MDF MULTIPOINT DUCT FLOWPROBE

Ideal for average air volume measurement
Multiple differential pressure sensing points
Averaging impact pressure measurement
Averaging static pressure measurement
Ultra low velocity detection
Ideal for installation in existing duct work
Made to measure from 75 mm to 495 mm
Length manufactured to fit standard duct sizes
Mounting brackets are made to fit round ducts
Easy field positioning and installation
MDF Flowprobes are of anodized aluminium
40 years in service worldwide

MDF Multipoint Duct Flowprobe

The CMR MDF Multipoint Duct Flowprobes have been designed to measure air volume in ventilation ducts. They work in conjunction with the CMR P-Sensor as it provides a linear output signal in m^3/s, m^3/h, l/s or m/s. This means, the combination MDF Flowprobes and P-Sensor provide an accurate and repeatable air volume measurement from 25-100% of the controlled air volume.

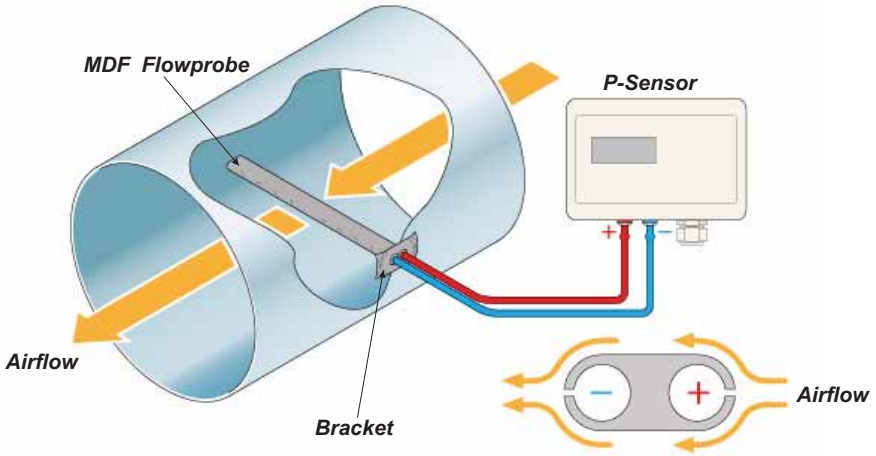
The MDF Flowprobe is mounted either horizontally or vertically in the duct. The MDF Flowprobe should be positioned preferably in a straight duct with relatively little air turbulence. Fit the MDF Flowprobe so that the averaging holes are facing the air flow. A red tube should be fitted to the MDF which is the (+) port. The air is then pushed around the probe and sucks from the rear holes which are opposed. A blue tube should be fitted which is the (-) port.

The probe produces a magnified pressure signal which is measured by the P-Sensor. The duct height and width or diameter can be entered via the keyboard of the P-Sensor. Low velocities can be measured, as the average measuring points produce a magnified pressure.

In order to convert the velocity pressure into an air volume i.e. m3/s, m3/h or l/s the height of the duct must be entered into the P-Sensor via the keyboard. The width must also be entered into P-Sensor which will calculate the total area in m2. After having adjusted the magnification factor, the P-Sensor shall provide an accurate volume output signal for the BMS or Scada system.

The P-Sensor can also linearize the measurements.

MDF Multipoint Duct Flowprobe fitted into a standard duct



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MDF DUCT FLOWPROBE SPECIFICATIONS

Selection of MDF Duct Flowprobes

It is essential to determine the air volume during the design stage. Normally there is a minimum and a maximum volume which has to be measured. The duct area should be calculated so that the velocity is approximately 2.5 m/s at the minimum volume and preferably 5 m/s at the operating point if possible. If the velocity is more than 5 m/s at the maximum volume then the noise level criteria needs to be considered of the whole installation. The maximum velocity should not exceed 9 m/s as the duct resistance shall increase and the overall energy consumption shall go up.

Installation

The MDF Duct Flowprobes are made to suit standard round duct sizes i.e 80, 100, 125, 140 150, 160,180, 200, 224, 250 280, 300, 315, 355, 400, 450 and 500 mm and are mounted from one side only. The Flowprobes are made 5 mm shorter to fit into the duct. It is very important, that the length is chosen correctly so that the measurement can be taken across the whole duct. It guarantees that the measurement holes are in the correct duct area to produce the best results.

After 500 mm duct width, the MDF can be supplied up to 1000 mm in increments of 25 mm. The difference is that there is a supporting bracket on the opposite side which has an elongated hole for the probe to slide through. The probe would extend to the outside of the duct by 50 mm. The supplied gasket would seal the probe and bracket to the duct.

The probe should be lagged to avoid thermal transfer and condensation on the outside of the duct. The MDF Duct Flowprobe can be installed horizontally or vertically but the tube connections should be on the side or on top to avoid any condensation built up. It works best if it has a reasonable length of duct so that the air flow is laminar when approaching the MDF Flow Probe. If a reasonable length is not available then the magnification factor (mf) can be adjusted on the P-Sensor and it can be linearized over 10 points for unusual measuring positions. This is easily achieved by measuring the air volume with a Pitot Tube at a different location of the duct and adjusting the P-Sensor via the keyboard accordingly.

Accuracy

The MDF Duct Flowprobe can achieve an accuracy of 5% between 30 and 100% of the design volume if it is used with a P-Sensor and the linearization function . If a higher accuracy is to be achieved over the whole range it is better to use multiple MDF Duct Flowprobes and a CMR averaging manifold.

Maintenance

The MDF Duct Flowprobe is maintenance free and when used in conjunction with the P-Sensor there is no air flow going through the Flowprobe and therefore no dust particles can enter the measuring holes as they are pressurised and any particles would be deflected from the Flowprobes.

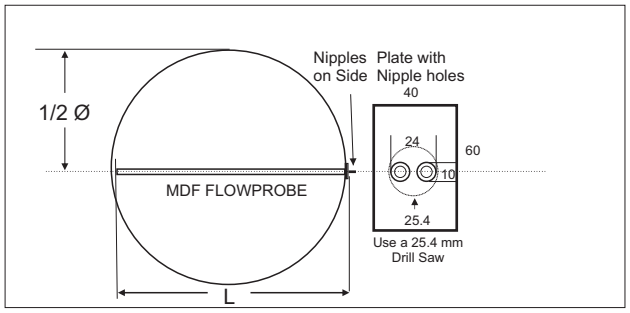
Materials

Flowrobes	-	Anodized Aluminium
Bracket	-	Stainless Steel 40 x 60mm
Gasket	-	Neoprene
Tube Nipples	-	Stainless Steel 6.0 mm Ø
Mounting Screws	-	Stainless Steel Size 6

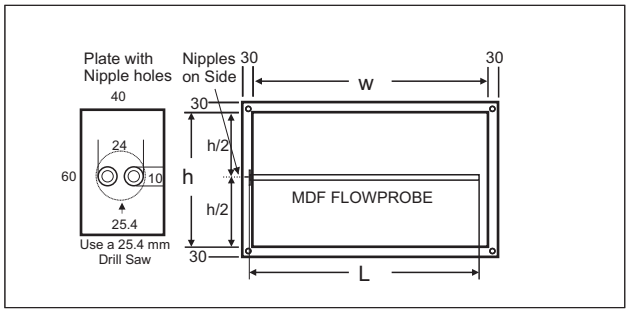
Specifications

Recommended minimum air velocity is	2.5 m/s
Recommended operating air velocity is	5.0 m/s
Recommended maximum air velocity is	9.0 m/s

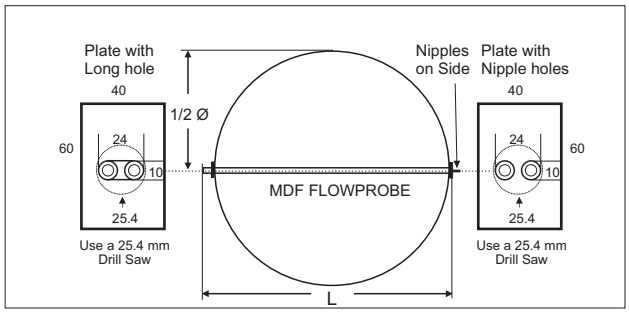
Humidity 10% to 90% non condensing.
Operating Temperature (dry condition) -20 to 80°C
Air density factor must be considered



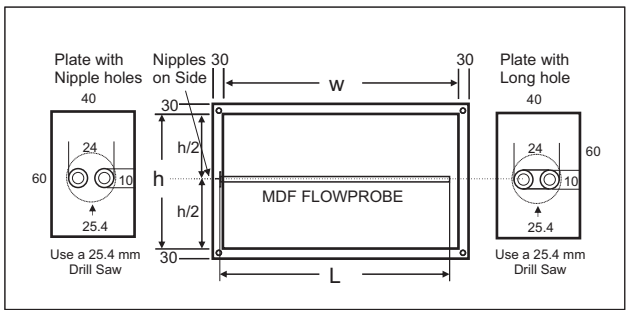
Type 'D' MDF Flowprobe round duct mounting on one side



Type 'D' MDF Flowprobe rectangular duct mounting on one side



Type 'A' MDF Flowprobe round duct mounting on both sides



Type 'A' MDF Flowprobe rectangular duct mounting on both sides

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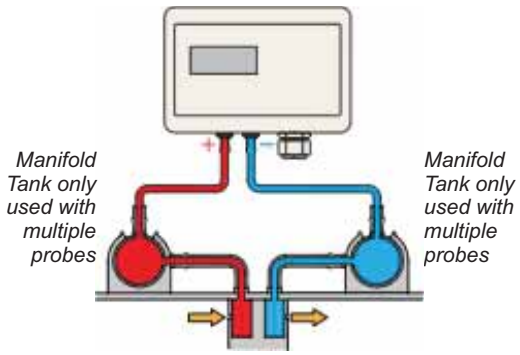
MDF FLOWPROBE VELOCITY PRESSURES



MDF Multipoint Duct Flowprobe

MDF Flowprobe and P-Sensor tube connections

The velocity pressure is measured by the Flowprobes mounted in the duct.The total impact pressure is measured on the positive (+red) and the static pressure is measured on the negative (- blue) Flowprobe. The P-Sensor shall be connected to the corresponding (+) and (-) port using CMR PVC red and blue tube.

If the P-Sensor is ordered with the MDF Flowprobe then it is pre-adjusted at the factory - i.e.duct diameter or width x height, density and MDF Flowprobe Magnification Factor (mf) and the range is in l/s, m^3/s, m^3/h. It is ready for connection to the control system.

If the P-Sensor was ordered separately and it was not factory adjusted then it is quite simple to adjust the parameters on site.

The P-Sensor has a keyboard and the duct inside diameter or height and width of rectangular ducts must be entered. The magnification factor of the MDF Flowprobe must be entered which is normally 1.650.

If the volume indicated on the P-Sensor display is deviating from the actual measurements, then the magnification factor can be adjusted to suit the installation abnormalities via the P-Sensor keyboard.

Adjust the fan to a constant volume – start with 50% of the minimum and maximum operating volume and take a pitot travers reading with an independent instrument. Once the average volume has been established and it is not the same as displayed on the P-Sensor, then adjust the Magnification Factor (mf) until the same display is achieved. For higher accuracy try this at 25%, 75% and 100% volume set point The P-Sensor has parameters to linearize the measurements for more precise applications.

Useful MDF Flowprobe scaling formula:

$$\text{velocity m/s} = \sqrt{\frac{2 \times (\Delta P \text{ in Pa} / \text{mag factor})}{1.2 \quad \text{Density}}}$$

Example:
2 x (50 Pa on the MDF / 1.650 mf) = 60.6 / 1.2 =50.505
$\sqrt{}$ 50.505 = 7.1066 m/s
6.454 m/s x (duct area in m2) = ... m^3/s * 3600 = m^3/h

Conversion Table - Velocity in m/s at standard density to Velocity Pressure in Pa

m/s	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	0.00	0.01	0.02	0.05	0.10	0.15	0.22	0.29	0.38	0.49
1	0.60	0.73	0.86	1.01	1.18	1.35	1.54	1.73	1.94	2.17
2	2.40	2.65	2.90	3.17	3.46	3.75	4.06	4.37	4.70	5.05
3	5.40	5.77	6.14	6.53	6.94	7.35	7.78	8.21	8.66	9.13
4	9.60	10.09	10.58	11.09	11.62	12.15	12.70	13.25	13.82	14.41
5	15.00	15.61	16.22	16.85	17.50	18.15	18.82	19.49	20.18	20.89
6	21.60	22.33	23.06	23.81	24.58	25.35	26.14	26.93	27.74	28.57
7	29.40	30.25	31.10	31.97	32.86	33.75	34.66	35.57	36.50	37.45
8	38.40	39.37	40.34	41.33	42.34	43.35	44.38	45.41	46.46	47.53
9	48.60	49.69	50.78	51.89	53.02	54.15	55.30	56.45	57.62	58.81
10	60.00	61.21	62.43	63.65	64.90	66.15	67.42	68.69	69.98	71.29
11	72.60	73.93	75.26	76.61	77.98	79.35	80.74	82.13	83.54	84.97
12	86.40	87.85	89.30	90.77	92.26	93.75	95.26	96.77	98.30	99.85
13	101.40	102.97	104.54	106.23	107.74	109.35	110.98	112.61	114.26	115.93
14	117.60	119.29	120.98	122.69	124.42	126.15	127.90	129.65	131.42	133.21
15	135.00	136.81	138.62	140.45	142.30	144.15	146.02	147.89	149.78	151.69
16	153.60	155.53	157.46	157.46	159.41	161.38	163.35	165.34	167.33	169.34
17	173.40	175.45	177.50	179.57	181.66	183.75	185.86	187.97	190.10	192.25
18	194.40	196.57	198.74	200.93	203.14	205.35	207.58	209.81	212.06	214.33
19	216.60	218.89	221.18	223.49	225.82	228.15	230.50	232.85	235.22	237.61
20	240.00	242.41	244.82	247.25	249.70	252.15	254.62	257.09	259.58	262.09
21	264.60	267.13	269.66	272.21	274.78	277.35	279.94	282.53	285.14	287.77
22	290.40	293.05	295.70	298.37	301.06	303.75	306.46	309.17	311.90	314.65
23	317.40	320.17	322.94	325.73	328.54	331.35	334.18	337.01	339.86	342.73
24	345.60	348.49	351.38	354.29	357.22	360.15	363.10	366.05	369.02	372.01
25	375.00	378.01	381.02	384.05	387.10	390.15	393.22	396.29	399.38	402.49

To get the range of the P-Sensor use the keyboard and display the range. This is the sensor range in l/s, m^3/s or m^3/h at 10 V / 20 mA. Enter this range into your control system. No further calculations are necessary. If you want to use the table above use the range of the transmitter in Pa and divide it by the (mf) of the MDF. Look up the velocity above. i.e. 100 Pa / 1.650 (mf) = 60.6 Pa. Look up above ~ 60.6 Pa and read on side and top ~ 10.05 m/s then multiply with the duct area in m^2 to get m^3/s and multiply by 3600 to get m^3/h.

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MDF SELECTION Type D and A

Type D with Single side Bracket								
Part Number	Description	Probe Length L mm	Overall Probe Length L1 mm	Probe Depth D mm	Probe Width W mm	Weight Unit	Weight kg	Carton Dimension 107 x 67 x L4 Carton Length L4 mm
MDF-24-0080	Multipoint Duct Flowprobe L= 075 mm	75	95	24	10	kg	0.5	115
MDF-24-0100	Multipoint Duct Flowprobe L= 095 mm	95	115	24	10	kg	0.5	135
MDF-24-0125	Multipoint Duct Flowprobe L= 120 mm	120	140	24	10	kg	0.5	160
MDF-24-0140	Multipoint Duct Flowprobe L= 135 mm	135	155	24	10	kg	0.5	175
MDF-24-0150	Multipoint Duct Flowprobe L= 145 mm	145	165	24	10	kg	0.5	185
MDF-24-0160	Multipoint Duct Flowprobe L= 155 mm	155	175	24	10	kg	0.5	195
MDF-24-0180	Multipoint Duct Flowprobe L= 175 mm	175	195	24	10	kg	0.5	215
MDF-24-0200	Multipoint Duct Flowprobe L= 195 mm	195	215	24	10	kg	0.5	235
MDF-24-0225	Multipoint Duct Flowprobe L= 220 mm	220	240	24	10	kg	1	260
MDF-24-0250	Multipoint Duct Flowprobe L= 245 mm	245	265	24	10	kg	1	285
MDF-24-0280	Multipoint Duct Flowprobe L= 275 mm	275	295	24	10	kg	1	315
MDF-24-0300	Multipoint Duct Flowprobe L= 295 mm	295	315	24	10	kg	1	335
MDF-24-0315	Multipoint Duct Flowprobe L= 310 mm	310	330	24	10	kg	1	350
MDF-24-0355	Multipoint Duct Flowprobe L= 350 mm	350	370	24	10	kg	1	390
MDF-24-0400	Multipoint Duct Flowprobe L= 395 mm	395	415	24	10	kg	1	435
MDF-24-0450	Multipoint Duct Flowprobe L= 445 mm	445	465	24	10	kg	1	485
MDF-24-0500	Multipoint Duct Flowprobe L= 495 mm	495	515	24	10	kg	1	535
Type A with additional elongated Bracket								
MDF-24-0525	Multipoint Duct Flowprobe L= 525 mm	575	600	24	10	kg	1.5	625
MDF-24-0550	Multipoint Duct Flowprobe L= 550 mm	600	625	24	10	kg	1.5	645
MDF-24-0575	Multipoint Duct Flowprobe L= 575 mm	625	650	24	10	kg	1.5	670
MDF-24-0600	Multipoint Duct Flowprobe L= 600 mm	650	675	24	10	kg	1.5	695
MDF-24-0625	Multipoint Duct Flowprobe L= 625 mm	675	700	24	10	kg	1.5	720
MDF-24-0650	Multipoint Duct Flowprobe L= 650 mm	700	725	24	10	kg	1.5	745
MDF-24-0675	Multipoint Duct Flowprobe L= 675 mm	725	750	24	10	kg	1.5	770
MDF-24-0700	Multipoint Duct Flowprobe L= 700 mm	750	775	24	10	kg	1.5	795
MDF-24-0725	Multipoint Duct Flowprobe L= 725 mm	775	800	24	10	kg	1.5	820
MDF-24-0750	Multipoint Duct Flowprobe L= 750 mm	800	825	24	10	kg	2	845
MDF-24-0775	Multipoint Duct Flowprobe L= 775 mm	825	850	24	10	kg	2	870
MDF-24-0800	Multipoint Duct Flowprobe L= 800 mm	850	875	24	10	kg	2	895
MDF-24-0825	Multipoint Duct Flowprobe L= 825 mm	875	900	24	10	kg	2	920
MDF-24-0850	Multipoint Duct Flowprobe L= 850 mm	900	925	24	10	kg	2	945
MDF-24-0875	Multipoint Duct Flowprobe L= 875 mm	925	950	24	10	kg	2	970
MDF-24-0900	Multipoint Duct Flowprobe L= 900 mm	950	975	24	10	kg	2	995
MDF-24-0925	Multipoint Duct Flowprobe L= 925 mm	975	1000	24	10	kg	2	1020
MDF-24-0950	Multipoint Duct Flowprobe L= 950 mm	1000	1025	24	10	kg	2	1045
MDF-24-0975	Multipoint Duct Flowprobe L= 975 mm	1025	1050	24	10	kg	2	1070
MDF-24-1000	Multipoint Duct Flowprobe L=1000 mm	1050	1075	24	10	kg	2	1095

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