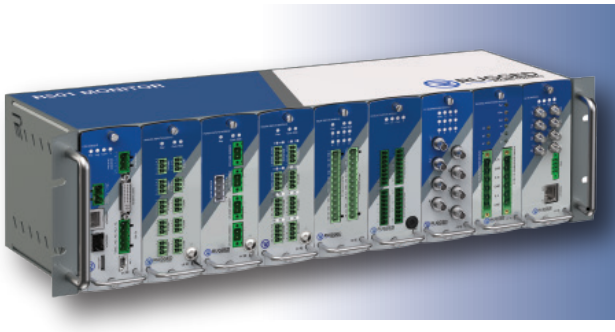
R501 Rack Mount Comprehensive and Customizable Asset Monitoring Solution



Rugged, Most Versatile and Multi Channel monitoring solution, Capable of Monitoring One or Multiple Assets: Basic Asset Monitoring, Fiber Optic Temperature Monitoring, Partial Discharge, Bushing, OLTC, Load, Power, and more...

Rapid transformation due to technological developments in electrical networks are challenging the performance of electrical assets connected in the network. Continuous online monitoring of electrical assets will increase the reliability, performance and expected lifetime while reducing the maintenance expenditure.

R501 is the most advanced monitoring solution designed to monitor multiple electrical assets with its simple and user-friendly interface. R501 provides condition monitoring of electrical assets by focusing on preventing asset failures and downtime. With our comprehensive monitoring solution, the health of assets can be determined and also maintenance activities can be scheduled. The system along with sensors, monitors, and software (RMEYE) is completely modular and customizable, with its rack mount design various monitoring modules can be added as per the requirements and specifications. The solution can be used for existing (retrofit applications) or new electrical assets.

Our R501 gives state-of-the-art condition monitoring solution for industries with huge electrical infrastructure. It can analyze the data and obtain the predictive diagnostics to detect any serious faults before a major breakdown occurs. R501 is precisely designed to monitor all electrical assets and to provide a greater visibility into the assets.

Features

- Expandable with daissy chain & Field Upgradable to add different monitoring modules
- Highly secure, web server based visualization and configuration software
- Simple visualization & easy to configure
- Equipped with most accurate & advance health assessment analytics
- Range of communication options and protocol support; ethernet redundancy (PRP)

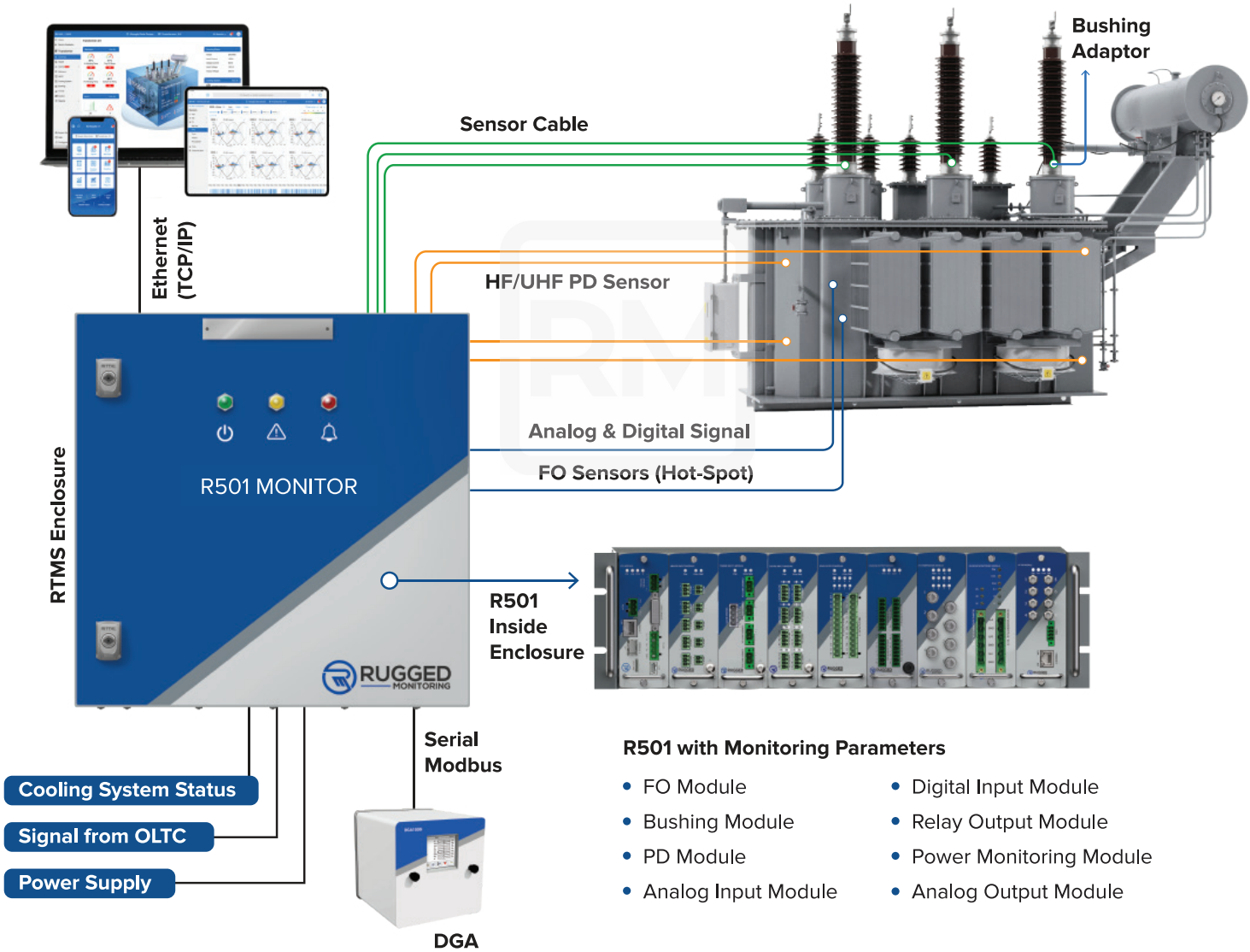
Applications

- **Transformer Monitoring (Oil Filled / Dry type)**
- **Cable Monitoring (EHV / HV / MV)**
- **Switchgear Monitoring (GIS / AIS / MV Panel)**
- **Motors/Generators Monitoring (DOL / VFD)**

Benefits

- Improved asset reliability
- Accurate predictive analysis
- Access asset data from anywhere
- One monitoring solution for multiple assets
- Increased asset lifetime
- Highest return on investment
- Field upgradable with no device downtime

System Architecture for Transformer



R501 with Monitoring Parameters

- FO Module
- Bushing Module
- PD Module
- Analog Input Module
- Digital Input Module
- Relay Output Module
- Power Monitoring Module
- Analog Output Module

Temperature Monitoring

- Oil/Winding Temperature
- Ambient Temperature
- Moisture/ Bubbling Temperature

Advanced Monitoring

- Bushing Monitoring (PF, Capacitance)
- Partial Discharge (HF/UHF/Optical)
- Dissolved Gas Analyzer (GC/PAS/NDIR)
- Transient Over Voltage
- GIC Current Monitoring
- Vibration Monitoring

Direct Winding Hotspot

- HV Winding
- LV Winding
- MV Winding
- Core Hotspot

Load, Power, Losses

- Load/ Over Current
- Active/ Reactive Power
- Overload Capacity/ Duration
- Power Factor/ Losses

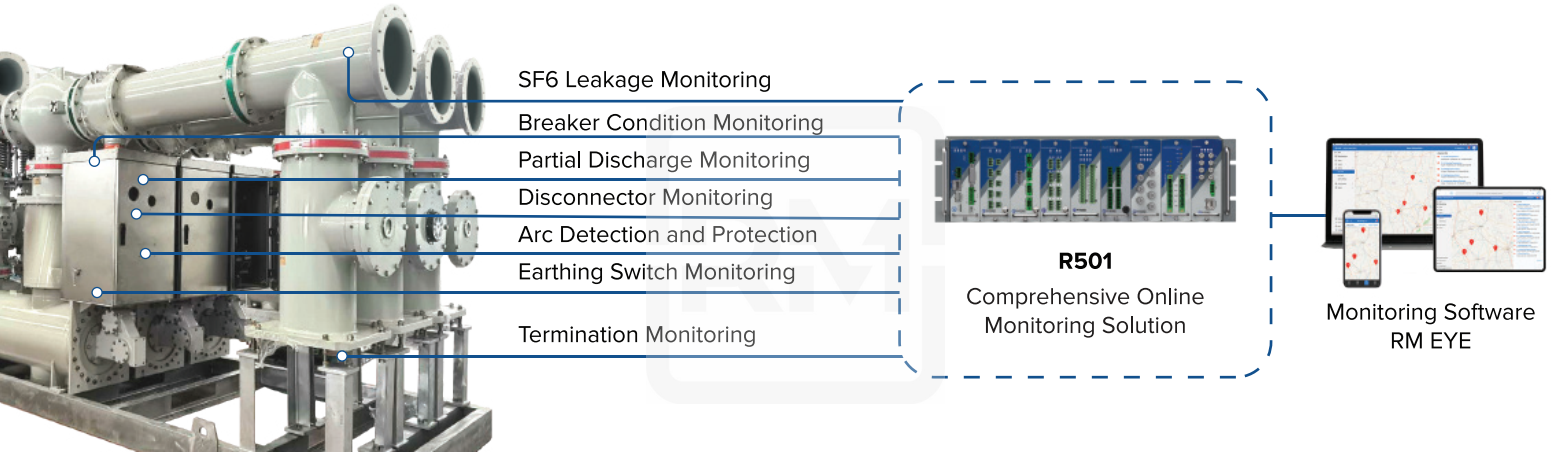
OLTC Monitoring

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

Cooling Monitoring/ Control

- Fan/ Pump Condition
- Motor Condition
- Intelligent Cooling Control
- Cooling Efficiency
- Oil/ Water Flow
- Inlet/ Outlet Oil Temperature

System Architecture for GIS



SF6 Leakage Monitoring

- SF6 Pressure / Density
- SF6 Leak Rate
- SF6 Time to Refill
- SF6 Time to Lockout
- Moisture / Dewpoint

Partial Discharge Monitoring

- PD Detection
- Fault Characterization
- PD Localization
- PD Severity Analysis
- PD Test and Measurement Services

Disconnector Monitoring

- Active Parts Temperatures
- Motors Condition
- Travel Curve and Speed during Opening and Closing
- Switches / Operating Drive Condition
- Offline/ Routine Test Reports

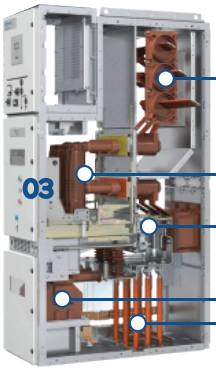
Earthing Switch Monitoring

- Switches / Operating Drive Condition
- Operating Mechanism
- Motor Condition
- Active Parts Temperatures

Breaker Condition Monitoring

- Operation Timing Analytics (without transducer & With Transducer)
- PD Analytics
- SF6 Analytics
- Stored Energy Analytics
- Contact wear
- Breaker Control Cubical

System Architecture for MV Panel



Temperature Monitoring

Partial Discharge Monitoring

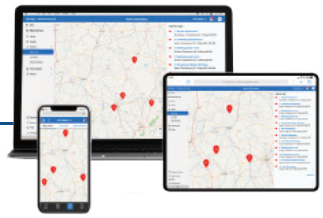
Circuit Breaker Monitoring

Arc Detection and Protection

Cable Monitoring

R501

Comprehensive Online Monitoring Solution



Monitoring Software
RM EYE

Temperature Monitoring

- Busbar Hot Spots
- Cable Terminations Temperature
- Breaker Mechanism
- Busbar Joints

Partial Discharge Monitoring

- PD Detection
- Fault Characterization
- PD Localization
- PD Severity Analysis
- PD Test and Measurement Services

Circuit Breaker Monitoring

- PD Detection
- Fault Characterization
- PD Localization
- PD Severity Analysis
- PD Test and Measurement Services

Cable Monitoring

- Temperature Monitoring
- Partial Discharge Monitoring
- Sheath Current Monitoring
- Power Monitoring

SF6 Leakage Monitoring

- SF6 Monitoring and Humidity

System Architecture for AIS

Partial Discharge Monitoring

- PD Detection
- PD Localization
- PD Severity Analysis
- PD Test and Measurement Services

Intrusion Detection

- Video camera
- Integrated with thermal imaging camera
- Real-time monitoring and Alarm Notification
- Coronagraphy

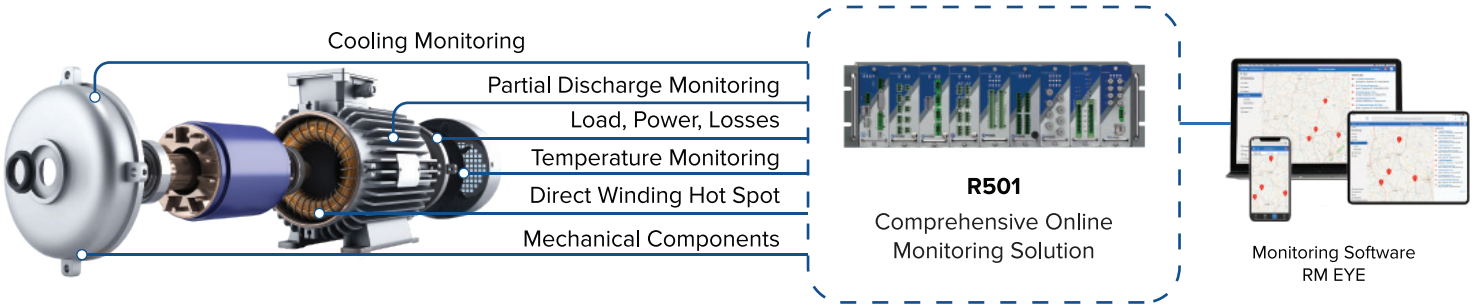
Thermal Monitoring

- Thermal Profiling
- Hotspot Identification
- Hotspot Localization

Other Monitoring

- LA Monitoring
- CT Monitoring
- VT/CVT Monitoring
- Dis-connector Monitoring CB Monitoring

System Architecture for Rotating Machine



Cooling Monitoring/Control

- Inlet Temperature
- Outlet Temperature
- Intelligent Cooling Control
- Cooling Efficiency

Temperature Monitoring

- Bearing Temperature
- Ambient Temperature
- Winding Temperature
- Cooling Air Temperature

Partial Discharge Monitoring

- PD Detection
- PD Localization
- PD Severity Analysis
- Offline/Routine Test Reporting

Direct Winding Hotspot

- Stator Winding Hotspot
- Rotor Airgap Temperature

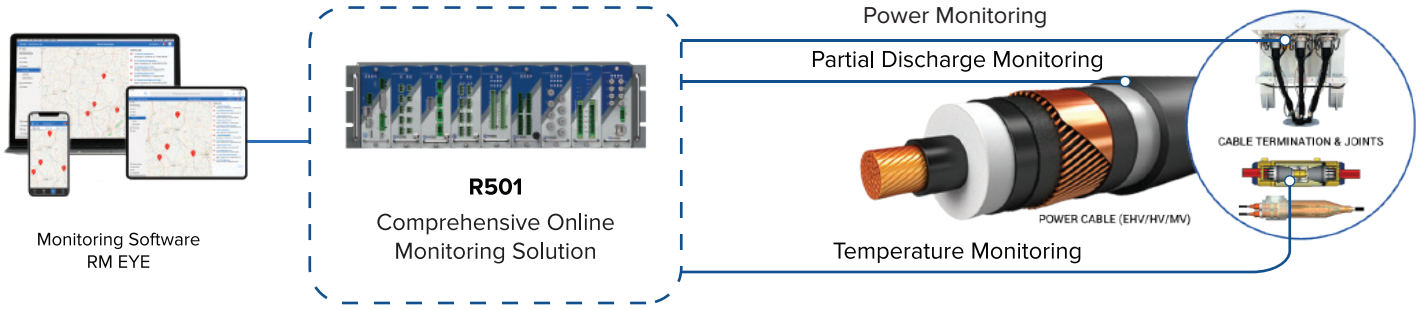
Power Monitoring

- Load / Over Current
- Active / Reactive Power
- Power Factor

Mechanical Components

- Flux Analytics
- CSA Analytics
- PD Analytic
- Vibration Analytics
- Temperature Analytic
- Bearing analysis
- Gear Box Monitoring

System Architecture for Cable



Partial Discharge Monitoring

- PD Detection
- Fault Characterization
- PD Localization
- PD Severity Analysis
- PD Test and Measurement Services

Temperature Monitoring

- Thermal Profiling
- Hotspot Identification
- Hotspot Localization
- Humidity Monitoring

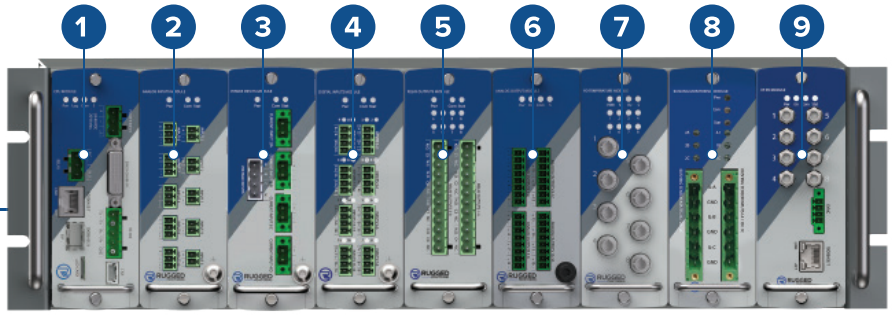
Power Monitoring

- Load Monitoring
- Current Monitoring
- Voltage Monitoring
- Sheath Current Monitoring

R501 **Monitoring Modules**

Most Advanced Monitoring Solution to Realize the Optimum Performance of Electrical Assets

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

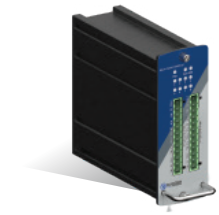
- 05 or 10 channels
- AC/DC current input
- RTD / Potentiometer
- Built-in LED indicators

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

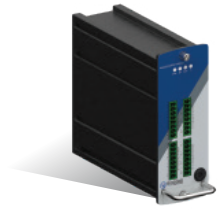
4. Digital Input Module

- 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

Power Cable
GIS
Transformer
AIS
Motor
Generator
UPS
Relays

RM EYE

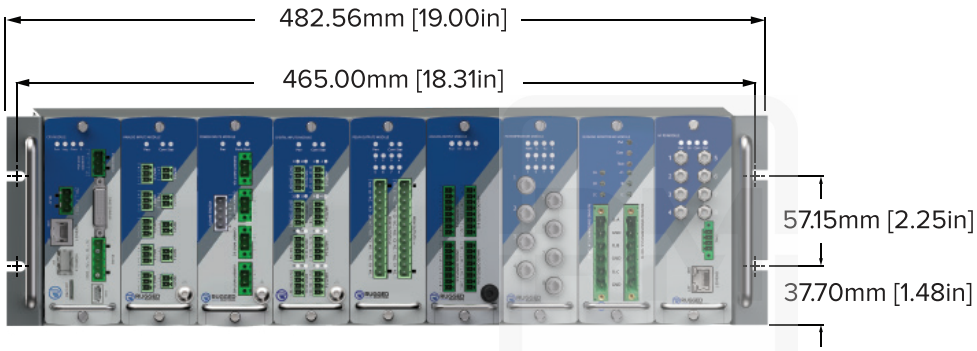
Improve the ROI
& Asset life.

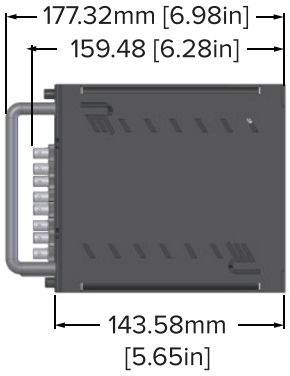
Technical Specifications

POWER SUPPLY	Input Power Requirement	24 - 48 V DC (Default), 120 W, 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°C to 72 °C
	Operating Humidity	95% Non Condensing
	Storage Temperature	-40°C to 85 °C
	Dimensions 8 Chaise	W48.25 x H15.71 x D17.73 cm (19.00" x 2.25" x 6.98")
	Weight	App. 5Kg. (for complete filled Chassis)

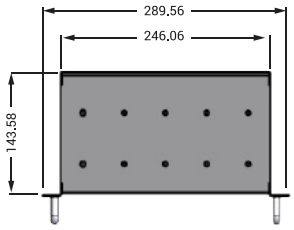
Product Drawing

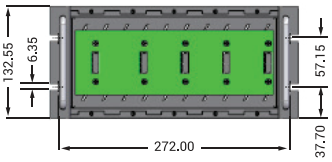


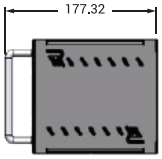


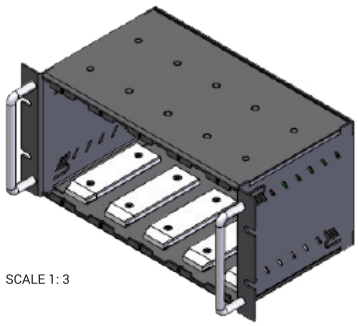
Weight : 5 Kilograms

Optional Smaller 3U Chassis









Ordering Code

Contact our sales team for Ordering Code

CERTIFICATIONS

ISO 9001 | ISO 14001 | OHSAS 18001 | Lloyd's Register | Atex Certification | NIST Certification

Canada

1415 Frank-Carrel, Suite , 230, Quebec, QC-G1N , 4N7, CANADA

Asia Pacific | China | India | Middle East & Africa | Europe | North America | Latin America

+1-418-767-0111

info@ruggedmonitoring.com

www.ruggedmonitoring.com