

**VBS and VCW Gas Venturi Meters
Installation Manual**

GAS VENTURI METERS

- Permits accurate setting of burner air and gas flow for optimum efficiency.
- Lower pressure loss than plate type orifices; can reduce blower horsepower requirements.
- +/- 1% accuracy depending on location, measurement accuracy and proper use of correction factors.
- One piece machined brass connection
- Includes brass hex-head screws to plug holes when measurements are not being taken.
- Metal tag chained to orifice clearly shows orifice pipe size and part number.

Screwed Venturi's (VBS)

- Available from 1/2" - 2 1/2" NPT.
- Rated for 250 PSI
- Brass construction

Pipe Size	Overall Length
1/2"	2-3/4"
3/4"	3"
1"	3-3/4"
1-1/4" (500)	4"
1-1/4" (616)	3-3/4"
1-1/2" (505)	4-1/4"
1-1/2" (632)	4"
2" (485)	5"
2" (685)	4-1/4"
2-1/2" (608)	5-1/2"
2-1/2" (750)	5-1/4"



Welded Ventures (VCW)

- Available from 2 2 1/2" - 30"
- Rated for 250 PSI
- Zinc plated construction
- Ends are chamfered for butt-welding to pipes.

Pipe Size	Overall Length	Pipe Size	Overall Length
2-1/2" (628)	4-5/8"	10	8"
2-1/2" (746)	4"	12"	12"
3" (623)	5-1/4"	14"	14"
3" (745)	4-1/4"	16"	26"
4" (555)	5-7/8"	18"	29"
4" (674)	5-3/8"	20"	32"
5"	5"	24"	39"
6"	6"	30"	48"
8"	7"		



Sizing a Venturi

- Use the tables on pages 2 and 3 for sizing a threaded orifice. Use the tables on page 4 and 5 for sizing a flanged, carbon steel orifice.
- The tables show the air flow in SCFH in hundreds and the corresponding pressure drop in inches of water column.
- Select the orifice by either pressure drop or by flow. Apply correction factors where needed.

SCREWED BRASS VENTURI (VBS)

Pressure Drop ("W.C.)

Pipe Size NPT	Model Number	Pressure Drop ("W.C.)											
		0.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	
1/2"	VBS-230	Flow CFH of Air in Hundreds	0.31	0.43	0.61	0.75	0.86	0.97	1.06	1.14	1.22	1.30	1.37
1/2"	VBS-327		0.64	0.91	1.29	1.58	1.82	2.03	2.23	2.41	2.57	2.73	2.88
3/4'	VBS-138		0.14	0.20	0.29	0.36	0.41	0.46	0.50	0.54	0.58	0.62	0.65
3/4'	VBS-276		0.58	0.81	1.15	1.14	1.63	1.82	2.00	2.16	2.31	2.44	2.58
3/4'	VBS-414		1.27	1.80	2.55	3.12	3.60	4.02	4.41	4.76	5.09	5.40	5.69
3/4'	VBS-550		2.55	3.60	5.09	6.24	7.20	8.05	8.82	9.52	10.18	10.80	11.38
1"	VBS-270		0.89	1.26	1.78	2.18	2.52	2.82	3.09	3.33	3.56	3.78	3.98
1"	VBS-406		2.04	2.88	4.07	4.99	5.76	6.44	7.05	7.62	8.15	8.64	9.11
1"	VBS-513		3.73	5.28	7.47	9.15	10.56	11.81	12.9	13.97	14.93	15.84	16.70
1"	VBS-648		5.22	7.38	10.44	12.78	14.76	16.50	18.08	19.53	20.87	22.14	23.34
1-1/4"	VBS-500		5.05	7.14	10.10	12.37	14.28	15.97	17.45	18.09	20.19	21.42	22.56
1-1/4"	VBS-616		7.88	11.15	15.77	19.31	22.30	24.93	27.31	29.50	31.54	33.45	35.26
1-1/2"	VBS-505		7.35	10.40	14.71	18.01	20.80	23.26	25.47	27.52	29.42	31.20	32.89
1-1/2"	VBS-632		11.03	15.60	22.06	27.02	31.20	34.88	36.2	41.27	44.12	46.80	49.33
2"	VBS-485		10.43	14.75	20.86	25.55	29.50	32.98	36.13	39.02	41.72	44.25	46.64
2"	VBS-685		23.33	33.00	46.67	57.16	66.00	73.79	80.83	87.31	93.34	99.00	104.36
2-1/2"	VBS-608		21.21	30.00	42.43	51.96	60.00	67.06	73.48	79.37	84.85	90.00	94.87
2-1/2"	VBS-750		33.94	48.00	67.88	83.14	96.00	107.33	117.58	127.00	135.76	144.00	151.79

Flows for all are air (1.0 S.G.) at 60 degrees F. seal level (14.7 PSI) with a supply pressure to the orifice of 1 PSIG. See CORRECTION FACTOR CALCULATION on page 5 for other pressures and temperatures.

SCREWED BRASS VENTURI (VBS)

Pressure Drop ("W.C.)

Pipe Size NPT	Model Number	Pressure Drop ("W.C.)								
		12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0
1/2"	VBS-230	1.50	1.62	1.73	1.83	1.93	2.03	2.12	2.20	2.29
1/2"	VBS-327	3.15	3.40	3.64	3.86	4.07	4.27	4.46	4.64	4.82
3/4'	VBS-138	0.71	0.77	0.82	0.87	0.92	0.96	1.00	1.05	1.08
3/4'	VBS-276	2.82	3.05	3.26	3.46	3.64	3.82	3.99	4.16	4.31
3/4'	VBS-414	6.24	6.73	7.20	7.64	8.05	8.44	8.82	9.18	9.52
3/4'	VBS-550	12.47	13.47	14.40	15.27	16.10	16.89	17.64	18.36	19.05
1"	VBS-270	4.36	4.71	5.04	5.35	5.63	5.91	6.17	6.42	6.67
1"	VBS-406	9.98	10.78	11.52	12.22	12.88	13.51	14.11	14.69	15.24
1"	VBS-513	18.29	19.76	21.12	22.40	23.61	24.77	25.87	26.92	27.94
1"	VBS-648	25.57	27.61	29.52	31.31	33.00	34.62	36.15	37.63	39.05
1-1/4"	VBS-500	24.73	26.72	28.56	30.29	31.93	33.49	34.98	36.41	37.78
1-1/4"	VBS-616	38.62	41.72	44.60	47.31	49.86	52.30	54.62	56.85	59.00
1-1/2"	VBS-505	36.03	38.91	41.60	44.12	46.51	48.78	50.95	53.03	55.03
1-1/2"	VBS-632	54.04	58.37	62.40	66.19	69.77	73.17	76.42	79.54	82.55
2"	VBS-485	51.10	55.19	59.00	62.58	65.96	69.18	72.26	75.21	78.05
2"	VBS-685	114.32	123.47	132.00	140.01	147.58	154.78	161.67	168.27	174.62
2-1/2"	VBS-608	103.92	112.25	120.00	127.28	134.16	140.71	146.97	152.97	158.75
2-1/2"	VBS-750	166.28	179.60	192.00	203.65	214.66	225.14	235.15	244.75	253.99

Flow CFH of Air in Hundreds

Head loss for all venturis is 10%. Head loss is the pressure loss caused by the orifice as a percentage of the measured pressure drop.

Flows for all are air (1.0 S.G.) at 60 degrees F. seal level (14.7 PSI) with a supply pressure to the orifice of 1 PSIG. See CORRECTION FACTOR CALCULATION on page 5 for other pressures and temperatures.

CARBON STEEL VENTURI (VCW)

Pressure Drop ("W.C.)

Pipe Size NPT	Model Number	Pressure Drop ("W.C.)										
		0.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
2-1/2"	VCW-628	21.57	30.50	43.13	52.83	61.00	68.20	74.71	80.70	86.27	91.50	96.45
2-1/2"	VCW-746	35.71	50.50	71.42	87.47	101.00	112.92	123.70	133.61	142.84	151.50	159.70
3"	VCW-623	32.17	45.50	64.35	78.81	91.00	101.74	111.45	120.38	128.69	136.50	143.88
3"	VCW-745	52.68	74.50	105.36	129.04	149.00	166.59	182.49	197.11	210.72	223.50	235.59
4"	VCW-550	54.45	77.00	108.89	133.37	154.00	172.18	188.61	203.72	217.7	231.00	243.50
4"	VCW-675	84.85	120.00	169.71	207.85	240.00	268.33	293.94	317.49	339.41	360.00	379.47
5"	VCW-715	110.31	156.00	220.62	270.20	312.00	348.83	383.12	412.74	441.23	468.00	493.32
6"	VCW-743	161.22	228.00	322.44	394.91	456.00	509.82	558.48	603.23	644.88	684.00	721.00
8"	VCW-750	284.96	403.00	569.93	698.02	806.00	901.14	987.14	1,066.2	1,139.9	1,209.0	1,274.4
10"	VCW-755	458.21	648.00	916.41	1,122.4	1,296.0	1,449.0	1,587.3	1,714.5	1,832.8	1,944.0	2,049.2
12"	VCW-750	627.91	888.00	1,255.8	1,538.1	1,776.0	1,985.6	2,175.2	2,349.4	2,511.6	2,664.0	2,808.1
14"	VCW-756	848.53	1,200.0	1,697.1	2,078.5	2,400.0	2,683.3	2,939.4	3,174.9	3,394.1	3,600.0	3,794.7
16"	VCW 721	1,103.1	1,560.0	2,206.2	2,702.0	3,120.0	3,488.3	3,821.2	4,127.4	4,412.4	4,680.0	4,933.2
18"	VCW-725	1,383.1	1,956.0	2,766.2	3,387.9	3,912.0	4,373.8	4,791.2	5,175.1	5,532.4	5,868.0	6,185.4
20"	VCW-710	1,697.1	2,400.0	3,394.1	4,156.9	4,800.0	5,366.7	5,878.8	6,349.8	6,788.2	7,200.0	7,589.5
24"	VCW-709	2,460.7	3,480.0	4,921.5	6,027.5	6,960.0	7,781.5	8,524.2	9,207.2	9,842.9	10,440.0	11,004.7
30"	VCW-636	3,012.3	4,260.0	6,024.6	7,378.5	8,520.0	9,525.7	10,434.8	11,270.9	12,049.1	12,780.0	13,471.3

Flow CFH of Air in Hundreds

Flows for all are air (1.0 S.G.) at 60 degrees F. seal level (14.7 PSI) with a supply pressure to the orifice of 1 PSIG. See CORRECTION FACTOR CALCULATION on page 5 for other pressures and temperatures.

CARBON STEEL VENTURI (VCW)

Pressure Drop ("W.C.)

Model Number	Flow CFH of Air in Hundreds								
	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0
VCW-628	105.66	114.12	122.00	129.40	136.40	143.06	149.42	155.52	161.39
VCW-746	174.94	188.95	202.00	214.25	225.84	236.87	247.40	257.50	267.22
VCW-623	157.62	170.25	182.00	193.04	203.48	213.41	222.90	232.01	240.76
VCW-745	258.08	278.75	298.00	316.08	333.17	349.44	364.97	379.88	394.22
VCW-550	266.74	288.11	308.00	326.68	344.35	361.16	377.22	392.62	407.45
VCW-675	415.69	449.00	480.00	509.12	536.66	562.85	587.88	611.88	634.98
VCW-715	540.40	583.70	624.00	661.85	697.65	731.70	764.24	795.45	825.47
VCW-743	789.82	853.10	912.00	967.32	1,019.65	1,069.41	1,116.97	1,162.58	1,206.46
VCW-750	1,396.0	1,507.9	1,612.0	1,709.8	1,802.3	1,890.24	1,974.29	2,054.90	2,132.48
VCW-755	2,244.7	2,424.6	2,592.0	2,749.2	2,897.9	3,039.39	3,174.54	3,304.16	3,428.89
VCW-750	3,076.1	3,322.6	3,552.0	3,767.5	3,971.3	4,165.09	4,350.29	4,527.93	4,698.85
VCW-756	4,156.9	4,490.0	4,800.0	5,091.2	5,366.6	5,628.50	5,878.78	6,118.82	6,349.80
VCW 721	5,404.0	5,837.0	6,240.0	6,618.5	6,976.5	7,317.05	7,642.41	7,954.47	8,254.74
VCW-725	6,775.8	7,318.7	7,824.0	8,298.6	8,747.5	9,174.45	9,582.40	9,973.68	10,350.18
VCW-710	8,313.8	8,980.0	9,600.0	10,182.3	10,733.1	11,257.00	11,757.55	12,237.65	12,699.61
VCW-709	12,055.1	13,021.0	13,920.0	14,764.4	15,563.0	16,322.65	17,048.45	17,744.59	18,414.43
VCW-636	14,757.1	15,939.5	17,040.0	18,073.7	19,051.3	19,981.17	20,869.65	21,721.82	22,541.80

Head loss for all venturis is 10%. Head loss is the pressure loss caused by the orifice as a percentage of the measured pressure drop.

CORRECTION FACTOR CALCULATION

Flows in the table are for air (1.0 s.g.) at 60°F., sea level (14.7 PSIG), with a supply pressure to the orifice of 1 PSIG. To correct to other conditions, use the following formula

Corrected Flow =

$$\text{Flow From Table} \times \sqrt{\frac{520}{460^\circ + ^\circ\text{F}}} \times \frac{1}{\text{s.g.}} \times \frac{\text{PSIA} + \text{PSIG}}{15.7}$$

Where:

- °F = gas temp. through orifice
- s.g. = specific gravity of gas
- PSIA = barometric pressure
- PSIG - Supply pressure to orifice

Use these figure to estimate the barometric pressure at varous altitudes:

Sea Level	14.7 PSIA
1000'	14.2 PSIA
2000'	13.7 PSIA
3000'	13.2 PSIA
4000'	12.7 PSIA
5000'	12.2 PSIA
6000'	11.8 PSIA
7000'	11.3 PSIA

To correct for specific gravity only:

Multiply the flow from the table by:

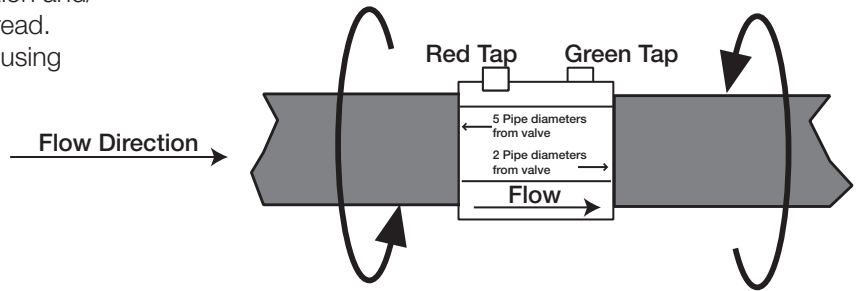
Natural gas, 0.60 s.g.	1.29
Propane, 1.56 s.g.	0.80
Butane, 2.00 s.g.	0.71
Propane/Air, 1.29 s.g.	0.88
Coke Oven gas, 0.45 s.g.	1.49

ATTENTION

- Read these instructions carefully.
- Failure to follow them and/or improper installation may cause explosion, property damage and injuries.
- Installation must be done with the supervision of a licensed burner technician.
- Check the ratings in the specifications to make sure that it is suitable for your application.
- Never perform work if gas pressure or power is applied, or in the presence of an open flame.
- Once installed, perform a complete checkout including leak testing.
- The system must be installed, used, and maintained to meet all applicable national and local code requirements such as but not limited to NFPA 70, NFPA 86, CSD-1, ANSI Z21.13, UL 795, NFPA 85, or CSA B149.3.

Installation of VBS Venturi

- Position the gas venturi so that that the red pressure tap is on the high pressure side.
- For maximum accuracy, install a minimum straight run of pipe 5 pipe diameters in length upstream gas orifice venturi, and minimum straight run of pipe 2 pipe diameters in length downstream gas orifice venturi.
- Use new, properly reamed and threaded pipe free of chips and debris (e.g. sand, dirt, water).
- Apply good quality pipe sealant, putting a moderate amount on the male threads only. Wipe away any excess after threading the pipe into the gas orifice. If using LP gas, use pipe sealant rated for use with LP gas.
- Do not thread pipe too far or overtighten the pipe. Follow the maximum torque values listed below. Distortion and/or leakage may result from excess pipe in the thread.
- After installation is complete, perform a leak test using soapy water.



NPT	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2 1/2"
Tmax [lb-in]	443	752	1106	1770	1991	2213	2876

Installation of VCW Venturi

- Position the gas orifice so that that the red pressure tap is on the high pressure side.
- For maximum accuracy, install a minimum straight run of pipe 5 pipe diameters in length upstream gas orifice venturi, and minimum straight run of pipe 2 pipe diameters in length downstream gas orifice venturi.
- Before welding the gas orifice directly to the pipe, first remove the pressure taps.