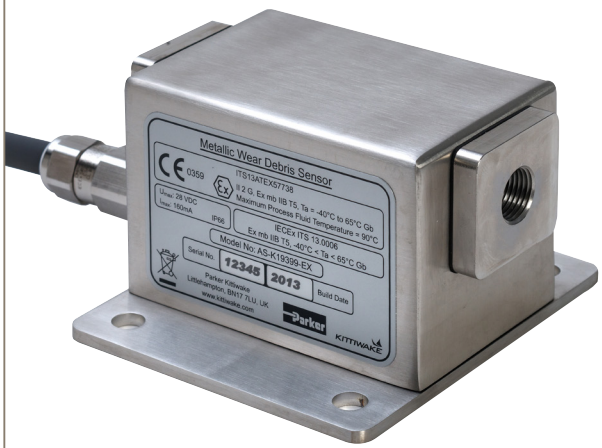
aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



Hazardous Area (ATEX/IECEx) Metallic Wear Debris Sensor

Instruction Manual

Parker

ENGINEERING YOUR SUCCESS.

Hazardous Area (ATEX/IECEx) Metallic Wear Debris Sensor

On-Line Metallic Wear Debris Sensor

Installation and Operation

User Manual: MA-K19523-EX Issue 10

Key to Symbols

 = Caution

 = Note – Helpful Hints and Tips

About This Manual

This manual is divided as follows:

 Do not discard this manual!

This instruction manual comprises a functional part of the Parker Kittiwake Metallic Wear Debris Sensor product (MWDS). The instruction manual must be kept safe for future reference.

The digital communication protocols are covered in a separate manual supplied with the product.

For General Enquiries, please contact:

Parker Kittiwake
3-6 Thorgate Road
Littlehampton
West Sussex
BN17 7LU
United Kingdom

Tel: +44 1903 731470
Fax: +44 1903 731480
Email: kittiwake.support@parker.com
Web: www.kittiwake.com www.parker.com

1. Contents

2. Introduction and Intended Use

This manual covers the Hazardous Area – ATEX/IECEx – certified Metallic Wear Debris Sensor [MWDS] which can be used to monitor the amount of metallic ferrous and non-ferrous wear debris in an oil or fluid medium. Mounted into the lubrication system of a machine, the MWDS reports wear debris particles, resulting from machinery wear.

The MWDS differentiates between discrete metallic particles of ferrous and non-ferrous origin. It simultaneously quantifies the metallurgical composition and the size of particles in a fluid as the fluid flows through the MWDS.

2.1 Use in Hazardous Areas

The MWDS has been designed to operate in offshore conditions and the areas classified as Zone 1 or Zone 2 where potentially explosive gas vapour or mist atmospheres in groups IIA and IIB might be present. The Temperature Classification of the unit is T5 (100ºC). Detailed information on the certification and environmental aspects is covered in section 3.

2.2 EMC

Under the applicable EC Directive 2004/108/EC, the MWDS meets the requirements of BS EN 61326 for RF Immunity in industrial environments. For cable runs exceeding 2m, a good quality (braid plus foil) shielded cable should be used. The cable shield should be earthed. Avoid routing the cable in close proximity to cables for motors and other electrically noisy equipment. The MWDS meets the requirements of BS EN 61326 for immunity to power frequency magnetic fields in industrial environments (30A/m). The cable should not be installed in close proximity to electric motors and other sources of intense magnetic fields.

2.3 Customer responsibility

The user of this equipment or subcontractor must not modify the MWDS or deviate from the recommended installation requirements including EN60079-14.

2.4 Important: Safety Summary

This manual must be thoroughly read and understood before attempting to install or operate the MWDS as covered in this manual, derivatives or related equipment.

If the equipment is used in a manner, or for a specific purpose other than that described in this manual, then any safety protection may be impaired.

The MWDS is designed to be connected to hydraulic systems which can be pressurised. A responsible body; the end user or system integrator is responsible for ensuring the safety of associated systems, hoses or pipe-work containing fluids. This includes isolation for maintenance to the MWDS. The maximum safe operating pressures and installation criteria are detailed in this manual.


Caution:

When maintenance is undertaken on the MWDS or machinery to which the MWDS is mounted, all common supplies [power and fluid] need turning off [disconnecting at source] and the valves to the MWDS should be closed to isolate the MWDS from the system.

- Never disassemble, attempt to repair or tamper with the MWDS.
- Ensure the load currents do not exceed the rated values.
- Do not remove the fasteners which are used to assemble the product.
- Ensure all associated equipment and pipe-work specification is equal to or greater than the operating specifications for the MWDS.

2.5 Maintenance

The MWDS and accessories contain no user serviceable parts. Do not dismantle.

Please retain all original packaging for shipping purposes. All fluids must be removed from the equipment and the MWDS cleaned appropriately before return. Parker Kittiwake will not be liable for damage to returned goods resulting from inadequate packaging.

2.6 Cleaning

The outer case does not require cleaning during normal use. If required, the case can be cleaned with a soft, clean water-damp cloth or tissue.

 = Caution: Do not use aggressive chemicals which are not compatible with the materials detailed in the specification section to clear or flush a blockage in the MWDS bore. Do not use wire brushes or scrapers to clear a blockage as this may scratch and damage the bore.

2.7 Calibration and Service

The MWDS uses proven Magnetometry; combined with internal micro-processing to indicate metallic particle contamination. Due to the lack of moving parts and sophisticated production methods, the factory calibrated MWDS posses' high reliability with long term stability.

 For continued performance, Parker Kittiwake recommends that the MWDS system is serviced, checked and calibrated regularly by authorised Parker Kittiwake installation and service personnel. The recommended re-calibration period is two years.

 Parker Kittiwake can provide check standards allowing the user to verify performance.

2.8 Pressure testing

The MWDS is factory pressure tested and there may be a small amount of test fluid present in the MWDS.

3. EC Declaration of Conformity

Manufacturer: Kittiwake Developments Limited (Parker Kittiwake)
3-6 Thorgate Road
Littlehampton
West Sussex
BN17 7LU
United Kingdom

Tel: +44 (0) 1903 731470
Fax: +44 (0) 1903 731480
kittiwakesales@parker.com
www.kittiwake.com
www.parker.com

Hereby declares that the following apparatus:

Product Name:	Metallic Wear Debris Sensor
Model Number:	AS-K19399-EX

Are in conformity with the following Directives and standards:

Electromagnetic Compatibility EMC Directive 2004/108/EC	
EN61326-1: 2013	Electrical equipment for measurement, control and laboratory use – EMC requirements

Hazardous area Directives, Standards and Notified body:

Equipment and protective Systems Intended for use in Potentially Explosive Atmospheres. Directive 94/9/EC (ATEX)	
EN60079-0: 2012	Electrical apparatus for explosive gas atmospheres. General requirements
EN60079-18: 2009	Electrical apparatus for explosive gas atmospheres. Encapsulation “m”

Product Certification numbers and Product Marking Codes:

ATEX:	Certificate: ITS13ATEX57738	CE 0359 Ex II 2 G, Ex mb IIB T5, Ta = -40°C to 65°C Gb
IECEx:	Certificate: IECEx ITS 13.0006	Ex mb IIB T5, -40°C < Ta < 65°C Gb

Notified Body: Intertek (Identification Number 0359)
Intertek House
Cleeve Road
Leatherhead
Surrey
KT22 7TX

Manufacturers Signature:

Andrew Baldwin
Technical Manager, Parker Kittiwake.

Date: 30/08/2013

4. Technical Information

All units are metric unless otherwise stated; millimetres or metres, Bar, °C.

4.1 MWDS – schedule of supply

The MWDS is supplied as a standalone sensor. Since each installation is unique, the level of additional equipment will vary. Below is a general list of required equipment:

- Valves and Hose
- Pipe work
- Computer or data collection equipment
- Cable
- MWDS mountings, Brackets and fasteners
- Power supply

4.2 Hazardous area classification

4.2.1 Notified Body and certificate

The Hazardous Area MWDS, model number: AS-K19399-EX, complies with the following standards:-

- EN60079-0: 2012
- EN60079-18: 2009

The certification of the MWDS is as follows:

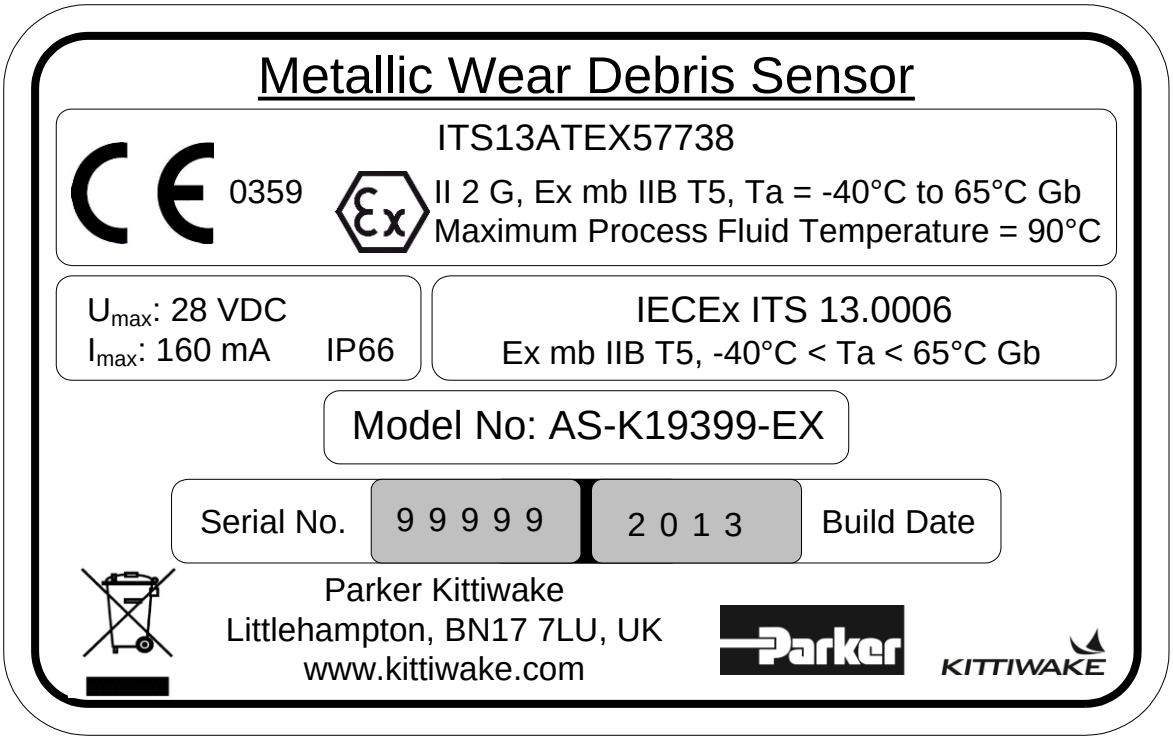
ATEX:	Certificate: ITS13ATEX57738	 II 2 G, Ex mb IIB T5, Ta = -40°C to 65°C Gb
IECEx:	Certificate: IECEx ITS 13.0006	Ex mb IIB T5, -40°C < Ta < 65°C Gb

The certificate has been issued by the Notified Body Intertek. This confirms compliance with the European ATEX Directive 94/9/EC for Group II, Category 2G equipment.

The Hazardous Area MWDS carries the Community Mark and subject to local codes of practice, may be installed in any of the EEA member countries.

This instruction manual describes installations which conform to BS EN 60079 - Part0: 2012 and BS EN 60079 - Part18: 2009 Electrical Installation in Hazardous Areas. When designing systems for installation outside the UK, the local Code of Practice should be consulted.

4.2.2 Certification marking



4.2.3 Usage

- The MWDS may be used in Zones 1 and 2 with flammable gases and vapours with apparatus groups IIA & IIB and with temperature classes T1, T2, T3, T4 and T5.
- The MWDS is only certified for use in ambient temperatures in the range -40°C to +65°C and should not be used outside this range.
- The MWDS has not been assessed as a safety related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).
- Installation of this equipment shall be carried out by suitably-trained personnel.
- Never disassemble, attempt to repair, or tamper with the MWDS.

4.2.4 Zones, Gas Groups and T Rating

The MWDS has been certified as:

ATEX:	Ex mb IIB T5, Ta = -40°C to 65°C Gb
IECEx:	Ex mb IIB T5, -40°C < Ta < 65°C Gb

When connected to an approved system it may be installed in the following categories:

Zone 1	Explosive gas air mixture likely to occur in normal operation
Zone 2	Explosive gas air mixture not likely to occur in normal operation and if it does occur it will only exist for a short time

The MWDS can be used with gases in the following groups:

Group IIA	Atmospheres containing propane or gases of equivalent Hazard
Group IIB	Atmospheres containing ethylene or gases of equivalent Hazard

The MWDS can be used with gases with temperature classifications of:

T1	450°C
T2	300°C
T3	200°C
T4	135°C
T5	100°C

4.3 Specifications

4.3.1 Materials of Construction and material compatibility

The MWDS has been designed to monitor a range of working fluids and operate in salt spray and outdoor conditions such as those found in offshore environments.

The certification of this equipment relies on the materials used in its construction. It is the responsibility of the user to take suitable precautions to check the compatibility of the working fluid and any aggressive substances that the MWDS is likely to come into contact with. This is to prevent the MWDS from being adversely affected and to ensure that protection is not compromised.

- Working fluids – include, but are not limited to: Synthetic and/or mineral gearbox, transmission, hydraulic or engine oils.
- Aggressive substances - include, but are not limited to: Acidic/corrosive liquids or gases that may attack metals, or hydrocarbons/solvents that may affect polymeric materials.
- Suitable precautions - include, but are not limited to: Establishing from a material data sheet that the MWDS construction materials are resistant to working fluid and any aggressive substances.

X5CrNiMo17-12-2 (SAE 316) Stainless Steel	Main enclosure, Cable Gland, Threaded Fluid Connections, threaded fasteners for Grounding (Earth bonding) and mounting
Exane; Irradiated cross-linked polyolefin. Low Smoke Halogen Free	Cable Sheath
PEEK (PolyEther Ether Ketone) polymer	Internal Fluid Tube
FKM Fluoroelastomer (Viton GLT)	Internal Fluid seals
Neoprene	Gasket
Conductive Silicone	Base plate sealant

Surfaces wetted by working Fluid:	PEEK, Viton (FKM), Stainless Steel (316)

4.3.2 MWDS performance

The following defines the particle detection performance of the MWDS.

Minimum Fluid Speed:		0.28 m/s (1.3 Litres/minute) *
Maximum Fluid Speed:		1.9 m/s (9 Litres/minute) *
Lower Detection Limits:	Ferrous	40 micron (0.04mm) ^^† [0.00157 inch]
	Non-Ferrous metallic	135 micron (0.135 mm) [0.00531 inch]

*Volumes quoted are for the MWDS bore and minimal Pipe work (10mm diameter and 0.5m long – including MWDS bore).

^^ Constant flow rate 0.3m/s, Iron metal (Electrolytic) 99.99% Fe purity - spherical particle. The MWDS will not detect combined Fe in a non-magnetic compound – for example; rust.

†Particle size is reported as the diameter of a spherical particle. See section 5.2.2.

4.3.3 Environmental

Maximum fluid Pressure:	20 Bar (sustained and transitory)
Permitted Fluid temperatures :	-40 to +90°C
Ambient operating temperature:	-40 to +65°C
IP rating:	IP66
Atmospheric pressure	0.90 to 1.10 Bar
Weight:	4 kg

All external fasteners on the MWDS have provision for wire-locking. Cables and hoses should be properly supported. Do not use the MWDS to support hoses.

4.3.4 Outputs and Alarms

Digital:	TCP/IP 10BASE-T Ethernet RS485 – 2 wire Half Duplex *CAN – Please contact Parker Kittiwake for further information

The default communication standard is Modbus over TCP/IP. If an alternative communication standard is required this should be changed prior to installation. Please see software protocol manual for details.

4.3.5 System electrical

Supply Voltage Range		24V ±4V
Maximum Supply Voltage (U_{max})		28V DC
Nominal Supply Current		0.125A (125mA)
Rated Power		3W
Maximum Current (I_{max})		0.16A (160mA)
Short Circuit Current (I_{SC})		0.34A (340mA)
Supply Fuse Rating:		0.2A (200mA) (Customer Responsibility)
Connection method:		Pre-wired cable, length 2m[¶]
Cable Specifications:	Type:	4 Twisted pair 24 AWG CAT 5.
	Makeup:	Stranded conductor (24 AWG 7/32)
	Protection:	Bronze Armour, Exane* Jacket
	Outer diameter:	15.75mm
	Temperature Range:	-55°C to +90°C
	Listings and Approvals:	ITS (ETL), a NRTL per IEEE45 Type Approved by ABS Type Approved by Lloyd's Register N. America DNV (pending) UL-2250
	Flame	46CFR: 111.60-2 (2002) – ANSI/UL 1581 Test 383 and IEEE 1202 (FT4)
	Flame test	IEEE 45. Tested to IEEE 1202 @ 70,000 Btu/hr.
For extension purposes:		
	Approval:	Ensure appropriate approvals relevant to installation.
	RS485 and CAN:	Twisted pair cable, shielded. Min 0.22 mm².
	TCP/IP 10BASE-T Ethernet:	EIA/TIA 568A Catergory 5
Equipotential bonding [Grounding or Earthing]:		
	MWDS Connections:	M6 x 17mm stud
	Conductor size:	Min 4 mm²
Cable Lengths: [recommended maximums]		
	RS485 or CAN:	1000m
	TCP/IP 10BASE-T Ethernet:	100m
Grounding requirements:		Equipotential bonding wire 300mm long. M6 eyelet

[¶]Different pre-wired cable lengths available on request.
*Exane; Irradiation Crossed-Linked polyolefin. Low Smoke Halogen Free (LSHF)

⚠ = Caution: MWDS is classified as permanently connected equipment, and requires an external isolating switch or circuit breaker and fuse. This must be clearly identifiable, labelled and positioned in a readily accessible location. All electrical wiring must be installed in accordance with the relevant standards and any local codes that may apply. Use conduit to protect cable runs.

4.3.6 System Plumbing

Standard Connection:		1/2” NPT x 17mm deep Female threads‡
Maximum torque to MWDS when tightening fluid connections:		73 N.m (54lbs.ft)
Maximum fluid viscosity		500 cst @ 40°C
Maximum system fluid pressure:		20 Bar
Min Fluid Speed:		0.28 m/s (1.3 Litres/minute)
Max Fluid Speed:		1.9 m/s (9 Litres/Minute)
MWDS bore diameter:		10mm
MWDS bore length:		120mm
Permitted fluid temperature range :		-40 to 90°C

‡Metric, Imperial and thread form variations available.

= Caution: Ensure that all fluid connections are leak tight and there are no fine leaks that could produce a mist. Use a proprietary sealing compound such as Loctite 577, which is compatible with the system fluid (oil).

= Caution: Use a 51mm A/F Wrench (spanner) across the flats of the MWDS fluid connection to minimise the turning forces on the MWDS when tightening the fluid connections. Excessive force (torque) may damage the MWDS beyond repair.

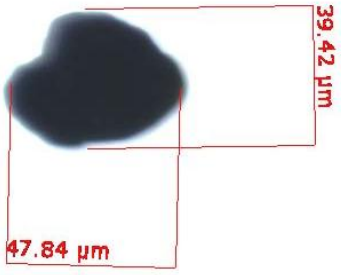
4.4 MWDS Dimensions and Installation drawing EX-080

Mounting detail and dimensions are contained in drawing EX-080 – Sheet 1 and 2. Drawings are in the appendix at the rear of this manual.

5. Particle Detection and Reporting Information

5.1 Particle Size – limit of Detection

0.3m/s, Iron metal (Electrolytic) 99.9% Fe purity - spherical particle



5.2 Particle Sizing notes

Bin sizing is affected by the following:

5.2.1 Metallurgy

The reported size of detected particles is affected by the electro-magnetic properties of the particle material, including the electrical conductivity and the magnetic permeability of the material. The particles bins have been structured about typical bearing metals, such as Chrome Steel (for the Ferrous bins) and Brass (for the Non-Ferrous bins).

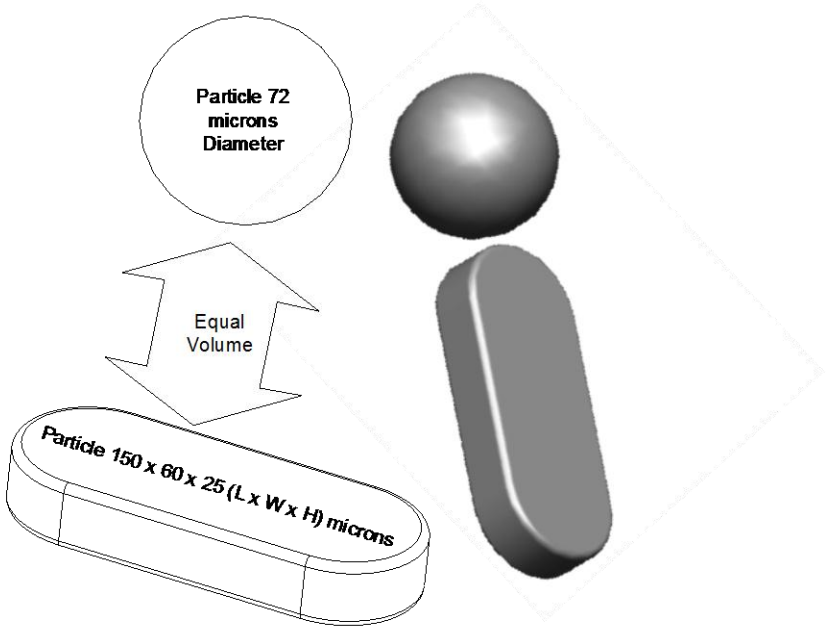
It is important to view the bins as a histogram to understand particle distribution.

5.2.2 Particle Size information

The MWDS detects the volume of the particle and displays this as particle size by assuming the particle is spherical and then calculating the diameter of the sphere.

Wear debris is not spherical – but is random in shape, therefore the equivalent spherical diameter is useful for understanding the comparative volumes of wear debris coming from machinery. It should be noted that the volume of a 70 micron (0.07mm) sphere will contain the same volume as a particle 150 x 60 x 25 microns (L x W x H). When the particles are viewed under a microscope, these flakes may appear larger than the equivalent sphere but their volumes are the same.

The MWDS has been developed using research conducted by independent technical institutes for Tribotechnology. The MWDS is calibrated and defined using spherical particles of laboratory verified composition and dimensions



Example Wear Debris

5.3 Particle Size Classification Reporting

The MWDS automatically classes particles into size categories or classes. These are termed ‘Bins’. These bins can be viewed and allow access to high resolution histogram analysis of detected particles. The following gives examples of these Bins.

The exact configuration of the Bins is dependant on the firmware supplied with the product. A full protocol description is supplied with the product in the accompanying software manual.

5.3.1 Ferrous Bins

≥u µm <v µm	≥v µm <w µm	≥w µm <x µm	≥x µm <y µm	…	≥y µm <z µm
Fe A	Fe B	Fe C	Fe D	…	Fe n

- Fe stands for ‘Ferrous Particle’ and the letter identifies the Bin.
- In the above example, Fe B contains Ferrous Particles greater than or equal to v µm* and less than w µm. v and w define the size of the bin – this will be detailed in software documentation.
- There can be any number of Bins per channel; n is typically between 5 and 10. For most versions, n =10 (or Fe J)

5.3.2 Non-Ferrous Bins

≥u µm <v µm	≥v µm <w µm	≥w µm <x µm	≥x µm <y µm	…	≥y µm <z µm
NFe A	NFe B	NFe C	NFe D	…	NFe n

- NFe stands for ‘Non-Ferrous Particle’ and the letter identifies the Bin.
- In the above example, NFe D contains Ferrous Particles greater than or equal to x µm and less than y µm. x and y define the size of the bin – this will be detailed in software documentation.
- There can be any number of Bins per channel; n is typically between 5 and 10. For most versions, n =10 (or NFe J)

5.3.3 Particles per minute - per Bin

Fe A.Minute^{-1}	Fe B.Minute^{-1}	Fe C.Minute^{-1}	Fe D.Minute^{-1}	…	Fe n.Minute^{-1}
Fe A Rate	Fe B Rate	Fe C Rate	Fe D Rate	…	Fe n Rate

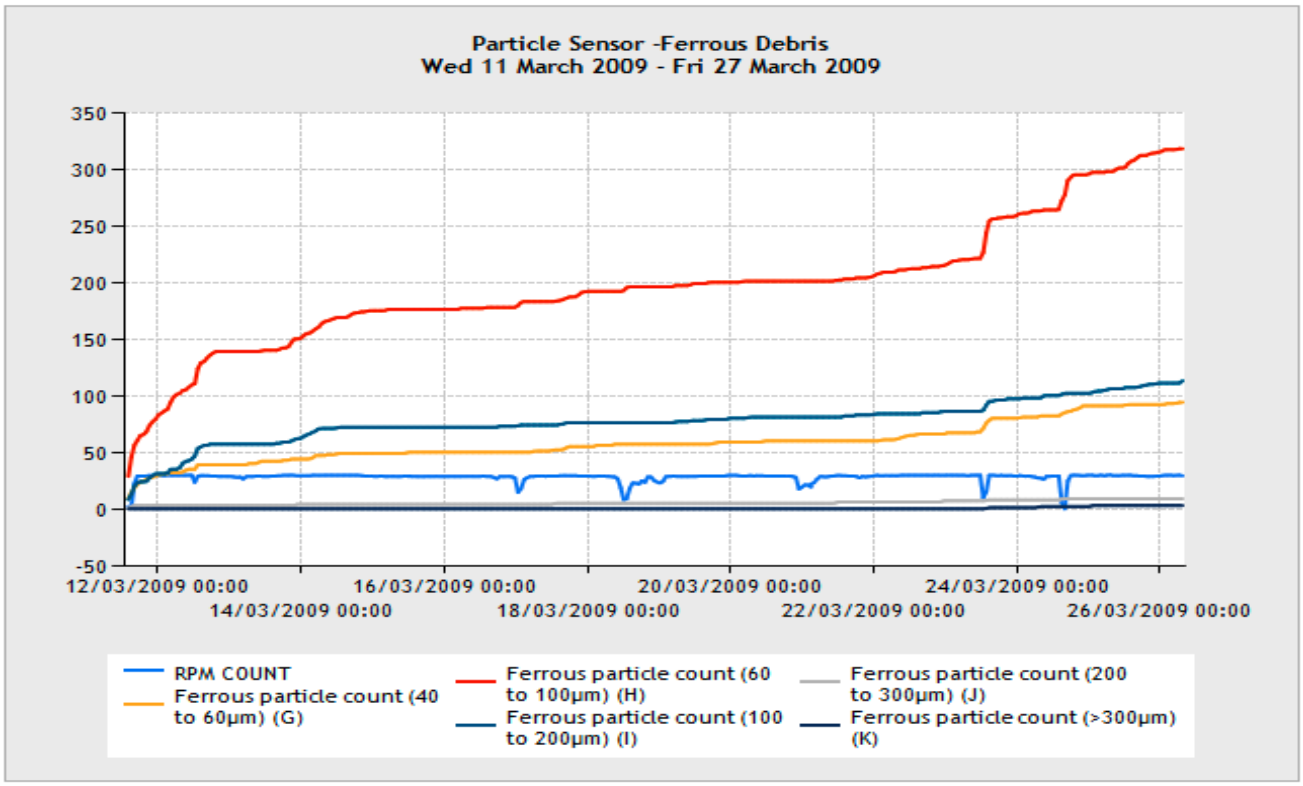
- Fe stands for 'Ferrous Particle' and the letter identifies the Bin.
- In the above example, Fe B Rate contains the rate of Ferrous Particles detected per minute. These particles are greater than or equal to v µm and less than w µm. bin – this will be detailed in the software documentation.
- There can be any number of Bins per channel; n is typically between 5 and 10. For most versions, n =10 (or Fe J)

The figure below shows Particles per minute – Per Bin for the Non-Ferrous channel. The explanation for each bin is similar to that of the Ferrous bin example above.

NFe A.Minute^{-1}	NFe B.Minute^{-1}	NFe C.Minute^{-1}	NFe D.Minute^{-1}	…	NFe n.Minute^{-1}
NFe A Rate	NFe B Rate	NFe C Rate	NFe D Rate	…	NFe n Rate

5.3.4 Example analysis of output

Below is a chart showing an example of how wear evolves with time. Trending the particle bins gives a clear picture of the severity of particle evolution together with the change, and rate-of-change allowing maintenance decisions to be made.



5.4 MWDS Memory

Every minute, the MWDS automatically saves particle measurement data in its non-volatile memory – so that no data is lost if the power is interrupted.

5.5 Particles per minute

The MWDS shows the number of particles counted per minute for each Ferrous and Non-Ferrous bin and the totals for all Ferrous particle sizes, all Non-Ferrous particle sizes and all particles. This is refreshed every 10 seconds.

5.6 Mass Per Hour

The MWDS calculates the mass of particles counted in the previous hour across all particle bins per Ferrous and Non-Ferrous channel. The mass is calculated based on the estimated size for each particle counted and a typical density for the particle type (Ferrous or Non-Ferrous). This is refreshed every 5 minutes.

6. Installation Information

6.1 Pipework design – EX-081 and EX-082

Refer to drawings EX-081 and EX-082 in the appendix at the rear of this manual.

Fluid (Oil) in the MWDS needs to be representative of the whole system. Where possible, avoid 90° bends, bore diameters less than 13mm (1/2”) and long pipe runs.

6.1.1 Full Flow

Where possible, the entire fluid flow should be diverted through the MWDS [full flow]. Care must be taken to ensure the flow rate does not exceed the specified upper particle speed limit.

6.1.2 Bypass

Due to the limited bore size and flow rate for the MWDS, the MWDS is typically installed on a manifold allowing part of the fluid to flow through the MWDS. This is referred to as bypass mode.

Representative sample flow is very important: ensure that a known proportion of fluid flows through the MWDS, use a factor to calculate the particles present in the total flow – this could be achieved by measuring the volumetric flow rate of the fluid through the MWDS and main pipe. Consistency is key to interpreting results from the MWDS – if the flow through the MWDS is variable, a flow meter should be used to derive a concentration factor, for example; double the flow will double the detected particles, even if the particle evolution rate is consistently the same.

In many cases a gate valve is fitted to divert flow into the MWDS, in some cases a pump is used to draw fluid through the MWDS. The pump has the advantage of automatically sampling a known amount of fluid from a main line in a non-invasive manner.

6.2 Mounting the MWDS – EX-080 and EX-083

Please refer to Sheets 1 and 2 of drawing EX-080. Anti-vibration mounts are provided with the MWDS – use of these should be decided on prior to installation by evaluation of the mounting location. Ensure that the mechanical couplings to the fluid system do not allow excess vibration through to the MWDS and are properly supported, do not use the MWDS to support pipework or cable runs, this may damage the MWDS. If it is not practical to use the supplied mounts, alternative bolts sized to fit 11.8mm bore (M10) should be used.

Use flexible hose and anti-vibration mounts to minimise the effects of vibration. All external fasteners have provision for wire-locking. Cables and hoses should be properly supported. Do not use the MWDS to support hoses.

6.3 Electrical Connections

The MWDS is supplied with bare wires. A full explanation is given in the appendix.


= Caution: All electrical wiring must be installed in accordance with the relevant standards and any local codes that may apply.

6.4 Installation best practice

The MWDS is extremely sensitive and can detect ferrous particles as small as 40 microns.

For optimum operation, observe the following:

- The MWDS is mounted before any fluid (oil) filtration
- The fluid (oil) sample is representative of the main fluid (oil) flow
- The installation does not divert fluid from work (starve lubrication)
- System pressure is within the MWDS pressure range
- Bypass flow rate is both constant and within MWDS flow limits
- Use flexible hose to minimise vibration
- Use supplied anti-vibration mounts to minimise vibration effects if required
- Hoses/Cable are clamped rigid at regular intervals
- Use valves on the bypass lines to allow easy removal of the MWDS

7. Installation of MWDS

This section is arranged in order of installation task.

DO NOT CONNECT POWER TO MWDS NETWORK UNTIL DIRECTED.

7.1 Installation Procedure

7.1.1 Unpack the MWDS

Unpack all equipment and check delivery for all parts. Notify Parker Kittiwake immediately of missing or damaged parts. Ensure that all additional (non-Parker Kittiwake supplied) equipment and accessories necessary for installation are present and appropriately rated before proceeding.

7.1.2 Set communications

The default communication output for the MWDS is Modbus over TCP/IP. This can be changed to RS485. Consult the software protocol manual for details.

7.1.3 Mount and securely bolt the MWDS

As detailed in the drawings in the appendix.

7.1.4 Drain Fluid (Oil)

Fluid (oil) may need draining from the system to ensure Pipework can be fitted.


Isolation vales may be fitted at a planned maintenance interval – allowing fitment of the MWDS at a later date

7.1.5 Make the Fluid (Oil) connections

Make connections in accordance with the 'Installation Information' in section 6 and the drawings EX-080 to 083. Ensure all power is 'OFF'.


= Caution: Ensure that all fluid connections are leak tight and there are no fine leaks that could produce a mist. Use a proprietary sealing compound such as Loctite 577, which is compatible with the system fluid (oil).


= Caution: Use a 51mm A/F Wrench (spanner) across the flats of the MWDS fluid connection to minimise the turning forces on the MWDS when tightening the fluid connections. Excessive force (torque) may damage the MWDS beyond repair.

7.1.6 Re-fill Fluid (Oil)

Ensure the system is fully charged with Fluid (Oil) as per machinery manufactures instructions.

7.1.7 Make electrical connections

Connections are made in accordance with the specification section 4.3.5, and section 9. Ensure all power is 'OFF' and check wiring connections.

= Caution: All electrical wiring must be installed in accordance with the relevant standards and any local codes that may apply. Use conduit to protect cable runs.

= Caution: Avoid routing the cable in close proximity to cables for motors, electrically noisy equipment and other sources of intense magnetic fields.

7.1.8 Grounding (Earth bonding) requirements

The MWDS must be grounded using the M6 stud on the MWDS enclosure. The MWDS is supplied with a pre-connected Grounding wire. If this connection has to be changed, a means of preventing the effects of vibration and rotation of the fastener must be fitted.

8. Commissioning and use

⚠ Caution: before opening isolation valves, connecting power or attempting to use the MWDS, Check the suitability of the following:-

- Oil inlet and outlet connections
- Oil inlet and outlet hose runs
- Types and connections of cables
- Check the tightness of all oil and electrical connections.

8.1 Commissioning Procedure

8.1.1 Power on

Turn on the power supply. The status lights on the unit will illuminate to indicate power and function.

8.1.2 Start oil flowing through the MWDS

Open the isolation valves (where fitted) and start the machine so that fluid can flow through the MWDS.

Adjust the oil flow rate (if necessary)

Using the techniques described in the 'installation information' and 'technical information' sections ensure the oil flow is within the limits specified.

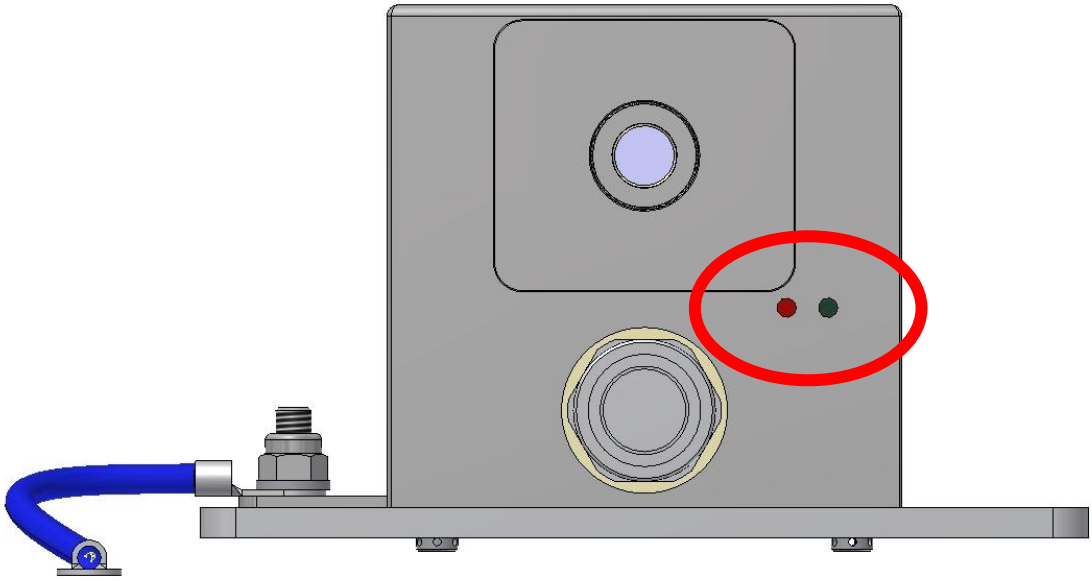
- Mount the MWDS before any fluid (oil) filtration – unless it is monitoring filter efficacy.
- The fluid (oil) sample should be representative of the main fluid (oil) flow.
- The flow rate through the MWDS should be both constant and within MWDS flow limits.

8.1.3 Start to read the MWDS outputs

Communication modules that are connected to the MWDS should be able to read the outputs – as selected - from the MWDS.

8.2 Status Lights

The MWDS has 2 Light Emitting diodes (LED) which can be used to verify operation. The status lights are configured as follows:



State of LED	Red LED 1 Hardware	Green LED 2 Communications
Off	No Power or software frozen.	No Power No reception
Steady On	Monitoring without Error	Reception without error
Flickering (<0.1 Hz)	Hardware issue (Not Monitoring – e.g. Balancing)	Data transmission*
Flashing (0.5Hz)	Power Reset has occurred	Alarm Level Triggered

*Note: The MWDS will only Transmit on receipt of a message.

On boot up both LEDs will flash on and off in unison for approximately 10 seconds. The Green LED should then emit a steady light whilst the RED LED continues to flash reporting the power up/reset.

The flashing RED LED is useful to determine if the power has been off and indicates the need to check data recording. The flashing RED LED is then acknowledged in software and goes to a steady state. Refer to the software protocol manual.

8.3 Data logging and Zeroing

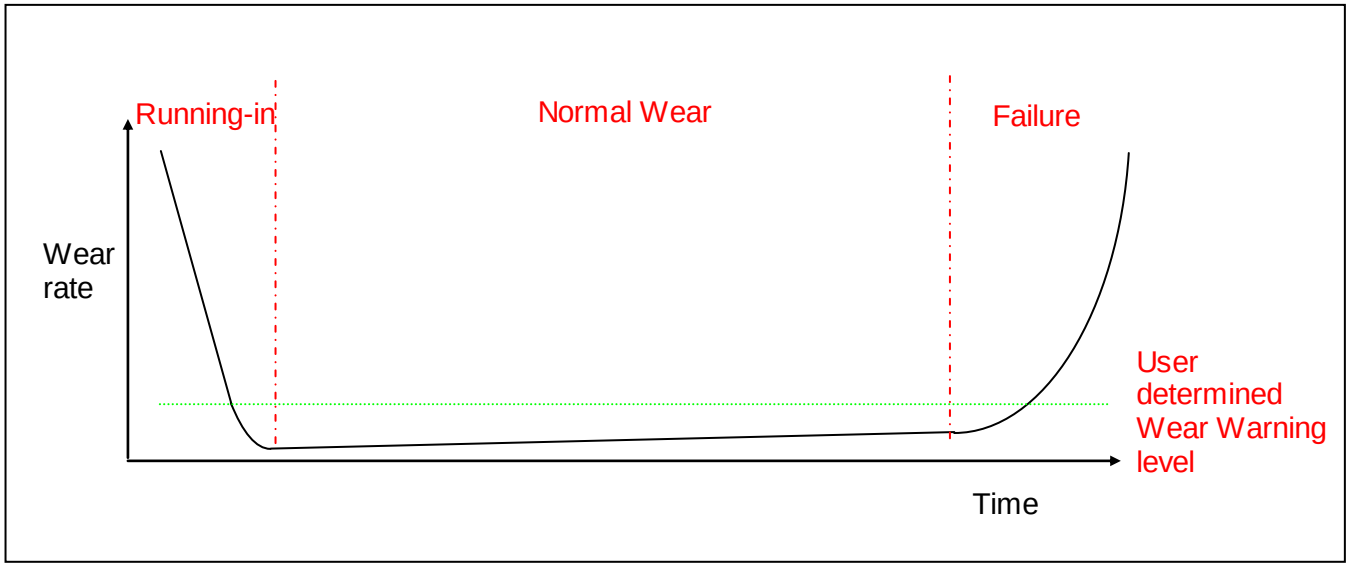
The MWDS will detect individual metallic particles and classify them by their size and metallurgical composition. The cumulative particle count is maintained by the MWDS when the MWDS is 'on'. It is not possible to 'pause' recording of data.

Therefore after an overhaul or oil change on the machinery – and especially after failure, cumulative particle counters should be zeroed.

The MWDS has no internal clock and data is not time stamped – this should be performed by the interface equipment; data logger; HMI, PLC or PC. Particle per minute data is live and is not recorded.

8.4 Interpreting results

The clearest indication of the onset of failure is a rapid rise in the wear rate. Although no two pieces of equipment are the same, generally, most metallic components in a system will have high wear when initially installed (due to bedding in processes), low wear in normal operation (when there is adequate lubrication), and high wear again as the component eventually fails. This is often called a classic bath tub curve. With this knowledge specific warning limits for each piece of equipment can set. If a rapid increase in wear is spotted early enough, proactive and preventative maintenance can be conducted before critical breakdown.



8.5 Setting the record interval

Longer intervals between reading the MWDS data will only affect the resolution of any charts or review of data. Short intervals will result in large file sizes and could lead to expensive data transfer costs if the data is transmitted remotely

8.6 Monitoring Strategy

When data is being accumulated, it becomes important to be able to monitor the most important aspects to determine whether a more detailed examination of the accumulated data is necessary. How the strategy is determined depends on the application.

It should be noted that the counts of particles are not a good indicator in themselves and the lubrication system layout should be referred to. For instance, on an unfiltered system the same particles will be counted over and over again. The count numbers constantly increase and thus a change may not be immediately noticeable (e.g. after months of running with counts above 20,000 an increase in the number of particles of 200 may not be obvious).

One suggested strategy is to monitor both the particles per minute (PPM) for each bin and the total particle mass per hour (MPH) over all bins. The PPM values give an indication of the quantity of particles whilst the MPH values give an overall indication of the particle mass. A significant change in either would then lead to an investigation of the accumulated data to determine what is occurring. A large increase in small particles may not cause as large a rise in MPH as a small increase of large particles. Linked to this strategy is the ability to set the Alarm conditions to trigger at predetermined levels of PPM and/or MPH. A triggered Alarm will set the Alarm line and the Alarm bits in the Status Word. Hence only the Status Word needs monitoring.

Alternate strategies are to vary the polling speed or the choice of data polled in response to detected changes (e.g. Alarm bit set in Status Word).

In addition to implementing one of these strategies, it is recommended that the user regularly reviews the MWDS data as a whole. The MWDS is intended as a trending tool and observing the changes in the system over longer periods (e.g. per day) can allow for early detection of a developing issue – even before Alarm levels of PPM or MPH have been reached.

8.7 Review wear rates

It is advisable to review the wear limits regularly and to keep historical data for reference and trending.

8.8 Self-Diagnostics

The MWDS is equipped with internal self-diagnostics for monitoring correct operation and continued performance. The diagnostics also provides the ability for the MWDS to report issues to the user.

8.9 Fault finding

Refer to the fault finding and troubleshooting section at the back of this manual.

9. Appendix

The appendix is divided as follows:

9.1 General MWDS Electrical Connections

The cable should be clamped rigidly at regular intervals along it length. It is recommended that the first clamp is within 15cm (6”) of the MWDS. The remaining clamps should be located at 15-30cm (6-12”) intervals along its length.

The armoured multi-core cable must be terminated in a Non Hazardous area [safe-Zone]. Individual ways in the cable should be connected into their own terminal block.

The MWDS must be grounded (Earthed) using the M6 stud on the MWDS enclosure. The connection must include a means of preventing loosening due to the effects of vibration and rotation of the fastener.


= The cable armour should be connected to ground within the safe zone.


= Caution: The MWDS is supplied with a suitable, pre-connected wire for equipotential bonding [Grounding or Earthing]. If this connection has to be changed, a means of preventing the effects of vibration and rotation of the fastener must be fitted.


= Caution: Avoid routing the cable in close proximity to cables for motors, electrically noisy equipment and other sources of intense magnetic fields.

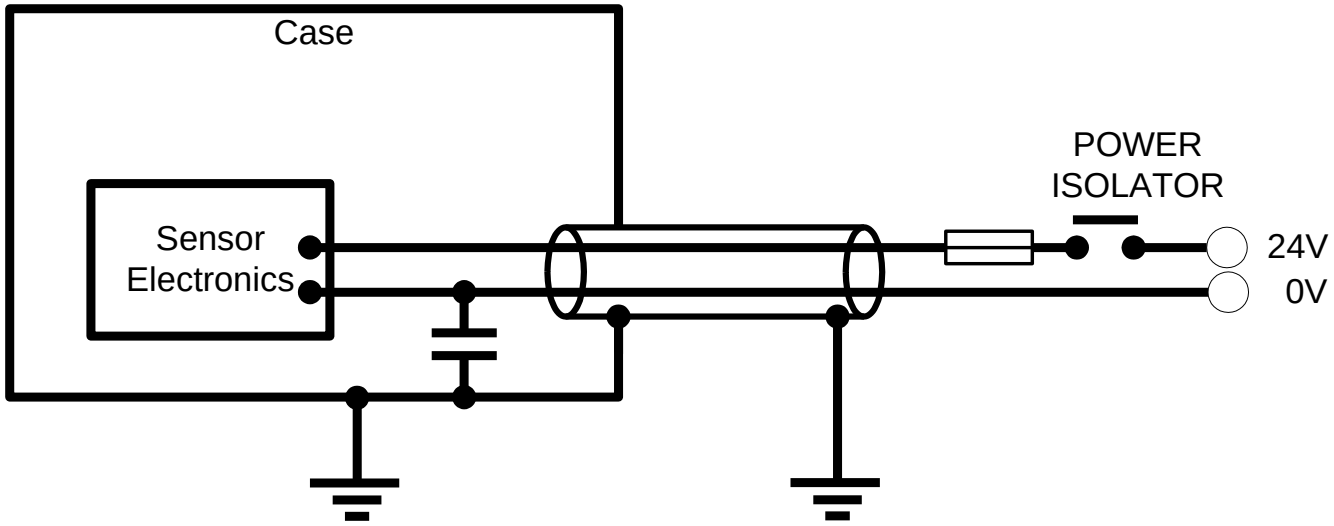
9.2 Electrical Connections:

Wire:		Colour:	
Pair1	1	White/Blue:	Power supply (+20V DC to +28V DC)
	2	Blue:	Power 0V (RS485 and CAN ground reference)
Pair 2	3	White/Brown:	RS485+ or CAN high*
	4	Brown:	RS485 – or CAN low*
Pair 3	5	White/Orange:	TCP/IP Rx+ (From MWDS point of view)
	6	Orange:	TCP/IP Rx- (From MWDS point of view)
Pair 4	7	White/Green:	TCP/IP Tx+ (From MWDS point of view)
	8	Green:	TCP/IP Tx- (From MWDS point of view)
Armour/Shield			Connect to Ground
Case			Connect to Ground

*The MWDS can use RS485 or CAN, but not both at the same time. This reduces the twisted pair count in the cable as only one interface is required. Please contact Parker Kittiwake for information regarding the use of CAN.

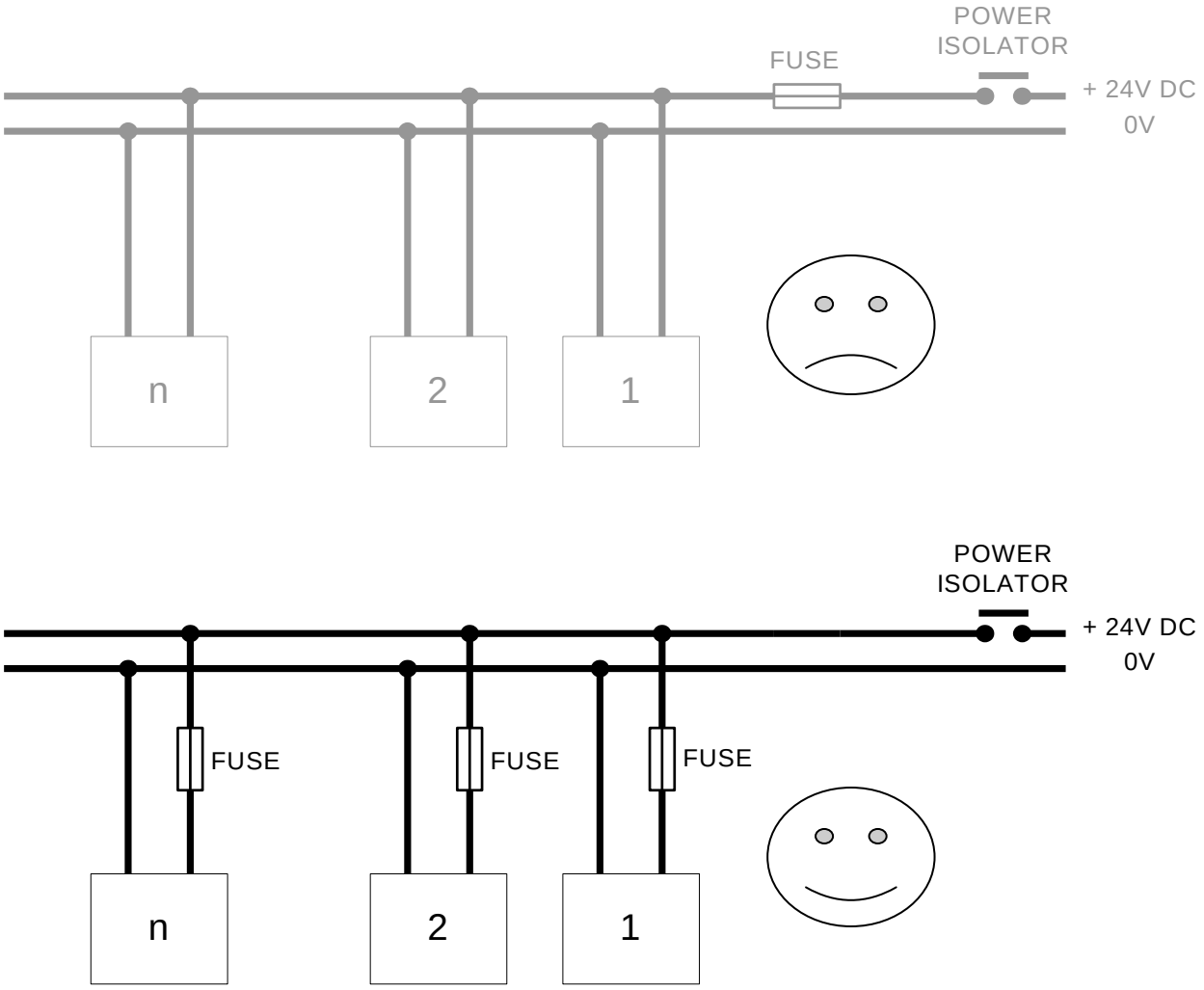
9.3 Grounding Requirements

The case and cable ground is decoupled from the 0V to avoid Ground loop return issues as the diagram below. The 0V can be connected to the ground if deemed necessary.



9.4 Fuse Wiring

For ATEX/IECEx purposes, each MWDS requires its own fuse rather than a system fuse protecting multiple sensors. The value of the fuse to meet ATEX/IECEx requirements is 0.2A (200mA).

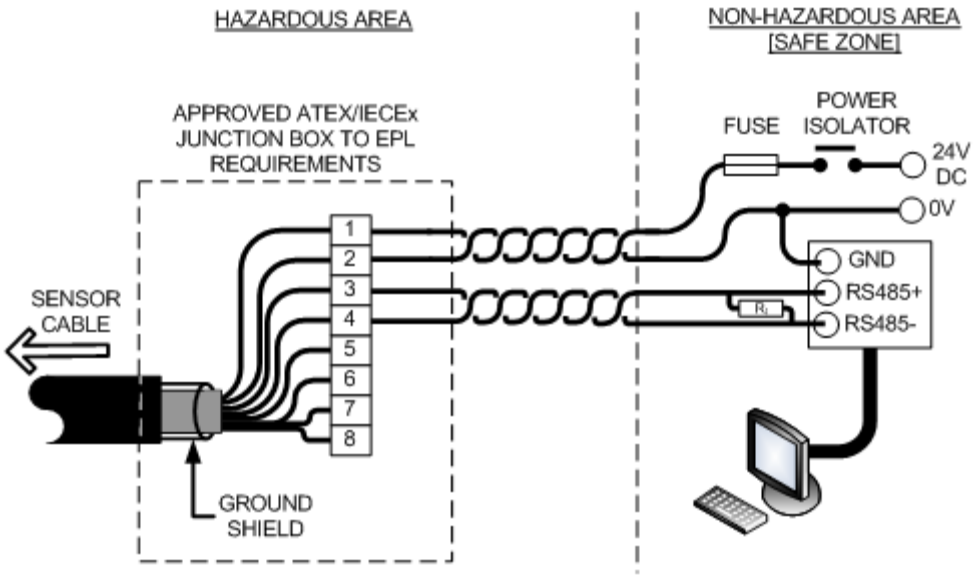


9.5 Communication Protocol

The MWDS is supplied with a manual which details the software protocol. The software manual also prescribes the hardware interface which must be connected in accordance with the specifications in this manual.

9.6 RS485 Half Duplex to a PC or PLC/HMI

This wiring diagram shows the MWDS configured to communicate via RS485 to a PC, display panel or data acquisition module. An RS485 to USB adapter is used when connecting to a PC. The MWDS communication is half duplex.



Please see the note on Terminating Resistors.

The MWDS can use RS485 or CAN, but not both at the same time. This reduces the twisted pair count in the cable as only one interface is required. Please contact Parker Kittiwake for information regarding the use of CAN.

9.7 RS485 Bus Wiring

RS485 is often mistaken as a two wire bus, where in fact three wires (two data plus ground) are necessary for full performance. Each installation scenario is unique, and attention must be paid to many aspects to guarantee full performance of the bus.

9.7.1 Connecting a Multidrop 485 Network

The EIA RS-485 Specification labels the data wires "A" and "B", but many manufacturers label their wires "+" and "-". Generally the "-" wire should be connected to the "A" line, and the "+" wire to the "B" line. Reversing the polarity will not damage a 485 device, but it will not communicate. Some semiconductor manufacturers (Maxim) have labelled their IC A & B pins in reverse. Always connect A to A and B to B, and if this doesn't work, reverse them.

9.7.2 Signal Ground and Optical Isolation

A signal ground is required and this ground wire serves an important purpose. Over a distance of hundreds or thousands of metres there can be very significant differences in the voltage level of "ground". RS-485 networks can typically maintain correct data with a difference of -7 to +12 Volts. If the grounds differ more than that amount, data will be lost and often the port itself will be damaged. The function of the signal ground wire is to tie the signal ground of each of the nodes to one common ground. However, if the differences in signal grounds are too great, further attention is necessary. Optical isolation is the cure for this problem.

9.7.3 Cable Selection

Proper and appropriate cable selection for RS-485 systems is often neglected. Attention to a few details in the selection process can prevent the costly prospect of re-pulling hundreds of feet of cable.

Number of Conductors: The signal ground conductor is often overlooked when ordering cable. An extra twisted pair must be specified to have enough conductors to run a signal ground. A two-wire system then requires two twisted pair, and a four-wire system requires three twisted pair. Section 4.3.5 details wiring specifications.

Shielding: the added cost of shielded cable is usually minimal and should be used.

9.8 RS485 Best Practice

9.8.1 Termination

Termination is used to match impedance of a node to the impedance of the transmission line being used. When impedances are mismatched, the transmitted signal is not completely absorbed by the load and a portion is reflected back into the transmission line. If the source, transmission line and load impedance are equal these reflections are eliminated. There are disadvantages of termination as well. Termination increases load on the drivers, increases installation complexity, changes biasing requirements and makes system modification more difficult.

The MWDS has inbuilt termination that may be turned on in firmware. Please see the note on terminating resistors later in this chapter.

The Modbus Organization offers a wealth of information to explore proper termination.

9.8.2 Biasing an RS-485 Network

When an RS-485 network is in an idle state, all nodes are in listen (receive) mode. Under this condition there are no active drivers on the network. All drivers are tristated. Without anything driving the network, the state of the line is unknown. If the voltage level at the receiver's A and B inputs is less than ±200mV the logic level at the output of the receivers will be the value of the last bit received. In order to maintain the proper idle voltage state, bias resistors must be applied to force the data lines to the idle condition. Bias resistors are nothing more than a pullup resistor on the data B line (typically to 5 volts) and a pulldown resistor (to ground) on the data A line. The next figure illustrates the placement of bias resistors on a transceiver in a two-wire configuration. Note that in an RS-485 four-wire configuration, the bias resistors should be placed on the receiver lines. The value of the bias resistors is dependent on termination and number of nodes in the system. The goal is to generate enough DC bias current in the network to maintain a minimum of 200mV between the B and A data lines.

9.9 Modbus implementation guide

Further reading can be found from the Modbus Organisation:

Modbus Organization
PO Box 628
Hopkinton, MA 01748

Telephone: +1 508-435-7170
Fax: +1 508-435-7172

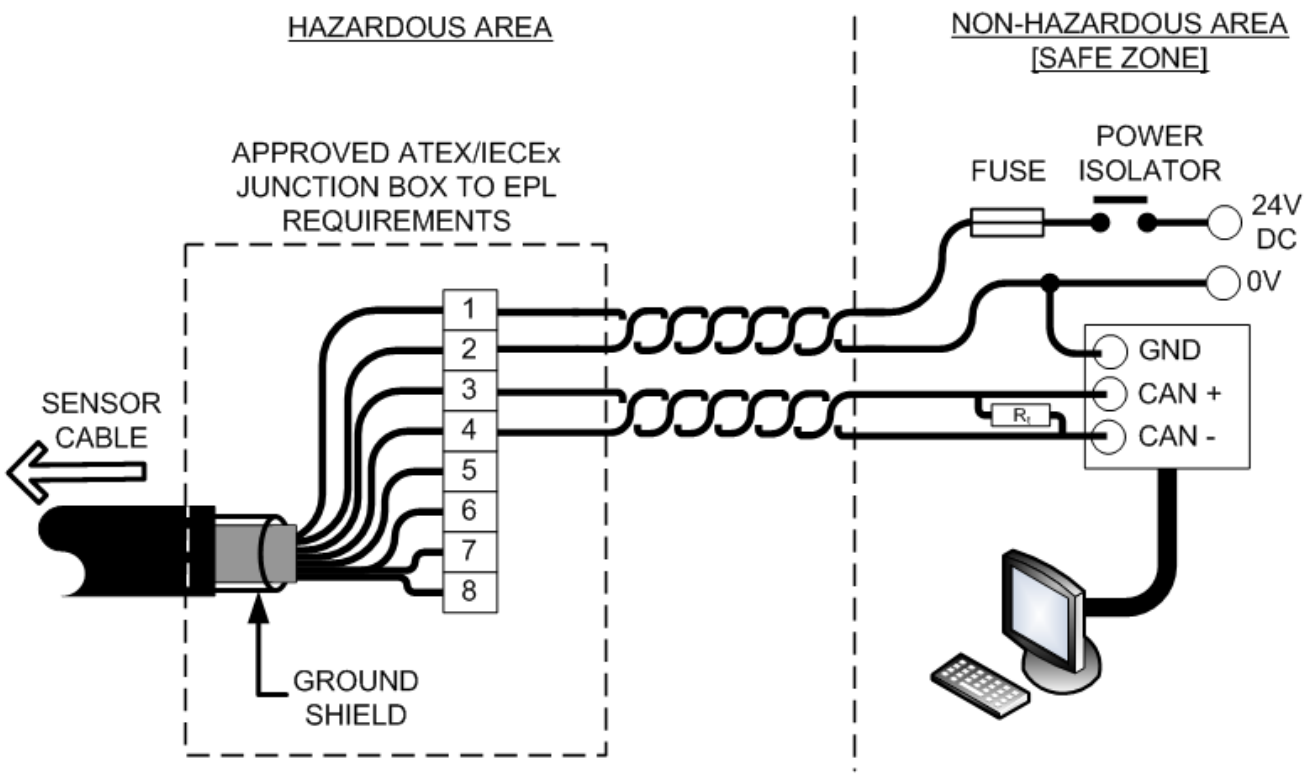
www.modbus.org

A detailed specification and Implementation guide can be found here:

http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf

9.10 CAN (Controller Area Network)

This wiring diagram shows the MWDS configured to communicate via CAN to a PC, display panel or data acquisition module.



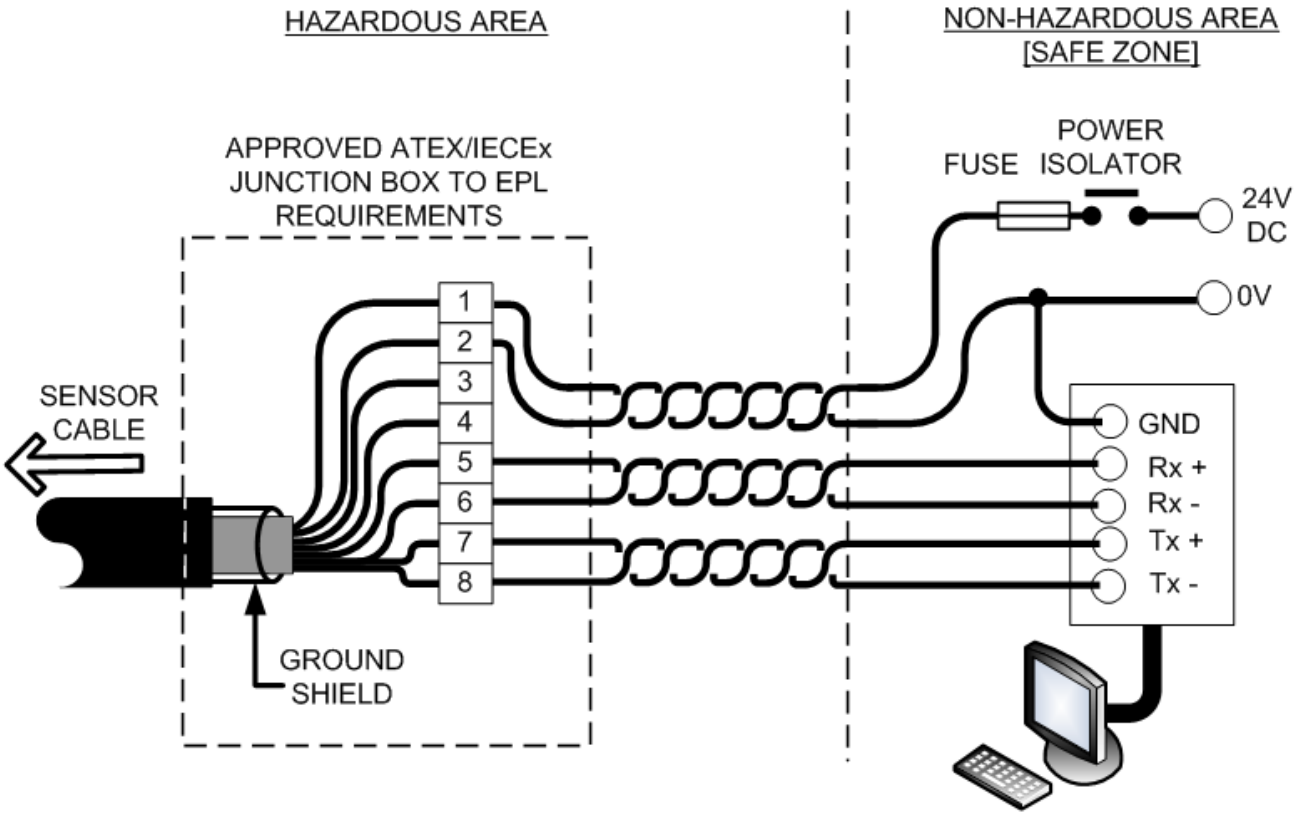
Please see the note on Terminating Resistors

The MWDS can use RS485 or CAN, but not both at the same time. This reduces the twisted pair count in the cable as only one interface is required. Please contact Parker Kittiwake for information regarding the use of CAN.

9.11 Terminating Resistors

The bus for both RS485 and CAN will require a 120Ω terminating resistor at each end of the bus. For sensors communicating directly (not multiple sensors on the bus) a 120Ω resistor is fitted at the terminal for HMI/PC – this is typically done via a jumper or DIP switch. The MWDS will require its on-board 120Ω resistor enabling. To do this please refer to the protocol manual supplied. For multiple sensors on a bus, there needs to be a 120Ω resistor at either end – not 1 per MWDS.

9.12 TCP/IP Ethernet



9.13 Ethernet Cabling and Connections

TIA/EIA-568-B.1-2001 specifies ethernet cabling. It gives 2 alternative wiring schemes, T568A and T568B. T568A is the preferred standard for ethernet but T568B (originally used for telephones) is still more common for patch cables etc. This distinction is unimportant for cables supplied with connectors fitted as the two schemes are identical with regard to which pins are actually linked by twisted pairs;

but which pair is green and which pair is orange is reversed. Another possible source of confusion is that “transmit” at one end of the cable must connect to “receive” at the other end, and vice versa. Standard patch cables are straight through and connect the same numbered pins at each end. This is correct for connecting a PC (NIC) to a hub. Crossover cables are also available.

Viewing the MWDS as an NIC talking to a hub then the colour scheme matches T568A:

- Transmit (as defined at NIC)
    - TX+ = White/Green
    - TX- = Green
- Receive (as defined at NIC)
    - RX+ = White/Orange
    - RX- = Orange

To connect the MWDS cable to a hub the connector should be wired as per the T568A colour scheme. To connect it directly to a PC the green and orange pairs should be swapped, as per T568B. Some ethernet adapters are able to detect and, if necessary, automatically crossover the connection.

10. Troubleshooting and Fault Finding

10.1 Troubleshooting

Symptom	Possible Causes	Solution
MWDS is not powered (both LEDs are unlit).	Wiring/MWDS Failure	Check wiring
		Check fuse
Communications not responding, both LEDs flashing in unison	MWDS is still initialising	Wait 30 seconds until both LEDs stop flashing in unison. Check connections
	MWDS communications set up incorrectly	Check using Engineering Mode on RS485 (refer to Software Manual)
No communication after both LEDs stopped flashing in unison	Wire Connections	Check wiring
	MWDS communications set up incorrectly	Check using Engineering Mode on RS485 (refer to Software Manual)
Red Light Flashes at approximately 1 second intervals.	The unit has been reset. Stops flashing when Status Word is cleared	Clear the status word. Determine the reason for the reset (i.e. was the system powered off, was a reboot requested). If the problem persists (i.e. the unit has been found to reset for no obvious reason) then contact the supplier.
Green Light Flashes at approximately 1 second intervals.	Parts per Minute or Mass per Hour Alarm Activated. Stops flashing when condition clears.	Acknowledge alarm by clearing status word. Determine the reason for the Alarm.
Red Light flickers	Unit is balancing. This should not occur very often and normally lasts less than a second.	If the problem persists (i.e. the flickering is constant or is noticeable) then contact the supplier.
No particles detected.	MWDS not filling with oil	Check the speed of the oil through the MWDS is within specification
	MWDS or pipe blocked	Sludge build-up or pipe bend too tight. Un-block. If reoccurs, re-position the MWDS.
	Very low wear (No particles to detect)	Confirm presence of debris in the oil (e.g. Laboratory test a sample)
	Flow rate not in specification	Check the speed of the oil through the MWDS is within specification
	MWDS firmware fault	Re-Boot MWDS - turn power to MWDS off and on again

Wear rates increasing at greater rate than normal but the oil has been tested as OK	Recent Environmental changes	Check that no new cables have been installed in the near vicinity of the MWDS cable
		Check levels of vibration
MWDS not filling with oil	Oil inlet valve closed	Open inlet valve
	MWDS or inlet pipe blocked	Sludge build up or pipe bend too tight. Un-block. If reoccurs, re-position the MWDS.
MWDS or pipe blocked	Pipe bend too tight	Refer to installation manual and re-run pipe if necessary.
	Sludge build up	Consider sampling from higher in a sump.
	Incorrect position in the system to 'catch' particles: Poor sample point	Re-position MWDS

10.2 Checking the Readings – MWDS Confidence Test

Parker Kittiwake offers a range of check standards consisting different particle sizes allowing the user to verify performance. This method is recommended for field use. However, for expedience, a confidence check can be made by dropping small metallic debris into the MWDS. In the example below a small paperclip is chosen. Do not use a paperclip which is too large for the sensor bore.

Connect communications to the MWDS and Zero Bins.

Stand the MWDS on a flat surface so that the metallic object can be dropped down the centre of the MWDS bore. The object should fall right through the MWDS and clear the bottom of the sensor. The particle count can be inspected to verify operation.

11. Notes

12. Drawings

This section contains the following:

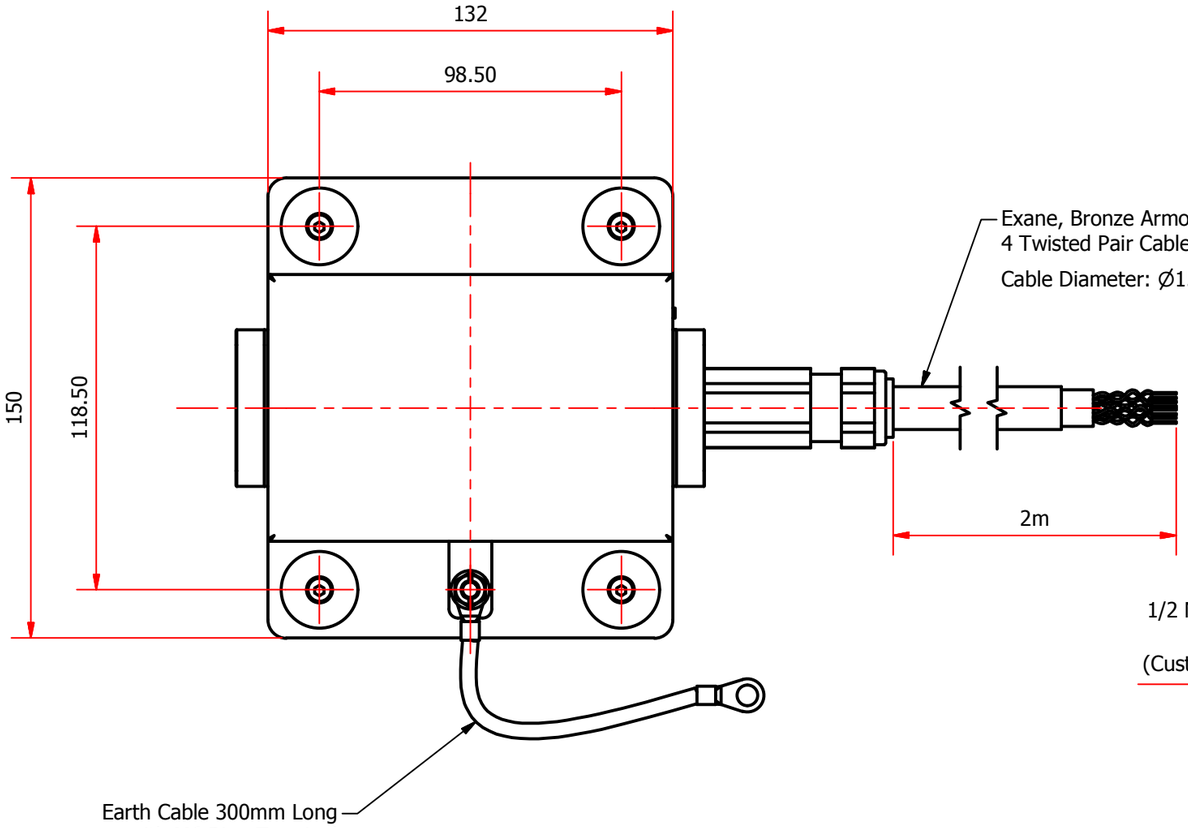
- EX-080 – Sheets 1 and 2.
    - General Arrangement and installation detail, including dimensions for the MWDS.

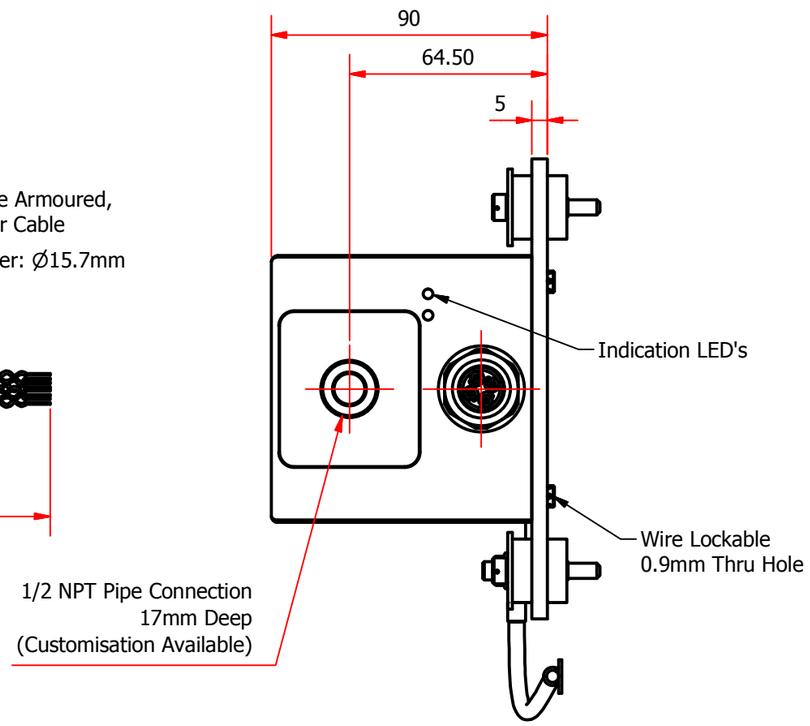
- EX-081 Pipework detail; how to prepare MWDS Pipework
    - The diagrams show how to get fluid flow to and from the MWDS at the correct rates.

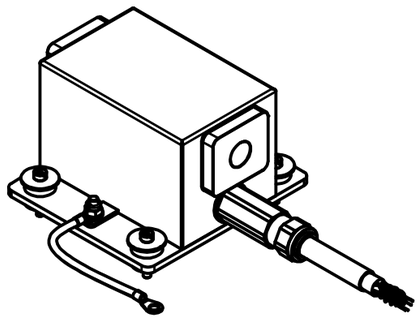
- EX-082 Sandwich plate installation
    - A possible solution for machinery where there no exposed pipework, but a canister type filter which will facilitate fitment.

- EX-083 Installation guidelines
    - Mounting detail including orientation, pipe work design and clamping.

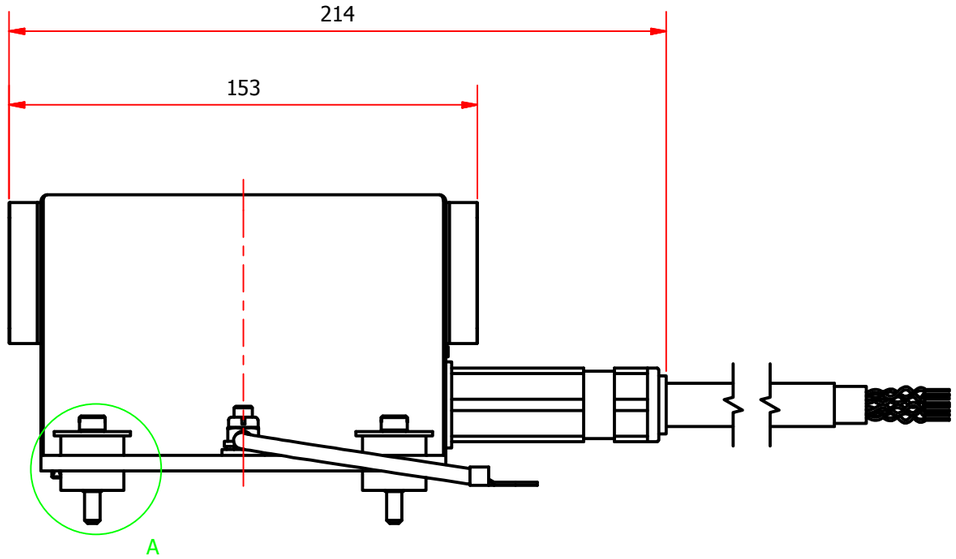
REVISION HISTORY					
PROJECT/VOC/ECR	REV	DESCRIPTION	DATE	AUTHOR	APPROVAL
CM 449	1	INITIAL DRAWING RELEASE	12/11/2013	OGI	



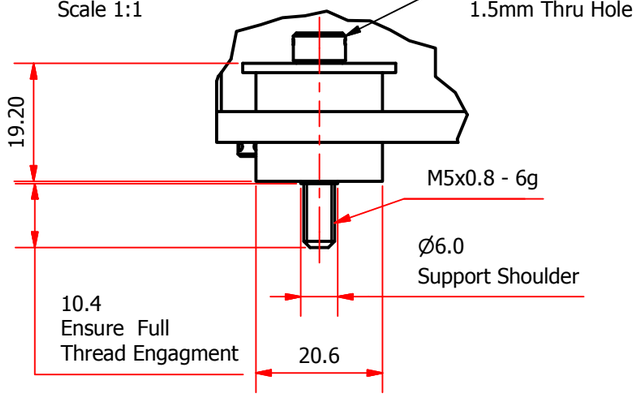


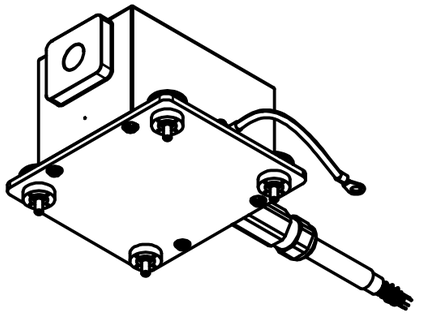


Isometric Views
Scale 1:4



Detail A - Under Full Compression
In 4 Positions
Scale 1:1





Parker Kittiwake,
Hydraulic Filter Division Europe,
3-6 Thorgate Road, Littlehampton,
West Sussex, UK. BN17 7LU

Tel: +44 (0) 1903 731470
Fax: +44 (0) 1903 731480
www.kittiwake.com
www.parker.com

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm.

TOLERANCES ARE:

DECIMALS		ANGLES
x	± 0.5	± 1 DEG
x.x	± 0.2	
x.xx	± 0.1	

DO NOT SCALE DRAWING

PART NUMBER: -
USED ON: -
SURFACE FINISH √N/A U.O.S
DRN. OGI: 26/02/2013
CHK. AB: 12/11/2013
APP. CJS: 12/11/2013
STATUS: RELEASED

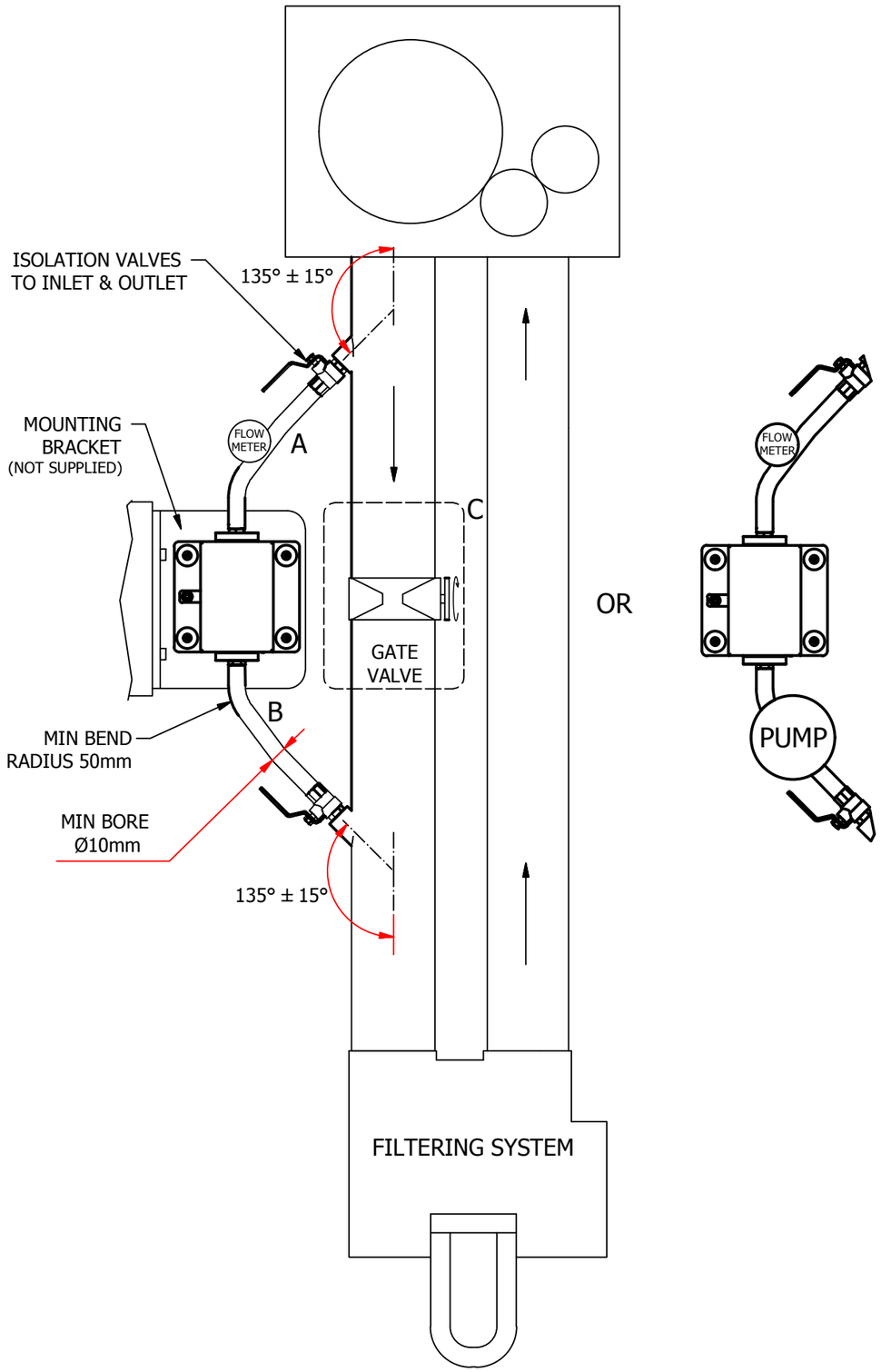
TITLE: ATEX MWDS MkII GA

THIRD ANGLE
DWG NUMBER: EX-080
Iss: 1
SCALE: 1:2
Size: A3
SHEET 1 OF 1

REVISION HISTORY					
PROJECT/VOC/ECR	REV	DESCRIPTION	DATE	AUTHOR	APPROVAL
CM 449	1	INITIAL DRAWING RELEASE	01/03/2013	OGI	

BYPASS LOOP OPTION

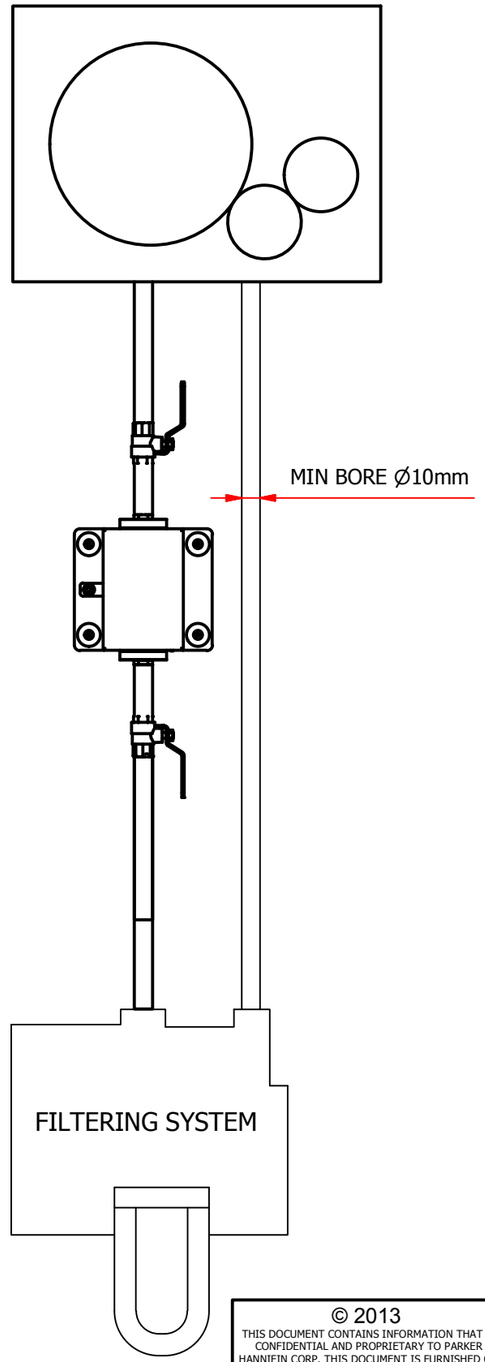
USED WHEN FLOW RATE IS TOO HIGH FOR SENSOR



OR

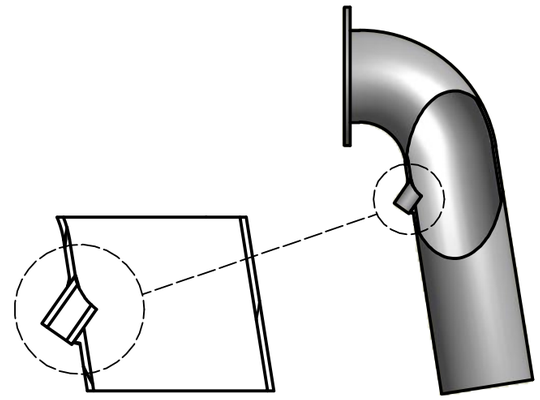
FULL FLOW LOOP OPTION

USED WHEN FLOW RATE IS SUITABLE FOR SENSOR



PIPE WORK DESIGN

1. AVOID 90° FITTINGS.
2. LENGTH OF PIPES 'A' AND 'B' TO BE MAX 1m. IDEAL LENGTH <0.5m.
3. WHEN USING 'BYPASS LOOP OPTION' WITH CONSTANT FLOW, USE METHOD 'C' AND A GATE VALVE TO ENSURE A SUITABLE FLOW RATE THROUGH THE SENSOR.
4. INLET POSITIONING. NOTE FITTING MUST BE POSITIONED AND SHAPED TO ENCOURAGE OIL FLOW INTO SENSOR PIPE.



Parker Kittiwake,
Hydraulic Filter Division Europe,
3-6 Thorgate Road, Littlehampton,
West Sussex, UK. BN17 7LU
Tel: +44 (0) 1903 731470
Fax: +44 (0) 1903 731480
www.kittiwake.com
www.parker.com

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm.
TOLERANCES ARE:

DECIMALS			ANGLES
x	±	0.5	± 1 DEG
x.x	±	0.2	
x.xx	±	0.1	

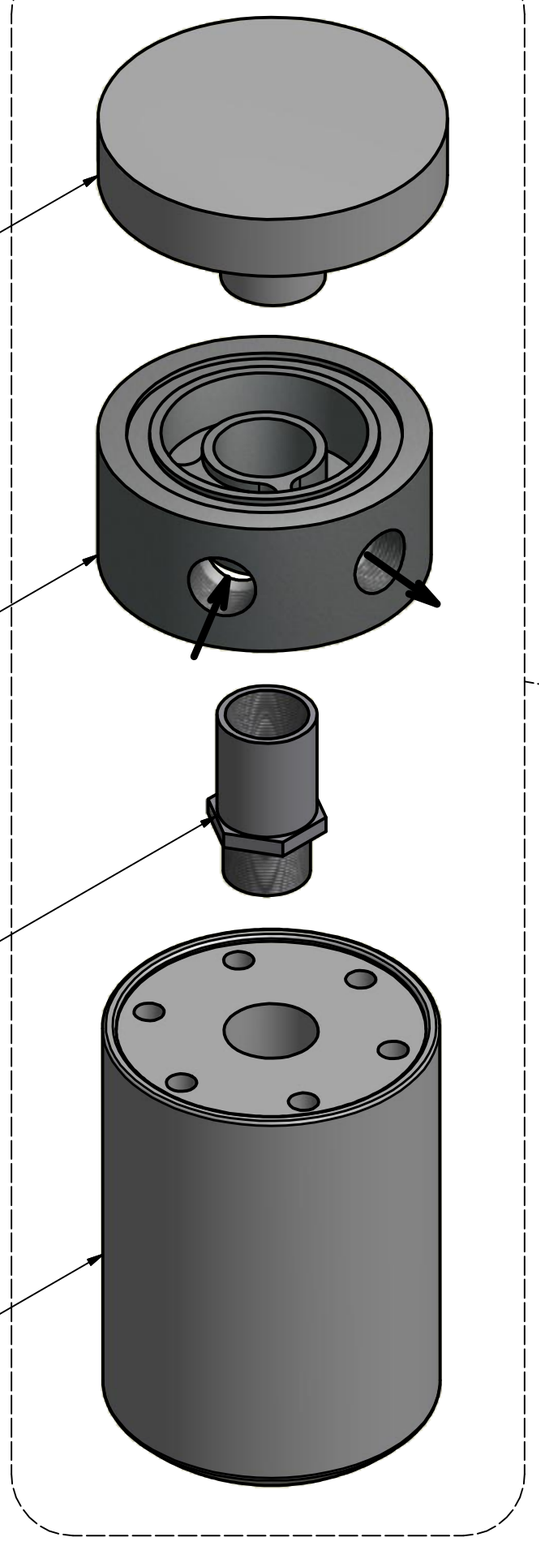
DO NOT SCALE DRAWING

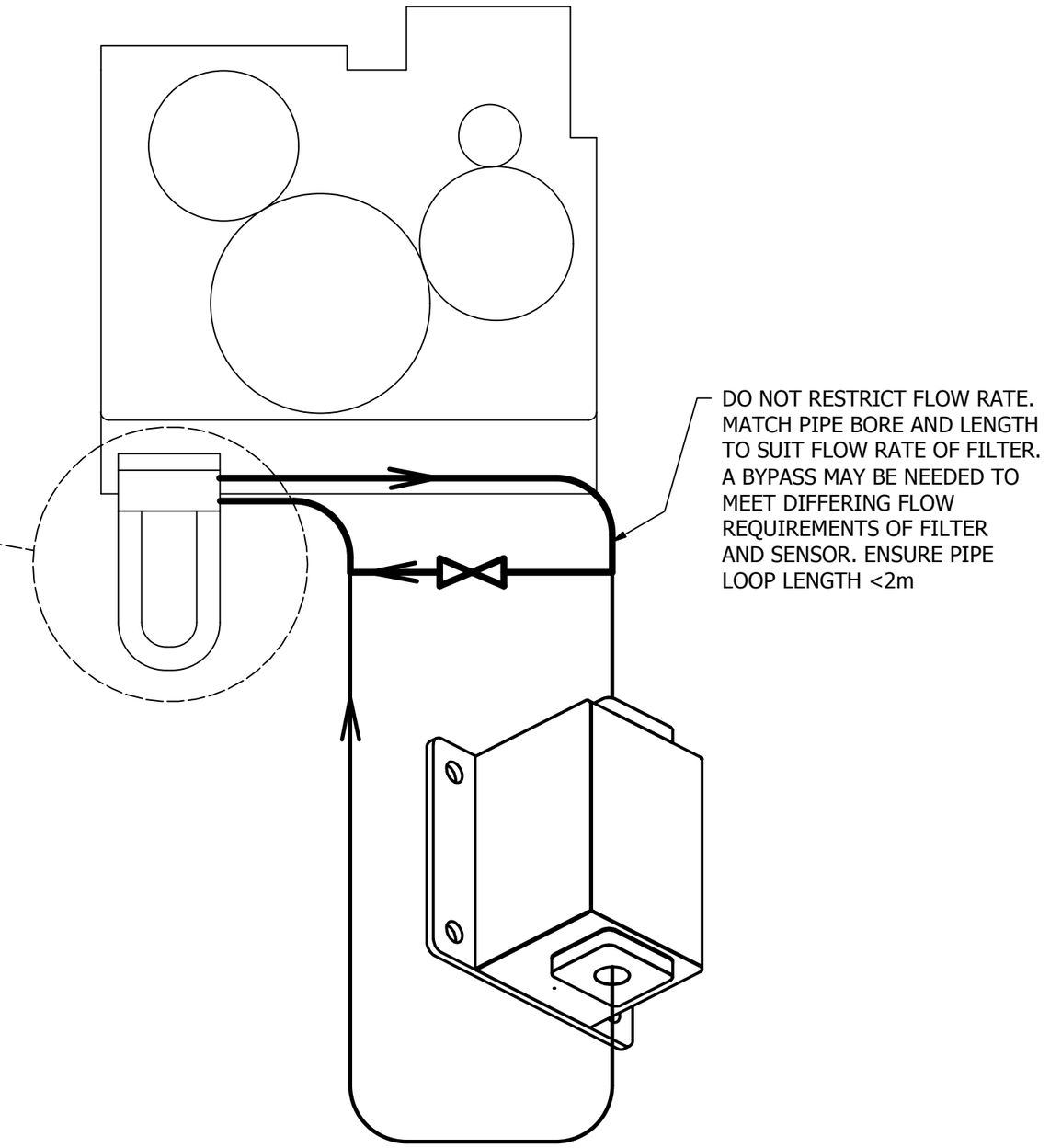
PART NUMBER:
DRN. marcusl: 02/04/2009
CHK. AB: 03/04/2009
APP. :
STATUS: PROTOTYPE

USED ON:
SURFACE FINISH √N/A U.O.S
TITLE: SENSOR PIPE WORK DETAIL
THIRD ANGLE
DWG NUMBER: EX-081
Iss: 1
SCALE: NTS
Size: A3
SHEET 1 OF 1

OPTION WHEN THERE IS NO EXPOSED PIPEWORK

REVISION HISTORY					
PROJECT/VOC/ECR	REV	DESCRIPTION	DATE	AUTHOR	APPROVAL
CM 449	1	INITIAL DRAWING RELEASE	01/03/2013	OGI	

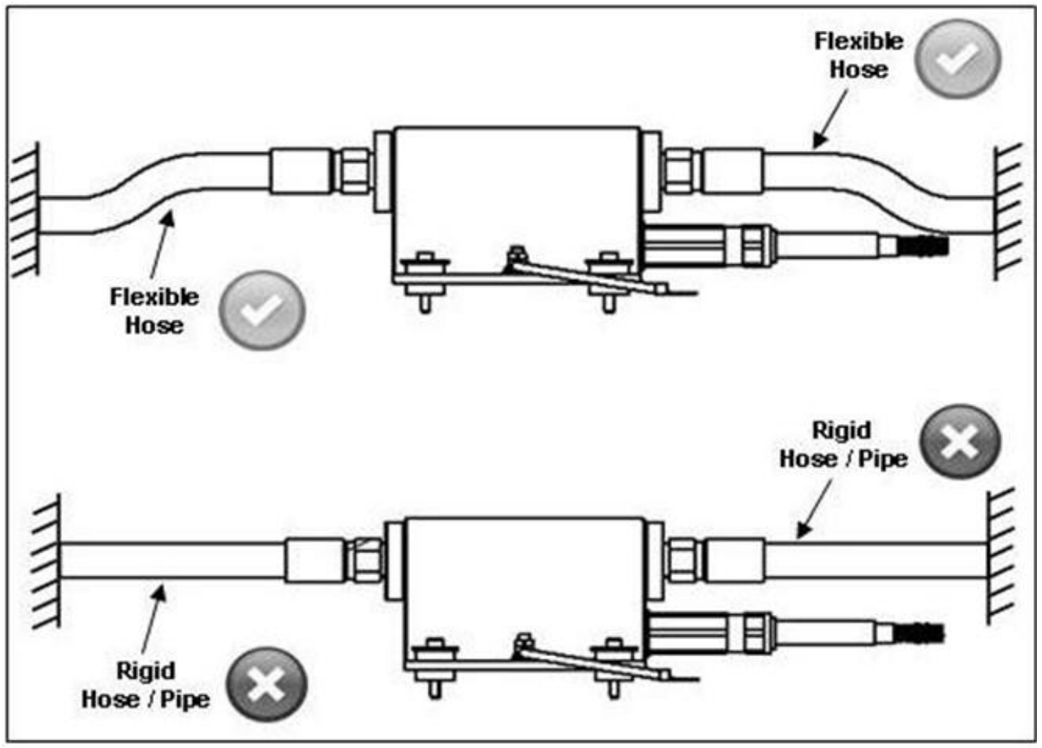


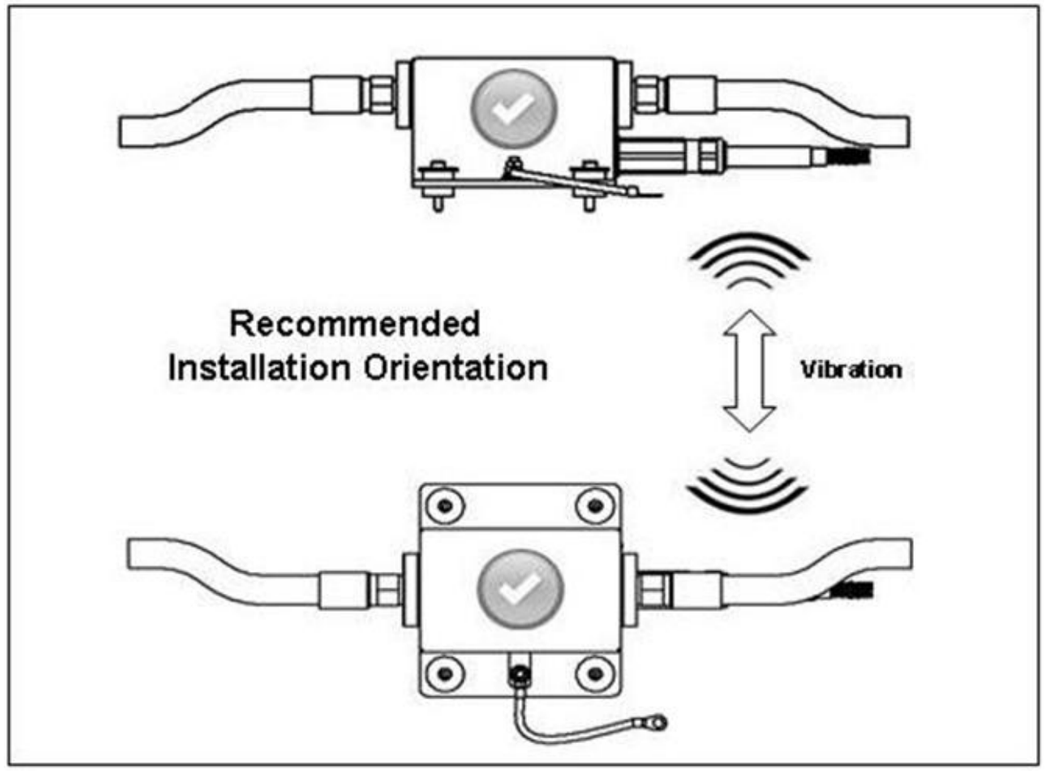


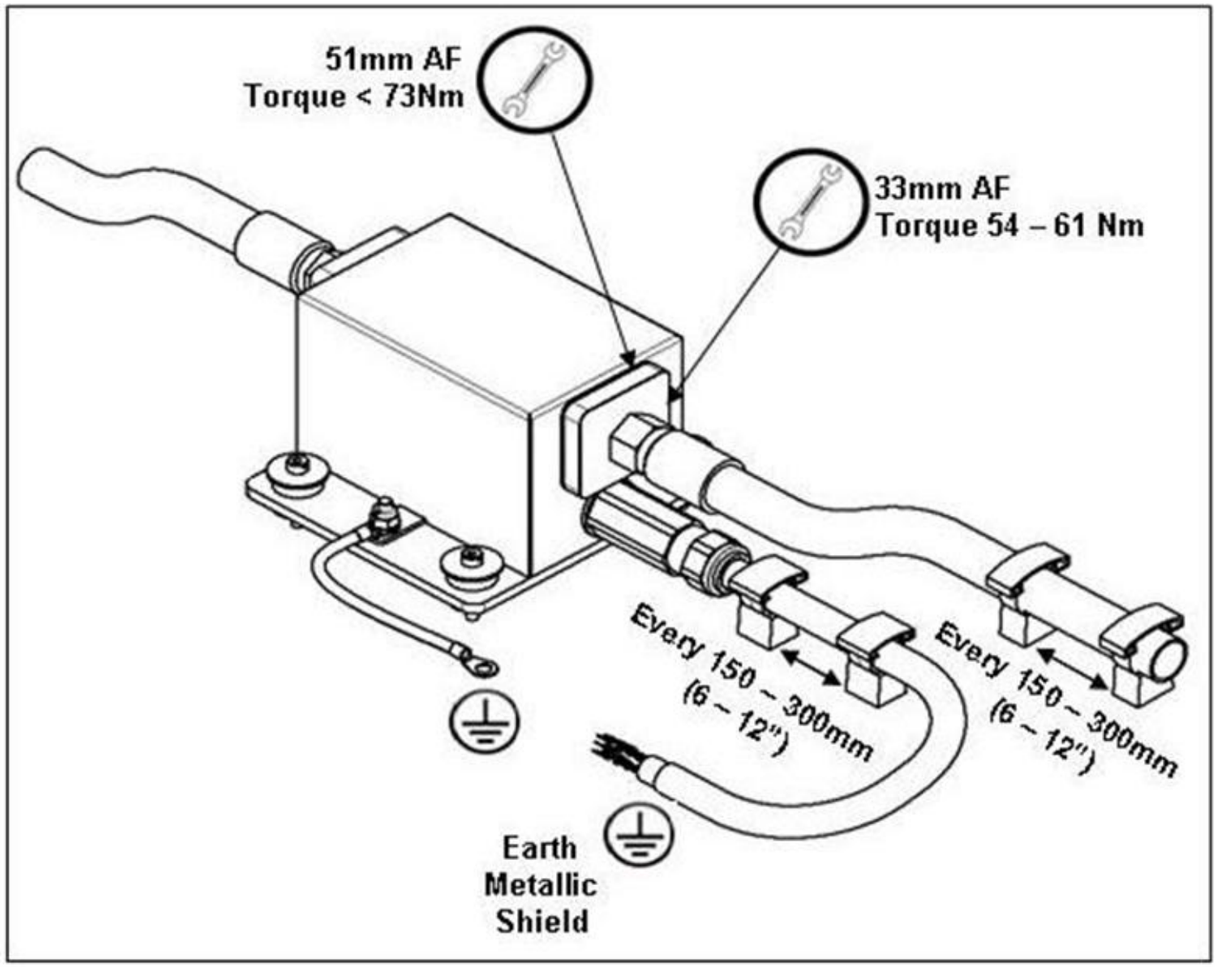
Parker Kittiwake,
Hydraulic Filter Division Europe,
3-6 Thorgate Road, Littlehampton,
West Sussex, UK. BN17 7LU
Tel: +44 (0) 1903 731470
Fax: +44 (0) 1903 731480
www.kittiwake.com
www.parker.com

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm.	PART NUMBER:	USED ON:	SURFACE FINISH √N/A U.O.S
TOLERANCES ARE: DECIMALS x ± 0.5, x.x ± 0.2, x.xx ± 0.1; ANGLES ± 1 DEG	DRN. OGI: 01/03/2013	TITLE: SENSOR INSTALLATION - NO EXPOSED PIPEWORK	
	CHK. AB: 12/11/2013		
	APP. CJS: 12/11/2013	THIRD ANGLE	DWG NUMBER: EX-082 Iss: 1
DO NOT SCALE DRAWING	STATUS: RELEASED		SCALE: NTS Size: A3 SHEET 1 OF 1

REVISION HISTORY					
PROJECT/VOC/ECR	ISSUE	DESCRIPTION	DATE	AUTHOR	APPROVAL
CM 449		INITIAL DRAWING RELEASE	12/11/103	OGI	







Parker Kittiwake,
Hydraulic Filter Division Europe,
3-6 Thorgate Road, Littlehampton,
West Sussex, UK. BN17 7LU

Tel: +44 (0) 1903 731470
Fax: +44 (0) 1903 731480
www.kittiwake.com
www.parker.com

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm.
TOLERANCES ARE:

DECIMALS			ANGLES
x	±	0.5	± 1 DEG
x.x	±	0.2	
x.xx	±	0.1	

DO NOT SCALE DRAWING

PART NUMBER: -
USED ON: -
SURFACE FINISH √N/A U.O.S
DRN. oliveri: 12/11/2013
CHK. AB: 12/11/2013
APP. CJS: 12/11/2013
STATUS: RELEASED
THIRD ANGLE

TITLE: ATEX MWDS MkII - INSTALLATION GUIDELINES

DWG NUMBER: EX-083
ISSUE 1
SCALE: NTS
Size: A3
SHEET 1 OF 1

MA-K19523-EX Issue 10

Parker Kittiwake
Hydraulic Filter Division Europe
3 - 6 Thorgate Road Littlehampton
West Sussex BN17 7LU United Kingdom
Tel: +44 1903 731470
Fax: +44 1903 731480
Email: kittiwakeinfo@parker.com
Web: www.kittiwake.com www.parker.com