RUGGED MONITORING

MONITORING SIMPLIFIED

Realtime Condition Monitoring improves your electrical assets productivity and lifespan

FOR RETROFIT ASSETS

Retrofit Monitoring Solution

Industry needs are changing with limited access to the resources and therefore, we have designed and manufactured a state-of-the-art remote monitoring solution to cater the monitoring needs of all electrical assets. Our solutions with deep insights into operational and diagnostic capability facilitate real-time asset optimization and allows remediation prior to failure. Continuous monitoring of asset health and proactive maintenance are the new reliability strategies.

Our precisely designed monitoring solutions for the retrofits (electrical assets in operation) will not only provide monitoring but it will also improve system work procedures.

The monitoring solutions will make the system more predictive rather than reactive. The new age electrical assets are constructed with inbuilt monitoring solutions. Thereby, the condition and risk assessment of the electrical assets in existing fleets are becoming more and more important to improve their performance, extend their useful life, decrease costs, and make the best technical and economic decisions, concerning their life cycle management.

Condition Monitoring Monitors

R501

Multi-Site, Multi-Asset Monitoring Solution

Expandable upto 256 channels with daisy chain & field upgradeable to add different monitoring modules. The monitor is recognized as an all-in-one solution capable of monitoring Fiber Optic Temperature, PartialDischarge, Bushing, OLTC, Load, Power, and more

T301
GaAs - 62.5µm

Available channels 2 to 24

8 Configurable Analog / Digital Channels. 2 to 24 Fiber Optic Temperature channels for monitoring in Transformers, Cables, GIS, AIS, Rotating Machines, and Breakers

O201
GaAs - 62.5µm

Available channels 2 to 8

Rugged fiber optic temperature monitor for third-party sensors with GaAs 62.5 µm / 200 µm technologies for monitoring in Transformers, Cables, GIS, AIS, Rotating Machines, and Breakers

O201
Fluro

Available channels 2 to 8

Rugged, Reliable and Accurate Fiber Optic Temperature Monitor compatible with fluorescence fiber optic sensors for monitoring in Transformers, Cables, GIS, AIS, Rotating Machines, and Breakers

The monitoring solutions will make the system more predictive rather than reactive. The new age electrical assets are constructed with inbuilt monitoring solutions. Thereby, the condition and risk assessment of the electrical assets in existing fleets are becoming more and more important to improve their performance, extend their useful life, decrease costs, and make the best technical and economic decisions, concerning their life cycle management.

Features

- Robust and Rugged Compact Design
- Expandable channels
- Plug and Play connections
- Customizable according to customer specific applications

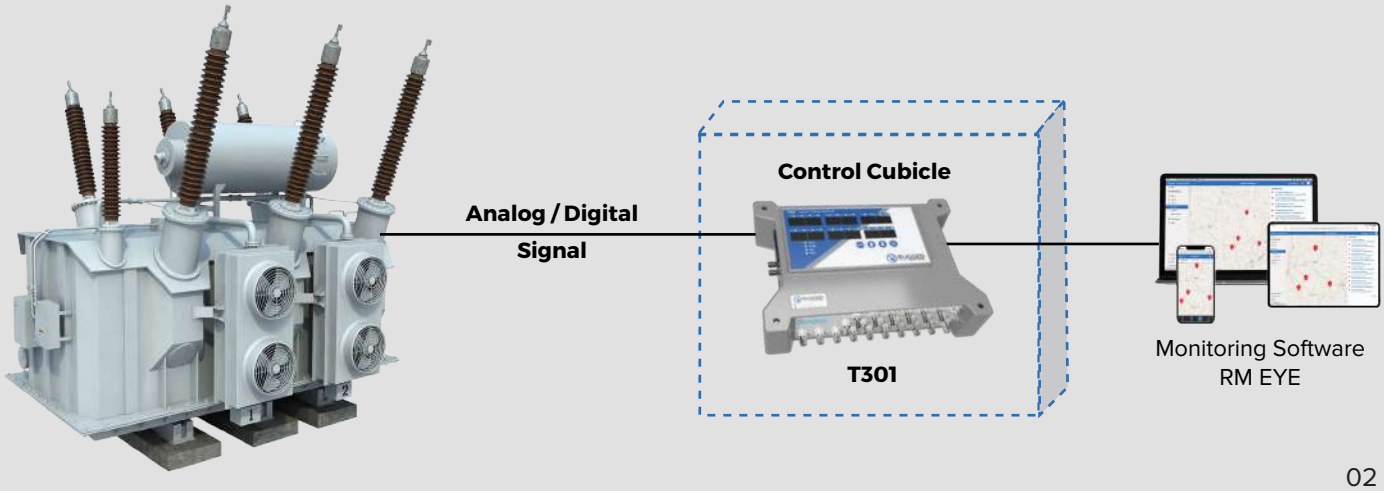
Benefits

- Integrate everything needed to drive down operation and maintenance costs
- Improve reliability with automatic monitoring
- Empower predictive & proactive maintenance procedures
- Compatible with multiple electrical assets

Applications

- Power Transformers
- Switchgear (AIS/GIS/MV Panel)
- Cables
- Rotating Machines

System Architecture



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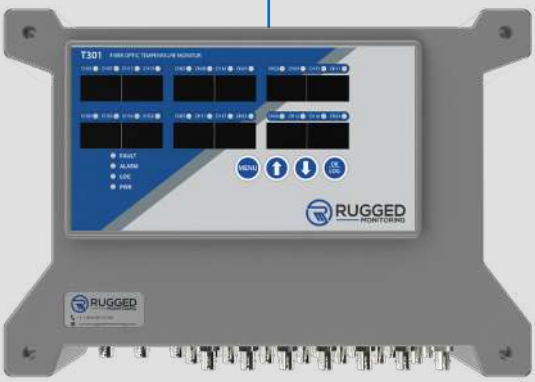
T301 Rugged Monitoring Temperature Monitor



The Rugged Monitoring T301 is a multi-channel fiber optic temperature monitor with precision measurement for Industrial and Laboratory applications. The T301 fiber optic monitor combines compact form factor and user-friendly interface in the monitor and software.

It is designed to operate reliably in extreme EMI, RFI, Microwave and high voltage environments. The T301 has a measuring range from -271°C to +300°C. The system offers complete immunity to RFI, EMI, Chemical, microwave radiation, and high voltages making it an optimal choice for environments where the limitations of conventional temperature sensors / monitors impact usage in extreme conditions. The system is based on proven zero-drift GaAs technology and designed for Plug and Play operation.

The T301 is designed to collect data and to easily integrate into existing systems through serial communication like RS-485 or Gigabit Optical Ethernet. The T301 monitor comes with Rugged Connect software which is designed with the needs of Test Platform or Industrial Process monitoring integration needs. It has the data integration capability of multiple test platforms. Rugged Connect software is designed to collect data from 256 channels simultaneously. Plug and Play functionality provides the flexibility to interchange sensors without the inconvenience / concerns of calibration.

Rugged Monitoring has a dedicated team for application specific customizations for fiber optic sensors, monitor configuration and software integration to simplify the data collection of testing and monitoring applications.

Applications

- Transformer Hot Spot monitoring
- Industrial process control and monitoring
- Electric Vehicle and Battery Testing
- Medical Equipment testing (MRI, PETSCAN, NMR)
- Commercial Grade Microwave Radiation
- Food and Beverage Processes

Features

- Rugged, Compact Design
- 4 to 24 Channels, Expandable
- Plug and Play, No field calibration
- Best in class EMI, ESD Immunity
- 8 Programmable relays, Form - C
- Software designed to be interfaced with other testing platforms

Benefits

- No shift over time, high stability
- Robust packaging
- Each Monitor comes with a complete NIST calibration Certificate
- Software designed for integration into test platforms
- Robust datalogging and analytics
- Customizable according to customer specific applications
- Suitable for OEM-type applications.

Ordering Code

Number of Channels
Ex: 08 = 8 Channels

Number of Analog Outputs
0 = No Analog Outputs
8 = 8 Analog Outputs

T 3 0 1 – [ ][ ] E [ ] A [ ] R [ ] M [ ]

Memory Size
0 = None
4 = 4 GB
8 = 8 GB

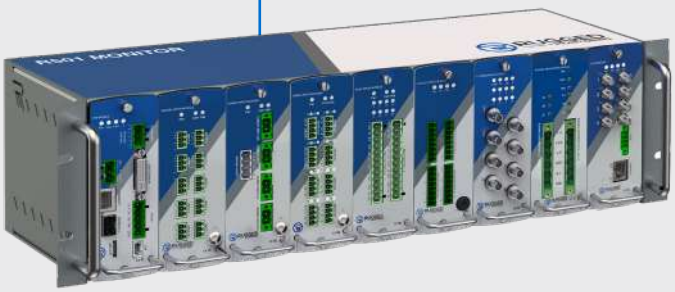
Number of Relays
0 = No Relays
8 = 8 Relays

Ethernet Protocols
0 = No Ethernet
1 = Ethernet (1x RJ45, 1x SFP port auto)
2 = Ethernet (1x RJ45, 1x SFP module 1Gbps)
3 = Ethernet (1x SFP port 1Gbps, 1x SFP port auto)
4 = Ethernet (2x SFP modules 1Gbps)
5 = Ethernet (1x RJ45, 1x SFP module 100 Mbps)
6 = Ethernet (1x SFP port 100 Mbps, 1x SFP port auto)
7 = Ethernet (2x SFP modules 100 Mbps)

Technical Specifications

Measurement Range	-80°C to +300°C (cryogenic 4°K range optional)
Measurement range (*Optional Range extensions*)	Down to 2°K / Up to +300 °C
Resolution	0.1°C
Accuracy	±1.0°C (±0.2°C in relative temperature)
Scan Rate	200 ms / channel
Memory	MicroSD external memory slot (Up to 2 TB)
Logging	10 years at 10 sec interval rate (8 GB)
Serial Port	RS-485 with Modbus
Ethernet Port	Gigabit RJ-45 or fiber ethernet (with PRP support using Redbox) – Optional
Analog Outputs	8 fully configurable 0-10 V / 4-20 mA optional module available – Optional
Max No. of Channels	256 Channels, Daisy chain up to 32 units (with Modbus)
Relays	8 Programmable Form-C Relays (5A) plus 1 system fault relay – Optional
Operating Temp	-40°C to 72°C
Storage Temp	-40°C to 85°C
Number of Channels	4 - 24 channels
Dimensions	10.5'' x 7.4" x 2.8'' 26.7W x 18.7D x 7.2H cm
Humidity	95% Non-Condensing

R501 Rack Mount Comprehensive and Customizable Transformer Monitoring Solution



Most Versatile, Multi Channel, Comprehensive Transformer Monitoring Solution

Single Monitoring Solution for: Temperature, Partial Discharge, Bushing, Load, Power, Losses and more...

Key Features

- Fully flexible rack mount and distributed architecture support
- Expandable to add different analog and (or) digital inputs and outputs
- Best in class EMI, ESD Immunity; range of communication options and protocol support
- Range of communication options for third party system integration
- Complies with the latest IEC/IEEE standards for Emission, Immunity, Safety and Environment.

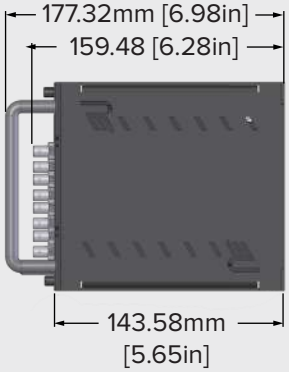
Benefit

- Improved reliability
- Accurate predictive analysis
- Access asset data from anywhere
- One monitoring solution for various parameters
- Increased lifetime
- Highest Return on Investment
- Field upgradable with no device downtime

Sensors that can be connected to R501

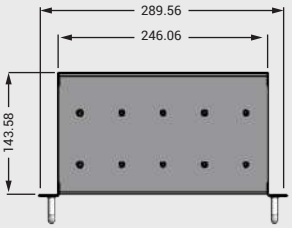
1. OTI,WTI, RTD, PRD, Breather, Buchholz Relay, LLG/OLI, Pressure Sensor etc.
2. Direct winding Hot Spot Monitor
3. Cooling System and Control Cabinet
4. Dissolved Gas Analyzer
5. Bushing Monitoring
6. Partial Discharge Monitor

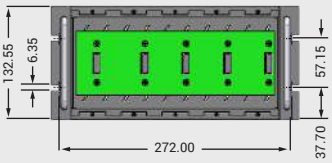
Product Drawing

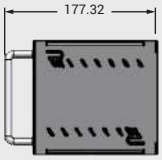


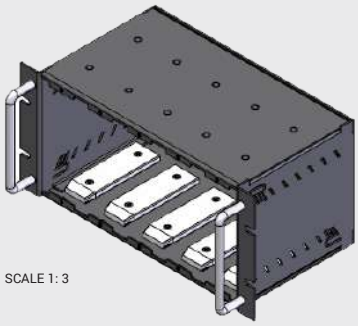
Weight : 5 Kilograms

Optional Smaller 3U Chassis









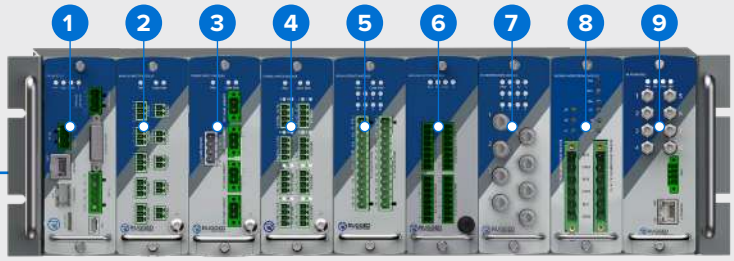
Odering Code

Contact our sales team for Ordering Code

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 100 MS/s
- Vertical Resolution 12bit
- Advanced PD Analysis
- UHF, Acoustic, Bushing PD Sensors available

Technical Specifications

POWER SUPPLY	Input Power Requirement	24 Vdc (Default), Optional 48 Vdc, 125 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

O201 Rugged Monitoring Temperature Monitor

Rugged design, designed for reliability, multichannel fiber optic temperature monitor for Industrial and Laboratory applications.

The Rugged Monitoring O201 is a compact design, designed for reliability to operate in extreme EMI, RFI, Microwave and high voltage environments. The O201 Fiber optic monitor combines reliability and user friendly configuration software. It is a multi-channel fiber optic temperature monitor with precision measurement for Original Equipment manufacturers. The O201 has a measuring range from -271°C to +300°C. The system offers complete immunity to RFI, EMI, microwave radiation and High Voltages making it an optimal choice for environments where the limitations of conventional temperature sensors/ monitors impact usage in extreme conditions. The system is based on proven GaAs technology and designed for Plug and Play operation.

The O201 is designed to collect data and easy to integrate into existing systems through serial communication like RS-485 or analog outputs like 0-10 V / 4-20 mA. The O201 supports Modbus, CANbus protocols and a system fault relay. The module is designed with capability to add additional application logic for customer specific applications. It is designed to cater the requirements of Monitoring, Test platforms or Industrial Process monitoring integration needs. It has the data integration capability of multiple test platforms. Industry standard drivers are available for a quick and easy connect to most popular laboratories softwares.

We at Rugged Monitoring have a dedicated team for application specific customizations for fiber optic sensors, monitor configuration and software integration to simplify the data collection of testing and monitoring applications.

Applications

- Electric Vehicle and Battery Testing
- Medical Equipment testing (MRI, PETSCAN, NMR)
- Commercial Grade Microwave Radiation
- Industrial process control and monitoring applications
- Chemical and process Industries Food and Beverage Processes
- Wood drying industry

Features

- Rugged, Compact Design
- 1 to 8 Channels, Expandable
- Plug and Play
- Best in class EMI, ESD Immunity
- Software designed to be interfaced with other testing platforms

Benefits

- Suitable for OEM-type applications.
- Sensors do not require any recalibration
- No shift over time, high stability & repeatability
- Robust packaging
- Each Monitor comes with a complete NIST calibration certificate
- Software designed for integration into test platforms
- Robust datalogging and Analytics
- Customizable according to customer specific applications
- Suitable for OEM-type applications

Ordering Code

O201 = Original Equipment Module, 201 Series

Number of Analog
Ex: 08 = 8 Channels (Available 00, 08)

O 2 0 1 – ☐☐ – ☐☐

Number of Channels,
Ex: 08 = 8 Channels (Available 02, 04, 06, 08)

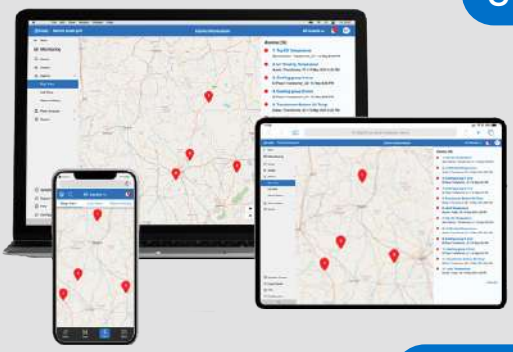
Technical Specifications

Measurement Range	-80°C to +300°C (cryogenic 4 °K range optional)
Measurement range (Optional Range extensions)	Down to 4°K / Up to +300°C
Resolution	0.1°C
Accuracy	±1.0°C (+/- 0.2°C in relative temperature)
Number of Channels	1 - 8 Channels
Logging	1 sec interval on USB / Micro SD card
Config port	USB (to use with Rugged connect windows software)
Max # of Channels	Expandable to 256 Channels, Daisy chain up to 32 units (with Modbus, Canbus)
Comunication Ports	RS-485 (RS-232 optional converter) with Modbus , CANbus
Power	24 VDC
Memory	MicroSD external memory slot (up to 2 TB)
Analog output module	Fully configurable eight 0-10 V / 4-20 mA module(Optional)
Dimensions	4.72" x 6.34" x 1.89" 120 x 161 x 48 mm
Scan rate	200 ms / channel (Optional: Faster scanning rates available)
Operating temp	-40 to 72°C
Storage temp	-40 to 85°C
Humidity	95% Non Condensing
Relay	System Fault relay (5A)

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

Manage different industrial assets on one platform without human intervention

Features

- **Advanced and Exceptional Reporting** Technology with automated alerts
- **Modern remote monitoring solutions** provide valuable insights to Multiple Assets at Multiple Sites on real-time
- **Robust asset health monitoring** with analysis and recommendations support asset effectiveness in addition to maximizing equipment uptime
- **Establish a real time and consistent monitoring** by getting the right information into right hands
- **An efficient, reliable partial discharge monitoring** for all the assets
- **A detailed comprehensive DGA Analysis**
- **Lifetime Consumption details.**
- **Built on well-established remote and cloud-based monitoring technology**
- **Simple user-friendly interface** providing fast access to all the features and commands
- **Quick and easy 1 step configuration setup**
- **Encompasses a secure access to data and configuration**
- **Advanced asset algorithms** based on standard ones with new ideas
- **Systematic fleet management and analysis**
- **Extended multilingual support** to handle product inquires or troubleshoot problems proactively
- **Up System Level Reporting**
- **Industrial IoT**

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

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.

Certification

ISO 9000

ISO 14000

ISO 45001/
OHSAS 18000

Llyod's
Register

ATEX
Certification

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