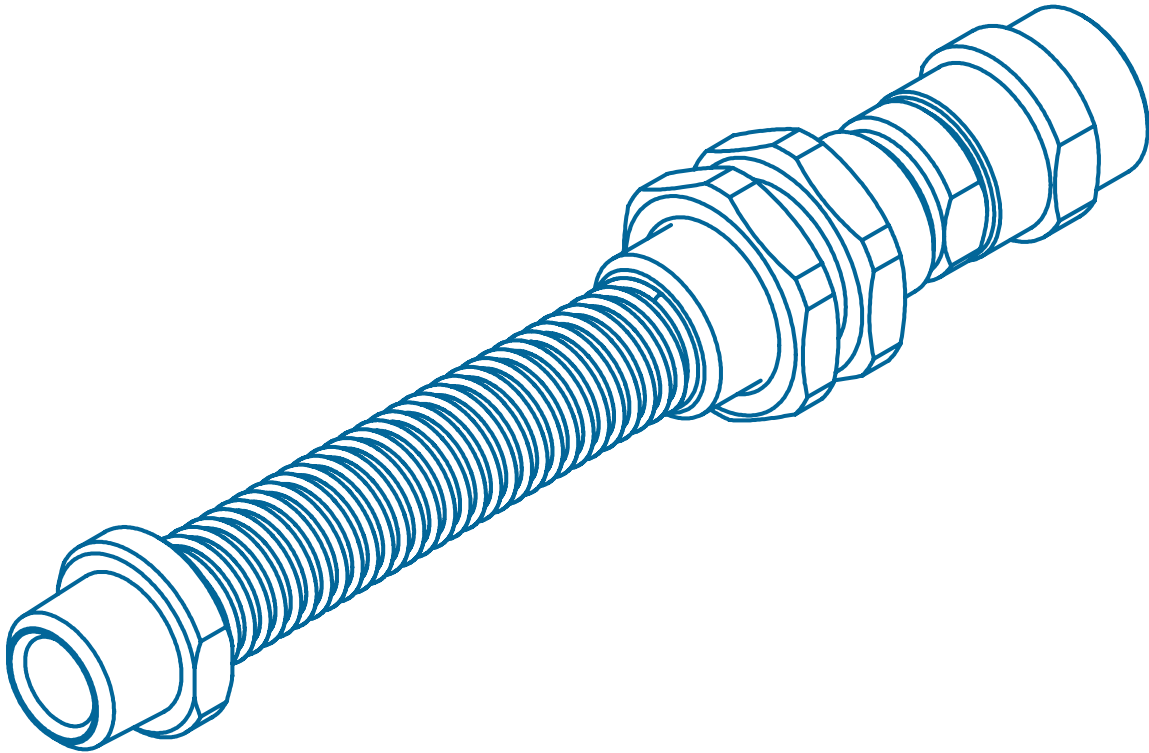
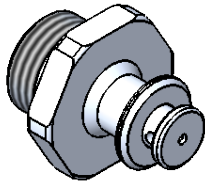


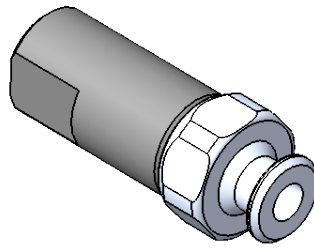
# Vacuum Cup Accessories

## Section 4

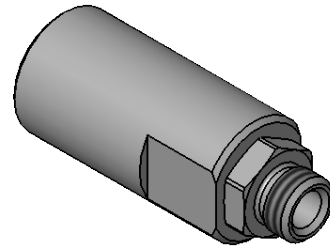




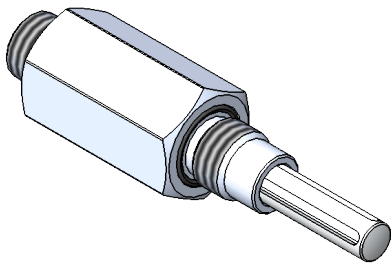
**Dual-Flow Valves**



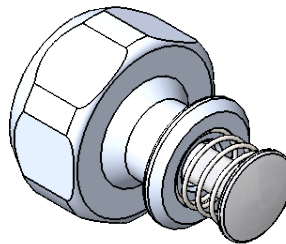
**Tri-Flow Valves**



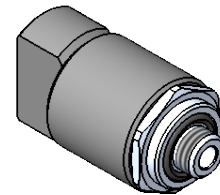
**Flow-Sensor-Valves**



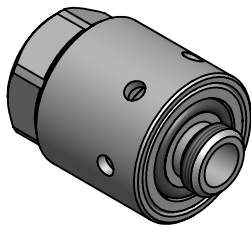
**Mechanical Valves**



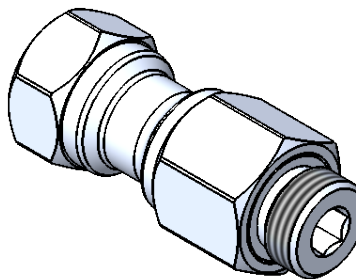
**Cone Valves**



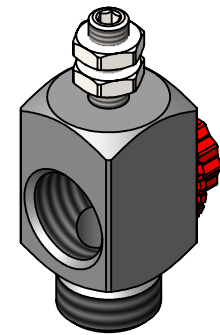
**Check Valves**



**Atmospheric Quick Release**

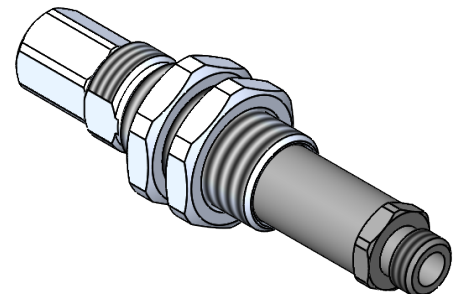


**Swivel Joints**



**Tee Adapters**

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**Level Compensators**

## Dual-Flow Valves

Dual-Flow Valves limit vacuum leakage in a system where some of the vacuum cups may not be in sealing contact with the work piece. Since vacuum flow is limited by a small orifice, Dual-Flow Valves are only recommended for non-porous parts or for slightly porous, light-weight parts.

There are two main ways to apply Dual-Flow Valves. The first is to bring Dual-Flow Valve equipped vacuum cups into contact with the work piece and then turn on the vacuum source. Non-sealing cups will leak and cause the associated Dual-Flow Valves to close to orifice flow only.

The second way is to turn on the vacuum source to close all Dual-Flow Valves before the vacuum cups contact the work piece and then allow the Dual-Flow Valve orifice flow to establish vacuum within the cups once contact is made.

In either case, part release is accomplished by removing the vacuum source and allow atmospheric air to open the Dual-Flow Valves. For a faster cycle time, use a blow-off pulse of compressed air to break the vacuum and release the part more quickly.

### Ø 20-35 mm Cups

Dual-Flow Fitting	Assembly Suffix	Weight oz [g]	Flow & 18 inHg [81 kPa] SCFM [NI/m]	Connection Threads
32-18FDF	-18FDF	0.13 [3.7]	0.20 [5.7]	G 1/8 NPS (F)
32-18MDF	-18MDF	0.13 [3.7]	0.20 [5.7]	G 1/8 NPS (M)
32-14MDF	-14MDF	0.19 [5.4]	0.20 [5.7]	1/4 NPT (M)
32-G14FDF	-G14FDF	0.27 [7.7]	0.20 [5.7]	G 1/4 (F)
32-G14MDF	-G14MDF	0.17 [4.8]	0.20 [5.7]	G 1/4 (M)
32-5X5FDF	-5X5FDF	0.9 [5.4]	0.20 [5.7]	M5x0.8 (F)
32-5X18FDF	-5X18FDF	1.01 [28.6]	0.20 [5.7]	G 1/8 NPS (F)

### Ø 40 mm Cups

Dual-Flow Fitting	Assembly Suffix	Weight oz [g]	Flow & 18 inHg [81 kPa] SCFM [NI/m]	Connection Threads
40-18FDF	-18FDF	0.22 [6.2]	0.50 [14.2]	G 1/8 NPS (F)
40-18MDF	-18MDF	0.22 [6.2]	0.50 [14.2]	G 1/8 NPS (M)
40-14MDF	-14MDF	0.23 [6.5]	0.50 [14.2]	1/4 NPT (M)
40-38FDF	-38FDF	0.47 [13.3]	0.50 [14.2]	3/8 NPT (F)
40-38MDF	-38MDF	0.29 [8.2]	0.50 [14.2]	3/8 NPSF (F)
40-G14FDF	-G14FDF	0.27 [7.7]	0.50 [14.2]	G 1/4 (F)
40-G14MDF	-G14MDF	0.23 [6.5]	0.50 [14.2]	G 1/4 (M)
40-G38MDF	-G38MDF	0.29 [8.2]	0.50 [14.2]	G 3/8 (M)
40-5X5FDF	-5X5FDF	0.33 [9.4]	0.50 [14.2]	M5x0.8 (F)
40-5X18FDF	-5X18FDF	1.01 [28.6]	0.50 [14.2]	G 1/8 NPS (F)

### Ø 50 mm Cups

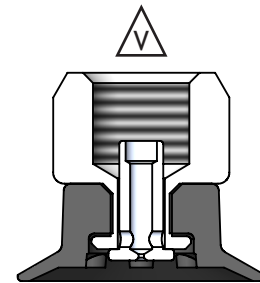
Dual-Flow Fitting	Assembly Suffix	Weight oz [g]	Flow & 18 inHg [81 kPa] SCFM [NI/m]	Connection Threads
50-18FDF	-18FDF	0.25 [7.1]	0.60 [17.0]	G 1/8 NPS (F)
50-18MDF	-18MDF	0.20 [5.7]	0.60 [17.0]	G 1/8 NPS (M)
50-14MDF	-14MDF	0.25 [7.1]	0.60 [17.0]	1/4 NPT (M)
50-38FDF	-38FDF	0.51 [14.5]	0.60 [17.0]	3/8 NPT (F)
50-38MDF	-38MDF	0.34 [9.6]	0.60 [17.0]	3/8 NPSF (F)
50-G14FDF	-G14FDF	0.39 [11.1]	0.60 [17.0]	G 1/4 (F)
50-G14MDF	-G14MDF	0.28 [7.9]	0.60 [17.0]	G 1/4 (M)
50-G38MDF	-G38MDF	0.34 [9.6]	0.60 [17.0]	G 3/8 (M)
50-5X5FDF	-5X5FDF	0.36 [10.2]	0.60 [17.0]	M5x0.8 (F)
50-5X18FDF	-5X18FDF	1.01 [28.6]	0.60 [17.0]	G 1/8 NPS (F)

### Sizing a Vacuum Pump

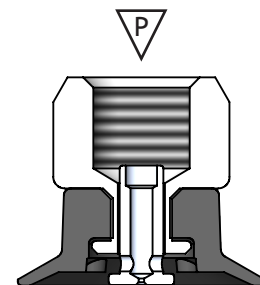
Using the tables, determine the orifice flow at your system's maximum vacuum operating level. Multiply this by the maximum number of non-sealing cups in the system. Select a pump that will give this total flow-rate at the system vacuum level with an additional factor of safety.

### Caution

If Dual-Flow Valves are used with a heavy porous part, the part may be dropped suddenly due to porosity flow through the part being greater than the available orifice flow. This can occur even if there is excess vacuum pump capacity. For this type of system, use Flow Sensor Valves.



Orifice Flow



Reverse Flow

## Tri-Flow Valves

Tri-Flow Valves limit vacuum leakage in a system where some of the vacuum cups may not be in sealing contact with the work piece.

Tri-Flow Valves are a cross between Flow Sensor Valves and Dual-Flow Valves because they are fully open until the Flow Sensor section closes at the factory preset vacuum flow-rate, then a bypass orifice meters vacuum flow to limit leakage to a manageable rate. Part release is accomplished by removing the vacuum source and admitting atmospheric air which will also reset any closed Tri-Flow Valves to the open position. For a faster cycle time, use a blow-off pulse of compressed air to break the vacuum and release the part more quickly.

Tri-Flow Valves can handle greater porosity flow than Dual-Flow Valves due to the fact that they're initially held open. Another advantage is the Tri-Flow metering orifice is protected by an integral filter for greater tolerance for contamination.

The normal way to set up a vacuum system using Tri-Flow Valve equipped vacuum cups is to bring them into contact with the work piece and then turn on the vacuum source. Non-sealing cups will leak and cause the associated Tri-Flow Valves to close to orifice flow only. Tri-Flow Valves on cups in sealing contact with the work piece will remain fully open to handle higher porosity flow-rates (normal leakage through the part) then Dual-Flow Valves can.

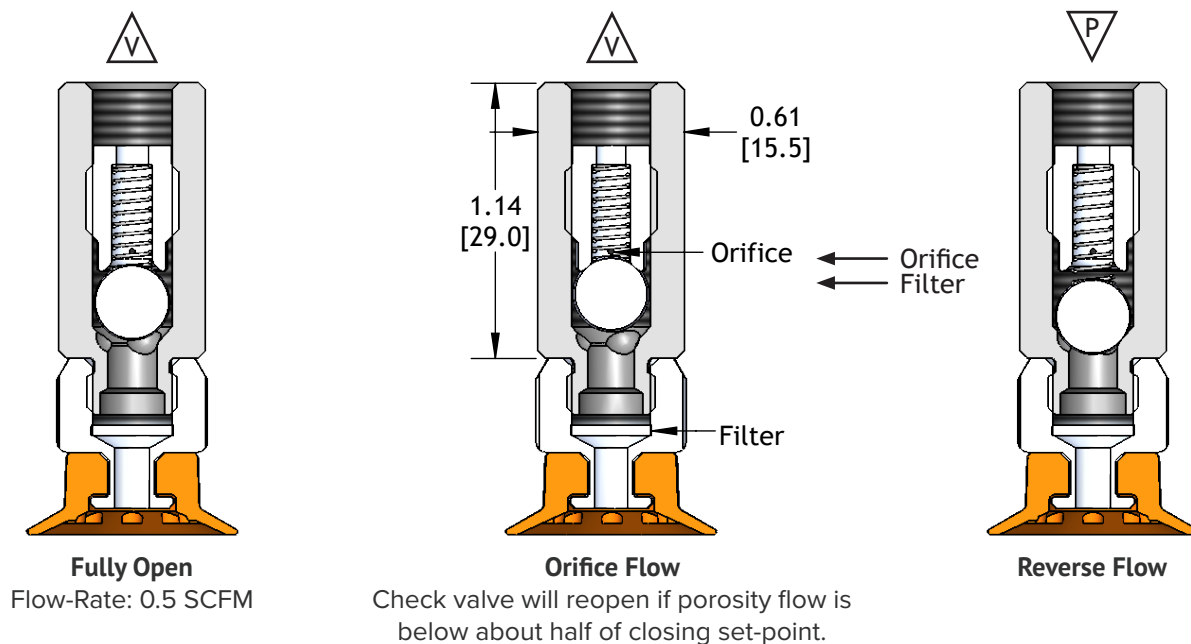
For a system handling non-porous parts, operation can be as described above or the vacuum source may be turned on before the vacuum cups are in sealing contact with the work piece. Tri-Flow Valves will reset to fully open. This feature is also convenient for use in vacuum holding fixtures. This capability is the only advantage that Tri-Flow Valves have over Flow Sensor Valves.

For mid to high porosity parts, we recommend using Flow Sensor Valves where the closing set point can be adjusted to suit the application.

To order a cup assembled with a Tri-Flow Valve, add suffix -18TFT to the part number.

Example: **XP-B50N-18TFT**

To order for use in-line, order T18F-XX. (Specify flow.)



Tri-Flow Valve In-line	Weight oz [g]	Connection Threads	Tri-Flow Valve w/ Cup Fitting	Weight oz [g]	Flow @ 18 inHg	Closing Flow
TF18F-0.4	0.43 [12.2]	G 1/8 NPSF	32-18FTF	0.55 [15.7]	0.2 SCFM	0.4 SCFM
TF18F-0.5	0.43 [12.2]	G 1/8 NPSF	40-18FTF	0.63 [17.2]	0.4 SCFM	0.5 SCFM
TF18F-0.6	0.43 [12.2]	G 1/8 NPSF	50-18FTF	0.66 [18.8]	0.5 SCFM	0.6 SCFM

## Flow Sensor Valves (PATENTED)

Flow Sensor Valves (FSV) are normally open valves that snap closed when the factory preset flow-rate is exceeded. Our FSV is insensitive to acceleration forces and may be used in any physical orientation. System vacuum level has no effect on the FSV set-point. However, higher system vacuum levels will cause greater flow-rates through a porous work piece.

Flow Sensor Valves eliminate the problem of vacuum loss through non-working standard cups or through valved cups overhanging the work piece edge. These are especially useful where work piece size and orientation will vary. For maximum effectiveness, each vacuum cup in the system should be equipped with a Flow Sensor Valve.

Flow Sensor Valves may be manifold or located in-line rather than at the vacuum cup. Piping integrity is important since the FSV will sense a fitting leak as easily as a leakage at a vacuum cup. Wherever installed, a suitable filter must be used upstream of the FSV. When used with EDCO fittings, a filter screen nests inside the fitting bore.

The optimum flow-rate set-point is best determined by testing the porosity of sample work pieces with a flow meter using the same vacuum cup size and style as will be used in the actual system. Porosity of items such as corrugated board can vary greatly from lot to lot so it is important to find the most porous part to be handled by the system.

A factor of safety must be added to the highest porosity test value to allow for variations in work piece porosity, system vacuum level, increased leakage due to wear, and other

factors. For porous work pieces such as paper or corrugated cases, the factor of safety should probably be in the 50% range. For non-porous work pieces such as plastic or metal, the factor of safety may be reduced.

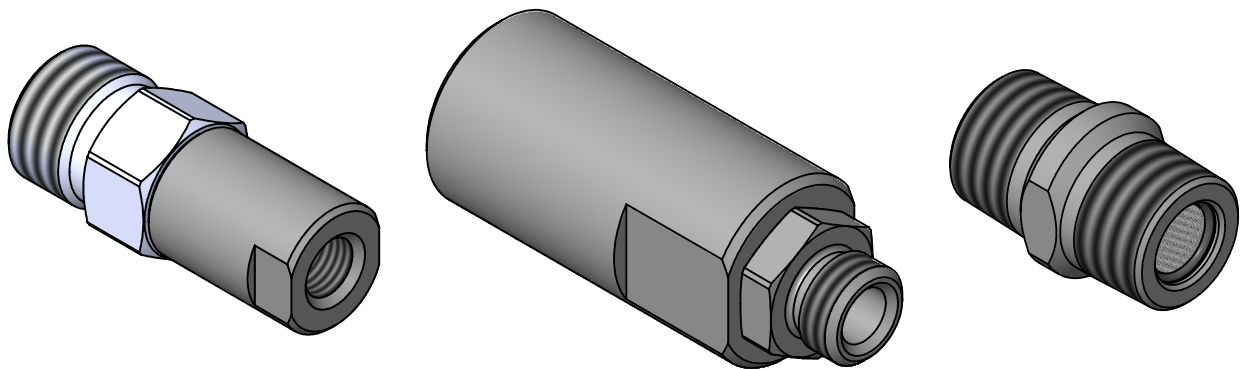
It is necessary to size the vacuum pump to have enough capacity to close all Flow Sensor Valves where cups are not sealed against a work piece plus the total "porosity" flow through the sealed cups. EDCO air powered multi-stage vacuum pumps are ideally suited since they produce large vacuum flow-rates at low vacuum levels (0-10 inHG) and can provide the flow necessary to close a large number of Flow Sensor Valves.

When used with large, bellows style vacuum cups, the cup should be pressed against the work piece to collapse the bellows before turning on the vacuum. This prevents accidentally activating the FSV by the high, instantaneous flow-rate caused by the bellows collapsing under the vacuum.

The FSV will automatically reset when the vacuum is turned off for a short period of time. If desired, a pressure pulse can be used to back flow the FSV to clean off the inlet filter. This blow-off pulse will reset the FSV and will quickly release the work piece.

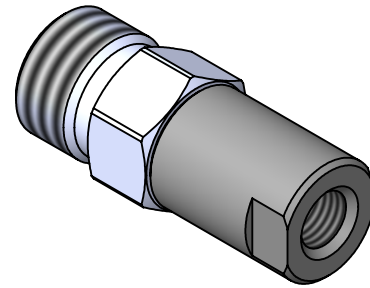
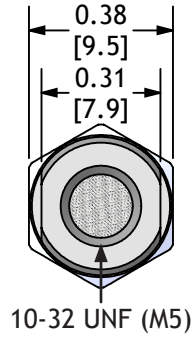
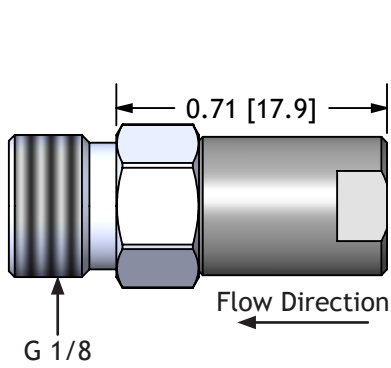
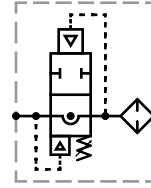
The FSVM version includes a monitor port where a vacuum sensor can be used to monitor whether the FSV is open or closed.

Note: Flow Sensor Valves are calibrated using a flow meter. Field adjustment is not practical or suggested.

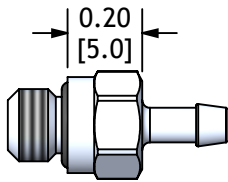


### FSV-10: Flow Sensor Valve, 10-32 UNF (M5)

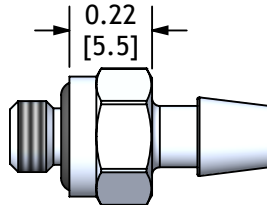
Set Point <sup>1</sup>	Connection Type	
FSV-10- 0.1		
0.1 - 0.6 SCFM	(Blank)	10-32 UNF (M5) Female
0.1 Increments	-8	4-8 mm Cup Size
	-10	10-15 mm Cup Size
	-32MS	25-35 mm Cup Size



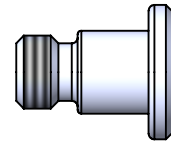
Weight: 0.16 oz [4.4 g]



**Ø 4-8 mm Cup Size**  
8-10M Cup Fitting



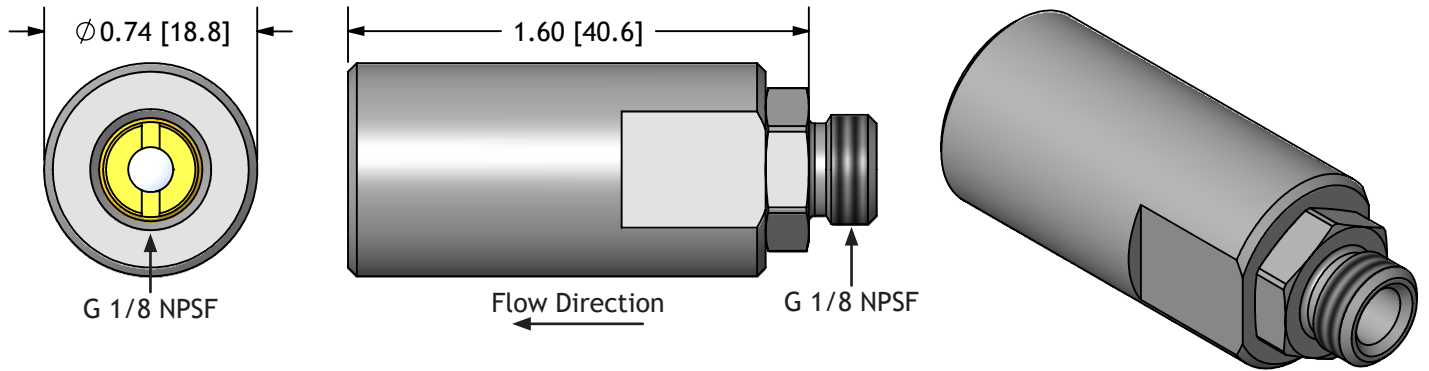
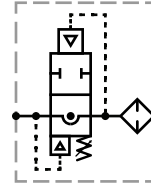
**Ø 10-15 mm Cup Size**  
10-10M Cup Fitting



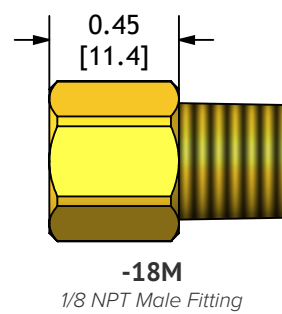
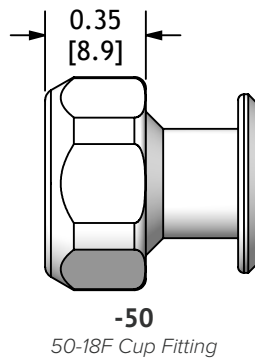
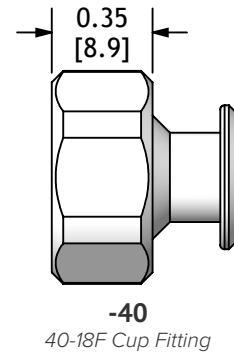
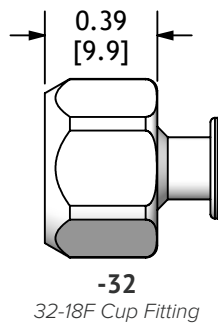
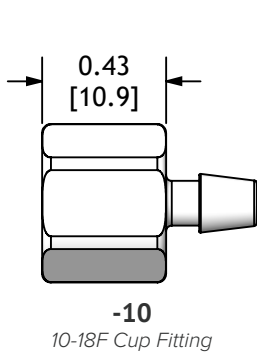
**Ø 25-35 mm Cup Size**  
32-10MS Cup Fitting

### FSV-18: Flow Sensor Valve, G 1/8 NPSF

Set Point <sup>1</sup>	Connection Type	
<b>FSV-18- 0.3</b>		
0.3 - 2.3 SCFM	(Blank)	G 1/8 NPSF Male
'0.1 Increments	-18M	1/8 NPT Male
	-10	10-15 mm Cup Size
	-32	25-35 mm Cup Size
	-40	40 mm Cup Size
	-50	50 mm Cup Size

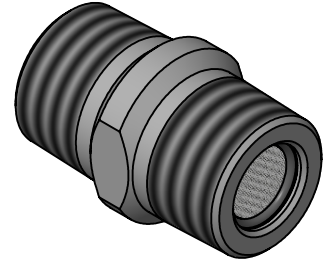
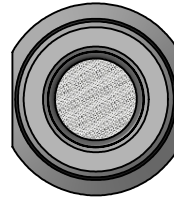
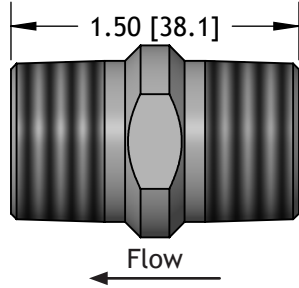
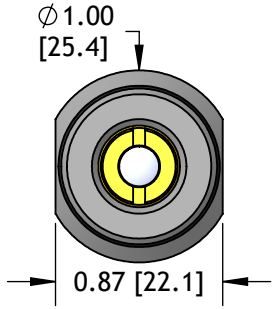
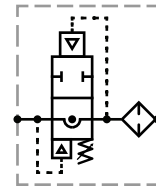


Weight: 0.99 oz [28.2 g]



### FSV-12: Flow Sensor Valve, 1/2 NPT

	Set Point <sup>1</sup>
FSV-12-	0.5
	0.5 - 6.0 SCFM
	<sup>1</sup> 0.1 Increments



Weight: 3.26 oz [92.6 g]



## Mechanical Valves

Mechanical valves are used with a vacuum cup in systems having a central vacuum pump and an array of vacuum cups to pick up a family of workpieces that vary by known values of width or length. Mechanical valves are used to seal off cups that are not directly over a workpiece to limit leakage into the vacuum system since these cups are not sealing. If the workpiece edge positions vary randomly, a mechanical valve could be opened by the workpiece but with a portion of the vacuum cup overhanging the edge causing leaking which would defeat the purpose of using mechanical valves.

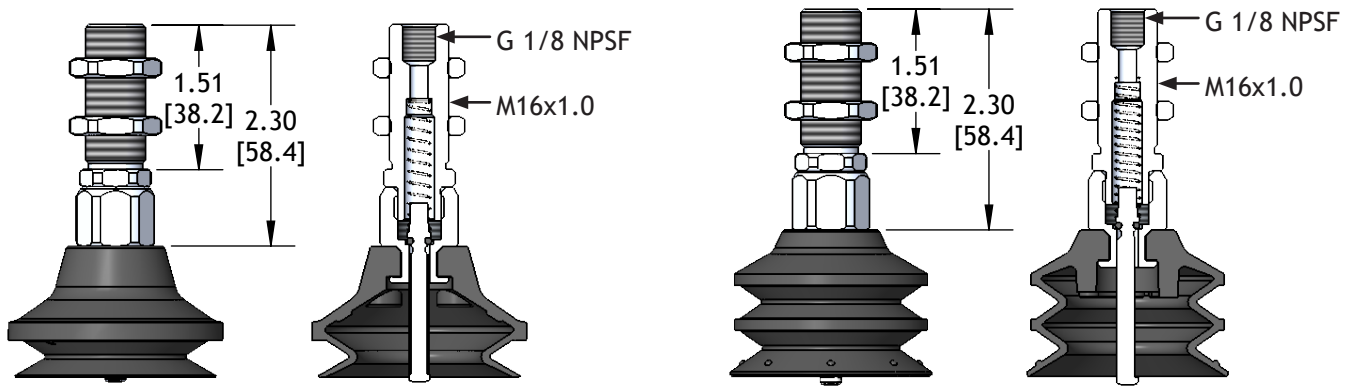
Mechanical valves are closed until the valve stem contacts a workpiece to open the valve and admit vacuum to the vacuum cup to allow gripping the workpiece. Since mechanical valves are mechanically operated by contact with a workpiece, there is a possibility for the valve stem to leave a mark if there is any relative movement. It is good practice to avoid using mechanical valves for delicate or highly polished surfaces and to make sure that vacuum cup movement is perpendicular to the workpiece surface.

### MV-B50 & MV-2B50: Mechanical Valve for XP-B50 & XP-2B50

To order full assembly with vacuum cup:

Cup Size		Cup Material		
XP-	B50	N		-16X40MV
B50	XP-B50	A	Ameriflex <sup>1</sup>	
2B50	XP-2B50	D	Duramax <sup>1</sup>	
		N	Nitrile	
		S	Silicone	
		V	Viton	

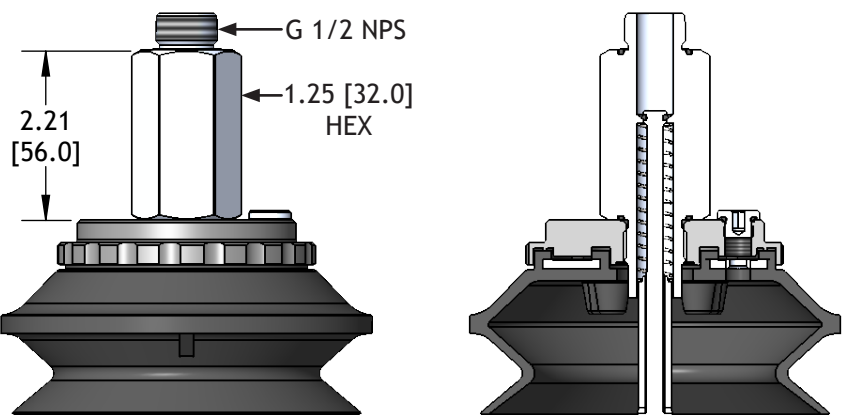
<sup>1</sup>Not available on 2B50.



### MV-B110: Mechanical Valve for XP-B110

To order full assembly with vacuum cup:

Cup Material		
XP-B110	N	-12F-MV
N	Nitrile	
S	Silicone	
V	Viton	

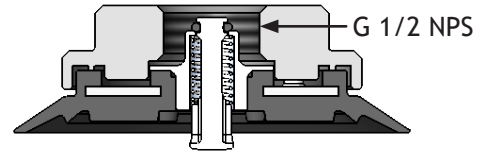
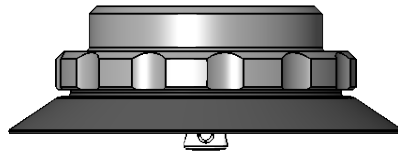


## Mechanical Valves

### MV-F75: Mechanical Valve for XP-F75

To order full assembly with vacuum cup:

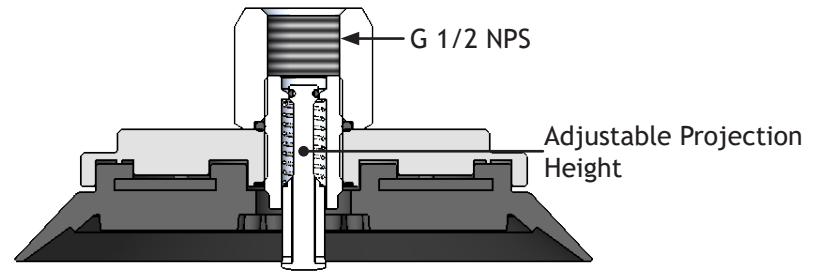
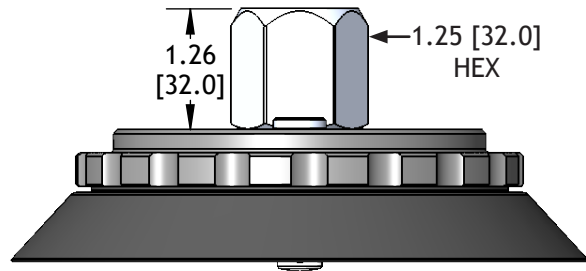
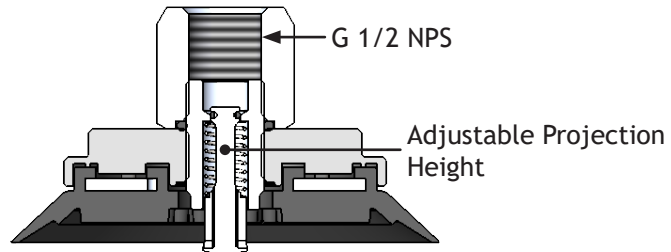
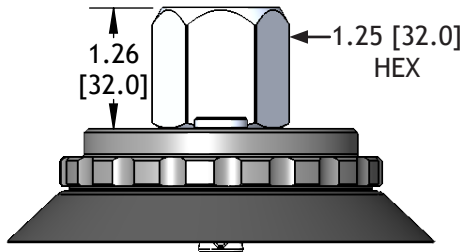
Cup Material		
XP-F75	N	-12F-MV
N	Nitrile	
S	Silicone	
V	Viton	



### MV-F110 & MV-F150: Mechanical Valve for XP-F110 & XP-F150

To order full assembly with vacuum cup:

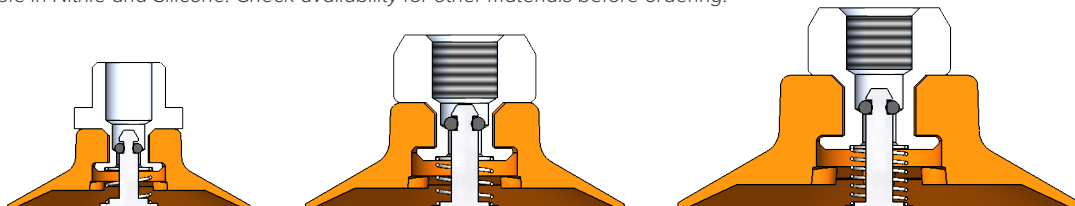
Cup Size		Cup Material		
XP-	F110	N	Nitrile	-12F-MV
F110	XP-F110	N	Nitrile	
F150	XP-F150	S	Silicone	
		V	Viton	



## Low-Profile Cone Valve w/ Vacuum Cups

Cup Size		Cup Material <sup>1</sup>		Cup Fitting	
XP-F	50	A	Ameriflex	18M	-CV
30	Ø 30 mm	A	Ameriflex	18M	G 1/8 NPSF Male 30 mm Cup Only
40	Ø 40 mm	D	Duramax	18F	G 1/8 NPSF Female 40 & 50 mm Cup Only
50	Ø 50 mm	N	Nitrile		
		S	Silicone		
		V	Viton		

<sup>1</sup>All cups are available in Nitrile and Silicone. Check availability for other materials before ordering.

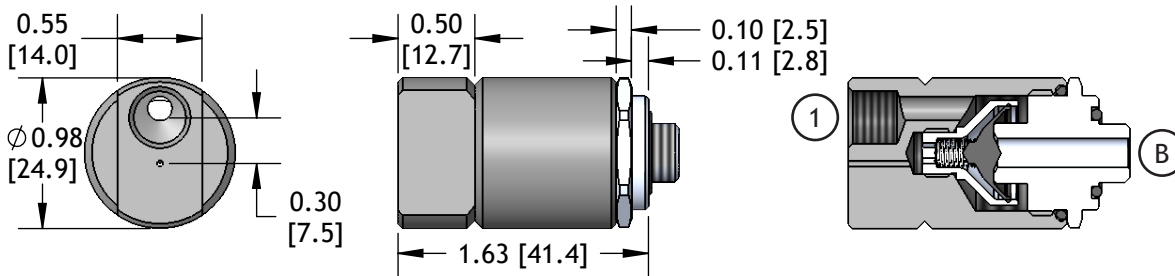


## Release Check Valves

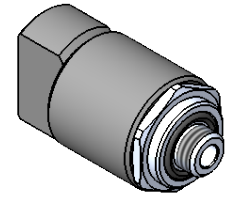
### RC18: Release Check Valve

The RC18A release check valve employs a normally closed valve to seal against pump vacuum without leaking. When a compressed air supply is applied, the release valve shifts to open at only 5 psi (0.3 bar) so that a full-flow burst of air can quickly dissipate (blow-off) system vacuum (minimum 5 psi air supply required). Once shifted, the valve doesn't try to close, but remains open. Once the compressed air source is removed, the valve automatically resets to a closed position. The RC18A should be used for high-flow vacuum release applications such as those involving vacuum reservoirs or larger, single-stage or multi-stage vacuum pumps.

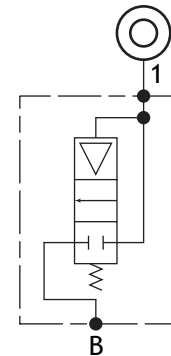
Competitive products are simply check valves with a 30-40 psi (2-3 bar) cracking pressure. The high cracking pressure is necessary to insure a tight seal against vacuum developed by the pump. When a compressed air supply is applied to open the valve for blow-off, the internal spring immediately tries to close the valve as soon as flow begins. This has the effect of subtracting the valve cracking pressure from the blow-off air pressure. Because of this, these systems normally have to operate at above 50 psi (3.5 bar), which wastes compressed air.



Code	Function	Ports
B	Blow-Off	G 1/8 NPSF
1	Blow-Off Air Pulse	G 1/8 NPSF

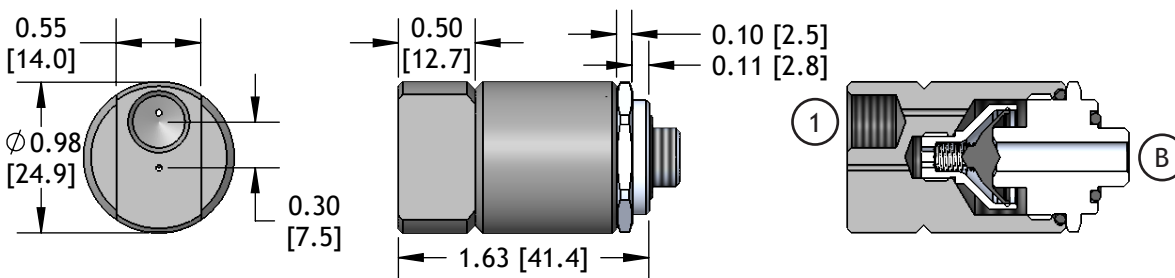


50 psi Max Air Pressure  
Weight: lbs [g]  
0.11 [48.5]

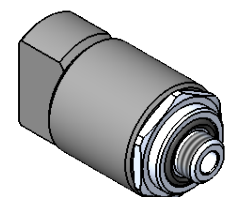


### RC18-040A: Release Check Valve w/ Balancing Orifice

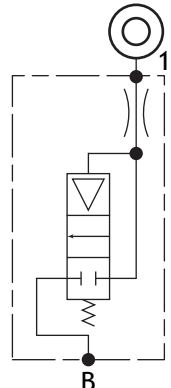
The RC18-040A operates the same as the RC18A but includes a 0.040 in (1 mm) balancing orifice to meter the air-flow when multiple release check valves are supplied air from the same blow-off control valves. Without the balancing orifice in each release check valve, the air would follow the path of least resistance. This would starve some release check valves of air while others would have a flow many times greater than necessary.



Code	Function	Ports
B	Blow-Off	G 1/8 NPSF
1	Blow-Off Air Pulse	G 1/8 NPSF



50 psi Max Air Pressure  
Weight: lbs [g]  
0.11 [48.5]



## Vacuum Check Valves

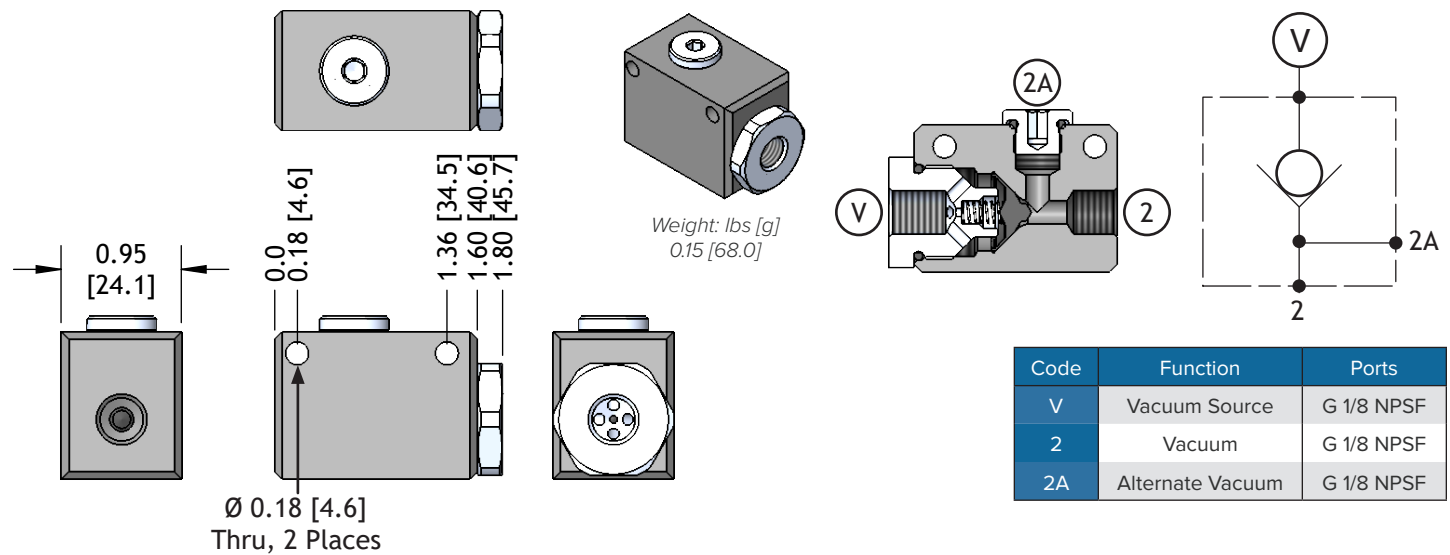
The Vacuum Check valve is designed to prevent the reverse flow of ambient air into a vacuum system. Vacuum Check valves are used to hold vacuum downstream whenever the vacuum source is removed or lost. Internally, a normally closed valve allows vacuum flow in the pump direction but seals off when vacuum flow ceases. When a Vacuum Check valve is used in a system, some provision must be made to release the trapped vacuum in order to release the work piece. The RC18 and RC18-040 Release Check valves are designed for this purpose.

One application for the Vacuum Check valve is for energy saver circuits using a vacuum storage tank to accumulate and store vacuum for high-volume, short duration flow rate requirements.

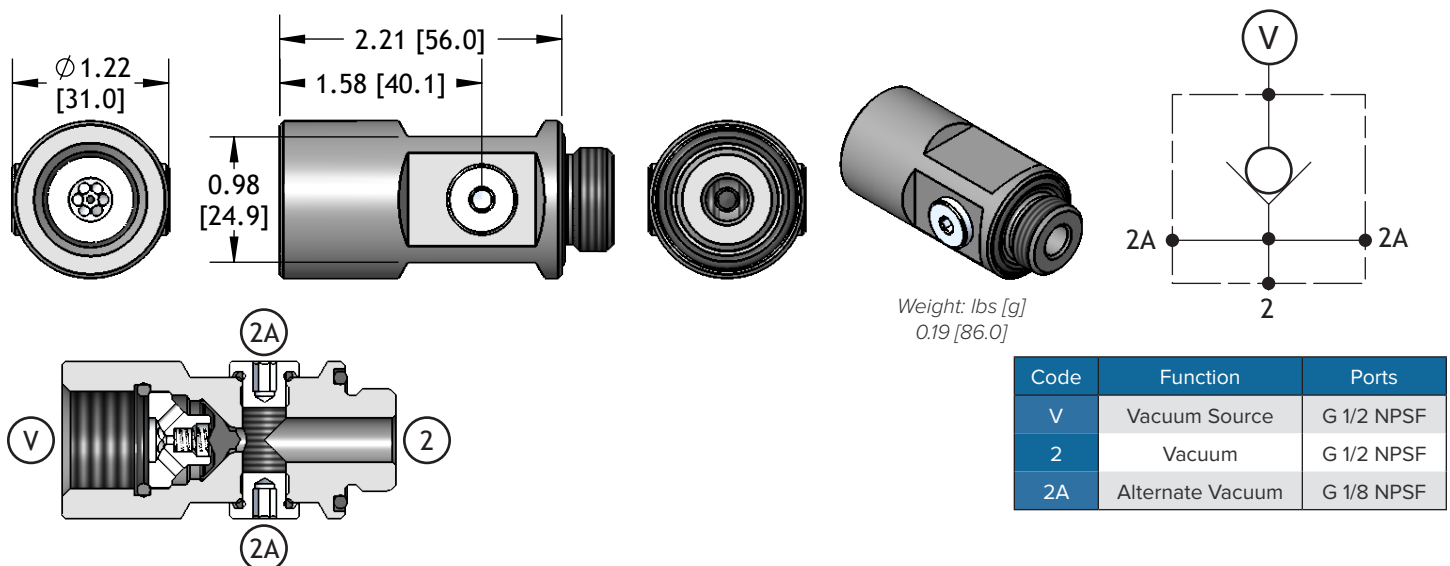
More commonly, a Vacuum Check valve with Release Check valve would be used with a single suction cup so a non-porous, high-value work piece would not be immediately dropped if the system vacuum source is lost. The vacuum trapped by the Vacuum Check valve will eventually leak down. The rate at which the vacuum diminishes will depend on the condition of all the components in the vacuum system. To increase the time delay interval, a volume chamber can be added to the auxiliary port. If the volume chamber is equal to twice the cup internal volume, the time delay interval will be approximately tripled, and so forth.

The VC18 should be used with cup diameters of 50 MM and smaller. The VC12 should be used with cup diameters of 75 MM and larger that are available with G1/2 NPS female fittings.

### VC18: Vacuum Check Valve, G 1/8 NPSF



### VC12: Vacuum Check Valve, G 1/2 NPSF



## Vacuum Check Valves

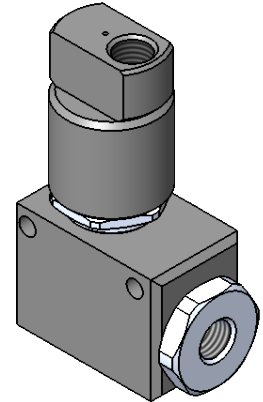
### VC18-RCA: Vacuum Check Valve w/ Release Check Valve, G 1/8 NPSF

The vacuum check valve with release check valve is used with a single vacuum cup so a non-porous, high value work piece won't be immediately dropped if the system vacuum source is lost. The vacuum trapped by the vacuum check valve will eventually leak down. The rate at which the vacuum diminishes will depend on the condition of all of the components in the vacuum system.

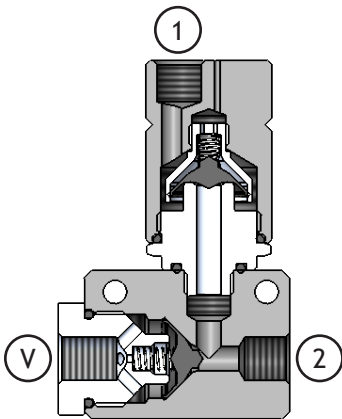
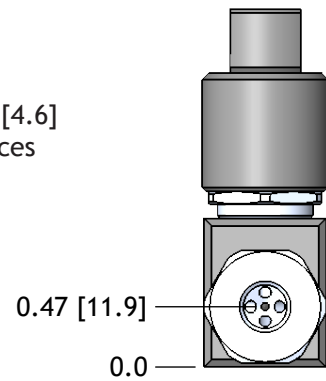
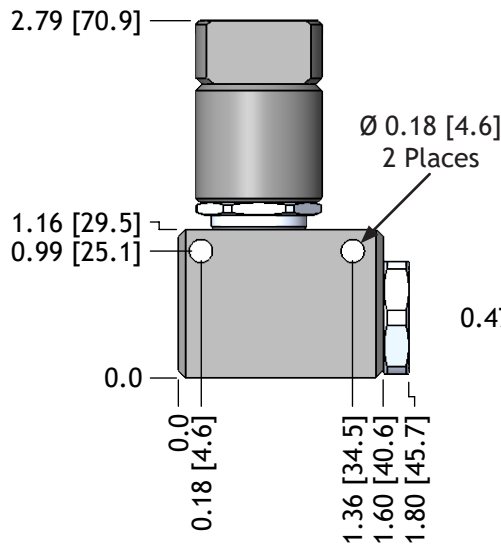
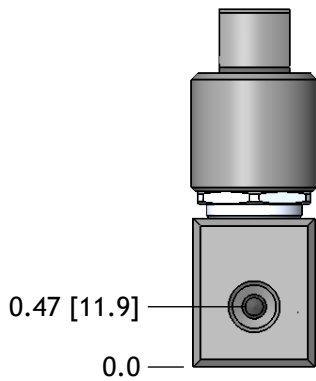
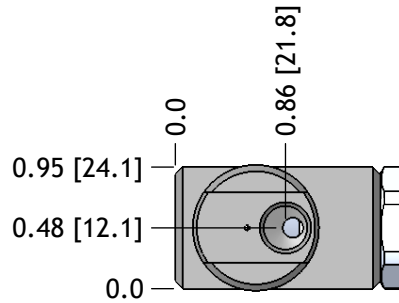
To increase the time delay interval, a volume chamber can be added to the auxiliary port. If the volume of the chamber is twice that of the internal cup volume, the time delay interval will be approximately tripled and so forth.

See previous pages about release check valves for more information.

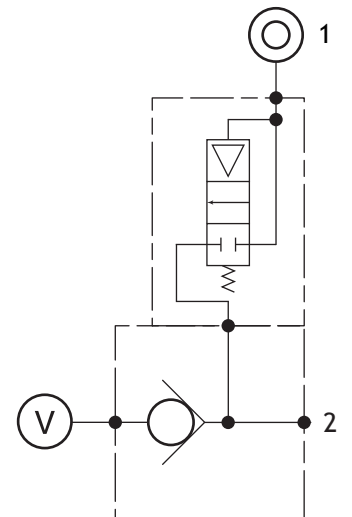
	Release Check Valve	
VC18-	RCA	
	RCA	RC18A
	RC040A	RC18-040A



Weight: lbs [g]  
0.28 [126.0]



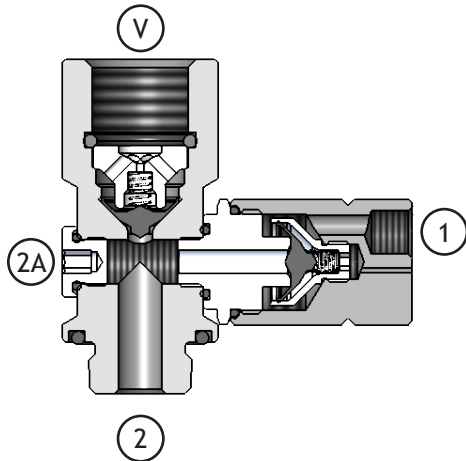
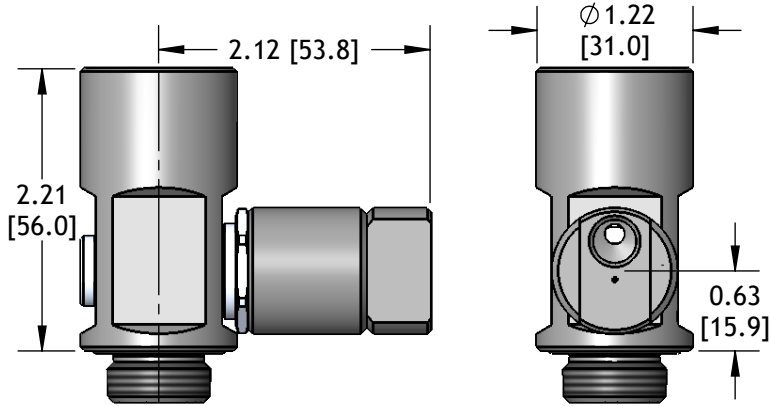
Code	Function	Ports
1	Blow-Off Air Pulse	G 1/8 NPSF
V	Vacuum Source	G 1/8 NPSF
2	Vacuum	G 1/8 NPSF



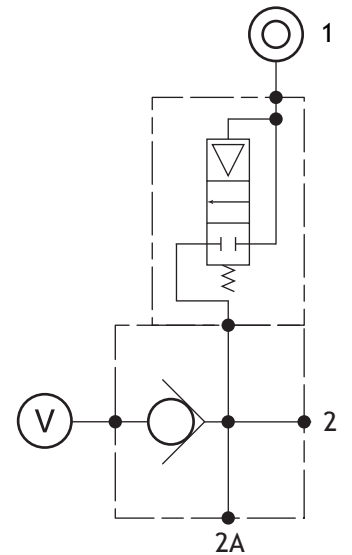
### Vacuum Check Valves

VC12-RCA: Vacuum Check Valve w/ Release Check Valve, G 1/2 NPSF

Release Check Valve	
VC12-	RCA
RCA	RC18A
RC040A	RC18-040A



Code	Function	Ports
V	Vacuum Source	G 1/2 NPSF
1	Blow-Off Air Pulse	G 1/8 NPSF
2	Vacuum	G 1/2 NPSF
2A	Alternate Vacuum	G 1/8 NPSF

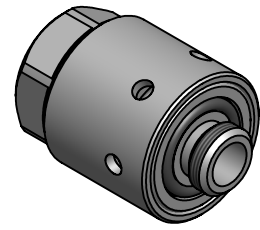


## Atmospheric Quick Release

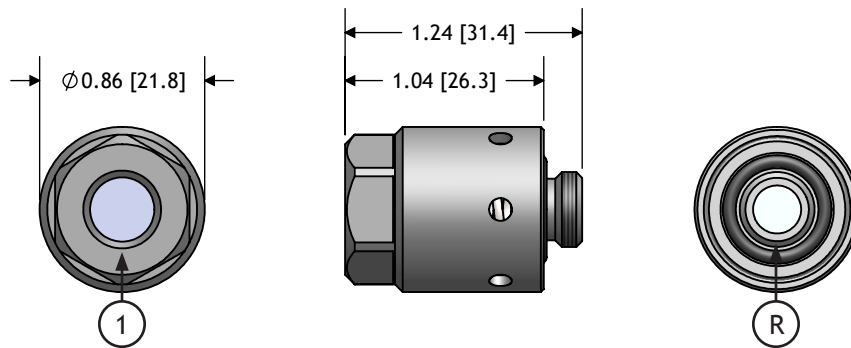
### AQR-18M

Vacuum generators, or vacuum pumps, are powered by compressed air to create vacuum. When the air source is turned off, vacuum is dissipated by atmospheric air entering the exhaust port and reverse flowing through the last venturi nozzle. This works well for slow cycle speeds and small cups but when relatively large cups are used with small vacuum generators then reverse air flow may not be sufficient to dissipate residual vacuum fast enough.

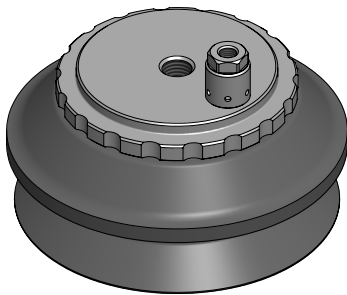
The AQR valve is spring-biased open but is held closed by air pressure supplied to the vacuum generator. When the air supply is turned off, vacuum is no longer generated and the AQR valve opens a large passage to atmosphere so that vacuum is quickly dissipated to release the work object.



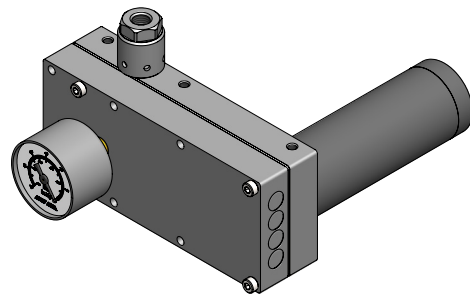
Weight: 0.64 oz [18.1 g]



### Examples

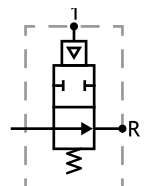


AQR-18M + XP-B110N-12F



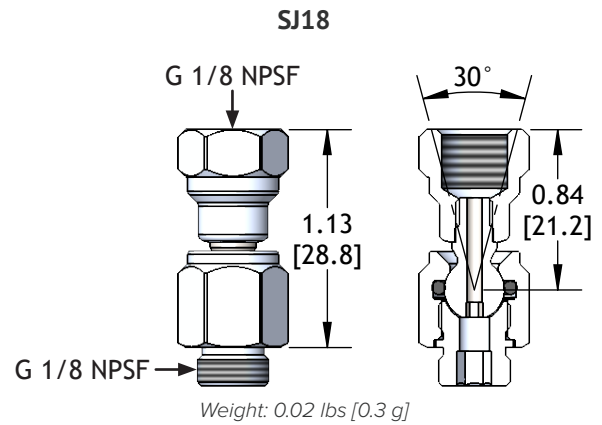
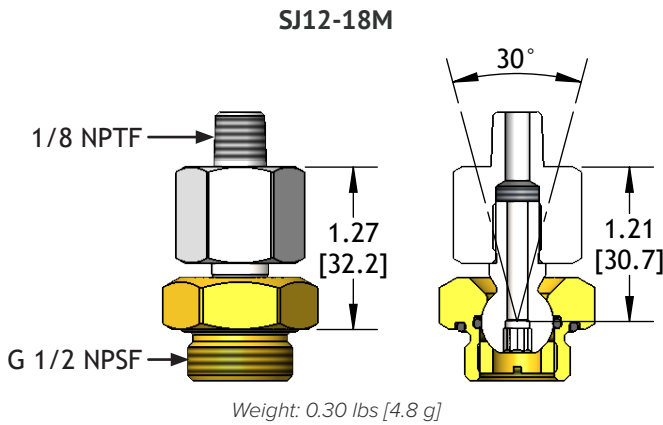
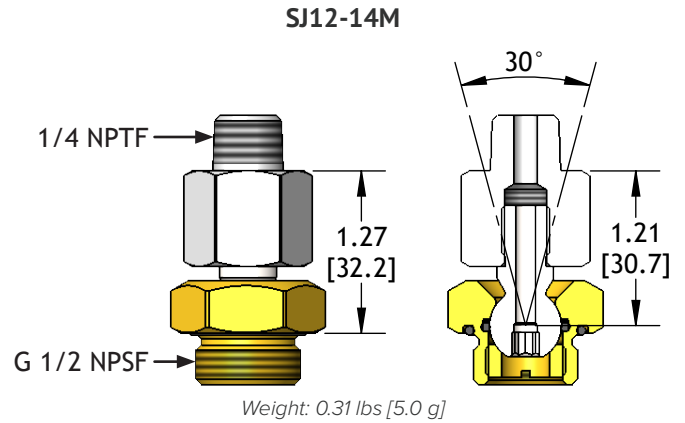
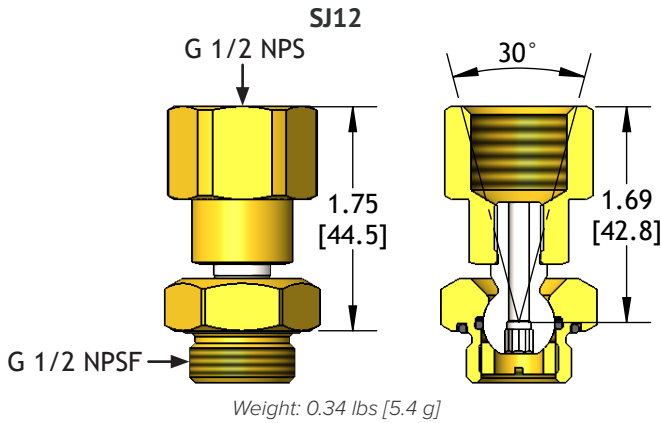
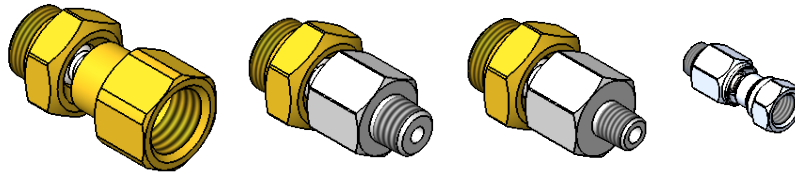
AQR-18M + ML100N

Code	Function	Ports
1	Air Supply (Common w/ Pump)	G 1/8 NPSF
R	Release (Connect to Vacuum)	G 1/8



## Swivel Joints

Swivel joints are recommended for applications where a vacuum cup is used to lift rounded or rotating products. Our swivel joints use a brass body, stainless steel shaft, and Nitrile seals. We offer a range of sizes and connections while each swivel joint operates in the same way. A coaxial connection between the vacuum source and vacuum cup are given 30 degrees of total movement while also being free to rotate on its axis.



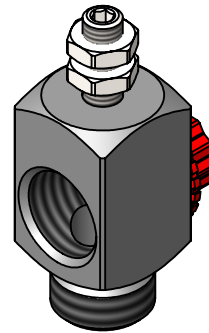
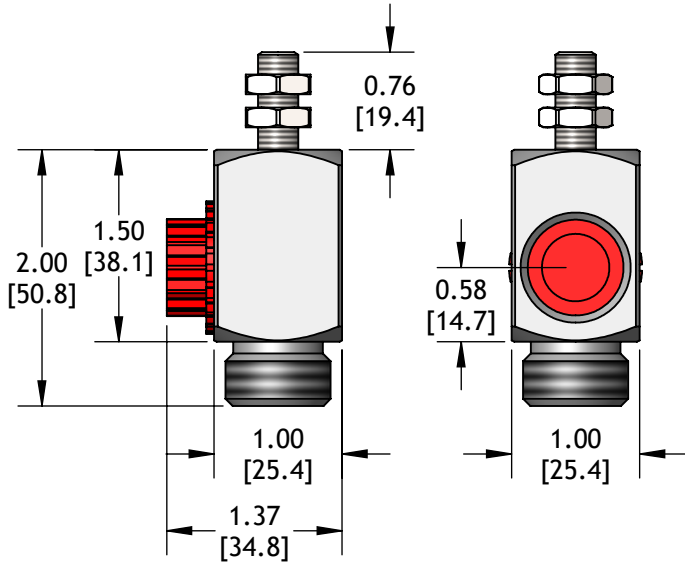


## Tee Adapters

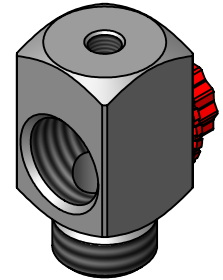
Tee adapters can be used in a similar way as side vacuum port vacuum cup fittings. The provided plug allows the tee adapter to be used as an angle adapter. Tee adapters can also be used to daisy chain vacuum tubing from one cup to the next. By simply removing the plug, tubing can be daisy chained from a vacuum source to several vacuum cups.

### TA12: Tee Adapter, G 1/2 NPS

Connection Type	
TA12-	8M
8F	M8x1.25 Female
8M	M8x1.25 Male Post



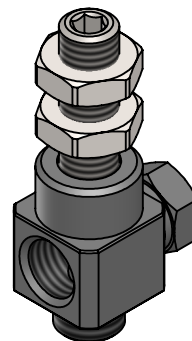
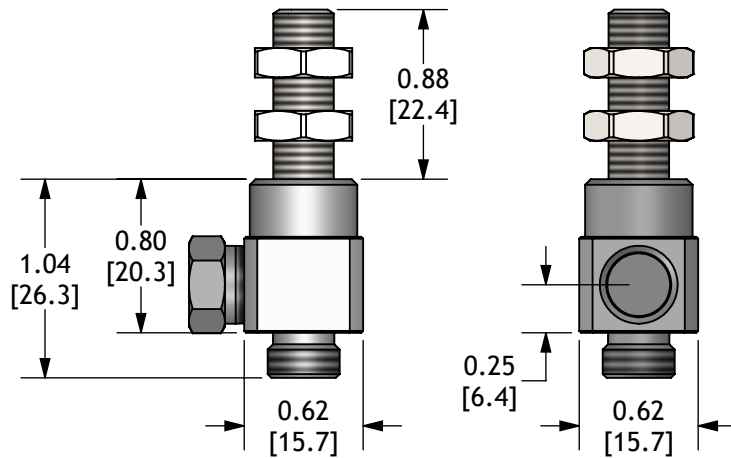
**TA12-8M**  
Weight: 2.51 oz [71.0 g]



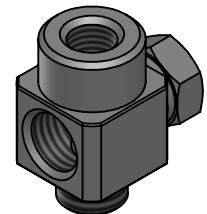
**TA12-8F**  
Weight: 1.89 oz [53.6 g]

### TA18: Tee Adapter, G 1/8 NPSF

Connection Type	
TA18-	8M
8F	M8x1.25 Female
8M	M8x1.25 Male Post



**TA18-8M**  
Weight: 0.99 oz [28.1 g]



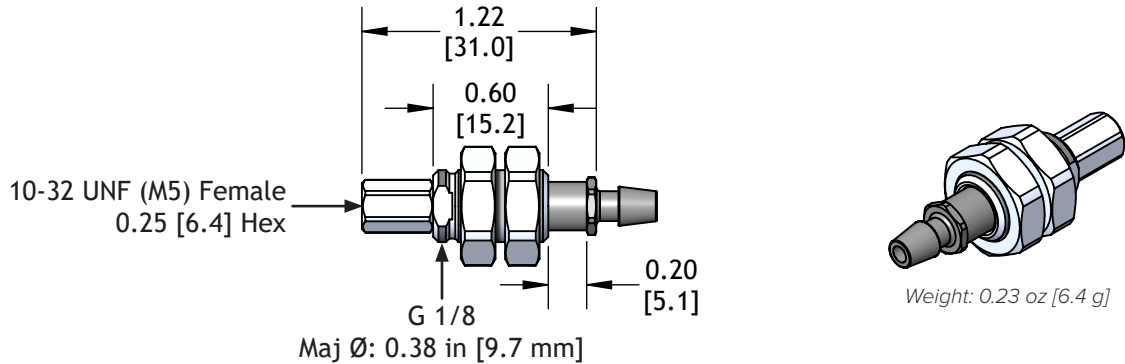
**TA18-8F**  
Weight: 0.38 oz [10.7 g]

## Level Compensators

Level compensators are primarily used to compensate for height differences on a work-piece surface. Installation should be done in a manner that allows all of the level compensators to be fully extended while supported the load. For special applications, such as sheet feeding, level compensators can be staggered so lifting begin at the edge or corner to assist in sheet separation.

Level compensators also serve as shock absorbers to prevent damage to work-pieces and allow greater positioning latitude for robotic applications. Extensive use of aluminum reduces the weight of EDCO USA level compensators by as much as 60%.

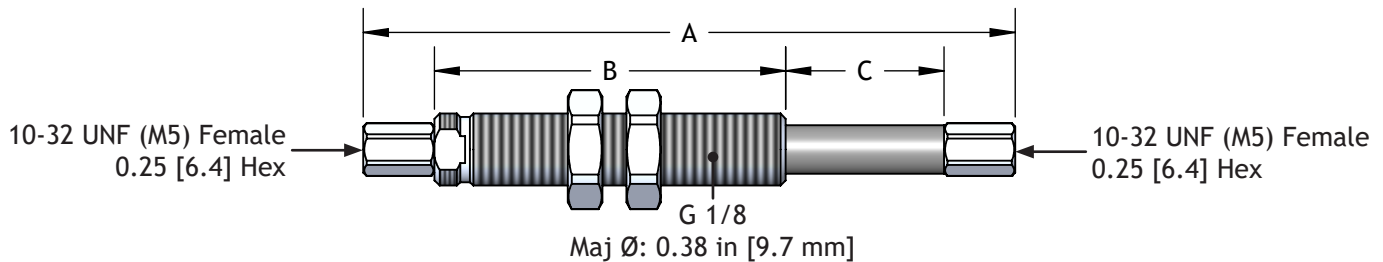
### LC10: Level Compensator, 10-32 UNF (M5) w/ Ø 10-15 mm Vacuum Cup Mount



### LC10: Level Compensator, 10-32 UNF (M5)

	Stroke Length	Options <sup>1</sup>
LC10	X20	
	(Blank) 8 mm	(Blank) Standard
	X20 20 mm	-NR Non-Rotating
	X30 30 mm	
	X50 50 mm	

<sup>1</sup>Non-Rotating option only available for 8 mm and 50 mm stroke length.

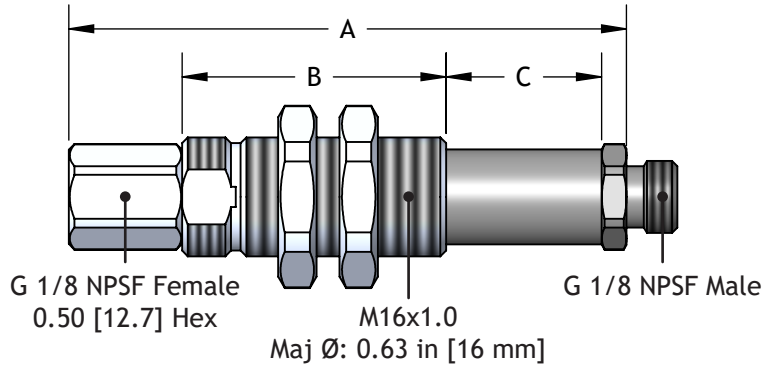
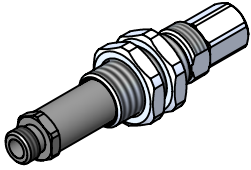


Part Number	A in [mm]	B in [mm]	C in [mm]	Weight oz [g]
LC10	1.70 [43.2]	0.76 [19.3]	0.30 [7.6]	0.25 [7.2]
LC10-NR	1.95 [49.5]	0.91 [23.1]	0.30 [7.6]	0.28 [7.9]
LC10X20	3.40 [86.4]	1.83 [46.5]	0.83 [21.0]	0.44 [12.5]
LC10X30	4.17 [106.0]	2.23 [56.6]	1.20 [30.5]	0.51 [14.6]

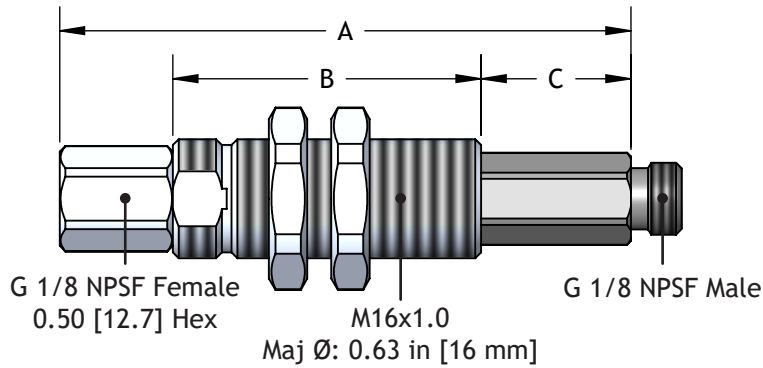
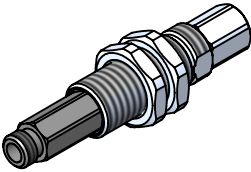
### LC18: Level Compensator, G 1/8 NPSF

Stroke Length		Options		Side-Port Option	
LC18	X35	(Blank)	Standard	(Blank)	None
(Blank)	20 mm	(Blank)	Standard	(Blank)	None
X35	35 mm	-NR	Non-Rotating	-SP	Side-Port
X50	50 mm	-20	20 mm Clamp Mount		

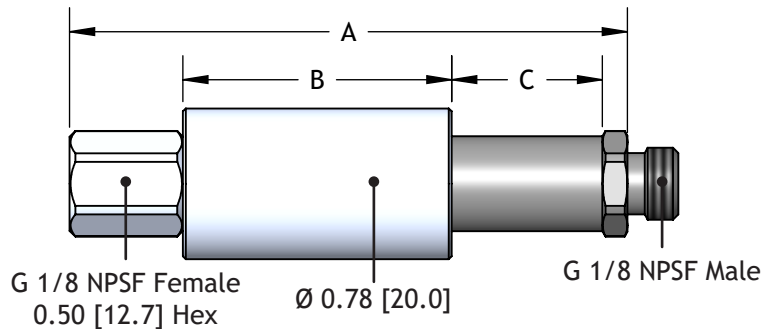
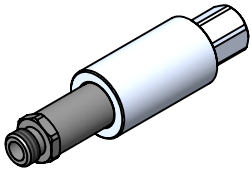
#### Standard



#### Non-Rotating



#### 20 mm Clamp Mount



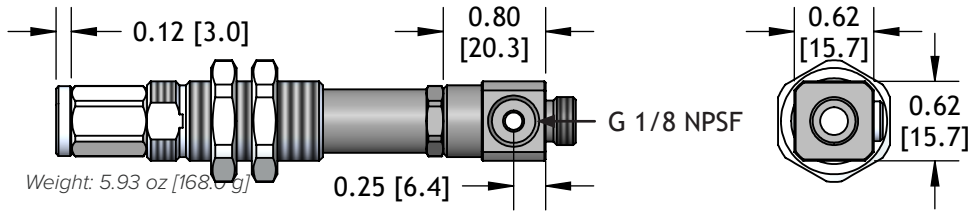
Part Number	A in [mm]	B in [mm]	C in [mm]	Weight oz [g]
LC18	2.89 [73.4]	1.38 [35.1]	0.79 [20.1]	1.06 [30.1]
LC18-NR	2.98 [75.6]	1.61 [40.8]	0.78 [19.8]	1.06 [30.1]
LC18-20	2.89 [73.4]	1.38 [35.1]	0.79 [20.1]	1.15 [32.6]
LC18X35	4.47 [114.0]	2.33 [59.2]	1.40 [35.6]	1.49 [42.2]
LC18X35-NR	4.54 [115.2]	2.56 [64.9]	1.39 [35.3]	1.46 [41.5]
LC18X35-20	4.47 [114.0]	2.33 [59.2]	1.40 [35.6]	1.94 [55.1]
LC18X50	5.75 [146.0]	2.97 [75.4]	2.00 [50.8]	1.83 [52.0]
LC18X50-NR	5.84 [148.3]	3.21 [81.5]	2.04 [51.8]	1.78 [50.5]
LC18X50-20	5.75 [146.0]	2.97 [75.4]	2.00 [50.8]	2.48 [70.1]

### LC18: Level Compensator, G 1/8 NPSF

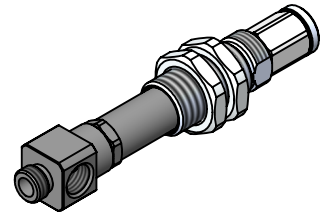
**-SP: Side-Port Option**

The side-port option for the LC18 family of level compensators is perfect when you need a side port for your vacuum supply rather than the standard in-line. A P18 is inserted into the vacuum port and an adapter is installed on the cup end of the level compensator. Both the side port and cup end connection threads are G 1/8 NPSF. An M5 port has been added opposite of the vacuum supply connection for monitoring purposes.

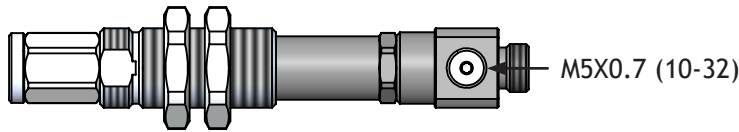
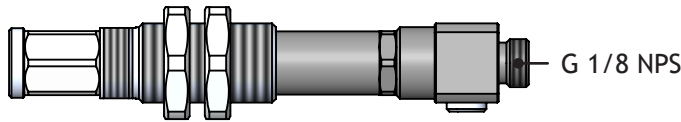
For full dimensions, simply add the provided specifications to the base specifications for the level compensator selected.



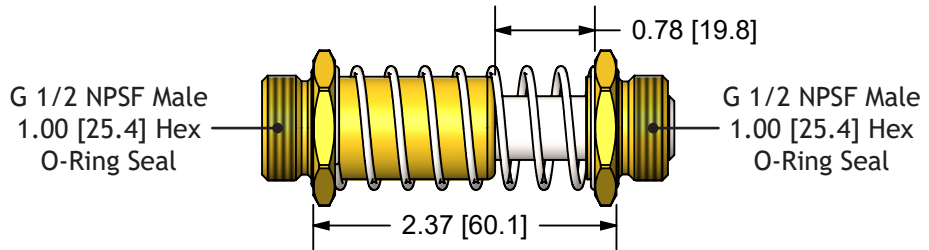
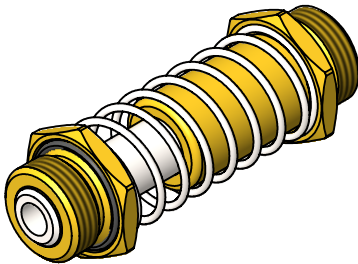
Weight: 5.93 oz [168.5 g]



Additional Weight: 0.38 oz [10.9 g]



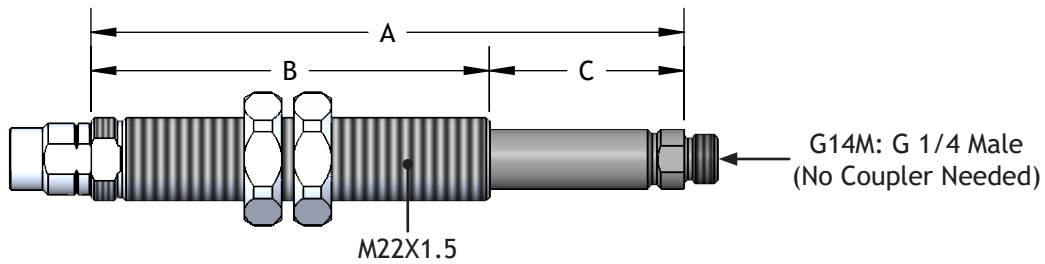
### LC12: Level Compensator, G 1/2 NPSF



### Heavy-Duty Level Compensators

Heavy-Duty Level Compensators have the strength necessary for loads associated with larger vacuum cup diameters. Widely spaced shaft bearings all mounting in either vertical or horizontal shaft orientations.

LC	Inlet Thread	Stroke Length	Cup End Thread
	14F	X25	38M
14F	1/4 NPSF Female	X25 25 mm	14F 1/4 NPSF Female
38M	3/8 NPTF Male	X50 50 mm	38M 3/8 NPTF Male
12M	1/2 NPTF Male		12M 1/2 NPTF Male
G14F	G 1/4 Female		G14F G 1/4 Female
G38M	G 3/8 Male		G14M G 1/4 Male
G12M	G 1/2 Male		G38M G 3/8 Male
			G12M G 1/2 Male

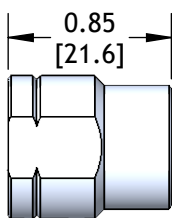


Stroke	A in [mm]	B in [mm]	C in [mm]	Weight oz [g]
25 mm	3.43 [87.1]	2.40 [61.0]	1.03 [25.0]	3.35 [94.9]
50 mm	6.18 [157]	4.15 [105.0]	2.03 [51.6]	5.13 [145.5]

Base weight calculated without couplers.

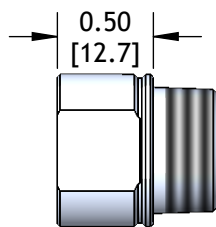
### Couplers

After picking an inlet and cup end thread, see the below couplers for additional dimensions.



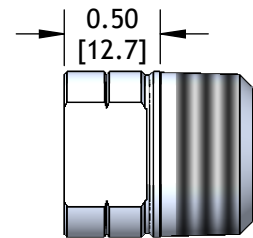
-14F

Threads:	1/4 NPT Female
Weight: oz [g]	0.27 [7.8]



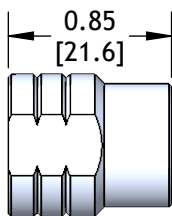
-38M

Threads:	3/8 NPTF Male
Weight: oz [g]	0.30 [8.6]



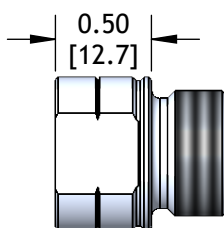
-12M

Threads:	1/2 NPTF Male
Weight: oz [g]	0.54 [15.3]



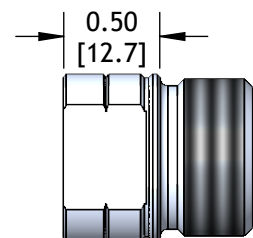
-G14F

Threads:	G 1/4 Female
Weight: oz [g]	0.26 [7.5]



-G38M

Threads:	G 3/8 Male
Weight: oz [g]	0.31 [8.7]



-G12M

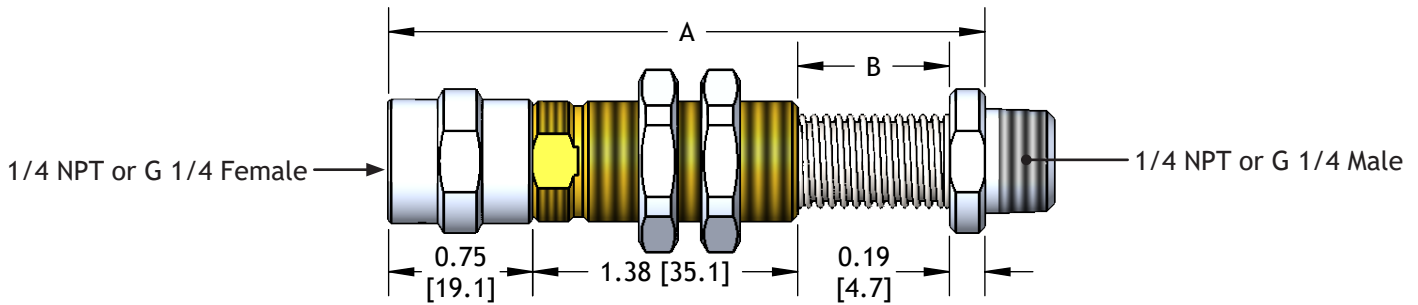
Threads:	G 1/2 Male
Weight: oz [g]	0.51 [14.4]

## External Spring Level Compensators

LCE level compensators are only suitable for vertical mount applications where low cost is the primary concern. The short bearing length dictates a vertical shaft mounting orientation and care should be taken to avoid shear loads which will cause premature shaft and bearing wear.

### LCE w/ Male Connection

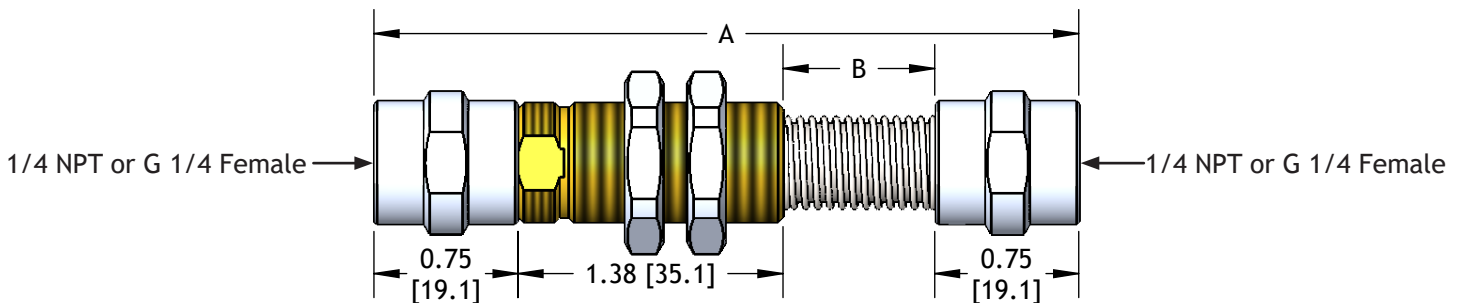
Sleeve Threads		Stroke Length		Connection Threads	
LCE	F	14X	10	(Blank)	NPT Threads
F	Fine - M16X1.0	10	10 mm	-G	G Threads
C	Coarse - M16X1.5	30	30 mm		
		50	50 mm		
		70	70 mm		



Sleeve Threads		A in [mm]	B in [mm]	Weight oz [g]
Fine - M16X1.0	Coarse - M16X1.5			
LCEF14X10	LCEC14X10	3.11 [79.0]	0.39 [10.0]	2.83 [80.2]
LCEF14X30	LCEC14X30	4.69 [119.0]	1.18 [30.0]	3.66 [103.8]
LCEF14X50	LCEC14X50	6.26 [159.0]	1.97 [50.0]	4.50 [127.7]
LCEF14X70	LCEC14X70	7.85 [199.0]	2.76 [70.0]	5.40 [153.1]

### LCE w/ Female Connection

Sleeve Threads		Stroke Length		Connection Threads	
LCE	F	14X	10	-14F	(Blank) NPT Threads
F	Fine - M16X1.0	10	10 mm	-G	G Threads
C	Coarse - M16X1.5	30	30 mm		
		50	50 mm		
		70	70 mm		

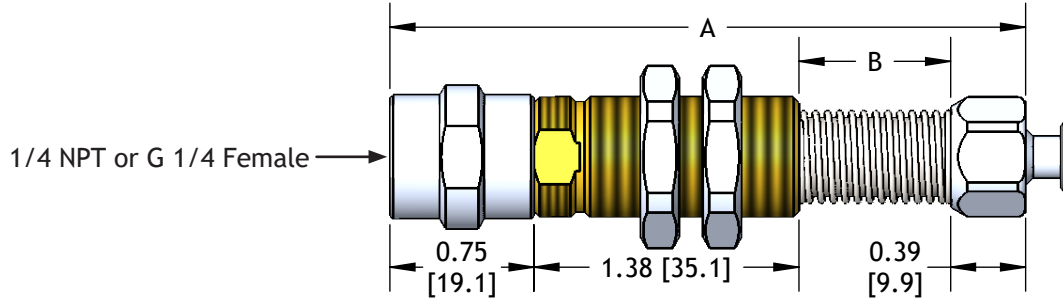


Sleeve Threads		A in [mm]	B in [mm]	Weight oz [g]
Fine - M16X1.0	Coarse - M16X1.5			
LCEF14X10-14F	LCEC14X10-14F	3.67 [93.2]	0.39 [10.0]	2.92 [82.7]
LCEF14X30-14F	LCEC14X30-14F	5.25 [133.0]	1.18 [30.0]	3.75 [106.2]
LCEF14X50-14F	LCEC14X50-14F	6.82 [173.0]	1.97 [50.0]	4.59 [130.2]
LCEF14X70-14F	LCEC14X70-14F	8.41 [214.0]	2.76 [70.0]	5.49 [155.5]

## External Spring Level Compensators

### LCE w/ Integral Cup Fitting

Sleeve Threads		Stroke Length		Cup Size		Connection Threads	
LCE	F	14X	10	-	32		
F	Fine - M16X1.0	10	10 mm	32	Ø 20-30 mm	(Blank)	NPT Threads
C	Coarse - M16X1.5	30	30 mm	40	Ø 40 mm	-G	G Threads
		50	50 mm	50	Ø 50 mm		
		70	70 mm				



Part Number		A	B	Weight
Fine - M16X1.0	Coarse - M16X1.5	in [mm]	in [mm]	oz [g]
LCEF14X10-__	LCEC14X10-__	3.31 [84.1]	0.39 [10.0]	2.79 [79.2]
LCEF14X30-__	LCEC14X30-__	4.89 [124.0]	1.18 [30.0]	3.62 [102.7]
LCEF14X50-__	LCEC14X50-__	6.46 [164.0]	1.97 [50.0]	4.47 [126.6]
LCEF14X70-__	LCEC14X70-__	8.05 [204.0]	2.76 [70.0]	5.36 [152.0]

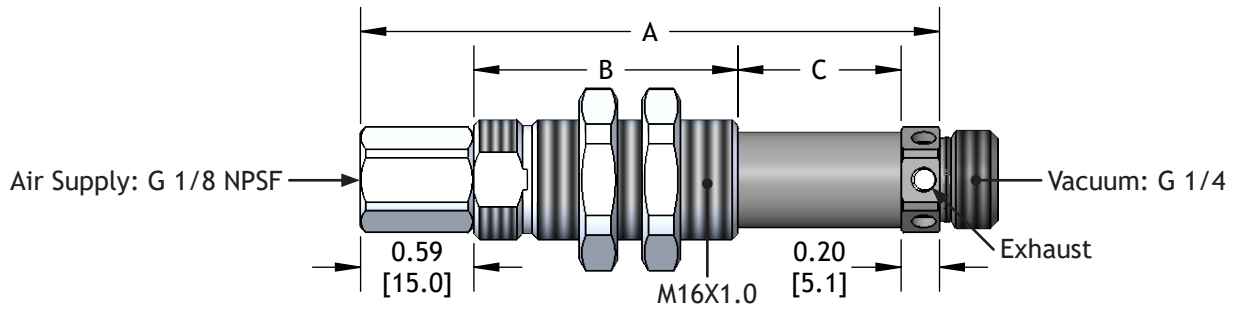
Weights and dimensions calculated using -32 cup fitting.

## LCP: Level Compensators w/ Integral Pump

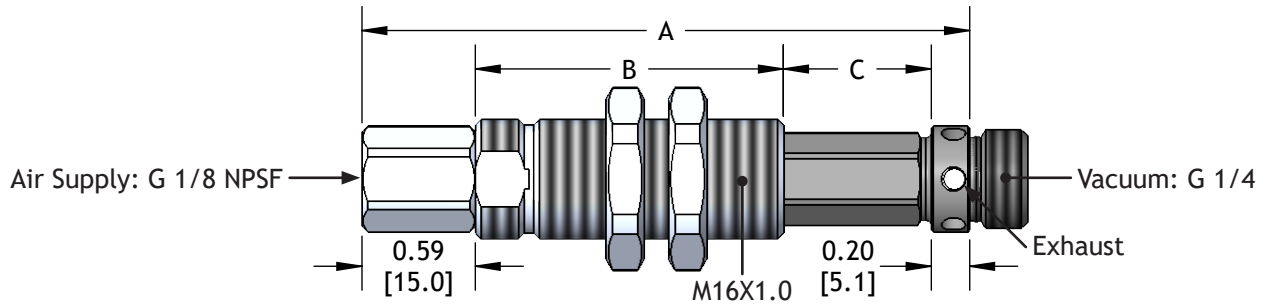
A vacuum pump integrated within a level compensator provides a simple point-of-use system that is easier to apply than two components separately. While the level compensator provides compliance, vacuum is generated directly at the vacuum cup, improving response time for both attaching to and detaching from a work-piece.

Venturi Series		Stroke Length		Non-Rotating Option	
LCP-	10L	-14X	20		
07	ER07	20	20 mm	(Blank)	Standard (Rotating)
09	ER09	35	35 mm	NR	Non-Rotating
10	ER10	50	50 mm		
10L	ER10L				

### Standard



### Non-Rotating



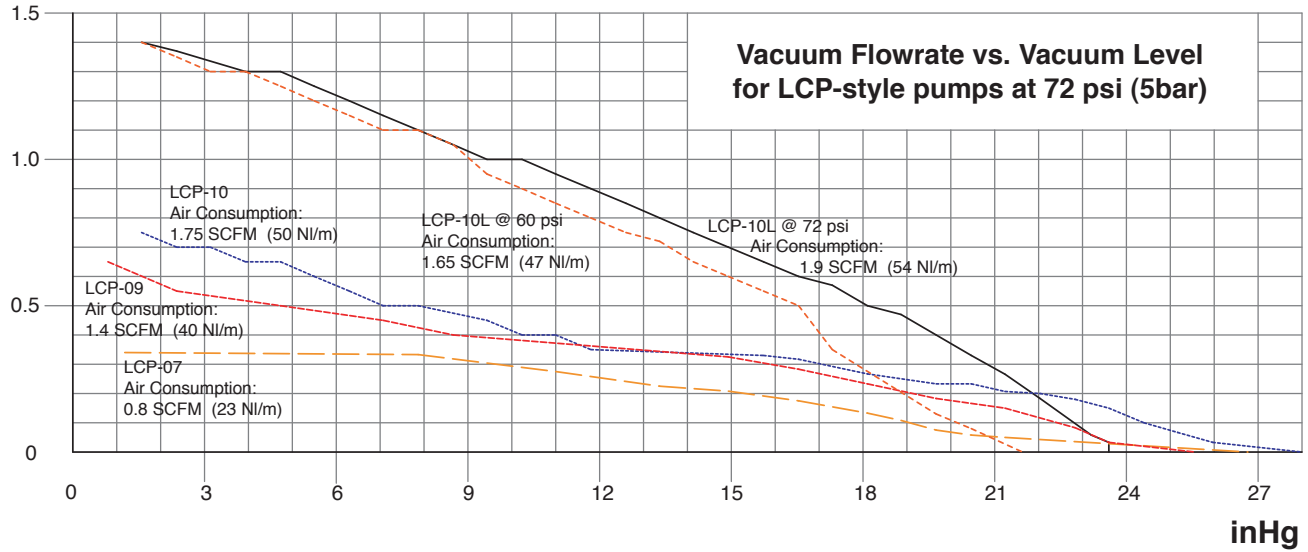
Part Number	A in [mm]	B in [mm]	C in [mm]	Weight oz [g]
LCP-__-14X20	3.02 [76.6]	1.38 [34.9]	0.85 [21.6]	1.12 [31.8]
LCP-__-14X35	4.31 [109.3]	2.33 [59.1]	1.19 [30.2]	1.51 [42.9]
LCP-__-14X50	5.57 [141.4]	2.98 [75.7]	2.00 [50.7]	1.85 [52.3]
LCP-__-14X20NR	3.17 [80.4]	1.61 [40.8]	0.77 [19.6]	1.16 [32.8]
LCP-__-14X35NR	4.47 [113.4]	2.56 [64.9]	1.32 [33.5]	1.52 [43.1]
LCP-__-14X50NR	5.73 [145.4]	3.21 [81.5]	1.93 [48.9]	1.83 [51.8]



## LCP: Level Compensators w/ Integral Pump

### Performance

#### SCFM



### Level Compensator Spring Data

Level Compensator	Force Exerted (Extended)	Force Exerted (Collapsed)	Spring Force
LC10X50-10	0.18 lbs	0.23 lbs	1.30 lbs/in
LC10	0.18 lbs	0.23 lbs	1.30 lbs/in
LC10X20	0.20 lbs	0.32 lbs	0.15 lbs/in
LC10X30	0.20 lbs	0.38 lbs	0.15 lbs/in
LC10X50	0.20 lbs	0.50 lbs	0.15 lbs/in
LC18	0.82 lbs	2.40 lbs	2.00 lbs/in
LC18X35	0.20 lbs	0.90 lbs	0.50 lbs/in
LC18X50	0.20 lbs	1.20 lbs	0.50 lbs/in
LC12	5.22 lbs	7.65 lbs	3.47 lbs/in
Heavy Duty (25 mm Stroke)	3.00 lbs	4.50 lbs	1.50 lbs/in
Heavy Duty (50 mm Stroke)	3.00 lbs	4.50 lbs	0.75 lbs/in
Ext Spring (10 mm Stroke)	1.10 lbs	1.36 lbs	0.67 lbs/in
Ext Spring (30 mm Stroke)	1.10 lbs	1.90 lbs	0.68 lbs/in
Ext Spring (50 mm Stroke)	1.10 lbs	2.44 lbs	0.68 lbs/in
Ext Spring (70 mm Stroke)	1.10 lbs	2.91 lbs	0.66 lbs/in
LCP (20 mm Stroke)	0.82 lbs	2.40 lbs	2.00 lbs/in
LCP (35 mm Stroke)	0.20 lbs	0.90 lbs	0.50 lbs/in
LCP (50 mm Stroke)	0.20 lbs	1.20 lbs	0.50 lbs/in