

RUGGED  **MONITORING**

MONITORING SIMPLIFIED



R501

ADVANCED TRANSFORMER MONITOR

Robust | Reliable | Responsive

R501 Rack Mount Comprehensive and Customizable Transformer Monitoring Solution



Rugged, Most Versatile and Multi Channel monitoring solution capable of monitoring one or multiple transformers for :

Basic Transformer Monitoring, Fibre Optic temperature monitoring, Partial Discharge, Bushing, OLTC, Cooling System, Load, Power, and more...

Key Features

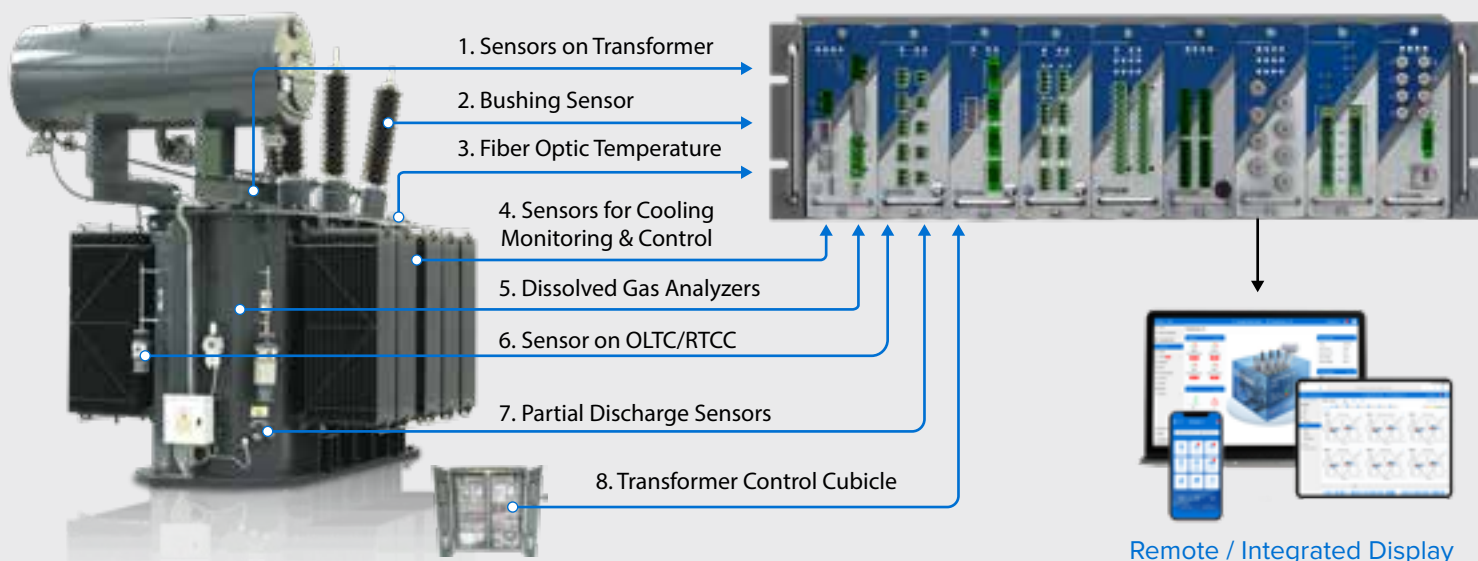
- Fully flexible rack mount and distributed architecture support
- Expandable & Field upgradable to add different transformer monitoring modules
- Highly secure, web server based visualisation and configuration software.
- Equipped with most accurate & advance transformer health assessment analytics
- Range of communication options and protocol support; Ethernet redundancy (PRP)
- Complies with the latest IEC/IEEE standards for Emission, Immunity, Safety and Environment.

Benefit

- Increased transformer availability
- Improved grid reliability
- Transformer lifetime extension
- Remote monitoring solution for various transformer parameters
- Lower cost of installation and maintenance - Higher RoI
- Faster integration with central condition monitoring system (On-Prem or Cloud)



R501 SYSTEM ARCHITECTURE



<p>1. Sensors on Transformer</p>	<p>2. Bushing Sensor</p>	<p>3. Fiber Optic Temperature</p>	<p>4. Sensors for Cooling Monitoring & Control</p>
<p>5. Dissolved Gas Analyzers</p>	<p>6. Sensor on OLTC/RTCC</p>	<p>7. Partial Discharge Sensors</p>	<p>8. Transformer Control Cubicle</p>

Sensors that can be **connected to R501**

1. OTI,WTI, RTD, PRD, Breather, Buchholz Relay, LLG/OLI, Pressure Sensor etc.
2. Range of Fibre Optic temperature monitoring sensors
3. Cooling System and Control Cabinet
4. Dissolved Gas Analyzer
5. Bushing adaptors and sensors
6. Range of Partial Discharge sensors

Certifications

ATEX	Lloyds	CE / RoHS

Variants

Offshore / Marine	Ethernet Redundancy: PRP	Enterprise Monitoring Software

R501 MONITORING FUNCTIONS

Real Time Monitoring and Advance Control

Direct Winding Hot Spot

- HV Winding
- LV Winding
- MV Winding
- Core Hot Spot

Bushing Monitoring

- Leakage Current
- TanDelta
- Power Factor
- Capacitance

Load, Power, Losses

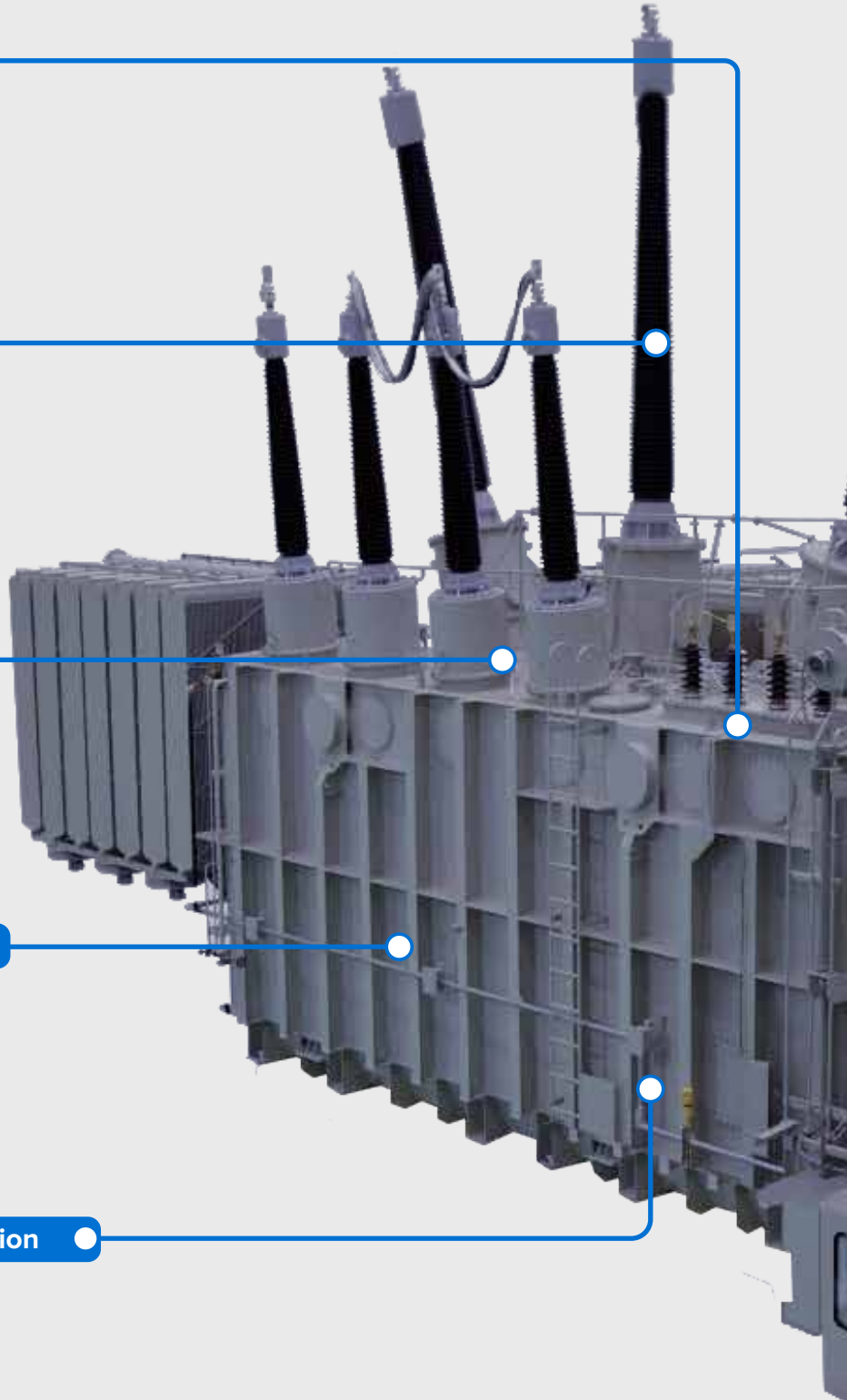
- Load/Over Current
- Active / Reactive Power
- Overload Capacity
- PF / Losses

Partial Discharge Monitoring

- PD Amplitude
- PD Discharge Rate
- PD Trend

Dissolved Gas Analyzer Integration

- Single gas DGA
- Multi-gas DGA
- Moisture



RM EYE - Transformer Monitoring Software



Transformer Health Assessment

- Remote Monitoring and Control
- Insulation Life Estimation
- Overload Capacity
- Bubbling Temperature
- Moisture in Insulation
- Real time Alarm and Notifications
- Easy Integration

Essential Monitoring

- Oil Temperature
- Winding Temperature
- Oil Level, Tank Pressure
- Moisture in Insulation
- Bubbling Temperature
- Ageing Rate
- Status/Relay Signals

Cooling Monitoring/Control

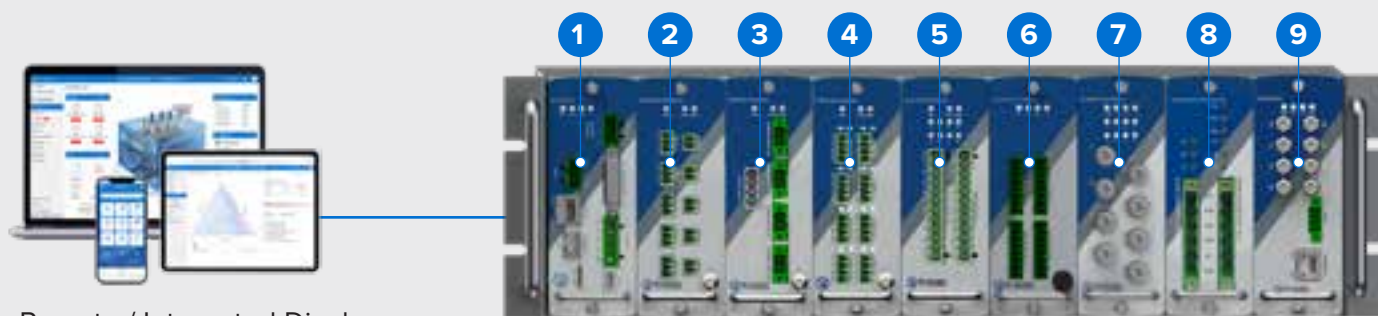
- Fan/Pump Condition
- Motor Condition
- Cooling Efficiency
- Oil/Water Flow

OLTC Monitoring

- Tap Position
- Motor Current / Voltage
- Motor Torque
- Power Consumption
- Oil Temperature
- Partial Discharge Level
- Dissolved Gases

R501 Monitoring Modules

Comprehensive Features to Meet Market Demand



Remote / Integrated Display



1. CPU/GTW Module

Option A. CPU Module

- Data Processing & Storage
- System Fault Relay
- 01 x Serial (RS485) ports
- 02 x Ethernet (PRP support)
- Health Assessment Analytics



Option B. CPU with GTW

- Main rack with CPU, Slave rack with GTW
- Provides power to all modules
- Up to 4 Racks can be daisy chained
- 01 x Serial (RS485) ports



Option C. GTW without CPU

- Main rack and slave racks with GTW
- Provides power to all modules
- Supports FOM and FLM modules
- Up to 4 Racks can be daisy chained
- 01 x Serial (RS485) ports

2. Analog Input Module

- 05 or 10 channels
- AC/DC current input
- RTD / Potentiometer
- Built-in LED indicators



3. Power Monitoring Module

- 03 Current & 03 Voltage Inputs
- Active, Reactive & Apparent Power
- Transformer Power Factor
- Through-Fault Monitoring (I2T)
- Current Signature Analysis
- OLTC Motor Torque



4. Digital Input Module

- 08 or 16 channels
- Input Voltage 75 - 250Vdc
- Threshold Voltage > 60V
- Built-in LED indicators



5. Relay Output Module

- 04 or 08 Form C Relays
- Dry contact (NO-C-NC)
- User Programmable
- Built-in LED indicators



6. Analog Output

- 08 or 16 Analog output
- DC Current Loop (4-20mA / 0-1mA)
- Dc Voltage (0-5V / 0-10V)
- User Programmable
- Built-in LED indicators



7. Fiber Optic Module

- 02, 04, 06 and 08 Channels
- GaAs (200u and 62.5u) Module
- Fluro Module
- Built-in LED indicators



8. Bushing Monitoring Module

- 03 or 06 Channels
- Leakage Current
- Tan Delta / Power Factor
- Capacitance
- Phase Voltage
- Custom Tap Adaptor for Different Bushing



HF



UHF

9. Partial Discharge Module

- 04 or 08 Channels Continuous Monitoring
- Wide Range (HF and UHF)
- Sampling 125 Ms/s
- Vertical Resolution 12bit
- Advanced PD Analysis
- UHF, Acoustic, Bushing PD Sensors available

One Solution for Multi-Site Multi Asset Monitoring

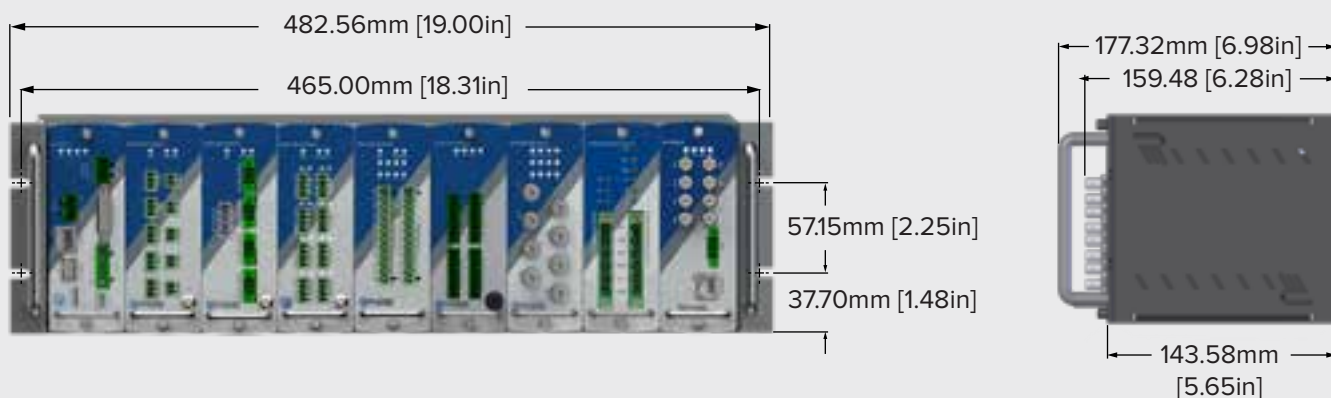


Technical Specifications

POWER SUPPLY	Input Power Requirement	24 - 48 Vdc (Default), 125 Vac/Vdc, and any other (upon request)
CPU MODULE	Data Storage Capacity	MicroSD external memory slot (up to 2 TB)
	Logging Rate	1 sec interval on USB
	Config port	USB (to use with Rugged connect windows software)
SYSTEM CAPACITY	Maximum number of Channels	Expandable to 256 Channels, Daisy chain up to 32 units (with Modbus, Canbus)
FIBER OPTIC MODULES	# of Channels	2, 4, 6 and 8 channels
	Measurement Range	-80 °C to +300 °C (cryogenic 4 °K range optional)
	Resolution	0.1 °C
	Accuracy	±1.0 °C (±0.2 °C in relative temperature)
	Scan Rate	200 ms / channel (Optional: Faster scanning rates available)
ANALOG INPUT MODULE	# of Input Channels	05 or 10 Channels
	AC Current Input	Clamp-on CT with different ranges: 5Amp, 10Amp, 20Amp, 100Amp and others available
	DC Current Input	4 - 20 mA
	Temperature Input	100 ohm platinum (Pt100)
	Potentiometer	up to 20,000 ohms
POWER MONITORING MODULE	# of Input Channels	03 Current and 03 Voltage
	Current Input Range	0 - 5A
	Voltage Input Range	0 - 250V
	Sampling Rate	32 KS/s
	Measurement Parameters	Power, Through-Fault, Motor Torque etc.
DIGITAL INPUT MODULE	# of Input Channels	08 or 16 Channels
	Dry Contact	Resistance between the contact < 100 Ω
	Powered Contact	75 - 250Vdc
ANALOG OUTPUT MODULE	# of Input Channels	08 or 16 Channels
	Output format	4-20 mA or 0-5V or 0-10V Configurable for any measured / calculated value
BUSHING MONITORING MODULE	# of Input Channels	03 or 06 Channels
	Leakage Current Range	1mA to 200mA
	Monitoring Parameters	Tan Delta (PF), Capacitance, Phase Voltage
PARTIAL DISCHARGE MODULE	# of Input Channels	04 or 08 Channels
	Acquisition Bandwidth	HPM: 0.01 - 100Mhz UPM: 100 MHz - 2 GHz
	Monitoring Parameters	PD Amplitude, Discharge Rate and PRPD
OUTPUT RELAY MODULE	# of Output Channels	04 or 08 Form C relays
COMMUNICATION OPTIONS	Ethernet Ports (RJ-45 & FO Ethernet)	Modbus, DNP3.0, IEC 60870-5-104, MQTT, IEC61850, PRP
	Serial Port	RS485 with Modbus support
	CANBUS Port	CANBUS Master/Slave support for Can Dataloggers

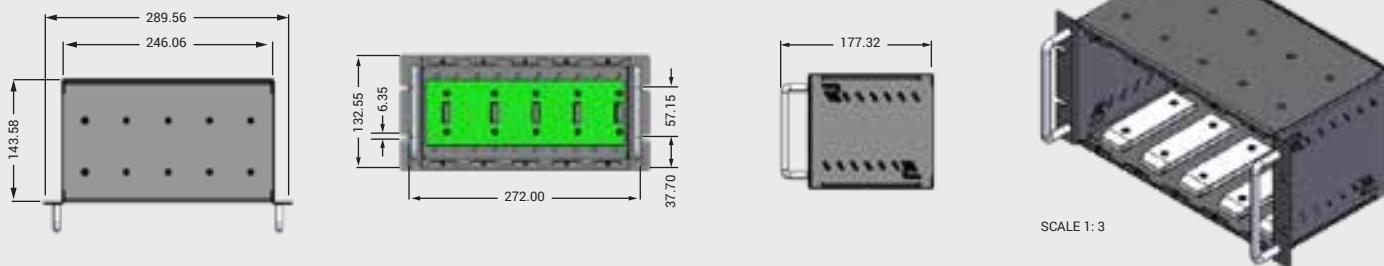
EMC COMPLIANCE	Conducted & Radiated Emissions	ICES-003 (2016), CISPR32 (2015), CISPR11 (2015)
	ESD and EM Field Immunity	IEC61000-4-2, C37.90-3, IEC61000-4-3, C37.90.2
	Fast Transient & Surge Immunity	IEC61000-4-4, IEC61000-4-5, C37.90.2
	Magnetic Field Immunity	IEC61000-4-8, IEC61000-4-10
	Immunity from Conducted Disturbances	IEC61000-4-6, IEC61000-4-16
	Ripple, Dips & Damped Oscillatory	IEC61000-4-17, IEC61000-4-18, IEC61000-4-29
	Safety	IEC60255-26 and CE Certified
ENVIRONMENTAL AND MECHANICAL	Operating Temperature	-40 to 72 °C
	Operating Humidity	95% Non Condensing
	Storage Temperature	-40 to 85 °C
	Dimensions	W26.7 cm x H7.2 cm x D18.7 cm (10.5" x 2.8" x 7.4")
	Weight	App. 5Kg. (for complete filled Chassis)

Product Drawing



Weight : 5 Kilograms

Optional Smaller 3U Chassis



Ordering Code

Contact our sales team for Ordering Code

Asset Monitoring : Enterprise Architecture

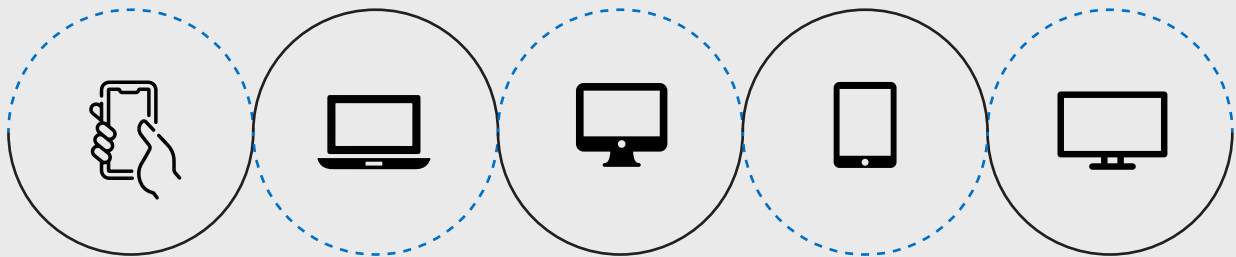
Compatible with Rugged Monitoring Enterprise Solution

UI UX



- Data Layer
- Analytics
- User Interface
- Custom Dashboards
- Reporting
- Email/SMS Notifications

RM EYE



Private Cloud (Customer Cloud),
Rugged Monitoring Cloud

IEC 60870-104

IEC 61850

FTP/SFTP

- XML, JSON

- CSV, COMTRADE



Data Collection

ODBC

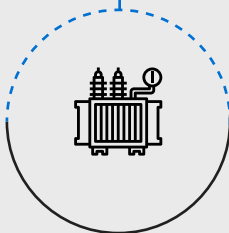
MODBUS

DNP 3.0

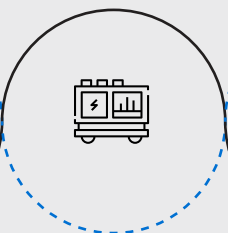
HTTPS

MQTT

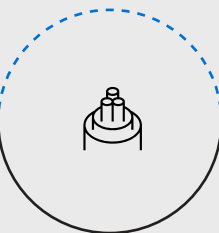
Asset Data



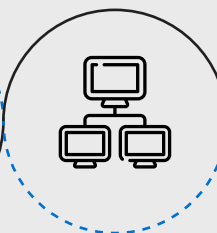
Transformer
Monitoring
System



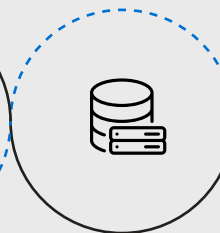
Switchgear
Monitoring
System



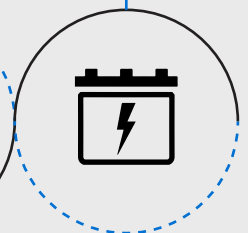
Power Cable
Monitoring
System



- Offline Test Results
- Inspection Records
- Name Plate



- Historian
- CMMS
- SCADA/ DCS



Power Electronics
(Battery, UPS,
VFD, Relay)

One Solution for Multi-Site Multi Asset Monitoring

**RM Eye - Unified platform to monitor entire network
of electrical assets**

Features

- **Advanced asset health monitoring** with analysis and recommendations to increase asset effectiveness in addition to maximizing equipment uptime
- **Modern remote monitoring solutions** provide valuable insights to Multiple Assets at Multiple Sites from time to time
- **Establish a real time and consistent monitoring** by getting the right information into right hands
- **Simple and user-friendly interface** providing easy and fast access to all the features
- **Everything about the asset at one place**
The raw data, analysis and recommendations
- **Advanced asset algorithms** for electrical assets to evaluate asset health
- **Advanced reporting technology with automated alerts**
- **An efficient, reliable partial discharge monitoring for all the assets**
- **A detailed comprehensive DGA analysis**
- **Built on well-established remote and cloud-based monitoring technology**
- **Quick configuration** so that you are not required to configure separately.
- **Protocols: MODBUS, MQTT, IEC61850**
- **Robust integration with 3rd party systems and devices** with industry standard protocols
- **Bulk configuration imports for fast deployment**
- **Encompasses a secure access to data and configuration**
- **QR code scanner on mobile devices**
- **Accessible on web browser and mobile app**
- **Historical data storage and on demand access** via export feature
- **Extended multilingual support** to handle product inquires or troubleshoot problems proactively
- **Systematic fleet management analysis**
- **Offline test data integration and analysis**

Why Customers Choose Us?

RM solution, the trusted monitoring solution for over 10000+ assets across 50+ countries. We are a leading High Value Electrical Asset Monitoring Company integrating fibre optic technology to the assets.



Attention to Details

It's our attention to the small stuff, scheduling of timelines and keen project management that makes us stand out from the rest.



A plan for Success

Our Customers are well satisfied with the advisory services that we offer to help them with best in class technological performance and a long durable life.



Experts only

We bring-in our diversified experienced team with over 100+ years of experience in Asset Monitoring



Meeting Deadlines

Work with us, and you'll work with seasoned professionals – vigilant of deadlines, and committed to exceeding client expectations.



Money Matters

We protect you against currency fluctuation with competitive and fair market prices




Our Presence Across the Globe



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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's leading team of asset condition monitoring 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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