

FE Series Butterfly Valves

Product Data Sheet



< STANDARDS >



ASTM D1784



ANSI B16.5

IPEX FE Series Butterfly Valves incorporate many features of our industrial FK valve, yet the all PVC construction and EPDM liner make this valve the perfect choice for water and light industrial applications. The special trapezoid shape of the liner and serrated body cavity guarantee a bubble tight seal while keeping break-away torque at an absolute minimum. This versatile valve features double self-lubricating seals, direct actuator mount capability, and the option of either a lever handle or mounted gear box. The FE lever handle includes the EasyFit Labeling system for valve identification. FE Series Butterfly Valves are part of our complete systems of pipe, valves, and fittings, engineered and manufactured to our strict quality, performance, and dimensional standards.

VALVE AVAILABILITY

| | |
|------------------|---|
| Body Material: | PVC |
| Disc Material: | PVC |
| Size Range: | 1-1/2" through 12" |
| Pressure: | 232 psi (1-1/2" to 2"), 150 psi (2-1/2" to 8") 75 psi (10" to 12") |
| Seats: | EPDM |
| Seals: | EPDM |
| Body Style: | Wafer |
| Control Style: | Lever Handle or Mounted Gear Box |
| End Connections: | Flanged (ANSI 150) |

Sample Specification

1.0 Butterfly Valves – FE

1.1 Material

- The valve body and disc shall be made of PVC compound which shall meet or exceed the requirements of cell classification 12454 according to ASTM D1784.
- The valve shaft shall be made of zinc plated steel.

1.2 Seats

- The disc liner shall be made of EPDM.

1.3 Seals

- The o-ring seals shall be made of EPDM.

2.0 Connections

2.1 Flanged style

- The ANSI 150 flanged connections shall conform to the dimensional standard ANSI B16.5.

3.0 Design Features

- The valve shall be of wafer design.
- Manual control of the valve shall be achieved through the use of either a lever handle or mounted gear box (specifier must select one).
- The shaft shall have standard ISO square dimensions for direct mounting of actuators.
- The disc seat shall be a trapezoidal elastomeric liner and provide a bubble tight seal.
- The liner shall completely isolate the valve body from the process flow.
- The liner shall function as a flange gasket on both sides of the valve.
- The body cavity shall feature special channeling to prevent liner slippage and compression.
- The disc, seats, and seals shall be the only wetted parts.
- Teflon® seated o-ring seals shall prevent the shaft from becoming wetted.
- The handle shall incorporate a transparent PVC plug and tag holder for valve identification.

3.1 Pressure Rating

- All valves sizes 1-1/2" through 2" shall be rated at 232 psi at 73°F.
- All valves sizes 2-1/2" through 8" shall be rated at 150 psi at 73°F.
- All valves sizes 10" through 12" shall be rated at 75 psi at 73°F.
- The handle shall incorporate a transparent PVC plug and tag holder for valve identification.

3.2 Markings

- All valves shall be marked to indicate size, material designation, and manufacturer's name or trade mark.

3.3 Color Coding

- All valves shall be color-coded dark gray.

- **4.0** All valves shall be Xirtec® 140 by IPEX or approved equal.

FE Series Butterfly Valves

Product Data Sheet

Valve Selection

| Size (inches) | Disc Material | Body Style | O-ring Material | IPEX Part Number | Pressure Rating @ 73°F |
|---------------|---------------|------------|-----------------|------------------|------------------------|
| 1-1/2 | PVC | Handle | EPDM | 053202 | 232 psi |
| 2 | | Handle | | 053203 | |
| 2-1/2 | | Handle | | 053842 | |
| 3 | | Gearbox | | 253842 | |
| | | Handle | | 053081 | |
| 4 | | Gearbox | | 253081 | |
| | | Handle | | 053082 | |
| 5 | | Gearbox | | 253082 | |
| | | Handle | | 053843 | |
| 6 | | Gearbox | | 253843 | |
| | | Handle | | 053083 | |
| 8 | | Gearbox | | 253083 | |
| | Handle | 053084 | | | |
| 10 | Gearbox | 253084 | | | |
| | Gearbox | 052264 | | | |
| 12 | Gearbox | 052265 | 75 psi | | |

Size (inches):

- | | |
|--------------------------------|-----------------------------|
| <input type="checkbox"/> 1-1/2 | <input type="checkbox"/> 6 |
| <input type="checkbox"/> 2 | <input type="checkbox"/> 8 |
| <input type="checkbox"/> 2-1/2 | <input type="checkbox"/> 10 |
| <input type="checkbox"/> 3 | <input type="checkbox"/> 12 |
| <input type="checkbox"/> 4 | |
| <input type="checkbox"/> 5 | |

Control Style:

- Lever Handle
 Mounted Gear Box

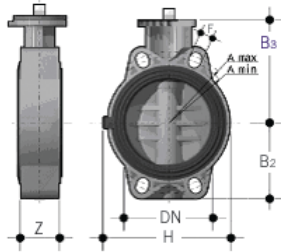
IPEX Part Number:

Note: Size 14" through 24" valves are available upon request.

FE Series Butterfly Valves

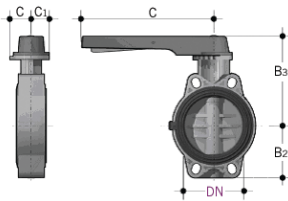
Product Data Sheet

Dimensions



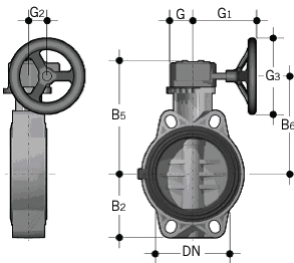
Dimension (inches)

| Size | DN | Z | B ₂ | B ₃ | H | A _{min} | A _{max} | f | # holes | Pattern |
|-------|-------|------|----------------|----------------|-------|------------------|------------------|------|---------|-------------|
| 1-1/2 | 1.57 | 1.30 | 2.36 | 4.17 | 5.20 | 3.68 | 4.29 | 0.75 | 4 | square |
| 2 | 1.97 | 1.69 | 2.76 | 4.45 | 5.79 | 4.25 | 4.88 | 0.75 | 4 | square |
| 2-1/2 | 2.56 | 1.81 | 3.15 | 4.84 | 6.50 | 5.04 | 5.67 | 0.75 | 4 | square |
| 3 | 3.15 | 1.93 | 3.54 | 5.59 | 5.12 | 5.71 | 6.26 | 0.75 | 4 | rectangular |
| 4 | 3.94 | 2.20 | 4.13 | 5.98 | 5.91 | 6.50 | 7.48 | 0.75 | 4 | rectangular |
| 5 | 4.92 | 2.52 | 4.76 | 6.93 | 7.28 | 8.03 | 8.46 | 0.91 | 4 | rectangular |
| 6 | 5.91 | 2.76 | 5.20 | 7.44 | 8.27 | 9.06 | 9.53 | 0.91 | 4 | rectangular |
| 8 | 7.87 | 2.80 | 6.34 | 8.46 | 12.80 | 11.02 | 11.73 | 0.91 | 8 | square |
| 10 | 9.84 | 4.49 | 8.27 | 9.76 | 15.94 | 14.25 | 14.25 | 1.00 | 12 | square |
| 12 | 11.81 | 4.49 | 9.65 | 12.01 | 18.70 | 17.00 | 17.00 | 1.00 | 12 | square |



Lever Handle – Dimension (inches)

| Size | DN | C ₁ | C ₂ | C | B ₂ | B ₃ | # holes | Pattern |
|-------|------|----------------|----------------|-------|----------------|----------------|---------|-------------|
| 1-1/2 | 1.57 | 1.77 | 1.65 | 6.89 | 2.36 | 5.35 | 4 | square |
| 2 | 1.97 | 1.77 | 1.65 | 6.89 | 2.76 | 5.63 | 4 | square |
| 2-1/2 | 2.56 | 1.77 | 2.09 | 9.84 | 3.15 | 6.61 | 4 | square |
| 3 | 3.15 | 1.77 | 2.09 | 9.84 | 3.54 | 7.17 | 4 | rectangular |
| 4 | 3.94 | 1.77 | 2.09 | 9.84 | 4.13 | 7.72 | 4 | rectangular |
| 5 | 4.92 | 1.77 | 2.09 | 13.19 | 4.76 | 8.46 | 4 | rectangular |
| 6 | 5.91 | 1.77 | 2.09 | 13.19 | 5.20 | 9.02 | 4 | rectangular |
| 8 | 7.87 | 2.56 | 3.23 | 16.73 | 6.34 | 12.17 | 8 | square |

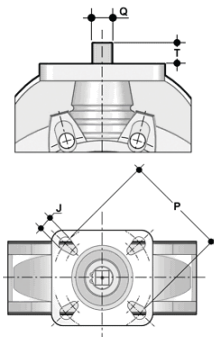
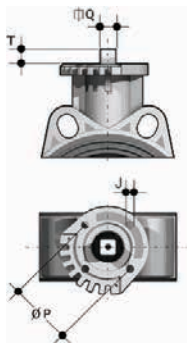


Mounted Gear Box – Dimension (inches)

| Size | DN | G ₂ | G | G ₁ | G ₃ | B ₂ | B ₅ | B ₆ | # holes | Pattern |
|-------|-------|----------------|------|----------------|----------------|----------------|----------------|----------------|---------|-------------|
| 2-1/2 | 2.56 | 1.54 | 1.89 | 5.31 | 4.92 | 3.15 | 6.81 | 5.71 | 4 | square |
| 3 | 3.15 | 1.54 | 1.89 | 5.31 | 4.92 | 3.54 | 7.36 | 6.26 | 4 | rectangular |
| 4 | 3.94 | 1.54 | 1.89 | 5.31 | 4.92 | 4.13 | 7.91 | 6.81 | 4 | rectangular |
| 5 | 4.92 | 1.54 | 1.89 | 5.67 | 7.87 | 4.76 | 8.66 | 7.56 | 4 | rectangular |
| 6 | 5.91 | 1.54 | 1.89 | 5.67 | 7.87 | 5.20 | 9.25 | 8.15 | 4 | rectangular |
| 8 | 7.87 | 2.36 | 2.56 | 6.89 | 7.87 | 6.34 | 11.34 | 10.12 | 8 | square |
| 10 | 9.84 | 2.99 | 3.46 | 9.29 | 9.84 | 8.27 | 12.48 | 11.06 | 12 | square |
| 12 | 11.81 | 2.99 | 3.46 | 9.29 | 9.84 | 9.65 | 14.72 | 13.31 | 12 | square |

Sizes 1-1/2" to 8"

Sizes 10" to 12"



Mounting Pad for Actuation – Dimension (inches)

| Size | ISO | J | P | T | Q |
|-------|-----------------|--------------------|--------------------|------|------|
| 1-1/2 | F05 | 0.28 | 1.97 | 0.47 | 0.43 |
| 2 | F05 | 0.28 | 1.97 | 0.47 | 0.43 |
| 2-1/2 | F05 / F07 | 0.28 / 0.35 | 1.97 / 2.76 | 0.47 | 0.43 |
| 3 | F07 | 0.35 | 2.76 | 0.63 | 0.55 |
| 4 | F07 | 0.35 | 2.76 | 0.63 | 0.55 |
| 5 | F07 | 0.35 | 2.76 | 0.75 | 0.67 |
| 6 | F07 | 0.35 | 2.76 | 0.75 | 0.67 |
| 8 | F10 | 0.43 | 4.02 | 0.94 | 0.87 |
| 10 | F10 / F12 / F14 | 0.43 / 0.51 / 0.67 | 4.02 / 4.92 / 5.51 | 0.94 | 0.87 |
| 12 | F10 / F12 / F14 | 0.43 / 0.51 / 0.67 | 4.02 / 4.92 / 5.51 | 0.94 | 0.87 |

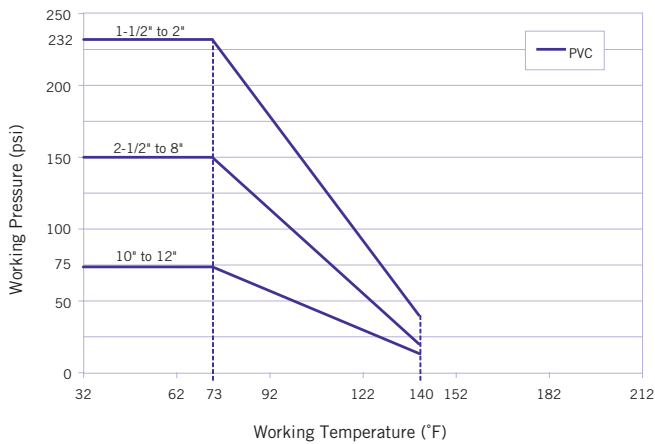
FE Series Butterfly Valves

Product Data Sheet

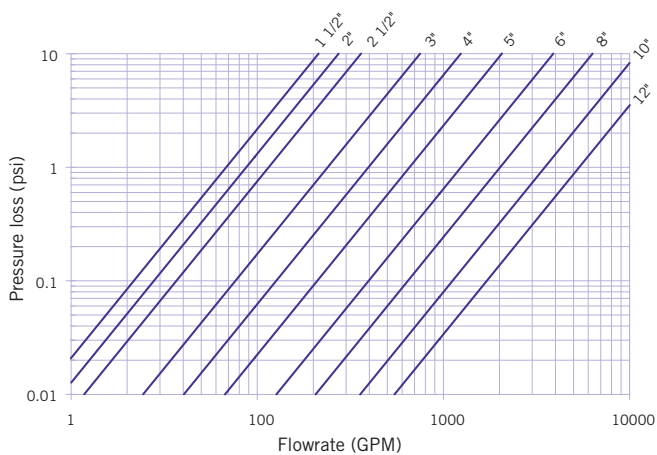
Weights

| Size | Approximate Weight (lbs) | | |
|-------|--------------------------|-----------|-------------|
| | Valve | w/ Handle | w/ Gear Box |
| 1-1/2 | 1.27 | 1.82 | - |
| 2 | 1.66 | 2.23 | - |
| 2-1/2 | 2.20 | 3.13 | 5.25 |
| 3 | 3.09 | 3.62 | 5.73 |
| 4 | 3.86 | 4.39 | 6.50 |
| 5 | 5.62 | 6.68 | 9.70 |
| 6 | 7.28 | 8.22 | 11.24 |
| 8 | 13.23 | 18.17 | 20.41 |
| 10 | 26.46 | - | 41.01 |
| 12 | 41.89 | - | 56.44 |

Pressure – Temperature Ratings



Pressure Loss Chart

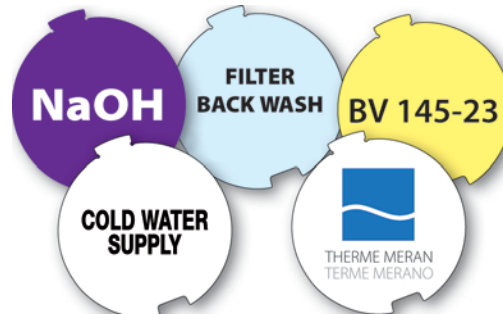


Flow Coefficients

| Size | C _v |
|-------|----------------|
| 1-1/2 | 70 |
| 2 | 90 |
| 2-1/2 | 119 |
| 3 | 249 |
| 4 | 413 |
| 5 | 690 |
| 6 | 1309 |
| 8 | 2135 |
| 10 | 3724 |
| 12 | 5712 |

Components

It is often necessary to customize a valve by labelling or tagging it in order to mark, protect and identify it.



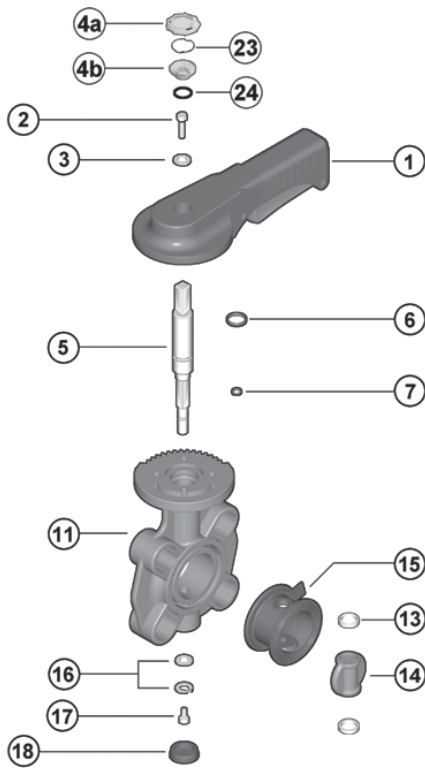
The FE is equipped with a specially designed water resistant module for the customization of the valve. The module is housed in the handle and is composed of a transparent PVC service plug and a white tag holder. The transparent plug can be easily removed to be used for self-labelling on its blank side. Self labelling can be done in several ways, but we recommend designing and printing custom labels through the EasyFit Labelling System (LSE).

FE Series Butterfly Valves

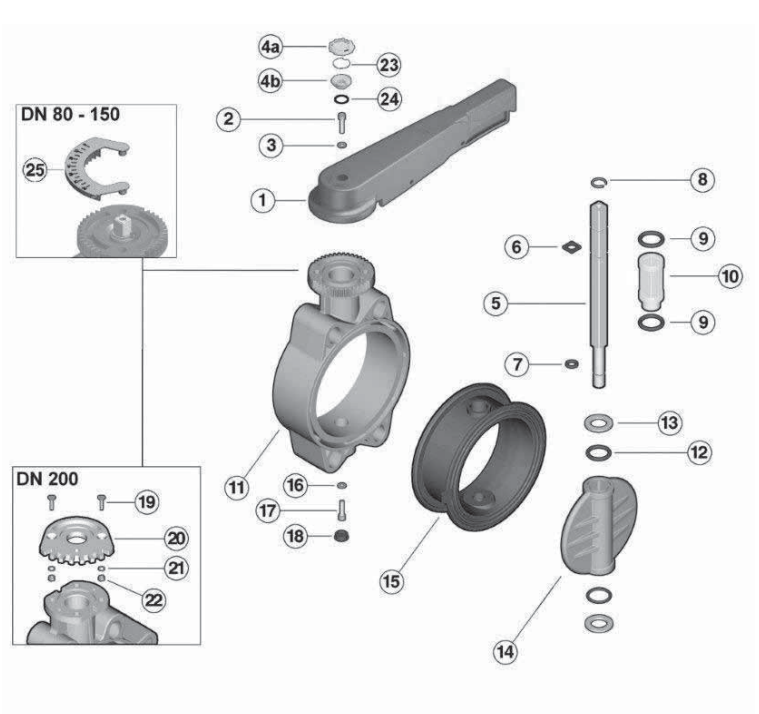
Product Data Sheet

Components

Sizes 1-1/2" to 2"



Sizes 2-1/2" to 8"



| # | Component | Material | Qty |
|-------|--------------------------|-------------------|-----|
| * 1 | handle | PVC | 1 |
| 2 | screw | SS | 1 |
| 3 | washer | SS | 1 |
| 4 | cap | PE | 1 |
| 4 a,b | transparent service plug | PVC | 1 |
| * 5 | shaft | zinc plated steel | 1 |
| * 6 | shaft o-ring | EPDM | 1 |
| * 7 | shaft o-ring | EPDM | 1 |
| 8 | retaining ring | SS | 1 |
| * 9 | bushing o-ring | EPDM | 2 |
| 10 | bushing | Nylon | 1 |
| 11 | body | PVC | 1 |
| * 12 | disc o-ring | EPDM | 2 |

| # | Component | Material | Qty |
|------|--------------------|----------|-----|
| * 13 | anti-friction ring | PTFE | 2 |
| * 14 | disc | PVC | 1 |
| * 15 | primary liner | EPDM | 1 |
| 16 | washer | SS | 1 |
| 17 | screw | SS | 1 |
| 18 | cap | PE | 1 |
| 19 | screw | SS | 2 |
| 20 | pad | PVC | 1 |
| 21 | washer | SS | 2 |
| 22 | nut | SS | 2 |
| 23 | tag holder | PVC | 1 |
| 24 | seal (o-ring) | NBR | 1 |
| 25 | position indicator | PVC | 1 |

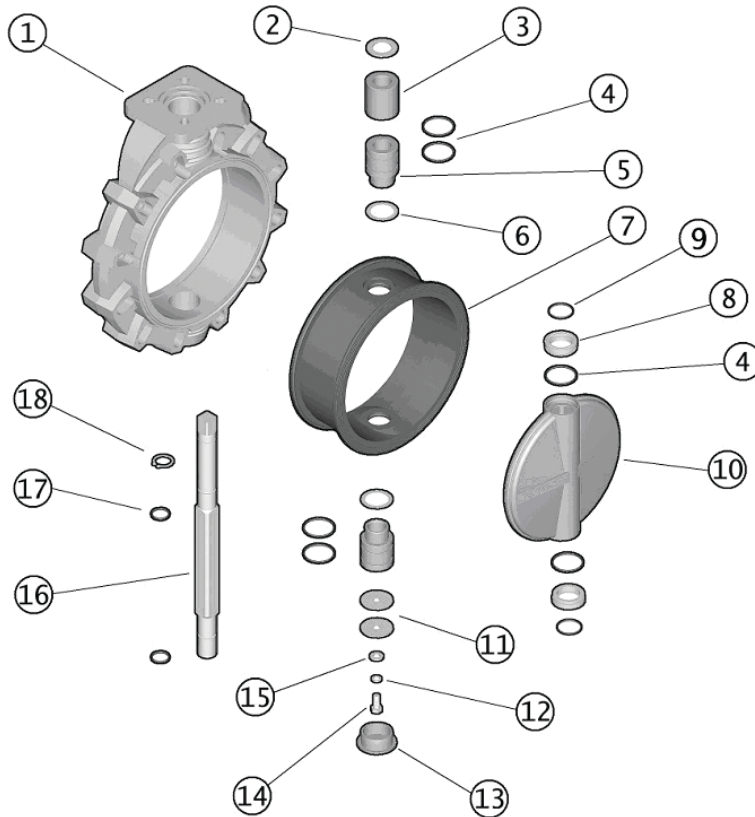
* Spare parts available

FE Series Butterfly Valves

Product Data Sheet

Components

Sizes 10" to 12"



| # | Component | Material | Qty |
|------|--------------------|-------------------|-----|
| 1 | body | PVC | 1 |
| 2 | washer | SS | 1 |
| 3 | bushing | PP | 1 |
| * 4 | bushing o-ring | EPDM | 4 |
| 5 | bushing for o-ring | PP | 2 |
| 6 | washer | PTFE | 2 |
| * 7 | primary liner | EPDM | 1 |
| * 8 | anti-friction ring | PTFE | 2 |
| * 9 | disc o-ring | EPDM | 2 |
| * 10 | disc | PVC | 1 |
| 11 | washer | SS | 2 |
| 12 | washer | SS | 1 |
| 13 | cap | PE | 1 |
| 14 | screw | SS | 1 |
| 15 | washer | SS | 1 |
| * 16 | shaft | Zinc Plated Steel | 1 |
| * 17 | shaft o-ring | EPDM | 2 |
| 18 | retaining ring | SS | 1 |

* Spare parts available.

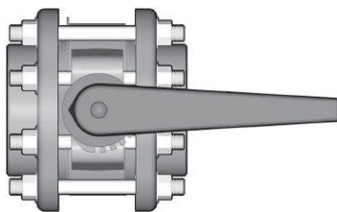
FE Series Butterfly Valves

Product Data Sheet

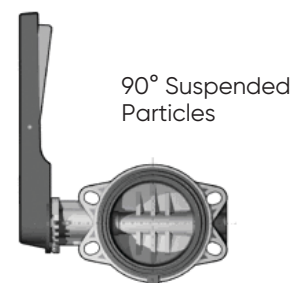
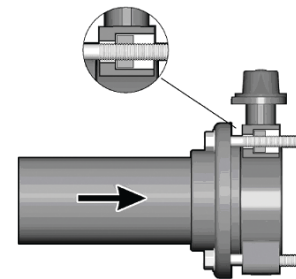
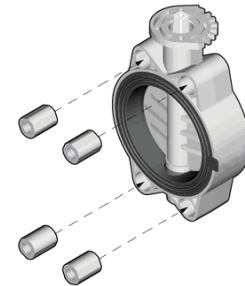
Installation Procedures

1. For the lever handle style, attach the handle (part #1 on previous pages) to the valve body (11) using the supplied bolt (2) and washer (3). Affix the cap (4) over the bolt.
2. **Ensure that the length of the bolts is sufficient for the size of valve being installed. Due to the varying designs of plastic flanges, there is no recommended minimum length. However, a length that results in at least 5 exposed threads on each side should be sufficient.**
3. Please refer to the appropriate application sub-section:
 - a. For typical inline installation, ensure that the disc is in the partially closed position then carefully insert the valve into the piping system between the two flanges. **Insert the bolts, washers, and nuts (if necessary), then hand tighten. Take care to properly line up the valve and flanges as any misalignment may cause leakage.**
 - b. For lugged version end of line installation, insert the necessary steel lugs into the valve body. Ensure that the disc is in the partially closed position then carefully position the valve on the flange. Insert the bolts, and washers, then hand tighten. **Take care to properly line up the valve and flange as any misalignment may cause leakage.**
4. To avoid damage to the primary gasket, cycle the valve to the open position before tightening the bolts. For correct joining procedure, please refer to the section entitled, "Joining Methods – Flanging" in the IPEX Industrial Technical Manual Series, "Volume I: Vinyl Process Piping Systems". **The bolts should be tightened in an even pattern to the nominal torque in the table below. These torque ratings are sufficient to maintain a watertight seal at the maximum rated operating pressure.**

Note: End of line installation will cause the maximum rated pressure to be reduced to the values listed in the table below. If the process media is dirty or contains suspended particles, it is advisable to install the valve in an orientation in which the shaft is not vertical (see diagrams). Over time, particles may collect at the bottom of the valve posing a threat to the seal between the disc, liner, and shaft.



| Size | Nominal Bolt Torque ((ft-lbs) | Lugged Pmax (psi) |
|-------|-------------------------------|-------------------|
| 1-1/2 | 7 | 90 |
| 2 | 9 | 90 |
| 2-1/2 | 11 | 90 |
| 3 | 13 | 90 |
| 4 | 15 | 90 |
| 5 | 26 | 90 |
| 6 | 30 | 60 |
| 8 | 41 | 60 |
| 10 | 52 | - |
| 12 | 52 | - |



Disassembly

1. If removing the valve from an operating system, isolate the valve from the rest of the system.
Be sure to depressurize and drain the isolated branch before continuing.
2. Cycle the valve to a partially open position then loosen each bolt holding the valve to the pipe flange(s). Please refer to the section entitled, "Joining Methods – Flanging" in the IPEX Industrial Technical Manual Series, "Volume I: Vinyl Process Piping Systems" for a recommended bolt tightening pattern diagram. Follow the same pattern when disassembling the flanged joint(s) then carefully remove the valve from the line.

Sizes 1-1/2" to 8"

3. For the lever handle style, remove the protection cap (4) then loosen the screw (2) and washer (3) to remove the handle (1).
4. For the mounted gear box style, loosen and remove the bolts and washers fixed to the gear box. Carefully remove the gear box from the valve taking care not to damage the stem.
5. For 8" sizes, loosen and remove the bolts (19), washers (21), and nuts (22) then remove the spacer pad (20) from the valve body.
6. Remove the cap (18) then loosen and remove the screw (17) and washer(s) (16) from the base of the valve body.
7. Carefully pull the shaft (5) out of the valve body then remove the disc (14).
8. Remove the primary liner (15) from the valve body.
9. Remove the nylon bushing (10) and o-rings (9) from the valve body (sizes 2-1/2" to 8").
10. Remove the disc anti-friction rings (13), and o-rings (12, sizes 2-1/2" to 8").
11. Remove the retaining ring (8, sizes 2-1/2" to 8") and o-rings (6, 7) from the shaft.
12. The valve components can now be checked for problems and/or replaced.

Sizes 10" to 12"

3. Loosen and remove the bolts and washers fixed to the gear box. Carefully remove the gear box from the valve taking care not to damage the stem.
4. Remove the cap (13) then loosen and remove the screw (14) and washers (11, 12, and 15) from the base of the valve body (1).
5. Carefully pull the shaft (16) out of the valve body then remove the disc (10).
6. Remove the primary liner (7) from the valve body
7. Remove the upper and lower bushings (3, 5), washers (2, 6), and o-rings (4) from the valve body.
8. Remove the disc anti-friction rings (8) and o-rings (4, 9).
9. Remove the retaining ring (18) and o-rings (17) from the shaft.
10. The valve components can now be checked for problems and/or replaced.

Assembly

Note: Before assembling the valve components, it is advisable to lubricate the o-rings with a water soluble lubricant. **Be sure to consult the "IPEX Chemical Resistance Guide" and/or other trusted resources to determine specific lubricant-rubber compatibilities.**

Sizes 1-1/2" to 8"

1. Insert the primary liner (15) into the valve body (11).
Ensure that the proper holes line up with those on the body.
2. Properly fit the o-rings (9) on the nylon bushing (10) (sizes 2-1/2" to 8") then insert into the valve body from above.
3. Properly fit the disc o-rings (12, sizes 2-1/2" to 8") and anti-friction rings (13) on the disc (14), then insert into the valve liner taking care to center the holes.
4. Properly fit the o-rings (6, 7) and retaining ring (8, sizes 2-1/2" to 8") in their grooves on the shaft (6), then carefully insert into the valve body from above.
5. Fasten the shaft at the base of the valve body using the screw (17) and washer (16). Affix the cap (18) over the bolt.
6. For 8" sizes, affix the spacer pad (20) to the valve body using the screws (19), washers (21), and nuts (22).
7. For the lever handle style, affix the handle (1) using the screw (2), washer (3), and protection cap (4).
8. For the mounted gear box style, carefully place the gear box on the stem, lining up the holes. Fasten using the necessary bolts and washers.

Sizes 10" to 12"

1. Insert the primary liner (7) into the valve body (1).
Ensure that the proper holes line up with those on the body.
2. Properly fit the o-rings (4) on the upper and lower bushings (3, 5) then insert into the valve body from above and below along with the washers (2, 6).
3. Properly fit the disc o-rings (4, 9) and anti-friction rings (8) on the disc (10), then insert into the valve liner taking care to center the holes.
4. Properly fit the o-rings (17) and retaining ring (18) in their grooves on the shaft (16), then carefully insert into the valve body from above.
5. Fasten the shaft at the base of the valve body using the screw (14) and washers (11, 12, and 15). Affix the cap (13) over the bolt.
6. Carefully place the gear box on the stem, lining up the holes. Fasten using the necessary bolts and washers.

Testing and Operating

The purpose of system testing is to assess the quality of all joints and fittings to ensure that they will withstand the design working pressure, plus a safety margin, without loss of pressure or fluid. Typically, the system will be tested and assessed in sub-sections as this allows for improved isolation and remediation of potential problems. With this in mind, the testing of a specific installed valve is achieved while carrying out a test of the overall system.

An onsite pressure test procedure is outlined in the IPEX Industrial Technical Manual Series, "Volume I: Vinyl Process Piping Systems" under the section entitled, "Testing". The use of this procedure should be sufficient to assess the quality of a valve installation. **In any test or operating condition, it is important to never exceed the pressure rating of the lowest rated appurtenance in the system.**

Important Points:

- Never test thermoplastic piping systems with compressed air or other gases including air-over-water boosters.
- When testing, do not exceed the rated maximum operating pressure of the valve.
- Avoid the rapid closure of valves to eliminate the possibility of water hammer which may cause damage to the pipeline or the valve.

The FE handle incorporates a locking mechanism that prevents unintentional rotation. The spring-loaded handle must be depressed to cycle the valve. A padlock can be installed through this portion of the handle as an additional safety precaution.

Please contact IPEX customer service and technical support with regard to any concern not addressed in this data sheet or the technical manual.

About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the world's largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical systems
- Telecommunications and utility piping systems
- Industrial process piping systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems
- PVC, CPVC, PP, PVDF, PE, ABS, and PEX pipe and fittings

This literature is published in good faith and is believed to be reliable. However, it does not represent and/or warrant in any manner the information and suggestions contained in this brochure. Data presented is the result of laboratory tests and field experience.

A policy of ongoing product improvement is maintained. This may result in modifications of features and/or specifications without notice.