

QUALITROL® 509 ITM

Intelligent transformer monitor



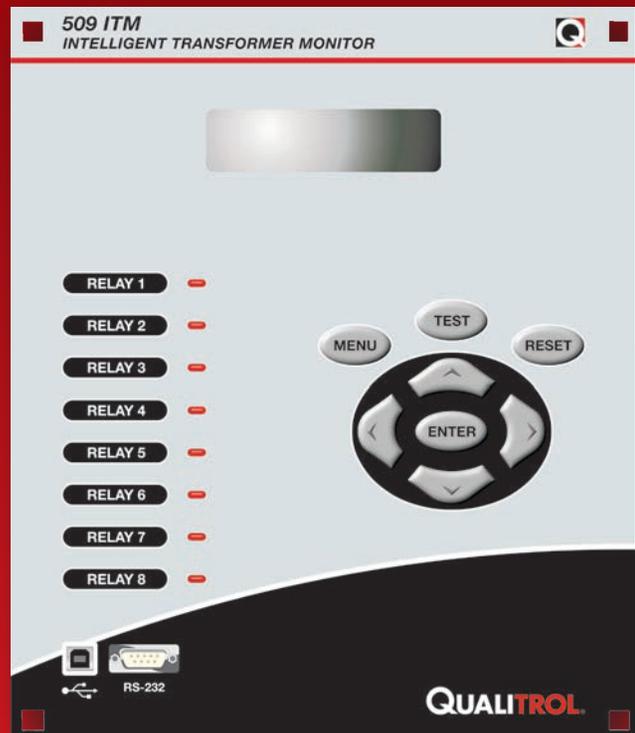
Improve asset protection and utilization

- Immediately know your transformer health with TransLife™
- Optimize loading and equipment life
- Simplify root cause analysis for condition-based maintenance

Product Summary

Description Advanced transformer monitor for all parameters required to accurately track and control power transformers. New capabilities of the device such as data logging, event recording and dynamic loading analysis help to optimize loading and maximize asset life.

Application Remote and local monitoring of oil-filled transformer and load tap changer parameters, including alarming and advanced control of cooling systems.



QUALITROL® 509 ITM intelligent transformer monitor

Improve asset protection and utilization

- In addition to traditional mechanical monitoring and protection, electronic transformer monitoring further improves reliability, safety, and the availability of key decision making information by automating control and making information available remotely
- Expanded capabilities and features such as direct winding measurement are now available in one single device, enabling users to avoid installation, maintenance and capital cost on additional devices

Immediately know your transformer health with TransLife™

- TransLife™ feature provides a dashboard of critical information needed to effectively manage transformer operation
- Computes loss of asset life rate, life consumption and remaining asset life
- Critical Forecast feature determines the time remaining until a critical temperature is reached based on current conditions
- Provides separate TransLife™ monitoring for up to 3 windings
- Temperature Profiler feature provides the history of the transformer's temperature

Optimize loading and equipment life

- Improved accuracy gained by use of direct winding or advanced calculated winding temperature measurement permit less contingency for measurement error, enabling safe operation at higher loads
- Automatic cooling bank switching normalizes fan and pump usage for maximum life
- Pre-cooling functionality limits damaging high temperatures produced by overloads by initiating the cooling system when load currents exceed set points, rather than waiting for oil or winding temperatures to rise
- Adaptive setback improves cooling system efficiency by measuring ambient temperature and then adapting cooling and alarm set points based on temperature trends
- Low temperature lock-out insures oil pumps remain off at cold temperatures to prevent static electrification and arcing
- Seasonal setback allows for customized cooling schemes depending on the time of the year
- Load tap changer monitor series can detect proper tap movement and contact wear, and logs tap position history. Alarms for contact loading (instantaneous and cumulative), excessive tap counts over time, false tap movements, false or no motor movement, motor and mechanism problems (overloading, breakage, binding) and worn tap contacts or coking so that actions can be taken before critical failure
- Cooling monitor series learns as it operates; automatically calculates maximum, minimum and average values for determining set points for optimal operation

Simplify root cause analysis for condition-based maintenance

- Continuous information of all important transformer operating parameters aids in "drilling down" to the root, fundamental cause of the problem
- Sequence of events and data logging leave a trail of all the transformer's parameters at the time of an alarm
- Relay control contacts and "go/no-go" alarms serve as economical, stand-alone and automated method for remotely determining status of a transformer

Flexibility

- Flexible modular inputs (compatible with RTDs, CTs, voltages, current loops & switch contacts) enable all parameters of transformers to be monitored in one integrated device and can be field upgraded for future monitoring inputs
- New matrix relays can be set to alarm based on set points, a matrix of set points and difference calculations. Improves identification of transformer issues and reduces false trips
- Four standard 0-1mA or 4-20mA outputs provide information to SCADA systems
- Multiple mounting options: control panel configurations; self-contained corrosion/weatherproof enclosure configurations; 19 inch mount rack configurations
- Utilizes digital protocols over Ethernet, RS-232, RS-485, or fiber optics for integration with today's communication systems



509 ITM intelligent transformer monitor capabilities

Monitor and measure



Oil level



Pressure



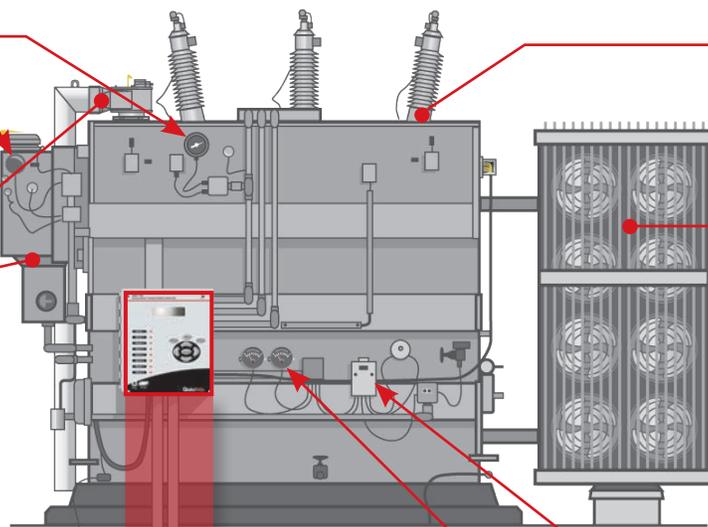
Load tap changer



Load current



Cooling system



Third party devices



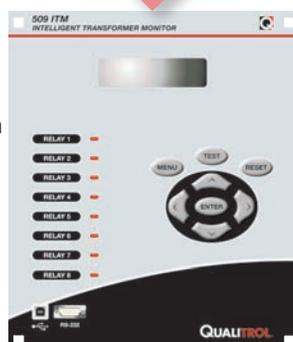
Temperature

Analyze and communicate



Control

- Cooling system optimization
- Local and remote alarms
- Programmable relays
- Cooling system exerciser
- Seasonal set points
- Ambient forecast



Information

- Event recording
- TransLife™
- Data logging
- Predictive loading
- SCADA outputs (0-1mA or 4-20mA)
- Digital communication (RS 485, RS 232, fiber optic, Ethernet)
- Protocols (DNP, MODBUS, IEC 61850, IEC 60870)

QUALITROL® 509 ITM intelligent transformer monitor

TransLife™, the report card for transformers

General Description

- TransLife™ feature provides a dashboard of critical information needed to effectively manage transformer operation
- QUALITROL 509 ITM is a helpful tool to manage transformers, to provide data for condition-based maintenance and to plan capital expenditures
- Critical forecast feature estimates the time to reach critical temperature based on the present transformer load
- Temperature profiler records the time at various temperatures that relate to asset life, this information is displayed graphically for quick identification of time spent at peak temperatures
- Monitoring up to 3 windings, the QUALITROL 509 ITM receives inputs from oil, winding and ambient temperature to report loss of life rates, life consumption (daily and hourly), total loss of life and remaining asset life

TransLife™
Monitoring for up to 3 windings

TransLife™ Control
Contains all the selections of input measurements for TransLife™

Critical Forecast
Determines the time remaining until a critical temperature is reached based on current conditions

Temperature Profiler
Logs the duration that the transformer is at each temperature range

Consumed Life
Computes loss of asset life rate, life consumed, remaining asset life and hours in operation

Temperature Profiler Graph
Graphical representation of the transformer's historical temperature
Red bars provide quick indication of time spent at accelerated life consumption

TransLife™ Setup

TransLife™ 1 | TransLife™ 2 | TransLife™ 3 |

TransLife™ Control

Page 1 | Enabled | Disabled

Winding temperature input module # Input 2 - WINDING

Ambient temperature input module # Input 8 - AMBIENT

Oil temperature input module # Input 5 - BOT OIL

Load current input module # (Required for fiber optic probes) Input 7 - LOAD

Critical Forecast

Critical point	Time to critical point
Point 1: 100.000	0.0000 Hours
Point 2: 105.000	0.0117 Hours
Point 3: 110.000	0.0234 Hours

Temperature Profiler

Unity temperature 110 C (1 HR Consumed = 1 HR Operating)

< 80 C	80 < 86 C	86 < 92 C	92 < 98 C	98 < 104 C	104 < 110 C	110 < 116 C	116 < 122 C	122 < 128 C	128 < 134 C	134 < 140 C	> 140 C
33	310	2003	989	497	391	113	96	5	0	0	0
Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours

Consumed Life

Life consumption formula variables

'A' -11.269 'B' 6328.80

Present loss of life rate 0.4324 CONS/OPER

Loss of life in the last hour 0.3072 Hours

Loss of life in the last day 2.0854 Hours

Total loss of life

Remaining life left (from 20 years)

Operating hours

Profiler Graph

Load

Temperature Profiler Graph

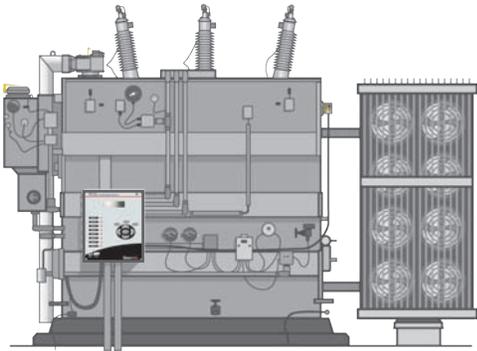
Graphical representation of the transformer's historical temperature

Red bars provide quick indication of time spent at accelerated life consumption

Temperature Range	Hours
< 80 C	33
80 < 86 C	310
86 < 92 C	2003
92 < 98 C	989
98 < 104 C	497
104 < 110 C	391
110 < 116 C	113
116 < 122 C	96
122 < 128 C	5
128 < 134 C	0
134 < 140 C	0
> 140 C	0

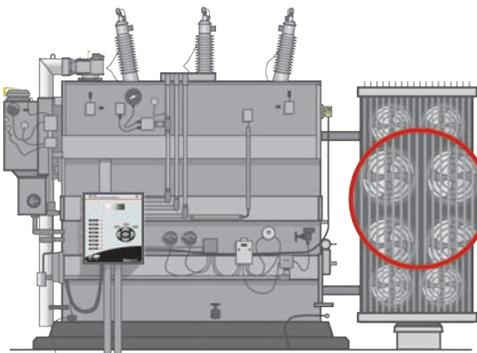


QUALITROL® 509 ITM intelligent transformer monitor series



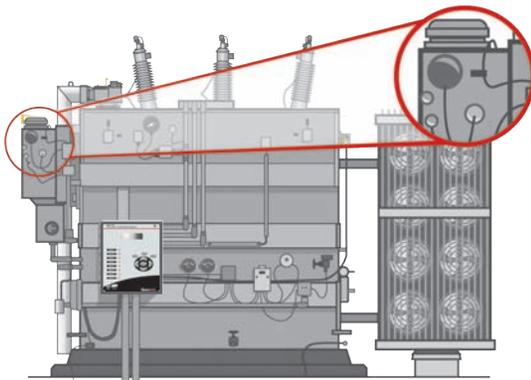
509-100 intelligent transformer monitor For general transformer control

- Monitors many standard parameters such as liquid temperature, winding temperature, load current, oil level, and mechanical alarm



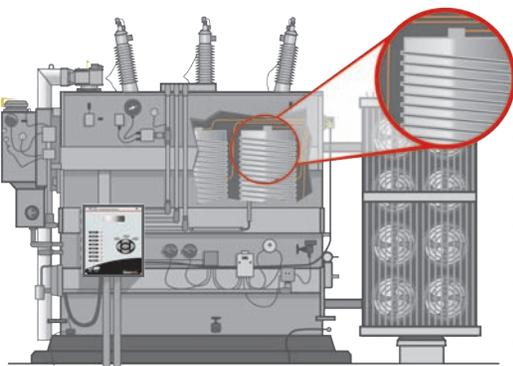
509-200 cooling monitor For general transformer and advanced cooling control

- Monitors many standard parameters such as liquid temperature, winding temperature, load current, oil level, and mechanical alarm
- Cooling monitor series learns as it operates; automatically calculates maximum, minimum, and average values for determining set points
- Monitoring and alarming based on enables



509-300 load tap changer monitor For general transformer and load tap changer monitoring

- Monitors many standard parameters such as liquid temperature, winding temperature, load current, oil level, and mechanical alarm
- Monitors differential temperature, tap position, mechanism, motor performance, detection of proper tap movement, contact wear and logging of tap position histo
- Alarms for contact loading (instantaneous and cumulative), excessive tap counts over time, false tap movements, false or no motor movement, motor and mechanism problems (overloading, breakage, binding) and worn tap contacts or coking



509 DW direct winding monitor For monitoring on the most critical transformers

- Monitors many standard parameters such as liquid temperature, winding temperature, load current, oil level, and mechanical alarm
- Real time comparison of direct and calculated winding temperatures
- Hot spot temperature measures the actual temperatures wherever the probe is installed directly
- Maximizes cooling efficiency with more accurate hot spot temperature measurement
- Can be combined with cooling or load tap changer monitor series

QUALITROL® 509 ITM intelligent transformer monitor

Components and accessories

Pt and Cu resistant temperature devices (RTDs)



- Provides transformer temperature measurements
- Many varieties available to custom fit hundreds of transformer applications with easy upgrade to different types of equipment
- Magnetic RTDs available for easy retrofit when wells are not available

Ambient RTD (103-047)



- For ambient temperature measurement within sub station (close to transformer)
- Includes sun shield to prevent false readings

Current transformers (CTs)



- Measures current flow needed to calculate winding temperature, monitor cooling systems and support advanced functions
- Clip-on design simplifies installation

Pressure transducers (TRN-603-1)



- Monitors static tank pressure and can provide sudden pressure protection (requires QUALITROL 930)



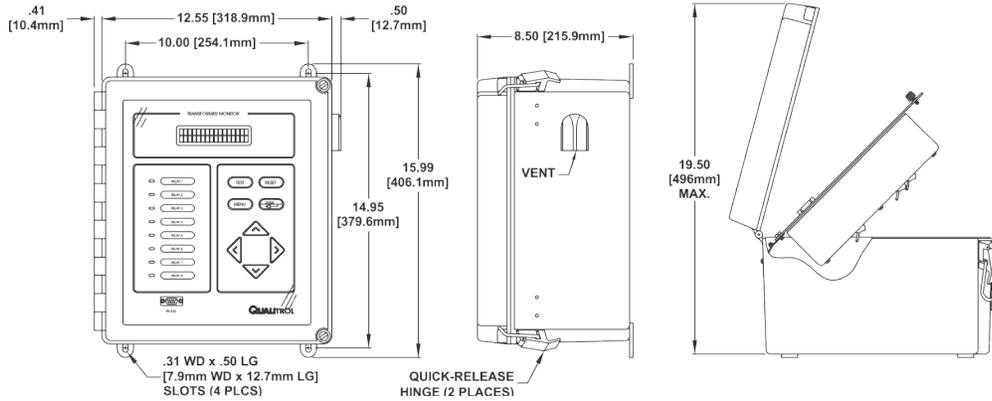
TECHNICAL SPECIFICATIONS

Power supply	Type	Universal; 90 to 264 watts VAC; 47-63 Hz, 40-290 VDC
	Consumption	< 35 watts
Input module parameters	Number of inputs	Accepts up to 8 input modules of various, configurable types
	Accuracy	± 0.5% full-scale input range
	RTD	10 ohm copper & 100 ohm platinum -40°F to 248°F range (-40°C to 120°C)
	CT, winding temperature	Uses clamp-on sensor; range 0 to 5, 10, 200 amps
	AC voltage	0 to 140 and 0 to 360 VAC ranges
	Potentiometer	Accepts potentiometers from 5K to 15K
	Dry switch contact	Measures a dry switch contact as wither open or closed
	Powered switch contact	Optically isolated; detects AC or DC from 120 to 250 volts
	Tap position	Detects resistor bridges of 40 to 1 K; up to 32 resistors
Output relays	Number of relays	8 programmable, 1 system status, 1 relay for heater control
	Type	Form C, 10 amps @ 120/240 VAC, 10 amps @ 30 VDC
Output current loop	Number of loops	4 magnetically-isolated current loops
	Type	Customer configurable in software to choose between 0-1 mA (max load 450Ω) and 4-20 mA (max load 10,000Ω)
Communications	RS232 port	1 port for set-up communications located on the front panel; varying baud rates
	RS485 port	1 port, 4-wire optically isolated for digital protocols
	Fiber optic port	ST connectors, 820 nm wavelength, max distance 1500m
	USB ports	1 type B (slave) for local setup, 1 type A (master) for data logging download and configuration upload with USB flash drive
	Protocols	DNP 3.0 level 1 slave, Modbus RTU, ASCII, IEC 61850, IEC 60870
User interface	Control	8 pushdown buttons located on front panel
	Local display	2 x 16 character backlit LCD
Environmental	Operating temperature	-40°F to 161.6°F (-40°C to + 72°C)
	Storage temperature	-58°F to 185°F (-50°C to + 85°C)
	Humidity	5% to 90% non-condensing
	Shock	10 G's half-sine, in three orthogonal planes
	Vibration	60/120 Hz @ .004 inch displacement; 10/150 Hz at 1G
Immunity	Dielectric strength	2500 VAC, 60 seconds to ground
	Surge withstand capability	IEEE C37.90.1
	Cond./radiated emissions	IEC 61000-6-1
	Cond./radiated RFI	IEC 61000-6-2
	Safety	IEC 61010-1
	CE approved	Yes
Data logging	Number of points	Logs up to 20 parameters
	Log rate	Selectable from one minute to 24 hours
	Memory capacity	Memory size capable of storing 8 parameters at one hour log rate for over 19 months. Shared 32MB non-volatile flash memory
Event recording	Number of points	Logs up to 8 events
	Record types	2 record types: time and date or complete system snapshot
	Memory capacity	Memory size capable of storing 62,500 time and date events, shared 32 MB non-volatile flash memory

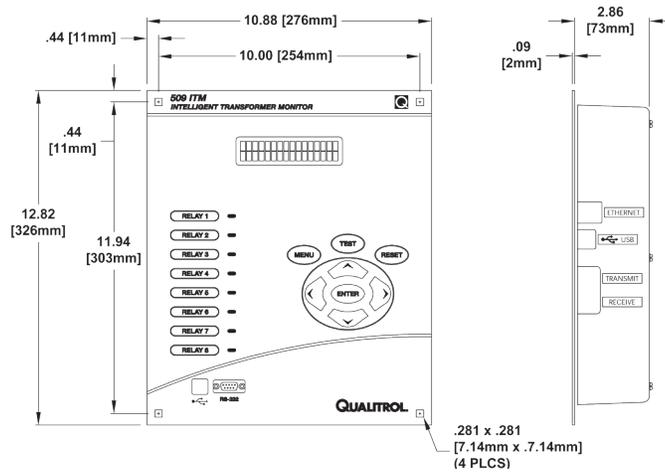
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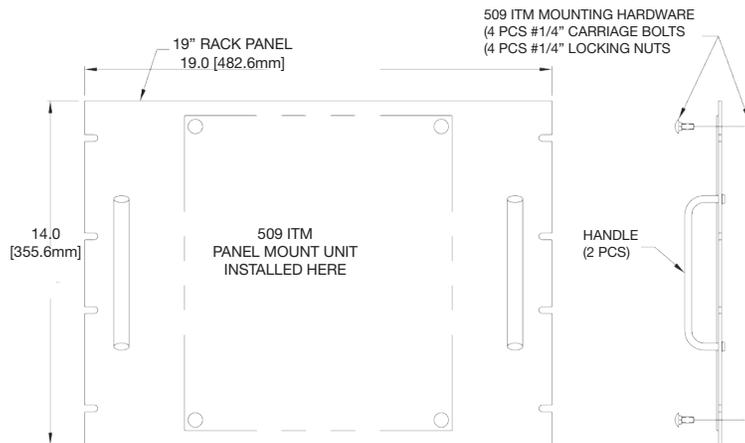
Weatherproof enclosure



Panel mount



19" rack mount



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