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# MANUAL Superseal bellows valves

## USER MANUAL



**KF & CF Flanged and Weldable Tube Series**

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Prior to returning any product, we require that you contact us by phone or email to determine if the issue can be resolved quickly. A technical support representative will work with you to resolve the problem. If the issue cannot be resolved in that manner, we will issue an RMA number and provide product return instructions.

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# SAFETY

Thank you for purchasing this equipment from Ideal Vacuum Products. We want you to operate it safely.



- **Read this manual and all associated equipment manuals before installing or operating this equipment. Failure to follow the warnings and instructions may result in serious injury or equipment damage.**
- **Keep this manual in a safe location for future reference.**
- **This equipment should only be installed and operated by trained, qualified personnel wearing appropriate protective equipment.**
- **Follow all codes that regulate the installation and operation of this equipment.**

**! DANGER**



**Use with clean, dry air or inert gases only. Do not use with any process that uses explosive, pyrophoric, corrosive, or toxic gases.**

**! CAUTION**



**Always wear protective equipment, including safety glasses and gloves. Exercise care when working with vacuum equipment.**

**NOTICE**

**Check valve installation and perform a leak test prior to pumping down.**

**NOTICE**



**Super-Seal bellows valves are not suitable for:**

- **Temperatures above 150°C (limit of Viton seals)**
- **Differential pressure >15 psi**
- **Torsional stress**
- **Pressure shocks**
- **Rough service conditions**

**Inspect valves regularly and use only OEM replacement parts**

# 1. INTRODUCTION

Ideal Vacuum Super-Seal™ manually operated bellows vacuum valves are primarily designed for high-vacuum (HV) applications. Depending on the valve flange type and seal material, they can be used in the high (HV) or ultra high-vacuum (UHV) to 60-80 psig positive pressure range, and have leak rates of  $10^{-9}$  to  $10^{-11}$  Torr l/s (He). All Super-Seal valves use 304L stainless steel for the valve body and mechanism, and Viton® poppet O-ring seals. High-vacuum rated valves use Viton for the bonnet seal. Ultra-high vacuum rated valves use OFHC copper gaskets for the bonnet seal. These valves operate with low friction and zero abrasion of the polymer elastomer surface allowing for repeatable sealing action over many thousands of cycles. Super-Seal manual valves are bakeable up to 150°C (limited by the Viton O-rings) and can withstand a maximum differential pressure of up to 15 psig. These valves can be mounted in any orientation.

The Super-Seal manually operated family of bellows valves includes weldable tube, KF, and Conflat (CF) flanged options, and most are available in both right angle (90°) and in-line (180°) versions. Conflat CF flanged valves have rotatable flanges for optimum connectivity to vacuum lines. Super-Seal valves provide high-conductance to maximize the evacuated gas flow rate. In-line valves have relatively decreased conductance compared to right angle valves.

Available valves include flanged types KF-16 to KF-50 and CF 1.33" to CF 4.5". Weldable tube sizes from 0.75" OD to 2.0" OD are available for custom adaptive flange configurations. All valve configurations are rated for high-vacuum ( $10^{-8}$  Torr). CF flanged valves with copper bonnet seals are rated for ultra-high vacuum ( $10^{-10}$  Torr).

Super-Seal valves are extremely reliable. To minimize possible down time, major and minor rebuild kits for high-vacuum rated valves (with Viton seals) are normally stocked and available for immediate delivery. Rebuild kits with Buna, Silicon, or Kalrez® seals can be specially ordered.

Manually operated Super-Seal bellows valves are an excellent solution when automation is not required. They are significantly less expensive and more quickly deployed than similar pneumatically operated bellows valves. Manual bellows valves are frequently used in roughing and high-vacuum forelines and make excellent chamber venting valves.

## 2. OPERATION

The Super-Seal manual poppet valve consists of a valve body with inlet and outlet ports, with or without flanges (i.e., welded tube valves). A center-tapped bonnet plate is screwed to the top of the valve body. A welded bellows is secured to the top of the valve body by the bonnet plate and sealed with an FKM elastomer O-ring for high-vacuum applications, or OFHC oxygen-free copper gasket for ultra-high vacuum use. The valve is closed by tightening the hand knob, which screws the valve stem down through the bonnet plate. At the other end of the valve stem, the welded bellows is affixed to a poppet. The bellows ensures that the valve cannot leak from the valve stem. The valve is sealed closed when the poppet O-ring is tightened against the valve seat.

### 2.1 VALVE COMPONENTS

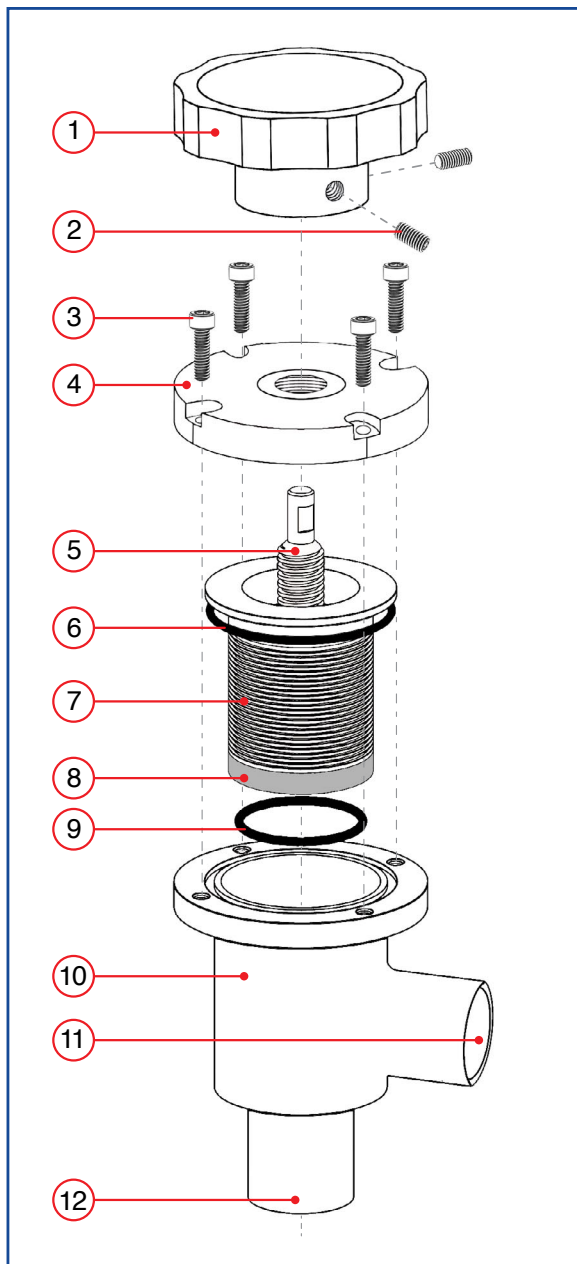


Figure 1 - Exploded view of valve

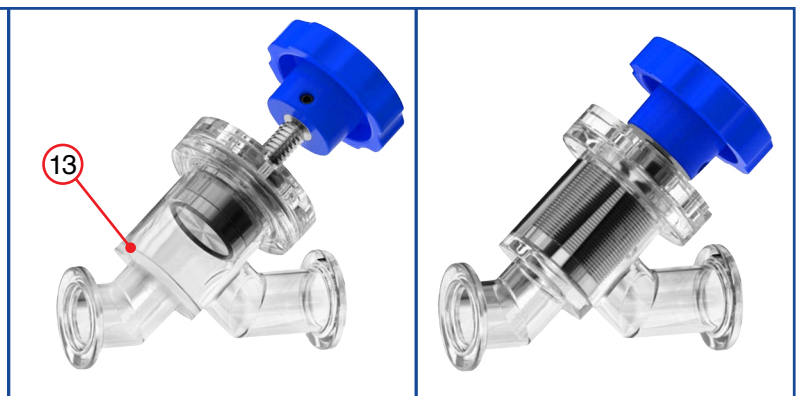


Figure 2 - Transparent views showing open and closed valve mechanism

Item	Description
1	Hand wheel
2	Hand wheel set screws (2, M5-0.8)
3	Bonnet plate screws (4, M4-0.7)
4	Bonnet plate
5	Valve stem
6	Bonnet seal
7	Welded bellows
8	Poppet
9	Poppet O-ring seal
10	Valve body
11	Inlet valve (chamber)
12	Outlet valve (pump)
13	Valve seat

Table 1 - Valve parts

### 3. VALVE SPECIFICATIONS

#### 3.1 KF FLANGED VALVES (HIGH-VACUUM)

KF Flanged Right Angle 90° Valves (HV)				
Flange	KF-16	KF-25	KF-40	KF-50
Tube OD	0.75 in.	1.0 in.	1.5 in.	2.0 in.
A	2.17 in. (55 mm)	2.05 in. (52 mm)	2.56 in. (65 mm)	2.76 in. (70 mm)
B	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)
C	5.43 in. (138 mm)	5.20 in. (132 mm)	6.46 in. (164 mm)	7.05 in. (179 mm)
D	6.38 in. (162 mm)	6.14 in. (156 mm)	7.40 in. (188 mm)	8.39 in. (213 mm)
E	2.40 in. (61 mm)	2.40 in. (61 mm)	3.03 in. (77 mm)	3.35 in. (85 mm)
Conduct.	6 l/s	15 l/s	48 l/s	82 l/s
Part #	P103785	P103784	P103936	P103935

Table 2 - KF angle valve specs

KF Flanged In-line 180° Valves (HV)				
Flange	KF-16	KF-25	KF-40	KF-50
Tube OD	0.75 in.	1.0 in.	1.5 in.	2.0 in.
A	4.02 in. (102 mm)	4.21 in. (107 mm)	5.12 in. (130 mm)	7.01 in. (178 mm)
B	3.94 in. (100 mm)	3.82 in. (97 mm)	4.84 in. (123 mm)	5.63 in. (143 mm)
C	4.61 in. (117 mm)	4.49 in. (114 mm)	6.69 in. (140 mm)	6.57 in. (167 mm)
D	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)
E	2.40 in. (61 mm)	2.40 in. (61 mm)	3.03 in. (77 mm)	3.35 in. (85 mm)
Conduct.	5 l/s	12 l/s	44 l/s	66 l/s
Part #	P103786	P103845	P103908	P103977

Table 3 - KF in-line valve specs

## 3.2 TUBE END VALVES (HIGH-VACUUM)

### Welded Tube Right Angle 90° Valves (HV)

Flange	N/A	N/A	N/A	N/A
Tube OD	0.75 in.	1.0 in.	1.5 in.	2.0 in.
A	2.00 in. (51 mm)	1.89 in. (48 mm)	2.40 in. (61 mm)	2.83 in. (72 mm)
B	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)
C	5.28 in. (134 mm)	5.04 in. (128 mm)	6.30 in. (160 mm)	7.64 in. (194 mm)
D	6.22 in. (158 mm)	6.02 in. (153 mm)	7.24 in. (184 mm)	9.25 in. (235 mm)
E	2.40 in. (61 mm)	2.40 in. (61 mm)	3.03 in. (77 mm)	3.35 in. (85 mm)
Conduct.	6 l/s	15 l/s	48 l/s	82 l/s
Part #	P103846	P103847	P103812	P103938

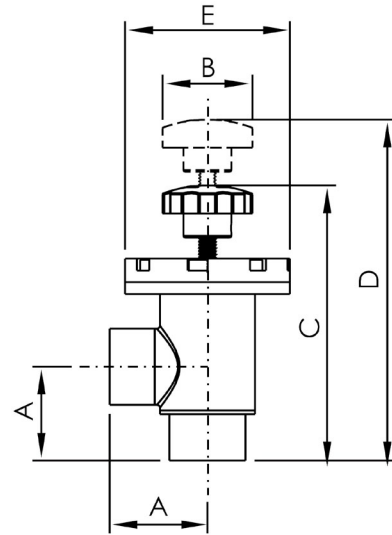


Table 4 - Welded tube angle valve specs

### Welded Tube In-line 180° Valves (HV)

Flange	N/A	N/A	N/A	N/A
Tube OD	0.75 in.	1.0 in.	1.5 in.	2.0 in.
A	3.70 in. (94 mm)	3.90 in. (99 mm)	4.84 in. (123 mm)	6.69 in. (170 mm)
B	3.94 in. (100 mm)	3.82 in. (97 mm)	4.84 in. (123 mm)	5.98 in. (152 mm)
C	4.61 in. (117 mm)	4.49 in. (114 mm)	5.51 in. (140 mm)	7.09 in. (180 mm)
D	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)
E	2.40 in. (61 mm)	2.40 in. (61 mm)	3.03 in. (77 mm)	3.35 in. (85 mm)
Conduct.	5 l/s	12 l/s	44 l/s	66 l/s
Part #	P103939	P103940	P103941	P103978

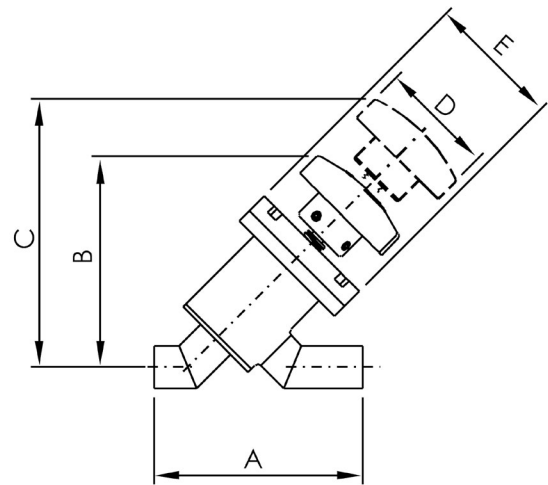


Table 5 - Welded tube in-line valve specs



### 3.3 CF FLANGED VALVES (HIGH-VACUUM)

CF Flanged Right Angle 90° Valves (HV)				
<b>Flange</b>	1.33 in.	2.12 in.	2.75 in.	3.38 in.
<b>Tube OD</b>	0.75 in.	1.0 in.	1.5 in.	2.0 in.
<b>A</b>	2.17 in. (55 mm)	1.97 in. (50 mm)	2.48 in. (6 mm)	2.83 in. (72 mm)
<b>B</b>	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)
<b>C</b>	5.43 in. (138 mm)	5.16 in. (131 mm)	6.38 in. (162 mm)	7.60 in. (193 mm)
<b>D</b>	6.38 in. (162 mm)	6.10 in. (155 mm)	7.32 in. (186 mm)	9.21 in. (234 mm)
<b>E</b>	2.40 in. (61 mm)	2.40 in. (61 mm)	3.03 in. (77 mm)	3.35 in. (85 mm)
<b>Conduct.</b>	6 l/s	15 l/s	48 l/s	82 l/s
<b>Part #</b>	P103843	P103844	P103787	P103937

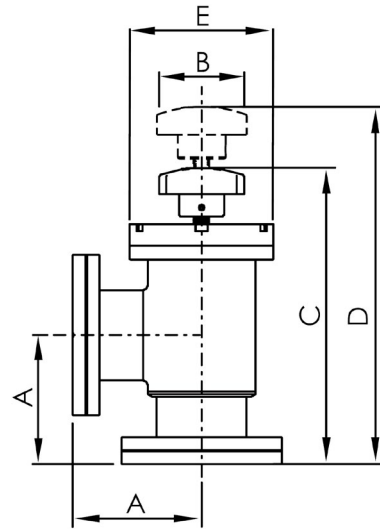


Table 6 - Conflat CF angle valve specs (HV)

CF Flanged In-line 180° Valves (HV)				
<b>Flange</b>	1.33 in.	2.12 in.	2.75 in.	3.38 in.
<b>Tube OD</b>	0.75 in.	1.0 in.	1.5 in.	2.0 in.
<b>A</b>	4.69 in. (119 mm)	4.21 in. (107 mm)	5.24 in. (133 mm)	7.17 in. (182 mm)
<b>B</b>	3.94 in. (100 mm)	3.82 in. (97 mm)	4.84 in. (123 mm)	5.98 in. (152 mm)
<b>C</b>	4.61 in. (117 mm)	4.49 in. (114 mm)	6.69 in. (140 mm)	7.13 in. (181 mm)
<b>D</b>	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)
<b>E</b>	2.40 in. (61 mm)	2.40 in. (61 mm)	3.03 in. (77 mm)	3.35 in. (85 mm)
<b>Conduct.</b>	5 l/s	12 l/s	44 l/s	66 l/s
<b>Part #</b>	P108821	P108864	P108822	P108820

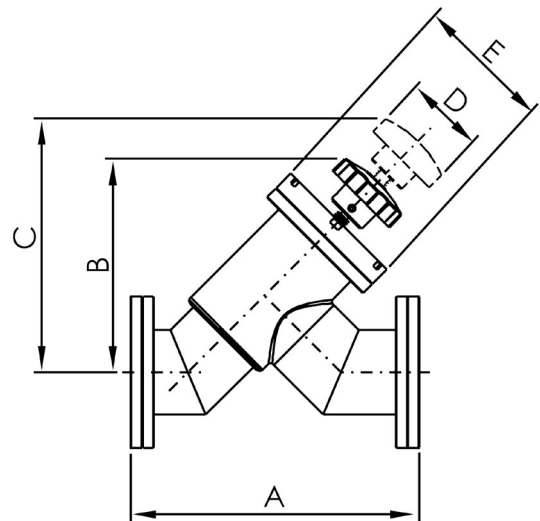


Table 7 - Conflat CF in-line valve specs (HV)

### 3.4 CF FLANGED VALVES (ULTRA-HIGH VACUUM)

CF Flanged Right Angle 90° Valves (UHV)					
Flange	1.33 in.	2.12 in.	2.75 in.	3.38 in.	4.50 in.
Tube OD	0.75 in.	1.0 in.	1.5 in.	2.0 in.	2.5 in.
A	2.17 in. (55 mm)	2.09 in. (53 mm)	2.48 in. (63 mm)	2.99 in. (76 mm)	3.58 in. (91 mm)
B	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)
C	5.47 in. (139 mm)	5.24 in. (133 mm)	6.38 in. (162 mm)	7.76 in. (197 mm)	8.27 in. (210 mm)
D	6.42 in. (163 mm)	6.18 in. (157 mm)	7.32 in. (186 mm)	9.37 in. (238 mm)	9.92 in. (252 mm)
E	2.76 in. (70 mm)	2.76 in. (70 mm)	3.39 in. (86 mm)	4.33 in. (110 mm)	4.80 in. (122 mm)
Conduct.	6 l/s	15 l/s	48 l/s	82 l/s	82 l/s
Part #	P1011810	P1011811	P1011812	P1011813	P1011814

Table 8 - Conflat CF angle valve specs (UHV)

CF Flanged In-line 180° Valves (UHV)				
Flange	1.33 in.	2.12 in.	2.75 in.	3.38 in.
Tube OD	0.75 in.	1.0 in.	1.5 in.	2.0 in.
A	4.69 in. (119 mm)	4.45 in. (113 mm)	5.27 in. (133 mm)	7.17 in. (182 mm)
B	3.94 in. (100 mm)	3.82 in. (97 mm)	4.84 in. (123 mm)	5.94 in. (151 mm)
C	4.61 in. (117 mm)	4.53 in. (115 mm)	6.69 in. (140 mm)	7.09 in. (180 mm)
D	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)	2.36 in. (60 mm)
E	2.76 in. (70 mm)	2.76 in. (70 mm)	3.39 in. (86 mm)	3.94 in. (100 mm)
Conduct.	5 l/s	12 l/s	44 l/s	66 l/s
Part #	P1011815	P1011846	P1011847	P1011848

Table 9 - Conflat CF in-line valve specs (UHV)

## 4. REBUILD KITS

Super-Seal manually operated bellows valves are extremely reliable over many thousands of cycles. Major and minor rebuild kits for high-vacuum rated valves (with Viton seals) are stocked and immediately available to keep your Super-Seal manual bellows valve operating at peak performance. Kits with other O-ring seal materials are available for special order. Please contact your Ideal Vacuum representative to purchase.

Right angle and in-line valves of the same flange type use the same rebuild kits.

Refer to [Figure 1, p. 7](#) for an exploded view of the valve. Major kits include all valve parts except the hand wheel and valve body (parts 2-9 in exploded view). Minor kits include the bonnet and poppet O-ring seals only (parts 6 & 9 in exploded view).

### 4.1 REBUILD KITS FOR HIGH-VACUUM VALVES

Right Angle or In-line Valves	Rebuild Kit Part Numbers							
	Viton		Buna <sup>1</sup>		Silicon <sup>1</sup>		Kalrez <sup>1</sup>	
	Major	Minor	Major	Minor	Major	Minor	Major	Minor
<b>KF Flange</b>								
KF-16	P106154	P106157	P106160	P106163	P106166	P106169	P106172	P106175
KF-25	P106154	P106157	P106160	P106163	P106166	P106169	P106172	P106175
KF-40	P106155	P106158	P106161	P106164	P106167	P106170	P106173	P106176
KF-50	P106156	P106159	P106162	P106165	P106168	P107171	P106174	P106177
<b>Tube</b>								
0.75" OD	P106154	P106157	P106160	P106163	P106166	P106169	P106172	P106175
1.0" OD	P106154	P106157	P106160	P106163	P106166	P106169	P106172	P106175
1.5" OD	P106155	P106158	P106161	P106164	P106167	P106170	P106173	P106176
2.0" OD	P106156	P106159	P106162	P106165	P106168	P107171	P106174	P106177
<b>CF Flange</b>								
CF 1.33"	P106154	P106157	P106160	P106163	P106166	P106169	P106172	P106175
CF 2.12"	P106154	P106157	P106160	P106163	P106166	P106169	P106172	P106175
CF 2.75"	P106155	P106158	P106161	P106164	P106167	P106170	P106173	P106176
CF 3.38"	P106156	P106159	P106162	P106165	P106168	P107171	P106174	P106177

<sup>1</sup> Available as special order only.

Table 10 - Rebuild kit part numbers



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