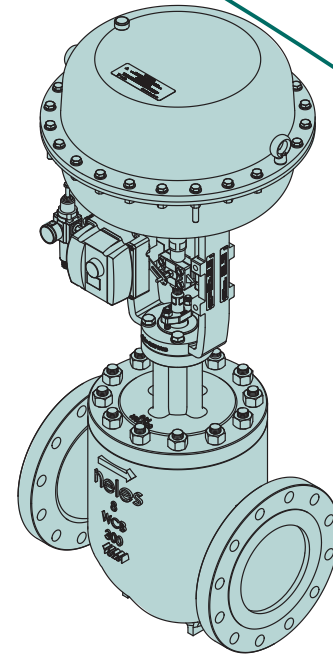


SERIES GM CONTROL VALVES GLOBE-OMEGA, MULTI-PATH & MULTI-STAGE TRIM

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

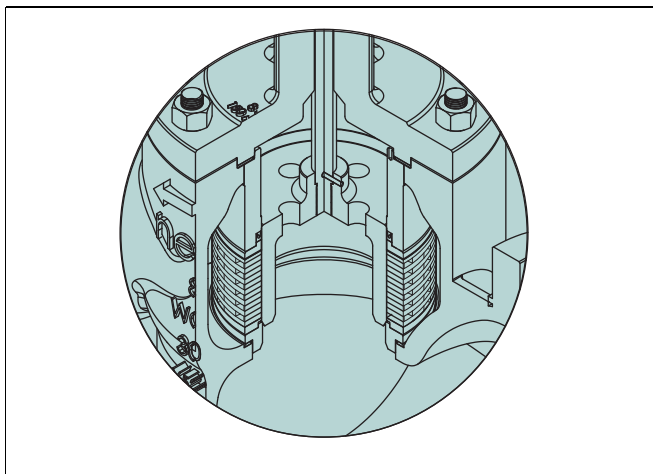
Severe services in power plant

- 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

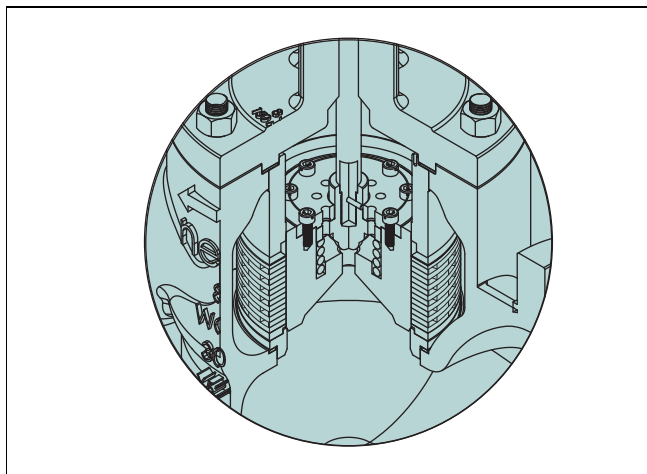
- Compressor anti-surge, kick back & recycle
- Pump minimum flow & recirculation
- Blow down discharge to vent flare
- Reactor de-pressurization
- Turbo expander by-pass
- Gas injection lift control
- Gas storage pressure letdown
- Gas flow regulation
- Pipeline anti-surge
- Heavy oil letdown
- Ethylene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

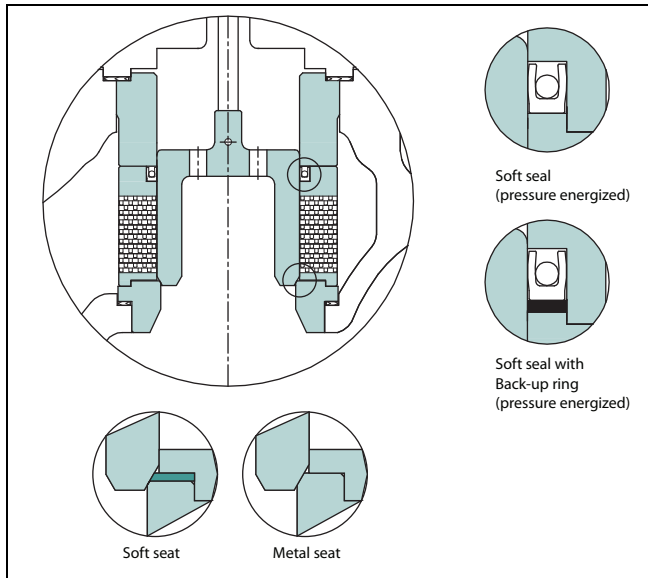
PTFE + Graphite spring energized seal with metal seat: -40...+260 °C
 PTFE spring energized seal with metal seat: -196...+232 °C
 Metal seat: -196...+593 °C

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



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.

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

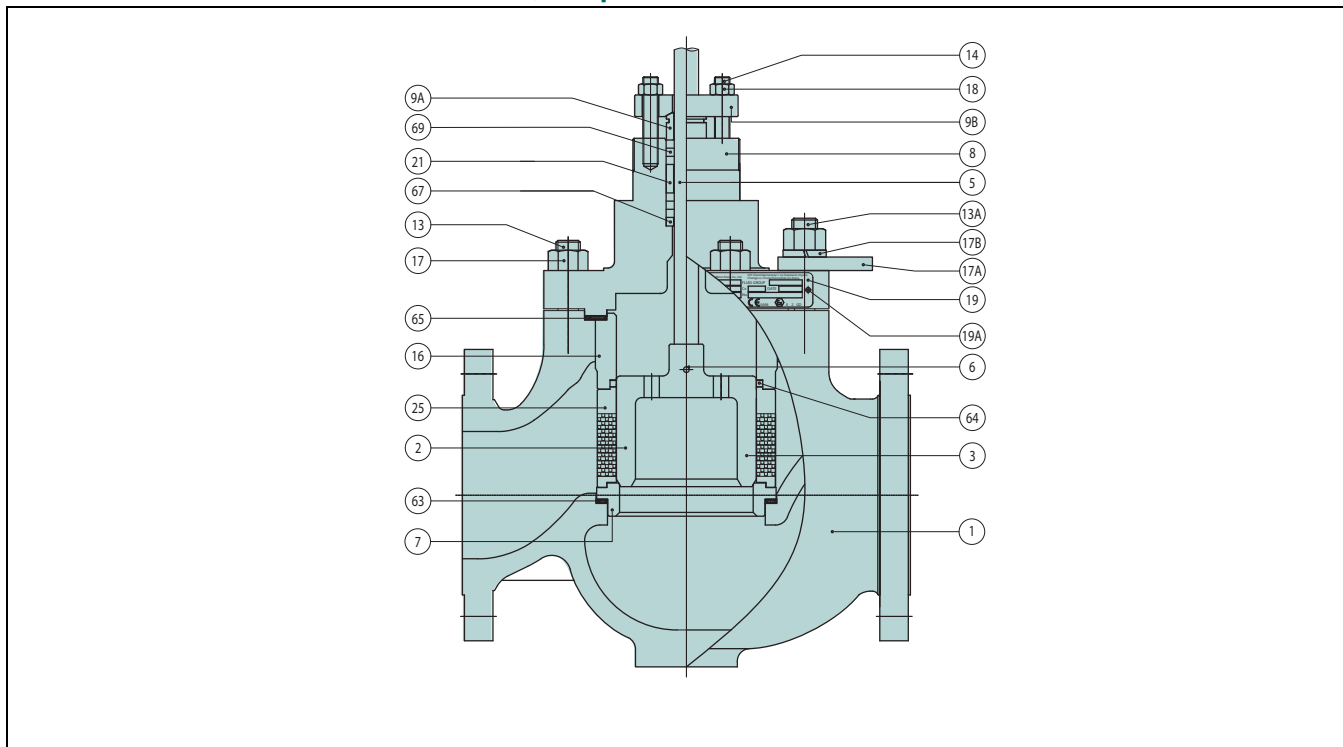
Linear, equal percentage or other customized characteristic.

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	O
250 / 10	O	O		O	O	O		O		O	O
300 / 12	O	O		O	O	O		O		O	O
350 / 14	O	O		O	O	O		O		O	O
400 / 16	O	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

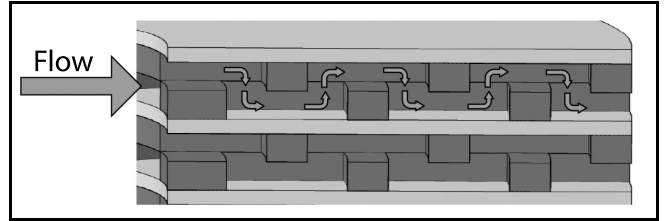
Body materials: Stainless steel

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

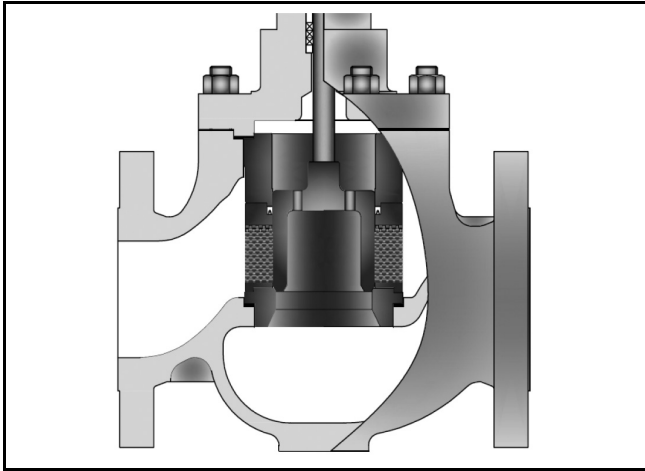
- Note.
1. Plug/Seat Hard Facing(Cobalt based alloy) & Soft Seat are available
 2. Materials description
 316 SS : ASTM A276 TP316 or JIS 316 St. Steel
 420 SS : ASTM A276 TP420 or JIS 420 St. Steel
 3. Above standard materials to be applicable depending on specific service conditions, other optional 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

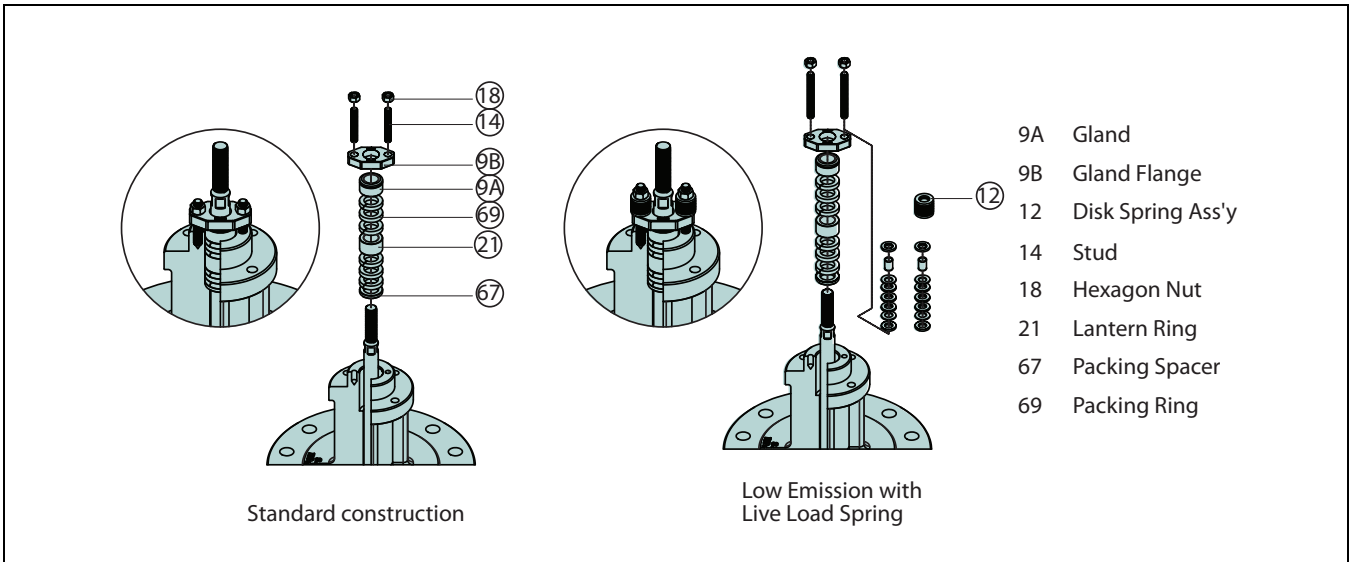


- The limitation data is based on ISA04-P211.
- The exceed velocity will be made in vibration and erosive damage to the body, trim and outlet pipe wall.
- The exceed energy will be made in mechanical vibration and erosive damage to the body, trim and outlet pipe wall.

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)
Continuos 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#

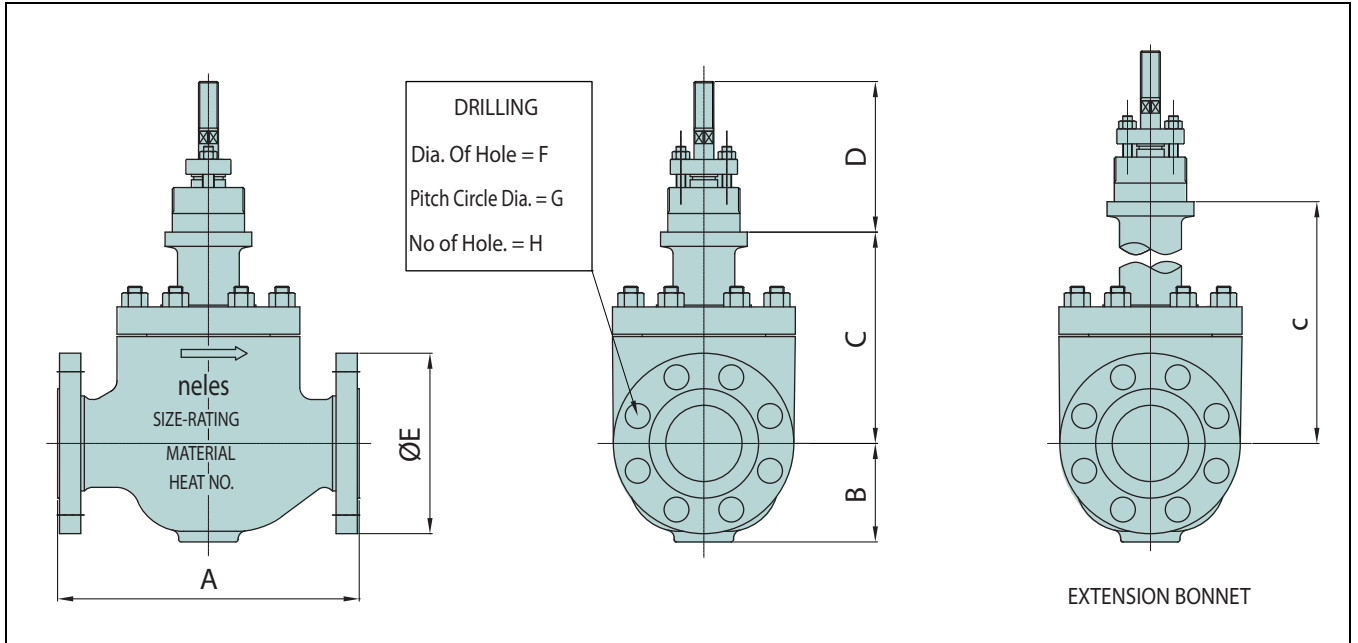
Size: 1" ~ 16"

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 #

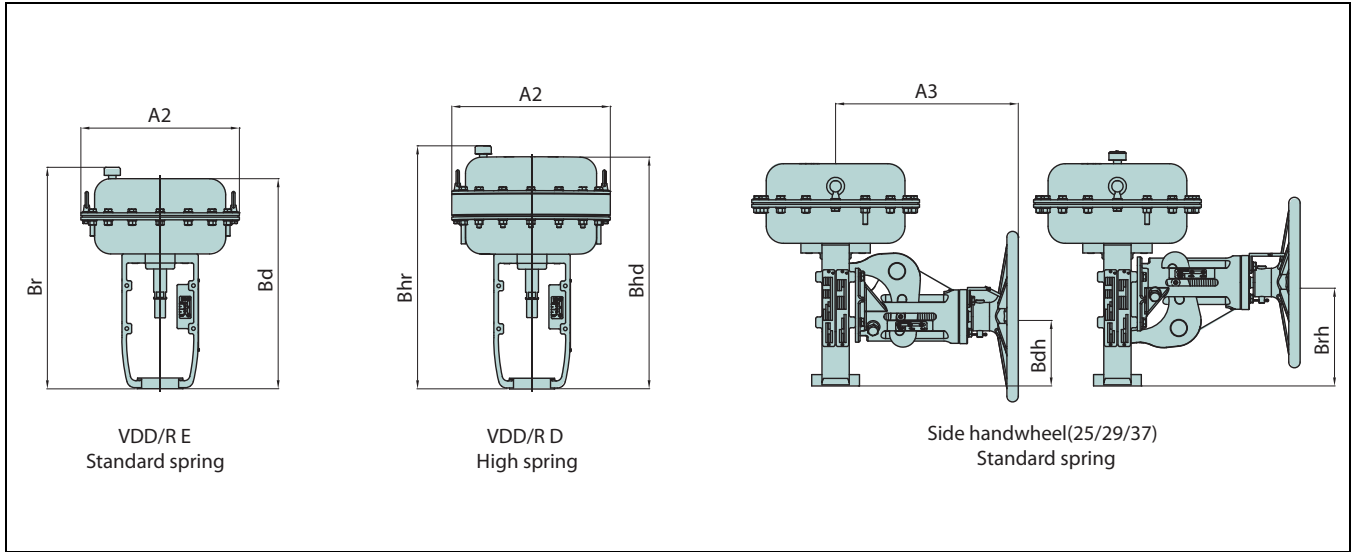
Dimension (mm)	A		B		C		D	E		F		G		H		Weight (kg)	
	900#	1500#	900#	1500#	STD	EXT	COMMON	900#	1500#	900#	1500#	900#	1500#	900#	1500#	900#	1500#
25	292	292	82	82	236	330	110	150	180	25.4	25.4	101.6	101.6	4	4	60	60
40	333	333	90	90	248	380	110	180	180	28.6	28.6	123.8	123.8	4	4	63	63
50	375	375	113	113	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..

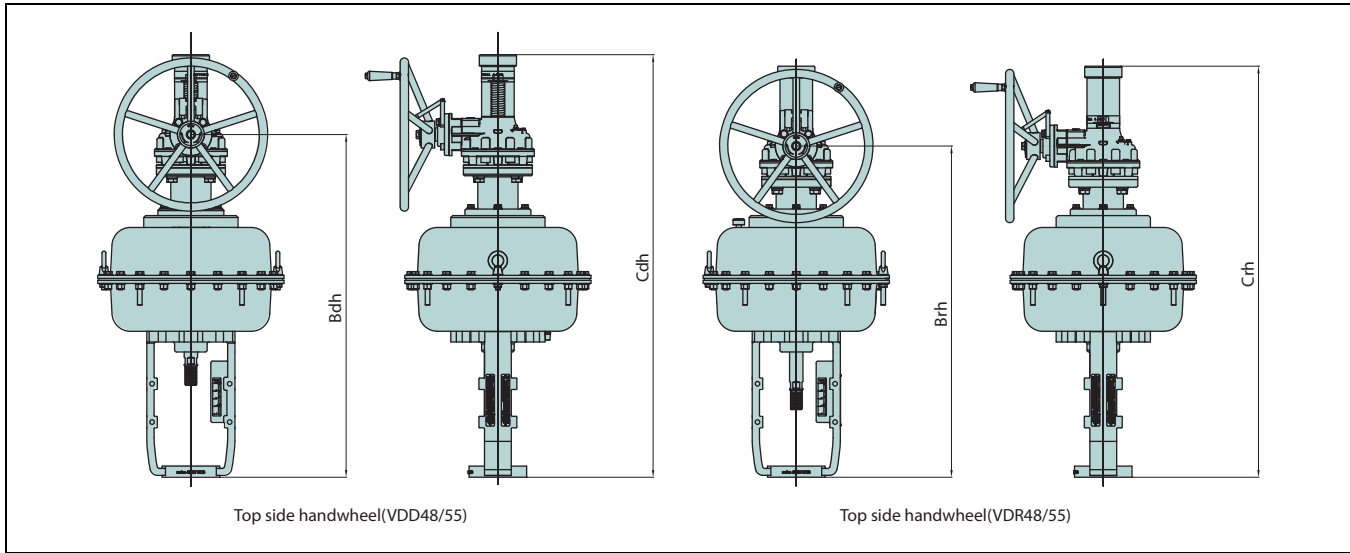
VD Diaphragm actuators

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	348	373	12	255	312	110	170	23	
VD_25 D	255	373	395	17						
VD_29 E	295	391	416	18	295	312	122	182	29	
VD_29 D	295	431	453	26						
VD_37 E	375	464	489	28	375	352	131	211	43	
VD_37 D	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	14	15	26	10	12	4	7	51	
VD_25 D	10	15	16	37						
VD_29 E	12	15	16	40	12	12	5	7	64	
VD_29 D	12	17	18	57						
VD_37 E	15	18	19	62	15	14	5	8	95	
VD_37 D	15	20	21	101						



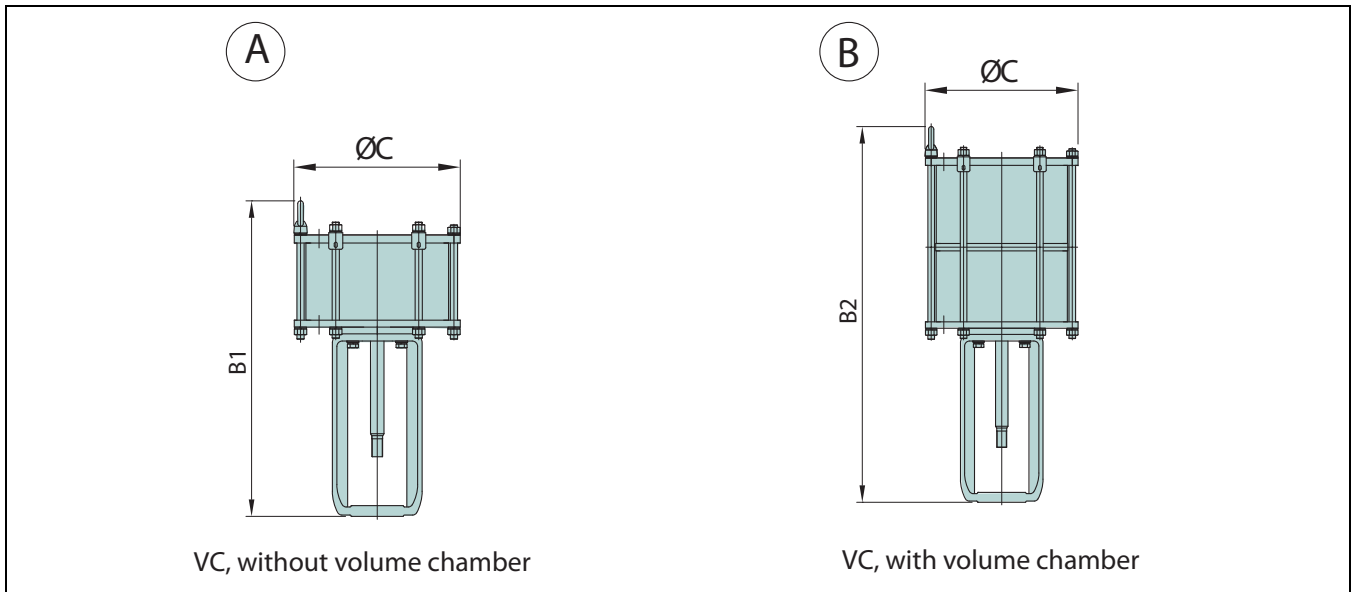
Dimension (mm)	Size (mm)	Without handwheel			With handwheel					
		A2	Bd / Bhd	Br / Bhr	Weight (kg)	Bdh	Brh	Cdh	Crh	Weight (kg)
VD_48 E	486	486	652	677	86	896	865	1102	1072	112
VD_48 D	486	486	702	724	118	946	915	1152	1122	144
VD_55 E	566	566	695	720	112	940	910	1145	1115	145
VD_55 D	566	566	745	767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

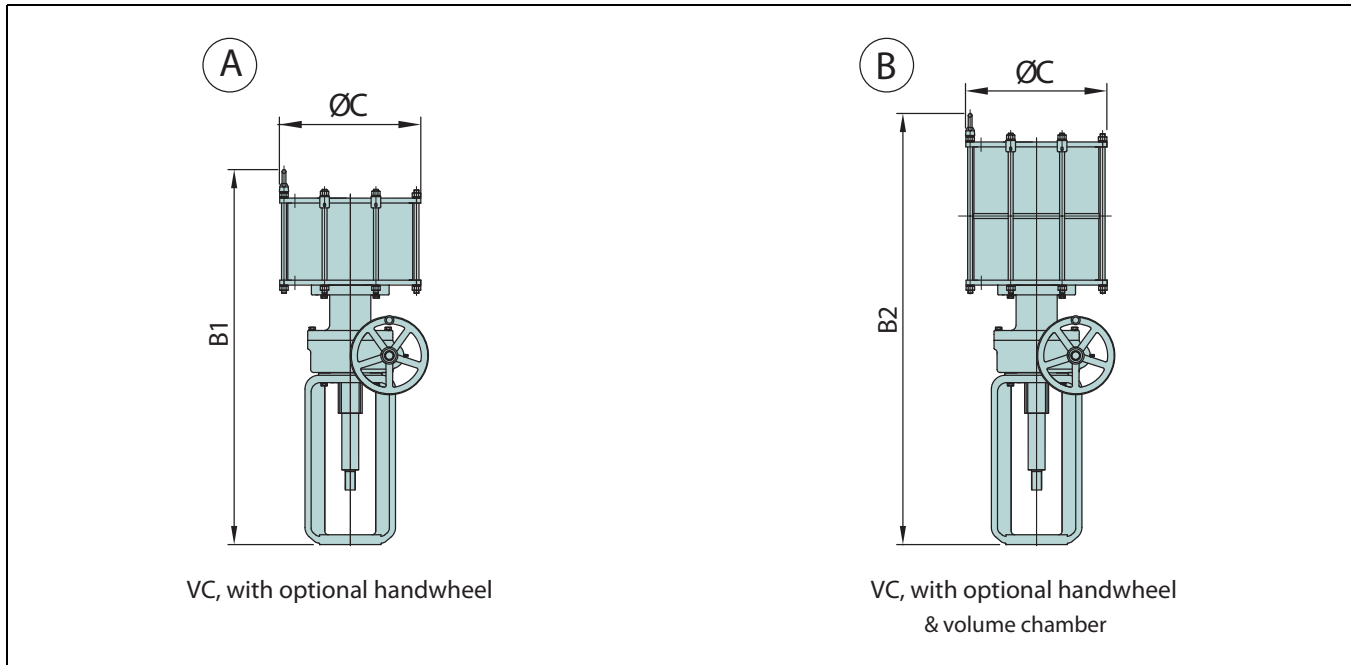
VC actuators without handwheel

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 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
18	18" / DN 450
24	24" / DN 600

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

Optional pressure rating	
G	ASME class 900
I	ASME class 2500

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. RATED Cv												
				22. Sign	Description	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.