

BSS-02B

Borehole Magnetic Susceptibility Sonde

For innovation in magnetic measuring instruments



This sonde is used in mineral prospecting and for stratigraphic correlation to depths of 6000 metres. The unit has a diameter of 43mm and is designed and calibrated for a 50mm borehole.

The sonde comprises two sections: an aluminium alloy cylindrical enclosure containing electronic circuitry and a high strength non-magnetic enclosure in which the detector is located. The electronics enclosure must be surrounded by a pressure enclosure; this is usually provided by the client, to fit with the rest of their system.

The sonde operates from an unregulated 15V nominal supply and provides an output in the form of a three-wire CMOS serial interface for integration into the client's data acquisition system, and a single wire pulse rate output for use with rate meters and counters.

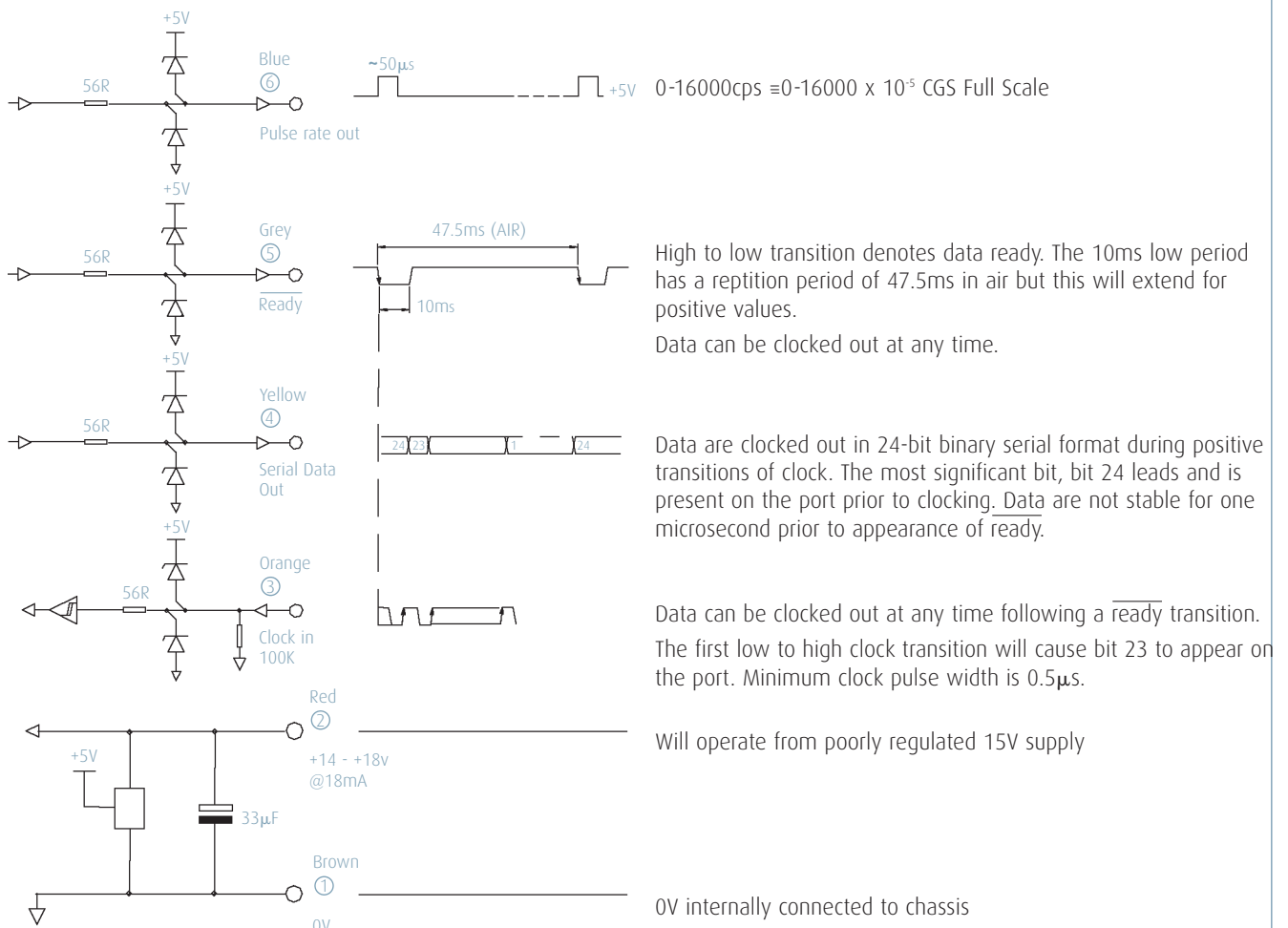
Features:

- Wide measuring range: 10^{-5} to 10^{-1} CGS
- Low operating frequency: 1.36kHz
- Good vertical resolution: 25mm with dual coil system
- Operates to pressures of 10000 psi maximum
- Operates to temperatures of 120°C: calibrated to 90°C
- Fast: logs at up to 21 readings per second
- High spatial resolution: will resolve strata down to 25mm
- Low temperature induced drift:
 $<20 \times 10^{-5}$ CGS over the calibrated temperature range ambient to 90°C

General:

1. The System is scaled to $1_{LSB} = 1 \times 10^{-5}$ CGS
2. A residual value of circa 1000 is present for air to accommodate ageing effects
3. Input* output logic is 5V CMOS compatible
4. The 'air' operating frequency of the sensor is 1.36kHz
5. The full dynamic is from 1×10^{-5} to 1×10^{-1} CGS

Electrical Interface



Specification

BSS-02B Sonde		
Mechanical		
Construction		
Non-magnetic enclosure	P.E.E.K. enclosure	
Pressure barrel	Supplied by user	
Overall length of sonde (mm)	720	
Weight in air (g)	815	
Seals		
Pressure barrel to mid-adaptor	2 Viton "O" rings BS 216	
Mid-adaptor to P.E.E.K. barrel	1 Viton "O" ring BS 126	
P.E.E.K. barrel to nose	"O" ring BS 126	
Alternative mating threads		
BSS02B-2	1.375[INCH]-12UNF-3A	
BSS02B-3	1.375[INCH]-16UN	
Pressure compensation	A single polyurethane diaphragm	
Volume of silicone oil	155ml	
Notes 1: the nose section is filled with silicone grease to prevent the ingress of contaminants. This should be cleared to a depth of 10mm and replaced as required.		
Notes 2: the sensor coil is housed in a pressure compensated, thin walled cylinder to achieve optimum magnetic coupling to the borehole wall. This cylinder is sufficiently robust for down-hole operation but can be damaged if it is subjected to excessive shock through dropping or strain through bending.		
Performance		
Max operating pressure	10,000 psi	
Maximum stratigraphic (spatial) resolution	25mm F.W.H.M. (Full Width Half Maximum)	
Note: below 20mm a small double response will be recorded.		
Calibration	calibrated to read directly 1×10^{-5} CGS units in a 50mm borehole	
Diameter effect (relative to 25mm layer normalised to a 50mm diameter borehole)		
Borehole	Response	Response
ø(mm)	centralised	decentralised
70	0.75	0.725
80	0.275	0.5
100	0.09	0.45
Temperature induced drift		
baseline	< 20×10^{-5} CGS from 20°C to 90°C	
scaling	< 1.0% full scale	
Max operating temperature	120°C	
Pressure induced baseline drift	Typ. -5.5×10^{-5} CGS	
Sensing coil type		
Overall length	97mm	
Separation	27mm	
Diameter	35mm	
Distance from nose to centre of detection	160mm	
Principle of operation discrimination:		
Operating frequency	1.36 kHz	
Power supply rejection ratio	not measurable	

Electrical

Power requirements	+14 to +18Vd.c.at 32mA
Input connection	300mm of 6-core PTFE coated leads
Connector type	none
Interface	three-wire 5V CMOS serial interface and single wire pulse rate output all ESD protected

Pulse Rate Output

A pulse of approximately 50µs width is output at a rate which is proportional to the current measurement. Refresh time is 47.5ms but will extend by 0.2ms for every 1000 units of measurement. Maximum output is 16000cps.

Digital Data Output

The /Ready signal goes low for a period of 10ms when the conversion has been completed and bit 24 (MSB) is present on the SDO Line. The minimum repetition period of /Ready is 47.5ms in air but will extend by 0.2ms for every 1000 units of measurement.

Each low to high transition of Clock In will cause the next bit to be placed on the SDO line. Data can be conveniently clocked into the external interface on high to low transitions of Clock In. Minimum clock pulse width is 0.5µs.

Data are presented as 24 bits with the MSB first.

Calibration

The system is scaled to a change of one least significant bit = 1×10^{-5} CGS units. (One measurement unit).

A residual value of circa 1000 accomodates negative values and ageing effects.

Departure from linear response will be:

Range x 10^{-5} CGS **Error %**

1-1000	0 to -0.9
1000-10,000	-0.9 to -9.0
10,000-100,000	-9.0 to -50

To calculate true value of K

$K \times 10^{-5} \text{ cgs} = (R + R^2 / 10^5) \times 10^{-5} \text{ CGS}$ where R is the measured value.

BSS-02B Accessories

Calibration Block

Dimensions of cylinder	OD 110mm
	L 100mm

Bore 44mm

Weight 1.13kg

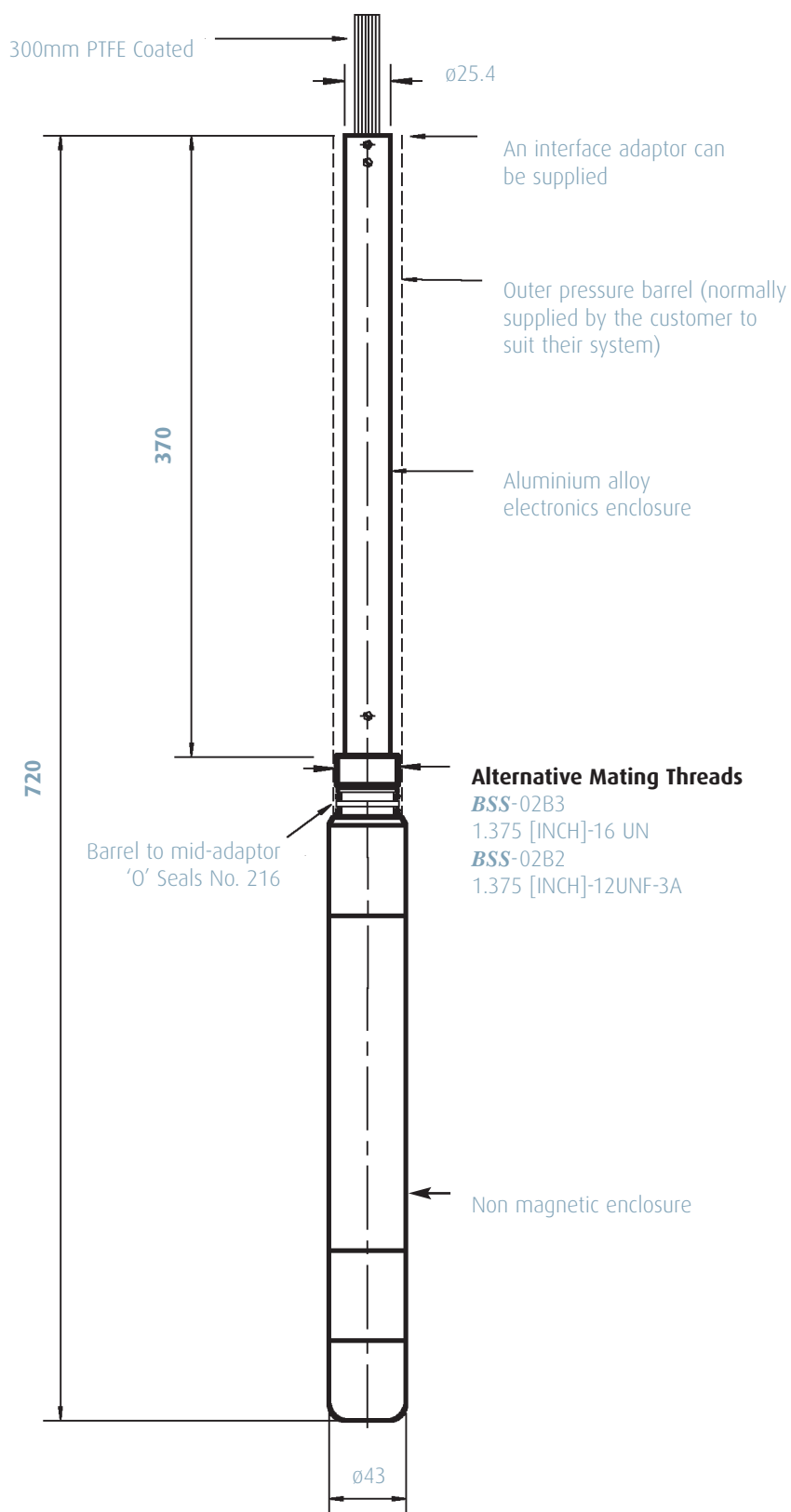
Calibration value (as marked)

Temperature coefficient +0.05% / °C

Note: To simulate groundwater effects the calibrator should be grounded via hand contact. This will depress the measured value by approximately -15×10^{-5} CGS.

Operation manual

Outline Drawing



The specification of the product described in this brochure is subject to change without prior notice

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