# Contents

## In-Line Mounted Valves

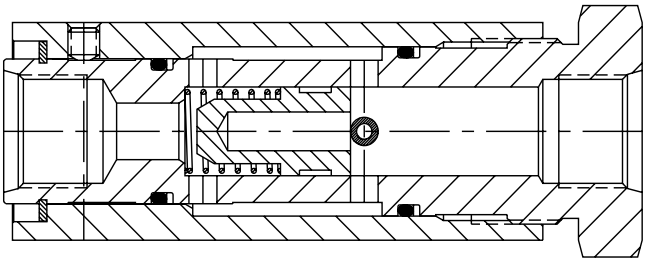
## General Description

Series AVF (Hydraulic) adjustable velocity fuses are designed to provide automatic hydraulic line rupture shut-off, as well as the ability to isolate a problem circuit on parallel circuit applications. Use of the fuses limits oil spillage and potential component damage. The fuses feature an adjustable flow for easy set-up and operation. A set screw in the body is provided to "lock in" the selected flow.

## Features

- Provides automatic line rupture shut-off.
- Isolates problem circuit on parallel circuit applications.
- Limits oil spillage and potential component damage.
- Adjustable closing flow — simple readjustment.

## Construction View



## Specifications

| | | |
|---|---|---|
| **Service Application** | Hydraulic | |
| **Maximum Operating Pressure** | 340 Bar (5000 PSI) | |
| **Material** | Body, Sleeve, Poppet, Roll Pin | Steel |
| | Spring | Stainless Steel |
| | O-ring | Fluorocarbon |
| | Back-up Ring | PTFE |
| | Finish | Zinc Plated |
| **Operating Temperature** | -27°C to +177°C (-20°F to +350°F) | |
| **Mounting** | Any | |

## Performance Data

| Valve Size | Closing Flow Adjustment Range | |
|---|---|---|
| | **Minimum** | **Maximum** |
| 1/4" | 1.9 LPM (1/2 GPM) | 15 LPM (4 GPM) |
| 3/8" | 3.8 LPM (1 GPM) | 30 LPM (8 GPM) |
| 1/2" | 5.7 LPM (1-1/2 GPM) | 45 LPM (12 GPM) |
| 3/4" | 7.6 LPM (2 GPM) | 68 LPM (18 GPM) |
| 1" | 11 LPM (3 GPM) | 102 LPM (27 GPM) |
| 1-1/2" | 23 LPM (6 GPM) | 227 LPM (60 GPM) |

Pressure drop at maximum rated flow is less than 100 PSID on all sizes.

## Ordering Information

| Nominal Size | Port Type | |
|---|---|---|
| | **NPT P/N** | **SAE P/N** |
| 1/4" | AVF-1/4-S28 | AVF-106-S28 |
| 3/8" | AVF-3/8-S28 | AVF-108-S28 |
| 1/2" | AVF-1/2-S28 | AVF-110-S28 |
| 3/4" | AVF-3/4-S28 | AVF-112-S28 |
| 1" | AVF-1-S28 | AVF-116-S28 |
| 1-1/2" | AVF-1 1/2-S28 | AVF-124-S28 |

## Operation

Series AVF adjustable velocity fuse is a normally open, in-line valve. Under normal conditions, a spring holds the fuse poppet off its seat.

### Flow Path

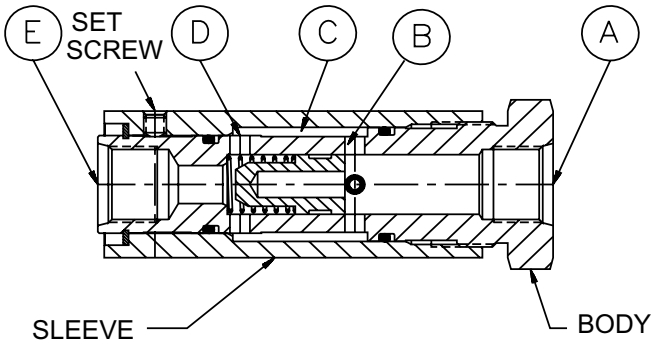
Flow enters the fuse at the flanged inlet port (A). Before reaching the poppet, a series of radial holes (B) in the body directs flow from the body core into an annular cavity (C) between the body and the adjusting sleeve. Flow is directed axially between the body and sleeve until it reaches another series of radial holes (D) at the poppet seat. Flow is then directed back into the body core through the seat and out the fuse outlet port (E).

### Making Adjustments

External adjustments of the sleeve reduce the “free” area of the radial holes (D). This reduction in area creates an increase in flow velocity, resulting in a higher pressure drop. When the pressure drop exceeds the spring force holding the poppet open, the inlet pressure will force the poppet against its seat, effectively closing the fuse.

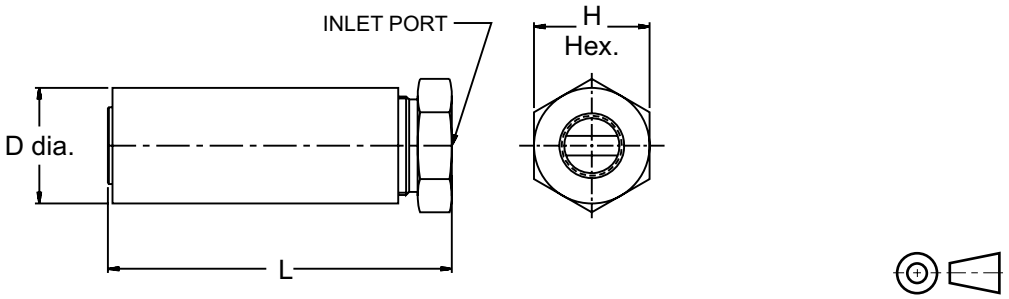
### Line Rupture Shut-Off

The sleeve can be adjusted such that, at normal flows, the fuse will remain open but increased flow rates (such as caused by downstream line rupture) will result in a rapid closing of the fuse. The fuse will remain closed until the inlet pressure is eliminated or the downstream pressure is equalized with the inlet.




## Dimensions

Inch equivalents for millimeter dimensions are shown in (**)




| Nominal Size | L mm - (in) | D mm - (in) | H mm - (in) | Weight kg - (lbs.) |
|---|---|---|---|---|
| 1/4" | 90 (3.56) | 29 (1.13) | 29 (1.13) | 0.36 (0.8) |
| 3/8" | 108 (4.25) | 33 (1.31) | 33 (1.31) | 0.54 (1.2) |
| 1/2" | 128 (5.02) | 43 (1.69) | 43 (1.69) | 1.1 (2.4) |
| 3/4" | 143 (5.62) | 51 (2.0) | 51 (2.0) | 1.7 (3.8) |
| 1" | 168 (6.62) | 61 (2.38) | 61 (2.38) | 2.8 (6.1) |
| 1-1/2" | 221 (8.69) | 76 (3.0) | 76 (3.0) | 5.3 (11.6) |

## Conventional Fuse

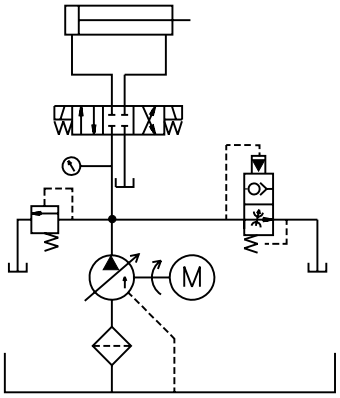
- Closing flow must be calculated
- Calculation error results in unusable valve
- System changes make valve unusable
- “Matched” fuses are very expensive
- Special order to meet requirements

## AVF Series Adjustable Velocity Fuse

- No calculations required
- Correct size always supplied
- Simple re-adjustment
- Minor adjustment only
- Stocked by pipe size

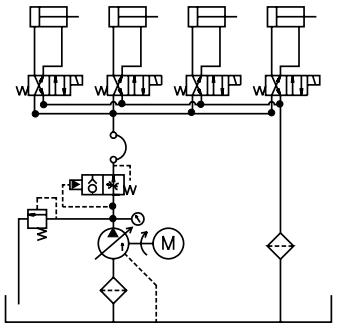
## Pump/System Air Bleed

When starting a pump under load, the blocked port resists flow, and more torque is required from the prime mover. This condition may cause an electric motor to draw higher “pull-up current,” or may cause a combustion engine powered pump to stall. The velocity fuse is normally open and when tied into the tank, it will provide an open, load free path to tank when the pump first starts. As the pump nears operating speed, the resulting flow will cause the fuse to close, directing all flow into the primary circuit.



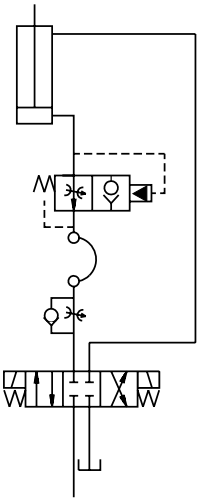

## Main Pressure Line from Pump to Manifold

A line rupture in a central power unit would allow fluid to be pumped out through the broken line. The loss of oil can be expensive to clean up, dispose of, and replace; plus it must be done in accordance with EPA regulations. Ruptured lines may cause physical damage or the release of oil into a flammable area. A velocity fuse closes down flow when failure of a line occurs and eliminates these problems.




## Cylinder/Actuator Shut-Off

A line rupture that occurs when a cylinder is supporting a load allows the load to fall unrestricted. A velocity fuse installed at the cylinder port will shut off flow and prevent the load from falling in the event of a hose or tubing failure.



## General Description

Series AVF (Pneumatic) adjustable velocity fuses are designed to provide automatic air line shut-off if a line should rupture or break. The use of fuses limits the possibility of personal injury or damage to equipment from whipping hoses. The fuses are field adjustable for easy setup and operation. A set screw in the body allows the selected setting to be locked.

## Features

- Provides automatic line rupture shut-off.
- Limits runaway conditions.
- Eliminates hose whip.
- Air or water compatible.

## Benefits

- Eliminates “line whip.” No injury or damage possible.
- Limits runaway conditions. Load will stay in place after break.
- Precise sizing not required. Each valve has an adjustable flow range.
- Simple readjustments. Turn barrel to reset.
- Setting may be locked.
- Four sizes available.
- Resets quickly after line repair. Pressurize downstream line.

## Specifications

| | | |
|---|---|---|
| **Service Application** | Pneumatic | |
| **Maximum Operating Pressure** | 136 Bar (2000 PSI) | |
| **Material** | Body, Sleeve, | Brass |
| | Poppet, Roll Pin Spring | Stainless Steel |
| | O-ring | Nitrile |
| | Back-up Ring | PTFE |
| **Operating Temperature** | -27°C to +177°C (-20°F to +350°F) | |
| **Mounting** | Any | |
| **Sizes** | 1/4", 3/8", 1/2" and 3/4" NPT | |

## Ordering Information

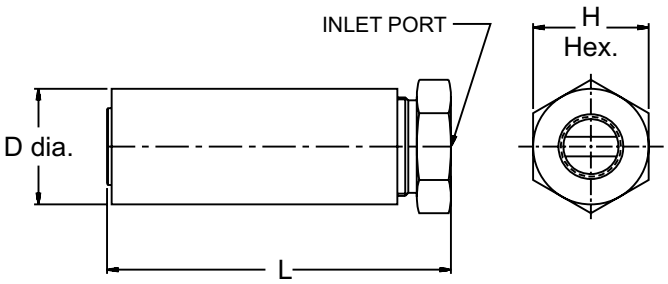
| Series AVF Air Service | |
|---|---|
| **Valve Size** | **Part Number** |
| 1/4" NPT | AVF-1/4-B2 |
| 3/8" NPT | AVF-3/8-B2 |
| 1/2" NPT | AVF-1/2-B2 |
| 3/4" NPT | AVF-3/4-B2 |

## Performance Data

| Valve Size | Series AVF Air Service Closing Flow Adjustment Range | |
|---|---|---|
| | **Minimum** | **Maximum** |
| 1/4" NPT | 5 SCFM | 30 SCFM |
| 3/8" NPT | 5 SCFM | 45 SCFM |
| 1/2" NPT | 10 SCFM | 60 SCFM |
| 3/4" NPT | 10 SCFM | 60 SCFM |

## Dimensions

Inch equivalents for millimeter dimensions are shown in (**)




| Nom. Size | L mm (Inches) | D mm (Inches) | H mm (Inches) | Weight kg (lbs.) |
|---|---|---|---|---|
| 1/4" | 90 (3.56) | 29 (1.13) | 29 (1.13) | 0.36 (0.80) |
| 3/8" | 108 (4.25) | 33 (1.31) | 33 (1.31) | 0.54 (1.20) |
| 1/2" | 128 (5.02) | 43 (1.69) | 43 (1.69) | 1.10 (2.40) |
| 3/4" | 143 (5.62) | 51 (2.00) | 51 (2.00) | 1.70 (3.80) |

## Operation

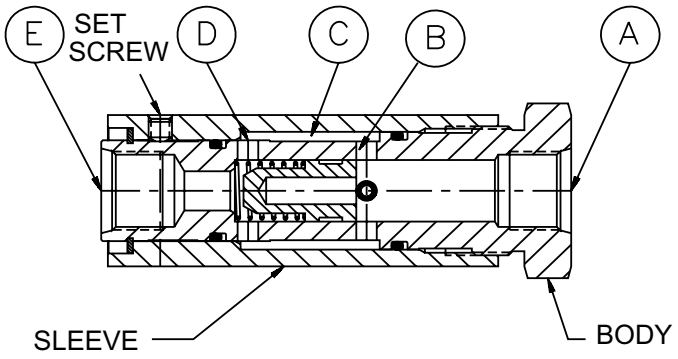
The AVF Series adjustable velocity fuse is a normally open, in-line valve. Under normal conditions, a spring holds the fuse poppet off its seat.

### Flow Path

Flow enters the fuse at the flanged inlet port (A). Before reaching the poppet, a series of radial holes (B) in the body directs flow from the body core into an annular cavity (C) between the body and the adjusting sleeve. Flow is directed axially between the body and sleeve until it reaches another series of radial holes (D) at the poppet seat. Flow is then directed back into the body core through the seat and out the fuse outlet port (E).

### Making Adjustments

External adjustments of the sleeve reduce the “free” area of the radial holes (D). This reduction in area creates an increase in flow velocity, resulting in a higher pressure drop. When the pressure drop exceeds the spring force holding the poppet open, the inlet pressure will force the poppet against its seat, effectively closing the fuse.



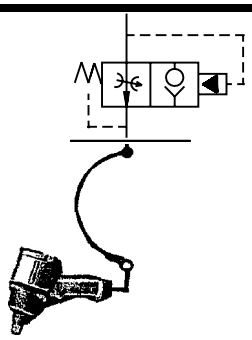

### Line Rupture Shut-Off

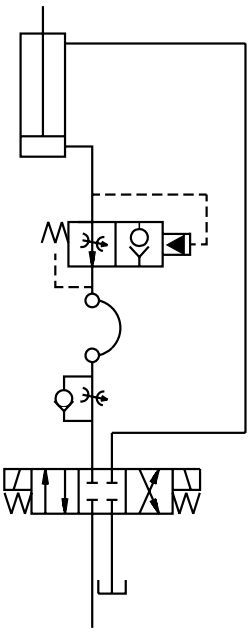
The sleeve can be adjusted such that, at normal flows, the fuse will remain open but increased flow rates (such as caused by downstream line rupture) will result in a rapid closing of the fuse. The fuse will remain closed until the inlet pressure is eliminated or the downstream pressure is equalized with the inlet.

## Applications

### Air Line Drop

A broken air hose may cause a violent whipping action that could cause injury to employees or damage to equipment. A velocity fuse will provide an automatic shut-off of air in case of a broken hose and eliminate this problem.





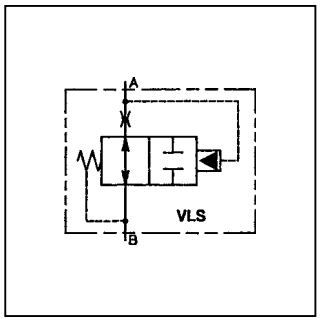
## Cylinder / Actuator Shut-Off

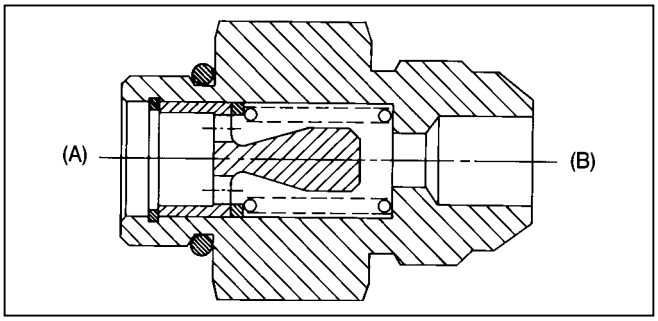
A line rupture that occurs when a cylinder is supporting a load allows the load to fall unrestricted. A velocity fuse installed at the cylinder port will shut off flow and prevent the load from falling in the event of a hose or tube failure.

## General Description

Series VLS velocity check valves protect your hydraulic system in the event of line rupture. These valves return to the open position once the pressure is equalized.

Series VLS valve is a flow sensing, hydraulic check. Flow will pass through the check until the designated closing flow is reached. Then the check will close, stopping further flow.




## Features

- Up to 207 Bar (3,000 PSI), 0.01 to 23.8 LPM (0.5 to 90 GPM)

## Specifications

| | |
|---|---|
| **Maximum Operating Pressure** | 207 Bar (3000 PSI) |
| **Normal Closing Flow** | To be based on a nominal 3.5 Bar (50 PSI) with 150 SUS oil |
| **Leakage After Closing** | 10 DPM maximum |
| **Reverse Flow** | Not to exceed 150% of specified closing flow |
| **Fluid Recommended** | Premium grade hydraulic fluid with viscosity of 10cSt (60 SUS) to 216 cSt (1000 SUS) at operating temperature. |

| | |
|---|---|
| **Operating Temperature** | Under normal conditions of continuous operation, fluid temperature should not exceed -82°C (180° F). In no instance should the temperature exceed 93°C (200°F). |
| **Torque Required for Installation** | See chart |
| **Material** | All steel |
| **Seals** | Nitrile standard. For other seal compounds, consult factory |
| **Mounting** | Not restricted |

| VLS | — | | M | | — | | M | | — | |
|---|---|---|---|---|---|---|---|---|---|---|
| Velocity Fuse | | Inlet Porting | Male Thread | Port Type | | Outlet Porting | Male Thread | Port Type | | Fusing Flow |

| Code | Size |
|---|---|
| 50 | 1/2" NPTF |
| 06 | SAE -6 |
| 08 | SAE -8 |
| 10 | SAE -10 |
| 12 | SAE -12 |

| Code | Type |
|---|---|
| 1 | NPTF |
| 2 | SAE |

| Code | Size |
|---|---|
| 50 | 1/2" NPTF |
| 06 | SAE -6 |
| 08 | SAE -8 |
| 10 | SAE -10 |
| 12 | SAE -12 |

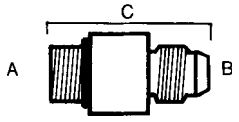
| Code | Type |
|---|---|
| 1 | NPTF |
| 2 | SAE |
| 3 | JIC |
| 4 | ORS |

| Code | Flow* |
|---|---|
| 0.8 | 3.0 LPM (0.8 GPM) |
| 1.5 | 5.7 LPM (1.5 GPM) |
| 2.0 | 7.6 LPM (2.0 GPM) |
| 3.0 | 11.4 LPM (3.0 GPM) |
| 6.0 | 22.7 LPM (6.0 GPM) |
| 7.0 | 26.5 LPM (7.0 GPM) |
| 10 | 37.9 LPM (10 GPM) |
| 22 | 83.3 LPM (22 GPM) |

| VLS Flow Chart | |
|---|---|
| **Max Flow** | **Models** |
| 26.5 LPM (7 GPM) | 06M2-06M3 |
| 37.9 LPM (10 GPM) | 08M2-08M3<br>10M2-08M4 |
| 45.4 LPM (12 GPM) | 10M2-10M3 |
| 56.8 LPM (15 GPM) | 50M1-50M1 |
| 90.8 LPM (24 GPM) | 12M2-12M3 |

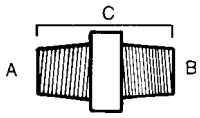
Inch equivalents for millimeter dimensions are shown in (**)

SAE TO JIC
MALE TO MALE



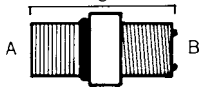

| A (In.) | B (In.) | C (In.) | C (mm) | Hex (In.) | Hex (mm) | Part Number | Recommended Installation Torque* (In Lb. Ft.) In Aluminum | In Steel |
|---|---|---|---|---|---|---|---|---|
| 3/8 | 3/8 | 1.30 | (33.0) | 11/16 | (17.5) | VLS-06M2-06M3-** | 85-100 | 13-16 |
| 1/2 | 1/2 | 2.25 | (57.2) | 7/8 | (22.2) | VLS-08M2-08M3-** | 15-20 | 25-33 |
| 5/8 | 5/8 | 2.06 | (52.3) | 1 | (25.4) | VLS-10M2-10M3-** | 25-30 | 42-50 |
| 3/4 | 3/4 | 1.97 | (50.0) | 1 1/4 | (31.8) | VLS-12M2-12M3-** | 35-40 | 55-65 |

NPT TO NPT
MALE TO MALE




| A (In.) | B (In.) | C (In.) | C (mm) | Hex (In.) | Hex (mm) | Part Number | Recommended Installation Torque* (In Lb. Ft.) In Aluminum | In Steel |
|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | 1.90 | (48.4) | 7/8 | (22.2) | VLS-50M1-50M1-** | 55-60 | 85-90 |

SAE TO ORS
MALE TO MALE




| A (In.) | B (In.) | C (In.) | C (mm) | Hex (In.) | Hex (mm) | Part Number | Recommended Installation Torque* (In Lb. Ft.) In Aluminum | In Steel |
|---|---|---|---|---|---|---|---|---|
| 3/8 | 3/8 | 1.25 | (31.8) | 3/4 | (19.1) | VLS-06M2-06M4-** | 85-100 | 13-16 |
| 5/8 | 1/2 | 2.10 | (53.3) | 1 | (25.4) | VLS-10M2-08M4-** | 25-30 | 42-50 |

## General Description

Series C check valves permit free flow in one direction, and dependable shut-off in the reverse direction.

## Operation

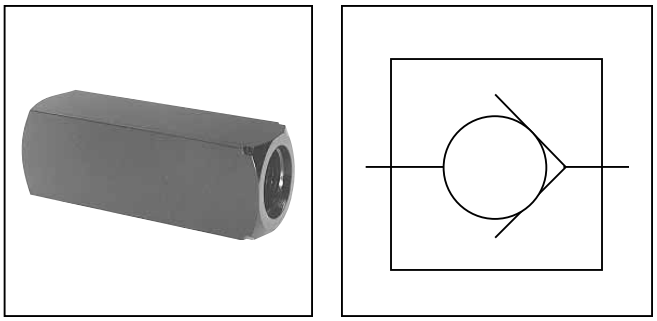
When pressure going through the valve is increased to the cracking level, the valve opens. When the pressure is reduced to below the cracking level, the valve closes.

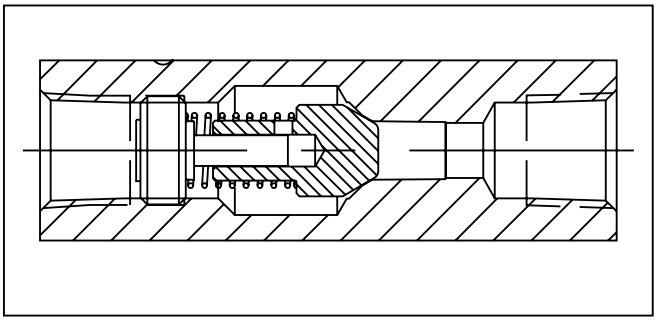
## Features

- Stainless steel poppets standard.
- Soft seal poppets are available.
- Triangular retainers guide the poppets, and hold the spring firmly in place even under high velocity and shock.

## Specifications

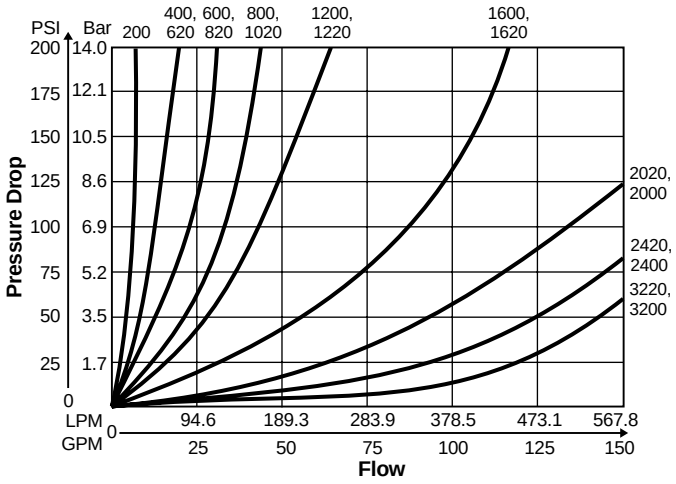
| | | |
|---|---|---|
| **Maximum Operating Pressure** | Brass: | 140 Bar (2000 PSI); except for C1600 brass which is 35 Bar (500 PSI) |
| | Steel & Stainless Steel: | 345 Bar (5000 PSI) for 200 thru 1220; 207 Bar (3000 PSI) for all other sizes and styles |
| **Material** | Body | see ordering code |
| | Spring | 316 Stainless Steel |
| | Poppet | 416 Stainless Steel |
| | Retainer | 416 Stainless Steel |
| | Stainless Steel Bodies | 303 Stainless Steel |
| **Poppets** | Soft seal poppet is standard for 200 through 800/1020 size.<br>For cracking pressures > 15 PSI, solid metal poppets are standard | |
| **Nominal Cracking Pressure** | 0.4 Bar (5 PSI) standard<br>0.07 Bar (1 PSI), 1.38 Bar (20 PSI), 4.48 Bar (65 PSI) optional | |
| **Operating Temperature** | -40°C to +121°C (-40°F to +250°F) Nitrile (standard)<br>-26°C to +205°C (-15°F to +400°F) Fluorocarbon | |





## Performance Curves

**Controlled Flow vs. Pressure Drop**
Free Flow 0.3 Bar (5 PSI) Cracking
100 SSU, Hydraulic Oil



Options | Series C | Size | Material | Cracking Pressure (nominal) | Seal Compound | Design Series

NOTE: Not required when ordering.

| Code | Description |
|---|---|
| Omit | NPTF/SAE |
| ★ 8 | BSPT |
| ★★ 9 | BSPP |

★ Code 8 can be used with sizes 200, 400, 600, 800, 1200 Steel only

★★ Code 9 can be used with sizes 200, 400, 600, 800, 1200, 1600, 2000, 2400, 3200

| Code | Size | Code | Size |
|---|---|---|---|
| 200 * | 1/8" | 1600 * | 1" |
| 400 *† | 1/4" | 1620 | #16 SAE |
| 600 *† | 3/8" | 2000 | 1 1/4" |
| 620 | #6 SAE | 2020 | #20 SAE |
| 800 *† | 1/2" | 2400 | 1 1/2" |
| 820 | #8 SAE | 2420 | #24 SAE |
| 1020 | #10 SAE | 3200 | 2" |
| 1200 * | 3/4" | 3220 | #32 SAE |
| 1220 * | #12 SAE | | |

* Sizes available in Brass

† Sizes available in Stainless Steel

| Code | Description |
|---|---|
| B | Brass |
| S | Steel |
| SS * | Stainless Steel |

Series C Brass Valves can be used for both air and oil service.

* Available in 400, 600 and 800 sizes.

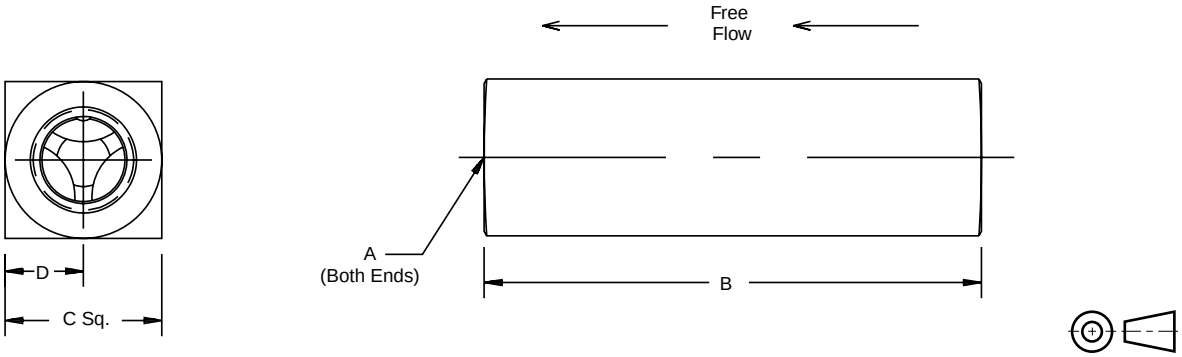
| Code | Description |
|---|---|
| Omit | Standard 0.4 Bar (5 PSI) |
| 1 | 0.07 Bar (1 PSI) |
| 20 | 1.38 Bar (20 PSI) |
| 65 | 4.5 Bar (65 PSI) |

Other cracking pressures available.

| Code | Description |
|---|---|
| Omit | Nitrile (Standard) |
| V | Fluorocarbon |

| Model Number | Max Flow LPM (GPM) | Effective Orifice Area Control Flow $in.^2$ | Effective Control Flow $C_v$ |
|---|---|---|---|
| C200 | 15 (3) | 0.023 | 0.53 |
| C400 | 23 (5) | 0.068 | 1.56 |
| C620 | 23 (5) | 0.068 | 1.56 |
| C600 | 30 (8) | 0.099 | 2.27 |
| C820 | 30 (8) | 0.099 | 2.27 |
| C800 | 45 (15) | 0.224 | 5.11 |
| C1020 | 45 (15) | 0.224 | 5.11 |
| C1200 | 100 (25) | 0.348 | 7.95 |
| C1220 | 100 (25) | 0.348 | 7.95 |
| C1600 | 150 (40) | 0.453 | 10.35 |
| C1620 | 150 (40) | 0.453 | 10.35 |
| C2000 | 284 (70) | 0.855 | 19.52 |
| C2020 | 284 (70) | 0.855 | 19.52 |
| C2400 | 378 (100) | 0.955 | 21.82 |
| C2420 | 378 (100) | 0.955 | 21.82 |
| C3200 | 605 (150) | 1.046 | 23.90 |
| C3220 | 605 (150) | 1.046 | 23.90 |

Inch equivalents for millimeter dimensions are shown in (**)




| Model Number | Weight kg (lbs.) | A | B | C | D |
|---|---|---|---|---|---|
| **C200** | 0.0 (0.1) | 1/8–27 NPTF | 50.8 (2.00) | 16.0 (0.63) | 7.9. (0.31) |
| **C400** | 0.2 (0.4) | 1/4–18 NPTF | 66.8 (2.63) | 20.6 (0.81) | 10.4 (0.41) |
| **C420** | 0.0 (0.1) | 7/16–20 UNF #4 SAE | 68.3 (2.69) | 20.6 (0.81) | 10.4 (0.41) |
| **C600** | 0.2 (0.5) | 3/8–18 NPTF | 69.9 (2.75) | 25.4 (1.00) | 12.7 (0.50) |
| **C620** | 0.2 (0.5) | 9/16–18 UNF #6 SAE | 79.2 (3.12) | 25.4 (1.00) | 12.7 (0.50) |
| **C800** | 0.6 (1.3) | 1/2–14 NPTF | 87.4 (3.44) | 31.8 (1.25) | 16.0 (0.63) |
| **C820** | 0.3 (0.7) | 3/4–16 UNF #8 SAE | 88.9 (3.50) | 28.4 (1.12) | 14.2 (0.56) |
| **C1020** | 0.6 (1.3) | 7/8–14 UNF #10 SAE | 101.6 (4.00) | 31.8 (1.25) | 15.7 (0.62) |
| **C1200** | 0.9 (2.0) | 3/4–14 NPTF | 98.6 (3.88) | 38.1 (1.50) | 19.1 (0.75) |
| **C1220** | 0.9 (2.0) | 1 1/6–12 UN #12 SAE | 117.3 (4.62) | 38.1 (1.50) | 19.1 (0.75) |
| **C1600** | 1.5 (3.3) | 1–11 1/2 NPTF | 127.0 (5.00) | 44.5 (1.75) | 22.4 (0.88) |
| **C1620** | 1.5 (3.3) | 1 5/16–12 UN #16 SAE | 142.7 (5.62) | 57.2 (2.25) | 28.4 (1.12) |
| **C2000** | 2.8 (6.2) | 1 1/4–11 1/2 NPTF | 143.0 (5.63) | 57.2 (2.25) | 28.7 (1.13) |
| **C2020** | 2.8 (6.2) | 1 5/8–12 UN #20 SAE | 165.1 (6.50) | 69.9 (2.75) | 35.1 (1.38) |
| **C2400** | 3.8 (8.4) | 1 1/2–11 1/2 NPTF | 143.0 (5.63) | 69.9 (2.75) | 35.1 (1.38) |
| **C2420** | 3.8 (8.4) | 1 7/8–12 UN #24 SAE | 184.2 (7.25) | 76.2 (3.00) | 38.1 (1.50) |
| **C3200** | 7.0 (15.4) | 2–11 1/2 NPTF | 165.1 (6.50) | 88.9 (3.50) | 44.5 (1.75) |
| **C3220** | 7.0 (15.4) | 2 1/2–12 UN #32 SAE | 228.6 (9.00) | 101.6 (4.00) | 50.8 (2.00) |

## General Description

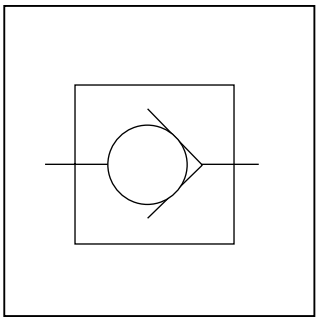
Series 6C check valves provide free flow in one direction and dependable shut-off in the reverse direction.

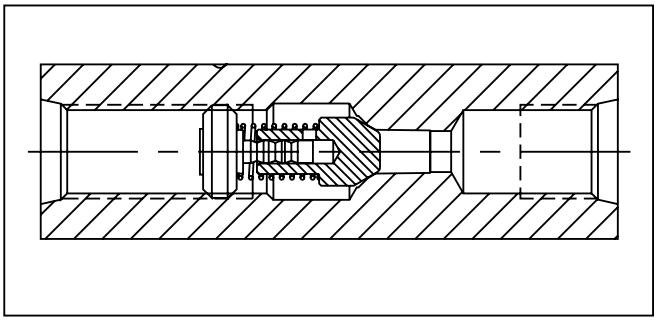
## Operation

When pressure going through the valve is increased to the cracking level, the valve opens. When the pressure is reduced to below the cracking level, the valve closes.

## Features

- Meets ISO 6149 standards.
- Hard metric dimensions.
- Reliable leak-free performance — straight thread port with o-ring sealing.
- Global interchangeablility.



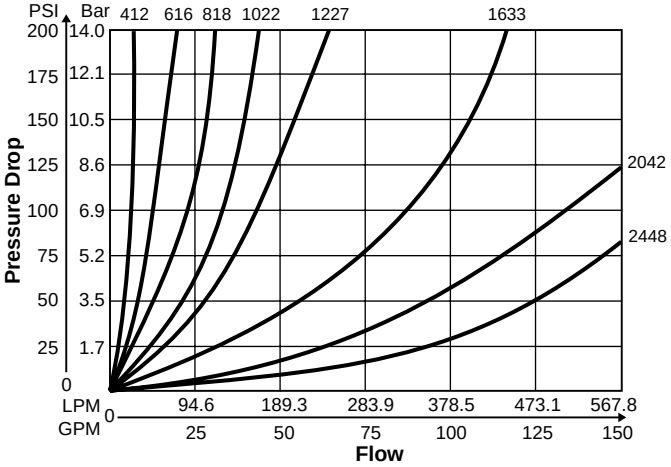


## Specifications

| | |
|---|---|
| **Maximum Operating Pressure** | 345 Bar (5000 PSI) |
| **Maximum Flow** | M12 x 1.5 11 LPM (3 GPM)<br>M16 x 1.5 19 LPM (5 GPM)<br>M18 x 1.5 30 LPM (8 GPM)<br>M22 x 1.5 57 LPM (15 GPM)<br>M27 x 2.0 95 LPM (25 GPM)<br>M33 x 2.0 151 LPM (40 GPM)<br>M42 x 2.0 265 LPM (70 GPM)<br>M48 x 2.0 379 LPM (100 GPM) |
| **Cracking Pressure** | Standard: 0.3 Bar (5 PSI)<br>Optional: 0.1 Bar (1 PSI)<br>4.5 Bar (65 PSI) |
| **Material** | Body ASTM 12L14 Carbon Steel<br>Poppet ASTM 416 Stainless Steel<br>Retainer ASTM 416 Stainless Steel<br>Spring ASTM 316 Stainless Steel |
| **Seals** | Standard: Nitrile<br>Optional: Fluorocarbon |

## Performance Curves

**Controlled Flow vs. Pressure Drop**
Free Flow 0.3 Bar (5 PSI) Cracking
100 SSU, Hydraulic Oil



## Ordering Information

| 6 | C | | S | |
|---|---|---|---|---|
| Ports | Style | Size | Material | Design Series |

NOTE: Not required when ordering.

| Code | Description |
|---|---|
| 6 | ISO 6149 ports |

| Code | Description |
|---|---|
| C | Check Valve |

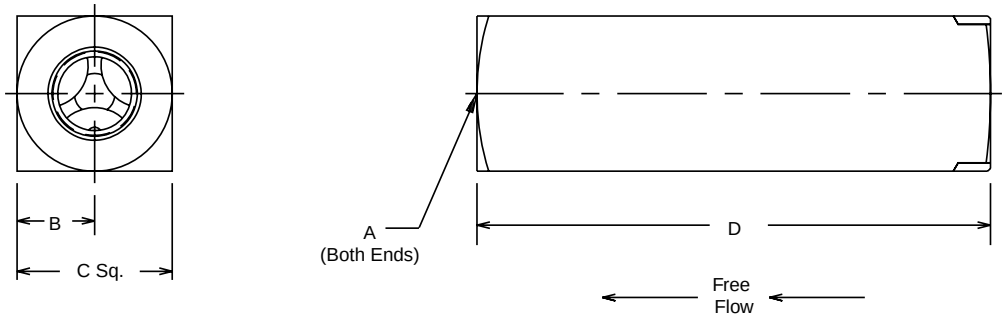
| Code | Ratio |
|---|---|
| 412 | M12 X 1.5 |
| 616 | M16 x 1.5 |
| 818 | M18 x 1.5 |
| 1022 | M22 x 1.5 |
| 1227 | M27 x 2.0 |
| 1633 | M33 x 2.0 |
| 2042 | M42 x 2.0 |
| 2448 | M48 x 2.0 |

| Code | Description |
|---|---|
| S | Steel |

| Model Number | Weight kg (lbs.) |
|---|---|
| 6C412 | 0.1 (0.3 ) |
| 6C616 | 0.2 (0.5 ) |
| 6C818 | 0.3 (0.7 ) |
| 6C1022 | 0.6 (1.3 ) |
| 6C1227 | 0.9 (2.0 ) |
| 6C1633 | 1.5 (3.3 ) |
| 6C2042 | 2.8 (6.2 ) |
| 6C2448 | 3.8 (8.4 ) |

## Dimensions

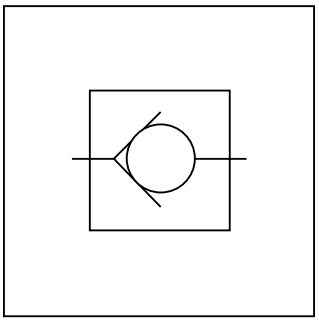
Inch equivalents for millimeter dimensions are shown in (**)




| Model Number | Weight kg (lbs.) | A | B | C | D |
|---|---|---|---|---|---|
| **6C412** | 0.1 (0.3) | M12 x 1.5 | 10.4 (0.41) | 20.6 (0.81) | 68.3 (2.69) |
| **6C616** | 0.2 (0.5) | M16 x 1.5 | 12.7 (0.50) | 25.4 (1.00) | 79.2 (3.12) |
| **6C818** | 0.3 (0.7) | M18 x 1.5 | 14.2 (0.56) | 28.4 (1.12) | 88.9 (3.50) |
| **6C1022** | 0.6 (1.3) | M22 x 1.5 | 15.7 (0.62) | 31.8 (1.25) | 101.6 (4.00) |
| **6C1227** | 0.9 (2.0) | M27 x 2.0 | 19.1 (0.75) | 38.1 (1.50) | 117.3 (4.62) |
| **6C1633** | 1.5 (3.3) | M33 x 2.0 | 22.4 (0.88) | 44.5 (1.75) | 127.0 (5.00) |
| **6C2042** | 2.8 (6.2) | M42 x 2.0 | 28.7 (1.13) | 57.2 (2.25) | 132.8 (5.23) |
| **6C2448** | 3.8 (8.4) | M48 x 2.0 | 35.1 (1.38) | 69.9 (2.75) | 143.0 (5.63) |

## General Description

Series VCL check valves operate at free flow in one direction. Reverse flow is blocked.

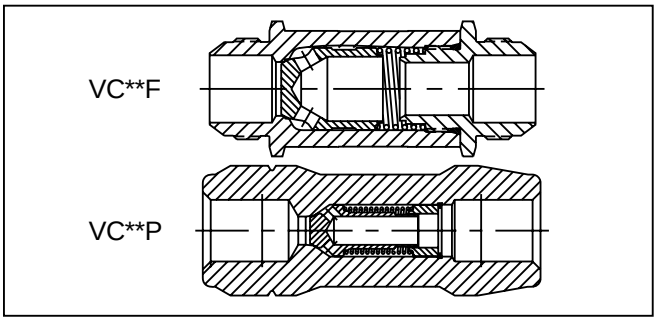


## Operation

The spring keeps the poppet closed until the valve reaches the preset pressure. The valve stays open until the pressure goes below the spring setting.

## Features

- Available in a wide variety of crack pressures.
- Poppet spring is isolated from liquid flow stream minimizing turbulence.
- Close tolerance fit between poppet and poppet retainer creates a cushion that protects valve from surge shock damage.




## Specifications

### Models VCL*P (female pipe to female pipe)

| Valve Model | Max. Oper. Press. Bar (PSI) | Material | Rated Flow LPM (GPM) | Cracking Press. ΔP Bar (PSI) | Total ΔP Bar (PSI) | Port Size |
|---|---|---|---|---|---|---|
| VCL4P5 | 207 (3000) | Steel† | 23 (5) | 0.3 (5) | 0.6 (8.3) | 1/4 NPSF |
| VCL4P65 | 207 (3000) | Steel† | 23 (5) | 4.5 (65) | 5.0 (72.5) | 1/4 NPSF |
| VCL6P5 | 207 (3000) | Steel† | 30 (8) | 0.3 (5) | 0.4 (6.0) | 3/8 NPSF |
| VCL6P65 | 207 (3000) | Steel† | 30 (8) | 4.5 (65) | 4.6 (66.0) | 3/8 NPSF |
| VCL8P5 | 207 (3000) | Steel† | 45 (15) | 0.3 (5) | 0.5 (7.2) | 1/2 NPSF |
| VCL8P65 | 207 (3000) | Steel† | 45 (15) | 4.5 (65) | 4.6 (66.0) | 1/2 NPSF |
| VCL12P5 | 207 (3000) | Steel† | 100 (25) | 0.3 (5) | 0.8 (11.0) | 3/4 NPSF |
| VCL12P65 | 207 (3000) | Steel† | 100 (25) | 4.5 (65) | 4.6 (67.0) | 3/4 NPSF |
| VCL16P5 | 207 (3000) | Steel† | 133 (35) | 0.3 (5) | 0.4 (5.3) | 1 NPSF |
| VCL16P65 | 207 (3000) | Steel† | 133 (35) | 4.5 (65) | 4.6 (66.0) | 1 NPSF |
| VCL20P5 | 207 (3000) | Steel† | 189 (50) | 0.3 (5) | 1.1 (15.9) | 1-1/4 NPSF |
| VCL20P65 | 207 (3000) | Steel† | 189 (50) | 4.5 (65) | 5.4 (78.0) | 1-1/4 NPSF |

* Available in “L” or “R” Style.
† All steel construction with zinc chromate plating.

### Models VCL*F (male 37° flare to male 37°)

| Valve Model | Max. Oper. Press. Bar (PSI) | Material | Seals | Rated Flow LPM (GPM) | Cracking Press. ΔP Bar (PSI) | Total ΔP Bar (PSI) | Port Size |
|---|---|---|---|---|---|---|---|
| VCL6F5 | 207 (3000) | Steel† | Nitrile O-Rings | 23 (5) | 0.3 (5) | 0.6 (8.3) | 9/16-18 UNF |
| VCL6F65 | 207 (3000) | Steel† | Nitrile O-Rings | 23 (5) | 4.5 (65) | 5.0 (72.5) | (SAE 6) |
| VCL8F5 | 207 (3000) | Steel† | Nitrile O-Rings | 30 (8) | 0.3 (5) | 0.4 (6.0) | 3/4-16 UNF |
| VCL8F65 | 207 (3000) | Steel† | Nitrile O-Rings | 30 (8) | 4.5 (65) | 4.6 (66.0) | (SAE 8) |
| VCL10F5 | 207 (3000) | Steel† | Nitrile O-Rings | 45 (15) | 0.3 (5) | 0.5 (7.2) | 7/8-14 UNF |
| VCL10F65 | 207 (3000) | Steel† | Nitrile O-Rings | 45 (15) | 4.5 (65) | 4.6 (66.0) | (SAE 10) |
| VCL12F5 | 207 (3000) | Steel† | Nitrile O-Rings | 100 (25) | 0.3 (5) | 0.8 (11.0) | 1 1/16-12 UN |
| VCL12F65 | 207 (3000) | Steel† | Nitrile O-Rings | 100 (25) | 4.5 (65) | 4.6 (67.0) | (SAE 12) |
| VCL16F5 | 207 (3000) | Steel† | Nitrile O-Rings | 133 (35) | 0.3 (5) | 0.4 (5.3) | 1 5/16-12 UN |
| VCL16F65 | 207 (3000) | Steel† | Nitrile O-Rings | 133 (35) | 4.5 (65) | 4.6 (66.0) | (SAE 16) |
| VCL20F5 | 207 (3000) | Steel† | Nitrile O-Rings | 189 (50) | 0.3 (5) | 1.1 (15.9) | 1 5/8-12 UN |
| VCL20F65 | 207 (3000) | Steel† | Nitrile O-Rings | 189 (50) | 4.5 (65) | 5.4 (78.0) | (SAE 20) |

* Available in “L” or “R” Style.
† All steel construction with zinc chromate plating.
3300-1.p65, dd



**Parker Hannifin Corporation**
Hydraulic Valve Division
Elyria, Ohio, USA

**VCL** — Series VCL

□ — Size

| Code | Description |
|---|---|
| 4* | 1/4" |
| 6 | 3/8" |
| 8 | 1/2" |
| 10† | 5/8" |
| 12 | 3/4" |
| 16 | 1" |
| 20 | 1 1/4" |

* 37° flare not available in size 4.

† NPTF not available in size 10.

□ — Port Style

| Code | Description |
|---|---|
| F | 37° Flare Tube Both Ends |
| P | NPTF Female Both Ends |

□ — Cracking Pressure

| Code | Description |
|---|---|
| 05 | 0.3 Bar (5 PSI) |
| 65 | 4.5 Bar (65 PSI) |

**A**

□ — Seal Compound*

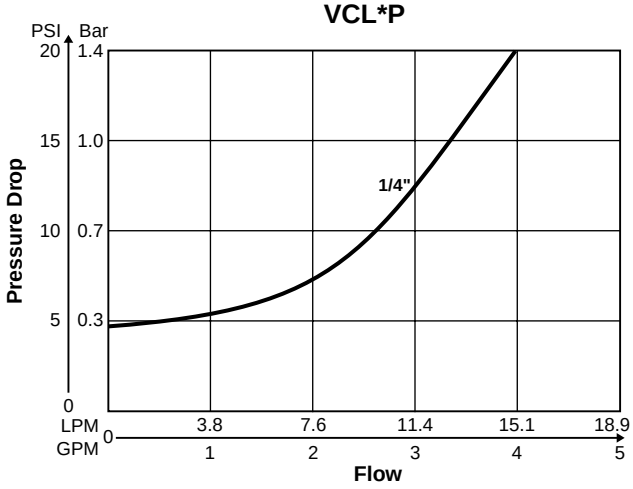
| Code | Description |
|---|---|
| Omit | Nitrile (Standard) |
| V | Fluorocarbon |

* Only available with "F" port style.

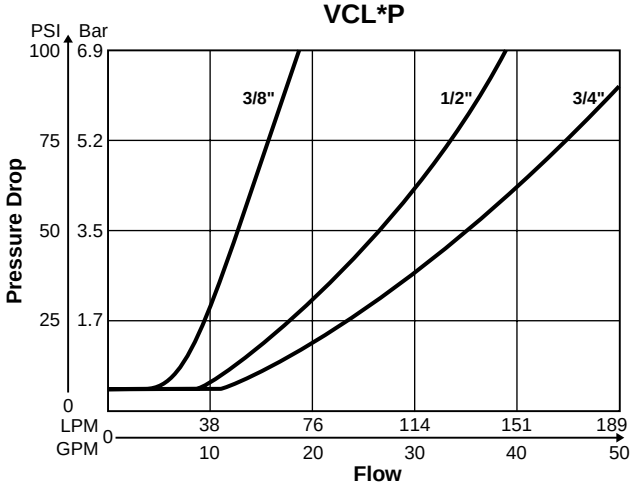
[ ] — Design Series

NOTE: Not required when ordering.

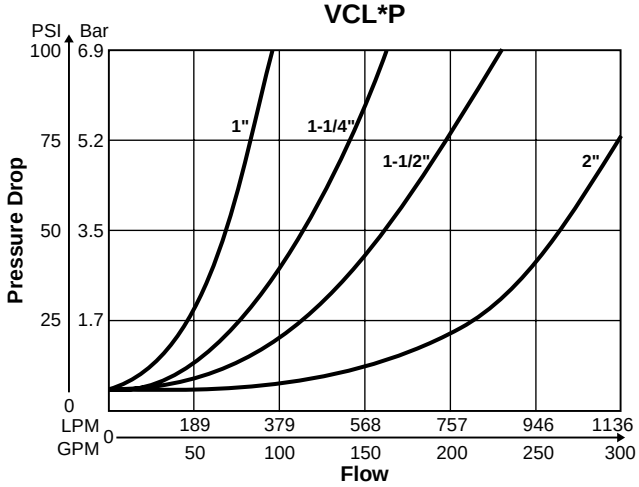
**VCL*P**



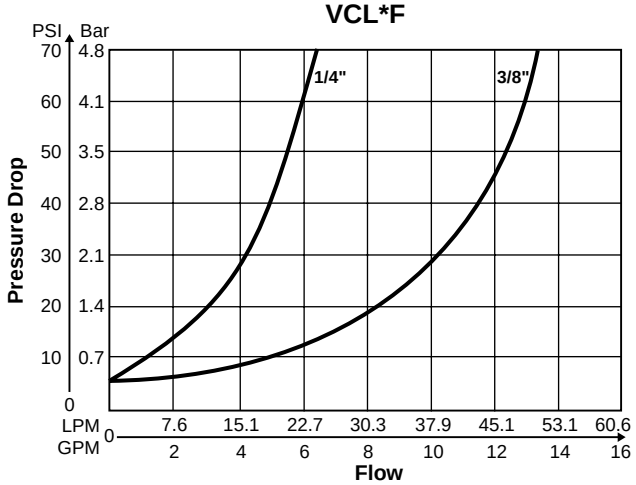

**VCL*P**



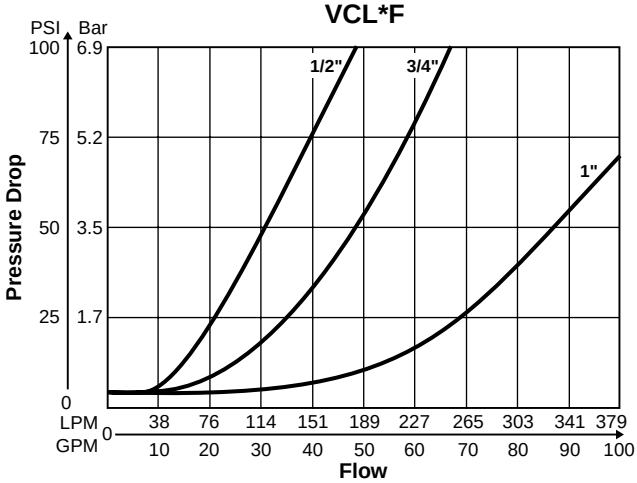

**VCL*P**




**VCL*F**



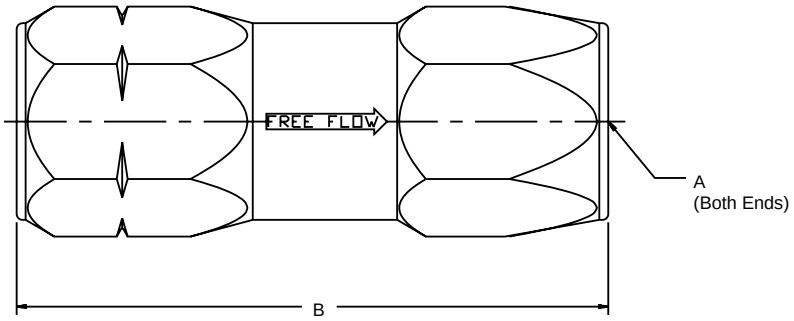

**VCL*F**

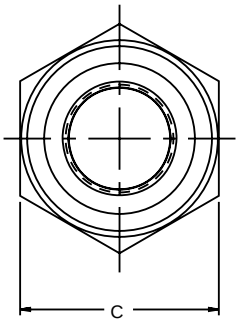



3300-1.p65, dd

Inch equivalents for millimeter dimensions are shown in (**)

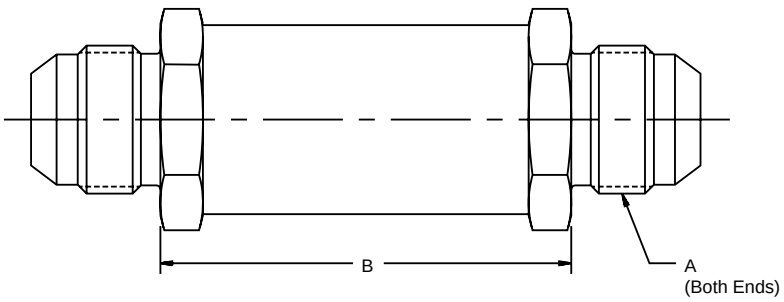
## Models VCL*P

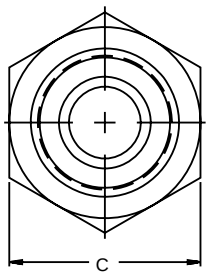


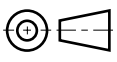

| Valve Model | Weight kg (lbs.) | A | B | C |
|---|---|---|---|---|
| **VC*4P**A** | 0.2 (0.4) | 1/4-1/8 NPSF | 62.0 (2.44) | 20.6 (0.81) |
| **VC*6P**A** | 0.3 (0.7 ) | 3/8-18 NPSF | 69.9 (2.75) | 22.4 (0.88) |
| **VC*8P**A** | 0.4 (0.9 ) | 1/2-14 NPSF | 88.9 (3.50) | 26.9 (1.06) |
| **VC*12P**A** | 0.5 (1.2 ) | 3/4-14 NPSF | 98.6 (3.88) | 34.8 (1.37) |
| **VC*16P**A** | 0.8 (1.8 ) | 1-11 1/2 NPSF | 124.0 (4.88) | 40.6 (1.60) |
| **VC*20P**A** | 2.0 (4.3 ) | 1 1/4-11 1/2 NPSF | 125.0 (4.94) | 50.8 (2.00) |

## Models VCL*F



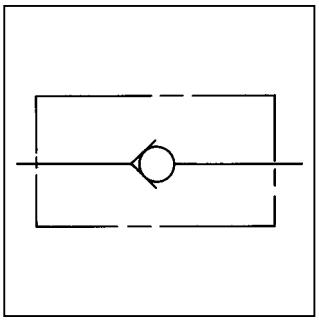



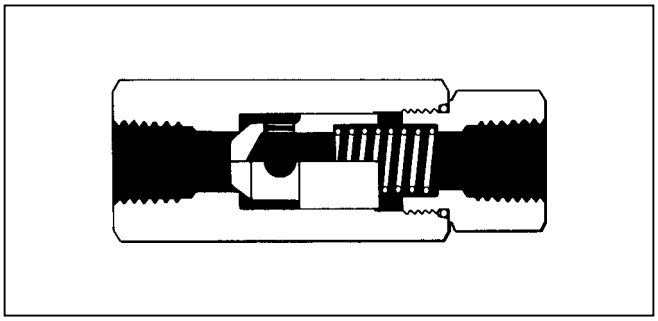

| Valve Model | Weight kg (lbs.) | A | B | C |
|---|---|---|---|---|
| **VC*6F**A** | 0.2 (0.4 ) | 9/16-18 UNF (SAE 6) | 44.5 (1.75) | 20.6 (0.81) |
| **VC*8F**A** | 0.3 (0.7 ) | 3/4-16 UNF (SAE 8) | 56.4 (2.22) | 25.4 (1.00) |
| **VC*10F**A** | 0.4 (0.9 ) | 7/8-14 UNF (SAE 10) | 61.2 (2.41) | 28.4 (1.12) |
| **VC*12F**A** | 0.5 (1.2 ) | 1 1/16-12 UN (SAE 12) | 69.9 (2.75) | 35.1 (1.38) |
| **VC*16F**A** | 0.8 (1.8 ) | 1 15/16-12 UN (SAE 16) | 84.1 (3.31) | 44.1 (1.62) |
| **VC*20F**A** | 2.0 (4.3 ) | 1 5/8-12 UN (SAE 20) | 84.1 (3.31) | 47.8 (1.88) |



## General Description

Series CLS in-line check valves are designed to provide free flow in one direction and a positive check in the opposite direction. They are available with a variety of port types and sizes and may be mounted in any position.



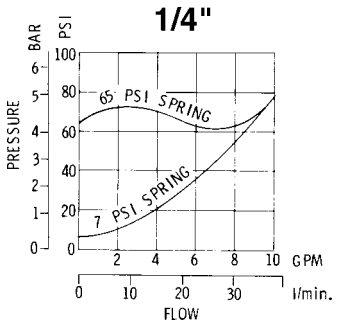
## Specifications

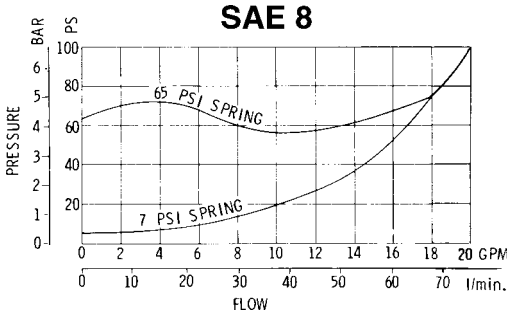
| | |
|---|---|
| **Maximum Operating Pressure** | 207 Bar (3000 PSI) |
| **Flow Rating** | Consult pressure drop data |
| **Fluid Recommended** | Premium grade hydraulic fluid with viscosity of 10cSt (60 SUS) to 216 cSt (1000 SUS) at operating temperature. |
| **Operating Temperature** | Under normal conditions of continuous operation, fluid temperature should not exceed -82°C (180° F). In no instance should the temperature exceed 93°C (200°F). |
| **Material** | All steel |
| **Mounting** | Not restricted |

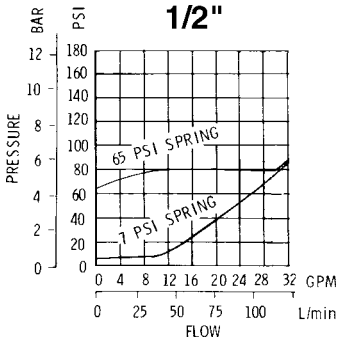
## Features

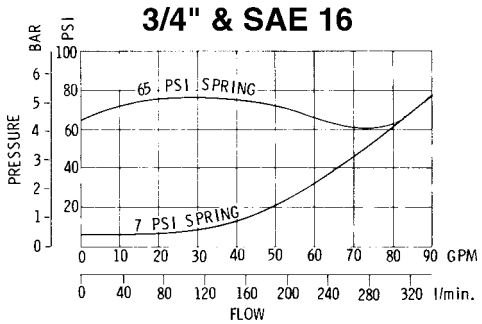
- Up to 3000 PSI (207 Bar)
- 1/4", 1/2", 3/4" NPTF
- #8, #12, #16 SAE

## Performance Curves



## Ordering Information

**CLS** — [ ] — [ ] [ ] [ ]

Check Valve | Port Size | Port Type | Spring Rate | Type

| Code | Size |
|---|---|
| 25 | 1/4" NPTF |
| 50 | 1/2" NPT |
| 75 | 3/4" NPT |
| 08 | SAE 8 |
| 12 | SAE 12 |
| 16 | SAE 16 |

**NOTE:** NPT ports not available on Male type valves.

| Code | Type |
|---|---|
| 1 | NPT |
| 2 | SAE |

| Code | Size |
|---|---|
| 7 | 7 PSI |
| 45 | 45 PSI |
| 65 | 65 PSI |

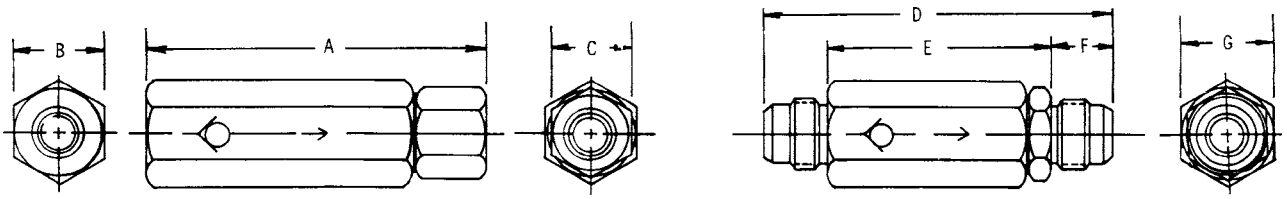
| Code | Type |
|---|---|
| M | Male |
| F | Female |

**Weight** (approx.)

¼″ . . . . . 0.50 lbs. [0,23 kg]
½″ . . . . . 1.00 lbs. [0,45 kg]
¾″ . . . . . 2.88 lbs. [1,30 kg]
SAE 8 . . . . . 1.00 lbs. [0,45 kg]
SAE 12 . . . . . 2.80 lbs. [1,27 kg]
SAE 16 . . . . . 3.00 lbs. [1,36 kg]

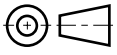
## Dimensions

Millimeter equivalents for inch dimensions are shown in (**)




| VALVE SIZE NPT & FEMALE SAE | A | B | C |
|---|---|---|---|
| 1/4″ | 3.30 ( 83.8) | 0.88 (22.3) | 0.75 (19.1) |
| SAE 8 | 3.66 ( 92.9) | 1.00 (25.4) | 0.88 (22.3) |
| 1/2″ & SAE 10 | 4.50 (114.3) | 1.38 (35.0) | 1.25 (31.7) |
| 3/4″ & SAE 12 | 5.22 (132.6) | 1.75 (44.4) | 1.50 (38.1) |

| VALVE SIZE MALE TUBE | D | E | F | G |
|---|---|---|---|---|
| SAE 12 | 5.30 (134.6) | 3.58 ( 90.9) | 0.86 (21.8) | 1.75 (44.4) |
| SAE 16 | 5.36 (136.1) | 3.54 ( 89.9) | 0.91 (23.1) | 1.75 (44.4) |

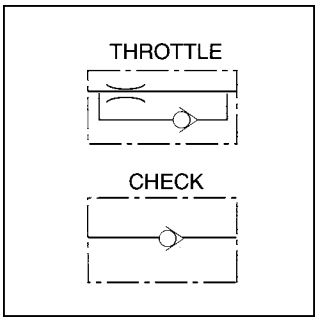


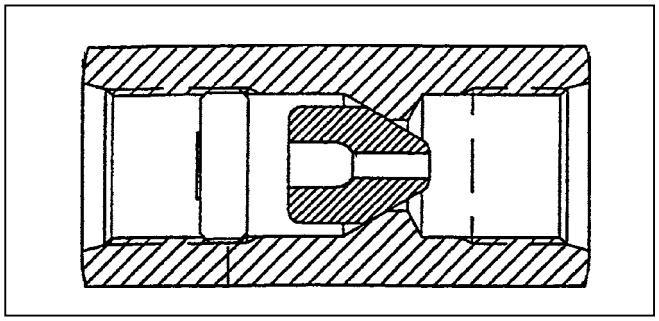
## General Description

Series LT and LTF Valves will operate satisfactorily when installed in any position. These valves may be used as Line Check Valves, permitting full flow of hydraulic oil in one direction only or they may be used as restrictors.

An assortment of restrictors are available. When installed, the valve becomes a Line Throttle Valve permitting free flow of hydraulic oil in one direction and a restricted flow in the opposite direction.

An array of color-coded poppets allows easy and quick identification.



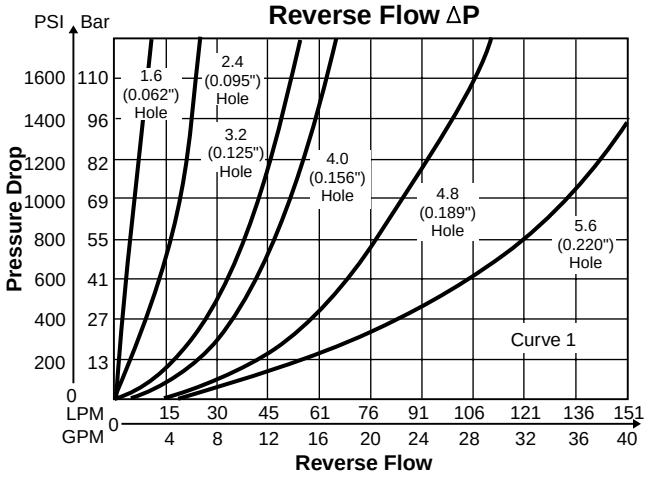
## Features

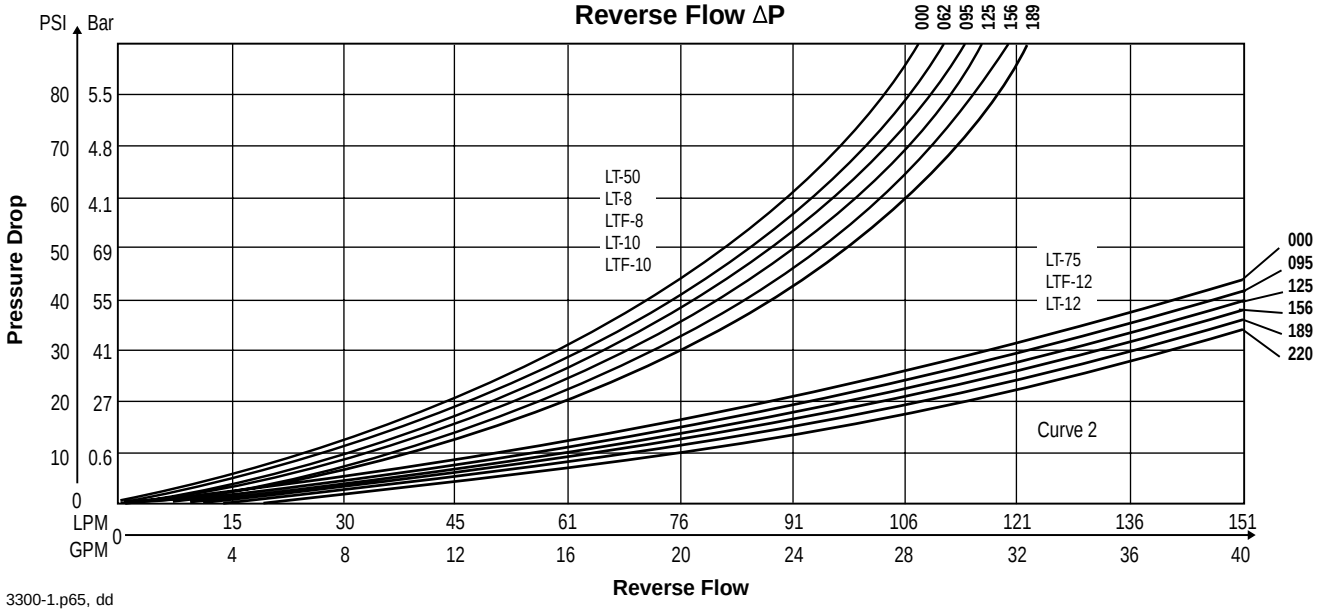
- Accurate control of double-acting cylinder by having both sides of the piston pressurized.
- For improving control of the lowering stroke of a cylinder.
- For preventing cavitation of a cylinder or motor having an inertia load.
- For metering oil flow to a hydraulic motor for proper motor speed.
- For improving control of the extend stroke of a hydraulic cylinder.
- Unidirectional.

## Specifications

| | |
|---|---|
| **Maximum Operating Pressure** | 207 Bar (3000 PSI) |
| **Materials** | Body: Steel/Zinc-plated<br>Poppet: Nylon<br>Retainer: 416 Stainless Steel |
| **Operating Temperature** | -30°C to +100°C (-22°F to +212°F) |

## Performance Curves

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**Parker Hannifin Corporation**
Hydraulic Valve Division
Elyria, Ohio, USA

## Ordering Information

□ — □ — □

Series | Port Size | Throttle and Check Poppets

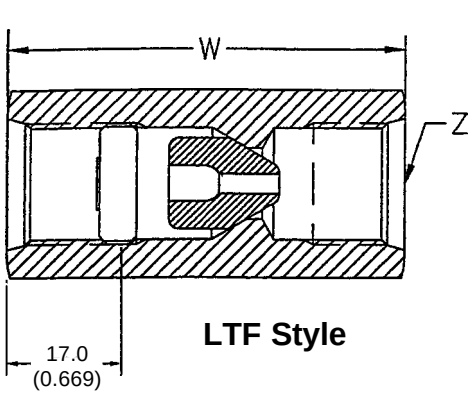
| Code | Series |
|---|---|
| LT | Male-Female Ports |
| LTF | Female-Female Ports |

| Code | Size |
|---|---|
| 8 | 3/4" – 16 UNF-2 |
| 10 | 7/8" – 14 UNF-2 |
| 12 | 1 1/16" – 12 UNF-2 |
| 50 | 1/2" – 14 NPT (LT Only) |
| 75 | 3/4" – 14 NPT (LT Only) |

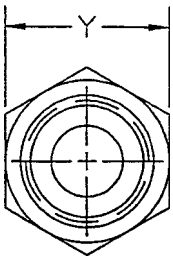
| Poppet Order Symbol | Diameter of Hole in Poppet | | Poppet Color |
|---|---|---|---|
| **For Part Numbers LT-8, LT-10, LT-50, LTF-8, LTF-10** | | | |
| 4 | 1.19 | (.947) | Brown |
| 6 | 1.57 | (.062) | Purple |
| 8 | 1.98 | (.078) | Pink |
| 9 | 2.41 | (.095) | Red |
| 11 | 2.77 | (.109) | Beige |
| 12 | 3.18 | (.125) | Yellow |
| 15 | 3.96 | (.156) | Lt. Green |
| 18 | 4.80 | (.189) | Black |
| 25 | 6.40 | (.252) | Dk. Green |
| 0 | Check (No Hole) | | Beige |
| **For Part Numbers LT-12, LT-75, LTF-12** | | | |
| 180 | 4.80 | (.189) | Black |
| 210 | 5.59 | (.220) | Orange |
| 250 | 6.40 | (.252) | Lt. Blue |
| 00 | Check (No Hole) | | White |

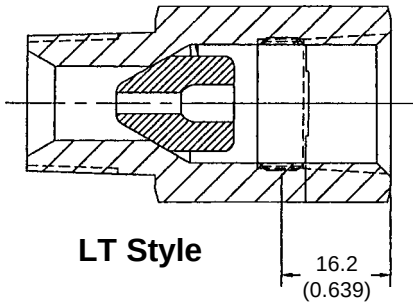
## Dimensions

Inch equivalents for millimeter dimensions are shown in (**)




**LTF Style**




**LT Style**

| Model Number | W Length | Y Hex Size | Z Thread (Both Ends) |
|---|---|---|---|
| **LT-50** | 54.1 (2.13) | 25.4 (1.00) | 1/2" – 14 NPT |
| **LT-8** | 54.1 (2.13) | 25.4 (1.00) | SAE 8 (3/4" – 16 UNF) |
| **LT-10** | 58.7 (2.31) | 28.7 (1.13) | SAE 10 (7/8" – 14 UNF) |
| **LT-12** | 77.7 (3.06) | 35.1 (1.38) | SAE 12 (1 1/16" – 12 UN) |
| **LT-75** | 73.2 (2.88) | 35.1 (1.38) | 3/4" – 14 NPT |
| **LTF-8** | 62.0 (2.44) | 25.4 (1.00) | SAE 8 (3/4" – 16 UNF) |
| **LTF-10** | 68.3 (2.69) | 28.7 (1.13) | SAE 10 (7/8" – 14 UNF) |
| **LTF-12** | 82.6 (3.25) | 35.1 (1.38) | SAE 12 (1 1/16" – 12 UN) |