



PSM INSTRUMENTATION LTD

**SERIES 290/3000
DIFFERENTIAL PRESSURE
TRANSMITTERS
USER MANUAL**

Models covered: 3660/DP, 3670/DP,
3675/DP, 290/DP, 292/DP & 295/DP

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1. INTRODUCTION

Series 3000 and 290 differential pressure transmitters are intended for applications across a wide range of processes from ultra low to medium pressure duties.

Different constructions and materials are available to suit a particular duty

The measurement principle is based on a precision rated diaphragm and linear variable differential transformer (LVDT) combination.

On all models the pressure chamber houses a rated pressure element to which the process pressure is directly applied. Backing plates are provided to protect against pressure overloads, and full asymmetric protection is achieved on certain models by employing a hydraulically linked dual diaphragm assembly,

The pressure element is attached to a ferro magnetic core which is located in the centre (null point) of a high resolution linear variable differential transformer(LVDT). When voltage is applied to the primary coil, any movement of the core due to pressure on the measuring element develops a voltage in the two secondary coils. The output signal from these two coils is then conditioned within the transmitter electronics to provide a standard process control signal output, which, using the adjustments provided, may be set by the user to the process requirements.

2. **SPECIFICATIONS - General**

Mechanical

Electronics Housing

Integral models: Stainless steel to IP65

Remote models: GRP with internal RFI screen to IP65

Pressure housing: 316 St Stl

Diaphragm material: Hastelloy C, / St Stl.(model dependant)

Remote sensor cable: Heavy duty TPE max length 100 metres

Process connections: 1/4" BSPT Fem on 54 mm centres

Electrical connections:

Integral models: Standard DIN type connector.

Remote models: PG9 Cable glands

Electrical

Maximum error: +/- 0.25% (including the effects of non-linearity and hysteresis)

Range adjustment: 30 to 100% of nominal input range

Zero adjustment: +/- 20 % of nominal input range

Signal output: 4 to 20 mA dc 2 wire

Power supply: 12 to 30 V dc

Performance

Operating temperature: -25 to +80 deg C (+100 deg C remote)

Temperature effect: Better than 0.05% per deg C

Humidity: 0-95 deg C RH non-condensing

Optional (remote versions only)

Square root extraction - non IS versions only

3 1/2 digit LCD Indicator 0 to 100%

For Models, Input ranges, overload capabilities and arrangements see the following tables:

	3660/DP	292/DP	3670/DP
Type	Differential	Differential	Differential
Nominal range: minimum	0 to 2 mb	0 to 2 mb	0 to 10 mb
Nominal range : maximum	0 to 10 mb	0 to 10mb	0 to 50 mb
Maximum Static	10 bar	10 bar	50 bar
Asymmetric Protection	5 bar	5 bar	20 bar
Electronics	Integral	Remote	Integral
Intrinsic safety	No	Yes	No
Process connection	1/4" BSP	1/4" BSP	1/4" BSP
Centres on 54mm	Yes	Yes	Yes
Duty: Dry	Yes	Yes	Yes
Duty: Wet	No	No	Yes

Model coding

3675 / DP / 100mb / cont...

3660/DP - Ultra Low Diff.

Pressure

3670/DP - Low Diff. Pressure

3675/DP - Differential Pressure

290/DP - As 3670 but remote IS

*Transmitter set range
S - Special calibration*

*2mb - Nominal range 2 mbar
 5mb - Nominal range 5 mbar
 10mb - Nominal range 10 mbar
 20mb - nominal range 20 mbar
 50mb - Nominal range 50 mbar
 100mb - Nominal range 100 mbar
 200mb - Nominal range 200 mbar
 500mb - Nominal range 500 mbar
 1b - Nominal range 1 bar
 2b - Nominal range 2 bar
 5b - Nominal range 5 bar
 10b - Nominal range 10 bar
 20b - Nominal range 20 bar*

290/DP	3675/DP	295/DP
Differential	Differential	Differential
0 to 10 mb	0 to 50 mb	0 to 50 mb
0 to 50 mb	0 to 1 bar	0 to 1 bar
50 bar	50 bar	50 bar
20 bar	20 bar	20 bar
Remote	Integral	Remote
Yes	No	Yes
1/4" BSP	1/4" BSP	1/4" BSP
Yes	Yes	Yes
No	Yes	Yes
Yes	Yes	Yes

..75mb / 42 / 54 / XX/SR / 00 / WS / -

42 - 4 to 20 mA output

*Process Connections
X - Non standard
54 - 54mm centres for
direct mounting*

*Specify cable length in Metres
(models 290/292/295 only)*

P- -

OX - Degreased

**NB- No Bracket direct
manifold mounting
WS- 2" Standpipe/Wall**

**00 - Loop powered 24 V
DC**

**NO - No options required
SR - Integral sq. rt.
extraction*
HC - Hastelloy wetted parts
DI - Integral digital indicator*
SD - Integral Sq. rt. & digital
indicator***

3. TRANSMITTER INSTALLATION MECHANICAL

Pre installation checks

The Transmitter will normally have been manufactured, calibrated and tested in accordance with the users specific requirements. It is recommended therefore, that prior to commencing installation, the specification of the instrument as supplied is checked to ensure that it is in accordance with actual installation requirements. Checks should include nominal and actual ranges set, signal output, power supply requirements and process connections. The relevant information will be engraved on the label located on the transmitter body.

Transmitter Mounting

For integral units the transmitter may be either direct manifold mounted surface mounted, or mounted on a standard 60mm instrument stand-pipe using the optional mounting brackets. For remote models the sensor itself is generally mounted directly to the pipework or 3 valve manifold, the remote amplifier module is surface mounting only. In either case care should be taken to ensure that the sensor is mounted level to within ± 2 degrees. This especially important for very low range models. Unless otherwise stated all transmitters are calibrated in the level position.

System Piping

The size of the process connection to the pressure chamber will depend on what was specified at the time of manufacture. The plastic protection plug, where fitted, should be removed. Do not overtighten the pressure connection or insert any objects through the entry hole since this may result in damage to the sensitive pressure element.

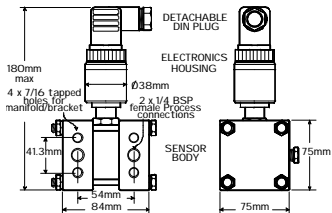
In general it should be ensured that the pipework and valves used are compatible with the process in terms of materials and pressure ratings. For liquid level duties long pipe runs should have a gradient to assist in clearance and line size should be $\frac{1}{4}$ " minimum. Where isolation valves are fitted they should be as close to the transmitter as practical, ideally the transmitter should be directly mounted to a 3 or 5 valve manifold.

For wet applications, to ensure that there is no air trapped in the system it will be necessary to purge/bleed the sensor using the bleed screws provided.

On D.P. applications the pressure should first be equalised. This is especially important on very low range units where asymmetric protection is limited.

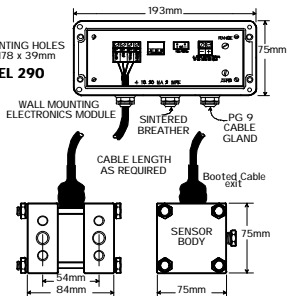
GENERAL OUTLINE DRAWINGS

MODEL 3670

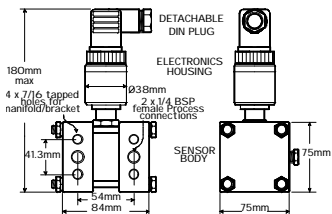


4 MOUNTING HOLES
ON 178 x 39mm

MODEL 290

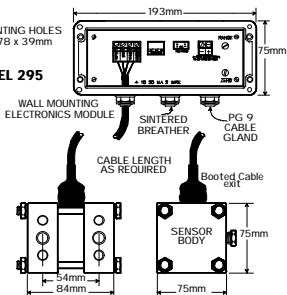


MODEL 3675

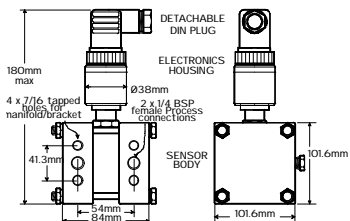


4 MOUNTING HOLES
ON 178 x 39mm

MODEL 295

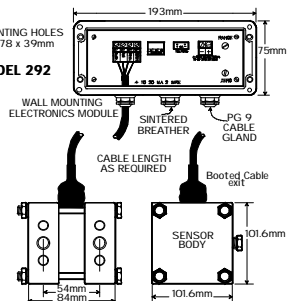


MODEL 3660



4 MOUNTING HOLES
ON 178 x 39mm

MODEL 292



4. TRANSMITTER INSTALLATION ELECTRICAL

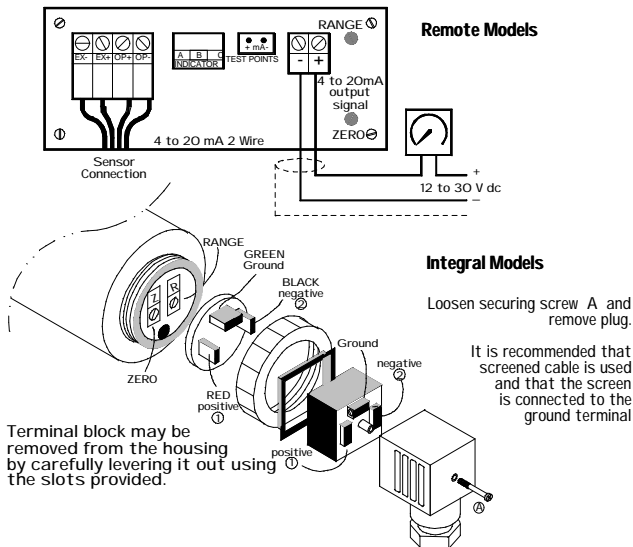
Electrical connections

On remote models the signal and supply cable is connected to the terminal block via PG9 cable glands. On integral models an industry standard DIN plug is used. The cabling may be of screened, flexible or mineral insulated type dependant upon the application requirements, maximum conductor size 1.5mm.

Prior to connection of any power supply it should be ensured that the voltage is correct for the transmitter otherwise damage may result.

Where other devices are to be included in the signal loop for 2 wire 4 to 20mA output transmitters, the total loop impedance may not exceed the figure given by the following equation:-

$$\text{Maximum output load} = \frac{\text{Supply Voltage} - 12}{0.002}$$



5. TRANSMITTER COMMISSIONING

Under normal circumstances the instrument will have been supplied with range and zero controls preset according to the users specifications, therefore, no adjustment should be necessary. However, it may be when the transmitter is installed, trimming of zero and/or range settings are necessary. It may also be that the transmitter is to be reset for a different application.

On integral models access to the zero and span adjustment potentiometers is provided by undoing the plastic locking ring at the rear of the body.

On remote models the zero and span adjustments are located on the lower PCB and accessed via 2 holes in the upper PCB.

In both cases the potentiometers are clearly identified.

Where practical all adjustments should be made with the transmitter installed on the process and the range and zero settings validated by measurement of the output signal at 0 and 100% of the process pressure. Where it is not practical to vary the process pressure to suit, an alternative pressure source may be employed, this should be an high accuracy device such as an air driven dead weight tester, laboratory digital pressure standard, water or mercury column.

Range & Zero adjustments

The zero should be adjusted firstly, the instrument is of the 'live zero' type therefore for when no pressure is applied the output signal should be 4.00mA . Once this is achieved the range potentiometer should be adjusted with the required max. pressure applied to the instrument until the output signal is 20mA. It is recommended that the zero be rechecked after range adjustment

Display scaling Remote models - optional digital indicator

Note: *DIL Sw 1 & DIL Sw. 2 should not be in the on position at the same time. Display scaling should be performed after any range and zero adjustments are made.*

Where the optional $3^{1/2}$ digit display is fitted an additional board is housed in the amplifier module. Two DIL switches 1 & 2, plus a zero and a range potentiometer are included.. scaling of the digital indicator is performed using these controls. With zero pressure applied the left hand potentiometer should be adjusted until the display reads zero, and when full scale pressure is applied, the right hand potentiometer should be adjusted until the meter reads as required. Placement of the decimal point may be altered using DIL switches marked 1. and 2. as follows:-

With both off max. full scale value is : 1999

With DIL sw.2. on max. full scale value is : 199.9

With DIL sw.1. on max full scale value is: 19.99

6. FAULT FINDING

Routine Maintenance

The design of these transmitters is such that no routine maintenance is required except for periodic examination of gaskets and security of pressure and electrical connections

Fault Finding

These transmitters are sensitive and accurate measuring instruments and have no mechanical wearing or contacting parts. If installation procedures have been followed correctly the instrument should give satisfactory operation over a long period.

In cases of failure or poor operation following installation or in normal service the following check list may assist in isolating the cause of any problems.

- 1 Are the range details of the transmitter correct for the duty?*
- 2 Fully check impulse piping and wiring installation, have any leaks developed or are there any poor electrical connections?*
- 3 Is the transmitter isolation valve (if fitted) fully in the open position?*
- 4 Is there pressure in the process and is it of the correct order?*
- 5 Is the correct power supply applied to the transmitter and is it actually present at the transmitter terminals?*
- 6 Check the output from the transmitter at the receiving instrument.*
- 7 If all the foregoing are found to be in order then it will be necessary to isolate the instrument and remove it from process.*

Check that no sludge or foreign matter has collected in the transmitter pressure chamber. Any deposits can normally be seen clearly at the entrance to the pressure housing. Do not use any tools or other pointed objects to clean inside the chamber, this should only be done flushing with solvents suitable for use with nitrile rubber.

Should the problems persist consult PSM Service department on 01444 410040 or return to the factory for examination.