DPM-120 AIR PRESSURE AIR VOLUME

- Ultra low pressure and volume measurement
- Traceable Calibration Certificate is included
- High accuracy and repeatability
- Linear pressure and volume flow output
- Both measuring and PID control output
- Two modbus for monitoring and remote display
- Two Alarm relays, buzzer and LED indicators
- Auto Zero, Isolation Valves, Overload protection
- Operator keyboard display for all functions
- Two Modbus rtu, 0..10V and 4..20mA output
- Enclosure with easy mount panel clamps
- 24 month warranty
- 30 Years field application experience

DPM Panel Mount Sensor with Keyboard and LED display

GENERAL
The DPM-120 is a panel mount ultra low pressure transmitter which provides 0..10V and 4..20mA as well as Modbus communication over the selected range . The display can be adjusted via the keyboard to show the measured value in Pa, hPa, kPa, m/s, l/s, m3/s, m3/h and ACR (air change rate).

A PID control output can be selected, but still having one output for monitoring the pressure or volume.

The pressure ranges can be adjusted via the keyboard, but the base range is factory calibrated and certified i.e. 25, 50, 100, 250 and going up to 7500 Pa. All ranges can be adjusted to +/- ie. -/+25Pa.

Power supply 24Vdc non-isolated or 24Vac isolated is standard.

CMR TRANSDUCER
The transducer is manufactured by CMR with high precision engineered components. The principle is the measurement of the displacement of the diaphragm by means of a push and pull variable reluctance circuit which is not affected by humidity and hence it can be used in any industrial or commercial environment. There are no mechanical connections to any of the sensing coils and the diaphragm.

CMR Transducer

Extremely low pressures can be measured with excellent repeatability and minimal hysteresis. The diaphragm displacement is so small that no air volume is required to measure the air pressure which means measurement tubing can be connected in excess of 200m throughout the building without losing accuracy or measurement speed.

The zero drift is minimized by the measuring copper 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 field track record of over 30 years.
All CMR Sensors are temperature compensated in a computerised climate chamber.

CMR Climate Chamber

KEYBOARD DISPLAY
A combined keyboard and LED Display is fitted to the front of unit and is connected to the DPM board with a molex plug. All parameters can be accessed via the key pad. The display can also be programmed to switch off after a time and by touching a key to light up again. Normally it is always on.

PARAMETER CONFIGURATION
The duct width and height can be entered as well as the density and (mf) magnification (K) factors to scale Fan Inlet Rings, Flowgrids, Veloprobes, Oval Flowprobes, Venturis or any other velocity pressure producing probes. The volume can be linearized over 8 points to provide extremely high accuracy in measurement.

The range can be changed from i.e. -10 Pa to 30 Pa or -20 to 120 Pa. The output signals can be changed to i.e. 2..10V, 1..5V or 5..19mA. The DPM-120 has two configurable Volt Free alarm output relays for high or low alarm with timers.

The auto zero function is built in, which is of great advantage at very low velocity pressure measurement i.e. 0.3 Pa to have an accurate base point at all times. The auto zero can be turned off where it is not required.

The overload protection can be switched on and is ideal to protect the low pressure diaphragm. It is active whenever the sensor is powered up.

One of the outputs can be configured to be a PID control to drive fan inverters or modulating dampers and the other can be used for the actual pressure or air volume measurement for the BMS or PLC system. The set point can be sent from the BMS via modbus.

The signals can be individually smoothed. The control output can be fast but the measurement output can be dampened.

A calibration mode can be selected so that all of the parameters remain the same as commissioned and only the base sensor shall be calibrated and displayed in Pa. Two isolation valves are fitted as standard to eliminate removing any tubes during calibration.

MODBUS rtu COMMUNICATION
The modbus communication can be used to read and write all parameters by the remote Host which can be the BMS , PLC or PC

REMOTE ALARM DISPLAY
A remote display DIS110 without alarm or DIS125 with alarm and mute button can be connected via Modbus if the modbus is not used for the BMS. The alarm button has green and red Led light rings to show healthy or alarm status. A buzzer is also fitted. A separate power supply can be wired to the display.

Remote Display Plate

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 Issue DPM120-GB-04-2

DPM-120 AIR PRESSURE MEASUREMENT

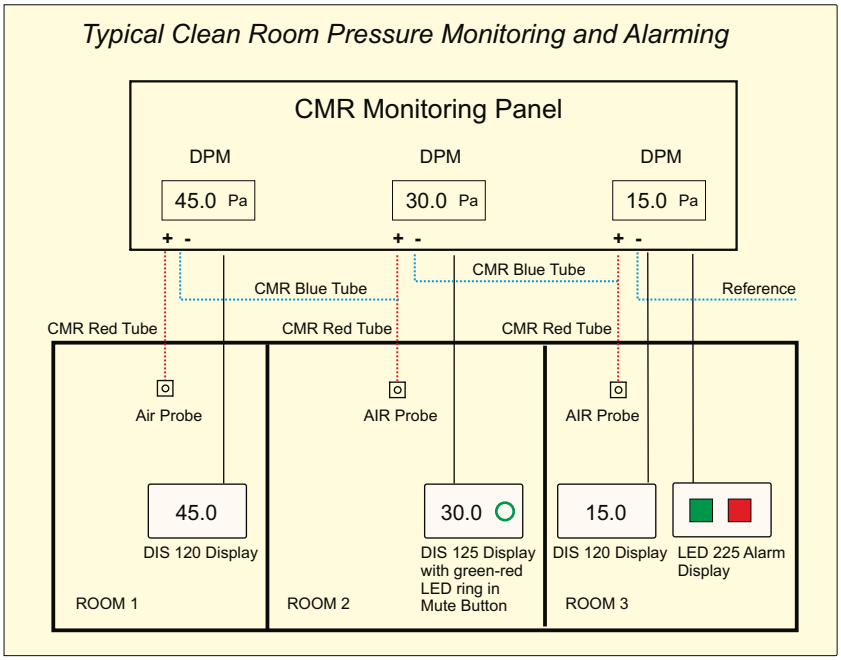
ROOM PRESSURE MEASUREMENT WITH DPM PRESSURE TRANSMITTERS

Tubes + Fittings

Ceiling Air Probe

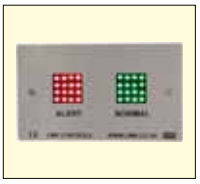
Air Probe Plate

Typical Clean Room Pressure Monitoring and Alarming



DIS 110 Display

DIS 125 Display



LED 225 Display

The above schematic shows a typical clean room. The room pressures are measured in cascades starting in Room 3 from a reference such as a plant room or any other stable location, then measuring across to room 2 and finally across to Room 1.

Each room has an air probe plate fitted to the ceiling. The air probes are connected to the DPM with red and blue CMR PVC Tubing.

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

Remote LED display plates are fitted for the operators to see the actual room pressure in Room 1 and 2. Room 2 has also a local illuminated alarm green and red led built as ring into the mute button and a buzzer. Room 3 has only a modbus alarm led indicator plate.

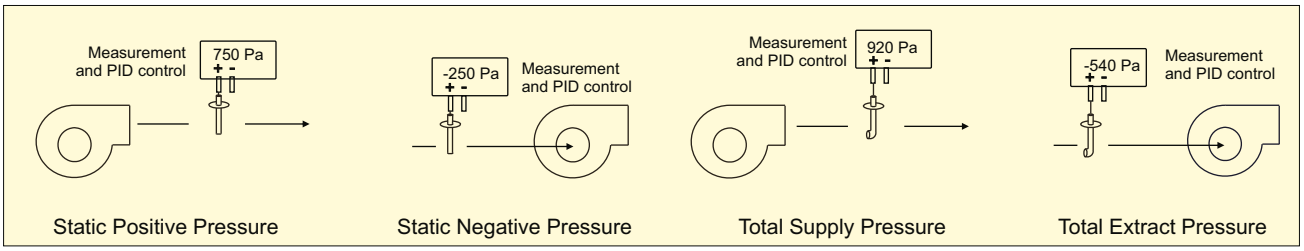
The DPM is a true Low Differential Air Pressure Transmitter and can be used for static pressure, vacuum pressure and differential pressure measurements in positive or negative areas.

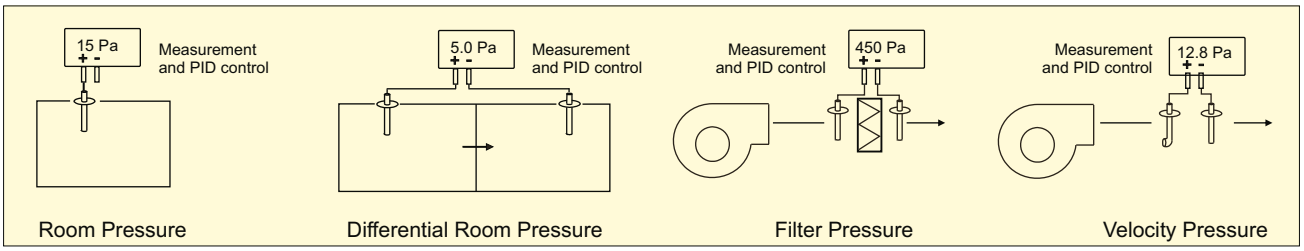
The operator keyboard with LED display is fitted into the lid as standard and shall display the actual pressure. All parameters can be adjusted from the front.

The Pressure measurement can be transmitted via modbus rtu or analogue signals 0..10V or 4..20mA to the SCADA, BMS or industrial PLC systems for long term monitoring.

All future calibration can be done using the calibration mode. Calibration Certificates traceable to National and International Standards (UKAS) are supplied as standard with all DPMs.

TYPICAL PRESSURE APPLICATIONS





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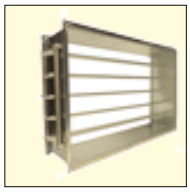
DPM-120 AIR VOLUME MEASUREMENTS

AIR VOLUME AND PRESSURE MEASUREMENT AND CONTROL WITH DPM TRANSMITTERS

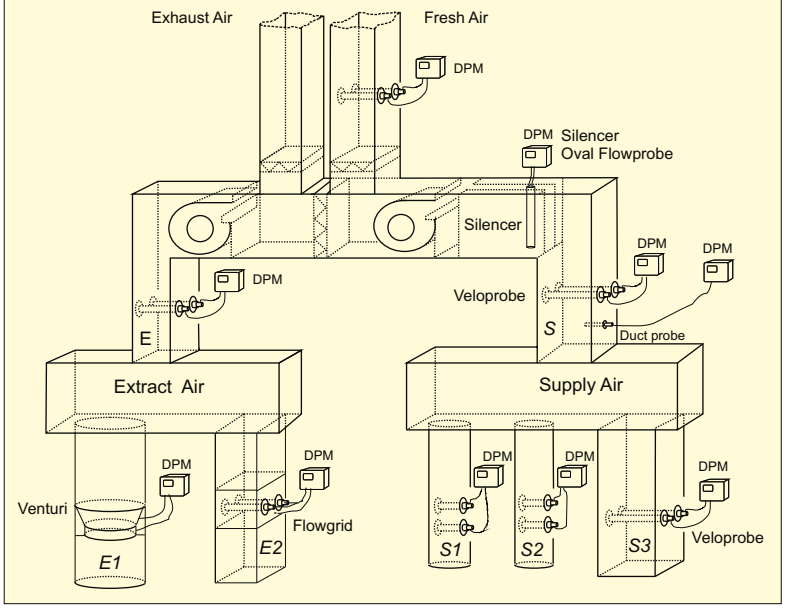


FGG Flowgrid

VVM Venturi

PVC Tube Fittings

Typical air volume measurement in air distribution systems



CMR Veloprobes

Duct Probes

Oval Flowprobe

The CMR DPM-120 is an ultra low high precision Velocity Pressure Transmitter which has been designed to accurately measure air volumes in Ventilation Ducts . The built in Square Root Extraction and Magnification Factor Scaling makes the DPM an extremely versatile measurement instrument.

It can display the actual volume in m3/s. Other Units such as m3/h, litres/s or ACR (Air change rate) can be selected via the keyboard. Any imperial measurement units i.e. CFM are available on request .

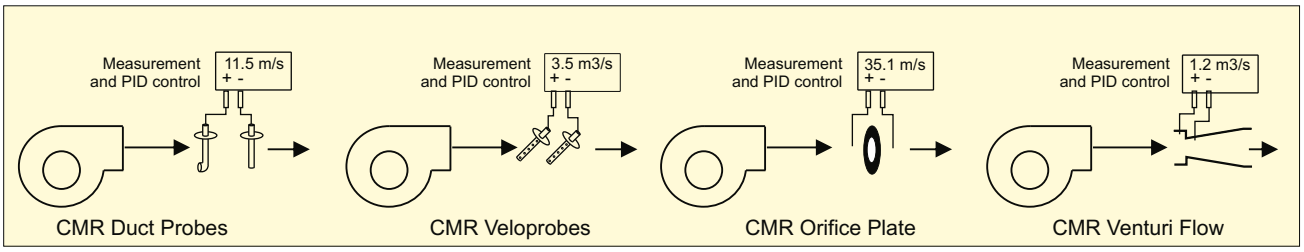
The CMR PVC tubing can be run up to 200m from the sensing station to the DPM without losing the accuracy of the measurement.

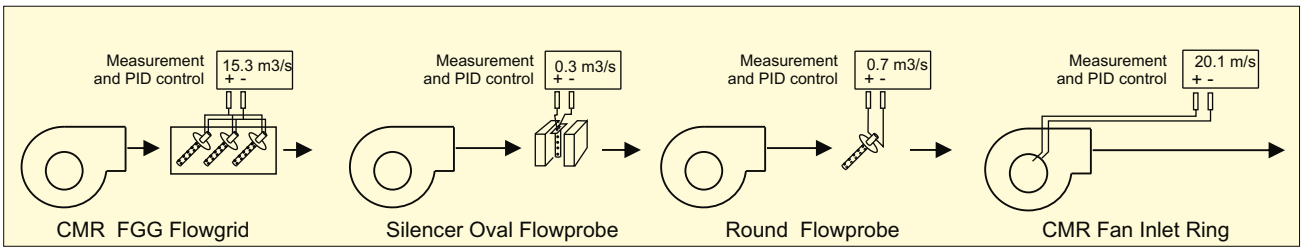
The DPM is used for monitoring and also controlling Volume Flow in Commercial or Process Applications and is designed to be connected to any CMR Veloprobes, Duct Probes, Flowgrids, Venturis and Fan Inlet Rings. It can also be used with any existing or custom made duct Flow Measurement Device.

The measured values can be transmitted to remote display plates, SCADA, BMS control systems or industrial PLCs through the output signals of 0..10V, 4...20mA and modbus.

Calibration Certificates traceable to National and International Standards (UKAS) are supplied with all DPMs.

TYPICAL CMR AIR VOLUME MEASUREMENT APPLICATIONS





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The information is subject to change without notice Issue DPM120-GB-04-2

DPM-120 MONITORING CONTROL PANEL

Typical DPM Pressure-Volume Measurement and Monitoring Panel

Front view of the CMR Panel. Up to 30 DPMs are fitted.

An isolator, fuses, power supply and computer interface terminals are fitted on the back plate

The pictures on the left show a complete DPM Instrument panel which is used to centralize the pressure and air volume measurements for easy maintenance.

The CMR DPM transmitters are located on the front panel door and all tubing is terminated on the panel roof. Up to 200m Tube can be installed from the field sensors to the panel without losing its accuracy.

The panel can be located in a convenient place in the plant room area which makes servicing and calibration very easy at required intervals.

The DPMs have built in alarms, timers and mute facilities and can be scaled to the application requirements.

Remote alarm display plates as well as a buzzers can be fitted per DPM transmitter which can be terminated on the back plate of the panel.

The CMR Pressure control and monitoring Panel can have up to 30 DPM instruments on the front door. Each Instrument can have different functions i.e. Room Pressure Monitoring, Air change Rate Monitoring or Fan and Damper Control.

All output terminals have spade isolation switches and where necessary lift up fuses for each field circuit. The Power Supply and terminations are fitted on the back plate. The complete panel is factory commissioned, tested and validated.

CMR Monitoring Panel fitted with 30 DPM-120Transmitters

Rear of the panel door with the DPMs fitted. All wiring and tubing is secured in cable trays. Designed for easy access during calibration in future.

DPM-120

Top of the panel with all tube connection nipples, cable entry glands and labels.

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DPM-120 KEYBOARD FUNCTIONS

FUNCTIONS (Use Operator Manual for full Instructions)

The DPM LED-Keyboard has been designed to simplify installation and commissioning. All adjustments can be done via the keyboard and also the calibration is simplified by the keyboard.

ZERO KEY

When pressing the zero key for 1 seconds, the DPM shall perform a zero which means the pressure is taken off the sensor internally and the diaphragm is relaxed to zero.

PASSWORD

The keyboard can be password protected so that only the display can be operated, but no adjustments can be made.

RANGE KEY

Pressing the range key very quickly once will display the sensor range i.e. if it shows 100, this means the range of the sensor has been configured to 0-100Pa for 10V/20mA output. By pressing the range key for 1 seconds it enters the configuration menu:

S	Software Version	1.5
Ad	Network Address	1-254 (0 Denotes Modbus Display)
AZ	Auto Zero	on - off
P	Positive Range	i.e. + 25
n	Negative Range	i.e. - 25
Opp	Over Pressure	1(on) 0(off)
F	Zero Offset	
t	Set Point	
Sn	Modbus smoothing	d or o
Azt	Auto Zero time interval	1-99 h
FF	Modbus float format	0-3

OUTPUT KEY

Pressing the output key very quickly once will display the sensor output configuration i.e. lin or root, which means the sensor measures pressure or airflow. By pressing the output key for 1 seconds the configuration menu can be reached:

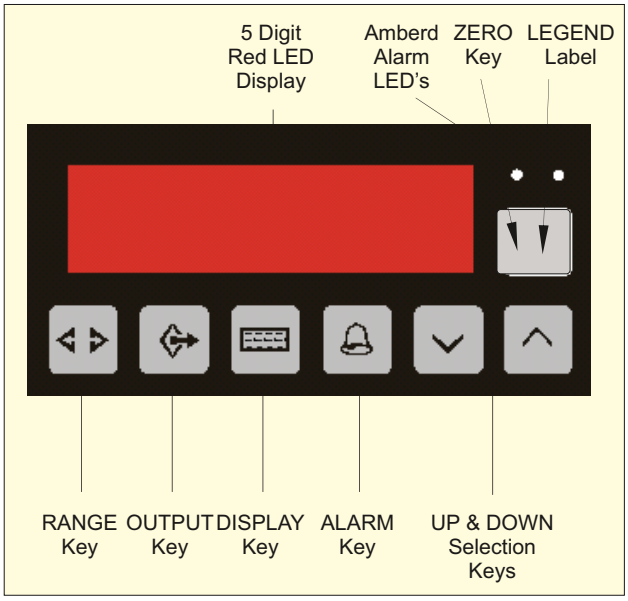
So	Output Smoothing	0-99
Lin	Output mode	linear pressure
root	Output mode	square root
e	Output scaling	F, L or Fac
F	Mag Factor	0-99.99
_	Duct width	0-9999mm
l	Duct height	0-9999mm
d	Air Density Factor	0 -9.99kg/m3
r	Room Size	0-9999m3
s	Small Value Shut off	0- 99.99%
o	Output Re-Scaling	
bFl	Bi-Directional Flow	0 or 1

DISPLAY KEY

Pressing the display key very quickly once will display the measurement units. i.e. Pa, hPa, kPa etc, and is the units the sensor has been configured to i.e. Pa. By pressing the display key for 1 seconds it enters the configuration menu:

Sd	Display Smoothing	0-99
Pa	Pascals	
hpa	hecta Pascals	
3pa	kPa	
nnps	metres per second	
lps	litres per second	
nn3s	cubic metres per second	
nn3h	cubic metres per hour	
acr	Air Change Rate per hour	
dp	Decimal Place	0- 4
pos	Display polarity (+)	
neg	Display polarity (-)	
Led	Display Activation	1 or t
b5t	Display Brightness	L or H
L2b	Leading Zero Blanking	1 - 4

DPM STANDARD LED KEYBOARD



ALARM KEY

Pressing the alarm key quickly the buzzer can be muted which is built in and remote. By pressing the alarm key for 1 seconds it enters the configuration menu.

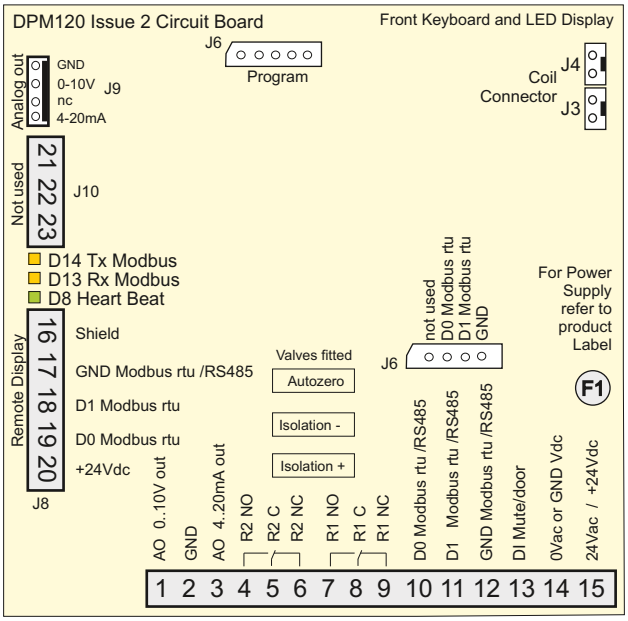
L	Low Alarm	
H	High Alarm	
t	Alarm timer 1	0-999
t.	Alarm timer 2	0-999
u.	Units	dU (Display Units) or Per (%)
af	Alarm Function	0-2
Sr	Self Reset	0-1
Er	External Reset	A or R
bu	Buzzer	-, 0, 1or P
rb	Remote Buzzer	-, 0, 1 or P
rA	Remote Alarm Indication	-, 0, F or LH
rt	Re-alarm timer	0-999 minutes
tU	Alarm timer units	s or h

UP - DOWN KEY

The up and down keys are used to select the various parameters

OUTPUT SIGNAL

0-10V and 4-20mA are also available on J7.



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DPM-120 ORDER DESCRIPTION

GENERAL
CMR manufactures the DPM to suit many low pressure and air volume measurement applications. The DPM120 has additional isolation valves compared with the DPM120 which means the calibration can be done without removing the field tubes. 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 DPM specification to satisfy a requirement. On the DPM Selection Table you will find all specifications available with the associated ordering code.

DPM-120 BASE PART NUMBER
The DPM Part Number starts with a base part number of the type of sensor. Code '30' which is a DPM-120 in a Panel mount enclosure.
The Part Number therefore starts with '30'.

DPM-120 Issue No.
The DPM will have an update on the electronic board from time to time and to identify the issue No i.e. for software and hardware, this number might change. For Issue 1 the Code is '1'.
The Part Number extends to '301'

TUBE CONNECTORS
4 mm barbed nipples to fit CMR silicone Tube are fitted as standard into the enclosure. They have the Code 'B'.
6 mm barbed nipples to suit the CMR PVC Tube are also available as Code 'A'.
The example has 4 mm barbed nipples.
The Part Number therefore extends to ' 301B '.

NEGATIVE PRESSURE RANGE
The Negative Range is specified as (-). 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 DPM produces an output signal equivalent of the negative pressure measured.
In the Example we have chosen - 25 which has the Code '0025' .
The Part Number extends to '301B0025'.

If the DPM must only measure in the positive Range i.e 0-25 then the Negative Range will always be selected as 0 and the Code is always '0000'.

PRESSURE UNITS
The negative pressure and the positive pressure range must be expressed in units i.e. Pa or kPa. The CMR transducers are in Pascals (Pa) as standard.
In the example Pa was selected with Code 'P'.
The Part Number extends '301B0025P'

POSITIVE PRESSURE RANGE
To measure Positive Pressure against a reference it is necessary to select a positive range i.e. +25. The Code is '0025' This means the DPM selected above can measure from - 25 Pa to 0 and from 0 to +25 Pa. The output Voltage would therefore be 5V or 12mA at 0 Pa.
The Part Number extends to '301B0025P0025'

LABEL UNITS
As the DPM has a fixed label next to the LED display, i.e. Pa, kPa, hPa, mB etc. It is necessary to specify the label when selecting the part number as this is all part of the validation of the instrument.
In the example Code 'P' for Pa was selected.
The Part Number extends to '301B0025P0025P'

OUTPUT SIGNAL
The Industry Standards for Output Signals are 0-10V or 4-20mA, but other signals can be adjusted via the keyboard by the operator.

If 0-10V is the Output Signal for -25 Pa to + 25 Pa then 5 V is 0 Pa. From 5V to 0V the DPM measures from 0 Pa to - 25 Pa i.e.-12.5 Pa would be 2.5V.
From 5V to 10V the DPM 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 the DPM can be adjusted via the keyboard to provide any offset.

In the Example, we have selected Dual (0-10V & 4-20mA) which has the Code '1'.
The Part Number extends to '301B0025P0025P1'

POWER SUPPLY
CMR can supply 24Vdc Non-Isolated which does not have an isolation transformer, and is also suitable for 3-Wire connection. Most common is the 24Vac Isolated. In the example we have selected 24Vac isolated which has the Code '3'.
The Part Number extends to '301B0025P0025P13'.

FINAL PART NUMBER
The Part Number to order is '301B0025P0025P13'

Now try and select your own DPM-120 using the DPM-120 Order Selection Table.

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DPM-120 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 depending on a specific requirement.

The Example Part Number 301B0025P0025P13 which is printed above the Selection Table and identified as being a DPM-120 with isolation valves, having an Issue No. 1, with 4mm barbed tube connectors, a Negative Pressure Range of -25, Range Units in Pa (Pascals) and a Positive Range of +25, labelled in Pa (Pascals) with Dual Output Signals of 0-10V & 4-20mA,which would mean in this case 0 Pa is 5V & 12mA. The Power Supply is 24Vac isolated.

The DPM-120 would be supplied with a 5 digit LED-Keyboard / Display mounted on the front face and the Measured Units are Pa (Pascals). The Decimal Point is user adjusted to 1 on the keyboard which indicates from -25.0 Pa to +25.0 Pa It comes with a traceable Calibration Certificate to national and international Standards (UKAS).

EXAMPLE PART NUMBER SELECTION (The code after the (=) sign is used i.e. 4mm = B)

30	1	B	0025	P	0025	P	1	3
DPM-120	**Board**	**Nipple**	**Negative**	**Range**	**Positive**	**Label**	**Output**	**Power**
Part No.	**Issue No.**	**Size**	**Range**	**Units**	**Range**	**Units**	**Signal**	**Supply**
Base = 30	Issue = 1	4mm = B	0000	Pa = P	0000	Pa = P	Dual = 1	24Vdc = 2
		6mm = A	0010		0010	kPa = K		24 Vac = 3
			0025		0025	mB = B		
			0030		0030	hPA = H		
			0050		0050	m/s = V		
			0060		0060	m3/s = Q		
			0100		0100	m3/h = M		
			0120		0120	l/s = L		
			0125		0125	ACR = A		
			0150		0150			
			0200		0200			
			0250		0250			
			0500		0500			
			0750		0750			
			1000		1000			
			1250		1250			
			1500		1500			
			2000		2000			
			2500		2500			
			5000		5000			
			7500		7500			

HOW TO ORDER

EXAMPLE
A panel mount pressure transmitter with isolation valves is required of the Type DPM-120
The latest Board Issue is required.
The tube connections must be 4mm for silicone Tube
The negative pressure range must be -100 Pa
The measured units must be in Pascals (Pa)
The positive pressure range must be +100Pa
The units on the LED display must in Pa as well as on the Product label.
The output signal must be Dual (0-10V & 4-20mA)
The power supply must be 24Vdc non-isolated

Call CMR for assistance at any time

The part Number for this DPM-120 is 30 1 B 0100 P 0100 P 1 2

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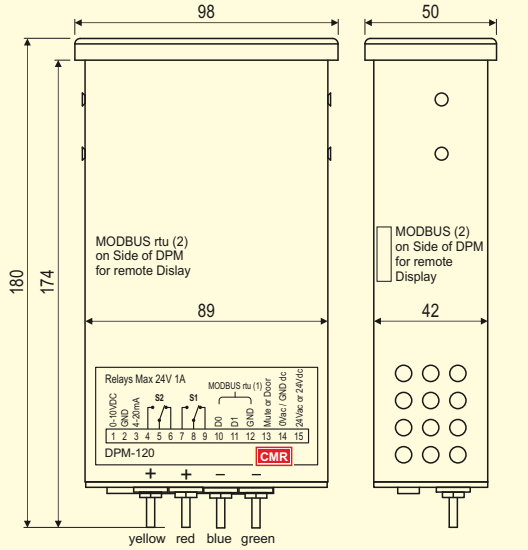
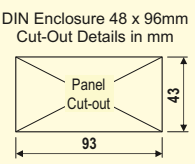
DPM-120 TECHNICAL SPECIFICATION

Measurement Range	Any Range from 0-25Pa or -/+25Pa up to 0-7500Pa or -/+7500Pa
Overload Capacity	Ranges 25Pa - 150Pa up to max 1200Pa if over pressure protection is off.
	Ranges from 200Pa - 7500Pa up to max 10 times of range if over pressure protection is off.
Media	Non corrosive gases such as Air, N2, O2, Co2, N2O and inert gases
Diaphragm Unit	Beryllium Copper suitable for high concentration of Formaldehyde - Stainless Steel on request.
AC Power Supplies	24 Vac 50/60Hz 200mA. Transformer isolation. Internal Fuse 300mA Auto-Reset.
Transformer Isolation	
DC Power Supplies	24 Vdc (19 to 31Vdc) smoothed 125mA. Internal Fuse 300mA Auto-Reset.
Voltage Output Signal	0-10V (0 to100% of Range) RL = 5kOhm min. Other output signals (e.g. 2-10V) or PID loop control is programmable via front keyboard.
Current Output Signal	4-20mA (0 to100% of Range) RL = 500 Ohm max.(0-20mA) or PID control is programmable via keyboard.
2 x Relay Output 1A 24Vdc	Alarm Relays are programmable via keyboard lo-hi / hi-hi / lo-lo. Alarm light - buzzer - mute
2 x Modbus rtu Connection	2 x Output Signal, Alarm Status, Alarm Thresholds and Alarm Timers are all readable as Modbus rtu Commands. Modbus rtu register assignments to read and write are available in the user manual.
Hysteresis/Repeatability	0.1% Typical of Full Scale.
Linearity (Accuracy)	+/- 0.25% of Full scale = > 100 Pa and 0.25Pa < 100Pa.
Zero Drift	0.05%K (+10°C to +50°C) - Automatically corrected to 0.0 if Auto-Zero function is enabled.
Operating Temperature	-10°C to +70°C.
Mounting Position	Horizontal
Weight	0.6 kg in ABS Housing.
Electrical Connections	ABS Housing: Rear removable screw terminal multiple plugs.
Air Tube Connections	ABS Housing: Positive and Negative Pressure Barbed Nipple 4mm OD x 15mm long with Isolation Valves
	Alternatively Barbed Nipple 6mm OD x 15mm long on special request
Enclosure	Plastic (ABS) Black Bezel or Light Grey (RAL7035) interchangeable - IP54 on front face - IP44 in Panel
	EN61326-1 EMC - EN61010-1 SAFETY.
Calibration Certificate	Supplied with Certificate traceable to national and international Standards (UKAS).

DPM-120 Issue 1 Dimensions with Tube connections for field and isolation valves and Electrical





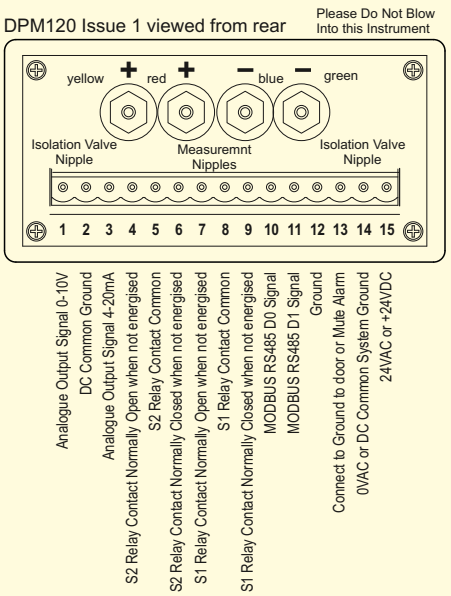
Notes:
4.0 mmØ nipples for CMR silicone tube. Isolation Valves fitted.

6.0 mmØ nipples for CMR PVC tube on special request.

The enclosure is DIN 48 x 96 panel mount with panel clamps for mounting.

The front panel consists of an LED display and a membrane keyboard.

The rear cable screw terminals are female plugs.



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