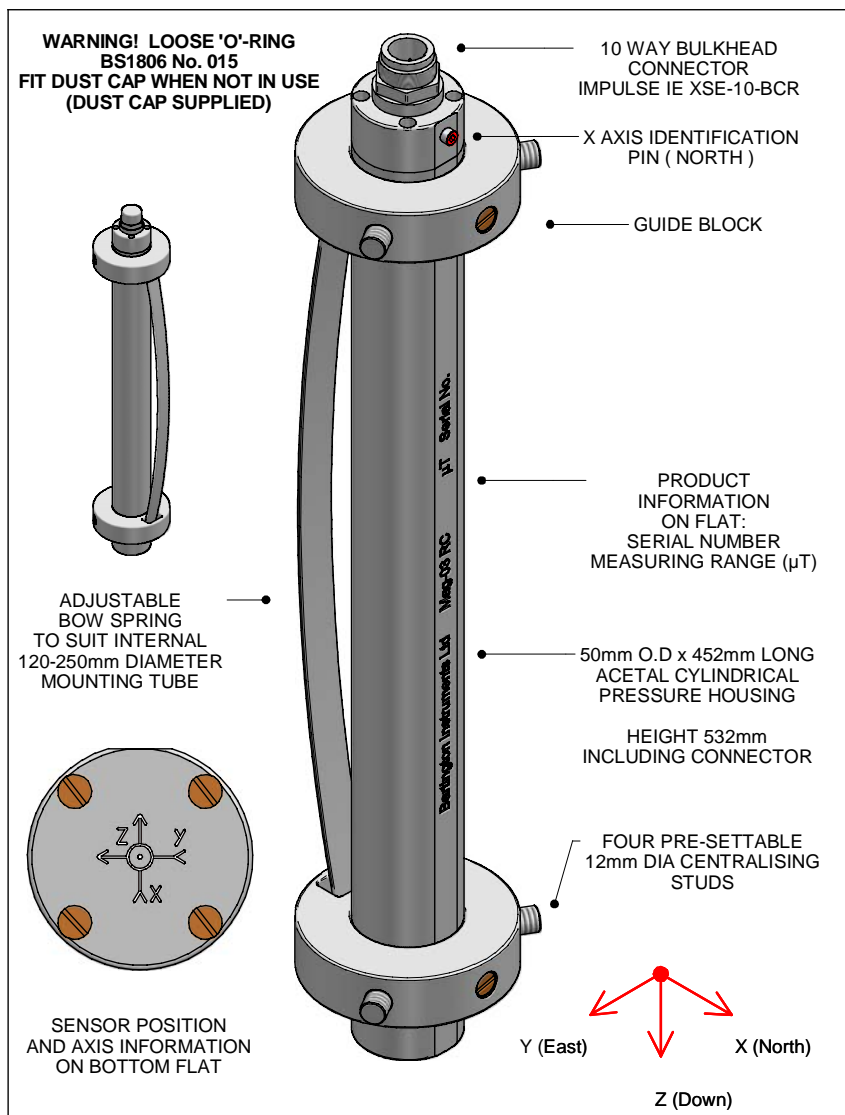


Mag-03RC

Three Axis Magnetic Range Magnetometer



The *Mag-03RC* is a tri-axial fluxgate magnetometer specifically designed for ten years minimum sub-sea operation to a depth of 100 metres. The very low self-noise, high accuracy, low hysteresis and superb long term stability make this product an ideal choice for ship magnetic signature measurement and marine surveillance. The sensor is supplied with a bow-spring mounting arrangement suitable for mounting in a vertical seabed cylinder.

A polyurethane-jacketed connecting cable is recommended to ensure reliable operation to a distance of up to one kilometre.

An operation / installation and fault finding manual is supplied with these units

The wide bandwidth, which is in excess of three kilohertz, is suited to alternating-magnetic (A-M) field measurement.

The ± 10 volts full-scale differential analog output ensures superior noise immunity when operated over long cables. The scale factor can be specified as ± 100 , ± 200 or $\pm 300 \mu\text{T}$ full-scale.

A single ended version with the same ± 10 volts full-scale range can be provided, on request.

The magnetometer requires approximately one watt of power from a poorly regulated 15-30 volt supply which is electrically isolated and causes no current to flow in the cable shields. A polyurethane jacketed connecting cable is recommended to ensure reliable operation to a distance of up to one kilometre. Surge arrestors are fitted across all lines within the magnetometer to protect against damage by electrical discharge. It is recommended that similar precautions are taken at the user interface.

A Built-In Test (BIT) facility, activated by a remote contact closure (or open-collector/drain transistor) gives assurance of correct functioning by creating a precise magnetic flux change within each axis.

The position of the three sensor axes, which are co-incident, is clearly engraved on the lower end of the enclosure. The product code, serial number and full scale measuring range information is engraved along the enclosure.

A fully assembled and tested polyurethane-jacketed marine telemetry cable, with negligible attenuation at 3kHz, can be supplied by Bartington Instruments, in lengths up to one kilometre.

The 'wet-end' connector has been selected for its low magnetic signature and reliable marine operation. Alternative connectors, e.g. Hydrobond HRS underwater mateable, can be provided, on request.

Performance Specification

Supply voltage	15-30V polarity protected (12V absolute min., 36V absolute max.)
Supply current	50mA @ 25V (Surge current 83mA at switch on)
Analog output	$\pm 10\text{V}$ differential $\equiv \pm 100\mu\text{T}$, $\pm 200\mu\text{T}$, $\pm 300\mu\text{T}$ Full scale
Output polarity	Non-inverting output +ve response with arrow pointing North (Right hand co-ordinate system)
Output impedance	10 Ω each line
Internal clock breakthrough	10mV pk-pk Max.
Linearity error	<0.0015%
Output Frequency response	-3dB @3kHz $\pm 10\%$
Output Frequency response	Flatness $\pm 5\%$ maximum at 1kHz
Calibration accuracy	$\pm 0.5\%$ 0Hz
Orthogonality error - all axes to reference face	<0.2°
Internal noise	11-20pTrms/ $\sqrt{\text{Hz}}$ at 1Hz
Built-in test (BIT)	Active low (TTL compatible) generates -1 μT $\pm 10\%$ magnetic field in each axis (Deliverable data)
Hysteresis (when powered) Within measuring range Beyond measuring range	$\leq 1\text{nT}$ 10nT @1mT (Can be supplied with 1nT Hysteresis but with 50pT noise floor)

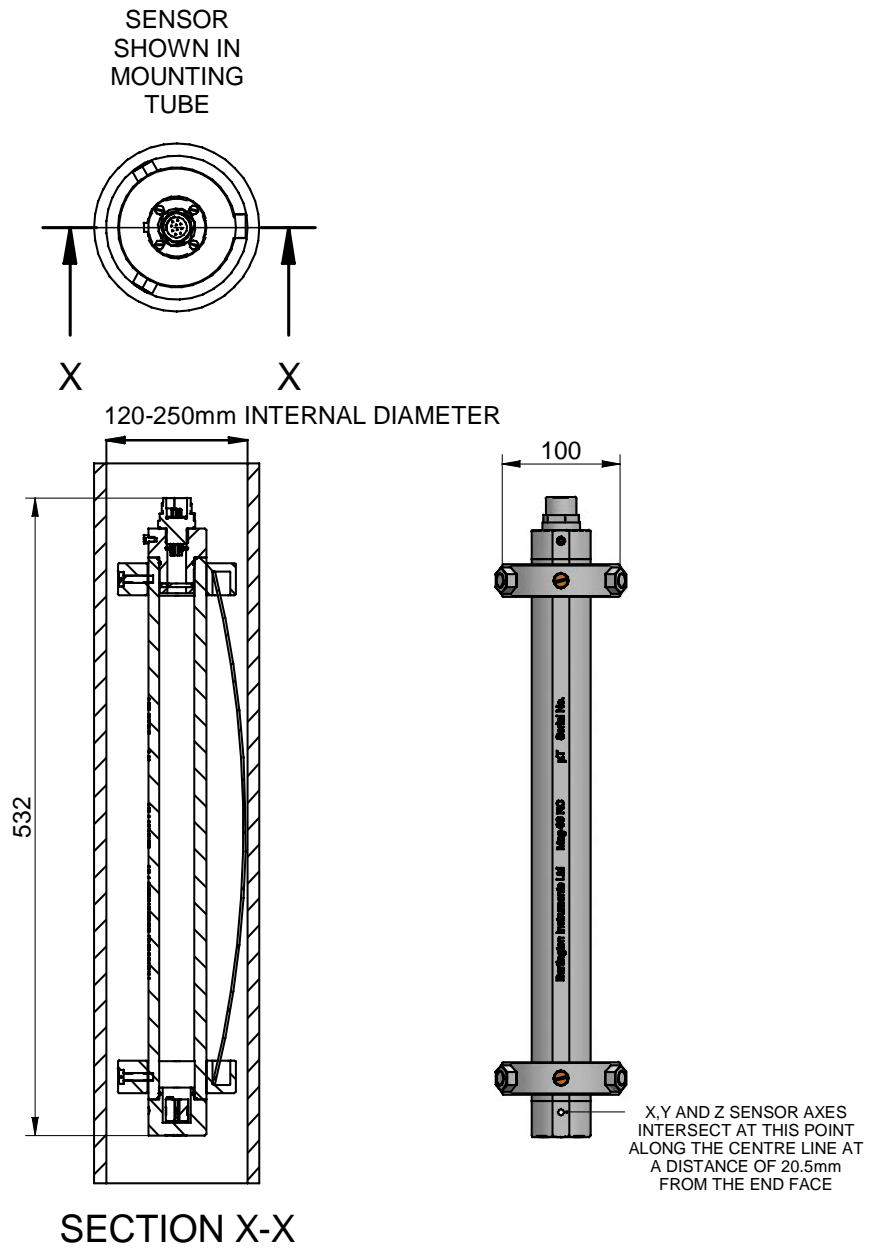
Mechanical & Environmental Specification

Enclosure	polyacetal
Dimensions (mm)	$\text{Ø}50 \times 532$ length exclusive of mounting arrangement
Mounting (Optional)	Two accurately positioned guide blocks with adjustable bow-spring and centring studs for location within a $\text{Ø}120 - \text{Ø}250\text{mm}$ barrel
Fitted Connector	Impulse IE XSE-10-BCR (dry mate only)
Mating connector	Impulse IE XSE-10-CCP (dry mate only)
Operating temperature	-10°C to +50°C
Weight	1.1kg in air (without bow spring assembly) 1.65kg in air (with bow spring assembly)
Environmental	submersible to 100 metres depth (negatively buoyant)
Soak Testing	100% of Mag-03RC are soak tested for 72 hours.
ESS Testing	10% of each production batch is ESS Tested generally in accordance with MIL-HDBK-344A.

Scale Factor Dependent Parameters

Measuring range	±100	±200	±300	μT
Scale Factor	100	50	33	mV/μT
Zero Field Offset error	±30	±60	±90	nT
Scale factor temperature coefficient	+10	+20	+30	ppm/°C
Zero field offset temperature coefficient	±0.2	±0.4	±0.6	nT/°C
Power supply rejection ratio	1	2	3	nT/V

Sensor Outline Drawing



Product Identification

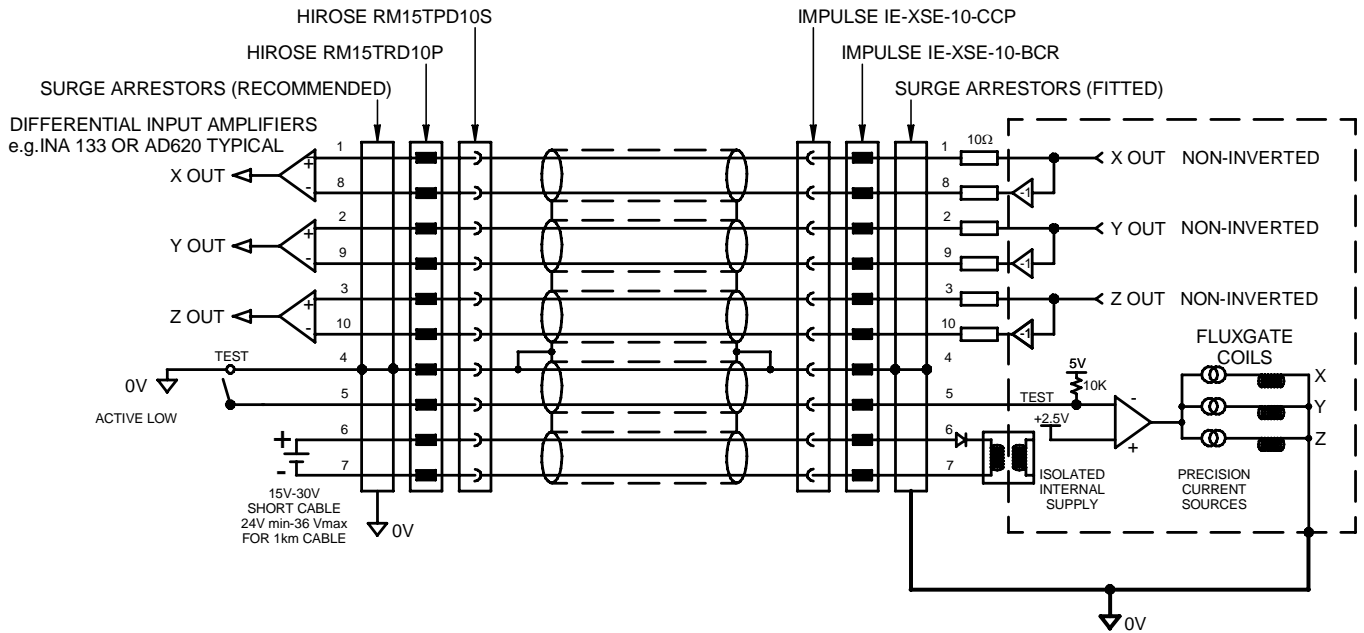
The magnetometer designation, range and serial number are engraved along the flat on the cylinder. The flat surface and pin combination at the top of the cylinder shows the X axis direction for help with orientation during installation.

Interface Schematic Drawing

User Interface

Marine Cable

Mag-03 RC Internal Circuitry



The internal, polarity protected, power supply is galvanically isolated and is clocked in synchronisation with the fluxgate circuitry. This ensures the greatest measurement precision.

Mag-03RC Cable

Description

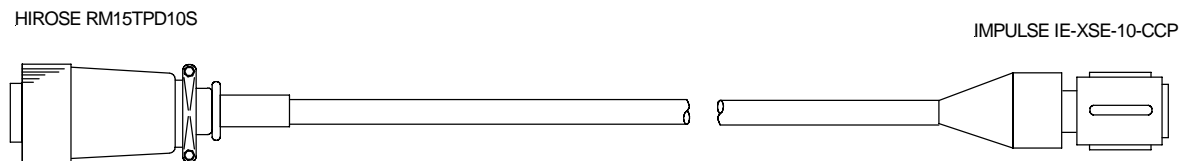
This cable is recommended for connection of the *Mag-03RC* range magnetometer to a data acquisition system and power supply. It can be supplied in lengths specified by the customer, up to one kilometre.

The cable assembly consists of a polyurethane jacketed, diameter 11mm nominal, five 0.40mm² (13 x 0.2mm) screened twisted pairs cable with an IE-XSE-10-CCP marine connector at the sensor end and a Hirose RM15TPD10S connector at the output end.

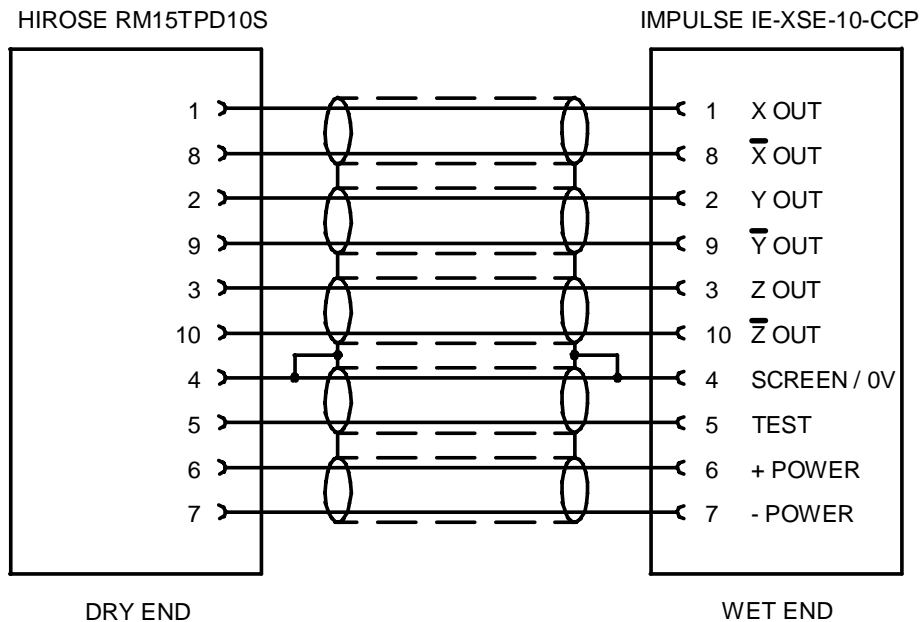
Alternative connectors, e.g. Hydrobond HRS underwater mateable, can be provided on request.

The cable is waterblocked with a curable polysulphide compound to prevent water ingress. The conducting cables are tinned copper, HDPE insulated, and will not corrode in seawater. Each cable is electronically tested for water integrity.

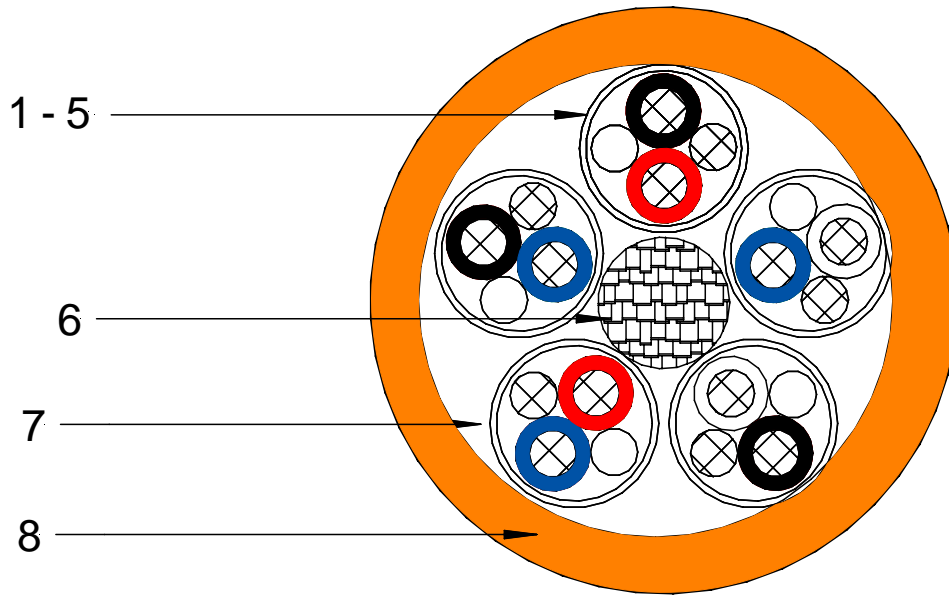
Cable Outline Drawing



Cable Schematic Drawing



Cable Cross Section & Specification



No.	Description	Colour	Dia. mm
1 - 5	<p>5 position Screened twisted Pairs</p> <p>0.40mm² (13/0.20mm) Tinned Copper HDPE insulated, 1.49mm ±0.05mm</p> <p>2 no Twisted together with 1no 13/0.20mm Tinned Copper drain Wire in one interstice and 0.85mm filler in other interstice All voids filled with curable silicone waterblocking compound</p> <p>Overall 12/23µM Ali/PET Helical Foil Screen. Min. 50% overlap.</p> <p>Overall 23µ PET Helical insulating tape. Min. 50% overlap.</p>	<p>Red Black</p> <p>White Blue</p> <p>Black White</p> <p>Blue Red</p> <p>Blue Black</p>	3.20 nom.
6	1 position central multi-filament PP filler	N/A	2.5 min.
7	Items 1-5 laid around item 6 with overall 23µM PET Helical binding tape. All voids filled with curable silicone waterblocking compound	N/A	8.80 nom.
8	Polyurethane jacket 1.10mm nominal RTI 87 Shore A 4350	Orange	11.00 ±0.50

Notes	
Maximum conductor resistance	51Ω/km @ 20°C
Minimum insulation resistance	
Core - Core	>500MΩ / km
Core - Screen	>250MΩ / km
Screen - Screen	>10MΩ / km
Working voltage	500Vrms
Maximum Current / Conductor	5 Amps
Calculated STP Capacitance	
Core - Core	52pF / Metre
Core - Screen	120pF / Metre
Calculated STP Inductance	
Core - Core	0.4864 μH / Metre
Core - Screen	0.2091 μH / Metre
Calculated STP Impedance	98 Ω / Km
Maximum operating temperature	
Static	+80°C
Dynamic	+60°C
Cold flex temperature	-40°C
Minimum recommended bend radius	
Static	80mm
Dynamic	120mm
Calculated weight in air	144kg/km
Calculated weight in sea water	38kg/km
Attenuation 10kHz	-0.051dB
100kHz	-6.0dB

Specifications of the products described in this brochure are subject to change without prior notice. Bartington® is a registered trademark of Bartington Instruments Ltd.

Bartington Instruments Ltd
5 & 10 Thorney Leys Business Park, Witney
Oxford OX28 4GE, England

Telephone +44 1993 706565
Facsimile +44 1993 774813
E-mail sales@bartington.com
Internet <http://www.bartington.com/>