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

The series GM, Omega trim valves are most suitable for high pressure drop of both compressible and uncompressible 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 to 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 passages through the flow passage generated by the Omega multistage trim. The pressure drop is apportioned across the stacks of letdown 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 seat available depending from the application
- Option for bellows seal for toxic or other application where no leak 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 with standard bonnet construction. Over +260 °C and under -29 °C 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 Cv per body size allowing for wide applicable 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
- Valve assembly is easy and self guiding
- 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

metso
Expect results

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 to leakage on high pressure drop and high temperature applications. 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 minimizes the leak paths and makes the valve insensitive to pipe 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

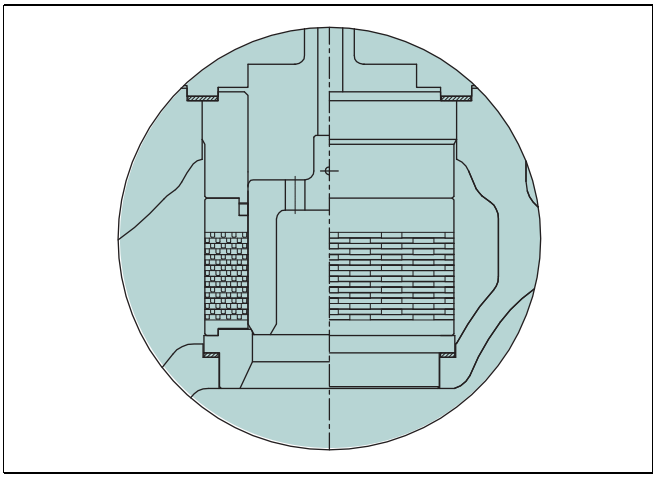
Severe services in power plant

- 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

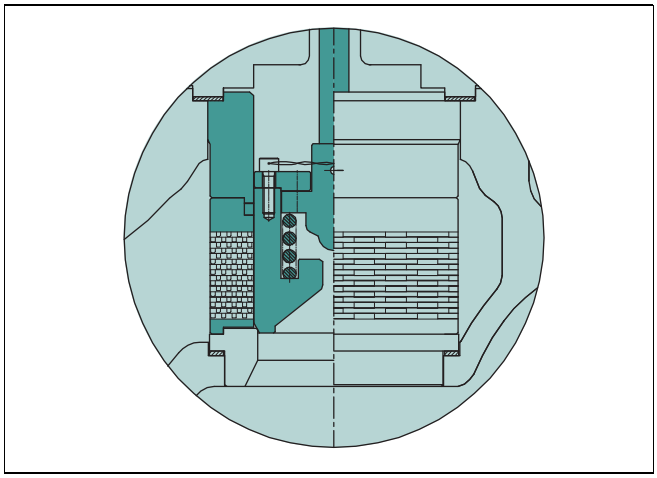
- Compressor anti-surge, kick back & recycle
- Pump minimum flow & recirculation
- Blow down discharge to vent flare
- Reactor de-pressurization
- Turbo expander by-pass
- Gas injection lift control
- Gas storage pressure letdown
- Gas flow regulation
- Pipeline anti-surge
- Heavy oil letdown
- Ethylene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



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 to leakage 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 & seat leakage class with different bonnet & seat applications

Valve size DN / Inch	ASME rating	Seat type	Temperature range (°C)		Seat leakage class (ANSI B 16.104)	
			Standard bonnet	Extension bonnet	Standard	Optional
25 / 1 ~ 400 / 16	150~ 600	Metal Seat	-29 ~ +260	-196 ~ +425	IV**	V
		Soft seat	-29 ~ +232	-196 ~ +232	VI**	V
25 / 1~ 400 / 16	900~ 1500	Metal seat	-29 ~ +260	-196 ~ +593	IV*	V
25 / 1~ 400 / 16	2500	Metal seat	-29 ~ +260	-196 ~ +593	IV*	V

* Leakage class will be IV for metal seat with soft seal, but class III for metal seat with metal or graphite seals
** Leakage class will be V for soft seat with soft seal
Optional Class V is available by using pilot trim option or as a special option for metal seat with soft seal up to 4" size

Seal ring applications

Seal ring application	Temp. range (°C)	Sign
Spring Energized (PTFE + Graphite)	-40 ~ +260	G
Spring Energized (PTFE + Graphite) with back-up ring (ASME 1500 and higher)	-40 ~ +260	G
Spring Energized (PTFE)	-40 ~ +232	T
Spring Energized (Poly PTFE) with back-up ring	-196 ~ +232	L
Metal ring	-29 ~ +593	M
Metal C-seal ring	-29 ~ +593	C

*Please contact Metso.

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	17-4PH + 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)	Sing
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

Standard Omega	Pilot Omega
FTO / FTC	FTC

* * FTO: Flow to open, applicable for compresible fluids (air, gas, steam, etc.) except Pilot trim
FTC: Flow to close, applicable for incompresible fluids (water and other liquids)

Cv ratio

100: 1

Flow characteristics

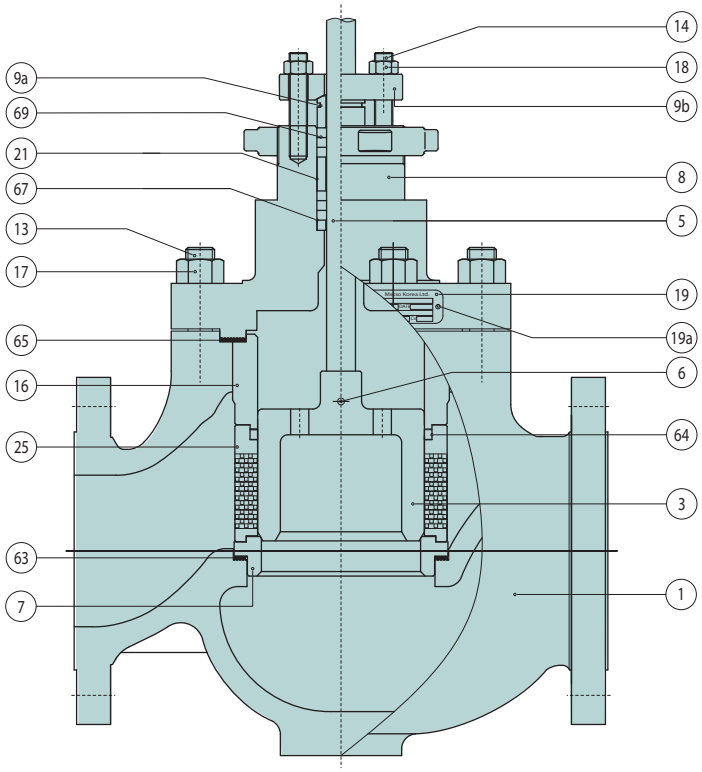
Linear & Customized %

GM, Ratings & End Connetions

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	STUD	A193 Gr.B7
14	STUD	A193 Gr.B8
16	CAGE GUIDE	420(J2) STAINLESS STEEL
17	HEXAGON NUT	A194 Gr.2H
18	HEXAGON NUT	A194 Gr.8
19	IDENTIFICATION PLATE	304 STAINLESS STEEL
20	RIVET	304 STAINLESS STEEL
21	LANTERN RING	304 STAINLESS STEEL
22	PACKING SPRING	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
   440C SS: ASTM A276 TP440C ot JIS 440C St. Steel
   410 SS: ASTM A276 TP410 or JIS 410 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.

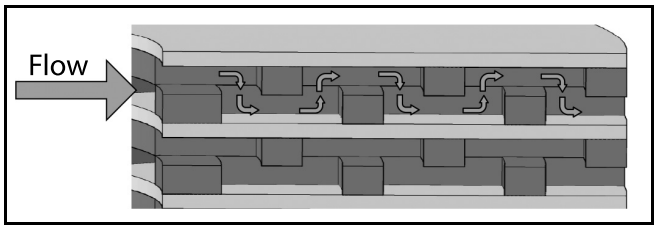
Body materials: Stainless steel

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	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)
18	HEXAGON NUT	A194 Gr.8
19	IDENTIFICATION PLATE	304 STAINLESS STEEL
19A	RIVET	304 STAINLESS STEEL
21	LANTERN RING	304 STAINLESS STEEL
22	PACKING SPRING	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

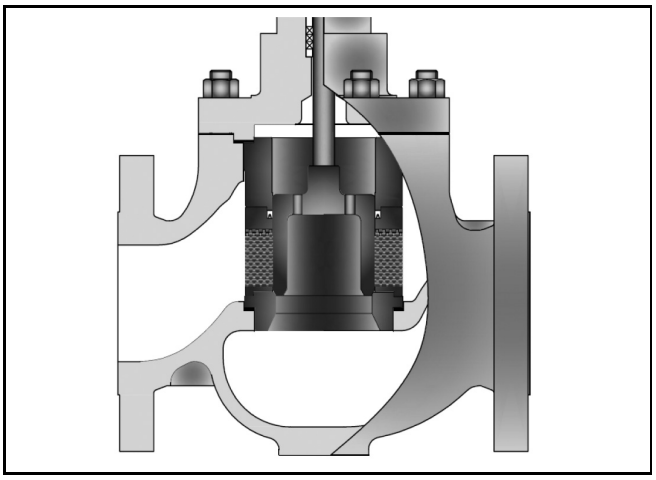
Note.
1. Plug/Seat Hard Facing(Cobalt based alloy) & Soft Seat are available
2. Materials description
   316 SS: ASTM A276 TP316 or JIS 316 St. Steel
   420 SS: ASTM A276 TP420 or JIS 420 St. Steel
3. Above standard materials to be applicable depending on specific service conditions, other optional materials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

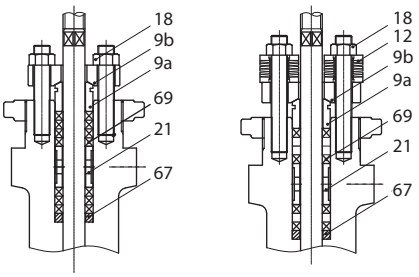


- The limitation data is based on ISA04-P211.
- The exceed velocity will made in vibration and erosive damage to the body, trim and outlet pipe wall.
- The exceed energy will made in mechanical vibration and erosive damage to the body, trim and outlet pipe wall.

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)

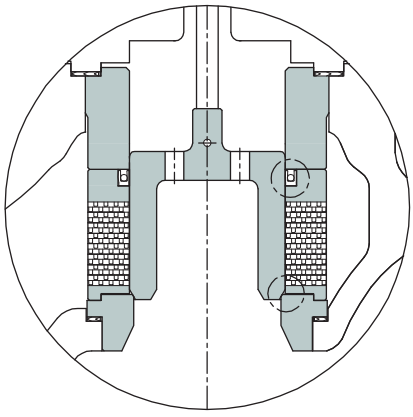
Packing constructions

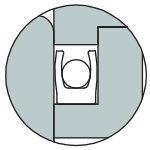


Standard construction

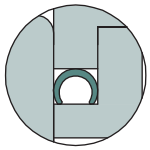
Low emission with live load spring

Seal-ring & seat solutions for GM valve trims

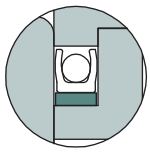




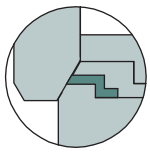
Soft seal (pressure energized)



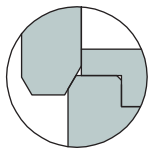
C-metal seal



Soft seal with back-up ring (pressure energized)



Soft seat



Metal seat

GM Series Cv vs Travel

Standard OMEGA

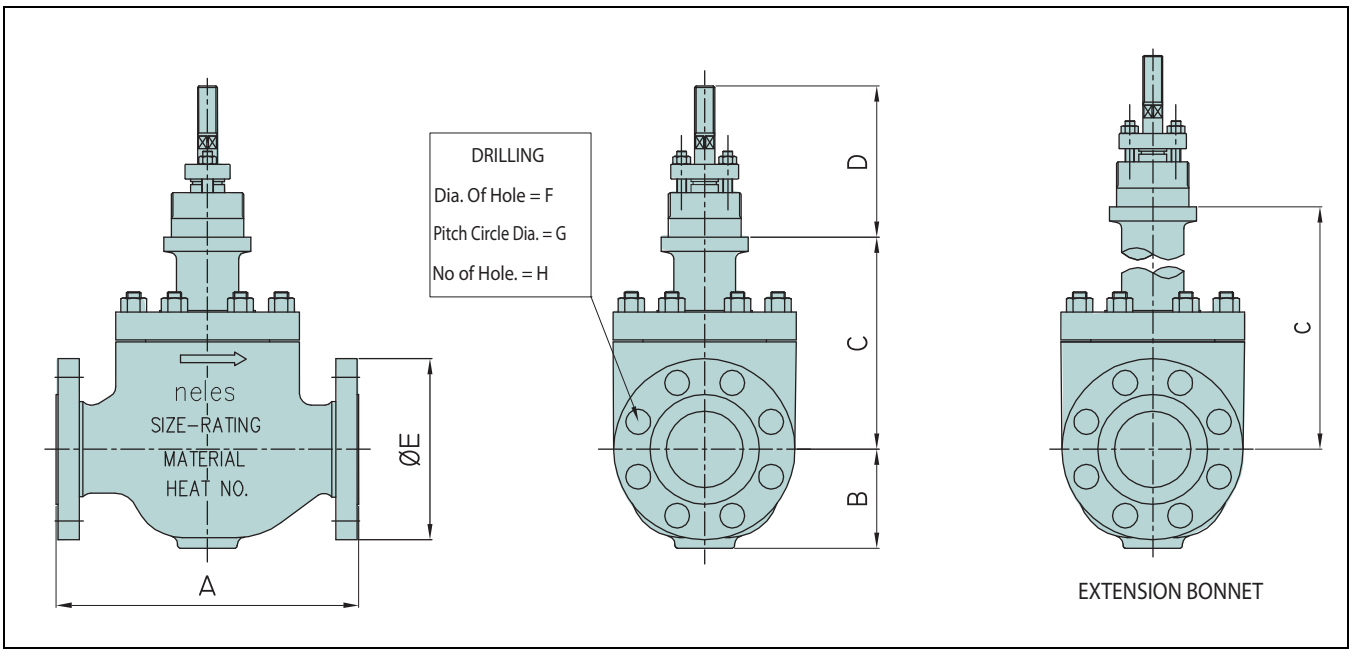
ANSI Class: 150# ~ 2500#

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
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	100	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	120	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	140	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

(UNIT: mm)

Dimension Size	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#
1"	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
1-1/2"	222	235	251	65	78	78	161	270	110	125	155	155	15.9	22.2	22.2	98.4	114.3	114.3	4	4	4	22	23	27
2"	254	267	286	83	83	83	178	295	110	150	165	165	19.1	19.1	19.1	120.7	127	127	4	8	8	30	32	40
3"	298	318	337	109	109	120	222	330	115	190	210	210	19.1	22.2	22.2	152.4	168.3	168.3	4	8	8	65	67	72
4"	352	368	394	135	135	135	248	380	140	230	255	275	19.1	22.2	25.4	190.5	200	215.9	8	8	8	100	103	112
6"	451	473	508	170	170	178	340	430	150	280	320	355	22.2	22.2	28.6	241.3	269.9	292.1	8	12	12	185	195	240
8"	543	568	610	230	230	230	451	490	150	345	380	420	22.2	25.4	31.8	298.5	330.2	349.2	8	12	12	363	385	443
10"	673	708	752	275	275	275	488	600	150	405	445	510	25.4	28.6	34.9	362	387.4	431.8	12	16	16	552	595	681
12"	737	775	819	350	350	350	543	660	150	485	520	560	25.4	31.8	34.9	431.8	450.8	489	12	16	20	905	955	1020
14"	889	927	972	385	385	385	616	740	210	535	585	605	28.6	31.8	38.1	476.3	514.4	527	12	20	20	1170	1230	1311
16"	1016	1057	1108	440	440	440	692	820	220	595	650	685	28.6	34.9	41.3	539.8	571.5	603.2	16	20	20	1380	1460	1587

900 #/ 1500

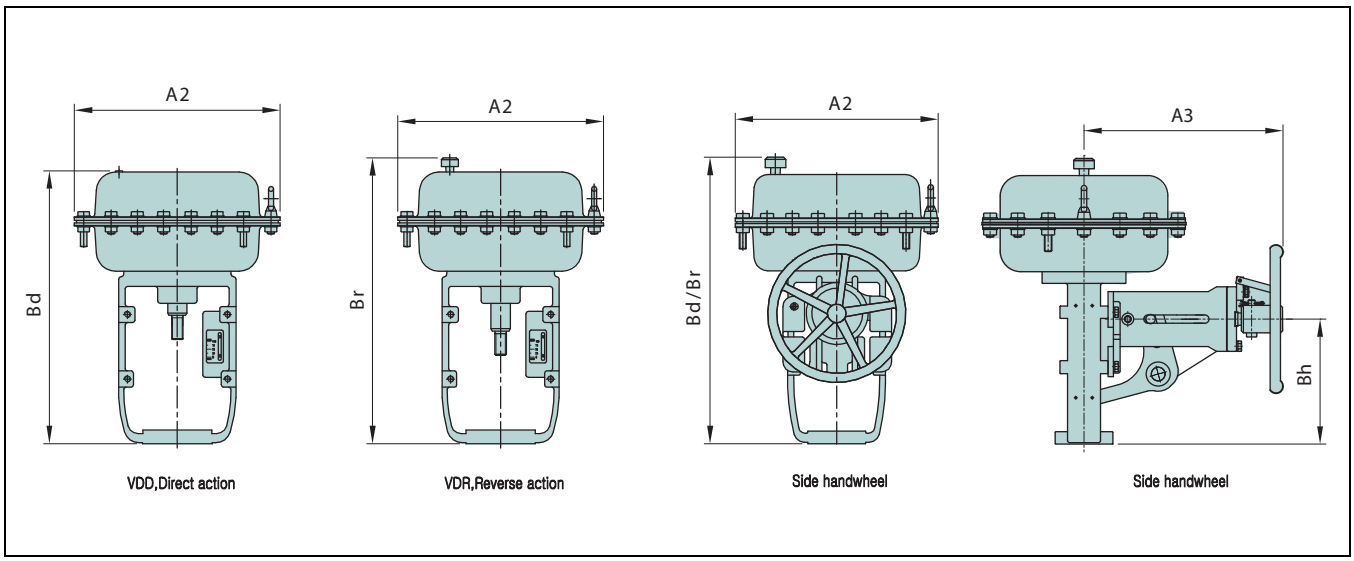
(UNIT: mm)

Dimension Size	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#
1"	292	292	82	82	236	330	110	150	180	25.4	25.4	101.6	101.6	4	4	60	60
1-1/2"	333	333	90	90	248	380	110	180	180	28.6	28.6	123.8	123.8	4	4	63	63
2"	375	375	113	113	315	380	110	215	215	25.4	25.4	165.1	165.1	8	8	67	67
3"	441	460	142	142	335	430	115	240	265	25.4	31.8	190.5	203.2	8	8	150	163
4"	511	530	182	182	376	475	140	290	310	31.8	34.9	235	241.3	8	8	244	255
6"	714	768	210	240	420	500	150	380	395	31.8	39	317.5	317.5	12	12	530	540
8"	914	972	290	290	550	600	150	470	485	38.1	45	393.7	393.7	12	12	698	821
10"	991	1067	310	350	600	700	150	545	585	38.1	51	469.9	482.6	16	12	955	1137
12"	1130	1219	385	385	680	800	150	610	675	38.1	54	533.4	571.5	20	16	1180	1240
14"	1257	1257	385	385	770	920	210	640	750	41.3	61	558.8	635	20	16	1387	1477
16"	1422	1422	450	450	850	1050	210	705	825	44.5	67	616	704.8	20	16	1601	1721

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

Actuator dimensions

VD Diaphragm actuators



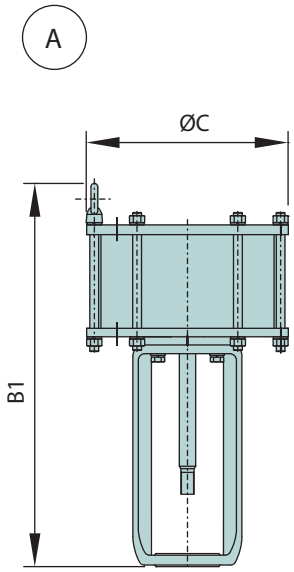
(UNIT: mm)

Without handwheel					With handwheel					
Size	**A2**	**Bd**	**Br**	**Weight (kg)**	**A2**	**Bd**	**Br**	**A3**	**Bh**	**Weight (kg)**
#25	255	348	373	12	255	348	373	312	170	22
#29	295	391	416	18	295	391	416	312	182	28
#37	375	464	489	28	375	464	489	342	201	43
#48	486	652	677	86	486	652	677	464	244	119
#55	566	695	720	112	566	695	720	464	244	145

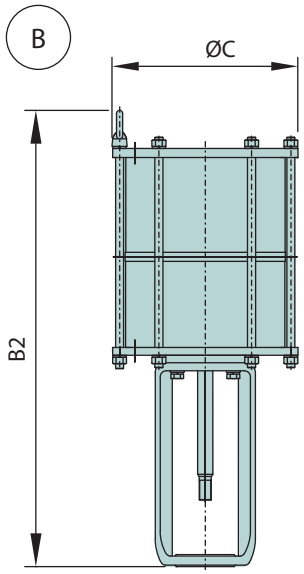
NOTE
1. "Br" refers to reverse acting actuator, VDR
2. "Bd" refers to direct acting actuator, VDD

Actuator dimensions

VC cylinder actuators with handwheel



VC, without volume chamber



VC, with volume chamber

VC actuators without handwheel

(UNIT: mm)

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

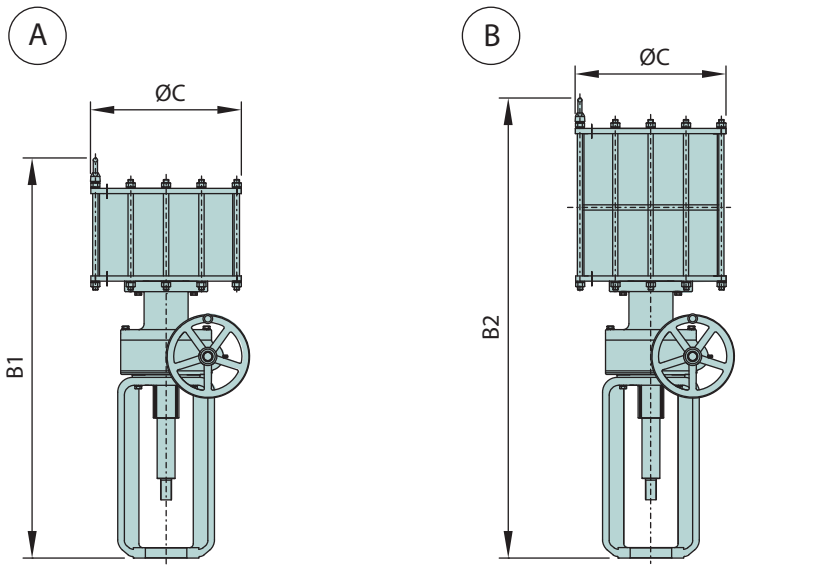
VC actuators without handwheel

(UNIT: mm)

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

Actuator dimensions

VC cylinder actuators with handwheel



VC, with optional handwheel

VC, with optional handwheel & volume chamber

VC actuators with handwheel

(UNIT: mm)

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

VC actuators with handwheel

(UNIT: mm)

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

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	A	J2	X	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		
01	1" / DN 25	1H	1-1/2" / DN 40
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	18	18" / DN 450
20	20" / DN 500	YY	Special

3.	PRESSURE RATING		
C	ASME class 150	D	ASME class 300
	Optional pressure rating		
F	ASME class 600	G	ASME class 900
H	ASME class 1500	I	ASME class 2500
A	ASME class 4500	Y	Special

4.	END CONNECTION
W	Flanged RF, ASME B16.5
	Optional end connection
V	Socket welding, ASME B16.11
Q	Butt welding, ASME B16.25
Z	Ring joint flange, ASME B16.5
Y	Special

5.	BONNET CONSTRUCTION	
	Bonnet type	Actuator connection
A	Standard	Standard actuator size
B	Standard	Applicable for VD_48/55 (3",4" only)
	Optional bonnet construction	
E	Extension	Standard actuator size
F	Extension	Applicable for VD_48/55 (3",4" only)
Y	Special	Special

6.	BODY & BONNET MATERIAL		
J2	A216 gr. WCB	S6	A351 gr. CF8M
	Optional body & bonnet material		
S4	A351 gr. CF8	S9	A351 gr. CF3
S1	A351 gr. CF3M	YY	Special

7.	BEARINGS (TRUNNION / THRUST BEARING)		
X	Not applicable	Y	Special

TRIM CONSTRUCTIONS

8.	PLUG MATERIAL
P2	SUS 420J2
YY	Special

9.	PLUG APPLICATION
X	Not applicable
A	Cobalt based alloy
	Optional plug application
C	Hard chrome
D	Cobalt based alloy + HCr
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
	Optional seat application
Y	Special

OTHERS

14.	PACKING TYPE
S	Standard packing
	Optional packing type
L	Live loaded packing
Y	Special

15.	PACKING MATERIAL
G	PTFE + Carbon fiber
	Optional packing material
F	Graphite (with mold and braided)
Y	Special

16.	SEALS MATERIAL
X	Not applicable
G	PTFE + Graphite
	Optional seals material
T	PTFE
F	Graphite
C	Metal C-seal ring
M	Metal (Ductile)
Y	Special

17.	GASKET MATERIAL
S	S/W gasket type, 316 SS + Graphite for standard
	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	Lubricator for the packing
W	Water seal
Y	Special

TRIM TYPE & RATED Cv

20.		21.		22.	RATED Cv																					
Sign	Trim type	Sign	Trim characteristic	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	Balanced 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	(100)	770	(120)	1020	(140)
P	Pilot balanced plug type	Q	Quick opening	FL	Full capa. / Liquid																					
U	Unbalanced plug type			1G	1-Step red. / Gas	3	(30)	8	(30)	12	(40)	28	(50)	52	(50)	90	(60)	156	(70)	234	(80)	340	(100)	470	(120)	620	(140)
				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	(100)	234	(120)	372	(140)
				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	(100)	116	(120)	224	(140)
				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	(100)	540	(120)	710	(140)
				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	(100)	328	(120)	430	(140)
				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	(100)	164	(120)	214	(140)
				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	(100)	82	(120)	106	(140)
				3L	3-Step red. / Liquid																					
Y	Special	Y	Special	YY	Special	Contact Metso for Cv details																				

Subject to change without prior notice.

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