Bintech

Product Note

LIQUID LEVEL SENSOR Model BI-2000 series

Features

The Bintech 2000 series level sensor with a programmable head mounted transmitter unit provides a linearised 4 to 20 mA output of tank volume. The sensor mounting enables direct replacement of mechanical style indicators and is ideally suited for use with the BI-1030 Remote Display Unit for the monitoring of underground and above ground tank contents. The Bintech 2000 sensor is designed and manufactured in Australia.

Specifications

Electrical Enclosure:	**Stainless steel IP67 rated EEx d Ex d**
Mounting:	**Flange with 8 x 14 mm holes on 89 mm (3.5 inch) pitch circle**
Gasket:	**Spiral stainless steel and polymer**
Cable access:	**M20 x 1.5 mm opening**
Access:	**Screw cap with hex lock screw**
Electrical connection:	**2 wire connection to the transmitter or 3 wire potentiometer connection direct to the sensor.**
Electrical output signal:	**4 to 20 mA from the transmitter with a 24 Vdc supply**
Guide Tube:	**13 mm diameter x 1.2 mm wall**
Float:	**Cylindrical or Spherical Titanium, Stainless Steel, Nitrile or PVC foam**
Sensor Length:	**750 to 3000 mm**
Contact Separation:	**18 mm (5, 10, 15 mm options)**
Resolution:	**Typically better than ± 9 mm (depends on the contact separation)**
Minimum Depth Reading:	**Typically 200 mm - Titanium float 150 mm - PVC foam float (allowing 40 mm clearance from the bottom of the sensor shaft to the bottom of the tank)**
Float Diameter:	**Titanium: - 50 mm Nitrile: - 40 mm PVC foam - 44 mm**
Max. Operating Pressure:	**6000 kpa (depends upon flange and float type) Operating Temp range -50 to 150°C**
Weight:	**Approx. 1600 gm + 320 gm / m**
Certification:	**Ex s d 11B T6 IP66 Zone 1 Head, Zone 0 Probe Aus Ex 4023X**

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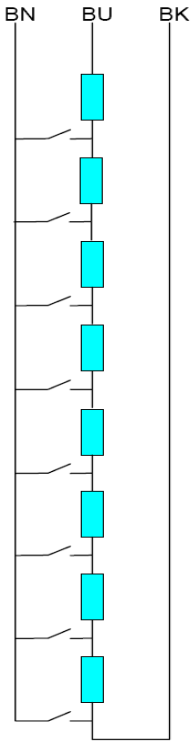
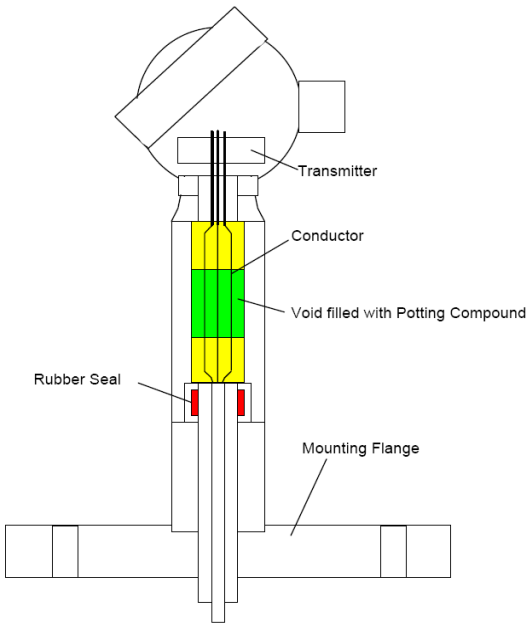
Theory and Operation of Sensor

Resistor - Reed Switch Chain

The sensor operates using the float principle with transmission in a two or three wire circuit. A series of reed switches and resistors built into the sensor are operated by a permanent magnet enclosed in the float. Changes in level are translated into a linear change in resistance. The switches are spaced 5 to 20 mm apart (depending on the sensor design and contact separation). In operation, the magnet fitted in the float rises with the liquid and operates the reed switches sequentially increasing the resistance between the wires. The three wires may be connected as a simple resistive or a potentiometer circuit. The changes in resistance are detected in the transmitter and are converted to a 4 to 20 mA current. With the tank empty the resistance is factory set to be nominally zero giving a 4 mA current. The resistance at maximum level is dependent on the length of the sensor and is calibrated to provide 20 mA.
The sensors are mounted on the turret of the tank and the resistor chains are typically 200 mm longer than the maximum liquid level height in the



Sensor Sealing



The resistor-reed switch chain is sealed within the sensor tube with a potting compound in the upper gland. This ensures electrical and mechanical isolation. The resistor chain may be removed from the sensor for service if necessary without needing to drain the tank to remove the sensor.
The transmitter and electrical connections to the loop circuit are contained in an EEx d Ex d rated enclosure. The transmitter is electrically programmed in the factory according to the dimensions and shape of the tank to achieve the required linearity eg. with an S curve for a horizontal bullet tank. The transmitter operates from 12 to 24 V and can drive any standard 4 to 20 mA circuit.

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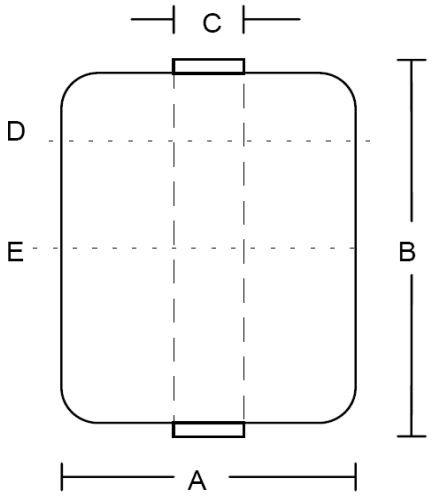
Float Selection

Cylinder Floats



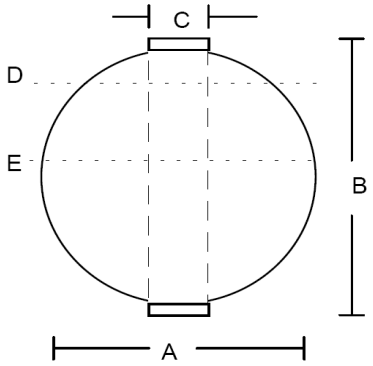
D = Limit S.G.
at 85% immersed float

E = Nominal S.G.
at 50% immersed float

Material	Code	A mm	B mm	C mm	Max Press. MPa	Max Temp °C	Limit SG kg/m3
Stainless Steel SS316T	V44R*	44	52	15	1.6	250	740
Titanium Gr 2	T44R* ZTS200*	44 50	52 200	15 200	1.6 3.0	250 250	645 490
PVC	P44R/150 P55R P55R/26 P80R	44 55 55 80	150 54 80 79	.15 22 26 25	0.3 0.3 0.3 0.3	60 60 60 60	480 805 869 577
Polypropylene	PP55R PP55R/26 PP80R	55 55 80	54 80 79	22 26 25	0.3 0.3 0.3	80 80 80	592 630 438
PVDF	PF55R PF80R	55 80	69 79	22 25	0.3 0.3	100 100	809 706
PTFE	TF80R	80	100	20	0.3	#	667
Nitrile	B40R/120	40	120	15	0.3	80	480

Ex Stock** **# Depends on Liquid

Spherical Floats



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at 85% immersed float

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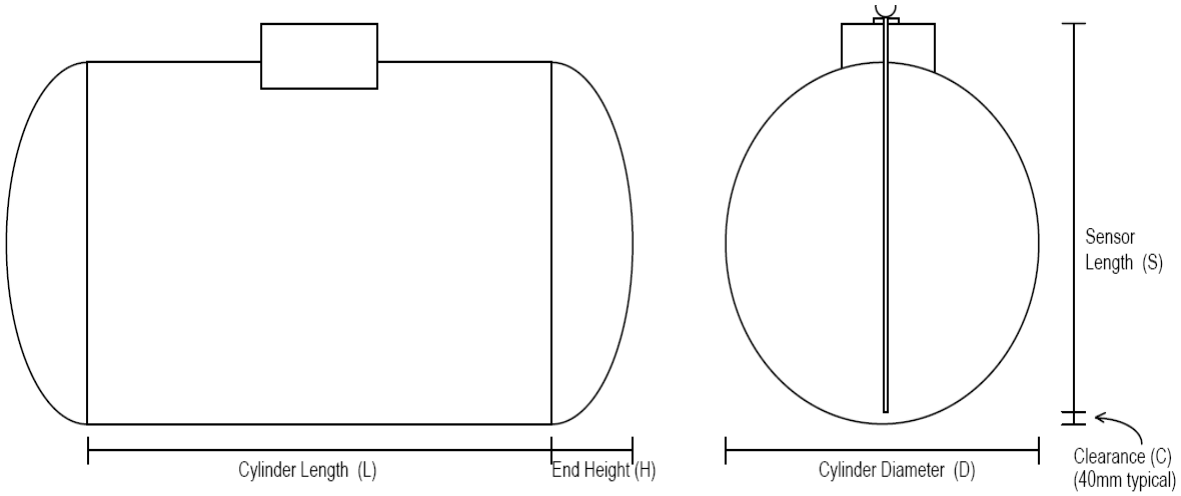
at 50% immersed float

Material	Code	A	B	C	Max Press. MPa	Max Temp °C	Limit SG kg/m3
Stainless Steel SS316T	V52R* V62R* V83R V80R*	52 62 83 80	52 61 81 76	15 15 15 23	4.0 3.2 2.5 2.5	250 250 250 250	727 597 412 617
Titanium Gr 2	T52R T62R T80R	52 62 80	52 62 76	15 15 23	2.5 2.5 2.5	250 250 250	623 482 866

Ex Stock
Special floats available on request

Tank Dimensions and Calibration

The movement of the float along the sensor shaft produces a linear change in resistance. Using the head mounted transmitter unit this change in resistance can be programmed to produce a current that is linear with change in volume. A 4 to 20 mA display will therefore directly indicate the contents of the tank. Bintech will program the transmitter using the key dimensions of the tank. Both vertical and horizontal bullet tanks may be programmed as required. When ordering the 2000 series sensors with a transmitter, the tank dimensions as shown below, need to be provided.



L =	mm	H =	mm	C =	mm
D =	mm	S =	mm	Volume =	kl

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Ordering Information

BI-12- Mounting — Housing — Float — Contact Separation — Transmitter — Sensor

Mounting	
20	LPG 8 Hole (Note 1)
30	4 Hole (Note 2)
40	ANSI Flange (Note 3)
50	NPT Screwed (Note4)
60	BSP Screwed (Note4)
70	Other - specify

Housing	
10	Stainless Steel Exd
20	None (Flying lead)
30	Aluminium IP65
40	Other - specify

Float
ZTS200
B40/120
P44R/150

Contact Separation	
K5	5 mm spacing
K10	10 mm
K18	18 mm

Transmitter	
TA	PR5343B
TS	XT42
TD	Hart
TE	XT42 SI

Sensor
mm

Note 1: Fits Magnatel 8 hole flange
Note 2: Fits Rochester Senior Gauge 4 hole 2.5 inch pcd
Note 3: Specifiy size & rating, eg. 3” ANSI 300 lb
Note 4: Specify size

Example: A sensor with a stainless steel head, titanium float with 18 mm contacts PR5343B transmitter for an U/G 17.4 kl tank with LPG 8 hole flange would be 2010-ZTS200-K18-TA -2500. The manufacturer supplied tank dimensions are: L= 3242, H=600, D=2340, S=2500 (with C=40) and V =17.4

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