QUALITROL
Defining Reliability

QUALITROL BREAKER CONDITION MONITORING (QBCM)

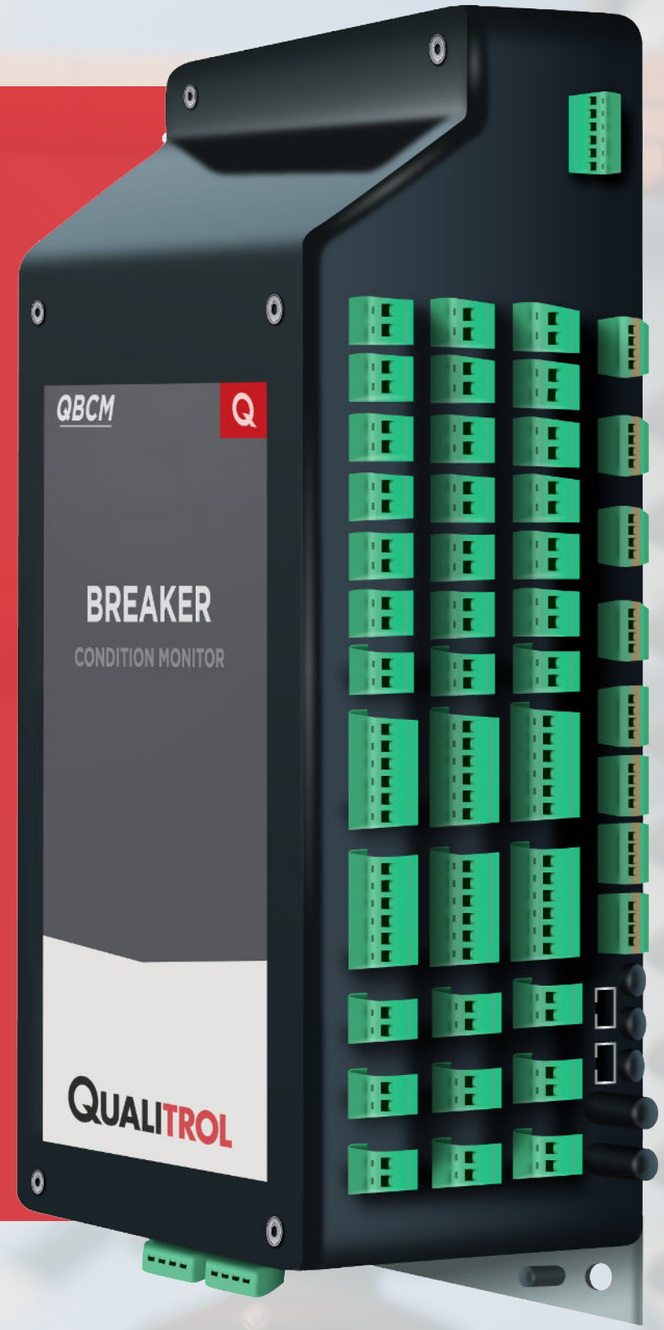
Next Generation line of Breaker Condition Monitors

Understanding asset health, deploying valuable resources when and where they are needed most.

Understanding Asset health is fundamental to any Condition Based Maintenance (CBM) Program. Traditionally investment in asset health monitoring has been focused on the most expensive assets, Transformers. While that is a good place to start, it is no place to stop. Any CBM program needs to strive for a complete picture of asset health across its entire fleet of assets including Circuit Breakers; improving safety, reliability, and performance along the way. This allows users to optimize their allocation of resources and make informed decisions to optimize asset utilization and prolong asset health.

The QBCM allows users to monitor the health of their Breaker in real time, avoiding the cost and inconvenience of offline testing, with the added benefit of a more comprehensive picture covering, SF_6, trigger coils, main contacts, motors, and heaters. With unique features such as Fingerprinting the QBCM enables users to compare the condition of their Breaker against a selected reference point highlighting any changes, and more importantly the rate of change. Fingerprinting, coupled with cloning, to replicate configurations on demand across an entire fleet of breakers helps streamline installation, minimizing the complexity and cost of installation. Users configure, control and view data through remote client software, intuitively designed with an easy-to-use dashboard for analysis of data, configuration updates and alarm management.

The QBCM is alone in its class, setting a new standard for breaker monitoring.



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Each QBCM comes standard with a remote client UI, Fingerprint and Cloning capabilities, complete trending, and analytics capabilities (for monitored parameters), a compact footprint, configurable alarms, thresholds, and protocols.

Capable of storing up to 10,000 operations with full waveform signatures the QBCM automatically compares new operations against the benchmark waveform signature or “Fingerprint”. With configurable alarm thresholds the QBCM notifies users of deviations from the fingerprint and allows for real time visualization of all data collected over its life. With advanced SF_6 density algorithms QBCM provides reliable and continuous monitoring of SF_6, with estimated time to reach lock-out, ±1 day precision, as well as yearly and cumulative SF_6 emissions tracking.

QBCM is available in 3 configuration each with the option to add a travel transducer to develop a complete travel curve profile.

QBCM-LT

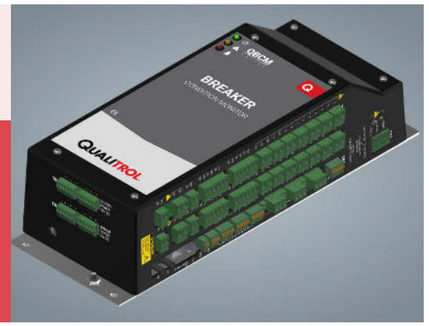
Provides essential breaker condition monitoring for Gang Operated Breakers (GOB):

- Coil currents and voltages
- Phase currents
- Main Cabinet Temperature
- SF_6 pressure, density, and humidity
- Battery Voltage
- Digital inputs
- Trip/Close/Backup Trip SCADA Signals
- Breaker Position 1 & 2 (Inverse)
- Motor Runtime/Status
- Heater Runtime/Status

QBCM-ST

Provides the essential monitoring of QBCM-LT for GOB’s plus:

- Heater Current Monitoring
- Motor Current Monitoring
- Battery Bank 2

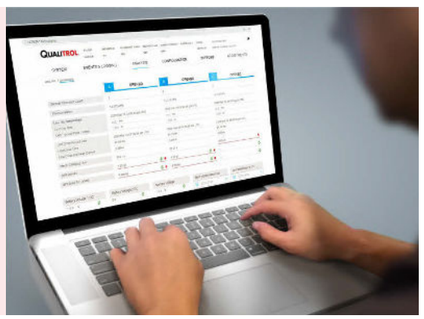


QBCM-IP

Provides the complete suite of monitoring that QBCM-ST provides across all phases of an Independent Pole Operated Breaker (IPOB)

Intuitive User Interface (UI)

Allows users to access, configure, manage, and analyze all parameters and data within the system from anywhere. With built in analytics capabilities the UI is a comprehensive easy to learn interface that streamlines management of the QBCM and allows users to unlock the value of the data and insights in provides.



TECHNICAL SPECIFICATIONS - POWER SUPPLY

Universal power supply

Rated input range	100 - 240 V AC (50/60Hz), 110 - 250 V DC

TECHNICAL SPECIFICATIONS - INPUTS

Analog inputs

3-phase currents	3 channels, 0-1 V AC or 0-333mV AC split-core CTs
Close coils	1-3 channels, 0-1 V DC shunt or hall effect sensor
Trip coils and B/U trip coils	2-6 channels, 0-1 V DC, shunt or hall effect sensor
Battery voltage	2 universal analog voltage inputs up to 299 V DC
Auxiliary voltages	1 universal analog voltage input up to 240 V AC
SF_6 gas density/pressure/humidity/dewpoint	1-3 channel, 4-20mA for analog sensors (can also be used for hydraulic pressure) 1 channel, RS 485 for daisy-chained modbus sensors
Anti-condensation heaters	3 channels, 0-1 V AC or 0-333mV AC split-core CTs
Mechanism heaters	3 channels, 0-1 V AC or 0-333mV AC split-core CTs
Motor currents AC/DC	0-3 channels, 0-1 V AC or 0-333 mVAC split-core CT, shunts or Hall Effect DC sensor

Travel transducer

Mechanism travel stroke. And velocity (optional)	3 x RS 422 channels on mother board, stroke measured in mm, inches or degrees. Velocity calculated in meters/sec, feet/sec or degrees/sec

Digital inputs

Trip initiation A, B, C	1-3 channels, up to 250 V DC, minimum 80 V
Backup trip initiation A, B, C	1-3 channels, up to 250 V DC, minimum 80 V
Close initiation A, B, C	1-3 channels, up to 250 V DC, minimum 80 V
52A auxiliary breaker contact status A, B, C	1-3 channels, up to 250 V DC, minimum 80 V
52B auxiliary breaker contact status A, B, C	1-3 channels, up to 250 V DC, minimum 80 V
Motor run timers 1, 2, 3	1-3 channels, up to 250 V DC / 240 V AC, minimum 80 V
Heater status 1, 2, 3	1-3 channels, up to 250 V DC / 240 V AC, minimum 80 V
Spare for alarms digitization	2-7 channels configurable option
All digital inputs are polarity free with special pitch terminal blocks offering easy mistake proof installation	

TECHNICAL SPECIFICATIONS - OUTPUTS

Relays

BCM failure alarm (Relay #1)	Dry contact 5A @ 125 V AC, 3A @ 250 V AC, 0.1A @ 250 V DC
Breaker failure alarm (Relay #2)	Dry contact 5A @ 125 V AC, 3A @ 250 V AC, 0.1A @ 250 V DC
User configurable alarm (Relay #3)	Dry contact 5A @ 125 V AC, 3A @ 250 V AC, 0.1A @ 250 V DC

TECHNICAL SPECIFICATIONS - PERFORMANCE — QBCM

LEDs / audible alarms

Power (Green)	BCM power OK
Warning (Amber)	Automatic warnings as compared with fingerprint
Alarm (Red)	Hard limit alarms as configured
3 kHz buzzer	For warnings, alarms and notifications - can be muted from UI

Recording

Resolution	User selectable for 32 / 64 / 128 samples per cycle

Storage

Data storage memory	8 GB microSDHC standard (up to 10,000 operations records)

Reporting

SF_6 emission	Days to reach lock-out level, total emission and year-to-date emission reporting
Breaker operation analysis report	A standard report with detailed analysis for every breaker operation. Includes comparison with stored reference fingerprint operation record. Mechanism operation time, auxiliary contact time, current interruption time, motor run time, peak motor current, restrike detection, travel transducer sensor data

Communications

Hardware media types	1 x 10/100Base RJ-45, 1 x 100Base-FX with ST connector, 1 x USB 2.0 port, 1 x RS 485 copper port
Protocols	DNP3.0, IEC 61850, Modbus
Time sync inputs	NTP Standard or optional IEEE 1588 PTP

Environmental

Ambient operating temperature	-40° C to +75° C [-40° F to +165° F]
Storage temperature	-60C to +75C [-76F to +165F]
Humidity	5 - 97%, non-condensing
Enclosure rating	IP20 (for installations inside breaker control cabinet) Optional IP67 enclosure for external mounting
Bump, shock and vibration	IEC 60255-21-1, -2

Regulatory

EMC test compliance	Immunity: EN61000-6-5 substation category, interface 4 Emissions: EN55011 Class A
Others	Safety: Overvoltage category 3, pollution degree 2, insulation class 1; per IEC60255-27

Mechanical

Dimensions and weight - QBCM-LT	381 mm x 140 mm x 70 mm (H) [15” x 5.5” x 2.75”] 1.50 kg [3.30 lbs]
Dimensions and weight - QBCM-ST	381 mm x 140 mm x 89 mm (H) [15” x 5.5” x 3.5”] 1.93 kg [4.25 lbs]
Dimensions and weight - QBCM-IP	381 mm x 140 mm x 115 mm (H) [15” x 5.5” x 4.5”] 2.24 kg [4.95 lbs

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QBCM SENSORS

QBCM Sensors were thoughtfully selected to achieve an optimal balance of accuracy, reliability, and ease of installation. When provided with the system the QBCM's default configurations are set to the applicable sensor, further simplifying installation, reducing chances for errors.

Split Core AC Current Transformer (CT):

QBCM utilizes Split Core CT's to measure AC motor current. Their split design allows for ease of installation, with the added benefit of eliminating the risk associated with disconnecting and reconnecting existing cables. Available in a variety of current capacities these CT's can cover a wide range of phase, motor, and heater currents.

DC Hall effect sensor:

QBCM utilizes a series of DC hall effect sensors that are highly accurate and provide low latency (10uSec.) for reliably capturing coil signals. Available in a wide variety of current capacities, with predrilled mounting holes this series of sensors is flexible for use across a wide variety of breakers. Note: If the OEM has installed shunts QBCM can utilize these in place of Hall Effect Sensors.

SF_6 sensors:

QBCM supports analog and Modbus SF_6 sensors, monitoring just one or multiple parameters such as Gas Density, Pressure, Temperature and Dew point. Analog sensors feature one parameter, while Modbus sensors monitor multiple parameters. To speed installation DN8 and DN20 adapters are available.

Travel transducers:

QBCM supports rotary travel transducers to develop a complete travel profile. An option on all units, these are available with standard 8 & 10mm flexible couplings for installation. Linear transducers are also available as a secondary option.

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