

P-SENSOR LOW AIR PRESSURE SENSOR

- Ultra low differential pressure measurement
- Traceable Calibration Certificate
- Excellent repeatability
- Self compensating zero
- Climate chamber compensated
- Long term span stability
- Ultra low hysteresis
- Unaffected by humidity
- Factory logged burn in time
- Transducer and PCB is made by CMR
- After Sales Service is provided by CMR
- 24 month warranty
- 20 Years field application experience

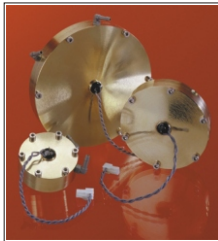
GENERAL DESCRIPTION

The P-Sensor is a wall mount pressure transmitter which provides an output signal of 0...10V or 4...20mA. If dual output is required, the LCD connector always provides 0...10V and the Output Terminals can be configured to either 0...10V or 4...20mA. Other signal outputs can be supplied on request. An optional LCD display can show the actual pressure in Pa, kPa or mBar, mmH₂O, and "WG" on request.

The 4...20mA is produced by the P-Sensor and can drive a number of devices. Many pressure ranges are available from 0-25 Pa or +/-25 Pa up to 0-10000 Pa. The maximum range is 1 Bar. Power supplies in DC or AC are standard.

THE TRANSDUCER

The transducer is manufactured by CMR and consists of precision engineered components, high quality metals and SMD electronics. The principle of the transducer is the measurement of the displacement of the linear diaphragm by means of a push and pull variable reluctance transducer which is not affected by Humidity, hence it can be used in many Industrial and Chemical applications even when using high concentration of formaldehyde.



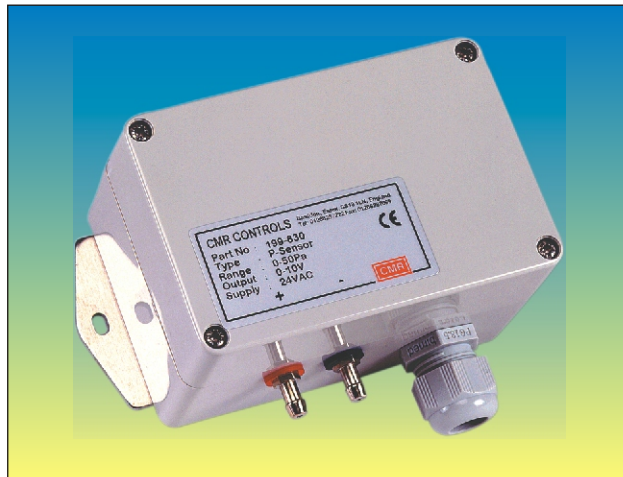
CMR Transducer

There are no mechanical connections to any of the sensing coils and the diaphragm, hence extreme low pressures can be measured at excellent repeatability and minimal hysteresis. The movement of the diaphragm is so small that no air volume is required to measure the air pressures over a distance of 200m.

The zero drift is uniquely minimized by the measuring coils which are matched to provide excellent self compensation. One coil measures positive and the other negative drift and therefore balances any excessive drift between two tolerance limits in its life cycle. The CMR Transducer has a proven track record of over 20 years. Finally, all CMR P-Sensors are temperature compensated in a computerised climate chamber and go through an ageing burn in cycle.



CMR Climate Chamber



P-SENSOR Wall Mount without LCD

LCD DISPLAY

An Optional LCD Display fitted into the lid indicates the actual pressure in Pa or mBar with a legend in the glass, mmH₂O or kPa or "WG" without legend.. It is intended for internal wall mount use.

LCD DISPLAY DAMPENING

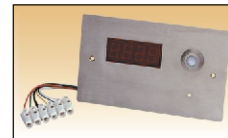
The display can be smoothed by means of a switch on the rear of the LCD independently of the output signal of the sensor.

DISPLAY SCALING

The display has independent zero and span adjustments but is factory scaled during manufacture. The display can be scaled by the user to display any other engineering units.

REMOTE DISPLAY

A remote LCD or LED can be connected to copy the information to the local operators by simply connecting it to the LCD Connector.



Remote Display Plate

SIGNAL DAMPENING

The output signal can be smoothed by means of the 'Slow' Pot adjustment on the PCB of the P-Sensor. The dampening acts on the Output Signal 0..10V,4...20mA and the Display simultaneously.

ALUMINIUM ENCLOSURE

The P-Sensor can be supplied in an IP65 Aluminium Enclosure with 6mm or 1/4" ferrule compression fittings and stainless Cable Gland.

An optional IP65 LED display either 3 1/2 or 4 1/2 Digit is mounted into the lid.

Stainless Steel Transducers can be supplied on request but then the Aluminium Enclosure shall always be supplied.



Aluminium Enclosure with LED

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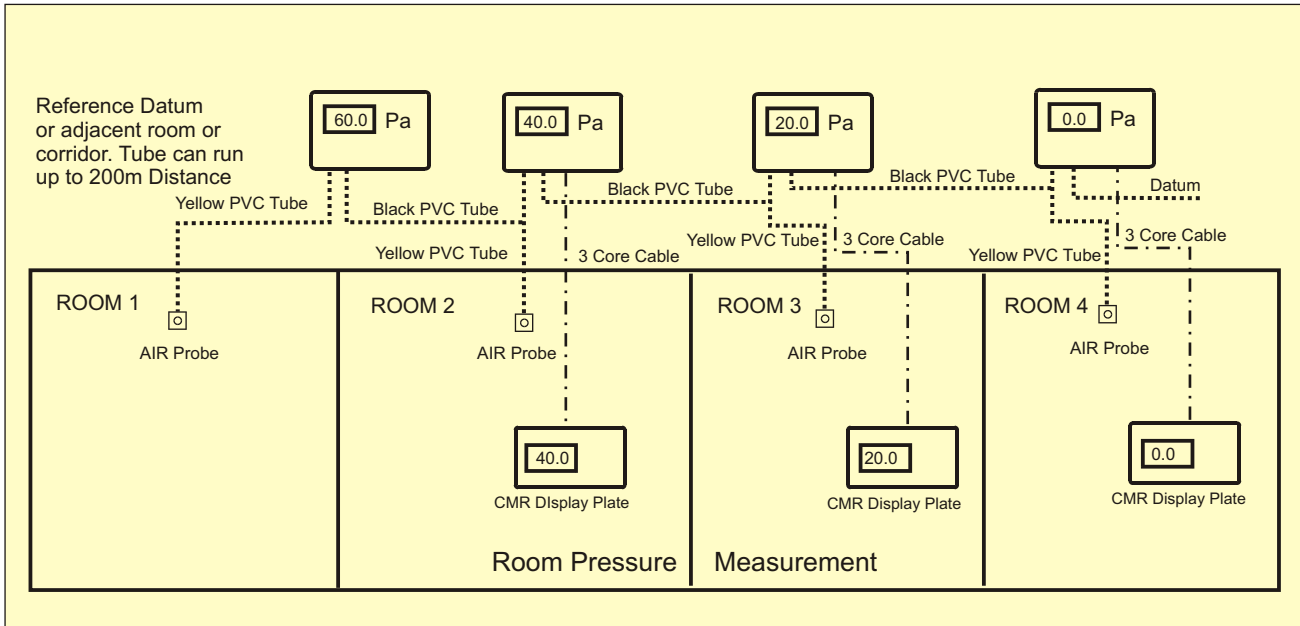
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P-SENSOR LOW PRESSURE APPLICATION

TYPICAL ROOM PRESSURE MEASUREMENT WITH CMR P-SENSORS



The above schematic shows a typical clean room. The room pressure must be measured against the adjacent room. Each room has air probe plates fitted to the ceiling. The air probes are connected to the P-Sensors with colour coded CMR PVC Tubing.

Remote LCD or LED display plates are fitted for the operators to see the actual room pressure. Each P-Sensor has either a 0..10V or 4...20mA signal output for control or monitoring functions.

The P-Sensor is a true Low Differential Air Pressure Transmitter and can be used for Static Pressure, Vacuum Pressure and differential Pressure Measurements in positive or negative applications.

The LCD Display is optional and shall be mounted into the Lid and shall display the actual pressure.

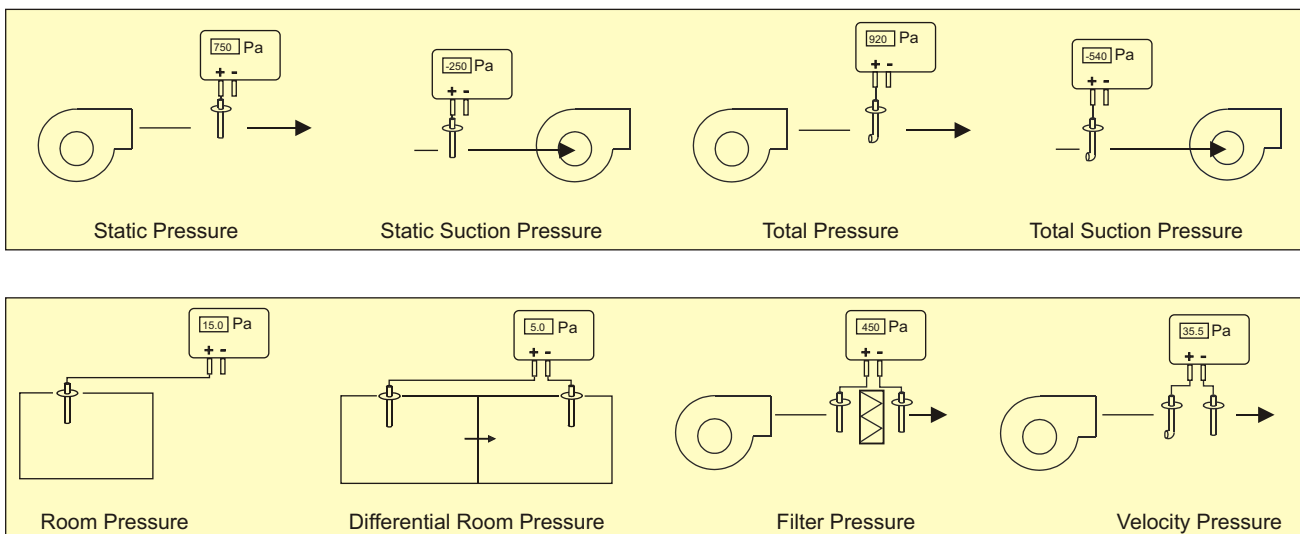
The P-Sensor can measure either from area to area or against a dedicated datum such as a plant room or any other stable location. It is designed for wall or panel mount installations.

The CMR PVC tubing can be run up to 200m without losing accuracy of the measurement.

The Pressure signal can be transmitted to remote custom made display fascia plates incorporating any of the CMR LCD's or LED's. An output signal of 0...10V and 4...20mA is standard for remote Scada or BMS connection. If Alarms are required see the data sheets DPM50 or APM100 units.

Calibration Certificates traceable to National Standards can be supplied with all P-Sensors and remote display plates

TYPICAL PRESSURE APPLICATIONS



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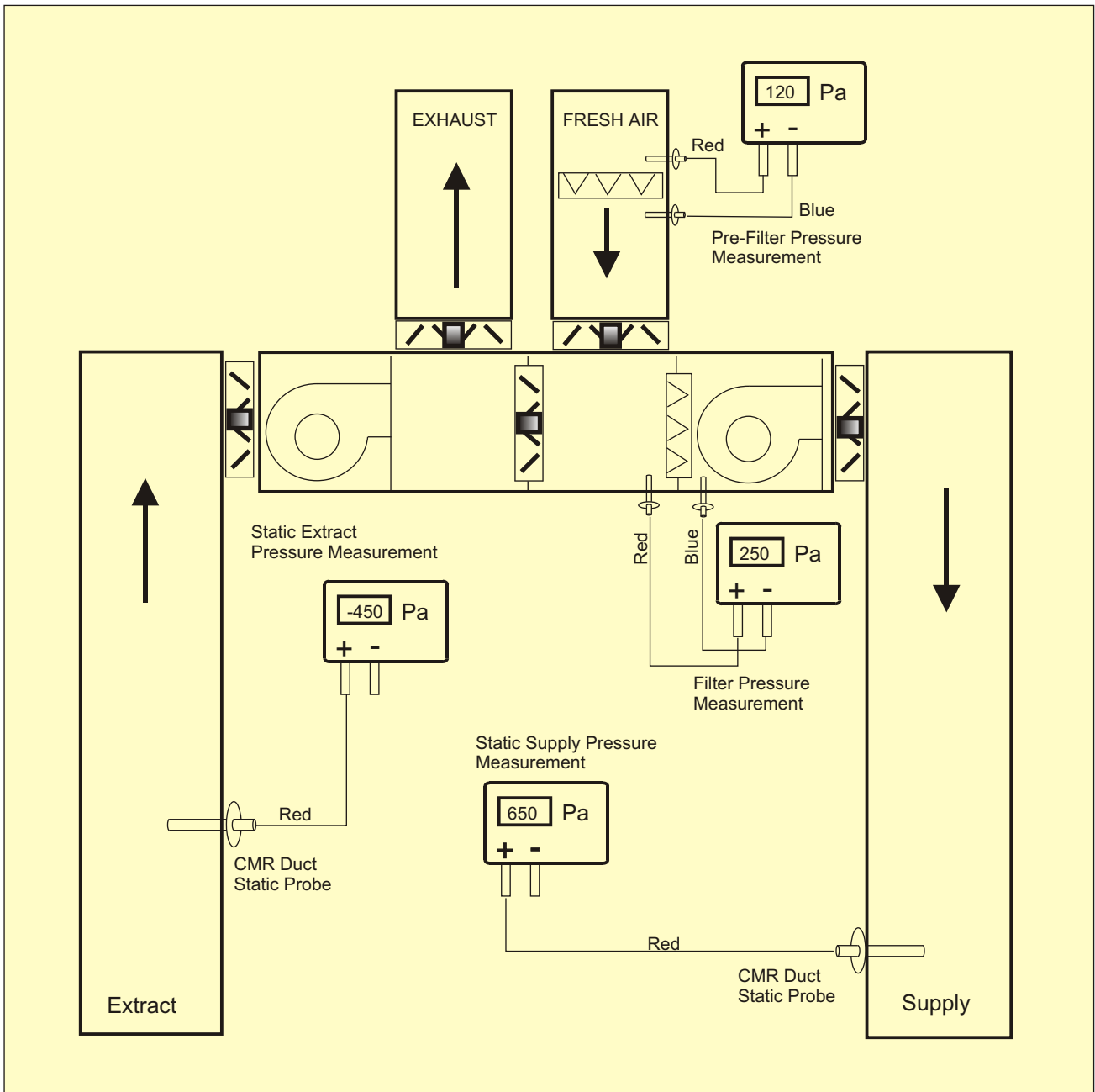
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P-SENSOR AHU APPLICATIONS

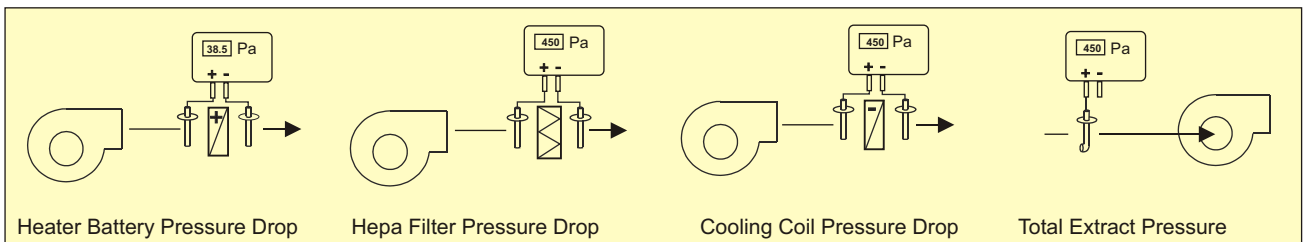
TYPICAL AIR HANDLING UNIT PRESSURE MEASUREMENTS



The above schematic shows a practical application in Supply and Extract Air-Handling Unit Control Systems, where Supply and

Extract Duct Pressures as well as Filter Pressures must be measured. The CMR P-Sensors are long term accurate.

TYPICAL PRESSURE APPLICATIONS



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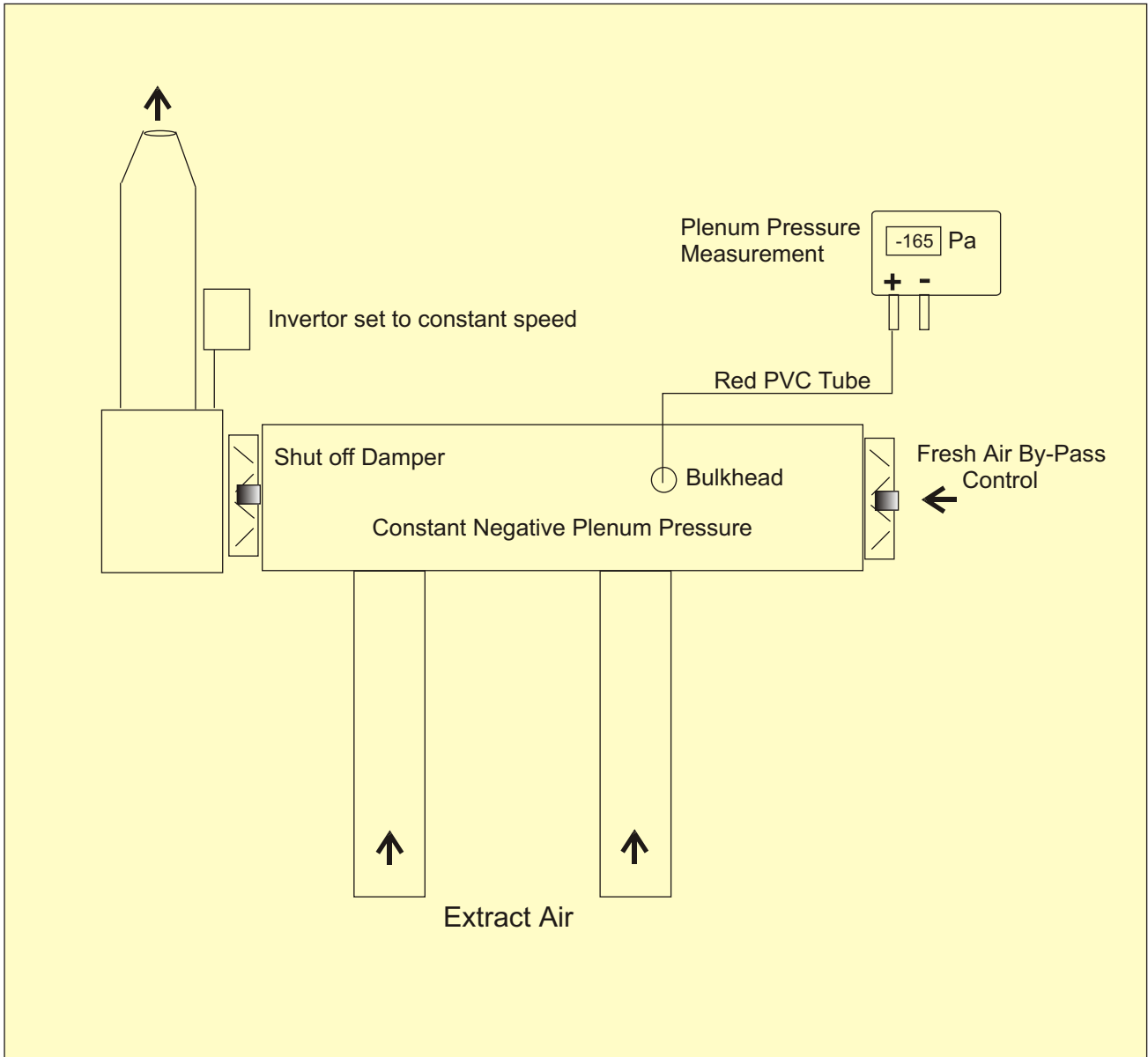
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P-SENSOR SPECIAL APPLICATIONS

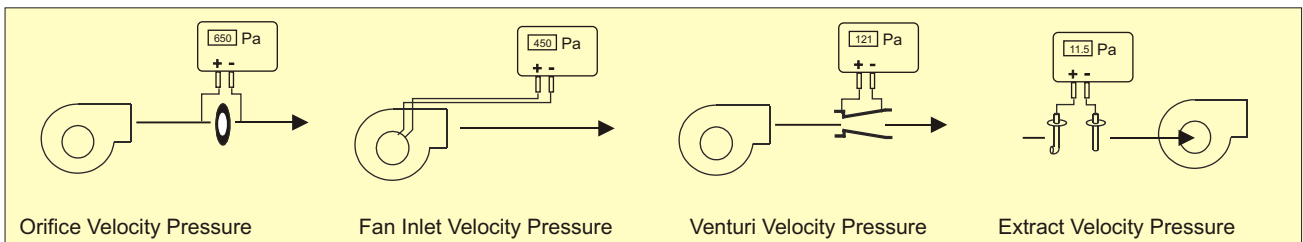
TYPICAL PLENUM PRESSURE MEASUREMENT IN EXTRACT SYSTEMS



The above schematic shows a practical application in Fume Cupboard or Dust Extract Control Systems, where Plenum Pressures have to be kept constant at any time.

The CMR P-Sensors are designed for delicate as well as extreme rugged Industrial Applications.

MORE SPECIALIST PRESSURE MEASUREMENT APPLICATIONS



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P-SENSOR OPERATING INSTRUCTIONS

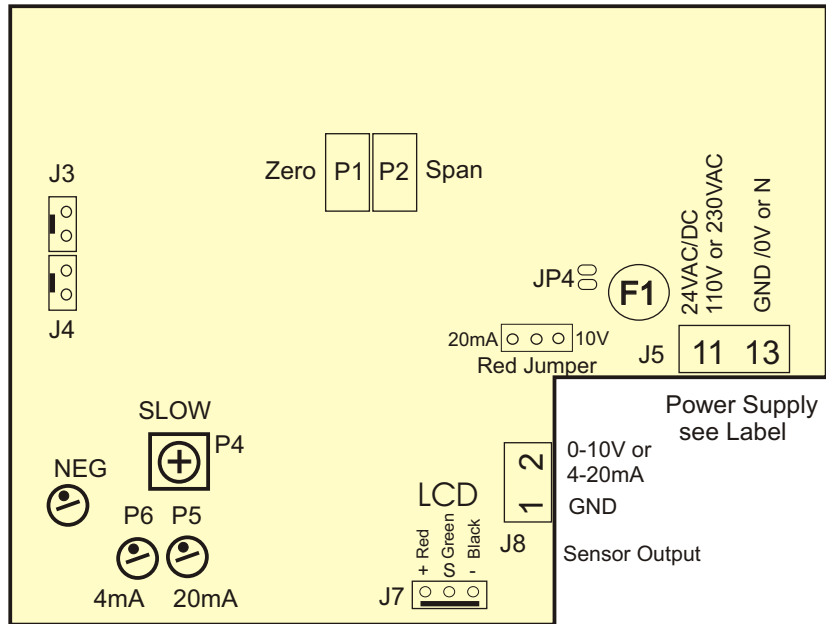
CALIBRATION INSTRUCTIONS

The P-Sensor's electronic is easily accessible by removing the lid.

Connect a Voltmeter either to the Terminals 1 and 2 or use a molex connector on the LCD Display connector J7. The output signal on the LCD connector is always 0...10V whilst the output on Terminal 1 and 2 depends on the Red Jumper setting. If set to the left position the output is 4...20mA. If set to the right position the output is 0-10V. It is important to know that the P-Sensor's base calibration is based on 0...10V, which means, all calibrations must be carried out in 0...10V first. The 4...20mA circuit is simply a convertor of the 0...10V and is factory set. It is therefore recommended never to touch P6 and P5 unless they have been tampered with. To calibrate the 4...20mA circuit it is suggested to connect a Voltmeter to the LCD connector and a mA meter to Terminal 1 and 2 to obtain overall accuracy.

When calibrating the P-Sensors it is essential to know that the +/- range of sensors i.e. -100Pa...+100Pa = 0...10V operate from 5.00V = 0Pa to 0V = -100Pa and from 5V = 0Pa to 10V = +100Pa. The zero Pa voltage output is therefore 5V or 12mA.

P-SENSOR LINKS AND POTENTIOMETER SETTINGS



ZERO ADJUSTMENT

Let the P-Sensor run for 24 hours to settle before attempting to adjust the zero. The zero is normally factory set.

P1 sets the Zero of the Sensor. Turn the 'SLOW' P4 Potentiometer completely anti clockwise to remove any dampening. Remove all Tubes and let the Sensor settle.

If the Voltmeter is connected to 1 and 2, adjust P1 until 0.00V is achieved.

If the mA Meter is connected to 1 and 2, adjust P1 until 4.00mA is achieved.

If the Voltmeter is connected to the LCD connector and displays 0.00V but the mA Meter connected to 1 and 2 is not at 4.00mA only then adjust P6 to achieve 4.00 mA.

SPAN ADJUSTMENT

P2 scales the Span of the P-Sensor. Turn the 'SLOW' P4 Potentiometer completely anti clockwise to remove any dampening. Disconnect all Tubes from the P-Sensor and let the Zero settle and correct the 0.00V or 4.00mA again.

Use any of the CMR Calibrators and pump up the positive nipple of the P-Sensor to 75% of Full Scale as indicated on the label of the P-Sensor i.e. a 100Pa Sensor would be pumped up to 75.0 Pa.

If the Voltmeter is connected to 1 and 2, adjust P2 until 7.50V is achieved.

If the mA Meter is connected to 1 and 2, adjust P2 until 16mA is achieved.

If the Voltmeter is connected to the LCD connector and displays 7.50V but the mA Meter connected to 1 and 2 is not at 16.00mA only then adjust P5 to achieve 16.00 mA.

Repeat the Zero and Span adjustments a few times until correct.

LINEARITY CHECK

Use any CMR Calibrator and pump up the positive nipple of the P-Sensor to 25% of Full Scale as indicated on the label of the P-Sensor i.e. a 100Pa Sensor would be pumped up to 25.0Pa.

25% = 25 Pa or 2.50V - 8.00mA
50 % = 50 Pa or 5.00V - 12.00mA
100% = 100 Pa or 10.00V - 20.00mA

The Linearity is the accuracy of the Sensor less any Calibrator deviation:

Example:
Zero of Sensor = 0.00 V Zero of Calibrator = 0.0Pa
Span of Sensor = 7.55 V Span of Calibrator = 75.5Pa
The Sensor is 100% linear compared with the Calibrator..

SLOW OR DAMPENING OF OUTPUT SIGNAL

Adjust 'SLOW' P4 to clockwise for signal output dampening. This adjustment is useful in monitoring applications where the output signal must be smoothed to eliminate fluctuations in the digital data input channels of Scada Monitoring or BMS Computer Systems. During Calibration of the P-Sensor set P4 fully anti-clockwise.

RED JUMPER

When moving the Jumper to 10V the signal is 0-10V and on 20mA it is 4-20mA on Terminal 1 and 2.

LCD / LED CONNECTOR J7

Regardless of the Red Jumper setting the output on the LCD connector J7 is always 0-10V on pin 'S', hence an LCD or LED display can be connected either local or remote without interfering with the signal output on terminal 1 and 2.

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P-SENSOR ORDER DESCRIPTION

GENERAL

CMR manufactures a large range of P-Sensors to suit many applications. Because of the variety of pressure ranges, output signals and power supplies it has been necessary to design an easy to use selection table for anybody to make up a P-Sensor specification to satisfy a requirement. On the P-Sensor Selection Table you will find all specifications available with the associated ordering Code.

P-SENSOR PART NUMBER

The P-Sensor Part Number starts with the selection of the enclosure which depends on the Tube connections. In the Example we have chosen Code '22A' which is a standard ABS P-Sensor enclosure with 6 mm barbed nipples to fit CMR PVC Tube. The Part Number therefore starts with '22A'.

Smaller straight nipples with a 3 mm O./D to fit the small bore CMR Silicone Tube makes Panel installations easier. This would have the Code '22B'.

Aluminium enclosures are supplied with compression fittings to suit either Stainless or Copper Tube i.e 6 mm Code '22C' or 1/4" Code '22D'. Barbed Adaptors for PVC Tube are available.

If Stainless Steel Transducers are required then only the Aluminium Enclosure is used to suit Stainless Tube 6mm Code '22E' or 1/4" Code '22F'.

NEGATIVE PRESSURE RANGE

The Negative Range is specified as (-) Pa. If the application requires to measure a negative pressure against a reference, i.e. a room has to be at negative pressure compared with the corridor then the room has to be connected to the Red or (+) nipple. The blue (-) nipple shall be connected to the reference in this case the corridor.

The negative room pressure shall suck on the red (+) nipple and the P-Sensor produces an output signal equivalent of the negative pressure measured.

In the Example we have chosen - 25 Pa which has the Code '010'. The Part Number extends to '22A 010'.

If the P-Sensor must only measure in the positive Range i.e 0-25Pa then the Negative Range will always be selected as 0Pa and the Code is always '000'.

POSITIVE PRESSURE RANGE

Now you have to determine, if you need to measure Positive Pressure. It is common to identify if the Room has gone into Positive Pressure and it is necessary to measure to which extent it has gone to positive. Therefore, it is suggested to use +25 Pa as the Positive Pressure Range. Please note that zero Pa Pressure is now in the middle of the Sensor Range.

This means the P-Sensor can measure from - 25 Pa to 0 and to +25 Pa. The Positive Pressure Range +25 Pa has the Code '010'. The Part Number extends to '22A 010 010'

OUTPUT SIGNAL

The Industry Standards for Output Signals are 0...10V or 4...20mA, but other signals can be supplied by CMR on request and are listed in the Selection Table. In the Example, we have chosen 0...10 V which has the Code 'A'. The Part Number extends to '22A 010 010 A'

If 0...10V is the Output Signal for -25 Pa to + 25 Pa then 5 V is 0 Pa. from 5V to 0V the P-Sensor measures from 0 Pa to - 25 Pa i.e. 12.5 Pa would be 2.5V.

From 5V to 10V the P-Sensor would measure positive Pressure from 0 Pa to + 25 Pa i.e. + 12.5 Pa would be 7.5V.

It is standard to use equal ranges - 25 Pa to + 25 Pa rather than -25 Pa to + 50 Pa but CMR can provide any offset.

POWER SUPPLY

The Industry Standards are 24VDC or 24VAC. 110VAC and 230VAC are less used today for safety and EMC protection reasons. The 15VDC version is seldom used. In the Example we have chosen 24VDC which has the Code '2'. The Part Number extends to '22A 010 010 A 2'.

INTERNAL LCD or LED BUILT INTO LID

The CMR 3 1/2 digit LCD Display can be supplied as an optional extra to be mounted into the LID of the P-Sensor. The LCD is a Liquid Crystal Display with no illumination. The Protection is IP44 and is only suitable for indoor applications. This LCD is the most popular display as it incorporates the Engineering Units as legends i.e. Pa or mBar and it fits into the standard ABS P-Sensor enclosure.

We have chosen this 3 1/2 digit LCD which has the Code 'A'. The Part Number extends to '22A 010 010 A 2 A'.

When ordering Aluminium Enclosures a 3 1/2 or 4 1/2 digit LCD or LED can be fitted which are IP65.

SCALED UNITS

The range is printed on a product label fixed to the lid of the sensor. Normally, the range is printed as Pa but other ranges can be selected under this order code. If an LCD or LED is required then the LCD's or LED's must be scaled to suit the application i.e.-25 Pa to + 25 Pa which means it is scaled in Pa (Pascals). The CMR 3 1/2 Digit LCD Display has the additional benefit that a small legend 'Pa' or 'mB' appears on the glass of the LCD. All other LCD's or LED's have no legends on the glass.

We have therefore chosen the Code '1'.

The Part Number extends to '22A 010 010 A 2 A 1'.

DECIMAL POINTS

If no LCD is fitted then this is N/A (not applicable).

The 3 1/2 digit LCD can only display 1999 or 199.9 or 19.99 or 1.999. The 4 1/2 digit LCD or LED can display 19999 or 1999.9 or 199.99 or 19.999 all depending on the decimal point setting..

It is essential to know how the pressure should be indicated on the LCD/LED glass. In the example we have chosen one decimal point which has the Code 'B' and the display should indicate -25.0 to + 25.0 Pa.

The Part Number extends to '22A 010 010 A 2 A 1 B'.

LINEARITY

The P-Sensor is available in two Linearity Grades 0.5% or 1%. In the Example we have chosen 0.5% which has Code 'A'.

The Part Number extends to '22A 010 010 A 2 A 1 B A'

TRACEABLE CALIBRATION CERTIFICATE

The P-Sensor can be supplied with a Traceable Calibration Certificate to National Standard which has the Code 'T'.

In the Example we have used Code 'T'.

The Part Number extends to '22A 010 010 A 2 A 1 B A T'.

FINAL PART NUMBER

The Part Number to order is 22A010010A2A1BAT.

Now try and select your own P-Sensor using the P-Sensor Order Selection Table.

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P-SENSOR ORDER SELECTION TABLE

The selection Table has been prepared to make ordering easy. Each Column contains a number of different options which are available and a Part Number can be established by yourself depending on your specific requirements. The Example Part Number 22A 010 010 A 2 A 1 B A T which is printed above the Selection Table can be identified as being a P-Sensor with ABS enclosure having 6mm barbed tube connectors with a Negative Range of 25Pa and a Positive Range of +25 Pa, with an Output Signal of 0-10V which would mean in this case 0 Pa is 5V. The Power Supply is 24VDC. The Sensor would be supplied with a 3 1/2 digit LCD Display mounted internally into the Lid and the Measured Units are Pa (Pascals). The Decimal Points are adjusted to 1 which indicates from -25.0 Pa to +25.0 Pa. The Linearity is 0.5% and it comes with a traceable Calibration Certificate to National Standards.

EXAMPLE PART NUMBER SELECTION (The code after the (=) sign is used i.e. 6mm = 22A)

22A	010	010	A	2	A	1	B	A	T
P-Sensor	Negative	Positive	Output	Power	Internal	Measure	Decimal	Linea-	Certifi-
Part No.	Range	Range	Signal	Supply	LCD or LED	Units	Points	rity	cate
6mm = 22A	0 Pa = 000	0 Pa = 000	0..10V = A	15 VDC = 1	NONE = N	Pa = 1	N/A = N	0.5% = A	Trace = T
3mm = 22B	-25 Pa = 010	+25 Pa = 010	4..20mA = B	24 VDC = 2	LCD 3 1/2 = A	mBar = 2	000 = A	1.0% = B	None = N
6cp = 22C	-50 Pa = 015	+50 Pa = 015	0..20mA = C	24 VAC = 3		kPa = 3	00.0 = B		
1/4cp = 22D	-60 Pa = 020	+60 Pa = 020	5..19mA = D	110 VAC = 4	In Alu Encl.	mm = 4	0.00 = C		
	-100 Pa = 025	+100 Pa = 025		230 VAC = 5	LCD 4 1/2 = B	"WG = 5	.000 = D		
	-125 Pa = 030	+125 Pa = 030	On request		LED 3 1/2 = C				
Stainless	-150 Pa = 035	+150 Pa = 035	0..5V = E		LED 4 1/2 = D				
6cp = 22E	-200 Pa = 040	+200 Pa = 040	1..5V = F						
1/4cp = 22F	-250 Pa = 045	+250 Pa = 045	+/- 5V = G						
	-300 Pa = 050	+300 Pa = 050	2..10V = H						
	-400 Pa = 055	+400 Pa = 055	+/- 10V = I						
	-500 Pa = 060	+500 Pa = 060							
	-750 Pa = 065	+750 Pa = 065							
	-1000 Pa = 070	+1000 Pa = 070							
	-1500 Pa = 075	+1500 Pa = 075							
	-2000 Pa = 080	+2000 Pa = 080							
	-2500 Pa = 085	+2500 Pa = 085							
	-3000 Pa = 090	+3000 Pa = 090							
	-4000 Pa = 095	+4000 Pa = 095							
	-5000 Pa = 100	+5000 Pa = 100							
	-6000 Pa = 105	+6000 Pa = 105							
	-7000 Pa = 110	+7000 Pa = 110							
	-8000 Pa = 115	+8000 Pa = 115							
	-9000 Pa = 120	+9000 Pa = 120							
	-10000 Pa = 125	+10000 Pa = 125							

HOW TO ORDER

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EXAMPLE

A wall mount pressure transmitter is required of the Type P-Sensor

The tube connections must be 3mm for small silicone Tube

The negative pressure range must be -100Pa

The positive pressure range must be +100Pa

The output signal must be 4-20mA

The power supply must be 24V AC isolated

The internal display must be 3 1/2 digit

The measured units must be in Pascals (Pa)

The indication must be 100.0 with one decimal point

The linearity must be 1% of full scale

The Certificate must be traceable to National Standards

Call CMR for assistance at any time

The part Number for this P-Sensor is 22B 025 025 B 3 A 1 B B T

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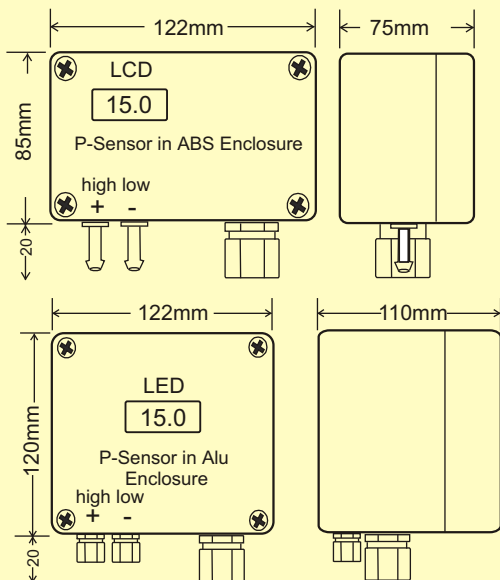
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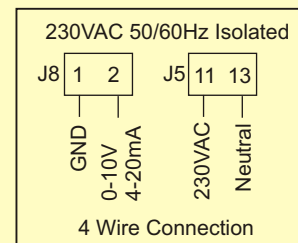
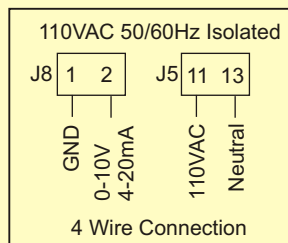
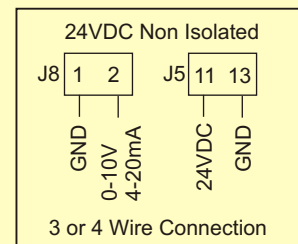
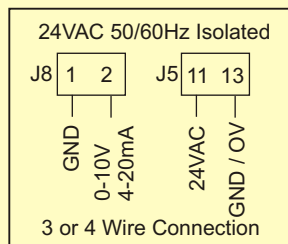
P-SENSOR TECHNICAL SPECIFICATION

Measurement Range	See P-Sensor Order Selection Table
Optional Range	Any Range from 25Pa up to +/- 10 000Pa or max up to 1 Bar
Overload Capacity	Ranges 25Pa - 150Pa up to max 1400Pa. Ranges from 200 - 10000Pa 10 times of range
Media	Non Corrosive Gases such as Air,N ₂ ,O ₂ ,CO ₂ ,N ₂ O, inert Gases
Diaphragm Unit	Bronze Beryllium Copper suitable for high concentration of Formaldehyde - All Stainless on request
AC Power Supplies	24 VAC 50/60Hz 140mA Fuse 300mA Auto Reset
	110VAC 50/60Hz 32mA Fuse 315mA Wickmann
	230VAC 50/60Hz 10mA Fuse 315mA Wickmann
DC Power Supplies	15 VDC smoothed. Sensor without remote LED (Volt output only)
	24 VDC (19 to 31VDC) smoothed. Sensor with remote LCD 130mA (with mA output)
Voltage Output Signal	0-10V (0...100% of Range) i.e 0...100Pa RL = 5kOhm min.
	If +/- 0...100Pa is used then: -100Pa = 0V 0Pa = 5.00V +100Pa = 10V
Current Output Signal	4...20mA (0...100% of Range) i.e. 0...100Pa RI = 500 Ohm max.
	If +/- 0...100Pa is used then: -100Pa = 4mA 0Pa = 12mA +100Pa = 20mA
Hysteresis/Repeatability	0.1% Typical of Full Scale
Linearity (Accuracy)	+/- 0.5% or 1.0% of Full Scale in Pressure Mode
Zero Drift	0.05%K (+10°C to +50°C)
Operating Temperature	-10°C to +70°C
Mounting Position	Vertical
Weight	0.7 kg
Electrical Connections	1 x PG13 Gland. Internal Plugs with Screw Connections (Other Gland sizes on request)
Air Tube Connections	ABS housing : Positive and Negative Pressure Barbed Nipple 6.5mm O/D or 3.00mm x 15mm long
	Alu Housing : Positive and Negative Pressure compression fittings 6mm or 1/4"
Enclosure	ABS Grey Protection IP65 without LCD. With CMR LCD IP44 and ALU with/without LCD/LED IP65
Conformity	EN61326-1 EMC EN61010-1 SAFETY
Calibration Certificate	Supplied with Certificate traceable to National Standards

DIMENSIONS AND CONNECTIONS



TUBE CONNECTIONS
 ABS 2 x 6mm for PVC or 3mm for Silicone Tube
 ALU 2 x Compression Fittings for 6mm or 1/4" O/D



CABLE ENTRY GLANDS
 1 x PG13 Gland for ABS Enclosure
 1 x PG13 Metal Gland for Aluminium Enclosure

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