

**RUGGED MONITORING**  
MONITORING SIMPLIFIED



# T401

## TRANSFORMER MONITOR

ROBUST | RELIABLE | RESPONSIVE

# T401 MONITORING FUNCTIONS

Real Time Monitoring and Advance Control

FUNCTIONALITY

## Transformer Monitoring

- Oil Temperature
- Winding Temperature
- Load Current
- OLTC Tap Position
- Liquid Level
- Tank Pressure

## Bushing Monitoring Integration

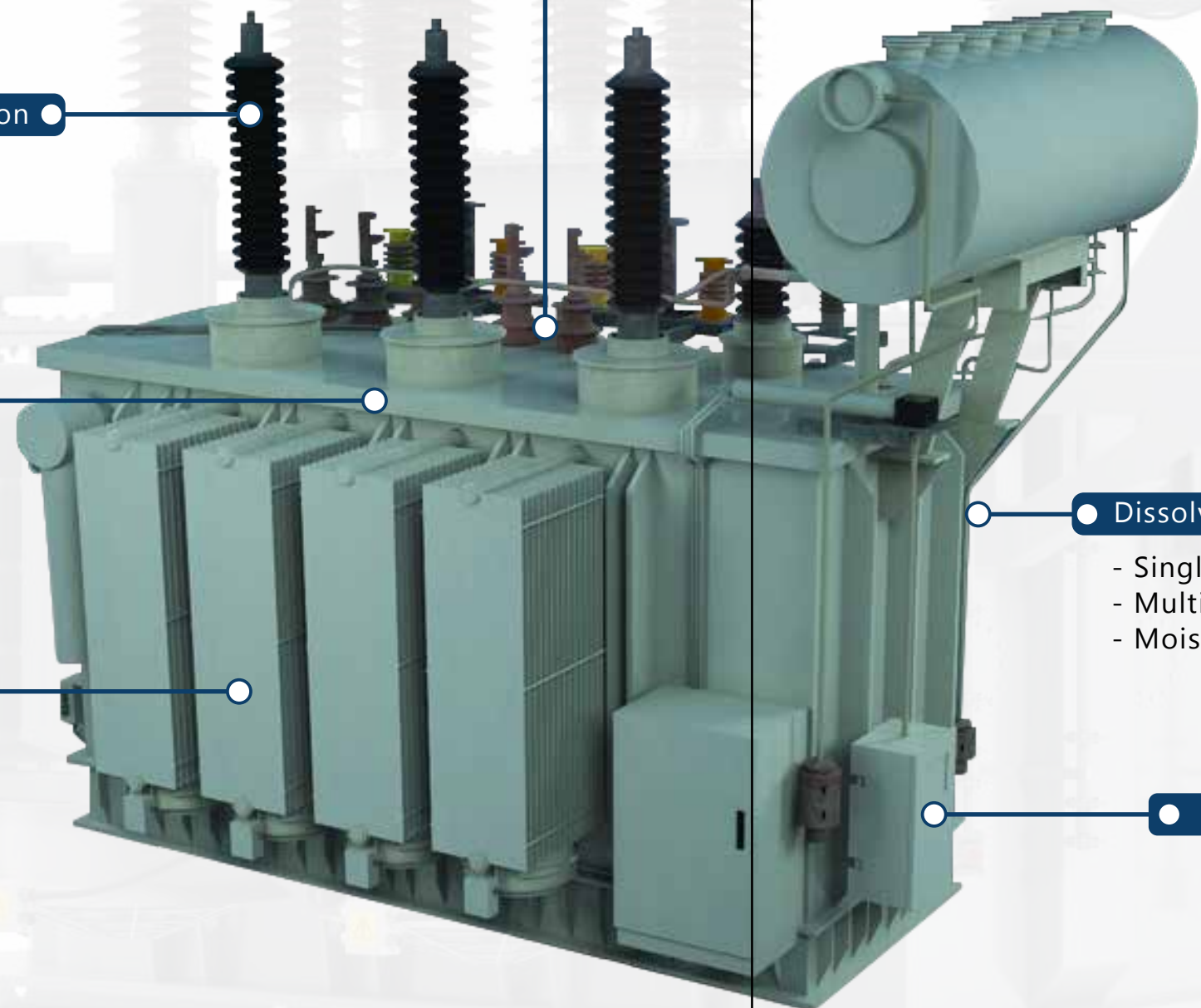
- TanDelta (Power Factor)
- Capacitance

## PD Monitoring Integration

- PD Amplitude
- PD Discharge Rate

## Cooling Control

- Fan/Pump Status
- Fan Bank Motor Current
- Cooling Efficiency
- Fan bank Exercise



## Transformer Health Assessment

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

## Dry Type TR Monitoring



## Transformer Monitoring



## Dissolved Gas analyzer Integration

- Single gas DGA
- Multi-gas DGA
- Moisture

## OLTC Monitoring

- Oil Temperature
- Oil Level
- OLTC Tap Position
- OLTC Motor Current
- Contact Wear

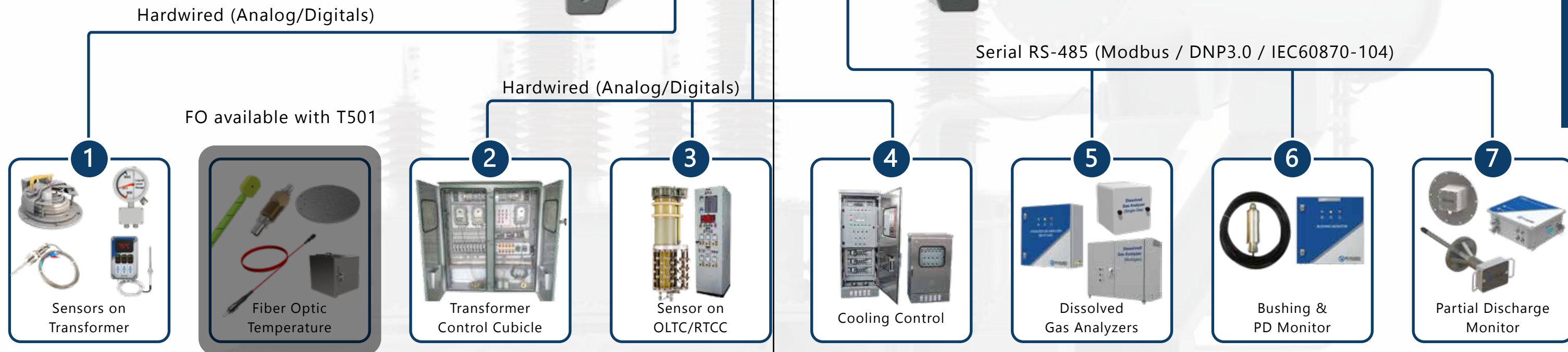
## Vault Monitoring



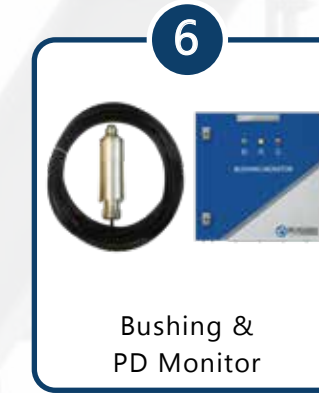
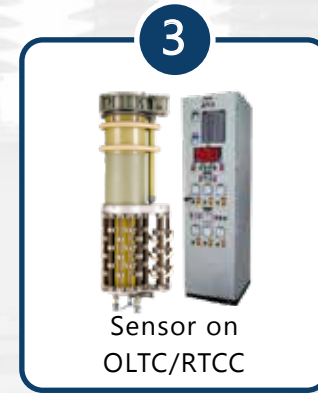
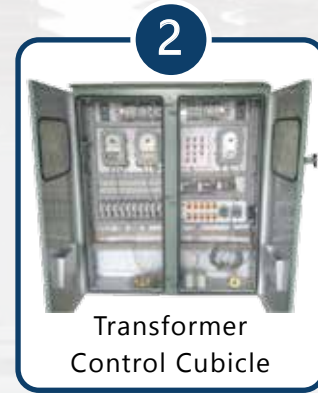
RUGGED SOFTWARE



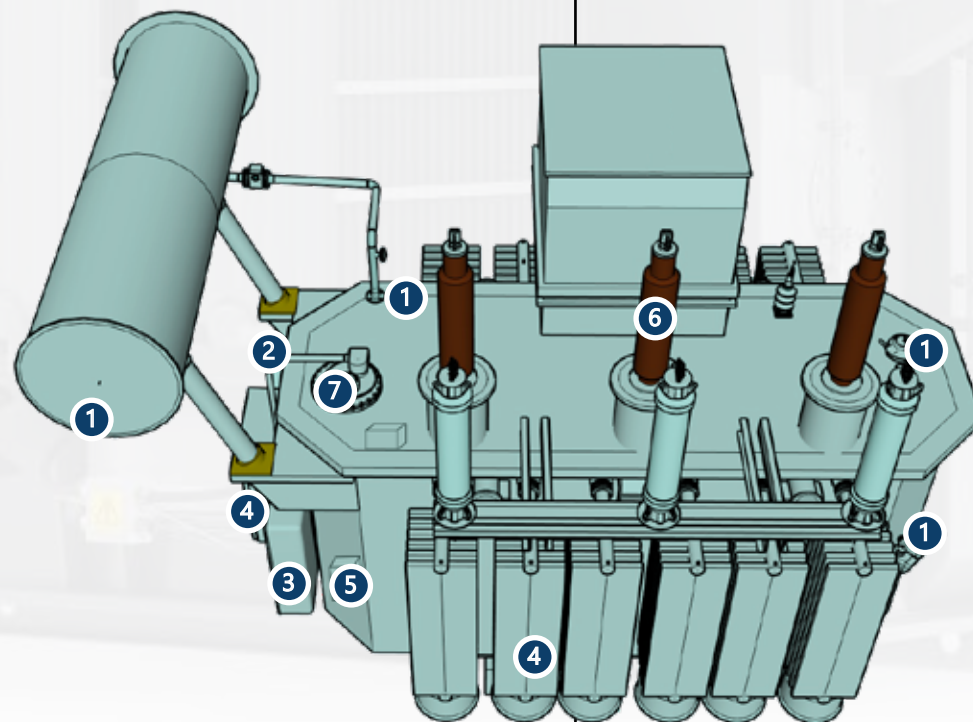
# T401 SYSTEM ARCHITECTURE



FO available with T501



1. OTI,WTI, RTD, PRD, Breather, Buchholz Relay, LLG/OLI, Pressure Sensor etc.
2. Transformer Control Cubicle
3. OLTC and RTCC Panel
4. Cooling System and Control Cabinet
5. Dissolved Gas Analyzer
6. Bushing Monitoring
7. Partial Discharge Monitor



### Certifications

- ATEX
- Lloyds
- CE / RoHs

### Variants

- Offshore / Marine
- Ethernet Redundancy: PRP
- Enterprise Monitoring Software

# T401 FEATURES

Comprehensive Features to Meet Market Demand

- POWER INPUT**
- 24 / 48 Vdc
  - Power Supply Unit / Adaptor provided as Accessories (OPTIONAL)

## RELAY OUTPUTS

- 08 x Form C Relay contacts
- NO-C-NC
- Cooling control
- Alerts / Alarms

- ANALOG OUTPUTS**
- 04 x User Programmable
  - Current Output (4-20mA)
  - Voltage Output (0-5V/0-10V)

## ANALOG / DIGITAL INPUTS

- 08 x Configurable Inputs
- RTD (PT-100), Potentiometer
- AC Current (Clamp-On CT), DC current (4-20mA)
- Digital (Dry Contacts)
- AC/DC Voltage

## SERIAL PORT (RS-485)

- Data Input/output Integration
- Modbus Protocol
- DNP3.0 Protocol
- IEC60870-104 Protocol



- Desktop and Web Client
- Remote Configuration
- Advanced Visualization
- Data Logging, Reporting
- Supports Industry Standard Protocols
- Customization available on request
- Secure access to data & Configuration
- Multiple Language Support

## LOCAL DISPLAY

- Industrial Grade LED
- Current Values of all Parameters

## LED INDICATORS

- Power ON/OFF
- System Fault
- Alarm & Log

## USB PORT

- Configuration & Troubleshooting
- Data Export
- MicroSD Card

## ETHERNET PORTS

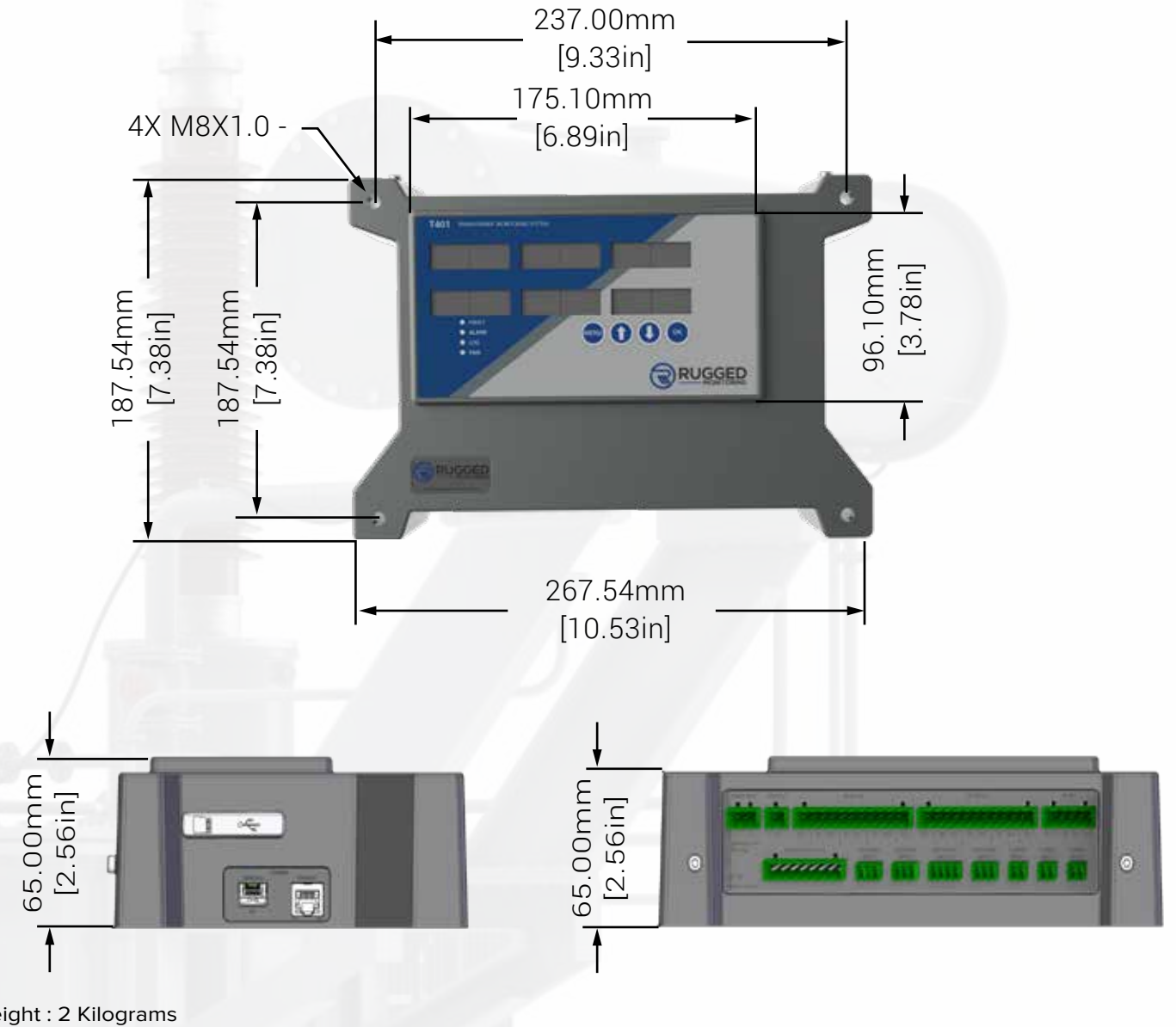
- 02 x configurable Ports (RJ-45/SFP)
- Full Redundancy
- PRP Protocol
- Modbus, DNP3.0, IEC60870-104 and IEC 61850



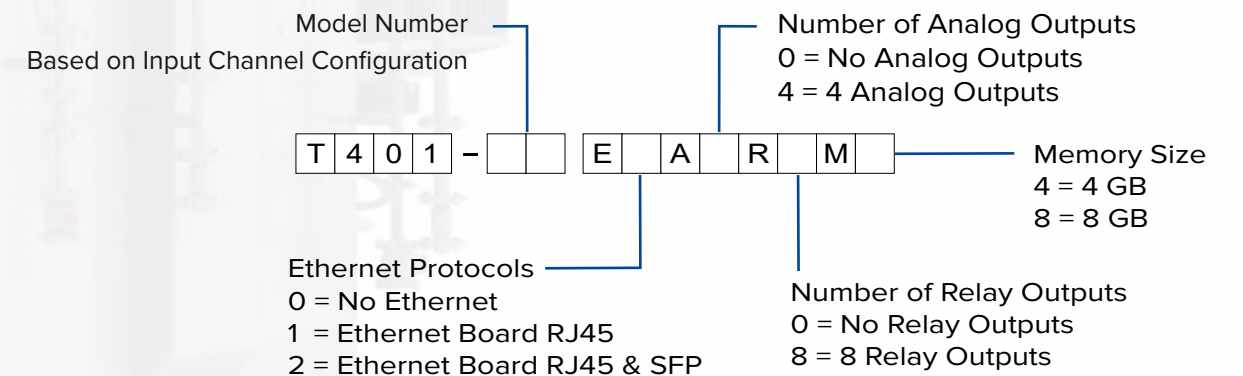
# TECHNICAL SPECIFICATIONS

POWER SUPPLY	Input Power Requirement	24/48 VDC ± 10%
	Power Consumption	20 Watts
ANALOG/DIGITAL INPUT MODULE	# of Input Channels	08/04 Channels
	Input Channel Types	Configurable from a range of input options, RTD, AC/DC current, AC/DC voltage, Potentiometer, Dry/Powered contact switch
	Accuracy of Channels	±0.5% full scale input range
	Input Channel Sample Rate	1 Hz
ANALOG OUTPUT MODULE	# of Output Channels	04 Channels
	Output format	4-20 mA or 0-5Vdc / 0-10Vdc (Configurable for any measured / calculated value)
OUTPUT RELAY MODULE	# of Output Channels	08 Form C relays (5A)
	User Programmable	Yes, from Rugged Connect Software or webserver, if present
DATA STORAGE & CONFIGURATION	Data Storage Capacity	4 or 8 GB, Industrial Grade micro-SD, extendable to 2TB
	Logging Rate	User Configurable, 1 sec interval on USB
	System Fault Indication	1 System Fault Relay, with Local LED light
	Config port	USB (to use with Rugged connect windows software)
COMMUNICATION	Serial Communication	01 x RS-485 (RS-232 optional converter)
	Ethernet Communication	02 Ethernet Ports, configurable to RJ-45 or SFP (Gigabit Optical)
	Redundancy	Support PRP Redundancy
	Protocol Supported	Modbus, DNP3.0, IEC60870-104, IEC61850, Other protocols provided on request
EMC TYPE TESTING	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. 1.5 to 2.0 Kg. (based on number of configuration)

# PRODUCT DRAWINGS



# ORDERING CODE



# RUGGED MONITORING



## Certification

- ISO9001
- ISO14000
- ISO 45001 (OHSAS 18000)
- ISO17025 Certification
- NIST Certification
- ATEX Certification









## Website

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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 leading team of fiber optic 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.

## Contact Us

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