



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

HARDWARE  
SOFTWARE  
XPERT SERVICES

PREDICTIVE  
MONITORING  
SOLUTIONS FOR THE  
**ELECTRICAL GRID**

# WHAT WE DO

---

— # 1 F O C U S —

PROVIDING CREDIBLE & RELIABLE  
CONDITION MONITORING SOLUTIONS



# WHAT WE DO

---

We help ensure the world has power

Monitor the health of your electrical assets to  
keep them up and running.



**HYDRO GENERATOR**  
Condition Monitoring



**MOTORS/GENERATOR**  
Condition Monitoring



**TURBINE GENERATOR**  
Condition Monitoring



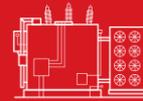
**POWER GRID**  
Condition Monitoring



**CABLE**  
Condition Monitoring



**SWITCHGEAR AND BREAKER**  
Condition Monitoring



**TRANSFORMER**  
Condition Monitoring



**VAULT TRANSFORMER**  
Condition Monitoring

# WHO WE ARE

- CONTINUED GROWTH THROUGH
- > INNOVATIVE PRODUCT
  - > DEVELOPMENT & STRATEGIC
  - > TECHNOLOGY ACQUISITIONS

2016



#### **FORTIVE LAUNCHES**

*Qualitrol now a proud part of Fortive Advanced Instrumentation & Solutions*

#### **ACQUISITION OF HATHAWAY, BEN, DMS, NEOPTIX, IRIS POWER AND SERVERON**

*Bringing Digital Fault Recording, Fiber Optic Temperature Measurement, Partial Discharge Monitoring and Dissolved Gas Analysis into the product portfolio*

2000's



1990's



#### **ACQUISITION OF AKM**

*A company specializing in transformer temperature measurement*

1986



#### **ACQUISITION BY DANAHER**

*Qualitrol becomes part of Danaher's Instrumentation Unit*

1945



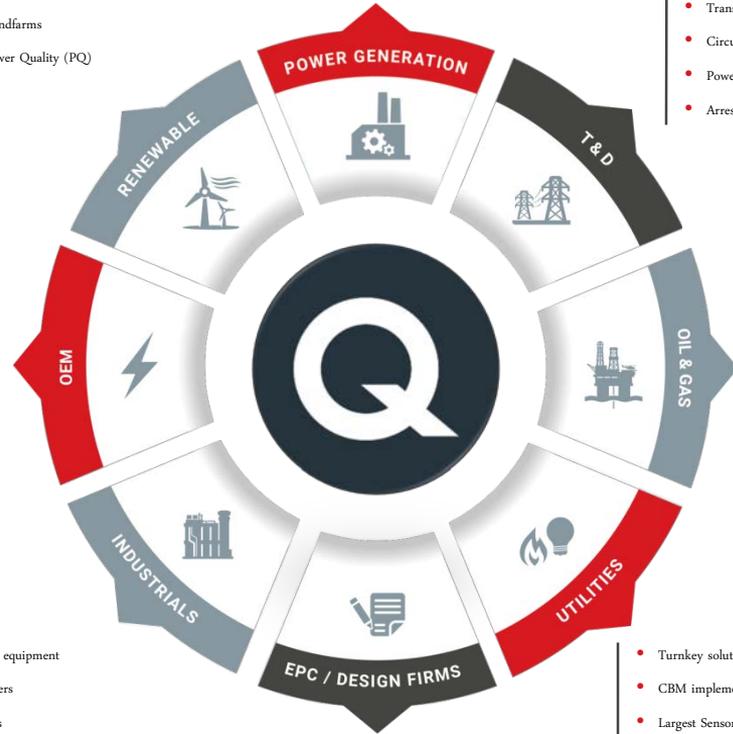
#### **FOUNDED**

*By George Ford in Fairport, NY*

# WHERE WE ARE

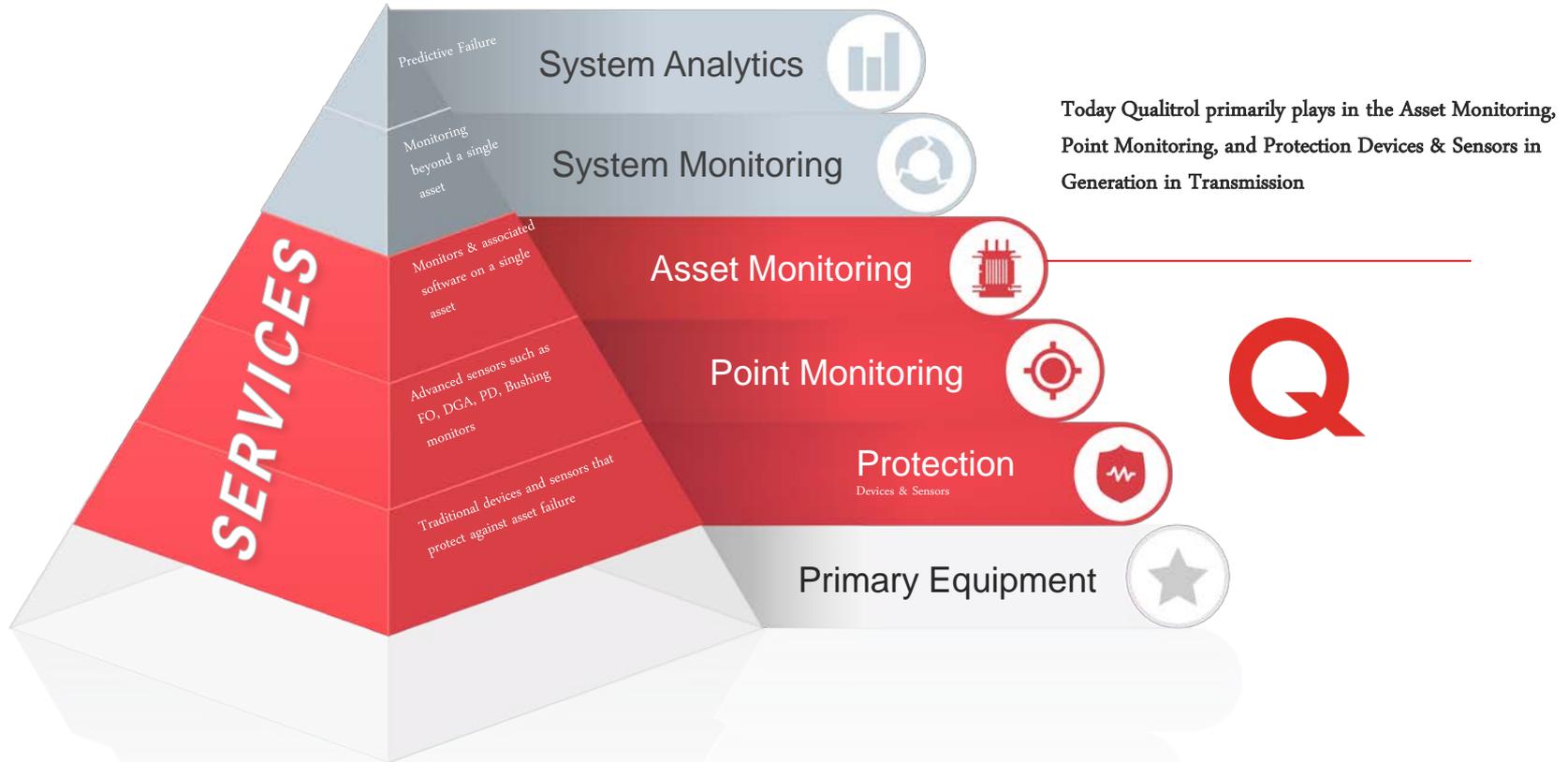
## GRID APPLICATIONS

Solutions enabling grid reliability and the transition from scheduled to condition based maintenance



# WHAT WE DO

## Our Products and Solutions Across Industry, Generation, Transmission and Distribution





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Defining Reliability

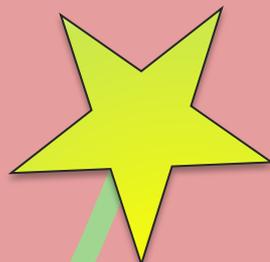
**SMARTSUB**

# Analytics Value Curve

How far your utility advanced in its analytics maturity?  
How much value is being derived as a result?

**PROCESS OPTIMIZATION**

Enabled by analytics  
Insights transformation  
underway



ANALYTICS CAPABILITIES



**O.M.G.**  
We have a lot of data

**DATA FORTRES**  
Data is stored secured, available

**BASIC REPORTING**  
Answer, "What happened" not intuitive

**BUSINESS INTELLIGENCE**  
Answer, "What happened, when and where?" more intuitively

**STATISTICAL ANALYSIS**  
Answer, "Why?"  
Questions: project what happens if current trend continue

**PREDICTIVE MODELS**  
Illuminate what will happen in the future

**PRESCRIPTIVE MODELS**  
Evaluate predicted future alternatives, recommend optimal actions



TIME

LACKING ANALYTICS

DESCRIPTIVE ANALYTICS

DIAGNOSTIC ANALYTICS

PREDICTIVE ANALYTICS

PRESCRIPTIVE ANALYTICS

BUSINESS TRANSFORMATION



# GETTING AWAY FROM JUST DATA - 1



		UHF PD	Ambient temperature	Bearing wear detector	Bladder rupture relay	Cooling control voltage	Cooling supply voltage	Core hotspot (Fiber) temperature	Hydrogen	Multi-gas Gas analysis	Inlet and outlet radiator temperatures	Load current	Moisture in oil	Oil temp at moisture location	Motor (fan, pump) currents	Nitrogen pressure	Oil level in main tank or conservator	Pump flow	Top and bottom oil temperatures	Top oil temperature	Winding hot spot temperature
Liquid	Liquid insulation moisture contamination												Red	Red					Yellow		
	Liquid insulation arcing	Red							Yellow	Red											
	Liquid insulation partial discharge	Red							Red	Yellow											
Cooling	Pumps and fans electrical failures			Yellow											Red			Red		Yellow	Yellow
	Pumps and fans mechanical failure			Yellow											Red			Red		Yellow	Yellow
	Cooling control inaccuracy of temperature sensors		Red									Red								Red	Yellow
	Cooling controls failure		Red			Red	Red					Red								Red	Yellow
	Pumps and fans running in reverse		Red			Red	Red	Yellow				Red								Red	Yellow
Internal or external blocking of radiators ( dependent on all cooling rules pass )										Yellow	Red							Red			
Main Tank	Oil level drops, exposing the windings												Yellow			Yellow	Red				
	Moisture contamination												Red			Yellow					
	Conservator tank bladder rupture				Red								Yellow	Yellow							
	Loose connection	Red							Yellow	Red		Yellow									

# GETTING AWAY FROM JUST DATA - 2



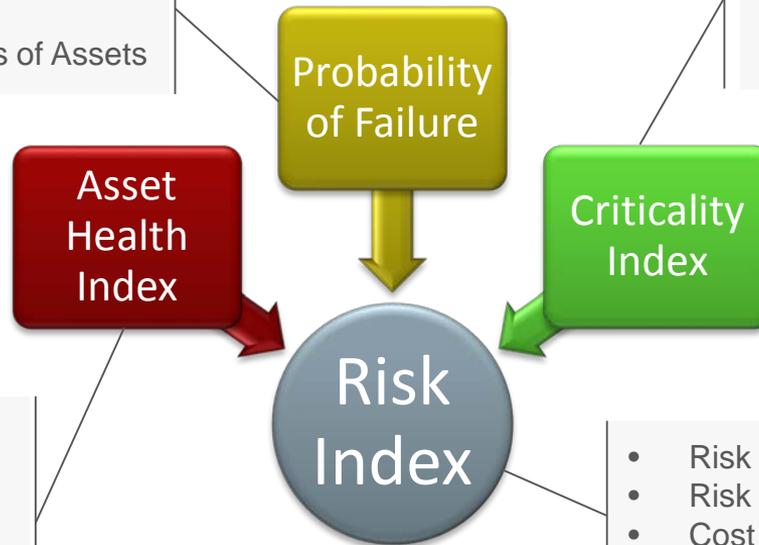
		UHF PD	Ambient temperature	Core ground current	Core hotspot (Fiber) temperature	Excitation current	Gas accumulation relay	Hydrogen	Multi-gas Gas analysis	Load current	Moisture in oil	Oil temp at moisture location	Pressure at Hot Spot	Top and bottom oil temperatures	Top oil temperature	Total percent dissolved gas-in-oil	Tank vibration	Winding hot spot temperature
<b>Mag. Circuit</b>	Overheating of laminations and/or core joints		Red		Red	Yellow	Yellow		Red					Yellow				
	Loss of core ground	Red		Red	Yellow		Yellow	Red	Yellow									
	Unintentional core ground	Yellow		Red	Yellow			Yellow	Yellow									
	Unintentional shield ground	Yellow							Red									
<b>Winding</b>	Winding insulation general overheating		Red				Yellow	Yellow	Yellow	Red				Red				Red
	Winding insulation local overheating							Yellow	Red									
	Winding insulation excessive moisture		Yellow								Red	Red		Yellow				Red
	Winding insulation bubble generation	Yellow	Yellow								Red	Red	Red	Yellow		Red		Red
	Winding insulation overloading of transformer		Red		Yellow						Red	Red						Red
	Winding insulation partial discharge	Red					Yellow	Red	Yellow									
	Winding loose																Red	

# SmartSUB Ent: Asset Health Index

Optimize CapEx / OpEx while meeting Business Objective

- Historic failure data
- Experience of utility with the Asset
- Age of the Asset
- Operating conditions of Assets

- Losses due to the sudden Outage:
  - ✓ Revenue Losses
  - ✓ Penalties
- Environmental Issues
- Any other criticality factor



- Nameplate Information
- Locational Data
- Inspection and Maintenance records
- Offline Testing results
- Online Condition Monitoring Data

- Risk of operating the Asset
- Risk of maintaining vs replacing
- Cost benefit analysis and Scenario Analysis
  - ✓ Total Return on Investment
  - ✓ Net Present Value

# Getting away from just data

SmartDSS 5.0.0

System Fault: PD Alarm, DGA, Breaker Alarm, Motor Alert, Generator Alert

Station: Substation 1

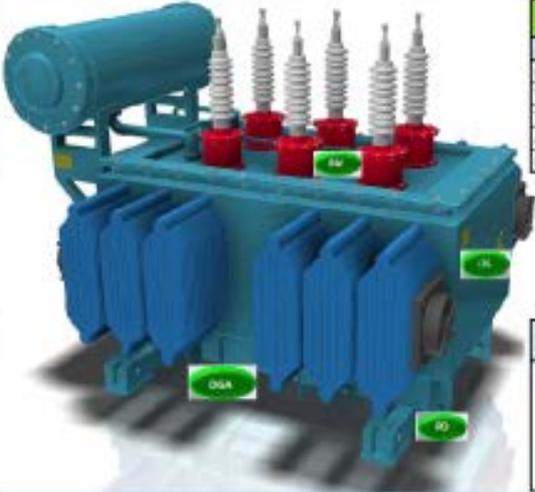
Year to Date Summary

Year to Date		Previous Year (2014)	
DGA Alarms	Partial Discharge Alarms	DGA Alarms	Partial Discharge Alarms
008	011	11	13

Schematic | Risks | All Sensors

**SS01-TR01: HEALTH INDEX -> 4.40**

Score Components	Score
LTC Score	4.50
Bushing Score	3.50
Winding Score	5.00
Main Tank Oil Score	5.00
Transformer History Score	4.00



**SS01-TR01: CRITICALITY INDEX -> 2.0**

Score Components	Score
Oil Containment Score	1.0
Transformer Rating	4.0
Transformer Location	3.0
Availability of Back-Up	1.0
Cost of outage	1.0

**Previous Testing and Maintenance**

Offline Testing Date	20-Oct-14
Asset Health Report Date	14-Nov-14
Maintenance Date	24-Aug-14

**Upload Offline Test Data / Results**

UPLOAD OIL ANALYSIS	UPLOAD THERMOGRAPHY
UPLOAD FURAN TESTING	UPLOAD PD TESTING

**Top 10 Risks**

SI No	Asset Name	Overall Risk Index
1	SS01-TR01	4.75
2	SS01-TR02	4.70
3	SS01-GIS01	4.50
4	SS01-GIS02	4.40
5	SS01-SWGR01	4.20
6	SS01-TR03	4.00
7	SS01-TR04	3.90
8	SS01-TR05	3.75
9	SS03-BRK001	3.75
10	SS01-SWGR02	3.60

**Alarm Summary**

Component	Alarms Type
DGA-H2	Hydrogen PPM Alarm
DGA-C2H2	Acytelene RoC Alarm
DGA-Duval	DGA Score Alarm
PD-CR01	Coupler01 PD Discharge
PD-CR02	Coupler02 PD Amplitud
Bushing-BM01	Bushing01 Tanδ Alarm

Generate Report | Print

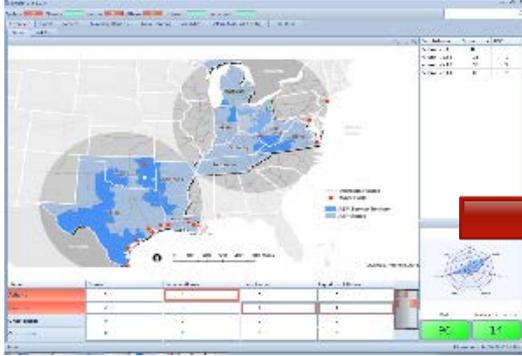
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03:37  
21/08/2015

# USER INTERFACE

*Intuitive UI*

## Quick Fault Identification in Network



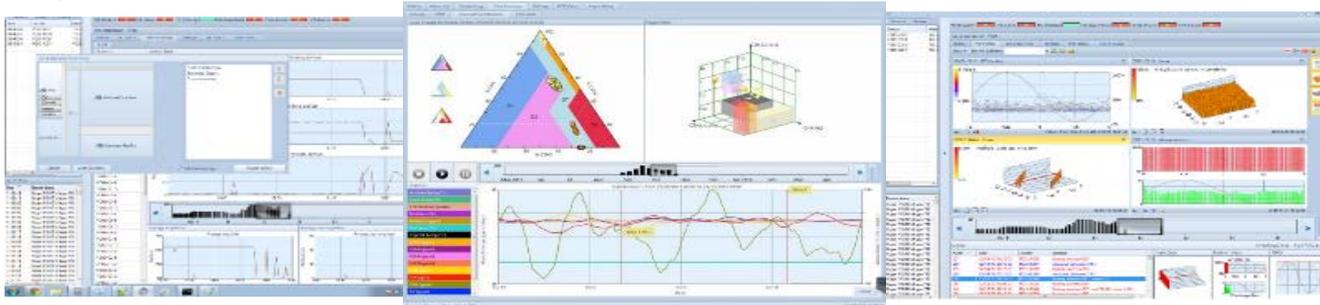
Country wide view: Showing all substations



Station level view: Line diagram showing assets



Asset Level View



Component level view: Showing all displays, data trends and other analysis for each parameter



# **TRANSFORMERS & REACTORS**

### 1 Thermometers

**REMOTE MOUNT THERMOMETER**

**OTI/WTI™**



- Bellow type measurement of OTI, WTI's
- 75+ years experience
- Up to 6 independent switches

**REMOTE MOUNT THERMOMETER**

**104/TR6000**



- Bourdon tube capillary measurement of OTI, WTI's
- 40+ years experience
- Polar, stainless and C5M paint options.

### 2 Pressure Relief Devices

**LARGE PRESSURE RELIEF DEVICE**

**LPRD**



- Pressure relief device with alarming capability
- Over 50 years field experience with over 500K installations
- Optional shield for oil diversion

**EXTRA PRESSURE RELIEF DEVICE**

**XPRD**



- Pressure relief device with alarming capability
- Patented 2x flowrate of the LPRD
- Built in shield for oil diversion and optional piping kits

### 3 Liquid Level Gauges

**LARGE OIL LEVEL INDICATORS**

**AKM 44712**



- Large dial face for easy viewing at a distance
- Lever or gear driven float arms with a high level of customization available
- Up to 4 switches

**LARGE OIL LEVEL INDICATORS**

**032/042/045**



- Magnetically coupled gear or lever driven float arms
- Custom dials and configurations available
- Up to 3 switches

### 4 Flow Gauge

**FLOW INDICATORS**

**092**

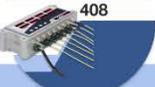


- Magnetically coupled dial assembly and flange with adjustable vane
- Provides up to two switches for alarming capability

### 5 Fiber Optics

**FIBER OPTIC TEMPERATURE MONITOR**

**408**



- Up to 16 channels for accurate fiber optic hot spot measurement
- 8 form C relays
- Available web server and multiple communication options

**DIRECT WINDING MONITOR**

**509 DW**



- Up to 16 fiber optic sensors integrate with 509 ITM capability
- Cooling and LTC monitoring options available
- NERC compliant

### 6 Sudden Pressure/ RPRR

**RAPID PRESSURE RISE RELAYS**

**900/910**



- Detection and alarming of sudden pressure rises
- Flange or thread mounting options for oil or gas space
- Original creator of technology

**ELECTRONIC PRESSURE MONITOR**

**930**



- Electronic detection and alarming of sudden pressure rises
- Settable sensitivity
- Two out of Three logic options available

### 7 Partial Discharge

**IN-HOUSE DEVELOPED PDM SENSORS**

**UHF Sensors**



- Internal, Window and Drain Valve
- Protection from high transient signals
- Support in sensor location and sensitivity testing

**PARTIAL DISCHARGE MONITOR**

**609 PDM**



- AI and NN based PD detection
- Real time trending of PD activity
- Expert Analysis display options
- IEC 61850 compliant – KEMA Certified

### 8 Bushing Monitor

**BUSHING MONITOR ADAPTORS**

**408**



- Custom designed
- Double protection from transients
- Dual earth connections from bushing tap adaptor
- Relay alarms for protection failure

**ON-LINE BUSHING MONITOR**

**OCM-T-BM**



- Higher accuracy
- Programmable Alarm criterion
- Time trend of the bushing parameters
- Temperature compensation

**OFFSHORE Xtreme**

**Hardened for Offshore Use**

- Robust materials to survive saline environment
- Made of 316 stainless steel or C5M painted
- Conformal coated electronics options available

### 9 Transformer Monitors

**INTELLIGENT TRANSFORMER MONITOR**

**505 ITM**



- Up to 4 inputs
- 4 current loop outputs
- TransLife calculations based on IEEE calculations
- NERC compliant

**INTELLIGENT TRANSFORMER MONITOR**

**509 ITM**



- Up to 8 inputs (16 with expansion module)
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### 10 Smart Breathers

**SMART TRANSFORMER BREATHER**

**STB Series**



- Maintenance free regenerating silica gel desiccant
- 1, 2, and 4 kg models available
- Bright LED alarm indication lights and color changing desiccant

**SMART TRANSFORMER BREATHER**

**Offshore Xtreme**



- Designed for harsh marine environments
- Enhanced materials made of stainless steel glass, and robust gaskets

### 11 DGA Monitors

**SINGLE DISSOLVED GAS ANALYSIS**

**TM1**



- Online hydrogen monitoring
- Alarm on PPM or Rate of Change
- Low cost of ownership with no membrane or consumables

**8 GAS DISSOLVED GAS ANALYSIS**

**TM8**



- Correlates 8 fault gases, plus moisture in oil
- Supports IEC and IEEE diagnostic tools
- Software for fleet management

### 12 TMS

**TRANSFORMER MONITORING SYSTEM**

**QTMS**

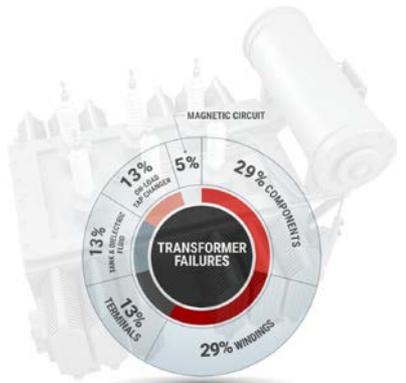


- Modular based, highly configurable transformer monitor
- Brings all smart sensor data into a central location
- Web based configuration

**POLAR Xecution**

**Hardened for Polar Use**

- Rated to -60°C
- Robust materials to survive harsh cold
- Additional heaters when required



**A COMPLETE AND FLEXIBLE PORTFOLIO ATTENDING DIFFERENT LEVELS OF NEEDS**

*Anton Donchenko - adonchenko@qualitrolcorp.com*

### 1 Thermometers

REMOTE MOUNT THERMOMETER  
**OTI/WTI™**

- Bellow type measurement of OTI, WTI
- 75+ years experience
- Up to 6 independent switches

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LARGE OIL LEVEL INDICATORS  
**032/042/045**

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FLOW INDICATORS  
**092**

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DIRECT WINDING MONITOR  
**509 DW**

- Up to 16 fiber optic sensors integrate with 509 ITM capability
- Cooling and LTC monitoring options available
- NERC compliant

Serveron DGA Monitors

1 to 9 gases  
+/- 5% accuracy

Auto self calibration in the field  
allows for reliable diagnostics

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**Offshore Xtreme**

- Designed for harsh marine environments
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**QTMS**

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- At least 100 level PD activity
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**TRANSFORMER FAILURES**

- 29% COMPONENTS
- 29% WINDINGS
- 13% TERMINALS
- 13% TAP CHANGERS
- 5% OIL
- 13% IM DAMAGE

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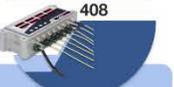


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**900/910**



- Detection and alarming of sudden pressure rises
- Flange or thread mounting options for oil or gas space
- Original creator of technology

**ELECTRONIC PRESSURE MONITOR**

**930**



- Electronic detection and alarming of sudden pressure rises
- Settable sensitivity
- Two out of Three logic options available

### 7 Partial Discharge

**IN-HOUSE DEVELOPED PDM SENSORS**

**UHF Sensors**



- High frequency, high transient signals
- Support in sensor location & sensitivity testing

**PARTIAL DISCHARGE MONITOR**

**609 PDM**



- AI and NN based PD detection
- Expert Analysis display options
- IEC 61850 compliant - KE3AA Certified

### 8 Bushing Monitor

**BUSHING MONITOR ADAPTORS**

**408**



- Custom design
- Double protection from transients
- Connections from bushing tap adaptor
- Relay alarms for protection failure

**ON-LINE BUSHING MONITOR**

**OCM T-500**



- Higher accuracy
- Programmable Alarm margin
- Time trend of parameters
- Temperature

**OFFSHORE Xtreme**

*Hardened for Offshore Use*



### 9 Transformer Monitors

**INTELLIGENT TRANSFORMER MONITOR**

**505 ITM**



- Up to 4 inputs
- 4 relay outputs
- 4 serial port outputs
- Cooling and LTC monitoring options available

**INTELLIGENT TRANSFORMER MONITOR**

**509 ITM**



- Up to 8 inputs (16 with expansion module)
- 4 serial port outputs
- Cooling and LTC monitoring options available

### 10 Smart Breathers

**SMART TRANSFORMER BREATHER**

**STB Series**



- Maintenance free regenerating silica gel desiccant
- 1, 2, and 4 kg models available
- Bright LED alarm indication lights and color changing desiccant

**SMART TRANSFORMER BREATHER**

**Offshore Xtreme**



- Designed for harsh marine environments
- Enhanced materials made of stainless steel glass, and robust gaskets

### 11 DGA Monitors

**SINGLE DISSOLVED GAS ANALYSIS**

**TM1**



- Online hydrogen monitoring
- Alarm on PPM or Rate of Change
- Low cost of ownership with no membrane or consumables

**8 GAS DISSOLVED GAS ANALYSIS**

**TM8**



- Correlates 8 fault gases, plus moisture in oil
- Supports IEC and IEEE diagnostic tools
- Software for fleet management

### 12 TMS

**TRANSFORMER MONITORING SYSTEM**

**QTMS**



- Modular based, highly configurable transformer monitor
- Brings all smart sensor data into central location
- Web based configuration

**POLAR Xcution**

**MAGNETIC CIRCUIT**



- Rated to -60°C
- Robust materials to survive harsh cold
- Additional heaters when required



**DMS PD measurement**  
**UHF method for great sensitivity**  
**Possibility to identify location**  
**Real time measurements & correlation**  
**Data analytics**



# **GAS INSULATED SWITCHGEAR**

## 1 Partial Discharge Monitors

### PARTIAL DISCHARGE MONITOR



PDMG-RH

### MINI PARTIAL DISCHARGE MONITOR



PDM Mini

- HV / EHV and UHV GIS: more than 24 sensors (>220 kV)
- Monitoring 350+ substations globally
- AI and NN based PD Fault identification for single and multiphase
- 3.5m+ fault records
- Software and hardware noise gating
- Suitable for HV testing of GIS
- Automatic report generation, configurable by customer
- Programmable Alarm criterion
- History data storage for up to 10 years
- Records and stores Switching signals for further analysis
- Expert Analysis display options - PRPD, POW, STT, real-time 3D/2D view
- Single station to multiple station - 2000 sensors
- IEC 61850 compliant - KEMA Certified
- Remote monitoring functionality

- Smaller GIS substations – up to 24 sensors (<220 kV)
- Cost effective
- AI and NN based PD Fault identification for single and multiphase
- 3.5m+ fault records
- Software and hardware noise gating
- Suitable for HV testing of GIS
- Local display for PD events and trends
- Remote monitoring - display options for expert analysis (PRPD, POW, STT) and reporting
- Programmable Alarm criterion - flexible to change in the field
- History data storage for up to 25 years
- Records and stores Switching signals for further analysis
- IEC 61850 compliant (KEMA Certified) - Easy to integrate with third party systems e.g. SCADA, PI historian, etc
- IP-66 rated (OCU and PDM Mini Cabinet)

## 2 SF<sub>6</sub> Leakage Monitoring

### ONLINE SF<sub>6</sub> GAS DENSITY MONITOR



iSGM

- Integration with any analog sensor
- Real time tracking of SF<sub>6</sub> emissions
- Calculate time to refill and refill quantity
- SF<sub>6</sub> emission reporting – user customized
- Substation and Region level monitoring
- Relay alarms for SF<sub>6</sub> lock out
- IEC 61850 compliant - KEMA certified

### ONLINE SF<sub>6</sub> GAS DENSITY MONITOR



iSGM MODBUS

- Integration with any modbus sensor
- Real time tracking of SF<sub>6</sub> emissions
- Calculate time to refill and refill quantity
- SF<sub>6</sub> emission reporting – user customized
- Substation and Region level monitoring
- Relay alarms for SF<sub>6</sub> lock out
- IEC 61850 compliant - KEMA certified

## 5 Breaker Condition Monitors

### ONLINE BREAKER CONDITION MONITOR



BCM

- 30+ years of experience
- Easily fits into breaker control cabinet
- 16 analog and 10 digital inputs
- Easy expandable to add more parameters
- Data recorded for every breaker operation
- Automatic 'fingerprint' analysis
- Extreme environment support
- Integration with travel transducer
- IP50 rated; Supplied into IP66 rated cabinet

### WEB PAGE CONFIGURATOR AND RECORD VIEWER



BCM

- 18-bit A/D Converter
- Web client based display and configuration
- Programmable relay alarms
- IEC 61850 and DNP3.0 support - easy to integrate with third party systems e.g. SCADA, PI, etc.
- Graphics display of the motor currents and gas density
- Breaker operation analysis report
- Fleet-wide breaker monitoring

## 3 Switchgear Temperature Monitors

### FIBER OPTIC TEMPERATURE MONITOR



408

- Real-time monitoring of multiple point measurements
- Characterize the normal thermal behaviour of breaker connections
- Prevents breaker damage due to poor contacts at the tulip connections

### FIBER OPTIC TEMPERATURE MONITOR



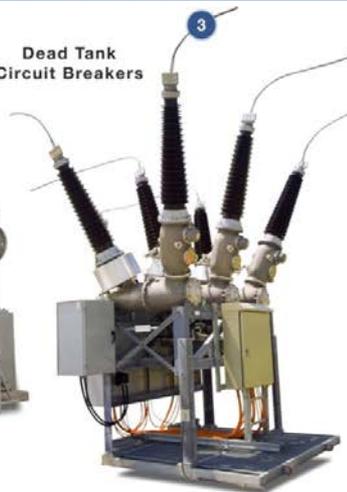
405

- Robust installation
- Faster response time than bus-bar time constant
- Built-in Relays for alarm and control
- Built-in memory for temperature and event storage
- Analog, serial and Ethernet communication protocols

Gas Insulated Switchgear



Dead Tank Circuit Breakers



Live Tank Circuit Breakers



## 1 Partial Discharge Monitors



- HV / EHV and UHV GIS: more than 24 sensors (>220 kV)
- Monitoring 350+ substations globally
- AI and NN based PD Fault identification for single and multiphase
- 3.5m+ fault records
- Software and hardware noise gating
- Suitable for HV testing of GIS
- Automatic report generation, configurable by customer
- Programmable Alarm criterion
- History data storage for up to 10 years
- Records and stores Switching signals for further analysis
- Expert Analysis display options - PRPD, POW, STT, real-time 3D/2D view
- Single station to multiple station - 2000 sensors
- IEC 61850 compliant - KEMA Certified
- Remote monitoring functionality

- Smaller GIS substations – up to 24 sensors (<220 kV)
- Cost effective
- AI and NN based PD Fault identification for single and multiphase
- 3.5m+ fault records
- Software and hardware noise gating
- Suitable for HV testing of GIS
- Local display for PD events and trends
- Remote monitoring - display options for expert analysis (PRPD, POW, STT) and reporting
- Programmable Alarm criterion - flexible to change in the field
- History data storage for up to 5 years
- Records and stores Switching signals for further analysis
- IEC 61850 compliant (KEMA Certified) - Easy to integrate with third party systems e.g. SCADA, PI historian, etc
- IP-66 rated (OCU and PDM Mini Cabinet)

## 2 SF<sub>6</sub> Leakage Monitoring



- Integration with any analog sensor
- Real time tracking of SF<sub>6</sub> emissions
- Calculate time to refill and refill quantity
- SF<sub>6</sub> emission reporting – user customized
- Substation and Region level monitoring
- Relay alarms for SF<sub>6</sub> lock out
- IEC 61850 compliant - KEMA certified

- Integration with any modbus sensor
- Real time tracking of SF<sub>6</sub> emissions
- Calculate time to refill and refill quantity
- SF<sub>6</sub> emission reporting – user customized
- Substation and Region level monitoring
- Relay alarms for SF<sub>6</sub> lock out
- IEC 61850 compliant - KEMA certified

## 5 Breaker Condition Monitors



- 30+ years of experience
- Easily fits into breaker control cabinet
- 16 analog and 10 digital inputs
- Easy expandable to add more parameters
- Data recorded for every breaker operation
- Automatic 'finger' monitoring
- Extreme environment support
- Integration with travel transducer
- IP50 rated; Supplied in a rugged cabinet

- 18-bit A/D Converter
- Web client based display and configuration
- Programmable relay alarms
- IEC 61850-90-2, IEC 61850-91-1 support
- Graphics display of the motor
- Fleet-wide breaker monitoring

## 3 Switchgear Temperature Monitors

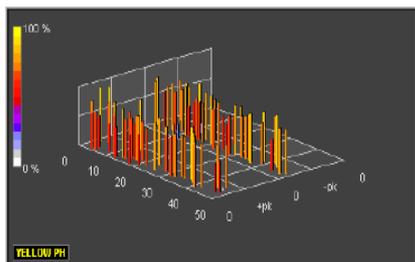


- Real-time monitoring of multiple point measurements
- Characterize the normal thermal behaviour of breaker connections
- Prevents breaker damage due to poor contacts at the tube connections

- Robust installation
- Faster response time than bus-bar time constants
- Built-in Relays for alarm and control
- Built-in memory for temperature and event storage
- Analog, serial and Ethernet communication protocols

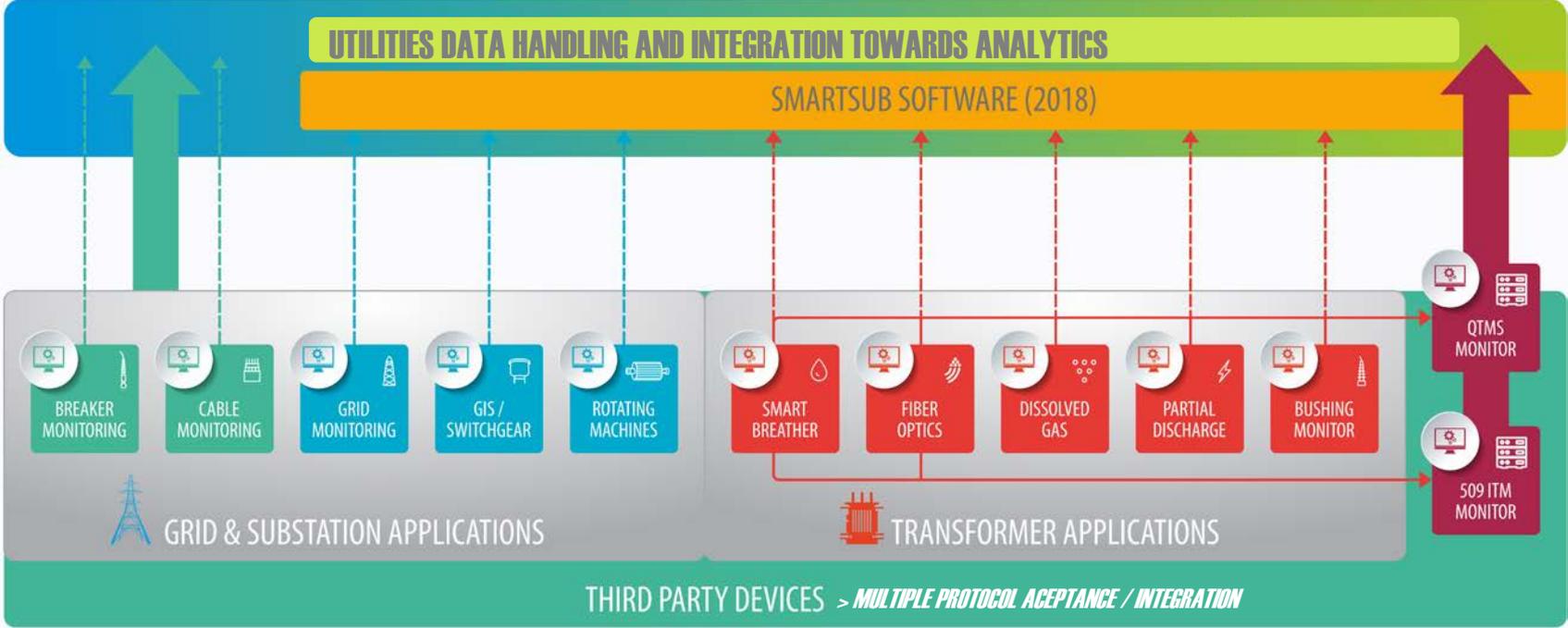
**DMS PD measurement**  
**UHF method for great sensitivity**  
**Data analysis and interpretation**  
**real time**

Gas Insulated Switchgear



# DATA INTEGRATION

## Asset KnowHow – Largest end to end monitoring solutions globally



**Creation of a unified software platform to connect all Qualitrol and third party CBM sensors**

# GLOBAL REACH QUALITROL®

Defining Reliability





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# QUALITROL<sup>®</sup>

Defining Reliability

*Overview 2019*

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