MOOG

High Flow Cartridge Valves – 2/2 Way

Series NG16 – NG100

Table of Contents

General Description

Cartridge valves, also known as 2/2–way valves or logic valves, conform to DIN 24342 and ISO 7368 standards. They have two operational ports A and B. The flow path between these two connections is controlled hydraulically by a pilot pressure applied to X.

Depending on the control input, cartridge valves can be used as:

➢ Directional Control Valves (start, stop, directional control)

➢ Flow Control Valves

The preferred mode of mounting is the manifold block, which can be equipped with several valves depending on the hydraulic circuit for the specific application. Each valve is connected to each other in the manifold block.

The Moog manifold systems product line contains valves of nominal bores 16, 25, 32, 40, 50, 63, 80 and 100 as per DIN 24342, for flows up to 12,000 lpm. Moreover, Moog offers cover plates and pilot valves for a wide variety of functions.

In addition to this, our product offering also contains cartridge housings for a great number of applications for subplate, pipe and flange mounting.

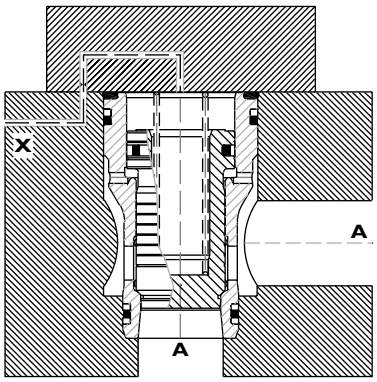
Operating Principle

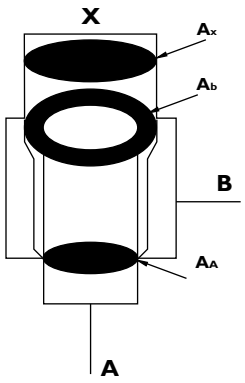
Cartridge valves have two working connections A and B, where the main flow is hydraulically operated by a controlling pressure applied to the connection X. The basic cartridge valve includes a valve poppet and sleeve which is normally held in the closed position by a spring. The poppet valve has a seated cone, giving a leakage free (dependent upon pilot control) condition across the two ports. The closing spring is retained by the control cover which encloses the cartridge valve and provides pilot connections from the X port. Various types of pilot control can be mounted either to the control cover or to an adjacent manifold face to provide direct control of the cartridge valve.

The effective areas of the basic element are A_A, A_B and A_X. Pilot oil can be taken from port A, B or both A and B (with a shuttle valve) or an external source. Hydraulic fluid can flow through the 2–way cartridge valve from A➔B or B➔A.

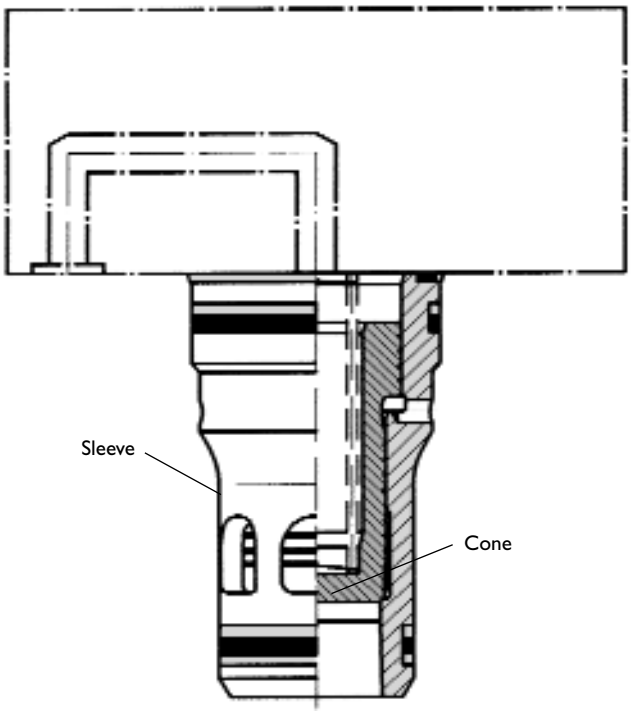
A pilot valve can be used to directly control the switching function of the cartridge valve, either between two extreme positions, open or closed, or in any number of intermediate positions. The exact position of the valve cone depends on the ratio of control surface A_X, to the pressures acting from the working connections A and B on the seating surface of A_A and the annular area of A_B.

If the valve cone is open, by reducing the pressure seen at X, then flow can move from A and B or vice-versa. By applying a control pressure at X, the working connections A to B are shut off as the valve cone is closed by the seat mounting. If there is a pressure difference between connection B and pilot connection X, as a result of clearance tolerance between the cone and sleeve, then leakage can be eliminated by using a leakproof seat valve and hooking up the pilot connection X to the working connection B. If the desired function does not permit such a switching operation, a cartridge valve with an additional sealing surface can be used to seal the connections A, B and X from each other.





Sectional View

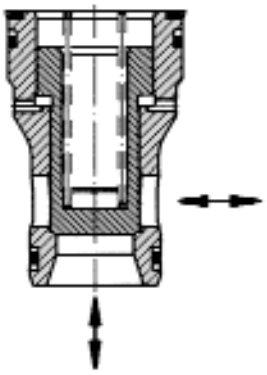


High Flow Cartridge Valve Advantages

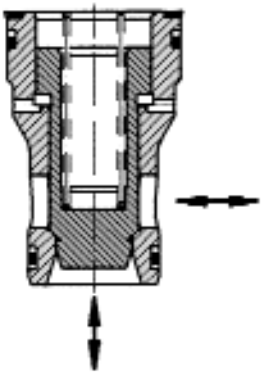
- 40% to 50% more flow with the same size of the DIN 24342 cartridge, relative to standard cartridge valves
- In many applications, the DIN 24342 cartridge can be reduced one size
- Fully interchangeable with DIN 24342 cavity; no manifold redesign required

Types of Cones and Sleeves

Directional Control and Flow Control Valves



Sleeve-B, Cone-S

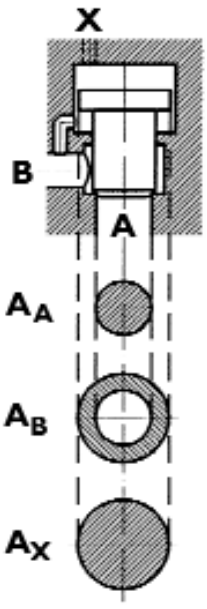


Sleeve-B, Cone-T

Specifications

General Data	Value	Unit	Specifications							
Designation	—	—	2-Way Cartridge Seat Valve							
Mode of Construction	—	—	Pilot Operated Seat Valve							
Mounting Method	—	—	Manifold Cartridge Mounting							
Branch Circuit Connection	—	—	Drilling in the Manifold							
Mounting Dimensions	—	—	See Mounting Dimensions Page 9							
Mounting Position	—	mm	Any							
Flow Direction	—	—	See Cone Types Page 4							
Ambient Temperature	min.	°F [°C]	-13° [-25°]							
	max.	°F [°C]	+140° [+60°]							
Working Pressure										
Inlet	min.	psi [bar]	0 [0]							
	max.	psi [bar]	5075 [350]							
Outlet	min.	psi [bar]	0 [0]							
	max.	psi [bar]	5075 [350]							
Temperature Range	min.	°F [°C]	-13° [-25°]							
	max.	°F [°C]	+176° [+80°]							
Viscosity Range	min.	$mm^2 \cdot s^{-1}$ [cSt]	2.8							
	max.	$mm^2 \cdot s^{-1}$ [cSt]	380							
Operational Viscosity	Vn	$mm^2 \cdot s^{-1}$ [cSt]	35							
Nominal Bore Size	—	mm	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Control Volume (S Cone)	— —	cu. in. [cc]	.15 [2.5]	.48 [7.8]	1.11 [18.2]	2.17 [35.5]	4.31 [70.6]	9.23 [151.3]	17.69 [289.9]	35.70 [585.0]
Control Volume (T Cone)	— —	cu. in. [cc]	.17 [2.85]	.52 [8.6]	1.21 [19.8]	2.31 [37.8]	4.52 [74.0]	9.62 [157.6]	18.56 [304.2]	35.70 [585.0]

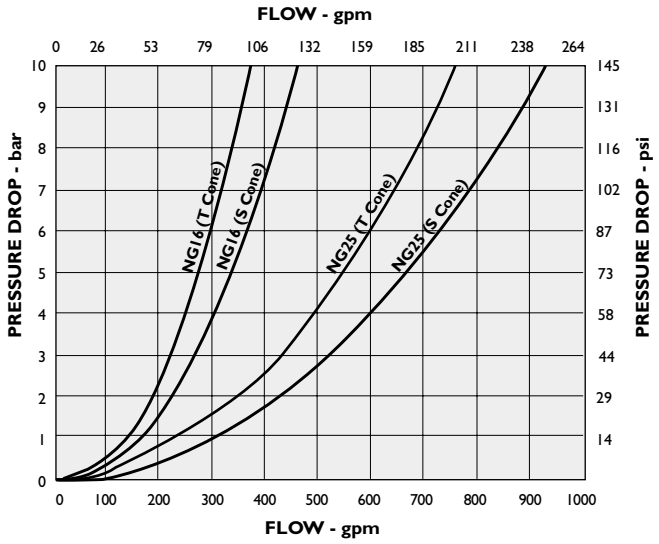
Characteristic Parameters

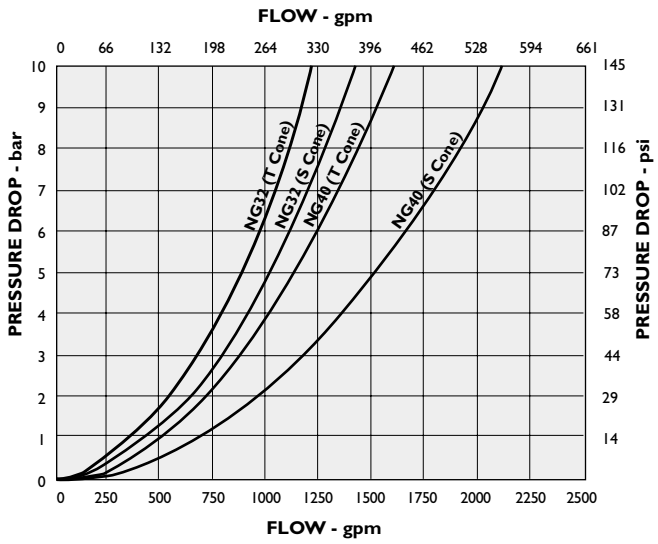


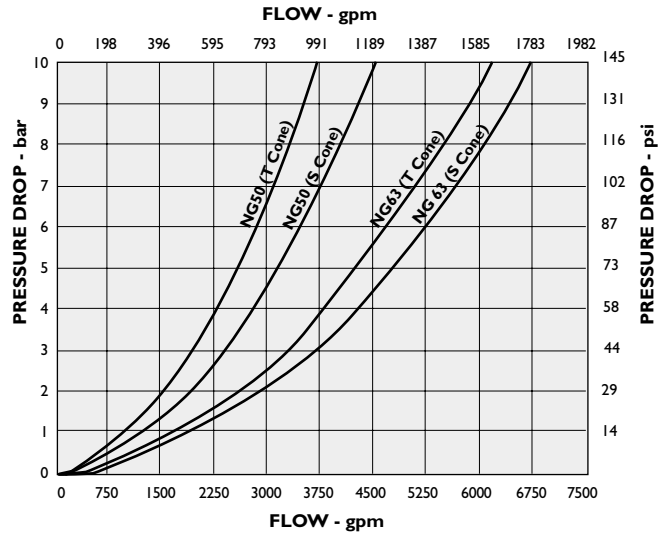
Reference Surface – A_A								
	NG16	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Cone S								
Stroke (mm)	6.5	10	12	15	20	24	30.5	39
A_A (mm^2)	211	434	707	1075	2206	3318	5281	8825
A_A	1	1	1	1	1	1	1	1
A_B	0.8	0.8	1.15	1.2	0.6	0.9	0.8	0.7
A_X	1.8	1.8	2.15	2.2	1.6	1.9	1.8	1.7
Cone T								
Stroke (mm)	7.5	11	13	16	21	25	32	39
A_A (mm^2)	211	434	707	1075	2206	3318	5281	8825
A_A	1	1	1	1	1	1	1	1
A_B	0.8	0.8	1.15	1.2	0.6	0.9	0.8	0.7
A_X	1.8	1.8	2.15	2.2	1.6	1.9	1.8	1.7

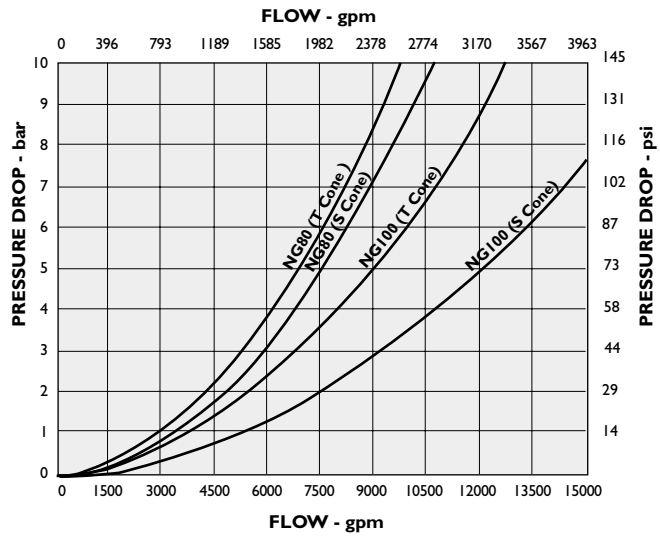
Typical Characteristic Curves

Flow and Direction Functions (S & T Cones)





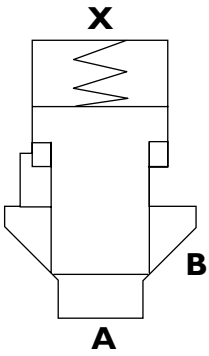




Notes:

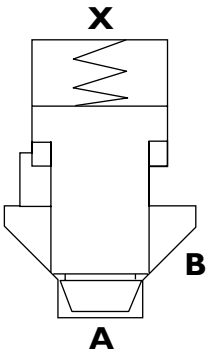
1. Performance characteristics are based on oil viscosity of 35 cSt.
2. Oil temperature – 122°F [50°C].
3. Pressure drop vs. flow data measured without spring.

Direction Control (without dampening nose]; area ratio = (please refer to page 6 for ratios)

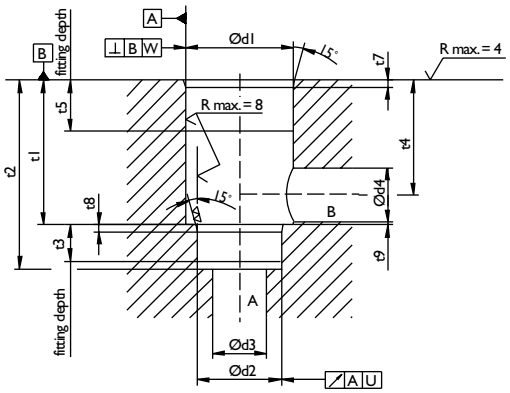
Symbol	Size NG (mm)	Weight lb [kg]	Spring Rating psi [bar]	Box Car Designation	Part Number
	16	0.44 [0.2]	14.5 [1.0]	M-CEHFE16D6SS	XCB11056-000-00
			29.0 [2.0]	M-CEHFE16D6ST	XCB11057-000-00
			58.0 [4.0]	M-CEHFE16D6SU	XCB11058-000-00
			87.0 [6.0]	M-CEHFE25D6SV	XCB11059-000-00
	25	0.9 [0.4]	14.5 [1.0]	M-CEHFE25D6SS	XCB11066-000-00
			29.0 [2.0]	M-CEHFE25D6ST	XCB11067-000-00
			58.0 [4.0]	M-CEHFE25D6SU	XCB11068-000-00
			87.0 [6.0]	M-CEHFE25D6SV	XCB11069-000-00
	32	2.0 [0.9]	14.5 [1.0]	M-CEHFE32D6SS	XCB11016-000-00
			29.0 [2.0]	M-CEHFE32D6ST	XCB11017-000-00
			58.0 [4.0]	M-CEHFE32D6SU	XCB11019-000-00
	40	4.0 [1.8]	14.5 [1.0]	M-CEHFE40D6SS	XCB11071-000-00
			29.0 [2.0]	M-CEHFE40D6ST	XCB11072-000-00
			58.0 [4.0]	M-CEHFE40D6SU	XCB11108-000-00
	50	7.0 [3.2]	14.5 [1.0]	M-CEHFE50D6SS	XCB11123-000-00
			29.0 [2.0]	M-CEHFE50D6ST	XCB11124-000-00
			58.0 [4.0]	M-CEHFE50D6SU	XCB11125-000-00
	63	15.2 [6.9]	14.5 [1.0]	M-CEHFE63D6SS	XCB11135-000-00
			29.0 [2.0]	M-CEHFE63D6ST	XCB11136-000-00
			58.0 [4.0]	M-CEHFE63D6SU	XCB11138-000-00
	80	26.5 [12.0]	14.5 [1.0]	M-CEHFE80D6SS	XCB11205-000-00
			29.0 [2.0]	M-CEHFE80D6ST	XCB11206-000-00
			58.0 [4.0]	M-CEHFE80D6SU	XCB11208-000-00
	100	52.8 [24.0]	14.5 [1.0]	M-CEHFE100D6SS	XCB11219-000-00
			29.0 [2.0]	M-CEHFE100D6ST	XCB11220-000-00
			43.5 [3.0]	M-CEHFE100D6SL	XCB11221-000-00

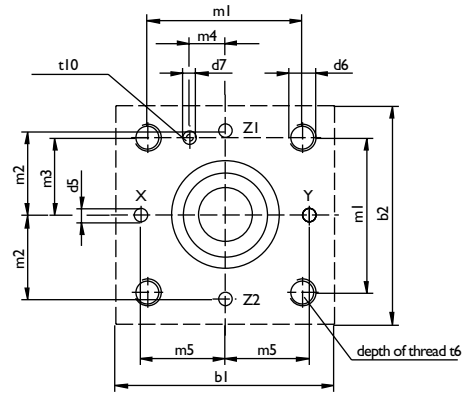
Standard Models

Direction Control (with dampening nose); area ratio = (please refer to page 6 for ratios)

Symbol	Size NG (mm)	Weight lb [kg]	Spring Rating psi [bar]	Box Car Designation	Part Number
	16	0.44 [0.2]	14.5 [1.0]	M-CEHFE16D6TS	XCB11188-000-00
			29.0 [2.0]	M-CEHFE16D6TT	XCB11189-000-00
			58.0 [4.0]	M-CEHFE16D6TU	XCB11190-000-00
			87.0 [6.0]	M-CEHFE25D6TV	XCB11191-000-00
	25	0.9 [0.4]	14.5 [1.0]	M-CEHFE25D6TS	XCB11183-000-00
			29.0 [2.0]	M-CEHFE25D6TT	XCB11184-000-00
			58.0 [4.0]	M-CEHFE25D6TU	XCB11185-000-00
			87.0 [6.0]	M-CEHFE25D6TV	XCB11186-000-00
	32	2.0 [0.9]	14.5 [1.0]	M-CEHFE32D6TS	XCB11149-000-00
			29.0 [2.0]	M-CEHFE32D6TT	XCB11150-000-00
			58.0 [4.0]	M-CEHFE32D6TU	XCB11151-000-00
	40	4.0 [1.8]	14.5 [1.0]	M-CEHFE40D6TS	XCB11118-000-00
			29.0 [2.0]	M-CEHFE40D6TT	XCB11119-000-00
			58.0 [4.0]	M-CEHFE40D6TU	XCB11217-000-00
	50	7.0 [3.2]	14.5 [1.0]	M-CEHFE50D6TS	XCB11099-000-00
			29.0 [2.0]	M-CEHFE50D6TT	XCB11100-000-00
			58.0 [4.0]	M-CEHFE50D6TU	XCB11101-000-00
	63	15.2 [6.9]	14.5 [1.0]	M-CEHFE63D6TS	XCB11141-000-00
			29.0 [2.0]	M-CEHFE63D6TT	XCB11142-000-00
			58.0 [4.0]	M-CEHFE63D6TU	XCB11144-000-00
	80	26.5 [12.0]	14.5 [1.0]	M-CEHFE80D6TS	XCB11211-000-00
			29.0 [2.0]	M-CEHFE80D6TT	XCB11212-000-00
			58.0 [4.0]	M-CEHFE80D6TU	XCB11214-000-00
	100	52.8 [24.0]	14.5 [1.0]	M-CEHFE100D6TS	XCB11224-000-00
			29.0 [2.0]	M-CEHFE100D6TT	XCB11225-000-00
			43.5 [3.0]	M-CEHFE100D6TL	XCB11226-000-00

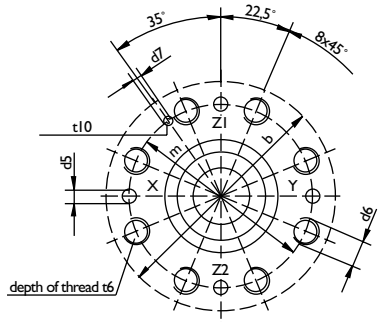
Cavity and Porting Pattern as per DIN 24342





NG16-NG63

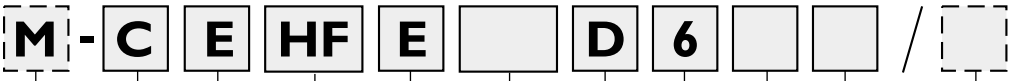
Dimensions (mm)	NG16	NG25	NG32	NG40	NG50	NG63
b1	65	85	102	125	140	180
b2	65	85	102	125	140	180
d1 H7	32	45	60	75	90	120
d2 H7	25	34	45	55	68	90
d3	16	25	32	40	50	63
d3 max	17	25	32	43	54	66
d4	16	25	32	40	50	63
d4 max	25	32	40	50	63	80
d5 max	4	6	8	10	10	12
d6	M8	M12	M16	M20	M20	M30
d7 H13	6	6	6	6	8	8
m1 ±0.2	46	58	70	85	100	125
m2 ±0.2	25	33	41	50	58	75
m3 ±0.2	23	29	35	42.5	50	62.5
m4 ±0.2	10.5	16	17	23	30	38
m5 ±0.2	25	33	41	50	58	75
t1 +0.1	43	58	70	87	100	130
t2 +0.1	56	72	85	105	122	155
t3	11	12	13	15	17	20
t4	34	44	52	64	72	95
t4 at d4 max	29.5	40.5	48	59	65.5	86.5
t5	20	30	30	30	35	35
t6	20	25	35	45	45	65
t7	2	2.5	2.5	3	4	4
t8	2	2.5	2.5	3	4	4
t9 cont. dim. min.	0.5	1.0	1.5	2.5	2.5	3
t10 min.	10	10	10	10	10	10
U	0.03	0.03	0.03	0.05	0.05	0.05
W	0.05	0.05	0.1	0.1	0.1	0.2



NG80-NG100

Dimensions (mm)	NG80	NG100
b max	250	300
d1 H7	145	180
d2 H7	110	135
d3	80	100
d3 max	82	107
d4	80	100
d4 max	104	120
d5 max	16	20
d6	M24	M30
d7 H	10	10
t1	175	210
t2 +0.2	205	245
t3	25	29
t4	130	155
t4 at d4 max	118	145
t5	40	50
t6	45	55
t7	5	5
t8	5	5
t9 cont. dim. min.	5	5
t10 min.	10	10
m ±0.3	200	245
U	0.05	0.05
W	0.2	0.2

Ordering Information



M	MIXED VITON and PU seal
V	VITON – SEALS
N	BUNA – N SEALS
S	Special seals on request

Valve Type	
C	Cartridge valve

Valve Functions	
E	Cartridge without cover

HF	High Flow

Mounting	
E	Manifold mounting

Size	Nominal Bore [NG]
16	NG16
25	NG25
32	NG32
40	NG40
50	NG50
63	NG63
80	NG80
100	NG100

Special Designs
i.e. Q5 = Special spring 5 bar

Opening Pressure psi [bar]	
Cone Types S and T	
S	14.5 [1.0]
T	29.0 [2.0]
L	43.5 [3.0]
U	58.0 [4.0]
V	87.0 [6.0]
Q	Special spring

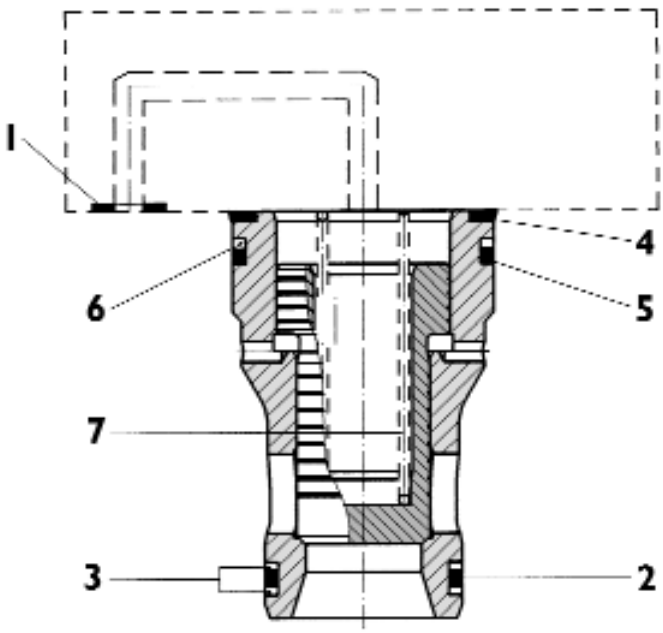
Cone Types	
S	Step poppet with small seat*
T	Step poppet with small seat and dampening nose*

Series	
6	Cartridge mounting dimensions as per DIN 24342

Serial Number

* Surfaces see Surface Area Ratios page 6.

Subject to technical changes.



Pos.	Designation	Order Number								
			NG16	NG25	NG32	NG40	NG50	NG63	NG80	NG100
1	O-Ring 80 Shore – VITON	X980	02010	02012	02013	02112	02112	02116	02215	02220
	Seal Kit for Cartridge	XEB	14413	14414	14373	14415	14420	14421	14422	14423
2	O-Ring 80 Shore – VITON	X980	02020	02122	02222	02225	02229	02338	02344	02427
3	Back-Up Ring – PTFE	X780	08020	18122	18222	18225	18229	18338	18344	18427
4	Axial Seal – PU	X783	00271	00212	00131	00195	00182	00179	00184	00194
5	O-Ring 80 Shore – VITON	X980	02024	02129	02227	02231	02338	02347	02430	02439
6	Back-Up Ring – PTFE	X780	18024	18129	08227	18231	18338	08348	08431	18439
	Springs									
7	Spring S 14.5 psi [1.0 bar]	XEF	10299	10286	10138	10292	10306	10045	10051	10059
7	Spring T 29.0 psi [2.0 bar]	XEF	10300	10287	10140	10293	10307	10310	10323	10326
	Spring L 43.5 psi [3.0 bar][1]	XEF XEF	–	–	–	10294	–	10172	10324	10326 10327*
7	Spring U 58.0 psi [4.0 bar][2]	XEF XEF	10301	10288	10170	10293 10295*	10307 10308*	10310 10311*	10323 10325*	–
7	Spring V 87.0 psi [6.0 bar]	XEF	10302	10289	–	–	–	–	–	–
7	With Spring 14.5 psi [1.0][3]	XEF	–	–	–	–	–	–	–	10327
	With Spring 29.0 psi [2.0][3]	XEF	–	–	–	10295	10308	10311	10325	–

* Not possible with stroke limiter 1H

Order example:
O-Ring 80 shore Pos. 5 for NG32
Order number: X980-02227

Spring 58 psi [4.0 bar] Pos. 7 for NG32
Order number: XEF10170

[1] Size NG100 43.5 psi [3.0 bar] spring rate is made up of the combination of springs shown.
[2] 58.0 psi [4.0 bar] spring rate in sizes NG40, NG50, NG63 and NG80 uses the combination of springs shown.
[3] To be used only in combinations shown in (1) & (2)

Argentina
Australia
Austria
Brazil
China
England
Finland
France
Germany

India
Ireland
Italy
Japan
Korea
Luxembourg
Norway
Russia
Singapore
Spain
Sweden
USA

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CDL6649 Rev C 500-361 0301