VGS VELOGRID AIR VOLUME SENSOR

Accurate average air volume measurement
Multiple differential pressure sensing points
Average static and impact pressure
BI - directional volume measurement
Ultra-low velocity detection
Frame made of stainless steel metal
Standard mounting flange 30 mm
Height manufactured in 100 mm increments
Width manufactured in 50 mm increments
Works with all CMR transmitters and controllers
CMR standard 24 month warranty
35 years field application experience

VGS VELOGRID

The VGS Velogrid has been designed to measure air volume in ventilation ducts. The Velogrid consists of a stainless steel duct section with a length of 300 mm and is available with a 30 mm flange duct connection to suit standard stainless steel duct work.

The CMR Veloprobes made of stainless steel are fitted across the internal duct frame area in predefined spacing. Each Veloprobe has a number of pressure inlet points to measure the impact and static pressure at the same time. Both static and impact pressure ports of the Veloprobes have independent pressure manifolds which provide a smooth pressure signal of the whole measured area.

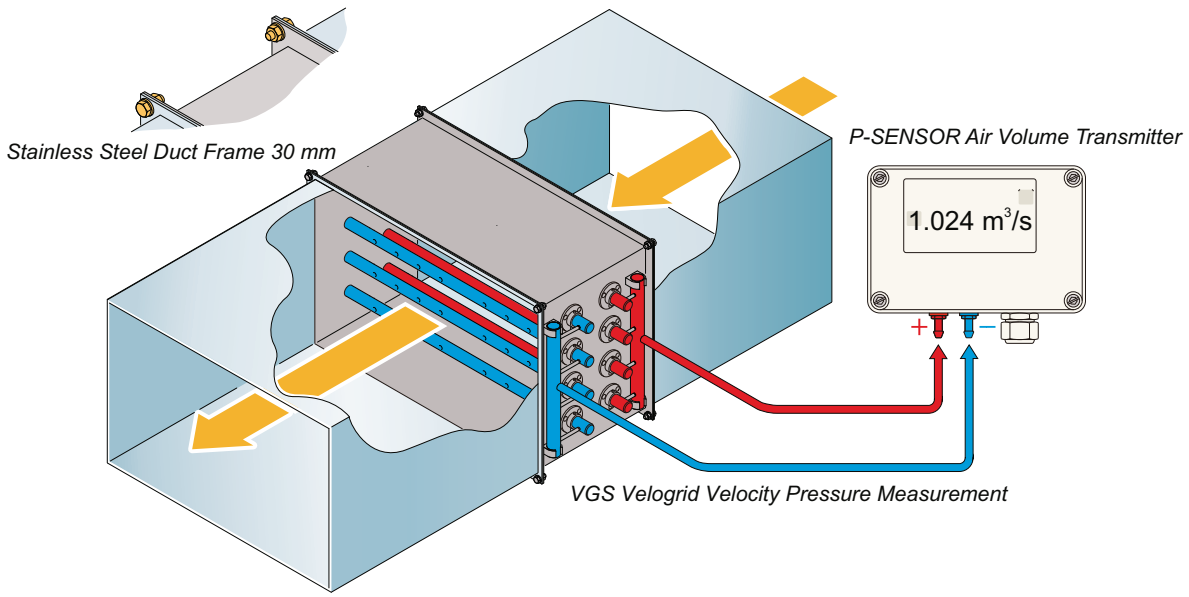
The differential pressure of both impact and static pressure is the velocity pressure which is converted by the P-Sensor to provide a total air volume measurement.

Another great advantage of the VGS Velogrid is that it can measure bi-directional as it is manufactured equally on both sides. This means the airflow is measured in one direction and should there be a reverse flow this can be detected and measured when using the CMR P-Sensor. The installation direction is therefore not important. The VGS Velogrids are manufactured in standard height increments of 100 mm going up to a maximum height of 1200 mm.

The width of the Velogrid is manufactured in increments of 50 mm up to 1200 mm. The Veloprobes are fitted across the width and are equally spaced over the height. If the duct height is 1000 mm then there will be 10 Veloprobe sets fitted into this Velogrid section.

Larger and fully welded Velogrids can be manufactured to order.

VGS VELOGRID and P-SENSOR providing accurate average air volume measurement in a duct.



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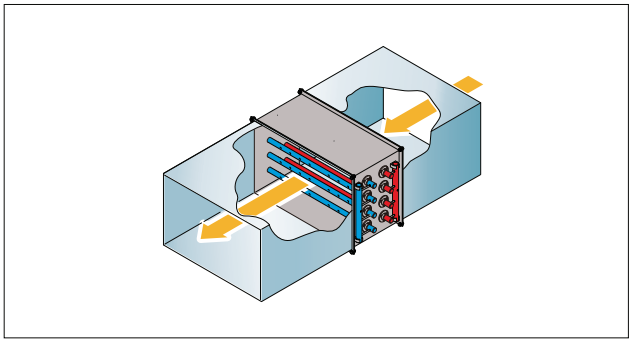
VGS VELOGRID INSTALLATION

The VGS Velogrid ist best installed in a straight duct with a length before and after the Flowgrid. A length on the air entering the Flowgrid is more important than the air exit path.

If the air is very turbulent the CMR P-Sensor can be adjusted to provide a smoothed output signal which is a mean air volume measurement. It does not need any duct flow straighteners.

The VGS Velogrid can be installed vertically or horizontally but care must be taken that the tube connections are either on the side or at the top. Never at the bottom, as condensation might enter the measurement tubes.



VGS VELOGRID in a straight duct section

The VGS Velogrid can be installed after an elbow as shown on the right. Best is to have room for a straight duct with a length before and after the Flowgrid. A length on the air entering the Flowgrid is more important than the air exit path.

If the air is very turbulent the CMR P-Sensor can be adjusted to provide a smoothed output signal which is a mean air volume measurement. It does not need any duct flow straighteners.

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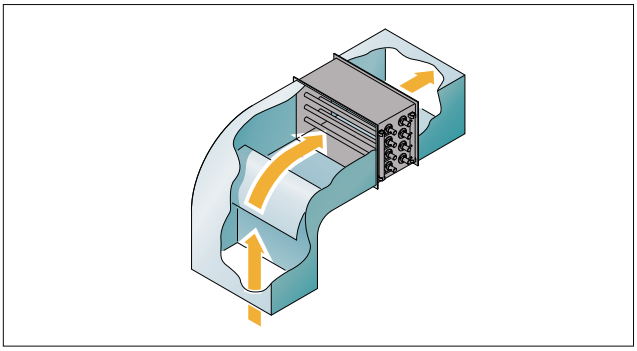

VGS VELOGRID after an elbow duct section

The VGS Velogrid can be installed after a T-Section shown on the the right. Best is to have room for a straight duct with a length before the Flowgrid and a length after the Flowgrid. A length on the air entering the Flowgrid is more important than the air exit path.

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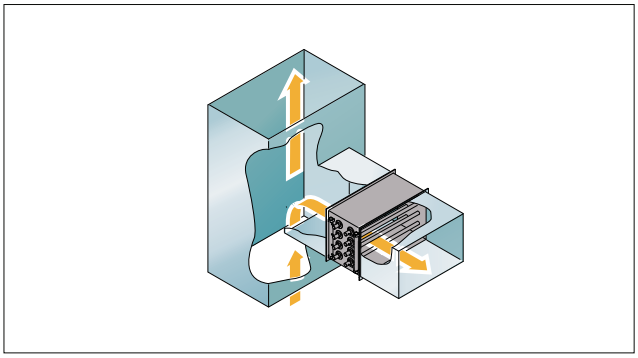
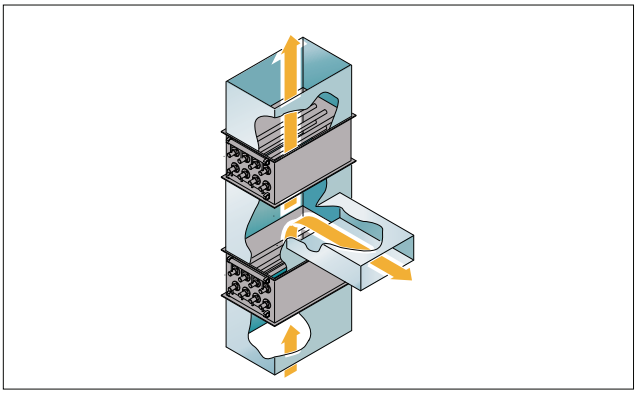


VGS VELOGRID after a T- duct section

If the duct on the right cannot be fitted with a VGS Velogrid then the bottom Flowgrid measures the total volume and the top Flowgrid measures what is left over. The difference is the volume which passes through the duct on the right. Both Flowgrids need room for a straight duct with a length before and after. A length on the air entering the Flowgrid is more important than the air exit path.

If the air is very turbulent the CMR P-Sensor can be adjusted to provide a smoothed output signal which is a mean air volume measurement. It does not need any duct flow straighteners.

The VGS Velogrid can be installed vertically or horizontally but care must be taken that the tube connections are either on the side or at the top. Never at the bottom, as condensation might enter the measurement tubes.



VGS VELOGRID before and after a T-duct section

Send a drawing to CMR to provide a selection and full dimensional specification of the VGS Velogrid.

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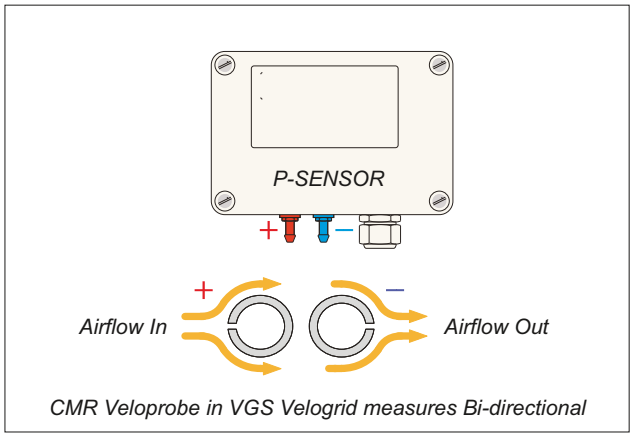
VGS VELOGRID VELOCITY PRESSURES



CMR Veloprobe in VGS Velogrid measures Bi-directional

VGS Velogrid and P-Sensor combination

The velocity pressure is measured by the Veloprobes built into the VGS Velogrid. The total impact pressure is measured on the positive (+red) and the static pressure is measured on the negative (- blue) manifold tanks. The P-Sensor shall be connected to the corresponding tanks using CMR PVC red and blue tube.

When the P-Sensor is ordered with the VGS Velogrid, then it is pre-adjusted at the factory - i.e. duct width and height, density and magnification factor (mf). The range is in m^3/s, m^3/h or l/s. It is ready for connection to the control or monitoring system.

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

The P-Sensor has a keyboard where the duct height and width must be entered. The magnification factor of the VGS Velogrid must be entered which is normally 2.667 if it is installed in a straight duct.
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. Then take a pitot travers reading with a CAL150 or any instrument. Once the average volume has been established and it is not the same as displayed on the P-Sensor, adjust the magnification factor (mf) until the same is achieved on the display. For higher accuracy try this at 25%, 75% and 100% volume set point. The P-Sensor also has parameters to linearize the measurements for more critical applications.

Useful VGS Velogrid 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 (100 Pa across VGS / 2.667 mf) = 74.99 / 1.2 = 62.48
$\sqrt{62.48}$ = 7.905 m/s
7.905 m/s x (duct height 'h' x duct width 'w') = ... 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 to display the range. This is the sensor range in m^3/s, m^3/h or l/s 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 VGS. Look up the velocity above i.e. 100 Pa / 2.667 = 37.49 Pa.
Look up above ~ 37.5 Pa and read on side and top ~ 8 m/s, then multiply with duct area in m^2 to get m^3/s and multiply 3600 to get m^3/h.

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VGS VELOGRID SPECIFICATIONS

Selection of Velogrids
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.

The maximum velocity should not exceed 9 m/s as the duct resistance shall increase and the overall energy consumption shall go up.

The VGS Velogrid has the advantage that it reduces the area internally which increases the velocity pressure momentarily but will have a regain of pressure after passing over the Veloprobes. This means that the volume could go down to very low limits and still providing a reasonable velocity pressure measurement.

Installation
The VGS Velogrid can be installed horizontally or vertically but the tube connections should be on the side or on top. It works best if it has a reasonable length of duct so that the air flow is laminar when approaching the VGS Velogrid. If a reasonable length is not available then the magnification factor (mf) can be adjusted on the P-Sensor and it can also be linearized over 10 points for unusual measuring positions. This is easily achieved by measuring the air volume at a different location of the duct and adjusting the P-Sensor via the keyboard accordingly.

Accuracy
The VGS Velogrid can achieve a very high accuracy between minimum and maximum design volume if it is used with a P-Sensor and the linearisation function .

Maintenance
The VGS Velogrid is maintenance free and when used in conjunction with the P-Sensor. There is no airflow going through the Veloprobes and therefore no dust particles can enter the measuring holes as they are pressurised and any particles would be deflected from the Veloprobes.

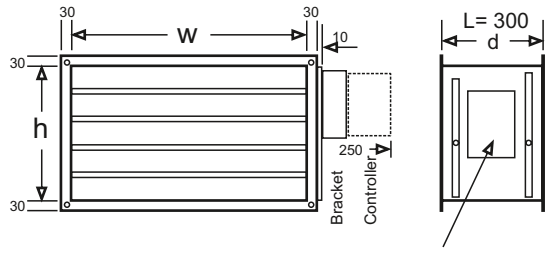
Materials
Frame	-	Stainless steel 304
Veloprobes	-	Stainless steel 304
Pipe flanges	-	Stainless steel 303
Manifold tank	-	Stainless steel 304
Tube nipples	-	Stainless steel 303
Mounting bolts	-	Stainless steel 316

Duct height '**h**' from 100 mm up to 1200 mm in 100mm steps
Duct width '**w**' from 100 mm up to 1200 mm in 50 mm steps
Duct length 300 mm
Standard duct frame 30 mm
Sensor/controller mounting bracket on 300 mm duct length only

Specifications
Recommended minimum air velocity is	2.5 m/s
Recommended operating air velocity is	5 m/s
Maximum recommended air velocity is	9 m/s

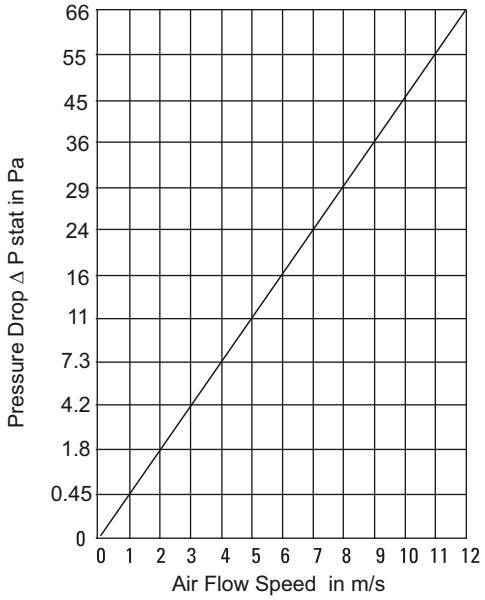
Very low airflow can be measured with the ultra-low P-Sensor transmitter.
Humidity 10% to 90% non condensing.
Operating temperature (dry condition) -5 to 60°C
Air density factor must be considered

VGS Velogrid Dimensions

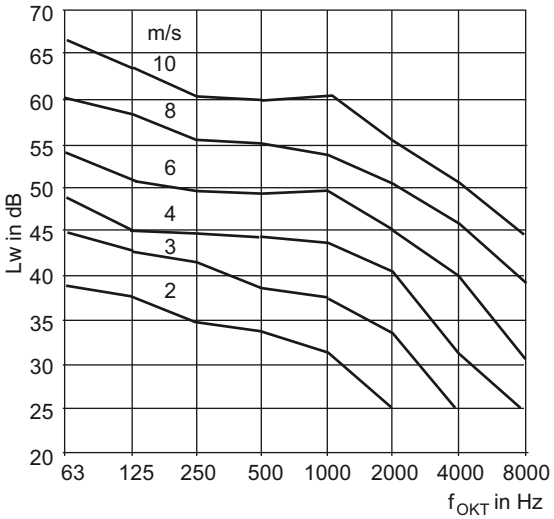


P-Sensor or Controller Bracket

Pressure Drop



Sound Performance Level



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VGS VELOGRID ORDER SELECTION

HOW TO ORDER

Call sales at CMR and provide the duct dimension such as height and width, the minimum and maximum air volume in l/s, m3/s or m3/h and how it is to be mounted in the duct.

You can however configure the part number yourself by using the table below. The selection table has been prepared to make ordering easy. Each column contains a number of different options which can be selected to configure a part number using the duct dimensions.

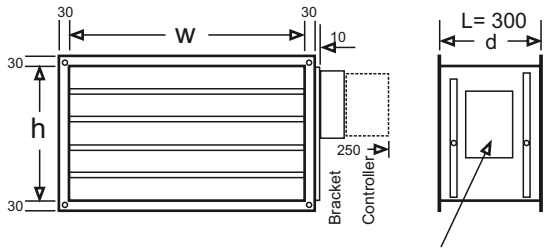
The example part number VGS-0300-0800-300-30 which is printed above the selection table can be used to try to configure a Part Number to be used in your new application.

The sample shows it is a Velogrid, having a base part Number of VGS - the height 'h' is 300m, the width 'w' is 800mm, the Velogrid length 'L' is 300mm and the Duct Flange is 30mm,

Example Part Number configuration
The code after the [=] sign is used to form the number

VSG-	0300-	0800-	300-	30
Velogrid	Height	Width	Length	Flange
Part No.	'h' mm	'w' mm	'L' mm	Size
Base = VGS	h = 0100	w = 0100	L = 300	Flange = 30
	h = 0200	w = 0150		
	h = 0300	w = 0200		
	h = 0400	w = 0250		
	h = 0500	w = 0300		
	h = 0600	w = 0350		
	h = 0700	w = 0400		
	h = 0800	w = 0450		
	h = 0900	w = 0500		
	h = 1000	w = 0550		
	h = 1100	w = 0600		
	h = 1200	w = 0650		
		w = 0700		
		w = 0750		
		w = 0800		
		w = 0850		
		w = 0900		
		w = 0950		
		w = 1000		
		w = 1050		
		w = 1100		
		w = 1150		
		w = 1200		

VGS Velogrid Dimensions



HOW TO ORDER

EXAMPLE
A stainless Steel Flowgrid to measure airvolume is required
The duct height must be 600 mm
The duct width must be 900 mm
The duct is long enough to fit a Flowgrid with a length of 300mm.
The Flowgrid can be mounted onto the duct with a 30mm Mezz Flange..

The part number for this CMR Velogrid is VGS-0600-0900-300-30

Now try to select your Veloprobe for your installation

Call CMR for free assistance at any time.

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