power transformer industry requirements: extended intervals between servicing, low maintenance, rugged components and the ability to withstand the harshest conditions. All components have been specifically selected for long term performance, including the light source that has an MTBF superior (>300 years of use) to the expected life of the transformer. Moreover, compared to other technologies available on the market, like fluorescent decay, our sensor does not fade or drift over time. This allows a constant and absolute temperature measurement of your transformer windings over the lifespan of the equipment. The Neoptix system is based on the proven GaAs semiconductor technology and incorporates an original algorithm to analyze the signal, providing repeatable and reproducible measurements.

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- Our fiber-optic probes are made only with dielectric materials and are designed to withstand initial manufacturing conditions. The probes can withstand kerosene desorption and heat runs, as well as long term oil immersion and vibration. Moreover, the Neoptix temperature probes are interchangeable and no calibration or inconvenient gage factors are required when interfacing sensors.

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- The T/Guard system is easy to interface to an existing marshaling or substation system via its isolated 4-20 mA analog outputs (0-10 Volts optional) or its serial or Modbus RTU communication interface. Users can count on optically isolated RS-232 or RS-485 communication port. The system can be delivered with an optional TCP/IP bridge (external module).

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- The T/Guard Link can be interfaced with Qualitrol OptiLink software, allowing complete control over the system for the setup and configuration. The software also provide a data logging option to record temperature points directly into a Microsoft™ Excel™ file.

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- The T/Guard Link is the perfect system for a small transformer, an embedded system or for the cost-conscious user. It is available with 1 to 8 optical channels. Moreover, the mounting brackets are integrated directly onto the T/Guard Link box, providing a quick and robust installation in the transformer control cabinet.



## Accessories

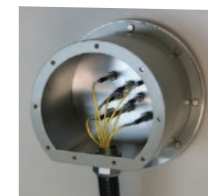
**T2™ Temperature probe** This temperature probe is designed to withstand initial manufacturing conditions, including kerosene desorption and heat runs, as well as long term oil immersion and vibration. The T2 probe consists of a 300-microns OD solid-state crystal and optical fiber sheathed with an oil permeable protective PTFE Teflon sheath. Only chemical resistant dielectric materials are used for these temperature probes. The temperature range is -80°C to +250°C. The probes can be embedded in a standard spacer or attached directly onto any other location inside power transformer copper windings. All T2 optical temperature probes are available in custom length from 1 to 25 meters.



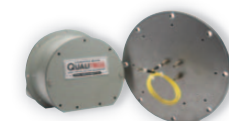
**Tank wall optical feedthrough** Specifically designed for transformer tank walls, this feedthrough has a simple design that provides both toughness and long-term leak-free operation. It is made from 316 stainless steel and relies on proven glass-to-metal bonding techniques. The feedthrough uses 1/4" NPT ANSI threads and can be installed directly into the tank wall or on a tank wall mounting plate. No O-rings are used.



**External fiber-optic extension cables** These cables are made with a polyurethane jacket reinforced with Kevlar threads and are designed to withstand the harshest conditions. External fiber-optic extension cables come in standard 5 or 10 meter lengths. Custom lengths are also available from 1 meter to 1 kilometer. The temperature range is -50°C to +85°C. Cables should be routed into protective conduits or tracks.



**Tank wall mounting plate & JBox** Up to 16 feedthroughs can be mounted on a tank wall mounting plate. The plate is made with carbon or stainless steel and has a standard size of 25.4 cm (10 inches) diameter. Tank wall mounting plates can be customized in size or material according to customer specifications, with larger plates allowing more feedthroughs. The mounting plate comes with the JBox™ protective enclosure.



**NEMA-4 Enclosure** The T/Guard system can be mounted in a NEMA-4 enclosure that houses and protects the instrument for long-term exterior use. All fiber-optic extension cables are connected inside this enclosure. The NEMA-4 enclosure includes a clear polycarbonate window-door and is compliant with NEMA/EEMAC Type 4 and 12 standards.



**OptiLink** OptiLink is ideal for configuring your T/Guard Link prior to use with its default Modbus mode. OptiLink adds the following capabilities to this T/Guard system:

- Supports up to 4 T/Guards and up to 64 channels
- Does data logging, directly to Excel (DDE)
- Displays and graphs up to 64 channels in real time on your PC
- And much more





TECHNICAL SPECIFICATIONS		
<b>System specifications</b>	Model name:	T/Guard Link
	Number of channel:	Multi-channel instrument ; from 1 to 8 optical channels
	Resolution:	0.1°C (0.1°F)
	Accuracy:	±1.0°C (1.6°F)
	Calibration:	No system recalibration needed over lifespan to remain within specifications
	System sampling rate:	250 ms switching rate between each channel; Rate can be adjusted by user from 250 milliseconds to one point per week
	Data output rate:	Data output rate can be adjusted by user from one point every 250 milliseconds to one point per week.
	Upgradability-Firmware:	Flash ROM upgradeable through serial communication
	Display:	None
	Units:	User selectable, Metric or Imperial
	Data logging memory:	Not available
Temperature measurement range:	-80 to 300°C (-112 to 572°F)	
<b>Communication and I/O</b>	Operating Mode:	ASCII commands over RS-232/RS-485/Modbus or Qualitrol™ OptiLink™ PC Software
	Communication (hardware):	Optically isolated RS-232 or RS-485
	Communication protocols:	ASCII (HyperTerminal); Modbus RTU (Full or Half-Duplex); External Serial-to-Ethernet bridge (optional)
	Remote (SCADA) output:	4-20 mA output (Max allowable load resistance of 450 ohms 0-10 Volts (optional)
	Relays:	None
	Analog Outputs:	Detachable header connector blocks, 3.1 mm pitch. One analogue I/O per channel Standard: 4-20 mA, Optional (no cost) : 0-10 Volts
	System status reading and indicators:	System has internal built-in temperature sensor; info can be logged into internal memory or sent through serial communication
<b>Mechanical and environmental</b>	Operating temperature:	-40 to +75°C, 5-90% humidity, non-condensing
	Storage temperature:	-50 to +85°C, 5-90% humidity, non-condensing
	Board level environmental protection:	MIL-I-46058C (IPC-CC-830) Type SR silicone conformal coating
	Light source MTBF:	Light source lifespan and optimal system performance superior to 300 years of continuous use. No degradation of total system accuracy over light source lifespan.
	Vibration:	60/120 Hz @ 0.1 mm displacement
	Shock :	10 G half-sine in three orthogonal planes
	Form factor:	IP 65 enclosure, mounting brackets at each corner
	Front membrane:	UV stabilized polyester
	Connectors:	Optical: ST connector; Serial and power-in: 3.1 mm pitch connectors socket for plugs with screw terminals
	Dimensions/weight:	Width: 190 mm; Height: 113 mm; Thickness: 38 mm; Weight: 0.7 Kg
<b>Compliance</b>	Conducted/Radiated Emissions and Surge Withstand:	IEC 6100-4-2 ESD; IEC 6100-4-3 Radiated RFI; IEC 6100-4-4 Burst; IEC 6100-4-5 Surge; IEC 6100-4-6 Induced (Conducted) RFI; IEC 6100-4-8 Magnetic eld; IEC 60255-5 Dielectric strength; IEEE C37.90 Dielectric strength; IEEE C37.90.1-2002 Fast transient; IEEE C37.90.1-2002 Oscillatory
	Environmental:	IEC 60068-2-1 Cold temperature; IEC 60068-2-2 Dry heat; IEC 60068-2-30 Humidity (damp heat, cyclic); IEC 60255-21-1 Vibration; IEC 60255-21-2 Shock; UL 60950 Temperature range
<b>Power</b>	Power requirements:	24 VDC
	Power consumption:	12 Watts
<b>Other</b>	Probe compatibility:	Compatible with all of Neoptix GaAs fiber optic temperature probes and transducers.
	Probe signal optimization:	System has built-in Neoptix™ WTune™ probe optimization algorithm
	Warranty:	Five-year Limited international warranty - Extended warranty available
<b>System ordering codes</b>	<p>Analog Output: 1 = 0-10V (optional) 2 = 4-20 mA (standard)</p> <p>TGL - <input type="checkbox"/> -A <input type="checkbox"/> -C <input type="checkbox"/></p> <p>Number of channels: 1 = 1 channel n = n channels 8 = 8 channels</p> <p>Communication 1 = RS-232 (standard) 2 = RS-485 Half-Duplex 3 = RS-485 Full-Duplex 4 = Modbus Half-Duplex 5 = Modbus Full-Duplex 7 = Other</p>	

**About QUALITROL®:**  
 QUALITROL® manufactures substation and transformer monitoring and protection devices used by electric utilities and manufacturing companies. It is the global leader in sales and installations of transformer asset protection equipment, fault recorders, and fault locators. Established in 1945, QUALITROL® produces thousands of different types of products on demand, each customized to customers' unique requirements.

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