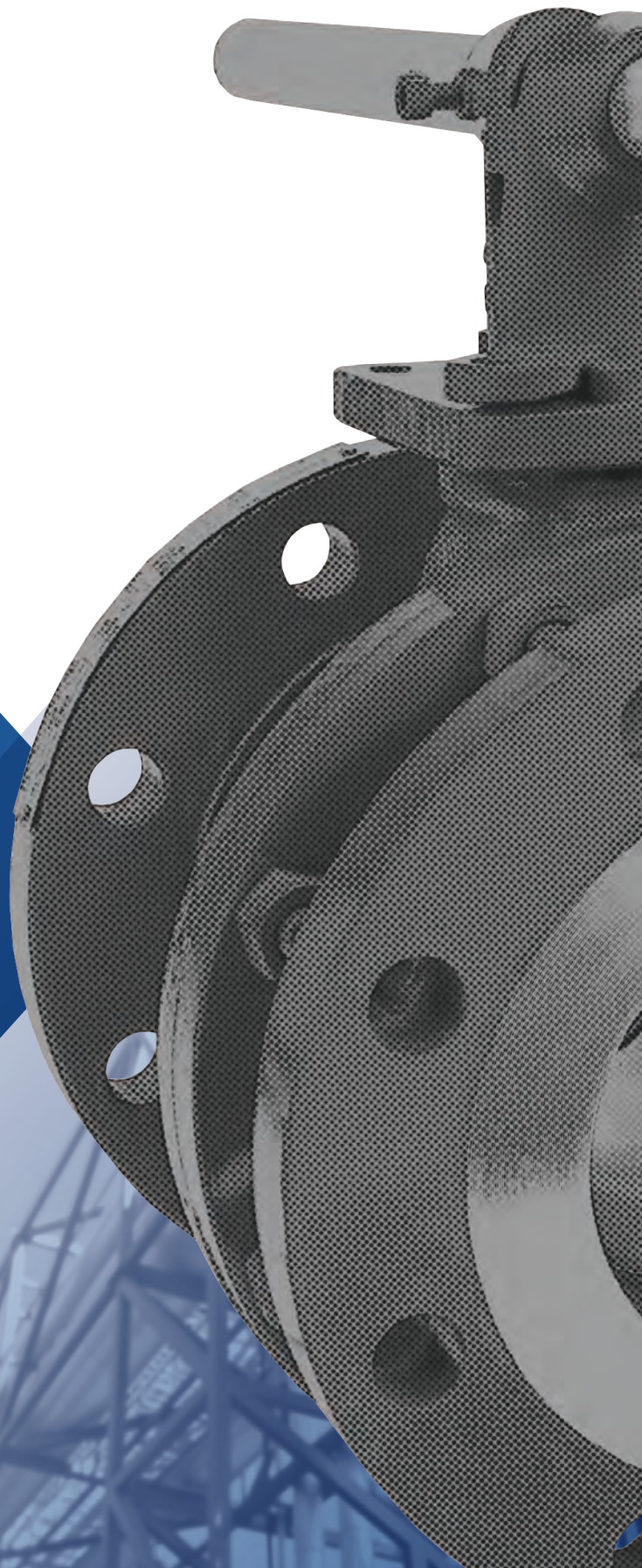


The logo for Flow+ features the word "Flow" in a bold, italicized sans-serif font, followed by a plus sign "+" that is partially enclosed by a curved line above it.

# Ball Valves

Brass | Carbon & Stainless Steel



**ISO**  
9001

**CRN**

**3 YEAR** VIEW TERMS  
& CONDITIONS  
**WARRANTY**

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# B SERIES

## 1, 2 AND 3 PIECE BALL VALVE

### PART NUMBERING SYSTEM

**1**

**1 = Size**

02 = 1/4"  
 03 = 3/8"  
 05 = 1/2"  
 07 = 3/4"  
 10 = 1"  
 12 = 1 1/4"  
 15 = 1 1/2"  
 20 = 2"  
 25 = 2 1/2"  
 30 = 3"  
 40 = 4"

**2**

**2 = Valve Series**

B01 = 2 PC, 1000 WOG, 316SS  
 B02 = 2 PC, 2000/1500 WOG, 316SS  
 B03 = 2 PC, 1000 WOG, 316SS, Direct Mount  
 B04 = 3 PC, 1000 WOG, 316SS, Screwed Ends  
 B04S = 3 PC, 1000 WOG, 316SS, Socket Weld Ends  
 B05 = 3 PC, 1000 WOG, 316SS, Direct Mount, Screwed Ends  
 B05S = 3 PC, 1000 WOG, 316SS, Direct Mount, Socket Weld Ends  
 B05TC = 3 PC, 1000 WOG, 316SS, Direct Mount, Tri-Clamps Ends  
 B05T0 = 3 PC, 1000 WOG, 316SS, Direct Mount, Tube Ends  
 B06 = 1 PC, 2000 PSI, Carbon Steel/Bar Stock  
 B07L = 3 PC, 1000 WOG, 316SS, 3-way, L-Port  
 B07T = 3 PC, 1000 WOG, 316SS, 3-way, T-Port  
 B11 = 2 PC, 2000/1500 WOG, Carbon Steel  
 BT3 = 3 PC, 3000 PSI, Carbon Steel  
 BT6 = 3 PC, 6000 PSI, Carbon Steel  
 TFP600 = 2 PC, 600 WOG, Brass, Threaded Ends  
 SFP600 = 2 PC, 600 WOG, Brass, Solder Ends

# 2-PC Full Port Brass Ball Valve

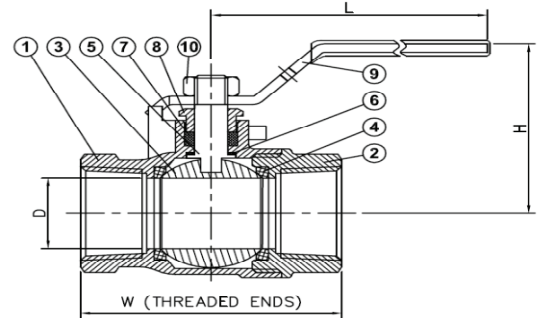
**PRESSURE RATING: 600 WOG**

**TFP600**



### Construction

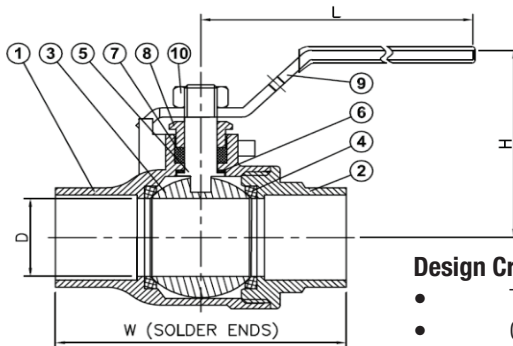
- Forged brass body
- Full port
- Durable chrome plated brass ball
- Viton O Ring and PTFE Packing
- Stem threaded packing nut
- Blow out proof stem
- MSS SP – 110 standards



# 2-PC Full Port Brass Ball Valve

**Pressure Rating: 600 WOG for 1/4" to 4"**

**SFP600**



| MATERIALS LIST |               |                                   |
|----------------|---------------|-----------------------------------|
| PART           |               | SPECIFICATION                     |
| 1              | BODY          | FORGED BRASS ASTM B124 C37700     |
| 2              | END CAP       | FORGED BRASS ASTM B124 C37700     |
| 3              | SEAT          | PTFE                              |
| 4              | BALL          | BRASS ASTM B16 C36000/B124 C37700 |
| 5              | STEM          | BRASS ASTM B16 C36000             |
| 6              | THRUST WASHER | PTFE                              |
| 7              | STEM PACKING  | PTFE                              |
| 8              | GLAND         | PTFE                              |
| 9              | HANDLE        | BRASS ASTM B16 C36000             |
| 10             | NUT           | STEEL                             |

### Design Criteria,

- Trim and drain 300PSI
- Compressed Gas Shut-off valves 600PSI
- Flammable Liquid Shut off Valves 600PSI
- Gas Shut off valves
- LP gas shut off valves
- Manual valves

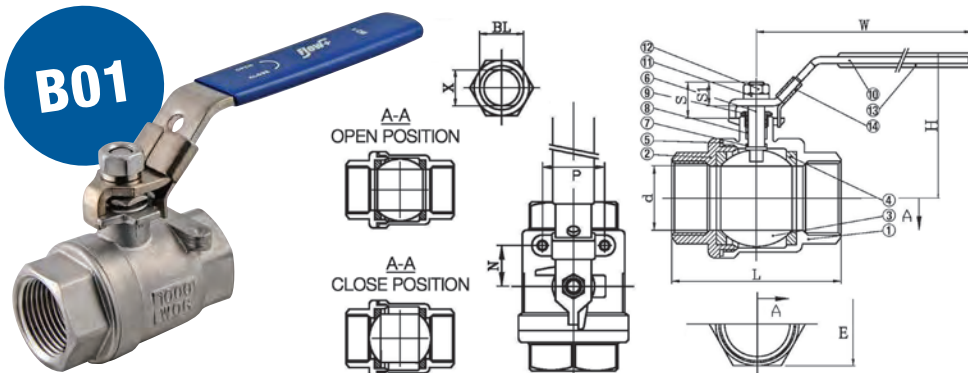
| SIZE (IN) | L    | D    | H    | W    |
|-----------|------|------|------|------|
| 1/2       | 3.23 | 0.50 | 1.45 | 1.94 |
| 3/4       | 3.94 | 0.75 | 1.78 | 2.73 |
| 1         | 4.72 | 0.98 | 2.29 | 3.29 |
| 1-1/4     | 4.72 | 1.22 | 2.44 | 3.74 |
| 1-1/2     | 7.09 | 1.50 | 3.00 | 4.30 |
| 2         | 7.09 | 1.97 | 3.30 | 5.31 |
| 2-1/2     | 8.66 | 2.50 | 4.59 | 6.29 |
| 3         | 8.66 | 3.00 | 4.92 | 7.19 |
| 4         | 9.84 | 3.98 | 5.73 | 9.26 |

| MATERIALS LIST |               |                                   |
|----------------|---------------|-----------------------------------|
| PART           |               | SPECIFICATION                     |
| 1              | BODY          | FORGED BRASS ASTM B124 C37700     |
| 2              | END CAP**     | FORGED BRASS ASTM B124 C37700     |
| 3              | SEAT          | PTFE                              |
| 4              | BALL          | BRASS ASTM B16 C36000/B124 C37700 |
| 5              | STEM          | BRASS ASTM B16 C36000             |
| 6              | THRUST WASHER | PTFE                              |
| 7              | STEM PACKING  | PTFE                              |
| 8              | GLAND         | PTFE                              |
| 9              | HANDLE        | BRASS ASTM B16 C36000             |
| 10             | NUT           | STEEL                             |

*Patented "Raised V" design negates body joint leakage.*

# 2-PC Full Port SS 1000 PSI Ball Valve

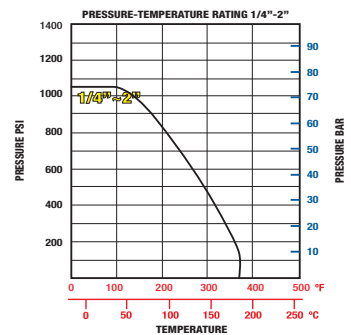
Pressure Rating: 1000 psi (69 bar) WOG for 1/4" to 2 1/2"



- Investment cast body and ends
- Blow-out proof stem
- Full port
- FNPT threaded on both ends
- Material: ASTM A351-CF8M
- NACE MR0175
- Locking handle

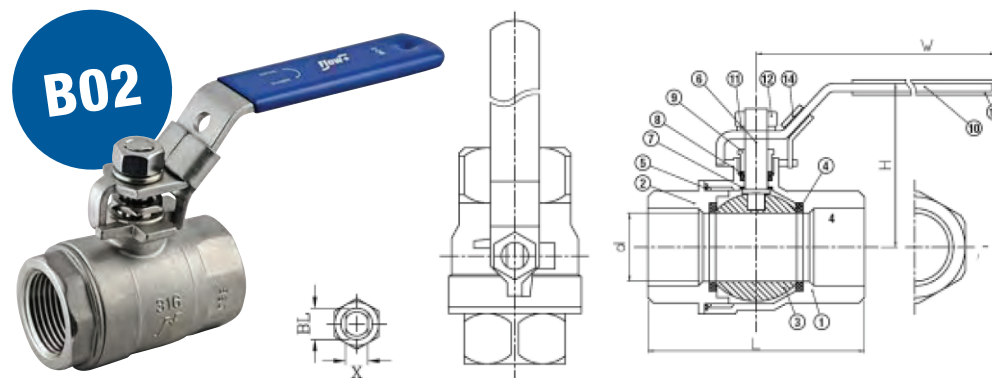
| Size   | dia (mm) | L   | H   | W   | S    | S1   | X   | N    | P    | BL    | Torque (in-lbs) | CV Factor | Kg   |
|--------|----------|-----|-----|-----|------|------|-----|------|------|-------|-----------------|-----------|------|
| 1/4"   | 11.6     | 50  | 48  | 91  | 16.5 | 10.2 | 5   | 12.5 | 28.5 | 5/16" | 35              | 7         | 0.21 |
| 3/8"   | 12.5     | 50  | 48  | 91  | 16.5 | 10.2 | 5   | 12.5 | 28.5 | 5/16" | 35              | 7         | 0.22 |
| 1/2"   | 15       | 60  | 52  | 91  | 16.5 | 10.2 | 5   | 12.5 | 28.5 | 5/16" | 47              | 15        | 0.29 |
| 3/4"   | 20       | 65  | 61  | 111 | 20   | 13.5 | 6.5 | 21   | 34.8 | 3/8"  | 64              | 45        | 0.42 |
| 1"     | 25       | 80  | 65  | 111 | 23.5 | 16   | 8   | 22.5 | 34.8 | 7/16" | 90              | 65        | 0.71 |
| 1 1/4" | 32       | 92  | 79  | 154 | 23.5 | 16   | 8   | 23.5 | 38.1 | 7/16" | 117             | 125       | 1.06 |
| 1 1/2" | 38       | 105 | 83  | 154 | 25.5 | 17   | 9   | 23.5 | 38.1 | 1/2"  | 156             | 175       | 1.68 |
| 2"     | 50       | 125 | 97  | 192 | 25.5 | 17   | 9   | 23.5 | 38.1 | 1/2"  | 217             | 380       | 2.71 |
| 2 1/2" | 65       | 156 | 129 | 246 | 41.5 | 29.5 | 12  | 35   | 56   | 3/4"  | 407             | 265       | 5.66 |

- | No. Part (Qty)        | Material       |
|-----------------------|----------------|
| 1. Body (1)           | ASTM-CF8M-A351 |
| 2. End (1)            | ASTM-CF8M-A351 |
| 3. Ball (1)           | ASTM-CF8M-A351 |
| 4. Ball Seat (2)      | 15% R-PTFE     |
| 5. Joint Gasket (1)   | PTFE           |
| 6. Stem (1)           | AISI 316       |
| 7. Thrust Washer (1)  | PTFE           |
| 8. Stem Packing (2)   | PTFE           |
| 9. Gland Nut (1)      | AISI 304       |
| 10. Handle (1)        | AISI 304       |
| 11. Spring Washer (1) | AISI 304       |
| 12. Stem Nut (1)      | AISI 304       |
| 13. Handle Sleeve (1) | Vinyl Grip     |
| 14. Lock Device (1)   | AISI 430       |



# 2-PC Full Port SS 2000 PSI Ball Valve

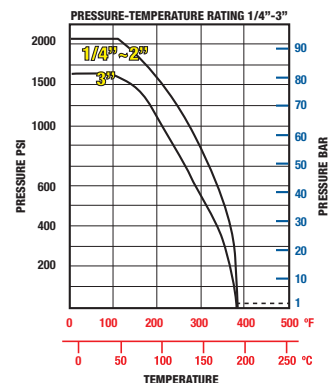
Pressure Rating: 2000 psi (138 bar) WOG for 1/4" to 2" / 1500 (103.4 bar) WOG for 3"



- Investment cast body and ends
- Blow-out proof stem
- Full port
- FNPT threaded on both ends
- Locking handle
- Material: ASTM A351-CF8M

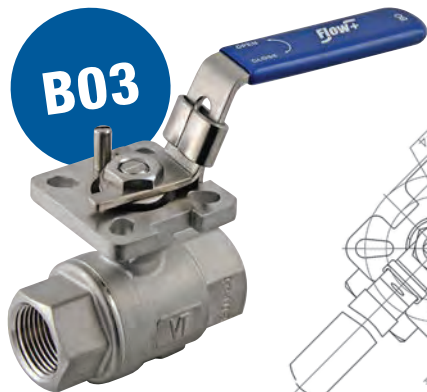
| Size   | (mm) | L    | H     | W   | X   | BL    | CV Factor | Torque (in-lbs) | Kg    |
|--------|------|------|-------|-----|-----|-------|-----------|-----------------|-------|
| 1/4"   | 11.6 | 44.5 | 51    | 95  | 5   | 5/16" | 6.6       | 35              | 0.194 |
| 3/8"   | 12.7 | 44.5 | 51    | 95  | 5   | 5/16" | 7.9       | 35              | 0.205 |
| 1/2"   | 15   | 57   | 53    | 95  | 5   | 5/16" | 11.2      | 47              | 0.285 |
| 3/4"   | 20   | 65   | 59.5  | 110 | 6.5 | 3/8"  | 21        | 64              | 0.456 |
| 1"     | 25   | 76   | 73    | 135 | 8   | 7/16" | 35        | 90              | 0.764 |
| 1 1/4" | 32   | 87.5 | 79    | 135 | 8   | 7/16" | 57        | 117             | 1.163 |
| 1 1/2" | 38   | 102  | 90.5  | 165 | 9   | 1/2"  | 80        | 156             | 1.870 |
| 2"     | 50   | 123  | 98.8  | 165 | 9   | 1/2"  | 148       | 217             | 3.126 |
| 3"     | 80   | 184  | 142.5 | 215 | 12  | 3/4"  | 415       | 651             | 9.79  |

- | No. Part (Qty)        | Material       |
|-----------------------|----------------|
| 1. Body (1)           | ASTM-CF8M-A351 |
| 2. End (1)            | ASTM-CF8M-A351 |
| 3. Ball (1)           | ASTM-CF8M-A351 |
| 4. Ball Seat (2)      | 15% R-PTFE     |
| 5. Joint Gasket (1)   | PTFE           |
| 6. Stem (1)           | AISI 316       |
| 7. Thrust Washer (1)  | PTFE           |
| 8. Stem Packing (2)   | PTFE           |
| 9. Gland Nut (1)      | AISI 304       |
| 10. Handle (1)        | AISI 304       |
| 11. Spring Washer (1) | AISI 304       |
| 12. Stem Nut (1)      | AISI 304       |
| 13. Handle Sleeve (1) | Vinyl Grip     |
| 14. Lock Device (1)   | AISI 304       |

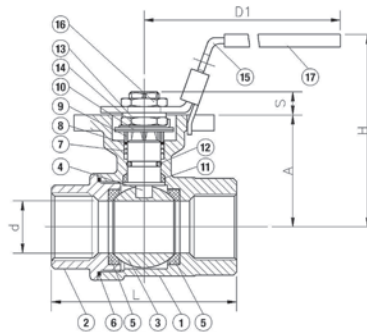
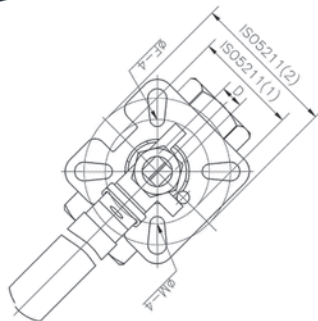


# 2-PC Full Port SS Ball Valve - Direct Mount

Pressure Rating: 1000 psi (69 bar) WOG for 1/4" to 2" / See Page 21 for Actuation



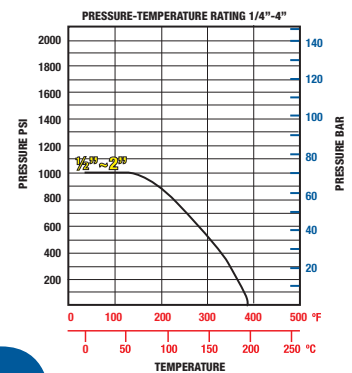
**B03**



- Investment cast body and ends
- Blow-out proof stem
- Full port
- Direct mounting pad for ISO Std 5211
- FNPT threaded on both ends
- Material: ASTM A351-CF8M (316SS)
- NACE MR0175

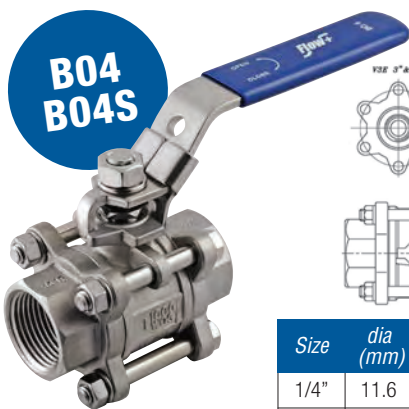
| Size   | dia (mm) | L     | F   | M   | ISO 5211         | Torque (in-lbs) | D  | H     | D1    | S    | A     | CV Factor | Kg   |
|--------|----------|-------|-----|-----|------------------|-----------------|----|-------|-------|------|-------|-----------|------|
| 1/2"   | 15       | 65.3  | 6   | 7.5 | 42 F04   50 F05  | 85              | 9  | 72.85 | 112   | 8.5  | 36.95 | 15        | 0.46 |
| 3/4"   | 20       | 77.3  | 7.5 | 9.5 | 50 F05   70 F07  | 110             | 9  | 81.8  | 112   | 8.5  | 45    | 45        | 0.81 |
| 1"     | 25       | 88.7  | 7.5 | 9.5 | 50 F05   70 F07  | 180             | 11 | 90.45 | 136   | 11.4 | 53.45 | 65        | 0.96 |
| 1 1/2" | 38       | 109   | 7.5 | 9.5 | 50 F05   70 F07  | 315             | 14 | 114.7 | 197.9 | 14   | 74.75 | 175       | 2.3  |
| 2"     | 50       | 125.3 | 9.5 | 11  | 70 F07   102 F10 | 450             | 14 | 124.0 | 197.9 | 13.7 | 83.5  | 380       | 2.3  |

| No. Part              | Material           |
|-----------------------|--------------------|
| 1. Body               | ASTM-A351 Gr. CF8M |
| 2. Ends               | ASTM-A351 Gr. CF8M |
| 3. Ball               | ASTM-A351 Gr. CF8M |
| 4. Stem               | 316SS              |
| 5. Ball Seat          | 15% RTFE           |
| 6. Gasket             | 15% RTFE           |
| 7. Stem Packing       | 15% RTFE           |
| 8. Thrust Washer      | 15% RTFE           |
| 9. Stem Packing       | 304SS              |
| 10. Belleville Washer | SUS 304-USP        |
| 11. Thrust Washer     | PTFE +25% Carbon   |
| 12. O-Ring            | Viton              |
| 13. Locking Washer    | 304SS              |
| 14. Stem Nut          | 304SS              |
| 15. Handle            | 304SS              |
| 16. Handle Nut        | 304SS              |
| 17. Handle Cover      | Vinyl Grip         |

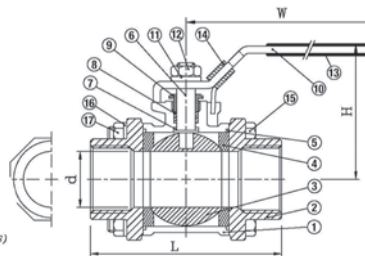
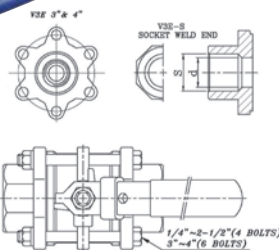


# 3-PC Full Port SS 1000 PSI Ball Valve

Pressure Rating: 1000 psi (69 bar) WOG for 1/4" to 4"



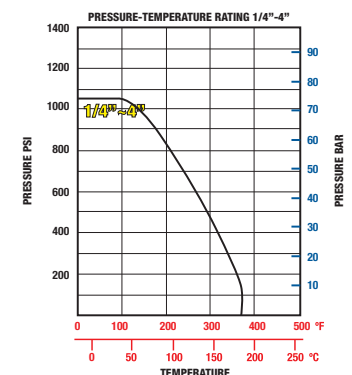
**B04  
B04S**



- Investment cast body and ends
- Blow-out proof stem
- Full port
- FNPT threaded on both ends for B04
- Socket weld on both ends for B04S
- Locking handle
- Material: ASTM A351-CF8M (316SS)

| Size   | dia (mm) | L     | H    | W   | B     | D    | S     | CV Factor | Kg   |
|--------|----------|-------|------|-----|-------|------|-------|-----------|------|
| 1/4"   | 11.6     | 54    | 51   | 84  | 12    | 18   | 14.1  | 10        | 0.34 |
| 3/8"   | 12.7     | 54    | 51   | 84  | 12.5  | 18   | 17.6  | 10        | 0.34 |
| 1/2"   | 15       | 61.5  | 55   | 84  | 15.8  | 22   | 21.7  | 26        | 0.46 |
| 3/4"   | 20       | 71    | 58.5 | 110 | 20.9  | 28   | 27.2  | 50        | 0.62 |
| 1"     | 25       | 83.5  | 73   | 135 | 26.6  | 34   | 33.9  | 68        | 1.96 |
| 1 1/4" | 32       | 97    | 78.5 | 135 | 35.05 | 44   | 42.6  | 120       | 1.49 |
| 1 1/2" | 38       | 110.5 | 90.5 | 165 | 40.9  | 50   | 48.7  | 170       | 2    |
| 2"     | 50       | 129   | 99   | 165 | 52.5  | 61.5 | 61.1  | 360       | 3.12 |
| 2 1/2" | 65       | 171.5 | 127  | 215 | 69    | 76   | 76.9  | 510       | 6.5  |
| 3"     | 80       | 200   | 136  | 215 | 82    | 90   | 89.8  | 900       | 10.4 |
| 4"     | 100      | 252   | 172  | 325 | 106   | 115  | 115.4 | 1250      | 20.2 |

| No. Part (Qty)           | Material       |
|--------------------------|----------------|
| 1. Body (1)              | ASTM-CF8M-A351 |
| 2. End (1)               | ASTM-CF8M-A351 |
| 3. Ball (1)              | ASTM-CF8M-A351 |
| 4. Ball Seat (2)         | 15% RTFE       |
| 5. Joint Gasket (1)      | 15% RTFE       |
| 6. Stem (1)              | AISI 316       |
| 7. Thrust Washer (1)     | PTFE           |
| 8. Stem Packing (2)      | PTFE           |
| 9. Gland Nut (1)         | AISI 304       |
| 10. Handle (1)           | AISI 304       |
| 11. Stem Washer (1)      | AISI 304       |
| 12. Stem Nut (1)         | AISI 304       |
| 13. Handle Sleeve (1)    | Vinyl Grip     |
| 14. Lock Device (1)      | AISI 304       |
| 15. Bolt (4-6)           | AISI 304       |
| 16. Spring Washer (4-12) | AISI 304       |
| 17. Hex Nut (4-12)       | AISI 304       |



Sizes and specifications shown are subject to change without notice.

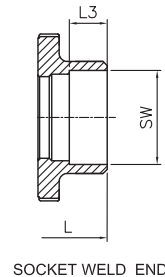
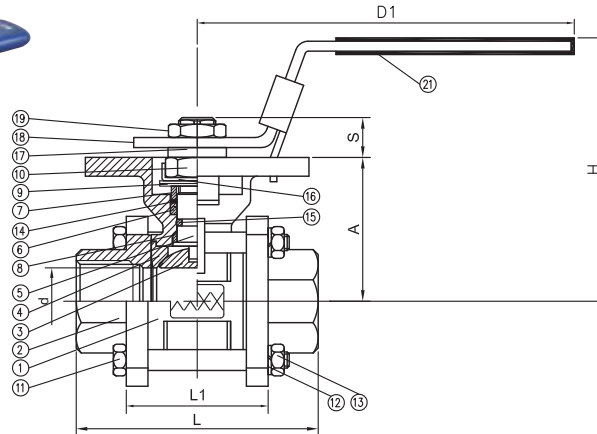
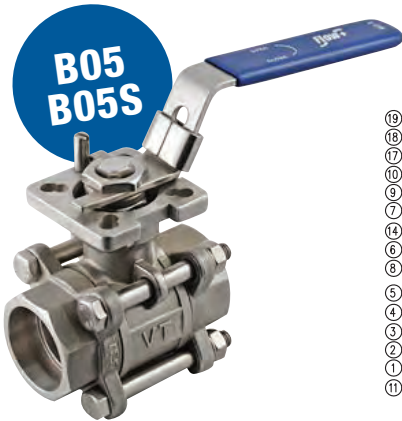
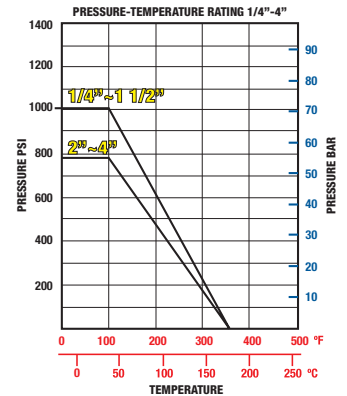
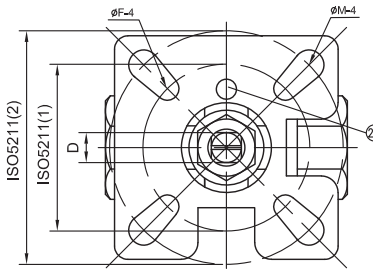
# 3-PC Full Port SS Ball Valve - Direct Mount

Pressure Rating: 1000 psi (69 bar) WOG for 1/4" to 4" / See Page 21 for Actuation

| No. Part (Qty)          | Material                          |
|-------------------------|-----------------------------------|
| 1. Body (1)             | ASTM-A351Gr. CF8M                 |
| 2. Ends (2)             | ASTM-A351Gr. CF8M<br>*CF3M for SW |
| 3. Ball (1)             | ASTM-A351Gr. CF8M                 |
| 4. Stem (1)             | 316SS                             |
| 5. Seat (2)             | 15% RTFE                          |
| 6. Stem Packing (1)     | 25% CTFE                          |
| 7. Washer (1)           | 304SS                             |
| 8. Thrust Washer (1)    | PTFE +25% Carbon                  |
| 9. Belleville Washer(1) | SUS 304-CSP                       |
| 10. Stem Nut (1)        | 304SS                             |
| 11. Bolts (4-6)         | 304SS                             |
| 12. Spring Washer (4-6) | 304SS                             |
| 13. Bolt Nuts (4-6)     | 304SS                             |
| 14. Stem Ring (1)       | PTFE +25% Carbon                  |
| 15. O-Ring (1)          | Viton                             |
| 16. Stopper Washer (1)  | 304SS                             |
| 17. Sqaure (1)          | 304SS                             |
| 18. Handle (1)          | 304SS                             |
| 19. Handle Nut (1)      | 304SS                             |
| 20. Stopper Pin (1)     | 304SS                             |
| 21. Handle Sleeve (1)   | Vinyl                             |

## Threaded (B05) and Socket Weld (B05S) Ends

- High Cycle, Live Loaded, Triple Stem Seal comprised of:
  - » Carbon filled PTFE wedge ring thrust washer and Viton O-Ring
  - » 15% RTFE Chevron packing
  - » Live loaded Belleville washers
  - » Packing nut mechanically locked to stem
- Investment cast body and ends
- Blow-out proof stem
- Full port
- Locking Handle
- Direct mounting pad for ISO Std 5211
- FNPT threaded on both ends on B05
- Socket weld ends on B05S
- Material: ASTM A351-CF8M (316SS) and 316LSS ends on socket weld



| Size     | 1/2"  |     | 3/4"  |     | 1"    |     | 1 1/4" |     | 1 1/2" |     | 2"    |     | 2 1/2" |     | 3"     |     | 4"     |     |
|----------|-------|-----|-------|-----|-------|-----|--------|-----|--------|-----|-------|-----|--------|-----|--------|-----|--------|-----|
| d        | 15    |     | 20    |     | 25    |     | 32     |     | 38     |     | 50    |     | 65     |     | 80     |     | 100    |     |
| L        | 63.5  |     | 72.5  |     | 81.0  |     | 94.5   |     | 108.0  |     | 121.5 |     | 157.5  |     | 190.0  |     | 225.0  |     |
| L1       | 22.5  |     | 27.5  |     | 34.0  |     | 42.5   |     | 52.0   |     | 63.5  |     | 85.5   |     | 102.0  |     | 128.5  |     |
| L3       | 10.0  |     | 13.0  |     | 7.5   |     | 7.5    |     | 7.5    |     | 9.5   |     | 9.5    |     | 11.0   |     | 11.0   |     |
| ØF       | 6.0   |     | 7.5   |     | 7.5   |     | 7.5    |     | 7.5    |     | 9.5   |     | 9.5    |     | 11.0   |     | 11.0   |     |
| ØM       | 7.5   |     | 9.5   |     | 9.5   |     | 9.5    |     | 9.5    |     | 11.0  |     | 11.0   |     | 14.3   |     | 14.3   |     |
| ISO 5211 | 42    | 50  | 50    | 70  | 50    | 70  | 50     | 70  | 50     | 70  | 70    | 102 | 70     | 102 | 102    | 125 | 102    | 125 |
|          | F04   | F05 | F05   | F07 | F05   | F07 | F05    | F07 | F05    | F07 | F07   | F10 | F07    | F10 | F10    | F12 | F10    | F12 |
| SW       | 21.8  |     | 27.4  |     | 34.1  |     | 42.7   |     | 49.0   |     | 61.2  |     | 77.0   |     | 90.2   |     | 115.3  |     |
| D        | 9.0   |     | 9.0   |     | 11.0  |     | 11.0   |     | 14.0   |     | 14.0  |     | 17.00  |     | 17.0   |     | 22.0   |     |
| H        | 72.95 |     | 80.8  |     | 90.45 |     | 98.65  |     | 115.25 |     | 124.0 |     | 155.0  |     | 208.5  |     | 216.7  |     |
| D1       | 112.0 |     | 112.0 |     | 136.0 |     | 185.0  |     | 197.9  |     | 197.9 |     | 264.0  |     | 264.0  |     | 325.0  |     |
| S        | 8.5   |     | 8.5   |     | 11.4  |     | 11.4   |     | 14.0   |     | 13.7  |     | 18.0   |     | 18.0   |     | 23.0   |     |
| A        | 36.95 |     | 45.0  |     | 53.45 |     | 58.95  |     | 74.75  |     | 83.5  |     | 108.75 |     | 118.25 |     | 153.75 |     |
| CV       | 26    |     | 51    |     | 68    |     | 120    |     | 170    |     | 376   |     | 510    |     | 996    |     | 1893   |     |
| T(NM)    | 7     |     | 12    |     | 20    |     | 21     |     | 33     |     | 45    |     | 70     |     | 120    |     | 200    |     |

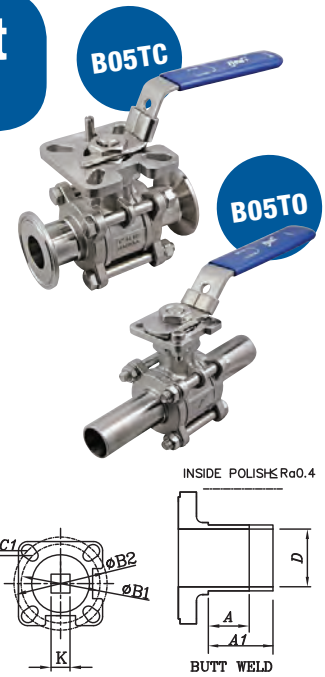
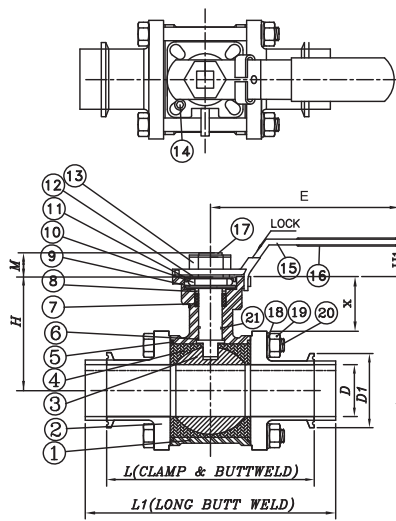
# 3-PC Full Port SS Ball Valve - Direct Mount

Pressure Rating: 1000 psi (69 bar) WOG for 1/2" to 4" / See Page 21 for Actuation

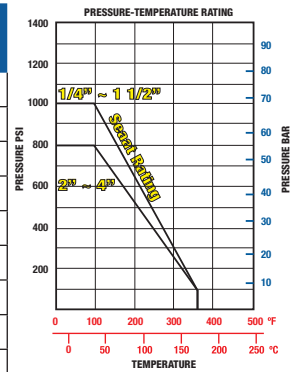
## Tri-Clamp (B05TC) and Tube (B05TO) Ends

- High Cycle, Live Loaded, Triple Stem Seal comprised of:
  - » Carbon filled PTFE wedge ring thrust washer and Viton O-Ring
  - » 15% RTFE Chevron packing
  - » Live loaded Belleville washers
  - » Packing nut mechanically locked to stem
- Investment cast body and ends
- Blow-out proof stem
- Full port
- Direct mounting pad for ISO Std 5211
- Tube ends
- Material: ASTM, A351-CF8M (316SS)

| No. | Part                   | Material      |
|-----|------------------------|---------------|
| 1.  | Body.....              | CF8/CF8M/CF3M |
| 2.  | Ends.....              | CF8/CF8M/CF3M |
| 3.  | Ball.....              | CF8/CF8M/CF3M |
| 4.  | Seat.....              | RPTFE         |
| 5.  | Gasket.....            | RPTFE         |
| 6.  | Thrust Packing.....    | RPTFE         |
| 7.  | Stem Packing.....      | RPTFE         |
| 8.  | Ring.....              | AISI 304      |
| 9.  | Belleville Washer..... | AISI 304      |
| 10. | Stem Nut.....          | AISI 304      |
| 11. | Lock Washer.....       | AISI 304      |
| 12. | Ring.....              | AISI 304      |
| 13. | Handle Nut.....        | AISI 304      |
| 14. | Stop Pin.....          | AISI 304      |
| 15. | Handle.....            | AISI 304      |
| 16. | Handle Sleeve.....     | Plastic       |
| 17. | Stem.....              | AISI 316      |
| 18. | Spring Washer.....     | AISI 304      |
| 19. | Bolt Nut.....          | AISI 304      |
| 20. | Bolt.....              | AISI 304      |
| 21. | O-Ring.....            | Viton         |

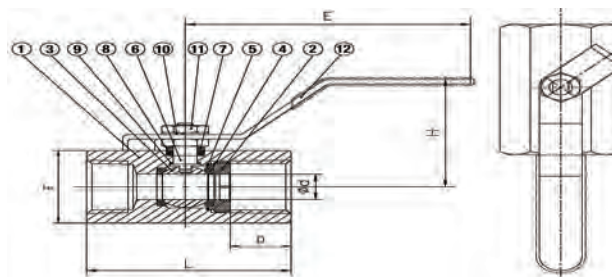


| Size | ISO    | D       | L    | H   | M     | ØB1 | ØB2 | K   | D1 | E     | D2  | H1    | A  | C1 | C2 | TORQUE IN LBS | X    | A1   | L1 ±1.0 | BWL   | Cv |      |
|------|--------|---------|------|-----|-------|-----|-----|-----|----|-------|-----|-------|----|----|----|---------------|------|------|---------|-------|----|------|
| DN   | NPS    | ±0.5    | ±1.0 |     | ±1.5  |     |     |     |    |       |     |       |    |    |    |               |      |      |         |       |    |      |
| 15   | 1/2"   | F03-F04 | 9.5  | 89  | 37.0  | 9   | 36  | 42  | 9  | 25.4  | 143 | 12.7  | 26 | 18 | 6  | 6             | 120  | 15.5 | 42      | 137   | 88 | 6    |
| 20   | 3/4"   | F03-F04 | 15.9 | 101 | 47.0  | 9   | 36  | 42  | 9  | 25.4  | 143 | 19.1  | 26 | 21 | 6  | 6             | 130  | 20.6 | 44      | 147   | 99 | 12.3 |
| 25   | 1"     | F04-F05 | 22.2 | 114 | 57.2  | 11  | 42  | 50  | 11 | 50.4  | 160 | 25.4  | 34 | 25 | 6  | 8             | 185  | 29.0 | 52      | 168   |    | 30   |
| 32   | 1 1/4" | F04-F05 | 28.5 | 124 | 62.5  | 11  | 42  | 50  | 11 | 50.4  | 160 | 31.8  | 41 | 27 | 6  | 8             | 250  | 29.0 |         |       |    | 50   |
| 40   | 1 1/2" | F05-F07 | 35.0 | 140 | 78.2  | 14  | 50  | 70  | 14 | 50.4  | 187 | 38.1  | 43 | 28 | 8  | 10            | 330  | 39.0 | 51      | 186   |    | 73.7 |
| 50   | 2"     | F05-F07 | 47.6 | 156 | 86.2  | 14  | 50  | 70  | 14 | 63.8  | 187 | 50.8  | 43 | 25 | 8  | 10            | 650  | 42.0 | 58.5    | 223   |    | 140  |
| 65   | 2 1/2" | F07-F10 | 60.3 | 197 | 109.2 | 17  | 70  | 102 | 17 | 77.6  | 310 | 63.5  | 53 | 35 | 10 | 12            | 850  | 48.0 | 61      | 250.4 |    | 245  |
| 80   | 3"     | F07-F10 | 73.0 | 229 | 116.2 | 17  | 70  | 102 | 17 | 91.0  | 310 | 76.2  | 53 | 43 | 10 | 12            | 1560 | 48.7 | 79      | 302   |    | 378  |
| 100  | 4"     | F10-F12 | 97.4 | 241 | 133.5 | 22  | 102 | 125 | 22 | 119.0 | 400 | 100.6 | 56 | 37 | 12 | 14            | 1900 | 34.0 | 75      | 317.5 |    | 760  |



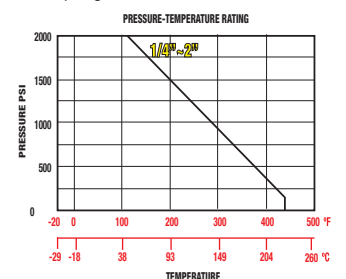
# 1-PC Reg. Port Carbon Steel 2000 PSI Ball Valve

Pressure Rating: 2000 psi (138 bar)



| Size   | D    | H    | L     | OD   | F    | E    | CV Factor | Kg   |
|--------|------|------|-------|------|------|------|-----------|------|
| 1/4"   | 12   | 31.8 | 41.3  | 5    | 21   | 66.7 | 1.5       | 0.21 |
| 3/8"   | 12.2 | 33.9 | 47.2  | 7    | 25.4 | 66.7 | 3.5       | 0.22 |
| 1/2"   | 17.4 | 55.5 | 62.5  | 9.2  | 30   | 118  | 5.7       | 0.29 |
| 3/4"   | 22.3 | 59   | 69.9  | 12.5 | 36   | 118  | 10        | 0.42 |
| 1"     | 25.5 | 65.4 | 85.9  | 16   | 46   | 120  | 16        | 0.71 |
| 1 1/4" | 27.8 | 74   | 93.7  | 20   | 55   | 146  | 25        | 1.06 |
| 1 1/2" | 29.6 | 78.7 | 101.6 | 24.5 | 61   | 146  | 40        | 1.68 |
| 2"     | 29.4 | 120  | 114.3 | 32   | 75   | 152  | 62        | 2.71 |

| No. | Part               | Material     |
|-----|--------------------|--------------|
| 1.  | Body.....          | A105         |
| 2.  | Insert.....        | A105         |
| 3.  | Ball.....          | AISI 316     |
| 4.  | Seat.....          | PTFE+15% G/F |
| 5.  | Stem.....          | AISI316      |
| 6.  | Thrust Washer..... | PTFE         |
| 7.  | Stem Seal.....     | PTFE         |
| 8.  | Handle.....        | AISI 304     |
| 9.  | Handle Sleeve..... | Vinyl        |
| 10. | Nut.....           | 304SS        |
| 11. | Washer.....        | WCB          |
| 12. | Spring Washer..... | 304SS        |



Sizes and specifications shown are subject to change without notice.

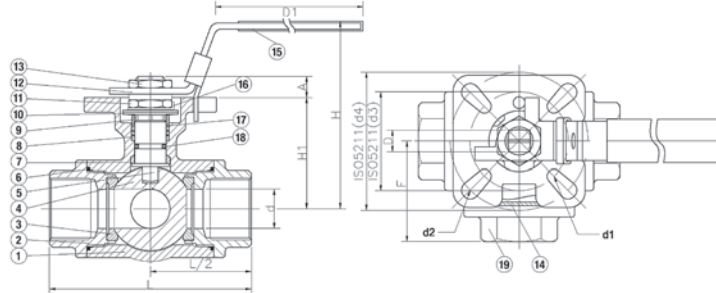
- NACE MR0175
- Blow-out proof stem
- FNPT thr eaded on both ends
- Material: ASTM A105N Carbon Steel

# 3-way Reg. Port SS Ball Valve - Direct Mount

Pressure Rating: 1000 psi (69 bar) WOG for 1/4" to 2" / See Page 21 for Actuation

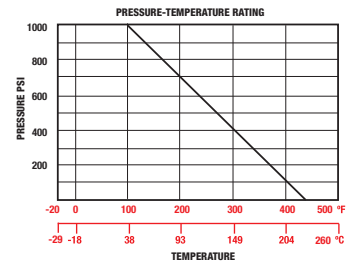
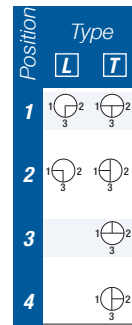


- High Cycle, Live Loaded, Triple Stem Seal comprised of:
  - » Carbon filled PTFE wedge ring thrust washer and Viton O-Ring
  - » 15% RTFE Chevron packing
  - » Live loaded Belleville washers
  - » Packing nut mechanically locked to stem
- Anti-static device
- L-Port and T-Port
- Blow-out proof stem
- FNPT end connections
- Material: ASTM A351-CF8M (316SS)
- Locking handle



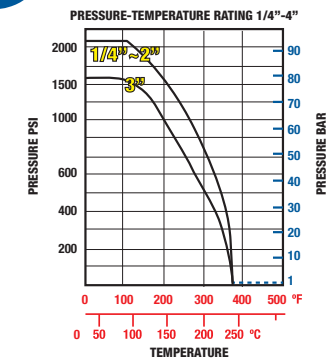
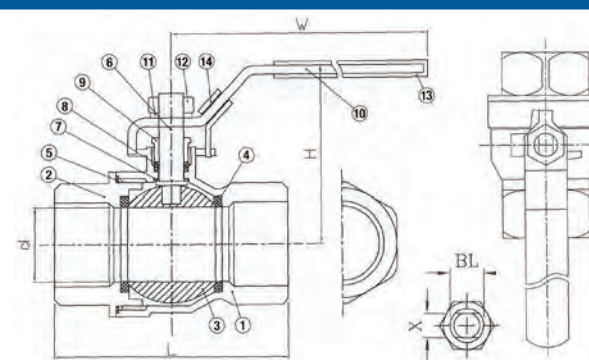
| No. Part              | Material           |
|-----------------------|--------------------|
| 1. Body               | ASTM-A351 Gr. CF8M |
| 2. Ends               | ASTM-A351 Gr. CF8M |
| 3. Seat               | 15% RTFE           |
| 4. Ball               | ASTM-A351 Gr. CF8M |
| 5. Stem               | 316SS              |
| 6. Gasket             | 15% RTFE           |
| 7. Thrust Washer      | PTFE +25% Carbon   |
| 8. Stem Packing       | 15% RTFE           |
| 9. Gland              | 304SS              |
| 10. Belleville Washer | SUS 304-CSP        |
| 11. Stem Nut          | 304SS              |
| 12. Handle            | 304SS              |
| 13. Handle Nut        | 304SS              |
| 14. Gasket            | 15% RTFE           |
| 15. Handle Sleeve     | Vinyl              |
| 16. Locking Washer    | SUS 304-CSP        |
| 17. Thrust Washer     | PTFE +25% Carbon   |
| 18. End Cap           | ASTM-A351 Gr. CF8M |
| 19. O-Ring            | Viton              |

| Size | dia (mm) | L     | F     | ISO 5211          | D  | H      | D1    | A    | C    | d1  | d2  | H1    | Torque (in-lbs) | Kg   | CV Factor |
|------|----------|-------|-------|-------------------|----|--------|-------|------|------|-----|-----|-------|-----------------|------|-----------|
| 1/2" | 12.7     | 75.7  | 37.25 | 42 F04<br>50 F05  | 9  | 77.45  | 112   | 8.5  | 12   | 6   | 7.5 | 40.65 | 85              | 0.67 | 6         |
| 3/4" | 16.0     | 86.6  | 44.7  | 50 F05<br>70 F07  | 9  | 82     | 112   | 8.5  | 12   | 7.5 | 9.5 | 45.2  | 110             | 1.07 | 8         |
| 1"   | 20.0     | 102.4 | 51.4  | 50 F05<br>70 F07  | 11 | 93.7   | 136.5 | 11.4 | 15.8 | 7.5 | 9.5 | 56.5  | 180             | 1.68 | 11        |
| 1½"  | 32.0     | 125.8 | 62.7  | 50 F05<br>70 F07  | 14 | 120.25 | 197.5 | 14   | 20.8 | 7.5 | 9.5 | 73.5  | 315             | 3.6  | 65        |
| 2"   | 38.1     | 149   | 74.6  | 70 F07<br>102 F10 | 14 | 129.85 | 197.5 | 13.7 | 20.8 | 9.5 | 11  | 87.35 | 450             | 5.8  | 112       |



# 2-PC Full Port Carbon Steel Ball Valve

Pressure Rating: 2000 psi (138 bar) WOG for 1/4" to 2" / 1500 (103.4 bar) WOG for 3"



- Blow-out proof stem
- Full port
- FNPT threaded on both ends
- Locking handle
- Carbon steel body and ends
- Material: ASTM A216-WCB
- NACE MR0175

| Size | dia (mm) | L    | H     | W   | X   | BL    | CV Factor | Torque (in-lbs) | Kg    |
|------|----------|------|-------|-----|-----|-------|-----------|-----------------|-------|
| 1/4" | 11.6     | 44.5 | 51    | 95  | 5   | 5/16" | 6.6       | 35              | 0.194 |
| 3/8" | 12.7     | 44.5 | 51    | 95  | 5   | 5/16" | 7.9       | 35              | 0.205 |
| 1/2" | 15       | 57   | 53    | 95  | 5   | 5/16" | 11.2      | 47              | 0.285 |
| 3/4" | 20       | 65   | 59.5  | 100 | 6.5 | 3/8"  | 21        | 64              | 0.456 |
| 1"   | 25       | 76   | 73    | 135 | 8   | 7/16" | 35        | 90              | 0.764 |
| 1¼"  | 32       | 87.5 | 79    | 135 | 8   | 7/16" | 57        | 117             | 1.163 |
| 1½"  | 38       | 102  | 90.5  | 165 | 9   | 1/2"  | 80        | 156             | 1.870 |
| 2"   | 50       | 123  | 98.8  | 165 | 9   | 1/2"  | 148       | 217             | 3.126 |
| 3"   | 80       | 184  | 142.5 | 215 | 12  | 3/4"  | 415       | 651             | 9.79  |

| No. Part (Qty)        | Material       |
|-----------------------|----------------|
| 1. Body (1)           | ASTM-A216-WCB  |
| 2. Ends (1)           | ASTM-A216-WCB  |
| 3. Ball (1)           | ASTM-CF8M-A351 |
| 4. Ball Seat (2)      | 15% R-PTFE     |
| 5. Joint Gasket (1)   | PTFE           |
| 6. Stem (1)           | AISI 316       |
| 7. Thrust Washer (1)  | PTFE           |
| 8. Stem Packing (2)   | PTFE           |
| 9. Gland Nut (1)      | AISI 304       |
| 10. Handle (1)        | AISI 304       |
| 11. Spring Washer (1) | AISI 304       |
| 12. Stem Nut (1)      | AISI 304       |
| 13. Handle Sleeve (1) | Vinyl          |
| 14. Lock Device (1)   | AISI 304       |

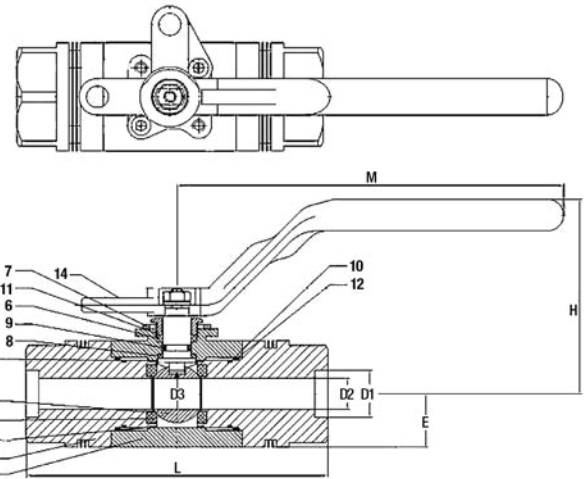


# 3-PC Threaded Body 3000/6000 PSI Ball Valve

Pressure Rating: 3000 psi for the BT3 and 6000 psi for the BT6



Available in threaded, socket weld and threaded-socket weld.



## SPECIFICATIONS AND FEATURES

- Designed to ASME B16.34
- NPT and SW to ASME B16.11
- Tested to API 598
- API 607 Fire-safe
- NACE MR0175
- Available in full port and regular port
- Forged steel body
- Locking lever
- Blow-out proof stem
- Anti-static device
- Mounting device

### STANDARD SOUR

| No. | Part              | Material                     |
|-----|-------------------|------------------------------|
| 1.  | Body              | A105N                        |
| 2.  | Cap               | A105N                        |
| 3.  | Ball              | CF8M / 316SS / 17/4 PH       |
| 4.  | Stem              | 316SS / A564 Gr. 630 17/4 PH |
| 5.  | Seat*             | PEEK                         |
| 6.  | Packing Ring      | 304SS                        |
| 7.  | Gland             | Carbon Steel                 |
| 8.  | Thrust Washer     | Delrin/PEEK                  |
| 9.  | Packing           | Graphite                     |
| 10. | O-Ring            | Viton-B                      |
| 11. | O-Ring            | Viton-B                      |
| 12. | Gasket            | Graphite                     |
| 13. | Belleville Washer | 302SS                        |
| 14. | Handle            | A216 WCB                     |

\*NPT valves

### LOW TEMP / SOUR

| No. | Part              | Material                     |
|-----|-------------------|------------------------------|
| 1.  | Body              | A350 LF2                     |
| 2.  | Cap               | A350 LF2                     |
| 3.  | Ball              | CF8M / 316SS / 17/4 PH       |
| 4.  | Stem              | 316SS / A564 Gr. 630 17/4 PH |
| 5.  | Seat*             | PEEK                         |
| 6.  | Packing Ring      | 304SS                        |
| 7.  | Gland             | Carbon Steel                 |
| 8.  | Thrust Washer     | PEEK                         |
| 9.  | Packing           | Graphite                     |
| 10. | O-Ring            | Viton-B                      |
| 11. | O-Ring            | Viton-B                      |
| 12. | Gasket            | Graphite                     |
| 13. | Belleville Washer | 302SS                        |
| 14. | Handle            | A216 WCB                     |

### STAINLESS STEEL / SOUR

| No. | Part              | Material                     |
|-----|-------------------|------------------------------|
| 1.  | Body              | 316SS                        |
| 2.  | Cap               | 316SS                        |
| 3.  | Ball              | CF8M / 316SS / 17/4 PH       |
| 4.  | Stem              | 316SS / A564 Gr. 630 17/4 PH |
| 5.  | Seat*             | PEEK                         |
| 6.  | Packing Ring      | 304SS                        |
| 7.  | Gland             | Carbon Steel                 |
| 8.  | Thrust Washer     | PEEK                         |
| 9.  | Packing           | Graphite                     |
| 10. | O-Ring            | Viton-B                      |
| 11. | O-Ring            | Viton-B                      |
| 12. | Gasket            | Graphite                     |
| 13. | Belleville Washer | 302SS                        |
| 14. | Handle            | A351 CF8M                    |

| Size          | Size (mm) | L<br>NPT | L<br>SW | L<br>NPT x SW | E  | H   | D1   | D2   | D3   | M   | Torque<br>(in-lbs) |
|---------------|-----------|----------|---------|---------------|----|-----|------|------|------|-----|--------------------|
| 1/2" FP-BT3   | 12.7      | 98       | 127     | 113           | 19 | 83  | 21.8 | 12.7 | 12.7 | 160 | 156                |
| 1/2" FP-BT6   | 12.7      | 98       | 127     | 119           | 19 | 83  | 21.8 | 12.7 | 12.7 | 160 | 214                |
| 3/4" FP       | 19        | 108      | 172     | 140           | 24 | 90  | 27.8 | 19   | 19   | 160 | 358                |
| 3/4" RP       | 19        | 111      | 172     | 140           | 19 | 83  | 27.8 | 19   | 12.7 | 160 | 156                |
| 1" FP         | 25        | 108      | 172     | 152           | 27 | 94  | 48.8 | 25   | 25   | 200 | 441                |
| 1" RP-BT3     | 25        | 108      | 172     | 140           | 24 | 90  | 48.8 | 25   | 19   | 160 | 358                |
| 1" RP-BT6     | 25        | 108      | 172     | 152           | 24 | 90  | 48.8 | 25   | 19   | 160 | 560                |
| 1 1/2" FP     | 38.1      | 159      | 217     | 188           | 37 | 122 | 33.9 | 38.1 | 38.1 | 250 | 885                |
| 1 1/2" RP-BT3 | 38.1      | 159      | 217     | 188           | 27 | 94  | 33.9 | 38.1 | 25   | 200 | 441                |
| 1 1/2" RP-BT6 | 38.1      | 159      | 217     | 201           | 27 | 94  | 33.9 | 38.1 | 25   | 200 | 841                |
| 2" FP         | 50        | 159      | 324     | 241           | 43 | 150 | 61.2 | 50   | 50   | 325 | 2847               |
| 2" RP-BT3     | 50        | 159      | 217     | 188           | 37 | 122 | 61.2 | 50   | 38.1 | 250 | 885                |
| 2" RP-BT6     | 50        | 159      | 217     | 201           | 37 | 122 | 61.2 | 50   | 38.1 | 250 | 1290               |

Sizes and specifications shown are subject to change without notice.

Z SERIES FLOATING FLANGED BALL VALVES

PART NUMBERING SYSTEM

1

1 = Code and Class

- ZR1 = Reduced port class 150
- ZR3 = Reduced port class 300
- ZR6 = Reduced port class 600
- ZF1 = Full port class 150
- ZF3 = Full port class 300
- ZF6 = Full port class 600

2

2 = Size

- 050 = 1/2"      250 = 2 1/2"
- 075 = 3/4"      003 = 3"
- 001 = 1"        004 = 4"
- 150 = 1 1/2"    006 = 6"
- 002 = 2"        008 = 8"

3

3 = Type

- A = Floating ball split body
- B = Floating ball uni-body
- L = 3-Way L port
- T = 3-Way T port

4

4 = Type

- 1 = ASTM A216 WCB, Non Direct Mount
- 2 = ASTM A325 LCC
- 3 = ASTM A351 CF8M, ISO Direct Mount
- 4 = A105N
- 5 = A350 LF2
- 6 = ASTM A351 CF8M, ISO Non Direct Mount

5

5 = End Connection

- F = Raised face flanged\*
- R = Ring joint flanged ends
- B = Butt-welded ends

6

6 = Trim Material

- 1 = Body + 3ENC
- 2 = 304SS
- 3 = 316SS\*

7

7 = Seat Material

- P = PTFE
- R = RTFE\*
- N = Nylon
- K = PEEK
- D = Devlon

8

8 = Operator

- H = Handle/Lever
- G = Gear Operator
- B = Bare Stem

9

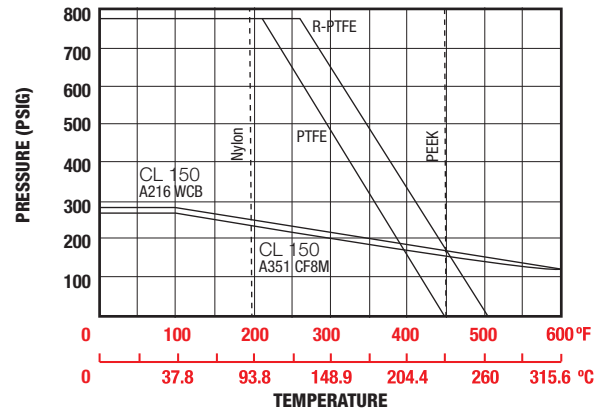
9 = Special Requirements

- 00 = Standard Requirement

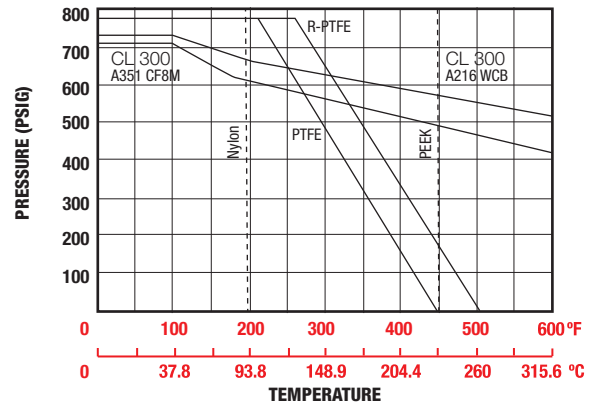
\*Denotes standard stock trim.

# Z Series Pressure and Temperature Charts

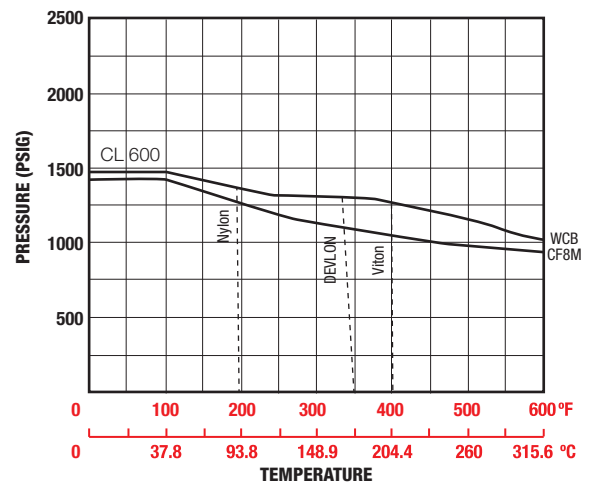
## CLASS #150



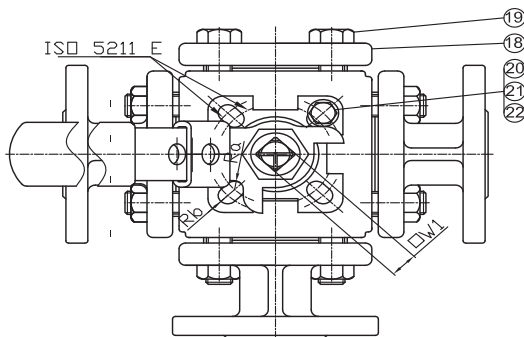
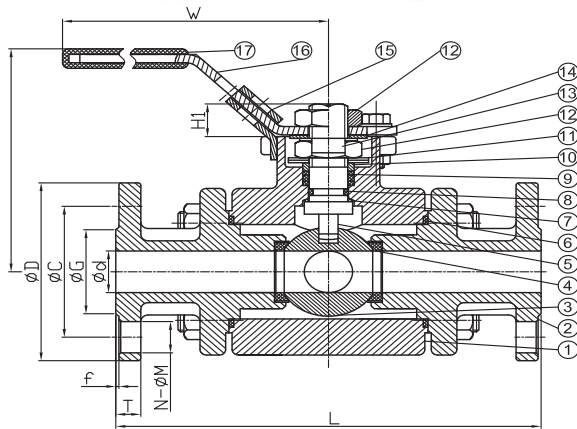
## CLASS #300



## CLASS #600



# ZF1- 150# Full Port 3-Way Flanged SS L/T PORT



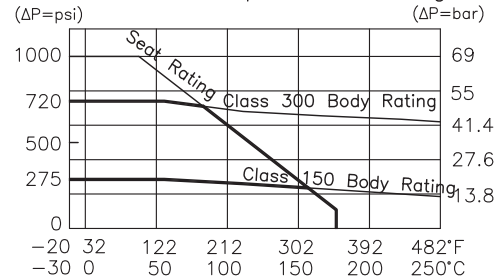
**FEATURES:**

- END FLANGE DIMENSION: ASME B16.5
- TEST: ASME B16.34
- INVESTMENT CASTING BODY
- WITH ISO 5211 MOUNTING PAD
- LOCKING DEVICE
- THERE ARE FOUR SEATS
- L-PORT OR T-PORT AVAILABLE / 360°PAD

**MATERIALS LIST:**

| NO. | PART NAME      | MATERIAL |
|-----|----------------|----------|
| 1   | BODY           | CF8M     |
| 2   | CAP            | CF8M     |
| 3   | BALL           | CF8M     |
| 4   | SEAT           | RPTFE    |
| 5   | STEM           | SUS316   |
| 6   | GASKET         | RPTFE    |
| 7   | THRUST WASHER  | TFM4215  |
| 8   | O-RING         | VITON    |
| 9   | PACKING        | RPTFE    |
| 10  | GLAND          | SUS304   |
| 11  | SPRING WASHER  | SUS301   |
| 12  | STEM NUT       | SUS304   |
| 13  | STOP WASHER    | SUS304   |
| 14  | HANDLE WASHER  | SUS304   |
| 15  | LOCKING DEVICE | SUS304   |
| 16  | HANDLE         | SUS304   |
| 17  | PLASTIC COVER  | PLASTIC  |
| 18  | CAP-A          | CF8M     |
| 19  | BOLT           | SUS304   |
| 20  | STOP PIN       | SUS304   |
| 21  | BOLT           | SUS304   |
| 22  | NUT            | SUS304   |

**Pressure Temperature Rating**



| SIZE    | d  | D   | C    | G  | T    | f   | N | M  | L   | H  | W   | ISO 5211 | E     | H1 | W1 | Ra | Rb   |
|---------|----|-----|------|----|------|-----|---|----|-----|----|-----|----------|-------|----|----|----|------|
| 15 1/2" | 15 | 89  | 60.5 | 35 | 11.1 | 1.6 | 4 | 16 | 148 | 80 | 123 | F03-F04  | 36-42 | 9  | 9  | R3 | R3   |
| 20 3/4" | 20 | 98  | 70.0 | 43 | 11.1 | 1.6 | 4 | 16 | 153 | 84 | 123 | F03-F04  | 36-42 | 9  | 9  | R3 | R3   |
| 25 1"   | 25 | 108 | 79.5 | 51 | 11.1 | 1.6 | 4 | 16 | 168 | 96 | 153 | F04-F05  | 42-50 | 11 | 11 | R3 | R3.5 |

**TEST PRESSURE:**

|                  |                      |
|------------------|----------------------|
| SHELL (BY WATER) | 450PSI               |
|                  | 32kg/cm <sup>2</sup> |
| SEAT BY AIR      | 85PSI                |
|                  | 6kg/cm <sup>2</sup>  |

**FLOW PATTERN:**

| PORT TYPE | 1     | 2     | 3     | 4     |
|-----------|-------|-------|-------|-------|
| L         | 1-2-3 | 1-2-3 | 1-2-3 | 1-2-3 |
| T         | 1-2-3 | 1-2-3 | 1-2-3 | 1-2-3 |

| SIZE      | d   | D   | C     | G   | T    | f   | N | M  | L   | H   | W    | ISO 5211 | E   | H1 | W1 | Ma  |
|-----------|-----|-----|-------|-----|------|-----|---|----|-----|-----|------|----------|-----|----|----|-----|
| 40 1 1/2" | 40  | 127 | 98.5  | 73  | 14.3 | 1.6 | 4 | 16 | 221 | 171 | 403  | F07      | 70  | 19 | 17 | □10 |
| 50 2"     | 50  | 152 | 120.5 | 92  | 15.9 | 1.6 | 4 | 19 | 254 | 176 | 403  | F07      | 70  | 19 | 17 | □10 |
| 65 2 1/2" | 65  | 178 | 139.5 | 105 | 17.5 | 1.6 | 4 | 19 | 300 | 208 | 504  | F10      | 102 | 24 | 22 | □12 |
| 80 3"     | 76  | 190 | 152.5 | 127 | 19.1 | 1.6 | 4 | 19 | 305 | 216 | 504  | F10      | 102 | 24 | 22 | □12 |
| 100 4"    | 96  | 229 | 190.5 | 157 | 23.9 | 1.6 | 8 | 19 | 369 | 236 | 654  | F10      | 102 | 24 | 22 | □12 |
| 150 6"    | 148 | 279 | 241.5 | 216 | 25.4 | 1.6 | 8 | 22 | 480 | 329 | 800  | F14      | 140 | 38 | 36 | □18 |
| 200 8"    | 200 | 343 | 298.5 | 270 | 28.6 | 1.6 | 8 | 22 | 630 | 354 | 1000 | F14      | 140 | 40 | 36 | □18 |

Sizes and specifications shown are subject to change without notice.

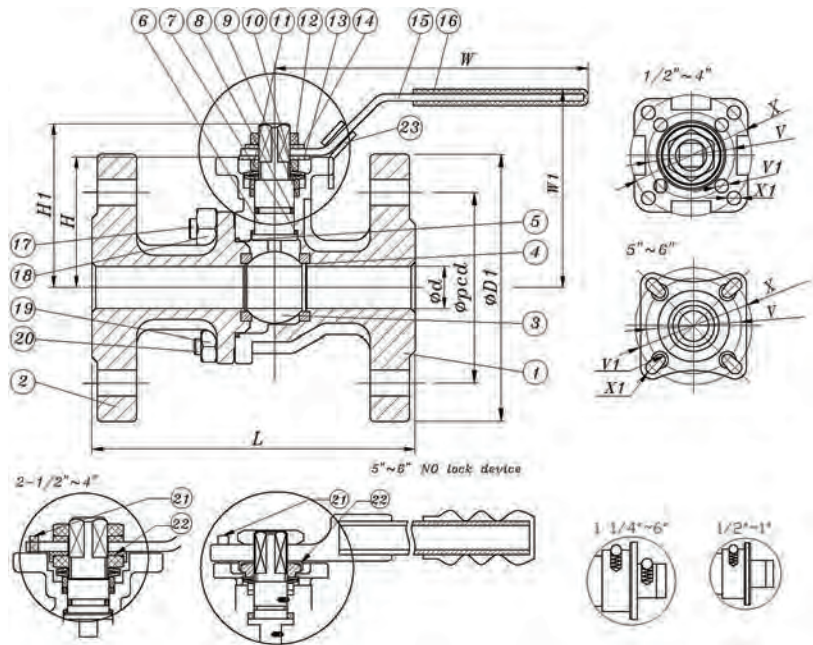
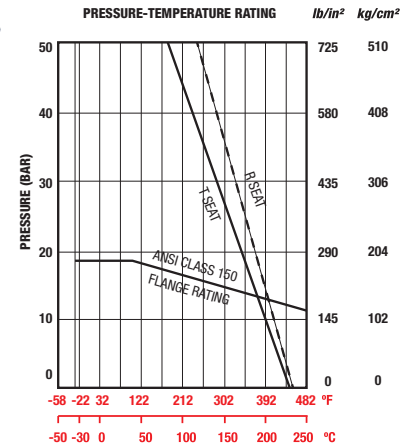
# ZF1 – 150# Full Port Direct Mount SS

## SPECIFICATIONS

- Designed according to ASME/ANSI Class 150 B16.34
- Face to Face per ASME/ANSI B16.10 Long Pattern
- Flanged designed per ASME/ANSI B16.5
- NACE MR0175
- Design Standard per API 608
- Markings per MSS-SP25
- Pressure Test per API 598

## FEATURES

- Full bore, 2 piece body floating ball
- ISO mounting pad, direct mounting
- Blow-out proof stem
- Cavity Relieved seats, anti-static device
- Lever operated



No. Part (Qty) Material

1. Body (1) .....ASTM-A351 CF8M
2. Cap (1).....ASTM-A351 CF8M
3. Ball (1) .....ASTM-A351 CF8M
4. Ball Seat (2)..... 15% R-PTFE
5. Joint Gasket (1) ..... PTFE +25% Carbon
6. Stem (1) .....AISI 316
7. Thrust Washer (1) ..... PTFE +25% Carbon
8. O-Ring (1) ..... Viton
9. Stem Packing (1) ..... PTFE +25% Carbon
10. Stem Ring (1) .....AISI 304
11. Belleville Washer (1).....AISI 304
12. Stem Nut (2).....AISI 304
13. Stopper (2) .....AISI 304
14. Spring Washer (1).....AISI 304
15. Handle (1) .....AISI 304
16. Plastic Cover (1)..... Plastic
17. Nut\*1 (1) .....AISI 304
18. Stud Bolt\*1 (1).....AISI 304
19. Nut\*2 (3,5,7) .....AISI 304
20. Stud Bolt\*2 (3,5,7) .....AISI 304
21. Stopper Pin (1).....AISI 304
22. Lock Washer (1).....AISI 304
23. Lock Device (1).....AISI 304

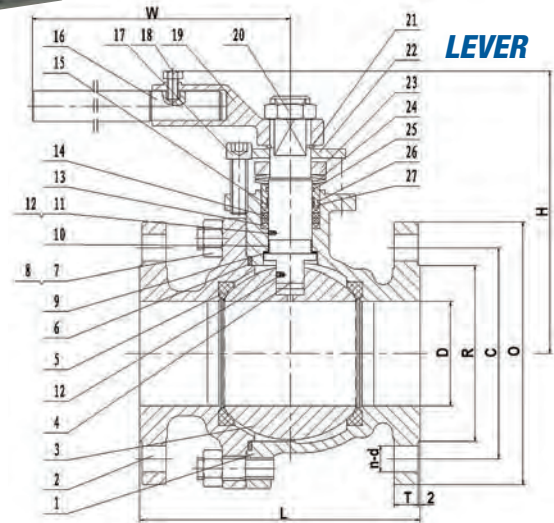
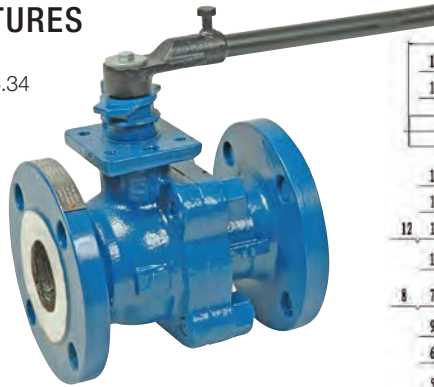
| Size | d     | D1     | pcd    | L      | H     | H1    | W      | W1    | V     | V1    | X     | X1    | Stem Diameter | Torque     | WT      | CV   |
|------|-------|--------|--------|--------|-------|-------|--------|-------|-------|-------|-------|-------|---------------|------------|---------|------|
| 1/4" | 0.59" | 3.5"   | 2.38"  | 4.25"  | 1.83" | 2.20" | 4.3"   | 3.50" | 1.65" | 0.24" | 1.97" | 0.28" | 0.35"         | 85 in lb   | 3.6 lb  |      |
| 12   | 15    | 89     | 60.5   | 108    | 46.5  | 56    | 110    | 89    | 42    | 6     | 50    | 7     | 9             | 9.6 Nm     | 1.6 kg  | 27   |
| 3/4" | 0.79" | 3.875" | 2.75"  | 4.6"   | 2.03" | 2.40" | 4.3"   | 3.70" | 1.97" | 0.3"  | 2.76" | 0.38" | 0.35"         | 110 in lb  | 4.5 lb  |      |
| 20   | 20    | 98     | 70     | 117    | 51.5  | 61    | 110    | 94    | 50    | 7.6   | 70    | 9.6   | 9             | 12.4 Nm    | 2 kg    | 50   |
| 1"   | 0.98" | 4.25"  | 3.125" | 5"     | 2.26" | 2.64" | 5.35"  | 3.74" | 1.97" | 0.3"  | 2.76" | 0.38" | 0.43"         | 180 in lb  | 7 lb    |      |
| 25   | 25    | 108    | 79.5   | 127    | 57.5  | 67    | 136    | 95    | 50    | 76    | 70    | 9.6   | 11            | 20.3 Nm    | 3.2 kg  | 95   |
| 1½"  | 1.57" | 5"     | 3.875" | 6.5"   | 3.01" | 3.62" | 8"     | 4.36" | 2.76" | 0.38" | 4.02" | 0.44" | 0.55"         | 315 in lb  | 14 lb   |      |
| 38   | 40    | 127    | 98.5   | 165    | 76.5  | 92    | 203    | 110.7 | 70    | 9.6   | 102   | 11.2  | 14            | 35.6 Nm    | 6.4 kg  | 280  |
| 2"   | 1.97" | 6"     | 4.75"  | 7"     | 3.29" | 3.90" | 8"     | 4.63" | 2.76" | 0.38" | 4.02" | 0.44" | 0.55"         | 450 in lb  | 21 lb   |      |
| 50.8 | 50    | 152.4  | 120.5  | 178    | 83.5  | 99    | 203    | 117.7 | 70    | 9.6   | 102   | 11.2  | 14            | 50.8 Nm    | 9.5 kg  | 490  |
| 2½"  | 2.56" | 7.01"  | 5.49"  | 7.48"  | 4.57" | 5.39" | 10.93" | 6.12" | 4.02" | 0.44" | 4.92" | 0.56" | 0.67"         | 565 in lb  | 36 lb   |      |
| 63.5 | 65    | 178    | 139.5  | 190    | 118.5 | 137   | 277.5  | 155.5 | 102   | 11.2  | 125   | 14.3  | 17            | 63.8 Nm    | 16.3 kg | 750  |
| 3"   | 3.14" | 7.5"   | 6"     | 8"     | 5.10" | 5.83" | 10.93" | 6.56" | 4.02" | 0.44" | 4.92" | 0.56" | 0.67"         | 680 in lb  | 48 lb   |      |
| 75   | 80    | 190.5  | 152.5  | 203    | 129.5 | 148   | 277.5  | 166.5 | 102   | 11.2  | 125   | 14.3  | 17            | 76.8 Nm    | 22 kg   | 1160 |
| 4"   | 3.94" | 9"     | 7.5"   | 9.06"  | 5.71" | 6.44" | 14.86" | 7.17" | 4.02" | 0.44" | 4.92" | 0.56" | 0.87"         | 1190 in lb | 79 lb   |      |
| 100  | 100   | 229    | 190.5  | 230    | 145   | 163.5 | 377.5  | 182   | 102   | 11.2  | 125   | 14.3  | 22            | 134.5 Nm   | 36 kg   | 2200 |
| 6"   | 5.9"  | 11"    | 9.5"   | 15.51" | 6.89" | 8.61" | 21.65" | 7.17" | 4.92" | 0.56" | 5.51" | 0.73" | 1.06"         | 2850 in lb | 207 lb  |      |
| 150  | 150   | 280    | 241.5  | 994    | 175   | 218.6 | 550    | 182   | 125   | 14.3  | 140   | 18.6  | 27            | 322 Nm     | 94 kg   | 5100 |

Sizes and specifications shown are subject to change without notice.

# ZF1 – 150# Full Port Carbon Steel and Low Temp

## SPECIFICATIONS AND FEATURES

- Fire-safe to API-607, latest Ed.
- Designed to ASME/ANSI Class 150-B16.34
- Face to Face to ASME/ANSI B16.10 Long Pattern
- Flanges to ASME/ANSI B16.5
- NACE MR0175
- Design Standard per API 608
- Pressure Test per API 598
- Full bore, 2 piece body floating ball
- ISO mounting pad, direct mounting
- Blow-out proof stem
- Cavity relieving seats, anti-static device
- Lever operated 2"-6", gear operated 8"

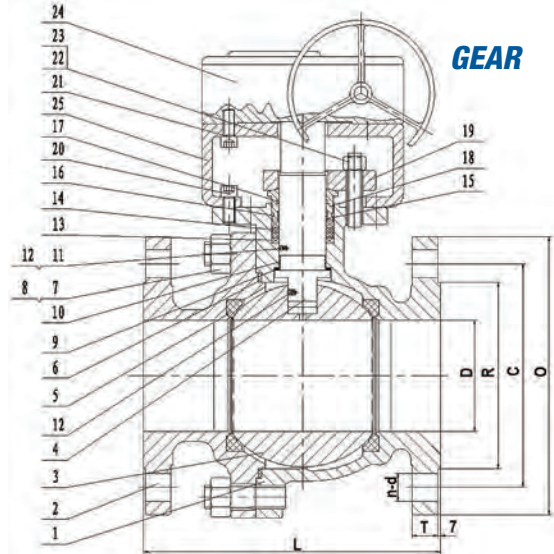


### LEVER and GEAR PARTS LIST

| No. Part                    | WCB BODY                  | LCC BODY                  |
|-----------------------------|---------------------------|---------------------------|
| 1. Body                     | A216 WCB                  | A352 LCC                  |
| 2. End                      | A216 WCB                  | A352 LCC                  |
| 3. Ball                     | A182 F316                 | A182 F316                 |
| 4. Stem                     | A182 F316                 | A182 F316                 |
| 5. Seat                     | R-PTFE                    | R-PTFE                    |
| 6. Body Gasket              | 304 Graphite Spiral Wound | 304 Graphite Spiral Wound |
| 7. Nut                      | A194-2HM                  | A194-2HM                  |
| 8. Full-threaded Bolt       | A193-B7M                  | A320 L7M                  |
| 9. Stem Gasket              | PTFE                      | PTFE                      |
| 10. Stem Bearing            | PTFE                      | PTFE                      |
| 11. Steel Ball              | A276 304                  | A276 304                  |
| 12. Anti-static Spring      | A276 304                  | A276 304                  |
| 13. Stem Firesafe Gasket I  | Flexible Graphite + 316   | Flexible Graphite + 316   |
| 14. Stem Firesafe Gasket II | Flexible Graphite         | Flexible Graphite         |
| 15. Packing Gland Bearing   | PTFE                      | PTFE                      |

### LEVER PARTS ONLY

|                          |           |           |
|--------------------------|-----------|-----------|
| 16. Lever                | AISI 1020 | AISI 1020 |
| 17. Screw                | A193-B7M  | A320 L7M  |
| 18. Hex Bolt             | A193-B7M  | SS        |
| 19. Joint                | A216 WCB  | A352 LCC  |
| 20. Nut                  | AISI 1020 | AISI 1020 |
| 21. Axial Retaining Ring | AISI 1566 | AISI 1566 |
| 22. Limit Block          | A36       | A36       |
| 23. Nut                  | AISI 1020 | AISI 1020 |
| 24. Belleville Washer    | A276 304  | A276 304  |
| 25. O-Ring               | Viton     | Viton     |
| 26. O-Ring               | Viton     | Viton     |
| 27. Packing Bushing      | A276 316  | A276 316  |



### GEAR PARTS ONLY

|                     | WCB BODY  |
|---------------------|-----------|
| 16. O-Ring          | Viton     |
| 17. O-Ring          | Viton     |
| 18. Packing Bushing | A276 316  |
| 19. Packing Plate   | A216 WCB  |
| 20. Inner Hex Screw | A193-B7M  |
| 21. Inner Hex Screw | A194-B7M  |
| 22. Nut             | A194-2HM  |
| 23. Bolt            | A193-B7M  |
| 24. Actuator        | Component |
| 25. Yoke            | A36       |

|                     | LCC BODY  |
|---------------------|-----------|
| 16. O-Ring          | Viton     |
| 17. O-Ring          | Viton     |
| 18. Packing Bushing | A276 316  |
| 19. Packing Plate   | A352 LCC  |
| 20. Inner Hex Screw | A320 L7M  |
| 21. Inner Hex Screw | A320 L7M  |
| 22. Nut             | A194 7M   |
| 23. Bolt            | A320 L7M  |
| 24. Actuator        | Component |
| 25. Yoke            | A36       |

| Size   | L      | D     | R       | C      | O      | n-d    | T      | W      | H      | WT       | Torque     |             |        |
|--------|--------|-------|---------|--------|--------|--------|--------|--------|--------|----------|------------|-------------|--------|
|        |        |       |         |        |        |        |        |        |        |          | 150 PSI    | 285 PSI     | CV     |
| 1/2"   | 4.25"  | 0.51" | 1.375"  | 2.375" | 3.5"   | 0.625" | 0.438" | 5.91"  | 3.19"  | 4.85 lb  | 71 in lb   | 107 in lb   |        |
| 12.7   | 108    | 13    | 34.93   | 60.33  | 88.9   | 4-62   | 11.11  | 150    | 81     | 2.2 kg   | 8 Nm       | 12 Nm       | 24     |
| 3/4"   | 4.61"  | 0.75" | 1.6875" | 2.75"  | 3.875" | 0.625" | 0.5"   | 5.91"  | 3.35"  | 5.95 lb  | 80 in lb   | 124 in lb   |        |
| 19.05  | 117    | 19    | 42.86   | 69.85  | 98.43  | 4-62   | 12.7   | 150    | 85     | 2.7 kg   | 9 Nm       | 14 Nm       | 53     |
| 1"     | 5.0"   | 0.98" | 2"      | 3.125" | 4.25"  | 0.625" | 0.56"  | 7.09"  | 3.86"  | 9.92 lb  | 142 in lb  | 239 in lb   |        |
| 25.4   | 127    | 25    | 50.8    | 79.38  | 107.98 | 4-62   | 14.29  | 180    | 98     | 4.5 kg   | 16 Nm      | 27 Nm       | 92     |
| 1 1/2" | 6.5"   | 1.50" | 2.875"  | 3.875" | 5"     | 0.625" | 0.69"  | 11.02" | 5.24"  | 15.43 lb | 292 in lb  | 487 in lb   |        |
| 38.1   | 165    | 38    | 73.03   | 98.43  | 127    | 4-62   | 17.46  | 280    | 133    | 7 kg     | 33 Nm      | 55 Nm       | 211    |
| 2"     | 7"     | 1.97" | 3.625"  | 4.75"  | 5.9"   | 0.625" | 0.75"  | 11.02" | 6.14"  | 22 lb    | 372 in lb  | 620 in lb   |        |
| 50.8   | 178    | 50    | 92.1    | 120.7  | 150    | 4-19   | 14.3   | 242    | 156    | 9.8 kg   | 42 Nm      | 70 Nm       | 450    |
| 3"     | 8"     | 2.95" | 5"      | 6"     | 7.48"  | 0.625" | 0.88"  | 13.78" | 8.07"  | 44 lb    | 797 in lb  | 1328 in lb  |        |
| 76.2   | 203    | 75    | 127     | 152.4  | 190    | 4-19   | 17.5   | 350    | 205    | 20 kg    | 90 Nm      | 150 Nm      | 1100   |
| 4"     | 9.02"  | 3.98" | 6.19"   | 7.5"   | 9.05"  | 0.625" | 1.06"  | 18.11" | 8.858" | 77 lb    | 1328 in lb | 2168 in lb  |        |
| 101.6  | 229    | 101   | 157.2   | 190.5  | 230    | 8-19   | 22.3   | 460    | 225    | 35 kg    | 150 Nm     | 245 Nm      | 2200   |
| 6"     | 15.51" | 5.94" | 8.5"    | 9.5"   | 11.02" | 0.625" | 1.06"  | 29.53" | 12.48" | 211 lb   | 3009 in lb | 4956 in lb  |        |
| 152.4  | 394    | 151   | 215.9   | 241.3  | 280    | 8-22.5 | 23.9   | 750    | 317    | 96 kg    | 340 Nm     | 560 Nm      | 5200   |
| 8"     | 18"    | 7.95" | 10.625" | 11.75" | 13.58" | 0.625" | 1.06"  | //     | //     | 364 lb   | 7213 in lb | 12001 in lb |        |
| 203.2  | 457    | 202   | 269.9   | 298.5  | 345    | 8-22.5 | 27     | //     | //     | 165 kg   | 815 Nm     | 1356 Nm     | 10,000 |

# ZR1 – 150# Reg. Port Carbon Steel and Low Temp

## SPECIFICATIONS

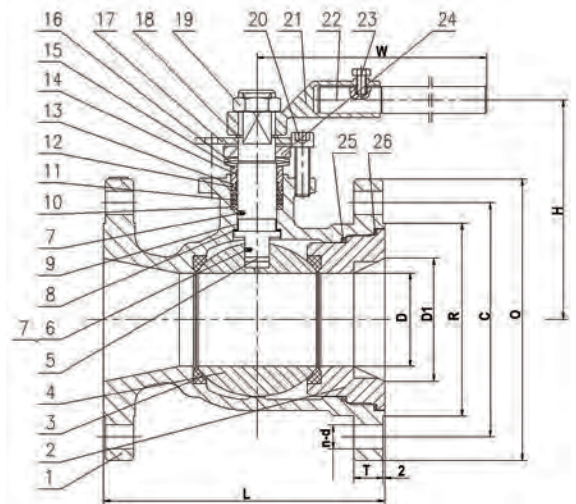
- Fire-safe to API-607, latest Ed.
- Designed to ASME/ANSI Class 150-B16.34
- Face to Face to ASME/ANSI B16.10 Short Pattern
- Markings per MSS-SP25
- NACE MR0175
- Design Standard per API 608
- Pressure Test per API 598

## FEATURES

- Reduced bore, 1 piece uni-body floating ball
- ISO mounting pad
- Blow-out proof stem
- Cavity relieving seats, anti-static device
- Lever operated



| No. Part                    | WCB BODY                  | LCC BODY                  |
|-----------------------------|---------------------------|---------------------------|
| 1. Body                     | A216 WCB                  | A352 LCC                  |
| 2. End                      | A216 WCB                  | A352 LCC                  |
| 3. Seat                     | R-PTFE                    | R-PTFE                    |
| 4. Ball                     | A182 F316                 | A182 F316                 |
| 5. Stem                     | A182 F316                 | A182 F316                 |
| 6. Stem Steel Ball          | A276 304                  | A276 304                  |
| 7. Spring                   | A276 304                  | A276 304                  |
| 8. Stem Gasket              | PTFE                      | PTFE                      |
| 9. Stem Bearing             | PTFE                      | PTFE                      |
| 10. Stem Firesafe Gasket I  | Flexible Graphite + 316   | Flexible Graphite + 316   |
| 11. Stem Firesafe Gasket II | Flexible Graphite         | Flexible Graphite         |
| 12. Packing Bushing Bearing | PTFE                      | PTFE                      |
| 13. O-Ring                  | Viton                     | Viton                     |
| 14. O-Ring                  | Viton                     | Viton                     |
| 15. Packing Bushing         | A276 316                  | A276 316                  |
| 16. Belleville Washer       | A276 304                  | A276 304                  |
| 17. Limit Block             | A36                       | A36                       |
| 18. Axial Retaining Ring    | AISI 1566                 | AISI 1566                 |
| 19. Nut                     | SS                        | SS                        |
| 20. Screw                   | A193 B7M                  | AZ320 L7M                 |
| 21. Joint                   | A216 WCB                  | A216 LCC                  |
| 22. Lever                   | AISI 1020                 | AISI 1020                 |
| 23. Hex Bolt                | CS                        | CS                        |
| 24. Nut                     | SS                        | SS                        |
| 25. Gasket                  | PTFE                      | PTFE                      |
| 26. Gasket                  | Flexible Graphite + 316SS | Flexible Graphite + 316SS |



| Size      | L     | D     | D1    | R       | C      | O      | n-d      | T      | W      | H      | WT     | Torque     |            | CV   |
|-----------|-------|-------|-------|---------|--------|--------|----------|--------|--------|--------|--------|------------|------------|------|
|           |       |       |       |         |        |        |          |        |        |        |        | 150 PSI    | 285 PSI    |      |
| 2" x 1½"  | 7"    | 1.46" | 1.97" | 3.625"  | 4.75"  | 5.9"   | 4-0.75"  | 0.562" | 9.53"  | 5.4"   | 22 lb  | 221 in lb  | 487 in lb  | 230  |
| 50 x 38   | 178   | 37    | 50    | 92.1    | 120.7  | 150    | 4-19     | 14.3   | 14.3   | 137    | 9.7 kg | 25 Nm      | 55 Nm      |      |
| 3" x 2"   | 8"    | 1.97" | 2.95" | 5"      | 6"     | 7.48"  | 4-0.75"  | 0.69"  | 9.35"  | 6.575" | 40 lb  | 372 in lb  | 620 in lb  | 450  |
| 76 x 50   | 203   | 50    | 75    | 127     | 152.4  | 190    | 4-19     | 17.5   | 242    | 167    | 18 kg  | 42 Nm      | 70 Nm      |      |
| 4" x 3"   | 9.02" | 2.95" | 3.98" | 6.19"   | 7.5"   | 9.05"  | 4-0.75"  | 0.88"  | 13.78" | 8.07"  | 77 lb  | 797 in lb  | 1328 in lb | 1100 |
| 102 x 76  | 229   | 75    | 101   | 157.2   | 190.5  | 230    | 8-19     | 22.3   | 350    | 205    | 35 kg  | 90 Nm      | 150 Nm     |      |
| 6" x 4"   | 10.5" | 3.98" | 5.94" | 8.5"    | 9.5"   | 11.02" | 4-0.885" | 0.94"  | 18.11" | 8.66"  | 132 lb | 1328 in lb | 2168 in lb | 2200 |
| 152 x 102 | 267   | 101   | 151   | 215.9   | 241.3  | 280    | 8-22.5   | 23.9   | 460    | 220    | 60 kg  | 150 Nm     | 245 Nm     |      |
| 8" x 6"   | 11.5" | 5.94" | 7.95" | 10.625" | 11.75" | 13.58" | 4-0.885" | 1.06"  | 29.52" | 12.32" | 265 lb | 3009 in lb | 4956 in lb | 5200 |
| 203 x 152 | 292   | 151   | 202   | 269.9   | 298.5  | 345    | 8-22.5   | 27     | 750    | 313    | 120 kg | 340 Nm     | 560 Nm     |      |

Sizes and specifications shown are subject to change without notice.

# ZF3 – 300# Full Port Carbon Steel, Low Temp and SS



**LEVER PARTS LIST**

| No. Part                    | WCB BODY                  | LCC BODY                  | 316SS BODY                |
|-----------------------------|---------------------------|---------------------------|---------------------------|
| 1. Body                     | A216 WCB                  | A352 LCC                  | A351 CF8M                 |
| 2. End                      | A216 WCB                  | A352 LCC                  | A351 CF8M                 |
| 3. Ball                     | A182 F316                 | A182 F316                 | A182 F316                 |
| 4. Stem                     | A182 F316                 | A182 F316                 | A182 F316                 |
| 5. Seat                     | R-PTFE                    | R-PTFE                    | R-PTFE                    |
| 6. Body Gasket              | 304 Graphite Spiral Wound | 304 Graphite Spiral Wound | 304 Graphite Spiral Wound |
| 7. Nut                      | A194-2HM                  | A194-2HM                  | A194-8M                   |
| 8. Full-threaded Bolt       | A193-B7M                  | A320 L7M                  | A320 B8M                  |
| 9. Stem Gasket              | PTFE                      | PTFE                      | PTFE                      |
| 10. Stem Bearing            | PTFE                      | PTFE                      | PTFE                      |
| 11. Steel Ball              | A276 304                  | A276 304                  | A276 304                  |
| 12. Anti-static Spring      | A276 304                  | A276 304                  | A276 304                  |
| 13. Stem Firesafe Gasket I  | Flexible Graphite + 316   | Flexible Graphite + 316   | Flexible Graphite + 316   |
| 14. Stem Firesafe Gasket II | Flexible Graphite         | Flexible Graphite         | Flexible Graphite         |
| 15. Packing Gland Bearing   | PTFE                      | PTFE                      | PTFE                      |
| 16. Lever                   | AISI 1020                 | AISI 1020                 | AISI 1020 + Zn            |
| 17. Screw                   | A193-B7M                  | A320 L7M                  | A193B8M                   |
| 18. Hex Bolt                | A193-B7M                  | SS                        | SS                        |
| 19. Joint                   | A216 WCB                  | A352 LCC                  | A216 WCB + Zn             |
| 20. Nut                     | AISI 1020                 | AISI 1020                 | SS                        |
| 21. Axial Retaining Ring    | AISI 1566                 | AISI 1566                 | AISI 1566                 |
| 22. Limit Block             | A36                       | A36                       | A36                       |
| 23. Nut                     | AISI 1020                 | AISI 1020                 | SS                        |
| 24. Belleville Washer       | A276 304                  | A276 304                  | A276 304                  |
| 25. O-Ring                  | Viton                     | Viton                     | Viton                     |
| 26. O-Ring                  | Viton                     | Viton                     | Viton                     |
| 27. Packing Bushing         | A276 316                  | A276 316                  | A276 316                  |

## SPECIFICATIONS

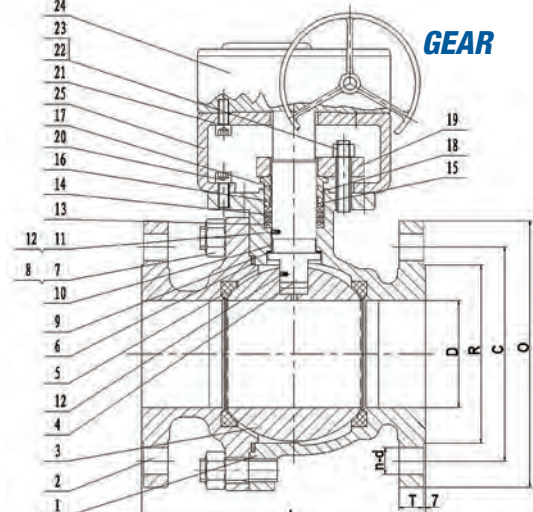
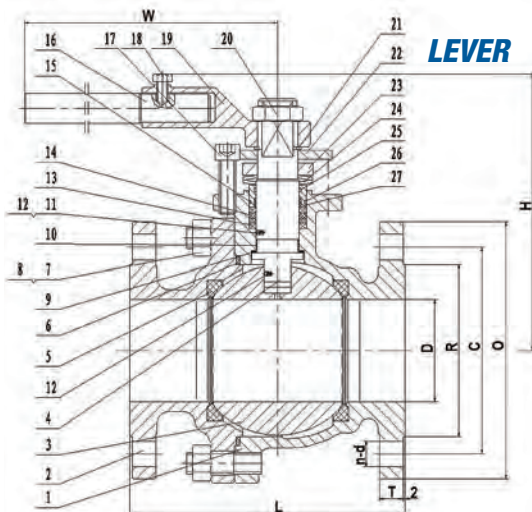
- Fire-safe to API-607, latest Ed.
- Designed to ASME/ANSI Class 300-B16.34
- Face to Face to ASME/ANSI B16.10 Long Pattern
- Flanges to ASME/ANSI B16.5
- NACE MR0175
- Design Standard per API 608
- Markings per MSS-SP25
- Pressure Test per API 598

## FEATURES

- Full bore, 2 piece body floating ball
- ISO mounting pad
- Blow-out proof stem
- Cavity relieving seats, anti-static device
- Lever operated 2"-6", gear operated 8"

**GEAR PARTS LIST**

| No. Part                    | WCB BODY                  | LCC BODY                  | 316SS BODY                |
|-----------------------------|---------------------------|---------------------------|---------------------------|
| 1. Body                     | A216 WCB                  | A352 LCC                  | A351 CF8M                 |
| 2. End                      | A216 WCB                  | A352 LCC                  | A351 CF8M                 |
| 3. Ball                     | A182 F316                 | A182 F316                 | A182 F316                 |
| 4. Stem                     | A182 F316                 | A182 F316                 | A182 F316                 |
| 5. Seat                     | R-PTFE                    | R-PTFE                    | R-PTFE                    |
| 6. Body Gasket              | 304 Graphite Spiral Wound | 304 Graphite Spiral Wound | 304 Graphite Spiral Wound |
| 7. Nut                      | A194-2HM                  | A194-2HM                  | A194-8M                   |
| 8. Full-threaded Bolt       | A193-B7M                  | A320 L7M                  | A320 B8M                  |
| 9. Stem Gasket              | PTFE                      | PTFE                      | PTFE                      |
| 10. Stem Bearing            | PTFE                      | PTFE                      | PTFE                      |
| 11. Steel Ball              | A276 304                  | A276 304                  | A276 304                  |
| 12. Anti-static Spring      | A276 304                  | A276 304                  | A276 304                  |
| 13. Stem Firesafe Gasket I  | Flexible Graphite + 316   | Flexible Graphite + 316   | Flexible Graphite + 316   |
| 14. Stem Firesafe Gasket II | Flexible Graphite         | Flexible Graphite         | Flexible Graphite         |
| 15. Packing Gland Bearing   | PTFE                      | PTFE                      | PTFE                      |
| 16. O-Ring                  | Viton                     | Viton                     | Viton                     |
| 17. O-Ring                  | Viton                     | Viton                     | Viton                     |
| 18. Packing Bushing         | A276 316                  | A276 316                  | A276 316                  |
| 19. Packing Plate           | A216 WCB                  | A352 LCC                  | A216 WCB + Zn             |
| 20. Inner Hex Screw         | A193-B7M                  | A320 L7M                  | A320 L8M                  |
| 21. Inner Hex Screw         | A193-B7M                  | A320 L7M                  | A320 L8M                  |
| 22. Nut                     | A194-2HM                  | A194-7M                   | A194-8M                   |
| 23. Bolt                    | A193-B7M                  | A320 L7M                  | A320 B8M                  |
| 24. Actuator                | Component                 | Component                 | Component                 |
| 25. Yokes                   | A36                       | A36                       | A36                       |



# ZF3 – 300# Full Port Carbon Steel sizing chart

Cont'd from Page 19

| Size      | L             | D            | R                | C                | O             | n-d                  | T              | W             | H             | WT               | Torque                 |                        | CV     |
|-----------|---------------|--------------|------------------|------------------|---------------|----------------------|----------------|---------------|---------------|------------------|------------------------|------------------------|--------|
|           |               |              |                  |                  |               |                      |                |               |               |                  | 150 PSI                | 285 PSI                |        |
| 2"<br>50  | 8.5"<br>216   | 1.97"<br>50  | 3.625"<br>92.1   | 5"<br>127        | 6.5"<br>165   | 8-0.75"<br>8-19      | 0.814"<br>20.7 | 9.53"<br>242  | 6.34"<br>161  | 35 lb<br>16 kg   | 664 in lb<br>75 Nm     | 974 in lb<br>100 Nm    | 450    |
| 3"<br>76  | 11.1"<br>283  | 2.95"<br>75  | 5"<br>127        | 6.62"<br>168.3   | 8.26"<br>210  | 8-0.885"<br>8-22.5   | 1.06"<br>27    | 13.78"<br>350 | 8.07"<br>205  | 79 lb<br>36 kg   | 1416 in lb<br>160 Nm   | 2478 in lb<br>280 Nm   | 1100   |
| 4"<br>102 | 12"<br>305    | 3.98"<br>101 | 6.19"<br>157.2   | 7.87"<br>200     | 10.04"<br>255 | 8-0.885"<br>8-22.5   | 1.19"<br>30.2  | 18.11"<br>460 | 8.86"<br>225  | 132 lb<br>60 kg  | 2301 in lb<br>260 Nm   | 3540 in lb<br>400 Nm   | 2200   |
| 6"<br>152 | 15.87"<br>403 | 5.94"<br>151 | 8.5"<br>215.9    | 10.625"<br>269.9 | 12.6"<br>320  | 12-0.885"<br>12-22.5 | 1.38"<br>35    | 29.53"<br>750 | 12.48"<br>317 | 260 lb<br>118 kg | 4426 in lb<br>500 Nm   | 8496 in lb<br>960 Nm   | 5200   |
| 8"<br>203 | 19.76"<br>502 | 7.95"<br>202 | 10.625"<br>269.9 | 13"<br>330.2     | 14.96"<br>380 | 12-1"<br>12-25.5     | 1.56"<br>39.7  | //<br>//      | //<br>//      | 520 lb<br>236 kg | 12611 in lb<br>1425 Nm | 13718 in lb<br>1550 Nm | 10,000 |

# ZR3 – 300# Reg. Port Carbon Steel and Low Temp

## SPECIFICATIONS

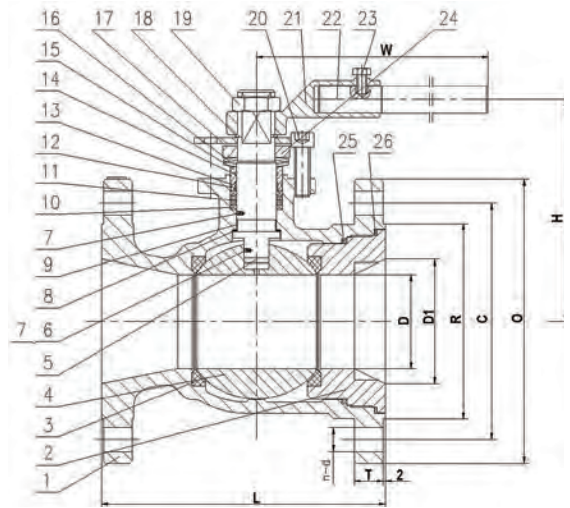
- Fire-safe to API-607, latest Ed.
- Designed to ASME/ANSI Class 300-B16.34
- Face to Face to ASME/ANSI B16.10 Short Pattern
- NACE MR0175
- Design Standard per API 608
- Markings per MSS-SP25
- Pressure Test per API 598

## FEATURES

- Reduce bore, 1 piece uni-body floating ball
- ISO mounting pad
- Blow-out proof stem
- Cavity relieving seats, anti-static device
- Lever operated



| No. Part                    | WCB BODY                  | LCC BODY                  |
|-----------------------------|---------------------------|---------------------------|
| 1. Body                     | A216 WCB                  | A352 LCC                  |
| 2. End                      | A216 WCB                  | A352 LCC                  |
| 3. Seat                     | R-PTFE                    | R-PTFE                    |
| 4. Ball                     | A182 F316                 | A182 F316                 |
| 5. Stem                     | A182 F316                 | A182 F316                 |
| 6. Stem Steel Ball          | A276 304                  | A276 304                  |
| 7. Spring                   | A276 304                  | A276 304                  |
| 8. Stem Gasket              | PTFE                      | PTFE                      |
| 9. Stem Bearing             | PTFE                      | PTFE                      |
| 10. Stem Firesafe Gasket I  | Flexible Graphite + 316   | Flexible Graphite + 316   |
| 11. Stem Firesafe Gasket II | Flexible Graphite         | Flexible Graphite         |
| 12. Packing Bushing Bearing | PTFE                      | PTFE                      |
| 13. O-Ring                  | Viton                     | Viton                     |
| 14. O-Ring                  | Viton                     | Viton                     |
| 15. Packing Bushing         | A276 316                  | A276 316                  |
| 16. Belleville Washer       | A276 304                  | A276 304                  |
| 17. Limit Block             | A36                       | A36                       |
| 18. Axial Retaining Ring    | AISI 1566                 | AISI 1566                 |
| 19. Nut                     | SS                        | SS                        |
| 20. Screw                   | A193 B7M                  | AZ320 L7M                 |
| 21. Joint                   | A216 WCB                  | A216 LCC                  |
| 22. Lever                   | AISI 1020                 | AISI 1020                 |
| 23. Hex Bolt                | CS                        | CS                        |
| 24. Nut                     | SS                        | SS                        |
| 25. Gasket                  | PTFE                      | PTFE                      |
| 26. Gasket                  | Flexible Graphite + 316SS | Flexible Graphite + 316SS |



Sizes and specifications shown are subject to change without notice.

| Size                   | L             | D            | D1           | R              | C                | O             | n-d                  | T              | W             | H             | WT               | Torque               |                      | CV   |
|------------------------|---------------|--------------|--------------|----------------|------------------|---------------|----------------------|----------------|---------------|---------------|------------------|----------------------|----------------------|------|
|                        |               |              |              |                |                  |               |                      |                |               |               |                  | 300 PSI              | 740 PSI              |      |
| 2" x 1 1/2"<br>50 x 38 | 8.5"<br>216   | 1.46"<br>37  | 1.97"<br>50  | 3.625"<br>92.1 | 5"<br>127        | 6.5"<br>165   | 8-0.75"<br>8-19      | 0.814"<br>20.7 | 9.53"<br>242  | 5.4"<br>137   | 33 lb<br>15 kg   | 575 in lb<br>65 Nm   | 841 in lb<br>95 Nm   | 230  |
| 3" x 2"<br>76 x 50     | 11.1"<br>283  | 1.97"<br>50  | 2.95"<br>75  | 5"<br>127      | 6.62"<br>168.3   | 8.26"<br>210  | 8-0.885"<br>8-22.5   | 1.06"<br>27    | 9.53"<br>242  | 6.575"<br>167 | 69 lb<br>31.2 kg | 664 in lb<br>75 Nm   | 974 in lb<br>110 Nm  | 450  |
| 4" x 3"<br>102 x 76    | 12"<br>305    | 2.95"<br>75  | 3.98"<br>101 | 6.19"<br>157.2 | 7.87"<br>200     | 10.04"<br>255 | 8-0.885"<br>8-22.5   | 1.19"<br>30.2  | 13.78"<br>350 | 8.07"<br>205  | 126 lb<br>57 kg  | 1415 in lb<br>160 Nm | 2478 in lb<br>280 Nm | 1100 |
| 6" x 4"<br>152 x 102   | 15.87"<br>403 | 3.98"<br>101 | 5.94"<br>151 | 8.5"<br>215.9  | 10.625"<br>269.9 | 12.6"<br>320  | 12-0.885"<br>12-22.5 | 1.38"<br>35    | 18.11"<br>460 | 8.66"<br>220  | 183 lb<br>83 kg  | 2301 in lb<br>260 Nm | 3540 in lb<br>400 Nm | 2200 |



# ZF6 – 600# Full Port Carbon Steel and Low Temp

## SPECIFICATIONS

- Fire-safe to API-607, latest Ed.
- Designed to ASME/ANSI Class 600-B16.34
- Face to Face to ASME/ANSI B16.10 Long Pattern
- Flanges to ASME/ANSI B16.5
- NACE MR0175
- Design Standard per API 608
- Markings per MSS-SP25
- Pressure Test per API 598

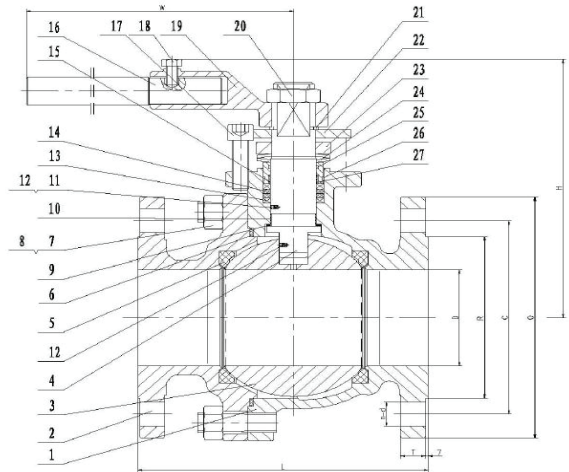
## FEATURES

- Full bore, 2 piece split body floating ball
- ISO mounting pad
- Blow-out proof stem
- Anti-static device
- Lever operated



LEVER PARTS LIST

| No. Part                    | WCB BODY                  | LCC BODY                  |
|-----------------------------|---------------------------|---------------------------|
| 1. Body                     | A216 WCB                  | A352 LCC                  |
| 2. End                      | A216 WCB                  | A352 LCC                  |
| 3. Ball                     | A182 F316                 | A182 F316                 |
| 4. Stem                     | A182 F316                 | A182 F316                 |
| 5. Seat                     | Nylon                     | Nylon                     |
| 6. Body Gasket              | 304 Graphite Spiral Wound | 304 Graphite Spiral Wound |
| 7. Nut                      | A194-2HM                  | A194-2HM                  |
| 8. Full-threaded Bolt       | A193-B7M                  | A320 L7M                  |
| 9. Stem Gasket              | PTFE                      | PTFE                      |
| 10. Stem Bearing            | PTFE                      | PTFE                      |
| 11. Steel Ball              | A276 304                  | A276 304                  |
| 12. Anti-static Spring      | A276 304                  | A276 304                  |
| 13. Stem Firesafe Gasket I  | Flexible Graphite + 316   | Flexible Graphite + 316   |
| 14. Stem Firesafe Gasket II | Flexible Graphite         | Flexible Graphite         |
| 15. Packing Gland Bearing   | PTFE                      | PTFE                      |
| 16. Lever                   | AISI 1020                 | AISI 1020                 |
| 17. Screw                   | A193-B7M                  | A320 L7M                  |
| 18. Hex Bolt                | A193-B7M                  | SS                        |
| 19. Joint                   | A216 WCB                  | A352 LCC                  |
| 20. Nut                     | AISI 1020                 | AISI 1020                 |
| 21. Axial Retaining Ring    | AISI 1566                 | AISI 1566                 |
| 22. Limit Block             | A36                       | A36                       |
| 23. Nut                     | AISI 1020                 | AISI 1020                 |
| 24. Belleville Washer       | A276 304                  | A276 304                  |
| 25. O-Ring                  | Viton                     | Viton                     |
| 26. O-Ring                  | Viton                     | Viton                     |
| 27. Packing Bushing         | A276 316                  | A276 316                  |



| Size      | L            | D            | R              | C              | O             | n-d                | T             | W             | H             | WT              | Torque               |                      | CV   |
|-----------|--------------|--------------|----------------|----------------|---------------|--------------------|---------------|---------------|---------------|-----------------|----------------------|----------------------|------|
|           |              |              |                |                |               |                    |               |               |               |                 | 600 PSI              | 1440 PSI             |      |
| 2"<br>50  | 11.5"<br>292 | 1.97"<br>50  | 3.625"<br>92.1 | 5"<br>127      | 6.5"<br>165   | 8-0.75"<br>8-19    | 1"<br>25.4    | 17"<br>432    | 6.14"<br>156  | 42 lb<br>19 kg  | 841 in lb<br>95 Nm   | 1682 in lb<br>190 Nm | 450  |
| 3"<br>76  | 14"<br>356   | 2.95"<br>75  | 5"<br>127      | 6.62"<br>168.3 | 8.26"<br>210  | 8-0.885"<br>8-22.5 | 1.25"<br>31.8 | 21.65"<br>550 | 8.22"<br>309  | 99 lb<br>45 kg  | 2080 in lb<br>235 Nm | 4071 in lb<br>460 Nm | 1100 |
| 4"<br>102 | 17"<br>432   | 3.98"<br>101 | 6.19"<br>157.2 | 8.5"<br>215.9  | 10.82"<br>275 | 8-1"<br>8-22.5     | 1.5"<br>38.1  | 33.46"<br>850 | 11.02"<br>280 | 167 lb<br>76 kg | 2567 in lb<br>290 Nm | 5089 in lb<br>575 Nm | 2200 |

# ZR6 – 600# Reg. Port Carbon Steel and Low Temp

## SPECIFICATIONS

- Fire-safe to API-607, latest Ed.
- Designed to ASME/ANSI Class 600-B16.34
- Face to Face to ASME/ANSI B16.10 Long Pattern
- NACE MR0175
- Design Standard per API 608
- Markings per MSS-SP25
- Pressure Test per API 598

## FEATURES

- Reduce bore, 2 piece split body floating ball
- ISO mounting pad
- Blow-out proof stem
- Anti-static device
- Lever operated 2"-4", gear operated 6"

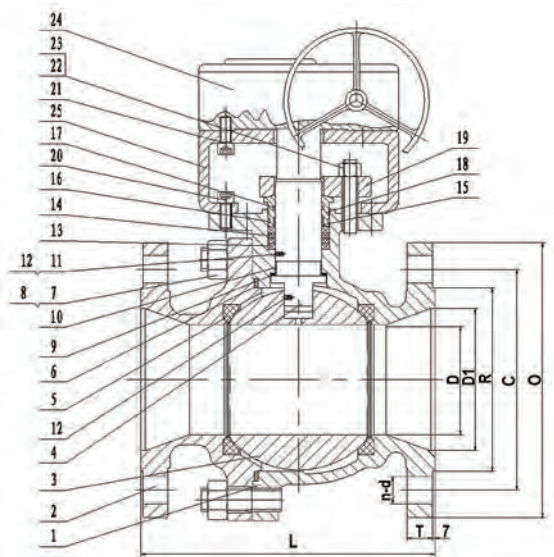
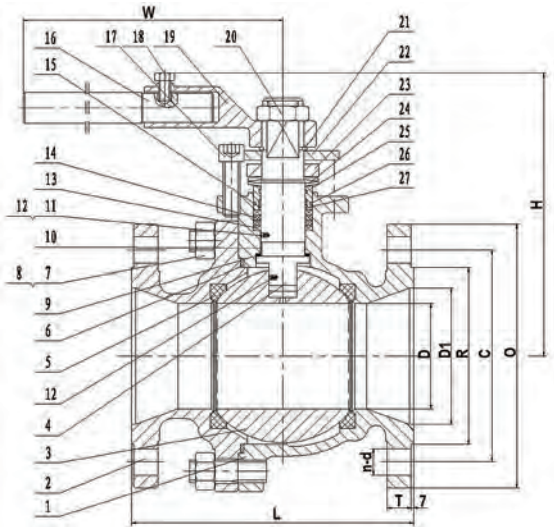


LEVER PARTS LIST

| No. | Part                    | WCB BODY                  | LCC BODY                  |
|-----|-------------------------|---------------------------|---------------------------|
| 1.  | Body                    | A216 WCB                  | A352 LCC                  |
| 2.  | End                     | A216 WCB                  | A352 LCC                  |
| 3.  | Ball                    | A182 F316                 | A182 F316                 |
| 4.  | Stem                    | A182 F316                 | A182 F316                 |
| 5.  | Seat                    | Nylon                     | Nylon                     |
| 6.  | Body Gasket             | 304 Graphite Spiral Wound | 304 Graphite Spiral Wound |
| 7.  | Nut                     | A194-2HM                  | A194-2HM                  |
| 8.  | Full-threaded Bolt      | A193-B7M                  | A320 L7M                  |
| 9.  | Stem Gasket             | PTFE                      | PTFE                      |
| 10. | Stem Bearing            | PTFE                      | PTFE                      |
| 11. | Steel Ball              | A276 304                  | A276 304                  |
| 12. | Anti-static Spring      | A276 304                  | A276 304                  |
| 13. | Stem Firesafe Gasket I  | Flexible Graphite + 316   | Flexible Graphite + 316   |
| 14. | Stem Firesafe Gasket II | Flexible Graphite         | Flexible Graphite         |
| 15. | Packing Gland Bearing   | PTFE                      | PTFE                      |
| 16. | Lever                   | AISI 1020                 | AISI 1020                 |
| 17. | Screw                   | A193-B7M                  | A320 L7M                  |
| 18. | Hex Bolt                | A193-B7M                  | SS                        |
| 19. | Joint                   | A216 WCB                  | A352 LCC                  |
| 20. | Nut                     | AISI 1020                 | AISI 1020                 |
| 21. | Axial Retaining Ring    | AISI 1566                 | AISI 1566                 |
| 22. | Limit Block             | A36                       | A36                       |
| 23. | Nut                     | AISI 1020                 | AISI 1020                 |
| 24. | Belleville Washer       | A276 304                  | A276 304                  |
| 25. | O-Ring                  | Viton                     | Viton                     |
| 26. | O-Ring                  | Viton                     | Viton                     |
| 27. | Packing Bushing         | A276 316                  | A276 316                  |

GEAR PARTS LIST

| No. | Part                    | WCB BODY                  | LCC BODY                  |
|-----|-------------------------|---------------------------|---------------------------|
| 1.  | Body                    | A216 WCB                  | A352 LCC                  |
| 2.  | End                     | A216 WCB                  | A352 LCC                  |
| 3.  | Ball                    | A182 F316                 | A182 F316                 |
| 4.  | Stem                    | A182 F316                 | A182 F316                 |
| 5.  | Seat                    | Nylon                     | Nylon                     |
| 6.  | Body Gasket             | 304 Graphite Spiral Wound | 304 Graphite Spiral Wound |
| 7.  | Nut                     | A194-2HM                  | A194-2HM                  |
| 8.  | Full-threaded Bolt      | A193-B7M                  | A320 L7M                  |
| 9.  | Stem Gasket             | PTFE                      | PTFE                      |
| 10. | Stem Bearing            | PTFE                      | PTFE                      |
| 11. | Steel Ball              | A276 304                  | A276 304                  |
| 12. | Anti-static Spring      | A276 304                  | A276 304                  |
| 13. | Stem Firesafe Gasket I  | Flexible Graphite + 316   | Flexible Graphite + 316   |
| 14. | Stem Firesafe Gasket II | Flexible Graphite         | Flexible Graphite         |
| 15. | Packing Gland Bearing   | PTFE                      | PTFE                      |
| 16. | O-Ring                  | Viton                     | Viton                     |
| 17. | O-Ring                  | Viton                     | Viton                     |
| 18. | Packing Bushing         | A276 316                  | A276 316                  |
| 19. | Packing Plate           | A216 WCB                  | A352 LCC                  |
| 20. | Inner Hex Screw         | A193-B7M                  | A320-L7M                  |
| 21. | Inner Hex Screw         | A193-B7M                  | A320-L7M                  |
| 22. | Nut                     | A194-B7M                  | A194-B7                   |
| 23. | Bolt                    | A193-B7M                  | A320-L7M                  |
| 24. | Actuator                | Component                 | Component                 |
| 25. | Yokes                   | A36                       | A36                       |



| Size      | L     | D     | D1    | R      | C     | O      | n-d      | T     | W      | H     | WT      | Torque<br>300 PSI | Torque<br>740 PSI | CV   |
|-----------|-------|-------|-------|--------|-------|--------|----------|-------|--------|-------|---------|-------------------|-------------------|------|
| 2" x 1½"  | 11.5" | 1.46" | 1.97" | 3.625" | 5"    | 6.5"   | 8-0.75"  | 1"    | 9.53"  | 5.4"  | 40 lb   | 664 in lb         | 1328 in lb        | 230  |
| 50 x 38   | 292   | 37    | 50    | 92.1   | 127   | 165    | 8-19     | 25.4  | 242    | 137   | 18.2 kg | 75 Nm             | 150 Nm            |      |
| 3" x 2"   | 14"   | 1.97" | 2.95" | 5"     | 6.62" | 8.26"  | 8-0.885" | 1.25" | 13.78" | 7.56" | 77 lb   | 841 in lb         | 1682 in lb        | 450  |
| 76 x 50   | 356   | 50    | 75    | 127    | 168.3 | 210    | 8-22.5   | 31.8  | 350    | 192   | 35 kg   | 95 Nm             | 190 Nm            |      |
| 4" x 3"   | 17"   | 2.95" | 3.98" | 6.19"  | 8.5"  | 10.82" | 8-1"     | 1.5"  | 21.65" | 8.2"  | 165 lb  | 2080 in lb        | 4071 in lb        | 1100 |
| 102 x 76  | 432   | 75    | 101   | 157.2  | 215.9 | 275    | 8-25.5   | 38.1  | 550    | 205   | 75 kg   | 235 Nm            | 460 Nm            |      |
| 6" x 4"   | 22"   | 3.98" | 5.94" | 8.5"   | 11.5" | 13.98" | 12-1.12" | 1.88" | /      | /     | 342 lb  | 2567 in lb        | 5089 in lb        | 2200 |
| 152 x 102 | 559   | 101   | 151   | 215.9  | 292.1 | 355    | 12-28.5  | 47.7  | /      | /     | 155 kg  | 290 Nm            | 575 Nm            |      |

Sizes and specifications shown are subject to change without notice.

# T SERIES FLANGED TRUNNION BALL VALVES

## PART NUMBERING SYSTEM

**1**

1 = Port and Class

- TR1 = Reduced port class 150
- TR3 = Reduced port class 300
- TR6 = Reduced port class 600
- TR9 = Reduced port class 900
- TR15 = Reduced port class 1500
- TR25 = Reduced port class 2500
- TF1 = Full port class 150
- TF3 = Full port class 300
- TF6 = Full port class 600
- TF9 = Full port class 900
- TF15 = Full port class 1500
- TF25 = Full port class 2500

**2**

2 = Size

- 002 = 2"      020 = 20"
- 003 = 3"      024 = 24"
- 004 = 4"      026 = 26"
- 006 = 6"      028 = 28"
- 008 = 8"      030 = 30"
- 010 = 10"     032 = 32"
- 012 = 12"     034 = 34"
- 014 = 14"     036 = 36"
- 016 = 16"     040 = 40"
- 018 = 18"     042 = 42"

**3**

3 = Type

- T = 3 Piece Split Body
- S = 2 Piece Split Body
- W = Welded Body

**4**

4 = Body Material

- 1 = ASTM A216 WCB (-29C)
- 2 = ASTM A325 LCC (-46C)
- 3 = ASTM A351CF8M (-196C)
- 4 = ASTM A105N (-29C)
- 5 = ASTM A350 LF2 (-46C)
- 6 = ASTM 182 F316 (-196C)
- 7 = DUPLEX 22CR

**5**

5 = End Connections

- F = Flanged Raised Face
- J = Flanged RTJ
- B = Butt Weld End
- G = Weld X RF
- H = Weld X RTJ
- P = Weld W/PUPS
- X = GRAYLOC

**6**

6 = Trim Material

- 1 = Body + 3ENC
- 2 = 304SS
- 3 = 316SS
- 4 = 410SS
- 5 = DUPLEX 22CR

**7**

7 = Seat Material

- P = PTFE
- R = RTFE
- N = Nylon
- K = PEEK
- D = Devlon
- M = Metal x Metal

**8**

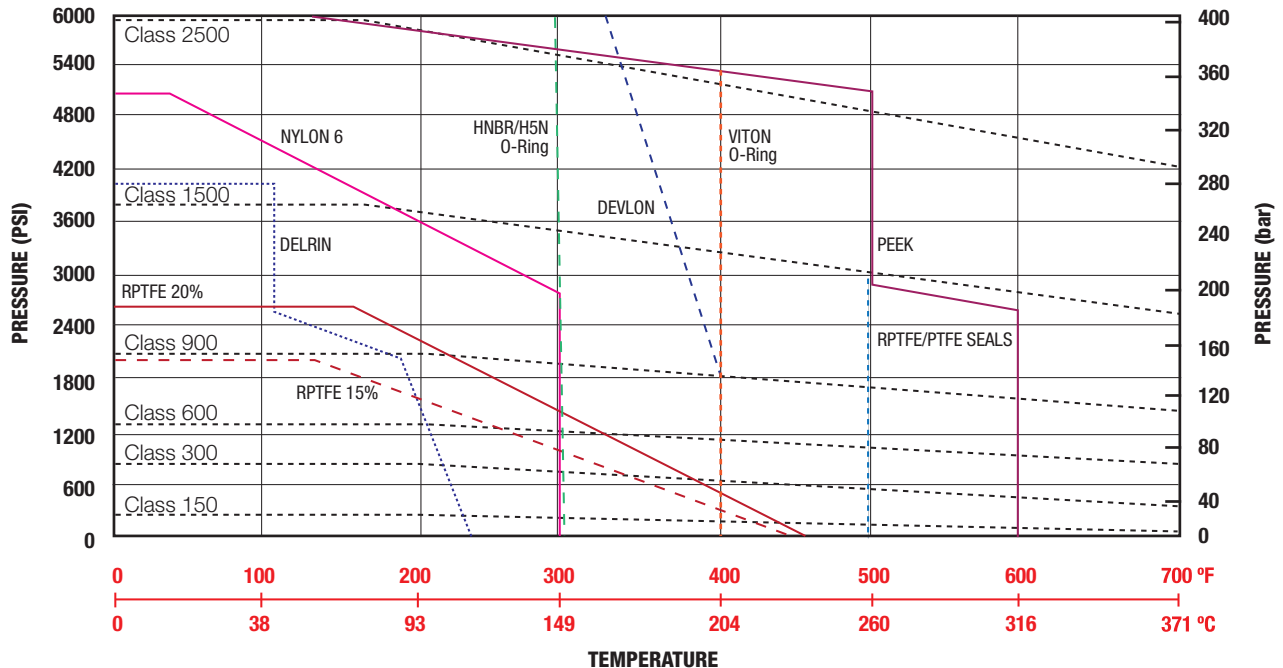
8 = Operator

- L = Handle/Lever
- G = Gear Operator
- B = Bare Stem
- C = Chain Wheel

**9**

9 = Special Requirements

- 00 = Standard Requirement



Consult ASME 16.34 for Specific Material Pressure/Temperature Ratings.  
For reference purposes only.

# T Series Trunnion Ball Valves

## COMPLIANCE / SPECIFICATIONS

- ISO 14313:2007 / API 6D
- ISO 9001-2008 Registered Quality System
- API 608 / API 598 Fire-safe to API 607
- ASME B16.34, B16.5, B16.10
- CSA Z245.15 Steel Valves
- NACE MR0175 / ISO 15156 Compliance

### Designs Available

Two piece cast or three piece forged designs available.

### Double Block and Bleed

Independent spring loaded upstream and downstream seats and body bleed ensure suitability for use in double and bleed services.

### Anti-Static Design

Anti-static design to ensure electrical continuity between stem, ball and body.

### Emergency Seat and Stem Seal Injection Fittings

In the event of leakage, sealant injection fittings are provided for the stem and seat areas to temporarily allow sealing the valve before a more permanent repair can be made.

### Automatic Body Cavity Relief

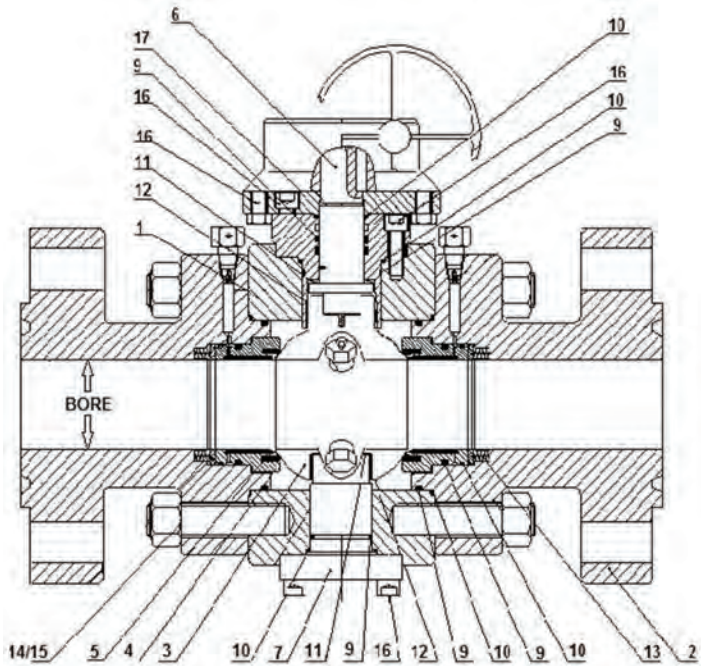
Trunnion mounted ball valves are protected from thermal expansion and over pressurizations due to spring loaded seats which automatically relieve pressure to the down stream side of the body cavity. In addition, all valves come with a manual safe relieving bleed valve.

### Seat Design

Independent free floating spring loaded seats provide a tight seal even in a low differential pressure situation.

#### Additional Notes

- Other materials available upon request.
- Materials shown are general materials of construction for 2 piece or 3 piece Trunnion Ball Valves.
- We reserve the right to substitute materials listed above with alternate approved material for specific service conditions.



| No. | Part Name      | Standard NACE  | Low Temperature NACE*  | Stainless Steel NACE                             | Duplex   |
|-----|----------------|--|--|--|--|
| 1.  | Body           | A105N<br>A216 WCB  | A350 LF2*<br>A352 LCC  | A182 F316<br>A351 CF8M                           | DUPLEX<br>22CR                                   |
| 2.  | Cap/Adapter    | A105N<br>A216 WCB  | A350 LF2*<br>A352 LCC  | A182 F316<br>A351 CF8M                           | DUPLEX<br>22CR                                   |
| 3.  | Ball           | A105N / ENP<br>A182 CF8M / 316SS                         | A350 LF2 / ENP*<br>A182 CF8M / 316SS                         | A182 F316<br>A351 CF8M                           | DUPLEX<br>22CR                                   |
| 4.  | Seat Holder    | A105N / ENP<br>A182 F316SS                               | A350 LF2/ ENP*<br>A182 F316SS                                | A182 F316SS                                      | A182 F51   |
| 5.  | Seat Insert    | RTFE<br>Nylon<br>Devlon<br>PEEK                          | RTFE<br>Nylon<br>Devlon<br>PEEK                              | RTFE<br>Nylon<br>Devlon<br>PEEK                  | RTFE<br>Nylon<br>Devlon<br>PEEK                  |
| 6.  | Stem           | A105N / ENP<br>4130 / 4140 / ENP<br>A182 F316SS / 17-4PH | A350 LF2 / ENP*<br>4130 / 4140 / ENP<br>A182 F316SS / 17-4PH | A182 F316SS<br>A479 Type 316SS<br>17-4PH         | A182 F316SS<br>A479 Type 316SS<br>17-4PH         |
| 7.  | Trunnion       | A105N / ENP<br>4130 / 4140 ENP<br>A182 F316SS            | A350 LF2 / ENP*<br>4130 / 4140 / ENP<br>A182 F316SS          | A182 F316SS<br>A479 Type 316SS<br>-              | A182 F316SS<br>A479 Type 316SS<br>-              |
| 8.  | Bonnet         | A105N<br>A216 WCB  | A350 LF2*<br>A352 LCC  | A182 CF8M<br>A182 F316                           | A182 CF8M<br>A182 F316                           |
| 9.  | O-Ring         | Viton-B<br>Viton-AED<br>Viton-GLT<br>HSN<br>EPDM         | Viton-B<br>Viton-AED<br>Viton-GLT<br>HSN (HNBR)*<br>EPDM     | Viton-B<br>Viton-AED<br>Viton-GLT<br>HSN<br>EPDM | Viton-B<br>Viton-AED<br>Viton-GLT<br>HSN<br>EPDM |
| 10. | Gasket         | Graphite   | Graphite*  | Graphite   | Graphite   |
| 11. | Thrust Washer  | RTFE<br>PEEK   | RTFE<br>PEEK   | Graphite<br>PEEK                                 | Graphite<br>PEEK                                 |
| 12. | Bearings       | Carbon Steel-DU  | Carbon Steel-DU  | Carbon Steel-DU                                  | Carbon Steel-DU                                  |
| 13. | Springs        | Inconel X750   | Inconel X750   | Inconel X750                                     | Inconel X750                                     |
| 14. | Studs          | A193 B7M   | A320 L2M   | A193 B8M   | A193 B8M   |
| 15. | Nuts           | A194 2HM   | A194 7M  | A194 Gr. 8                                       | A194 Gr. 8                                       |
| 16. | Bolting        | A193 B7M   | A320 L7M   | 193 B8M  | 193 B8M  |
| 17. | Mounting Plate | Carbon Steel   | Carbon Steel   | Stainless Steel                                  | Stainless Steel                                  |

Sizes and specifications shown are subject to change without notice.

## ANSI 150

| Size | Full Port Bore |     | Regular Bore |     | Raised Face Length |      | Weld End Length |      | RTJ Length |      |
|------|----------------|-----|--------------|-----|--------------------|------|-----------------|------|------------|------|
|      | Inch           | mm  | Inch         | mm  | Inch               | mm   | Inch            | mm   | Inch       | mm   |
| 2    | 2              | 49  | 2            | 49  | 7                  | 178  | 8.5             | 216  | 7.5        | 191  |
| 3    | 3              | 74  | 3            | 74  | 8                  | 203  | 11.12           | 283  | 8.5        | 219  |
| 4    | 4              | 100 | 4            | 100 | 9                  | 229  | 12              | 305  | 9.5        | 241  |
| 6    | 6              | 150 | 6            | 150 | 15.5               | 394  | 18              | 457  | 16         | 406  |
| 8    | 8              | 201 | 8            | 201 | 18                 | 467  | 20.5            | 521  | 18.5       | 470  |
| 10   | 10             | 252 | 10           | 252 | 21                 | 533  | 22              | 559  | 21.5       | 546  |
| 12   | 12             | 303 | 12           | 303 | 24                 | 610  | 25              | 635  | 24.5       | 622  |
| 14   | 14             | 334 | 12           | 303 | 27                 | 686  | 30              | 762  | 27.5       | 699  |
| 16   | 16             | 385 | 16           | 385 | 30                 | 762  | 33              | 838  | 30.5       | 775  |
| 18   | 18             | 436 | 16           | 385 | 34                 | 864  | 36.37           | 914  | 34.5       | 876  |
| 20   | 20             | 487 | 20           | 487 | 36                 | 914  | 39              | 991  | 35.6       | 927  |
| 24   | 24             | 589 | 20           | 487 | 42                 | 1067 | 45              | 1143 | 42.5       | 1080 |
| 26   | 26             | 633 | 24           | 589 | 45                 | 1143 | 49              | 1245 | -          | -    |
| 28   | 28             | 684 | 26           | 633 | 49                 | 1245 | 53              | 1346 | -          | -    |
| 30   | 30             | 735 | -            | -   | 51                 | 1295 | 55              | 1397 | -          | -    |

## ANSI 300

| Size | Full Port Bore |     | Regular Bore |     | Raised Face Length |      | Weld End Length |      | RTJ Length |      |
|------|----------------|-----|--------------|-----|--------------------|------|-----------------|------|------------|------|
|      | Inch           | mm  | Inch         | mm  | Inch               | mm   | Inch            | mm   | Inch       | mm   |
| 2    | 2              | 49  | -            | -   | 8.5                | 216  | 8.5             | 216  | 9.12       | 232  |
| 3    | 3              | 74  | 2            | 49  | 11.12              | 283  | 11.12           | 283  | 11.75      | 298  |
| 4    | 4              | 100 | 3            | 74  | 12                 | 305  | 12              | 305  | 12.62      | 321  |
| 6    | 6              | 150 | 4            | 100 | 15.87              | 403  | 18              | 457  | 16.5       | 419  |
| 8    | 8              | 201 | 6            | 150 | 19.75              | 502  | 20.5            | 521  | 20.37      | 518  |
| 10   | 10             | 252 | 8            | 201 | 22.37              | 568  | 22              | 559  | 23         | 584  |
| 12   | 12             | 303 | 10           | 252 | 25.5               | 648  | 25              | 635  | 26.12      | 664  |
| 14   | 14             | 334 | 12           | 303 | 30                 | 762  | 30              | 762  | 30.62      | 778  |
| 16   | 16             | 385 | 12           | 303 | 33                 | 838  | 33              | 838  | 33.62      | 854  |
| 18   | 18             | 436 | 16           | 385 | 36                 | 914  | 36.37           | 914  | 36.62      | 930  |
| 20   | 20             | 487 | 16           | 385 | 39                 | 991  | 39              | 991  | 39.75      | 1010 |
| 24   | 24             | 589 | 20           | 487 | 45                 | 1143 | 45              | 1143 | 45.87      | 1165 |
| 26   | 26             | 633 | 20           | 487 | 49                 | 1245 | 49              | 1245 | 50         | 1270 |
| 28   | 28             | 684 | 24           | 589 | 53                 | 1346 | 53              | 1346 | 54         | 1372 |
| 30   | 30             | 735 | 26           | 633 | 55                 | 1397 | 55              | 1397 | 56         | 1422 |

## ANSI 600

| Size | Full Port Bore |     | Regular Bore |     | Raised Face Length |      | Weld End Length |      | RTJ Length |      |
|------|----------------|-----|--------------|-----|--------------------|------|-----------------|------|------------|------|
|      | Inch           | mm  | Inch         | mm  | Inch               | mm   | Inch            | mm   | Inch       | mm   |
| 2    | 2              | 49  | -            | -   | 11.5               | 292  | 11.5            | 292  | 11.62      | 295  |
| 3    | 3              | 74  | 2            | 49  | 14                 | 356  | 14              | 356  | 14.12      | 359  |
| 4    | 4              | 100 | 3            | 74  | 17                 | 432  | 17              | 432  | 17.12      | 435  |
| 6    | 6              | 150 | 4            | 100 | 22                 | 559  | 22              | 559  | 22.12      | 562  |
| 8    | 8              | 201 | 6            | 150 | 26                 | 660  | 26              | 660  | 26.12      | 664  |
| 10   | 10             | 252 | 8            | 201 | 31                 | 787  | 31              | 787  | 31.12      | 791  |
| 12   | 12             | 303 | 10           | 252 | 33                 | 838  | 33              | 838  | 33.12      | 841  |
| 14   | 14             | 334 | 12           | 303 | 35                 | 889  | 35              | 889  | 35.12      | 892  |
| 16   | 16             | 385 | 12           | 303 | 39                 | 991  | 39              | 991  | 39.12      | 994  |
| 18   | 18             | 436 | 16           | 385 | 43                 | 1092 | 43              | 1092 | 43.12      | 1095 |
| 20   | 20             | 487 | 16           | 385 | 47                 | 1194 | 47              | 1194 | 47.25      | 1200 |
| 24   | 24             | 589 | 20           | 487 | 51                 | 1295 | 51              | 1295 | 51.37      | 1305 |
| 26   | 26             | 633 | 20           | 487 | 55                 | 1397 | 55              | 1397 | 55.37      | 1407 |
| 28   | 28             | 684 | 24           | 589 | 57                 | 1448 | 57              | 1448 | 57.5       | 1461 |
| 30   | 30             | 735 | 26           | 633 | 61                 | 1549 | 61              | 1549 | 61.5       | 1562 |

## ANSI 900

| Size | Full Port Bore |     | Regular Bore |     | Raised Face Length |      | Weld End Length |      | RTJ Length |      |
|------|----------------|-----|--------------|-----|--------------------|------|-----------------|------|------------|------|
|      | Inch           | mm  | Inch         | mm  | Inch               | mm   | Inch            | mm   | Inch       | mm   |
| 2    | 2              | 49  | -            | -   | 14.5               | 368  | 14.5            | 368  | 14.62      | 371  |
| 3    | 3              | 74  | 2            | 49  | 15                 | 381  | 15              | 381  | 15.12      | 384  |
| 4    | 4              | 100 | 3            | 74  | 18                 | 457  | 18              | 457  | 18.12      | 460  |
| 6    | 6              | 150 | 4            | 100 | 24                 | 610  | 24              | 610  | 24.12      | 613  |
| 8    | 8              | 201 | 6            | 150 | 29                 | 737  | 29              | 737  | 29.12      | 740  |
| 10   | 10             | 252 | 8            | 201 | 33                 | 838  | 33              | 838  | 33.12      | 841  |
| 12   | 12             | 303 | 10           | 252 | 38                 | 965  | 38              | 965  | 38.12      | 968  |
| 16   | 14.67          | 373 | 12           | 303 | 44.5               | 1130 | 44.5            | 1130 | 44.87      | 1140 |
| 18   | 16.67          | 423 | -            | -   | 48                 | 1219 | 48              | 1219 | 48.5       | 1232 |
| 20   | 18.5           | 471 | -            | -   | 52                 | 1321 | 52              | 1321 | 52.5       | 1334 |
| 24   | 22.5           | 570 | -            | -   | 61                 | 1549 | 61              | 1549 | 61.75      | 1568 |

For information on ANSI 2500, please contact your Flow+ supplier.

## ANSI 1500

| Size | Full Port Bore |     | Regular Bore |     | Raised Face Length |      | Weld End Length |      | RTJ Length |      |
|------|----------------|-----|--------------|-----|--------------------|------|-----------------|------|------------|------|
|      | Inch           | mm  | Inch         | mm  | Inch               | mm   | Inch            | mm   | Inch       | mm   |
| 2    | 2              | 49  | -            | -   | 14.5               | 368  | 14.5            | 368  | 14.61      | 371  |
| 3    | 3              | 74  | 2            | 49  | 18.5               | 470  | 18.5            | 470  | 18.62      | 473  |
| 4    | 4              | 100 | 3            | 74  | 21.5               | 546  | 21.5            | 546  | 21.62      | 549  |
| 6    | 5.67           | 144 | 4            | 100 | 27.75              | 705  | 27.75           | 705  | 28         | 711  |
| 8    | 7.56           | 192 | 6            | 150 | 32.75              | 832  | 32.75           | 832  | 33.12      | 841  |
| 10   | 9.41           | 239 | 8            | 201 | 39                 | 991  | 39              | 991  | 39.37      | 1000 |
| 12   | 11.3           | 287 | 10           | 252 | 44.5               | 1130 | 44.5            | 1130 | 45.12      | 1146 |
| 16   | 14.17          | 360 | 12           | 303 | 54.5               | 1384 | 54.5            | 1384 | 55.39      | 1407 |

# T Series Trunnion Ball Valve Cv Flow Coefficients

| Size | 150#   | 300#   | 600#   | 900#   | 1500# | 2500# |
|------|--------|--------|--------|--------|-------|-------|
| Inch | Cv     | Cv     | Cv     | Cv     | Cv    | Cv    |
| 1/2  | 46     | 46     | 46     | 42     | 41    | -     |
| 3/4  | 97     | 97     | 97     | 90     | 88    | -     |
| 1    | 168    | 168    | 168    | 156    | 152   | -     |
| 1.5  | 389    | 389    | 389    | 360    | 350   | -     |
| 2    | 647    | 647    | 647    | 599    | 582   | 412   |
| 3    | 2086   | 2086   | 2086   | 1932   | 1879  | 1268  |
| 4    | 2694   | 2694   | 2694   | 2494   | 2426  | 1766  |
| 6    | 6062   | 6062   | 6062   | 5612   | 5030  | 4004  |
| 8    | 10885  | 10885  | 10885  | 10077  | 8943  | 7476  |
| 10   | 17109  | 17109  | 17109  | 15840  | 13857 | 11603 |
| 12   | 24734  | 24734  | 24734  | 22990  | 19982 | 16385 |
| 14   | 30055  | 30055  | 30055  | 25862  | 24071 | 19894 |
| 16   | 39934  | 39934  | 39934  | 34703  | 31440 | 25872 |
| 18   | 51214  | 51214  | 51214  | 44630  | 39988 | 32636 |
| 20   | 63896  | 63896  | 63896  | 53333  | 50002 | 40982 |
| 24   | 96465  | 96465  | 96465  | 81039  | 7231  | 58329 |
| 26   | 109956 | 109956 | 109956 | 98501  | -     | -     |
| 28   | 121833 | 121833 | 121833 | 113248 | -     | -     |
| 30   | 145588 | 145588 | 145588 | 129948 | -     | -     |
| 32   | 170872 | 170872 | 170872 | 151468 | -     | -     |
| 36   | 211092 | 211092 | 211092 | 198273 | -     | -     |
| 40   | 267398 | 267398 | 267398 | -      | -     | -     |
| 42   | 280946 | 280946 | 280946 | -      | -     | -     |
| 48   | 383846 | 383846 | 383846 | -      | -     | -     |
| 46   | 520791 | 520791 | 520791 | -      | -     | -     |

## METHOD OF CALCULATING FLOW

The Flow Coefficient “Cv” of a valve is the flow rate of water (gallons/minute) through a fully opened valve, with a pressure drop of 1 PSI across the valve. To find the flow of liquid through the valve from the Cv, use the following formulae.

### Liquid Flow

$$Q_L = C_v (\Delta P/G)^{1/2}$$

WHERE

Q<sub>L</sub> = flow rate of liquid (gal./min.)

ΔP = differential pressure across the valve (psi)

G = specific gravity of liquid (for water, G=1)

### Gas Flow

$$Q_g = 61C_v (P_2 \Delta P/g)^{1/2}$$

WHERE {(ΔP/P < 1.0)}

Q<sub>g</sub> = flow rate of gas (CFH at STP)

P<sub>2</sub> = outlet pressure (psi)

g = specific gravity of gas (for air, G=1.0)

# Valve Position Monitor - FL31000: Weatherproof, Compact and Durable

## FL31000 POSITION MONITOR



### FEATURES OF THE FL31000

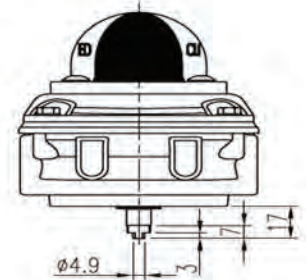
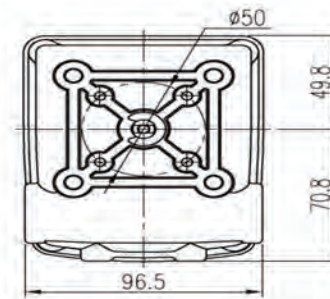
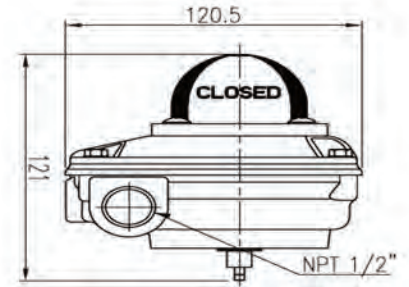
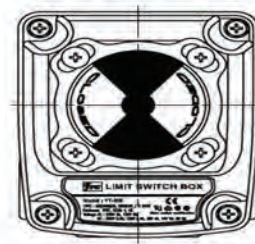
- Solid and compact design.
- Weatherproof and corrosion resistant, NEMA 4, 4X, IP67 enclosure.
- Captive stainless steel cover bolts.
- Bolt on green/red position indicator.
- Quick-sets, spring loaded, splined cams.
- Requires no tools for adjustments.
- Dual 1/2" conduit entries and 8 point terminal strip to allow for mounting and wiring of solenoid valve.
- Qty 2 OMRON SPDT mechanical switches rated at 5 amps at 120 VAC / 4 amps at 30 VDC. Other switches are available on request.
- Approvals: UL, CSA, SEMKO and SEV EN61058-1.

### MATERIALS OF CONSTRUCTION

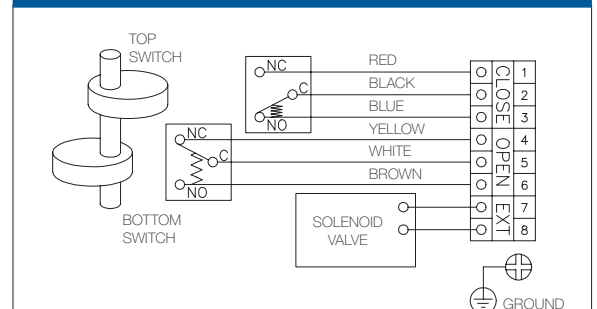
|                          |                         |
|--------------------------|-------------------------|
| Housing Cover/Body ..... | Polyester Painted       |
| Shaft .....              | Aluminum                |
| Indicator Cover .....    | Stainless Steel         |
| Indicator .....          | Polycarbonate           |
| Cam .....                | ABS/Polycarbonate       |
| Spring .....             | Polycarbonate           |
| Housing Cover Bolt ..... | Stainless Steel         |
| O-Ring .....             | Captive Stainless Steel |
| Bushing .....            | NBR                     |
| E-Ring (Shaft) .....     | Bronze                  |
| Ground Lug .....         | Stainless Steel         |
| Bracket .....            | Stainless Steel         |

### DIMENSIONS FOR FL31000

#### DIMENSIONS



#### Wiring diagram for 2 SPDT Mechanical Switch



# Valve Position Monitor - FL41000: Explosion Proof, Compact and Durable



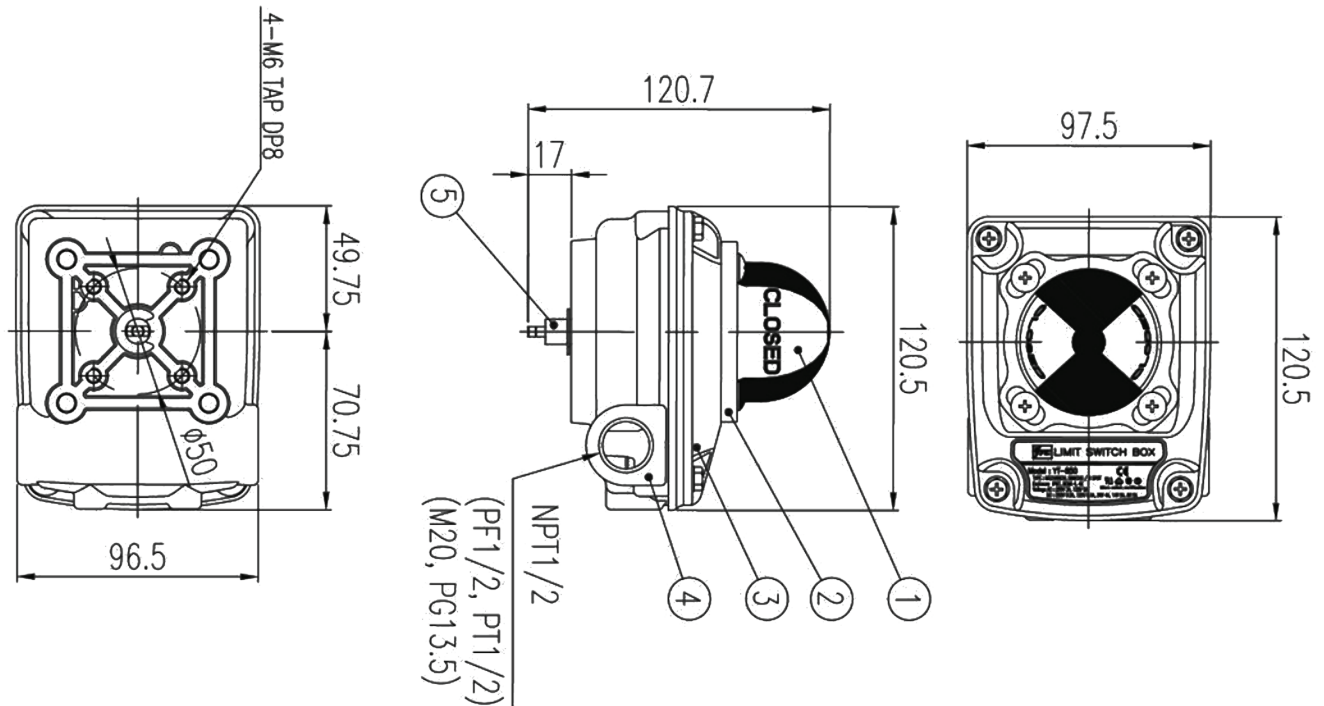
## FL41000 POSITION MONITOR

|                      |                                |
|----------------------|--------------------------------|
| Switch Type          | Mechanical Switch x 2          |
| Switch Rating        | AC 250V 0.2A, 125V 0.4A 30V 4A |
| Enclosure Protection | IP67                           |
| Explosion Proof      | Exd IIC T6                     |
| Ambient Temp         | -20 C - 60 C                   |
| Conduit Entry        | NPT3/4 (PF3/4, M20)            |
| Terminal             | 8 Points                       |
| Mounting Bracket     | NAMUR VDI/VDE 3845, ISO 5211   |
| Material             | Aluminum Diecasting            |
| Weight               | 1.5kg (3.3lb)                  |

- Visual Position indicator
- 8 contacts of terminal ports
- Compatibility with any rotary motion actuator <ISO5211>
- Easy adjustment of cam position
- Dual 1/2" conduit entries



### DIMENSIONS FOR FL41000





**For ISO Direct Mount Ball Valves Only (B03, B05/5S/5TC/5T0, B07L/T and ZF1 SS)\***

## ISO Direct Mount Ball Valve Actuation Selection Chart

| Actuator Sizing Info | Double Acting | Spring Return | Valve Torque |
|----------------------|---------------|---------------|--------------|
| 1/2"                 | SPNII50DA     | SPNII63SR     | 85           |
| 3/4"                 | SPNII63DA     | SPNII63SR     | 110          |
| 1"                   | SPNII63DA     | SPNII75SR     | 180          |
| 1 1/2"               | SPNII75DA     | SPNII85SR     | 315          |
| 2"                   | SPNII75DA     | SPNII100SR    | 450          |
| 3"                   | SPNII100DA    | SPNII115SR    | 680          |
| 4"                   | SPNII115DA    | SPNII125SR    | 1190         |
| 6"                   | SPNII145DA    | SPNII180SR    | 2850         |



### ADDITIONAL NOTES

\*Actuator sized for liquid service up to 500 psig differential line pressure using 80 psig instrument air.

\*\* Actuator sizing torques up to 500 psig DP: Water – 1.0, Oil – 0.8, Gas Wet (Steam) – 1.0, Gas Dry – 1.3.

\*\*\* Add 20% on torque valves for 3-way B07 series valve.

\*\*\*\* For high or low temperature applications consult supplier for special seal kits.



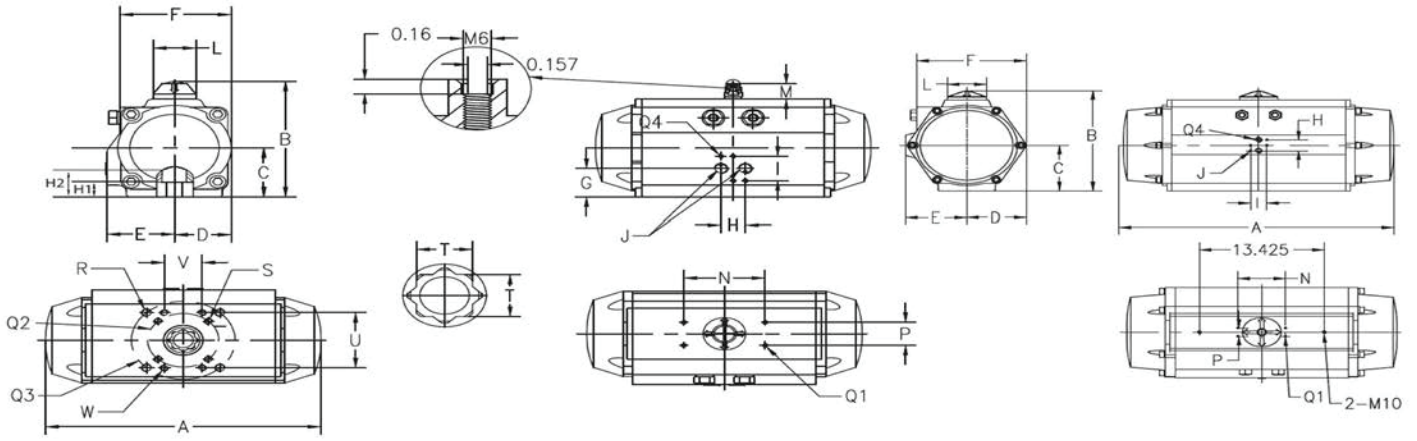
Example of the Flow+ ZF1 SS ball valve mounted to a Sharpe SPNII actuator.

## Actuation Selection Chart for Carbon Steel, Full Port/Reduced Port Ball Valves. \* Non - Direct Mounting Kit Required

|        | 150 FP | DA    | SR11    | 300FP | DA    | SR11    | 150RP | DA    | SR11    | 300RP | DA    | SR11    |
|--------|--------|-------|---------|-------|-------|---------|-------|-------|---------|-------|-------|---------|
| 1/2"   | 106    | 050DA | 063SR11 |       |       |         |       |       |         |       |       |         |
| 3/4"   | 124    | 050DA | 075SR11 |       |       |         |       |       |         |       |       |         |
| 1"     | 239    | 063DA | 085SR11 |       |       |         |       |       |         |       |       |         |
| 1-1/2" | 486    | 075DA | 100SR11 |       |       |         |       |       |         |       |       |         |
| 2"     | 663    | 085DA | 115SR11 | 885   | 100DA | 125SR11 | 486   | 075DA | 100SR11 | 787   | 085DA | 115SR11 |
| 3"     | 1433   | 115DA | 145SR11 | 1912  | 115DA | 160SR11 | 663   | 085DA | 115SR11 | 885   | 100DA | 125SR11 |
| 4"     | 2070   | 125DA | 160SR11 | 4213  | 145DA | 200SR11 | 1443  | 115DA | 145SR11 | 1912  | 115DA | 160SR11 |
| 6"     | 7115   | 180DA | 240SR11 | 11841 | 240DA | 265SR11 | 2071  | 125DA | 160SR11 | 4213  | 145DA | 200SR11 |
| 8"     | 12479  | 240DA | 300SR11 | 27435 | 300DA |         | 7115  | 180DA | 240SR11 | 11841 | 240DA | 265SR11 |

Actuator sizing torque based on MAWP in in/lbs, clean wet service at ambient temperature. Actuator recommendation is based on Sharpe SPNII models using 80 psi supply air. Fabricated mounting kit required. Sizing is subject to review without notice

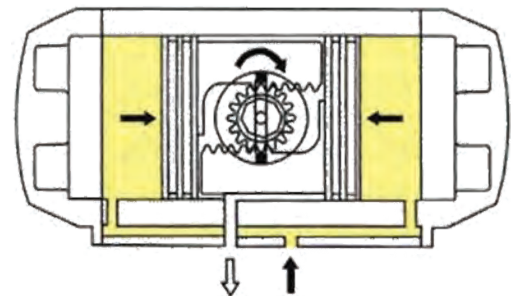
# SPNII Actuator Information



| Model | Unit | A     | B     | C    | D    | E    | F     | G    | H    | H1   | H2   | I    | J    | L    |
|-------|------|-------|-------|------|------|------|-------|------|------|------|------|------|------|------|
| 032   | in   | 4.61  | 1.77  | 0.88 | 0.88 | 0.88 | 1.77  | .88  | 0.94 | 0.39 | -    | 1.25 | 1/8" | 1.4  |
|       | mm   | 117   | 45    | 22   | 22   | 22   | 45    | 22   | 24   | 10   |      | 32   |      | 36   |
| 050   | in   | 5.8   | 3.62  | 1.35 | 1.12 | 1.61 | 2.28  | 1.02 | 0.94 | 0.47 | 1.26 | 1.26 | 1/4" | 1.65 |
|       | mm   | 147   | 92    | 34   | 28   | 41   | 58    | 26   | 24   | 12   | 32   | 32   |      | 42   |
| 063   | in   | 6.26  | 4.25  | 1.67 | 1.42 | 1.14 | 2.83  | 1.18 | 0.94 | 0.63 | 1.34 | 1.26 | 1/4" | 1.65 |
|       | mm   | 159   | 108   | 42   | 36   | 29   | 72    | 30   | 24   | 16   | 34   | 32   |      | 42   |
| 075   | in   | 8.39  | 4.92  | 2.01 | 1.71 | 2.07 | 3.39  | 1.03 | 0.94 | 0.75 | 1.34 | 1.26 | 1/4" | 1.65 |
|       | mm   | 213   | 125   | 51   | 43   | 53   | 86    | 26   | 24   | 19   | 34   | 32   |      | 42   |
| 085   | in   | 9.8   | 5.43  | 2.27 | 1.91 | 2.22 | 3.8   | 1.26 | 0.94 | 0.75 | 1.34 | 1.26 | 1/4" | 1.65 |
|       | mm   | 249   | 138   | 58   | 49   | 56   | 97    | 32   | 24   | 19   | 34   | 32   |      | 42   |
| 100   | in   | 10.67 | 5.94  | 2.5  | 2.2  | 2.6  | 4.17  | 1.46 | 0.94 | 0.91 | 1.89 | 1.26 | 1/4" | 1.65 |
|       | mm   | 271   | 151   | 64   | 56   | 66   | 106   | 37   | 24   | 23   | 48   | 32   |      | 42   |
| 115   | in   | 12.40 | 6.89  | 2.85 | 2.52 | 3.03 | 5.00  | 1.67 | 0.94 | 0.91 | 1.89 | 1.26 | 1/4" | 2.6  |
|       | mm   | 315   | 175   | 72   | 64   | 77   | 127   | 42   | 24   | 23   | 48   | 32   |      | 66   |
| 125   | in   | 13.62 | 7.48  | 3.09 | 2.72 | 3.23 | 5.12  | 1.8  | 0.94 | 1.14 | 2.56 | 1.26 | 1/4" | 2.6  |
|       | mm   | 346   | 190   | 78   | 69   | 82   | 130   | 46   | 24   | 29   | 65   | 32   |      | 66   |
| 145   | in   | 16.22 | 8.25  | 3.46 | 3.15 | 3.54 | 5.85  | 2.17 | 0.94 | 1.14 | 2.56 | 1.26 | 1/4" | 2.6  |
|       | mm   | 412   | 210   | 88   | 80   | 90   | 149   | 55   | 24   | 29   | 65   | 32   |      | 66   |
| 160   | in   | 17.44 | 9.06  | 3.88 | 3.46 | 3.87 | 6.28  | 2.04 | 0.94 | 1.14 | 2.56 | 1.26 | 1/4" | 2.6  |
|       | mm   | 443   | 230   | 99   | 88   | 98   | 160   | 52   | 24   | 29   | 65   | 32   |      | 66   |
| 180   | in   | 19.37 | 9.96  | 4.29 | 3.88 | 4.15 | 7.07  | 2.37 | 0.94 | 1.65 | 3.62 | 1.26 | 1/4" | 3.15 |
|       | mm   | 492   | 253   | 109  | 99   | 105  | 180   | 60   | 24   | 42   | 92   | 32   |      | 80   |
| 200   | in   | 21.54 | 10.91 | 4.8  | 4.29 | 4.41 | 7.64  | 2.6  | 0.94 | 1.65 | 3.62 | 1.26 | 1/4" | 3.15 |
|       | mm   | 547   | 277   | 122  | 109  | 112  | 194   | 66   | 24   | 42   | 92   | 32   |      | 80   |
| 240   | in   | 24.17 | 13.7  | 5.75 | 5.14 | 5.16 | 9.09  | 2.76 | 1.57 | 1.97 | 3.27 | 1.77 | 3/8" | 3.15 |
|       | mm   | 614   | 348   | 146  | 131  | 131  | 231   | 70   | 40   | 50   | 92   | 45   |      | 80   |
| 265   | in   | 28.7  | 15.31 | 6.57 | 5.79 | 5.78 | 9.99  | 3.54 | 1.57 | 1.97 | 3.27 | 1.77 | 3/8" | 3.15 |
|       | mm   | 729   | 389   | 167  | 147  | 147  | 254   | 90   | 40   | 50   | 92   | 45   |      | 80   |
| 300   | in   | 33.03 | 16.14 | 6.99 | 6.38 | 6.81 | 11.42 | 3.35 | 1.57 | 1.97 | 3.27 | 1.77 | 1/2" | 3.15 |
|       | mm   | 839   | 410   | 178  | 162  | 173  | 290   | 85   | 40   | 50   | 92   | 45   |      | 80   |



| Model | Unit | M    | N    | P    | Q1 | Q2  | Q3  | Q4 | R   | S   | T    | U    | V    | W   |
|-------|------|------|------|------|----|-----|-----|----|-----|-----|------|------|------|-----|
| 032   | in   | 0.79 | 1.97 | 1.18 | M5 | F03 | -   | M5 | -   | -   | 0.35 | -    | -    | -   |
|       | mm   | 20   | 50   | 30   |    |     |     |    |     |     | 9    |      |      |     |
| 050   | in   | 0.79 | 3.15 | 1.18 | M5 | F04 | -   | M5 | -   | M5  | 0.67 | -    | -    | -   |
|       | mm   | 20   | 80   | 30   |    |     |     |    |     |     | 17   |      |      |     |
| 063   | in   | 0.79 | 3.15 | 1.18 | M5 | F05 | -   | M5 | -   | M6  | 0.67 | -    | -    | -   |
|       | mm   | 20   | 80   | 30   |    |     |     |    |     |     | 17   |      |      |     |
| 075   | in   | 0.79 | 3.15 | 1.18 | M5 | F05 | F07 | M5 | M8  | M6  | 0.87 | -    | -    | -   |
|       | mm   | 20   | 80   | 30   |    |     |     |    |     |     | 22   |      |      |     |
| 085   | in   | 0.79 | 3.15 | 1.18 | M5 | F05 | F07 | M5 | M8  | M6  | 0.87 | -    | -    | -   |
|       | mm   | 20   | 80   | 30   |    |     |     |    |     |     | 22   |      |      |     |
| 100   | in   | 0.79 | 3.15 | 1.18 | M5 | F07 | F10 | M5 | M10 | M8  | 0.87 | 2.83 | 1.46 | M8  |
|       | mm   | 20   | 80   | 30   |    |     |     |    |     |     | 22   | 72   | 37   |     |
| 115   | in   | 1.18 | 3.15 | 1.18 | M5 | F07 | F10 | M5 | -   | M10 | 0.87 | -    | -    | M8  |
|       | mm   | 30   | 80   | 30   |    |     |     |    |     |     | 22   |      |      |     |
| 125   | in   | 1.18 | 3.15 | 1.18 | M5 | F10 | -   | M5 | -   | M10 | 1.42 | 2.83 | 1.46 | M8  |
|       | mm   | 30   | 80   | 30   |    |     |     |    |     |     | 36   | 72   | 37   |     |
| 145   | in   | 1.18 | 3.15 | 1.18 | M5 | F10 | F12 | M5 | M12 | M10 | 1.42 | 2.83 | 1.46 | M8  |
|       | mm   | 30   | 80   | 30   |    |     |     |    |     |     | 36   | 72   | 37   |     |
| 160   | in   | 1.18 | 3.15 | 1.18 | M5 | F10 | F12 | M5 | M12 | M10 | 1.42 | 2.83 | 1.46 | M8  |
|       | mm   | 30   | 80   | 30   |    |     |     |    |     |     | 36   | 72   | 37   |     |
| 180   | in   | 1.18 | 5.12 | 1.18 | M5 | F10 | F14 | M5 | M16 | M10 | 1.42 | 3.9  | 2.09 | M10 |
|       | mm   | 30   | 130  | 30   |    |     |     |    |     |     | 36   | 99   | 53   |     |
| 200   | in   | 1.18 | 5.12 | 1.18 | M5 | F10 | F14 | M5 | M16 | M10 | 1.42 | 3.9  | 2.09 | M10 |
|       | mm   | 30   | 130  | 30   |    |     |     |    |     |     | 36   | 99   | 53   |     |
| 240   | in   | 1.97 | 5.12 | 1.18 | M5 | F12 | F16 | M6 | M20 | M12 | 1.81 | -    | -    | -   |
|       | mm   | 50   | 130  | 30   |    |     |     |    |     |     | 46   |      |      |     |
| 265   | in   | 1.97 | 5.12 | 1.18 | M5 | -   | F16 | M6 | M20 | -   | 1.81 | -    | -    | -   |
|       | mm   | 50   | 130  | 30   |    |     |     |    |     |     | 46   |      |      |     |
| 300   | in   | 1.97 | 5.12 | 1.18 | M5 | -   | F16 | M6 | M20 | -   | 1.81 | -    | -    | -   |
|       | mm   | 50   | 130  | 30   |    |     |     |    |     |     | 46   |      |      |     |



# Terms and Conditions

VSTC-18-3 | Effective July 1, 2018

- 1) CANCELLATIONS & RESTOCKING POLICY:** Purchase orders once placed by Buyer and accepted by Seller can be cancelled only with Seller's written consent and upon terms which will save Seller from loss. No orders may be cancelled subsequent to delivery and/or shipment, whichever occurs first. As estimated actual damages, Buyer agrees to pay Seller the greater of Seller's actual costs incurred prior to cancellation plus a reasonable profit, or the following minimum cancellation charges: a) 20% of Order value if cancelled thirty (30) or more days prior to the original delivery/shipment date; b) 50% of the Order value if cancelled thereafter; or, c) 100% of the Order value of any non-standard items, which are items not built for stock or built to Buyer's specifications.
- 2) RETURNED PRODUCT:** All sales are final; all custom products (non-stocking) are not subject to return, credit or refund. The return of obsolete and used Products shall not be permitted. The Purchaser shall not return Products without first obtaining Seller's written permission and shall be subject to a restocking charge. Products must be returned within 10 days after the date that written permission has been given. All transportation charges for any returned Products shall be paid by the Purchaser. Request to return Products must be accompanied by relevant customer order and Seller's invoice number(s). Final acceptance of returned Products is subject to examination and/or testing. Products will not be accepted for return or credit later than six (6) months after invoicing.
- 3) PRICES:** Possession of price lists will not be accepted by the Seller as an obligation, or offer, to sell any goods listed therein. All prices contained in published price lists are subject to change without notice and supersede those of all previous lists. Prices quoted are based on current exchange rates; Seller reserves the right to adjust pricing to reflect the exchange rate in effect at the product receipt date to Seller's facility.
- 4) LIQUIDATED DAMAGES:** Liquidated damages will not be accepted in the event of order placement.
- 5) SALES TAXES, ETC.:** The Purchaser shall pay and be responsible for all provincial, local or federal sales, use or other taxes (including general sales or value added taxes) and customs duties now or hereinafter enacted which may be applicable to the sale of the Products or the importation of the Products to the destination specified by the Purchaser and which duties and taxes shall be the responsibility of the Purchaser.
- 6) CREDIT APPROVAL:** Orders are accepted subject to satisfactory credit approval. Pending credit approval, delivery may be delayed without liability to Seller.
- 7) TERMS OF PAYMENT:** The terms of payment for Products purchased pursuant to this Agreement are (I) upon acceptance of the purchase order a deposit in such amount as may be set out in the Seller's written acceptance notice and (II) the balance within 30 days from the date of invoice. Any invoice amount which is not paid when due shall bear interest at the rate of one and one-half (1 ½%) percent per month until paid in full.

The Purchaser agrees that it will not have any rights of set off against or deduction from the purchase price for the Products payable by the Purchaser pursuant to this Agreement. The Purchaser grants to Seller a purchase money security interest in all Products delivered pursuant to this Agreement and all proceeds thereof (whether cash or non-cash and including, without limitation, accounts, instruments and chattel paper). Any failure by the Purchaser to pay the purchase price in full as provided in this Agreement shall constitute an event of default for purposes of said security interest. Upon the occurrence of any such default, Seller shall have all rights of a secured party after default under applicable law. Any repossession and removal of any Products shall be without prejudice to any of Seller's other remedies at law or in equity. The Purchaser agrees, without further consideration, at any time, to do or cause to be done, to execute and deliver, all such further acts and instruments (including, without limitation, financing statements approved for filing) as Seller may reasonably request in order to perfect Seller's security interest.
- 8) DELIVERY DATE:** Seller will utilize reasonable best efforts to meet the delivery schedules stipulated in this Agreement. In the event the provisions of Section 14 hereof shall apply, the delivery date shall be extended by a number of days that is equal to the duration of the event or condition that is responsible for such delay.
- 9) TITLE AND SHIPMENT:** All quotations and sales are FCA Loaded Truck ValvSource Warehouse (Inco Terms 2010) unless otherwise specified in writing and agreed by both parties. Seller's responsibility ceases upon delivery to carrier and title shall transfer and risk of loss shall be borne by Buyer at that point. Any expedited or other premium transportation charges requested by Buyer will be for the account of Buyer. Prices include domestic packing, blocked and strapped to open pallets and wrapped in Poly. No claims for price adjustments will be honored unless presented within six (6) months from date of invoice. All quotations are subject to change without notice and prior to sale of goods.
- 10) INSPECTION BY PURCHASER:** All Products must be inspected by the Purchaser upon receipt and the Purchaser and Seller, collectively, agree to file appropriate claims with the carrier when there is evidence of shipping damage, either concealed or external. Claims for shortage or error in shipment or for damage other than shipping damage must be made within 5 days after receipt of shipment, failing which the Purchaser shall be deemed to have accepted the shipment.
- 11) LIMITED WARRANTY:** Purchaser acknowledges that the Products are provided to the Purchaser subject only to the limited warranties provided by the manufacturer of the Products and are subject to all of the conditions, limitations and exclusions set out therein, all of which are hereby accepted by the Purchaser. The warranty exclusions include, without limitation, (I) any defects caused by faulty installation performed by Purchaser or third parties, (II) any damage caused by the contractors or tradesman of the Purchaser, (III) any damage caused by improper use or misuse, including exposure to excessive temperatures, moisture or cleaning agents and solvents and (IV) any damage caused during transportation or improper storage. Claims for warranty repairs and replacements must be made within the applicable time period described in the manufacturer's limited warranty. In no event shall Seller be liable for other than the repair or replacement of any defective Products. In no event shall Seller be liable for any damages, direct or indirect, special or consequential, including, without limitation, damages for lost profits, business interruption, or economic loss arising out of defects in the Products.
- 12) EXCLUSION OF WARRANTIES:** Except as expressly set forth herein seller disclaims all warranties with regard to the products including, without limitation, all implied warranties of merchantability and fitness for a particular purpose.
- 13) CATALOGUE AND OTHER PRINTED MATTER:** Seller's illustrations are representations of a certain size of each line of Product, but do not necessarily represent all sizes and materials in detail. Similarly, dimensions, weights and material information have been prepared with care, but their correctness is not guaranteed. Seller reserves the right to vary the designs and dimensions without notice.
- 14) FORCE MAJEURE:** Any delay or failure of performance by Seller shall be excused if and to the extent caused, directly or indirectly, events beyond Seller's control including, without limitation, fire, flood earthquake, lightning, hurricane, explosion, accident or breakdown, acts of God, embargo, strike, labour dispute, labour trouble, lockout, shortage or control of power supply, shortage of supplies or raw materials, or any causes whether of the same kind as the causes enumerated before or not. Subject to any express provisions of this Agreement, any such causes of delay shall extend the time of performance by the length of delay occasioned thereby.
- 15) NO WAIVER:** No waiver by Seller of any right hereunder or of any right granted in connection with a failure to perform or breach by the Purchaser shall be deemed as a waiver of any other right hereunder or of any right granted in connection with any other failure or breach by the Purchaser, whether of a similar nature or otherwise.
- 16) NOTICE:** Any notice made under or in relation to this Agreement shall be sent to the addresses first above written or such other address as the intended recipient shall have previously designated by written notice, by postage prepaid registered mail or by telegram including telex, followed by a confirmation letter by postage prepaid and return receipt requested registered mail. The notice shall be deemed to be made on the fifth day following the date of mailing.
- 17) ENTIRE AGREEMENT:** This Agreement contains the entire agreement and understanding of the parties hereto with respect to the subject matter of this Agreement, and supersedes all prior discussions, agreements, understandings of any and every nature, whether written or oral, between the parties with respect to the subject matter of this Agreement, and no condition, definition, warranty or representation other than those expressly provided for in this Agreement with respect to the subject matter of this Agreement shall be binding upon either party hereto.
- 18) AMENDMENTS IN WRITING:** Any amendment, modification, change or alteration of this Agreement shall be made in writing which expressly refers to this Agreement and which is signed by a duly authorized officer or representative of each of the parties hereto.
- 19) SEVERABILITY:** All provisions of this Agreement are severable and this Agreement shall be interpreted and enforced as if all completely invalid or unenforceable provisions were not contained herein. All partially valid and enforceable provisions shall be enforced to the extent they are valid and enforceable.
- 20) NO AGENCY OR PARTNERSHIP:** Nothing herein contained shall be deemed or construed to constitute either party the agent or partner of the other. Neither party shall have any right, title or authority to enter into any contract, agreement or commitment on behalf of the other or to bind the other in any manner whatsoever.
- 21) GOVERNING LAW:** This agreement shall be governed by and construed in accordance with the laws of the jurisdiction from which the products are shipped by the seller to the purchaser and the parties hereby attorn to the courts of such jurisdiction.
- 22) ENUREMENT:** This Agreement shall enure to the benefit of and be binding upon the parties hereto and on their successors and permitted assigns.
- 23) SELLER DEFINED:** For the purposes hereof, Seller means the Corporation listed as such on the front page of the Invoice or acceptance notice of which these terms and conditions of sale form a part.



- 1,2,3 Piece Ball Valves
- Flanged Floating Ball Valves
- Knife Gate Valves
- Butterfly Valves
- Actuation
- Position Switches



- Y, Basket & Temporary Strainers
- Check Valves
- Triple Duty Valves
- Foot Valves
- Expansion Joints



- Pressure Gauges & Accessories
- Temperature Indicators
- Needle Valves
- Thermowells & Thermocouples



- Brass Ball Valves
- Bronze Gate, Globe, & Check Valves
- Cast Iron Gate, Globe, & Check Valves
- Cast & Forged Steel Gate, Globe and Check Valves



- Cast Gate, Globe & Check Valves
- Forged Gate, Globe & Checks
- Threaded Ball Valves
- Flanged Ball Valves



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