POSEIDON SYSTEMS

TRIDENT ™ DM4500

Wear Debris Monitor

Real-time monitoring leads to improved asset health management

PRODUCT OVERVIEW

Poseidon Systems' Trident™ DM4500 Wear Debris Monitor is a real-time, in-line fluid sensing technology for the detection of metallic wear debris and particulates in a lubrication system. By continuously monitoring wear debris generation, the device alerts users to faults in their earliest stages, allowing for lower-cost corrective actions than conventional schedule based maintenance.

The DM4500 Wear Debris Monitor will detect, categorize (ferrous vs. non-ferrous), and size metals within a machinery lubrication system. The monitor will detect and measure particles with an estimated spherical diameter of 40 micron ferrous and 150 micron non-ferrous and larger. A wide range of output formats are available including particle type/size, approximate mass, and particle counts in user configurable bins.

The DM4500 is a standalone sensor supporting a variety of plumbing connections; JIC, SAE ORB, BSPP, and Compression fitting adapters are available. The DM4500 is also backward compatible with the TechAlert 10 (TA10) Debris Monitor.

BENEFITS

- Optimize machinery oil sample timing & maintenance intervals
- Improve asset health state awareness
- Advanced warning enables improved asset maintenance & logistics planning
- Reduce cost of unscheduled downtime

KEY FEATURES

- 40 micron ferrous & 150 micron non-ferrous debris detection ability
- Industry standard communication interface
- Mounting footprint matched to TA10 for drop-in replacement
- Particle size/mass estimates
- Volumetric flow rate estimates
- Total particle count estimation

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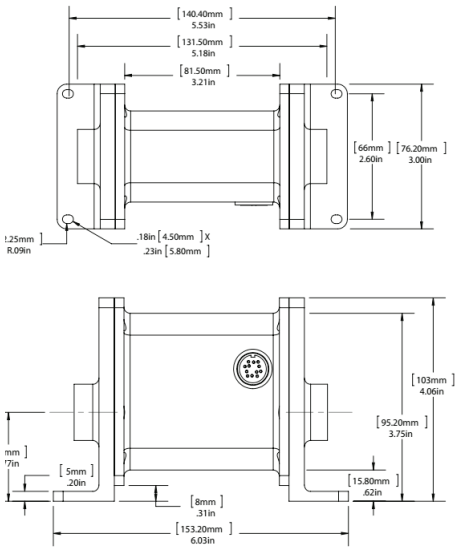
TECHNICAL SPECIFICATIONS

Detection Sensitivity (Debris)	40 µm Ferrous & 150 µm Non-Ferrous Metallic Particles
Communications	RS485/RS232 Modbus RTU, Pulse Output
Oil Connection	SAE ORB Female
Ambient Temperature	-40 to 185˚F (-40 to 85˚C)
Fluid Temperature	-40 to 185˚F (-40 to 85˚C)
Volumetric Flow Rate	0.25 to 10 gpm (0.95 to 38 lpm)
Sensor Bore Diameter	0.472 inches (12 mm)
Ingress Protection	IP65
Power Supply	10-30 VDC, 300 mA
Weight	1.5 pounds (0.68 kg)
Working Pressure	150 psi (10.3Bar) Max



Poseidon Systems, LLC
200 Canal View Blvd.
Rochester, NY 14623

Phone:
(585) 239-6025

Website:
www.PoseidonSys.com

Email:
info@poseidonsys.com

TRIDENT™ FQMS

Fluid Quality Monitoring System

Multi-sensor systems for advanced fluid quality analysis

PRODUCT OVERVIEW

Poseidon Systems offers fluid quality monitoring systems that accommodate a suite of sensors for assessing the condition of a lubricant through real-time, online measurements. Several sensor options are available to allow for customization to your application. These include the following:

- Oil Quality Sensor
- Water-in-Oil Sensor
- Wear Debris Monitor
- Online Viscometer

The sensors are plumbed and wired into a 12”x12”x 6” NEMA 4 enclosure with external interfaces provided for fluid connections, power, and communications. An optional data acquisition system (Trident AP2200) handles all sensor data acquisition, storage, and relaying. Data can be directed to the Poseidon Live online data portal for trending, analysis, and automated alarm notifications or to a 3rd party historian.

BENEFITS

- Enable condition based fluid maintenance
- Identify equipment faults prior to failure
- Maximize equipment life
- Minimize reliance on offline analysis
- Optimize fluid drain intervals

KEY FEATURES

- Complete online fluid monitoring solution
- Easy-to-install, self-contained kit
- Optional data logger & network interface
- Customizable to user application
- In-depth fluid & system health insight

OIL CONDITION SENSOR

An in-line sensor that provides real-time monitoring of oil quality via measurements and interpretation of the electrochemical properties of the fluid. The device allows for continuous insight into fluid condition, alerting operators to an array of fluid degradations including soot contamination, water contamination, and additive depletion. An integrated water-in-oil sensor provides direct measurement of dissolved water content in the fluid.

WEAR DEBRIS MONITOR

An online fluid sensing technology for the detection of metallic wear debris and particulates in oil. The device will detect, categorize (ferrous vs. non-ferrous), and size metals within a machinery lubrication system. Poseidon's wear debris devices use best-in-class inductive coil technology providing sub-50µm detection sensitivity. Trending wear debris concentration levels provides early warning of system damage to allow for proactive maintenance

ONLINE VISCOMETER

An online viscometer that can measure and report the viscosity and density of an in-service fluid. By monitoring viscosity trends, this device can provide early warning of fluid degradation and contaminations such as fuel dilution. This device reports the dynamic viscosity of the working fluid in Centipoise as well as the density in Grams per Cubic Centimeter.

ADDITONAL SENSOR MODULES

The system can support a range of 3rd party sensors to meet specific customer requirements. RS485, RS232, CANBUS and other sensor inputs are supported, though custom driver development may be required.

Poseidon Systems, LLC
200 Canal View Blvd.
Rochester, NY 14623

Phone:
+1 (585) 239-6025
Fax:
+1 (585) 625-0408

www.PoseidonSys.com

POSEIDON SYSTEMS

MIDAS™

Ferrous Metal Debris Monitor

Detect excessive wear through offline ferrous debris concentration analysis

PRODUCT OVERVIEW

Routine wear metal analysis of machinery lubricants provides early warning of impending faults. Midas™ provides an accurate, easy-to-use solution for offline and at-line measurements of ferrous wear debris concentrations. Resulting measurements provide the insight necessary to determine if equipment is operating normally or if additional analyses are required.

Wear debris monitoring provides exceptional sensitivity to emerging problems and can often detect problems well in advance of vibration analysis, thermography, or other indirect monitoring methods.

Midas™ is a standalone device that analyzes a small sample of oil for ferrous debris. The rapid and simple operation of Midas™ is accompanied by its outstanding sensitivity, making the device a perfect complement to any on-side or laboratory oil analysis.

APPLICATIONS

- Oil Analysis Labs
- Wind Energy
- Oil & Gas Processing
- Oil Refineries
- Power Generation
- Gas Compression
- Manufacturing
- Pulp & Paper
- Transportation
- Aerospace
- Process Machinery
- Military

KEY FEATURES

- Avoid unpredicted failures; facilitate planned maintenance
- Monitor system commissioning ("break in")
- Assess filter performance and integrity
- Easy-to-use and only a small sample volume needed
- Lightweight, robust and portable
- Calibration independent of base fluid used

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TECHNICAL SPECIFICATIONS

Sensitivity (ferrous)	Concentration down to 1 microgram/ml
Range Maximum	2 mg/ml
Repeatability	± 1 count typical
Sample Size	2 ml in plastic micro-tube
Display	3.5 digital LCD with HOLD
Power Supply	External 12 Vdc supply at 50 mA, or battery pack
Temperature Range	10 to 55˚C operating (-20 to 70˚ storage)
Dimensions	80 H, 110 W, 150 D (mm)
Weight	980 g (Midas™ unit only)

OPERATING MIDAS™

How It Works

Midas™ provides repeatable and accurate determination of ferromagnetic material concentration down to single ppm levels. It provides a mass proportional output from any size or quantity of ferrous contaminant particles, even sub-micron particles. A lubricant sample is placed in a standard 2 ml laboratory sample tube. A debris reading is then taken by simply dropping the plastic sample tube into the sensing chamber and reading the updated display.

Calibration

Midas'™ response is proportional to mass of ferrous material present and calibrations are performed using test standards at the time of manufacture. Particle size does not affect the measurement (in contrast to spectrometric methods). Readings are unaffected by properties (dielectric) of fluid base, or additive package, or water content. Readings are straightforward and are presented in mass/volume standard nits, i.e.; mg Fe per liter, or PPM.

Kit Contents

Midas™ is supplied in a protective foam lined plastic case. Complete with operating instructions, 12 Vdc universal mains adapter and a calibration check tube. Ready to use with 100 empty sample tubes. Additional tubes are readily available from stock.

Poseidon Systems, LLC
200 Canal View Blvd.
Rochester, NY 14623

Poseidon Systems, Ltd.
20 Wren Court
Strathclyde Business Park
Bellshill Lanarkshire, UK, ML4 3NQ

Phone:
(585) 239-6025

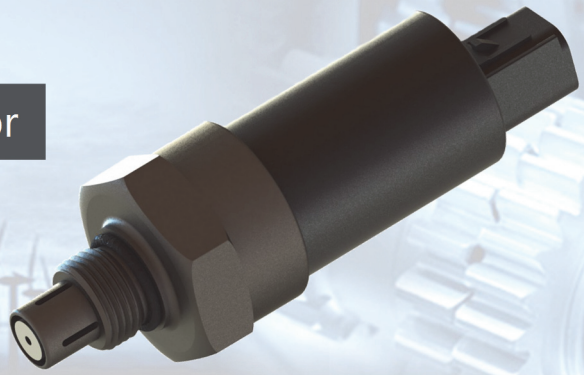
Phone:
+44 (0) 1698-907-020

www.PoseidonSys.com

TRIDENT™ QW3100

Oil Quality and Water Contamination Monitor

Optimize lubrication maintenance practices



PRODUCT OVERVIEW

Poseidon Systems' Trident QW3100 is a real-time, in-line sensing technology for monitoring the health state of lubricating fluids. The device provides continuous insight to oil health, promoting condition-based maintenance practices such as optimized fluid drain intervals and reduced dependence on offline analysis.

The QW3100 utilizes electrochemical impedance spectroscopy (EIS) technology to measure a fluid's impedance spectrum and track its health. The impedance spectrum provides multiple condition indicators which can be used to assess the lubricant's additive package health, monitor breakdown, and identify the presence of contaminants. Additionally, an integrated water-in-oil sensor provides direct measurement of dissolved water content in the lubricant.

The QM3100 provides you with the power to improve your asset health management practices by enabling informed maintenance decisions based on real-time information.

APPLICATIONS

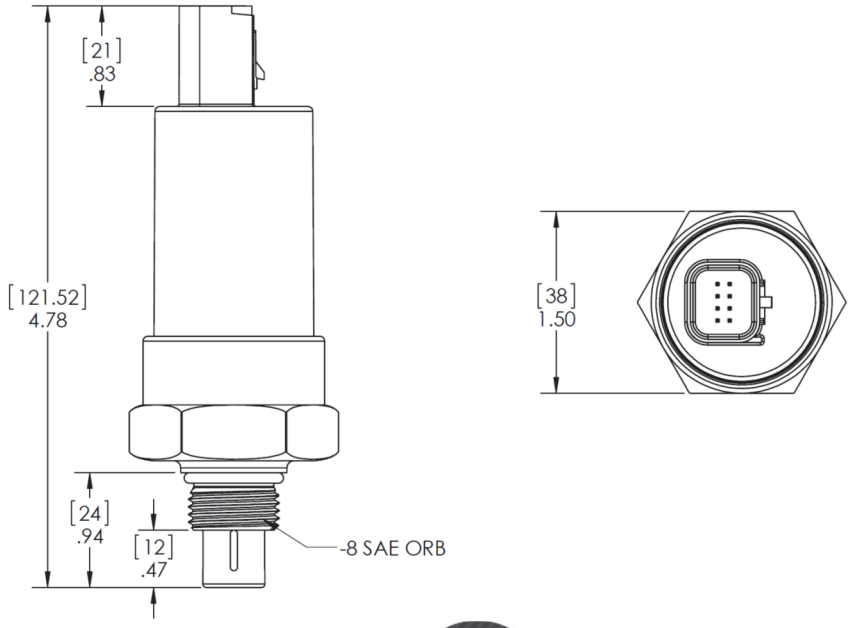
- Optimize oil drain and sampling intervals
- Improve asset health state awareness
- Identify contamination events
- Detect oil changes and top-up events
- Verify proper lubrication system maintenance
- Track water contamination levels

KEY FEATURES

- CAN-J1939 compatible
- RS485-Modbus RTU compatible
- Multi-frequency analysis
- Integrated water contamination sensor
- Small form factor, easy to install
- Supports all oil types

TECHNICAL SPECIFICATIONS

Fluid Temperature	-40 to 302°F (-40 to 150°C)
Working Pressure	150 psi (10.3 bar) max
Flow Rate	Flow rate independent
Viscosity	Viscosity independent
Water Measurement Accuracy	+/-3% RH
Port Specification	3/4”-16 or M16
Ingress Protection	IP67
Communications	CAN J1939 / RS485 Modbus RTU
Weight	0.4 lbs (0.18kg)
Power Supply	10-30 Vdc, 1.5 W max



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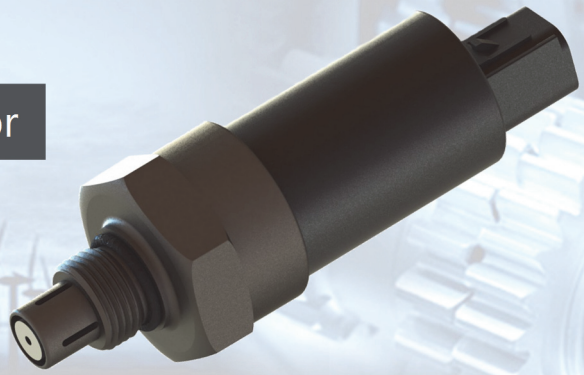

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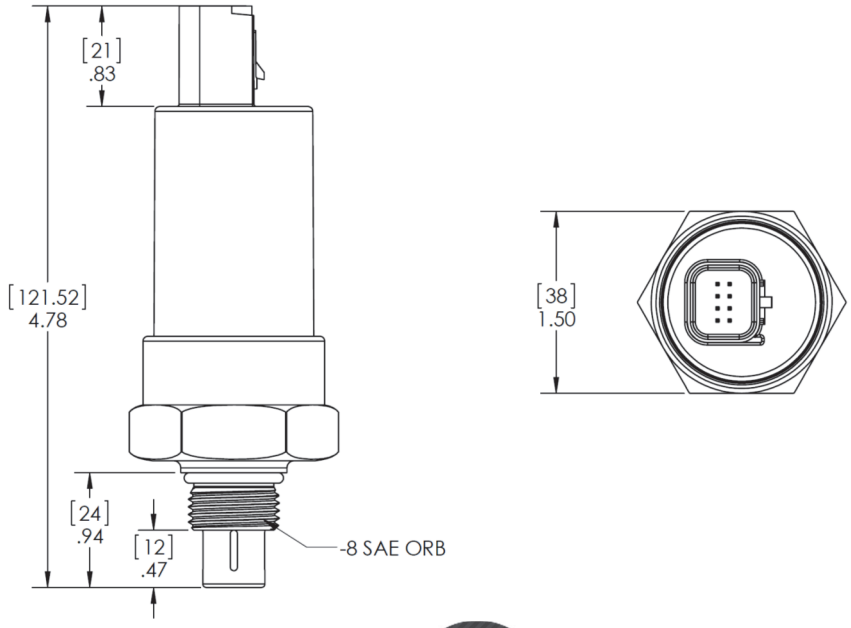

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TRIDENT ™ AP2200

Acquisition Platform

Bridges the gap between Modbus RTU & the Internet

PRODUCT OVERVIEW

Poseidon Systems' Trident AP2200 is an easy to use platform for collecting sensor data, processing and interpreting measurements, and posting information to web servers for remote access.

The AP2200 makes collecting sensor data easy and reliable even in unreliable environments. Data is buffered in the 1.7 GB of on-board storage until successfully off-loaded via Ethernet, WIFI, mobile networks, and more.

The AP2200 is a versatile data collection platform. It can be used as a Modbus TCP gateway, allowing collection of data from two RS-232 ports, RS-485 port, and CAN bus ports. The cellular modem makes deployment easy even in remote locations.

Easily configure to query sensors and forward the data on to your HTTP or FTP servers, buffering locally as necessary. It is even possible to perform computations on-board, utilizing the Lua scripting engine.

APPLICATIONS

- Securely connect Modbus RTU devices to the Internet
- CAN/J1939 and Modbus data logging
- Industrial data gateway
- Asset monitoring and tracking
- CBM (condition based maintenance)

KEY FEATURES

- Direct support for sensors & Poseidon Live
- Web configurable
- Modbus TCP master, slave, and gateway
- DIN rail mountable
- GPRS and CDMA mobile networks
- Industrial temperature range (-40 to 85 C)
- CAN/J1939 option
- GPS option
- Lua scripting engine
- Self monitoring with reporting

SOFTWARE SPECIFICATIONS

- Modbus TCP gateway
- Modbus TCP master
- Modbus TCP slave
- Modbus RTU master
- JSON data exchange format
- Zerconf service discovery
- Lua scripting engine
- HTTP
- FTP
- Dynamic DNS (dyndns)
- Network time (NTP)
- DHCP
- J1939 (optional)

HARDWARE SPECIFICATIONS

- RS-485 port
- (2) RS-232 ports
- (2) CAN bus ports (1 standard)
- 10/100 Ethernet
- USB port
- Cellular modem (GPRS, CDMA, HSPA+ optional)
- GPS (optional)
- 802.11 b/g/n WIFI (optional)

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