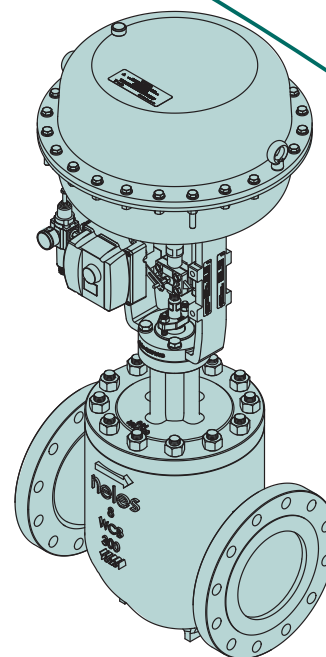


SERIES GM CONTROL VALVES GLOBE-OMEGA, MULTI-PATH & MULTI-STAGE TRIM

The series GM, Omega trim valves are most suitable for high pressure drop applications of both compressible and incompressible fluids as it enables the flow velocity to be controlled through the multistage Omega trim. Also, series GM range of valves combines high integrity features, such as 2 or 3 dimensional flow path multistage trim, a high flow capacity and a wide range of 'OMEGA' trim designs. This means it is ideally suited to meet the various severe service process control requirements that are demanded from a wide range of industry related applications. The 'OMEGA' trim design is a multi-passage, multiturn disk stack trim. There are 2~32 turns designs available depending on pressure drop and potential for cavitation. The fluid passes through the flow passage generated by the Omega multistage trim. The pressure drop is staged across the stacks so that the pressure drop progressively reduces as it passes through the steps of the trim. This gives excellent resistance to cavitation on high pressure drop applications. For very high pressure drop applications the Omega trim, plug and seat insert would be standard manufactured from hardened stainless steel, stellite stainless steel, and optionally solid tungsten carbide or glass metallic. Standard valves are equipped with VD spring diaphragm actuators or VC Cylinder actuators with ND9000® intelligent valve controllers for precise flow control, extended operational life and performance monitoring on-line.

Construction

- Various construction design available with a range of different end styles and connections
- The Omega standard balanced trim design is based on 2 or 3 dimensional multistage cage and balanced plug.
- The multistage trim shape defines the flow path through the valve and flow characteristics of the valve (linear, equal percentage or others), standard trim characteristic is linear.
- The balancing holes are located in the top of the plug. This trim is specially suited to high pressure drop application and is used in the majority of control applications.
- Wide variety of trims with different Cv and characteristics
- Both metal and soft seats are available depending the application
- Optional bellows seal for toxic or other applications where no stem seal leakage is allowed
- Wide material selection for different applications
- Many end connection styles available for different applications
- Extension bonnet design for wide temperature range



Wide range of applications

- Suitable for gas, liquid and steam
- Temperature limits -29 ... +260 °C / (-20 ... +500 °F) with standard bonnet construction. Over +260 °C / (+500 °F) and under -29 °C / (-20 °F) with extension bonnet
- Large variation of trim designs for multi-turns and passages for low-noise, and anti-cavitation applications
- Wide range of applicable noise control components, silencers, attenuate plates
- Inherently characterized trim offered in Linear, and optionally Equal Percentage.
- Large range of trims per size allowing for wide rangeability in process conditions
- Clamped cage for heavy duty guiding on severe service applications
- High integrity cage guiding system
- Double packing available

Benefits of 'OMEGA' trim applications

- Quick change trim and top entry construction for easy in-line maintenance
- Self guided components makes for easy valve assembly
- All trim components removable from the top side for easy maintenance
- Prolonged trim and valve life time
- Effective noise control
- Reduction of cavitation damage and pipe fatigue
- Stable process control
- Faster start-up, reduced system managing cost
- ND9000 digital valve controller with online diagnostics enables performance follow up and predictive maintenance
- Efficient asset management with Metso FieldCare open architecture software and excellent networking capabilities

Omega quick change, Pilot balanced trim

Pilot balanced trim construction is designed with a special pilot plug & seat built-in the main plug. This design gives excellent seat tightness to leakage on high pressure drop and high temperature. The design applicable TSO (Tight Shut Off, seat leakage class V) requirement in high temperature services.

Accurate control & performance

- ND9000 digital valve controller for auto-calibration and accurate control
- Accurate and sensitive diaphragm and cylinder actuators

- Stable flow control with high rangeability
- Low-noise, anti-cavitation control and erosion resistant trims
- Streamline flow passage to secure capacity

Safety and quality

- Rugged one piece body structure to minimize leakage paths and make the valve less insensitive from prone stress
- Strictly tested to ensure specified performance with quality assurance systems in according to ISO 9001
- Certified ISO 15848 fugitive emissions
- Certified CE/PED & ATEX, TSG & EAC (GOST-R)

Applications for 'OMEGA' trim

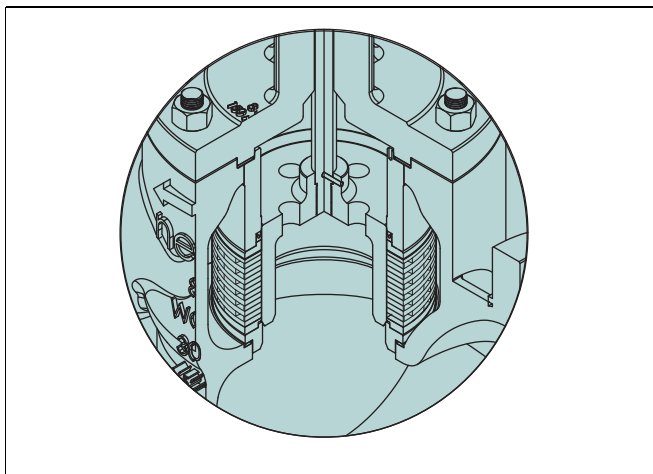
Severe services in power plant

- Flow control for main & start-up feed pump recirculation
- Main & booster feed water control
- Condensate booster pump recirculation
- Deaerator level control
- Turbine by-pass & steam generator blow down
- Auxiliary steam shoot blower control
- Boiler start-up main steam spray
- Pressurizer & POSRV
- Chemical & Volume Control System (CVCS) letdown
- HP coolant injection
- Atmospheric steam dump
- Atmospheric venting silencer

Severe services in oil & gas plant

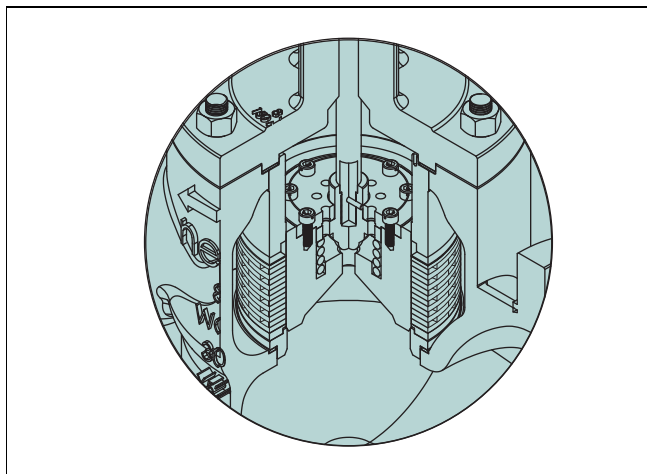
- Compressor anti-surge, kick back & recycle
- Pump minimum flow & recirculation
- Blow down discharge to vent flare
- Reactor de-pressurization
- Turbo expander by-pass
- Gas injection lift control
- Gas storage pressure letdown
- Gas flow regulation
- Pipeline anti-surge
- Heavy oil letdown
- Ethylene letdown
- Steam vent to atmosphere
- Well head choke valves

Different trim designs



Omega quick change, Standard balanced trim

The Omega standard balanced trim design is based on 2 or 3 dimensional labyrinth disk stack cage and balanced plug. The opened disk stack shape defines the flow path through the valve and flow characteristics of the valve (linear, equal percentage, others), standard trim characteristic is linear. The balancing holes are located in the top of the plug. This trim is specially suited to high pressure drop application and is used in the majority of control applications.



Omega quick change, Pilot balanced trim

Pilot balanced trim construction is designed with a special pilot plug & seat built-in the main plug. The design gives excellent seat tightness on high pressure drop and high temperature applications. The design applicable TSO (Tight Shut Off, seat leakage class V) requirement in high temperature services.

GM Application guide

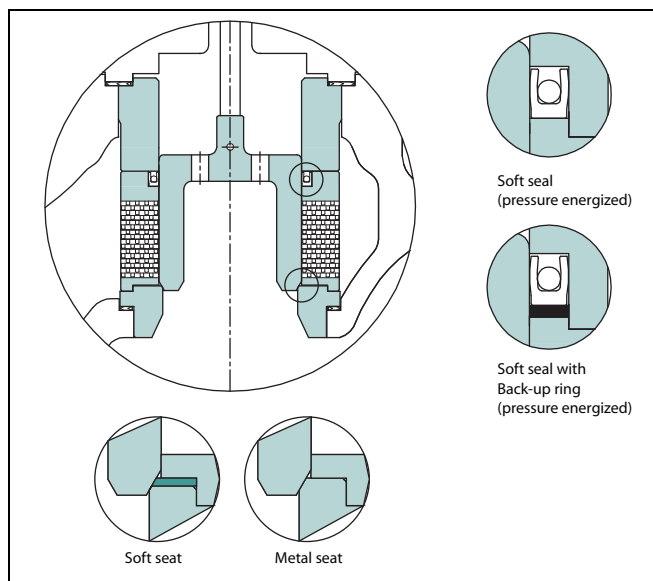
Temperature range

PTFE + Graphite spring energized seal with metal seat: -40...+260 °C
 PTFE spring energized seal with metal seat: -196...+232 °C
 Metal seat: -196...+593 °C

Shut-off classification

Class IV with soft seal & metal seat per ANSI FCI 70-2.
 (0.01 % of valve rated capacity).
 Class V with soft seat or pilot balanced plug per ANSI FCI 70-2.

Seal-ring & seat solutions for GM valve trims



Trim materials

| GM, Trim | | | | Temp. range (°C) | Sign |
|-----------------------|--------------|--------|--------|------------------|------------|
| Plug | Stem | Seat | Disk | | |
| 420 J2 | 630 SS + HCr | 420 J2 | 420 J2 | -29 ~ +425 | P2XBCS1P2X |
| Inconel 625, 718, 750 | | | | -196 ~ +645 | * |

*Please contact Metso.

Gasket applications

| Body, bonnet material | Gasket material | Temp. range (°C) | Sign |
|--|--|------------------|------|
| Carbon steel WCB,A105 | S/W (Spiral Wound) 316SS + Graphite | -29 ~ +425 | S |
| Stainless steel CF8,CF8M,CF3,CF3M | S/W (Spiral Wound) 316SS + Graphite | -196 ~ +425 | S |
| | S/W (Spiral Wound) 316SS + PTFE | -196 ~ +232 | L |
| Cr.Mo. Steel WC6,WC9,F22, C12A,F91 | S/W (Spiral Wound) 316SS + Graphite + Non Asbestos | -29 ~ +593 | H |
| | S/W (Spiral Wound) 316SS+ Graphite + Mica (special Hi-Temp. max 950) | | * |

*Please contact Metso.

Packing applications

| Packing material | Temp (°C) | Sign |
|---|-------------|------|
| PTFE + Carbon Fiber (Braided TEF + Graphite), standard | -196 ~ +260 | G |
| PTFE V-Ring | -196 ~ +232 | T |
| Graphite (with Mold + Braided) | -196 ~ +400 | F |
| Hi-Graphite (with Mold + Braided) | -196 ~ +593 | H |
| RTFE V-Ring + Metal | -40 ~ +350 | M |

*Please contact Metso.

Flow direction

| Series | Plug / Disk stack | General plug (Balanced plug) | | Pilot balanced plug | Unbalanced plug |
|--------|-------------------|------------------------------|------------------|---------------------|-----------------|
| | | General (Gas) | General (Liquid) | General | General |
| GM | | FTO | FTC | FTC | FTO |
| AM | | FTO | FTC | FTC | FTO |

FTO: Flow to open
 FTC: Flow to close

Cv ratio

100: 1

Flow characteristics

Linear, equal percentage or other customized characteristic.

Temperature range with different body and stud/nut materials

| Body, bonnet material | Stud, nut material | Temp. range (°C) | Sign |
|--|---------------------------------------|------------------|------|
| Carbon steel (WCB, A105) | ASTM A193-B7 STUD ASTM A194-2H NUT | -29 ~ +425 | A |
| Stainless steel (CF3, CF8,CF3M, CF8M) | ASTM A193-B7 STUD ASTM A194-2H NUT | -46 ~ +538 | A |
| | ASTM A193-B8 STUD ASTM A194-8 NUT | -196 ~ +538 | B |
| Cr.Mo. Steel (WC6, F11, WC9, F22, C12A, F91) | ASTM A193-B16 STUD ASTM A194-4 NUT | -29 ~ +593 | * |

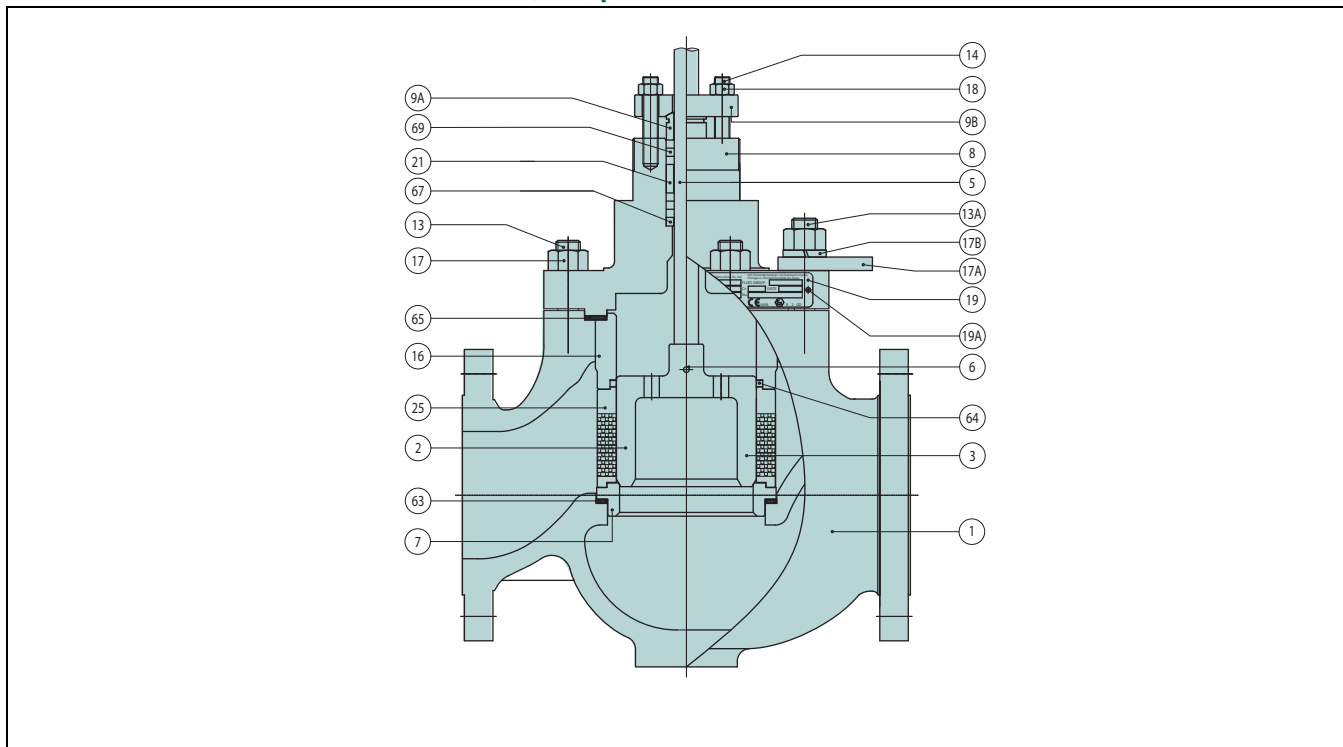
*Please contact Metso.

GM, Ratings & End Connctions

| Valve size DN / Inch | GM, ASME ratings | | | | | | | | | | |
|-------------------------|------------------|-----|----|----|------------------|-----|----|----|------------|-----|----|
| | Class 150 ~ 600 | | | | Class 900 ~ 1500 | | | | Class 2500 | | |
| | RF | RTJ | SW | BW | RF | RTJ | SW | BW | RF | RTJ | BW |
| 25 / 1 | O | O | O | O | O | O | O | O | | O | O |
| 40 / 1-1/2 | O | O | O | O | O | O | O | O | | O | O |
| 50 / 2 | O | O | O | O | O | O | O | O | | O | O |
| 80 / 3 | O | O | | O | O | O | | O | | O | O |
| 100 / 4 | O | O | | O | O | O | | O | | O | O |
| 150 / 6 | O | O | | O | O | O | | O | | O | O |
| 200 / 8 | O | O | | O | O | | O | | | O | O |
| 250 / 10 | O | O | | O | O | | O | | | O | O |
| 300 / 12 | O | O | | O | O | | O | | | O | O |
| 350 / 14 | O | O | | O | O | | O | | | O | O |
| 400 / 16 | O | O | | O | O | | O | | | O | O |

*Note 1. RF: Raised Face Flange RTJ: Ring Joint SW: Socket Weld BW: Butt Weld
 2. ASME class 2500# & 4500# ratings are available for sizes(up to 24"), special trims for severe service applications are available.

GM, Components and materials



Body materials: Carbon steel or alloy steel

| Part no. | Description | Material |
|----------|----------------------|--|
| 1 | BODY | A216 WCB / ALLOY STEEL AVAILABLE |
| 2 | PLUG SET | 420(J2) SS / 630 SS |
| 3* | PLUG | 420(J2) STAINLESS STEEL |
| 5* | STEM | 630 STAINLESS STEEL + HCr |
| 6* | PLUG PIN | 316 STAINLESS STEEL |
| 7 | SEAT RING | 420(J2) STAINLESS STEEL |
| 8 | BONNET | A216 WCB / ALLOY STAINLESS STEEL AVAILABLE |
| 9A | GLAND | 304 STAINLESS STEEL |
| 9B | GLAND FLANGE | A351 CF8 |
| 13 / 13A | STUD | A193 Gr.B7 |
| 14 | STUD | A193 Gr.B8 |
| 16 | CAGE GUIDE | 420(J2) STAINLESS STEEL |
| 17 | HEXAGON NUT | A194 Gr.2H |
| 17A | LIFTING PLATE | JIS G3101-SS400 |
| 17B | SPRING WASHER | AISI 304 |
| 18 | HEXAGON NUT | A194 Gr.8 |
| 19 | IDENTIFICATION PLATE | 304 STAINLESS STEEL |
| 20 | RIVET | 304 STAINLESS STEEL |
| 21 | LANTERN RING | 304 STAINLESS STEEL |
| 25 | DISK STACK | 420(J2) STAINLESS STEEL |
| 63 | SEAT GASKET | S/W GASKET, 316 SS + GRAPHITE |
| 64 | SEAL RING | PTFE + GRAPHITE |
| 65 | BODY GASKET | S/W GASKET, 316 SS + GRAPHITE |
| 67 | PACKING SPACER | 304 STAINLESS STEEL |
| 69 | PACKING RING | PTFE + CARBON FIBER |

- Note.
1. Plug/Seat Hard Facing(Cobalt based alloy) & Soft Seat are available
 2. Materials description
 316 SS : ASTM A276 TP316 or JIS 316 St. Steel
 410 SS : ASTM A276 TP410 or JIS 410 St. Steel
 420 SS : ASTM A276 TP420 or JIS 420 St. Steel
 440C SS : ASTM A276 TP440C or JIS 440C St. Steel
 17-4PH : ASTM A564 630(H1100) or JIS 630(H1100) St. Steel
 3. Above standard materials to be applicable depending on specific service conditions, other optional materials to consult Metso..
 4. Optional materials to meet to requirements of NACE MR 01-75 are available
 5. The materials are subject to change as equivalent depending on detail design
 6. The part no.3 , 5 , 6 are delivered as a set with no.2

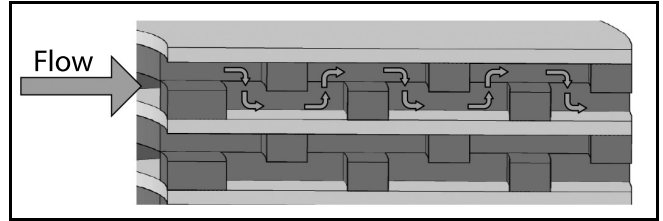
Body materials: Stainless steel

| Part no. | Description | Material |
|----------|----------------------|-------------------------------|
| 1 | BODY | A351 CF8M |
| 2 | PLUG SET | 420(J2) SS / 630 SS |
| 3* | PLUG | 420(J2) STAINLESS STEEL |
| 5* | STEM | 630 STAINLESS STEEL + HCr |
| 6* | PLUG PIN | 316 STAINLESS STEEL |
| 7 | SEAT RING | 420(J2) STAINLESS STEEL |
| 8 | BONNET | A351 CF8M |
| 9A | GLAND | 304 STAINLESS STEEL |
| 9B | GLAND FLANGE | A351 CF8 |
| 13 / 13A | STUD | A193 Gr.B8(M) |
| 14 | STUD | A193 Gr.B8(M) |
| 16 | CAGE GUIDE | 420(J2) STAINLESS STEEL |
| 17 | HEXAGON NUT | A194 Gr.8(M) |
| 17A | LIFTING PLATE | JIS G3101-SS400 |
| 17B | SPRING WASHER | AISI 304 |
| 18 | HEXAGON NUT | A194 Gr.8 |
| 19 | IDENTIFICATION PLATE | 304 STAINLESS STEEL |
| 19A | RIVET | 304 STAINLESS STEEL |
| 21 | LANTERN RING | 304 STAINLESS STEEL |
| 25 | DISK STACK | 420(J2) STAINLESS STEEL |
| 63 | SEAT GASKET | S/W GASKET, 316 SS + GRAPHITE |
| 64 | SEAL RING | PTFE + GRAPHITE |
| 65 | BODY GASKET | S/W GASKET, 316 SS + GRAPHITE |
| 67 | PACKING SPACER | 304 STAINLESS STEEL |
| 69 | PACKING RING | PTFE + CARBON FIBER |

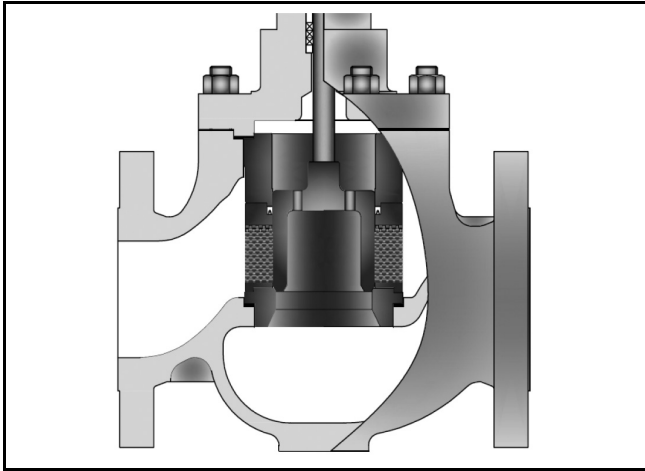
- Note.
1. Plug/Seat Hard Facing(Cobalt based alloy) & Soft Seat are available
 2. Materials description
 316 SS : ASTM A276 TP316 or JIS 316 St. Steel
 420 SS : ASTM A276 TP420 or JIS 420 St. Steel
 3. Above standard materials to be applicable depending on specific service conditions, other optional materials to consult Metso.
 4. Cryogenic application : ASTM A320 B8M & 8M for Studs(13) and Nuts(17)
 5. Optional materials to meet to requirements of NACE MR 01-75 are available
 6. The materials are subject to change as equivalent depending on detail design
 7. The part no.3 , 5 , 6 are delivered as a set with no.2

OMEGA design principals

- The value of pressure drop in the omega trim can be bigger than the conventional cage trims through the number of turns with multi-path and multi-stage.
- The value of pressure drop in the omega trim is a sum of the 'dynamic pressure in omega trim' and the 'dynamic pressure in valve design'.



Trim outlet velocity and kinetic energy limitation

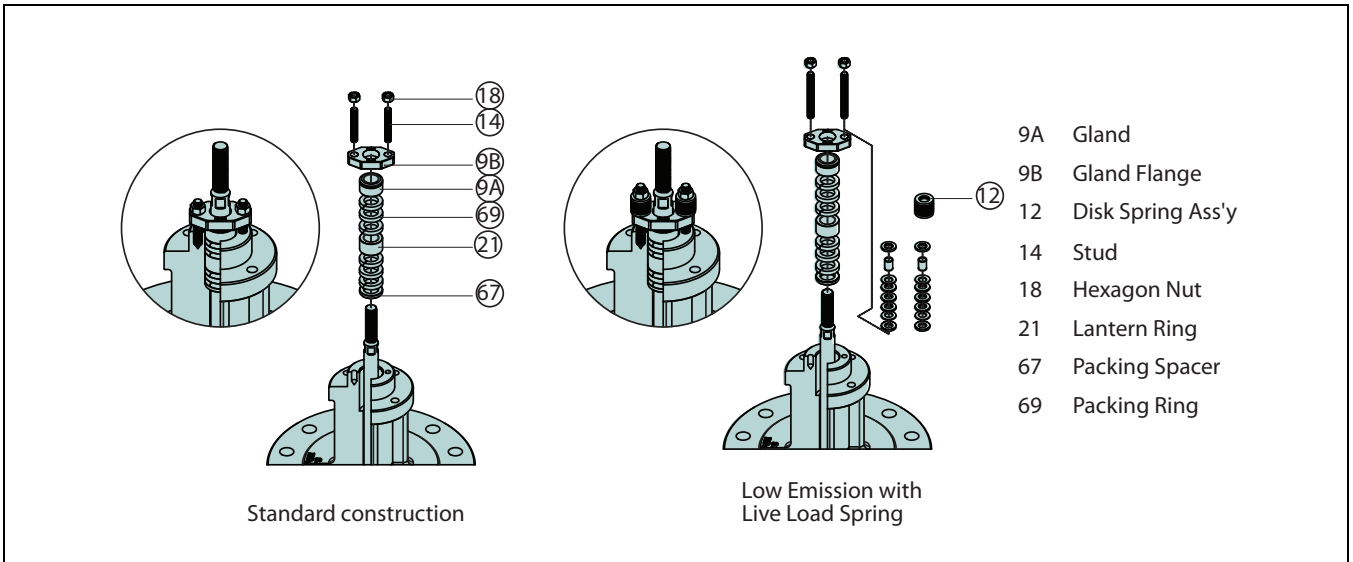


- The limitation data is based on ISA04-P211.
- The exceed velocity will be made in vibration and erosive damage to the body, trim and outlet pipe wall.
- The exceed energy will be made in mechanical vibration and erosive damage to the body, trim and outlet pipe wall.

Valve trim outlet fluid kinetic energy density criteria

| Service conditions | Water velocity | Oil velocity (Gf=0.8) | Air velocity (p=7 Mpa) | Kinetic energy |
|--|----------------|-----------------------|------------------------|----------------|
| | m/s (ft/s) | m/s (ft/s) | m/s (ft/s) | kpa (psi) |
| Continuous service, Single phase fluid | 30 (100) | 34 (112) | 105 (345) | 480 (70) |
| Cavitating and multi-phase fluids | 23 (75) | 26 (84) | - | 275 (40) |
| Vibration sensitive system | 12 (40) | 14 (45) | 42 (140) | 75 (11) |

Packing constructions



GM Series Cv vs Travel Standard OMEGA

ANSI Class: 150# ~ 2500#

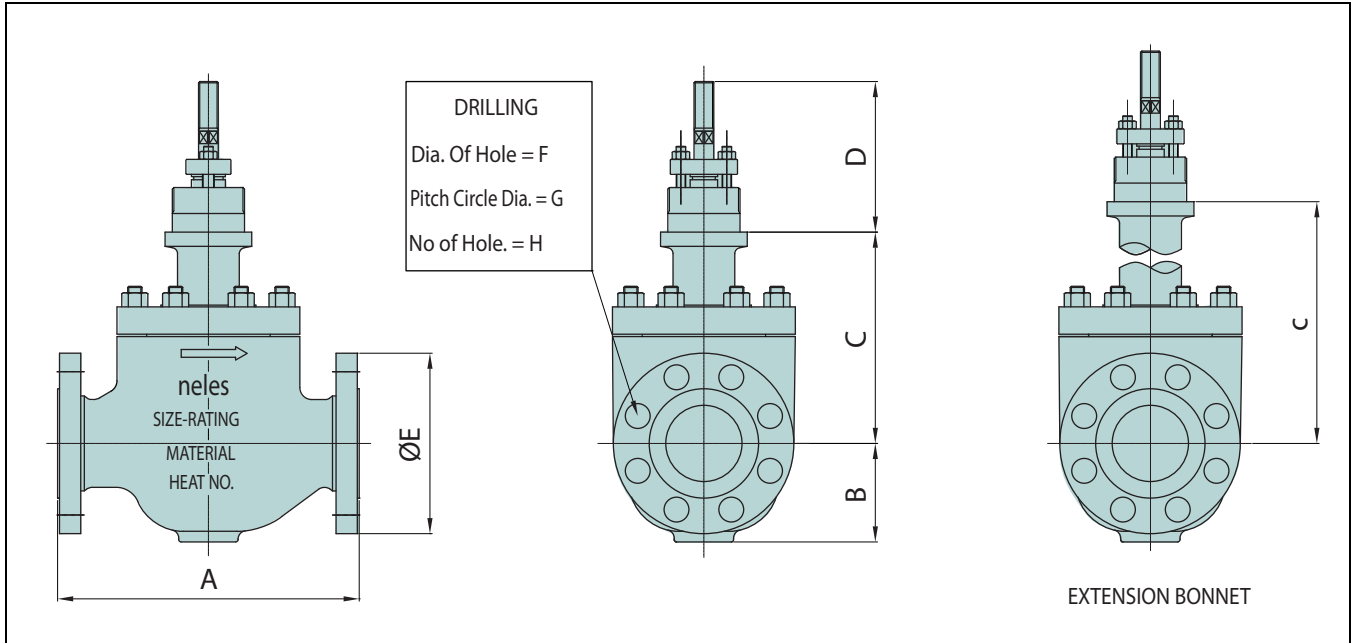
Size: 1" ~ 16"

Flow Characteristic: LINEAR

| Valve Travel [%] | | | | | | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |
|------------------|-----|--------------|------|-------|--------|-----|----------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|
| F _L | | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Valve Size | | Orifice Dia. | | | Travel | | Rated Cv | | | | | | | | | | |
| Inch | mm | Sign | Inch | mm | Inch | mm | | | | | | | | | | | |
| 1 | 25 | FC | 0.6 | 15.7 | 1.2 | 30 | 0.69 | 1.37 | 2.06 | 2.75 | 3.43 | 4.12 | 4.80 | 5.49 | 6.18 | 7.0 | |
| | | 1A | | | | | 0.29 | 0.59 | 0.88 | 1.18 | 1.47 | 1.76 | 2.06 | 2.35 | 2.65 | 3.0 | |
| | | 2A | | | | | 0.16 | 0.31 | 0.47 | 0.63 | 0.78 | 0.94 | 1.10 | 1.25 | 1.41 | 1.6 | |
| | | 3A | | | | | 0.08 | 0.16 | 0.24 | 0.31 | 0.39 | 0.47 | 0.55 | 0.63 | 0.71 | 0.8 | |
| 1-1/2 | 40 | FC | 0.9 | 23.0 | 1.2 | 30 | 1.57 | 3.14 | 4.71 | 6.28 | 7.84 | 9.41 | 10.98 | 12.55 | 14.12 | 16.0 | |
| | | 1A | | | | | 0.79 | 1.57 | 2.35 | 3.14 | 3.92 | 4.71 | 5.49 | 6.27 | 7.06 | 8.0 | |
| | | 2A | | | | | 0.39 | 0.78 | 1.18 | 1.57 | 1.96 | 2.35 | 2.74 | 3.14 | 3.53 | 4.0 | |
| | | 3A | | | | | 0.20 | 0.39 | 0.59 | 0.78 | 0.98 | 1.18 | 1.37 | 1.57 | 1.76 | 2.0 | |
| 2 | 50 | FC | 1.5 | 37.0 | 1.6 | 40 | 2.55 | 5.10 | 7.65 | 10.20 | 12.75 | 15.29 | 17.84 | 20.39 | 22.94 | 26.0 | |
| | | 1A | | | | | 1.18 | 2.35 | 3.53 | 4.71 | 5.88 | 7.06 | 8.23 | 9.41 | 10.59 | 12.0 | |
| | | 2A | | | | | 0.59 | 1.18 | 1.77 | 2.35 | 2.94 | 3.53 | 4.12 | 4.71 | 5.29 | 6.0 | |
| | | 3A | | | | | 0.29 | 0.59 | 0.88 | 1.18 | 1.47 | 1.76 | 2.06 | 2.35 | 2.65 | 3.0 | |
| 3 | 80 | FC | 3.0 | 77.0 | 2.0 | 50 | 5.30 | 10.59 | 15.89 | 21.18 | 26.47 | 31.76 | 37.05 | 42.35 | 47.64 | 54 | |
| | | 1A | | | | | 2.75 | 5.49 | 8.24 | 10.98 | 13.73 | 16.47 | 19.21 | 21.96 | 24.70 | 28 | |
| | | 2A | | | | | 1.37 | 2.75 | 4.12 | 5.49 | 6.86 | 8.23 | 9.61 | 10.98 | 12.35 | 14 | |
| | | 3A | | | | | 0.69 | 1.37 | 2.06 | 2.75 | 3.43 | 4.12 | 4.80 | 5.49 | 6.18 | 7 | |
| 4 | 100 | FC | 3.6 | 91.0 | 2.0 | 50 | 8.2 | 16.5 | 24.7 | 32.9 | 41.2 | 49.4 | 57.6 | 65.9 | 74.1 | 84 | |
| | | 1A | | | | | 5.1 | 10.2 | 15.3 | 20.4 | 25.5 | 30.6 | 35.7 | 40.8 | 45.9 | 52 | |
| | | 2A | | | | | 2.6 | 5.1 | 7.6 | 10.2 | 12.7 | 15.3 | 17.8 | 20.4 | 22.9 | 26 | |
| | | 3A | | | | | 1.4 | 2.7 | 4.1 | 5.5 | 6.9 | 8.2 | 9.6 | 11.0 | 12.4 | 14 | |
| 6 | 150 | FC | 4.1 | 133.6 | 2.4 | 60 | 14.3 | 28.6 | 43.0 | 57.3 | 71.6 | 85.9 | 100.2 | 114.5 | 128.8 | 146 | |
| | | 1A | | | | | 8.8 | 17.7 | 26.5 | 35.3 | 44.1 | 52.9 | 61.8 | 70.6 | 79.4 | 90 | |
| | | 2A | | | | | 4.4 | 8.8 | 13.2 | 17.6 | 22.1 | 26.5 | 30.9 | 35.3 | 39.7 | 45 | |
| | | 3A | | | | | 2.2 | 4.3 | 6.5 | 8.6 | 10.8 | 12.9 | 15.1 | 17.3 | 19.4 | 22 | |
| 8 | 200 | FC | 6.9 | 175.5 | 3.1 | 70 | 24.7 | 49.4 | 74.1 | 98.8 | 123.5 | 148.2 | 172.9 | 197.6 | 222.3 | 252 | |
| | | 1A | | | | | 15.3 | 30.6 | 45.9 | 61.2 | 76.5 | 91.8 | 107.0 | 122.3 | 137.6 | 156 | |
| | | 2A | | | | | 7.7 | 15.3 | 22.9 | 30.6 | 38.2 | 45.9 | 53.5 | 61.2 | 68.8 | 78 | |
| | | 3A | | | | | 3.9 | 7.8 | 11.8 | 15.7 | 19.6 | 23.5 | 27.4 | 31.4 | 35.3 | 40 | |
| 10 | 250 | FC | 8.1 | 214.2 | 3.5 | 80 | 37.7 | 75.3 | 113.0 | 150.6 | 188.2 | 225.9 | 263.5 | 301.1 | 338.8 | 384 | |
| | | 1A | | | | | 23.0 | 45.9 | 68.8 | 91.8 | 114.7 | 137.6 | 160.6 | 183.5 | 206.4 | 234 | |
| | | 2A | | | | | 11.4 | 22.8 | 34.1 | 45.5 | 56.9 | 68.2 | 79.6 | 91.0 | 102.3 | 116 | |
| | | 3A | | | | | 5.7 | 11.4 | 17.1 | 22.7 | 28.4 | 34.1 | 39.8 | 45.5 | 51.2 | 58 | |
| 12 | 300 | FC | 10.4 | 264.8 | 4.7 | 120 | 55.0 | 109.9 | 164.8 | 219.6 | 274.5 | 329.4 | 384.3 | 439.2 | 494.0 | 560 | |
| | | 1A | | | | | 33.4 | 66.7 | 100.0 | 133.3 | 166.7 | 200.0 | 233.3 | 266.6 | 299.9 | 340 | |
| | | 2A | | | | | 16.7 | 33.4 | 50.0 | 66.7 | 83.3 | 100.0 | 116.7 | 133.3 | 150.0 | 170 | |
| | | 3A | | | | | 8.2 | 16.5 | 24.7 | 32.9 | 41.2 | 49.4 | 57.6 | 65.9 | 74.1 | 84 | |
| 14 | 350 | FC | 12.4 | 315.5 | 5.5 | 140 | 75.6 | 151.1 | 226.5 | 302.0 | 377.5 | 452.9 | 528.4 | 603.8 | 679.3 | 770 | |
| | | 1A | | | | | 46.1 | 92.2 | 138.3 | 184.3 | 230.4 | 276.5 | 322.5 | 368.6 | 414.6 | 470 | |
| | | 2A | | | | | 23.0 | 45.9 | 68.8 | 91.8 | 114.7 | 137.6 | 160.6 | 183.5 | 206.4 | 234 | |
| | | 3A | | | | | 11.4 | 22.8 | 34.1 | 45.5 | 56.9 | 68.2 | 79.6 | 91.0 | 102.3 | 116 | |
| 16 | 400 | FC | 14.1 | 357.7 | 6.3 | 160 | 100.0 | 200.1 | 300.1 | 400.0 | 500.0 | 600.0 | 699.9 | 799.9 | 899.8 | 1020 | |
| | | 1A | | | | | 61.2 | 122.4 | 183.6 | 244.7 | 305.9 | 367.0 | 428.2 | 489.3 | 550.5 | 624 | |
| | | 2A | | | | | 30.4 | 60.8 | 91.2 | 121.6 | 152.0 | 182.3 | 212.7 | 243.1 | 273.5 | 310 | |
| | | 3A | | | | | 15.1 | 30.2 | 45.3 | 60.4 | 75.5 | 90.6 | 105.7 | 120.8 | 135.9 | 154 | |

NOTE
 C_v: Valve flow coefficient
 F_L: Liquid pressure recovery factor
 FC: Full Capacity 1A: 1-Step reduction 2A: 2-Step reduction 3A: 3-Step reduction

GM, Valve dimensions and weights



150 # / 300 # / 600 #

| Dimension (mm) | A | | | B | | | C | | D | E | | | F | | | G | | | H | | | Weight (kg) | | |
|----------------|------|------|------|------|------|------|-----|-----|--------|------|------|------|------|------|------|-------|-------|-------|------|------|------|-------------|------|------|
| | 150# | 300# | 600# | 150# | 300# | 600# | STD | EXT | COMMON | 150# | 300# | 600# | 150# | 300# | 600# | 150# | 300# | 600# | 150# | 300# | 600# | 150# | 300# | 600# |
| 25 | 184 | 197 | 210 | 55 | 63 | 63 | 142 | 250 | 110 | 110 | 125 | 125 | 15.9 | 19.1 | 19.1 | 79.4 | 88.9 | 88.9 | 4 | 4 | 4 | 14 | 15 | 23 |
| 40 | 222 | 235 | 251 | 65 | 78 | 78 | 161 | 269 | 110 | 125 | 155 | 155 | 15.9 | 22.2 | 22.2 | 98.4 | 114.3 | 114.3 | 4 | 4 | 4 | 22 | 23 | 27 |
| 50 | 254 | 267 | 286 | 83 | 83 | 83 | 178 | 333 | 110 | 150 | 165 | 165 | 19.1 | 19.1 | 19.1 | 120.7 | 127 | 127 | 4 | 8 | 8 | 30 | 32 | 40 |
| 80 | 298 | 318 | 337 | 109 | 109 | 120 | 222 | 395 | 115 | 190 | 210 | 210 | 19.1 | 22.2 | 22.2 | 152.4 | 168.3 | 168.3 | 4 | 8 | 8 | 65 | 67 | 72 |
| 100 | 352 | 368 | 394 | 135 | 135 | 135 | 248 | 402 | 140 | 230 | 255 | 275 | 19.1 | 22.2 | 25.4 | 190.5 | 200 | 215.9 | 8 | 8 | 8 | 100 | 103 | 112 |
| 150 | 451 | 473 | 508 | 170 | 170 | 178 | 340 | 467 | 150 | 280 | 355 | 355 | 22.2 | 22.2 | 28.6 | 241.3 | 269.9 | 292.1 | 8 | 12 | 12 | 185 | 195 | 240 |
| 200 | 543 | 568 | 610 | 230 | 230 | 230 | 451 | 557 | 150 | 345 | 420 | 420 | 22.2 | 25.4 | 31.8 | 298.5 | 330.2 | 349.2 | 8 | 12 | 12 | 363 | 385 | 443 |
| 250 | 673 | 708 | 752 | 275 | 275 | 275 | 488 | 670 | 150 | 405 | 510 | 510 | 25.4 | 28.6 | 34.9 | 362 | 387.4 | 431.8 | 12 | 16 | 16 | 552 | 595 | 681 |
| 300 | 737 | 775 | 819 | 350 | 350 | 350 | 543 | 716 | 140 | 485 | 560 | 560 | 25.4 | 31.8 | 34.9 | 431.8 | 450.8 | 489 | 12 | 16 | 20 | 905 | 955 | 1020 |
| 350 | 889 | 927 | 972 | 385 | 385 | 385 | 616 | 846 | 210 | 535 | 605 | 605 | 28.6 | 31.8 | 38.1 | 476.3 | 514.4 | 527 | 12 | 20 | 20 | 1170 | 1230 | 1311 |
| 400 | 1016 | 1057 | 1108 | 440 | 440 | 440 | 692 | 909 | 220 | 595 | 685 | 685 | 28.6 | 34.9 | 41.3 | 539.8 | 571.5 | 603.2 | 16 | 20 | 20 | 1380 | 1460 | 1587 |

| Dimension (inch) | A | | | B | | | C | | D | E | | | F | | | G | | | H | | | Weight (lbs) | | |
|------------------|------|------|------|------|------|------|------|-------|--------|------|------|------|------|------|------|------|------|------|------|------|------|--------------|------|------|
| | 150# | 300# | 600# | 150# | 300# | 600# | STD | EXT | COMMON | 150# | 300# | 600# | 150# | 300# | 600# | 150# | 300# | 600# | 150# | 300# | 600# | 150# | 300# | 600# |
| 1" | 7.2 | 7.8 | 8.3 | 2.2 | 2.5 | 2.5 | 5.6 | 9.8 | 4.3 | 4.3 | 4.9 | 4.9 | 0.6 | 0.8 | 0.8 | 3.1 | 3.5 | 3.5 | 4 | 4 | 4 | 31 | 33 | 51 |
| 1-1/2" | 8.7 | 9.3 | 9.9 | 2.6 | 3.1 | 3.1 | 6.3 | 10.59 | 4.3 | 4.9 | 6.1 | 6.1 | 0.6 | 0.9 | 0.9 | 3.9 | 4.5 | 4.5 | 4 | 4 | 4 | 49 | 51 | 60 |
| 2" | 10 | 10.5 | 11.3 | 3.3 | 3.3 | 3.3 | 7 | 13.11 | 4.3 | 5.9 | 6.5 | 6.5 | 0.8 | 0.8 | 0.8 | 4.8 | 5 | 5 | 4 | 8 | 8 | 66 | 71 | 88 |
| 3" | 11.7 | 12.5 | 13.3 | 4.3 | 4.3 | 4.7 | 8.7 | 15.55 | 4.5 | 7.5 | 8.3 | 8.3 | 0.8 | 0.9 | 0.9 | 6 | 6.6 | 6.6 | 4 | 8 | 8 | 143 | 148 | 159 |
| 4" | 13.9 | 14.5 | 15.5 | 5.3 | 5.3 | 5.3 | 9.8 | 15.82 | 5.5 | 9.1 | 10 | 10.8 | 0.8 | 0.9 | 1 | 7.5 | 7.9 | 8.5 | 8 | 8 | 8 | 221 | 227 | 247 |
| 6" | 17.8 | 18.6 | 20 | 6.7 | 6.7 | 7 | 13.4 | 18.38 | 5.9 | 11 | 12.6 | 14 | 0.9 | 0.9 | 1.1 | 9.5 | 10.6 | 11.5 | 8 | 12 | 12 | 408 | 430 | 529 |
| 8" | 21.4 | 22.4 | 24 | 9.1 | 9.1 | 9.1 | 17.8 | 21.92 | 5.9 | 13.6 | 15 | 16.5 | 0.9 | 1 | 1.3 | 11.8 | 13 | 13.7 | 8 | 12 | 12 | 800 | 849 | 977 |
| 10" | 26.5 | 27.9 | 29.6 | 10.8 | 10.8 | 10.8 | 19.2 | 26.37 | 5.9 | 15.9 | 17.5 | 20.1 | 1 | 1.1 | 1.4 | 14.3 | 15.3 | 17 | 12 | 16 | 16 | 1217 | 1312 | 1501 |
| 12" | 29 | 30.5 | 32.2 | 13.8 | 13.8 | 13.8 | 21.4 | 28.18 | 5.9 | 19.1 | 20.5 | 22 | 1 | 1.3 | 1.4 | 17 | 17.7 | 19.3 | 12 | 16 | 20 | 1995 | 2105 | 2249 |
| 14" | 35 | 36.5 | 38.3 | 15.2 | 15.2 | 15.2 | 24.3 | 33.30 | 8.3 | 21.1 | 23 | 23.8 | 1.1 | 1.3 | 1.5 | 18.8 | 20.3 | 20.7 | 12 | 20 | 20 | 2579 | 2712 | 2890 |
| 16" | 40 | 41.6 | 43.6 | 17.3 | 17.3 | 17.3 | 27.2 | 35.78 | 8.7 | 23.4 | 25.6 | 27 | 1.1 | 1.4 | 1.6 | 21.3 | 22.5 | 23.7 | 16 | 20 | 20 | 3042 | 3219 | 3499 |

900 #/ 1500 #

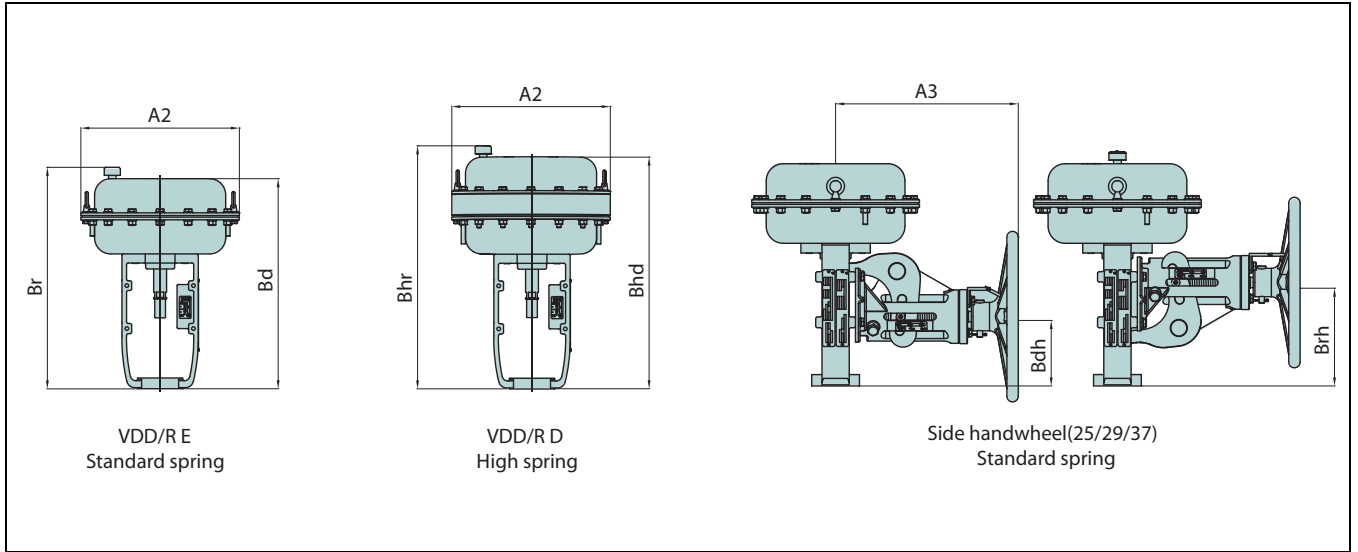
| Dimension (mm) | A | | B | | C | | D | E | | F | | G | | H | | Weight (kg) | |
|----------------|------|-------|------|-------|-----|------|--------|------|-------|------|-------|-------|-------|------|-------|-------------|-------|
| | 900# | 1500# | 900# | 1500# | STD | EXT | COMMON | 900# | 1500# | 900# | 1500# | 900# | 1500# | 900# | 1500# | 900# | 1500# |
| 25 | 292 | 292 | 82 | 82 | 236 | 330 | 110 | 150 | 180 | 25.4 | 25.4 | 101.6 | 101.6 | 4 | 4 | 60 | 60 |
| 40 | 333 | 333 | 90 | 90 | 248 | 380 | 110 | 180 | 180 | 28.6 | 28.6 | 123.8 | 123.8 | 4 | 4 | 63 | 63 |
| 50 | 375 | 375 | 113 | 113 | 315 | 380 | 110 | 215 | 215 | 25.4 | 25.4 | 165.1 | 165.1 | 8 | 8 | 67 | 67 |
| 80 | 441 | 460 | 142 | 142 | 335 | 430 | 115 | 240 | 265 | 25.4 | 31.8 | 190.5 | 203.2 | 8 | 8 | 150 | 163 |
| 100 | 511 | 530 | 182 | 182 | 375 | 475 | 140 | 290 | 310 | 31.8 | 34.9 | 235 | 241.3 | 8 | 8 | 244 | 255 |
| 150 | 714 | 768 | 210 | 240 | 420 | 500 | 150 | 380 | 395 | 31.8 | 39 | 317.5 | 317.5 | 12 | 12 | 530 | 540 |
| 200 | 914 | 972 | 290 | 290 | 550 | 600 | 150 | 470 | 485 | 38.1 | 45 | 393.7 | 393.7 | 12 | 12 | 698 | 821 |
| 250 | 991 | 1067 | 310 | 350 | 600 | 700 | 150 | 545 | 585 | 38.1 | 51 | 469.9 | 482.6 | 16 | 12 | 955 | 1137 |
| 300 | 1130 | 1219 | 385 | 385 | 680 | 800 | 140 | 610 | 675 | 38.1 | 54 | 533.4 | 571.5 | 20 | 16 | 1180 | 1240 |
| 350 | 1257 | 1257 | 385 | 385 | 770 | 920 | 210 | 640 | 750 | 41.3 | 61 | 558.8 | 635 | 20 | 16 | 1387 | 1477 |
| 400 | 1422 | 1422 | 450 | 450 | 850 | 1050 | 220 | 705 | 825 | 44.5 | 67 | 616 | 704.8 | 20 | 16 | 1601 | 1721 |

| Dimension (inch) | A | | B | | C | | D | E | | F | | G | | H | | Weight (lbs) | |
|------------------|------|-------|------|-------|-----|-----|--------|------|-------|------|-------|------|-------|------|-------|--------------|-------|
| | 900# | 1500# | 900# | 1500# | STD | EXT | COMMON | 900# | 1500# | 900# | 1500# | 900# | 1500# | 900# | 1500# | 900# | 1500# |
| 1" | 11.5 | 11.5 | 3.2 | 3.2 | 9 | 13 | 4 | 5.9 | 7.1 | 1 | 1 | 4 | 4 | 4 | 4 | 132 | 132 |
| 1-1/2" | 13.1 | 13.1 | 3.5 | 3.5 | 10 | 15 | 4 | 7.1 | 7.1 | 1.1 | 1.1 | 4.9 | 4.9 | 4 | 4 | 139 | 139 |
| 2" | 14.8 | 14.8 | 4.4 | 4.4 | 12 | 15 | 4 | 8.5 | 8.5 | 1 | 1 | 6.5 | 6.5 | 8 | 8 | 148 | 148 |
| 3" | 17.4 | 18.1 | 5.6 | 5.6 | 13 | 17 | 5 | 9.4 | 10.4 | 1 | 1.3 | 7.5 | 8 | 8 | 8 | 331 | 359 |
| 4" | 20.1 | 20.9 | 7.2 | 7.2 | 15 | 19 | 6 | 11.4 | 12.2 | 1.3 | 1.4 | 9.3 | 9.5 | 8 | 8 | 538 | 562 |
| 6" | 28.1 | 30.2 | 8.3 | 9.4 | 17 | 20 | 6 | 15 | 15.6 | 1.3 | 1.5 | 12.5 | 12.5 | 12 | 12 | 1168 | 1191 |
| 8" | 36 | 38.3 | 11.4 | 11.4 | 22 | 24 | 6 | 18.5 | 19.1 | 1.5 | 1.8 | 15.5 | 15.5 | 12 | 12 | 1539 | 1810 |
| 10" | 39 | 42 | 12.2 | 13.8 | 24 | 28 | 6 | 21.5 | 23 | 1.5 | 2 | 18.5 | 19 | 16 | 12 | 2105 | 2507 |
| 12" | 44.5 | 48 | 15.2 | 15.2 | 27 | 31 | 6 | 24 | 26.6 | 1.5 | 2.1 | 21 | 22.5 | 20 | 16 | 2602 | 2734 |
| 14" | 49.5 | 49.5 | 15.2 | 15.2 | 30 | 36 | 8 | 25.2 | 29.5 | 1.6 | 2.4 | 22 | 25 | 20 | 16 | 3058 | 3256 |
| 16" | 56 | 56 | 17.7 | 17.7 | 33 | 41 | 8 | 27.8 | 32.5 | 1.8 | 2.6 | 24.3 | 27.7 | 20 | 16 | 3530 | 3794 |

* Bigger sizes and ASME class 2500 & 4500 ratings are available, please contact Metso..

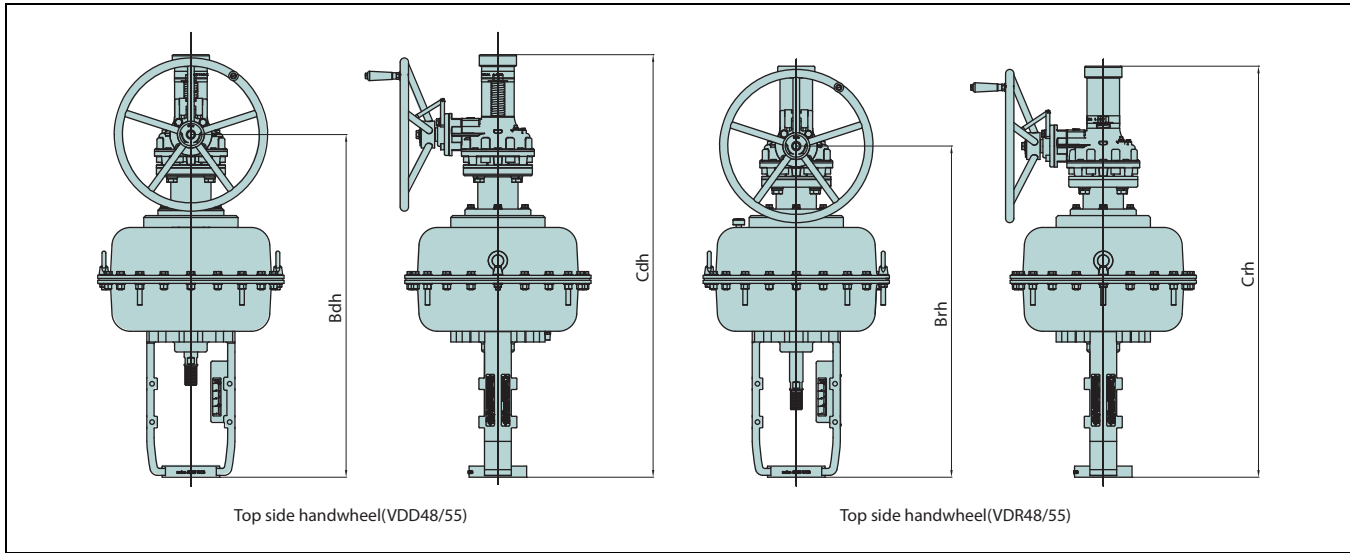
VD Diaphragm actuators

Actuator dimensions



| Dimension (mm) | Size (mm) | Without handwheel | | | | With handwheel | | | | |
|----------------|-----------|-------------------|----------|----------|-------------|----------------|-----|-----|-----|-------------|
| | | A2 | Bd / Bhd | Br / Bhr | Weight (kg) | A2 | A3 | Bdh | Brh | Weight (kg) |
| VD_25 E | 255 | 255 | 348 | 373 | 12 | 255 | 312 | 110 | 170 | 23 |
| VD_25 D | 255 | 255 | 373 | 395 | 17 | | | | | |
| VD_29 E | 295 | 295 | 391 | 416 | 18 | 295 | 312 | 122 | 182 | 29 |
| VD_29 D | 295 | 295 | 431 | 453 | 26 | | | | | |
| VD_37 E | 375 | 375 | 464 | 489 | 28 | 375 | 352 | 131 | 211 | 43 |
| VD_37 D | 375 | 375 | 514 | 535 | 46 | | | | | |

| Dimension (inch) | Size (inch) | Without handwheel | | | | With handwheel | | | | |
|------------------|-------------|-------------------|----------|----------|--------------|----------------|----|-----|-----|--------------|
| | | A2 | Bd / Bhd | Br / Bhr | Weight (lbs) | A2 | A3 | Bdh | Brh | Weight (lbs) |
| VD_25 E | 10 | 10 | 14 | 15 | 26 | 10 | 12 | 4 | 7 | 51 |
| VD_25 D | 10 | 10 | 15 | 16 | 37 | | | | | |
| VD_29 E | 12 | 12 | 15 | 16 | 40 | 12 | 12 | 5 | 7 | 64 |
| VD_29 D | 12 | 12 | 17 | 18 | 57 | | | | | |
| VD_37 E | 15 | 15 | 18 | 19 | 62 | 15 | 14 | 5 | 8 | 95 |
| VD_37 D | 15 | 15 | 20 | 21 | 101 | | | | | |



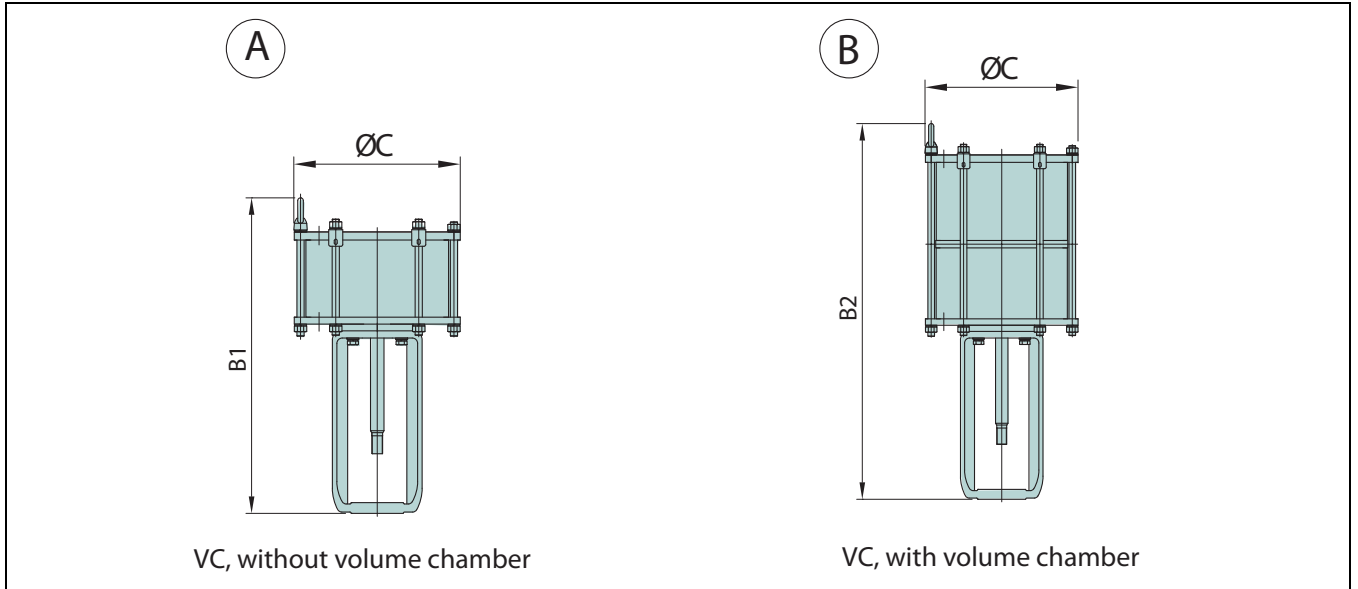
| Dimension (mm) | Size (mm) | Without handwheel | | | With handwheel | | | | | |
|----------------|-----------|-------------------|----------|----------|----------------|-----|-----|------|------|-------------|
| | | A2 | Bd / Bhd | Br / Bhr | Weight (kg) | Bdh | Brh | Cdh | Crh | Weight (kg) |
| VD_48 E | 486 | 486 | 652 | 677 | 86 | 896 | 865 | 1102 | 1072 | 112 |
| VD_48 D | 486 | 486 | 702 | 724 | 118 | 946 | 915 | 1152 | 1122 | 144 |
| VD_55 E | 566 | 566 | 695 | 720 | 112 | 940 | 910 | 1145 | 1115 | 145 |
| VD_55 D | 566 | 566 | 745 | 767 | 152 | 990 | 960 | 1195 | 1165 | 185 |

| Dimension (inch) | Size (inch) | Without handwheel | | | | With handwheel | | | | |
|------------------|-------------|-------------------|----------|----------|--------------|----------------|-----|-----|-----|--------------|
| | | A2 | Bd / Bhd | Br / Bhr | Weight (lbs) | Bdh | Brh | Cdh | Crh | Weight (lbs) |
| VD_48 E | 19 | 19 | 26 | 27 | 190 | 35 | 34 | 43 | 42 | 247 |
| VD_48 D | 19 | 19 | 28 | 29 | 260 | 37 | 36 | 45 | 44 | 317 |
| VD_55 E | 22 | 22 | 27 | 28 | 247 | 37 | 36 | 45 | 44 | 320 |
| VD_55 D | 22 | 22 | 29 | 30 | 335 | 39 | 38 | 47 | 46 | 408 |

- NOTE
1. "E" refers to Spring range 0.8~2.6
 2. "D" refers to Spring range 1.5~3.4
 3. "Br / Bhr" refers to reverse acting actuator, VDR E / D
 4. "Bd / Bhd" refers to direct acting actuator, VDD E / D
 5. "Cdh / Crh" Top side handwheel actuator, VD_48/55

Actuator dimensions

VC cylinder actuators without handwheel



VC actuators without handwheel

| Stroke (mm) | #30 | | | #40 | | | #50 | | |
|-------------|------|-------------|-----|------|-------------|-----|------|-------------|-----|
| | ØC | 370 | | ØC | 460 | | ØC | 560 | |
| | B1 | Weight (kg) | | B1 | Weight (kg) | | B1 | Weight (kg) | |
| | B2 | A | B | B2 | A | B | B2 | A | B |
| 40 | 640 | 92 | 115 | 810 | 120 | 148 | 810 | 186 | 234 |
| | 760 | | | 935 | | | 935 | | |
| 50 | 650 | 94 | 118 | 820 | 123 | 152 | 820 | 189 | 237 |
| | 790 | | | 965 | | | 965 | | |
| 60 | 660 | 97 | 121 | 830 | 126 | 155 | 830 | 192 | 242 |
| | 820 | | | 995 | | | 995 | | |
| 70 | 670 | 100 | 124 | 840 | 128 | 159 | 840 | 195 | 246 |
| | 850 | | | 1025 | | | 1025 | | |
| 80 | 680 | 103 | 127 | 850 | 131 | 162 | 850 | 198 | 251 |
| | 880 | | | 1055 | | | 1055 | | |
| 90 | 690 | 106 | 130 | 860 | 134 | 166 | 860 | 201 | 256 |
| | 910 | | | 1085 | | | 1085 | | |
| 100 | 700 | 108 | 133 | 870 | 137 | 173 | 870 | 203 | 261 |
| | 940 | | | 1115 | | | 1115 | | |
| 120 | 720 | 114 | 139 | 890 | 142 | 177 | 890 | 209 | 270 |
| | 1000 | | | 1175 | | | 1175 | | |
| 140 | | | | 910 | 148 | 184 | 910 | 215 | 279 |
| | | | | 1235 | | | 1235 | | |
| 180 | | | | 950 | 159 | 198 | 950 | 227 | 298 |
| | | | | 1355 | | | 1355 | | |

| Stroke (mm) | #60 | | | #70 | | | #80 | | |
|-------------|------|------------|-----|------|------------|-----|------|------------|-----|
| | ØC | 660 | | ØC | 710 | | ØC | 820 | |
| | B1 | Weight(kg) | | B1 | Weight(kg) | | B1 | Weight(kg) | |
| | B2 | A | B | B2 | A | B | B2 | A | B |
| 100 | 954 | 255 | 344 | 955 | 322 | 438 | 954 | 378 | 519 |
| | 1199 | | | 1203 | | | 1207 | | |
| 120 | 974 | 262 | 355 | 975 | 330 | 450 | 974 | 386 | 531 |
| | 1259 | | | 1263 | | | 1267 | | |
| 140 | 994 | 269 | 365 | 995 | 338 | 461 | 994 | 394 | 543 |
| | 1319 | | | 1323 | | | 1327 | | |
| 180 | 1034 | 283 | 386 | 1035 | 354 | 484 | 1034 | 410 | 567 |
| | 1439 | | | 1443 | | | 1447 | | |
| 240 | 1094 | 303 | 417 | 1095 | 377 | 518 | 1094 | 435 | 604 |
| | 1619 | | | 1623 | | | 1627 | | |
| 280 | | | | | | | 1134 | 451 | 628 |
| | | | | | | | 1747 | | |

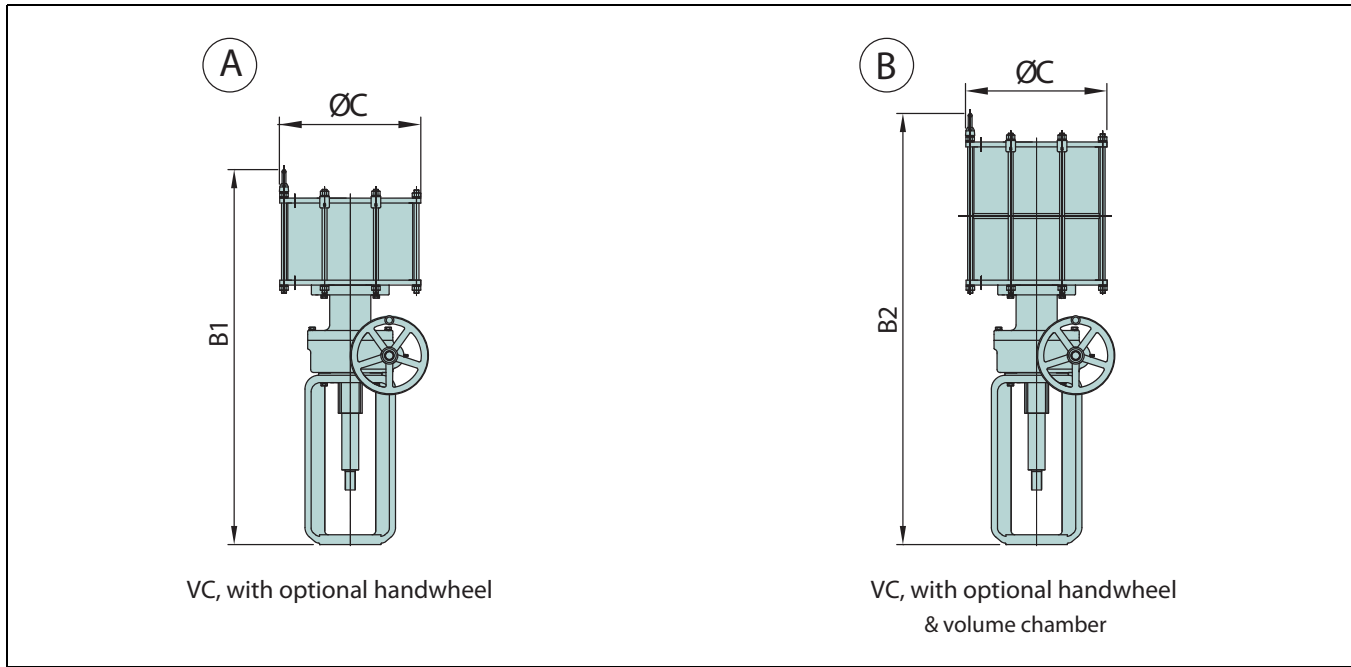
VC actuators without handwheel

| Stroke (mm) | #30 | | | #40 | | | #50 | | |
|-------------|-----|-------------|-----|-----|-------------|-----|-----|-------------|-----|
| | ØC | 15 | | ØC | 18 | | ØC | 22 | |
| | B1 | Weight(lbs) | | B1 | Weight(lbs) | | B1 | Weight(lbs) | |
| | B2 | A | B | B2 | A | B | B2 | A | B |
| 40 | 25 | 203 | 254 | 32 | 265 | 326 | 32 | 410 | 516 |
| | 30 | | | 37 | | | 37 | | |
| 50 | 26 | 207 | 260 | 32 | 271 | 335 | 32 | 417 | 522 |
| | 31 | | | 38 | | | 38 | | |
| 60 | 26 | 214 | 267 | 33 | 278 | 342 | 33 | 423 | 534 |
| | 32 | | | 39 | | | 39 | | |
| 70 | 26 | 220 | 273 | 33 | 282 | 351 | 33 | 430 | 542 |
| | 33 | | | 40 | | | 40 | | |
| 80 | 27 | 227 | 280 | 33 | 289 | 357 | 33 | 437 | 553 |
| | 35 | | | 42 | | | 42 | | |
| 90 | 27 | 234 | 287 | 34 | 295 | 366 | 34 | 443 | 564 |
| | 36 | | | 43 | | | 43 | | |
| 100 | 28 | 238 | 293 | 34 | 302 | 381 | 34 | 448 | 575 |
| | 37 | | | 44 | | | 44 | | |
| 120 | 28 | 251 | 306 | 35 | 313 | 390 | 35 | 461 | 595 |
| | 39 | | | 46 | | | 46 | | |
| 140 | | | | 36 | 326 | 406 | 36 | 474 | 615 |
| | | | | 49 | | | 49 | | |
| 180 | | | | 37 | 351 | 437 | 37 | 500 | 657 |
| | | | | 53 | | | 53 | | |

| Stroke (mm) | #60 | | | #70 | | | #80 | | |
|-------------|-----|-------------|-----|-----|-------------|------|-----|-------------|------|
| | ØC | 26 | | ØC | 28 | | ØC | 32 | |
| | B1 | Weight(lbs) | | B1 | Weight(lbs) | | B1 | Weight(lbs) | |
| | B2 | A | B | B2 | A | B | B2 | A | B |
| 100 | 38 | 562 | 758 | 38 | 710 | 966 | 37 | 833 | 1144 |
| | 47 | | | 47 | | | 48 | | |
| 120 | 38 | 578 | 783 | 38 | 728 | 992 | 38 | 851 | 1171 |
| | 50 | | | 50 | | | 50 | | |
| 140 | 39 | 593 | 805 | 39 | 745 | 1016 | 39 | 869 | 1197 |
| | 52 | | | 52 | | | 52 | | |
| 180 | 41 | 624 | 851 | 41 | 780 | 1067 | 41 | 904 | 1250 |
| | 57 | | | 57 | | | 57 | | |
| 240 | 43 | 668 | 919 | 43 | 831 | 1142 | 43 | 959 | 1332 |
| | 64 | | | 64 | | | 64 | | |
| 280 | | | | | | | 45 | 994 | 1385 |
| | | | | | | | 69 | | |

Actuator dimensions

VC cylinder actuators with handwheel



VC, with optional handwheel

VC, with optional handwheel & volume chamber

VC actuators with handwheel

| Stroke (mm) | #30 | | | #40 | | | #50 | | |
|-------------|------|-------------|-----|------|-------------|-----|------|-------------|-----|
| | ØC | 370 | | ØC | 460 | | ØC | 560 | |
| | B1 | Weight (kg) | | B1 | Weight (kg) | | B1 | Weight (kg) | |
| | B2 | A | B | B2 | A | B | B2 | A | B |
| 40 | 930 | 134 | 157 | 1095 | 180 | 208 | 1095 | 246 | 294 |
| | 1055 | | | 1220 | | | 1220 | | |
| 50 | 940 | 137 | 160 | 1105 | 183 | 212 | 1105 | 249 | 299 |
| | 1085 | | | 1250 | | | 1250 | | |
| 60 | 950 | 139 | 163 | 1115 | 186 | 215 | 1115 | 252 | 303 |
| | 1115 | | | 1280 | | | 1280 | | |
| 70 | 960 | 142 | 167 | 1125 | 188 | 219 | 1125 | 255 | 308 |
| | 1145 | | | 1310 | | | 1310 | | |
| 80 | 970 | 144 | 170 | 1135 | 191 | 222 | 1135 | 258 | 313 |
| | 1175 | | | 1340 | | | 1340 | | |
| 90 | 980 | 147 | 173 | 1145 | 194 | 226 | 1145 | 261 | 318 |
| | 1205 | | | 1370 | | | 1370 | | |
| 100 | 990 | 150 | 176 | 1155 | 197 | 230 | 1155 | 263 | 322 |
| | 1235 | | | 1400 | | | 1400 | | |
| 120 | 1010 | 155 | 183 | 1175 | 202 | 237 | 1175 | 269 | 332 |
| | 1295 | | | 1460 | | | 1460 | | |
| 140 | | | | 1195 | 208 | 244 | 1195 | 275 | 341 |
| | | | | 1520 | | | 1520 | | |
| 180 | | | | 1235 | 219 | 258 | 1235 | 287 | 360 |
| | | | | 1640 | | | 1640 | | |

VC actuators with handwheel

| Stroke (mm) | #30 | | | #40 | | | #50 | | |
|-------------|-----|--------------|-----|-----|--------------|-----|-----|--------------|-----|
| | ØC | 15 | | ØC | 18 | | ØC | 22 | |
| | B1 | Weight (lbs) | | B1 | Weight (lbs) | | B1 | Weight (lbs) | |
| | B2 | A | B | B2 | A | B | B2 | A | B |
| 40 | 37 | 295 | 346 | 43 | 397 | 459 | 43 | 542 | 648 |
| | 42 | | | 48 | | | 48 | | |
| 50 | 37 | 302 | 353 | 44 | 403 | 467 | 44 | 549 | 659 |
| | 43 | | | 49 | | | 49 | | |
| 60 | 37 | 306 | 359 | 44 | 410 | 474 | 44 | 556 | 668 |
| | 44 | | | 50 | | | 50 | | |
| 70 | 38 | 313 | 368 | 44 | 414 | 483 | 44 | 562 | 679 |
| | 45 | | | 52 | | | 52 | | |
| 80 | 38 | 317 | 375 | 45 | 421 | 489 | 45 | 569 | 690 |
| | 46 | | | 53 | | | 53 | | |
| 90 | 39 | 324 | 381 | 45 | 428 | 498 | 45 | 575 | 701 |
| | 47 | | | 54 | | | 54 | | |
| 100 | 39 | 331 | 388 | 45 | 434 | 507 | 45 | 580 | 710 |
| | 49 | | | 55 | | | 55 | | |
| 120 | 40 | 342 | 403 | 46 | 445 | 522 | 46 | 593 | 732 |
| | 51 | | | 57 | | | 57 | | |
| 140 | | | | 47 | 459 | 538 | 47 | 606 | 752 |
| | | | | 60 | | | 60 | | |
| 180 | | | | 49 | 483 | 569 | 49 | 633 | 794 |
| | | | | 65 | | | 65 | | |

| Stroke (mm) | #60 | | | #70 | | | #80 | | |
|-------------|------|-------------|-----|------|-------------|-----|------|-------------|-----|
| | ØC | 660 | | ØC | 710 | | ØC | 820 | |
| | B1 | Weight (kg) | | B1 | Weight (kg) | | B1 | Weight (kg) | |
| | B2 | A | B | B2 | A | B | B2 | A | B |
| 100 | 1239 | 315 | 404 | 1240 | 368 | 502 | 1289 | 438 | 579 |
| | 1484 | | | 1488 | | | 1542 | | |
| 120 | 1259 | 322 | 415 | 1260 | 376 | 514 | 1309 | 446 | 591 |
| | 1544 | | | 1548 | | | 1602 | | |
| 140 | 1279 | 329 | 425 | 1280 | 384 | 525 | 1329 | 454 | 603 |
| | 1604 | | | 1608 | | | 1662 | | |
| 180 | 1319 | 343 | 446 | 1320 | 400 | 548 | 1369 | 470 | 627 |
| | 1724 | | | 1728 | | | 1782 | | |
| 240 | 1379 | 363 | 477 | 1380 | 423 | 582 | 1429 | 495 | 664 |
| | 1904 | | | 1908 | | | 1962 | | |
| 280 | | | | | | | 1469 | 511 | 688 |
| | | | | | | | 2082 | | |

| Stroke (mm) | #60 | | | #70 | | | #80 | | |
|-------------|-----|--------------|------|-----|--------------|------|-----|--------------|------|
| | ØC | 26 | | ØC | 28 | | ØC | 32 | |
| | B1 | Weight (lbs) | | B1 | Weight (lbs) | | B1 | Weight (lbs) | |
| | B2 | A | B | B2 | A | B | B2 | A | B |
| 100 | 49 | 694 | 891 | 49 | 811 | 1107 | 51 | 966 | 1276 |
| | 58 | | | 58 | | | 61 | | |
| 120 | 50 | 710 | 915 | 50 | 829 | 1133 | 52 | 983 | 1303 |
| | 61 | | | 61 | | | 63 | | |
| 140 | 50 | 725 | 937 | 50 | 847 | 1157 | 52 | 1001 | 1329 |
| | 63 | | | 63 | | | 65 | | |
| 180 | 52 | 756 | 983 | 52 | 882 | 1208 | 54 | 1036 | 1382 |
| | 68 | | | 68 | | | 70 | | |
| 240 | 54 | 800 | 1052 | 54 | 933 | 1283 | 56 | 1091 | 1464 |
| | 75 | | | 75 | | | 77 | | |
| 280 | | | | | | | 58 | 1127 | 1517 |
| | | | | | | | 82 | | |

HOW TO ORDER

Globe single seated, OMEGA trim type, Series GM

| | | | | | | | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. | 16. | 17. | 18. | 19. | 20. | 21. | 22. |
| GM | 02 | H | Z | B | J2 | A | P2 | X | BC | S1 | P2 | X | S | G | G | S | A | X | A | L | FG |

VALVE CONSTRUCTIONS

| 1. | VALVE SERIES | |
|----|------------------------------------|--|
| GM | Globe Omega trim, Multi-stage type | |

| 2. | BODY SIZE | |
|----|--------------|-----------------|
| 02 | 2" / DN 50 | 03 3" / DN 80 |
| 04 | 4" / DN 100 | 06 6" / DN 150 |
| 08 | 8" / DN 200 | 10 10" / DN 250 |
| 12 | 12" / DN 300 | 14 14" / DN 350 |
| 16 | 16" / DN 400 | |

| Optional body size | | |
|--------------------|--------------|-------------------|
| 01 | 1" / DN 25 | 1H 1-1/2" / DN 40 |
| 18 | 18" / DN 450 | 20 20" / DN 500 |
| 24 | 24" / DN 600 | YY Special |

| 3. | PRESSURE RATING | |
|----|-----------------|------------------|
| C | ASME class 150 | D ASME class 300 |
| F | ASME class 600 | |

| Optional pressure rating | | |
|--------------------------|-----------------|-------------------|
| G | ASME class 900 | H ASME class 1500 |
| I | ASME class 2500 | Y Special |

| 4. | END CONNECTION | |
|----|------------------------|--|
| W | Flanged RF, ASME B16.5 | |

| Optional end connection | |
|-------------------------|-------------------------------|
| Z | Ring joint flange, ASME B16.5 |
| V | Socket welding, ASME B16.11 |
| Q | Butt welding, ASME B16.25 |
| Y | Special |

| 5. | BONNET CONSTRUCTION | |
|------------------------------|---------------------|-------------------------------|
| | Bonnet type | Actuator connection |
| A | General | Applicable for VD_25/29/37 |
| B | General | Applicable for VD_48/55 |
| C | General | Applicable for VC_30 |
| D | General | Applicable for VC_40/50/60/70 |
| Optional bonnet construction | | |
| E | Extension | Applicable for VD_25/29/37 |
| F | Extension | Applicable for VD_48/55 |
| G | Extension | Applicable for VC_30 |
| H | Extension | Applicable for VC_40/50/60/70 |
| Y | Special | Special |

| 6. | BODY & BONNET MATERIAL | |
|---------------------------------|------------------------|------------------|
| J2 | A216 gr. WCB | S6 A351 gr. CF8M |
| Optional body & bonnet material | | |
| S1 | A351 gr. CF3M | YY Special |

- Bonnet material is same or equivalent with Body material.

| 7. | MODEL CODE | |
|----|------------|--|
| A | Model A | |
| B | Model B | |

TRIM CONSTRUCTIONS

| 8. | PLUG MATERIAL | |
|----|---------------|--|
| P2 | SUS 420J2 | |
| YY | Special | |

| 9. | PLUG APPLICATION | |
|----|--------------------|--|
| X | Not applicable | |
| A | Cobalt based alloy | |
| Y | Special | |

| 10. | STEM MATERIAL | | |
|-----|---------------|--|--|
| BC | 630 SS + HCr | | |
| YY | Special | | |

| 11. | SEAT TYPE | | |
|-----|-------------------|--|--|
| S1 | Single metal seat | | |
| YY | Special | | |

| 12. | SEAT / DISK STACK MATERIAL | | |
|-----|----------------------------|------------|------------|
| | Seat | Disk stack | Cage guide |
| P2 | SUS 420J2 | SUS 420J2 | SUS 420J2 |
| YY | Special | Special | Special |

| 13. | SEAT APPLICATION | | |
|-----|--------------------|--|--|
| X | Not applicable | | |
| A | Cobalt based alloy | | |
| Y | Special | | |

OTHERS

| 14. | PACKING / BELLOWS TYPE | |
|-----|--------------------------------|--|
| S | General packing | |
| E | Low emission, live loaded | |
| C | Bellows Seal (316L SS, Formed) | |
| Y | Special | |

| 15. | PACKING MATERIAL | |
|-----|----------------------------------|--|
| G | PTFE + Carbon fiber | |
| F | Graphite (with mold and braided) | |

| Optional packing material | |
|---------------------------|-----------------------------------|
| T | PTFE V-Ring |
| H | Hi-Graphite (with mold + braided) |
| Y | Special |

| 16. | SEAL RING MATERIAL | |
|-----|--------------------|--|
| G | PTFE + Graphite | |
| X | Not applicable | |

| Optional seals material | |
|-------------------------|---------|
| T | PTFE |
| Y | Special |

| 17. | GASKET MATERIAL | |
|--------------------------|---|--|
| S | S/W gasket type, 316 SS + Graphite for general | |
| Optional gasket material | | |
| H | S/W gasket type, 316 SS + Graphite for high temp. | |
| L | S/W gasket type, 316 SS + PTFE | |
| Y | Special | |

| 18. | STUD / NUT MATERIAL | |
|-----|---------------------------|--|
| A | A193 gr. B7 / A194 gr. 2H | |
| B | A193 gr. B8 / A194 gr. 8 | |

| Optional bolting material | |
|---------------------------|---------------------------|
| H | A193 gr. B16 / A194 gr. 4 |
| Y | Special |

| 19. | OPTIONS | |
|-----|--------------------|--|
| X | Not applicable | |
| E | Anti-erosion | |
| L | Lub. & Isol. valve | |
| W | Water seal | |
| Y | Special | |

* Face to face length according to ISA 75.08

* The body, bonnet, trim materials are subject to change as equivalent depending on detail design.

* Please see 'Neles Globe Typecode Instruction' for further options.

TRIM TYPE & RATED Cv

| 20. Sign | Trim type | 21. Sign | Trim characteristic | 22. Sign | Description | RATED Cv | | | | | | | | | | | |
|-------------|--|-------------|----------------------|-------------|----------------------|------------------------------|-------------|---------|---------|---------|----------|----------|----------|-----------|-----------|------------|--|
| | | | | | | Body Size and Stroke | | | | | | | | | | | |
| | | | | | | 1" Srk. | 1-1/2" Srk. | 2" Srk. | 3" Srk. | 4" Srk. | 6" Srk. | 8" Srk. | 10" Srk. | 12" Srk. | 14" Srk. | 16" Srk. | |
| A P U | Balanced plug type Pilot balanced plug type Unbalanced plug type | L | Linear | FG | Full capa. / Gas | 7 (30) | 16 (30) | 26 (40) | 54 (50) | 84 (50) | 146 (60) | 252 (70) | 384 (80) | 560 (120) | 770 (140) | 1020 (160) | |
| | | | | FL | Full capa. / Liquid | | | | | | | | | | | | |
| | | | | 1G | 1-Step red. / Gas | 3 (30) | 8 (30) | 12 (40) | 28 (50) | 52 (50) | 90 (60) | 156 (70) | 234 (80) | 340 (120) | 470 (140) | 620 (160) | |
| | | | | 1L | 1-Step red. / Liquid | | | | | | | | | | | | |
| | | | | 2G | 2-Step red. / Gas | 1.6 (30) | 4 (30) | 6 (40) | 14 (50) | 26 (50) | 45 (60) | 78 (70) | 116 (80) | 170 (120) | 234 (140) | 372 (160) | |
| | | | | 2L | 2-Step red. / Liquid | | | | | | | | | | | | |
| | | | | 3G | 3-Step red. / Gas | 0.8 (30) | 2 (30) | 3 (40) | 7 (50) | 14 (50) | 22 (60) | 40 (70) | 58 (80) | 84 (120) | 116 (140) | 224 (160) | |
| | | 3L | 3-Step red. / Liquid | | | | | | | | | | | | | | |
| | | E | Equal % | FG | Full capa. / Gas | 5 (30) | 10 (30) | 18 (40) | 38 (50) | 60 (50) | 104 (60) | 176 (70) | 268 (80) | 390 (120) | 540 (140) | 710 (160) | |
| | | | | FL | Full capa. / Liquid | | | | | | | | | | | | |
| | | | | 1G | 1-Step red. / Gas | 2.5 (30) | 6 (30) | 11 (40) | 24 (50) | 36 (50) | 64 (60) | 108 (70) | 164 (80) | 236 (120) | 328 (140) | 430 (160) | |
| | | | | 1L | 1-Step red. / Liquid | | | | | | | | | | | | |
| | | | | 2G | 2-Step red. / Gas | 1.2 (30) | 3 (30) | 5 (40) | 12 (50) | 18 (50) | 32 (60) | 54 (70) | 82 (80) | 118 (120) | 164 (140) | 214 (160) | |
| | | | | 2L | 2-Step red. / Liquid | | | | | | | | | | | | |
| 3G | 3-Step red. / Gas | | | 0.6 (30) | 1.5 (30) | 2 (40) | 6 (50) | 9 (50) | 16 (60) | 27 (70) | 40 (80) | 60 (120) | 82 (140) | 106 (160) | | | |
| 3L | 3-Step red. / Liquid | | | | | | | | | | | | | | | | |
| Y | Special | Y | Special | YY | Special | Contact Metso for Cv details | | | | | | | | | | | |

- Srk. & number in the bracket means the valve stroke.

Metso Corporation

Töölönlahdenkatu 2, PO Box 1220, 00100 Helsinki, Finland
Tel. +358 20 484 100

Metso Flow Control Inc.

Vanha Porvoontie 229, P.O. Box 304, FI-01301 VANTAA, Finland.
Tel. +358 20 483 150. Fax +358 20 483 151

www.metso.com/valves

Subject to change without prior notice. Product names in this
bulletin are all trademarks of Metso Flow Control Inc.

