

## FLOAT LEVEL SWITCH

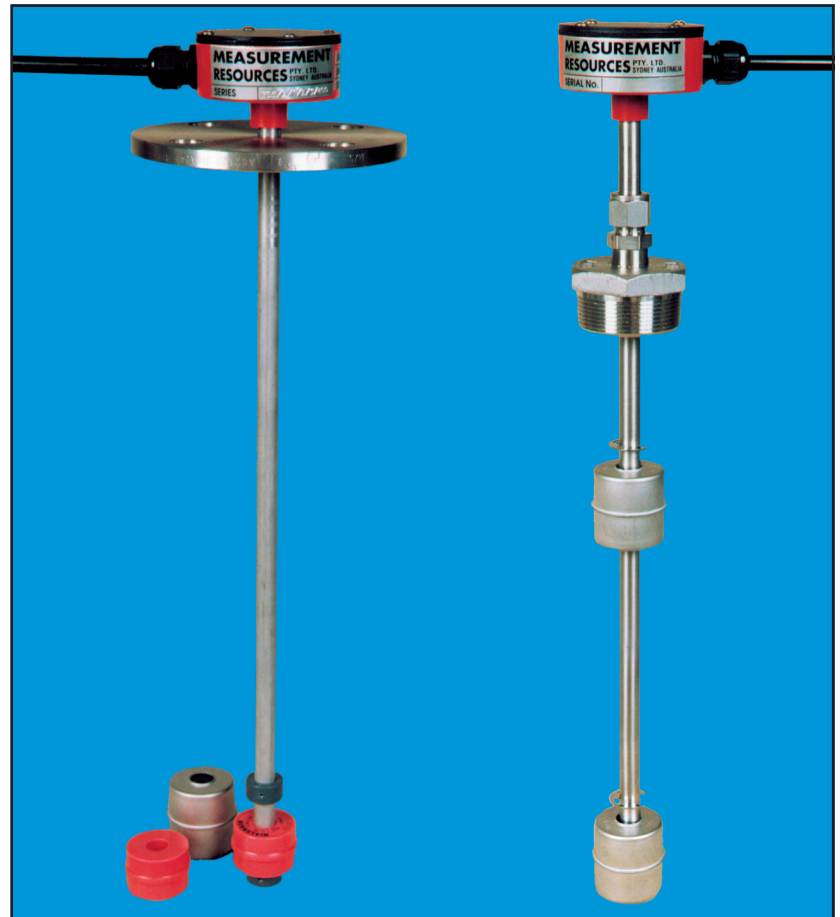
**Industrial**

**Marine**

**Liquid Level**

**Control-  
alarm duties**

**Large bouyant  
floats for lower  
specific gravity**



### **Single or Multi Point**

A versatile range of top or side installation, vertical float level switches offering 1, 2 or 3 switch actions per unit. Designed for alarm and control applications in water, oils and chemical storage tanks and process vessels using the proven magnet and reed switch technology. A permanent magnet is contained within the float which, being bouyant, moves up and down with liquid level change.

Total float travel is restricted by stops to ensure positive magnetic linkage with the reed switch. Hermetically sealed reed switch contacts within the stem change over as the float passes. Switch operation is therefore a direct reading of liquid level eliminating electronic and mechanical transmission or calibration errors found in other systems.

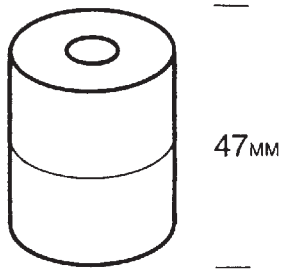
### **Custom Built**

### **Choice of Float Materials**

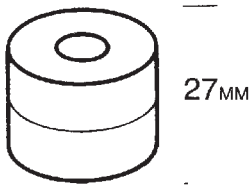
Typical applications are high and or low alarm and pump control. Materials in contact with the liquid and vapours include stainless steel, or polyophylene methylene floats. Stainless steel stems with top of tank terminal enclosure in aluminium. Stainless steel flange or screwed connections making for compatibility with most liquids.

All FLS Series switches are manufactured in Measurement Resources Sydney factory, where we have the expertise and facilities to build standard and non-standard units all within a tight QA/QC environment.

# STANDARD FLOATS



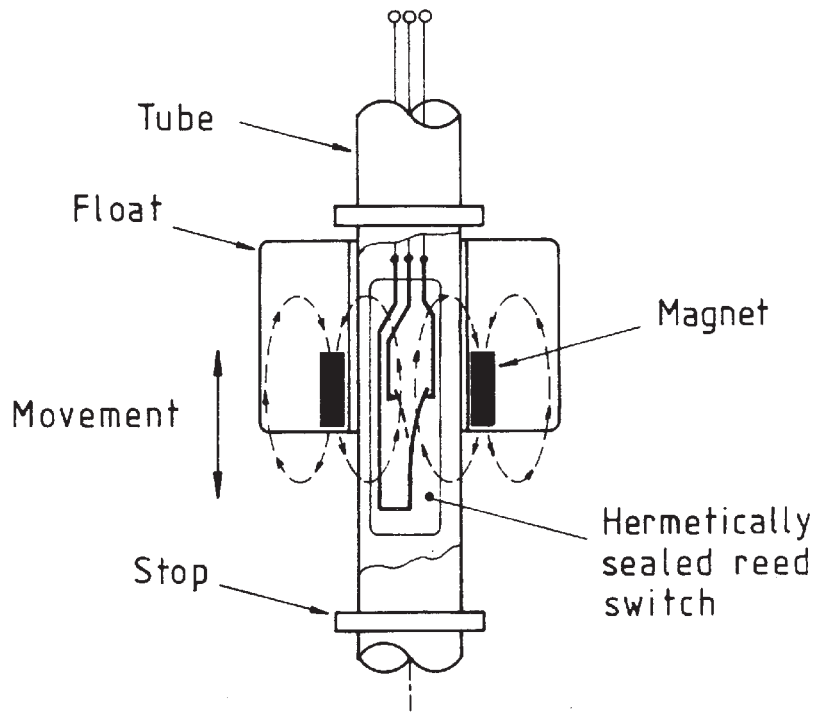
Ø 45MM  
STAINLESS STEEL 304



Ø 40MM  
POLYOPHLENE METHALENE

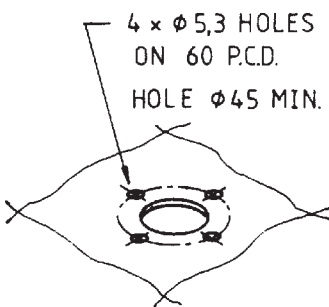
# MAGNET REED SWITCH OPERATION

SHOWING STANDARD SINGLE POLE CHANGE OVER SWITCH OPERATION



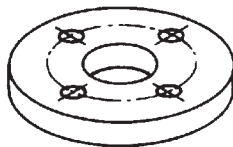
# PROCESS CONNECTION

## Standard Fitting

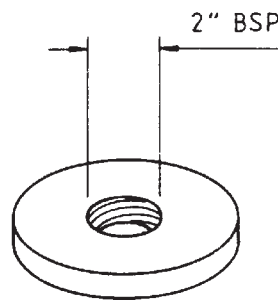


## Bolted Flange

A.S. 2129 - TABLE 'E'  
50mm NOM. BORE MIN.



## Screw Fitting



# SPECIFICATION

## Switch Electrical Rating

0.5 amp 240 volts AC 30 V.A.

## Terminal Enclosure

Die-cast aluminium alloy weatherproof to IP65

## Electrical Entry

PG11 cable gland, Internal terminal strip

## Process Connection

Flanged or screwed minimum opening to clear float (see above)

## Switch Temperature Rating

-5° to + 70°C continuous

## Specify Gravity

0.7 to 1.0

## Pressure Rating Floats

Float code 2 - 2000 kPa @ 150°C

Float code 1 - 1000 kPa @ 100°C

# FLOAT LEVEL SWITCHES

## ORDER CODE

### FLS FLOAT LEVEL SWITCH

FLS	CODE	NUMBER OF SWITCH ACTIONS (SEE BACK PAGE)						
	A	One switch action change over contact 3 way terminal						
	B	Two switch action change over contact 6 way terminal						
	C	Three switch action change over contact 9 way terminal						
	X	Special requirement (Consult Factory)						
		CODE	FLOAT MATERIAL					
		1	POM Polyophylene methalene					
		2	Stainless Steel type 304					
			CODE	STEM MATERIAL				
			A	Stainless Steel				
			B	Other Consult Factory				
				CODE	PROCESS CONNECTION			
				10	Standard fitting bolts to top of tank			
				11	Standard fitting bolts side of tank			
				12	Flanged 2" Table E Stainless Steel Bolts to top of tank			
				13	Screwed 2" B.S.P. Stainless Steel screws into top of tank			
					<i>All above top of tank process connections can be fitted with stem compression gland allowing switch point (or points) to be adjusted <math>\pm 70</math>mm Add suffix ADJ to above code.</i>			
				99	Special requirement consult factory.			
					CODE	DIMENSION L1 (SEE BACK PAGE)		
					XX	Distance in mm from underside of connection to top switch point		
						CODE	DIMENSION L2 (SEE BACK PAGE)	
						XX	Distance in mm from underside of connection to middle switch point	
							CODE DIMENSION L (SEE BACK PAGE)	
						XX	Distance in mm from underside of connection to bottom switch point	
FLS	B	1	A	10	XX	XX	XX	<b>TYPICAL ORDER CODE</b>

When option ADJ is specified in the order code, this results in the FLS being manufactured with the stem assembly being fixed to the tank connection via a stainless steel compression gland. This construction allows the complete terminal enclosure, stem and floats to be raised or lowered in relation to the top of the tank by  $\pm 70$  mm. Note all multi point models all switch points are moved.

**NOTE:** Maximum Stem Length 3000mm in Stainless Steel  
Minimum Length 100mm in Stainless Steel

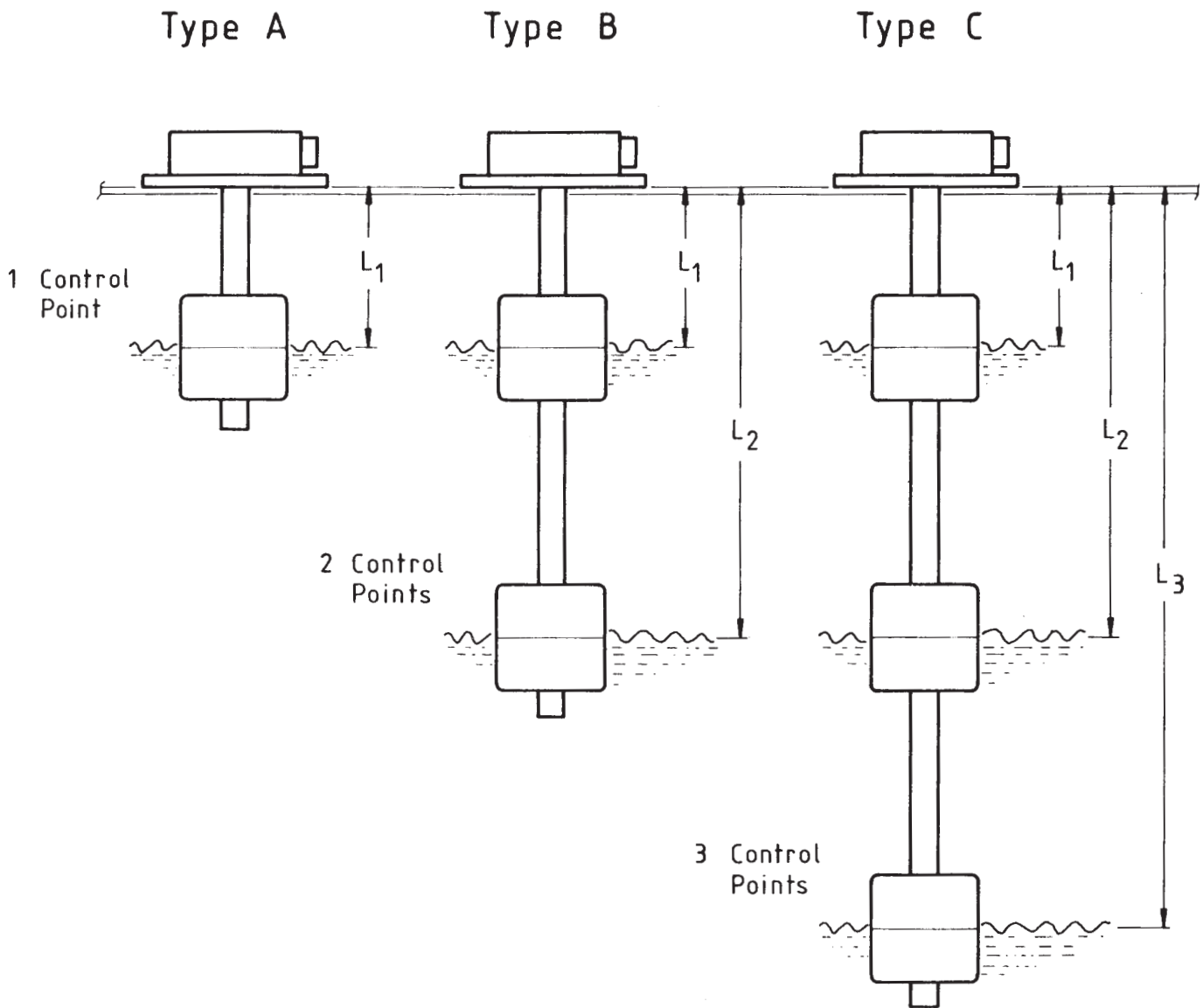
When more than three (3) switch actions are required a common interconnection is made to one side of each reed switch. This interconnection arrangement can be

provided on above standard models as requested. If required, special FLS can be manufactured with several switch points, or with process connections and material of construction to suit existing tank connections or processes. Please consult factory.

The FLS Series is part of Measurement Resources' extensive range of level indicators and controls including self-powered mechanical, pneumatic, hydrostatic and ultrasonic sensors. They are supported by analogue and digital indicator monitors and controllers.

Please ask for further information.

# STANDARD SWITCHING OPTIONS



*Measurement Resources Pty Ltd is committed to the development, manufacture and distribution of Level, Pressure, Temperature, Flow Sensors and Controls.*

*It's market is Australasia and South East Asia. It regards quality of customer service and product as prime objectives.*

*This Australian company is totally owned by the employees.*

**Measurement Resources Pty Ltd**  
A.B.N. 62 003 247 738

33-37 College Street  
PO Box 145 Gladesville NSW 2111 Australia  
Telephone: (61-2) 9816 3377 Fax: (61-2) 9816 3806  
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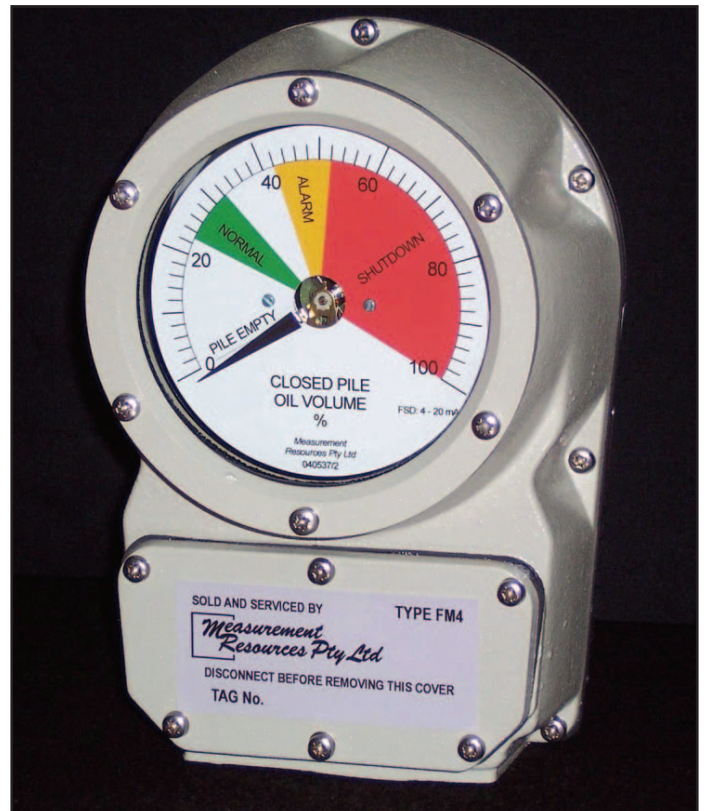
PRINTED IN AUSTRALIA

## ANALOGUE ELECTRICAL INDICATOR

**WEATHERPROOF  
SEALING TO IP 66**

**SAFE & HAZARDOUS  
AREA USE**

**EASY TO READ  
ANALOGUE DISPLAY IN  
YOUR PREFERRED UNITS**



**240 DEGREE  
MOVING COIL  
INDICATOR**

**EPOXY COATED STRONG  
METAL CASE WITH  
TOUGHENED GLASS WINDOW**

**SUITABLE FOR  
SURFACE, PANEL OR  
PIPE MOUNTING**

The FM4 series is designed to provide in plant, operator friendly indication. At a glance the analogue display clearly shows process variable and rate of change.

A 4-20 mA value can be shown in any customer preferred engineering unit, representing Temperature, Level, Flow, Pressure or other measured variables.

The indicator is suitable for both safe and hazardous areas predominately found on plant in tough petrochemical oil and gas sites. Offshore marine and water treatment plants are also users of the indicator.

The strong epoxy-coated die cast case, sealed to IP66 with a 5mm toughened glass window, withstands dust and hosing.

The FM4 uses a proven high quality jewel pivot movement system. Manufactured with military standard components. The movement is inherently reliable and accurate.

Mounting arrangements can be surface or bulkhead mounted using the mounting straps supplied or onto a panel using 5 mm screws (this requires rear panel access). A further alternative is horizontal or vertical pipe mounting using the optional pipe mounting kit. The indicator is easy to install and maintenance free.

The indicator is offered with ATEX Certification. Supporting Australian documentation can also be supplied.

## Specifications & Construction

### Input

4-20mA

### Pointer Deflection

240°

### Accuracy

-1.0 % at 20°C

### Ambient Temperature

-25°C to +70°C

### Case

Epoxy-Coated Die Cast LM6 Alloy

### Window

5mm Toughened Glass

### Gasket

Hypalon

### Weather Proof Protection

IP66 (Protected Against Dust and Water Ingress)

### Movement

Shock & Vibration Resistant Pivot and Jewel suspension

### Dial

100mm Flat Metal Dial, Colour White

### Weight

2.1 Kg (Excluding Fittings)

### Order Code

## Hazardous Atmosphere

### Certified Ranges

4-20 mA dc

### Movement Resistance

4 ohms min

### Max Inductance

195 uH

### Intrinsically Safe Certification ia

Cert No: SIRA 03 ATEX2270

### Energy Limitation Certification nL

Cert No. SIRA 03 ATEX4271

### Ambient Temperature Limits

-20°C to +40°C

### Dimensions

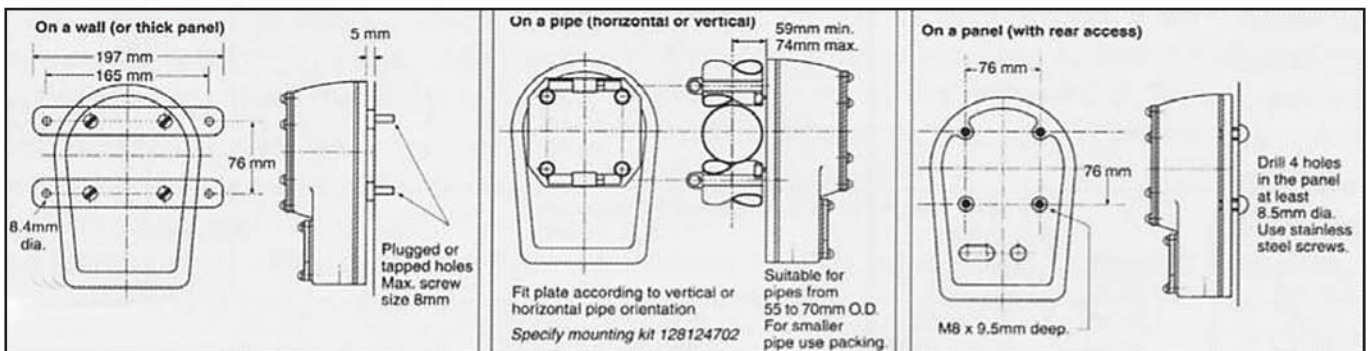
See Diagrams

### Calibration

Dial markings in your preferred units.  
See Order Code.

CODE				
FM4	FM Series Analogue Electrical Indicator			
	CODE	MOUNTING ARRANGEMENT		
	A	Wall Surface using Mounting Straps		
	B	Pipe using Vertical/horizontal 55 to 70 mm pipe mounting kit		
	C	On Panel using rear access screw fitting		
		CODE	DIAL MARKINGS	
		1	4 to 20mA	
		2	0 to 100%	
		3	Square Root	
		4	Other: advise your requirements	
			CODE	CERTIFICATION
			A	EEx ia IIC T6
			B	EEx nL IIC T6
FM4	A	1	A	TYPICAL ORDER CODE

## Mounting and Connection Details



33 – 37 College Street  
 P.O. Box 145 Gladesville NSW 2111 Australia  
 Telephone: (61-2) 9816 3377 Fax: (61-2) 9816 3806  
 Email: [sydney@measurement-resources.com.au](mailto:sydney@measurement-resources.com.au)  
 Website: [www.measurement-resources.com.au](http://www.measurement-resources.com.au)



## SELF POWERED CONTENTS GAUGE

MARINE  
INDUSTRIAL  
AND  
VEHICULAR  
LIQUID  
LEVEL  
APPLICATIONS



### HYDROCARBONS

The 100 Series converts the hydrostatic head pressure of liquid in a vented tank to give accurate continuous remote contents gauging.

The gauge is completely self powered without the need of batteries, electrical or pneumatic supply. This makes it totally safe for use in flameproof/explosion proof and Zone 0 areas.

The principle of operation makes the 100 Series ideal for tanks or compartments with foaming, vaporising, or turbulent liquids. These are applications which result in significant errors for gauges using buoyancy, capacitance change or reflective principles. Hydrostatic head pressure operation greatly reduces indication errors caused by pitching and rolling of the tank, commonly experienced in marine and vehicular duties.

The gauge is supplied complete, only requiring site connection to the tank to provide accurate continuous reading, without need of additional services, site programming or calibration.

The 100 Series offers a choice of tank mounted

### CHEMICALS

sensors to suit the application, including versions to match the original KDG standard tank connections.

The sensor diaphragm balances the hydrostatic pressure of the liquid within the tank. This pressure is transmitted to a precision capsule operated indicator via a fine bore, inert gas charged, sealed and sheathed capillary. The indicator scale may be calibrated in any unit of mass, head or volume. The 100 Series can be used for any shape vessel, tank or compartment and provide full-scale indication for level change.

The use of an inert gas filled and sealed capillary reduces temperature effect errors, and allows the dial indicator to be positioned above, below or at the same level as the tank sensor.

The use of a stainless steel fully weatherproof indicator together with the options offered for sensor wetted parts and capillary enable compatible construction for a wide range of liquids and hostile environments, where accurate continuous gauging is required.

### WATER

# SPECIFICATION

## Accuracy

Maximum error  $\pm 1.0\%$  of range

## Overload

200% of range

## Optional Temperature

Sensor –  $10^{\circ}\text{C}$  to  $+ 100^{\circ}\text{C}$

Indicator –  $10^{\circ}\text{C}$  to  $+ 50^{\circ}\text{C}$

## Weatherproof Protection

Sensor – IP67

Indicator – IP65

## Indicators

100mm, 160mm and 250mm diameter stainless steel

## Capillary Length

3 metres (standard)

Up to 20 metres maximum (Code A or B)

## Calibration

Dial marked in customer specified mass, head or volume units, and tank reference.

## Measurement Range

Tank Depths 1 through 15 metres.

## Sensor

E All type 316 stainless steel welded body and diaphragm. Rear screwed capillary connection; 3/4" BSP female running nut connection to tank.

EF All type 316 stainless steel welded flange and diaphragm. 4" Table E flanged connection to tank.

EFM As above but with Teflon® mask and gasket to process.

IF Type 316 stainless steel sensor welded to 20mm stainless steel support pole. Stainless steel 4" Table E flanged connection to tank.

IM Type 316 stainless steel sensor, stainless steel mounting bracket, stainless capillary to stainless steel top of tank bulkhead plate.

100	CODE	CONNECTION TO TANK			
	E	Stainless steel type 316, connection and all wetted parts, 3/4" BSP female running nut			
	EF	4" Table E stainless steel type 316 front flange and all wetted parts			
	EFM	Similar to EF above, but with teflon/mask & gasket.			
	IF	Stainless steel type 316 complete sensor and 20mm support pole, stainless steel 4" Table E flange			
	IM	Stainless steel type 316 complete sensor			
		CODE	INDICATOR		
		1	160mm stainless steel wall mounting (back flange)		
		2	160mm stainless steel panel mounting (U clamp)		
		3	100mm stainless steel wall mounting (back flange)		
		4	100mm stainless steel panel mounting (U clamp)		
	5	250mm stainless steel wall mounting (back flange)			
		CODE	INTERCONNECTING CAPILLARY		
		A	Fine bore heavy duty copper with outer sheath fire retardant grade plastic compound yellow colour.		
		B	Fine bore stainless steel within an outer of flexible stainless steel.		
			CODE	CAPILLARY LENGTH	
			3	3 metres	
			5	5 metres	
			10	10 metres	
			20	20 metres	
100	EF	1	A	10	TYPICAL ORDER CODE

**ALSO ADVISE DETAILS OF TANK SHAPE AND SIZE, LIQUID AND CALIBRATION UNITS. AT TIME OF ORDER OR COMPLETE OUR QUESTIONNAIRE FORM.**

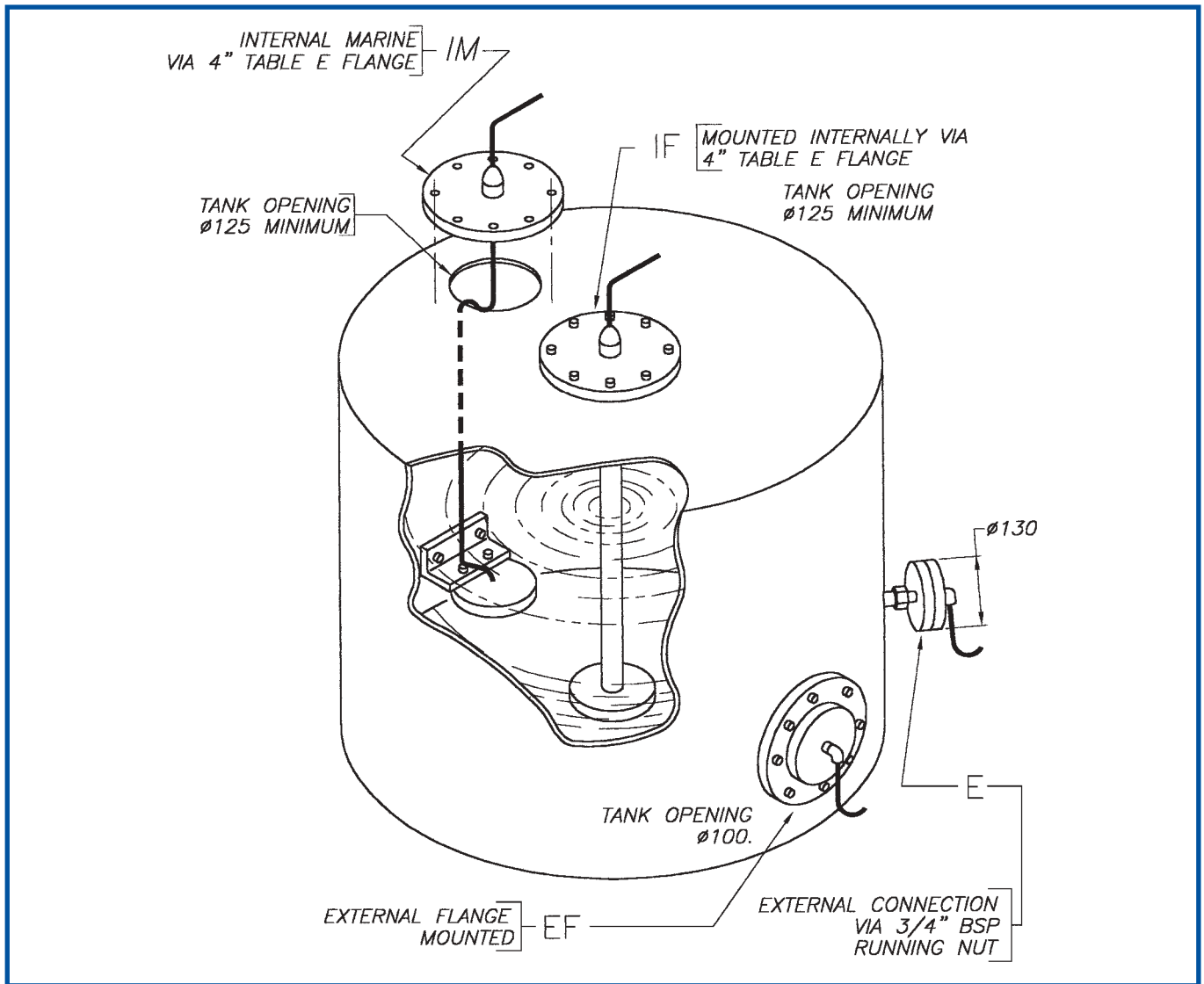
## OPTIONAL EXTRAS:

- Indicator dial with two scales (eg Litres/Kgs)
- For shallow tank with high overloads (Typically marine double bottom tanks), additional overload protection)
- Special tank connection flanges and fittings
- High temperature liquid calibration
- Two remote indicators from one tank sensor
- Tank isolation valve for E sensors
- Special calibration to maximum error  $\pm 0.5\%$  of range

Teflon® is a registered trademark of Dupont.



## TYPICAL SENSOR INSTALLATION



Order Code: 100EF1A3



Order Code: 100E1B3

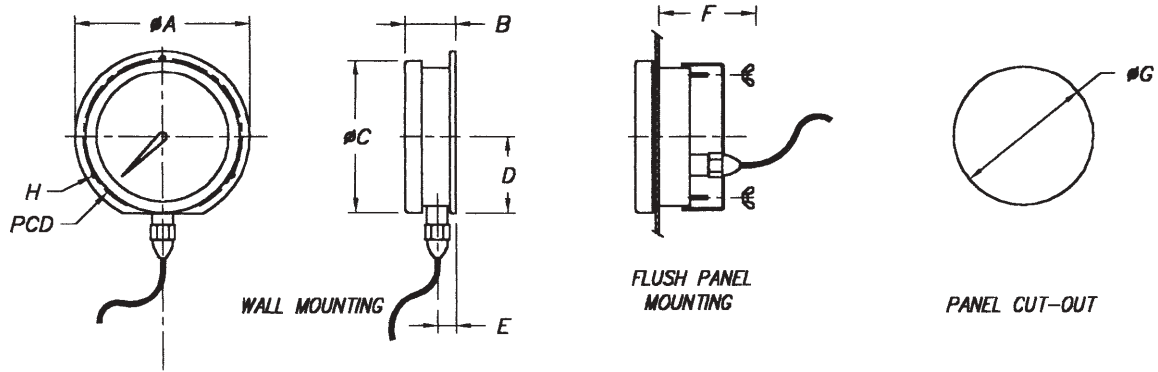


## SENSOR APPLICATIONS

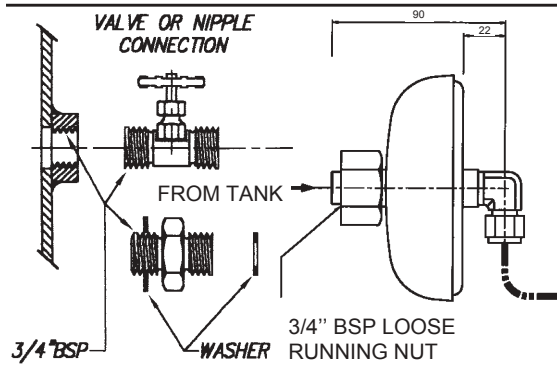
- IF Normally used on 'in-ground' and existing tanks or situations where tank connection is required above liquid level. Suitable for light and viscous liquids. Sensor bolts to tank top.
- E Most widely used; suitable for all but hygienic and viscous duties. Sensor screws onto male tank or valve 3/4" BSP connection.
- EF Suitable for viscous and hygienic duties where flush process contact is required.
- EFM Similar to EF but with Teflon<sup>®</sup> mask and gasket in contact with process fluid for corrosive applications.
- IM Mainly used in ship tanks or compartments where no external access is possible; and also solves limited head room problems. When using IM installation specify length between sensor and bulkhead plate and total length.

# GENERAL OUTLINE

(Dimensions mm)

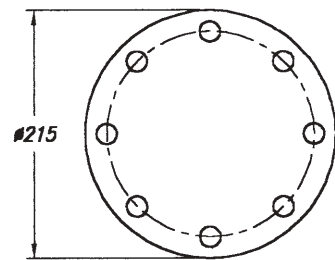


100 Series	DIMENSIONS IN mm								
	$\varnothing A$	B	$\varnothing C$	D	E	F	$\varnothing G$	$\varnothing H$	PCD
100 NOM. DIA.	133	52	112	55	18	80	100	5	117
160 NOM. DIA.	196	61	173	86	20	80	158	5	178
250 NOM. DIA.	285	58	250	142.5	20	—	—	6	270



4" FLANGE,  
TABLE E, AS2129

(8) M16 BOLTS  
ON 178 P.C.D.



## ALTERNATIVE LEVEL TRANSMITTERS AND INDICATORS



13 Sirius Rd, Lane Cove, NSW 2066  
Telephone: +61 (0)2 9428 7377 • Facsimile: +61 (0)2 9428 7379 • Email: [mr@hmagroup.com.au](mailto:mr@hmagroup.com.au)

[www.hmagroup.com.au](http://www.hmagroup.com.au)

Measurement Resources Pty Ltd : ABN 62 003 247 738

## ELECTRONIC LEVEL TRANSMITTER

MARINE - WATER  
AND  
PROCESS  
INDUSTRIES  
LIQUID LEVEL AND  
CONTENTS  
APPLICATIONS  
HYDROSTATIC  
OPERATION



### INTRINSICALLY SAFE

The 200A Series transmitters measures liquid level directly by the hydrostatic head pressure principle. Not subject to the inherent limitations and errors of buoyancy, capacitance change, or reflecting type sensors when applied to foaming, vaporising, or turbulent liquids. Hydrostatic head sensors are also ideally suited to marine and vehicular duties where the tank is subject to pitching and rolling.

The 200A transmitter is based on the well proven Linear Variable Differential Transformer (L.V.D.T.) produced in volume over several years by Measurement Resources. Improved assembly techniques use advanced electron beam fusion welding and temperature aging to ensure long term stability. The transmitter also features:

- ◆ Use of a flush Hastelloy diaphragm
- ◆ Cable outer sheath in Teflon \*
- ◆ Improved temperature coefficient, over a wider range
- ◆ Meeting International requirements for RFI/EMI and surge immunity
- ◆ Reduced sensor mass
- ◆ Optional integral digital indicator
- ◆ Wider choice of process connections

### SUBMERSIBLE - SCREWED FLANGED - HYGIENIC MODELS

Providing easier installation, improved performance, greater compatibility with corrosive, viscous and sanitary processes over a wider process and ambient temperature, greater surge and lightning immunity.

The 200A Series uses split architecture with a sensor in contact with the liquid, an interconnecting cable to the transmitter which encloses all active electronics. This arrangement improves stability and accuracy by removing the electronics from the process liquid and process temperature. Presenting span, zero and sensor adjustment in an accessible convenient form assisting commissioning and any through life calibration or adjustments.

The sensor can be screwed or flanged to the process tank or vessel, or alternatively submerged within the liquid.

The transmitter produces an industry standard two wire 4-20mA 24V dc output suitable for use with propriety systems or conventional monitors.

\* Teflon® is a registered trademark of Dupont.

### MARINE APPROVED

# SPECIFICATION

**Accuracy** -  $\pm 0.25\%$  of full range output; includes effects of linearity hysteresis and repeatability. (Optional  $0.1\%$  some models)

**Overload** - 500% of nominal range

**Operating Temperature** - Sensor -  $-10$  to  $95^{\circ}\text{C}$ ; (Optional  $+150^{\circ}\text{C}$ ); Transmitter  $-10$  to  $+55^{\circ}\text{C}$ . (Optional  $60^{\circ}\text{C}$ )

**Temperature Coefficient** -  $\pm 0.05\%/^{\circ}\text{C}$  range and zero. (Optional  $\pm 0.02\%/^{\circ}\text{C}$ )

**Weatherproof Protection** - Transmitter - IP65  
Sensor - Submersible

**Span Adjustment** - 0-30% to 0-100% of nominal range

**Zero Adjustment** -  $\pm 10\%$  of span

**Power Supply** - 12 to 30 Volts DC loop powered

**Output** - 2 wire 4-20mA DC

**Maximum Load**

Supply voltage - 10 = OHMS  
0.02

**Construction**

**Sensor** - Stainless steel 316L body, Hastelloy C376 diaphragm. (Nylon protection. end cap on IS sensor installation), (Optional Monel 400 diaphragm or all inconel construction). Support pole and flanges stainless steel  
**Cable** - Heavy Duty TPE screened integral vent  
**Transmitter** - GRP internal screen and breather

**Optional Indicator** - Digital integral with transmitter. Linear display hydrostatic head or mA output

**Weight** - Depends on flange/connection. Typical IS sensor, 3M cable, transmitter - 2kg.

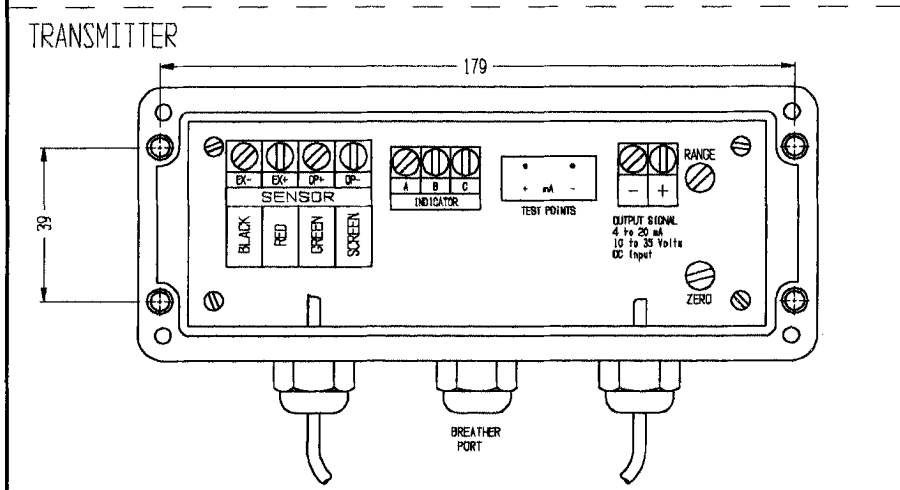
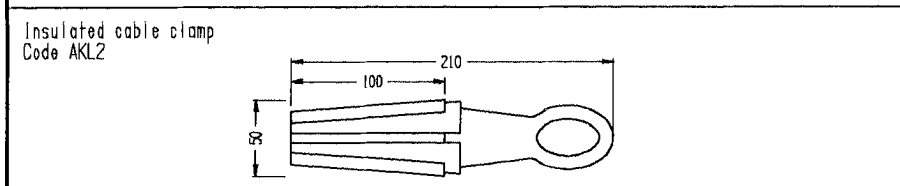
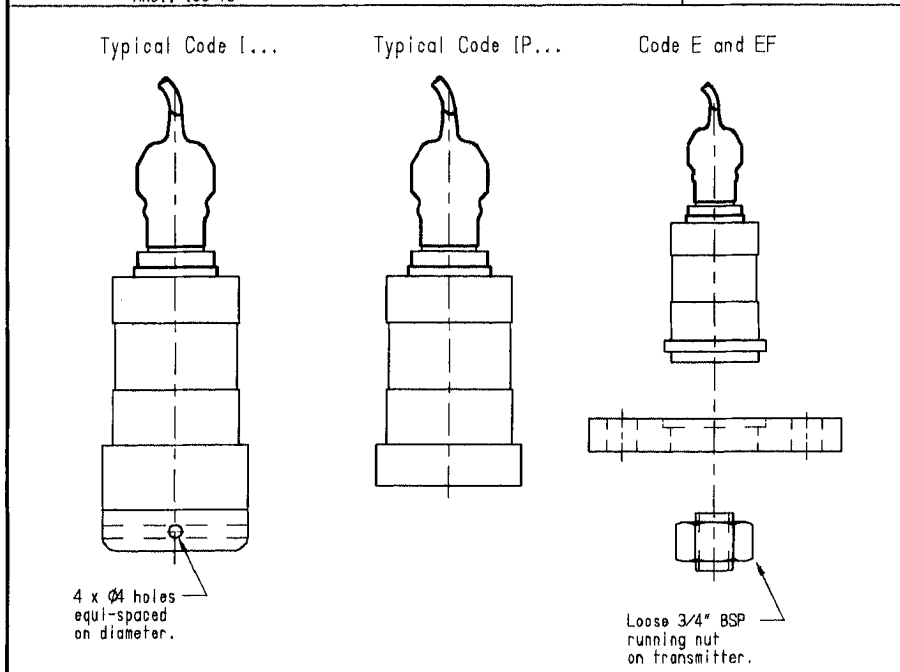
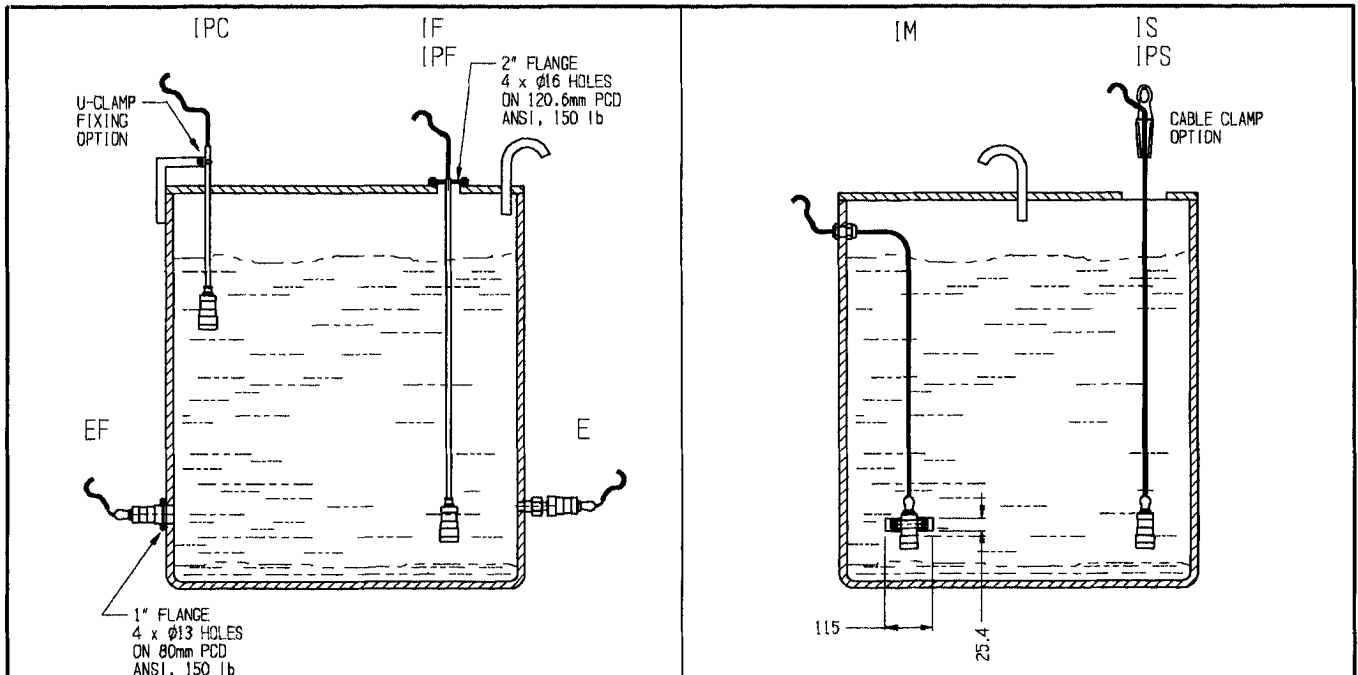
200A	CODE	SENSOR INSTALLATION ARRANGEMENT					
	IS	Submersible sensor suspended by cable (Optional cable clamp)					
	IM	Internally mounted via tank fixing clamp (included in price)					
	IF	Internally mounted via stainless steel pipe with 2" 150lb ANSI stainless steel flange connection through tank top (up to 2m pipe in price)					
	EF	Externally flanged to tank 1" 150lb ANSI stainless steel flange connection					
	E	Externally screwed 3/4" BSP stainless steel running nut connection					
	IPF	Internally mounted submersible sensor secured via stainless steel pipe (sensor diaphragm totally open to process fluid), used on sanitary duties 2" 150lb ANSI stainless steel flange.					
	IPC	Similar to IPF, but pipe U bolt mounting					
	IPS	Similar to IPF, but sensor suspended on cable					
	EH	External hygienic 2" BSM/RJT connection					
	EHT	External hygienic 2" Triclover connection					
	EHA	External hygienic 2" 3A standard connection					
		CODE	SENSOR MATERIALS IN CONTACT WITH PROCESS				
		SC	Stainless steel type 316L body Hastelloy diaphragm		Stainless steel support pipe and flanges		
		SM	Stainless steel type 316L body Monel diaphragm		nylon cap on IS sensor		
		CODE	ACCURACY, LINEARITY, HYSTERESIS AND REPEATABILITY				
		S	0.25% of nominal range				
		H	0.1% of nominal range				
		CODE	NORMAL RANGE				
		1	0-1 metres hydrostatic head at SG 1.0				
		2	0-2 metres hydrostatic head at SG 1.0				
		4	0-4 metres hydrostatic head at SG 1.0				
		8	0-8 metres hydrostatic head at SG 1.0				
		16	0-16 meters hydrostatic head at SG 1.0				
		32	0-32 metres hydrostatic head at SG 1.0				
		50	0-50 metres hydrostatic head at SG 1.0				
		CODE	SPAN				
		XX	Specify actual span in mm				
		CODE	CABLE INTERCONNECTING SENSOR TO TRANSMITTER				
		X	Cable length in metres (3m included in base price)				
200A	IS	SC	S	2	1700	7	TYPICAL ORDER CODE

**ADVISE DETAILS OF TANK SHAPE AND SIZE WHEN USED WITH MONITOR FOR CONTENTS GAUGE APPLICATIONS.**

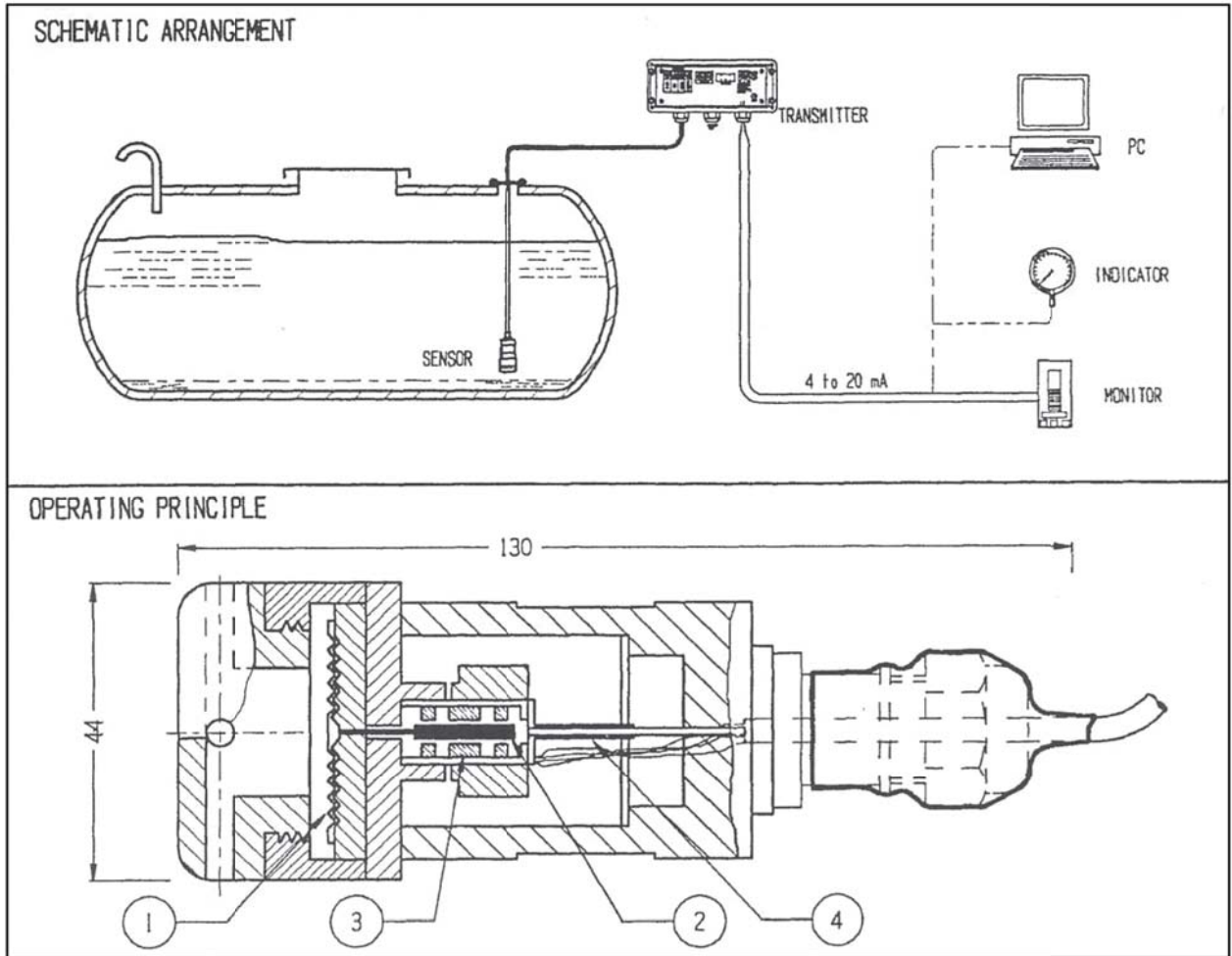
## Optional Extras

- Integral digital indicator
- All inconel construction
- Reference port for sealed tanks
- Special ranges
- Remote analogue and digital indicators
- Intrinsically safe barriers
- Mains to 28 volt D.C. power supply
- Cable clamp ALK2 for suspended version
- Spring loaded dry break (non-return valve) and spigot
- Extended temperature range.

# SENSOR INSTALLATION



- TYPICAL MODEL APPLICATION**
- IS** Water, diesel tanks, wells and reservoirs.
  - IM** Low viscosity liquids; marine and vehicular restricted headroom tank access.
  - IF** Water, diesel, inground tanks.
  - EF** Chemical and viscous products; storage and process tanks.
  - E** Water, fuel low viscosity liquids; storage and process tanks.
  - IPF** Sanitary and viscous products; storages and process tanks.
  - IPC** Sanitary and viscous products; clamp U bolt fixing pit, well and open channel flow.
  - IPS** Paint, ink, sewage wells.
  - EH** } Food, beverage; storage and process tanks.
  - EHT** }
  - EHA** }



The rated diaphragm 1 converts hydrostatic head pressure to linear movement. Deflecting the core 2 within the matched windings of a hollow cylindrical Linear Variable Differential Transformer (L.V.D.T.) 3. A breather tube 4 references the inside of the diaphragm to atmosphere for depth or vented tank duties, on sealed tanks the breather is connected to tank top. The L.V.D.T generates high level linear output enabling active electronics to be remote from the sensor with improved stability, reliability and accessibility.

## ALTERNATIVE LEVEL TRANSMITTERS AND INDICATORS



# HMA

**MEASUREMENT  
RESOURCES**

**CATALOG**



**Bourdon Tube Pressure Gauges**



**Superior  
Measurement  
Systems**

[www.hmagroup.com.au](http://www.hmagroup.com.au)

# Bourdon Tube Pressure Gauges

## Case and Bayonet Ring Stainless Steel Standard (RCh) or Liquid Filled (RChG)

NCS 100 mm (4")  
160 mm (6")  
250 mm (10")

Accuracy Class 1.0

Models

**RCh**  
**RChG**

### Application

For fluid and gaseous media (compatible to the wetted materials), which are not highly viscous and do not tend to polymerize, especially where a sealed case and/or chemical resistance are required.

### Nominal Case Sizes (NCS):

Model RCh: 100, 160, 250 mm (4", 6", 10")

Model RChG: 100, 160 mm (4", 6")

### Accuracy Class (EN 837-1)

1.0 (i.e.  $\pm 1.0\%$  f.s.)

### Pressure Ranges (EN 837-1)

Version – 1\*: 0-0.6 to 0-1000 bar, 0-10 to 0-15,000 psi

Version – 2\*: 0-1600 bar, 0-20,000 psi

Version – 3\*: 0-0.6 to 0-1600 bar, 0-10 to 0-20,000 psi

also corresponding vacuum and compound pressure ranges

(\*see below)

### Pressure Limitations

Steady pressure: full scale value

Cyclic pressure: 90% of full scale value

Overpressure: 130% of full scale value

### Protection Type (EN 60 529 / IEC 529)

Model RCh = IP 54 / Model RChG = IP 65

Further information about advantages, applications, specifications, temperature limitations and pressure ranges of Bourdon tube pressure gauges, accuracy classes 1.0 and 1.6 according to EN, can be found on **general information leaflet 1000**.

## Standard Configuration

### Process Connection

G ½ B (½" BSP) bottom connection, optionally: lower back (r)

### Wetted Parts

Ordering code –1:	Socket:	brass
	Bourdon tube:	$\leq 40$ bar = bronze, C-form, ( $\leq 800$ psi) soft soldered
		$\geq 60$ bar = 316 Ti (1.4571), ( $\geq 1,000$ psi) helical, silver brazed
Ordering code –2:	Socket <sup>2)</sup> :	316 Ti stainless steel (1.4571)
	Bourdon tube:	alloy steel, helical, argon arc welded
Ordering code –3:	Socket <sup>2)</sup> :	316 Ti stainless steel (1.4571)
	Bourdon tube:	argon arc welded, $\leq 40$ bar = 316 Ti (1.4571), ( $\leq 800$ psi) C-form
		$\geq 60$ bar = 316 Ti (1.4571), ( $\geq 1,000$ psi) helical <sup>3)</sup> ,
		1600 bar = NiFe-alloy, helical <sup>3)</sup> , (20,000 psi)

### Movement

Version –1 = brass/German silver; –2 and –3 = stainless steel

### Dial:

Aluminum alloy, black figures, white background

### Pointer:

Aluminum black

### Case and Ring

304 stainless steel (1.4301), bayonet ring

### Window

Version –1: single strength glass, –2 and –3: laminated safety glass

### Case Filling

Model RChG only: Glycerine

### Safety Features

RCh: 1" Blow-out ( $\varnothing$  25 mm) in the back of the case

RChG 100: Blow-out  $\varnothing$  40 mm ( $\sim 1.57$ ") in the back of the case, with pressure equalizing membrane

RChG 160: Top blow-out device



## Special Options

- Wetted parts **monel** = ordering code: – 6:  
pressure ranges 0-0.6 to 0-600 bar and 0-10 psi to 0-10,000 psi, Bourdon tube argon arc welded, stainless steel movement
- Process connection M 20 x 1.5, ½" NPT, G ¼ B, ¼" NPT, high-pressure connections; others upon request
- Inlet port restrictor screw brass, stainless steel, or monel
- Pressure ranges 0-2500 bar, 0-30,000 psi, 0-35,000 psi, version –2 or –3, pressure limitation at steady pressure: full scale value, at cyclic pressure: 65% of full span, HP-connection with M16x1.5 female and sealing cone for ¼" pipe; optionally with 9/16–18 UNF female or 9/16–18 UNF (left) male; others upon request
- Special scales, such as dual ranges, special units, fine division (with knife edge pointer) etc.
- Refrigerant gauge, see technical info. sheet T01-000-015
- Receiver gauges 0.2-1 bar or 3-15 psi
- Micro-adjustable pointer, mechanism aluminum
- Stationary red pointer on the dial
- Maximum-indicating pointer (pressure ranges  $\geq 0-2.5$  bar) or stationary red pointer with external adjustment, acrylic glass resp. polycarbonate lens
- Other than vertical installation; top or side connection
- NCS 100 or 160 (4", 6") for higher temperatures
- Other case fillings, e.g. silicone oil for low temperatures down to  $-40$  °C and others upon request
- Electrical accessories, see data sheets 1291 and 9000 ff

## How to Order:

Model code:	<b>RCh</b> (no case filling, IP 54) <b>RChG</b> (filled case, IP 65) <b>RCh(G)</b> (fillable case, IP 65)
Nominal case size:	<b>100, 160, 250</b>
Wetted parts:	<b>– 1, – 2 or – 3</b> (see left side)
Case configuration: (compare overleaf)	<b>r, Rh, rRh, Fr, rFr, rBFR</b> (standard case = bottom connection = without additional code letter)
Pressure range:	according to EN 837-1 <b>e.g. 0 - 4 bar or 0-60 bar</b>
Process connection:	<b>G ½ B</b> (½" BSP, standard) or <b>½" NPT</b> (others: see above)
Special options:	(see above)

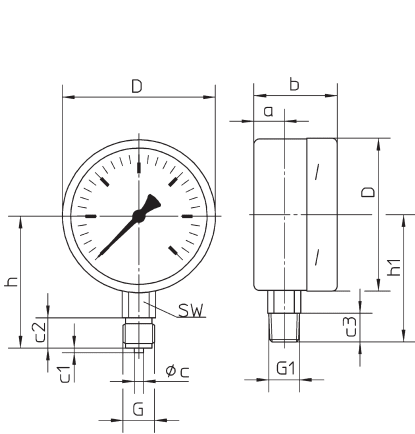
### Examples for Ordering Information:

- RCh 100–3 rFr, 0-6 bar, G ½ B (or ½" BSP)
- RChG 160–1, -1/+9 bar, ½" NPT

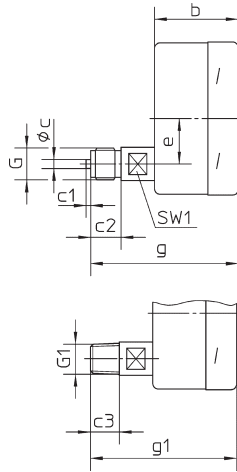


# Case Configuration, Code Letters, Dimensional Data and Weight

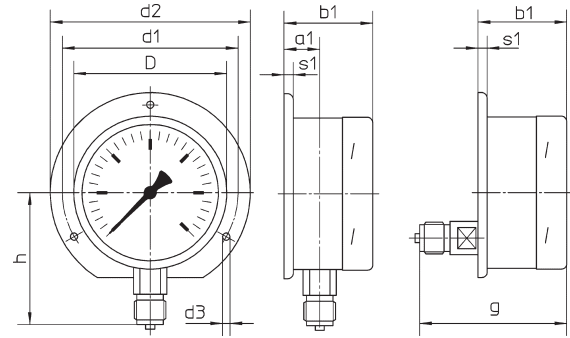
Bottom connection,  
without code letter



Lower back connection,  
code letter: **r**

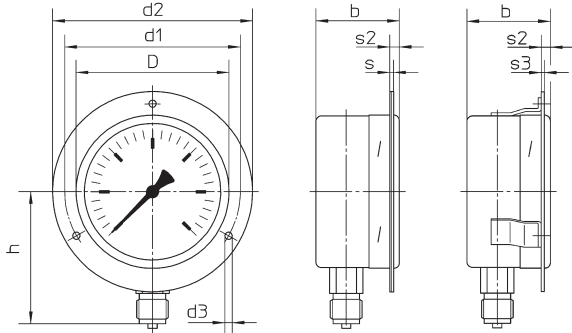


Bottom connection,  
rear mounting flange<sup>1)</sup>,  
code letters: **Rh**

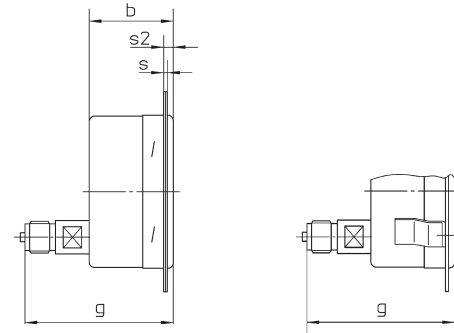


Lower back connection,  
rear mounting flange<sup>2)</sup>,  
code letters: **rRh**

Bottom connection, front mounting flange<sup>2)</sup>,  
code letters: **Fr**



Lower back connection, front mounting flange<sup>2)</sup>,  
code letters: **rFr**



**Dry case version, model RCh:**  
Front flange with longholes attached to the case, and a separate cover front flange

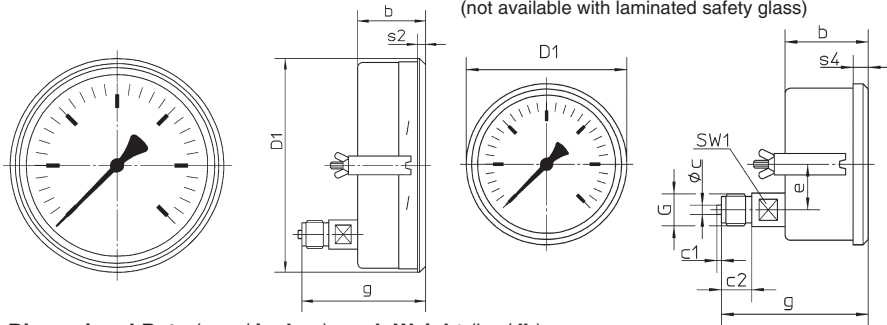
**Filled case version, model RChG:**  
Mounting brackets welded to the case, and a separate front flange

**Dry case version, model RCh:**  
Front flange with longholes attached to the case and a separate cover front flange

**Filled case version, model RChG:**  
Mounting brackets welded to the case, and a separate front flange

**Model RCh 160 (dry version) only:**  
Lower back connection,  
U-clamp for panel mounting,  
code letters: **rBFr**

**Nominal size 100 according data sheet 1202 only:**  
Lower back connection,  
U-clamp for panel mounting, crimped-on ring,  
Model: **RChg** resp. **RChgG 100... rBFr**  
(not available with laminated safety glass)

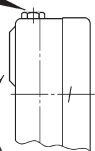


### Safety blow-outs:

Model RChG 160:  
Top blow-out device

Models RCh 100, 160, 250:  
Blow-out Ø 1" (25,4 mm)

Model RChG 100:  
Blow-out Ø 40 mm (~1.57")



### Dimensional Data (mm / inches) and Weight (kg / lb)

NCS	a	a1	b	b1	c	c1	c2	c3	D	D1	d1	d2	d3	e	g	g1
100 4"	20 .79	23.5 .93	55 2.17	58.5 2.30					101 3.98	106 4.17	116 4.57	132 5.20	4.8 .19	30 1.18	97 3.82	96 3.78
160 6"	15.5 .61	19 .75	51 2.01	54 2.13	6 .24	3 .12	20 .79	19 .75	161 6.34	167 6.57	178 7.08	196 7.72	5.8	52 2.05	92.5 3.64	91.5 3.60
250 10"		17.5 .69	58 2.28	60 2.36					251 9.88	—	270 10.63	285 11.22	.23		97 3.82	96 3.78

NCS	G	G1	h	h1	s	s1	s2	s3	s4	SW	SW1
100 4"			87 3.43	84 3.31					10 .39		
160 6"	G ½ B <sup>3)</sup> ½" BPS	½" NPT	115 4.53	114 4.49	.08	.24	.24	.04	—	22 .87	17 .67
250 10"			165 6.50	164 6.46	—	.08	—	—	—		

Weight (approx)	
RCh	RChG
.60	.95
1.30	2.10
1.10	1.95
2.40	4.30
2.10	—
4.60	—

<sup>1)</sup> RCh 250 with mtg. brackets welded to the case    <sup>2)</sup> not with nom. size 250    <sup>3)</sup> optional M 20 x 1,5

The information in this leaflet is given in good faith, but we reserve the right to make changes without notice.

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## NEW ZEALAND

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## Halley & Mellowes Australasia Group of Companies

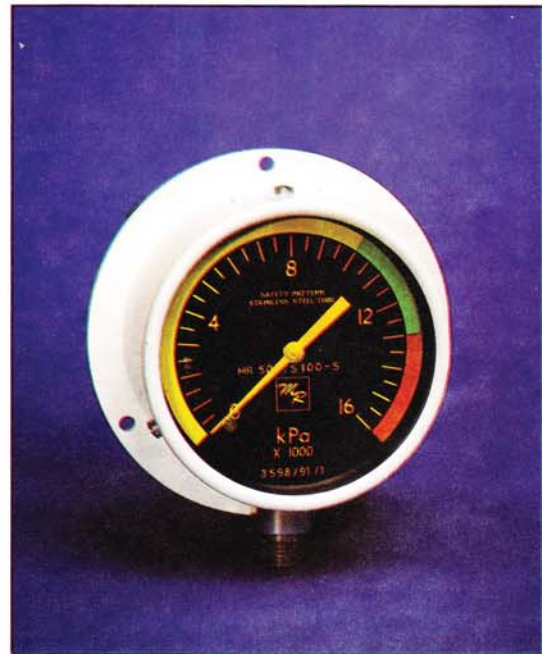
## SAFETY PATTERN PRESSURE GAUGES

FULL SAFETY PATTERN  
CONSTRUCTION

SAFETY GLASS WINDOW

MILITARY MARINE ACCEPTED

SHOCK AND ENDURANCE TESTED



Designed to be both inherently safe for any high pressure gas duty mechanically strong enough to meet the exacting Defence Industry shock and endurance testing specification

504 Series is manufactured in Europe by the company that invented the bourdon tube to Measurement Resources specifications with Australian calibration and testing.

504 Series are fully safety pattern construction.

While 504 is mainly found in the gas and power generation industries special options can be incorporated to meet particular requirements. The above illustration shows a variant currently being supplied in volume for a major Australian Defence program.

Meeting standards A.S. 1349-1986. Section 3.8.1 and 1780-1985 section 5.1.1. The gauges also meet European and Australian Standards.

### SPECIFICATION

#### Nominal Diameter

63, 100, 150, 200, 250, 300mm

#### Case & Bezel

Aluminium alloy. 25mm blown out disc push on bezel.

#### Window

Splinter proof safety glass

#### Pointer

Aluminium alloy balanced and black finish.

#### Movement

Standard brass plates and links, stainless steel pinions and arbor; optional all stainless steel or monel.

#### Scale

Standard black numerals on white background, colours optional.

#### Tube & Shank

Standard phosphor bronze tube silver soldered to brass connection. Option stainless steel or monel.

#### Connection

Standard 1/4, 3/8 or 1/2" BSP

#### Accuracy

Standard

error will not exceed 1% over 90% of scale

Option

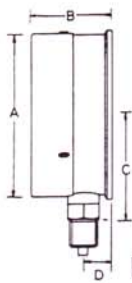
error will not exceed 0.25% of full scale

#### Overload

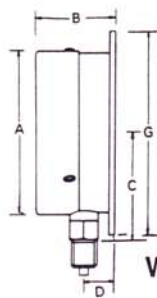
Up to 16,000 Kpa 25%

16,001 to 600,000 Kpa 15%

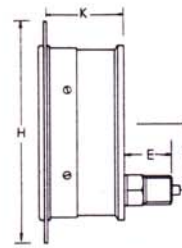
600,000 Kpa as above 10%



**DIRECT MOUNTING**



**WALL MOUNTING**



**FLUSH PANEL MOUNTING**

**Gauge Dimensions**

**GAUGE SIZE**

(mm) Nom.	A	B	C	D	E	F	G	H	K
63	68	42	46	17	29	22	89	89	38
100	102	49	65	20	30	35	127	133	41
150	159	56	102	19	38	54	181	187	57
200	205	53	142	22	38	54	235	232	52
250	256	60	152	24	38	54	292	305	52
300	307	60	178	24	38	54	343	368	52

**Standard Connections**

GAUGE SIZE (mm) Nom.	63	100, 150 & 200	250 & 300
Direct & Surface mounting	Up to 60 bar Above 60 bar	1/4" BSP 1/4" BSP	3/8" BSP 1/2" BSP
Flush mounting	All ranges	1/4" BSP	3/8" BSP

or corresponding API/NPT, and B.S.P. taper pipe thread

**Fixing Dimensions**

Gauge Size (mm) Nom.	SURFACE MOUNTING			FLUSH MOUNTING		
	P.C.D.	HOLE SIZE	PANEL CUT OUT	FLANGE DIA. MAX.	P.C.D.	HOLE SIZE
63	76	M4	70	90	78	M4
100	116	M5	112	134	121	M5
150	168	M5	165	188	175	M5
200	221	M5	215	240	225	M5
250	273	M6	270	305	285	M6
300	325	M6	330	370	345	M6

**ORDER CODE**

504	CODE	NOMINAL DIAMETER
	63	63mm
	100	100mm
	150	150mm
	200	200mm
	250	250mm
	300	300mm
	CODE	MOUNTING/INSTALLATION
	1	Direct mounting bottom connection
	2	Wall mounting back flange.
	3	Flush panel mounting clamp fixing
	CODE	PRESSURE CONNECTION
	A	B S P as above standard
	O	Other please advise
	CODE	PRESSURE RANGE KPa
	1	-100 to + 150
	2	-100 to + 300
	3	-100 to + 500
	4	-100 to + 900
	6	100
	7	160
	8	250
	9	400
	10	600
	11	800
	12	1 000
	13	1 600
	14	2 500
	15	4 000
	16	6 000
	17	8 000
	18	10 000
	19	16 000
	20	25 000
	21	40 000
	22	60 000
	23	80 000
	24	100 000
	CODE	ACCURACY
	A	Error not greater than 1% of range between 10% and 90% of range AS 1349
	B	Error not greater than 0.25% of range between 10% and 90% of range AS 1349
	CODE	CONSTRUCTION MATERIAL
	1	Standard aluminium case phosphol bronze tube.
	2	As above but stainless steel tube and movement.
	3	As above but monel tube and movement.
504	100	1 A 14 A 1 Typical Order Code



*Measurement Resources Pty Ltd*

A.C.N. 003 247 738

**HEAD OFFICE & FACTORY**

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Telephone: (02) 816 3377, Fax: (02) 816 3806

**SOUTH EAST REGIONAL OFFICE**

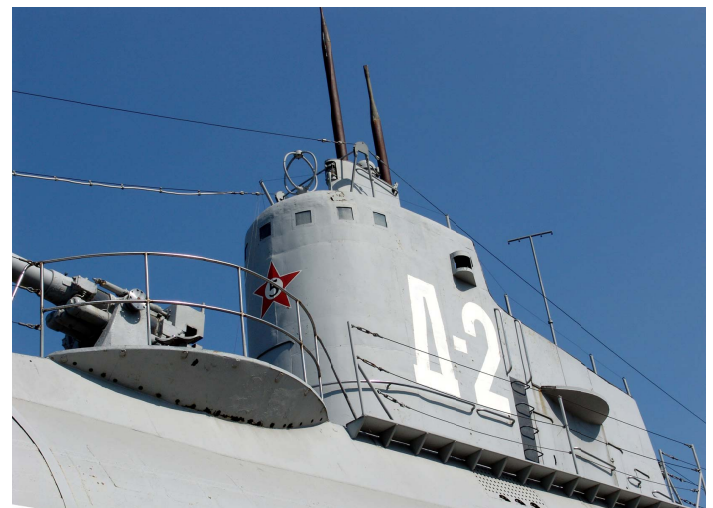
2nd Floor, 541 Blackburn Road  
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THE COMPANY RESERVES THE RIGHT TO MODIFY THIS DESIGN WITHOUT NOTIFICATION



# HMA

 **MEASUREMENT  
RESOURCES**



**MARINE SOLUTIONS**

**Superior  
Measurement  
Systems**

Committed People  Innovative Solutions

[www.hmagroup.com.au](http://www.hmagroup.com.au)

HMA Measurement Resources develops manufactures and distributes innovative measurement and control solutions for the process and marine industries.

Our market extends from Australasia, through Pacific Rim, Asia, Europe, Africa and North America. We regard quality of customer service and products as our prime objectives.

**Our activities include:**

- The design and manufacture of standard products
- Exclusive agent/licensee for innovative international brands
- In-house NATA accredited measurement laboratory in accordance with ISO/IEC 17025

**Our Attributes:**

- Royal Australian Navy supplier number Z3444
- Member of the Department of Defence Industrial Security Program
- Defence Recognised Supplier
- Bureau Veritas Certification (Level Gauges & Factory)
- Quality Management System to ISO 9001
- Solutions engineered products for special application
- Through-life product support



**Our skills and facilities enable us to provide support to an extensive range of instruments and controls including:**

Autrol	KDG Instruments	MPB	RTK Instruments
Besta	KSR	New Flow	Sarasota
Bopp & Reuther	KURZ	Peek	Sika
Dobbie McInnes	Lemis	PSM Instrumentation	Solartron
Hawker Electronics	Levelstate	Record	SSD
Heinrich Kübler	Micronics	Rotameter	Wyatt Flow
Hydrastep	Mobrey Measurement	Rototherm	



## SELF POWERED CONTENTS GAUGE

MARINE  
INDUSTRIAL  
AND  
VEHICULAR  
LIQUID  
LEVEL  
APPLICATIONS



### HYDROCARBONS

The 100 Series converts the hydrostatic head pressure of liquid in a vented tank to give accurate continuous remote contents gauging.

The gauge is completely self powered without the need of batteries, electrical or pneumatic supply. This makes it totally safe for use in flameproof/explosion proof and Zone 0 areas.

The principle of operation makes the 100 Series ideal for tanks or compartments with foaming, vaporising, or turbulent liquids. These are applications which result in significant errors for gauges using buoyancy, capacitance change or reflective principles. Hydrostatic head pressure operation greatly reduces indication errors caused by pitching and rolling of the tank, commonly experienced in marine and vehicular duties.

The gauge is supplied complete, only requiring site connection to the tank to provide accurate continuous reading, without need of additional services, site programming or calibration.

The 100 Series offers a choice of tank mounted

### CHEMICALS

sensors to suit the application, including versions to match the original KDG standard tank connections.

The sensor diaphragm balances the hydrostatic pressure of the liquid within the tank. This pressure is transmitted to a precision capsule operated indicator via a fine bore, inert gas charged, sealed and sheathed capillary. The indicator scale may be calibrated in any unit of mass, head or volume. The 100 Series can be used for any shape vessel, tank or compartment and provide full-scale indication for level change.

The use of an inert gas filled and sealed capillary reduces temperature effect errors, and allows the dial indicator to be positioned above, below or at the same level as the tank sensor.

The use of a stainless steel fully weatherproof indicator together with the options offered for sensor wetted parts and capillary enable compatible construction for a wide range of liquids and hostile environments, where accurate continuous gauging is required.

### WATER

# SPECIFICATION

## Accuracy

Maximum error  $\pm 1.0\%$  of range

## Overload

200% of range

## Optional Temperature

Sensor –  $-10^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$

Indicator –  $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$

## Weatherproof Protection

Sensor – IP67

Indicator – IP65

## Indicators

100mm, 160mm and 250mm diameter stainless steel

## Capillary Length

3 metres (standard)

Up to 20 metres maximum (Code A or B)

## Calibration

Dial marked in customer specified mass, head or volume units, and tank reference.

## Measurement Range

Tank Depths 1 through 15 metres.

## Sensor

E All type 316 stainless steel welded body and diaphragm. Rear screwed capillary connection; 3/4" BSP female running nut connection to tank.

EF All type 316 stainless steel welded flange and diaphragm. 4" Table E flanged connection to tank.

EFM As above but with Teflon® mask and gasket to process.

IF Type 316 stainless steel sensor welded to 20mm stainless steel support pole. Stainless steel 4" Table E flanged connection to tank.

IM Type 316 stainless steel sensor, stainless steel mounting bracket, stainless capillary to stainless steel top of tank bulkhead plate.

100	CODE	CONNECTION TO TANK			
	E	Stainless steel type 316, connection and all wetted parts, 3/4" BSP female running nut			
	EF	4" Table E stainless steel type 316 front flange and all wetted parts			
	EFM	Similar to EF above, but with teflon/mask & gasket.			
	IF	Stainless steel type 316 complete sensor and 20mm support pole, stainless steel 4" Table E flange			
	IM	Stainless steel type 316 complete sensor			
		CODE	INDICATOR		
		1	160mm stainless steel wall mounting (back flange)		
		2	160mm stainless steel panel mounting (U clamp)		
		3	100mm stainless steel wall mounting (back flange)		
		4	100mm stainless steel panel mounting (U clamp)		
	5	250mm stainless steel wall mounting (back flange)			
		CODE	INTERCONNECTING CAPILLARY		
		A	Fine bore heavy duty copper with outer sheath fire retardant grade plastic compound yellow colour.		
		B	Fine bore stainless steel within an outer of flexible stainless steel.		
			CODE	CAPILLARY LENGTH	
			3	3 metres	
			5	5 metres	
			10	10 metres	
			20	20 metres	
100	EF	1	A	10	TYPICAL ORDER CODE

**ALSO ADVISE DETAILS OF TANK SHAPE AND SIZE, LIQUID AND CALIBRATION UNITS. AT TIME OF ORDER OR COMPLETE OUR QUESTIONNAIRE FORM.**

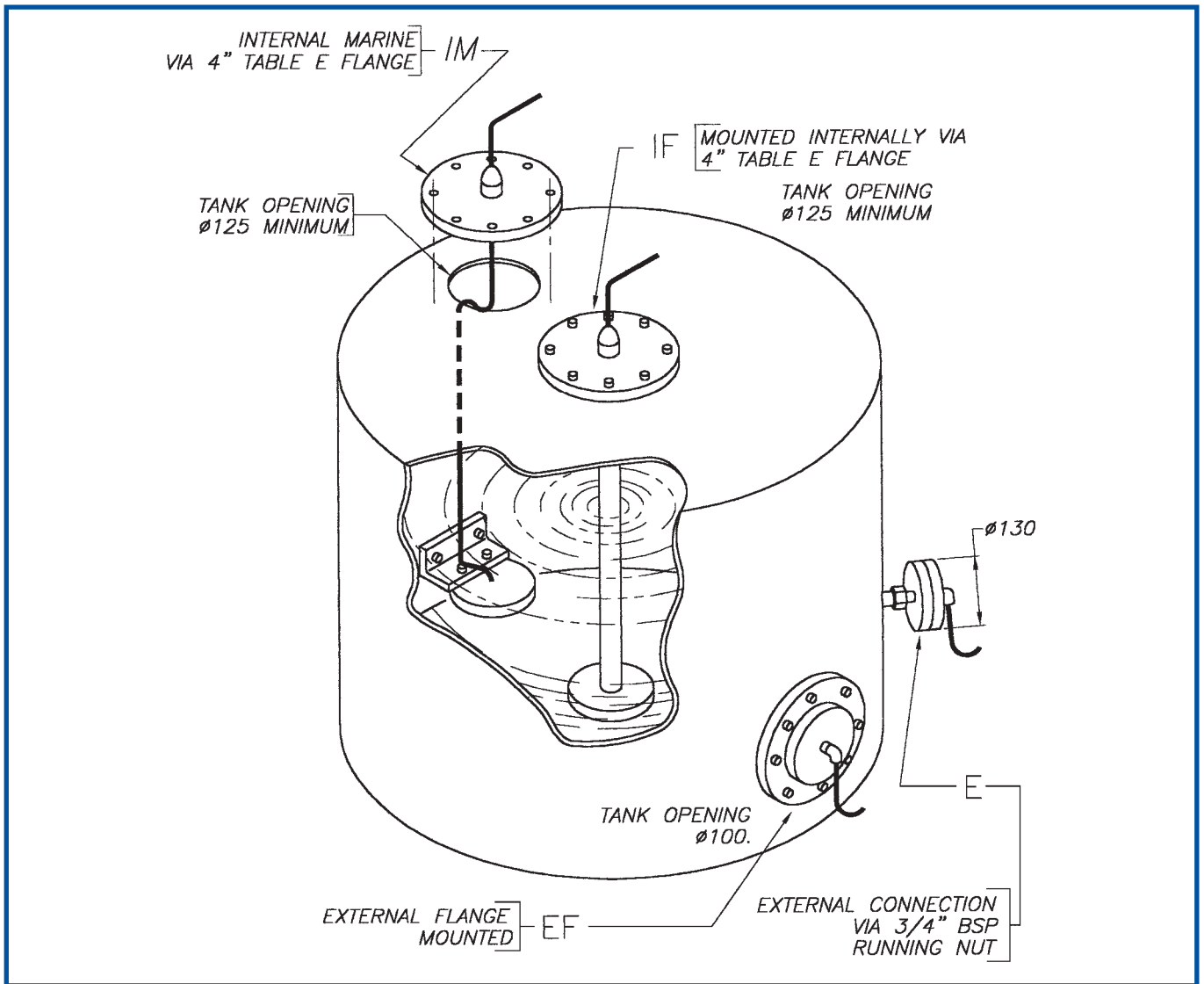
## OPTIONAL EXTRAS:

- Indicator dial with two scales (eg Litres/Kgs)
- For shallow tank with high overloads (Typically marine double bottom tanks), additional overload protection)
- Special tank connection flanges and fittings
- High temperature liquid calibration
- Two remote indicators from one tank sensor
- Tank isolation valve for E sensors
- Special calibration to maximum error  $\pm 0.5\%$  of range

Teflon® is a registered trademark of Dupont.



# TYPICAL SENSOR INSTALLATION



Order Code: 100EF1A3



Order Code: 100E1B3

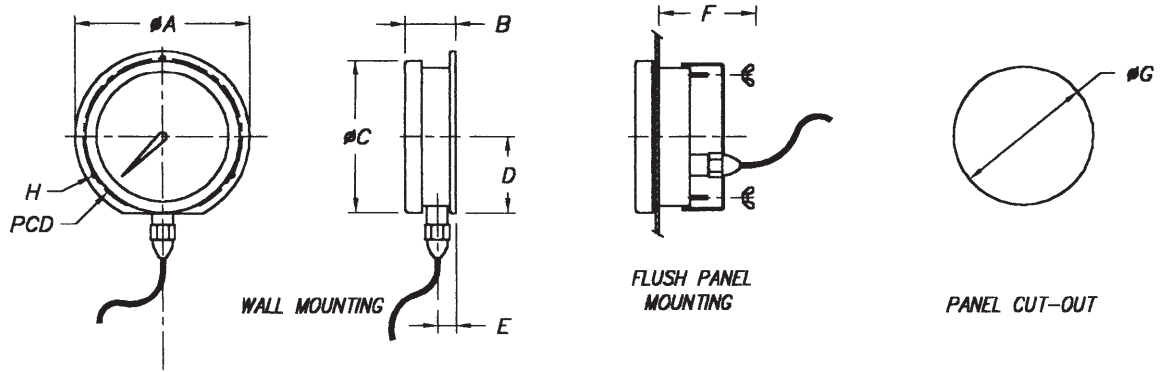


## SENSOR APPLICATIONS

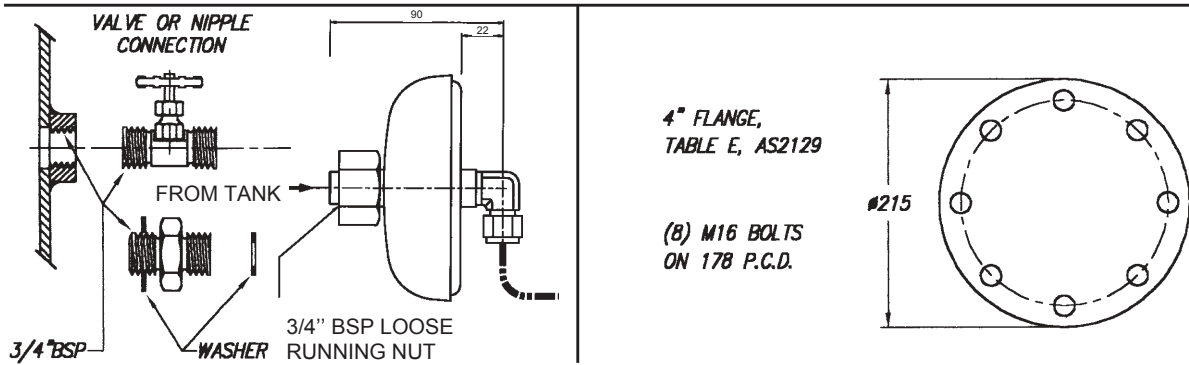
- IF Normally used on 'in-ground' and existing tanks or situations where tank connection is required above liquid level. Suitable for light and viscous liquids. Sensor bolts to tank top.
- E Most widely used; suitable for all but hygienic and viscous duties. Sensor screws onto male tank or valve 3/4" BSP connection.
- EF Suitable for viscous and hygienic duties where flush process contact is required.
- EFM Similar to EF but with Teflon<sup>®</sup> mask and gasket in contact with process fluid for corrosive applications.
- IM Mainly used in ship tanks or compartments where no external access is possible; and also solves limited head room problems. When using IM installation specify length between sensor and bulkhead plate and total length.

# GENERAL OUTLINE

(Dimensions mm)



100 Series	DIMENSIONS IN mm								
	$\varnothing A$	B	$\varnothing C$	D	E	F	$\varnothing G$	$\varnothing H$	PCD
100 NOM. DIA.	133	52	112	55	18	80	100	5	117
160 NOM. DIA.	196	61	173	86	20	80	158	5	178
250 NOM. DIA.	285	58	250	142.5	20	—	—	6	270



## ALTERNATIVE LEVEL TRANSMITTERS AND INDICATORS



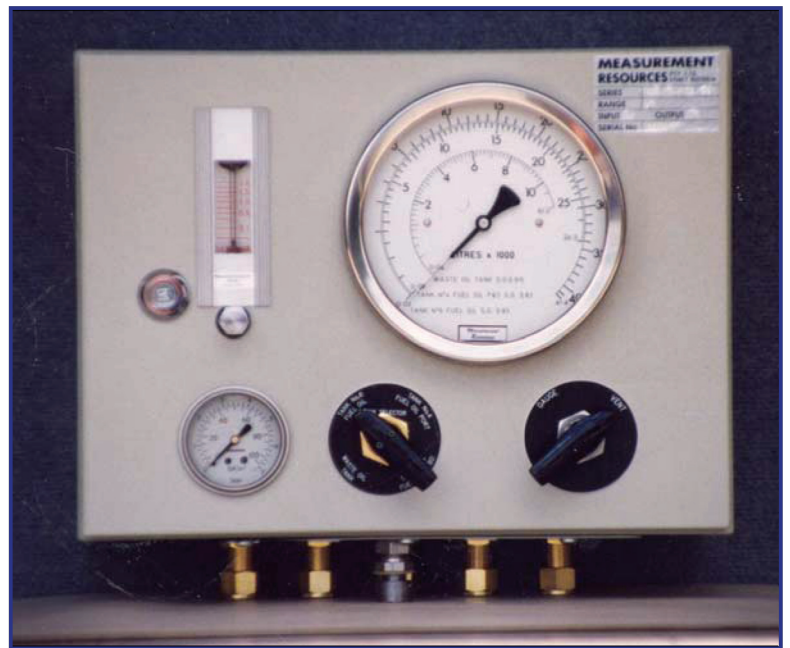
13 Sirius Rd, Lane Cove, NSW 2066  
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Measurement Resources Pty Ltd : ABN 62 003 247 738

## PNEUMATIC PURGE CONTENTS GAUGE

Marine - Industrial - Liquid Level Applications  
Typically - Water - Oil - Chemicals



### Accurate

### Economic

### Multi-Tank

### Any Calibration

Designed to utilise the well-proven bubbler (air reaction) technique to measure liquid level and/or contents. This series is packaged to meet application and site considerations, two standard versions are being offered.

The principal of operation is the back pressure in an air purged tube within the tank balances the hydrostatic head of liquid. The resultant pressure is applied to the indicator giving a read out in preferred engineering units.

**160C** used where constant indication is needed. Can monitor one to four levels. Using integral tank selector switching.

**160M** serves application where there is no constant air supply and only occasional spot reading required. Monitors one to four levels.

Both models incorporate a hand-calibrated indicator graduated in any preferred units of mass, head or volume. High quality valves to select

the level to be displayed and allow indicator zero to be checked. Instruments are supplied pre-piped suitable for wall bulkhead mounting.

The enclosure also comprises: -

**160C** Pneumatic supply pressure gauge. Constant flow regulator with indication and provision to site adjust rate to suit impulse pipe work and vary response time.

**160M** A hand-pump, which generates the air pressure, need to purge the bubbler tube and balance the static head of liquid.

Stand-pipes are available in a range of materials to suit the process liquid and are positioned vertically with the open end above any expected sludge level. For high viscosity applications, heavy-duty versions are supplied. Impulse pipe work between the instrument and tanks must be leak free and installed to ensure it reaches a point higher than anticipated liquid level.

# Specifications

## Accuracy

Maximum error not greater than plus/minus 1.0% of indicator full-scale deflection

## Overload

125% of range

## Operational Temperature

160 Series Enclosure: -10 to 60°C

## Maximum Temperature Stand Pipes

P.V.C. – 20 to + 70°C

Carbon Steel – 20 to + 200°C

Stainless Steel – 20 to + 400°C

## Weather Proof Protection

IP 54

## Air Consumption

160C factory set at 28 litres per hour site adjustable up to 56 maximum

## Weight

From 6kg Fibreglass to 8kg Steel Enclosure

## Calibration

Dial marked in any Engineering unit of mass, head or volume

## Transmission Distance

Up to 150 metres. It is however recommended that impulse pipeline be kept as short as practicable to minimize response time. Typical values of which are 50 metres pipe 1.5 seconds, 100 metres pipe 5 seconds, 150 metres pipe 10 seconds.

## Measurement

Range – 0 to 1 through to 65 metres at SG 1.0

## Interconnecting Pipework

6mm or 12mm installed to rise above tank vent level

## Air Supply

160C greater than liquid head not exceeding 690Kpa

## Valves

160C – tank selector

– gauge – vent

160M – tank selector

– gauge – vent – pump

## Order Code

CODE					
160					
	CODE				
	C	Continuous air supply required			
	M	Manual hand pump operation			
		CODE	NUMBER OF LEVELS TO BE MEASURED		
		1	Single		
		2	Two Way		
		3	Three Way		
		4	Four Way		
			CODE	ENCLOSURE	
			E.S.	Steel epoxy paint finish	
			E.F.	Fibreglass	
			CODE	PURGE LINE CONNECTION	
			6	6mm O.D.	
			12	12mm O.D.	
160	C	1	E.F.	6	TYPICAL ORDER CODE

Also advise details of tank, liquid and calibration units

## Optional Extras

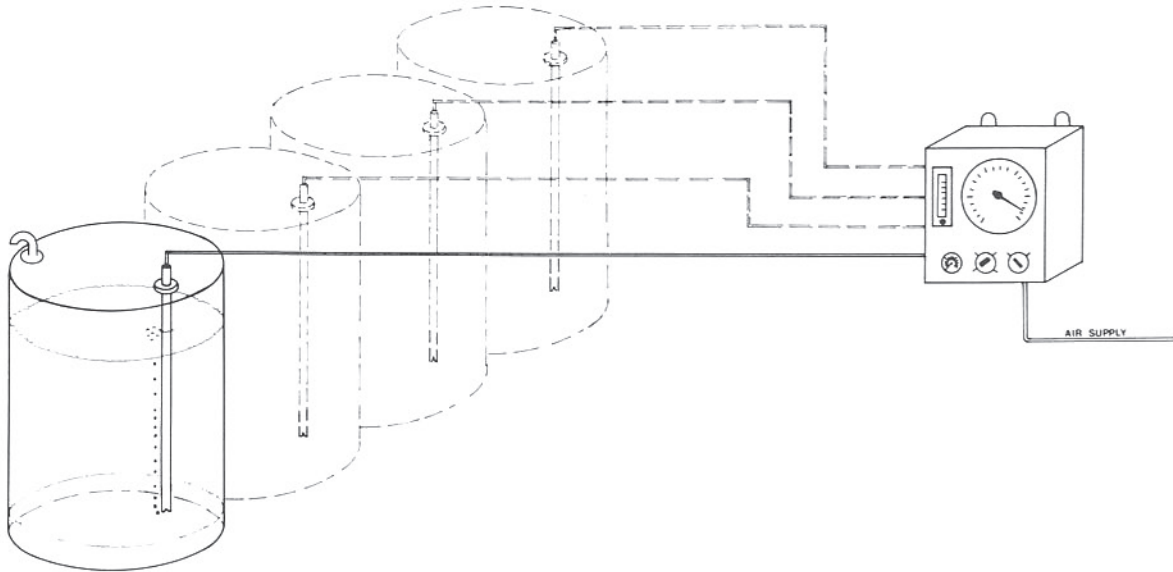
Internal dial with two scales (e.g. litres/tons)

Additional repeater indicators

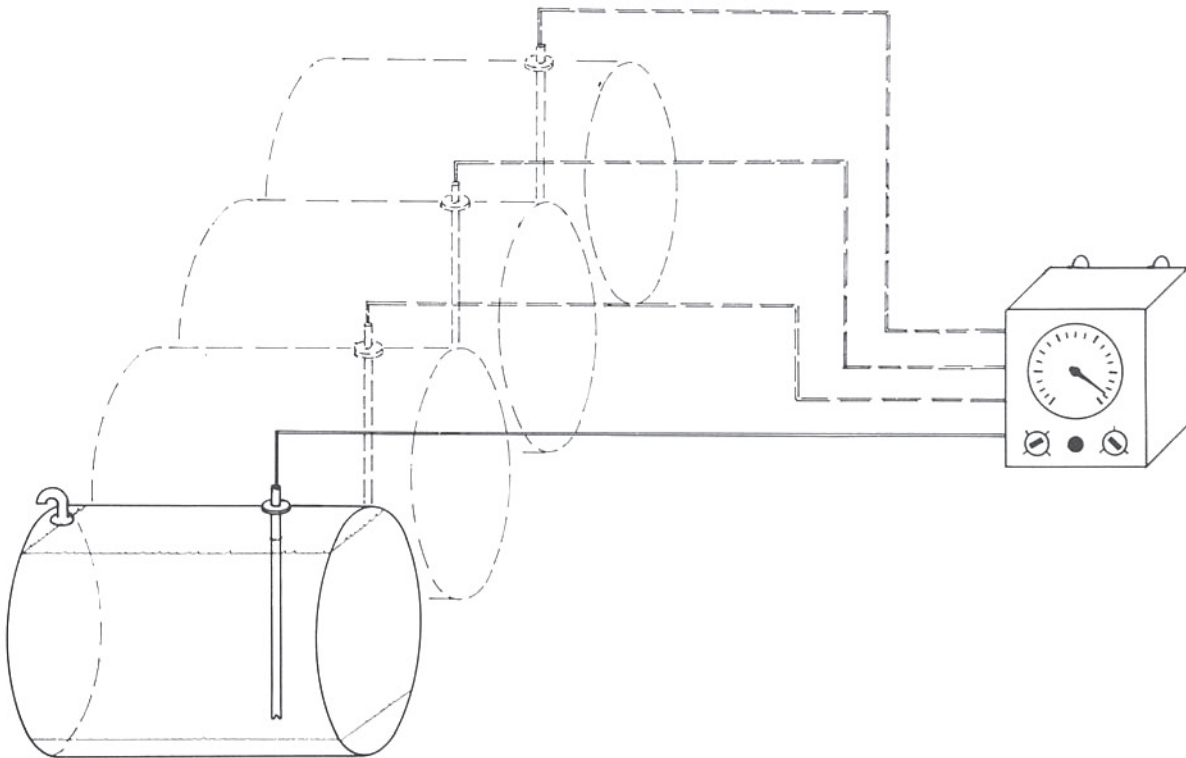
Stand pipes (bubble tubes) can be supplied pricing varies with length, material, tank connection, viscosity and duty.

## TYPICAL LAYOUT

### 160C CONSTANT INDICATION OF SELECTED LEVEL



### 160C SPOT READING OF SELECTED TANK AFTER HAND PUMP OPERATION

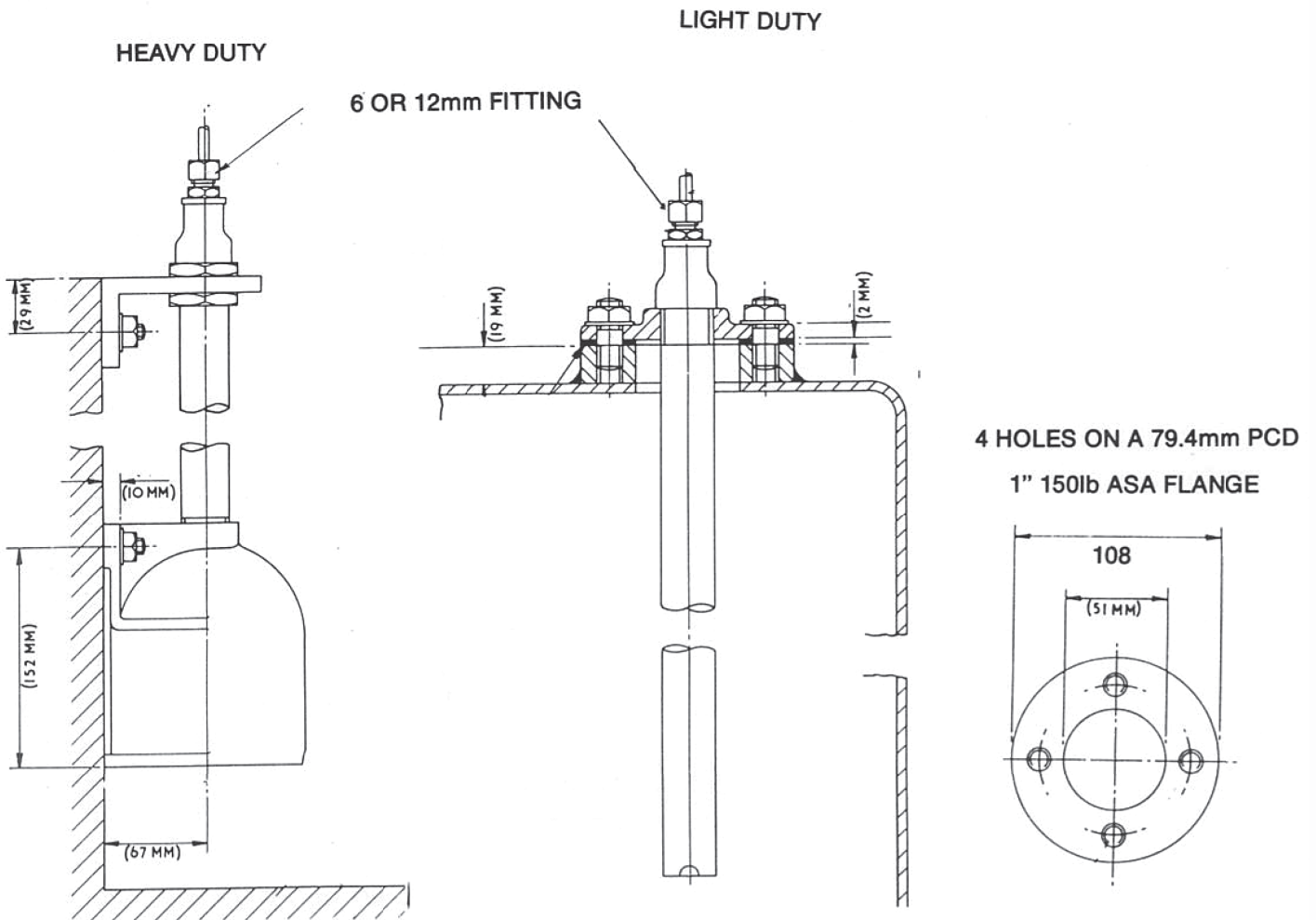


## INSTALLATION AND APPLICATION

Site layout may require the read out instrument to be mounted some distance from the tank. This will cause friction losses in 6mm pipework resulting in the indicator showing a higher level than actual liquid. This error is not significant on runs up to 20 metres but to maintain accuracy runs greater than this should use 12mm impulse pipe work.

It is recommended the pneumatic supply to the 160C be via a filter capable of removing water and oil content to less than one part in one million and filtering to below 5 micron.

## Typical Stand Pipe Installation



## ALTERNATIVE LEVEL TRANSMITTERS AND INDICATORS

An extensive range of 2 wire 4-20mA Level Hydrostatic & Ultrasonic Transmitters.



Self Powered Contents Gauge stainless steel sensor and indicator with flame retardant capillary.



**Measurement Resources Pty Ltd**  
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160/C/07



PRINTED IN AUSTRALIA

## ELECTRONIC LEVEL TRANSMITTER

MARINE - WATER

AND

PROCESS  
INDUSTRIES

LIQUID LEVEL AND  
CONTENTS  
APPLICATIONS

HYDROSTATIC  
OPERATION



### INTRINSICALLY SAFE

The 200A Series transmitters measures liquid level directly by the hydrostatic head pressure principle. Not subject to the inherent limitations and errors of buoyancy, capacitance change, or reflecting type sensors when applied to foaming, vaporising, or turbulent liquids. Hydrostatic head sensors are also ideally suited to marine and vehicular duties where the tank is subject to pitching and rolling.

The 200A transmitter is based on the well proven Linear Variable Differential Transformer (L.V.D.T.) produced in volume over several years by Measurement Resources. Improved assembly techniques use advanced electron beam fusion welding and temperature aging to ensure long term stability. The transmitter also features:

- ◆ Use of a flush Hastelloy diaphragm
- ◆ Cable outer sheath in Teflon \*
- ◆ Improved temperature coefficient, over a wider range
- ◆ Meeting International requirements for RFI/EMI and surge immunity
- ◆ Reduced sensor mass
- ◆ Optional integral digital indicator
- ◆ Wider choice of process connections

### SUBMERSIBLE - SCREWED FLANGED - HYGIENIC MODELS

Providing easier installation, improved performance, greater compatibility with corrosive, viscous and sanitary processes over a wider process and ambient temperature, greater surge and lightning immunity.

The 200A Series uses split architecture with a sensor in contact with the liquid, an interconnecting cable to the transmitter which encloses all active electronics. This arrangement improves stability and accuracy by removing the electronics from the process liquid and process temperature. Presenting span, zero and sensor adjustment in an accessible convenient form assisting commissioning and any through life calibration or adjustments.

The sensor can be screwed or flanged to the process tank or vessel, or alternatively submerged within the liquid.

The transmitter produces an industry standard two wire 4-20mA 24V dc output suitable for use with propriety systems or conventional monitors.

\* Teflon® is a registered trademark of Dupont.

### MARINE APPROVED

# SPECIFICATION

**Accuracy** -  $\pm 0.25\%$  of full range output; includes effects of linearity hysteresis and repeatability. (Optional  $0.1\%$  some models)

**Overload** - 500% of nominal range

**Operating Temperature** - Sensor -  $-10$  to  $95^{\circ}\text{C}$ ; (Optional  $+150^{\circ}\text{C}$ ); Transmitter  $-10$  to  $+55^{\circ}\text{C}$ . (Optional  $60^{\circ}\text{C}$ )

**Temperature Coefficient** -  $\pm 0.05\%/^{\circ}\text{C}$  range and zero. (Optional  $\pm 0.02\%/^{\circ}\text{C}$ )

**Weatherproof Protection** - Transmitter - IP65  
Sensor - Submersible

**Span Adjustment** - 0-30% to 0-100% of nominal range

**Zero Adjustment** -  $\pm 10\%$  of span

**Power Supply** - 12 to 30 Volts DC loop powered

**Output** - 2 wire 4-20mA DC

**Maximum Load**

Supply voltage - 10 = OHMS  
0.02

**Construction**

**Sensor** - Stainless steel 316L body, Hastelloy C376 diaphragm. (Nylon protection. end cap on IS sensor installation), (Optional Monel 400 diaphragm or all inconel construction). Support pole and flanges stainless steel  
**Cable** - Heavy Duty TPE screened integral vent  
**Transmitter** - GRP internal screen and breather

**Optional Indicator** - Digital integral with transmitter. Linear display hydrostatic head or mA output

**Weight** - Depends on flange/connection. Typical IS sensor, 3M cable, transmitter - 2kg.

200A	CODE	SENSOR INSTALLATION ARRANGEMENT					
	IS	Submersible sensor suspended by cable (Optional cable clamp)					
	IM	Internally mounted via tank fixing clamp (included in price)					
	IF	Internally mounted via stainless steel pipe with 2" 150lb ANSI stainless steel flange connection through tank top (up to 2m pipe in price)					
	EF	Externally flanged to tank 1" 150lb ANSI stainless steel flange connection					
	E	Externally screwed 3/4" BSP stainless steel running nut connection					
	IPF	Internally mounted submersible sensor secured via stainless steel pipe (sensor diaphragm totally open to process fluid), used on sanitary duties 2" 150lb ANSI stainless steel flange.					
	IPC	Similar to IPF, but pipe U bolt mounting					
	IPS	Similar to IPF, but sensor suspended on cable					
	EH	External hygienic 2" BSM/RJT connection					
	EHT	External hygienic 2" Triclover connection					
	EHA	External hygienic 2" 3A standard connection					
		CODE	SENSOR MATERIALS IN CONTACT WITH PROCESS				
		SC	Stainless steel type 316L body Hastelloy diaphragm		Stainless steel support pipe and flanges		
		SM	Stainless steel type 316L body Monel diaphragm		nylon cap on IS sensor		
		CODE	ACCURACY, LINEARITY, HYSTERESIS AND REPEATABILITY				
		S	0.25% of nominal range				
		H	0.1% of nominal range				
		CODE	NORMAL RANGE				
		1	0-1 metres hydrostatic head at SG 1.0				
		2	0-2 metres hydrostatic head at SG 1.0				
		4	0-4 metres hydrostatic head at SG 1.0				
		8	0-8 metres hydrostatic head at SG 1.0				
		16	0-16 meters hydrostatic head at SG 1.0				
		32	0-32 metres hydrostatic head at SG 1.0				
		50	0-50 metres hydrostatic head at SG 1.0				
		CODE	SPAN				
		XX	Specify actual span in mm				
		CODE	CABLE INTERCONNECTING SENSOR TO TRANSMITTER				
		X	Cable length in metres (3m included in base price)				
200A	IS	SC	S	2	1700	7	TYPICAL ORDER CODE

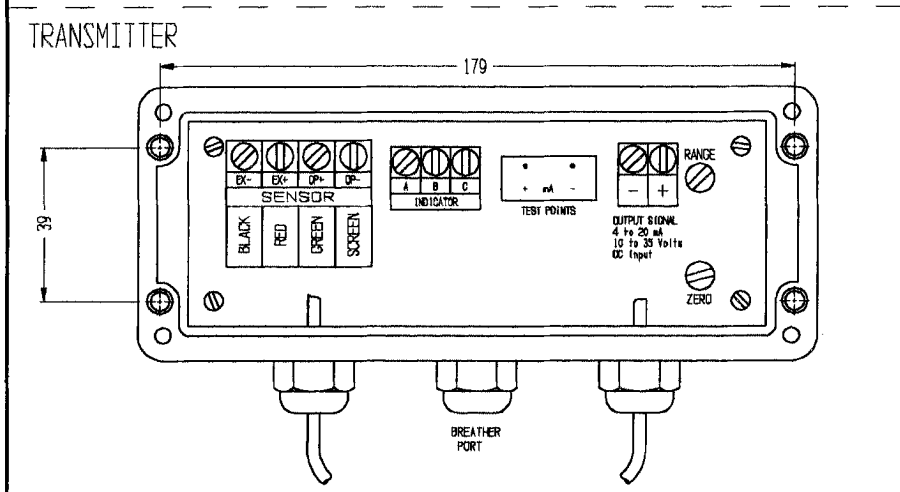
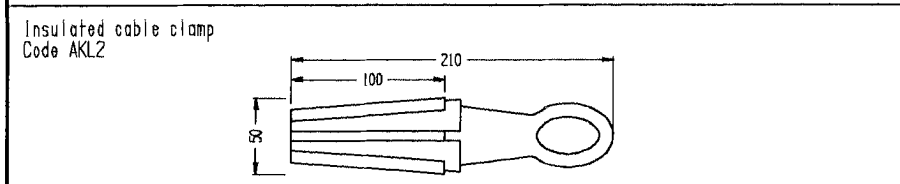
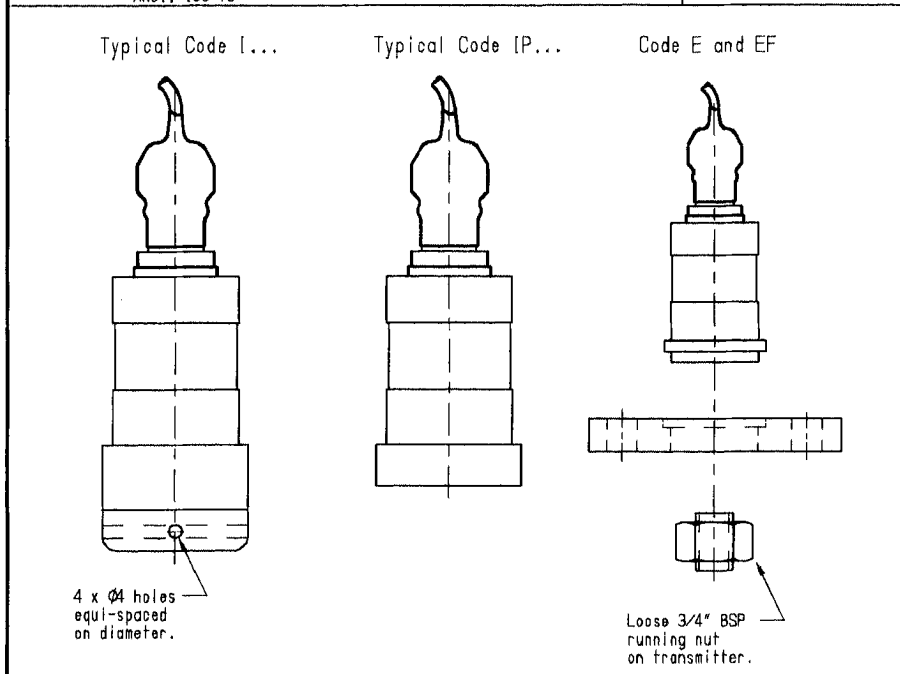
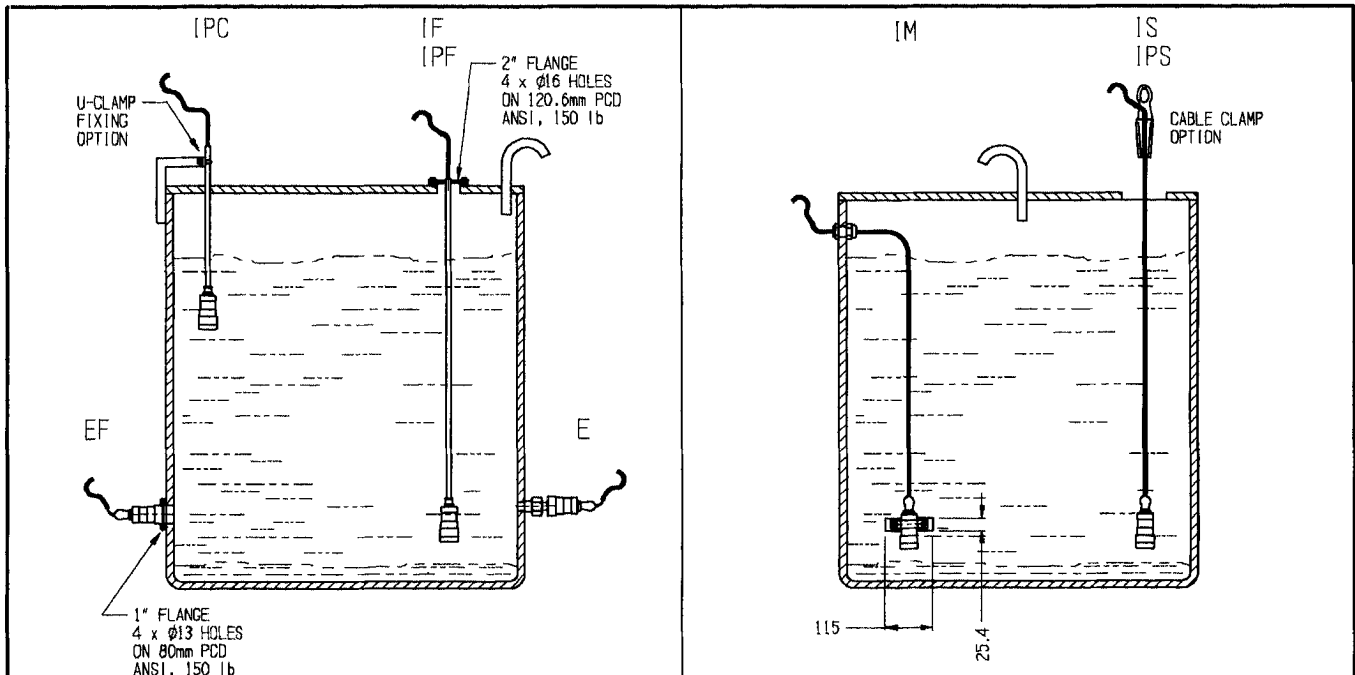
**ADVISE DETAILS OF TANK SHAPE AND SIZE WHEN USED WITH MONITOR FOR CONTENTS GAUGE APPLICATIONS.**

## Optional Extras

- Integral digital indicator
- All inconel construction
- Reference port for sealed tanks
- Special ranges
- Remote analogue and digital indicators
- Intrinsically safe barriers
- Mains to 28 volt D.C. power supply
- Cable clamp ALK2 for suspended version
- Spring loaded dry break (non-return valve) and spigot
- Extended temperature range.

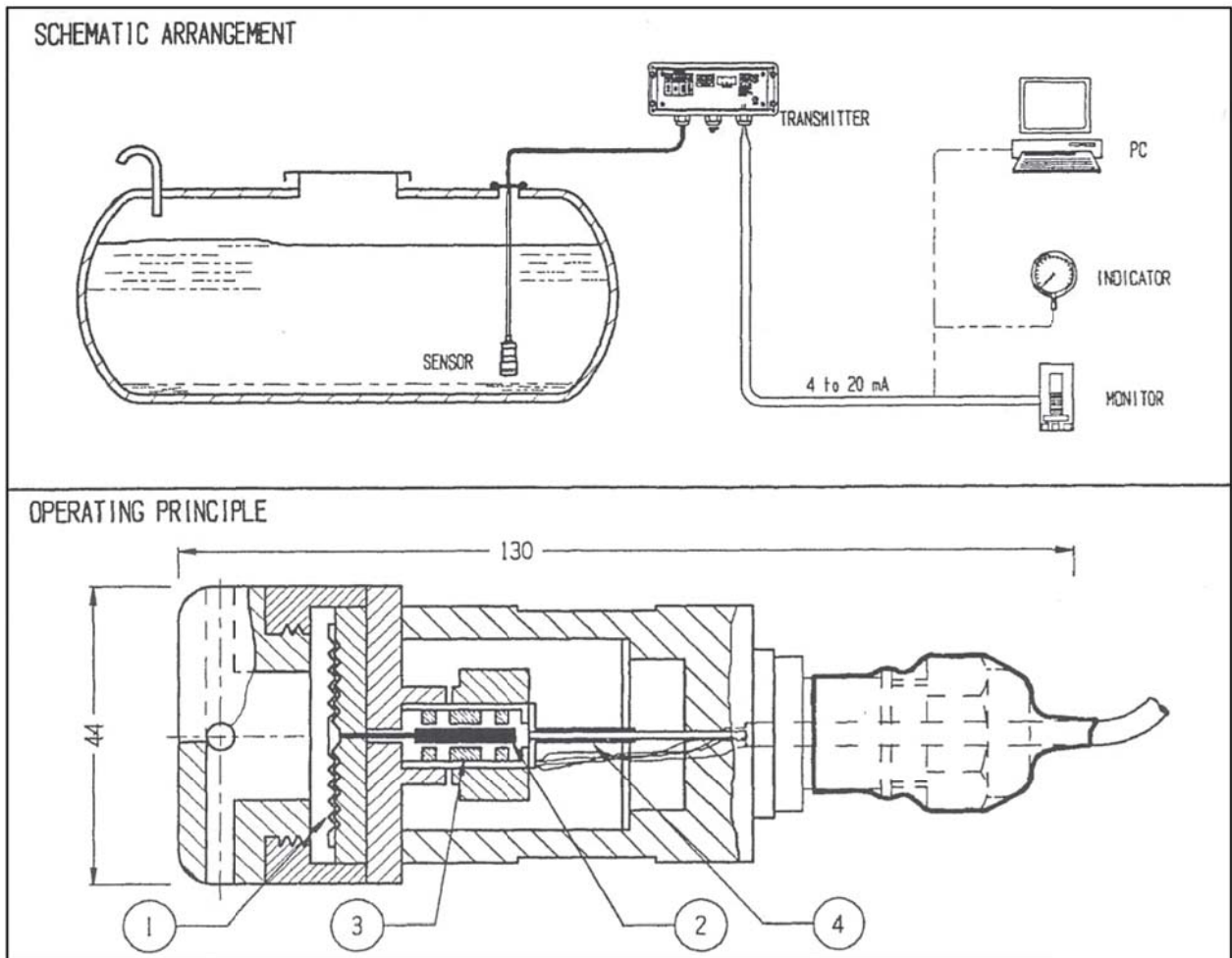


# SENSOR INSTALLATION



## TYPICAL MODEL APPLICATION

- IS** Water, diesel tanks, wells and reservoirs.
- IM** Low viscosity liquids; marine and vehicular restricted headroom tank access.
- IF** Water, diesel, inground tanks.
- EF** Chemical and viscous products; storage and process tanks.
- E** Water, fuel low viscosity liquids; storage and process tanks.
- IPF** Sanitary and viscous products; storages and process tanks.
- IPC** Sanitary and viscous products; clamp U bolt fixing pit, well and open channel flow.
- IPS** Paint, ink, sewage wells.
- EH** } Food, beverage; storage and process tanks.
- EHT** }
- EHA** }



The rated diaphragm 1 converts hydrostatic head pressure to linear movement. Deflecting the core 2 within the matched windings of a hollow cylindrical Linear Variable Differential Transformer (L.V.D.T.) 3. A breather tube 4 references the inside of the diaphragm to atmosphere for depth or vented tank duties, on sealed tanks the breather is connected to tank top. The L.V.D.T generates high level linear output enabling active electronics to be remote from the sensor with improved stability, reliability and accessibility.

## ALTERNATIVE LEVEL TRANSMITTERS AND INDICATORS



# MEASUREMENT RESOURCES

## 2200 Series

### Single & Multiple channel Tank Content monitors & Data Acquisition units

Versatile, simple to apply, & cost effective, attributes common to all members of PSM's family of tank monitors.

Developing on the capabilities of its highly successful predecessor, the range offers comprehensive display & control facilities to keep you clearly in the picture.

From a single tank installation, through a small tank farm, to a complete plant or ship wide network, the flexibility and connectivity offered by all units ensures that tailoring the optimum system for your particular application is straightforward & simple.

Particular attention has been paid to packaging the products for simple installation under the harsh environmental conditions often found in Marine and Industrial applications.

They are offered in a choice of housing formats, both panel and weatherproof wall mount. For multi-tank installations the housings feature sufficient space for direct marshalling and termination of field signal cabling. Single tank units feature both a large LED and an alphanumeric LCD display. Multi-channel units may be either "blind" when used for data acquisition and processing, or be equipped with a multi-line LCD for local display.

All units feature an RS485 serial port for network communications, and an RS232 port for host communications and local configuration.

Network communication employs PSM's own highly secure protocol, with host communication based on industry standards. This facilitates simple information sharing with systems from other manufacturers.

Naturally all ITM's are fully compatible with PSM's range of Hydrostatic and Ultrasonic Level transmitters, including all Marine "Type Approved" and Intrinsically Safe certified versions.



For more comprehensive display facilities PSM offer stand-alone Graphic LCD panels and "TANKVIEW FOR WINDOWS", a PC based graphical monitoring package running in the Windows environment.

## Model Options

### Single Tank Unit (STU)

Providing full stand alone monitoring and control facilities for one tank The unit has up to three 4 to 20 mA inputs for level, top pressure, and S.G. or temperature. Up to four control or alarm relay outputs, and a 4 to 20 mA retransmission (volume corrected) are also included.

### Multi Tank Unit (MTU)

The basic unit has 8 x 4 to 20 mA inputs. There are further options of 16 & 24 x 4 to 20 mA inputs available, allowing up to 24 vented tanks to be monitored from one unit.

A 16 relay (mains rated SPCO) may be added to all versions to provide comprehensive local control facilities. Display is a multi-line alpha-numeric LCD or optionally an LCD graphic panel. The integral keypad provides full access to the operation & set-up menus.

### Data Acquisition Module (DAM)

In effect this is a "blind" version of the MTU intended for use where the display is required remote from the data collection point. For example the DAM might be mounted out in the plant area sited for economic cabling of all I/O signals and routing the processed data via an RS485 link to the main display in the control room.

### Input Display Module (IDM)

This unit has no direct plant inputs or outputs, it communicates serially with other units to act as a remote or repeater display.

## Key Features

**Expandability** - from 1 to 100 tanks and beyond

**Ease of use** - simple to use menu structures , accessed either locally or via PC link

**Flexibility** - look up table programmable for any shape of pressurised or vented tank. Tank name, product details, and engineering units are all user defined.

**Control**- 16 output relays for control / alarm monitoring. inputs for alarms from other systems

**S.G. Correction** - manually programmable or automatically calculated by the monitor

**Communications** - RS485 unit to unit, and RS232 output to other systems. 4 to 20 mA retransmission signals

**Local Display** - both LED and LCD displays are used to provide a complete picture of the current status

**Security** - password protected non volatile Memory.

**Simple menu driven/push button operation with functional checks available at any time (holds empty or filled.)**

# hardware

## STU specifications

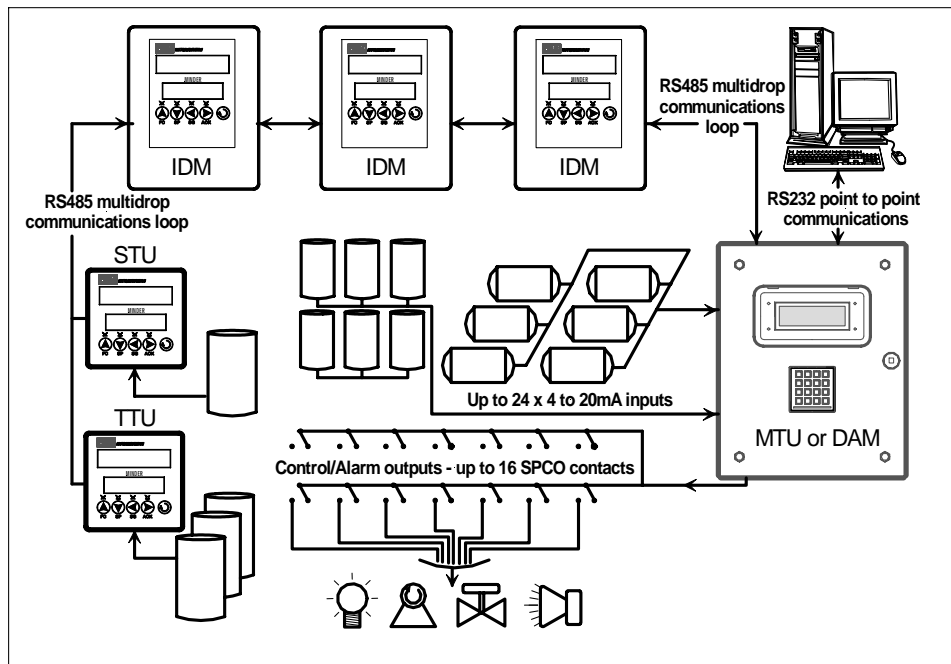
<b>Housing</b>	Enclosure options of DIN 96 mm Panel mount, and IP65 wall mount weatherproof .
<b>Display</b>	2 line X 16 character alphanumeric LCD, & 6 decade "superbright" 14.2 mm LED. <b>Operation</b> : Fully menu driven accessed via 5 multifunction buttons on front panel
<b>Power requirement</b>	24 V DC , or 110 / 240 V AC.
<b>Inputs</b>	3 No. 4 to 20 mA . Transmitter power supply may be selected / de-selected as required.
<b>Re-transmission</b>	Isolated 4 to 20 mA, maximum load 500 ohms
<b>Relay outputs</b>	4 No. SPCO relays rated 5A 250 V AC
<b>Serial communications</b>	1 x RS 232 local port, 1 x RS 485 network port

Note: The IDM variant has similar packaging and functionality to the STU with the exception that no local inputs or outputs are fitted

## MTU specifications

<b>Housing</b>	IP65 Wall mounting epoxy coated steel. Size to suit I/O capacity and field wiring
<b>Display</b>	8 line X 30 Character alphanumeric LCD
<b>Power requirement</b>	24V DC or 110/220/240 V AC
<b>Standard Inputs</b>	8 No 4 to 20 mA. Transmitter power supply may be selected
<b>Operation</b>	Menu driven accessed via integral 16 button keypad
<b>Optional Relay outputs</b>	16 No. SPCO relays rated 5A 250 V AC
<b>Optional Inputs</b>	16 or 24 No 4 to 20 mA input units available Transmitter power supply may be selected
<b>Serial Communications</b>	2 x RS232 local port, 2 x RS485 network port

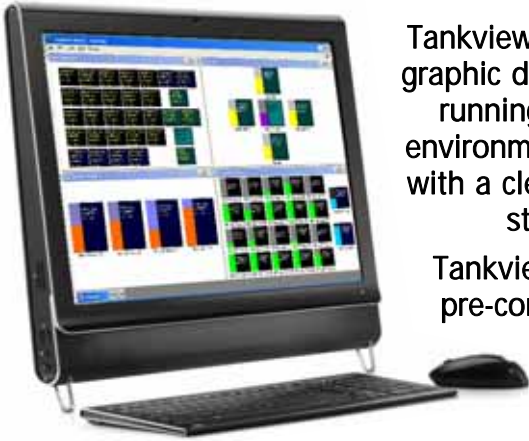
Note : The DAM variant has similar packaging to the MTU but it is not fitted with a display / keypad



# MEASUREMENT RESOURCES

## TANKVIEW key features

### Tank Monitoring and Control Software package



Tankview is a simple to operate graphic display software package running within the Windows environment. It provides the user with a clear picture of the current status of all inputs.

Tankview is generally supplied pre-configured and tailored to meet application parameters and user preferences.

### graphic display package

Each sensor input is represented by a graphical object which shows the current status in the form of a bargraph. Current numeric values such as level, volume and ullage may also be displayed in any chosen unit.

Each input object is individually configurable for all parameters including tank shape correction, SG, & offsets. Secondary temperature, top pressure and density inputs can also be incorporated to provide automatic volume correction.

Sensor input objects can be arranged in a number of windows according to tank duty or location; i.e. ballast, cargo, fuel oils, fresh water etc. providing a clear picture of the current status of all inputs.

### inputs

The input data can be collected from a variety of sources including conventional 4 to 20mA analogue devices, switched inputs, and our new generation of ICT digital ceramic MODBUS sensors and RFM function modules & barriers utilising RS-485 communication protocol; the industry's most widely used bi-directional, balanced transmission line suitable for industrial environments.

Input data is received via the PC's serial or USB port using industry standard data acquisition modules, alternatively the 9 way serial port may be used directly for digital inputs providing it is equipped with auto flow control.

Tankview will have been configured with the necessary communication package, and in operation this aspect is transparent to the user as scanning & up-dating of values is an automatic background function.

### outputs

Tankview provides visual indication, audible alarm and recording of up to 4 alarm events for each input, these events may be used to trigger external warning devices via relay outputs.

An RS232 or RS 485 serial output protocol enables communication of formatted data to plant / shipboard management systems. Alternatively data may be logged to the PC's hard drive for access by other applications.

Marine and industrial  
Fully adaptable to suit user  
application

Can run on any Windows  
based PC

Any 4 to 20 mA and/or digital  
inputs/outputs

System fully user configurable

Compensation algorithms  
include pressurised tanks, auto  
density correction,  
temperature, auto-trim factor  
(marine) etc

### single Tank Display

Each input object can be further  
interrogated using a single tank display  
which provides comprehensive data for that  
input alone.



The single tank display window enables the user to view and print a detailed report of the current status of that particular tank including volume, weight, density and actual level. When configured, several parameters such as the temperature, density and product can be manually changed from this window which in turn automatically adjusts the volume readings as appropriate.

# Simple networks



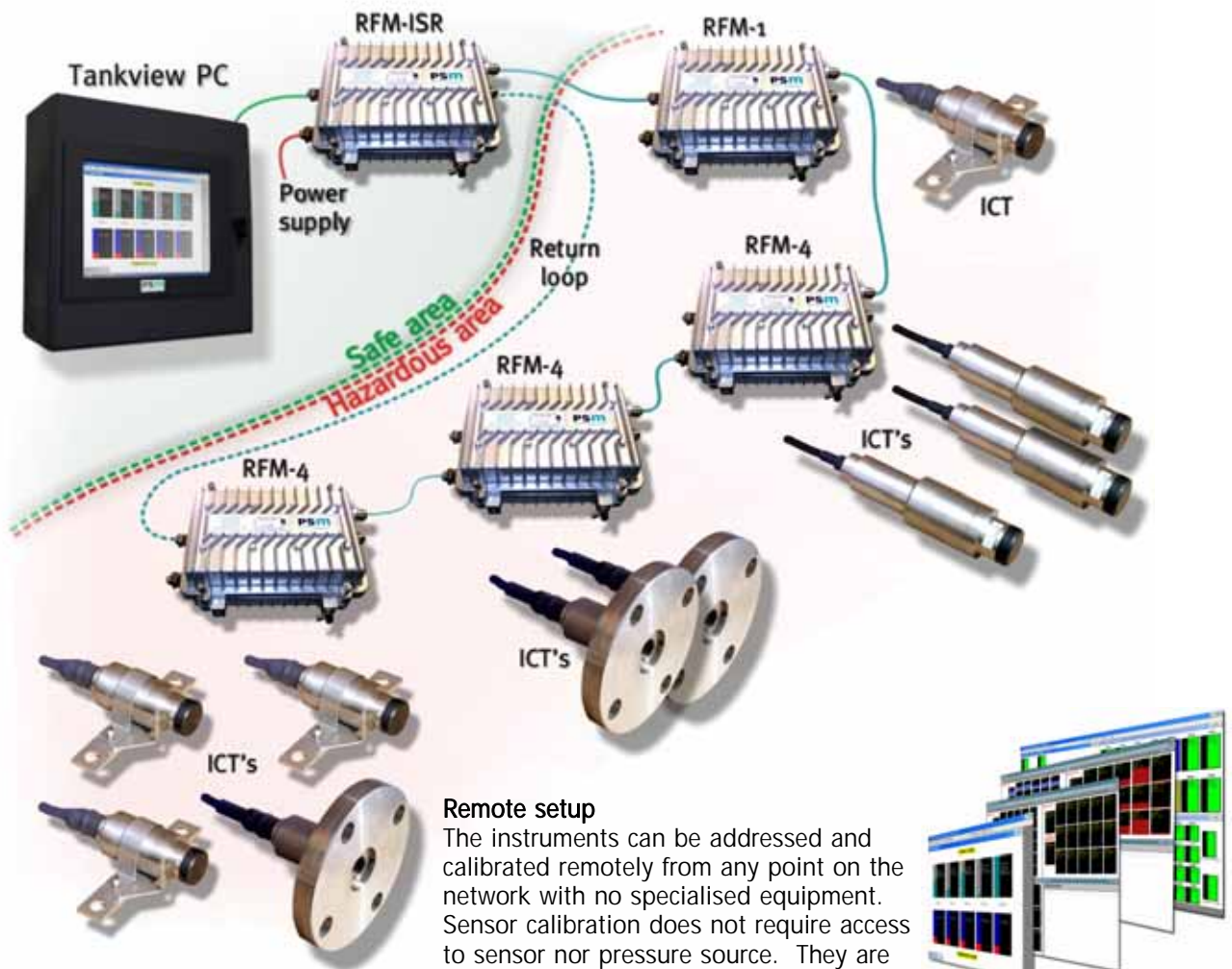
Tankview combined with our new generation of ICT digital level, pressure and temperature sensors provide a complete tank gauging solution offering clear advantages and cost savings due to the multi-drop configuration, reduced power consumption and remote setup.

## Reduced cabling and equipment requirements

The instruments are interconnected in a multi-drop configuration where the cable goes from point to point rather than each connection being run all the way back to a data acquisition module or central display - save 80% of cable cost typically.

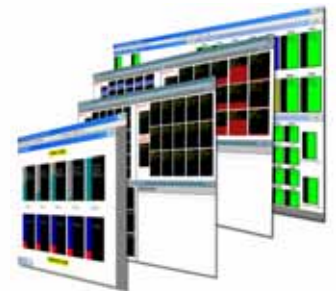
## Reduced power

The equipment run in digital mode has a much lower power consumption enabling multiple instruments to be connected via a single power / communications barrier for ATEX compliance as opposed to each requiring it's own supply and barrier. For a typical 50 channel system save 49 zener barriers



## Remote setup

The instruments can be addressed and calibrated remotely from any point on the network with no specialised equipment. Sensor calibration does not require access to sensor nor pressure source. They are also interchangeable and can be configured after installation reducing spares requirements. The configuration data is stored in non-volatile memory both on the sensors themselves and within the Tankview central monitor for instant data restoration to a replaced sensor.



# Solution-Engineered Products



Pressure Manifold Cabinet  
**Water Industry**



Tank Farm Monitoring Solutions  
**General Process**



Valve Seat Leak Indicator Panel  
**Oil & Gas**

Some process control requirements cannot be met by standard catalogue products. For such needs, our experience together with our manufacturing and calibration facilities allows us to precisely engineer an innovative application specific solution.

Gas Density Metering Panel  
**Oil & Gas Industry**



## Service

Our team of locally certified and factory trained technicians support all products via:

- On site commissioning and calibration
- In house calibration to world-wide standards (NATA)
- In-house repair for local manufacture and agency products
- Service/replacement contracts





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