



Precision Orifices



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Plus
Fluid Control Products

O'Keefe Controls Co.

Monroe, CT

"Precision Orifice Capital of the World"

CATALOG NO. 11

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Sapphire Orifice Assemblies

3

.0012" to .0252" DIA.

Description

The restrictors incorporate a precision synthetic sapphire orifice which is fitted within a main body. The sapphire orifice is a stable, accurate flow restrictor. Standard sizes range from .0012" to .0252" orifice diameter in 32 increments.

Applications

- Precision Flow Control - Gases or Liquids
- Accurate Timing in Pneumatic or Hydraulic Circuits
- Pressure Dividing Circuits and Pneumatic Resistance Bridges
- Impedance Matching

Kits

See page 31 for kit selection.

General Specifications

Maximum Operating Pressure – 100 psig

Flow Direction – Preferred direction shown below.

Not recommended for reverse flow.

Flow – See flow chart for air on page 22.

Orifice Diameters – .0012" to .0252"

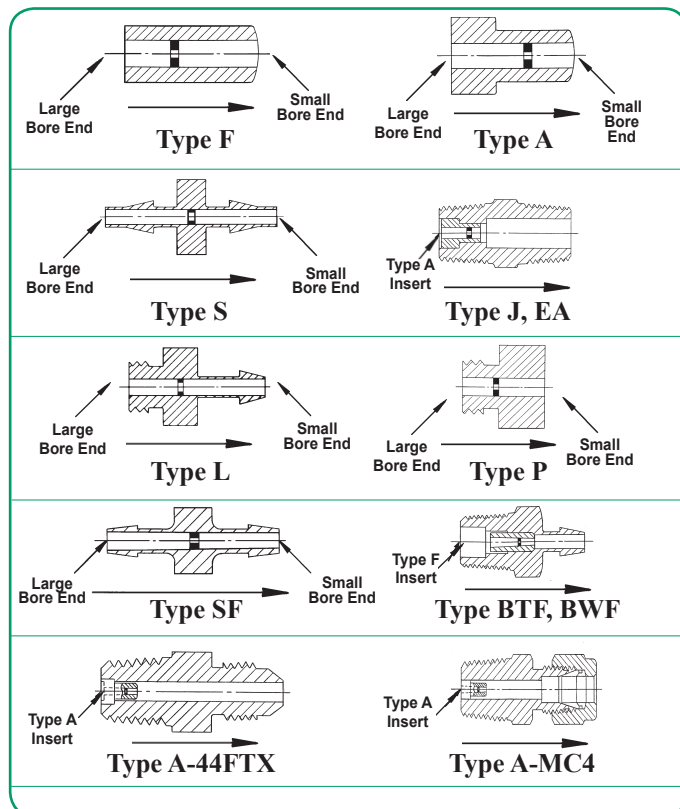
Orifice Diameter Accuracy – $\pm .0003$ "

C_v Range – .00003 to .013 See page 22.

Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction.

Dimensions – See drawings on page 4, 5.

Construction



The restrictors should be installed with flow in the direction shown above. The flow data provided in this catalog is measured for the flow direction shown above.

Sapphire Sizes Available

Size Number	Orifice Diameter	
	mm	In.
3	.03	.0012
4	.04	.0016
5	.05	.0020
6	.06	.0024
7	.07	.0028
8	.08	.0031
9	.09	.0035
10	.10	.0039
11	.11	.0043
12	.12	.0047
13	.13	.0051
14	.14	.0055
15	.15	.0059
16	.16	.0063
17	.17	.0067
18	.18	.0071
20	.20	.0079
22	.22	.0087
24	.24	.0094
26	.26	.0102
28	.28	.0110
30	.30	.0118
32	.32	.0126
34	.34	.0134
36	.36	.0142
40	.40	.0157
44	.44	.0173
48	.48	.0189
52	.52	.0205
54	.54	.0213
58	.58	.0228
64	.64	.0252

Part Numbers

The complete part number for an orifice assembly includes Type, Size Number, Body Material and Options.

EXAMPLES

Type	Size Number (Orifice Dia.)	Body Material	Options	Part Number
A	3 (.0012")	Nylon	—	A-3-NY
S	5 (.0020")	Brass	—	S-5-BR
S	5 (.0020")	Brass	EN	S-5-BR-EN
J	10 (.0039")	Brass	—	J-10-BR
J	10 (.0039")	SS	—	J-10-SS

Options

- Electroless nickel plating is available on Type S and Type L. Add suffix EN.
- Plating is for external appearance only.
- See page 37 for screened orifices.

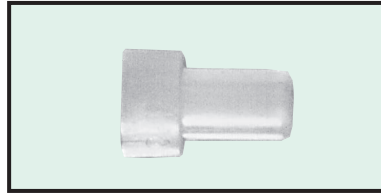
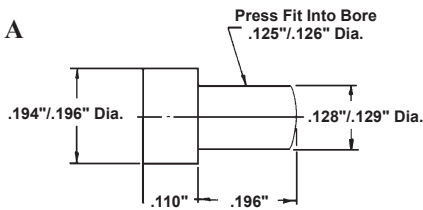
(More on pages 4, 5.)

Sapphire Orifice Assemblies

.0012" to .0252" DIA.

Dimensions

Type A

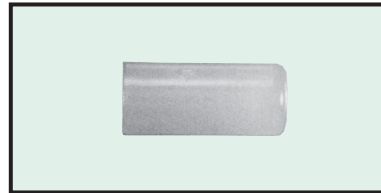
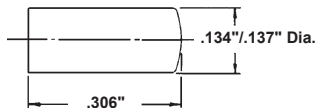


Specifications

PLASTIC INSERT

Body – Nylon
Orifice – Synthetic Sapphire
Press fits into bore – .125\"/>

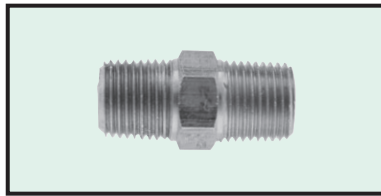
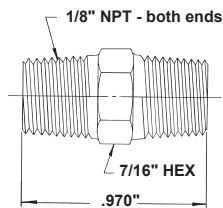
Type F



PLASTIC INSERT

Body – Nylon
Orifice – Synthetic Sapphire
Press fits into bore – .132\"/>

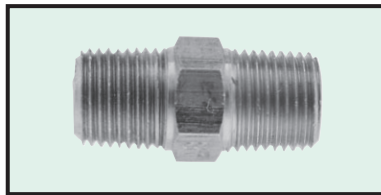
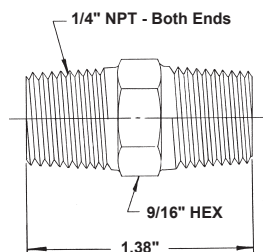
Type J



HEX NIPPLE

Body – Brass or 303 SS
Insert – Nylon
Orifice – Synthetic Sapphire
Threads – 1/8" NPT
Standard Orifice Sizes – .0012" to .0252" Dia.

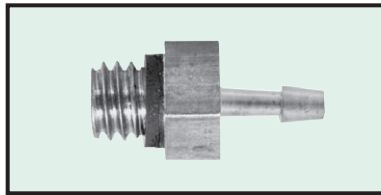
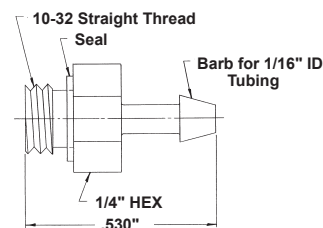
Type EA



HEX NIPPLE

Body – Brass or 303 SS
Insert – Nylon
Orifice – Synthetic Sapphire
Threads – 1/4" NPT
Standard Orifice Sizes – .0012" to .0252" Dia.

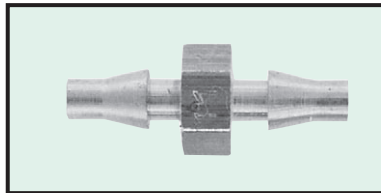
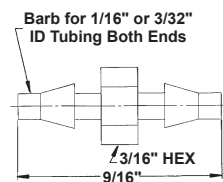
Type L



ADAPTER

Body – Brass **Seal** – Viton
Orifice – Synthetic Sapphire
Thread – 10-32 UNF
Barb – For 1/16" ID Tubing
Option – Electroless nickel plating on brass
Standard Orifice Sizes – .0012" to .0252" Dia.

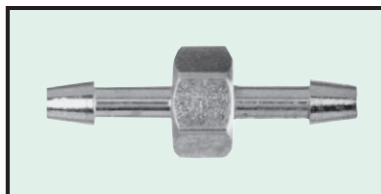
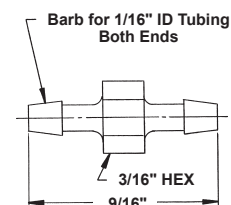
Type S



DUAL BARB

Body – Brass
Orifice – Synthetic Sapphire
Barb – For 1/16" or 3/32" ID Tubing
Option – Electroless nickel plating on brass
Standard Orifice Sizes – .0012" to .0252" Dia.

Type SF



DUAL BARB

Body – Brass
Orifice – Synthetic Sapphire
Barb – For 1/16" ID Tubing
Standard Orifice Sizes – .0012" to .0252" Dia.

(More on page 5.)

Sapphire Orifice Assemblies

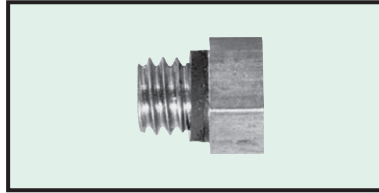
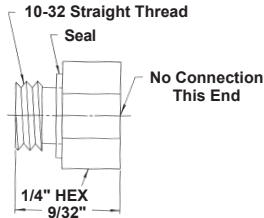
5

.0012" to .0252" Dia.

Dimensions

Specifications

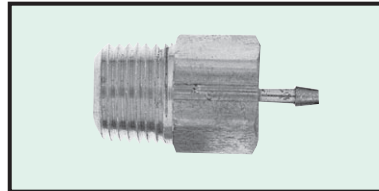
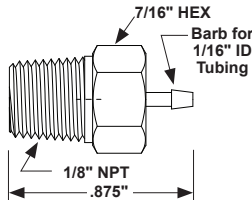
Type P



BLEED PLUG

Body – Brass **Seal** – Viton
Orifice – Synthetic Sapphire
Maximum Operating Pressure – 100 psig
Thread – 10-32 UNF
Standard Orifice Sizes – .0012" to .0252" Dia.

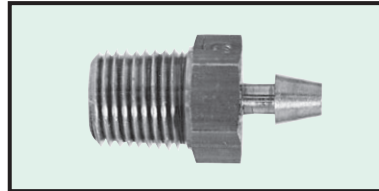
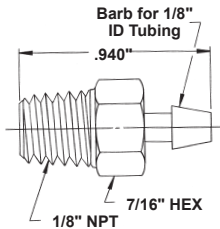
Type BTF



ADAPTER

Materials
Body – Brass or 303 SS
Orifice – Sapphire/Nylon Sleeve
Maximum Operating Pressure – 100 psig
Connections – 1/8" NPT x 1/16" Barb
Orifice Sizes – .0012" to .0252" Dia.

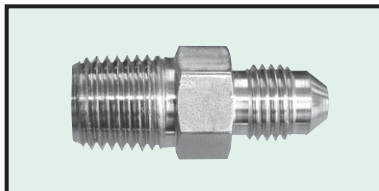
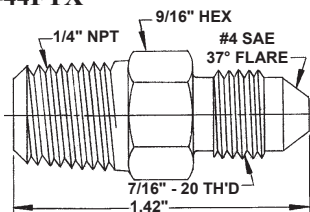
Type BWF



ADAPTER

Materials
Body – Brass or 303 SS
Orifice – Sapphire/Nylon Sleeve
Maximum Operating Pressure – 100 psig
Connections – 1/8" NPT x 1/8" Barb
Orifice Sizes – .0012" to .0252" Dia.

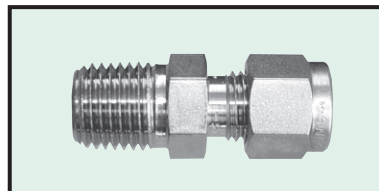
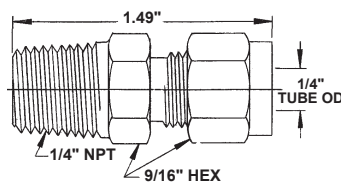
Type A-44FTX



37° FLARED TUBE CONNECTOR

Body – Brass or 304 SS
Orifice – Sapphire/Nylon Sleeve
Maximum Operating Pressure – 200 psig
Maximum Pressure Differential – 100 psi
Orifice Sizes – .0012" to .0252" Dia.

Type A-MC4



TUBE ADAPTER

Body – 316 SS
Orifice – Sapphire/Nylon Sleeve
Maximum Operating Pressure – 100 psig
Orifice Sizes – .0012" to .0252" Dia.
 For 1/4" OD Metal Tubing
 Made from Swagelok Male Connector

Metal Orifice Assemblies

Description

One-piece construction of solid metal is employed. Orifices are accurately machined, thoroughly cleaned, and flow tested to exacting standards. Sizes range from .004" to .063" orifice diameter. Special sizes can be made to order.

Applications

- Precision Flow Control - Gases or Liquids
- Speed Controls - Cylinders and Actuators
- Accurate Timing in Pneumatic or Hydraulic Circuits
- Flow Restriction
- Accurate Throttling
- Snubbers - Gages and Instruments

Advantages

- High Pressure Capability
- Bi-directional Flow Compatibility
- Economical Precision Orifice
- Repeatable Orifice Size and Shape
- Predictable Flow Rate

Flow Direction

Metal Orifice Assemblies can be used for flow in either direction. The data on pages 20 and 21 is for a flow direction as shown in the right column on this page.

Kits

See pages 30-31 for kit selection.

General Specifications

Maximum Operating Pressure – 100 psig

Flow – See flow chart for air on pages 20 and 21.

Orifice Diameters – .004" to .063"

Orifice Diameter Accuracy – $\pm .0005$ "

C_v Range – .00035 to .088

See pages 20 and 21.

Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction.

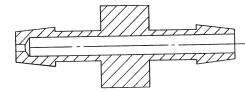
Dimensions – See drawings on page 7.

BARB CONNECTIONS

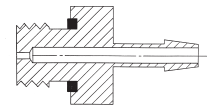
Size Number	Orifice Dia. In.	Size Number Range
4	.0039	Type T Brass 4-35 303 SS 4-35
5	.0051	
6	.0059	
7	.0071	
8	.0079	
9	.0091	Type W Brass 4-63 303 SS 4-63
10	.0102	
11	.0110	
12	.0122	
13	.0130	Type M Brass 4-35 303 SS 4-35
14	.0142	
15	.0150	
16	.016	
17	.017	Type N Brass 4-63 303 SS 4-63
18	.018	
19	.019	
20	.020	
21	.021	Type Q Brass 4-35
22	.022	
23	.023	
24	.024	Type BT Brass 4-35 303 SS 4-35
25	.025	
26	.026	
27	.027	Type BW Brass 4-63 303 SS 4-63
28	.028	
29	.029	
31	.031	Type QX Brass 4-35 303 SS 4-35
32	.032	
33	.033	
35	.035	Type QX Brass 4-35 303 SS 4-35
37	.037	
38	.038	
39	.039	Type FM Brass 4-63 303 SS 4-63
40	.040	
41	.041	
42	.042	Type FF Brass 4-63 303 SS 4-63
43	.043	
47	.047	
52	.052	
55	.055	
60	.060	
63	.063	

Construction

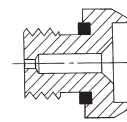
Type T or W



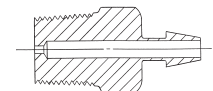
Type M or N



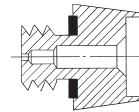
Type Q



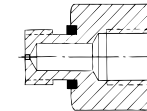
Type BT or BW



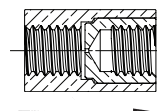
Type QX



Type FM



Type FF



Part Numbers

The complete part number for an orifice assembly is composed of Type, Size Number, Body Material and Options.

EXAMPLES

Type	Size Number	Body Material	Options	Part Number
T	4 (.004")	Brass	–	T-4-BR
BW	16 (.016")	SS	–	BW-16-SS
M	24 (.024")	Brass	–	M-24-BR

Metal Orifice Assemblies

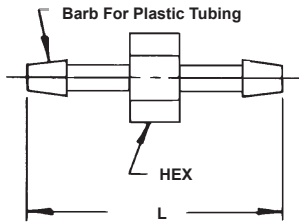
7

Dimensions

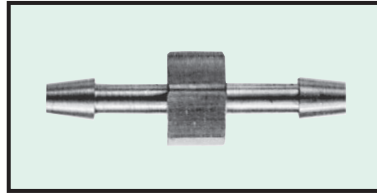
BARB CONNECTIONS

Specifications

Type T or W

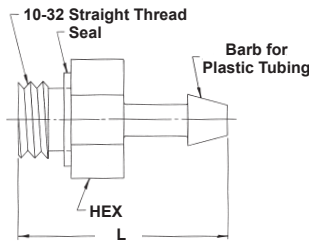


Barbs fit 1/16" or 1/8" ID Tubing.

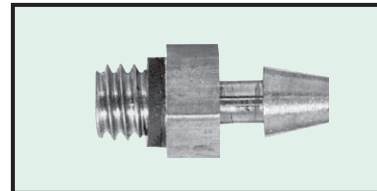


Type	Dim. L	HEX	Barb
T	.625"	3/16"	1/16"
W	.800"	1/4"	1/8"

Type M or N

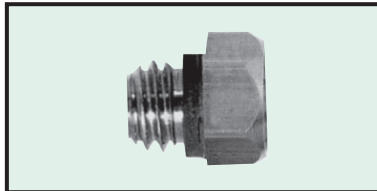
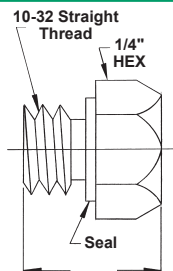


Barbs fit 1/16" or 1/8" ID Tubing.



Type	Dim. L	HEX	Barb
M	.530"	1/4"	1/16"
N	.610"	1/4"	1/8"

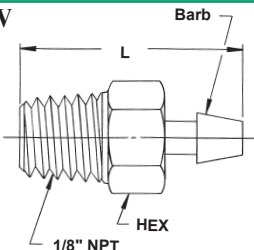
Type Q



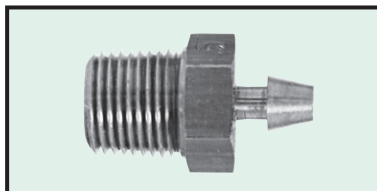
BLEED PLUG

Body and Orifice – Brass
Thread – 10-32 UNF
Thread Seal – Viton
Standard Orifice Sizes – .004" to .035" Dia.

Type BT or BW



Barbs fit 1/16" or 1/8" ID Tubing.

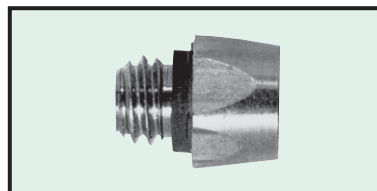
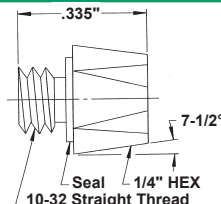


Type	Dim. L	HEX	Barb
BT	.800"	7/16"	1/16"
BW	.880"	7/16"	1/8"

ADAPTER

Body and Orifice – Brass or 303 SS
Thread – 1/8" NPT
Standard Orifice Sizes –
 Type BT – .004" to .035" Dia.
 Type BW – .004" to .063" Dia.

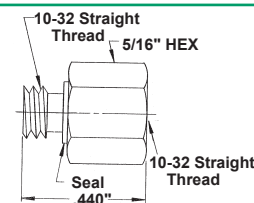
Type QX



BLEED PLUG

Body and Orifice – Brass or 303 SS
Thread – 10-32 UNF
Thread Seal – Viton
Standard Orifice Sizes – .004" to .035" Dia.

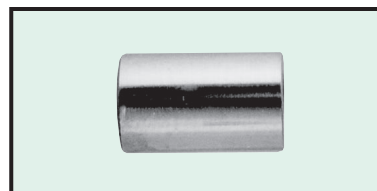
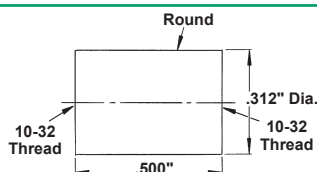
Type FM



ADAPTER

Body and Orifice – Brass or 303 SS
Thread – 10-32 UNF
Thread Seal – Viton
Standard Orifice Sizes – .004" to .063" Dia.

Type FF



COUPLER

Body and Orifice – Brass or 303 SS
Threads – 10-32 UNF
Standard Orifice Sizes – .004" to .063" Dia.

Metal Orifice Assemblies

Description

One-piece construction of solid metal is employed. Orifices are accurately machined, thoroughly cleaned, and flow tested to exacting standards. Sizes range from .004" to .125" orifice diameter. Special sizes can be made to order. Type DEL is a two-piece construction.

Applications

- Precision Flow Control –
Gases or Liquids
- Speed Controls –
Cylinders and Actuators
- Accurate Timing in Pneumatic or Hydraulic Circuits
- Flow Restriction
- Accurate Throttling
- Snubbers - Gages and Instruments
- Ultrasonic Sound Sources

Advantages

- High Pressure Capability
- Bi-directional Flow Compatibility
- Economical Precision Orifice
- Repeatable Orifice Size and Shape
- Predictable Flow Rate

Flow Direction

Metal Orifice Assemblies can be used for flow in either direction. The data on pages 20 and 21 is for a flow direction as shown in the right column on this page.

Kits

See pages 30-31 for kit selection.

General Specifications

Maximum Operating Pressure –

Brass 2000 psig

303 SS 4000 psig

Type DEL

Brass 200 psig

Flow – See flow chart for air on pages 20 and 21.

Orifice Diameters – .004" to .125" standard. Consult factory for other sizes.

Orifice Diameter Accuracy – $\pm .0005"$

C_v Range – .00035 to .37 See pages 20 and 21.

Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction.

Dimensions – See drawings on page 9.

NPT CONNECTIONS

Size Number	Orifice Dia. In.	Size Number Range
4	.0039	
5	.0051	
6	.0059	
7	.0071	
8	.0079	
9	.0091	
10	.0102	
11	.0110	
12	.0122	
13	.0130	
14	.0142	
15	.0150	
16	.016	
17	.017	
18	.018	
19	.019	
20	.020	
21	.021	
22	.022	
23	.023	
24	.024	
25	.025	
26	.026	
27	.027	
28	.028	
29	.029	
31	.031	
32	.032	
33	.033	
35	.035	
37	.037	
38	.038	
39	.039	
40	.040	
41	.041	
42	.042	
43	.043	
47	.047	
52	.052	
55	.055	
60	.060	
63	.063	
67	.067	
70	.070	
73	.073	
76	.076	
79	.079	
81	.081	
86	.086	
89	.089	
94	.094	
96	.096	
100	.100	
104	.104	
109	.109	
113	.113	
120	.120	
125	.125	

Type B, E or V

Brass 4-125
303SS 4-125

Type D, G, H or VV or VV

Brass 4-125
303SS 4-125

Type BM or EM

Brass 4-125
303SS 4-125

Type BH or EH

Brass 4-125
303SS 4-125

Type BMM

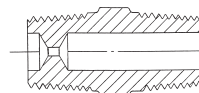
Brass 4-125
303SS 4-125

Type DEL

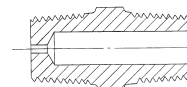
Brass 4-63

Construction

Type B, E or V

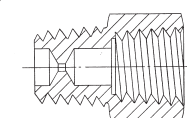


Orifice diameter .021" or larger

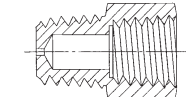


Orifice diameter .020" or smaller

Type D, G, H or VV

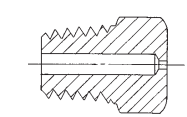


Orifice diameter .021" or larger

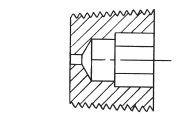


Orifice diameter .020" or smaller

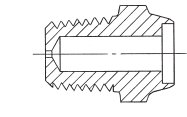
Type BM or EM



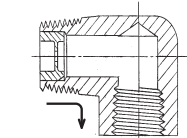
Type BH or EH



Type BMM



Type DEL



Part Numbers

The complete part number for an orifice assembly includes Type, Size Number, Body Material and Options.

EXAMPLES

Type	Size Number	Body Material	Options	Part Number
B	10 (.010")	Brass	–	B-10-BR
G	15 (.015")	Brass	–	G-15-BR
D	20 (.020")	SS	–	D-20-SS

Metal Orifice Assemblies

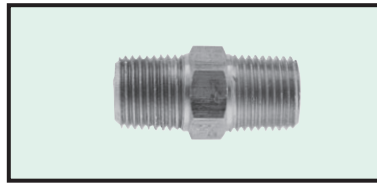
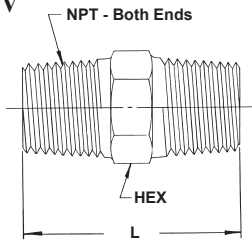
9

Dimensions

NPT CONNECTIONS

Specifications

Type B, E or V



Type	Dim. L	HEX	NPT
B	.97"	7/16"	1/8"
E	1.38"	9/16"	1/4"
V	1.47"	11/16"	3/8"

HEX NIPPLE

Body and Orifice – Brass or 303 SS

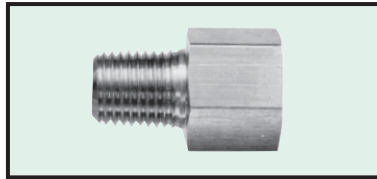
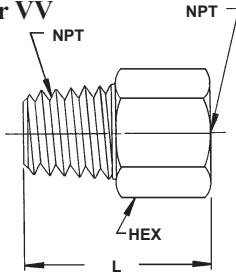
Threads – 1/8", 1/4" or 3/8" NPT

Standard Orifice Sizes –

Brass – .004" to .125" Dia.

303 SS – .004" to .125" Dia.

Type D, G, H or VV



Type	Dim. L	HEX	NPT
D	.88"	9/16"	1/8"
G	1.25"	3/4"	1/4"
VV	1.52"	7/8"	3/8"
H	1.69"	1-1/16"	1/2"

ADAPTER

Body and Orifice – Brass or 303 SS

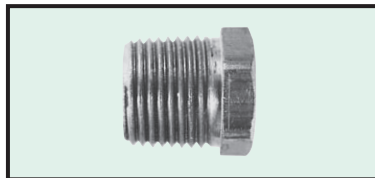
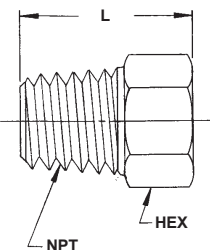
Threads – 1/8", 1/4", 3/8" or 1/2" NPT

Standard Orifice Sizes –

Brass – .004" to .125" Dia.

303 SS – .004" to .125" Dia.

Type BM or EM



Type	Dim. L	HEX	NPT
BM	.580"	7/16"	1/8"
EM	.800"	9/16"	1/4"

BLEED PLUG

Body and Orifice – Brass or 303 SS

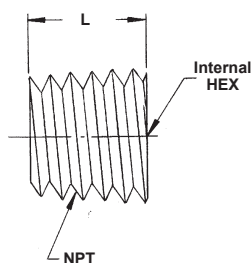
Thread – 1/8" or 1/4" NPT

Standard Orifice Sizes –

Brass – .004" to .125" Dia.

303 SS – .004" to .125" Dia.

Type BH or EH



Type	Dim. L	HEX	NPT
BH	.30"	3/16"	1/8"
EH	.46"	1/4"	1/4"

BLEED PLUG

Body and Orifice – Brass or 303 SS

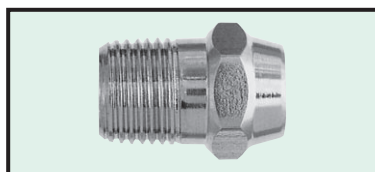
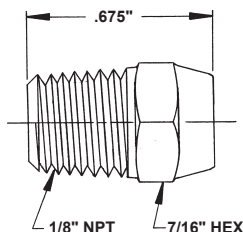
Thread – 1/8" or 1/4" NPT

Standard Orifice Sizes –

Brass – .004" to .125" Dia.

303 SS – .004" to .125" Dia.

Type BMM



BLEED PLUG

Body and Orifice – Brass or 303 SS

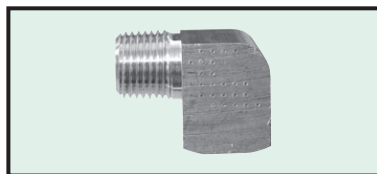
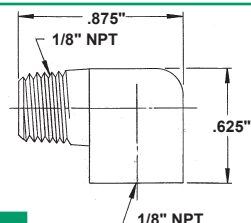
Thread – 1/8" NPT

Standard Orifice Sizes –

Brass – .004" to .125" Dia.

303 SS – .004" to .125" Dia.

Type DEL



ELBOW

Body and Orifice – Brass

Threads – 1/8" NPT

Standard Orifice Sizes – .004" to .063" Dia.

Orifice – Press fit insert

Metal Orifice Assemblies

Description

The inserts shown on this page are designed to press-fit into openings accurately machined in fittings, manifolds and custom parts. There is a choice of insert sizes and materials of construction.

Applications

The inserts can be used with a wide variety of fittings by accurately machining the inside of the fitting. The orifice is then pressed into the fitting for control of the flow rate of liquids or gases.

Manifolds or other custom assemblies that require flow rate control of fluids can be accurately machined to press fit the orifices shown on this page and on page 11.

General Specifications

Maximum Operating Pressure

Insert Only (*see exceptions*)

Brass – 2000 psig

303SS – 4000 psig

316SS – 4000 psig

exceptions IAS, US

Maximum Differential Pressure –
100 psid

Flow – See flow chart for air flow on pages 20, 21 and 22.

Orifice Diameters – .004" to .125". See chart at right. Consult factory for other sizes.

Orifice Diameter Accuracy – $\pm .0005"$

C_v Range – .000030 to .37

See pages 20, 21 and 22.

Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction.

Dimensions – See drawings in right hand column of this page and on page 11.

Press Fit – See drawings in right hand column of this page and on page 11.

Materials

Type IA, AM, IF – Brass or 303 SS

Type IAS – Brass, 304 SS Screen

Type IB, IE, IJ – 303 SS

IK, U

Type IL – Brass

Type IC, ID, IM – 316 SS

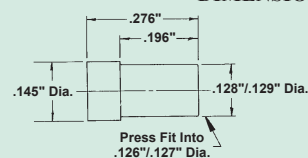
Type US – 303 SS, 304 SS Screen

INSERTS

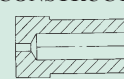
Size Number	Orifice Dia. In.	Size Number Range
4	.0039	
5	.0051	
6	.0059	
7	.0071	Type AM
8	.0079	4-35
9	.0091	
10	.0102	
11	.0110	Type IA
12	.0122	4-63
13	.0130	
14	.0142	Type IAS
15	.0150	4-35
16	.016	
17	.017	Type IB
18	.018	4-25
19	.019	
20	.020	
21	.021	Type IC
22	.022	4-63
23	.023	
24	.024	Type ID
25	.025	4-125
26	.026	
27	.027	
28	.028	Type IE
29	.029	4-35
31	.031	
32	.032	Type IF
33	.033	4-63
35	.035	
37	.037	
38	.038	Type IJ
39	.039	4-125
40	.040	
41	.041	
42	.042	Type IK
43	.043	4-20
47	.047	
52	.052	Type IL
55	.055	4-35
60	.060	
63	.063	Type IM
67	.067	4-125
70	.070	
73	.073	
76	.076	
79	.079	Type U
81	.081	4-63
86	.086	
89	.089	
94	.094	Type US
96	.096	4-35
100	.100	
104	.104	
109	.109	
113	.113	
120	.120	
125	.125	

Type AM

DIMENSIONS

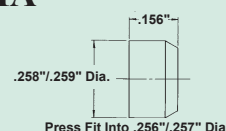


CONSTRUCTION

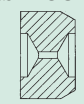


Type IA

DIMENSIONS

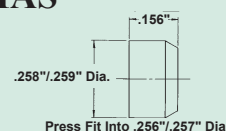


CONSTRUCTION

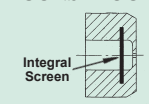


Type IAS

DIMENSIONS

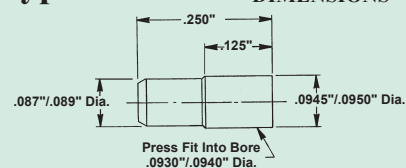


CONSTRUCTION

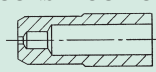
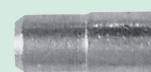


Type IB

DIMENSIONS



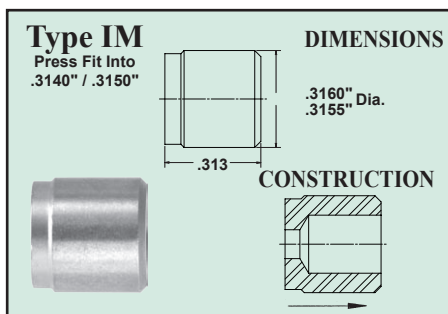
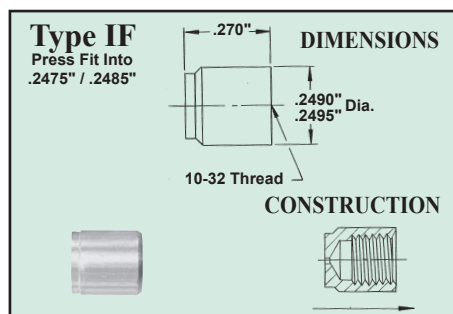
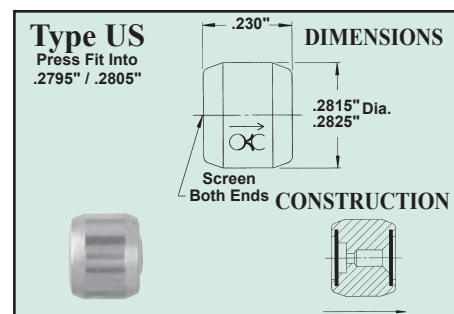
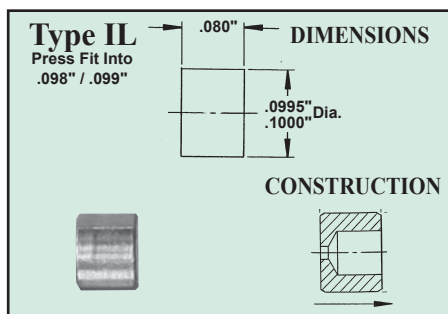
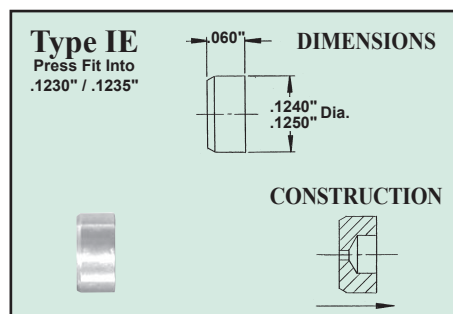
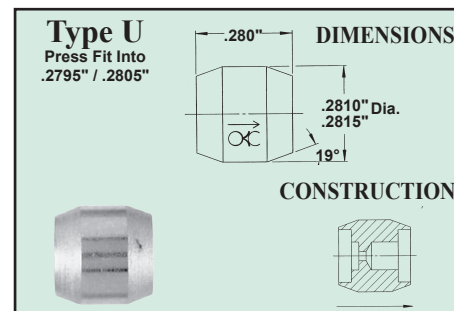
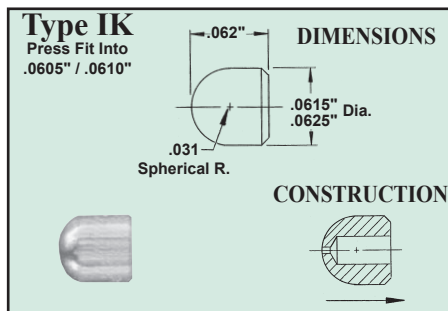
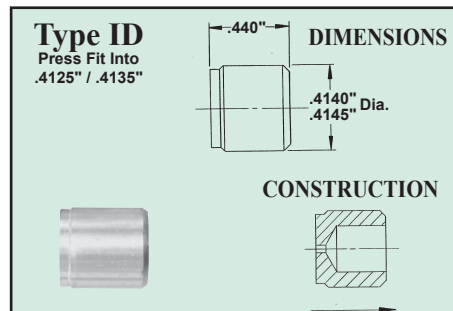
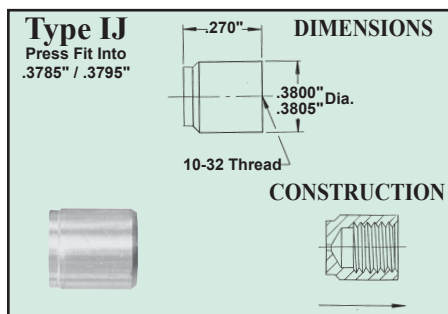
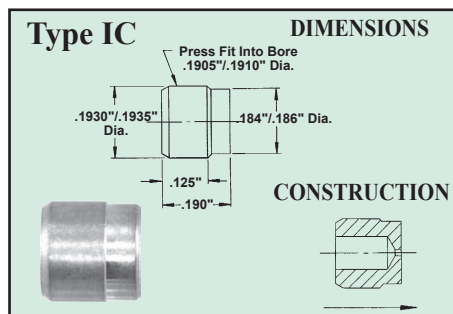
CONSTRUCTION



Custom Inserts

Where quantity requirements exceed 1000 pieces, custom inserts can be manufactured in brass, stainless steel, or special materials to the dimensions required. Provide a dimension drawing, material specifications, and quantities to our technical service department to obtain price and delivery quotations.

INSERTS



Orifice Diameters

See chart on page 10 for sizes available for each insert type. Consult factory for other sizes.

Part Numbers

The complete part number for an orifice assembly includes Type, Size Number, Body Material and Options.

EXAMPLES

Type	Size Number	Body Material	Options	Part Number
IB	6 (.006")	SS	—	IB-6-SS
AM	10 (.010")	SS	—	AM-10-SS
IA	20 (.020")	Brass	—	IA-20-BR

Flow Direction

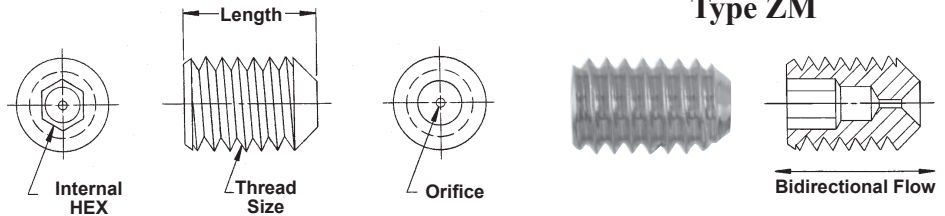
Metal Orifice Assemblies can be used for flow in either direction. The data on pages 20, 21 and 22 is for a flow direction as shown in the right column on page 10 and throughout this page.

Metal Orifice Assemblies

METRIC THREADED INSERTS

Description

Set screw style threaded orifice inserts can be installed in fittings, manifolds or custom parts to establish flow rates of liquids or gases. Standard size orifices range from .10 mm to 1.60 mm.



PART NUMBER SYSTEM

<u>TYPE</u> <u>ZM</u>		<u>ORIFICE</u> <u>SIZE NO.</u>	<u>THREAD</u> <u>SIZE</u>	<u>LENGTH NO.</u>	<u>MATERIAL</u>
Standard Sizes		Standard Size <u>Range</u>	<u>Thread Size</u>	<u>Length</u> <u>mm</u> <u>No.</u>	
Size No.	Orifice Dia.* mm.				
4	.10	4-35	<u>Thread Size</u> M3 x .5 mm	4 mm 4	SS 18-8 SS
5	.13		<u>Hex Size</u> 1.5 mm		
6	.15				
7	.18				
8	.20				
9	.23				
10	.26	4-35	<u>Thread Size</u> M4 x .7 mm	5 mm 5	
11	.28		<u>Hex Size</u> 2.0 mm		
12	.31				
13	.33				
14	.36				
15	.38				
16	.41	4-63	<u>Thread Size</u> M5 x .8 mm	6 mm 6	
17	.43		<u>Hex Size</u> 2.5 mm		
18	.46				
19	.48				
20	.51				
21	.53				
22	.56	4-63	<u>Thread Size</u> M6 x 1.0 mm	8 mm 8	
23	.58		<u>Hex Size</u> 3.0 mm		
24	.61				
25	.63				
26	.66				
27	.69				
28	.71	4-63	<u>Thread Size</u> M8 x 1.25 mm	10 mm 10	
29	.74		<u>Hex Size</u> 4.0 mm		
31	.79				
32	.81				
33	.84				
35	.89				
37	.94	4-63	<u>Thread Size</u> M10 x 1.50 mm	12 mm 12	
38	.97		<u>Hex Size</u> 5.0 mm		
39	.99				
40	1.02				
41	1.04				
42	1.07				
43	1.09				
47	1.19				
52	1.32				
55	1.40				
60	1.52				
63	1.60				

*Consult factory for larger orifice sizes.

EXAMPLES

	<u>TYPE</u>		<u>SIZE NO.</u>		<u>THREAD SIZE</u>		<u>LENGTH NO.</u>		<u>MATERIAL</u>
1.	ZM	—	10	—	M3	—	4	—	SS
	(Type ZM)		(.26 mm diameter)				(4 mm length)		(Stainless Steel)
2.	ZM	—	31	—	M6	—	8	—	SS
	(Type ZM)		(.79 mm diameter)				(8 mm length)		(Stainless Steel)

Metal Orifice Assemblies

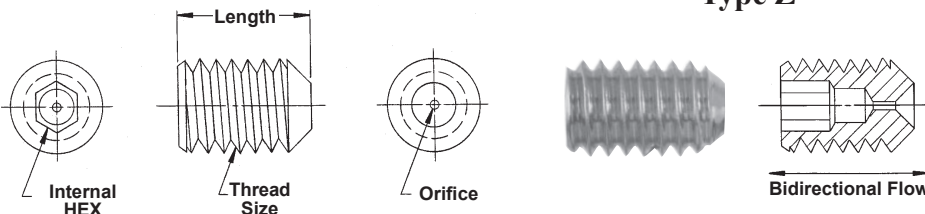
13

Description

Set screw style threaded orifice inserts can be installed in fittings, manifolds or custom parts to establish flow rates of liquids or gases. Standard size orifices range from .004" to .063". Both brass and 316 SS materials are offered.

THREADED INSERTS – INCH

Type Z



PART NUMBER SYSTEM

<u>TYPE</u> <u>Z</u>		<u>ORIFICE</u> <u>SIZE NO.</u>		<u>THREAD</u> <u>SIZE</u>	<u>LENGTH NO.</u>		<u>MATERIAL</u>
Standard Sizes		Standard Size		Thread Size	Length		
Size No.	Orifice Dia.* In.	Range			In.	No.	
4	.0039	Thread 6 • 32 Brass SS	Size No. 4-35 4-35	6 • 32	1/8	2	BR - Brass SS - 316SS
5	.0051				3/16	3	
6	.0059				1/4	4	
7	.0071						
8	.0079						
9	.0091	8 • 32 Brass SS	4-35 4-35	8 • 32	1/8	2	
10	.0102				3/16	3	
11	.0110				1/4	4	
12	.0122						
13	.0130						
14	.0142	10 • 32 Brass SS	4-63 4-63	10 • 32	3/16	3	
15	.0150				1/4	4	
16	.016						
17	.017						
18	.018						
19	.019	1/4 • 20 Brass SS	4-63 4-63	1/4 • 20	3/16	3	
20	.020				1/4	4	
21	.021				3/8	6	
22	.022						
23	.023						
24	.024	5/16 • 18 Brass SS	4-63 4-63	5/16 • 18	1/4	4	
25	.025				3/8	6	
26	.026				1/2	8	
27	.027						
28	.028						
29	.029	3/8 • 16 Brass SS	4-63 4-63	3/8 • 16	3/8	6	
30	.030				1/2	8	
31	.031						
32	.032						
33	.033						
34	.034	3/8 • 16 Brass SS	4-63 4-63	3/8 • 16	3/8	6	
35	.035				1/2	8	
36	.036						
37	.037						
38	.038						
39	.039	3/8 • 16 Brass SS	4-63 4-63	3/8 • 16	3/8	6	
40	.040				1/2	8	
41	.041						
42	.042						
43	.043						
44	.044	3/8 • 16 Brass SS	4-63 4-63	3/8 • 16	3/8	6	
45	.045				1/2	8	
46	.046						
47	.047						
48	.048						
49	.049	3/8 • 16 Brass SS	4-63 4-63	3/8 • 16	3/8	6	
50	.050				1/2	8	
51	.051						
52	.052						
53	.053						
54	.054	3/8 • 16 Brass SS	4-63 4-63	3/8 • 16	3/8	6	
55	.055				1/2	8	
56	.056						
57	.057						
58	.058						
59	.059	3/8 • 16 Brass SS	4-63 4-63	3/8 • 16	3/8	6	
60	.060				1/2	8	
61	.061						
62	.062						
63	.063						

*Consult factory for larger orifice sizes.

EXAMPLES

	<u>TYPE</u>		<u>SIZE NO.</u>		<u>THREAD SIZE</u>		<u>LENGTH NO.</u>		<u>MATERIAL</u>
1.	Z	—	10	—	10 • 32	—	6	—	BR
	(Type Z)		(.010" diameter)		(10 • 32 thread)		(3/8" length)		(Brass)
2.	Z	—	31	—	1/4 • 20	—	4	—	SS
	(Type Z)		(.031" diameter)		(1/4 • 20 thread)		(1/4" length)		(Stainless Steel)

Metal Orifice Assemblies

COMPRESSION FITTINGS

Description

Precision orifice assemblies that adapt to common fittings used in the process industry are described on pages 14 and 15. Press-fit inserts are used with standard compression tube fittings to form a precision orifice assembly. The fittings shown here are for 1/4" OD tubing, or 3/16" OD tubing.

Applications

Compression fittings are used with a metal or rigid plastic tubing. These fittings are used in instrumentation for process control systems. The nature of the connectors allow for easy disassembly and re-assembly without the need for teflon tape or sealants.

Advantages

- High Pressure Capability
- Bi-directional Flow
- Economical Precision Orifice
- Repeatable Orifice Size and Shape
- Predictable Flow Rate

General Specifications

Flow Direction – Suitable for flow in either direction. Data on pages 20 and 21 is measured for flow direction shown in right column of this page.

Flow – See flow chart for air flow on pages 20 and 21.

C_v Range – .00035 to .088

See pages 20 and 21.

Orifice Size Numbers – 4 to 63

Orifice Sizes – .0039" to .063"

Orifice Diameter Accuracy – $\pm .0005$ "

Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction.

Dimensions – See drawings on page 15.

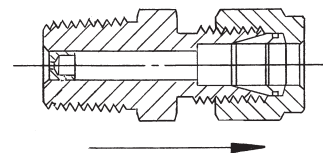
Materials of Construction – See page 15.

Maximum Operating Pressure – See page 15.

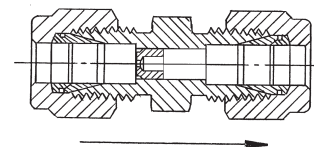
Size Number	Orifice Dia In.	Size Number Range
4	.0039	Type IC-MC4
5	.0051	
6	.0059	
7	.0071	
8	.0079	
9	.0091	4-63
10	.0102	
11	.0110	
12	.0122	
13	.0130	
14	.0142	Type IC-MC6
15	.0150	
16	.016	
17	.017	
18	.018	
19	.019	Type IC-4006
20	.020	
21	.021	
22	.022	
23	.023	
24	.024	Type AM-3006
25	.025	
26	.026	
27	.027	
28	.028	
29	.029	4-35
31	.031	
32	.032	
33	.033	
35	.035	
37	.037	Type IC-UT4
38	.038	
39	.039	
40	.040	
41	.041	
42	.042	4-63
43	.043	
47	.047	
52	.052	
55	.055	Type IC-PC4
60	.060	
63	.063	

Construction

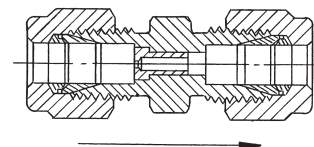
Type IC-MC4, IC-MC6



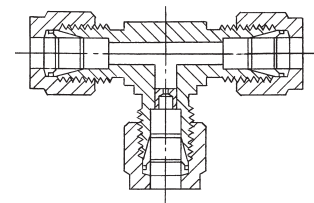
Type IC-4006



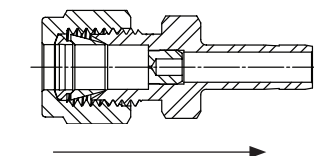
Type AM-3006



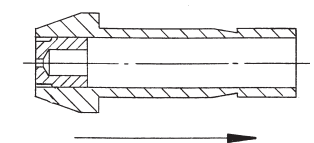
Type IC-UT4



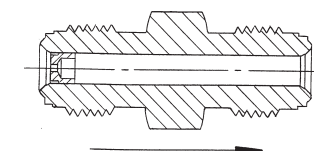
Type IC-400R4



Type IC-PC4



Type IC-DM4



Part Numbers

The complete part number for an orifice assembly includes Type, Size Number, Body Material and Options.

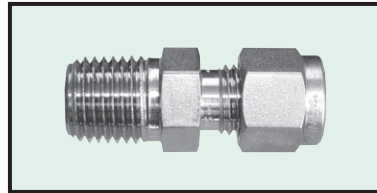
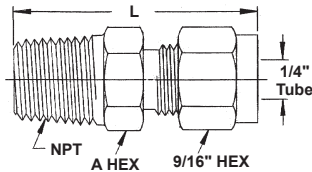
EXAMPLES

Type	Size Number	Body Material	Options	Part Number
IC-MC4	6 (.006")	SS	–	IC-MC4-6-SS
IC-400R4	13 (.013")	SS	–	IC-400R4-13-SS
AM-3006	35 (.035")	Brass	–	AM-3006-35-BR
IC-UT4	28 (.028")	SS	–	IC-UT4-28-SS

COMPRESSION FITTINGS

Dimensions

Type IC-MC4
Type IC-MC6



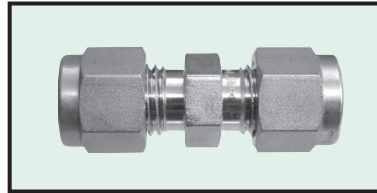
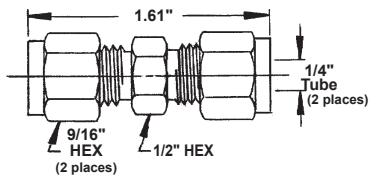
TYPE	NPT	L (in)	A HEX
IC-MC4	1/4"	1.48	9/16"
IC-MC6	3/8"	1.51	11/16"

Specifications

TUBE ADAPTER

Body – 316 SS
Orifice – 316 SS
Maximum Body Pressure – 4000 psig
Maximum Pressure Differential – 200 psid*
Orifice Sizes – .004" to .063" dia.

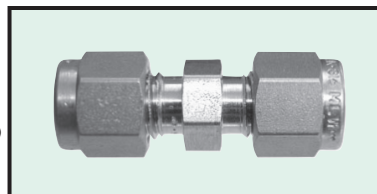
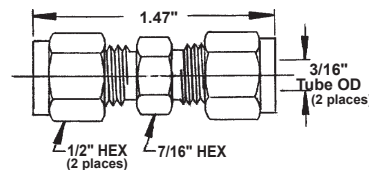
Type IC-4006



TUBE UNION – 1/4" OD

Body – 316 SS
Orifice – 316 SS
Maximum Body Pressure – 4000 psig
Maximum Pressure Differential – 200 psid*
Orifice Sizes – .004" to .063" dia.

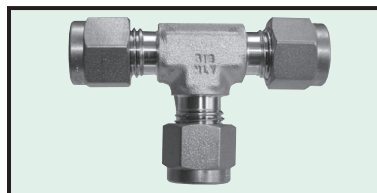
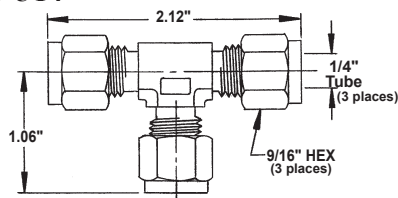
Type AM-3006



TUBE UNION – 3/16" OD

Body – Brass or 316 SS
Orifice – Brass or 303 SS
Maximum Body Pressure – 4000 psig
Maximum Pressure Differential – 200 psid*
Orifice Sizes – .004" to .035" dia.

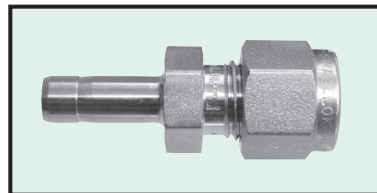
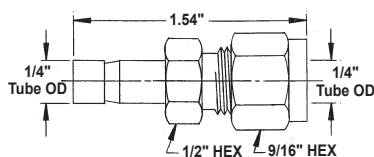
Type IC-UT4



UNION TEE

Body – 316 SS
Orifice – 316 SS
Maximum Body Pressure – 4000 psig
Maximum Pressure Differential – 200 psid*
Orifice Sizes – .004" to .063" dia.

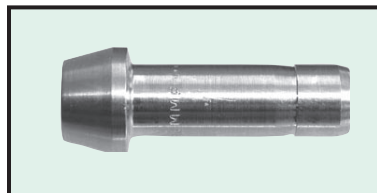
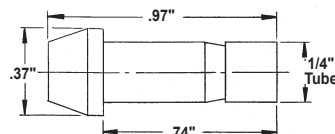
Type IC-400R4



TUBE ADAPTER

Body – 316 SS
Orifice – 316 SS
Maximum Body Pressure – 4000 psig
Maximum Pressure Differential – 200 psid*
Orifice Sizes – .004" to .063" dia.

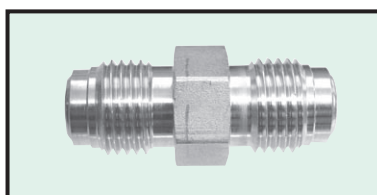
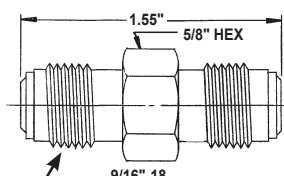
Type IC-PC4



PORT CONNECTOR

Body – 316 SS
Orifice – 316 SS
Maximum Body Pressure – 4000 psig
Maximum Pressure Differential – 1000 psid*
in direction shown
Orifice Sizes – .004" to .063" dia.

Type IC-DM4



DOUBLE MALE UNION

Body – 316 SS
Orifice – 316 SS
Maximum Body Pressure – 4000 psig
Maximum Pressure Differential – 1000 psid*
in direction shown
Orifice Sizes – .004" to .063" dia.
Made from Swagelok 1/4" VCR fittings

*psid – pounds per square inch differential

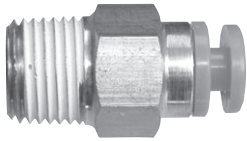
Metal Orifice Assemblies

PUSH-ON TUBE ADAPTERS

Size Numbers

Type IA-H0134
IA-H0334
IA-H0534
IA-H0734

- For Plastic Tubing
1/8", 5/32", 3/16" or 1/4" OD
- Easy Connect/Disconnect
- Type IA Insert
- Orifice Size Numbers 4 - 63



PUSH-ON TUBE ADAPTER

1/8" NPT x 1/8" OD Tube
1/8" NPT x 5/32" OD Tube
1/8" NPT x 3/16" OD Tube
1/8" NPT x 1/4" OD Tube

Body – Brass/Plastic

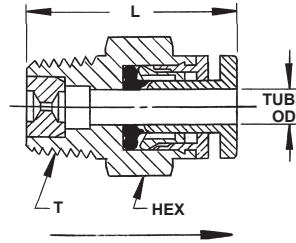
Orifice – Brass

Seals – Buna-N

Max. Body Pressure – 140 psig

Orifice Sizes – .004" to .063" dia.

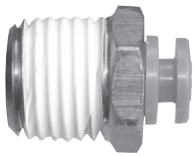
Orifice Size No. 4-63



Type	L	T	HEX	TUBE OD
IA-H0134	.87"	1/8" NPT	7/16"	1/8"
IA-H0334	.87"	1/8" NPT	7/16"	5/32"
IA-H0534	.87"	1/8" NPT	1/2"	3/16"
IA-H0734	.89"	1/8" NPT	5/8"	1/4"

Type IA-H0135
IA-H0335
IA-H0535
IA-H0735

- For Plastic Tubing
1/8", 5/32", 3/16" or 1/4" OD
- Easy Connect/Disconnect
- Type IA Insert
- Orifice Size Numbers 4 - 63



PUSH-ON TUBE ADAPTER

1/4" NPT x 1/8" OD Tube
1/4" NPT x 5/32" OD Tube
1/4" NPT x 3/16" OD Tube
1/4" NPT x 1/4" OD Tube

Body – Brass/Plastic

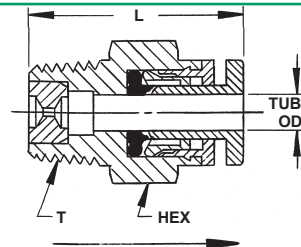
Orifice – Brass

Seals – Buna-N

Max. Body Pressure – 140 psig

Orifice Sizes – .004" to .063" dia.

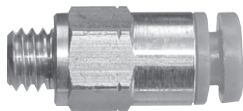
Orifice Size No. 4-63



Type	L	T	HEX	TUBE OD
IA-H0135	.77"	1/4" NPT	5/8"	1/8"
IA-H0335	.77"	1/4" NPT	5/8"	5/32"
IA-H0535	.83"	1/4" NPT	5/8"	3/16"
IA-H0735	.91"	1/4" NPT	5/8"	1/4"

Type IL-H0132
IL-H0332
IL-H0532
IL-H0732

- For Plastic Tubing
1/8", 5/32", 3/16" or 1/4" OD
- Easy Tubing Connect/
Disconnect
- Type IL Insert
- Orifice Size Numbers 4 - 35



PUSH-ON TUBE ADAPTER

10-32 x 1/8" OD Tube
10-32 x 5/32" OD Tube
10-32 x 3/16" OD Tube
10-32 x 1/4" OD Tube

Body – Brass/Plastic

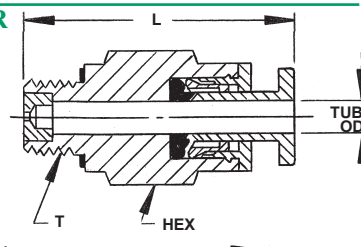
Orifice – Brass

Seals – Buna-N

Max. Body Pressure – 140 psig

Orifice Sizes – .004" to .035" dia.

Orifice Size No. 4-35

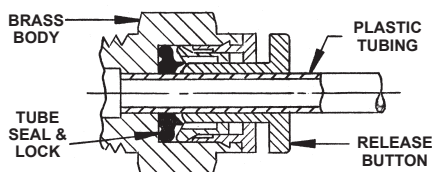


Type	L	T	HEX	TUBE OD
IL-H0132	.66"	#10-32	9/32"	1/8"
IL-H0332	.67"	#10-32	5/16"	5/32"
IL-H0532	.95"	#10-32	5/16"	3/16"
IL-H0732	.73"	#10-32	7/16"	1/4"

Metal Orifice Size Number	Orifice Dia. in.
4	.0039
5	.0051
6	.0059
7	.0071
8	.0079
9	.0091
10	.0102
11	.0110
12	.0122
13	.0130
14	.0142
15	.0150
16	.016
17	.017
18	.018
19	.019
20	.020
21	.021
22	.022
23	.023
24	.024
25	.025
26	.026
27	.027
28	.028
29	.029
31	.031
32	.032
33	.033
35	.035
37	.037
38	.038
39	.039
40	.040
41	.041
42	.042
43	.043
47	.047
52	.052
55	.055
60	.060
63	.063

See pages 20 and 21 for
orifice flow charts.

HOW PUSH-ON FITTINGS WORK!



Part Numbers

The complete part number for these assemblies includes Type, Size Number and Body Material.

EXAMPLES

Type	Size Number	Body Material	Part Number
IA-H0134 (1/8" NPT x 1/8" OD Tube)	10 (.010")	B/P (all)	IA-H0134-10-B/P
IA-H0735 (1/4" NPT x 1/4" OD Tube)	25 (.025")	B/P (all)	IA-H0735-25-B/P
IL-H0332 (10-32 x 5/32" OD Tube)	6 (.006")	B/P (all)	IL-H0332-6-B/P

THREADED INSERTS - NOSE SEALS

Description

This type precision orifice includes an o-ring for sealing against a flat surface. The set screw style can be installed in fittings, manifolds and custom parts for accurate flow rate control of liquids or gases.

Specifications

Thread Sizes – 6/32, 10/32, 1/4•20 and 5/16•18.

Flow Direction – Suitable for flow in either direction. Data on pages 20 and 21 is measured for flow direction from nose end to hex end.

Flow – See flow chart for air flow on pages 20 and 21.

C_v Range – .00035 to .200
See pages 20, 21 and 23.

Orifice Diameter Accuracy – ±.0005"

Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction.

Dimensions – See drawings this page.

Materials of Construction –
Brass or 303 SS Body.
Viton or Buna-N O-ring

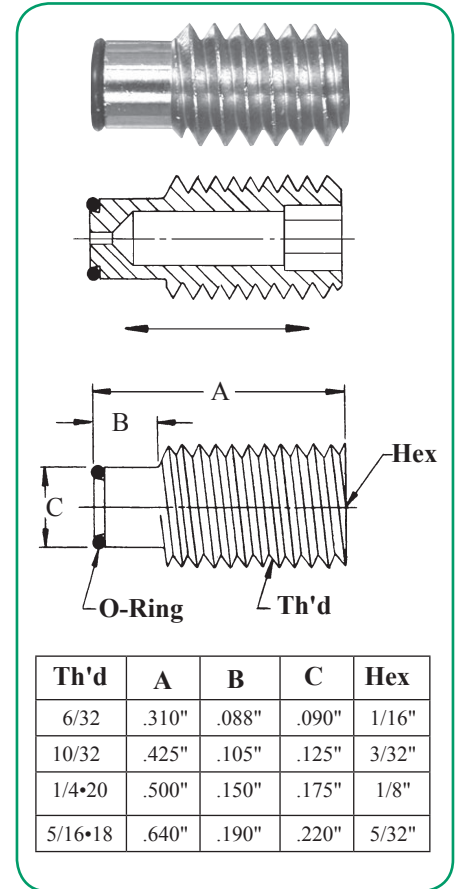
Maximum Operating Pressure –
200 psig

Maximum Operating Temperature –
300°F.

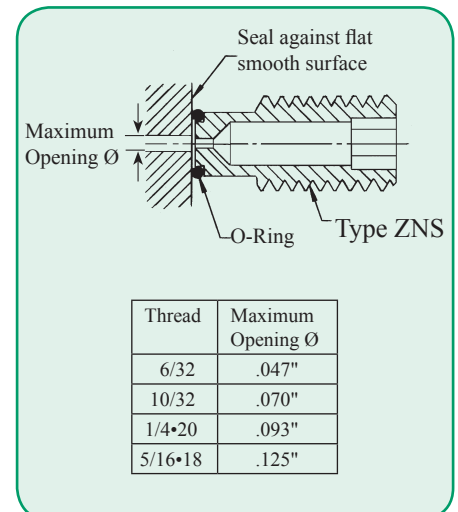
Size Number	Orifice Dia. In.	Size Number Range
4	.0039	Thread 6/32 4-31
5	.0051	
6	.0059	
7	.0071	
8	.0079	
9	.0091	
10	.0102	
11	.0110	
12	.0122	
13	.0130	
14	.0142	Thread 10/32 4-52
15	.0150	
16	.016	
17	.017	
18	.018	
19	.019	
20	.020	
21	.021	
22	.022	
23	.023	Thread 1/4•20 4-81
24	.024	
25	.025	
26	.026	
27	.027	
28	.028	
29	.029	
31	.031	
32	.032	
33	.033	Thread 5/16•18 4-94
35	.035	
37	.037	
38	.038	
39	.039	
40	.040	
41	.041	
42	.042	
43	.043	
47	.047	
52	.052	
55	.055	
60	.060	
63	.063	
67	.067	
70	.070	
73	.073	
76	.076	
79	.079	
81	.081	
86	.086	
89	.089	
94	.094	

Construction

Type ZNS



Installation



Part Numbers

The complete part number for an orifice assembly includes Type, Size Number, Thread Size, Body Material and Seal Material.

EXAMPLES

Type	Size Number	Thread Size	Body Material	O-Ring	Part Number
ZNS	10(.010")	6/32	BR (Brass)	V (Viton)	ZNS-10-6/32-BR-V
ZNS	20(.020")	1/4•20	SS (303 SS)	BN (Buna-N)	ZNS-20-1/4•20 SS-BN

Metal Orifice Assemblies

Description

Precision orifice assemblies that adapt to common fittings used in process instruments and hydraulic systems are shown on pages 18 and 19. Types K4, R4 and RG4 are used with nominal 1/4" tube fittings. Type BFS is for 45° flare fittings and Type CFJ is for 37° flare fittings. Type OD is a pipe adapter.

Applications

- Type K4 is a 1/4" OD Tube and is suitable for use with a wide variety of compression fittings.
- Type K2 is for 1/8" OD Tube fittings.
- Types R4 and RG4 are suitable for use with face seal fittings.
- Types BFS and CFJ are used in hydraulic circuits, having SAE flare connections.

Advantages

- High Pressure Capability
- Bi-directional Flow
- Economical Precision Orifice
- Repeatable Orifice Size and Shape
- Predictable Flow Rate

General Specifications

Flow Direction – Suitable for flow in either direction. Data on pages 20 and 21 is measured for flow direction shown in right column of this page.

Flow – See flow chart for air flow on pages 20 and 21.

C_v Range – .00035 to .37

See pages 20 and 21.

Orifice Diameter Accuracy – ±.0005"

Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction.

Dimensions – See drawings on page 19.

Materials of Construction –

See page 19.

Maximum Operating Pressure –

See page 19.

MISCELLANEOUS

Size Number	Orifice Dia. In.	Size Number Range
4	.0039	Type K2 4-20
5	.0051	
6	.0059	
7	.0071	
8	.0079	
9	.0091	Type K4 4-35
10	.0102	
11	.0110	
12	.0122	
13	.0130	
14	.0142	Type R4 4-125
15	.0150	
16	.016	
17	.017	
18	.018	
19	.019	Type RG4 4-125
20	.020	
21	.021	
22	.022	
23	.023	
24	.024	Type BFS 4-125
25	.025	
26	.026	
27	.027	
28	.028	
29	.029	Type CFJ4 4-125
31	.031	
32	.032	
33	.033	
35	.035	
37	.037	Type CFJ6 4-125
38	.038	
39	.039	
40	.040	
41	.041	
42	.042	Type CFJ8 4-125
43	.043	
47	.047	
52	.052	
55	.055	Type OD 4-125
60	.060	
63	.063	
67	.067	
70	.070	Type IA-44FTX 4-63
73	.073	
76	.076	
79	.079	
81	.081	
86	.086	
89	.089	
94	.094	
96	.096	
100	.100	
104	.104	
109	.109	
113	.113	
120	.120	
125	.125	

Construction

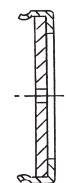
Type K2
K4



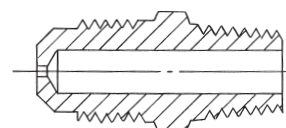
Type R4



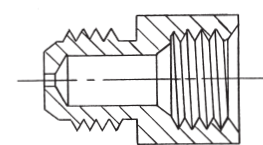
Type RG4



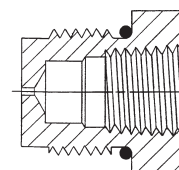
Type BFS



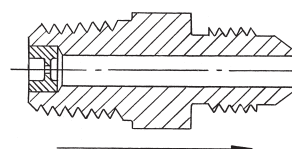
Type CFJ4
CFJ6
CFJ8



Type OD



Type IA-44FTX



Part Numbers

The complete part number for an orifice assembly includes Type, Size Number, Body Material and Options.

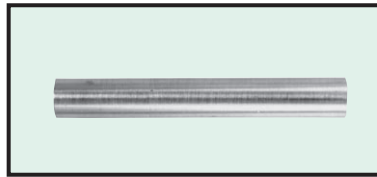
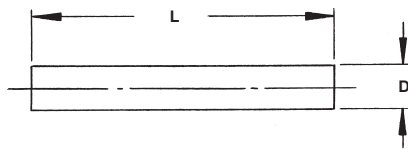
EXAMPLES

Type	Size Number	Body Material	Options	Part Number
K4	6 (.006")	Stainless Steel	—	K4-6-SS
R4	13 (.013")	Stainless Steel	—	R4-13-SS
BFS	35 (.035")	Brass	—	BFS-35-BR
CFJ6	104 (.104")	Stainless Steel	—	CFJ6-104-SS

MISCELLANEOUS

Dimensions

Type K2
K4



TYPE	L (in)	D (in)
K2	1.25	.125
K4	1.75	.250

Specifications

TUBE

For Compression Fittings

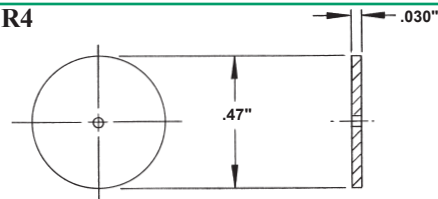
Maximum Operating Pressure – 4000 psig

Material – 316 SS

Orifice Sizes – K2 .004" to .020" Dia.

K4 .004" to .035" Dia.

Type R4



CIRCULAR DISK

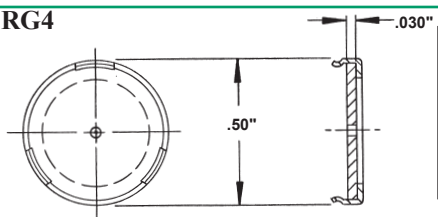
For Face Seal Fittings

Maximum Operating Pressure – 100 psig

Material – 316 SS/Silver Plated

Orifice Sizes – .004" to .125" Dia.

Type RG4



CIRCULAR DISK

WITH RETAINING GASKET

For Face Seal Fittings

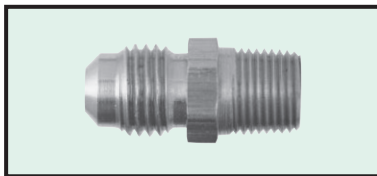
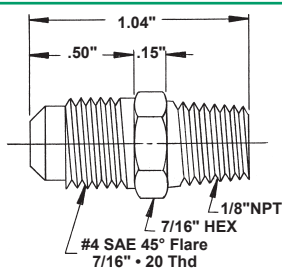
Maximum Operating Pressure – 100 psig

Material – Disk • 316 SS/Silver Plated

Gasket • 316 SS

Orifice Sizes – .004" to .125" Dia.

Type BFS



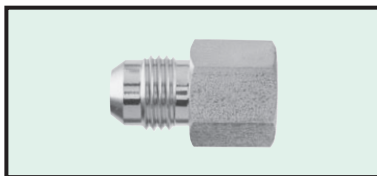
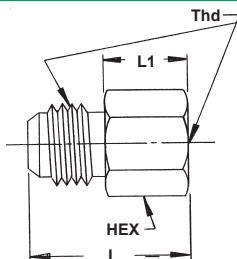
SAE 45° FLARE ADAPTER

Maximum Operating Pressure – 2000 psig

Material – Brass

Orifice Sizes – .004" to .125" Dia.

Type CFJ4
CFJ6
CFJ8



SAE 37° FLARE ADAPTER

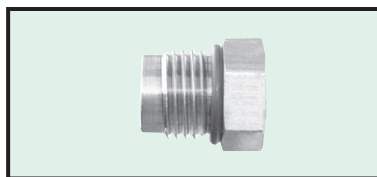
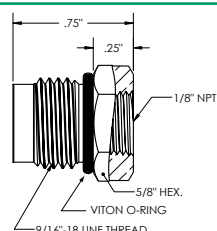
Maximum Operating Pressure – 4000 psig

Material – 303 SS

Orifice Sizes – .004" to .125" Dia.

TYPE	L (in)	L1 (in)	Thd	HEX (in)
CFJ4	1.14	.600	7/16"-20	9/16
CFJ6	1.19	.625	9/16"-18	11/16
CFJ8	1.36	.710	3/4"-16	7/8

Type OD



STRAIGHT THREAD O-RING/ FEMALE PIPE ADAPTER

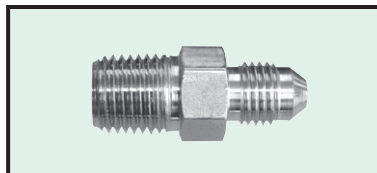
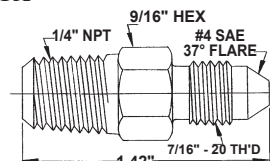
Body/Orifice – Brass or 303 SS

O-Ring – Viton

Maximum Operating Pressure – 2000 psig

Orifice Sizes – .004" to .125" Dia.

Type IA-44FTX



37° FLARED TUBE CONNECTOR

Body/Orifice – Brass or 304 SS

Orifice – Brass or 304 SS

Maximum Operating Pressure – 200 psig

Orifice Sizes – .004" to .063" Dia.

Metal Orifice Air Flow – SLPM

Office Diameter Inches	0.004 0.005 0.006 0.007 0.008 0.009 0.010 0.011 0.012 0.013 0.014 0.015 0.016 0.017 0.018 0.019 0.020 0.021 0.022 0.023 0.024 0.025 0.026 0.027 0.028 0.029 0.031 0.032 0.033																																
Size Number	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	31	32	33				
Supply Pressure - psig	C _v	0.00035	0.00061	0.00086	0.0012	0.0015	0.0019	0.0025	0.0028	0.0034	0.0038	0.0043	0.0050	0.0055	0.0067	0.0073	0.0080	0.0088	0.0096	0.011	0.012	0.013	0.014	0.016	0.017	0.018	0.019	0.022	0.024	0.025			
	1	0.035	0.064	0.086	0.127	0.170	0.226	0.280	0.308	0.398	0.45	0.52	0.61	0.66	0.77	0.86	0.96	1.05	1.13	1.29	1.41	1.54	1.67	1.91	1.95	2.21	2.39	2.65	2.88	3.03			
	5	0.09	0.16	0.21	0.30	0.40	0.52	0.65	0.71	0.92	1.06	1.21	1.41	1.54	1.76	1.98	2.22	2.47	2.65	2.97	3.24	3.53	3.83	4.34	4.44	4.94	5.31	5.86	6.42	6.80			
	10	0.12	0.22	0.31	0.43	0.57	0.74	0.93	1.01	1.29	1.48	1.68	1.95	2.01	2.26	2.54	2.83	3.16	3.53	4.33	4.75	5.18	5.55	6.15	6.43	7.18	7.83	8.63	9.40	9.98			
	15	0.16	0.28	0.39	0.54	0.72	0.93	1.17	1.26	1.62	1.85	2.10	2.44	2.50	2.85	3.23	3.57	4.01	4.41	5.35	5.93	6.43	6.95	7.58	7.95	8.78	9.58	10.6	11.6	12.3			
	20	0.19	0.33	0.46	0.65	0.85	1.10	1.38	1.49	1.92	2.19	2.49	2.87	2.97	3.40	3.86	4.26	4.84	5.22	6.35	6.95	7.58	8.15	8.90	9.28	10.3	11.2	12.4	13.5	14.3			
	25	0.22	0.39	0.53	0.75	0.98	1.27	1.59	1.71	2.20	2.50	2.86	3.28	3.42	3.92	4.45	4.91	5.59	6.01	7.30	7.95	8.65	9.38	10.2	10.7	11.7	12.8	14.2	15.4	16.3			
	30	0.25	0.44	0.60	0.85	1.12	1.43	1.80	1.93	2.47	2.82	3.21	3.69	3.87	4.43	5.03	5.56	6.33	6.81	8.23	8.98	9.75	10.6	11.5	12.0	13.2	14.4	15.9	17.3	18.4			
	40	0.30	0.54	0.74	1.05	1.38	1.77	2.21	2.37	3.04	3.45	3.93	4.51	4.78	5.47	6.21	6.85	7.81	8.42	10.1	11.0	12.0	13.0	14.1	14.7	16.1	17.5	19.4	21.1	22.5			
	50	0.36	0.65	0.88	1.26	1.65	2.10	2.62	2.80	3.58	4.07	4.64	5.31	5.70	6.51	7.40	8.15	9.26	10.0	11.9	13.0	14.2	15.4	16.6	17.3	19.0	20.7	22.9	25.0	26.6			
	60	0.42	0.75	1.02	1.46	1.91	2.42	3.02	3.23	4.13	4.70	5.34	6.13	6.61	7.56	8.58	9.46	10.7	11.6	13.8	15.0	16.4	17.7	19.2	20.0	21.9	23.8	26.4	28.8	30.7			
70	0.48	0.86	1.16	1.67	2.17	2.75	3.43	3.66	4.68	5.32	6.05	6.96	7.53	8.61	9.77	10.8	12.2	13.2	15.6	17.0	18.5	20.1	21.7	22.7	24.8	27.0	30.0	32.7	34.9				
80	0.54	0.96	1.30	1.87	2.43	3.08	3.83	4.09	5.23	5.95	6.77	7.79	8.46	9.67	11.0	12.1	13.7	14.9	17.5	19.0	20.7	22.5	24.2	25.3	27.7	30.2	33.6	36.7	39.0				
90	0.60	1.07	1.44	2.08	2.69	3.40	4.23	4.51	5.78	6.58	7.49	8.62	9.38	10.7	12.2	13.4	15.2	16.5	19.3	21.0	22.9	24.9	26.8	28.0	30.7	33.5	37.2	40.6	43.2				
100	0.66	1.17	1.58	2.28	2.95	3.72	4.63	4.94	6.33	7.22	8.21	9.46	10.3	11.8	13.4	14.7	16.6	18.0	21.1	23.0	25.1	27.4	29.4	30.8	33.7	36.8	40.9	44.6	47.5				
In. Hg. Vacuum Level	5	0.053	0.096	0.129	0.191	0.253	0.332	0.406	0.450	0.582	0.661	0.773	0.899	0.977	1.14	1.28	1.41	1.55	1.70	1.90	2.10	2.30	2.48	2.74	2.83	3.16	3.41	3.78	4.12	4.32			
	10	0.069	0.124	0.168	0.246	0.324	0.421	0.519	0.564	0.730	0.834	0.972	1.12	1.24	1.41	1.58	1.79	1.96	2.18	2.44	2.68	2.89	3.13	3.44	3.58	4.00	4.30	4.77	5.16	5.43			
	15	0.075	0.134	0.185	0.268	0.351	0.455	0.566	0.614	0.792	0.902	1.07	1.22	1.35	1.55	1.75	1.94	2.19	2.32	2.61	2.85	3.12	3.34	3.65	3.78	4.20	4.51	5.05	5.45	5.72			
	20	0.075	0.134	0.185	0.268	0.351	0.455	0.566	0.614	0.792	0.902	1.07	1.22	1.35	1.55	1.75	1.94	2.19	2.32	2.61	2.85	3.12	3.34	3.65	3.78	4.20	4.51	5.05	5.45	5.72			
Checked Flow	30	0.075	0.134	0.185	0.268	0.351	0.455	0.566	0.614	0.792	0.902	1.07	1.22	1.35	1.55	1.75	1.94	2.19	2.32	2.61	2.85	3.12	3.34	3.65	3.78	4.20	4.51	5.05	5.45	5.72			

Orifice Diameter Inches	0.035	0.037	0.038	0.039	0.04	0.041	0.042	0.043	0.047	0.052	0.055	0.06	0.063	0.067	0.07	0.073	0.076	0.079	0.081	0.086	0.089	0.094	0.096	0.1	0.104	0.109	0.113	0.12	0.125	
Size Number	35	37	38	39	40	41	42	43	47	52	55	60	63	67	70	73	76	79	81	86	89	94	96	100	104	109	113	120	125	
Supply Pressure – psig	C _v	0.028	0.031	0.032	0.033	0.036	0.038	0.039	0.041	0.048	0.059	0.068	0.081	0.088	0.1	0.11	0.12	0.13	0.14	0.15	0.17	0.18	0.2	0.21	0.23	0.25	0.27	0.31	0.34	0.37
	1	3.48	3.83	4.13	4.46	4.6	4.67	4.99	5.36	6.43	8.04	9.4	11.2	12.2	14.2	15.9	16.9	18.5	20.3	21.7	23.5	25.4	28.4	30.1	32.9	35.5	39.6	43.1	47.8	50.1
	5	7.67	8.48	9.09	9.7	10.2	10.6	11.3	12.1	14.2	17.6	20.3	23.9	26.1	30.3	33.8	36.1	39.4	43.1	46	51.1	54.9	61.9	65	70.8	76.6	84.8	92.1	102	108
	10	10.6	11.8	12.5	13.6	14.4	14.8	15.6	16.8	19.4	24.5	27.1	32.2	35.2	40.7	45.6	48.5	52.9	57.3	61.6	67.9	72.3	81	85.5	92.3	102	112	118	135	148
	15	13.1	14.5	15.4	16.7	17.7	18.2	19.1	20.4	23.6	29.7	32.9	39	42.6	49.3	55.3	58.8	64	69.4	74.5	82.1	87.3	97.8	103	111	123	135	143	163	178
	20	15.3	17	18.1	19.6	20.9	21.4	22.5	24	27.7	35	38.7	45.9	50.1	58	65	69	75.3	81.4	87.3	95.6	102	114	121	130	144	158	167	190	210
	25	17.7	19.6	20.8	22.6	24	24.7	25.9	27.6	31.9	40.3	44.6	52.8	57.7	66.7	74.7	79.3	86.4	93.5	100	110	117	131	138	149	164	180	191	219	241
	30	20	22.2	23.6	25.6	27.2	28	29.4	31.3	36	45.6	50.4	59.7	65.2	75.4	84.3	89.5	97.4	105	113	125	132	148	156	168	185	204	216	248	273
	40	24.8	27.4	31.7	31.6	33.6	34.6	36.3	38.7	44.5	56.3	62.2	73.6	80.3	92.7	104	110	120	129	139	153	162	181	191	207	228	251	267	306	337
	50	29.5	32.6	34.8	37.6	40.1	41.3	43.3	46	52.9	66.9	74	87.4	95.4	110	123	131	142	153	164	181	192	215	227	247	272	299	317	364	401
	60	34.3	38	40.6	43.8	46.7	48.1	50.3	53.5	61.5	77.7	85.8	101	110	127	142	151	164	177	189	210	223	250	264	286	315	347	368	422	465
70	39.2	43.3	46.3	50	53.3	55	57.4	61	70	88.4	97.6	115	126	145	162	171	186	202	216	240	254	285	301	327	360	396	421	482	531	
80	44	48.7	52.1	56.2	60	61.9	64.5	68.5	78.6	99.1	109	129	141	162	181	191	209	227	242	269	285	320	338	367	404	445	472	541	596	
90	50	54.2	57.8	62.4	66.7	68.9	71.5	76	87.2	109	121	143	156	179	200	211	231	251	268	298	316	354	374	406	447	492	522	598	660	
100	53.9	59.6	63.7	68.7	73.5	77.3	78.6	83.5	95.8	120	133	156	171	196	221	234	255	277	296	329	349	392	413	449	494	544	578	662	729	
In. Hg.	5	4.92	5.4	5.81	6.29	6.76	6.82	7.29	7.67	9.08	11.3	12.4	14.8	17.1	20	22.5	23.9	26	28.3	30.2	33.2	35.9	40.1	41.8	45.3	49	53.9	57.9	65.3	70.9
	10	6.18	6.78	7.29	7.85	8.31	8.5	9.08	9.58	11.1	13.9	15.4	18.2	21.2	24.4	27.2	29.9	32.5	35.3	37.7	41.5	44.8	50	52.1	56.6	61.2	67.2	72.2	81.4	88.4
	15	6.5	7.17	7.63	8.22	8.66	8.87	9.46	10	11.6	14.4	15.9	18.6	22.1	25.5	28.4	31.2	33.9	36.8	39.4	43.3	46.7	52.1	54.4	59	63.8	70.1	75.3	84.9	92.2
	20	6.5	7.17	7.63	8.22	8.66	8.87	9.46	10	11.6	14.4	15.9	18.6	22.1	25.5	28.4	31.2	33.9	36.8	39.4	43.3	46.7	52.1	54.4	59	63.8	70.1	75.3	84.9	92.2
Checked Flow	30	6.5	7.17	7.63	8.22	8.66	8.87	9.46	10	11.6	14.4	15.9	18.6	22.1	25.5	28.4	31.2	33.9	36.8	39.4	43.3	46.7	52.1	54.4	59	63.8	70.1	75.3	84.9	92.2

Standard Conditions 70°F, 14.7 psia

SCFH – Standard Cu. Ft. Per Hour
SLPM – Standard Liters Per Minute

Sapphire Orifice Air Flow – SLPM

Orifice Diameter Inches	0.0012	0.0016	0.0020	0.0024	0.0028	0.0031	0.0035	0.0039	0.0043	0.0047	0.0051	0.0055	0.0059	0.0063	0.0067	0.0071	0.0079	0.0087	0.0094	0.0102	0.0110	0.0118	0.0126	0.0134	0.0142	0.0157	0.0173	0.0189	0.0205	0.0213	0.0228	0.0252	
Size Number	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	22	24	26	28	30	32	34	36	40	44	48	52	54	58	64	
Cv	.00030	.00053	.00090	.00012	.00017	.00022	.00028	.00035	.00042	.00050	.00061	.00071	.00084	.00094	.0011	.0012	.0015	.0018	.0021	.0024	.0028	.0032	.0036	.0040	.0046	.0057	.0067	.0080	.0091	.010	.011	.013	
Supply Pressure – psig	1	0.003	0.005	0.010	0.014	0.020	0.025	0.034	0.040	0.050	0.058	0.068	0.080	0.095	0.106	0.120	0.139	0.161	0.194	0.259	0.275	0.300	0.340	0.393	0.446	0.499	0.677	0.822	0.965	1.10	1.12	1.38	1.69
	5	0.009	0.013	0.027	0.036	0.047	0.059	0.076	0.093	0.108	0.136	0.159	0.192	0.223	0.256	0.273	0.313	0.350	0.430	0.584	0.623	0.695	0.800	0.933	1.06	1.20	1.51	1.81	2.16	2.50	2.57	3.26	4.06
	10	0.010	0.016	0.036	0.049	0.065	0.082	0.107	0.132	0.164	0.193	0.228	0.264	0.308	0.357	0.382	0.430	0.480	0.590	0.830	0.868	0.968	1.09	1.27	1.45	1.63	2.01	2.43	2.90	3.32	3.45	4.43	5.58
	15	0.014	0.021	0.046	0.062	0.082	0.104	0.134	0.166	0.205	0.240	0.285	0.329	0.386	0.443	0.482	0.535	0.613	0.755	1.05	1.11	1.24	1.42	1.63	1.85	2.09	2.56	3.08	3.69	4.26	4.43	5.55	7.08
	20	0.016	0.025	0.055	0.074	0.099	0.125	0.159	0.197	0.243	0.284	0.337	0.390	0.457	0.525	0.569	0.635	0.730	0.910	1.25	1.32	1.48	1.70	1.95	2.20	2.48	3.04	3.64	4.36	5.06	5.31	6.55	8.33
	25	0.019	0.030	0.063	0.087	0.115	0.144	0.184	0.229	0.280	0.327	0.389	0.450	0.526	0.605	0.654	0.733	0.843	1.05	1.44	1.52	1.70	1.95	2.24	2.52	2.84	3.50	4.19	5.03	5.81	6.11	7.53	9.55
	30	0.022	0.034	0.072	0.098	0.132	0.164	0.208	0.260	0.317	0.370	0.440	0.511	0.595	0.685	0.710	0.838	0.958	1.19	1.63	1.69	1.91	2.19	2.52	2.84	3.19	3.96	4.75	5.69	6.57	6.90	8.48	10.7
	40	0.027	0.043	0.089	0.122	0.163	0.203	0.257	0.321	0.390	0.456	0.543	0.632	0.734	0.845	0.88	1.04	1.18	1.47	2.02	2.11	2.35	2.67	3.07	3.46	3.90	4.89	5.86	7.02	8.10	8.50	10.4	13.1
	50	0.032	0.052	0.106	0.147	0.195	0.241	0.306	0.383	0.463	0.542	0.652	0.753	0.872	1.00	1.05	1.24	1.41	1.75	2.39	2.50	2.78	3.16	3.63	4.08	4.59	5.83	6.96	8.35	9.63	10.1	12.3	15.5
	60	0.037	0.061	0.123	0.171	0.227	0.280	0.356	0.445	0.536	0.630	0.751	0.875	1.01	1.16	1.23	1.45	1.64	2.03	2.77	2.89	3.20	3.63	4.17	4.69	5.29	6.77	8.10	9.69	11.1	11.7	14.2	17.9
	70	0.042	0.070	0.141	0.195	0.259	0.318	0.403	0.507	0.609	0.717	0.855	0.996	1.15	1.32	1.40	1.66	1.87	2.31	3.14	3.28	3.62	4.12	4.72	5.31	5.99	7.71	9.23	11.0	12.7	13.3	16.0	20.2
80	0.047	0.080	0.158	0.200	0.292	0.357	0.453	0.569	0.683	0.804	0.959	1.12	1.28	1.48	1.57	1.86	2.09	2.59	3.51	3.66	4.04	4.68	5.28	5.93	6.69	8.65	10.4	12.3	14.3	14.8	17.9	22.6	
90	0.053	0.089	0.175	0.244	0.324	0.396	0.502	0.632	0.757	0.891	1.06	1.24	1.42	1.64	1.75	2.06	2.32	2.87	3.89	4.05	4.47	5.07	5.83	6.56	7.41	9.60	11.5	13.7	15.7	16.4	19.7	24.9	
100	0.058	0.098	0.193	0.269	0.356	0.435	0.551	0.692	0.830	0.978	1.17	1.36	1.56	1.80	1.92	2.27	2.55	3.15	4.26	4.44	4.89	5.57	6.38	7.18	8.12	10.6	12.6	15.0	17.2	18.0	21.6	27.3	
Vacuum Level In. Hg.	5	0.003	0.006	0.014	0.020	0.028	0.036	0.047	0.057	0.073	0.085	0.100	0.116	0.137	0.156	0.169	0.199	0.229	0.277	0.377	0.401	0.451	0.510	0.591	0.673	0.764	0.982	1.16	1.38	1.61	1.64	2.13	2.61
	10	0.004	0.008	0.018	0.027	0.036	0.046	0.061	0.073	0.093	0.109	0.128	0.149	0.175	0.200	0.217	0.253	0.292	0.352	0.482	0.503	0.566	0.638	0.734	0.833	0.955	1.26	1.51	1.80	2.06	2.11	2.55	3.19
	15	0.006	0.010	0.021	0.030	0.040	0.050	0.065	0.079	0.100	0.117	0.138	0.159	0.188	0.214	0.235	0.269	0.320	0.390	0.525	0.554	0.626	0.711	0.818	0.921	1.07	1.39	1.65	1.99	2.31	2.39	2.77	3.48
	20	0.006	0.010	0.021	0.030	0.040	0.050	0.065	0.079	0.100	0.117	0.138	0.159	0.188	0.214	0.235	0.269	0.320	0.390	0.525	0.554	0.626	0.711	0.818	0.921	1.07	1.39	1.65	1.99	2.31	2.39	2.77	3.48
30	0.006	0.010	0.021	0.030	0.040	0.050	0.065	0.079	0.100	0.117	0.138	0.159	0.188	0.214	0.235	0.269	0.320	0.390	0.525	0.554	0.626	0.711	0.818	0.921	1.07	1.39	1.65	1.99	2.31	2.39	2.77	3.48	

Sapphire Orifice Air Flow – SCFH

Orifice Diameter Inches	Supply Pressure – psig																																
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	22	24	26	28	30	32	34	36	40	44	48	52	54	58	64	
Size Number	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	22	24	26	28	30	32	34	36	40	44	48	52	54	58	64	
	Cv	0.0030	0.0053	0.0090	0.0012	0.0017	0.0022	0.0028	0.0035	0.0042	0.0050	0.0061	0.0071	0.0084	0.0094	0.0111	0.012	0.015	0.018	0.021	0.024	0.028	0.032	0.036	0.040	0.046	0.057	0.067	0.080	0.091	0.10	0.11	0.13
In. Hg.	1	0.007	0.011	0.021	0.030	0.042	0.053	0.072	0.085	0.106	0.123	0.144	0.169	0.201	0.225	0.254	0.294	0.341	0.411	0.549	0.583	0.636	0.720	0.833	0.945	1.06	1.43	1.74	2.04	2.33	2.37	2.92	3.58
	5	0.019	0.027	0.056	0.075	0.100	0.124	0.161	0.197	0.228	0.288	0.337	0.407	0.471	0.542	0.577	0.663	0.740	0.911	1.24	1.32	1.47	1.70	1.98	2.25	2.53	3.20	3.83	4.58	5.30	5.44	6.90	8.60
	10	0.021	0.034	0.076	0.104	0.138	0.174	0.227	0.280	0.347	0.409	0.483	0.559	0.653	0.756	0.809	0.911	1.02	1.25	1.76	1.84	2.05	2.31	2.69	3.07	3.45	4.26	5.15	6.14	7.03	9.31	11.8	
	15	0.030	0.044	0.097	0.131	0.174	0.220	0.284	0.352	0.434	0.508	0.604	0.697	0.818	0.939	1.02	1.13	1.30	1.60	2.22	2.35	2.63	3.01	3.45	3.92	4.43	5.42	6.53	7.82	9.03	9.39	11.8	15.0
	20	0.034	0.053	0.117	0.157	0.210	0.265	0.337	0.417	0.515	0.602	0.714	0.826	0.968	1.11	1.21	1.35	1.55	1.93	2.65	2.80	3.14	3.60	4.13	4.66	5.25	6.44	7.71	9.24	10.7	11.3	13.9	17.6
	25	0.040	0.064	0.133	0.184	0.244	0.305	0.390	0.485	0.593	0.693	0.824	0.953	1.11	1.28	1.39	1.55	1.79	2.22	3.05	3.22	3.60	4.13	4.75	5.34	6.02	7.42	8.88	10.7	12.3	12.9	16.0	20.2
	30	0.046	0.072	0.152	0.208	0.280	0.347	0.441	0.551	0.672	0.784	0.932	1.08	1.26	1.45	1.50	1.78	2.03	2.52	3.45	3.58	4.05	4.64	5.34	6.02	6.76	8.39	10.1	12.1	13.9	14.6	18.0	22.7
	40	0.057	0.091	0.189	0.258	0.345	0.430	0.544	0.680	0.826	0.986	1.15	1.34	1.56	1.79	1.86	2.20	2.50	3.11	4.28	4.47	4.98	5.66	6.50	7.33	8.26	10.4	12.4	14.9	17.2	18.0	22.0	27.8
	50	0.068	0.110	0.225	0.311	0.413	0.511	0.648	0.811	0.981	1.15	1.38	1.60	1.85	2.13	2.22	2.63	2.99	3.71	5.06	5.30	5.89	6.69	7.69	8.64	9.72	12.4	14.7	17.7	20.4	21.4	26.1	32.8
	60	0.079	0.129	0.261	0.362	0.481	0.593	0.754	0.943	1.14	1.33	1.59	1.85	2.14	2.46	2.61	3.07	3.47	4.30	5.87	6.12	6.78	7.69	8.83	9.94	11.2	14.3	17.2	20.5	23.5	24.8	30.1	37.9
70	0.089	0.149	0.299	0.413	0.549	0.674	0.854	1.07	1.29	1.52	1.81	2.11	2.43	2.80	2.97	3.52	3.96	4.89	6.65	6.95	7.67	8.73	10.0	11.3	12.7	16.3	19.6	23.3	26.9	28.2	33.9	42.8	
80	0.100	0.168	0.335	0.424	0.619	0.756	0.960	1.21	1.45	1.70	2.03	2.37	2.72	3.13	3.33	3.94	4.43	5.49	7.44	7.75	8.56	9.75	11.2	12.6	14.2	18.3	22.0	26.1	30.3	31.4	37.9	47.9	
90	0.111	0.188	0.371	0.471	0.686	0.839	1.06	1.34	1.60	1.89	2.25	2.62	3.01	3.47	3.71	4.36	4.92	6.08	8.24	8.58	9.47	10.7	12.4	13.9	15.7	20.3	24.4	29.0	33.3	34.7	41.7	52.8	
100	0.122	0.208	0.409	0.570	0.754	0.922	1.17	1.47	1.76	2.07	2.47	2.88	3.30	3.81	4.07	4.81	5.40	6.67	9.03	9.41	10.4	11.8	13.5	15.2	17.2	22.5	26.7	31.8	36.4	38.1	45.8	57.8	
Vacuum Level	5	0.007	0.013	0.029	0.043	0.059	0.076	0.100	0.121	0.154	0.180	0.212	0.246	0.280	0.331	0.358	0.422	0.485	0.587	0.799	0.850	0.956	1.08	1.25	1.43	1.62	2.08	2.46	2.92	3.41	3.47	4.51	5.53
	10	0.009	0.018	0.039	0.057	0.076	0.098	0.128	0.155	0.197	0.231	0.271	0.316	0.371	0.424	0.460	0.536	0.619	0.746	1.02	1.07	1.18	1.35	1.56	1.76	2.02	2.67	3.19	3.81	4.36	4.47	5.40	6.76
	15	0.012	0.020	0.045	0.063	0.085	0.107	0.138	0.168	0.212	0.248	0.292	0.337	0.398	0.453	0.498	0.570	0.678	0.826	1.11	1.17	1.33	1.51	1.73	1.95	2.26	2.95	3.50	4.22	4.89	5.06	5.87	7.37
	20	0.012	0.020	0.045	0.063	0.085	0.107	0.138	0.168	0.212	0.248	0.292	0.337	0.398	0.453	0.498	0.570	0.678	0.826	1.11	1.17	1.33	1.51	1.73	1.95	2.26	2.95	3.50	4.22	4.89	5.06	5.87	7.37

Metal Orifice Water Flow – Gallons/minute

Orifice Diameter Inches	Supply Pressure – psig																																
Size Number	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	31	32	33				
C _v	0.00035	0.0006	0.0009	0.0012	0.0015	0.0019	0.0025	0.0028	0.0034	0.0038	0.0043	0.0050	0.0055	0.0067	0.0073	0.0080	0.009	0.010	0.011	0.012	0.013	0.014	0.016	0.017	0.018	0.019	0.022	0.024	0.025				
1	0.00035	0.0006	0.0009	0.0012	0.0015	0.0019	0.0025	0.0028	0.0034	0.0038	0.0043	0.0050	0.0055	0.0067	0.0073	0.0080	0.009	0.010	0.011	0.012	0.013	0.014	0.016	0.017	0.018	0.019	0.022	0.024	0.025				
2	0.00049	0.0009	0.0012	0.0017	0.0021	0.0027	0.0035	0.0040	0.0048	0.0054	0.0061	0.0071	0.0078	0.0095	0.0103	0.0113	0.012	0.014	0.016	0.017	0.018	0.020	0.023	0.024	0.025	0.027	0.031	0.034	0.035				
3	0.00061	0.0011	0.0015	0.0021	0.0026	0.0033	0.0043	0.0048	0.0059	0.0066	0.0074	0.0087	0.0095	0.0116	0.0126	0.0139	0.015	0.017	0.019	0.021	0.023	0.024	0.028	0.029	0.031	0.033	0.038	0.042	0.043				
4	0.00070	0.0012	0.0017	0.0024	0.0030	0.0038	0.0050	0.0056	0.0068	0.0076	0.0086	0.0100	0.0110	0.0134	0.0146	0.0160	0.018	0.019	0.022	0.024	0.026	0.028	0.032	0.034	0.036	0.038	0.044	0.048	0.050				
5	0.00078	0.0014	0.0019	0.0027	0.0034	0.0042	0.0056	0.0063	0.0076	0.0085	0.0096	0.0112	0.0123	0.0150	0.0163	0.0179	0.020	0.021	0.025	0.027	0.029	0.031	0.036	0.038	0.040	0.042	0.049	0.054	0.056				
6	0.00086	0.0015	0.0021	0.0029	0.0037	0.0047	0.0061	0.0069	0.0083	0.0093	0.0105	0.0122	0.0135	0.0164	0.0179	0.0196	0.022	0.024	0.027	0.029	0.032	0.034	0.039	0.042	0.044	0.047	0.054	0.059	0.061				
7	0.00093	0.0016	0.0023	0.0032	0.0040	0.0050	0.0066	0.0074	0.0090	0.0101	0.0114	0.0132	0.0146	0.0177	0.0193	0.0212	0.023	0.025	0.029	0.032	0.034	0.037	0.042	0.045	0.048	0.050	0.058	0.063	0.066				
8	0.00099	0.0017	0.0024	0.0034	0.0042	0.0054	0.0071	0.0079	0.0096	0.0107	0.0122	0.0141	0.0156	0.0190	0.0206	0.0226	0.025	0.027	0.031	0.034	0.037	0.040	0.045	0.048	0.051	0.054	0.062	0.068	0.071				
9	0.00105	0.0018	0.0026	0.0036	0.0045	0.0057	0.0075	0.0084	0.0102	0.0114	0.0129	0.0150	0.0165	0.0201	0.0219	0.0240	0.026	0.029	0.033	0.036	0.039	0.042	0.048	0.051	0.054	0.057	0.066	0.072	0.075				
10	0.00111	0.0019	0.0027	0.0038	0.0047	0.0060	0.0079	0.0089	0.0108	0.0120	0.0136	0.0158	0.0174	0.0212	0.0231	0.0253	0.028	0.030	0.035	0.038	0.041	0.044	0.051	0.054	0.057	0.060	0.070	0.076	0.079				
15	0.00136	0.0024	0.0033	0.0046	0.0058	0.0074	0.0097	0.0108	0.0132	0.0147	0.0167	0.0194	0.0213	0.0259	0.0283	0.0310	0.034	0.037	0.043	0.046	0.050	0.054	0.062	0.066	0.070	0.074	0.085	0.093	0.097				
20	0.00157	0.0027	0.0038	0.0054	0.0067	0.0085	0.0112	0.0125	0.0152	0.0170	0.0192	0.0224	0.0246	0.0300	0.0326	0.0358	0.039	0.043	0.049	0.054	0.058	0.063	0.072	0.076	0.080	0.085	0.098	0.107	0.112				
30	0.00192	0.0033	0.0047	0.0066	0.0082	0.0104	0.0137	0.0153	0.0186	0.0208	0.0236	0.0274	0.0301	0.0367	0.0400	0.0438	0.048	0.053	0.060	0.066	0.071	0.077	0.088	0.093	0.099	0.104	0.120	0.131	0.137				
40	0.00221	0.0039	0.0054	0.0076	0.0095	0.0120	0.0158	0.0177	0.0215	0.0240	0.0272	0.0316	0.0348	0.0424	0.0462	0.0506	0.056	0.061	0.070	0.076	0.082	0.089	0.101	0.108	0.114	0.120	0.139	0.152	0.158				
50	0.00247	0.0043	0.0061	0.0085	0.0106	0.0134	0.0177	0.0198	0.0240	0.0269	0.0304	0.0354	0.0389	0.0474	0.0516	0.0566	0.062	0.068	0.078	0.085	0.092	0.099	0.113	0.120	0.127	0.134	0.156	0.170	0.177				
60	0.00271	0.0047	0.0067	0.0093	0.0116	0.0147	0.0194	0.0217	0.0263	0.0294	0.0333	0.0387	0.0426	0.0519	0.0565	0.0620	0.068	0.074	0.085	0.093	0.101	0.108	0.124	0.132	0.139	0.147	0.170	0.186	0.194				
70	0.00293	0.0051	0.0072	0.0100	0.0125	0.0159	0.0209	0.0234	0.0284	0.0318	0.0360	0.0418	0.0460	0.0561	0.0611	0.0669	0.074	0.080	0.092	0.100	0.109	0.117	0.134	0.142	0.151	0.159	0.184	0.201	0.209				
80	0.00313	0.0055	0.0077	0.0107	0.0134	0.0170	0.0224	0.0250	0.0304	0.0340	0.0385	0.0447	0.0492	0.0599	0.0653	0.0716	0.079	0.086	0.098	0.107	0.116	0.125	0.143	0.152	0.161	0.170	0.197	0.215	0.224				
90	0.00332	0.0058	0.0082	0.0114	0.0142	0.0180	0.0237	0.0266	0.0323	0.0360	0.0408	0.0474	0.0522	0.0636	0.0693	0.0759	0.083	0.091	0.104	0.114	0.123	0.133	0.152	0.161	0.171	0.180	0.209	0.228	0.237				
100	0.00350	0.0061	0.0086	0.0120	0.0150	0.0190	0.0250	0.0280	0.0340	0.0380	0.0430	0.0500	0.0550	0.0670	0.0730	0.0800	0.088	0.096	0.110	0.120	0.130	0.140	0.160	0.170	0.180	0.190	0.220	0.240	0.250				

Orifice Diameter Inches	0.035	0.037	0.038	0.039	0.04	0.041	0.042	0.043	0.047	0.052	0.055	0.06	0.063	0.067	0.07	0.073	0.076	0.079	0.081	0.086	0.089	0.094	0.096	0.1	0.104	0.109	0.113	0.12	0.125	
Size Number	35	37	38	39	40	41	42	43	47	52	55	60	63	67	70	73	76	79	81	86	89	94	96	100	104	109	113	120	125	
Supply Pressure – psig	0.028	0.031	0.032	0.033	0.036	0.038	0.039	0.041	0.048	0.059	0.068	0.081	0.088	0.100	0.110	0.120	0.130	0.140	0.150	0.170	0.180	0.200	0.210	0.230	0.250	0.270	0.310	0.340	0.370	
	1	0.028	0.031	0.032	0.033	0.036	0.038	0.039	0.041	0.048	0.059	0.068	0.081	0.088	0.100	0.110	0.120	0.130	0.140	0.150	0.170	0.180	0.200	0.210	0.230	0.250	0.270	0.310	0.340	0.370
	2	0.040	0.044	0.045	0.047	0.051	0.054	0.055	0.058	0.068	0.083	0.096	0.115	0.124	0.141	0.156	0.170	0.184	0.198	0.212	0.240	0.255	0.283	0.297	0.325	0.354	0.382	0.438	0.481	0.523
	3	0.048	0.054	0.055	0.057	0.062	0.066	0.068	0.071	0.083	0.102	0.118	0.140	0.152	0.173	0.191	0.208	0.225	0.242	0.260	0.294	0.312	0.346	0.364	0.398	0.433	0.468	0.537	0.589	0.641
	4	0.056	0.062	0.064	0.066	0.072	0.076	0.078	0.082	0.096	0.118	0.136	0.162	0.176	0.200	0.220	0.240	0.260	0.280	0.300	0.340	0.360	0.400	0.420	0.460	0.500	0.540	0.620	0.680	0.740
	5	0.063	0.069	0.072	0.074	0.080	0.085	0.087	0.092	0.107	0.132	0.152	0.181	0.197	0.224	0.246	0.268	0.291	0.313	0.335	0.380	0.402	0.447	0.470	0.514	0.559	0.604	0.693	0.760	0.827
	6	0.069	0.076	0.078	0.081	0.088	0.093	0.096	0.100	0.118	0.145	0.167	0.198	0.216	0.245	0.269	0.294	0.318	0.343	0.367	0.416	0.441	0.490	0.514	0.563	0.612	0.661	0.759	0.833	0.906
	7	0.074	0.082	0.085	0.087	0.095	0.101	0.103	0.108	0.127	0.156	0.180	0.214	0.233	0.265	0.291	0.317	0.344	0.370	0.397	0.450	0.476	0.529	0.556	0.609	0.661	0.714	0.820	0.900	0.979
	8	0.079	0.088	0.091	0.093	0.102	0.107	0.110	0.116	0.136	0.167	0.192	0.229	0.249	0.283	0.311	0.339	0.368	0.396	0.424	0.481	0.509	0.566	0.594	0.651	0.707	0.764	0.877	0.962	1.047
	9	0.084	0.093	0.096	0.099	0.108	0.114	0.117	0.123	0.144	0.177	0.204	0.243	0.264	0.300	0.330	0.360	0.390	0.420	0.450	0.510	0.540	0.600	0.630	0.690	0.750	0.810	0.930	1.020	1.110
10	0.089	0.098	0.101	0.104	0.114	0.120	0.123	0.130	0.152	0.187	0.215	0.256	0.278	0.316	0.348	0.379	0.411	0.443	0.474	0.538	0.569	0.632	0.664	0.727	0.791	0.854	0.980	1.075	1.170	
Supply Pressure – psig	15	0.108	0.120	0.124	0.128	0.139	0.147	0.151	0.159	0.186	0.229	0.263	0.314	0.341	0.387	0.426	0.465	0.503	0.542	0.581	0.668	0.697	0.775	0.813	0.891	0.968	1.046	1.201	1.317	1.433
	20	0.125	0.139	0.143	0.148	0.161	0.170	0.174	0.183	0.215	0.264	0.304	0.362	0.394	0.447	0.492	0.537	0.581	0.626	0.671	0.760	0.805	0.894	0.939	1.029	1.118	1.207	1.386	1.521	1.655
	30	0.153	0.170	0.175	0.181	0.197	0.208	0.214	0.225	0.263	0.323	0.372	0.444	0.482	0.548	0.602	0.657	0.712	0.767	0.822	0.931	0.986	1.095	1.150	1.260	1.369	1.479	1.698	1.862	2.027
	40	0.177	0.196	0.202	0.209	0.228	0.240	0.247	0.259	0.339	0.430	0.512	0.557	0.632	0.696	0.759	0.822	0.885	0.949	1.075	1.138	1.265	1.328	1.455	1.581	1.708	1.961	2.150	2.340	
	50	0.198	0.219	0.226	0.233	0.255	0.269	0.276	0.290	0.399	0.417	0.481	0.573	0.622	0.707	0.778	0.849	0.919	0.990	1.061	1.202	1.273	1.414	1.485	1.626	1.768	1.909	2.192	2.404	2.616
	60	0.217	0.240	0.248	0.256	0.279	0.294	0.302	0.318	0.372	0.457	0.527	0.627	0.682	0.775	0.852	0.930	1.007	1.084	1.162	1.317	1.394	1.549	1.627	1.782	1.936	2.091	2.401	2.634	2.866
	70	0.234	0.259	0.268	0.276	0.301	0.318	0.326	0.343	0.402	0.494	0.569	0.678	0.736	0.837	0.920	1.004	1.088	1.171	1.255	1.422	1.506	1.673	1.757	1.924	2.092	2.259	2.594	2.845	3.096
	80	0.250	0.277	0.286	0.295	0.322	0.340	0.349	0.367	0.438	0.528	0.608	0.724	0.787	0.894	0.984	1.073	1.163	1.252	1.342	1.521	1.610	1.789	1.878	2.057	2.236	2.415	2.773	3.041	3.309
	90	0.266	0.294	0.304	0.313	0.342	0.360	0.370	0.389	0.455	0.560	0.645	0.768	0.835	0.949	1.044	1.138	1.233	1.328	1.423	1.613	1.708	1.897	1.992	2.182	2.372	2.561	2.941	3.226	3.510
	100	0.280	0.310	0.320	0.330	0.360	0.380	0.390	0.410	0.480	0.590	0.680	0.810	0.880	1.000	1.100	1.200	1.300	1.400	1.500	1.700	1.800	2.000	2.100	2.300	2.500	2.700	3.100	3.400	3.700

Metal Orifice Water Flow – Liters/minute

Orifice Diameter Inches	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.02	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.028	0.029	0.031	0.032	0.033	
Size Number	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	31	32	33	
C_v	0.00035	0.0006	0.0009	0.0012	0.0015	0.0019	0.0025	0.0028	0.0034	0.0038	0.0043	0.0050	0.0055	0.0067	0.0073	0.0080	0.009	0.010	0.011	0.012	0.013	0.014	0.016	0.017	0.018	0.019	0.022	0.024	0.025	
Supply Pressure – psig	1	0.0013	0.0023	0.0033	0.0045	0.0057	0.0072	0.0095	0.0106	0.0129	0.0144	0.0163	0.0189	0.0208	0.0254	0.0276	0.0303	0.033	0.036	0.042	0.045	0.049	0.053	0.061	0.064	0.068	0.072	0.083	0.091	0.095
	2	0.0019	0.0033	0.0046	0.0064	0.0080	0.0102	0.0134	0.0150	0.0182	0.0203	0.0230	0.0268	0.0294	0.0359	0.0391	0.0428	0.047	0.051	0.059	0.064	0.070	0.075	0.086	0.091	0.096	0.102	0.118	0.128	0.134
	3	0.0023	0.0040	0.0056	0.0079	0.0098	0.0125	0.0164	0.0184	0.0223	0.0249	0.0282	0.0328	0.0361	0.0439	0.0479	0.0525	0.058	0.063	0.072	0.079	0.085	0.092	0.105	0.111	0.118	0.125	0.144	0.157	0.164
	4	0.0026	0.0046	0.0065	0.0091	0.0114	0.0144	0.0189	0.0212	0.0257	0.0288	0.0326	0.0379	0.0416	0.0507	0.0553	0.0606	0.067	0.073	0.083	0.091	0.098	0.106	0.121	0.129	0.136	0.144	0.167	0.182	0.189
	5	0.0030	0.0052	0.0073	0.0102	0.0127	0.0161	0.0212	0.0237	0.0288	0.0322	0.0364	0.0423	0.0466	0.0567	0.0618	0.0677	0.074	0.081	0.093	0.102	0.110	0.119	0.135	0.144	0.152	0.161	0.186	0.203	0.212
	6	0.0032	0.0057	0.0080	0.0111	0.0139	0.0176	0.0232	0.0260	0.0315	0.0352	0.0399	0.0464	0.0510	0.0621	0.0677	0.0742	0.082	0.089	0.102	0.111	0.121	0.130	0.148	0.158	0.167	0.176	0.204	0.223	0.232
	7	0.0035	0.0061	0.0086	0.0120	0.0150	0.0190	0.0250	0.0280	0.0341	0.0381	0.0431	0.0501	0.0551	0.0671	0.0731	0.0801	0.088	0.096	0.110	0.120	0.130	0.140	0.160	0.170	0.180	0.190	0.220	0.240	0.250
	8	0.0037	0.0065	0.0092	0.0128	0.0161	0.0203	0.0268	0.0300	0.0364	0.0407	0.0460	0.0535	0.0589	0.0717	0.0782	0.0857	0.094	0.103	0.118	0.128	0.139	0.150	0.170	0.182	0.193	0.220	0.236	0.257	0.268
	9	0.0040	0.0069	0.0098	0.0136	0.0170	0.0216	0.0284	0.0318	0.0386	0.0432	0.0488	0.0568	0.0625	0.0761	0.0829	0.0908	0.100	0.109	0.125	0.136	0.148	0.159	0.182	0.193	0.204	0.216	0.250	0.273	0.284
	10	0.0042	0.0073	0.0103	0.0144	0.0180	0.0227	0.0299	0.0335	0.0407	0.0455	0.0515	0.0599	0.0658	0.0802	0.0874	0.0958	0.105	0.115	0.132	0.144	0.156	0.168	0.192	0.203	0.215	0.227	0.263	0.287	0.299
	15	0.0051	0.0089	0.0126	0.0176	0.0220	0.0279	0.0367	0.0411	0.0498	0.0557	0.0630	0.0733	0.0806	0.0982	0.1070	0.1173	0.129	0.141	0.161	0.176	0.191	0.205	0.235	0.249	0.264	0.279	0.323	0.352	0.367
	20	0.0059	0.0103	0.0146	0.0203	0.0254	0.0322	0.0423	0.0474	0.0576	0.0643	0.0728	0.0846	0.0931	0.1134	0.1236	0.1354	0.149	0.163	0.186	0.203	0.220	0.237	0.271	0.288	0.305	0.322	0.372	0.406	0.423
	30	0.0073	0.0126	0.0178	0.0249	0.0311	0.0394	0.0518	0.0581	0.0705	0.0788	0.0892	0.1037	0.1140	0.1389	0.1514	0.1659	0.182	0.199	0.228	0.249	0.270	0.290	0.332	0.352	0.373	0.394	0.456	0.498	0.518
	40	0.0084	0.0146	0.0206	0.0287	0.0359	0.0455	0.0599	0.0670	0.0814	0.0910	0.1029	0.1197	0.1317	0.1604	0.1748	0.1915	0.211	0.230	0.263	0.287	0.311	0.335	0.383	0.407	0.431	0.455	0.527	0.575	0.599
	50	0.0094	0.0163	0.0230	0.0321	0.0402	0.0509	0.0669	0.0749	0.0910	0.1017	0.1151	0.1338	0.1472	0.1793	0.1954	0.2141	0.236	0.257	0.294	0.321	0.348	0.375	0.428	0.455	0.482	0.509	0.589	0.642	0.669
	60	0.0103	0.0179	0.0252	0.0352	0.0440	0.0557	0.0733	0.0821	0.0997	0.1114	0.1261	0.1466	0.1613	0.1965	0.2140	0.2346	0.258	0.281	0.323	0.352	0.381	0.411	0.469	0.498	0.528	0.557	0.645	0.704	0.733
	70	0.0111	0.0193	0.0272	0.0380	0.0475	0.0602	0.0792	0.0887	0.1077	0.1203	0.1362	0.1584	0.1742	0.2122	0.2312	0.2534	0.279	0.304	0.348	0.380	0.412	0.443	0.507	0.538	0.570	0.602	0.697	0.760	0.792
	80	0.0119	0.0207	0.0291	0.0406	0.0508	0.0643	0.0846	0.0948	0.1151	0.1287	0.1456	0.1693	0.1862	0.2268	0.2472	0.2709	0.298	0.325	0.372	0.406	0.440	0.474	0.542	0.576	0.609	0.643	0.745	0.813	0.846
	90	0.0126	0.0219	0.0309	0.0431	0.0539	0.0682	0.0898	0.1006	0.1221	0.1365	0.1544	0.1796	0.1975	0.2406	0.2622	0.2873	0.316	0.345	0.395	0.431	0.467	0.503	0.575	0.610	0.646	0.682	0.790	0.862	0.898
	100	0.0132	0.0231	0.0326	0.0454	0.0568	0.0719	0.0946	0.1060	0.1287	0.1438	0.1628	0.1893	0.2082	0.2536	0.2763	0.3028	0.333	0.363	0.416	0.454	0.492	0.530	0.606	0.644	0.681	0.719	0.833	0.908	0.946
Orifice Diameter Inches	0.035	0.037	0.038	0.039	0.04	0.041	0.042	0.043	0.047	0.052	0.055	0.06	0.063	0.067	0.07	0.073	0.076	0.079	0.081	0.086	0.089	0.094	0.096	0.1	0.104	0.109	0.113	0.12	0.125	
Size Number	35	37	38	39	40	41	42	43	47	52	55	60	63	67	70	73	76	79	81	86	89	94	96	100	104	109	113	120	125	
C_v	0.028	0.031	0.032	0.033	0.036	0.038	0.039	0.041	0.048	0.059	0.068	0.081	0.088	0.100	0.110	0.120	0.130	0.140	0.150	0.170	0.180	0.200	0.210	0.230	0.250	0.270	0.310	0.340	0.370	
Supply Pressure – psig	1	0.106	0.117	0.121	0.125	0.136	0.144	0.148	0.155	0.182	0.223	0.257	0.307	0.333	0.379	0.416	0.454	0.492	0.530	0.568	0.644	0.681	0.757	0.795	0.871	0.946	1.022	1.173	1.287	1.401
	2	0.150	0.166	0.171	0.177	0.193	0.203	0.209	0.219	0.257	0.316	0.364	0.434	0.471	0.535	0.589	0.642	0.696	0.749	0.803	0.910	0.964	1.071	1.124	1.231	1.338	1.445	1.660	1.820	1.981
	3	0.184	0.203	0.210	0.216	0.236	0.249	0.256	0.269	0.315	0.387	0.446	0.531	0.577	0.656	0.721	0.787	0.852	0.918	0.983	1.115	1.180	1.311	1.377	1.508	1.639	1.770	2.033	2.229	2.426
	4	0.212	0.235	0.242	0.250	0.273	0.288	0.295	0.310	0.363	0.447	0.515	0.613	0.666	0.757	0.833	0.908	0.984	1.060	1.136	1.287	1.363	1.514	1.590	1.741	1.893	2.044	2.347	2.574	2.801
	5	0.237	0.262	0.271	0.279	0.305	0.322	0.330	0.347	0.406	0.499	0.576	0.686	0.745	0.846	0.931	1.016	1.100	1.185	1.270	1.439	1.524	1.693	1.778	1.947	2.116	2.285	2.624	2.878	3.132
	6	0.260	0.287	0.297	0.306	0.334	0.352	0.362	0.380	0.445	0.547	0.631	0.751	0.816	0.927	1.020	1.113	1.205	1.298	1.391	1.576	1.669	1.854	1.947	2.133	2.318	2.504	2.874	3.153	3.431
	7	0.280	0.310	0.320	0.331	0.361	0.381	0.391	0.411	0.481	0.591	0.681	0.811	0.881	1.002	1.102	1.202	1.302	1.402	1.502	1.703	1.803	2.003	2.103	2.304	2.504	2.704	3.105	3.405	3.706.

.0003" to .0050" Dia.

Description

The Precision *Micro-Orifices*® are constructed of brass or stainless steel with orifice sizes from .0003" to .005" diameter. The orifices are used to accurately meter very low flow rates of gases. Optional stainless steel screens are available to protect the tiny orifices from minute contamination particles.

Applications

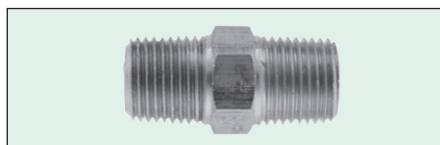
- Precision metering of very low flow rates of gases
- Standard for flow or leak rates
- Accurate timing in pneumatic circuits
- Flow limiting

Features

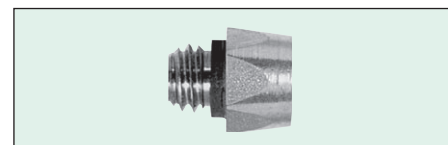
- High temperature capability (Type BLP, IBLP, K4LP, IALP)
- High pressure capability (Type BLP, K4LP, IBLP, IALP)
- Bi-directional flow
- High accuracy
- NIST traceable
- Optional in-line screens available (except Type IBLP, IALP)
- Orifice calibration available

Kits

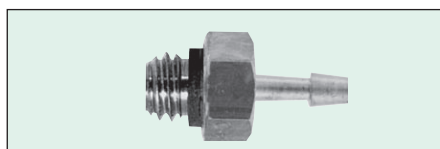
See page 30 for kit selection.



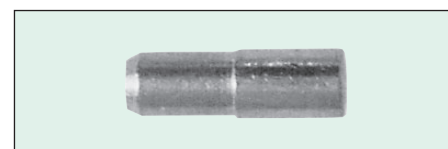
Type BLP - 1/8" NPT Nipple



Type QXLP - 10-32 Bleed Plug



Type MLP - 10-32 x 1/16" Barb



Type IBLP - Insert



Type K4LP - 1/4" OD Tube



Type IALP - Insert



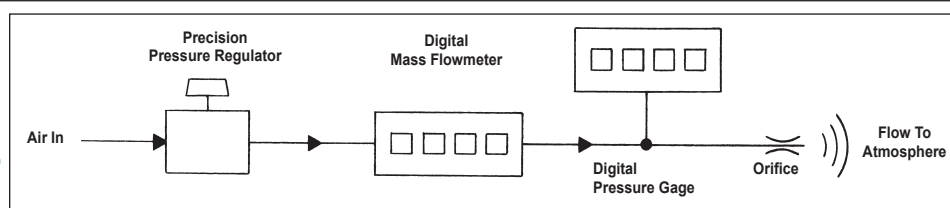
Type Y2LPSS - Replaceable Orifice Assembly

AIR FLOW — SCCM

Orifice Diameter (In.)	.0003	.0005	.0007	.0010	.0015	.0020	.0025	.0030	.0035	.0040	.0050
Size Number	0C	0E	0G	1	1E	2	2E	3	3E	4	5
Cv	.0000019	.0000053	.0000104	.0000216	.0000477	.0000840	.0001300	.0001860	.0002580	.0003490	.0005450
Supply Pressure — psig	5	0.50	1.38	2.70	5.60	12.4	20.9	33.8	48.2	67.9	144
	10	0.72	2.00	3.92	8.13	18.0	31.3	49.4	70.6	97.1	203
	15	0.90	2.51	4.92	10.2	22.2	40.2	62.6	88.7	123	253
	20	1.08	2.99	5.86	12.2	26.7	47.7	74.5	108	146	299
	25	1.24	3.44	6.74	14.0	31.0	55.0	86.0	124	168	344
	30	1.40	3.90	7.64	15.9	35.3	62.1	97.3	141	190	390
	40	1.74	4.83	9.47	19.7	43.8	77.4	123	173	233	482
	50	2.09	5.80	11.4	24.5	53.2	92.1	146	204	278	570
	60	2.42	6.73	13.2	28.4	61.8	107	169	237	324	662
	70	2.76	7.65	15.0	32.5	70.2	121	192	270	369	753
	80	3.09	8.57	16.8	36.5	78.9	135	215	303	415	845
	90	3.45	9.56	18.7	40.7	87.4	153	241	337	461	938
	100	3.80	10.6	20.9	44.8	96.1	168	269	371	504	1036
Flow Accuracy @ 25 psig	±0.40 SCCM	±0.50 SCCM	±0.60 SCCM	±0.70 SCCM	±1.5 SCCM	±4 SCCM	±6 SCCM	±8 SCCM	±10 SCCM	±20 SCCM	±20 SCCM

Above data applies to Types BLP, MLP, QXLP, IBLP, K4LP, IALP and Y2LPSS.

TEST PROCEDURE



Measurements made @ 70°F ; 29.75" Hg

CONVERSION FACTORS

SCFH = .00212 X SCCM

SLPM = .001 X SCCM

STANDARD CONDITIONS

68°F (20°C)

14.7 psia

UNITS

SCFH = Standard cu. ft. per hr.

SCCM = Standard cu. cm. per min.

SLPM = Standard liters per min.

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O'Keefe Controls Co.

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e-mail ca@okcc.com • website www.okcc.com

General Specifications

Maximum Operating Pressure –

• Type BLP (Brass)	2000 psig
• Type BLP (SS)	4000 psig
• Types MLP, QXLP	100 psig
• Type IBLP (SS)	4000 psig
• Type K4LP (SS)	4000 psig
• Type IALP (Brass)	2000 psig
• Type IALP (SS)	4000 psig
• Type Y2LPSS	200 psig

Materials of Construction –

- Type BLP - 303 SS or Brass
- Type MLP - Brass/Viton gasket
- Type QXLP-303 SS or Brass/Viton gasket
- Type IBLP - 303 SS
- Type K4LP - 316 SS
- Type IALP - 303 SS or Brass
- Type Y2LPSS - 303 SS or Brass with Viton gaskets

Accuracy

Standard Precision *Micro-Orifices*® are produced with very accurate characteristics and are production tested at an air supply pressure of 25 psig. The chart on page 25 lists the nominal flow at 25 psig and the accuracy of the measured flow for each orifice size.

Calibration

Measured air flow data is optionally available. Twenty flow data points, over the specified supply pressure range, are measured with NIST traceable instruments.

Flow Direction – Suitable for flow in either direction. Data in flow table is measured for the direction shown in construction drawings.

Flow – See chart on page 25 for air flow.

Flow Accuracy – See chart on page 25.

Orifice Diameter – .0003" to .0050" (eleven standard sizes). Consult factory for special sizes.

Cv Range – .000002 to .000545

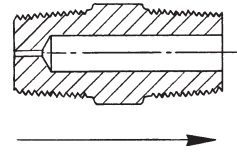
Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction. Fluids must be free of solid particles, .03 microns or larger.

Custom Orifice Sizes

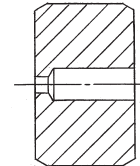
Custom orifice sizes, .0003" diameter and larger, can be produced to exacting air pressure and flow specifications. Using electronic pressure and flow measuring equipment that is NIST traceable, the custom *Micro-Orifices*® are produced to customer specifications. These custom orifices are available in types BLP, MLP, QXLP, IBLP, K4LP, IALP and Y2LPSS. A certificate of compliance to customer specifications is provided for all custom *Micro-Orifices*®. Contact factory for further details.

Construction

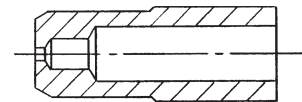
Type BLP



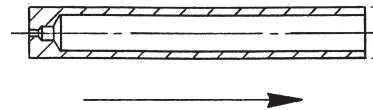
Type IALP



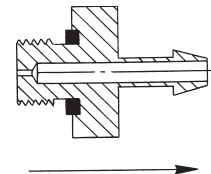
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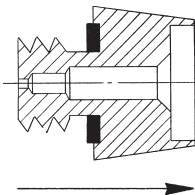
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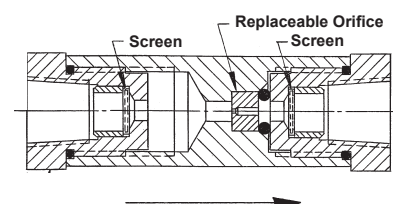
Type MLP



Type QXLP



Type Y2LPSS



O'Keefe Controls Co.

Measured Data Points

Air Flow

Pressure	Air Flow	Barometric Pressure
1		_____
2		_____
3		_____
4		_____
5		_____
6		_____
7		_____
8		_____
9		_____
10		_____
11		_____
12		_____
13		_____
14		_____
15		_____
16		_____
17		_____
18		_____
19		_____
20		_____

Ambient Temperature _____
 Flowmeter _____
 OKC Part No. _____
 I/D No. _____
 Purchased Order _____
 Customer _____
 Customer P/N _____
 Invoice _____
 Data By _____
 Date _____

O'Keefe Controls Co.

Precision *Micro-Orifices*®

CUSTOM PRODUCTION CERTIFICATE OF COMPLIANCE

Customer _____ Invoice _____
 Purchase Order _____ Part Number _____
 Sample # _____
 Marking _____

Test Pressure _____ Ambient Temperature _____

Air Flow Required _____ Barometric Pressure _____

Flow Accuracy Guaranteed _____

Measured Flow _____ NIST Traceable

Pressure Instrument _____ ☐ Yes ☐ No

Flow Instrument _____ ☐ Yes ☐ No

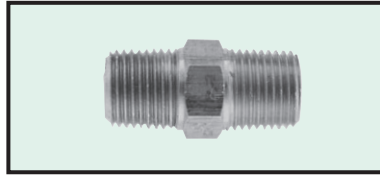
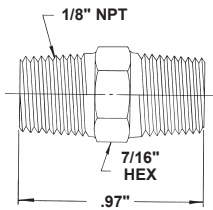
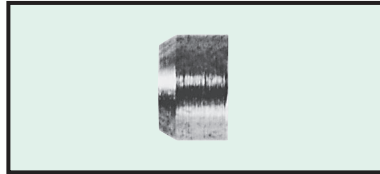
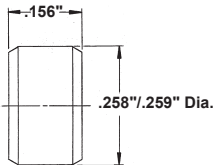
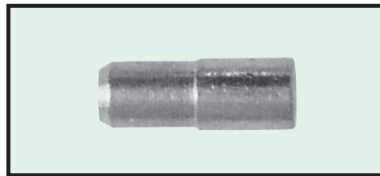
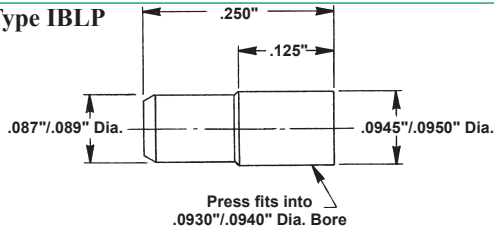
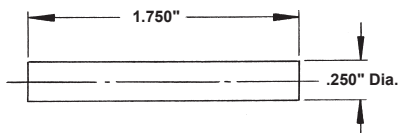
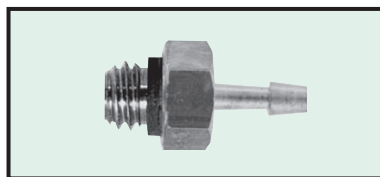
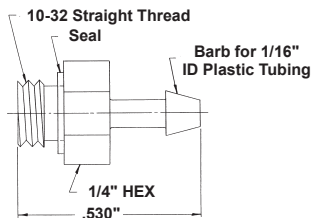
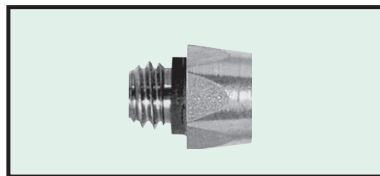
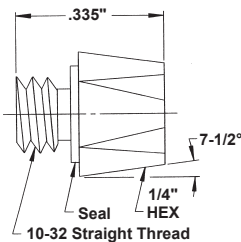
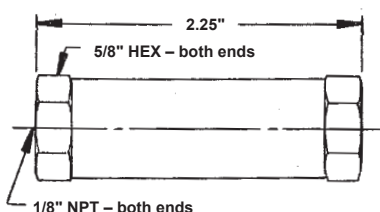
Date _____ Certifier _____

O'Keefe Controls Co.

Note:
Screens (15 microns or finer)
are recommended
for use with *Micro-Orifices*®

Robert F. O'Keefe
President

Dimensions

Type BLP

Type IALP

Type IBLP

Type K4LP

Type MLP

Type QXLP

Type Y2LPSS


Specifications

HEX NIPPLE

Maximum Operating Pressure –

Brass – 2000 psig

303 SS – 4000 psig

Orifice Sizes – .0003" to .005"

Orifice Size Numbers – see chart on page 28

INSERT

Maximum Operating Pressure –

Brass – 2000 psig (body only)

303 SS – 4000 psig (body only)

Orifice Sizes – .0003" to .005"

Orifice Size Numbers – see chart on page 28

INSERT

Maximum Operating Pressure – 4000 psig

Material – 303 SS

Orifice Sizes – .0003" to .005"

Orifice Size Numbers – see chart on page 28

TUBE

for compression fittings

Maximum Operating Pressure – 4000 psig

Material – 316 SS

Orifice Sizes – .0003" to .005"

Orifice Size Numbers – see chart on page 28

ADAPTER

Maximum Operating Pressure – 100 psig

Material – Brass/Viton gasket

Orifice Sizes – .0003" to .005"

Orifice Size Numbers – see chart on page 28

BLEED PLUG

Maximum Operating Pressure – 100 psig

Material – Brass or 303 SS with

Viton gaskets

Orifice Sizes – .0003" to .005"

Orifice Size Numbers – see chart on page 28

REPLACEABLE ORIFICE

Maximum Operating Pressure – 200 psig

Material – Brass or 303 SS with

Viton gaskets

Orifice Sizes – .0003" to .005"

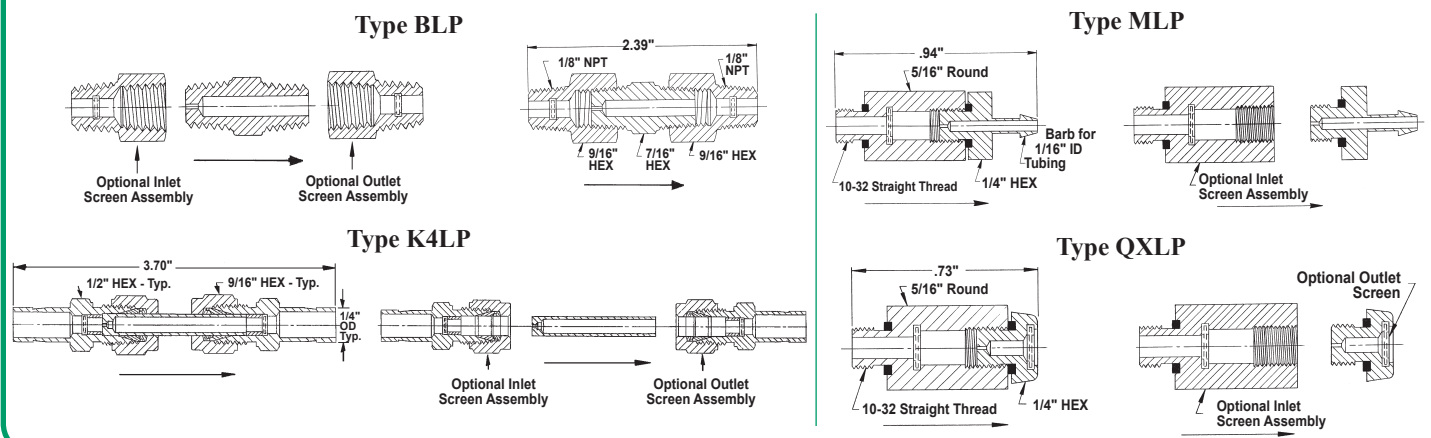
Orifice Size Numbers – see chart on page 28

Replaceable Orifice – Type IALP

Precision *Micro-Orifices*®

.0003" to .0050" DIA.

SCREEN OPTIONS



Optional Screens

Micro-Orifices® must be used with extremely clean fluids (filtered to .03 microns). Otherwise, there is a high probability of clogging the orifice with solid particles. Even with clean fluids, there is also the possibility of introducing contaminants during assembly of the fluid system. To minimize the possibility of clogging small orifices, it is recommended that screens be installed on the upstream and downstream sides of the orifice, to protect against handling contamination.

Fifteen micron screens are normally used with *Micro-Orifices*®, to minimize contamination that occurs during handling or assembly. Screen material is stainless steel.

Ordering Information

Identify the part number of *Micro-Orifices*® using the complete detail on the chart at right. See examples also.

For orifice assemblies without optional screens, use the base number only. For assemblies that include screens, add the suffixes shown in the table. Both inlet and outlet screens are rated for 15 microns.

SIZE CHART	
Size Number	Orifice Dia. In.
0C	.0003
0E	.0005
0G	.0007
1	.0010
1E	.0015
2	.0020
2E	.0025
3	.0030
3E	.0035
4	.0040
5	.0050

PART NUMBERS — *Micro-Orifices*®

BODY	BASE NUMBER			OPTIONS**	
	TYPE	SIZE NO.	MATERIAL	INLET SCREEN	OUTLET SCREEN
Brass	BLP	— See Chart	— BR	/ DSO-2-BR	/ DSO-2-BR
SS	BLP	— See Chart	— SS	/ DSO-2-SS	/ DSO-2-SS
SS	IBLP	— See Chart	— SS	/ —	—
Brass	MLP	— See Chart	— BR	/ FMS-2-BR	—
Brass	QXLP	— See Chart	— BR	/ FMS-2-BR	*
SS	QXLP	— See Chart	— SS	/ FMS-2-SS	*
Brass	IALP	— See Chart	— BR	—	—
SS	IALP	— See Chart	— SS	—	—
SS	K4LP	— See Chart	— SS	/ SLR4-2-SS	/ SLR4-2-SS
Brass	Y2LPSS	— See Chart	— BR	Inlet/Outlet Screens are included	
SS	Y2LPSS	— See Chart	— SS		

* Change Type to QXSLP. See example 3 below.

** Wire screens are rated 15 microns. Wire is 304SS.

EXAMPLES

1. Type BLP

Orifice .0015" diameter
Material: Stainless Steel
No Options
P/N BLP-1E-SS

2. Type BLP

Orifice .0010" diameter
Material: Brass
Inlet Screen
Outlet Screen
P/N BLP-1-BR/(2)DSO-2-BR

3. Type QXLP

Orifice .0007" diameter
Material: Brass
Inlet Screen
Outlet Screen
P/N QXSLP-0G-BR/FMS-2-BR

4. Type MLP

Orifice .0035" diameter
Material: Brass
Inlet Screen only
P/N MLP-3E-BR/FMS-2-BR

5. Type QXLP

Orifice .0025" diameter
Material: Stainless Steel
Inlet Screen only
P/N QXLP-2E-SS/FMS-2-SS

6. Type IBLP

Orifice .0005" diameter
Material: Stainless Steel
No Options
P/N IBLP-0E-SS

7. Type IALP

Orifice .002" diameter
Material: Stainless Steel
No Options
P/N IALP-2-SS

8. Type K4LP

Orifice .001" diameter
Material: 316 SS
Inlet Screen
Outlet Screen
P/N K4LP-1-SS/(2) SLR4-2-SS

9. Type Y2LPSS

Orifice .0005" diameter
Material: Brass
Inlet/Outlet Screens - Standard
P/N Y2LPSS-0E-BR

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O'Keefe Controls Co.

P.O. BOX Q • TRUMBULL, CT 06611 • CT PHONE (203) 261-6711 • TOLL FREE PHONE (800) 533-3285 • FAX (203) 261-8331

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e-mail ca@okcc.com • website www.okcc.com

FLOW METERING

Description

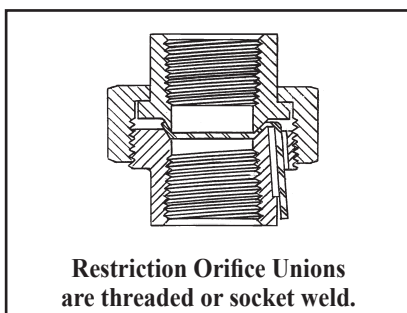
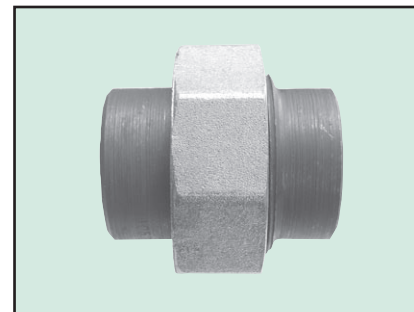
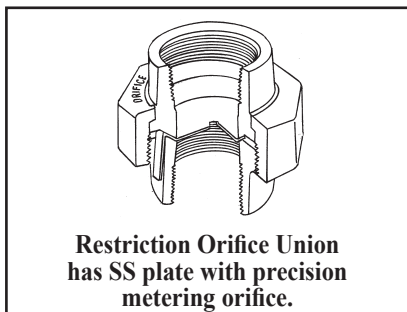
Restriction unions contain an easily replaceable orifice plate and are available in carbon steel or stainless steel. The assembly is used in liquid or gas piping systems to meter flow rate of the fluid. The all metal assembly is capable of a wide range of pressure and temperature variables.

Applications

Restriction orifice unions are used in setting flow rates of a wide variety of fluids.

- Compressed Air
- Water
- Steam
- Hydraulic Fluids
- Gases
- Chemicals
- Coolants

Flow rates can be easily changed by inserting other replaceable metering plates.



Specifications

Materials

Orifice Plate – 316 Stainless Steel

Union – A105 Carbon Steel or 316 SS

Sizes – 1/4", 3/8", 1/2", 3/4", 1", 1-1/4", 1-1/2", 2"

Connections – NPT or Socket Weld

Pressure Rating

Carbon Steel – 3000 psig

Stainless Steel – 3000 psig

Part Numbers – Type ROU

Known Orifice Size

If orifice size is known provide

- Orifice Diameter
- Nominal Pipe Size
- End Connections
- Union Material

"Part Number"

<u>TYPE</u>	<u>ORIFICE</u>	<u>PIPE SIZE</u> <u>CODE</u>	<u>UNION</u> <u>ENDS</u>	<u>UNION</u> <u>MATERIAL</u>
ROU	.060 (.060")	4 (1/2" NPT)	N (NPT)	SS (316 SS)
└─ 3 decimal places eg. .060", .210", 1.250"				

Unknown Orifice Size

If orifice size is unknown provide

- Nominal Pipe Size
- Data for Orifice Calculation
- End Connections
- Union Material

"Part Number"

<u>TYPE</u>	<u>ORIFICE</u>	<u>PIPE SIZE</u> <u>CODE</u>	<u>UNION</u> <u>ENDS</u>	<u>UNION</u> <u>MATERIAL</u>
ROU	xx (calculate)	8 (1")	S (Socket Weld)	CS (Carbon Steel)

Data Required for Calculation

- Fluid Type (Air, Water, Steam, etc.)
- Fluid Supply Pressure and Temperature
- Pressure Differential Across Orifice
- Required Flow Rate
- Pipe ID or Pipe Schedule
- Specific Gravity, if not air or water

With the above data the orifice size can be calculated.

To order plates only, consult factory.

Orifice Kits

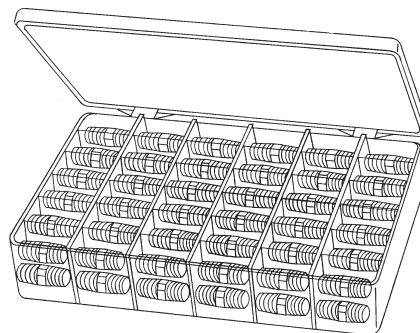
METAL

Description

For research and development of products requiring flow metering, it is convenient to have an accurate array of precision orifices. The kits described on this page provide a wide range of orifice sizes and a corresponding wide range of metered flow.

Metal orifice and sapphire orifice kits use compartmented plastic boxes for storage of the precision restrictors.

The **Micro-Orifices**® provided in kits include protective screens to protect against contamination during handling and installation.



Kit contains an assortment of orifice sizes of one type.

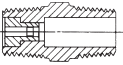
Metal Orifices

Type		Kit Part Number	Reference Catalog Page	Body Material	Quantity	Orifice Diameters
B		KB-58-BR	8	Brass	58 (1 each)	.004" to .125"
		KB-174-BR	8	Brass	174 (3 each)	.004" to .125"
		KB-58-SS	8	303SS	58 (1 each)	.004" to .125"
		KB-174-SS	8	303SS	174 (3 each)	.004" to .125"
BT		KBT-30-BR	6	Brass	30 (1 each)	.004" to .035"
		KBT-90-BR	6	Brass	90 (3 each)	.004" to .035"
BW		KBW-42-BR	6	Brass	42 (1 each)	.004" to .063"
		KBW-126-BR	6	Brass	126 (3 each)	.004" to .063"
		KBW-42-SS	6	303SS	42 (1 each)	.004" to .063"
		KBW-126-SS	6	303SS	126 (3 each)	.004" to .063"
D		KD-58-BR	8	Brass	58 (1 each)	.004" to .125"
		KD-174-BR	8	Brass	174 (3 each)	.004" to .125"
		KD-58-SS	8	303SS	58 (1 each)	.004" to .125"
		KD-174-SS	8	303SS	174 (3 each)	.004" to .125"
E		KE-58-BR	8	Brass	58 (1 each)	.004" to .125"
		KE-174-BR	8	Brass	174 (3 each)	.004" to .125"
		KE-58-SS	8	303SS	58 (1 each)	.004" to .125"
		KE-174-SS	8	303SS	174 (3 each)	.004" to .125"
K4		KK4-30-SS	18	303 SS	30 (1 each)	.004" to .035"
		KK4-90-SS	18	303 SS	90 (3 each)	.004" to .035"
M		KM-30-BR	6	Brass	30 (1 each)	.004" to .035"
		KM-90-BR	6	Brass	90 (3 each)	.004" to .035"
N		KN-42-BR	6	Brass	42 (1 each)	.004" to .063"
		KN-126-BR	6	Brass	126 (3 each)	.004" to .063"
QX		KQX-30-BR	6	Brass	30 (1 each)	.004" to .035"
		KQX-90-BR	6	Brass	90 (3 each)	.004" to .035"
		KQX-30-SS	6	303SS	30 (1 each)	.004" to .035"
		KQX-90-SS	6	303SS	90 (3 each)	.004" to .035"
T		KT-30-BR	6	Brass	30 (1 each)	.004" to .035"
		KT-90-BR	6	Brass	90 (3 each)	.004" to .035"
		KT-30-SS	6	303SS	30 (1 each)	.004" to .035"
		KT-90-SS	6	303SS	90 (3 each)	.004" to .035"
W		KW-42-BR	6	Brass	42 (1 each)	.004" to .063"
		KW-126-BR	6	Brass	126 (3 each)	.004" to .063"
		KW-42-SS	6	303SS	42 (1 each)	.004" to .063"
		KW-126-SS	6	303SS	126 (3 each)	.004" to .063"

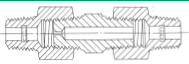
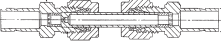
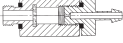
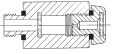
® Registered Trademark of O'Keefe Controls Co.

SAPPHIRE AND MICRO

Sapphire Orifices

Type		Kit Part Number	Reference Catalog Page	Body Material	Quantity	Orifice Diameters
A		KA-96-NY	3	Nylon	96 (3 each)	.0012" to .0252"
F		KF-96-NY	3	Nylon	96 (3 each)	.0012" to .0252"
J		KJ-96-BR	3	Brass	96 (3 each)	.0012" to .0252"
		KJ-96-SS	3	303 SS	96 (3 each)	.0012" to .0252"
L		KL-96-BR	3	Brass	96 (3 each)	.0012" to .0252"
		KL-96-BR-EN	3	Brass (Plated)	96 (3 each)	.0012" to .0252"
P		KP-96-BR	3	Brass	96 (3 each)	.0012" to .0252"
S		KS-96-BR	3	Brass	96 (3 each)	.0012" to .0252"
		KS-96-BR-EN	3	Brass (Plated)	96 (3 each)	.0012" to .0252"
SF		KSF-96-BR	3	Brass	96 (3 each)	.0012" to .0252"

Micro-Orifices® with Screens Included

BLP		KBLPS-9-BR	28	Brass	9 (1 each)	.0003" to .0035"
		KBLPS-9-SS	28	303 SS	9 (1 each)	.0003" to .0035"
K4LP		KK4LPS-9-SS	28	316 SS	9 (1 each)	.0003" to .0035"
MLP		KMLPS-9-BR	28	Brass	9 (1 each)	.0003" to .0035"
QXLP		KQXSPL-9-BR	28	Brass	9 (1 each)	.0003" to .0035"
		KQXSPL-9-SS	28	303 SS	9 (1 each)	.0003" to .0035"

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Other Precision Orifice Kits

The kits identified on pages 30 and 31 include only the popular orifice types. Consult factory for price and delivery on other orifice kits not included here.

Orifice kits which include screens can also be provided. Consult the factory for price and delivery.

Screened Metal Orifices

INTEGRAL WIRE SCREENS

Description

Stainless steel wire screens are mounted within the precision orifice assembly to protect the orifice from contamination that could be introduced during handling or installation. The fine screens are not intended to replace normal filtration equipment, but rather to augment the protection of small orifices.

Applications

The integral screen/orifice assembly provides a compact arrangement.

Type BS and ES – The screen protects the orifice from particles in the pressurized fluid.

Types BMMS, QS, QXS – The screen protects the orifice from particles that could migrate from outside, when there is no fluid flow.

Type US – The dual screen protects the orifices from particles that could enter in either direction.

General Specifications

Maximum Operating Pressure –

Type BS, BMMS, ES

Brass 2000 psig

303 SS 4000 psig

Type QS, QXS 100 psig

Type US (body only) 4000 psig

Maximum Operating Pressure Differential (MOPD) – 100 psid for all types.

Flow – See flow charts on pages 20 and 21. The screen will cause a decrease of 1 to 2% in flow chart value.

Orifice Diameter Accuracy – $\pm .0005"$

C_v Range – .00035 to .028

See pages 20 and 21.

Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction.

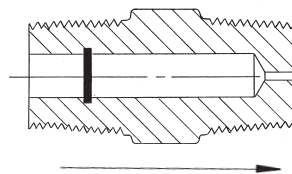
Dimensions – See drawings on page 33.

Screen Material – 304 SS

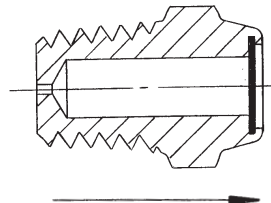
Size Number	Orifice Dia. In.	Size Number Range
4	.0039	Type BS or ES
5	.0051	
6	.0059	
7	.0071	
8	.0079	
9	.0091	
10	.0102	
11	.0110	
12	.0122	
13	.0130	
14	.0142	Type BMMS
15	.0150	
16	.016	Brass 4-35
17	.017	
18	.018	303 SS 4-35
19	.019	
20	.020	Type QS
21	.021	
22	.022	Type QXS
23	.023	
24	.024	Type US
25	.025	
26	.026	303 SS 4-35
27	.027	
28	.028	
29	.029	
31	.031	
32	.032	
33	.033	
35	.035	

Construction

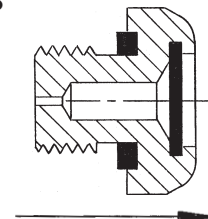
Type BS or ES



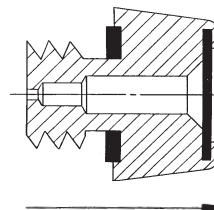
Type BMMS



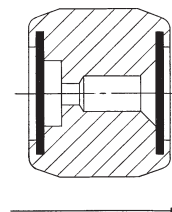
Type QS



Type QXS



Type US



Flow Direction

Metal Orifice Assemblies can be used for flow in either direction. The data on pages 20 and 21 is for a flow direction as shown in the right column on this page.

Part Numbers

The complete part number for a screened orifice assembly includes Type, Size Number, and Body Material.

EXAMPLES

Type	Size Number	Body Material	Part Number
BS	10 (.010")	SS	BS-10-SS
QS	4 (.004")	Brass	QS-4-BR
US	16 (.016")	SS	US-16-SS

Screen Filter Ratings

Orifice Size No.	Micron Rating
4 - 10	15
11 - 16	25
17 - 35	100

Screened Metal Orifices

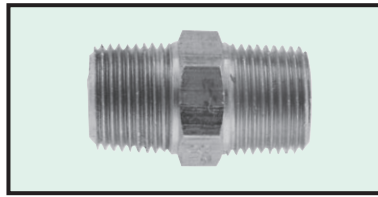
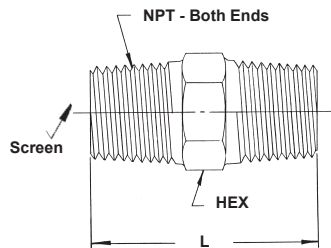
33

Dimensions

INTEGRAL WIRE SCREENS

Specifications

Type BS or ES



Type	Dim. L	HEX	NPT
BS	.970"	7/16"	1/8"
ES	1.38"	9/16"	1/4"

HEX NIPPLE

Body and Orifice – Brass or 303 SS

Threads – 1/8" or 1/4" NPT

Maximum Operating Pressure –

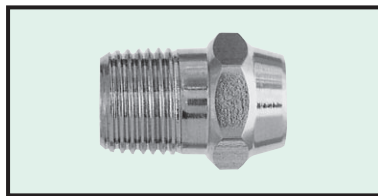
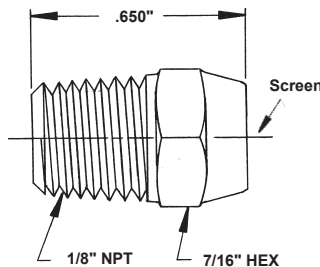
Brass – 2000 psig

303 SS – 4000 psig

MOPD – 100 psid

Standard Orifice Sizes – .004" to .035" Dia.

Type BMMS



BLEED PLUG

Body and Orifice – Brass or 303 SS

Thread – 1/8" NPT

Maximum Operating Pressure –

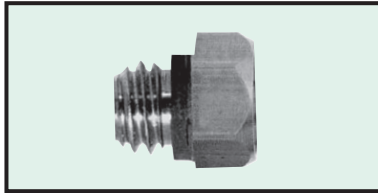
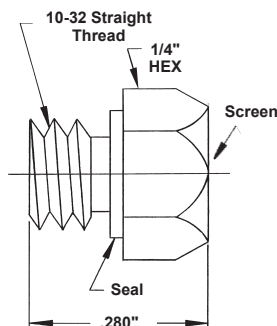
Brass – 2000 psig

303 SS – 4000 psig

MOPD – 100 psid

Standard Orifice Sizes – .004" to .035" Dia.

Type QS



BLEED PLUG

Body and Orifice – Brass

Thread – 10-32 UNF

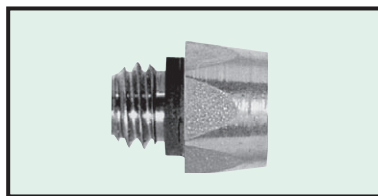
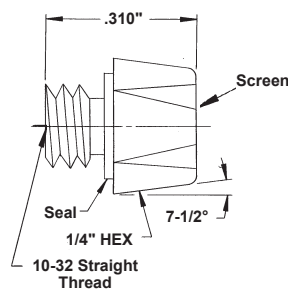
Thread Seal – Viton

Standard Orifice Sizes – .004" to .035" Dia.

Maximum Operating Pressure – 100 psig

MOPD – 100 psid

Type QXS



BLEED PLUG

Body and Orifice – 303 SS

Thread – 10-32 UNF

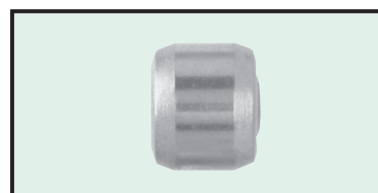
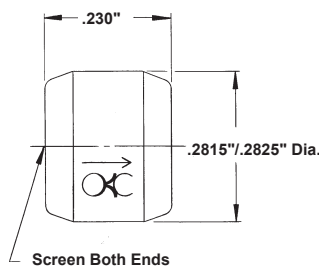
Thread Seal – Viton

Standard Orifice Sizes – .004" to .035" Dia.

Maximum Operating Pressure – 100 psig

MOPD – 100 psid

Type US



DUAL SCREEN INSERT

Body and Orifice – 303 SS

Screen – 304 SS

Press Fit Dimension –

Press into bore .2795"/.2805" Dia.

Standard Orifice Sizes – .004" to .035" Dia.

Maximum Operating Pressure – 4000 psig

MOPD – 100 psid

Screened Metal Orifices

INTEGRAL WIRE SCREENS

Description

Stainless steel wire screens are mounted within the precision orifice assembly to protect the orifice from contamination that could be introduced during handling or installation. The fine screens are not intended to replace normal filtration equipment, but rather to augment the protection of small orifices.

Applications

The integral screen/orifice assembly provides a compact arrangement.

All types on this page

The screen is located upstream of the orifice and protects against particles carried by the pressurized fluid.

For protection against contamination in reverse flow situations add an external screen downstream of the orifice.

General Specifications

Maximum Operating Pressure –

See page 35.

Maximum Operating Pressure Differential (MOPD) – 100 psi.

Flow – See flow charts on pages 20 and 21. The screen will cause a decrease of 1 to 2% in flow chart value.

Orifice Diameter Accuracy – $\pm .0005"$

C_v Range – .00035 to .028

See pages 20 and 21.

Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction.

Dimensions – See drawings on page 35.

Screen Material – 304 SS

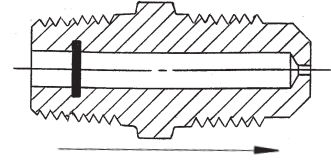
Size Number	Orifice Dia. In.	Size Number Range
4	.0039	4-35
5	.0051	
6	.0059	
7	.0071	
8	.0079	
9	.0091	
10	.0102	
11	.0110	
12	.0122	
13	.0130	
14	.0142	BFSS
15	.0150	DS
16	.016	
17	.017	FFOS
18	.018	
19	.019	FMOS
20	.020	
21	.021	GS
22	.022	
23	.023	IAS
24	.024	
25	.025	ODS
26	.026	
27	.027	
28	.028	
29	.029	
31	.031	
32	.032	
33	.033	
35	.035	

Flow Direction

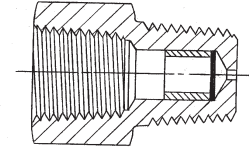
Metal Orifice Assemblies can be used for flow in either direction. The data on pages 20 and 21 is for a flow direction as shown in the right column on this page.

Construction

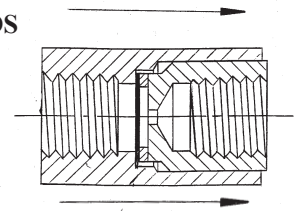
Type BFSS



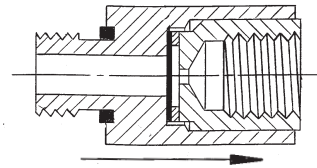
Type DS, GS



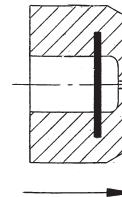
Type FFOS



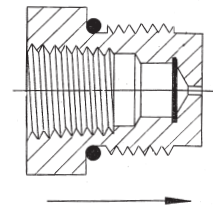
Type FMOS



Type IAS



Type ODS



Screen Filter Ratings

Orifice Size No.	Micron Rating
4 - 10	15
11 - 16	25
17 - 35	100

Part Numbers

The complete part number for a screened orifice assembly includes Type, Size Number, and Body Material.

EXAMPLES

Type	Size Number	Body Material	Part Number
BFSS	10 (.010")	Brass	BFSS-10-BR
GS	4 (.004")	SS	GS-4-SS
IAS	16 (.016")	Brass	IAS-16-BR

Screened Metal Orifices

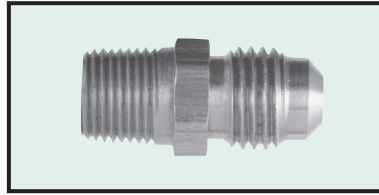
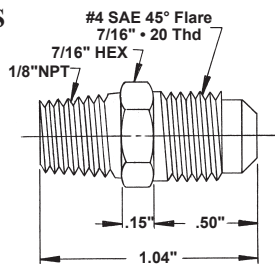
35

INTEGRAL WIRE SCREENS

Dimensions

Specifications

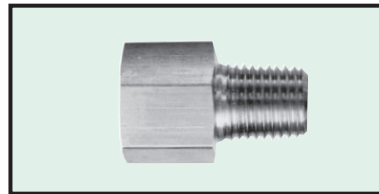
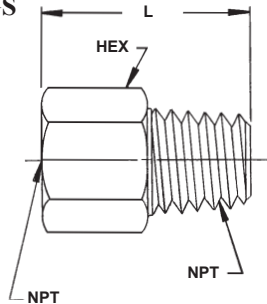
Type BFSS



SAE 45° FLARE ADAPTER

Body and Orifice – Brass
Maximum Operating Pressure – 2000 psig
MOPD – 100 psid
Standard Orifice Sizes – .004" to .035" Dia.

Type DS, GS

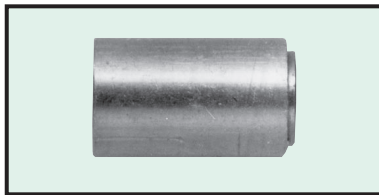
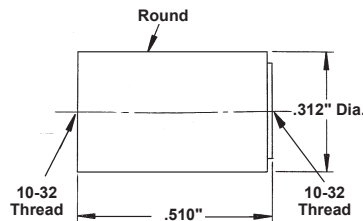


ADAPTER

Body and Orifice – Brass or 303 SS
Minimum Operating Pressure
 Brass Body – 2000 psig
 SS Body – 4000 psig
MOPD – 100 psid
Standard Orifice Sizes – .004" to .035" Dia.

TYPE	Dim. L	HEX	NPT
DS	.88"	9/16"	1/8"
GS	1.25"	3/4"	1/4"

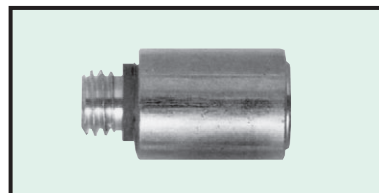
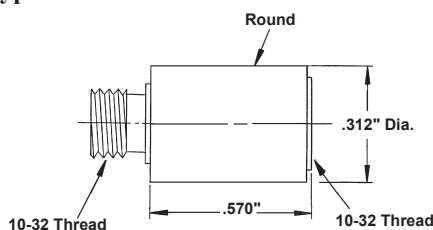
Type FFOS



COUPLER

Body and Orifice – Brass or 303 SS
Maximum Operating Pressure – 100 psig
MOPD – 100 psid
Standard Orifice Sizes – .004" to .035" Dia.

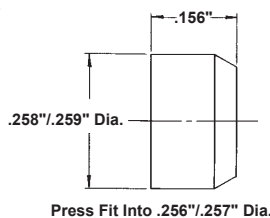
Type FMOS



ADAPTER

Body and Orifice – Brass or 303 SS
Maximum Operating Pressure – 100 psig
MOPD – 100 psid
Seal – Viton
Standard Orifice Sizes – .004" to .035" Dia.

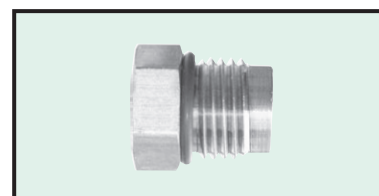
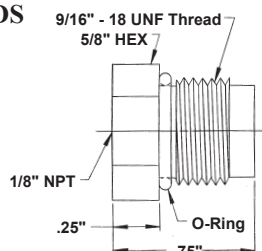
Type IAS



INSERT

Body and Orifice – Brass
Maximum Operating Pressure – 2000 psig
MOPD – 100 psid
Standard Orifice Sizes – .004" to .035" Dia.

Type ODS



O-RING ADAPTER

Body and Orifice – Brass or 303 SS
Maximum Operating Pressure – 2000 psig
MOPD – 100 psid
Seal – Viton
Standard Orifice Sizes – .004" to .035" Dia.

Screened Sapphire Orifices

INTEGRAL WIRE SCREENS

Description

Stainless steel wire screens are mounted within the precision orifice assembly to protect the orifice from contamination that could be introduced during handling or installation. The fine screens are not intended to replace normal filtration equipment, but rather to augment the protection of small orifices.

Applications

The integral screen/orifice assembly provides a compact arrangement.

Type BTFS and BWFS – The screen is located upstream of the orifice and protects against particles carried by the pressurized fluid.

For protection against contamination in reverse flow situations add an external screen downstream of the orifice.

Type JSS – The dual screen protects the orifice from particles that could enter in either direction.

General Specifications

Maximum Operating Pressure –
100 psig

Maximum Differential Pressure Across Screen – 100 psid

Flow – See flow charts on page 22.

The screen will cause a decrease of 1 to 2% in flow chart value.

Orifice Diameter Accuracy – $\pm .0005"$

C_v Range – .000030 to .013

See page 22.

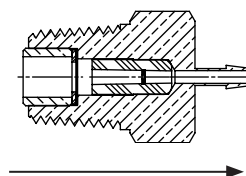
Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction.

Dimensions – See drawings on page 37.

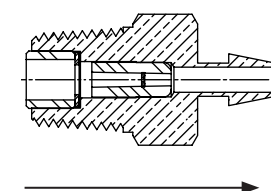
Screen Material – 304 SS

Construction

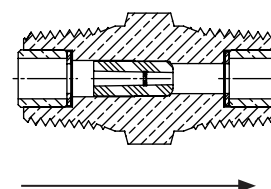
Type BTFS



Type BWFS



Type JSS



Size Number	Orifice Dia. In.	Size Number Range
3	.0012	3-64
4	.0016	
5	.0020	
6	.0024	
7	.0028	
8	.0031	
9	.0035	
10	.0039	
11	.0043	
12	.0047	
13	.0051	Types
14	.0055	
15	.0059	BTFS
16	.0063	BWFS
17	.0067	JSS
18	.0071	
20	.0079	
22	.0087	
24	.0094	
26	.0102	
28	.0110	
30	.0118	
32	.0126	
34	.0134	
36	.0142	
40	.0157	
44	.0173	
48	.0189	
52	.0205	
54	.0213	
58	.0228	
64	.0252	

Flow Direction

There is a preferred flow direction for sapphire orifice assemblies. See construction drawings at right and on page 37.

Part Numbers

The complete part number for a screened orifice assembly includes Type, Size Number, and Body Material.

EXAMPLES

Type	Size Number	Body Material	Part Number
BTFS	4 (.0016")	Brass	BTFS-4-BR
BWFS	10 (.0039")	SS	BWFS-10-SS
JSS	52 (.0205")	Brass	JSS-52-BR

Screen Filter Ratings

Orifice Size No.	Micron Rating
3 - 26	15
28 - 40	25
44 - 64	100

Screened Sapphire Orifices

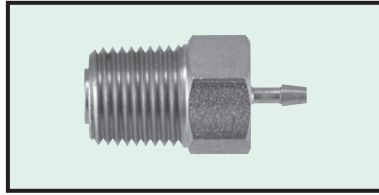
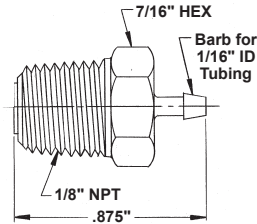
37

INTEGRAL WIRE SCREENS

Dimensions

Specifications

Type BTFS



ADAPTER

Materials

Body – Brass or 303 SS

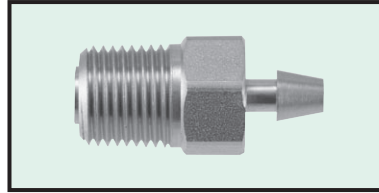
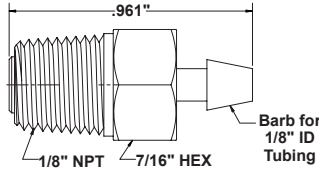
Orifice – Sapphire/Nylon Sleeve

Maximum Operating Pressure – 100 psig

Orifice Sizes – .0012" to .0252" Dia.

Connections – 1/8" NPT x 1/16" Barb

Type BWFS



ADAPTER

Materials

Body – Brass or 303 SS

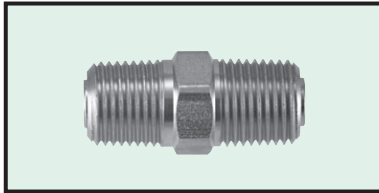
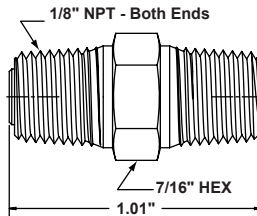
Orifice – Sapphire/Nylon Sleeve

Maximum Operating Pressure – 100 psig

Orifice Sizes – .0012" to .0252" Dia.

Connections – 1/8" NPT x 1/8" Barb

Type JSS



HEX NIPPLE

Materials

Body – Brass or 303 SS

Orifice – Sapphire/Nylon Sleeve

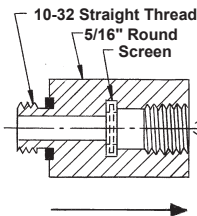
Maximum Operating Pressure – 100 psig

Orifice Sizes – .0012" to .0252" Dia.

Connections – 1/8" NPT

2 PIECE CONSTRUCTION

Type FMS

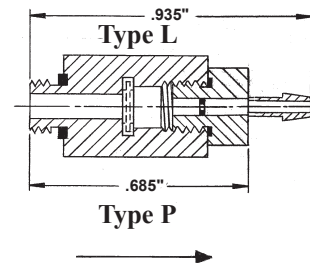
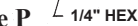


Type L

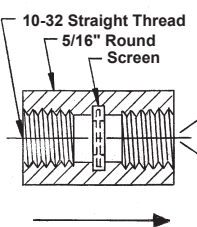


Synthetic Sapphire Orifice

Type P



Type FFS

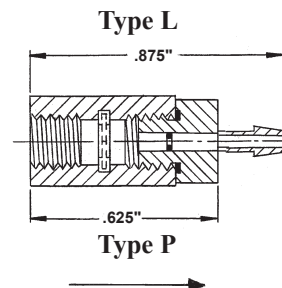
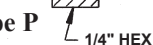


Type L



Synthetic Sapphire Orifice

Type P



Part Numbers

Select the screen assembly part number from page 38 (Type FFS or FMS). Select the sapphire orifice assembly from page 3 (Type L or Type P).

EXAMPLES

FFS-1-BR/P-7-BR

FMS-2-BR/L-20-BR

Miniature In-Line Screens

SS WIRE SCREENS

Description

Fine screens are used to protect orifices and other critical components from the occasional particles that enter the fluid during installation or otherwise. They are not intended to replace normal filtration equipment, but rather to augment the protection of critical components in fluid control systems.

Four sizes of screen particle retention are offered; 10, 15, 25 and 100 microns. The stainless steel wire screens do not introduce loose particles into the fluid stream. The screens are thoroughly cleaned to prevent inadvertent introduction of contaminants.

Applications

In-line screens are suitable for use with liquids or gases compatible with the materials of construction. The screens protect critical components such as orifices from clogging or reducing flow rate.

Applications for in-line screens include protection of:

- Precision Orifices
- Pneumatic Transducers
- Gas and Liquid Flow Instruments
- Medical Devices
- Filling and Purging Systems
- Pneumatic Timers
- Transmitters
- Pneumatic Transmission Lines
- Hydraulic Controls
- Leak Test Equipment
- Flow Measurement Devices

Features

The in-line screen products are all metal; the screen material is made from fine stainless steel wire.

- Particle retention size as small as 10 microns
- Miniature fittings and screens
- Clean assemblies
- No loose fibers or particles
- Long life screen material
- Well defined flow characteristics
- Compatible with standard 10-32 and NPT fittings

General Specifications

Body Materials – Brass or 303 SS
– Viton Seal on Type FMS

Screen Material – 304 SS

Maximum Operating Pressure
– Brass (NPT) – 2000 psig
– 304 SS (NPT) – 4000 psig
– 10-32 Threads – 100 psig

Maximum Pressure Differential Across Screen (MOPD) – 100 psid

Flow – See C_v in chart on page 39

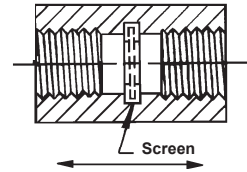
Fluids – Use with liquids or gases compatible with materials of construction

Dimensions – See drawings on page 39

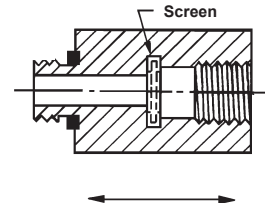
Screen Ratings – 10, 15, 25 and 100 microns
See chart below

Construction

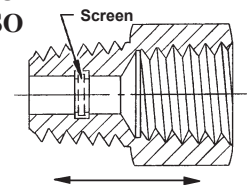
Type FFS



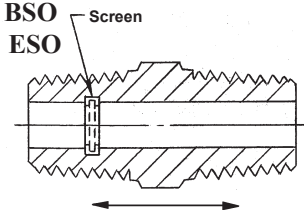
Type FMS



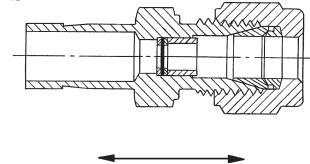
Type DSO GSO



Type BSO ESO



Type SLR4



Part Numbers

The part number consists of Type, Screen Size Number, and Body Material.

EXAMPLES

Type	Screen Size Number	Body Material	Part Number
FMS	2 (15 micron)	SS	FMS-2-SS
DSO	20 (100 micron)	SS	DSO-20-SS
SLR4	5 (25 micron)	SS	SLR4-5-SS
ESO	1 (10 micron)	Brass	ESO-1-BR

Screen Filter Ratings

Particle Retention Micron	Particle Retention Inch	Screen Size Number
10	.0004	1
15	.0006	2
25	.0010	5
100	.0040	20

Miniature In-Line Screens

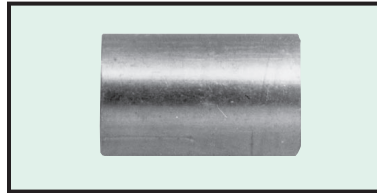
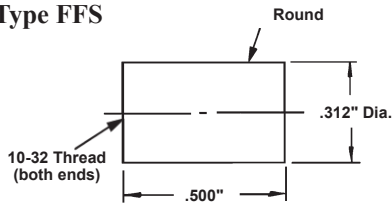
39

SS WIRE SCREENS

Dimensions

Specifications

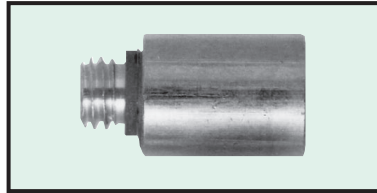
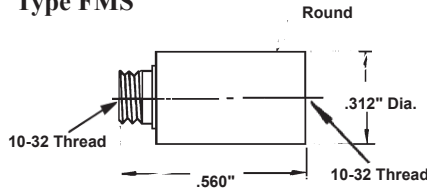
Type FFS



COUPLER

Threads – 10-32 UNF
Body – Brass or 303 SS
Screen – 304 SS
Maximum Operating Pressure – 100 psig
MOPD² – 100 psid
C_v – See chart at bottom of page

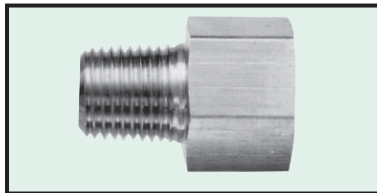
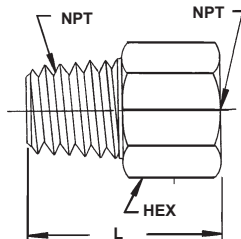
Type FMS



ADAPTER

Threads – 10-32 UNF
Body – Brass or 303 SS
Seal – Viton
Screen – 304 SS
Maximum Operating Pressure – 100 psig
MOPD² – 100 psid
C_v – See chart at bottom of page

Type DSO GSO

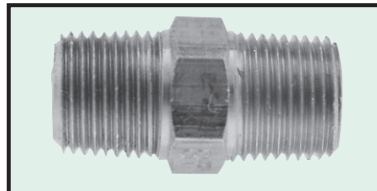
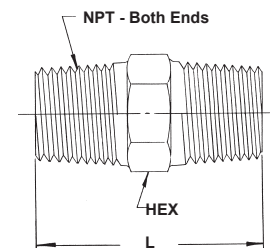


ADAPTER

Threads – See chart at left
Body – Brass or 303 SS
Screen – 304 SS
Maximum Operating Pressure –
Brass – 2000 psig
303 SS – 4000 psig
MOPD² – 100 psid
C_v – See chart at bottom of page

Type	Dim. L	HEX	NPT
DSO	.880"	9/16"	1/8"
GSO	1.250"	3/4"	1/4"

Type BSO ESO

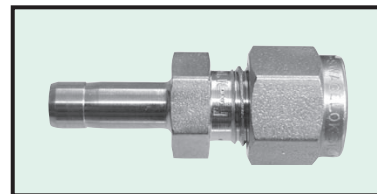
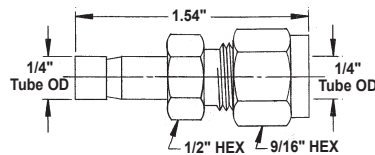


NIPPLE

Threads – See chart at left
Body – Brass or 303 SS
Screen – 304 SS
Maximum Operating Pressure –
Brass – 2000 psig
303 SS – 4000 psig
MOPD² – 100 psid
C_v – See chart at bottom of page

Type	Dim. L	HEX	NPT
BSO	.97	7/16"	1/8"
ESO	1.38	9/16"	1/4"

Type SLR4



TUBE CONNECTOR

1/4" OD Tubing

Body – 316 SS
Screen – 304 SS
Maximum Operating Pressure – 4000 psig
MOPD² – 100 psid
C_v – See chart at bottom of page

2. MOPD – Maximum Pressure Differential Across Screen

Recommended Screen/Orifice Sizing Chart Shows Maximum Orifice Diameter (Inch)¹

1. When used with precision orifices, it is important that the screen not have a major influence on the flow through the orifice. The recommended maximum orifice when used with a screen will have less than 1% change in the orifice flow.
* MOD – Maximum Orifice Diameter (inch)
** Do not use this screen for liquid flow.

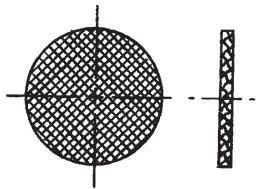
			Types FMS, FFS, DSO, BSO, SLR4			Types ESO, GSO		
Screen Size No.	Particle Retention Micron	Inch	Gas Flow MOD*	Liquid Flow MOD*	Screen C _v	Gas Flow MOD*	Liquid Flow MOD*	Screen C _v
1	10	.0004	.0064	**	.009	.011	**	.028
2	15	.0006	.0105	**	.025	.018	**	.068
5	25	.0010	.0165	**	.055	.028	**	.180
20	100	.0040	.0195	.0195	.090	.033	.033	.250

Miniature In-Line Screens

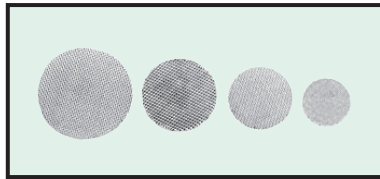
SS WIRE INSERTS

Construction

Type XS

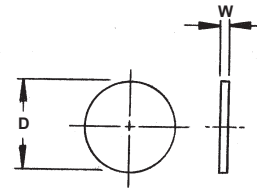


PLAIN SCREEN

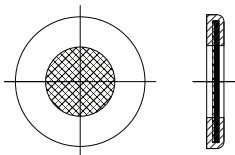


Type	D	W	Type	D	W
XSA	.211"	.005"/.010"	XSF	.375"	.005"/.010"
XSB	.254"	.005"/.010"	XSG	.500"	.005"/.010"
XSC	.312"	.005"/.010"	XSH	.750"	.005"/.010"
XSD	.165"	.005"/.010"			

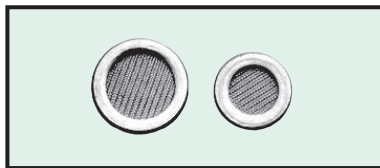
Dimensions



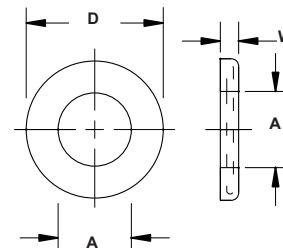
Type SS



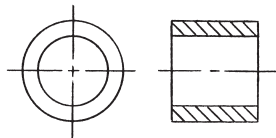
BOUND SCREEN



Type	D	W	A
SSB	.254"	.030"	.15"
SSC	.312"	.030"	.22"



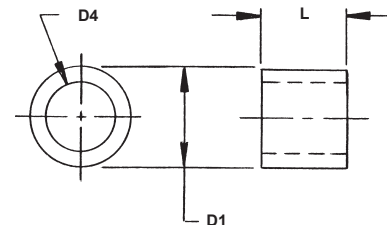
Type PF



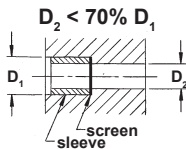
SCREEN SLEEVE



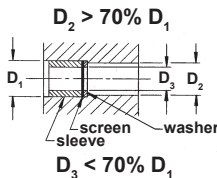
Part Number	L	D1	D4	Press Fit Bore
PFA-SS	.188"	.222"	.156"	.219/.220"
PFC-SS	.188"	.323"	.250"	.320/.321"



Installation Methods



To install a press fit sleeve for securing a screen in position, it is good practice to have the shoulder diameter D_2 less than 70% of the press fit diameter D_1 . The inner diameter of the sleeve should also be less than 70% of D_1 .



To install a screen where D_2 is greater than 70% of diameter D_1 first install a washer in which the inner diameter D_3 is less than 70% of D_1 and then secure the screen with a sleeve which has an inner diameter that is less than 70% of D_1 .

Specifications

Screen Material – 304 SS

Screen Construction – Wire Mesh

Maximum Operating Pressure

Differential Across Screen – 100 psid

Fluid Media – Air, Water, Gases and Liquids compatible with 304 SS

Sleeve Material – 303 SS

Screen Micron Rating

Particle Retention Micron	Inch	Designation In Part Number
10	.0004	1
15	.0006	2
25	.0010	5
100	.0040	20

Part Numbers

Screens – Screen part numbers consist of type and micron designation.

EXAMPLES

Type		Micron Designation
XSC	–	2
(Plain Screen)		(15 micron)
SSB	–	20
(Bound Screen)		(100 micron)

Sleeves – Part numbers for sleeves are listed above for Type PF.

SS WIRE SCREENS

Description

Fine screen breathers provide an air passage into equipment, enclosures, and pneumatic controls while preventing the ingestion of solid particles. Miniature fine screen breathers are rated at 10, 15, 25 or 100 microns and are available in either brass or stainless steel fittings. Connection sizes are 10-32, 1/8" or 1/4" NPT.

Applications

The fine screen breathers are used where there is a requirement to insure that only clean fluid enters into a component or system. Typical applications include:

- Equipment enclosures
- Vented control components
- Small 3- or 4-way valves
- Small 2-way vacuum valves
- Air purge equipment
- EMI or RFI shield

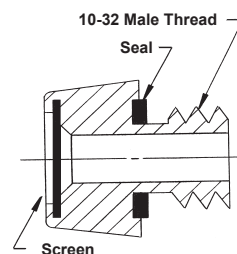
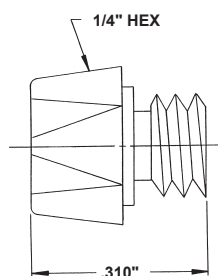
Specifications

- **Materials**
Body – Brass or 303 SS
Screen – 304 SS
Seals – Viton (10-32 only)
- **Maximum Operating Pressure**
Brass (NPT) – 2000 psig
303 SS (NPT) – 4000 psig
10-32 threads – 100 psig
- **Maximum Pressure Differential Across Screen** – 100 psid
- **Flow** – See C_v data in chart at right.
- **Fluids** – Use with liquids or gases compatible with materials of construction.
- **Dimensions** – See drawings this page.

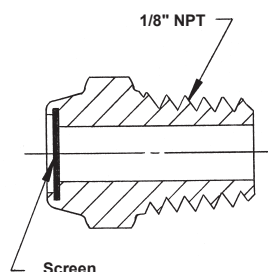
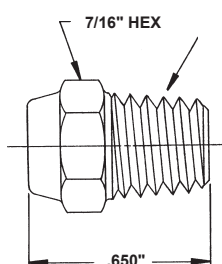
Ordering Information

- Select the part number from the chart at right.
- Indicate quantity and part number on order.

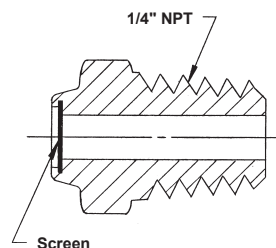
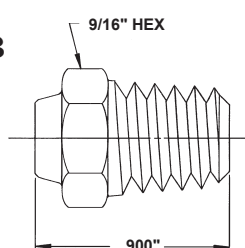
Type
QSB



Type
BMB



Type
EMB



Part Numbers – Breathers

Filter Rating (Microns)	Connection Size	Part Number		Flow C_v
		Brass	Stainless Steel	
10	10-32	QSB-1-BR	QSB-1-SS	.009
15	10-32	QSB-2-BR	QSB-2-SS	.025
25	10-32	QSB-5-BR	QSB-5-SS	.055
100	10-32	QSB-20-BR	QSB-20-SS	.090
10	1/8" NPT	BMB-1-BR	BMB-1-SS	.009
15	1/8" NPT	BMB-2-BR	BMB-2-SS	.025
25	1/8" NPT	BMB-5-BR	BMB-5-SS	.055
100	1/8" NPT	BMB-20-BR	BMB-20-SS	.090
10	1/4" NPT	EMB-1-BR	EMB-1-SS	.028
15	1/4" NPT	EMB-2-BR	EMB-2-SS	.068
25	1/4" NPT	EMB-5-BR	EMB-5-SS	.180
100	1/4" NPT	EMB-20-BR	EMB-20-SS	.250

Pressure Snubbers

NPT CONNECTIONS

Description

A simple in-line element called a pressure snubber is used to reduce the rate of flow of fluids into pressure instruments and controls. A small orifice in an adapter fitting dampens shock and fluctuating pressure effects by limiting the rate at which flow enters. The smaller the orifice, the greater is the dampening effect.

The proper orifice size for any application depends upon the size of the pressurized chamber, the viscosity of the fluid and the required response time of the system.

Orifice sizes from .004" diameter to .020" diameter are available. In general, large instrument chambers require large flow orifices. Viscous fluids require larger flow orifices than low viscosity fluids. Gases generally require small orifices.

Specifications

- Maximum Operating Pressure**

Brass – 2000 psig
303SS – 4000 psig

- Flow Direction** – Suitable for flow in either direction

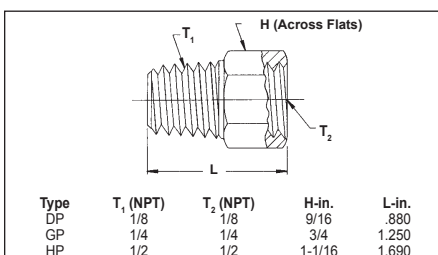
- Orifice Diameter** – Standard .004", .008", .015", .020". See chart at right. Special orifice sizes available; consult factory.

- Flow Rate** –

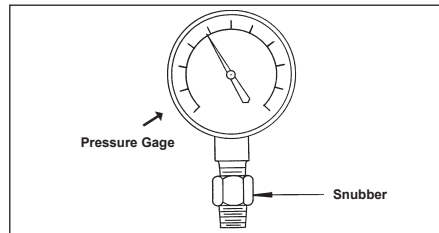
Orifice Diameter (in.)	C _v	Air Flow to Atmos. @ 25 psig inlet
.004	.00035	.46 scfh
.008	.0015	2.0 scfh
.015	.0050	6.9 scfh
.020	.0088	13.0 scfh

- Fluid Media** – Air, Water Gases and Liquids compatible with materials of construction.

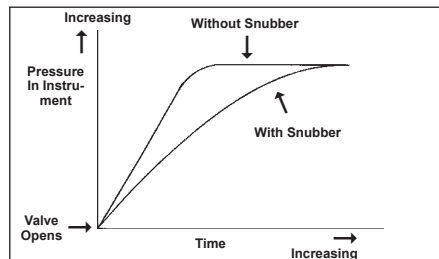
Dimensions



Operation

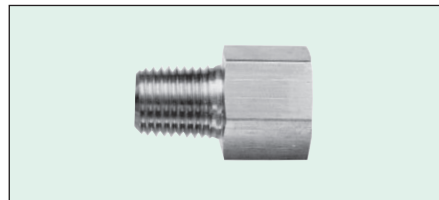


Pressure snubber adapts to pressure gage, instrument or control element with 1/8", 1/4" or 1/2" NPT connection.

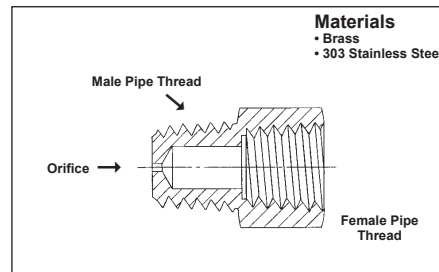


After a valve opens, the pressure in an instrument or control device builds more slowly when equipped with a pressure snubber.

Construction



Pressure snubbers are in-line components which reduce the rate of fluid flow to a gage, instrument or control element and thus dampen shock and fluctuating pressure effects.



Part Numbers

TYPE	Orifice Diameter-In.	Pipe Size (NPT)	Stainless Steel Part Number	Brass Part Number
DP	.004	1/8	DP-4-SS	DP-4-BR
DP	.008	1/8	DP-8-SS	DP-8-BR
DP	.015	1/8	DP-15-SS	DP-15-BR
GP	.004	1/4	GP-4-SS	GP-4-BR
GP	.008	1/4	GP-8-SS	GP-8-BR
GP	.015	1/4	GP-15-SS	GP-15-BR
HP	.004	1/2	HP-4-SS	HP-4-BR
HP	.008	1/2	HP-8-SS	HP-8-BR
HP	.015	1/2	HP-15-SS	HP-15-BR
HP	.020	1/2	HP-20-SS	HP-20-BR

Applications

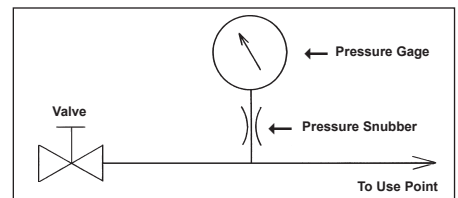
Pressure snubbers are used as in-line elements to reduce rapid pressure fluctuations in the following types of components:

- Pressure Gages
- Pressure Measuring Instruments
- Air Piloted Valves
- Hydraulic Piloted Valves

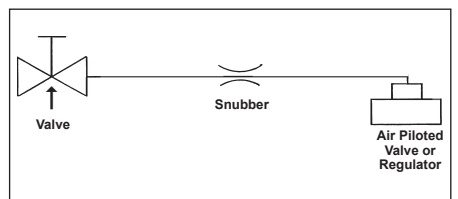
They can also be used to control the flow rate of fluid delivered to:

- Air Cylinders
- Hydraulic Cylinders
- Fluid Actuators

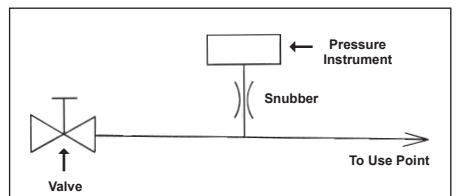
See illustrations for typical applications.



A pressure gage equipped with a snubber will respond more slowly to pressure changes than a gage without a snubber. This slowed response dampens pressure spikes caused by valves and pumps.



When valve opens the pressure in the pilot port increases slowly. In the case of an air loaded pressure regulator with a snubber, the output also increases gradually rather than suddenly.



Pressure measuring instruments are protected from surges when equipped with a snubber. High frequency pressure spikes are dampened by the small orifice in the pressure snubber.

Ordering Information

To order pressure snubbers, indicate quantity and obtain part number from the chart.

WATER FLOW

Description

The fixed flow rate orifices contain a deformable opening which decreases in size as the pressure differential increases. The design of the unit compensates for pressure differential increase by reducing the area of the orifice resulting in constant flow over the differential pressure range 15-150 psig.

Specifications

Maximum Pressure 150 psig

Constant Flow Pressure Range 15 - 150 psig

Temperature Range 32 to 160° F

Accuracy ± 10%

Materials Body - Brass • Diaphragm - Buna-N

Applications

Water Flow Rate Control

Heating and Cooling Systems

Water Spray

Film Process and Rinse

Water Conservation

Flow Rate Limitation

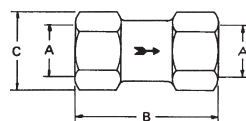
Ordering Information

- Select the flow rate
- Select the pipe size
- Obtain part number from charts at right

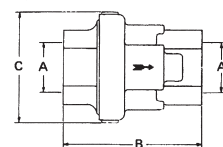
Dimensions

Series 2305		
A. Pipe Size - NPT	B. Overall Length	C. Height
1/4"	2"	1-1/6"
3/8"	1-3/4"	1-1/16"
1/2"	2-7/32"	1-1/4"
3/4"	2-9/16"	1-17/32"

Series 2307		
A. Pipe Size - NPT	B. Overall Length	C. Height
3/4"	3-19/32"	2-7/8"
1"	3-19/32"	2-7/8"
1-1/4"	6-3/16"	5-1/4"
1-1/2"	8-7/8"	7-3/8"

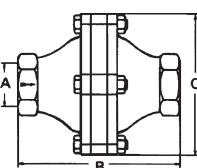


2305



2307

3/4", 1" NPT



2307

1-1/4", 1-1/2" NPT

Part Numbers - Series 2305

0.2 to 10 GPM

FLOW RATE GPM-H ₂ O	PIPE SIZE			
	1/4" NPT	3/8" NPT	1/2" NPT	3/4" NPT
0.20	2305-0011-1/4			
0.25	2305-1011-1/4			
0.30	2305-0031-1/4	2305-0031-3/8		
0.40	2305-0041-1/4	2305-0041-3/8		
0.50	2305-1021-1/4	2305-1021-3/8	2305-1021-1/2	
0.60	2305-0061-1/4	2305-0061-3/8	2305-0061-1/2	
0.75	2305-1031-1/4	2305-1031-3/8	2305-1031-1/2	
1.00	2305-1041-1/4	2305-1041-3/8	2305-1041-1/2	2305-1041-3/4
1.25	2305-1051-1/4	2305-1051-3/8	2305-1051-1/2	2305-1051-3/4
1.50	2305-1061-1/4	2305-1061-3/8	2305-1061-1/2	2305-1061-3/4
1.75	2305-1071-1/4	2305-1071-3/8	2305-1071-1/2	2305-1071-3/4
2.00	2305-1081-1/4	2305-1081-3/8	2305-1081-1/2	2305-1081-3/4
2.50			2305-1091-1/2	2305-1091-3/4
3.00			2305-1101-1/2	2305-1101-3/4
3.50			2305-1111-1/2	2305-1111-3/4
4.0			2305-1121-1/2	2305-1121-3/4
4.5				2305-1131-3/4
5				2305-1141-3/4
6				2305-1151-3/4
7				2305-1161-3/4
8				2305-1171-3/4
9				2305-1181-3/4
10				2305-1191-3/4

Part Numbers - Series 2307

8 to 100 GPM

FLOW RATE GPM-H ₂ O	PIPE SIZE			
	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT
8	2307-1171-3/4	2307-1171-1		
9	2307-1181-3/4	2307-1181-1		
10	2307-1191-3/4	2307-1191-1		
11	2307-1201-3/4	2307-1201-1		
12	2307-1211-3/4	2307-1211-1		
13	2307-1221-3/4	2307-1221-1		
14	2307-1231-3/4	2307-1231-1		
15	2307-1241-3/4	2307-1241-1		
16	2307-1251-3/4	2307-1251-1		
17	2307-1261-3/4	2307-1261-1		
18	2307-1271-3/4	2307-1271-1	2307-1271-1-1/4	
19		2307-1281-1	2307-1281-1-1/4	
20		2307-1291-1	2307-1291-1-1/4	
21		2307-1301-1	2307-1301-1-1/4	
22		2307-1311-1	2307-1311-1-1/4	
24			2307-1321-1-1/4	
26			2307-1331-1-1/4	
28			2307-1341-1-1/4	
30			2307-1351-1-1/4	
32			2307-1361-1-1/4	
34			2307-1371-1-1/4	
36			2307-1381-1-1/4	
38			2307-1391-1-1/4	
40			2307-1401-1-1/4	
42			2307-1411-1-1/4	
44			2307-1421-1-1/4	
46			2307-1431-1-1/4	
48			2307-1441-1-1/4	
50				2307-1451-1-1/2
55				2307-1461-1-1/2
60				2307-1471-1-1/2
65				2307-1481-1-1/2
70				2307-1491-1-1/2
75				2307-1501-1-1/2
80				2307-1511-1-1/2
85				2307-1521-1-1/2
90				2307-1531-1-1/2
95				2307-1541-1-1/2
100				2307-1551-1-1/2

Page 45

Fundamentals of Flow Measurement

Volumetric Flow

Standard Conditions – Definition

Temperature Effects

Barometric Pressure Effects

Pages 46, 47

Extending Orifice Flow Data

How to adjust for parameters not included in the air flow charts on pages 20, 21 and 22

Specific Gravity Temperature

Pressure Other Orifice Sizes

How to adjust for water flow conditions not included in the charts on pages 23 and 24

Page 48

Choked Flow of Gases

A discussion on the conditions under which gas flow rate
is limited by speed of sound considerations

Page 49

Calibration of Orifices

Accurate measurement of the flow characteristics of orifices
can be provided using NIST traceable instruments

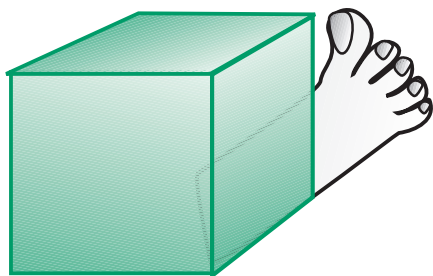
Page 50

Custom Orifice Configurations

Special threads, dimensions, etc. not in the catalog can be produced for OEM quantities

GAS FLOW MEASUREMENT

The Standard Cubic Foot



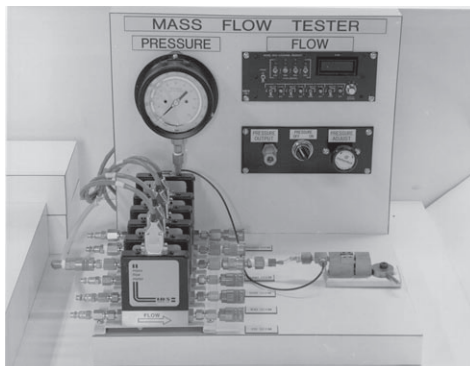
Volumetric Flow

The flow of gases is traditionally measured in volumetric units such as cubic feet, liters or cubic centimeters. However, since gases are compressible fluids, the total mass contained in a given volume varies with both the temperature and pressure of the gas. To provide a meaningful reference for volumetric flow measurements, a "standard" set of conditions are defined for temperature and pressure of the gas.

Unfortunately, the definition of standard conditions varies slightly in technical disciplines and industry groups. Standard temperature ranges from 32 to 70°F (0 to 20°C). Standard pressure is generally average atmospheric pressure at sea-level, 14.7 psia.

Standard Conditions

For the data presented in the charts on pages 20-22, standard conditions are 70°F and 14.7 psia. For data points measured by O'Keefe Controls Co., the same standard conditions are used.



A mass flowmeter measures flow accurately and relatively independent of barometric pressure. The unit shown above is used to obtain the data for calibrated orifices.

Factors to Consider

In comparing volumetric flow measurements taken at different locations and with different measuring equipment, the following factors should be considered:

- **Definition of Standard Conditions**
Between 32°F and 70°F, the standard conditions can vary up to 8%.
- **Temperature of the Gas**
A 10°F deviation causes about 1% error in a rotameter reading. More or less deviation occurs in other type flow measuring instruments. The deviations are predictable and the flow measurement is correctable.
- **Barometric Pressure**
Normal atmospheric pressure variations of $\pm 1/2$ " Hg. can cause more than 1% error in rotameters. Altitude is also an important factor, since the barometric pressure decreases rapidly with increasing altitude. At an elevation of 2,000 ft. above sea level, rotameter scale readings are in error by 3-1/2%. These errors can be corrected quite easily with predictable correction factors, and accurate knowledge of barometric pressure.

What To Do To Improve Measurement Accuracy

In many applications, errors of $\pm 10\%$ in flow rate are unimportant. In this case, corrections for 1) standard conditions, 2) barometric pressure and 3) temperature are not required.

1. Definition of Standard Conditions

The data on pages 20-22 is for standard conditions of 70°F and 14.7 psia. To reconcile data taken from volumetric instruments which are referenced to different standard conditions, use the following formula:

$$Q_s = Q_m \times \frac{P_m}{P_s} \times \frac{T_s}{T_m}$$

Q_m = measured volumetric flow (SCFH) or (SLPM).

Q_s = volumetric flow corrected to 70°F and 14.7 psia.

P_m = standard barometric pressure referenced by manufacturer (psia). This is generally 14.7 psia.

P_s = standard barometric pressure = 14.7 psia.

T_m = Standard absolute temperature referenced by manufacturer (°Rankine).

T_s = standard absolute temperature = 530°R.

For Example:

A mass flowmeter manufacturer uses the following standard conditions:

14.7 psia, 32°F (492°R)

To convert to standard conditions of 70°F (530°R) and 14.7 psia, apply the following:

$$Q_s = Q_m \times \frac{P_m}{P_s} \times \frac{T_s}{T_m} = Q_m \times \frac{14.7}{14.7} \times \frac{530}{492} = 1.077 Q_m$$

The volumetric flow Q_s is larger than Q_m by 7.7%. Consult the manufacturer of your flow measuring equipment to insure that you know exactly the standard conditions which apply to your equipment.

2. Temperature Effects

Consult your instrument manufacturer for temperature correction factors. There are two temperature considerations.

1. Effect of ambient temperature on the flow measuring instrument
2. Effect of gas temperature on the flow measuring instrument

3. Barometric Pressure Effects

Consult your instrument manufacturer for pressure correction factors. There are two pressure considerations.

1. Effect of barometric pressure on the flow measuring instrument
2. Effect of gas pressure on the flow measuring instrument

Table of Average Barometric Pressure

Altitude Above Sea Level	Barometer Reading	Atmospheric Pressure
Feet	Inches Mercury	PSIA
0	29.92	14.696
500	29.38	14.43
1000	28.86	14.16
1500	28.33	13.91
2000	27.82	13.66
2500	27.32	13.41
3000	26.82	13.17
3500	26.33	12.93
4000	25.84	12.69
4500	25.37	12.46
5000	24.90	12.23
5500	23.99	11.78
7000	23.10	11.34
8000	22.23	10.91

Extending Orifice Flow Data

EXTRAPOLATION

1. Specific Gravity

Other Gases

To convert air flow from chart to another gas flow.

$$\text{Flow (gas)} = \text{Flow (air)} / \sqrt{\text{S.G.}} \quad (\text{gas})$$

EXAMPLE:

To obtain flow rate for helium when air flow is 5 SCFH

$$\begin{aligned} \text{Flow (Helium)} &= \text{Flow (air)} / \sqrt{.138} \\ &= 5 / .371 = 13.48 \text{ SCFH} \end{aligned}$$

S.G. = specific gravity of gas relative to air
S.G. = .138 for Helium

Gas	Specific Gravity ¹	Chart Multiplier ²
Air	1.0	1.0
Argon	1.379	.852
Carbon Dioxide	1.53	.809
Helium	.138	2.68
Hydrogen	.0696	3.79
Methane	.554	1.34
Natural Gas	.61	1.28
Nitrogen	.972	1.01
Oxygen	1.1053	.95
Propane	1.56	.80

Note 1 Specific gravity relative to air @ 70°F, 14.7 psia
Note 2 To obtain the flow of gases other than air, multiply the air flow values on the charts on pages 20, 21 and 22 by the chart multiplier.

2. Pressure – Air Flow

High Pressure Extrapolation

To calculate flow rates at pressures higher than those on the charts, use the following formula.

$$Q_{HP} = Q_{80} \times \frac{P_{HP} + 14.7}{94.7}$$

Q_{HP} = Flow at elevated pressure
(above 80 psig.).

Q_{80} = Chart flow reading at 80 psig.

P_{HP} = Elevated pressure in psig.

EXAMPLE:

To calculate the flow for the No. 16 metal orifice at 150 psig supply pressure.

$$\begin{aligned} Q_{HP} &= 17.9 \times \frac{150 + 14.7}{94.7} = 31.13 \text{ SCFH} \\ &\quad \uparrow \\ &\quad \text{(from chart)} \end{aligned}$$

Low Pressure Extrapolation

To calculate flow rates at pressures lower than those on the charts, use the following formula.

$$Q_{LP} = Q_5 \sqrt{\frac{P_{LP}^2 + 29.4 P_{LP}}{13.12}}$$

Q_{LP} = Flow at the low pressure
(below 5 psig.)

Q_5 = Chart flow reading at 5 psig.

P_{LP} = Low pressure in psig.

EXAMPLE:

To calculate the flow at a supply pressure of 0.5 psig. for the No. 16 metal orifice.

$$\begin{aligned} Q_{LP} &= 3.26 \sqrt{\frac{0.5^2 + 29.4 (.5)}{13.12}} = 0.96 \text{ SCFH} \\ &\quad \uparrow \\ &\quad \text{(from chart)} \end{aligned}$$

3. Temperature Effects

Air Flow

The flow of gases through an orifice varies inversely as the absolute temperature. As the gas temperature rises and the gas density decreases, the mass flow rate also decreases.

To extend the chart data on pages 20-22 for air flow, use the following formula.

$$Q_T = Q_S \sqrt{\frac{T_S}{T_T}}$$

Where:

T_S = standard absolute temperature °R
(°R = 460 + °F).

T_T = non standard absolute temperature °R.

Q_S = flow from chart at 70°F = 530°R.

Q_T = flow at a different temperature.

EXAMPLE:

At 70°F and an inlet pressure of 25 psig the No. 60 (.060" dia.) orifice has a flow rate of 52.8 SLPM (see page 21). Under similar conditions, the air flow rate at 300°F is

$$Q_T = 52.8 \sqrt{\frac{530}{760}} = 44.09 \text{ SLPM}$$

4. Other Orifice Sizes

Air Flow

To calculate the required diameter of an orifice that is not included in the charts on pages 20-22 use the following formula. The equations are based on data taken for the size no. 60 (.060" dia.) orifice.

$$d_L = .060 \sqrt{\frac{Q_L}{Q_{60}}} \text{ in. dia.}$$

Where:

d_L = diameter of the unknown orifice.

Q_L = flow through the unknown orifice.

Q_{60} = flow from chart on pages 20-22.

EXAMPLE: (data from page 21)

At supply pressure of 50 psig and outlet at standard conditions,

Q_{60} = 87.4 SLPM (from chart)

Let:

Q_L = 600 SLPM @ 50 psig

$$d_L = .060 \sqrt{\frac{600}{87.4}} = .157 \text{ in. dia.}$$

Water Flow

Using the C_v method for liquid flow, and using measured C_v data we can derive the following formula to calculate required orifice sizes.

$$d_L = \sqrt{\frac{1}{22.5} \frac{Q_L}{\sqrt{\Delta P}}}$$

Where:

d_L = diameter of unknown orifice (in.)

Q_L = required flow (gpm)

EXAMPLE:

Flow rate required =

.5 GPM @ ΔP = 1.0 psi

$$d_L = \sqrt{\frac{1}{22.5} \frac{.5}{\sqrt{1}}} = .149 \text{ in. dia.}$$

Also, to obtain the C_v

$$C_{vL} = \frac{Q_L}{\sqrt{\Delta P}} = \frac{.5}{1} = .5$$

C_{vL} is the C_v for the orifice with diameter = d_L .

MISCELLANEOUS

Conversion Factors

A. Gas Flow

SCFH - standard cu. ft. per hour
SLPM - standard liters per minute
SCCM - standard cu. cm. per minute

SCFH x .472 = SLPM
SCFH x 472 = SCCM
SLPM x 1000 = SCCM

EXAMPLE:

5 SCFH x .472 = 2.36 SLPM

B. Liquid Flow

GPM - gallons per minute
LPM - liters per minute
CCM - cubic centimeters per minute
CFH - cubic feet per hour
CFM - cubic feet per minute

GPM x 3.785 = LPM
GPM x 3785 = CCM
GPM x .1337 = CFM
GPM x 8.021 = CFH
CCM x .001 = LPM

EXAMPLE:

25 GPM x 3.785 = 94.625 LPM

C. Pressure – Gases or Liquids

PSIG - pounds per sq. in. gage
Kg/CM² - kilograms per sq. cm
KPA - kilo pascals
Bar - unit of pressure equal to 1 atmos.
In-H₂O - pressure produced by 1" H₂O

PSIG x .0703 = Kg/CM²
PSIG x 6.895 = KPA
PSIG x .0689 = Bars
PSIG x 27.68 = In. H₂O

EXAMPLE:

25 psig x 6.895 = 172.37 KPA

Liquid Flow C_v Method

A. Water

The C_v method of rating flow capacity of various devices employs empirical data based on water flow. The basic formula for water flow is

$$Q = C_v \sqrt{\Delta P}$$

Q = flow in GPM

ΔP = pressure differential in psi

C_v = flow factor

For a flow of 1 gpm at ΔP = 1, the C_v = 1

To obtain the water flow rate through precision orifices use the above equation and obtain the C_v value from the charts on pages 23, 24.

EXAMPLE:

Size Number 100 (.100" dia.) has a C_v = .23
For a 25 psig pressure differential:

$$Q = C_v \sqrt{\Delta P} = .23 \sqrt{25} = 1.15 \text{ GPM}$$

Selected flow data is also presented on pages 23, 24. The chart data assumes flooded conditions on both sides of the orifice. This is particularly important for orifices less than .020" diameter because of surface tension influences.

B. Other Liquids

For liquids other than water, the equation becomes:

$$Q = C_v \sqrt{\frac{\Delta P}{\text{S.G.}}}$$

Where:

S.G. = Specific gravity of the liquid

(The specific gravity of water is 1.0)

To obtain the flow rate of an oil with S.G. = .85, use the above equation and obtain the C_v value from the charts on pages 20, 21, 22.

EXAMPLE: Size number 100 (.100" dia.) has a C_v = .23

For a 25 psig pressure differential:

$$Q = C_v \sqrt{\frac{\Delta P}{\text{S.G.}}} = .23 \sqrt{\frac{25}{.85}} = 1.25 \text{ GPM}$$

Specific Gravity of Various Liquids Relative to Water @ 60°F

Alcohol, Ethyl	.79
Gasoline	.75
Glycerine	1.26
Kerosene	.80
Diesel Oil	.85
Lube Oil	.90
Turpentine	.87
Water	1.00

Test Procedures

A. Rotameters - Gas Flow

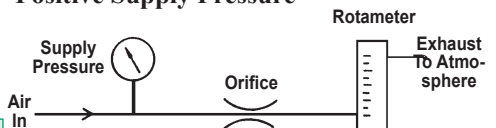
Rotameters for measurement of air or other gas flows must be used for the conditions for which they are calibrated. Typically they are calibrated for the following:

- Air Flow
- Outlet Conditions - 14.7 psig @ 70°F

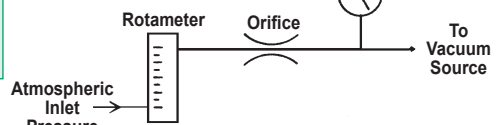
Rotameters can be calibrated for other gas flows or other outlet pressure conditions. Manufacturers also provide graphs or tables for correction of measured data when conditions vary from the calibration conditions.

When using rotameters calibrated for standard outlet conditions use the test procedures shown below.

Positive Supply Pressure



Vacuum Source



B. Mass Flowmeters - Gas Flow

Mass flowmeters are generally insensitive to gas pressure or barometric pressure conditions. Consequently their location in the test circuit is not critical. Consult your instrument manufacturer for recommended test procedures.

C. Instrument Accuracy - Gas Flow

The three variables to be measured in gas flow applications are:

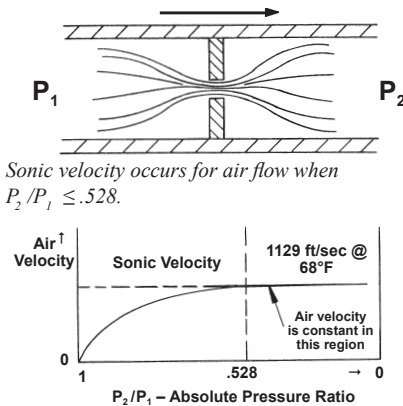
- Pressure
- Temperature
- Flow Rate

The accuracy of the flow measurement of a gas through an orifice is limited by the combined accuracy of the instruments used in the measurement. Expected accuracy of a gas flow measurement is generally in the range of 1 to 20%. 1% accuracy can only be achieved with high quality instruments.

The Basic Concept

A greatly misunderstood and misapplied notion is that of "choked flow", also referred to as "critical flow".

In gas flow through an orifice there is an occasion where the gas velocity reaches sonic conditions. This occurs for air flow when the absolute pressure ratio is .528, i.e. when the downstream absolute pressure (P_2) is 52.8% of the upstream absolute pressure (P_1).

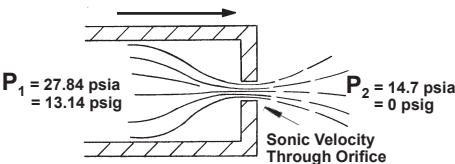


The air flow velocity is limited once the absolute pressure ratio is $\leq .528$.

For air flow through an orifice with an inlet air temperature of 68°F the choked (sonic) velocity is 1129 ft/sec.

The Misconception!

Once sonic velocity is achieved in orifice air flow ($P_2/P_1 = .528$), it is easy to "assume" that the mass flow rate is constant for all pressure ratios less than .528; i.e. $P_2/P_1 \leq .528$. For example, when P_2 is 14.7 psia and P_1 is 27.84 psia, sonic velocity occurs through the orifice. As P_1 further increases there is no further increase in the velocity of the air flowing through the orifice.



Conditions for the onset of sonic velocity in orifice air flow.

Consider all the Factors!

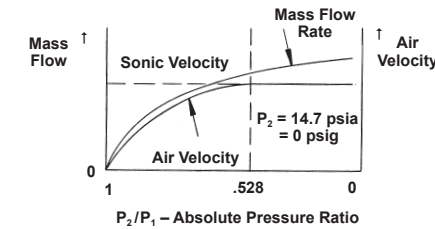
The mass flow rate through an orifice is a function of three basic parameters.

Q (flow) is a function of

- Velocity
- Density
- Orifice Area

When the air velocity reaches sonic velocity ($P_2/P_1 \leq .528$) further increases in P_1 (upstream pressure) do not cause any further increase in the air velocity through the orifice. Consequently it is wrongly concluded that the mass flow rate also does not increase.

As the air pressure (P_1) increases, the density of the air also increases; and since the mass flow rate is also a function of density, the mass flow rate increases linearly with pressure (P_1).

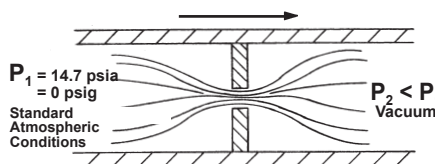


Even though the air velocity through the orifice is limited to the speed of sound, the mass flow rate continues to increase as the absolute pressure (P_1) increases.

What is Choked?

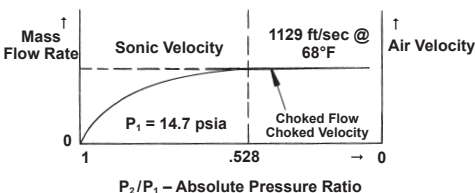
The parameter that becomes "choked" or "limited" is the velocity of the air. It is more accurate to use the term "choked velocity" rather than "choked flow" when the absolute pressure ratio of air through an orifice is $\leq .528$.

Vacuum Conditions



Air at atmospheric pressure enters the orifice and flows to a downstream vacuum pump.

In the case of vacuum conditions on the outlet of an orifice and where the inlet is at ambient atmospheric pressure, both the air velocity and the mass flow rate become choked (limited) when sonic velocity is achieved through the orifice.



For atmospheric inlet pressure and downstream vacuum, both the air velocity and mass flow rate are limited.

The reason for the mass flow rate limitation is the fixed inlet density combined with the fixed velocity. The flow charts on pages 20-22 show the choked mass flow effect for vacuum conditions. At vacuum levels between 15-30" Hg the mass flow rate is fixed.

Choked Flow for Positive Pressure Conditions

As in the case of the above vacuum conditions there are certain situations in which choked flow does occur for positive (above atmospheric) pressure. By maintaining a fixed inlet pressure to the orifice and allowing the outlet pressure (back pressure) to vary, there is a range of outlet pressures over which the mass flow rate is fixed.

For example (see chart below).

- With an inlet pressure of 80 psig, the mass flow rate is choked (limited) for all outlet pressures less than 35.30 psig (including vacuum conditions).
- The actual flow rate is constant for the outlet pressure range of 35.30 psig to as low as a complete vacuum. The flow rate can be obtained from the charts on pages 20-22; e.g. for an orifice of .010" diameter and with 80 psig inlet pressure, the choked flow rate is 8.12 scfh (page 20). This flow rate will be constant for all outlet pressure conditions between 35.30 psig and full vacuum.

Sonic Velocity Conditions – Air Flow			
Inlet Pressure		Outlet Pressure For Sonic Velocity	
Gage Pressure psig	Absolute Pressure psia	Absolute Pressure psia	Gage Pressure psig
100	114.7	≤ 60.56	≤ 45.86
90	104.7	≤ 55.28	≤ 40.58
80	94.7	≤ 50.00	≤ 35.30
70	84.7	≤ 44.72	≤ 30.02
60	74.7	≤ 39.44	≤ 24.74
50	64.7	≤ 34.16	≤ 19.46
40	54.7	≤ 28.88	≤ 14.18
30	44.7	≤ 23.60	≤ 8.90
20	34.7	≤ 18.32	≤ 3.62
15	29.7	≤ 15.68	$\leq .98$
14.7	29.4	≤ 15.52	$\leq .82$
10	24.7	≤ 13.08	≤ -1.62
5	19.7	≤ 10.40	≤ -4.30
1	15.7	≤ 8.29	≤ -6.47
0	14.7	≤ 7.76	≤ -6.94

Temperature 68°F

e-mail ca@okcc.com • website www.okcc.com

Custom Orifice Assemblies

METAL OR SAPPHIRE



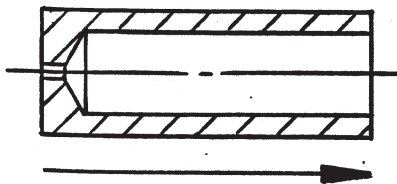
Special orifice assemblies can be provided where quantity requirements are sufficiently large. Shown to the left are a few of the custom assemblies produced using sapphire or metal orifices.

Some of the custom precision orifice assemblies which have previously been manufactured are:

- *Modified standard pipe, tube or process fittings with orifice inserts.*
- *Custom machined orifice assemblies.*
- *Custom orifices with integral screen.*
- *Orifice manifolds for flow selection.*

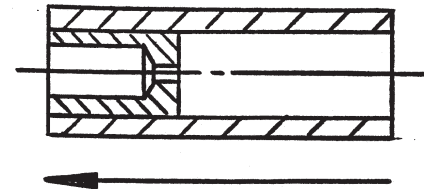
Custom Metal Assemblies

An all metal orifice assembly in brass, stainless steel or aluminum can be fabricated on a custom basis where OEM quantities are required. Pressure ratings up to 2000 psig for brass and 4000 psig for stainless steel are standard.



Custom Orifice Insert Assemblies

Standard pipe, tube or hose fittings can be modified by the addition of a press fit insert. Large quantities are not required for this type of customized precision orifice assembly.

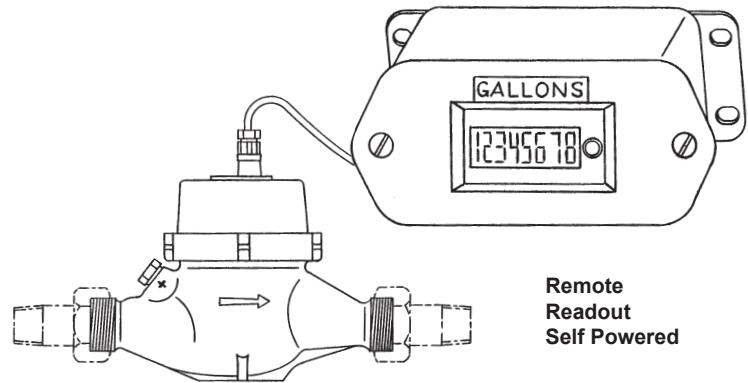


REMOTE READOUT

Description

The remote water totalizer system consists of a standard water totalizing meter that is adapted with a contact switch which provides one pulse per gallon; and a remote self powered electronic LCD eight digit display. No external electric power is required. Battery life for the remote register is 10 years.

The meter can be installed in a location not normally accessible and the remote readout conveniently located for easy observation. The readout can be up to 1000 feet from the flowmeter.



Flow Totalizer
with Couplings

Remote
Readout
Self Powered

Specifications

Maximum Pressure – 150 psig

Flow Accuracy $\pm 2\%$ of reading

Readout – Self Powered • 10 year battery life
8 digit • 3/8" height

Maximum Temperature Cold Water Meter • 105° F
Hot Water Meter • 194° F

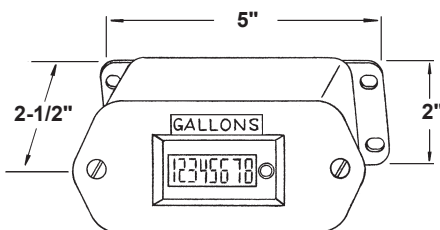
Meter Body – Bronze

Cable Length – 6 ft. standard
– can be extended to 1000 ft.

Catalog Numbers

	Part Number	Pipe Size (NPT)	Flow Rate - GPM		Readout
			Min.	Max.	
Cold Water Meter	OKC-1317-2	3/4"	.22	22	8 digit/gallons
	OKC-1317-3	1"	.44	52	8 digit/gallons
	OKC-1317-4	1-1/2"	.88	88	8 digit/gallons
	OKC-1317-5	2"	2.0	132	8 digit/gallons
Hot Water Meter	OKC-1318-2	3/4"	.22	22	8 digit/gallons
	OKC-1318-3	1"	.44	52	8 digit/gallons
	OKC-1318-4	1-1/2"	.88	88	8 digit/gallons
	OKC-1318-5	2"	2.0	132	8 digit/gallons

Remote Readout OKC-1319

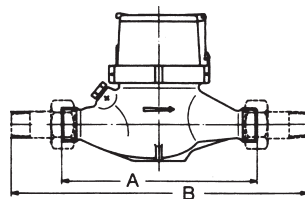


The remote readout is included with each totalizer. It is also available separately.

Remote Readout Only

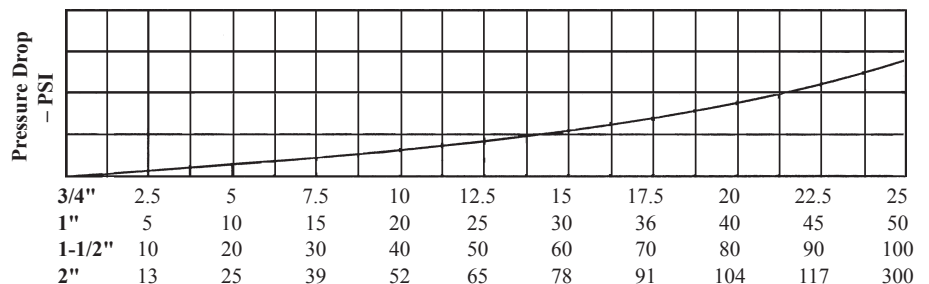
- Catalog Number OKC-1319
- Operates on remote contact closure
- Self powered internal lithium battery - 10 year typical life
- 8 digits – 3/8" height
- Heavy duty enclosure

Dimensions



	3/4"	1"	1-1/2"	2"
A	Meter Only			
	7-1/2"	10-3/4"	12-5/8"	10-5/8"
B	With Couplings (MNPT)			
	12-5/8"	16-1/8"	18-1/2"	16-7/8"

Typical Pressure Drop Curve



Check Valves

BALL TYPE

Description

Ball type check valves are produced in three sizes: 10-32, 1/8" NPT and 1/4" NPT. They are available in both brass and stainless steel and are suitable for use with liquids or gases. Free flow occurs in one direction only; reverse flow is prevented.

All valve seats are metal to metal construction. Minor amounts of seat leakage can be expected. See General Specifications.

Features

- All metal construction
- Long life operation
- Choice of cracking pressure
- High pressure capability

General Specifications

Materials of Construction

Body – Brass or 303 SS
 Ball Check Assembly – 304 SS
 Flow Control Orifice – Brass or 303 SS
 Sealant – Loctite 609, 680
 High pressure types only

Maximum Temperature

NPT – 300°F (max.)
 10-32 – 150°F (max.)

Maximum Operating Pressure

Standard Pressure Type

NPT – 200 psig (max.)
 10-32 – 125 psig (max.)

High Pressure Type (Suffix H)

NPT – 2000 psig (max.)

Seat Leakage – 20 sccm (max.)

Air flow at 25 psi differential

Flow Capacity

Free Flow Direction

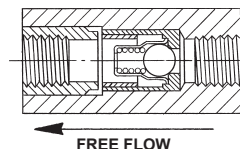
Size	10-32	1/8" NPT	1/4" NPT
Type	FFLC	BLC, BLCH DLC, DFLC	ELC, ELCH GLC, GFLC
C _v	.081	.081	.190

Check Valve Cracking Pressure

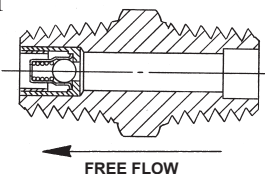
Selectable 0,2,10 or 15 psid
 See chart on next page

Construction

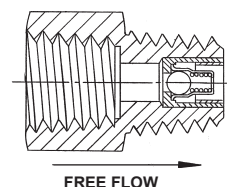
Type FFLC



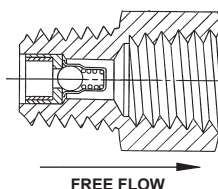
Type BLC BLCH



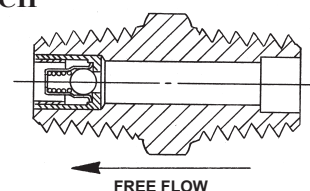
Type DLC GLC



Type DFLC GFLC



Type ELC ELCH



Part Numbers

The complete part number for a ball type check valve includes Type, Cracking Pressure and Body Material.

EXAMPLES

Type	Cracking Pressure psid*	Body Material	Part Number
FFLC	2	BR	FFLC-2-BR (standard pressure)
BLC	10	SS	BLC-10-SS (standard pressure)
ELCH	15	BR	ELCH-15-BR (high pressure)
GLC	0	SS	GLC-0-SS (standard pressure)
DFLC	2	BR	DFLC-2-BR (standard pressure)

*psid – pounds per square inch differential

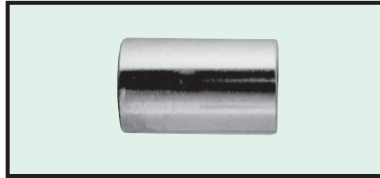
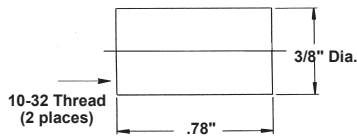
Check Valves

53

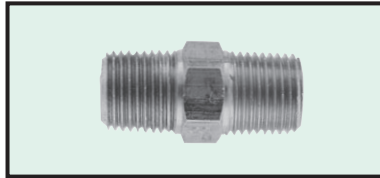
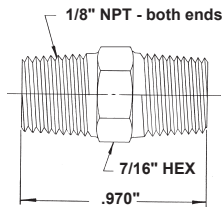
BALL TYPE

Dimensions

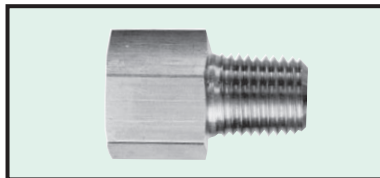
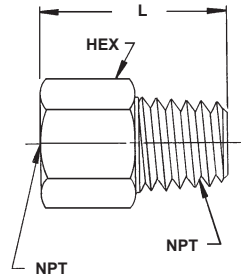
Type FFLC



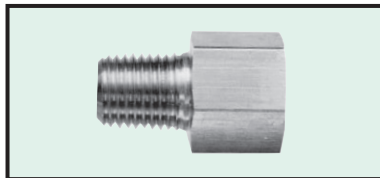
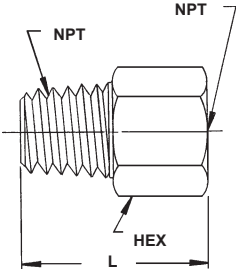
Type BLC BLCH



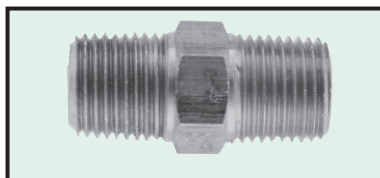
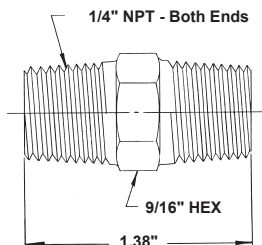
Type DLC GLC



Type DFLC GFLC



Type ELC ELCH



Specifications

10-32 COUPLING

Body – Brass or 303 SS

Valve Assembly – 304 SS

C_v and Flow Data – See chart below

Maximum Operating Pressure – 125 psig

Cracking Pressure – See chart below

1/8" NPT NIPPLE

Body – Brass or 303 SS

Valve Assembly – 304 SS

C_v and Flow Data – See chart below

Maximum Operating Pressure –

BLC 200 psig

BLCH 2000 psig

Cracking Pressure – See chart below

1/8" OR 1/4" NPT ADAPTER

Body – Brass or 303 SS

Valve Assembly – 304 SS

C_v and Flow Data – See chart below

Maximum Operating Pressure – 200 psig

Cracking Pressure – See chart below

1/8" OR 1/4" NPT ADAPTER

Body – Brass or 303 SS

Valve Assembly – 304 SS

C_v and Flow Data – See chart below

Maximum Operating Pressure – 200 psig

Cracking Pressure – See chart below

1/4" NPT NIPPLE

Body – Brass or 303 SS

Valve Assembly – 304 SS

C_v and Flow Data – See chart below

Maximum Operating Pressure –

ELC 200 psig

ELCH 2000 psig

Cracking Pressure – See chart below

Valve Characteristics

	Cracking Pressure – psid*				C _v	Inlet Pressure – 100 psig Outlet Pressure – Atmos.	
Type	0	2	10	15		Air Free Flow – SCFH	Water Flow – GPM
FFLC	✓	✓	✓			.081	331
BLC, BLCH, DLC, DFLC	✓	✓	✓		.081	331	.8
ELC, ELCH GLC, GFLC	✓	✓		✓	.190	781	1.9

*psid – pounds per square inch differential

Check Valves

DISK TYPE

Description

Disk type check valves are produced in four sizes: 10-32, 1/8" NPT, 1/4" NPT and 3/8" NPT. They are available in both brass and stainless steel and are suitable for use with liquids or gases. Free flow occurs in one direction only; reverse flow is prevented.

Features

- High Flow Capacity
- Low Pressure Loss
- Low Cracking Pressure
- Long Life Operation

General Specifications

Maximum Pressure – 150 psig (NPT)
125 psig (10-32)

Maximum Temperature

Brass Disk Assembly	225°F
303 SS Disk Assembly	225°F
Delrin Disk Assembly	120°F
All 10-32 Assemblies	120°F

Flow Capacity

Free Flow Direction

Size	10-32	1/8" NPT	1/4" NPT	3/8" NPT
Cv	.15	.43	.61	1.09

Materials of Construction

Body – Brass or 303 SS

Seals – Viton, Silicone

Disk – Brass, 303 SS or Delrin

Cracking Pressure

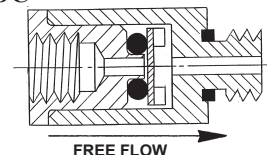
Less than 0.25 psid (NPT)

Less than 0.5 psid (10-32)

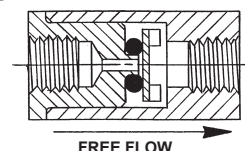
Use "0" in part number

Construction

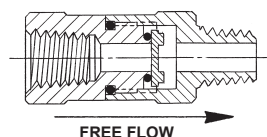
Type FMOC



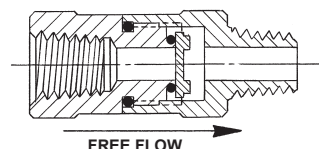
Type FFOC



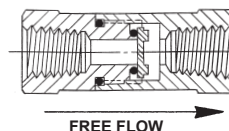
Type DOC



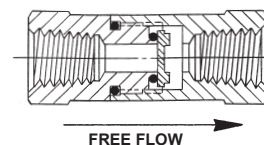
Type GOC



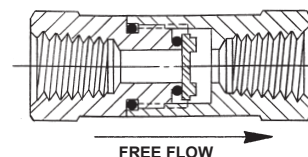
Type Y2C



Type Y4C



Type Y6C



Part Numbers

The complete part number for a disk check valve includes Type, Cracking Pressure (0), Body Material and Disk Material.

EXAMPLES

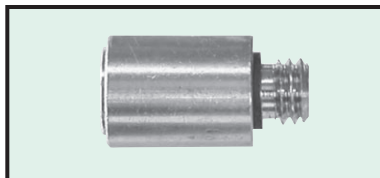
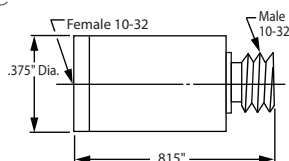
Type	Cracking* Pressure	Body Material	Disk Material	Part Number
GOC (1/4" male/female)	0	SS (303 SS)	DE (Delrin)	GOC-0-SS-DE
Y6C (3/8" female/female)	0	BR (Brass)	BR (Brass)	Y6C-0-BR-BR
FMOC (10-32 male/female)	0	BR (Brass)	BR (Brass)	FMOC-0-BR-BR

* Cracking Pressure designation is "0" for Disk Check Valves.

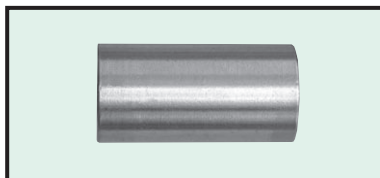
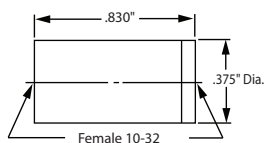
DISK TYPE

Dimensions

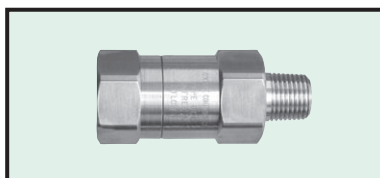
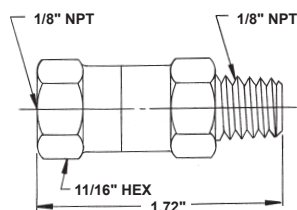
Type FMOC



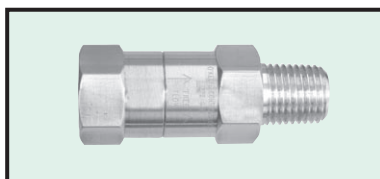
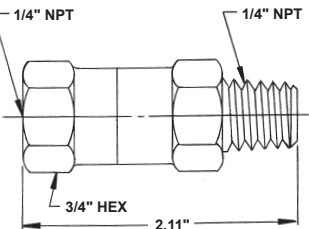
Type FFOC



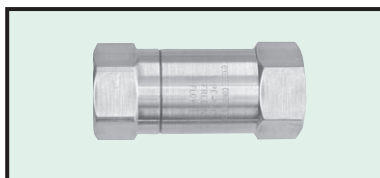
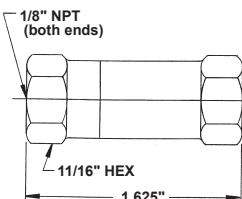
Type DOC



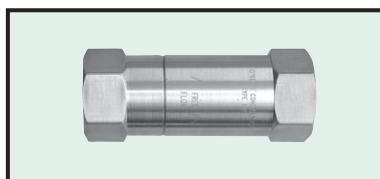
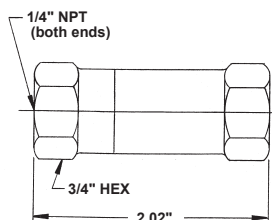
Type GOC



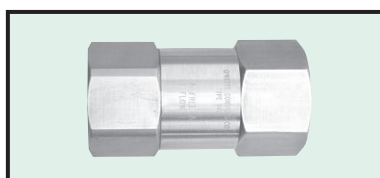
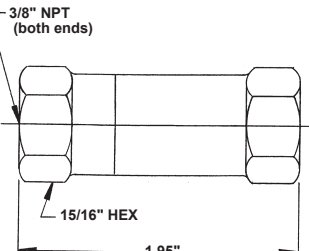
Type Y2C



Type Y4C



Type Y6C



Specifications

10-32 ADAPTER

Body – Brass or 303 SS

Disk – Brass or 303 SS

Seals – Silicone

C_v – .15

Maximum Operating Pressure – 125 psig

Cracking Pressure – Less than 0.5 psid*

10-32 COUPLING

Body – Brass or 303 SS

Disk – Brass or 303 SS

Seals – Silicone

C_v – .15

Maximum Operating Pressure – 125 psig

Cracking Pressure – Less than 0.5 psid*

1/8" ADAPTER

Body – Brass or 303 SS

Disk – Brass, 303 SS or Delrin

Seals – Viton

C_v – .43

Maximum Operating Pressure – 150 psig

Cracking Pressure – Less than 0.25 psid*

1/4" NPT ADAPTER

Body – Brass or 303 SS

Disk – Brass, 303 SS or Delrin

Seals – Viton

C_v – .61

Maximum Operating Pressure – 150 psig

Cracking Pressure – Less than 0.25 psid*

1/8" NPT COUPLING

Body – Brass or 303 SS

Disk – Brass, 303 SS or Delrin

Seals – Viton

C_v – .43

Maximum Operating Pressure – 150 psig

Cracking Pressure – Less than 0.25 psid*

1/4" NPT COUPLING

Body – Brass or 303 SS

Disk – Brass, 303 SS or Delrin

Seals – Viton

C_v – .61

Maximum Operating Pressure – 150 psig

Cracking Pressure – Less than 0.25 psid*

3/8" NPT COUPLING

Body – Brass or 303 SS

Disk – Brass, 303 SS or Delrin

Seals – Viton

C_v – 1.09

Maximum Operating Pressure – 150 psig

Cracking Pressure – Less than 0.25 psid*

*psid – pounds per square inch differential

Fixed Flow Controls

BALL TYPE

Description

Fixed flow controls are a parallel arrangement of a ball check valve and a precision orifice. Free flow occurs in one direction and metered flow occurs in the opposite direction. Suitable for both liquids and gases the fixed flow controls are available in brass or stainless steel.

Features

- All Metal Construction
- Long Life Operation
- Choice of Cracking Pressure
- Tamperproof Orifice
- High Pressure Capacity

General Specifications

Materials of Construction

Body – Brass or 303 SS as listed
 Ball Check Assembly – 304 SS
 Flow Control Orifice – Brass or 303 SS
 Sealant – Locite 609, 680
 High pressure types only

Maximum Temperature – 300°F

Maximum Operating Pressure

Standard Pressure Type

NPT – 200 psig (max.)
 10-32 – 125 psig (max.)

High Pressure Type (Suffix H)

NPT – 2000 psig (max.)

Seat Leakage – 20 sccm (max.)

Air flow at 25 psi differential

Flow Capacity

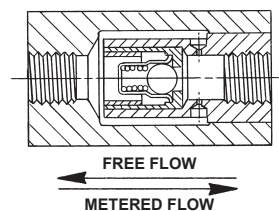
See charts on page 57 for details

Check Valve Cracking Pressure

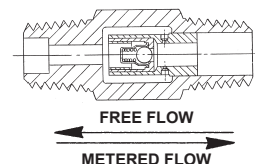
Selectable 0, 2, 10 or 15 psid

Construction

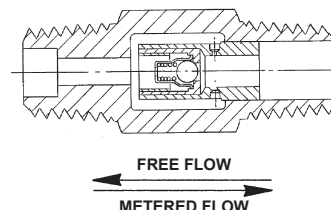
Type FFLF



Type BLF, BLFH



Type ELF, ELFH



Valve Characteristics

Type	Cracking Pressure – psid*				Free Flow C _v	Inlet Pressure – 100 psig Outlet Pressure – Atmos.	
	0	2	10	15		Air Free Flow – SCFH	Water Flow – GPM
FFLF	✓	✓	✓		.084 to .162	346 to 662	.8 to 1.6
BLF	✓	✓	✓		.084 to .162	346 to 662	.8 to 1.6
ELF	✓	✓		✓	.194 to .396	809 to 1650	1.9 to 3.9

Ordering Information

FIXED FLOW CONTROL – PART NUMBER

EXAMPLES

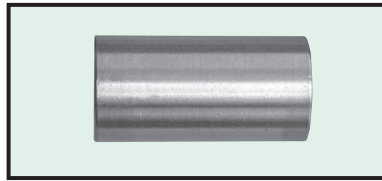
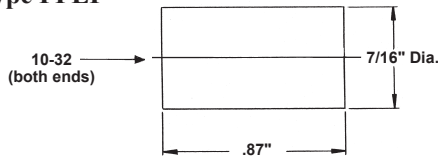
Type	Orifice Size Number	Cracking Pressure psid*	Body Material	Part Number
FFLF	10	10	BR	FFLF-10-10-BR (standard pressure)
BLFH	25	2	SS	BLFH-25-2-SS (high pressure)
ELF	60	15	BR	ELF-60-15-BR (standard pressure)

*psid – pounds per square inch differential

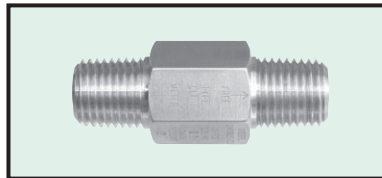
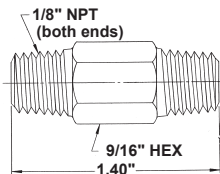
BALL TYPE

Dimensions

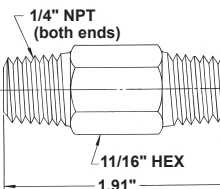
Type FFLF



Type BLF BLFH



Type ELF ELFH



Specifications

10-32 COUPLING

Body – Brass or 303 SS

Valve – 304 SS

C_v – Variable, see chart below

Maximum Operating Pressure – 125 psig

Cracking Pressure – 0, 2 or 10 psid

1/8" NPT NIPPLE

Body – Brass or 303 SS

Valve – 304 SS

C_v – Variable, see chart below

Maximum Operating Pressure –

BLF – 200 psig

BLFH – 2000 psig

Cracking Pressure – 0, 2 or 10 psid

1/4" NPT NIPPLE

Body – Brass only

Valve – 304 SS

C_v – Variable, see chart below

Maximum Operating Pressure –

ELF – 200 psig

ELFH – 2000 psig

Cracking Pressure – 0, 2 or 15 psid

Types BLF, BLFH, FFLF

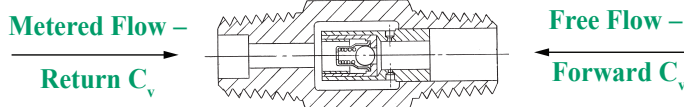
Orifice Size Number	Orifice Dia. In.	Orifice Cv (return)	Check Valve Cv	Assembly Forward Cv	Cv Ratio Forward Cv Return Cv
10	.0102	0.0025	0.081	0.084	33.40
11	.0110	0.0028	0.081	0.084	29.93
*12	.0122	0.0034	0.081	0.084	24.82
13	.0130	0.0038	0.081	0.085	22.32
14	.0142	0.0043	0.081	0.085	19.84
15	.0150	0.0050	0.081	0.086	17.20
16	.016	0.0055	0.081	0.087	15.73
17	.017	0.0067	0.081	0.088	13.09
18	.018	0.0073	0.081	0.088	12.10
19	.019	0.0080	0.081	0.089	11.13
*20	.020	0.0088	0.081	0.090	10.20
21	.021	0.0096	0.081	0.091	9.44
22	.022	0.011	0.081	0.092	8.36
23	.023	0.012	0.081	0.093	7.75
24	.024	0.013	0.081	0.094	7.23
25	.025	0.014	0.081	0.095	6.79
*26	.026	0.016	0.081	0.097	6.06
27	.027	0.017	0.081	0.098	5.76
28	.028	0.018	0.081	0.099	5.50
29	.029	0.019	0.081	0.100	5.26
31	.031	0.022	0.081	0.103	4.68
*32	.032	0.024	0.081	0.105	4.38
33	.033	0.025	0.081	0.106	4.24
35	.035	0.028	0.081	0.109	3.89
37	.037	0.031	0.081	0.112	3.61
38	.038	0.032	0.081	0.113	3.53
39	.039	0.033	0.081	0.114	3.45
*40	.040	0.036	0.081	0.117	3.25
41	.041	0.038	0.081	0.119	3.13
42	.042	0.039	0.081	0.120	3.08
43	.043	0.041	0.081	0.122	2.98
47	.047	0.048	0.081	0.129	2.69
*52	.052	0.059	0.081	0.140	2.37
55	.055	0.068	0.081	0.149	2.19
60	.060	0.081	0.081	0.162	2.00

*These sizes are normally stocked with 2 psid cracking pressure.

Types ELF, ELFH

Orifice Size Number	Orifice Dia. In.	Orifice Cv (return)	Check Valve Cv	Assembly Forward Cv	Cv Ratio Forward Cv Return Cv
10	.0102	0.0025	0.191	0.194	77.40
11	.0110	0.0028	0.191	0.194	69.21
*12	.0122	0.0034	0.191	0.194	57.18
13	.0130	0.0038	0.191	0.195	51.26
14	.0142	0.0043	0.191	0.195	45.42
15	.0150	0.0050	0.191	0.196	39.20
16	.016	0.0055	0.191	0.197	35.73
17	.017	0.0067	0.191	0.198	29.51
18	.018	0.0073	0.191	0.198	27.16
19	.019	0.0080	0.191	0.199	24.88
*20	.020	0.0088	0.191	0.200	22.70
21	.021	0.0096	0.191	0.201	20.90
22	.022	0.011	0.191	0.202	18.36
23	.023	0.012	0.191	0.203	16.92
24	.024	0.013	0.191	0.204	15.69
25	.025	0.014	0.191	0.205	14.64
*26	.026	0.016	0.191	0.207	12.94
27	.027	0.017	0.191	0.208	12.24
28	.028	0.018	0.191	0.209	11.61
29	.029	0.019	0.191	0.210	11.05
31	.031	0.022	0.191	0.213	9.68
*32	.032	0.024	0.191	0.215	8.96
33	.033	0.025	0.191	0.216	8.64
35	.035	0.028	0.191	0.219	7.82
37	.037	0.031	0.191	0.222	7.16
38	.038	0.032	0.191	0.223	6.97
39	.039	0.033	0.191	0.224	6.79
*40	.040	0.036	0.191	0.227	6.31
41	.041	0.038	0.191	0.229	6.03
42	.042	0.039	0.191	0.230	5.90
43	.043	0.041	0.191	0.232	5.66
47	.047	0.048	0.191	0.239	4.98
*52	.052	0.059	0.191	0.250	4.24
55	.055	0.068	0.191	0.259	3.81
60	.060	0.081	0.191	0.272	3.36
63	.063	0.088	0.191	0.279	3.17
67	.067	0.10	0.191	0.291	2.91
70	.070	0.11	0.191	0.301	2.74
73	.073	0.12	0.191	0.311	2.59
76	.076	0.13	0.191	0.321	2.47
79	.079	0.14	0.191	0.331	2.36
81	.081	0.15	0.191	0.341	2.27
86	.086	0.17	0.191	0.361	2.12
89	.089	0.18	0.191	0.371	2.06
94	.094	0.20	0.191	0.391	1.96

*These sizes are normally stocked with 2 psid cracking pressure.



Fixed Flow Controls

DISK TYPE

Description

Fixed flow controls are a parallel arrangement of a disk check valve and a precision orifice. Free flow occurs in one direction and metered flow occurs in the opposite direction. Suitable for both liquids and gases the fixed flow controls are available in brass or stainless steel.

Applications

- Air Cylinder Speed Controls
- Compressed Air Dryer Purge Controls
- Timing Circuits

Features

- High Flow Capacity
- Low Pressure Loss
- Low Cracking Pressure
- Long Life Operation
- Tamperproof Orifice

Ordering Information

EXAMPLES		FIXED FLOW CONTROL – PART NUMBER			
Type	Orifice Size No.*	Body Material	Disk Material	Part Number	
GOF	10	SS	SS	GOF-10-SS-SS	
(1/4" male/female)	(.010" orifice)	(303 SS)	(303 SS)		
Y6F	22	BR	DE	Y6F-22-BR-DE	
(3/8" female/female)	(.022" orifice)	(Brass)	(Delrin)		

*See chart on page 60.

Valve Characteristics

Type	Thread	End Connections	Metering* Orifice Size No.	Body Material	Disk Material	Maximum Pressure	Free Flow Cv	
FMOF	10-32	male/female	4 to 25	Brass (BR)	Brass (BR)	NPT 150 psig	.15-.17	
DOF	1/8" NPT		4 to 125				303 SS (SS)	.43-.51
GOF	1/4" NPT							.61-.98
FFOF	10-32	female/female	4 to 25	or	or Delrin (DE)	10-32 125 psig		.15-.17
Y2F	1/8" NPT		4 to 125	303 SS (SS)			.43-.51	
Y4F	1/4" NPT						.61-.98	
Y6F	3/8" NPT						1.09-1.46	

*See chart on page 60.

General Specifications

Maximum Operating Pressure

NPT – 150 psig
10-32 – 125 psig

Maximum Temperature

Brass Disk Assembly 225°F
303 SS Disk Assembly 225°F
Delrin Disk Assembly 120°F
All 10-32 Assemblies 120°F

Flow Capacity – See chart below

Materials of Construction

Body – Brass or 303 SS
Seals – Viton, Silicone
Disk – Brass, 303 SS or Delrin

Cracking Pressure – Less than 0.5 psid

Orifice Sizes (Fixed Flow Controls)

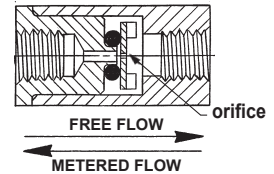
.004" to .125" (NPT)
.004" to .025" (10-32)

Seat Leakage (Check Valves)

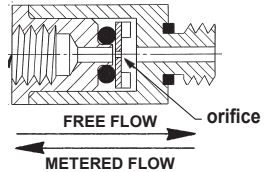
Bubbletight for differential pressure greater than 2 psid (NPT)

Construction

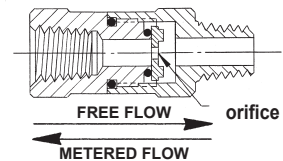
Type FFOF



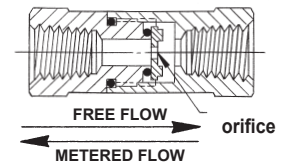
Type FMOF



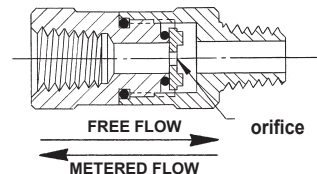
Type DOF



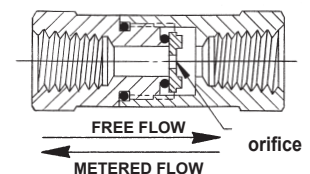
Type Y2F



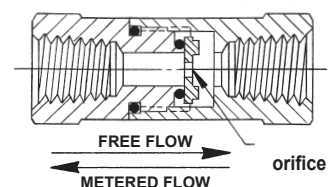
Type GOF



Type Y4F



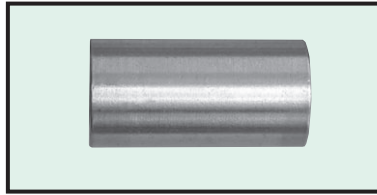
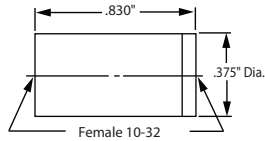
Type Y6F



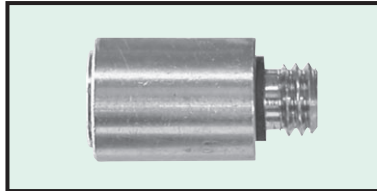
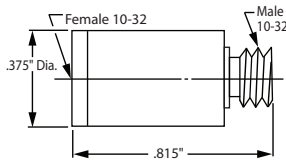
DISK TYPE

Dimensions

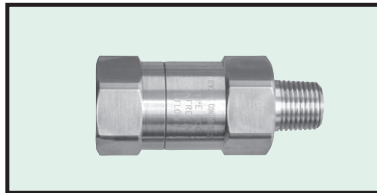
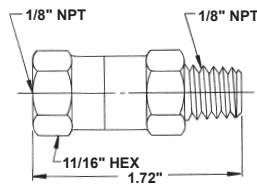
Type FFOF



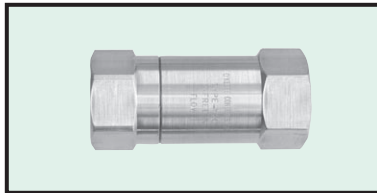
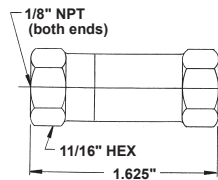
Type FMOF



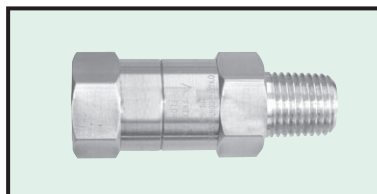
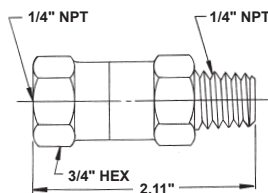
Type DOF



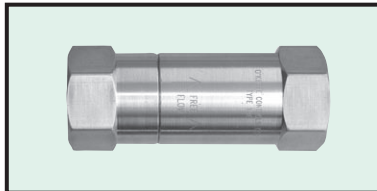
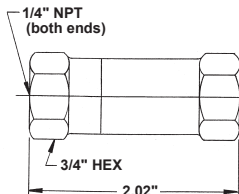
Type Y2F



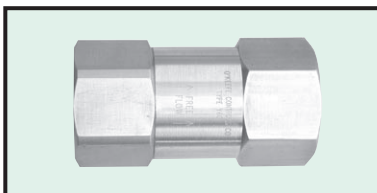
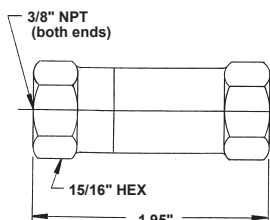
Type GOF



Type Y4F



Type Y6F



Specifications

10-32 COUPLING

Body – Brass or 303 SS
Disk – Brass or 303 SS
Seals – Viton, Silicone
Maximum Operating Pressure – 125 psig
Orifice Size Numbers – 4 to 25
Flow Capacity – See chart on page 60

10-32 ADAPTER

Body – Brass or 303 SS
Disk – Brass or 303 SS
Seals – Viton, Silicone
Maximum Operating Pressure – 125 psig
Orifice Size Numbers – 4 to 25
Flow Capacity – See chart on page 60

1/8" NPT ADAPTER

Valve Body – Brass or 304 SS
Disk – Brass, 303 SS, Delrin
Seals – Viton
Maximum Operating Pressure – 150 psig
Orifice Size Numbers – 4 to 125
Flow Capacity – See chart on page 60

1/8" NPT COUPLING

Valve Body – Brass or 304 SS
Disk – Brass, 303 SS, Delrin
Seals – Viton
Maximum Operating Pressure – 150 psig
Orifice Size Numbers – 4 to 125
Flow Capacity – See chart on page 60

1/4" NPT ADAPTER

Valve Body – Brass or 304 SS
Disk – Brass, 303 SS, Delrin
Seals – Viton
Maximum Operating Pressure – 150 psig
Orifice Size Numbers – 4 to 125
Flow Capacity – See chart on page 60

1/4" NPT COUPLING

Valve Body – Brass or 304 SS
Disk – Brass, 303 SS, Delrin
Seals – Viton
Maximum Operating Pressure – 150 psig
Orifice Size Numbers – 4 to 125
Flow Capacity – See chart on page 60

3/8" NPT COUPLING

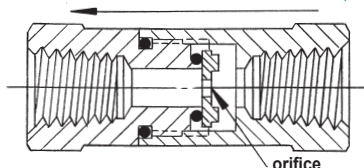
Valve Body – Brass or 304 SS
Disk – Brass, 303 SS, Delrin
Seals – Viton
Maximum Operating Pressure – 150 psig
Orifice Size Numbers – 4 to 125
Flow Capacity – See chart on page 60

Fixed Flow Controls

DISK TYPE

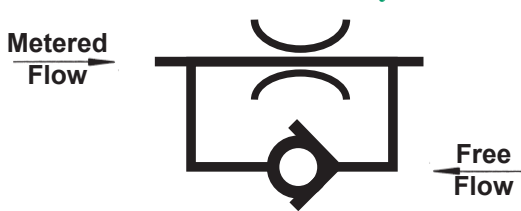
Orifice Size No.	Orifice Dia.	Orifice Cv (return)	Types FFOF, FMOF		Types DOF, Y2F		Types GOF, Y4F		Type Y6F	
			Forward Cv	Cv Ratio Forward Cv Return Cv	Forward Cv	Cv Ratio Forward Cv Return Cv	Forward Cv	Cv Ratio Forward Cv Return Cv	Forward Cv	Cv Ratio Forward Cv Return Cv
4	.0039	.00035	.150	428.57	.430	1229.57	.614	1755.29	1.091	3118.14
5	.0051	.00061	.151	247.54	.431	705.92	.615	1007.56	1.092	1789.52
6	.0059	.00086	.151	175.58	.431	501.00	.615	714.95	1.092	1269.60
7	.0071	.0012	.151	125.83	.431	359.33	.615	512.67	1.092	910.17
8	.0079	.0015	.152	101.33	.432	287.67	.616	410.33	1.093	728.33
9	.0091	.0019	.152	80.00	.432	227.32	.616	324.16	1.093	575.21
10	.0102	.0025	.153	61.20	.433	173.00	.617	246.60	1.094	437.40
11	.0110	.0028	.153	54.64	.433	154.57	.617	220.29	1.094	390.64
12	.0122	.0034	.153	45.00	.433	127.47	.617	181.59	1.094	321.88
13	.0130	.0038	.154	40.53	.434	114.16	.618	162.58	1.095	288.11
14	.0143	.0043	.154	35.81	.434	101.00	.618	143.79	1.095	254.72
15	.0150	.0050	.155	31.00	.435	87.00	.619	123.80	1.096	219.20
16	.016	.0055	.156	28.36	.436	79.18	.620	112.64	1.097	199.36
17	.017	.0067	.157	23.43	.437	65.18	.621	92.64	1.098	163.84
18	.018	.0073	.157	21.51	.437	59.90	.621	85.11	1.098	150.45
19	.019	.0080	.158	19.75	.438	54.75	.622	77.75	1.099	137.38
20	.020	.0088	.159	18.07	.439	49.86	.623	70.77	1.100	124.98
21	.021	.0096	.160	16.67	.440	45.79	.624	64.96	1.101	114.65
22	.022	.011	.161	14.64	.441	40.09	.625	56.82	1.102	100.18
23	.023	.012	.162	13.50	.442	36.83	.626	52.17	1.103	91.92
24	.024	.013	.163	12.54	.443	34.08	.627	48.23	1.104	84.92
25	.025	.014	.164	11.71	.444	31.71	.628	44.86	1.105	78.93
26	.026	.016			.446	27.88	.630	39.38	1.107	69.19
27	.027	.017			.447	26.29	.631	37.12	1.108	65.18
28	.028	.018			.448	24.89	.632	35.11	1.109	61.61
29	.029	.019			.449	23.63	.633	33.32	1.110	58.42
31	.031	.022			.452	20.55	.636	28.91	1.113	50.59
32	.032	.024			.454	18.92	.638	26.58	1.115	46.46
33	.033	.025			.455	18.20	.639	25.56	1.116	44.64
35	.035	.028			.458	16.36	.642	22.93	1.119	39.96
37	.037	.031			.461	14.87	.645	20.81	1.122	36.19
38	.038	.032			.462	14.44	.646	20.19	1.123	35.09
39	.039	.033			.463	14.03	.647	19.61	1.124	34.06
40	.040	.036			.466	12.94	.650	18.06	1.127	31.31
41	.041	.038			.468	12.32	.652	17.16	1.129	29.71
42	.042	.039			.469	12.03	.653	16.74	1.130	28.97
43	.043	.041			.471	11.49	.655	15.98	1.132	27.61
47	.047	.048			.478	9.96	.662	13.79	1.139	23.73
52	.052	.059			.489	8.29	.673	11.41	1.150	19.49
55	.055	.068			.498	7.32	.682	10.03	1.159	17.04
60	.060	.081			.511	6.31	.695	8.58	1.172	14.47
63	.063	.088			.518	5.89	.702	7.98	1.179	13.40
67	.067	.10			.530	5.30	.714	7.14	1.191	11.91
70	.070	.11			.540	4.91	.724	6.58	1.201	10.92
73	.073	.12			.550	4.58	.734	6.12	1.211	10.09
76	.076	.13			.560	4.31	.744	5.72	1.221	9.39
79	.079	.14			.570	4.07	.754	5.39	1.231	8.79
81	.081	.15			.580	3.87	.764	5.09	1.241	8.27
86	.086	.17			.600	3.53	.784	4.61	1.261	7.42
89	.089	.18			.610	3.39	.794	4.41	1.271	7.06
94	.094	.20			.630	3.15	.814	4.07	1.291	6.46
96	.096	.21			.640	3.05	.824	3.92	1.301	6.20
100	.100	.23			.660	2.87	.844	3.67	1.321	5.74
104	.104	.25			.680	2.72	.864	3.46	1.341	5.36
109	.109	.27			.700	2.59	.884	3.27	1.361	5.04
113	.113	.31			.740	2.39	.924	2.98	1.401	4.52
120	.120	.34			.770	2.27	.954	2.81	1.431	4.21
125	.125	.37			.800	2.16	.984	2.66	1.461	3.95

Metered Flow – Return C_v



Free Flow – Forward C_v

Fixed Flow Control Symbol



BALL TYPE

Description

Checked orifices are a series arrangement of a precision orifice, a ball check valve and an optional screen. The all metal assemblies are made of brass or stainless steel. Gas or liquid can flow in one direction only, at a rate established by the metering orifice. Reverse pressure differential does not result in reverse flow. Standard sizes are 10-32, 1/8" NPT and 1/4" NPT. Custom requirements will be reviewed for large quantity applications.

Applications

- Unidirectional gas or liquid flow
- Backflow prevention in metering systems
- Fluid contamination reduction
- Isolation of fluid sources in mixers
- Fuel line metering with no reverse flow
- Medical metering of fluids

Ordering Information

Part Number System

Type	Orifice Size No.	Cracking Pressure psid*	Material
------	------------------	-------------------------	----------

EXAMPLES

BIFLC - 10 - 2 - BR
(Standard Pressure) .010" 2 psid Brass

FIFLCS - 31 - 10 - BR
(With Screen) .031" 10 psid Brass

EIJLCSH - 81 - 15 - SS
(High Pressure With Screen) .081" 15 psid Stainless Steel

Select – Type from illustrations in right column and from SPECIFICATIONS
Orifice Size No. from chart
Cracking Pressure from SPECIFICATIONS
Material - Brass or Stainless Steel

Specifications

Materials of Construction

Body - Brass or 303 SS

Ball Check Assembly - 304 SS

Flow Control Orifice -

Brass or 303 SS

Sealant - Loctite 609, 680

High pressure types only

Temperature - 300°F (max.)

Maximum Operating Pressure

Standard Pressure Type

NPT - 200 psig (max.)

10-32 - 125 psig (max.)

High Pressure Type (Suffix H)

NPT - 2000 psig (max.)

Seat Leakage - 20 sccm (max.)

air flow at 25 psi differential

Cracking Pressure

- 10-32 or 1/8" NPT

0, 2 or 10 psid

- 1/4" NPT

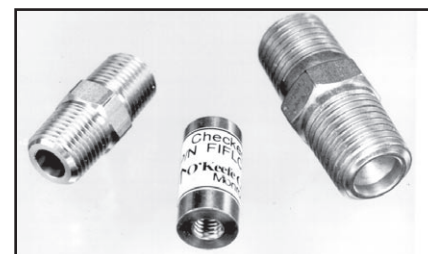
0, 2 or 15 psid

Flow Capacity - Cv and air flow

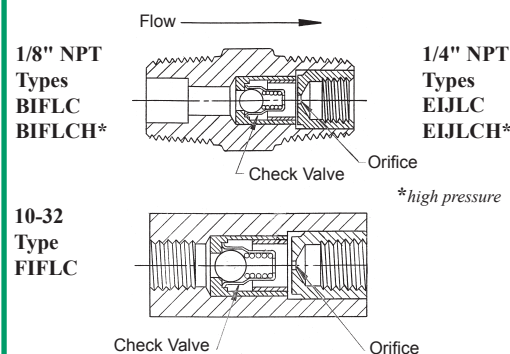
shown in chart below

Orifice Size Number	Orifice Dia. In.	Orifice Cv	Air Flow - SCFH	
			25 psig	100 psig
10	.0102	0.0025	3.37	9.81
11	.0110	0.0028	3.62	10.5
*12	.0122	0.0034	4.66	13.4
13	.0130	0.0038	5.30	15.3
14	.0142	0.0043	6.06	17.4
15	.0150	0.0050	6.95	20.0
*16	.016	0.0055	7.25	21.8
17	.017	0.0067	8.31	25.0
18	.018	0.0073	9.43	28.4
19	.019	0.0080	10.4	31.1
*20	.020	0.0088	11.8	35.2
21	.021	0.0096	12.7	38.1
22	.022	0.011	15.5	44.7
23	.023	0.012	16.8	48.7
24	.024	0.013	18.3	53.2
25	.025	0.014	19.9	58.1
*26	.026	0.016	21.6	62.3
27	.027	0.017	22.7	65.3
28	.028	0.018	24.8	71.4
29	.029	0.019	27.1	78.0
31	.031	0.022	30.1	86.7
*32	.032	0.024	32.6	94.5
33	.033	0.025	34.5	101
35	.035	0.028	37.5	114
37	.037	0.031	41.5	126
38	.038	0.032	44.1	135
39	.039	0.033	47.9	146
*40	.040	0.036	50.9	156
41	.041	0.038	52.3	164
42	.042	0.039	54.9	167
43	.043	0.041	58.5	177
47	.047	0.048	67.6	203
*52	.052	0.059	85.4	254
55	.055	0.068	94.5	282
60	.060	0.081	112	331
63	.063	0.088	122	362
67	.067	0.10	141	415
70	.070	0.11	158	468
73	.073	0.12	168	496
76	.076	0.13	183	540
*79	.079	0.14	198	587
81	.081	0.15	212	627
86	.086	0.17	233	697
89	.089	0.18	248	739
94	.094	0.20	278	831

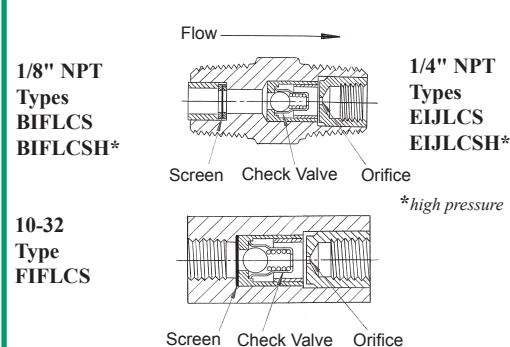
*These sizes are normally stocked with 2 psid cracking pressure.



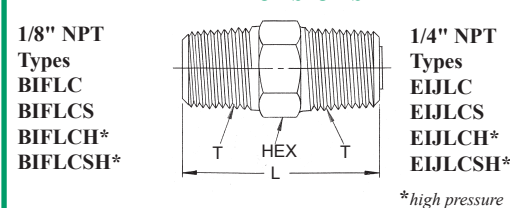
Check Valve/Orifice



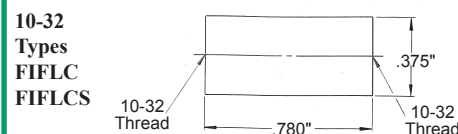
Screen/Check Valve/Orifice



Dimensions



Thread (T)	HEX	L
1/8" NPT	7/16"	.970"
1/4" NPT	9/16"	1.38"

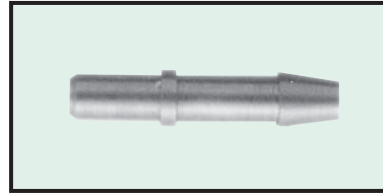
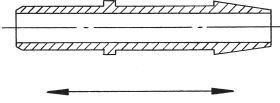


*psid – pounds per square inch differential

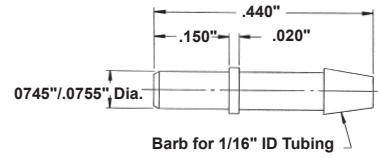
Miniature Stainless Steel Fittings

Construction

Barb Insert

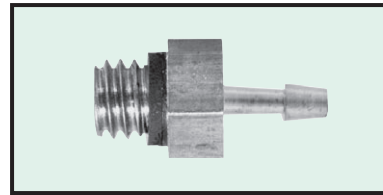
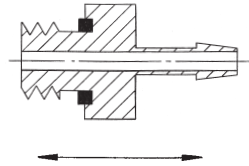


Part Number TB-52-SS
For 1/16" ID Tubing

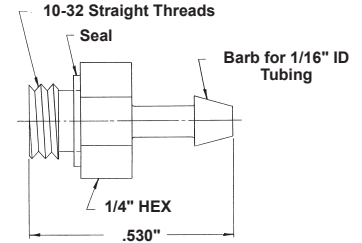


Press fit into bore .0730"/.0735"
(adhesive recommended)

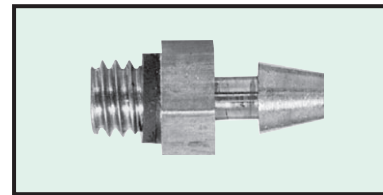
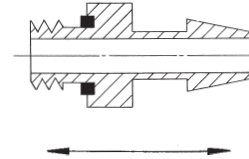
Barb Adapter



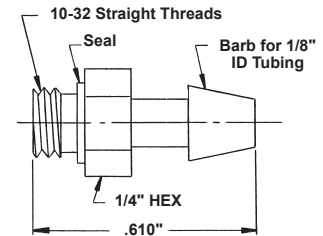
Part Number M-48-SS
For 1/16" ID Tubing



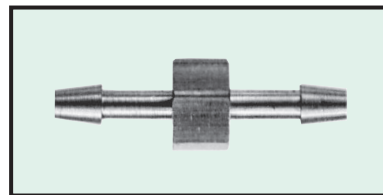
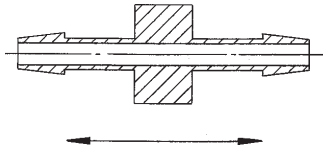
Barb Adapter



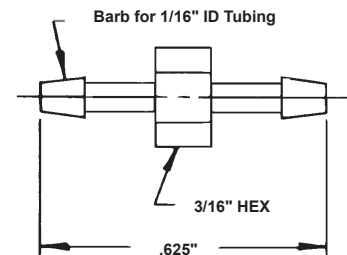
Part Number N-96-SS
For 1/8" ID Tubing



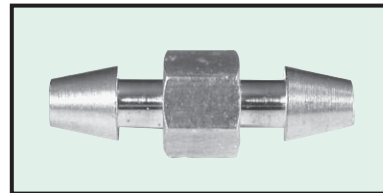
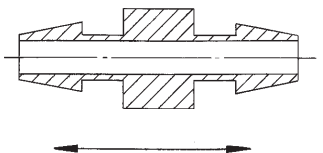
Barb Coupling



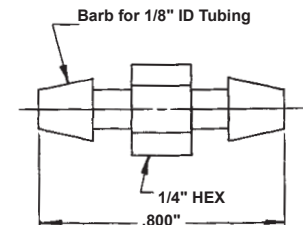
Part Number T-48-SS
For 1/16" ID Tubing



Barb Coupling



Part Number W-96-SS
For 1/8" ID Tubing



GENERAL SPECIFICATIONS

Barb or 10-32 Connections

Maximum Operating Pressure – 125 psig

Materials of Construction — Body - 303 SS • Seals - Viton

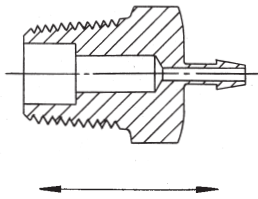
Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction

Miniature Stainless Steel Fittings

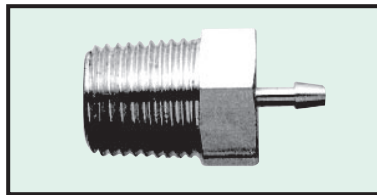
63

Construction

Barb Adapter

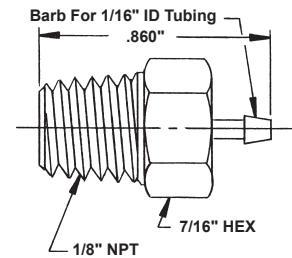


THREADED FITTINGS

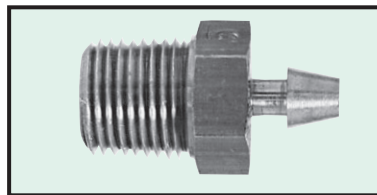
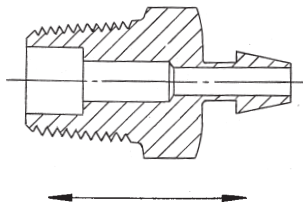


Part Number BT-48-SS
For 1/16" ID Tubing

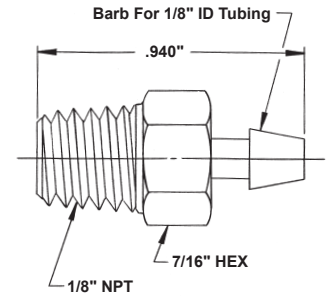
Dimensions



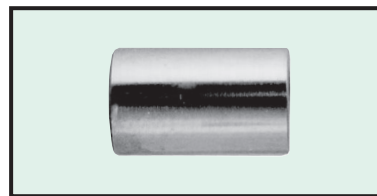
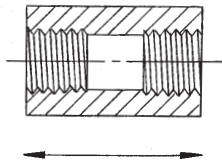
Barb Adapter



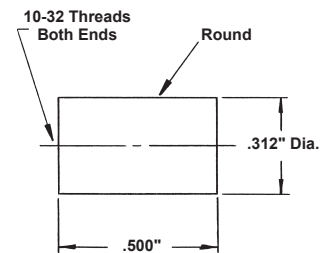
Part Number BW-96-SS
For 1/8" ID Tubing



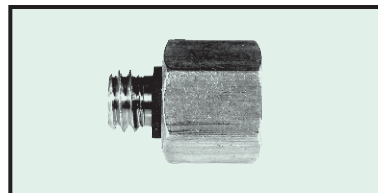
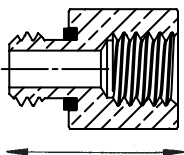
10-32 Coupling



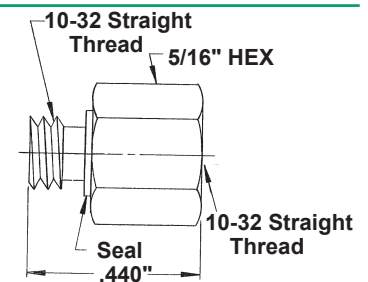
Part Number FF-96-SS



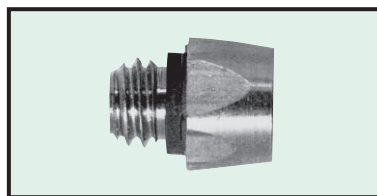
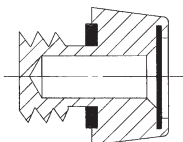
10-32 Adapter



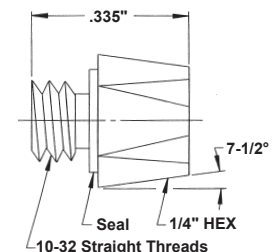
Part Number FM-96-SS



10-32 Plug



Part Number QX-0-SS



GENERAL SPECIFICATIONS

Barb, 10-32 or NPT Connections

Maximum Operating Pressure – 125 psig

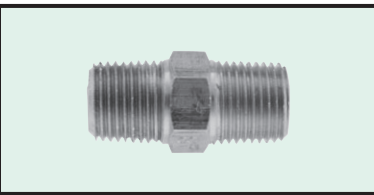
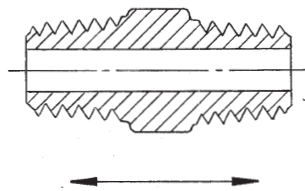
Materials of Construction — Body - 303 SS • Seals - Viton

Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction

Miniature Stainless Steel Fittings

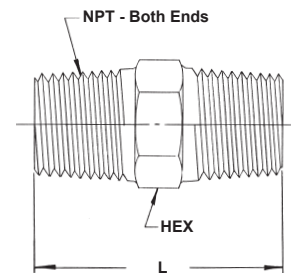
Construction

Hex Pipe Nipple

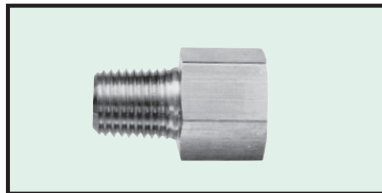
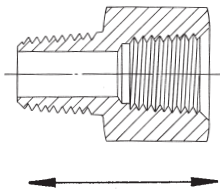


Part Number	Dim. L	HEX	NPT
B-191-SS	.97"	7/16"	1/8"
E-312-SS	1.38"	9/16"	1/4"

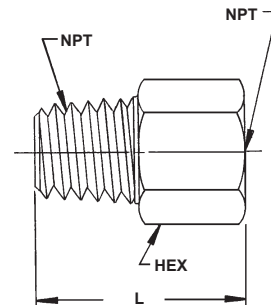
Dimensions



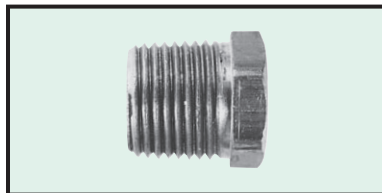
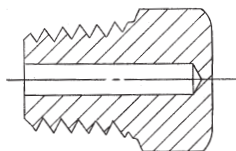
Pipe Adapter



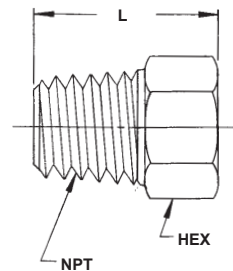
Part Number	Dim. L	HEX	NPT
D-159-SS	.88"	9/16"	1/8"
G-312-SS	1.25"	3/4"	1/4"
H-312-SS	1.69"	1-1/16"	1/2"



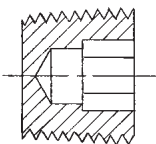
Pipe Plug



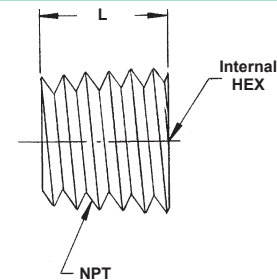
Part Number	Dim. L	HEX	NPT
BM-0-SS	.580"	7/16"	1/8"
EM-0-SS	.800"	9/16"	1/4"



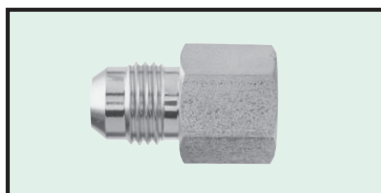
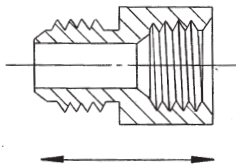
Pipe Plug



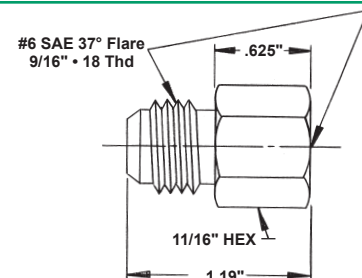
Part Number	Dim. L	HEX	NPT
BH-0-SS	.30"	3/16"	1/8"
EH-0-SS	.46"	1/4"	1/4"



SAE 37° Flare Adapter



Part Number CFJ6-295-SS



GENERAL SPECIFICATIONS

Pipe Connections/SAE 37° Flare

Maximum Operating Pressure – 4000 psig

Materials of Construction – 303 SS

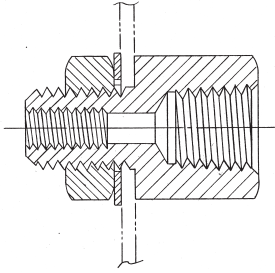
Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction

Miniature Stainless Steel Fittings

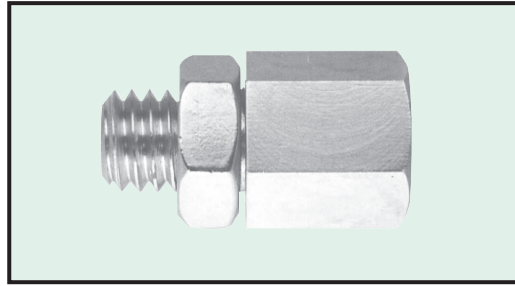
65

Construction

10-32 x 1/8" NPT

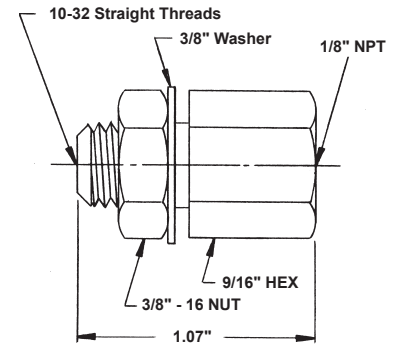


BULKHEAD FITTINGS



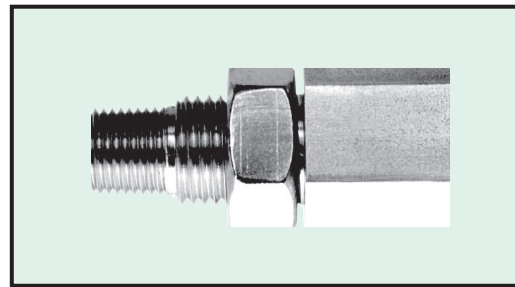
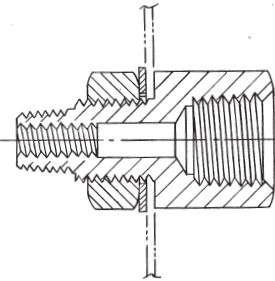
Part Number BUK1-159-SS

Dimensions

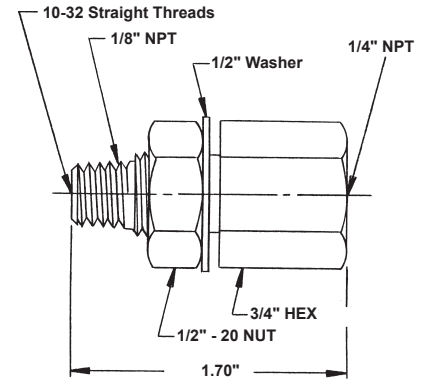


10-32 x 1/4" NPT

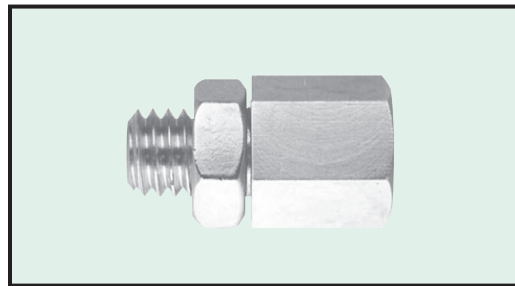
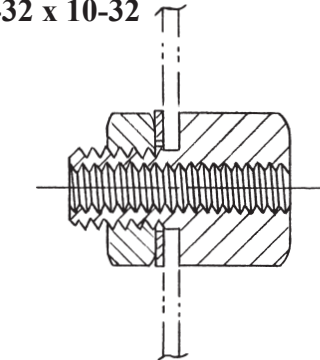
1/8" NPT x 1/4" NPT



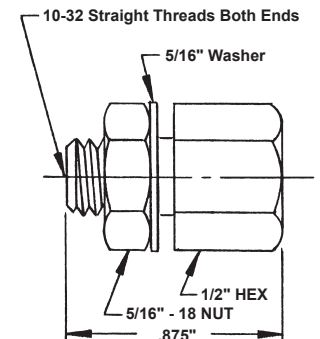
Part Number BUK2-159-SS



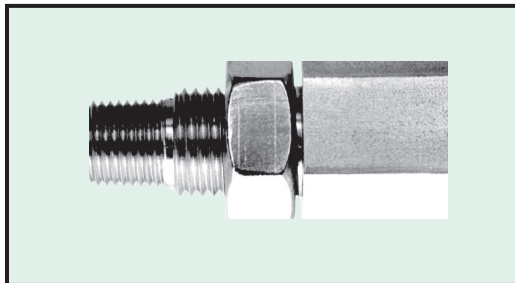
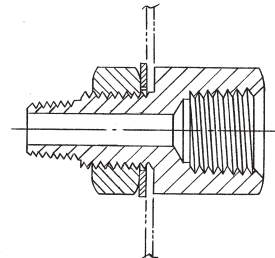
10-32 x 10-32



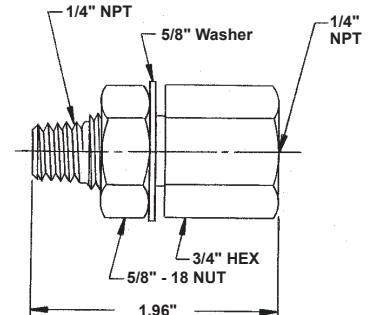
Part Number BUK3-159-SS



1/4" NPT x 1/4" NPT



Part Number BUK4-219-SS



GENERAL SPECIFICATIONS

Bulkhead Connectors

Maximum Operating Pressure – Pipe Connections – 4000 psig • 10-32 Connections – 125 psig

Materials of Construction – Body – 303 SS • Nuts/Washers – 303 SS

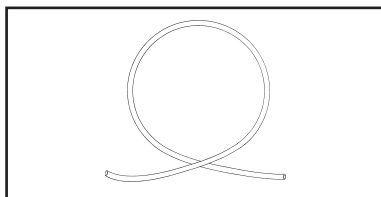
Fluid Media – Air, Water, Gases and Liquids compatible with materials of construction

Miniature Brass Fittings

ADAPTERS, CONNECTORS, TUBING

Polyurethane Tubing

The characteristics of polyurethane tubing are very suitable for use with barb connections. A secure, long life connection is obtained with the tubing offered here. Quick-Attach fittings which secure to the outside of tubing are also suitable with the polyurethane offered here. Consult the factory for color tubing.

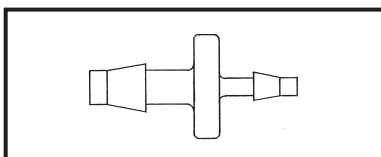
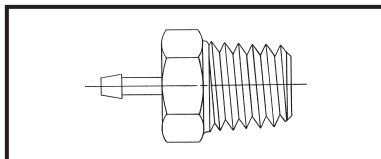
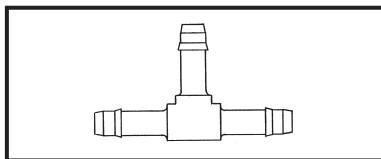


Specifications

<u>Part No.</u>	<u>Tubing Size</u>	<u>Color</u>
K150-3	1/16" ID x 1/8" OD	Clear
K150-4	1/8" ID x 1/4" OD	Clear
OTU0425G-20	3/32" ID x 5/32" OD	Green

Barb Fittings

Barb fittings for use with polyurethane tubing provide economical leak-free connections at pressures up to 100 psig at 70°F. The barb OD is sized to adapt to 1/16" or 1/8" polyurethane tubing.



<u>Part No.</u>	<u>TEE Barb Size</u>
K209-1	1/16" ID Tubing
K525-1	1/8" ID Tubing

Material – Brass

THREADED ADAPTER

<u>Part No.</u>	<u>Barb</u>	<u>Thread</u>
K210-1	1/16"	1/8" NPT
K211-1	1/16"	10-32
K211-2	1/8"	10-32
K521-1	1/8"	1/8" NPT

Material – Brass

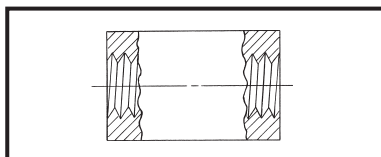
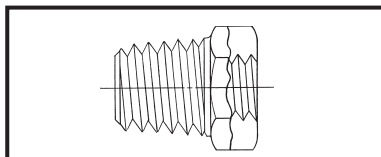
BARB ADAPTER

<u>Part No.</u>	<u>Size</u>
KVC1-2	1/8" x 1/16"

Material – Nylon

Threaded Fittings

Reducing bushings provide a convenient transition from one size to another. The 10-32 coupling connects two male threads.



REDUCING BUSHING

<u>Part No.</u>	<u>Size</u>
KMPA-1410	10-32 x 1/4" NPT
KMPA-1610	10-32 x 1/16" NPT
KMPA-1810	10-32 x 1/8" NPT

Material – Brass

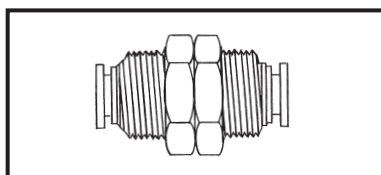
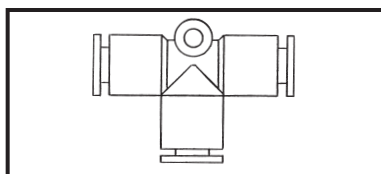
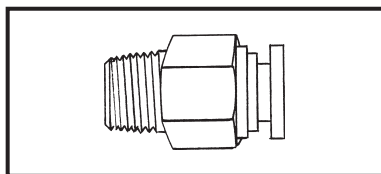
COUPLING

<u>Part No.</u>	<u>Size</u>
K1046-1	10-32 X 10-32

Material – Brass

Quick-Attach Fittings

Recent new developments in quick attach fittings facilitate their use with flexible polyurethane tubing. The Quick-Attach fittings can be easily secured to flexible or rigid tubing and do not require any tools. Secure leak-free attachments at pressure up to 100 psig are readily obtained.



MALE CONNECTOR

<u>Part No.</u>	<u>Thread</u>	<u>Tube</u>
OKQH01-32	10-32	1/8" OD
OKQH03-32	10-32	5/32" OD
OKQH07-32	10-32	1/4" OD
OKQH03-34S	1/8" NPT	5/32" OD
OKQH07-34S	1/8" NPT	1/4" OD
OKQH03-35S	1/4" NPT	5/32" OD
OKQH07-35S	1/4" NPT	1/4" OD

Material – Brass/Plastic

UNION TEE

<u>Part No.</u>	<u>Tube Size</u>
OKQT01-00	1/8" OD
OKQT03-00	5/32" OD
OKQT07-00	1/4" OD

Material – Brass/Plastic

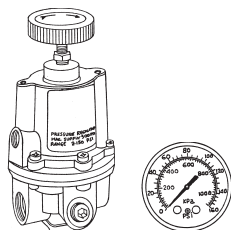
BULKHEAD UNION

<u>Part No.</u>	<u>Tube Size</u>
OKQE01-00	1/8" OD
OKQE03-00	5/32" OD
OKQE07-00	1/4" OD

Material – Brass/Plastic

PRESSURE REGULATORS, FILTERS, FLOWMETERS

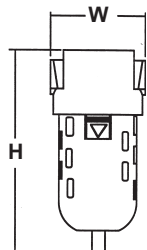
Precision Air Pressure Regulators



Part No.*	Part No. With Gage	Size	Output Pressure	Supply (max.)	Dimensions
OKC-1045-1	OKC-1045-1G		0-2 psig		
OKC-1045-2	OKC-1045-2G		0-10 psig		Inlet to
OKC-1045-3	OKC-1045-3G	1/4"	0-20 psig	400 psig	Outlet < 3"
OKC-1045-4	OKC-1045-4G	NPT	0-30 psig		Height
OKC-1045-5	OKC-1045-5G		0-60 psig		6-1/2" max.
OKC-1045-6	OKC-1045-6G		0-160 psig		

*Maximum Pressure 150 psig; Maximum Temperature 150°F

Fine Air Filters



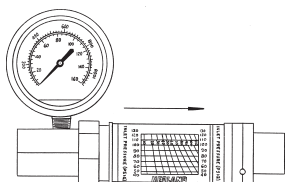
Part No.**	Connection Size	Micron Rating	Drain	Dimensions W H	Max. Flow SCFM	Max. Pressure*
OKC-1379	1/4" NPT	5	Manual	1.5" 3.6"	3	150 psig
OKC-1380	1/4" NPT	.01	Manual	3.3" 6.3"	3	150 psig
OKC-739	1/4" NPT	5	Auto	3.0" 7.5"	10	150 psig
OKC-740	1/4" NPT	.01	Auto	3.0" 7.5"	10	150 psig
OKC-730	1/4" NPT	5	Auto	3.3" 8.2"	20	150 psig
OKC-731	1/4" NPT	.01	Auto	3.3" 8.2"	20	150 psig

*Maximum Operating Temperature 125°F

** Filter Bowls are polycarbonate. Metal bowl guard included.

In-Line Flowmeters with Pressure Gage – Air Service

Calibrated for Inlet Pressures 40-100 psig • Vertical ↑ or Horizontal → Mounting

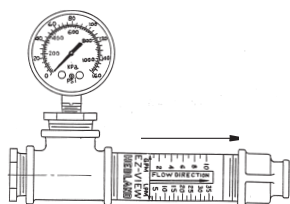


Part No.*	Pipe Size Female NPT	Flow Range SCFM	Approximate Inlet to Outlet Dim.	Maximum Height
OKC-1000-1	1/4"	1-4	6-3/4"	4-1/4"
OKC-1000-2	1/4"	2-9	6-3/4"	4-1/4"
OKC-1000-3	1/4"	2-18	6-3/4"	4-1/4"
OKC-1000-5	1/2"	2-20	9-1/4"	4-3/4"
OKC-1000-6	1/2"	10-60	9-1/4"	4-3/4"
OKC-1000-10	3/4"	5-50	10-1/2"	5-1/4"
OKC-1000-11	3/4"	10-90	10-1/2"	5-1/4"

*Maximum Pressure 150 psig; Maximum Temperature 150°F

In-Line Flowmeters with Pressure Gage – Water Service

Vertical ↑ or Horizontal → Mounting



Part No.*	Pipe Size Female NPT	Flow Range GPM	Approximate Inlet to Outlet Dim.	Maximum Height
OKC-1001-1	1/2"	0.5-4	9-1/8"	5-1/8"
OKC-1001-2	1/2"	1-7	9-1/8"	5-1/8"
OKC-1001-3	1/2"	1-10	9-1/8"	5-1/8"
OKC-1001-4	1/2"	1-16	9-1/8"	5-1/8"
OKC-1001-6	3/4"	1-7	9-3/8"	5-1/8"
OKC-1001-8	3/4"	1-16	9-3/8"	5-1/8"
OKC-1001-10	3/4"	4-28	9-3/8"	5-1/8"
OKC-1001-13	1"	1-10	8-3/4"	5-1/8"
OKC-1001-15	1"	4-18	8-3/4"	5-1/8"
OKC-1001-16	1"	4-28	8-3/4"	5-1/8"

*Maximum Pressure 150 psig; Maximum Temperature 150°F

Flowmeters – Air Service – Rotameter Style

Calibrated for Standard Atmospheric Conditions • Vertical ↑ Mounting Only



Part No.*	Air Flow Range (SCFH)	Dimensions Overall Height	Scale Length	Connection	Maximum Pressure
KRMA-1	.05 - .5	4-9/16"	2"	1/8" NPT	100 psig
KRMA-3	.2 - 2	4-9/16"	2"	1/8" NPT	100 psig
KRMA-5	1-10	4-9/16"	2"	1/8" NPT	100 psig
KRMB-52	5-50	8-1/2"	5"	1/4" NPT	70 psig
KRMB-54	20-200	8-1/2"	5"	1/4" NPT	70 psig
KRMC-104	40-400	15-1/8"	10"	1/2" NPT	35 psig
KRMC-106	100-1000	15-1/8"	10"	1/2" NPT	35 psig
KRMC-108	180-1800	15-1/8"	10"	1/2" NPT	35 psig

*Maximum Temperature 130°F

Low Pressure Switches

AIR SERVICE

Description

These air pressure switches provide sensitivity as low as 0.5" H₂O. Two of the types (OKC-819 and OKC-661) have factory preset switching pressure levels, and the type OKC-2337 has an adjustable setpoint range. Because of their small size, all of the switches have very short response times.

Types 819 and 661 are differential pressure switches. Type 2337 is used for positive pressure only.

General Specifications

Media – Air or inert gas

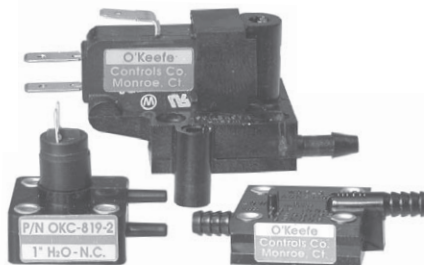
Materials of Construction

Type 819 – ABS plastic

Type 661 – polycarbonate, polyurethane

Type 2337 – polycarbonate, polyurethane

Mounting – Integral mounting holes



Specifications

TYPE 819

Switch Action

Single Pole, Double Break

Normally Open or Normally Closed

Voltage – 24 or 120 volts/60 hz

24 or 120 volts/DC

Maximum Current – AC 60 mA

DC 40 mA

Electric Connections – solder

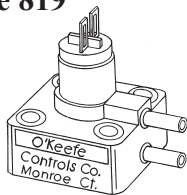
Pressure Sensing – Preset for 1" H₂O
can sense pressure, vacuum or differential conditions

Maximum Operating Pressure – 1 psig

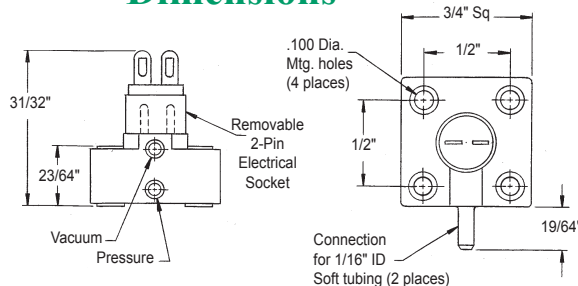
Air Pressure Connections – 1/16" barb (2)

Construction

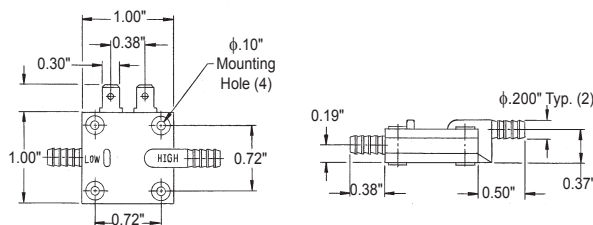
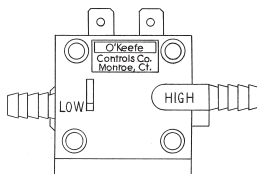
Type 819



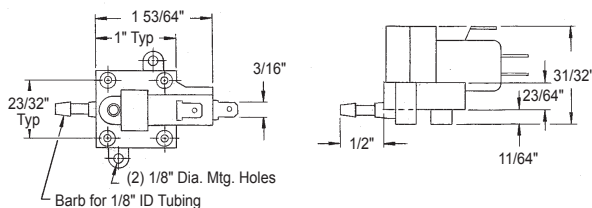
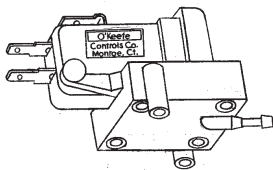
Dimensions



Type 661



Type 2337



TYPE 661

Switch Action

Single Pole, Double Break

Normally Open

Voltage – 30 volts AC/DC resistive load

120/60 neon lamp only

Maximum Current – 40 mA resistive load

Electric Connections – spade terminals

Pressure Sensing – Preset for 0.5", 1", 4" or 20" H₂O. Can sense pressure, vacuum or differential conditions

Maximum Operating Pressure – 1 psig

Air Pressure Connections – 1/8" barb

TYPE 2337

Switch Action – SPDT

Voltage – 24 /60 or 120/60

24 or 120 volts/DC

Current – See chart below

Electric Connections – spade terminals

Pressure Sensing – variable, positive pressure only. See chart below.

Maximum Operating Pressure – 30 psig

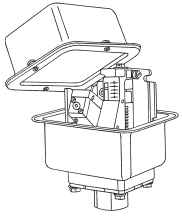
Air Pressure Connections – 1/8" barb

Part Numbers

TYPE 819		TYPE 661		TYPE 2337			
Part Number		Switch Pressure	Part Number	Switch Pressure Range	Part Number	Max. Current	
Normally Closed	OKC-819-2	0.5" H ₂ O	OKC-661-05	2-10" H ₂ O	OKC-2337-2	3	.5
	Normally Open	1.0" H ₂ O	OKC-661-1	10-28" H ₂ O	OKC-2337-10	10	.5
		4.0" H ₂ O	OKC-661-4	28-111" H ₂ O	OKC-2337-28	15	.5
		20.0" H ₂ O	OKC-661-20	111-416" H ₂ O	OKC-2337-111	15	.5

"ALL-AIR" DEVICES

Pneumatic Pressure Switch



The Pneumatic Pressure Switch combines a pressure sensing element and a spool valve to produce a switching device with an adjustable set point. The assembly is non-electric, using only air or inert gas in the switch unit.

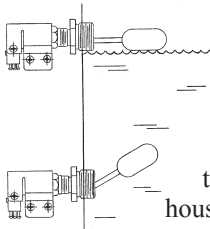
The pressure sensor is compatible with air, water, steam, oil and many corrosive liquids or gases. Setpoint is adjustable – vacuum up

to 6000 psig.

Air signals from the 5 ported 4-way valve in the switch unit can be either vacuum or positive pressure up to 100 psig.

Request Bulletin OK-043.

Pneumatic Float Valve



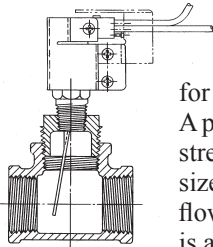
The Float Valve is an air sensor for detecting liquid level inside a vessel. The float mechanism mounted within the vessel operates a ceramic coated magnet. A magnetically actuated sensor on the outside of the solid metal housing reacts to the inner magnet movement. The movement shifts a 3-way air valve.

Both side mounted (shown here) and top mounted units are available. Wetted materials are brass or stainless steel.

The magnetic sensor unit operates at air pressure from 30 to 100 psig. The 3-way valve signals can pilot alarms or control elements.

Request Bulletin OK-242.

Pneumatic Flow Switch

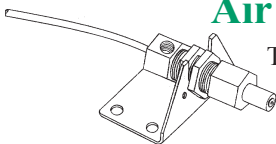


The Pneumatic Flow Switch is an air sensor for detecting the flow of liquids or gases in a pipe. A paddle extends into the fluid and deflects as the stream velocity increases or decreases. Various sized paddles establish the particular fluid stream flow rate at which the external magnetic sensor is actuated.

The air sensor is a 3-way valve which operates at pressures from 30 to 100 psig. Flow switch units are available from 1/2" to 2" NPT. Wetted materials are brass or stainless steel.

Request Bulletin OK-268.

Air Jet Proximity Sensor

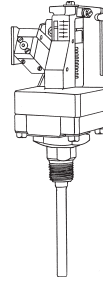


The Air Jet Proximity Sensor is a non-contact no-moving-part sensor, capable of detecting the presence of an object at ranges up to 1/8". In the absence of an object, air flows freely from the sensor resulting in a near zero output signal. The presence of an object within the sensing range deflects the normal air flow and results in a positive output signal.

Air supply pressure is 0.5 to 10 psig. Output signals are low pressure and sufficient to actuate air/electric switches or air/air amplifiers.

Request Brochure OK-098.

Pneumatic Temperature Switch

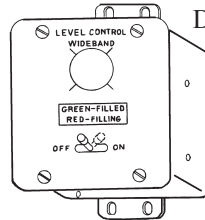


The Pneumatic Temperature Switch combines a temperature sensing element and a spool valve to produce a switching device with an adjustable set point. The assembly is non-electric, using only air or inert gas in the switch unit.

The temperature sensor is available in direct mount (shown here) or with a bulb and capillary. Wetted materials are copper or stainless steel.

Air signals from the 5 ported 4-way valve in the switch unit can be either vacuum or positive pressure up to 100 psig. **Request Bulletin OK-088.**

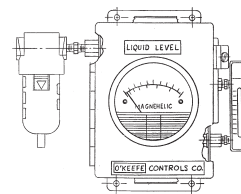
Pneumatic Liquid Level Controller



Designed for use with the pneumatic float valve, these controllers are used to operate air piloted valves for "fill" or "drain" of a vessel. The narrow band model uses one float valve to maintain a tight level within 1/2". The wide band model uses two float valves to maintain the level between the two sensor locations.

Request Bulletin OK-242.

Pneumatic Liquid Level Indicator



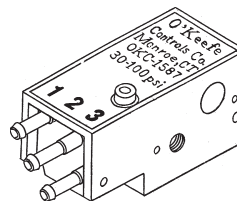
The Liquid Level Indicator displays the height of liquid above the tip of an air tube immersed in the liquid. A small amount of air bubbles through the liquid of a vented vessel. The back pressure in the sense tube is displayed on a gage. This back pressure corresponds to the height of the

liquid above the top of the sense tube.

Ranges of liquid height vary from 0-1 in. to 0-60 ft.

Request Bulletin OK-267.

Magnetic Proximity Sensor



The Magnetic Proximity Sensor detects the presence of a magnetic or steel part in its near vicinity. The 3-way normally closed air valve is actuated when in the presence of a small magnet or steel part. The valve deactuates when the small magnet or steel part is removed.

Since magnetic fields penetrate materials such as aluminum or stainless steel, the proximity sensor readily detects a properly polarized magnetic piston in a cylinder constructed with aluminum or stainless steel barrels. It is often used in place of limit switches to detect end of stroke position.

The sensor is available with mounting straps for attachment to a round cylinder barrel. **Request Brochure OK-248.**

Low Dew Point Air Dryers

SELF-REGENERATIVE

Description

The air dryer products of O'Keefe Controls Co. employ a self-regenerative, desiccant style drying system. "Self-regenerative" means that the dryer automatically and continuously discharges collected water vapor which has been removed from the air passing through the system. Desiccant style means that a material (a desiccant) is used to selectively remove water vapor from the air surrounding this material. Three common desiccant materials are silica gel, alumina and molecular sieve.

How It Works!

In the O'Keefe Controls Co. air dryers desiccant material is a molecular sieve. This type desiccant adsorbs the water vapor molecule in tiny pores on the surface of each bead of the molecular sieve material. Moist air passing by this desiccant is dried as vapor molecules are selectively attracted to the pores in the molecular sieve beads. A dew point as low as minus 100°F is possible using molecular sieve material.

Another equally important characteristic of the molecular sieve is that extremely dry air (very low dew point) passing by this desiccant will reabsorb the water vapor trapped in the pores; thus providing a means of automatic regeneration of the desiccant.

Two desiccant tanks are employed in each air dryer. Wet pressurized air enters one tank and is dried as it passes through to the outlet. A portion of the dried air is directed into the top of the second tank through a purge orifice and flows at near atmospheric pressure through this tank to atmosphere. As this dry air passes around the molecular sieve beads it reabsorbs water vapor and then exhausts to atmosphere.

Call for Free Catalog!
Also on Website

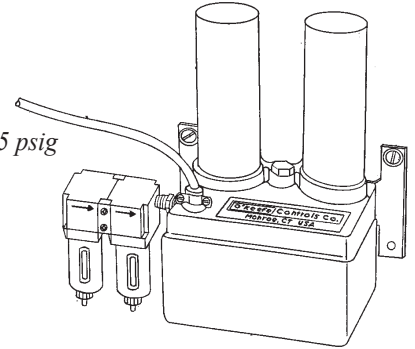
www.okcc.com

Twenty-four page catalog presents 36 air dryer models for generating low dew point compressed air. Additionally included are important accessories for air dryer systems.



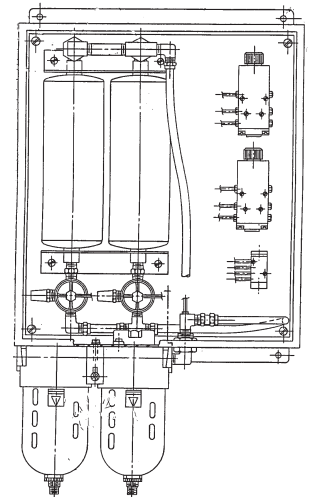
Compact Air Dryer

- Shoebox size
- Air flow up to 6 scfm
- Operating pressure 80-125 psig
- Dew point minus 50°F
- Lower at reduced flow



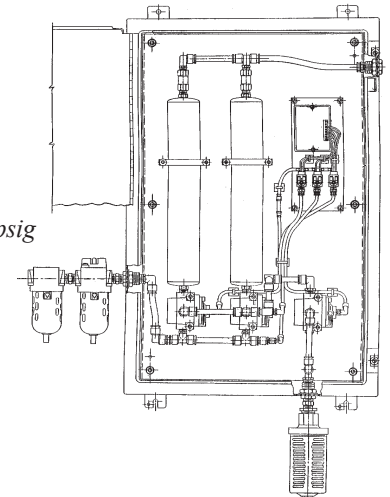
Standard Air Dryer

- Enclosure 16" x 14" x 6"
- Air flow up to 13 scfm
- Operating pressure 80-125 psig
- Dew point minus 50°F
- Lower at reduced flow



High Flow Air Dryer

- Enclosure 36" x 24" x 7"
- Air flow up to 20 scfm
- Operating pressure 80-125 psig
- Pulse free
- Quiet Operation
- Dew point minus 50°F
- Lower at reduced flow



Founded in 1975, the company manufactures specialty fluid control products in its Monroe, CT location. Chief among the products is an extensive line of precision orifices for accurate metering of liquids or gases. Other products include miniature in-line screens for use with small orifices, and several unique pneumatic sensors used in industrial control applications.

The company provides extensive engineering support for product selection and application to its customers. Accurate calibration of orifices can also be provided using in-house NIST traceable instrumentation.

O'Keefe Controls Co. encourages inquiries for custom fluid control products from its customers. Special orifice sizes, configurations, and flow specifications are routinely satisfied on an attractive economic scale. Please call with your special requirements.



Precision Orifice Processing at O'Keefe Controls Co.



Ultrasonic cleaners are used to remove contamination from the interior of orifice assemblies. Small particles can cause major changes in orifice flow rates.

At O'Keefe Controls Co. there are several important steps in the production of precision fluid restrictors. All orifice assemblies are 100% cleaned, inspected under a microscope, and flow tested before shipment.

With orifice diameters as small as .0003" it is important to have the assembly cleaned so that physical contaminants do not obstruct flow through the orifice.

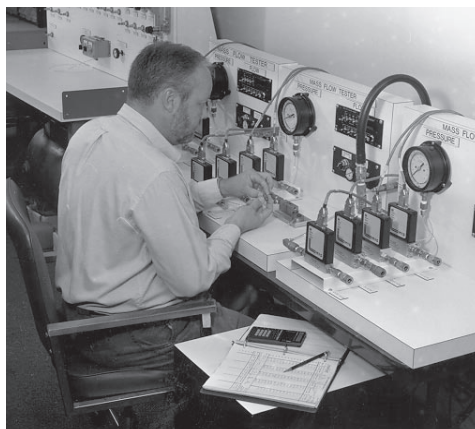
The ultimate objective of a precision fluid restrictor is to accurately meter the flow of a gas or liquid. The restrictors available from O'Keefe Controls Co. are 100% tested and must meet exacting flow standards before shipment.



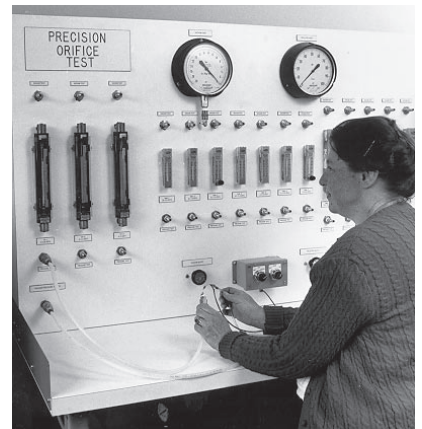
All production orifices are examined by experienced inspectors using a microscope to detect contaminants and to assure orifice quality.



Orifice diameter dimensions are checked using a precision measuring microscope. Accuracy is better than .0001".



Mass flowmeters are used for NIST traceable calibration of orifice flow.



All production orifices are flow tested and must meet exacting flow standards. A special test bench has been constructed for this purpose.

See Catalog and Product Updates on our Website www.okcc.com

