Electronic Pressure Sensors

ESI Technology Ltd

The worldwide specialist for customized high precision electronic pressure sensors

For decades, ESI Technology with headquarters in Wrexham (UK) has served its customers with consistent product development, special engineered solutions and outstanding technical service and sales support.

In 2009 ESI Technology ltd was acquired by SUCO. Since then ESI stands for Electronics, Sensors and Instruments. By forming part of a bigger organisation, yet keeping its own independence, ESI has gained the strength to expand its sales efforts and services worldwide.

ESI Technology has become one of the leading suppliers for specialised pressure sensors by offering bespoke solutions for specific applications.

With a dedicated manufacturing and engineering facility in Wrexham, ESI serves an extensive range of major industries such as Oil and Gas, Subsea, Aerospace, Process, Test and Calibration.

Being one of the key suppliers to these industries requires high performance not only of its products. From design and sourcing through to shipment and customer service, ESIs' Management System is approved to ISO 9001:2008 and ATEX and IECEx approval is available on a wide range of products.

Throughout the product range, ESI uses a variety of state of the art sensor technologies to make each product a perfect fit to the desired application.

Though, the jewel of ESI's sensor technologies is Silicon-on-Sapphire which has redefined the performance capability of pressure monitoring products.

Additional services, such as tailoring of the existing product range to suit application requirements, product conditioning such as ESS (Environmental Stress Screening) and product documentation packaging, make ESI the perfect partner for customers who need a bespoke service.

With a wide sales network, ESI Technology is able to deliver its' special services globally.

If you can't find the suitable solution on the following pages, please do not hesitate to contact the ESI Technology sales team or one of its partners who are always close by.

We are looking forward to supporting you!

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Pressure Sensors Overview

Technical Explanation

for ESI Pressure Sensors

Technical Explanation

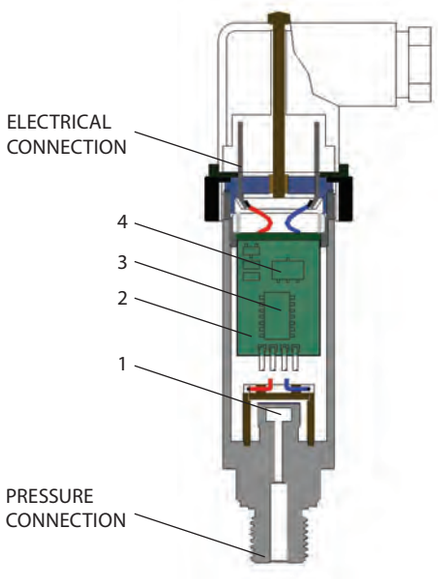
What is a pressure transmitter?

A pressure transmitter (also called pressure transducer or pressure converter) is a component used to convert a pneumatic or hydraulic pressure to an electric (usually analogue and linear) output signal, such as a current or voltage.

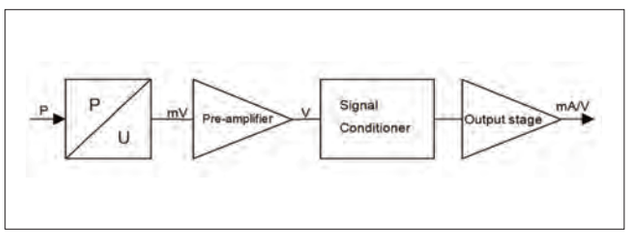
How does a pressure transmitter work?

The pressure measuring cell has a membrane (**1**) that is exposed to the pressure to be measured. Affixed on this membrane is a bridge circuit consisting of four ohmic resistors in the form of a Wheatstone bridge. The values of these resistors change proportionally to the pressure load present at the measuring cell or membrane. The bridge voltage of the measuring cell is amplified in the evaluation electronics (**2**) and a calibrated signal is established in the signal conditioner / microcontroller (**3**).

The downstream output stage (**4**) converts this signal to the output signal required (such as 4 - 20 mA, 0 - 5 V, or 0 - 10 V).



Block diagram



SoS technology

In the silicone-on-sapphire technology, the substrate of the thin film measuring cell is synthetic sapphire. This has excellent mechanical and temperature stable properties and prevents undesired parasitic effects, thereby having a positive effect on accuracy and stability. In conjunction with a titanium membrane, this results in virtually unique coaction between the temperature coefficients of sapphire and titanium. This is because, unlike silicon and high-grade steel, they are more closely matched and so only require a low level of compensation overhead. This also has a favourable effect on long-term stability.

"Oil-filled" high-grade steel measuring cell (Isolated Piezoresistive)

In this measuring cell technology, the piezo-resistive measuring cell is packaged within a metallic housing filled with fluorine or silicone oil. This means the measuring cell is virtually free of external mechanical stresses. Fluorine oil has excellent characteristics as regards temperature and ageing behaviour, and is not flammable and so lends itself perfectly to deployment in oxygen applications. It is not recommended for food applications.

Ceramic measuring cell / thick film technology

Ceramic thick film pressure measuring cells are made up of a sintered ceramic body. The ceramic body sleeve already has the key geometries for the subsequent pressure range. The membrane thickness required and thus, the pressure range required is established with grinding and lapping. The resistors are imprinted with thick film technology and interconnect to form a measuring bridge.

Bonded foil measuring cell

Bonded foil pressure measuring cells are based on the same principle as a strain gauge. Four foil gauges, made from constantan on a flexible polyimide backing, are bonded to a high-grade steel diaphragm in the form of a Wheatstone bridge circuit. The diaphragm flexes and strains in response to an applied pressure and causes an electrical resistance change in the strain gauges producing a sensitivity of 2 mV/V.

Piezoresistive silicon

The measuring cell consists of a piezoresistive silicon sensing element without a protective membrane. The cell is packaged in a plastic housing for direct mounting to a printed circuit board. It is suitable only for air and non-corrosive / non-ionising gases, and is typically used for very low pressure air differential pressure measurement.

Standard signals

Output signals 4 - 20 mA, 0 - 5 V and 0- 10 V in particular are established in the industry. Unamplified millivolt (mV) output signals are available for some variants. Also offered are transmitters with digital USB output or customer-specific output signals (such as 1 - 5 V).

Output configuration

The output configuration for a 4-20 mA signal is a 2 wire connection. For 0-5 V and 0-10 V signals, the configuration is either 3 wire or 4 wire connection depending on the model variant. All mV outputs are 4 wire.

Load / apparent ohmic resistance for pressure transmitters

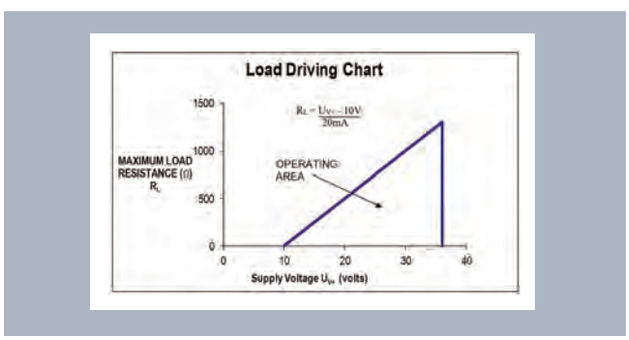
An appropriate ohmic load must be connected to guarantee perfect functioning of a pressure transmitter.

The load resistance for transmitters with a voltage output; 0 - 5 V should be at greater than 5 kΩ , and for 0-10 V should be greater than 10 kΩ For mV output the measuring instrument input impedance should be as high as possible to reduce loading errors and should be no lower than 1 MΩ.

For transmitters with a current output (4 - 20 mA), the maximum load is calculated using the following formula:

$$R_L = \frac{U_{V+} - U_{V+(min)}}{20mA}$$

Where U_{V+} (U_B) is the actual supply voltage and U_V+ (min) is the minimum supply voltage to be taken from the data sheet. For example with a supply voltage range 10 – 36 VDC and thus $U_{V+ (min)}$ = 10 V, this gives the following operating range for example:

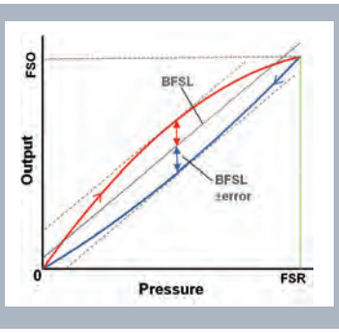


Operating/supply voltage

All pressure transmitters work with DC voltage and have no galvanic isolation. Within the thresholds specified in the relevant data sheet, the supply voltage may change without it having a bearing on the output signal. In order to guarantee the functionality of a transmitter, the supply voltage should not fall below the minimum operating voltage. The maximum operating voltage may not be exceeded to ensure the electronics are not damaged beyond repair.

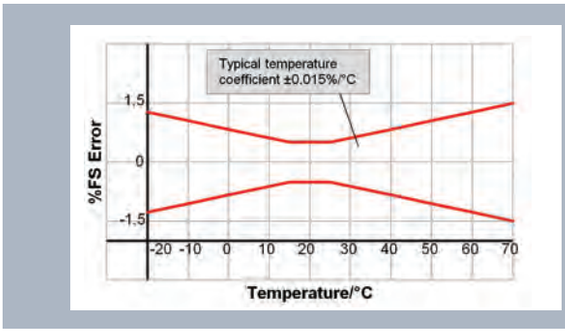
Accuracy

ESI defines accuracy as the combined error due Non-linearity, Hysteresis and Repeatability (NLHR), defined at room temperature and condition as new. The maximum deviation from an ideal characteristic curve is defined in accordance with Best Fit Straight Line (BFSL) method. Other factors that have a bearing on accuracy, such as zero and span tolerance and temperature error are specified separately.



Temperature errors and ranges

The temperature (for both ambient and medium) generally has a significant bearing on the accuracy of a pressure transmitter. Pressure transmitters are temperature compensated over a particular range corresponding to the typical application. This means that temperature errors within this temperature range are minimised by means of circuitry design and algorithms. The temperature error is added to the accuracy and is shown in the total error band of the pressure transmitter, also called "butterfly graph". The maximum error is not defined outside the compensated temperature range but the transmitter will still function however. To prevent mechanical and electrical damage, pressure transmitters may not be deployed beyond the threshold temperature ranges specified in the data sheet.



Our Ex Certification

for ESI Pressure Sensors

Our Ex Certification

ESI has an extensive range of intrinsically safe transmitters, all ATEX and IECEx approved for explosion protection for flammable gases (zone 0), dusts (zone 20) and mining areas (group I M1).

II 1 G Ex ia IIC T4 Ga
II 1 D Ex ia IIIC T135°C Da
I M 1 Ex ia I Ma

Putting safety first in explosive environments…..

Our range of Ex certified pressure transmitters have both ATEX and IECEx approval.

ATEX is an EU Directive (94/9/EC) that ensures products are safe to use in explosive environments.

IECEx scheme certifies worldwide conformity to international standards and provides assurance that equipment for use in explosive atmospheres are manufactured and operated according to the highest International Standards of safety.

The most common protection method for process instrumentation is Intrinsic Safety (IS) and this is the protection method used in ESI transmitters. With these instruments the low voltage electronics is designed in such a way that it is incapable of releasing enough energy thermally or electrically to cause an ignition of flammable gases or liquids. To achieve this there are limitations set on levels of voltage, current, capacitance and inductance such that the available energy at a sparking device is below the minimum ignition energy of the potentially explosive atmosphere.

Intrinsic safety equipment must undergo Type Examination by an approved third party. It involves a detailed process of examination, testing and assessment of equipment confirming and demonstrating that the product is safe to use within potentially explosive atmospheres. The certification process must be undertaken by a Notified Body.

Hazardous Zone Classification

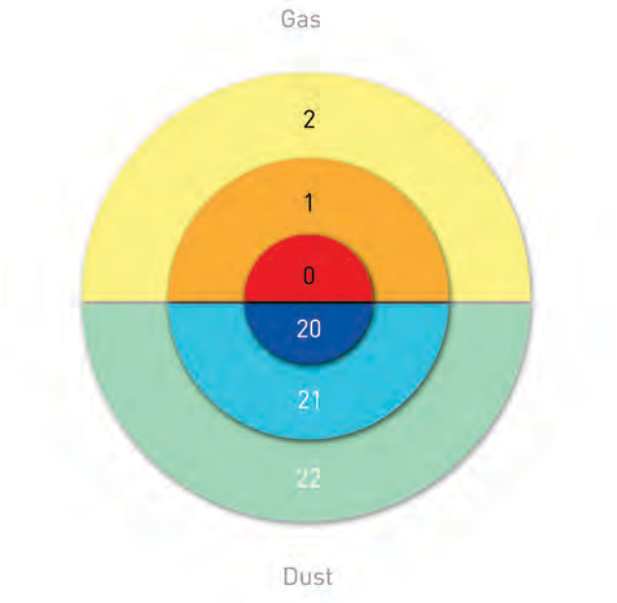
Hazardous areas are classified into zones (0, 1, 2 for gas-vapour-mist and 20, 21, 22 for dust)

The zones are determined by the type of combustible material present, the length of time it is present, and the physical construction of the area where such material is present.

Zone 0 or 20 locations are those areas where ignitable or flammable concentrations of combustible gases or dusts exist continuously or for long periods of time.

Zone 1 or 21 locations are those areas where ignitable or flammable concentrations of combustible gases or dusts are likely to or frequently exist during normal operations.

Zone 2 or 22 locations are those areas where ignitable or flammable concentrations of combustible gases or dusts are not likely to occur during normal operations or will exist for only a brief period of time.



Zone 0 and 20 require Category 1 marked equipment, Zone 1 and 21 require Category 1 or 2 marked equipment and Zone 2 and 22 require Category 1, 2, or 3 marked equipment. Zone 0 and 20 are the zones with the highest risk of an explosive atmosphere being present.

Using an Intrinsically Safe Barrier

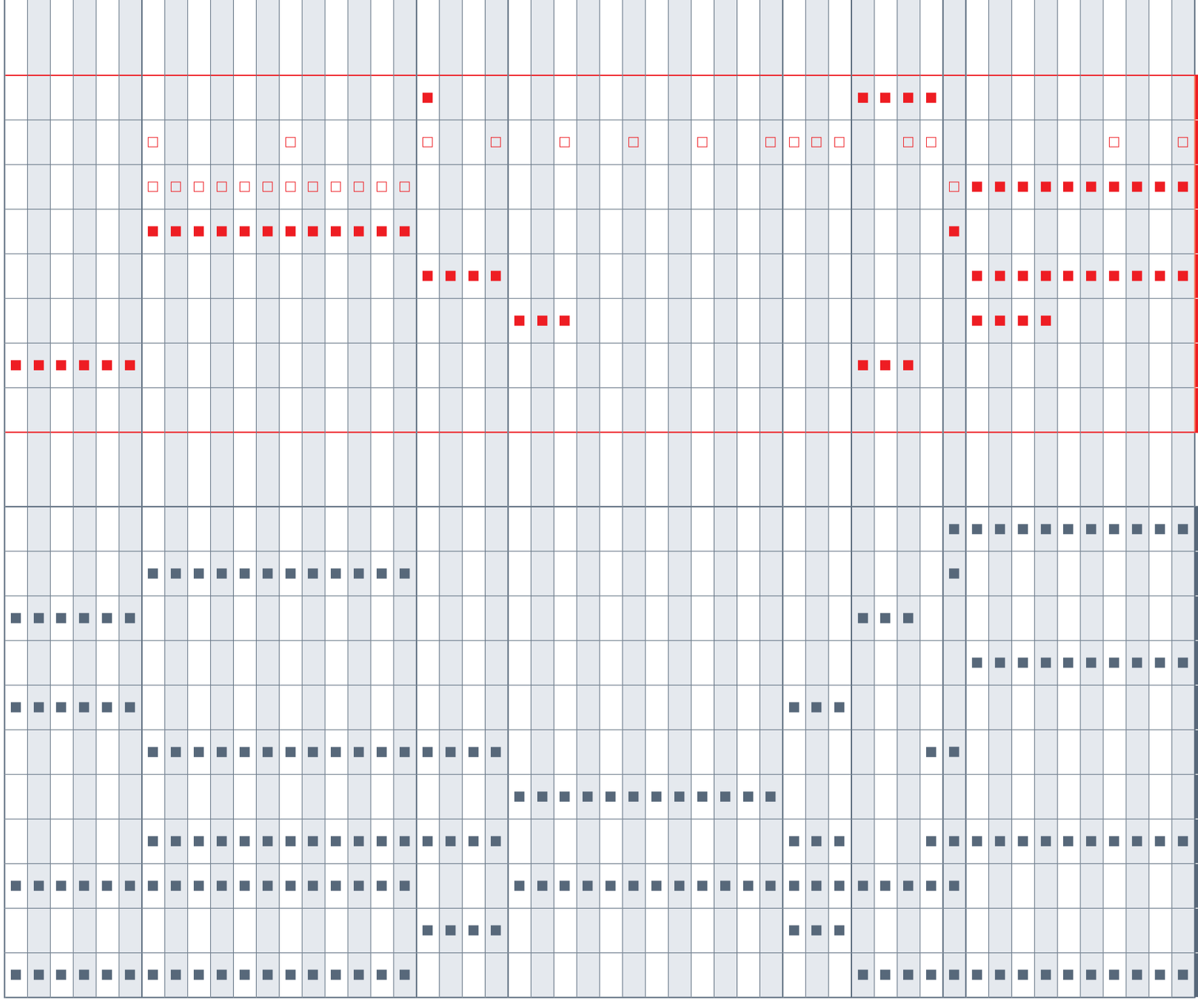
The essential concept behind intrinsic safety is the restriction of electrical energy to apparatus and the interconnecting wiring exposed to the potentially explosive atmosphere to a level than will not cause ignition by either sparking or heating effects. It is therefore a low-energy signalling technique that prevents explosions from occurring by ensuring that the energy transferred to a hazardous area is well below the energy required to initiate an explosion.
This is a achieved by limiting the electrical energy transferred to a hazardous area through the use of an Intrinsic Safety Barrier situated in a safe area .

Intrinsic Safety Barriers provide both power and signal isolation. A safety barrier is used between the "safe area" and the "hazardous area" so that any fault that generates a high energy level would not get carried over to the hazardous area.

Contact the sales team for more information sales@esi-tec.com

Selection Matrix

			Silicon-on-Sapphire	Ceramic Thick Film	Isolated Piezoresistive	Piezoresistive Silicon
High Specification High Temperature Pressure Transmitters	**HI2000**	Silicon-on-Sapphire Pressure Transmitter, mV output, 1 m cable	■			
	HI2001	Silicon-on-Sapphire Pressure Transmitter, 5 V output, 1 m cable	■			
	HI2002	Silicon-on-Sapphire Pressure Transmitter, 10 V output, 1 m cable	■			
	HI2010	Silicon-on-Sapphire Pressure Transmitter, mV output, MIL-C-26482	■			
	HI2011	Silicon-on-Sapphire Pressure Transmitter, 5 V output, MIL-C-26482	■			
	HI2012	Silicon-on-Sapphire Pressure Transmitter, 10 V output, MIL-C-26482	■			
	HI2200	Silicon-on-Sapphire Pressure Transmitter, mV output, 1 m cable	■			
	HI2210	Silicon-on-Sapphire Pressure Transmitter, mV output, MIL-C-26482	■			
	HI2300	Silicon-on-Sapphire Pressure Transmitter, mV output, 1 m cable	■			
	HI2310	Silicon-on-Sapphire Pressure Transmitter, mV output, MIL-C-26482	■			
Digital USB	**GS4200-USB**	Silicon-on-Sapphire Pressure Transducer, USB connector	■			
Differential	**PR3200**	Differential Pressure Transmitter, 4 – 20 mA (2 wire)	■			
	PR3202	Air Differential Pressure Transmitter, 4 – 20 mA (2 wire), 0 – 5 up to 0 – 1,000 mbar DP				■
	PR3203	Air Differential Pressure Transmitter, 5 V (3 wire), 0 – 5 up to 0 – 1,000 mbar DP				■
	PR3204	Air Differential Pressure Transmitter, 10 V (3 wire), 0 – 5 up to 0 – 1,000 mbar DP				■
Submersible	**PR3420**	Submersible Pressure Transmitter, sludge platform, 4 – 20 mA (2 wire)			■	
	PR3441	Depth/Level Pressure Transmitter, 25 mm diameter, 4 – 20 mA (2 wire)			■	
	PR3442	Depth/Level Pressure Transmitter, 16.5 mm diameter, 4 – 20 mA (2 wire)			■	
Hygienic/ Barrier Seal	**PR3800**	Pressure Transmitter, pipe-clamp barrier seal, 4 – 20 mA (2 wire)		■		
	PR3801	Pressure Transmitter, pipe-clamp barrier seal, 0 – 5 V (4 wire)		■		
	PR3802	Pressure Transmitter, pipe-clamp barrier seal, 0 – 10 V (4 wire)		■		
	PR3820	Pressure Transmitter, choice of barrier seal fittings, 4 – 20 mA (2 wire)		■		
	PR3821	Pressure Transmitter, choice of barrier seal fittings, 0 – 5 V (4 wire)		■		
	PR3822	Pressure Transmitter, choice of barrier seal fittings, 0 – 10 V (4 wire)		■		
	PR3850	Pressure Transmitter, flush diaphragm, 4 – 20 mA (2 wire)		■		
	PR3851	Pressure Transmitter, flush diaphragm, 0 – 5 V (4 wire)		■		
	PR3852	Pressure Transmitter, flush diaphragm, 0 – 10 V (4 wire)		■		
	PR3860	High Temperature Pressure Transmitter, flush diaphragm, 4 – 20 mA (2 wire)		■		
	PR3861	High Temperature Pressure Transmitter, flush diaphragm, 0 – 5 V (4 wire)		■		
	PR3860	High Temperature Pressure Transmitter, flush diaphragm, 0 – 10 V (4 wire)		■		
Oil & gas, subsea	**PR3913**	Control Valve Pressure Transmitter, 4 – 20 mA output	■			
	PR3914	Subsea Pressure Transmitter, 4 – 20 mA output	■			
	PR3915	Dual Redundant Control Valve Pressure Transmitter, 4 – 20 mA output	■			
	PR3920	DP Control Valve Pressure Transmitter, 4 – 20 mA output	■			
High Pressure	**HP1000**	High Pressure Transducer, mV output, pressures to 2,000 bar	■			
	HP1001	High Pressure Transducer, 5 V (4 wire), pressures to 2,000 bar	■			
	HP1011	High Pressure Transducer, 5 V (3 wire), pressures to 2,000 bar	■			
	HP1002	High Pressure Transducer, 10 V (4 wire), pressures to 2,000 bar	■			
	HP1012	High Pressure Transducer, 10 V (3 wire), pressures to 2,000 bar	■			
	HP1003	High Pressure Transmitter, 4 – 20mA output, pressures to 2,000 bar	■			
	HP1100	High Pressure Transducer, mV output, pressures to 4,000 bar	■			
	HP1101	High Pressure Transducer, 5 V (4 wire), pressures to 4,000 bar	■			
	HP1111	High Pressure Transducer, 5 V (3 wire), pressures to 4,000 bar	■			
	HP1102	High Pressure Transducer, 10 V (4 wire), pressures to 4,000 bar	■			
	HP1112	High Pressure Transducer, 10 V (3 wire), pressures to 4,000 bar	■			
	HP1103	High Pressure Transmitter, 4 – 20mA output, pressures to 4,000 bar	■			
Low Pressure	**LP1000**	Air, Low Pressure Transducer, mV output			■	□
	LP1001	Air, Low Pressure Transducer, 5 V (4 wire)			■	□
	LP1011	Air, Low Pressure Transducer, 5 V (3 wire)			■	□
	LP1002	Air, Low Pressure Transducer, 10 V (4 wire)			■	□
	LP1012	Air, Low Pressure Transducer, 10 V (3 wire)			■	□
	LP1003	Air, Low Pressure Transmitter, 4 – 20 mA output			■	□


Differential
ATEX/ IECEx / M1 Option
High Accuracy
Highest Pressure
High Specification
High Temperature (>125°C)
Lowest Pressure
Wireless
Aerospace
Automotive
Clean Room
Defence
Depth & Level
Hydraulic
Hygienic
Oil & Gas
Process
Subsea
Test & Calibration

S.01

Hipres HP1000 Series

High Pressure Transmitter

- Pressure ranges to 4,000bar
- High pressure integrity for safe use due to unique sensor design.
- Pressure diaphragm and process connection is machined from one piece of Titanium with no seals or welds.
- High resistance to overpressure and pressure transients
- Silicon-on-Sapphire (SoS) sensor technology for outstanding performance and reliability
- ATEX/IECEx option available (includes M1 for mining applications) for 4-20mA versions

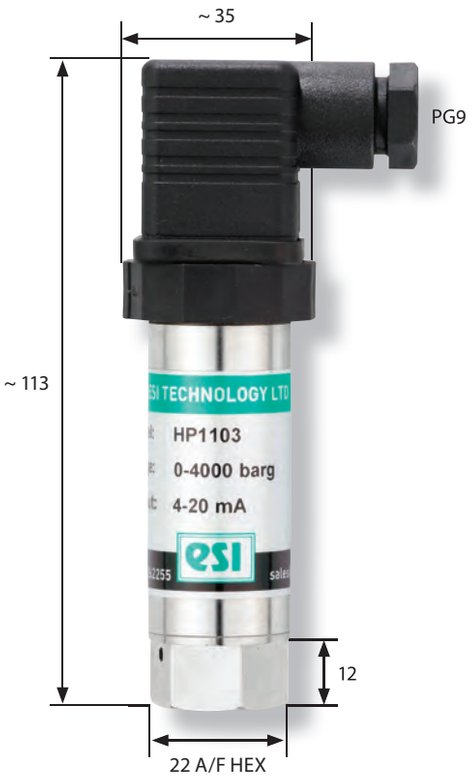
DESCRIPTION

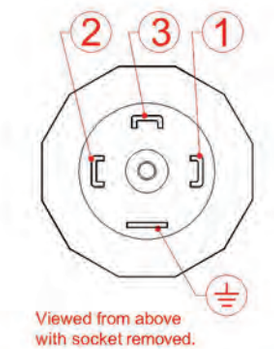
The HP1000 series extends the Silicon-on-Sapphire pressure sensor technology into very high pressure applications, with operating ranges up to 4,000bar and still maintaining an extremely high performance level.

The unique Silicon-on-Sapphire sensor provides outstanding performance and gives excellent stability over a wide temperature range. The wetted parts and diaphragm are machined from a single piece of titanium alloy which means no weld joints and therefore high pressure integrity and overload capacity. Available in pressure ranges from 0-600bar to 0-4,000bar and with electrical outputs of 0-10mV/V, 0-5V, 0-10V and 4-20mA. Applications include aerospace, laboratory and test, oil and gas monitoring equipment and general industrial.

An optional ATEX and IECEx approved version of this product is available for explosion protection for flammable gases (zone 0), dusts (zone 20) and mining areas (group I M1).

DIMENSIONS (in mm)





ELECTRICAL CONNECTION (mA)

Pin. No.	2 wire
1	+ supply
2	4-20 mA signal
3	N\C
⏚	to case

ELECTRICAL CONNECTION (V)

Pin. No.	4 wire	3 wire
1	- supply	common
2	+ supply	+ supply
3	+ output	+ output
⏚	- output	to case

Hipres HP1000 Series

High Pressure Transmitter

TECHNICAL DATA

Type:	**HP1000/HP1100**	**HP1xx1**	**HP1xx2**	**HP1003/HP1103**
Output signal:	10 mV/V (4 wire)	0-5 V (3 or 4 wire)	0-10 V (3 or 4 wire)	4-20 mA (2 wire)
Supply Voltage:	10 VDC (5-15V)	13-30 VDC	13-30 VDC	10-36 VDC
Pressure Reference:	Gauge			
Protection of Supply Voltage:	Protected against supply voltage reversal up to 50 V (amplified versions)			
Standard Pressure Ranges:	HP10xx: 0-600 bar; 0-700 bar; 0-1,000 bar; 0-1,500 bar HP11xx: 0-2,000 bar; 0-2,500 bar; 0-3,000 bar; 0-4,000 bar (other ranges available)			
Overpressure Safety:	1.5x for ranges 0-600 bar to 0-3,000 bar; 1.25x for 4,000 bar			
Load Driving Capability:	4-20 mA: $R_L < [U_B - 10\ V] / 20\ mA$ (e.g. with supply voltage (U_B) of 36 V, max. load (R_L) is 1300Ω) 10 mV/V: n/a 0-5 V: max. load $R_L > 5$ KΩ 0-10 V: max. load $R_L > 10$ KΩ			
Accuracy NLHR:	±0.25% FS typical max. BFSL			
Zero Offset and Span Tolerance:	±0.5% FS at room temperature (HP1000/HP1100: ±1 mV) ±5% FS (approx.) adjustment with easy access trimming potentiometers on amplified versions only			
Operating Ambient Temperature:	-40°C to +85°C			
Operating Media Temperature:	-50°C to +125°C			
Storage Temperature:	+5°C to +40°C (recommended best practice)			
Temperature Effects:	±1.5% FS total error band for -20°C to +70°C. Typical thermal zero and span coefficients ±0.015% FS/ °C			
ATEX/IECEx Approval Option (4-20mA version only):	Ex II 1 G Ex ia IIC T4 Ga (zone 0) Ex II 1 D Ex ia IIIC T135°C Da (zone 20) Ex I M 1 Ex ia I Ma (group 1 M1)			
	Emissions: EN61000-6-4 Immunity: EN61000-6-2 Certification: CE Marked			
Insulation Resistance:	> 100 MΩ @ 50 VDC			
Wetted Parts:	Titanium alloy machined from a single piece			
Pressure Media:	All fluids compatible with Titanium alloy			
Pressure Connection:	F250-C Autoclave fitting; thread type 9/16-18UNF-2B female			
Electrical Connection:	Mating socket EN175301-803 Form A (ex DIN43650), a screw terminal connector rated IP65 with PG9 cable entry (other options available)			

ORDER MATRIX

Output		Wires	Type
10 mV/V	Model to 1,500 bar	4	HP1000
	Model 2,000 bar and above	4	HP1100
0-5 V	Model to 1,500 bar	4	HP1001
	Model 2,000 bar and above	4	HP1101
	Model to 1,500 bar	3	HP1011
	Model 2,000 bar and above	3	HP1111
0-10 V	Model to 1,500 bar	4	HP1002
	Model 2,000 bar and above	4	HP1102
	Model to 1,500 bar	3	HP1012
	Model 2,000 bar and above	3	HP1112
4-20 mA	Model to 1,500 bar	2	HP1003
	Model 2,000 bar and above	2	HP1103

Electrical Connection / Option

	Electrical Connector
DIN EN175301 plug and socket	–
Cable outlet 1m screened	A
M12 connector	B
Cable outlet 1m screened IP67 protection	C
ATEX/ IECEx certified with DIN EN175301 plug and socket	EX

Pressure Range in bar

	Pressure Range
0-600 bar	600
0-1,000 bar	1000
0-1,500 bar	1500
0-2,000 bar	2000
0-3,000 bar	3000
0-4,000 bar	4000

Process Connection

	Process Connection
Autoclave F-250-C female	DE

Order Number Example HP1000A1000DE

For options not listed please contact sales team.

HP1103

S.02

Lopres LP1000 Series

Low Pressure Transmitter

- Piezoresistive sensor technology for high performance
- Low pressure measurement from 50mbar
- Robust stainless steel construction for durability
- Low hysteresis and excellent long term stability
- Wide operating temperature
- On-site zero and span adjustment

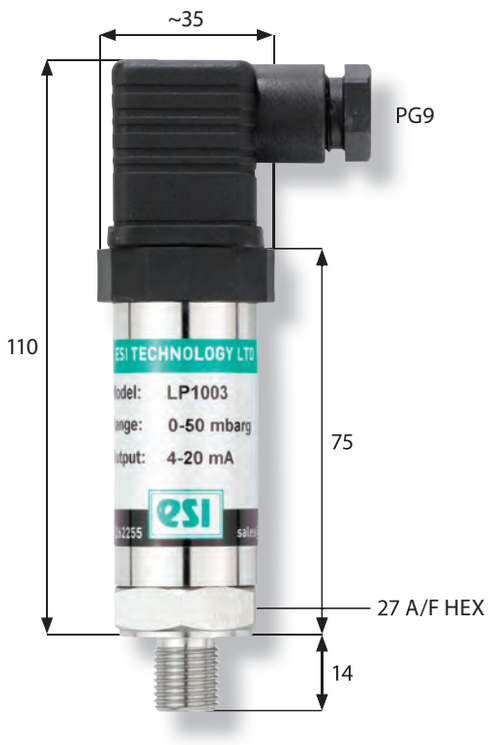
DESCRIPTION

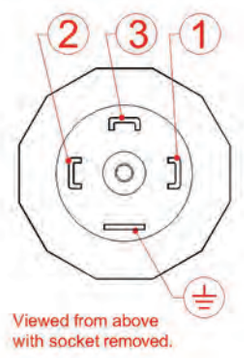
LP1000 series transmitters are designed for very low-pressure applications, with operating ranges down to 0-50mbar whilst still maintaining high performance. The advanced sensor design provides very low hysteresis and excellent long-term stability not normally achievable when measuring very low pressure.

The combination of stainless steel housing, nitrile O-ring and stainless steel sensing element means that the LP1000 is suitable for use with most liquids in pressure ranges 0-100mbar and above. For pressure ranges below 100mbar, the stainless steel sensing element is replaced with a silicon sensor making it ideal for use with non-corrosive gases and various liquids compatible with silicon. The design enables the product to maintain accurate performance and excellent durability. Available in pressure ranges from 0-50mbar to 0-500mbar and with electrical outputs of 0-100mV, 0-5Vdc, 0-10Vdc and 4-20mA.

Applications include laboratory and test, air and gas pressure monitoring, leak detection, low pressure liquid and hydrostatic pressure measurements.

DIMENSIONS (in mm)





ELECTRICAL CONNECTION (mA)

Pin. No.	2 wire
1	+ supply
2	4-20 mA signal
3	N/C
⏚	to case

ELECTRICAL CONNECTION (V)

Pin. No.	4 wire	3 wire
1	- supply	common
2	+ supply	+ supply
3	+ output	+ output
⏚	- output	to case

Lopres LP1000 Series

Low Pressure Transmitter

TECHNICAL DATA

Type:	LP1000	LP1001/LP1011	LP1002/ LP1012	LP1003
Output signal:	10 mV/V typical (4 wire)	0-5 V (3 or 4 wire)	0-10 V (3 or 4 wire)	4-20 mA (2 wire)
Supply Voltage:	10 VDC	13-30 VDC	13-30 VDC	10-36 VDC
Pressure Reference:	Gauge			
Protection of Supply Voltage:	Protected against supply voltage reversal up to 50 V (amplified versions)			
Standard Pressure Ranges:	0-50 mbar; 0-100 mbar; 0-250 mbar; 0-500 mbar (other ranges available)			
Overpressure Safety:	4 x for ranges 50 mbar to 250 mbar; 3x for 500 mbar range			
Load Driving Capability:	4-20 mA: $R_L < [U_B - 13\ V] / 20\ mA$ (e.g. with supply voltage (U_B) of 36V, max. load (R_L) is 1150 Ω) 10 mV/V: n/a 0-5 V: max. load $R_L > 5$ KΩ 0-10 V: max. load $R_L > 10$ KΩ			
Accuracy NLHR:	±0.50% FS typical max. BFSL			
Zero Offset and Span Tolerance:	±0.5% FS at room temperature (LP1000: ±1 mV) ±5% FS (approx.) adjustment with easy access trimming potentiometers on amplified versions only			
Operating Media Temperature:	-20°C to +85°C			
Operating Media Temperature:	-20°C to +85°C			
Storage Temperature:	+5°C to +40°C (recommended best practice)			
Temperature Effects:	±3.0% FS total error band for -20°C to +70°C. Typical thermal zero and span coefficients ±0.05% FS/ °C			
Electromagnetic Capability:	Emissions: EN61000-6-4 Immunity: EN61000-6-2 Certification: CE Marked			
Insulation Resistance:	> 100 MΩ @ 50 VDC			
Wetted Parts:	<100mbar: SAE 316 stainless steel, Nitrile O-ring and silicon		>100mbar SAE 316 stainless steel and Nitrile O-ring	
Pressure Media:	Non-corrosive, non-ionic fluids, such as air and dry gases			
Pressure Connection:	1/4"BSP male (other options available)			
Electrical Connection:	Mating socket EN175301-803 Form A (ex DIN43650), a screw terminal connector rated IP65 with PG9 cable entry (other options available)			

ORDER MATRIX

Output		Wires	Type	Electrical Connector	Pressure Range	Process Connection
10 mV/V	Model 100 mbar and above	4	LP1000			
	Model below 100 mbar	4	LP1100			
0-5 V	Model 100 mbar and above	4	LP1001			
	Model below 100 mbar	4	LP1101			
	Model 100 mbar and above	3	LP1011			
	Model below 100 mbar	3	LP1111			
0-10 V	Model 100 mbar and above	4	LP1002			
	Model below 100 mbar	4	LP1102			
	Model 100 mbar and above	3	LP1012			
	Model below 100 mbar	3	LP1112			
4-20 mA	Model 100 mbar and above	2	LP1003			
	Model below 100 mbar	2	LP1103			

Electrical Connection / Option

DIN EN175301 plug and socket	–
Cable outlet 1m screened	A
M12 connector	B
Cable outlet 1m screened IP67 protection	C

Pressure Range in bar

0-50 mbar	0050
0-100 mbar	0100
0-250 mbar	0250
0-500 mbar	0500

Process Connection

1/4" BSP male	AB
1/2" BSP male	AC
1/4" NPT male	AM
1/2" NPT male	AN

Order Number Example LP1003–0050AC

For options not listed please contact sales team.

LP1003

S.03

Hispec HI2000 Series

High Precision Pressure Transducer

- High accuracy and performance
- Silicon-on-Sapphire sensor technology for outstanding stability
- Pressure ranges to 1,500bar
- Titanium wetted parts for excellent chemical compatibility
- High thermal stability over wide operating temperature
- ATEX/IECEx option available (includes M1 for mining applications)

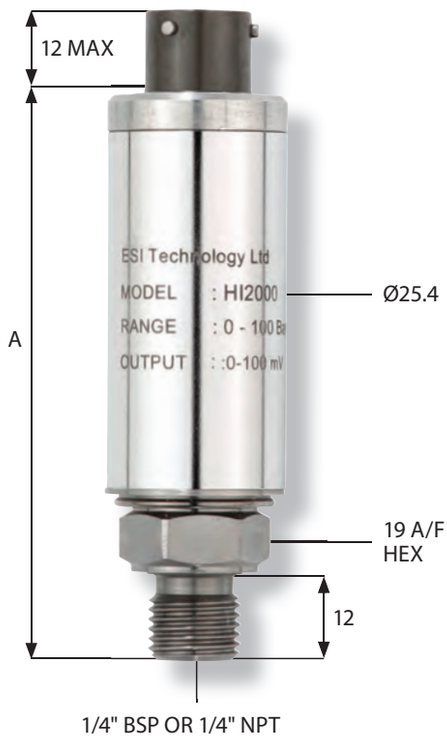
DESCRIPTION

The HISPEC HI2000 series of pressure transducers, with Silicon-on-Sapphire sensor technology, offer levels of accuracy and performance previously unobtainable or prohibitively expensive.

The unique Silicon-on-Sapphire sensor provides outstanding performance, stability and accuracy over a wide temperature range. The wetted parts and diaphragm are machined from a single piece of titanium alloy which provides excellent chemical compatibility. Applications include aerospace, laboratory and test, oil and gas monitoring equipment (down-hole) and subsea. Available in pressure ranges from 0-500mbar to 0-1,500bar and with electrical outputs of 10mV/V, 0-5V and 0-10V.

An optional ATEX and IECEx approved version of this product is available for explosion protection for flammable gases (zone 0), dusts (zone 20) and mining areas (group I M1).

DIMENSIONS (in mm)



ELECTRICAL CONNECTION (mA) MIL-C-26482

Pin.	Designation
A	+supply
B	+output
C	-output
D	-supply
E	N/C
F	N/C

ELECTRICAL CONNECTION CABLE OUTLET

WIRE COLOUR	Designation
RED	+supply
GREEN	+output
YELLOW	-output
BLUE	-supply

	Dim. A
HI2x00	80
HI2x01/2	95

Hispec HI2000 Series

High Precision Pressure Transducer

TECHNICAL DATA

Type:	HI2000/HI2010	HI2001/HI2011	HI2002/HI2012
Output signal:	10 mV/V (4 wire)	0-5 V (4 wire)	0-10 V (4 wire)
Supply Voltage:	10 VDC (5-15V)	13-30 VDC	13-30 VDC
Pressure Reference:	Gauge		
Protection of Supply Voltage:	Protected against supply voltage reversal up to 50 V (amplified versions)		
Standard Pressure Ranges:	0-1 bar Vac; 0-0.5 bar; 0-1 bar; 0-10 bar; 0-25 bar; 0-100 bar; 0-250 bar; 0-700 bar; 0-1,500 bar (other ranges available)		
Overpressure Safety:	4x for 0.5 bar range; 2 x for ranges 1 bar to 600 bar; 1.5x for 1,000 bar range; 1.1x for 1,500 bar range		
Load Driving Capability:	10 mV/V: n/a 0-5 V: max. load R_L > 5 KΩ 0-10 V: max. load R_L > 10 KΩ		
Accuracy NLHR:	±0.1% FS typical max. BFSL		
Zero Offset and Span Tolerance:	±0.5% FS at room temperature (HI2000/HI2010: ±1 mV)		
Operating Ambient Temperature:	-40°C to +85°C		
Operating Media Temperature:	-50°C to +125°C		
Storage Temperature:	±5°C to +40°C (recommended best practice)		
Temperature Effects:	±1.0% FS total error band for -20°C to +70°C. Typical thermal zero and span coefficients ±0.005% FS/ °C		
ATEX/IECEx Approval Option (mV version only):	Ex II 1 G Ex ia IIC T4 Ga (zone 0) Ex II 1 D Ex ia IIIC T135°C Da (zone 20) Ex I M 1 Ex ia I Ma (group 1 M1)		
ATEX/IECEx Safety Values:	Ui = 28 V, Ii = 119 mA, Pi = 0.65 W, Li = 0.1 µH, Ci = 0, Temperature Range = -20°C to +70°C, Max. cable length = 50 m		
Electromagnetic Capability:	Emissions: EN61000-6-4 Immunity: EN61000-6-2 Certification: CE Marked		
Insulation Resistance:	> 100 MΩ @ 50 VDC		
Wetted Parts:	Titanium alloy		
Pressure Media:	All fluids compatible with Titanium alloy		
Pressure Connection:	1/4" BSP or 1/4" NPT Male (others options available)		
Electrical Connection:	HI200x: PTFE insulated flying lead, conductor size 7/0.1 mm. HI201x: MIL-C-26482 6 pin bayonet connector (Accessory not included: mating connector type MS3116F10-6S).		

ORDER MATRIX

Output		Wires	Type
10 mV/V	Cable outlet 1m PTFE	4	HI2000
	MIL-C-26482 6 pin bayonet	4	HI2010
0-5 V	Cable outlet 1m PTFE	4	HI2001
	MIL-C-26482 6 pin bayonet	4	HI2011
0-10 V	Cable outlet 1m PTFE	4	HI2002
	MIL-C-26482 6 pin bayonet	4	HI2012

Electrical Connection / Option	Electrical Connector
No special option required	–
ATEX/ IECEx certified	EX

Pressure Range in bar	Pressure Range
0-1 barVac	V001
0-0.5 bar	00.5
0-1 bar	0001
0-10 bar	0010
0-25 bar	0025
0-100 bar	0100
0-250 bar	0250
0-700 bar	0700
0-1,500 bar	1500

Process Connection	Process Connection
1/4" BSP male	AB
1/4" NPT male	AM

Order Number Example HI2000EX0020AB

For options not listed please contact sales team.

HI2000

HI2010

S.04

Hispec HI2200/2300 Series and **Protran** PR3860

High Temperature Transmitter

- High operating temperatures of up to 250°C
- High ambient temperatures of up to 200°C
- Pressure ranges to 1,500bar
- Temperature compensated option
- Good chemical compatibility for a range of applications
- ATEX/IECEx option available (includes M1 for mining applications)

DESCRIPTION

Our high temperature pressure transducers and transmitters are designed to operate at constant media temperatures of up to 250ºC and ambient temperatures of up to 200ºC, at pressure ranges of up to 1,500bar.

The HI2200/HI2300 model takes advantage of the advanced Silicon-on-Sapphire sensors' outstanding insulation properties which allows the sensor to operate over a very wide temperature range without loss of performance. The HI2200/ HI2300 offers compensated and un-compensated output options and not only does it perform effectively at high media temperatures, but can also be used in environments where there are elevated ambient temperatures of up to 200°C, inside a furnace or thermal chamber for example.

The PR3860 high temperature pressure transmitter has been designed to meet the requirements of the majority of industrial pressure measurement applications where a hygienic flush diaphragm connection is required. Robustly constructed from stainless steel, the PR3860 pressure transmitter permits accurate pressure measurement at elevated temperatures up to 250ºC. The flush membrane can be easily cleaned for long term reliability and performance. An optional weldable boss is available to ensure flush-face installation of transmitter to tanks and pipe-work. An optional ATEX and IECEx approved version is available.

DIMENSIONS (in mm)

Model shown H12200

ELECTRICAL CONNECTION (mA) MIL-C-26482

Pin.	Designation
A	+supply
B	+output
C	-output
D	-supply
E	N/C
F	N/C

ELECTRICAL CONNECTION CABLE OUTLET

WIRE COLOUR	Designation
RED	+supply
GREEN	+output
YELLOW	-output
BLUE	-supply

Hispec HI2200/2300 Series and **Protran** PR3860

High Temperature Transmitter

TECHNICAL DATA

Type:	**HI2200/HI2210**	**HI2300/HI2310**
Output signal:	10-20 mV/V (Un-rationalised and un-compensated)	10 mV/V (Rationalised and compensated)
Supply Voltage:	10 VDC (5-15 V)	
Pressure Reference:	Gauge	
Standard Pressure Ranges	0-1 bar, 0-10 bar, 0-25 bar, 0-60 bar, 0-100 bar, 0-250 bar, 0-400 bar, 0-1,000 bar, 0-1,500 bar (Other options available)	
Overpressure Safety:	2x for ranges -1 bar to 600 bar; 1.5x for 1,000 bar range; 1.1x for 1,500 bar range	
Load Driving Capability:	n/a	
Accuracy NLHR:	±0.1% FS typical max. BFSL	
Zero Offset and Span Tolerance:	Zero offset: ±1 mV/V Span Tolerance: 10-20 mV/V	Zero offset: ±1 mV Span Tolerance: ±1% FS
Operating Ambient Temperature:	-40°C to +200°C	
Operating Media Temperature:	-50°C to +200°C	
Storage Temperature:	+5°C to +40°C (recommended best practice)	
Temperature Effects:	Typical thermal zero and span coefficients compensated ±0.05% FS/ °C	±2.0% FS Total error band -40°C to +150°C, typical thermal zero and span coefficients ±0.005% FS/ °C
Electromagnetic Capability:	Emissions: EN61000-6-4 Immunity: EN61000-6-2 Certification: CE Marked	
Insulation Resistance:	> 100 MΩ @ 50 VDC	
Wetted Parts:	Titanium alloy	
Pressure Media:	All fluids compatible with Titanium alloy	
Pressure Connection:	1/4" BSP or 1/4" NPT Male (others options available)	
Electrical Connection:	HI2x0x: PTFE insulated flying lead, conductor size 7/0.1 mm. HI2x1x: MIL-C-26482 6 pin bayonet connector (Accessory not included: mating connector type MS3116F10-6S).	

ORDER MATRIX

Output		Wires	Type	Electrical Connector	Pressure Range	Process Connection
10-20 mV/V	1m PTFE insulated flying lead	4	HI2200			
	MIL-C-26482 6 pin bayonet	4	HI2210			
10 mV/V	1m PTFE insulated flying lead	4	HI2300			
	MIL-C-26482 6 pin bayonet	4	HI2310			

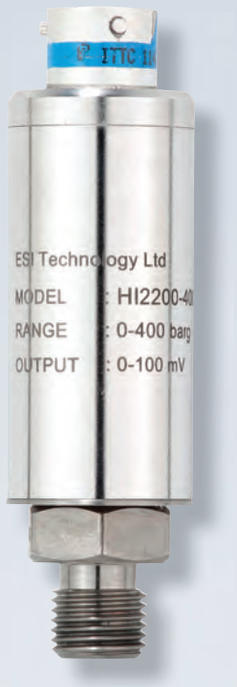
Electrical Connection / Option	
1m PTFE insulated flying lead (HI2200, HI2300)	–
MIL-C-26482 6 pin bayonet (HI2210, HI2310)	–

Pressure Range in bar	
0-1 bar	0001
0-10 bar	0010
0-25 bar	0025
0-60 bar	0060
0-100 bar	0100
0-250 bar	0250
0-400 bar	0400
0-1,000 bar	1000
0-1,500 bar	1500

Process Connection	
1/4" BSP male	AB
1/4" NPT male	AM

Order Number Example HI2200–0400AB

For options not listed please contact sales team.



HI2200

Hispec HI2200/2300 Series and **Protran** PR3860

High Temperature Transmitter

TECHNICAL DATA

Type:	**PR3860**	**PR3861**	**PR3862**
Output signal:	4-20 mA (2 wire)	0-5 V (4 wire)	0-10 V (4 wire)
Supply Voltage:	10 - 36 VDC	13 - 30 VDC	13-30 VDC
Pressure Reference:	Gauge		
Protection of Supply Voltage:	Protected against supply voltage reversal up to 50 V		
Standard Pressure Ranges:	0-10 bar; 0-25 bar; 0-60 bar; 0-100 bar; 0-250 bar; 0-400 bar (other options available)		
Overpressure Safety:	1.5x all ranges		
Load Driving Capability:	4-20 mA: $R_L < [U_B - 13\ V] / 20\ mA$ (e.g. with supply voltage (U_B) of 36V, max. load (R_L) is 1150 Ω) 0-5 V: max load $R_L > 5$ KΩ 0-10 V: max load $R_L > 10$ KΩ		
Accuracy NLHR:	±0.30% FS typical max. BFSL		
Zero Offset and Span Tolerance:	±1.0% FS at room temperature ±5% FS (approx.) adjustment with easy access trimming potentiometers on amplified versions only		
Operating Ambient Temperature:	-20°C to +85°C		
Operating Media Temperature:	0°C to +250°C (sensor and electronics thermally insulated from media temperature)		
Storage Temperature:	+5°C to +40°C (recommended best practice)		
Temperature Effects:	±2.5% FS total error band for -20°C to +70°C. Typical thermal zero and span coefficients ±0.04% FS/ °C		
ATEX/IECEx Approval Option (4-20mA version only):	Ex II 1 G Ex ia IIC T4 Ga (zone 0) Ex II 1 D Ex ia IIIC T135°C Da (zone 20) Ex I M 1 Ex ia I Ma (group 1 M1)		
ATEX/IECEx Safety Values:	Ui = 28 V, Ii = 119 mA, Pi = 0.65 W, Li = 0.1 µH, Ci = 62 nF, Temperature Range = -20°C to +70°C, Max. cable length = 105 m		
Electromagnetic Capability:	Emissions: EN61000-6-4 Immunity: EN61000-6-2 Certification: CE Marked		
Insulation Resistance:	> 100 MΩ @ 50 VDC		
Wetted Parts:	SAE 316L stainless steel		
Pressure Media:	All fluids compatible with SAE 316L stainless steel		
Pressure Connection:	1/2" BSP male with standard integral Viton (FKM) o-ring seal and flush SAE 316L stainless steel diaphragm. O-ring seal is for service temperature up to max. 205ºC. An alternative o-ring material can be provided for service up to 250ºC (charged accessory)		
Electrical Connection:	Mating socket EN175301-803 Form A (ex DIN43650), a screw terminal connector rated IP65 with PG9 cable entry (other options available)		

ORDER MATRIX

Output	Wires	Type	Electrical Connector	Pressure Range	Process Connection
4-20 mA	2	PR3860			
0-5 V	4	PR3861			
0-10 V	4	PR3862			

Electrical Connection / Option

DIN EN175301 plug and socket	–
ATEX/ IECEx certified DIN EN175301 plug and socket	EX

Pressure Range in bar

0-10 bar	0010
0-25 bar	0025
0-60 bar	0060
0-100 bar	0100
0-250 bar	0250
0-400 bar	0400

Process Connection

1/2" BSP flush diaphragm male	BA

Order Number Example PR3860–0400BA

For options not listed please contact sales team.

PR3860

S.05

Genspec GS4200-USB

Digital Pressure Transducer

- Silicon-on-Sapphire sensor technology for outstanding performance and reliability
- Pressure ranges to 4,000bar
- Cost effective alternative to data loggers
- Quickly and easily record data from multiple pressure sources in one test
- Create customised test certificates
- Set up and ready to use within 10 minutes

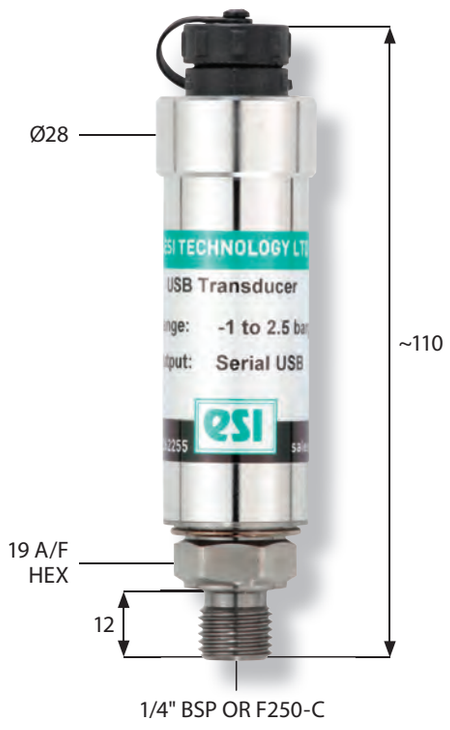
DESCRIPTION

The GS4200-USB© Digital Pressure Transducer has been designed to measure, analyse and record pressure directly on your computer without the need for costly I/O interface boards. It allows the user to measure up to 16 pressure inputs simultaneously and easily create customised test certificates.

The transducer is powered by the computer's USB port, data is then presented on the PC via the ESI-USB© configurable Windows Interface software supplied with the transducer. It has instant connection with auto-detection, and will configure automatically with your desktop or laptop pc via USB protocol. The sample rate enables dynamic pressures to be measured with up to 21 bit resolution. For real-time analysis, data transferred to the PC is achieved without loss of accuracy or bandwidth. This pressure transducer is USB 1.1 and USB 2.0 compatible, the ESI-USB© interface configuration and analysis software is compatible with Windows©7 and Windows©8 (32bit & 64bit), Vista, XP & 2000. Data can be displayed in graphical or tabular form, with a choice of pressure units and fully adjustable scales. Data can be saved to a file or exported to Excel.

The unique Silicon-on-Sapphire sensor technology provides outstanding performance and gives excellent stability over a wide temperature range. Excellent measurement accuracy provides high resolution with a precision greater than 1 in 10,000. Pressure ranges are available from 2.5bar to 4,000 bar. Each unit is supplied with ESI-USB© software, 2m USB lead rated to IP68 and a convenient carry case.

DIMENSIONS (in mm)



Genspec GS4200-USB

Digital Pressure Transducer

TECHNICAL DATA

Type:	**GS4200-USB**
Output signal:	USB 1.1 and USB 2.0 compatible
Supply Voltage:	5 VDC via USB bus
Pressure Reference:	Gauge (default); Absolute reference input by user
Standard Pressure Ranges:	-1 to 2.5 bar; 0-16 bar; 0-100 bar; 0-400 bar; 0-1,500 bar; 0-2,000 bar; 0-4,000 bar
Overpressure Safety:	2x for ranges up to 400 bar; 1.5x for 1,500 bar and 2,000 bar ranges; 1.25x for 4,000 bar range
Accuracy NLHR:	±0.15% FS typical max. BFSL
Operating Ambient Temperature:	-20°C to +85°C
Operating Media Temperature:	-50°C to +125°C
Storage Temperature:	+5°C to +40°C (recommended best practice)
Temperature Effects:	±1.5% FS total error band for -20°C to +70°C. Typical thermal zero and span coefficients ±0.015% FS/ °C
Wetted Parts:	Titanium alloy
Pressure Media:	All fluids compatible with titanium alloy
Pressure Connection:	1/4" BSP male, 1/4" NPT male or F250-C (Autoclave)
Electrical Connection:	Mating to USB mini B socket for cable connection to PC. Supplied with 2m USB lead rated to IP68 as standard.

ORDER MATRIX

Output	Type	Pressure Range	Process Connection
USB 1.1 and USB 2.0 full speed connection	GS4200-USB		
Electrical Connection			
Mating to USB mini B socket			

Pressure Range in bar

-1 to 2.5 bar	02.5
0-16 bar	0016
0-100 bar	0100
0-400 bar	0400
0-1,500 bar	1500
0-2,000 bar	2000
0-4,000 bar	4000

Process Connection

1/4" BSP male	AB
1/4" NPT male	AM
Autoclave F-250-C female (for pressures above 1500bar)	DE

Order Number Example GS4200-USB1500AB

For options not listed please contact sales team.

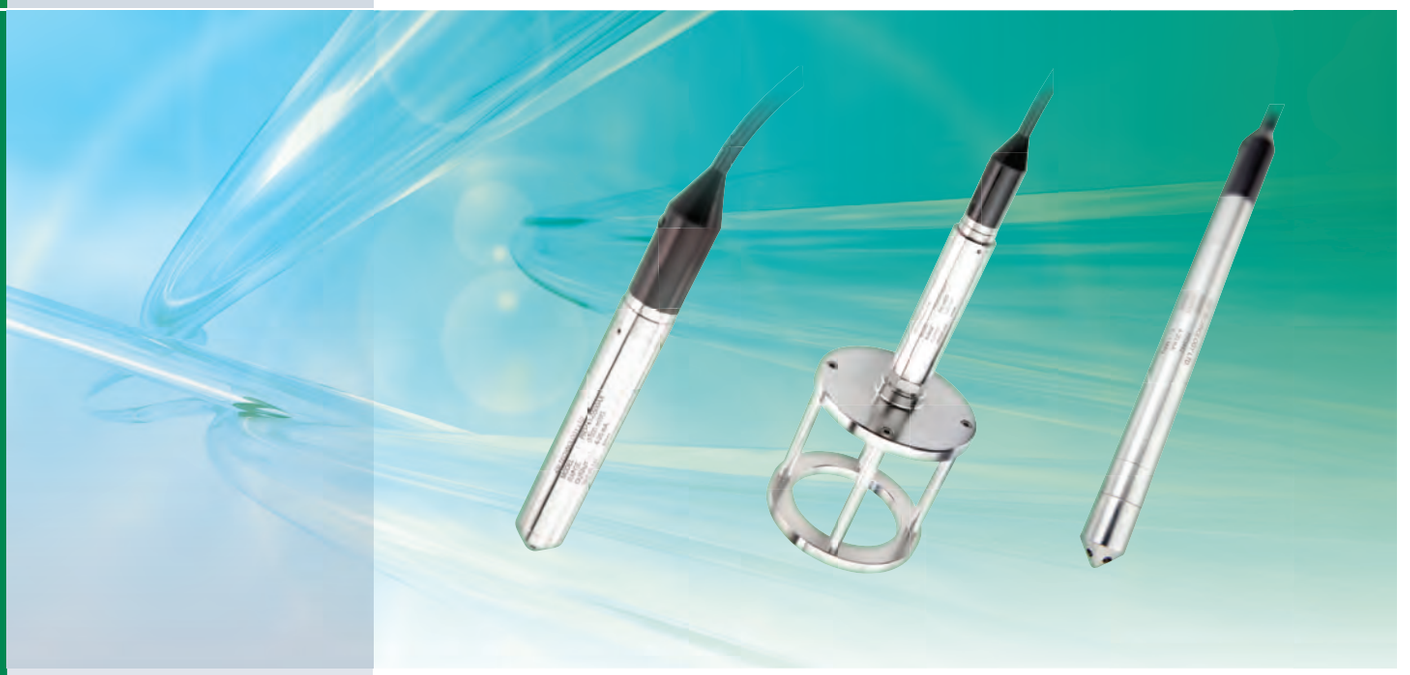
GS4200-USB

GS4200-USB HP

S.06

Protran PR3441/PR3420/PR3442

Submersible Depth/Level Pressure Transmitter



- Piezoresistive sensor technology for excellent stability and repeatability
- Robust stainless steel construction
- Pressure ranges available from 0-1mWG
- High strength, moulded cable for protection against ingress
- Ultra slim option for borehole applications
- Sludge Platform option to raise sensor above sediment level
- ATEX/IECEx option available (includes M1 for mining applications)

DESCRIPTION

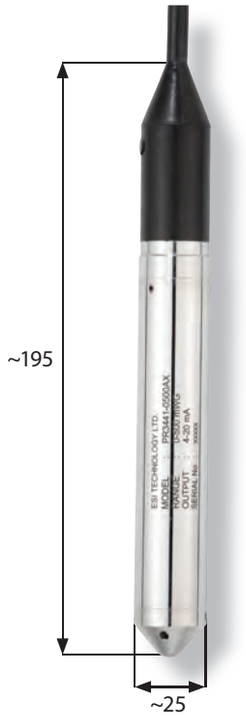
The submersible range of pressure transmitters has been designed for the accurate measurement of the depth and level of liquids in many applications. Standard output signal is 4-20mA, and electrical connection is via a high strength moulded cable with integral tube for trouble-free venting to the surface atmosphere.

The PR3441 transmitter has a 25 mm diameter, suitable for depth and level measurement in boreholes,while the PR3442 model has a slim-line 16mm diameter suitable for boreholes from 19 mm wide. Applications include borehole level and reservoir level monitoring, water mains pressure, power level and outlet pressure measurement on submersible pumps.

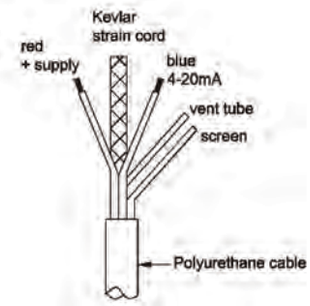
The PR3420 submersible depth and level transmitter has been designed specifically for the measurement of depth in sludge/slurry materials and is mounted on a sludge platform to lift the sensing diaphragm above the sludge/tar level.

An optional ATEX and IECEx approved version of this product is available for explosion protection for flammable gases (zone 0), dusts (zone 20) and mining areas (group I M1).

DIMENSIONS (in mm)



Model shown PR3441



polyurethane cable termination

ELECTRICAL CONNECTION

Red	+ supply
Blue	4-20 mA signal
Screen	to case

Protran PR3441/PR3420/PR3442

Submersible Depth/Level Pressure Transmitter

TECHNICAL DATA

Type:	PR3441	PR3420	PR3442
Output Signal:	4-20 mA (2 wire)		
Supply Voltage:	13 -36 VDC		
Pressure Reference:	Vented Gauge	Vented Gauge	Vented or Sealed Gauge
Protection of Supply Voltage:	Protected against supply voltage reversal up to 50 V		
Standard Pressure Ranges:	0-1 mWG; 0-10 mWG; 0-20 mWG; 0-50 mWG; 0-100 mWG; 0-250 mWG; 0-500 mWG (other options available)		
Overpressure Safety:	2x all ranges		
Load Driving Capability:	4-20 mA: $R_L < [U_B - 13\ V] / 20\ mA$ (e.g. with supply voltage (U_B) of 36V, max. load (R_L) is 1150 Ω)		
Accuracy NLHR:	±0.3% FS typical max. BFSL		
Zero Offset and Span Tolerance:	±0.5% FS at room temperature		
Operating Ambient Temperature:	-20°C - +60°C		
Operating Media Temperature:	Media must not freeze around the sensor		
Storage Temperature:	+5°C to +40°C (recommended best practice)		
Temperature Effects:	±2.0% FS total error band for -20°C - +60°C. Typical thermal zero and span coefficients +/0.03%FS/°C		
ATEX/IECEx Approval Option:	Ex II 1 G Ex ia IIC T4 Ga (zone 0) Ex II 1 D Ex ia IIIC T135°C Da (zone 20) Ex I M 1 Ex ia I Ma (group 1 M1)		
ATEX/IECEx Safety Values:	Ui = 28 V, Ii = 119 mA, Pi = 0.65 W, Li = 0.1 µH, Ci = 62 nF, Temperature Range = -20°C to +70°C, Max. cable length = 105 m		
Electromagnetic Capability:	Emissions: EN61000-6-4	Immunity: EN61000-6-2	Certification: CE Marked
Insulation Resistance:	> 100 MΩ @ 50 VDC		
Wetted Parts:	SAE 316L stainless steel housing and diaphragm, polyurethane cable and nitrile (NBR) o-ring seal	303 or 316L stainless steel housing, alumina diaphragm, nylon over-tube and Nitrile o-ring seal	SAE 316L stainless steel housing & diaphragm and polyurethane cable
Pressure Media	All fluids compatible with SAE 316L stainless steel, polyurethane and nitrile (NBR)	All fluids compatible with 303/316L stainless steel, alumina, nylon and Nitrile	All fluids compatible with SAE 316L stainless steel and polyurethane
Pressure Connection:	Stainless steel nose cone with radial pressure inlets	Sludge platform	Stainless steel nose cone with radial pressure inlets
Electrical Connection:	Submersible black polyurethane cable moulded to housing. With integral screen, Kevlar strain cord and vent tube. Conductor size 7/0.20 mm (24 AWG), resistance 8.9 Ω / 100 m (x2)	Screened cable in pressure tight, flexible nylon sheath. Cable conductor size 7/0.20mm2 (24awg), resistance 8.9ohms/100m (x2)	Submersible black polyurethane cable moulded to housing. With integral screen, Kevlar strain cord and vent tube. Conductor size 7/0.20 mm (24 AWG), resistance 8.9 Ω / 100 m (x2)

ORDER MATRIX

Output		Wires	Type	Electrical Connector	Pressure Range	Process Connection
4-20 mA	25mm diameter	2	PR3441			
	With sludge platform	2	PR3420			
	16mm diameter	2	PR3442			

Electrical Connection / Option	Electrical Connector
No special option required	–
ATEX/ IECEx certified (PR3420 and PR3441 only)	EX

Pressure Range in mWG (Metres Water Gauge)	Pressure Range
0-1 mWG (PR3441 only)	0001
0-10 mWG (PR3420 and PR3441 only)	0010
0-50 mWG	0050
0-100 mWG	0100
0-250 mWG	0250
0-500 mWG	0500

Process Connection	Process Connection
Protective nose cone (PR3441 and PR3442 only)	AX
1/4" BSP (PR3441 only)	AB
Sludge platform	AY

Order Number Example PR3441–0500AX

For options not listed please contact sales team.

PR3441

PR3420

PR3442

S.07

Protran PR3800/PR3820/ PR3850/PR3860

Flush Diaphragm Pressure Transmitter

- Easy clean flush membrane to prevent clogging
- Thick film sensor technology for long service life
- Pressure ranges to 400bar
- Range of sanitary grade pressure fittings
- Up to 250°C media temperature option
- Models available with integral O-ring seal option to ensure flush pressure seal
- ATEX/IECEx option available (includes M1 for mining applications)

DESCRIPTION

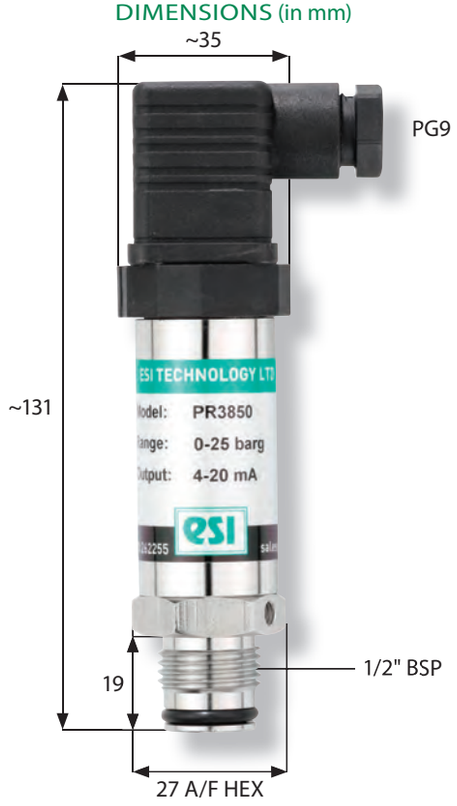
The range of flush diaphragm pressure transmitters have been designed to meet the requirements of the majority of industrial pressure measurement applications where a hygienic flush diaphragm or remote barrier seal connection is required.

Robustly constructed from stainless steel, this range of pressure transmitters incorporates the latest strain gauge technology together with a custom IC amplifier offering excellent stability and accuracy over a long service life. The range offers a stable and accurate output signal of 4-20mA with options for 0-5V and 0-10V.

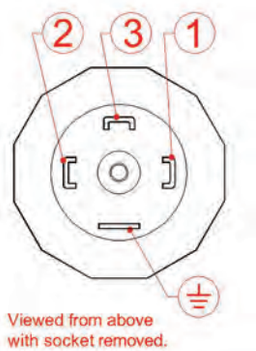
Typical applications include food processing, pharmaceutical, petrochemical, waste water and slurry handling. In these installations the process media may corrode the sensing diaphragm or clog the narrow pressure inlet on a standard transmitter. The flush membrane can be easily cleaned for long term reliability and outstanding performance. For hygienic applications the PR3800 series provides a sanitary grade pressure fitting. Seals are available in a variety of forms and materials for a wide range of applications and can be directly attached to the proposed connection or remotely via stainless steel capillary. For food processing, pharmaceutical and petrochemical applications the PR3860 is suitable for use at media temperature up to 250ºC. Pressure ranges available from 0-200mbar to 0-400bar.

An optional ATEX and IECEx approved versions of this range are available for explosion protection for flammable gases (zone 0), dusts (zone 20) and mining areas (group I M1).

DIMENSIONS (in mm)



Model shown PR3850



ELECTRICAL CONNECTION (mA)

Pin. No.	2 wire
1	+ supply
2	4-20 mA signal
3	N/C
⏚	to case

ELECTRICAL CONNECTION (V)

Pin. No.	4 wire	3 wire
1	- supply	common
2	+ supply	+ supply
3	+ output	+ output
⏚	- output	to case

Protran PR3800/PR3820/ PR3850/PR3860

Flush Diaphragm Pressure Transmitter

TECHNICAL DATA

Type:	PR3800	PR3801	PR3802	PR3820	PR3821	PR3822
Output signal:	4-20 mA (2 wire)	0-5 V (4 wire)	0-10 V (4 wire)	4-20 mA (2 wire)	0-5 V (4 wire)	0-10 V (4 wire)
Supply Voltage:	13 to 36 VDC	13-30 VDC	13-30 VDC	13 to 36 VDC	13-30 VDC	13-30 VDC
Pressure Reference:	Gauge					
Protection of Supply Voltage:	Protected against supply voltage reversal up to 50 V					
Standard Pressure Ranges:	0-1 bar Vac; 0-1 bar; 0-2.5 bar; 0-10 bar; 0-16 bar; 0-25 bar; 0-40 bar (other options available)					
Overpressure Safety:	1.5x for ranges 0-200 mbar to 0-40 bar					
Load Driving Capability:	4-20 mA: $R_L < [U_B - 13\ V] / 20\ mA$ (e.g. with supply voltage (U_B) of 36V, max. load (R_L) is 1150 Ω)					
Accuracy NLHR:	±0.30% FS typical max. BFSL					
Zero Offset and Span Tolerance:	±1.0% FS at room temperature ±5% FS (approx.) adjustment with easy access trimming potentiometers on amplified versions only					
Operating Ambient Temperature:	-20°C - +85°C					
Operating Media Temperature:	-20°C - +85°C					
Storage Temperature:	+5°C - +40°C (recommended best practice)					
Temperature Effects:	±2.5% FS total error band for -20°C - +70°C. Typical thermal zero and span coefficients ±0.04% FS/ °C					
ATEX/IECEx Approval Option (4-20mA version only):	Ex II 1 G Ex ia IIC T4 Ga (zone 0) Ex II 1 D Ex ia IIIC T135°C Da (zone 20) Ex I M 1 Ex ia I Ma (group 1 M1)					
ATEX/IECEx Safety Values:	Ui = 28 V, Ii = 119 mA, Pi = 0.65 W, Li = 0.1 µH, Ci = 62 nF, Temperature Range = -20°C - +70°C, Max. cable length = 105 m					
Electromagnetic Capability:	Emissions: EN61000-6-4 Immunity: EN61000-6-2 Certification: CE Marked					
Insulation Resistance:	> 100 MΩ @ 50 VDC					
Wetted Parts:	SAE 316L stainless steel					
Pressure Media:	All fluids compatible with SAE 316L stainless steel					
Pressure Connection:	Pipe clamp (Tri-clover) 1.5" 316L Stainless steel (Other options available)			DIN 11851 female 316L Stainless steel (Other options available)		
Electrical Connection:	Mating socket EN175301-803 Form A (ex DIN43650), a screw terminal connector rated IP65 with PG9 cable entry (other options available)					

DISCLAIMER: ESI Technology Ltd operates a policy of continuous product development. We reserve the right to change specification without prior notice. All products manufactured by ESI Technology Ltd are calibrated using precision calibration equipment with traceability to international standards.

ORDER MATRIX

Output	Wires	Type	Electrical Connector	Pressure Range	Process Connection
4-20 mA	2	PR3800			
	2	PR3820			
0-5 V	4	PR3801			
	4	PR3821			
0-10 V	4	PR3802			
	4	PR3822			

Electrical Connection / Option

DIN EN175301 plug and socket	–
Cable outlet 1m screened	A
M12 connector	B
Cable outlet 1m screened IP67 protection	C
ATEX/ IECEx certified with DIN EN175301 plug and socket	EX

Pressure Range in bar

0-1 bar vac	V001
0-1 bar	0001
0-2.5 bar	02.5
0-10 bar	0010
0-16 bar	0016
0-25 bar	0025
0-40 bar	0040

Process Connection

Pipe clamp (Tri-clover) 1.5" 316L Stainless steel (PR3800 only)	BG
Pipe clamp (Tri-clover) 2" 316L Stainless steel (PR3800 only)	BH
RJT 38mm female 316L Stainless steel (PR3820 only)	BJ
DIN11851 female 32mm Stainless steel (PR3820 only)	BR
SMS 40mm female 316 Stainless steel (PR3820 only)	BV

Order Number Example PR3800–0250BG

For options not listed please contact sales team.

PR3820

Protran PR3800/PR3820/ PR3850/PR3860

Flush Diaphragm Pressure Transmitter

TECHNICAL DATA

Type:	PR3850	PR3851	PR3852	PR3860	PR3861	PR3862
Output signal:	4-20 mA (2 wire)	0-5 V (4 wire)	0-10 V (4 wire)	4-20 mA (2 wire)	0-5 V (4 wire)	0-10 V (4 wire)
Supply Voltage:	13 to 36 VDC	13-30 VDC	13-30 VDC	13 to 36 VDC	13-30 VDC	13-30 VDC
Pressure Reference:	Gauge					
Protection of Supply Voltage:	Protected against supply voltage reversal up to 50 V					
Standard Pressure Ranges:	0-10 bar; 0-25 bar; 0-100 bar; 0-250 bar; 0-400 bar (other options available)					
Overpressure Safety:	1.5x all ranges					
Load Driving Capability:	4-20 mA: $R_L < [U_B - 13\ V] / 20\ mA$ (e.g. with supply voltage (U_B) of 36V max. load (R_L) is 1150 Ω) 0-5 V: max load $R_L > 5$ KΩ 0-10 V: max load $R_L > 10$ KΩ					
Accuracy NLHR:	±0.30% FS typical max. BFSL					
Zero Offset and Span Tolerance:	±1.0% FS at room temperature ±5% FS (approx.) adjustment with easy access trimming potentiometers on amplified versions only					
Operating Ambient Temperature:	-20°C - +85°C					
Operating Media Temperature:	-20°C - +85°C			0°C to +250°C (sensor and electronics thermally insulated from media temperature)		
Storage Temperature:	+5°C - +40°C (recommended best practice)					
Temperature Effects:	±2.5% FS total error band for -20°C - +70°C. Typical thermal zero and span coefficients ±0.04% FS/ °C					
ATEX/IECEx Approval Option (4-20mA version only):	Ex II 1 G Ex ia IIC T4 Ga (zone 0) Ex II 1 D Ex ia IIIC T135°C Da (zone 20) Ex I M 1 Ex ia I Ma (group 1 M1)					
ATEX/IECEx Safety Values:	Ui = 28 V, Ii = 119 mA, Pi = 0.65 W, Li = 0.1 µH, Ci = 62 nF, Temperature Range = -20°C - +70°C, Max. cable length = 105 m					
Electromagnetic Capability:	Emissions: EN61000-6-4 Immunity: EN61000-6-2 Certification: CE Marked					
Insulation Resistance:	> 100 MΩ @ 50 VDC					
Wetted Parts:	SAE 316L stainless steel					
Pressure Media:	All fluids compatible with SAE 316L stainless steel					
Pressure Connection:	1/2" BSP male with integral nitrile (NBR) o-ring seal and flush SAE 316L stainless steel diaphragm with high temperature fitting			1/2" BSP male with standard integral Viton (FKM) o-ring seal and flush SAE 316L stainless steel diaphragm. O-ring seal is for service temperature up to max. 205ºC. An alternative o-ring material can be provided for service up to 250ºC (charged accessory)		
Electrical Connection:	Mating socket EN175301-803 Form A (ex DIN43650), a screw terminal connector rated IP65 with PG9 cable entry (other options available)					

ORDER MATRIX

Output	Wires	Type	Electrical Connector	Pressure Range	Process Connection
4-20 mA	2	PR3850			
	2	PR3860			
0-5 V	4	PR3851			
	4	PR3861			
0-10 V	4	PR3852			
	4	PR3862			

Electrical Connection / Option

DIN EN175301 plug and socket	–
Cable outlet 1m screened	A
M12 connector	B
Cable outlet 1m screened IP67 protection	C
ATEX/ IECEx certified with DIN EN175301 plug and socket	EX

Pressure Range in bar

0-10 bar	0010
0-25 bar	0025
0-100 bar	0100
0-250 bar	0250
0-400 bar	0400

Process Connection

1/2" BSP male with flush membrane	BA
1" BSP male with flush membrane (PR385x only)	BC

Order Number Example PR3860–0250BA

For options not listed please contact sales team.

PR3850

PR3860

S.08

Special Solutions

- Application specific design solutions
- Customised housing design
- Choice of output signals and pressure ranges
- Specialised process connections
- Various electrical connector options
- Special housing materials

From Conception to Completion… The custom design service from ESI.

Whatever your application may be, there are times when your requirements are not straightforward and you need a tailor made pressure measurement solution to your unique specifications.

ESI Technology specialise in the design and manufacture of pressure transducers and transmitters for a wide range of industries.

In addition to the standard range of instruments, a team of qualified engineers, with extensive experience in electronic, software and mechanical instrumentation offer a complete design service using the latest technologies. The team are able to analyse and interpret customers' specific requirements and create a product that meets, and often exceeds, the exact needs of the application in order to eradicate any compromise from the customer.

The ability to design bespoke solutions, often just minor adjustments to standard products, is a major benefit to customers in certain applications. In addition, ESI have the capabilities to take on major design projects and, using extensive in-house pressure and environmental test equipment, create prototype sensors complete with qualification and first article test reports.

Sensor technology, output signals, pressure ranges, electrical connections and specialised process connections can be adapted to customer requirements. Stringent quality control and inspection is exercised at every stage of the manufacturing process to ensure our customers complete satisfaction with the end product, backed up with technical advice and support. Customer focus and high quality is maintained, regardless of whether the project is small, mid or high volume.

S.09

Oil & Gas and Subsea Solutions


PR3914


PR3915


PR3913


PR3920

- Dual Redundant pressure sensors and electronics
- Hyperbaric testing to 3,300m depth
- Environmental Stress Screening (ESS)
- Specialised process connections
- Extended service life
- Range of housing materials
- Comprehensive documentation package and certification

Oil, Gas & Subsea

Oil, gas & subsea applications have become a speciality of ESI. The ability to meet exacting requirements for these markets can be illustrated by the evolution of the field proven oil & gas and subsea product range which includes dual redundant and subsea differential designs.

Pressure measurement plays an important role in the oil & gas industry. With the necessity to find oil in less accessible places, the systems utilised in exploration become more complex and the use of pressure transducers and transmitters is increasing. New and more challenging applications require specifically designed solutions to cope with higher static pressures, aggressive processes and environmental conditions. One of our particular areas of expertise is in deep-water subsea applications where we provide specialist transmitters, often for control valve operation and for immersion up to 6000 metres with an expected service life of 25 years.

Pressure port threads, output signals, pressure ranges, electrical connections and wetted parts can be tailored to adapt to the harsh and unforgiving environments synonymous with the oil, gas and subsea industries. At the heart of the design is ESI's unique Silicon-on-Sapphire sensor technology; a sensor not only with high sensitivity and stability, but also rugged and resilient against high overload pressures and transients.

Optional ATEX and IECEx approved versions of this product range are available for explosion protection for flammable gases (zone 0), dusts (zone 20) and mining areas (group I M1).

Product Conditioning

Pre-conditioning and testing is fundamental to the success of our oil, gas and subsea range. Our investment in hyperbaric test facilities means that each and every unit we supply has already been subjected to 3300 metres of submersion before leaving the factory and the customer can rest assured that there is no concern about leakage or integrity when deploying these pressure transmitters in deep water subsea applications.

Investment in vibration test equipment and automated thermal chambers means that transmitters can be environmentally screened at ESI before shipment, confirming that the units are fit and reliable for a long service life on the seabed. This is a major benefit to the customer as the cost of valve retrieval from a subsea process is extreme. This investment and commitment means that every customer receives a material requirement package with each transmitter confirming calibration, accuracy, material conformity, hyperbaric test and ESS test certificates

Documentation Support

The provision of documentation to support products is usually beyond the scope of most quality systems, but we have adapted our procedures to offer full and comprehensive document support including certificates of conformity, calibration certificates and material certificates for traceability. Document packages have become a standard requirement in the competitive oil and gas market and ESI are ready to support any new requirements that arise.

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S.10

Protran PR3200/PR3202

Differential Pressure Transmitter

- Wide range of pressure ranges from ultra-low to 200 barDP
- WET/WET operation for use with liquids on both sensors
- Available for gauge reference or bi-directional measurement
- Durable designs for industrial and commercial installations
- R.F.I. SHIELDED for protection against electromagnetic radiation
- ATEX/IECEx option available (includes M1 for mining applications)

DESCRIPTION

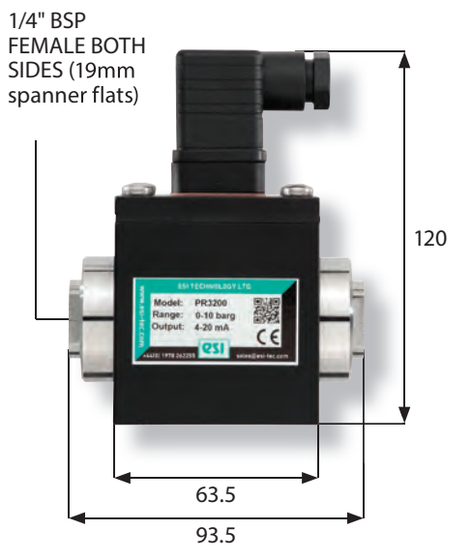
Differential pressure measurement has a wide number of applications from measuring a few millibar in cleanrooms up hundreds of bar in subsea environments. ESI Technology has a range of differential pressure transmitters with pressure ranges available from 0-5mbar to 0-200bar in DP, gauge reference or bi-directional.

The PR3200 differential pressure transmitter uses two Silicon-on-Sapphire pressure sensors, offering high stability and performance with true wet/wet operation, suitable for use with all liquids and gases compatible with stainless steel and titanium.

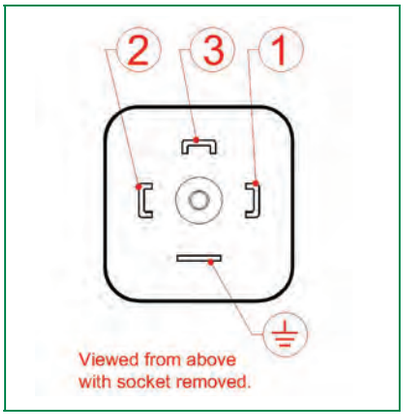
The PR3202 air differential pressure transmitter provides an accurate solution for low pressure sensing, and is fully temperature compensated for unrivalled stability at very low pressures. Housed in an RFI shielded wall mountable box for EMC protection, the PR3202 combines precise measurement with the robustness and flexibility for industrial and commercial installations. An optional heavy-duty aluminium die-cast housing is available for the harshest environments.

Optional ATEX and IECEx approved versions are available for explosion protection for flammable gases (zone 0), dusts (zone 20) and mining areas (group I M1).

DIMENSIONS (in mm)



Model shown PR3200



ELECTRICAL CONNECTION (mA)

Pin. No.	2 wire
1	+ supply
2	4-20 mA signal
3	N/C
⏚	to case

Protran PR3200/PR3202

Differential Pressure Transmitter

TECHNICAL DATA

Type:	PR3200	PR3202	PR3203	PR3204
Output signal:	4-20 mA (2 wire)	4-20 mA (2 wire)	0-5 V (3 wire)	0-10 V (3 wire)
Supply Voltage:	10-36 VDC	10-36 VDC	13-30 VDC	13-30 VDC
Pressure Reference:	Differential			
Protection of Supply Voltage:	Protected against supply voltage reversal up to 50 V			
Standard Pressure Ranges:	0-0.5 bar; 0-1 bar; 0-10 bar; 0-20 bar; 0-40 bar; 0-100 bar; 0-200 bar (other options available)	0-5 mbar; 0-10 mbar; 0-20 mbar; 0-50 mbar; 0-100 mbar; 0-250 mbar; 0-500 mbar; 0-1000 mbar (other options available)		
Overpressure Safety:	1.5x maximum static line pressure for all ranges	25 mbar max. for ranges 0-5 mbar to 0-10 mbar; 200 mbar max. for ranges 0-20 mbar to 0-100 mbar; 1200 mbar max. for ranges 0-150 mbar to 0-1000 mbar		
Common Mode (Static line pressure)	2.5 bar for 0-0.5 bar range; 4 bar for 0-1 bar range; 40 bar for 0-10 bar range; 60 bar for 0-20 bar range; 160 bar for 0-40 bar range; 400 bar for 0-100 bar range; 600 bar for 0-200 bar range	375 mbar equal to both ports for ranges 0-5 to 0-10 mbar; 2 bar max. equal to both ports for ranges 0-20 mbar to 0-1000 mbar		
Load Driving Capability:	4-20mA: $R_L < [U_B - 10\ V] / 20$ mA (e.g. with supply voltage (U_B) of 36V, max. load (R_L) is 1300 Ω)	4-20 mA: $R_L < [U_B - 13\ V] / 20$ mA (e.g. with supply voltage (U_B) of 36 V, max. load (R_L) is 1150 Ω)		
Accuracy NLHR:	±0.30% FS typical max. BFSL			
Zero Offset and Span Tolerance:	±1.0% FS at room temperature ±5% FS (approx.) adjustment with easy access trimming potentiometers			
Operating Ambient Temperature:	-20°C - +85°C	-20°C - +70°C		
Operating Media Temperature:	-20°C - +85°C	-20°C -+70°C		
Storage Temperature:	+5°C - +40°C (recommended best practice)			
Temperature Effects:	±3.0% FS total error band for -20°C - +70°C. Typical thermal zero and span coefficients ±0.05% FS/ °C	±2.0% FS total error band for -20°C - +70°C. Typical thermal zero and span coefficients ±0.04% FS/ °C		
ATEX/IECEx Approval (4-20mA version only):	Ex II 1 G Ex ia IIC T4 Ga (zone 0) Ex II 1 D Ex ia IIIC T135°C Da (zone 20) Ex I M 1 Ex ia I Ma (group 1 M1)			
ATEX/IECEx Safety Values:	Ui = 28 V, Ii = 119 mA, Pi = 0.65 W, Li = 0.1 µH, Ci = 74 nF, Temperature Range = -20°C - +70°C, Max. cable length = 45 m			
Electromagnetic Capability:	Emissions: EN61000-6-4 Immunity: EN61000-6-2 Certification: CE Marked			
Insulation Resistance:	> 100 MΩ @ 50 VDC			
Wetted Parts:	SAE 304 stainless steel and titanium alloy	Nickel plated brass, silicone tubing, silicon diaphragm, glass filled polyamide		
Pressure Media:	All fluids compatible with SAE 304 stainless steel and titanium alloy	Non-corrosive, non-ionic fluids, such as air, dry gases		
Pressure Connection:	1/4"BSP female (other options available)	4 mm I.D. hose (other options available)		
Electrical Connection:	Mating socket EN175301-803 Form A (ex DIN43650), a screw terminal connector rated IP65 with PG9 cable entry (other options available)	Screw terminals for conductor sizes 0.2-2 mm2 are located beneath the enclosure lid. Cable entry is via IP66 cable gland with compression seal for cable sizes 4-8 mm (optional M20 conduit available)		

ORDER MATRIX

Output	Wires	Type
4-20 mA	2	PR3200
	2	PR3202
0-5 V	3	PR3203
0-10 V	3	PR3204

Electrical Connection / Option	Electrical Connector
DIN EN175301 plug and socket (PR3200 only)	–
PG7 cable gland (PR3202, PR3203, PR3204 only)	–
ATEX/ IECEx certified	EX

Pressure Range in bar	Pressure Range
0-5 mbar (PR3202, PR3203, PR3204 only)	0005
0-50 mbar (PR3202, PR3203, PR3204 only)	0050
0-100 mbar (PR3202, PR3203, PR3204 only)	0100
0-500 mbar (PR3202, PR3203, PR3204 only)	0500
0-500 mbar (PR3200 only)	00.5
0-1 bar (PR3200 only)	0001
0-10 bar (PR3200 only)	0010
0-50 bar (PR3200 only)	0050
0-100 bar (PR3200 only)	0100
0-200 bar (PR3200 only)	0200

Process Connection	Process Connection
1/4" BSP female (PR3200 only)	AR
1/4" NPT female (PR3200 only)	AS
4.8mm tube connection (push-on stem) (PR3202, PR3203, PR3204 only)	AW
1/4" BSP male (PR3202, PR3203, PR3204 only)	AB

Order Number Example PR3200EX0200AR

For options not listed please contact sales team.

PR3200

PR3202

S.11

Accessories ADHT/ PM1000/ PM8000

- High temperature pressure adapter
- Panel meter
- Plug-in display

DESCRIPTION

The ESI product range includes high quality accessories in order to grant users the optimal installation solution in all applications.

The ADHT Cooling Coil Adaptor provides thermal isolation for a pressure transducer from hot liquid or gas media.

It is an ideal solution for applications where the media temperature exceeds the rating of a pressure transducer or transmitter. The Cooling Coil adapter will reduce the temperature of the media by approximately one fifth before it makes contact with the transducer sensing element. The ADHT can be used with media up to 200°C and with pressure ranges up to 400bar max. Constructed entirely from 316L stainless steel, it offers a simple yet effective solution to high temperature applications when used with ESI pressure sensors.

PM1000

The PM1000 series is a 4 digit LED plug-on display for use with transmitters with 4-20 mA 2 wire output and fitted with DIN 43650 connector. It provides a local display for a multitude of applications.

The plug-on display simply fits between the transmitter plug and connecting cable socket and is powered from the 4-20mA current loop signal of the transmitter. No additional power source is required.

PM8000

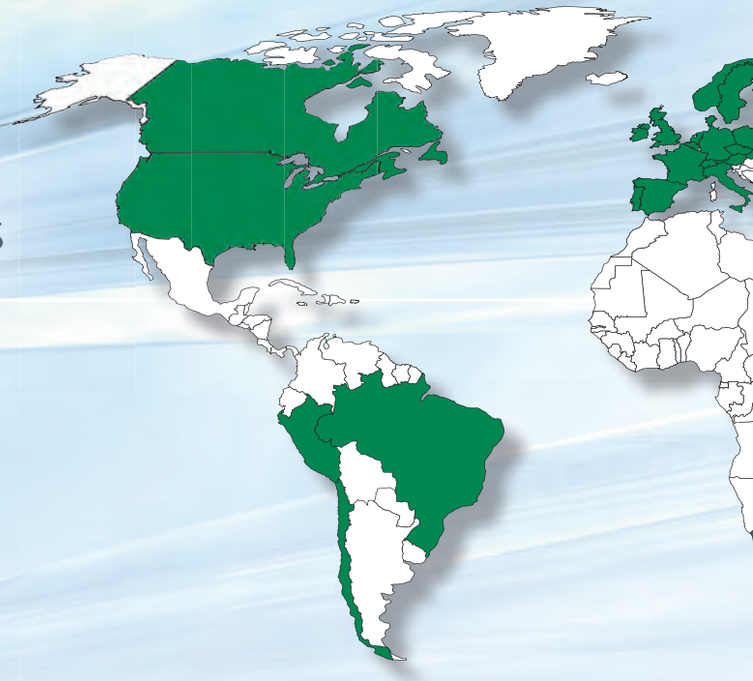
The PM8000 Series digital panel meters are easy to set up and commission, whilst offering extremely high precision and long term reliability.
A MENU-FREE calibration system is employed with this panel meter design. This makes calibration and set-up of operating parameters very straightforward and radically simplifies this process compared with the usual menu arrangement used on most digital meters.

PM1000

PM8000

ADHT

ESI wordwide:
International sales partners



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Publisher ESI-Technology,
Sensor House, Wrexham
Technology Park, Wrexham LL13 7YP

1. Edition, April 2015
No of prints 2000pcs
Part No: 1-0-00-999-107