

**Table of Contents**

Table of Contents ..... Page 1  
 Attention ..... Page 1  
 Gas Venturi Flow Metering Device ..... Page 2  
 Sizing a Venturi ..... Page 3  
 Screwed Brass Venturi (VBS) ..... Page 3  
 Screwed Brass Venturi (VBS) ..... Page 4  
 Carbon Steel Venturi (VCW)..... Page 5  
 Carbon Steel Venturi (VCW)..... Page 6  
 Correction Factor Calculation ..... Page 6  
 Installation of VBS Venturi ..... Page 7



**Attention**



The installation and maintenance of this product must be done under the supervision of an experienced and trained specialist. Never perform work if gas pressure or power is applied, or in the presence of an open flame.



Check the ratings in the specifications to make sure that they are suitable for your application.



Please read the instruction before installing or operating. Keep the instruction in a safe place. You find the instruction also at [www.dungs.com](http://www.dungs.com) If these instructions are not heeded, the result may be personal injury or damage to property.



On completion of work on the gas venturi meter, perform a leakage and function test.



Any adjustment and application-specific adjustment values must be made in accordance with the appliance-/boiler manufacturers instructions.



This product is intended for installations covered by, but not limited to, the following codes and standards: NFPA 70, NFPA 86, CSD-1, ANSI Z21.13, UL 795, NFPA 85, or CSA B149.3.

**Explanation of symbols**

- 1, 2, 3 ... = Action
- = Instruction

## Gas Venturi Flow Metering Device

- 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)	Pipe Size	Overall Length
<ul style="list-style-type: none"> <li>• Available from 1/2" - 2 1/2" NPT</li> <li>• Rated for 250 PSI</li> <li>• Brass construction</li> <li>• Max. temperature rating 300 °F</li> </ul>	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 Venturi's (VCW)	Pipe Size	Overall Length
<ul style="list-style-type: none"> <li>• Available from 2 1/2" - 30" NPT</li> <li>• Rated for 250 PSI</li> <li>• Zinc plated construction</li> <li>• Ends are chamfered for butt welding to pipes</li> <li>• Max. temperature rating 300 °F</li> </ul>	2 1/2" (628)	4 5/8"
	2 1/2" (746)	4"
	3" (623)	5 1/4"
	3" (745)	4 1/4"
	4" (555)	5 7/8"
	4" (674)	5 3/8"
	5"	5"
	6"	6"
	8"	7"
	10"	8"
	12"	12"
	14"	14"
	16"	26"
	18"	29"
	20"	32"
	24"	39"
	30"	48"



## 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)

Pipe Size NPT	Model Number	Flow CFH of Air in Hundreds	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		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	12.90	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	36.20	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)

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	Flow CFH of Air in Hundreds	1.50	1.62	1.73	1.83	1.93	2.12	2.20	2.29	
1/2"	VBS-327		3.15	3.40	3.64	3.86	4.07	4.46	4.64	4.82	
3/4"	VBS-138		0.71	0.77	0.82	0.87	0.92	1.00	1.05	1.08	
3/4"	VBS-276		2.82	3.05	3.26	3.46	3.64	3.99	4.16	4.31	
3/4"	VBS-414		6.24	6.73	7.20	7.64	8.05	8.82	9.18	9.52	
3/4"	VBS-550		12.47	13.47	14.40	15.27	16.10	17.64	18.36	19.05	
1"	VBS-270		4.36	4.71	5.04	5.35	5.63	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

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)

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	Flow CFH of Air in Hundreds	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	217.70	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

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)

Model Number	Flow CFH of Air in Hundreds	Pressure Drop ("W.C.)								
		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	8,298.6	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	10,182.3	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	14,764.4	16,322.65	17,048.45	17,744.59	18,414.43
VCW-636		14,757.1	15,939.5	17,040.0	18,073.0	18,073.7	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 =

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

°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

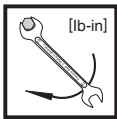
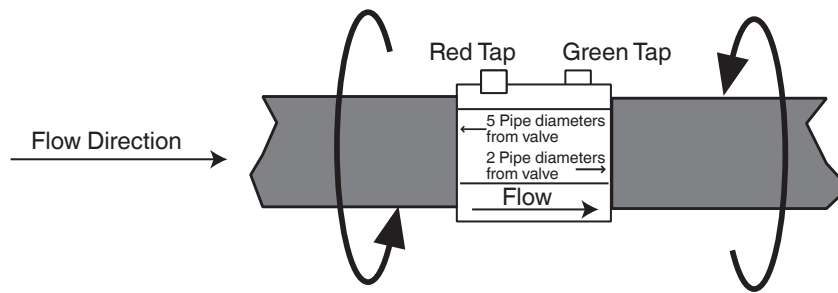
To correct for specific gravity only:

Multiple 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

**Installation of VBS Venturi**

- Position the gas venturi so 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.



Recommended Torque for Piping	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	NPT pipe
		443	752	1106	1770	1991	2213	2876

We reserve the right to make modifications in the course of technical development.



**Karl Dungs, Inc.**  
3890 Pheasant Ridge Drive NE  
Suite 150  
Blaine, MN 55449, U.S.A.  
Phone 763 582-1700  
Fax 763 582-1799  
e-mail [info@karldungsusa.com](mailto:info@karldungsusa.com)  
Internet <http://www.dungs.com/usa/>

**Karl Dungs GmbH & Co. KG**  
P.O. Box 12 29  
D-73602 Schorndorf, Germany  
Phone +49 (0)7181-804-0  
Fax +49 (0)7181-804-166  
e-mail [info@dungs.com](mailto:info@dungs.com)  
Internet <http://www.dungs.com>