Proportional Pressure Control, DIN Slip-in Cartridge Valves

Motion Control Products

Catalog HY14-2555/US

Supplement to Catalog HY14-2550/US

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Parker

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SAFETY GUIDE

For safety information, see Safety Guide SG HY14-1000 at www.parker.com/safety or call 1-800-CParker.

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Cat HY14-2555-infrtbckcvr.indd, dd

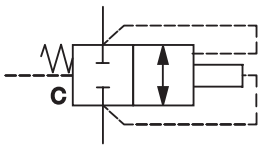
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Contents

Notes

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Port Identifications - Graphics



Description

Depending on valve function and design, power ports A and B can be used for inlet or outlet.

The control port C is the connection between cover and cartridge unit.

Further Control Ports

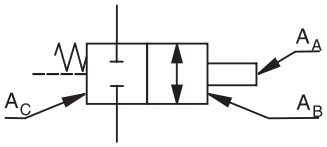
X control oil connection, inlet

Y control oil connection, outlet

Z_1 control oil connection, preferred inlet

Z_2 control oil connection, preferred outlet

Control Surfaces - Graphics



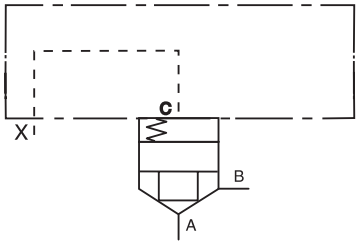
Description

A_A Area, which is subjected to the pressure at port A

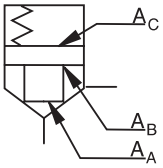
A_B Area, which is subjected to the pressure at port B

A_C Area, which is subjected to the pressure at port C

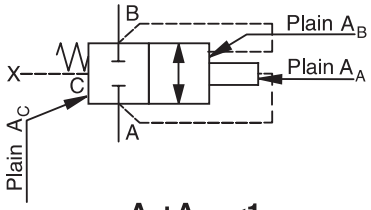
Port Identifications - Schematics



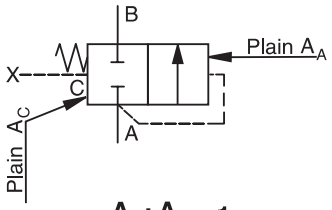
Control Surfaces - Schematics



Area Representation

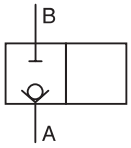


$A_A : A_C = <1$

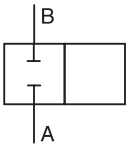


$A_A : A_C = 1$

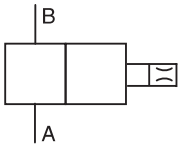
Design Representation



Seat design

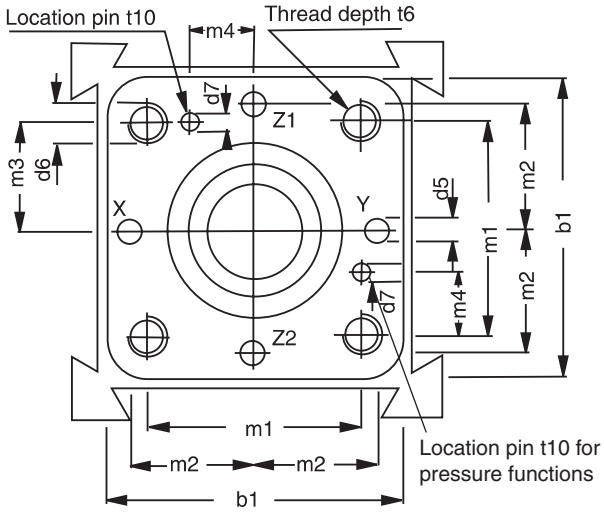


Spool design

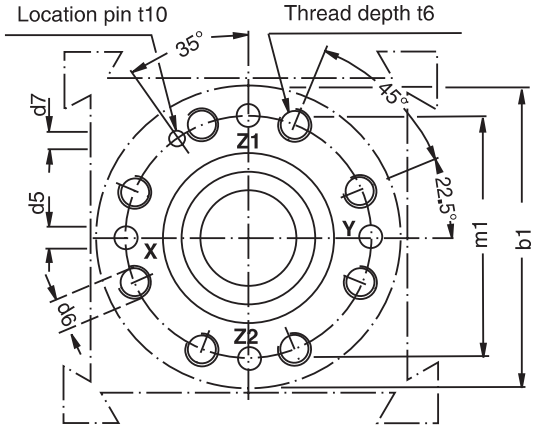


Dampening poppet

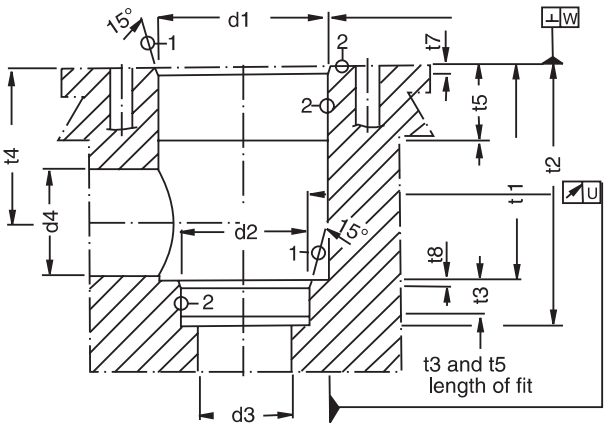
Code: ISO 7368-B*-*-2-A/B
NG16 to NG63



Code: ISO 7368-B*-*-2-A
NG80 to NG100



Hole and mounting pattern acording ISO 7368



Required surface finish:

$(1) = \sqrt{R_{max}16}$, $(2) = \sqrt{R_{max}8}$

Inch equivalents for millimeter dimensions are shown in (**)

Size	b1	d1 H7	d2 H7	d3	d3 max	d4	d4 max*	d5 max	d6	d7 H13	m1±0.2	m2±0.2	m3±0.2
NG16	65.0 (2.56)	32.0 (1.26)	25.0 (0.98)	16.0 (0.63)	18.0 (0.71)	16.0 (0.63)	25.0 (0.98)	4.0 (0.16)	M 8	4.0 (0.16)	46.0 (1.81)	25.0 (0.98)	23.0 (0.91)
NG25	85.0 (3.35)	45.0 (1.77)	34.0 (1.34)	25.0 (0.98)	25.5 (1.00)	25.0 (0.98)	32.0 (1.26)	6.0 (0.24)	M 12	6.0 (0.24)	58.0 (2.20)	33.0 (1.30)	29.0 (1.14)
NG32	102.0 (4.02)	60.0 (2.36)	45.0 (1.77)	32.0 (1.26)	36.0 (1.42)	32.0 (1.26)	40.0 (1.57)	8.0 (0.31)	M 16	6.0 (0.24)	70.0 (2.76)	41.0 (1.61)	35.0 (1.38)
NG40	125.0 (4.92)	75.0 (2.95)	55.0 (2.17)	40.0 (1.57)	43.0 (1.69)	40.0 (1.57)	50.0 (1.97)	10.0 (0.39)	M 20	6.0 (0.24)	85.0 (3.35)	50.0 (1.97)	42.5 (1.67)
NG50	140.0 (5.51)	90.0 (3.54)	68.0 (2.68)	50.0 (1.97)	56.0 (2.20)	50.0 (1.97)	63.0 (2.48)	10.0 (0.39)	M 20	8.0 (0.31)	100.0 (3.94)	58.0 (2.28)	50.0 (1.97)
NG63	180.0 (7.09)	120.0 (4.72)	90.0 (3.54)	63.0 (2.48)	74.0 (2.91)	63.0 (2.48)	80.0 (3.15)	12.0 (0.47)	M 30	8.0 (0.31)	125.0 (4.92)	75.0 (2.95)	62.5 (2.46)
NG80	250.0 (9.84)	145.0 (5.71)	110.0 (4.33)	80.0 (3.15)	93.0 (3.66)	80.0 (3.15)	100.0 (3.94)	16.0 (0.63)	M 24	10.0 (0.39)	200.0 (7.87)	—	—
NG100	300.0 (11.81)	180.0 (7.09)	135.0 (5.31)	100.0 (3.94)	115.0 (4.53)	100.0 (3.94)	125.0 (4.92)	20.0 (0.79)	M 30	10.0 (0.39)	245.0 (9.65)	—	—

Size	m4±0.2	t1+0.1	t2+0.1	t3	t4	t4 max*	t5	t6	t7	t8	t10	U	W
NG16	10.5 (0.41)	43.0 (1.69)	56.0 (2.20)	11.0 (0.43)	34.0 (1.34)	29.5 (1.16)	20.0 (0.79)	20.0 (0.79)	2.0 (0.08)	2.0 (0.08)	10.0 (0.39)	0.03 (0.001)	0.05 (0.002)
NG25	16.0 (0.63)	58.0 (2.28)	72.0 (2.83)	12.0 (0.47)	44.0 (1.73)	40.5 (1.59)	30.0 (1.18)	25.0 (0.98)	2.5 (0.10)	2.5 (0.10)	10.0 (0.39)	0.03 (0.001)	0.05 (0.002)
NG32	17.0 (0.67)	70.0 (2.76)	85.0 (3.35)	13.0 (0.51)	52.0 (2.05)	48.0 (1.89)	30.0 (1.18)	35.0 (1.38)	2.5 (0.10)	2.5 (0.10)	10.0 (0.39)	0.03 (0.001)	0.1 (0.004)
NG40	23.0 (0.91)	87.0 (3.43)	105.0 (4.13)	15.0 (0.59)	64.0 (2.52)	59.0 (2.32)	30.0 (1.18)	45.0 (1.77)	3.0 (0.12)	3.0 (0.12)	10.0 (0.39)	0.05 (0.002)	0.1 (0.004)
NG50	30.0 (1.18)	100.0 (3.94)	122.0 (4.80)	17.0 (0.67)	72.0 (2.83)	65.5 (2.58)	35.0 (1.38)	45.0 (1.77)	4.0 (0.16)	3.0 (0.12)	10.0 (0.39)	0.05 (0.002)	0.1 (0.004)
NG63	38.0 (1.50)	130.0 (5.12)	155.0 (6.10)	20.0 (0.79)	95.0 (3.74)	86.5 (3.41)	40.0 (1.57)	65.0 (2.56)	4.0 (0.16)	4.0 (0.16)	10.0 (0.39)	0.05 (0.002)	0.2 (0.008)
NG80	—	175.0 (6.89)	205.0 (8.07)	25.0 (0.98)	130.0 (5.12)	120.0 (4.72)	40.0 (1.57)	50.0 (1.97)	5.0 (0.20)	5.0 (0.20)	10.0 (0.39)	0.05 (0.002)	0.2 (0.008)
NG100	–	210.0 (8.27)	245.0 (9.65)	29.0 (1.14)	155.0 (6.10)	142.0 (5.59)	50.0 (1.97)	53.0 (2.09)	5.0 (0.20)	5.0 (0.20)	10.0 (0.39)	0.05 (0.002)	0.2 (0.008)

* Only together with $d4_{max}$ and $t4_{max}$

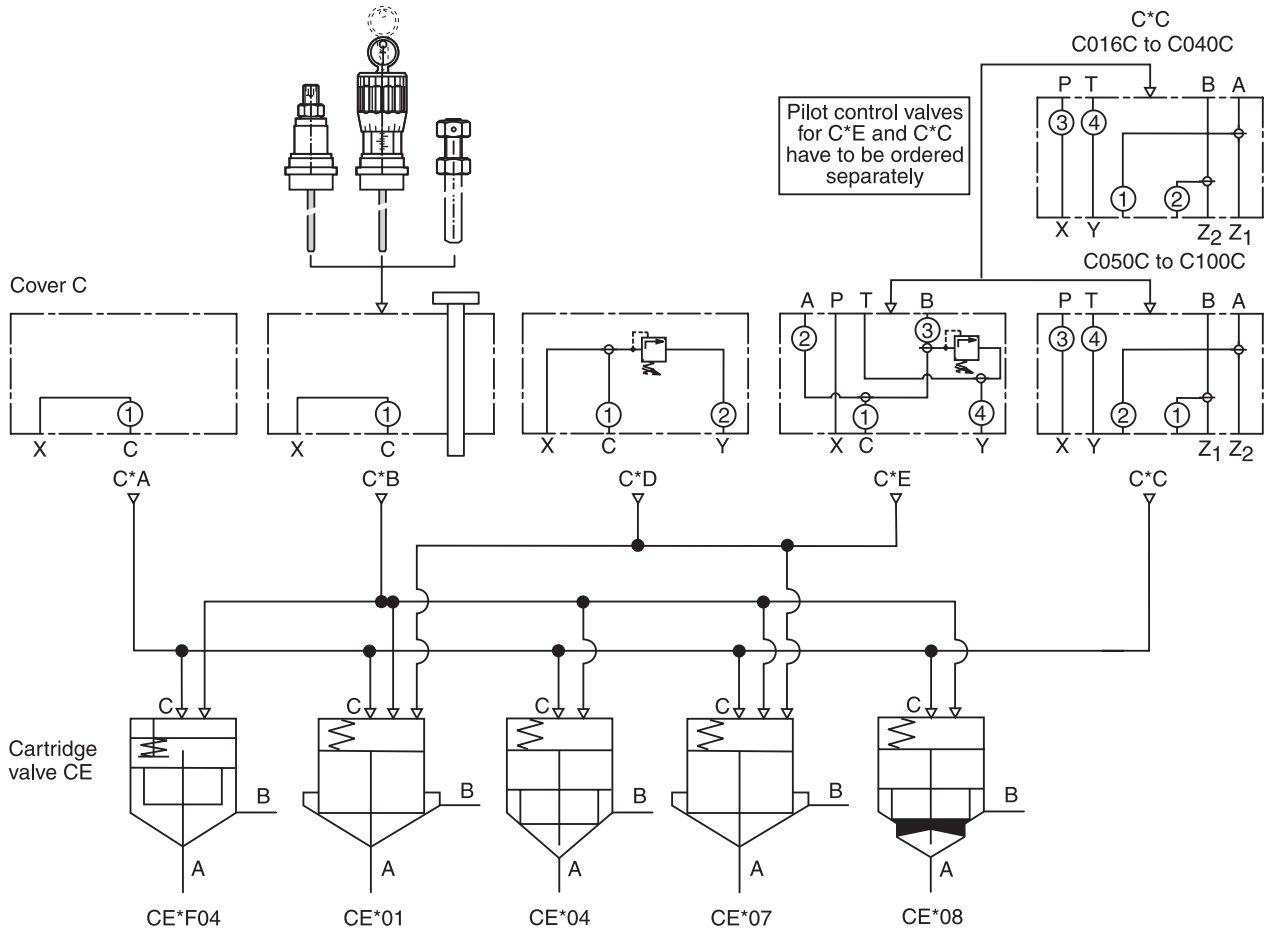
General Description

Series CE and C 2-way slip-in cartridge valves are hydraulically controlled seat valves that are designed for compact block installation. Slip-in cartridge, cover, and pilot system are valve elements that permit single and combined functions.

Features

- Installation cavity and mounting pattern according to ISO 7368.
- One sleeve only for all poppets.
- 5 poppet shapes.
- 6 poppet springs.
- Optional seal between ports B and C.
- Cover with adjustable stroke limitation for poppet.
- Cover with mounting pattern for pilot valve assembly.
- Combinations for complex functions.
- Normally open cartridge (CE*F04).
- 8 nominal sizes NG16 to NG100.

Pilot Control



CE-C.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General								
Interface	2 way slip-in cartridge valves according to ISO 7368							
Operation	Hydraulic							
Mounting Position	Unrestricted							
Ambient Temperature	-40°C to +60°C (-40°F to +140°F)							
Hydraulic								
Fluid	Hydraulic fluid according to DIN 51 524...525							
Viscosity, recomended	30 to 80 cSt (mm^2/s)							
Viscosity, permitted	20 to 380 cSt (mm^2/s)							
Fluid Temperature	-20°C to +60°C (-4°F to +140°F)							
Max. Contamination	ISO 4406 : 1999 ; 18/16/13							
Operating Pressure	420 Bar (6090 PSI) without pilot valve							
	Ports A, B, X, Z1, Z2: 350 Bar (5075 PSI), 420 Bar (6090 PSI) (depending on p_{max} of pilot valves)							
	Port Y: 350 Bar (5075 PSI), according to pilot system, maximum (depending on p_{max} of pilot valves)							
Nominal Size	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Nominal Flow at Δp 5 Bar (73 PSI)	LPM (GPM)	LPM (GPM)	LPM (GPM)	LPM (GPM)	LPM (GPM)	LPM (GPM)	LPM (GPM)	LPM (GPM)
poppet 01, 04, 07	250 (66)	450 (119)	900 (238)	1350 (357)	1800 (476)	3600 (952)	5250 (1576)	8000 (2116)
poppet 08	230 (61)	400 (106)	800 (212)	1250 (331)	1625 (430)	3400 (900)	5000 (1323)	7500 (1984)
Pilot Volume Requirement	cm^3	cm^3	cm^3	cm^3	cm^3	cm^3	cm^3	cm^3
at poppet 01	2.0	6.5	10.2	17.4	34.5	77.4	190.1	342.6
at poppet 04	2.0	6.5	12.2	20.3	39.4	94.6	190.1	363.4
at poppet 07	2.0	6.5	10.2	17.4	34.5	77.4	—	—
at poppet 08	2.0	7.4	15.3	23.2	49.2	111.8	217.3	415.3
Opening Pressure flow direction A → B	Poppet 01 / 07		spring:	L = 0.1 Bar (1.5 PSI)	N = 0.5 Bar (7.3 PSI)	S = 1.6 Bar (23.2 PSI)	T = 2.5 Bar (36.3 PSI)	U = 4.0 Bar (58.0 PSI)
	Poppet 04 / 08		spring:	L = 0.2 Bar (2.9 PSI)	N = 0.9 Bar (13.1 PSI)	S = 2.7 Bar (39.2 PSI)	T = 4.0 Bar (58.0 PSI)	U = 6.6 Bar (95.7 PSI)
Opening Pressure	Poppet 01 / 07		not possible					
flow direction B → A	Poppet 04 / 08		spring:	L = 0.3 Bar (4.4 PSI)	N = 1.3 Bar (18.9 PSI)	S = 4.0 Bar (58.0 PSI)	T = 6.3 Bar (91.4 PSI)	U = 10.0 Bar (145.0 PSI)

CE — Cartridge | Nominal Size | Design | Poppet Area Ratio | Spring | Orifice | Seals | Design Series (not required for ordering)

Code	Description
016	NG16
025	NG25
032	NG32
040	NG40
050	NG50
063	NG63
080	NG80
100	NG100

Code	Poppet Area Ratio
01	$A_A = A_C$
04	$A_A = 0.6A_C$, $A_B = 0.4A_C$
07 [3]	$A_A = 0.96A_C$
08	$A_A = 0.6A_C$, $A_B = 0.4A_C$ with dampening

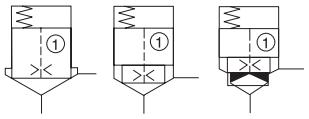
[3] Not for NG80 and NG100

Code	Normal Position	Description
C	Closed	No Poppet Sealing
S[1]	Closed	With Poppet Sealing
F[2]	Open	No Poppet Sealing

[1] Only for spring S and U.
[2] Only with spring code L

Code	Description
L	Opening Pressure 0.1 Bar (1.45 PSI)
N	Opening Pressure 0.5 Bar (7.25 PSI)
S	Opening Pressure 1.6 Bar (23.2 PSI)
T	Opening Pressure 2.5 Bar (36.3 PSI)
U	Opening Pressure 4.0 Bar (58.0 PSI)

Code	Description
99	Without Orifice, Open
00	Plug, Closed Orifice Options



Orifice position

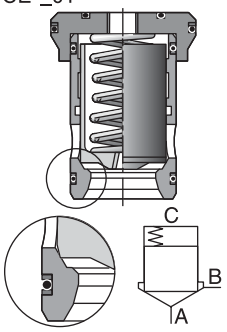
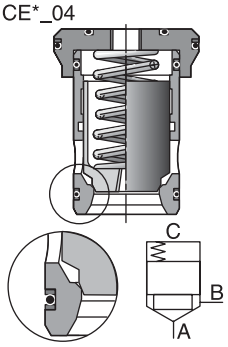
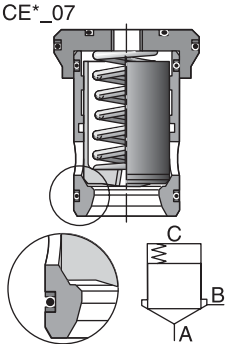
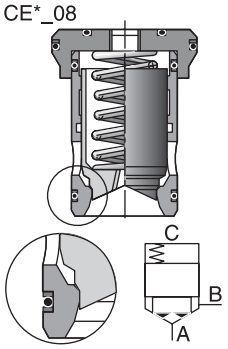
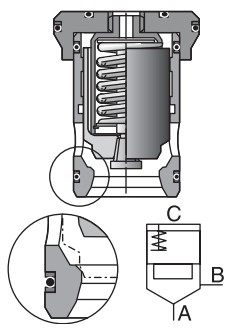
Code	Description
N	Nitrile
V	Fluorocarbon

Weight:

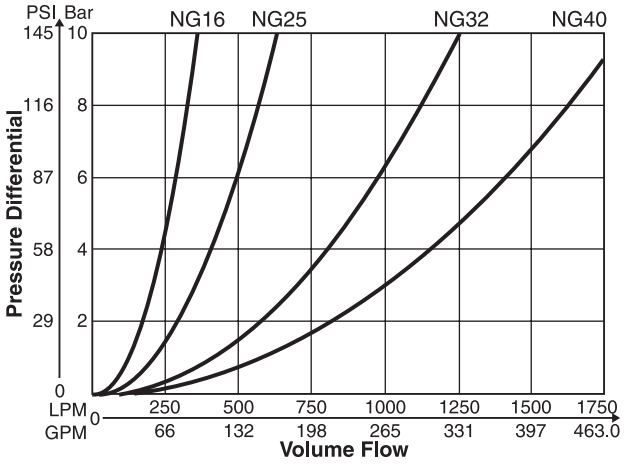
CE016	0.3 kg (0.7 lbs.)
CE025	0.6 kg (1.3 lbs.)
CE032	1.1 kg (2.4 lbs.)
CE040	1.7 kg (3.7 lbs.)
CE050	3.7 kg (8.2 lbs.)
CE063	7.1 kg (15.7 lbs.)
CE080	12.8 kg (28.2 lbs.)
CE100	27.0 kg (59.5 lbs.)

For spare parts see Accessories.

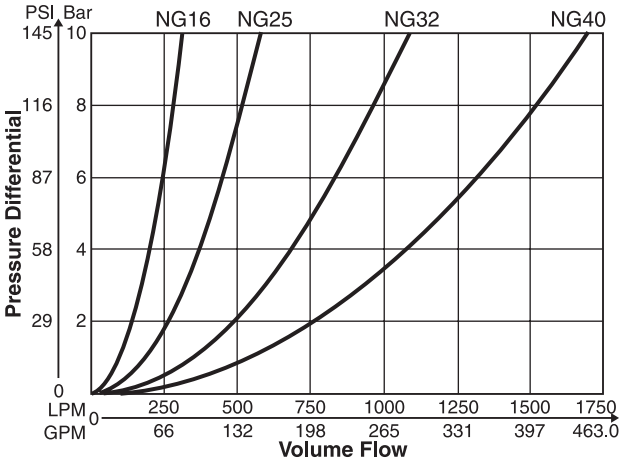
For orifice recommendations see Combination Examples.

CE*_01	CE*_04	CE*_07	CE*_08	CE*F04
				
1 : 1 $A_A = A_C$	1 : 1.67 $A_A = 0.6\ A_C$ $A_B = 0.4\ A_C$	1 : 1.04 $A_A = 0.96\ A_C$	1 : 1.67 $A_A = 0.6\ A_C$ $A_B = 0.4\ A_C$ dampening poppet	1 : 1.67 $A_A = 0.6\ A_C$ $A_B = 0.4\ A_C$ normally open

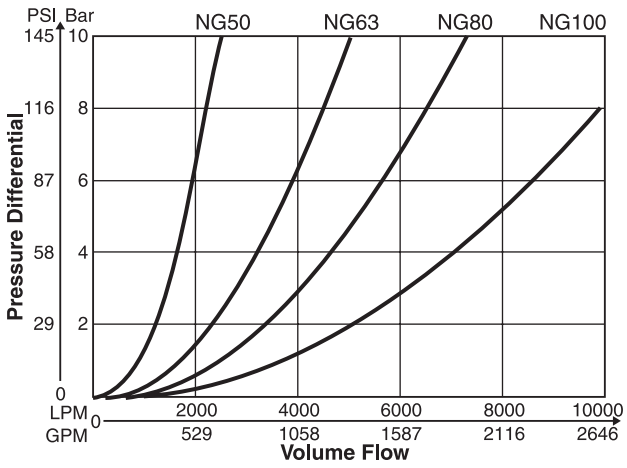
Poppet 01, 04, 07*



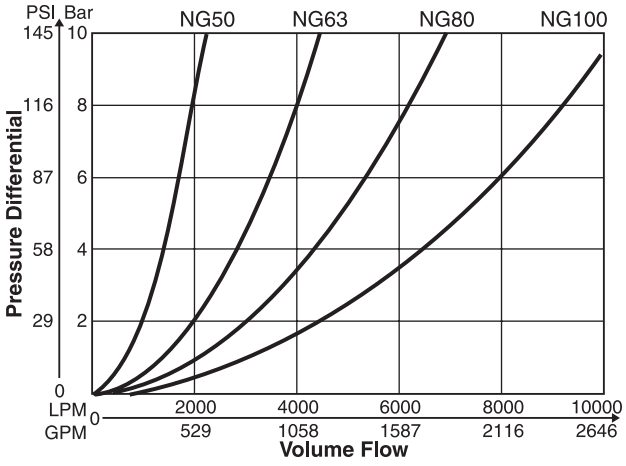
Poppet 08*



Poppet 01, 04, 07*



Poppet 08*



* without spring and poppet seal, C-chamber unloaded)

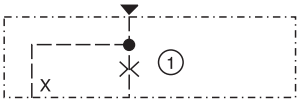
Ordering Information

C	□	A	A	□	□	□
Cover	Nominal Size	Cover with X-Connection and Gauge Port G1/4"	Without Auxiliary Function	Orifice	Seals	Design Series not required for ordering

Code	Description
016	NG16
025	NG25
032	NG32
040	NG40
050	NG50
063	NG63
080	NG80
100	NG100

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
99	Without Orifice, Open Orifice Options



Orifice position

Weight:

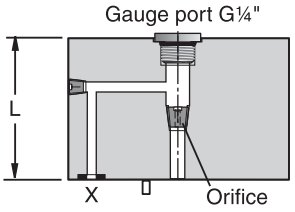
C016A	0.9 kg (2.0 lbs.)
C025A	1.9 kg (4.2 lbs.)
C032A	2.9 kg (6.4 lbs.)
C040A	5.3 kg (11.7 lbs.)
C050A	8.5 kg (18.7 lbs.)
C063A	15.5 kg (34.2 lbs.)
C080A	34.0 kg (75.0 lbs.)
C100A	58.0 kg (127.9 lbs.)

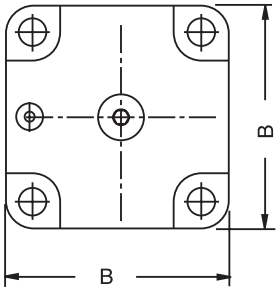
For orifice recommendations, bolt and seal kits, see Accessories .

Dimensions

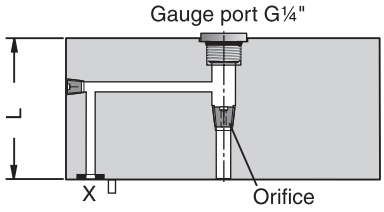
Inch equivalents for millimeter dimensions are shown in (**)

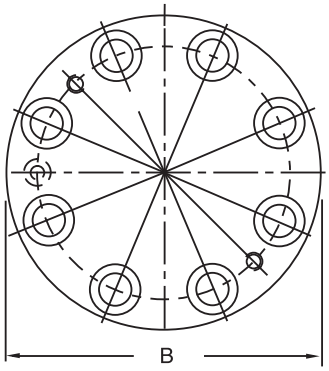
NG16 to NG63





NG80 to NG100





Size	B	L	Orifice Thread
NG16	65.0 (2.56)	36.0 (1.42)	1/16 NPT
NG25	85.0 (3.35)	45.0 (1.77)	1/16 NPT
NG32	102.0 (4.02)	50.0 (1.97)	1/16 NPT
NG40	125.0 (4.92)	60.0 (2.36)	1/8 NPT
NG50	140.0 (5.51)	70.0 (2.76)	1/8 NPT
NG63	180.0 (7.09)	85.0 (3.35)	1/8 NPT
NG80	Ø250.0 (9.84)	105.0 (4.13)	1/8 NPT
NG100	Ø300.0 (11.81)	120.0 (4.72)	1/8 NPT

CE-C.indd, dd

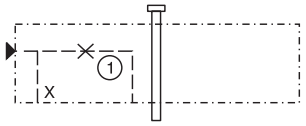
Ordering Information

C	□	B	□	□	□	□
Cover	Nominal Size	Cover with X-Connection and Stroke Limiter	Adjustment	Orifice	Seals	Design Series not required for ordering

Code	Description
016	NG16
025	NG25
032	NG32
040	NG40
050	NG50
063	NG63
080	NG80
100	NG100

Code	Description
N	Screw / Spindle
Y	Knob E10 lock, only NG16-NG50

Code	Description
99	Without Orifice, Open Orifice Options



Orifice position

Code	Description
N	Nitrile
V	Fluorocarbon

Weight:

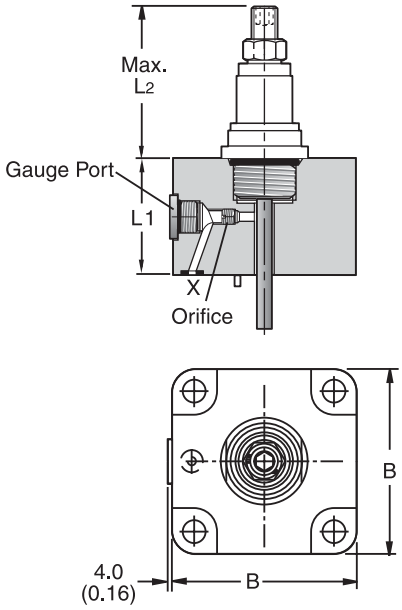
C016B	0.9 kg (2.0 lbs.)
C025B	1.9 kg (4.2 lbs.)
C032B	2.9 kg (6.4 lbs.)
C040B	5.4 kg (11.9 lbs.)
C050B	8.4 kg (18.5 lbs.)
C063B	15.1 kg (33.3 lbs.)
C080B	34.0 kg (75.0 lbs.)
C100B	60.0 kg (132.3 lbs.)

For orifice recommendations, bolt and seal kits, see Accessories.

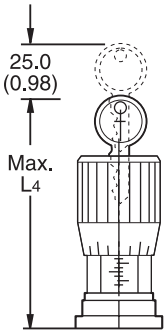
Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

NG16 to NG25 - Adjustment N



Adjustment Y



Size	B	L1	L2 max.	L4 max.	Gauge Port	Orifice Thread
NG16	65.0 (2.56)	36.0 (1.42)	72.0 (2.83)	100.0 (3.94)	G 1/4"	M6
NG25	85.0 (3.35)	45.0 (1.77)	72.0 (2.83)	100.0 (3.94)		

CE-C.indd, dd

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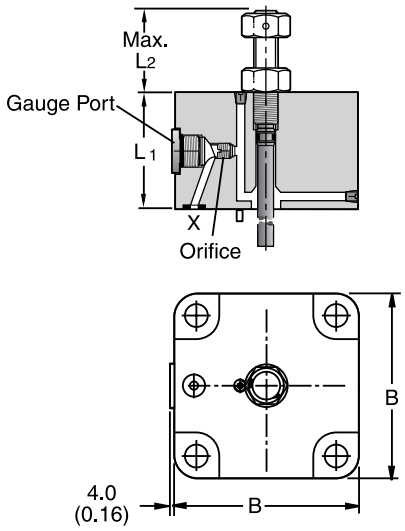
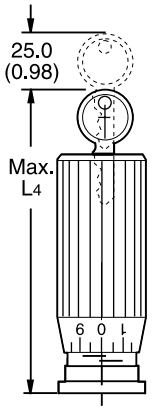
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

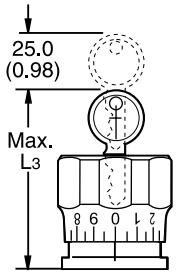
NG32 to NG50
Adjustment N



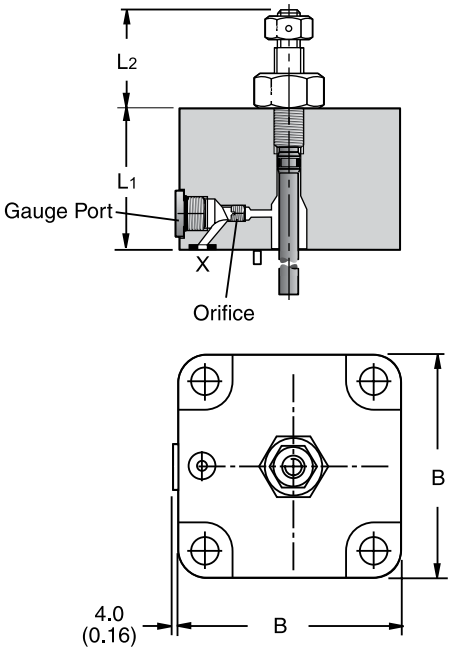
Adjustment Y (NG32)



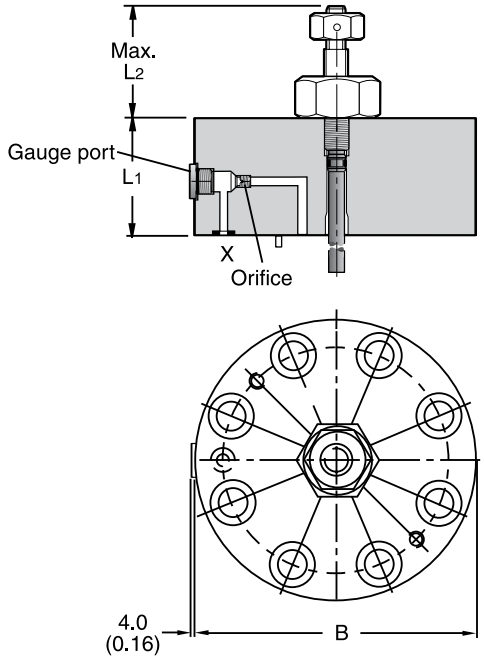
Adjustment Y (NG40/50)



NG63
Adjustment N



NG80 to 100
Adjustment N



Size	B	L1	L2 max.	L3	L4 max.	Gauge Port	Orifice Thread
NG32	102.0 (4.02)	50.0 (1.97)	48.0 (1.89)	—	141.0 (5.50)	G¼"	1/16 NPT
NG40	125.0 (4.92)	60.0 (2.36)	50.0 (1.97)	123.0 (4.84)	—		1/16 NPT
NG50	140.0 (5.51)	70.0 (2.76)	50.0 (1.97)	127.0 (5.00)	—		1/16 NPT
NG63	180.0 (7.09)	85.0 (3.35)	65.0 (2.56)	—	—		1/8 NPT
NG80	Ø250.0 (9.84)	105.0 (4.13)	95.0 (3.74)	—	—		1/8 NPT
NG100	Ø300.0 (11.81)	120.0 (4.72)	120.0 (4.72)	—	—		1/8 NPT

CE,C.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Ordering Information

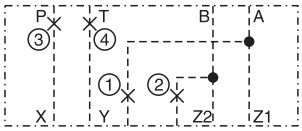
C	□	C	A	□	□	□	□	□	⌐ ⌐
Cover	Nominal Size	Cover for Pilot System Mounting	Without Auxiliary Function	①	②	③	④ Orifice / Choke	Seals	Design Series not required for ordering

Code	Description
016	NG16
025	NG25
032	NG32
040	NG40
050	NG50
063	NG63
080	NG80
100	NG100

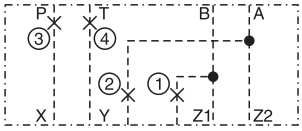
Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
99	Without Orifice, Open Orifice Options
00	Plug, Closed Orifice Options

NG16 to NG40



NG50 to NG100



◯ Orifice position

Weight:

C016C	1.0 kg (2.12 lbs.)
C025C	1.9 kg (4.20 lbs.)
C032C	2.9 kg (6.40 lbs.)
C040C	5.3 kg (11.70 lbs.)
C050C	8.5 kg (18.70 lbs.)
C063C	15.3 kg (33.70 lbs.)
C080C	34.0 kg (75.0 lbs.)
C100C	60.0 kg (132.30 lbs.)

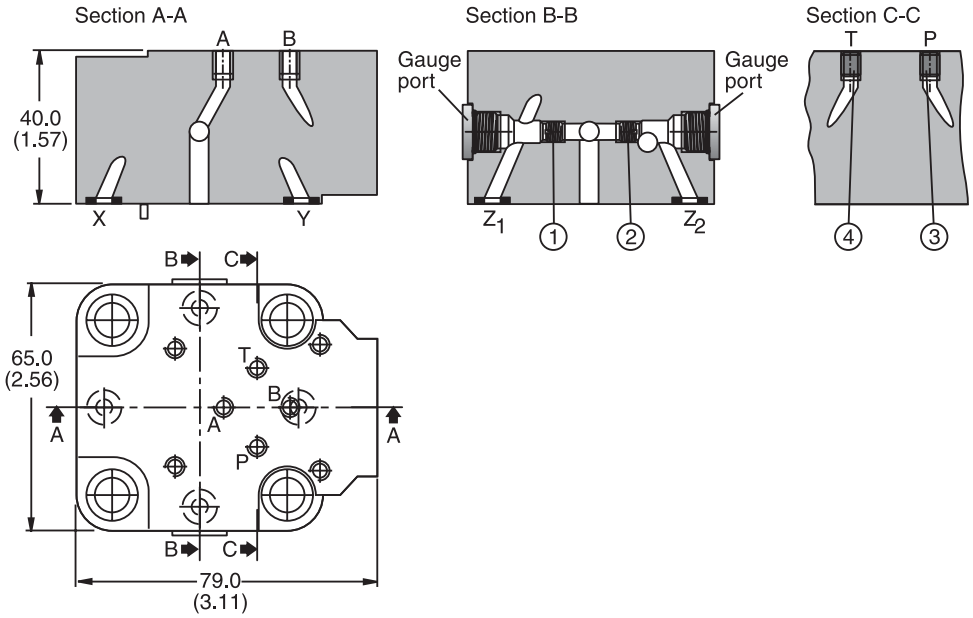
Attention:
For NG50 and larger:
If pilot system NG06 is used, mount adapater plate PADA 1007/A-B/B-A or PADA 1007/A-A/B-B (NG10 to NG06) on cover.

For orifice recommendations, bolt and seal kits, see Accessories.

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

NG16



CE-C.indd, dd

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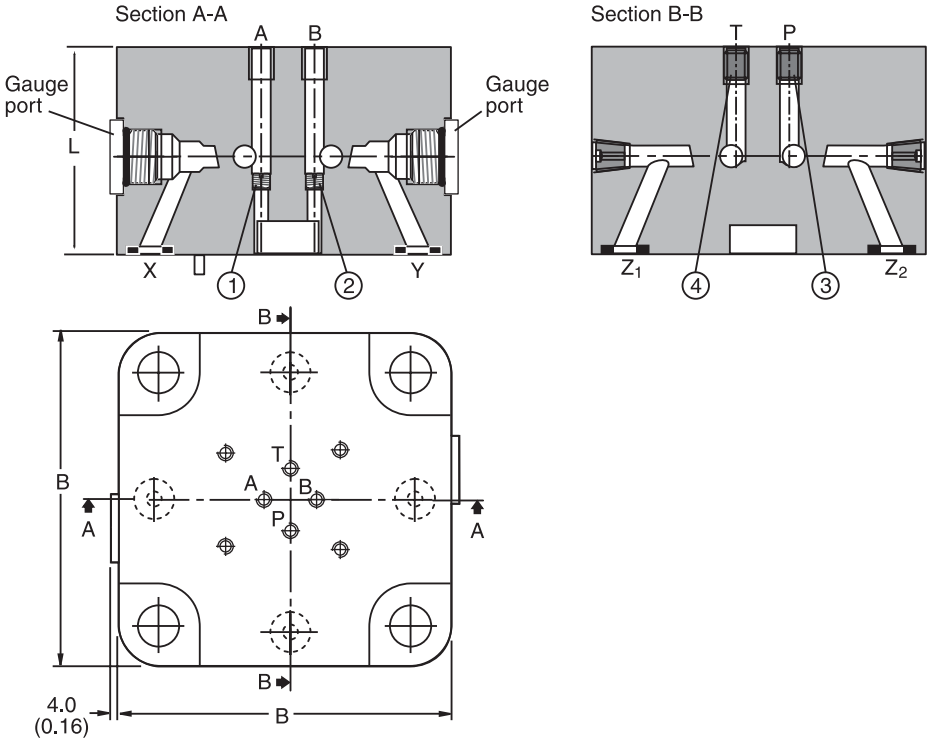
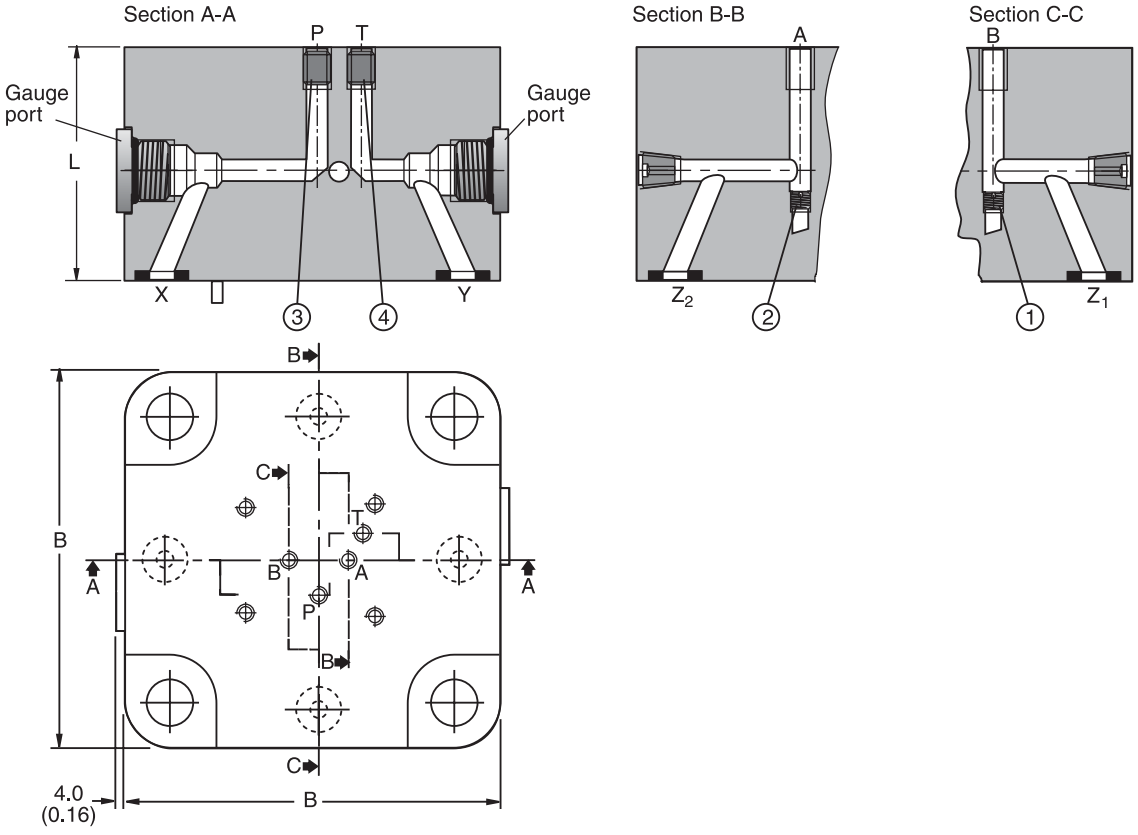
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)

NG25 to NG40



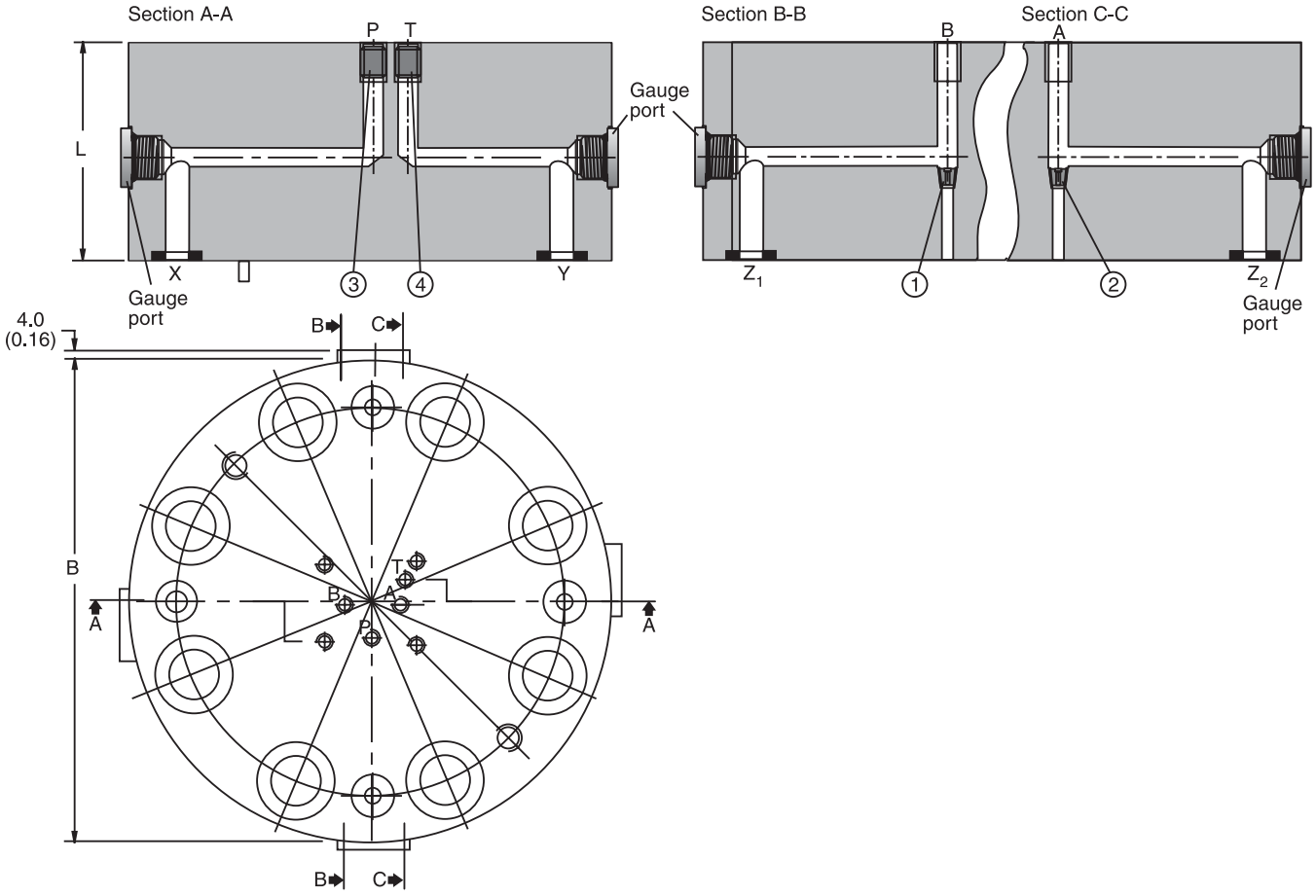
NG50 to NG63



CE-C.indd, dd

Inch equivalents for millimeter dimensions are shown in (**)

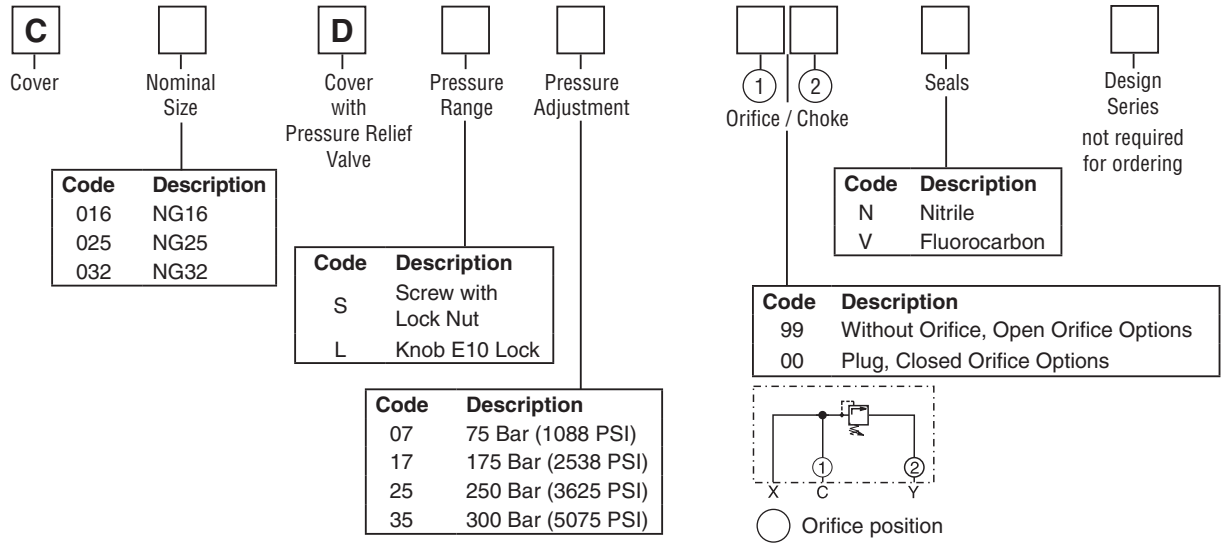
NG80 to NG100



Size	B	L	Gauge Port	Orifice Thread			
				①	②	③	④
NG16	79.0 [1] (3.11)	40.0 (1.57)	G¼"	M5	M5	M5	M5
NG25	85.0 (3.35)	45.0 (1.77)		M5	M5	M6	M6
NG32	102.0 (4.02)	50.0 (1.97)		M5	M5	M6	M6
NG40	125.0 (4.92)	60.0 (2.36)		M5	M5	M6	M6
NG50	140.0 (5.51)	70.0 (2.76)		M6	M6	M8	M8
NG63	180.0 (7.09)	85.0 (3.35)		M6	M6	M8	M8
NG80	Ø250.0 (9.81)	105.0 (4.13)		1/16 NPT	1/16 NPT	M10x1	M10x1
NG100	Ø300.0 (11.81)	120.0 (4.72)		1/16 NPT	1/16 NPT	M10x1	M10x1

[1] Width 65m (2.56 in.)

Ordering Information



Code	Description
016	NG16
025	NG25
032	NG32

Code	Description
S	Screw with Lock Nut
L	Knob E10 Lock

Code	Description
07	75 Bar (1088 PSI)
17	175 Bar (2538 PSI)
25	250 Bar (3625 PSI)
35	300 Bar (5075 PSI)

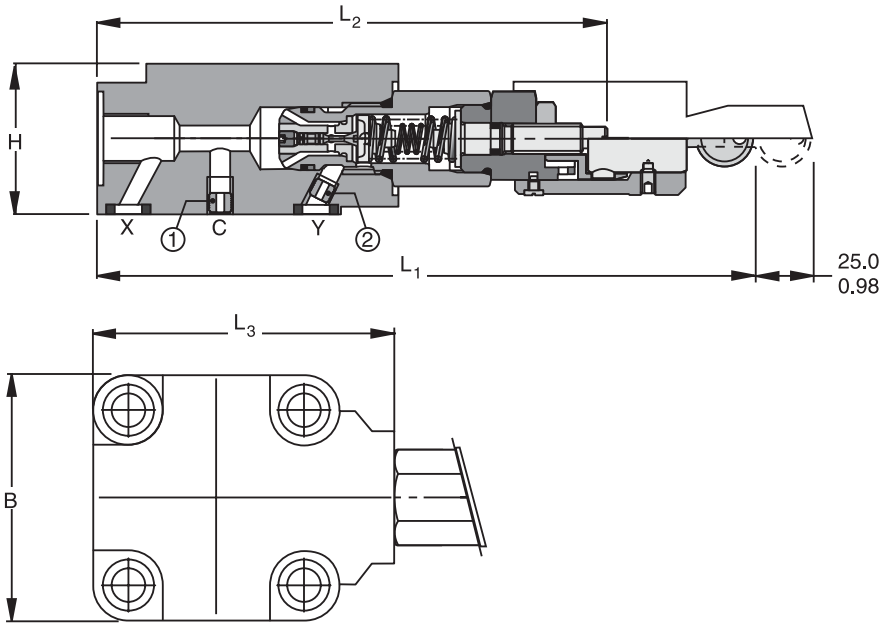
Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
99	Without Orifice, Open Orifice Options
00	Plug, Closed Orifice Options

For orifice recommendations, bolt and seal kits, see Accessories in this chapter.

Dimensions

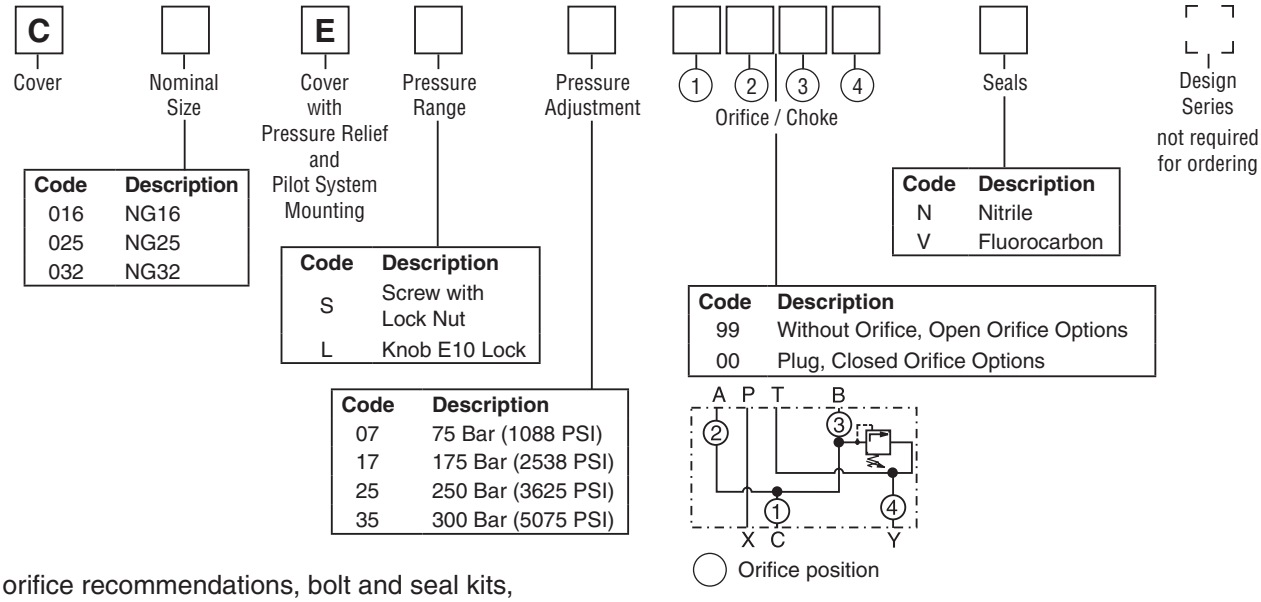
Inch equivalents for millimeter dimensions are shown in (**)



Size	B	H	L1 max.	L2 max.	L3 max.	Orifice Thread ①	Orifice Thread ②
NG16	65.0 (2.56)	40.0 (1.57)	160.0 (6.30)	125.0 (4.92)	82.0 (3.23)	M5	M5
NG25	85.0 (3.35)	45.0 (1.77)	166.0 (6.54)	132.0 (5.20)	88.0 (3.46)	M5	M6
NG32	102.0 (4.02)	50.0 (1.97)	183.0 (7.20)	152.0 (5.98)	105.0 (4.13)	M5	M6

CE-C.indd, dd

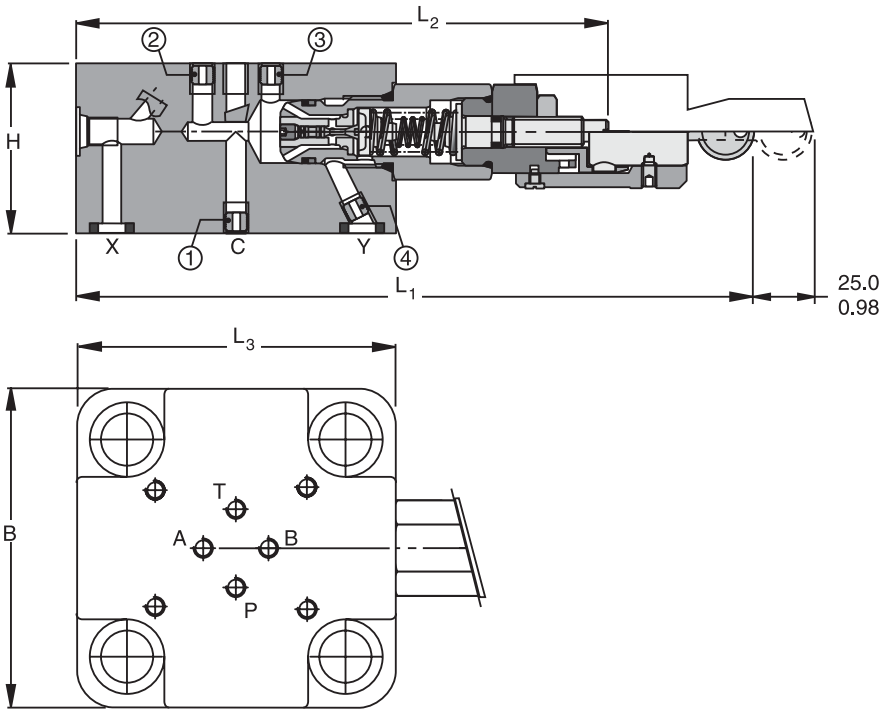
Ordering Information



For orifice recommendations, bolt and seal kits, see Accessories.

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)



Size	B	H	L1 max.	L2 max.	L3 max.	Orifice Thread			
						①	②	③	④
NG16	65.0 (2.56)	40.0 (1.57)	160.0 (6.30)	125.0 (4.92)	82.0 (3.23)	M5	M5	M5	M5
NG25	85.0 (3.35)	45.0 (1.77)	166.0 (6.54)	132.0 (5.20)	88.0 (3.46)	M5	M5	M6	M6
NG32	102.0 (4.02)	50.0 (1.97)	183.0 (7.20)	152.0 (5.98)	105.0 (4.13)	M5	M5	M6	M6

CE-C.indd, dd

Pressure Relief Valve DSD*P*
Subplate Mounting NG6

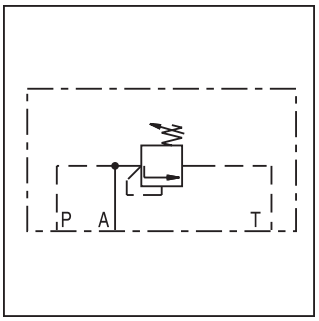
V-DSDA100 □ **P07** □

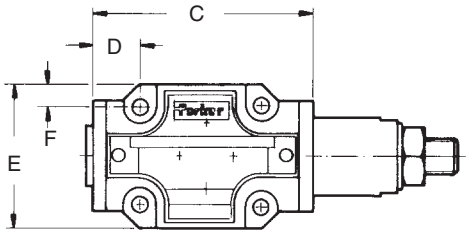
Pressure Adjustment

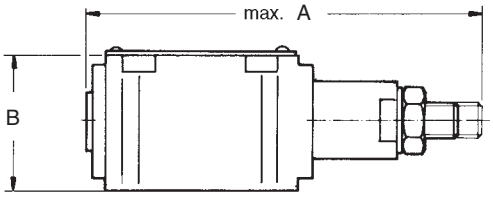
Code	Description
2	Hexagon Screw with Lock Nut
61	Knob E10 Lock

Pressure Range

Code	Description
E	175 Bar (2538 PSI)
K	350 Bar (5075 PSI)







Dimension	A	B	C	D	E	F
mm (in.)	130.0 (5.12)	43.2 (1.70)	74.0 (2.91)	17.0 (0.67)	46.0 (1.81)	7.5 (0.30)

Pressure Relief Valve ZUD*AT*Z*
Sandwich Plate NG6

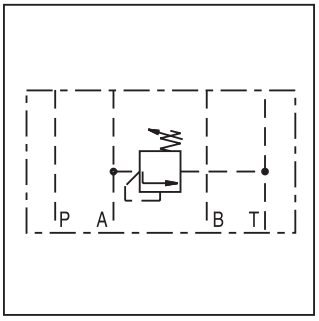
V-ZUDB1AT □ **Z07** □

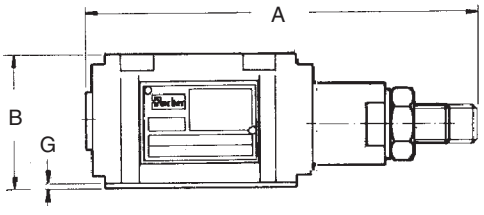
Pressure Adjustment

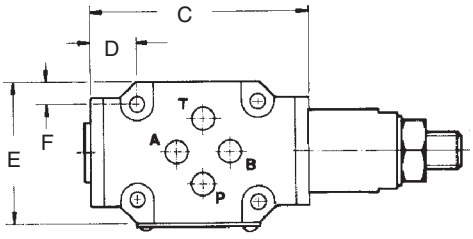
Code	Description
2	Hexagon Screw with Lock Nut
61	Knob E10 Lock

Pressure Range

Code	Description
E	175 Bar (2538 PSI)
K	350 Bar (5075 PSI)







Dimension	A	B	C	D	E	F	G
mm (in.)	130.0 (5.12)	43.2 (1.70)	74.0 (2.91)	17.0 (0.67)	46.0 (1.81)	7.5 (0.30)	1.2 (0.05)

Pressure Relief Valve ZUD*PT*Z*
Sandwich Plate Mounting NG6

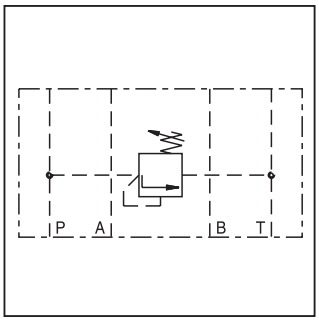
V-ZUDB1PT [ ] **Z07** [ ]

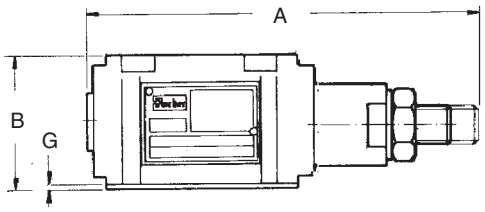
Pressure Adjustment

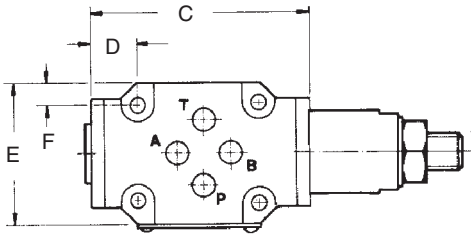
Code	Description
2	Hexagon Screw with Lock Nut
61	Knob E10 Lock

Pressure Range

Code	Description
E	175 Bar (2538 PSI)
K	350 Bar (5075 PSI)







Dimension	A	B	C	D	E	F	G
mm (in.)	130.0 (5.12)	43.2 (1.70)	74.0 (2.91)	17.0 (0.67)	46.0 (1.81)	7.5 (0.30)	1.2 (0.05)

Preload Valve DSB*P*
Subplate Mounting NG6

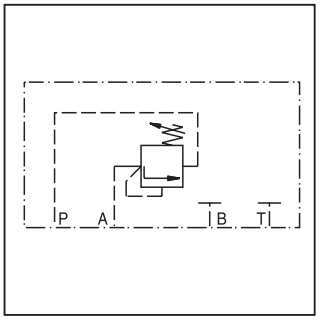
V-DSBA100 [ ] **P07** [ ]

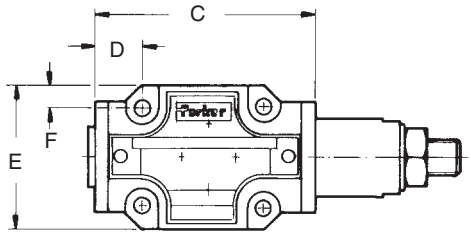
Pressure Adjustment

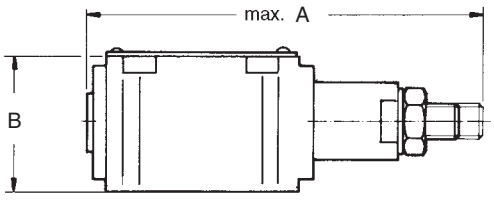
Code	Description
2	Hexagon Screw with Lock Nut
61	Knob E10 Lock

Pressure Range

Code	Description
B	70 Bar (1015 PSI)







Dimension	A	B	C	D	E	F
mm (in.)	130.0 (5.12)	43.2 (1.70)	74.0 (2.91)	17.0 (0.67)	46.0 (1.81)	7.5 (0.30)

Preload Valve DSB*Z
Sandwich Plate Mounting NG6

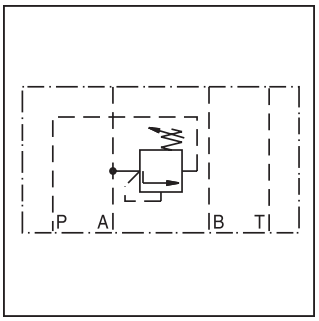
V-DSBA100 □ **Z07** □

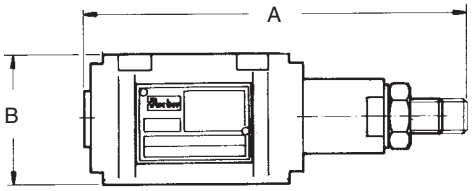
Pressure Adjustment

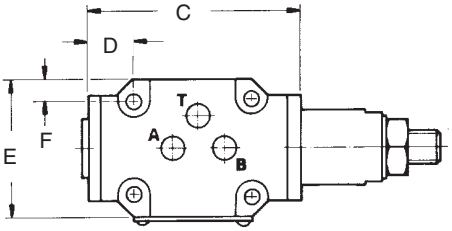
Code	Description
2	Hexagon Screw with Lock Nut
61	Knob E10 Lock

Pressure Range

Code	Description
B	70 Bar (1015 PSI)







Dimension	A	B	C	D	E	F
mm (in.)	130.0 (5.12)	43.2 (1.70)	74.0 (2.91)	17.0 (0.67)	46.0 (1.81)	7.5 (0.30)

Unloading Valve DAF*P
Subplate Mounting NG6

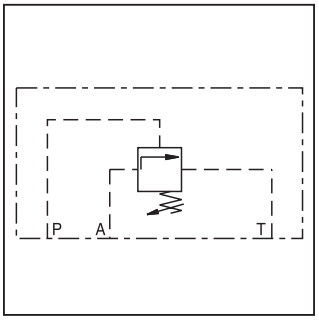
V-DAFA100 □ **P07** □

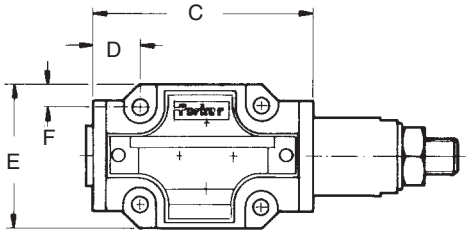
Pressure Adjustment

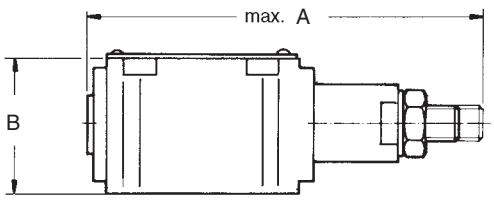
Code	Description
2	**Hexagon Screw with Lock Nut**
61	Knob E10 Lock

Pressure Range

Code	Description
E	**175 Bar (2538 PSI)**
K	**350 Bar (5075 PSI)**







Dimension	A	B	C	D	E	F
mm (in.)	130.0 (5.12)	43.2 (1.70)	74.0 (2.91)	17.0 (0.67)	46.0 (1.81)	7.5 (0.30)

Unloading Valve DAF*Z*
Sandwich Plate Mounting NG6

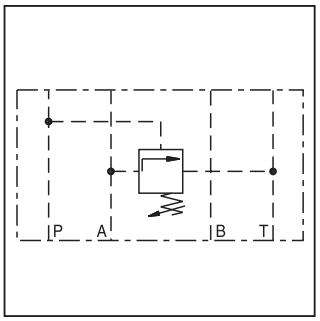
V-DAFA100 [ ] **Z07** [ ]

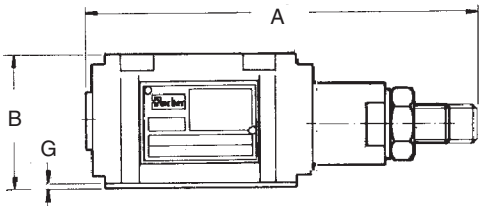
Pressure Adjustment

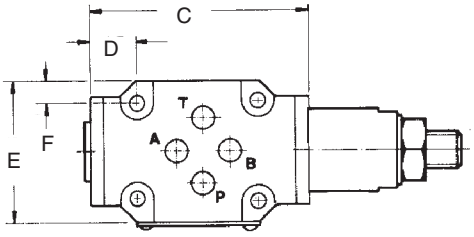
Code	Description
2	Hexagon Screw with Lock Nut
61	Knob E10 Lock

Pressure Range

Code	Description
E	175 Bar (2538 PSI)
K	350 Bar (5075 PSI)







Dimension	A	B	C	D	E	F	G
mm (in.)	130.0 (5.12)	43.2 (1.70)	74.0 (2.91)	17.0 (0.67)	46.0 (1.81)	7.5 (0.30)	1.2 (0.05)

Pressure Sequence Valve DNL*P*
Subplate Mounting NG6

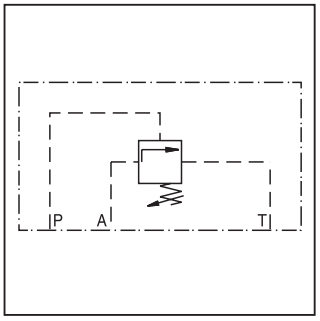
V-DNLA100 [ ] **P07** [ ]

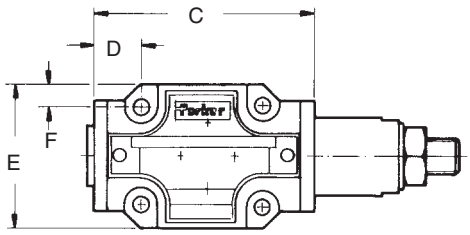
Pressure Adjustment

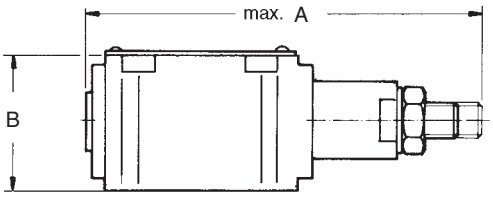
Code	Description
2	Hexagon Screw with Lock Nut
61	Knob E10 Lock

Pressure Range

Code	Description
E	175 Bar (2538 PSI)
K	350 Bar (5075 PSI)







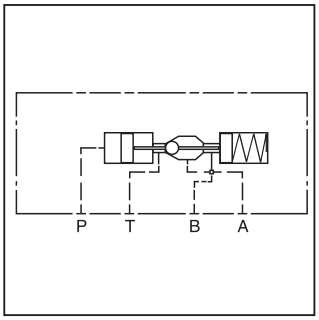
Dimension	A	B	C	D	E	F
mm (in.)	130.0 (5.12)	43.2 (1.70)	74.0 (2.91)	17.0 (0.67)	46.0 (1.81)	7.5 (0.30)

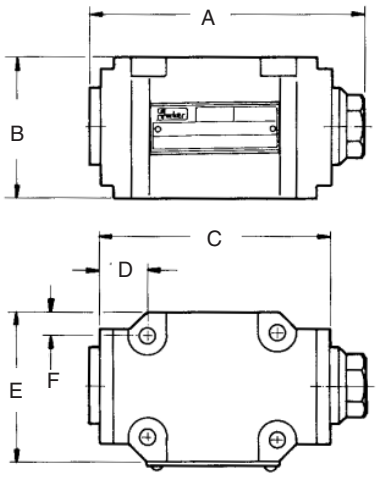
Check Valve
Hydraulically Pilot Operated NG6

Size NG6 with pilot control for subplate assembly

Ordering Information

SVLA1006P07





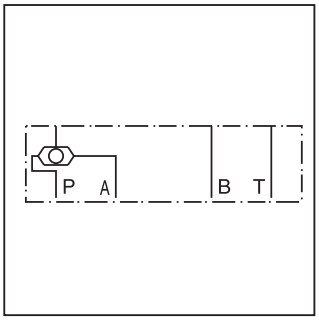
Dimension	A	B	C	D	E	F
mm	92.0	43.2	74.0	17.0	46.0	7.5
(in.)	(3.62)	(1.70)	(2.91)	(0.67)	(1.81)	(0.30)

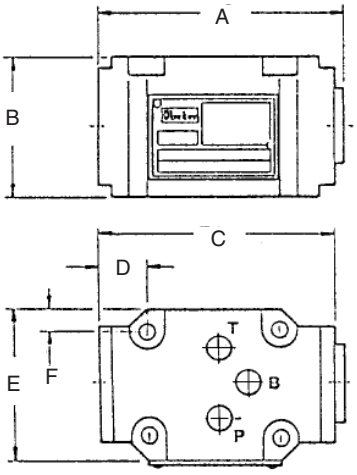
Shuttle Valve
Sandwich Plate NG6

Size NG6 with pilot control for subplate assembly

Ordering Information

ZSRA1PP0Z07





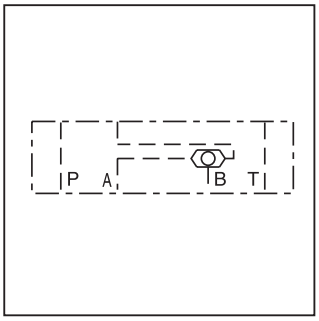
Dimension	A	B	C	D	E	F
mm	80.0	43.2	74.0	17.0	46.0	7.5
(in.)	(3.15)	(1.70)	(2.91)	(0.67)	(1.81)	(0.30)

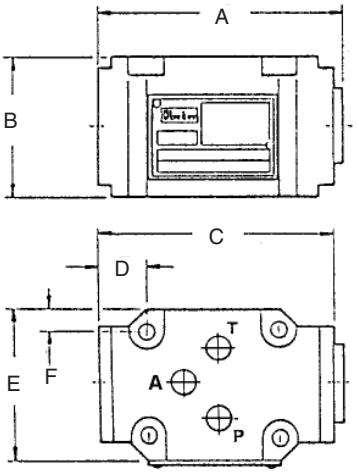
Shuttle Valve
Sandwich Plate NG6

Size NG6 with pilot control for subplate assembly

Ordering Information

ZSRB1AA0Z07





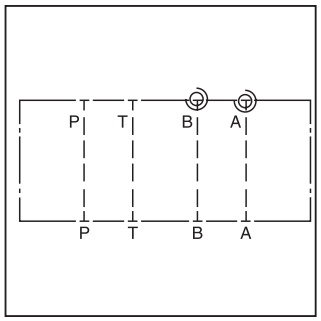
Dimension	A	B	C	D	E	F
mm	80.0	43.2	74.0	17.0	46.0	7.5
(in.)	(3.15)	(1.70)	(2.91)	(0.67)	(1.81)	(0.30)

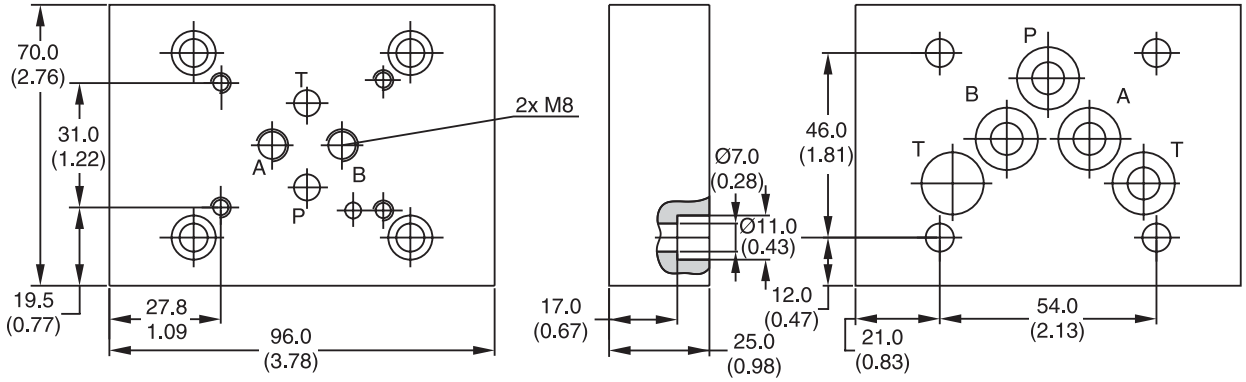
Adaptor Plate

Size NG10 to NG6

Ordering Information

PADA1007/A-A/B-B



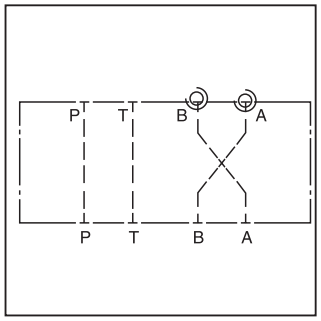


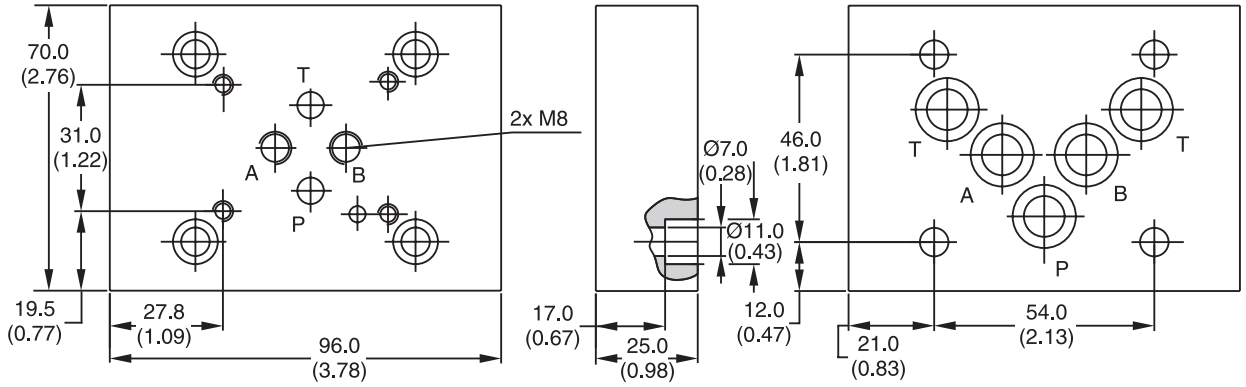
Adaptor Plate

Size NG10 to NG6

Ordering Information

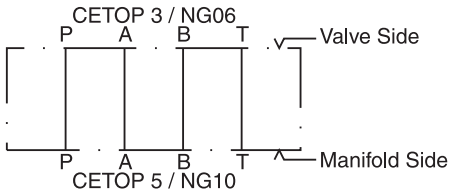
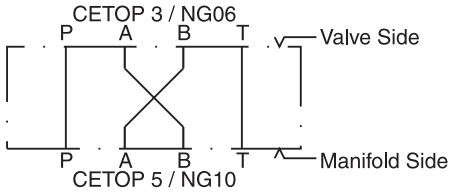
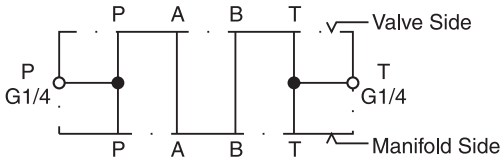
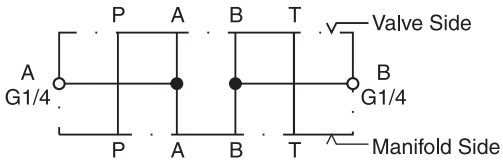
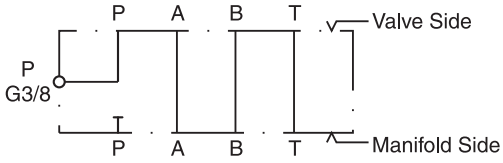
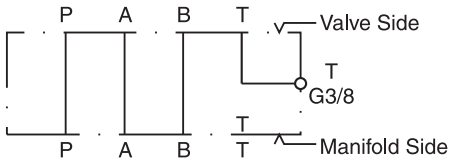
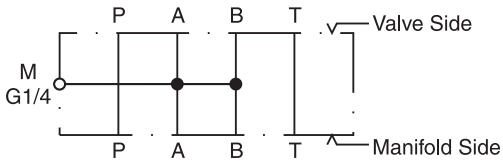
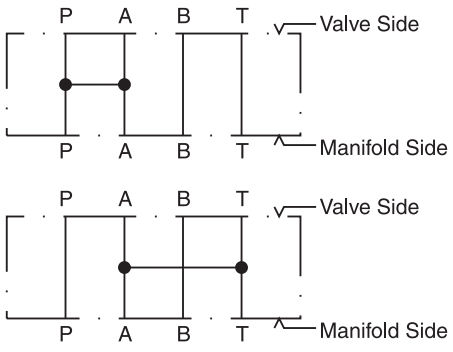
PADA1007/A-B/B-A

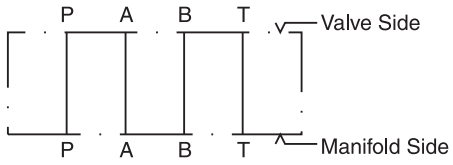
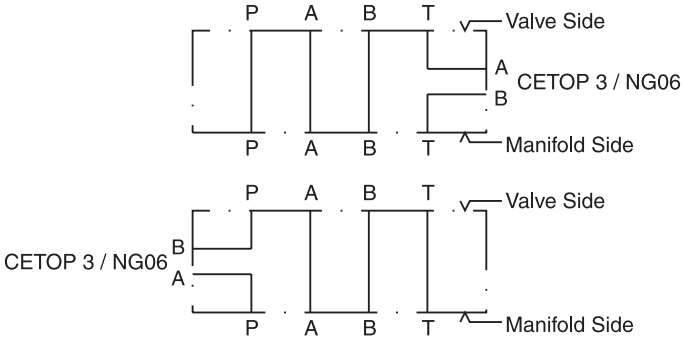
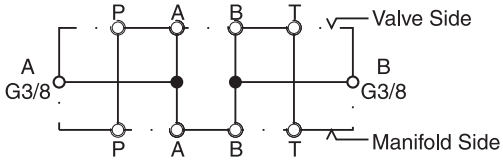
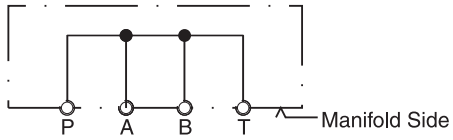
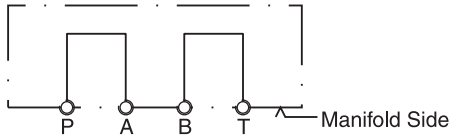
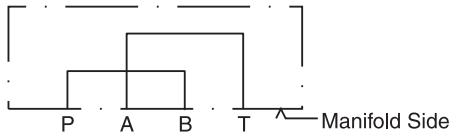
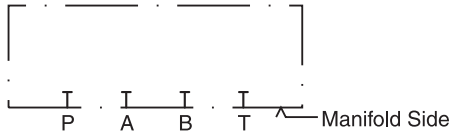




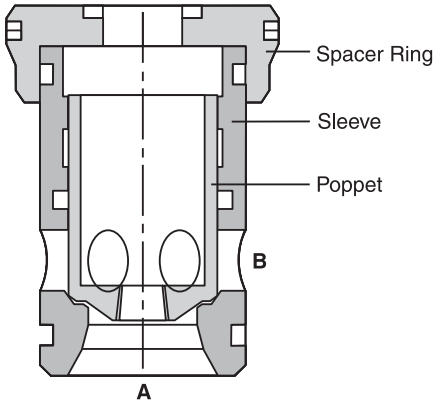
Attention:
For NG50 and larger: If pilot system NG06 is used, mount adapter plate PADA 1007/A-B/B-A or PADA 1007/A-A/B-B (NG10 to NG6) on cover.

Adaptor Plate: PADA 1007/A-B/B-A or PADA 1007/A-A/B-B
Sealing Kit: SK-PADA 1007
Bolt Kit: BK136

Symbol	Type	Size	Height
	PADA 1007/A-A/B-B	NG10-NG6	25.0mm (0.98 in.)
	PADA 1007/A-B/B-A	NG10-NG6	25.0mm (0.98 in.)
	H06-1044	NG6	30.0mm (1.18 in.)
	H06-1039	NG6	30.0mm (1.18 in.)
	H06-504	NG6	30.0mm (1.18 in.)
	H06-711	NG6	30.0mm (1.18 in.)
	H06-1274	NG6	30.0mm (1.18 in.)
	H06-1040	NG6	30.0mm (1.18 in.)

Symbol	Type	Size	Height
	H06DO-1291	NG6	10.0mm (0.39 in.)
	H06DU-814	NG6	71.3mm (2.81 in.)
	CS06040N	NG6	40.0mm (1.57 in.)
	CS06082N	NG6	—
	CS06080N	NG6	—
	D51VP071D	NG6	—
	D51VP071C D51VP101D	NG6 NG10	—

Poppets, Cages, Spacer Rings



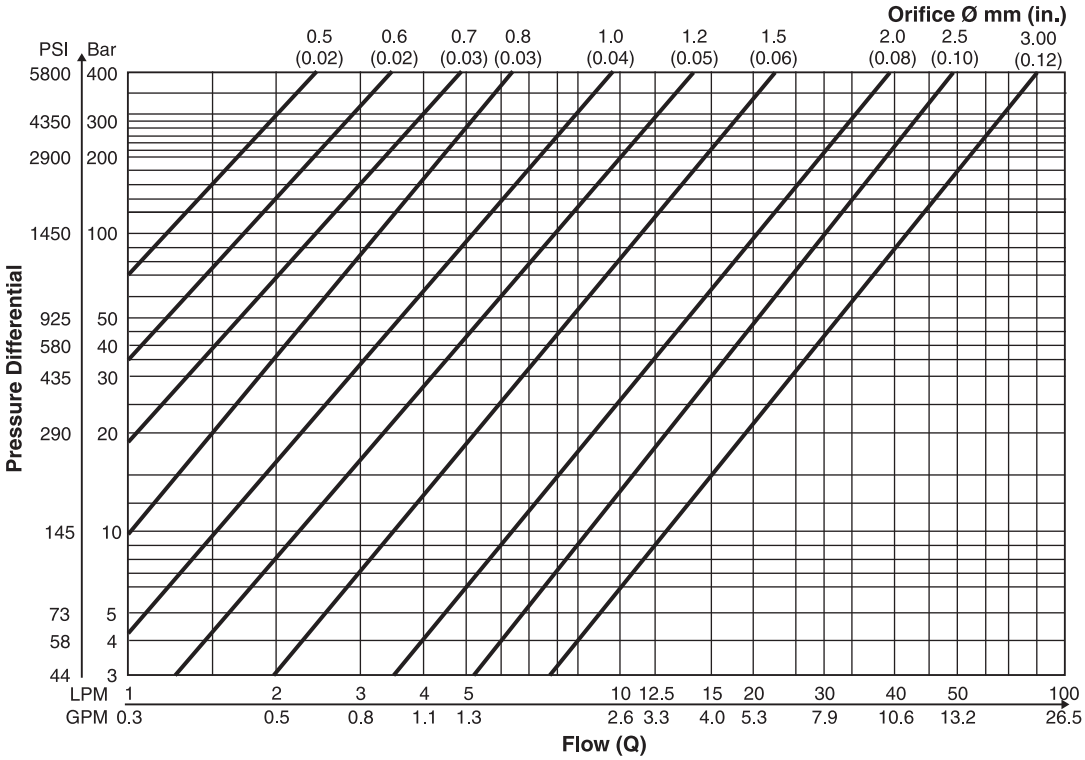
Size	NG16	NG25	NG32	NG40	NG50	NG63	NG80	NG100
Poppet 01	RK-45036369	RK-45036379	RK-45036392	RK-45036409	RK-45036421	RK-45036437	RK-35036449	RK-35036467
Poppet 04	RK-45036370	RK-45036380	RK-45036395	RK-45036406	RK-45036422	RK-45036436	RK-35036460	RK-35036468
Poppet 07	RK-35037531	RK-45036964	RK-45036965	RK-45036966	RK-45036967	RK-45036968	—	—
Poppet 08	RK-45036368	RK-45036381	RK-45036391	RK-45036408	RK-45036424	RK-45036438	RK-35036459	RK-35036469
Sleeve	RK-35038871	RK-35038872	RK-35038873	RK-35036403	RK-35036417	RK-35036432	RK-25036452	RK-25036470
Spacer Ring	RK-35036364	RK-35036375	RK-35036393	RK-35036402	RK-35036416	RK-35036435	RK-25036453	RK-25036471

Springs, Seals, Fitting Bolts

Size	NG16	NG25	NG32	NG40	NG50	NG63	NG80	NG100
Spring *								
Type L 0.1 Bar (1.5 PSI)	FK-CE016-L	FK-CE025-L	FK-CE032-L	FK-CE040-L	FK-CE050-L	FK-CE063-L	FK-CE080-L	FK-CE100-L
Type N 0.5 Bar (7.3 PSI)	FK-CE016-N	FK-CE025-N	FK-CE032-N	FK-CE040-N	FK-CE050-N	FK-CE063-N	FK-CE080-N	FK-CE100-N
Type S 1.6 Bar (23.2 PSI)	FK-CE016-S	FK-CE025-S	FK-CE032-S	FK-CE040-S	FK-CE050-S	FK-CE063-S	FK-CE080-S	FK-CE100-S
Type U 4.0 Bar (58.0 PSI)	FK-CE016-U	FK-CE025-U	FK-CE032-U	FK-CE040-U	FK-CE050-U	FK-CE063-U	FK-CE080-U	FK-CE100-U
Seal Kits Fluorcarbon Nitrile	 SK-CBE160V SK-CBE160	 SK-CBE250V SK-CBE250	 SK-CBE320V SK-CBE320	 SK-CBE400V SK-CBE400V	 SK-CBE500V SK-CBE500	 SK-CBE630V SK-CBE630	 SK-CBE800V SK-CBE800	 SK-CBE1000V SK-CBE1000
Bolt Kits (DIN 912 12.9)	BK414 4x M8x40	BK391 4x M12x50	BK415 4x M16x55	BK416 4x M20x70	BK417 4x M2x75	BK418 4x M30x100	BK419 4x M24x120	BK420 4x M30x130
Bolt Kits (US)	BK84 5/16–18x1.5	BK77 1/2–13x2	BK85 5/8–11x2.25	BK86 3/4–10x2.75	BK87 3/4–10x3.0	BK88 1 1/4–7x4.00	BK135 1–8x5.00	BK90 1 1/4–7x5.5
Recommended Torque Nm (lb.-ft.)	27 (19.9)	94 (69.3)	234 (172.6)	460 (339.3)	460 (339.3)	1570 (1157.9)	790 (582.6)	1570 (1157.9)

* 1 spring kit contains 10 springs
Ordering Example: FK-CE016 ⇒ 10 pcs., type U

Diagram to Choose the Orifice Ø



Values measured at a viscosity of 40 cSt (187 SSU) and a temperature of 50°C (122°F).

Orifices

There are different orifices available to realize different opening / closing velocities.
The control volume of each nominal valve size can be found at the CE series.

Orifice Kits, Sorted by Thread with Different Diameters

Orifice Kit	Orifice Kit, sorted by thread with different diameters, consisting of 2 pieces of each marked diameter												
Ø mm (in.)	0.0 (0.0)	0.8 (0.03)	0.9 (0.04)	1.0 (0.04)	1.1 (0.04)	1.2 (0.05)	1.3 (0.05)	1.5 (0.06)	1.8 (0.07)	2.0 (0.08)	2.2 (0.09)	2.5 (0.10)	3.0 (0.12)
DK-M4	x	x	x	x	x	x	x	x	-	x	-	-	-
DK-M5	x	x	x	x	x	x	x	x	-	x	-	-	-
DK-M6	x	x	x	x	x	x	x	x	-	x	-	-	-
DK-M8	x	-	-	x	-	x	-	x	x	x	x	x	-
DK-M10x1	x	-	-	x	-	x	-	x	x	x	-	x	x
DK-1/16NPT	x	x	x	x	x	x	x	x	-	x	-	-	-
DK-1/8NPT	x	-	-	x	-	x	-	x	x	x	-	x	x

Orifice Kits, Thread with One Defined Diameter, 20 pieces per Box

Orifice kits of one size:
Ordering Examples:
DK-M4-06 ⇒ 20 pcs., orifice size 0.8mm (0.03 in.)
DK-M5-10 ⇒ 20 pcs., orifice size 1.0mm (0.04 in.)
DK-M8-12 ⇒ 20 pcs., orifice size 1.2mm (0.05 in.)

Orifice gauge: Order no. DK-05-30

Removal CE016 to CE063

The extracting tools consist of tee bar, slide hammer, support handle, and expanding collet (Figure 1).

At first the spacer ring is removed. Next, spring and poppet are withdrawn. Finally, the expanding collet is inserted into the sleeve and braced by means of the tee bar. Using the slide hammer, collet and sleeve are extracted from the cavity.

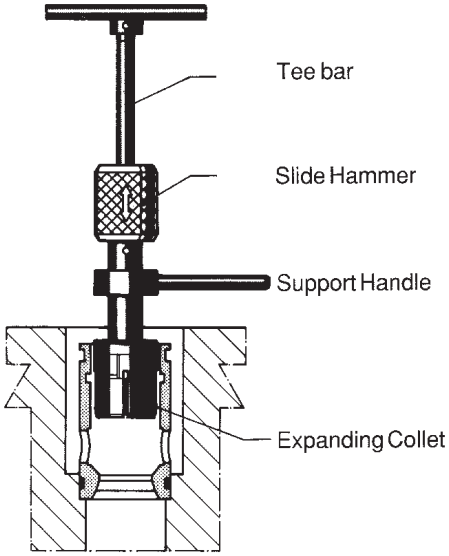


Figure 1

Ordering Information

Valve Size	Order No.
CE016	090 4600 09779
CE025	090 4600 09780
CE032	090 4600 09781
CE040	090 4600 09782
CE050	090 4600 09783
CE063	090 4600 09784
CE016 to CE063	090 4600 09785

Removal CE080 toCE100

The extracting tools consist of spacer ring puller (Figure 4), puller (Figure 3), and puller thrust plate. At first the spacer ring is removed. Next the puller is inserted into the sleeve and aligned by the puller thrust plate. Tightening the nut then extracts the sleeve from the cavity.

Ordering Information

Valve Size	Order No.
CE080	090 4600 10628
CE100	090 4600 10629

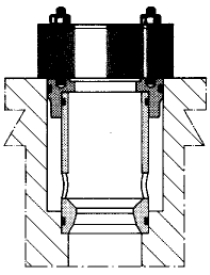


Figure 2

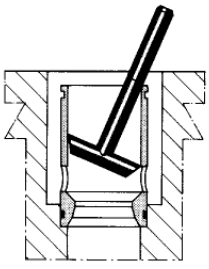


Figure 3

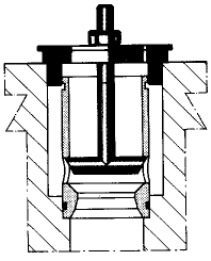
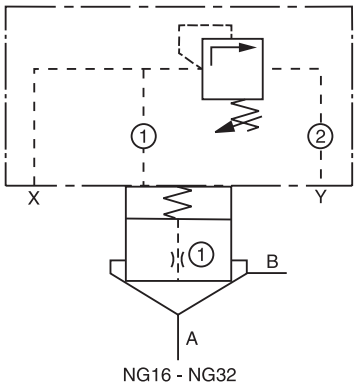
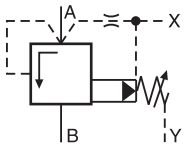


Figure 4

Pressure Relief Valve with Screw-in Cartridge within Control Cover



NG16 - NG32

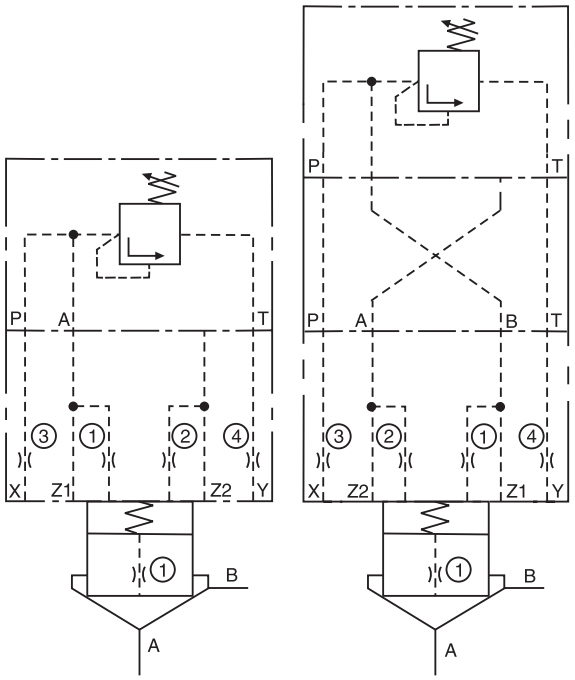


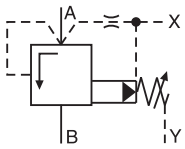
	Type		
Description	**NG16**	**NG25**	**NG32**
Cover incl. Pressure Valve [1]	C016Dxx9999x	C025Dxx9999x	C032Dxx9999x
Cover Orifice ①	M5xØ1.0	M5xØ1.1	M5xØ1.2
Cover Orifice ②	M5xØ1.2	M6xØ1.3	M5xØ1.4
Cartridge [2]	CE016C01*	CE025C01*	CE032C01*
Poppet Orifice ①	1/16NPT x Ø0.8	1/16NPT x Ø0.9	1/16NPT x Ø1.0
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)		
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Ordering Information C*D
[2] Complete type see Ordering Information CE*

Pressure Relief Valve with Separate Pilot



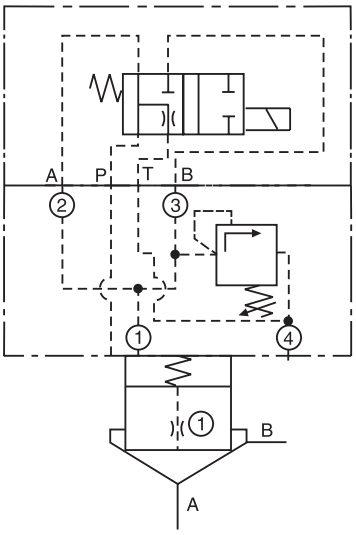


	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Pressure Valve [1]	V-DSDA100xP07x					
Adaptor Plate [2]	without				PADA1007/A-B/B-A	
Cover [3]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.1	M5xØ1.3	M5xØ1.4	M5xØ1.5	M6xØ1.6	M6xØ1.7
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.3	M6xØ1.5	M6xØ1.7	M6xØ1.8	M8xØ2.0	M8xØ2.2
Cartridge [4]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4	1/16NPT x Ø1.5
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK387					

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

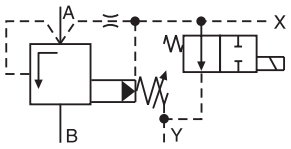
[1] Complete type see Pilot Valves
[2] Includes O-rings and mounting bolts
[3] Complete type see Ordering Information C*C
[4] Complete type see Ordering Information CE*

Pressure Relief Valve with Electrical Vent Function, Normally Open and Screw-in Cartridge within Control Cover



NG16 - NG32

Flow A → B



	Type		
Description	**NG16**	**NG25**	**NG32**
4/2 DC Valve [1]	D1VW104K*		
Cover incl. Pressure Valve [2]	C016Exx99999999x	C025Exx99999999x	C032Exx99999999x
Cover Orifice ①	M5xØ1.0	M5xØ1.1	M5xØ1.2
Cover Orifice ②	M5xØ99	M6xØ99	
Cover Orifice ③	M5xØ00	M6xØ00	
Cover Orifice ④	M5xØ1.2	M6xØ1.3	M6xØ1.4
Cartridge [3]	CE016C01*	CE025C01*	CE032C01*
Poppet Orifice ①	1/16NPT x Ø0.8	1/16NPT x Ø0.8	1/16NPT x Ø1.0
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)		
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)
Bolt Kit Pilot	BK375		

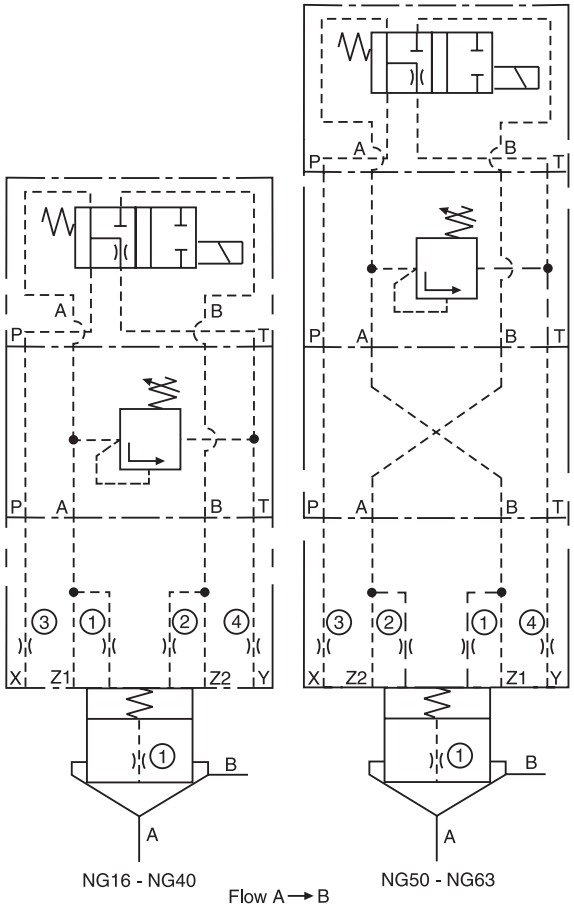
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

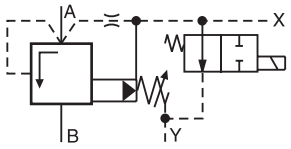
[1] Complete type see Catalog HY14-2502/US, Series D1VW.
[2] Complete type see Ordering Information C*E
[3] Complete type see Ordering Information CE*

Combination-Pressure.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Pressure Relief Valve with Electrical Vent Function, Normally Open and Pilot in Sandwich Design





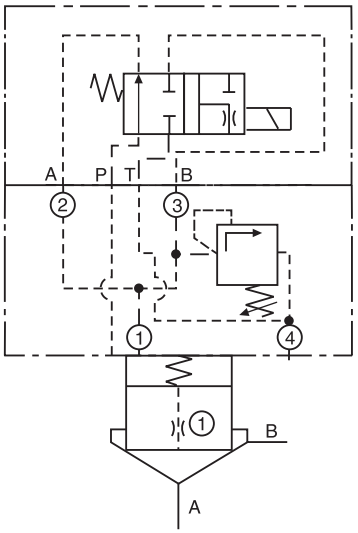
	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
4/2 DC Valve [1]	D1VW104K*					
Pressure Valve [2]	V-ZUDB1ATxZ07x					
Adaptor Plate [3]	without				PADA1007/A-B/B-A	
Cover [4]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.1	M5xØ1.3	M5xØ1.4	M5xØ1.5	M6xØ1.6	M6xØ1.7
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.3	M6xØ1.5	M6xØ1.5	M6xØ1.8	M8xØ2.0	M8xØ2.2
Cartridge [5]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4	1/16NPT x Ø1.5
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK401					

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

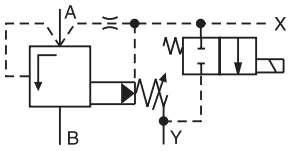
[1] Complete type see Catalog HY14-2502/US, Series D1VW.
[2] Complete types see Pilot Valves
[3] Included O-rings and mounting bolts
[4] Complete type see Ordering Information C*C
[5] Complete type see Ordering Information CE*

Combination-Pressure.indd, dd

Pressure Relief Valve with Electrical Vent Function, Normally Closed and Screw-in Cartridge within Control Cover



NG16 - NG32
Flow A → B



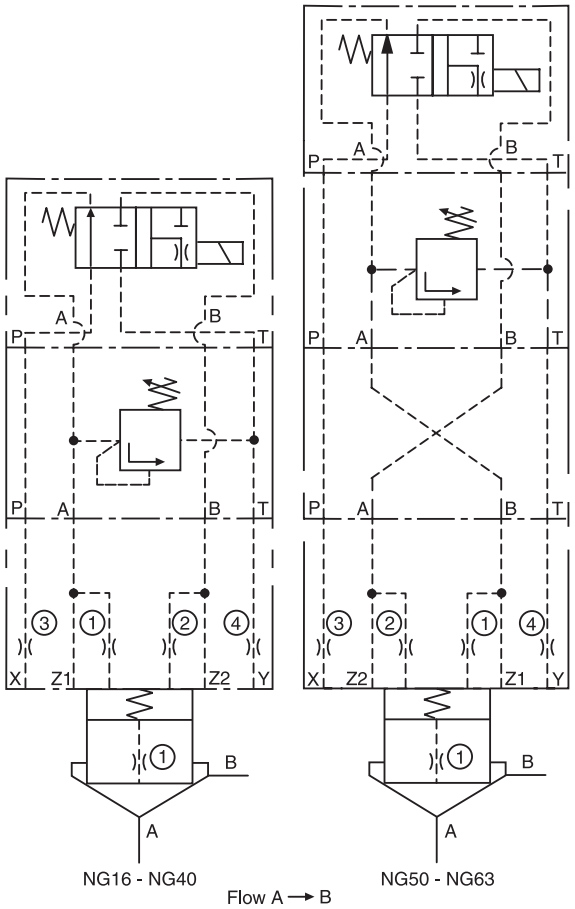
	Type		
Description	**NG16**	**NG25**	**NG32**
4/2 DC Valve [1]	D1VW105K*		
Cover incl. Pressure Valve [2]	C016Exx99999999x	C025Exx99999999x	C032Exx99999999x
Cover Orifice ①	M5xØ1.0	M5xØ1.1	M5xØ1.4
Cover Orifice ②	M5xØ99	M6xØ99	
Cover Orifice ③	M5xØ00	M6xØ00	
Cover orifice ④	M5xØ1.2	M6xØ1.3	M6xØ1.4
Cartridge [3]	CE016C01*	CE025C01*	CE032C01*
Poppet Orifice ①	1/16NPT x Ø0.8	1/16NPT x Ø0.8	1/16NPT x Ø1.0
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)		
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)
Bolt Kit Pilot	BK375		

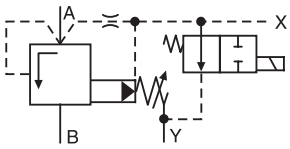
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Catalog HY14-2502/US, Series D1VW.
[2] Complete type see Ordering Information C*E
[3] Complete type see Ordering Information CE*

Combination-Pressure.indd, dd

Pressure Relief Valve with Electrical Vent Function, Normally Closed and Pilot in Sandwich Design





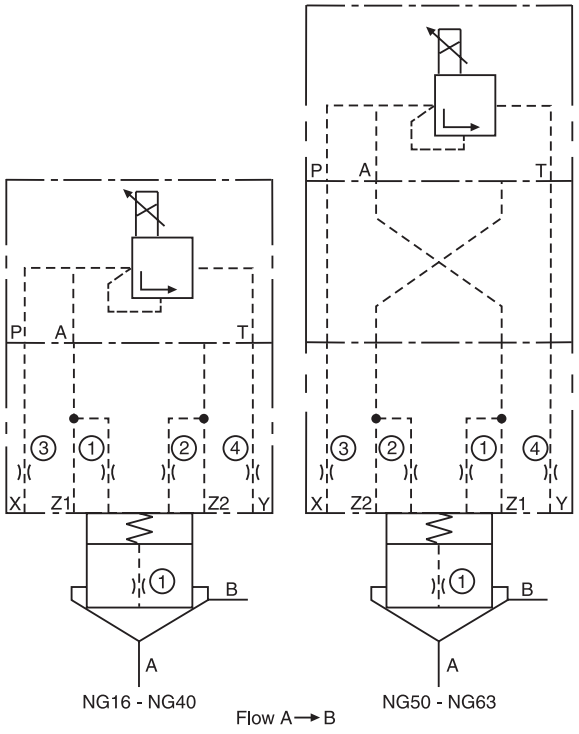
	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
4/2 DC Valve [1]	D1VW105K*					
Pressure Valve [2]	V-ZUDB1ATxZ07x					
Adaptor Plate [3]	without				PADA1007/A-B/B-A	
Cover [4]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.1	M5xØ1.3	M5xØ1.4	M5xØ1.5	M6xØ1.6	M6xØ1.7
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.3	M6xØ1.5	M6xØ1.7	M6xØ1.8	M8xØ2.0	M8xØ2.2
Cartridge [5]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4	1/16NPT x Ø1.5
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK401					

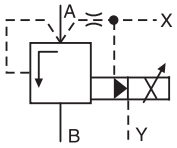
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Catalog HY14-2502/US, Series D1VW.
[2] Complete types see Pilot Valves
[3] Included O-rings and mounting bolts
[4] Complete type see Ordering Information C*C
[5] Complete type see Ordering Information CE*

Combination-Pressure.indd, dd

Proportional Pressure Relief Valve



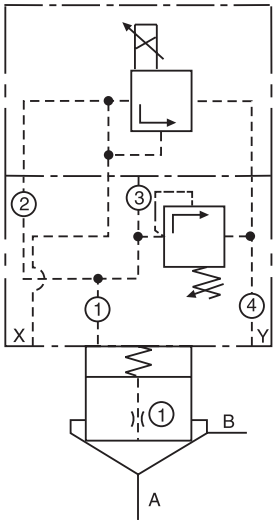


	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Pressure Valve [1]	RE06MxW2V1KW					
Adaptor Plate [2]	without				PADA1007/A-B/B-A	
Cover [3]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.1	M5xØ1.3	M5xØ1.4	M5xØ1.4	M6xØ1.5	
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.2	M6xØ1.4	M6xØ1.5	M6xØ1.5	M8xØ1.6	
Cartridge [4]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4	
Spring	0.5 Bar (7.3 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK375					

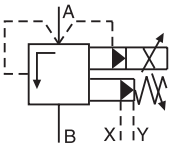
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Catalog HY14-2550/US, Series RE06M*W.
[2] Inclusive O-rings and mounting bolts
[3] Complete type see Ordering Information
[4] Complete type see Ordering Information CE*

Proportional Pressure Relief Valve with Mechanical Maximum Pressure Protection (Screw-in Cartridge within Control Cover)



Flow A → B



	Type		
Description	**NG16**	**NG25**	**NG32**
Prop. DC Valve [1]	RE06MxW2V1xW		
Cover incl. Pressure Valve [2]	C016Exx99999999x	C025Exx99999999x	C032Exx99999999x
Cover Orifice ①	M5xØ1.0	M5xØ1.1	M5xØ1.4
Cover Orifice ②	M5xØ99		
Cover Orifice ③	M5xØ00		
Cover Orifice ④	M5xØ1.2	M6xØ1.3	M6xØ1.7
Cartridge [3]	CE016C01*	CE025C01*	CE032C01*
Poppet Orifice ①	1/16NPT x Ø0.8	1/16NPT x Ø0.9	1/16NPT x Ø1.2
Spring	1.6 Bar (23.2), Type S (order no. see spare parts)		
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)
Bolt Kit Pilot	BK375		

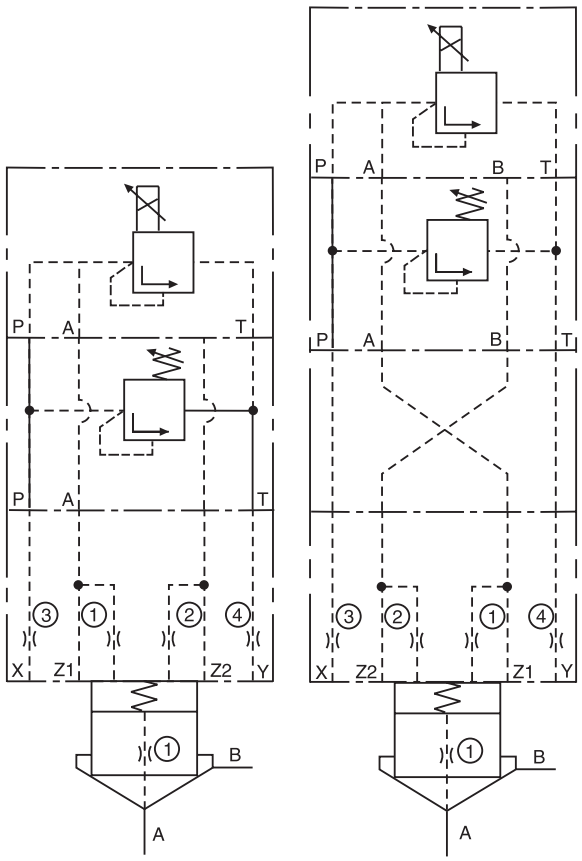
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

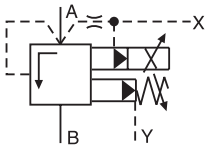
[1] Complete type see Catalog HY14-2550/US, Series RE06M*W.
[2] Complete type see Ordering Information C*C
[3] Complete type see Ordering Information CE*

Combination-Pressure.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Proportional Pressure Relief Valve with Mechanical Maximum Pressure Protection in Sandwich Design





	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Pressure Valve [1]	RE06MxW2V1KW					
Max. Pressure Valve [2]	V-ZUDB1PTxZ07x					
Adaptor Plate [3]	without				PADA1007/A-B/B-A	
Cover [4]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.1	M5xØ1.3		M5xØ1.4	M6xØ1.6	
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.2	M6xØ1.4		M6xØ1.5	M8xØ1.6	
Cartridge [5]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4	
Spring	0.5 Bar (7.3 PSI), Type N (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK401					

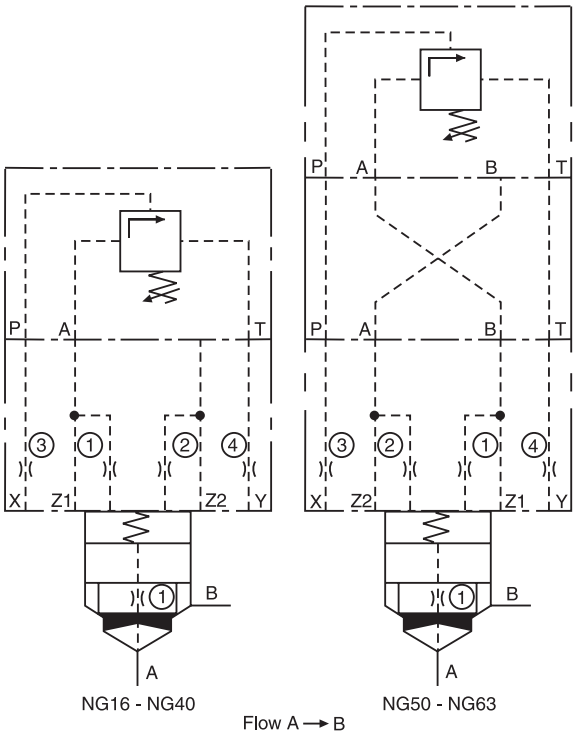
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

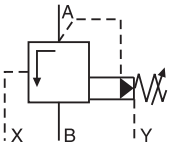
[1] Complete type see Catalog HY14-2550/US, Series RE06M*W.
[2] Complete types see Pilot Valves
[3] Includes O-rings and mounting bolts
[4] Complete type see Ordering Information C*C
[5] Complete type see Ordering Information CE*

Combination-Pressure.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Unloading Valve



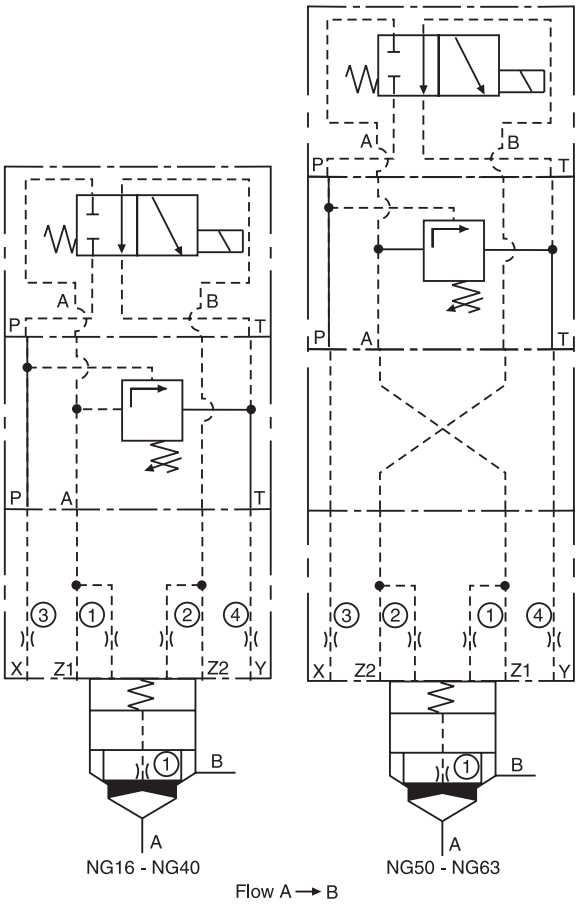


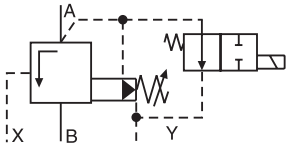
	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Unloading Valve [1]	V-DAFA100xP07					
Adaptor Plate [2]	without				PADA1007/A-B/B-A	
Cover [3]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.4	M5xØ1.5	M5xØ1.6	M5xØ1.7	M6xØ1.8	M6xØ1.9
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.5	M6xØ1.6	M6xØ1.7	M6xØ1.8	M8xØ1.9	M8xØ2.0
Cartridge [4]	CE016C08*	CE025C08*	CE032C08*	CE040C08*	CE050C08*	CE063C08*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.0	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK387					

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete types see Pilot Valves
[2] Includes O-rings and mounting bolts
[3] Complete type see Ordering Information C*C
[4] Complete type see Ordering Information CE*

Unloading Valve with Electrical Vent Function, Normally Open





	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
4/2 DC Valve [1]	D1VW76K*					
Pressure Valve [2]	V-DAFA100xZ07x					
Adaptor Plate [3]	without				PADA1007/A-B/B-A	
Cover [4]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.4	M5xØ1.5	M5xØ1.6	M5xØ1.7	M6xØ1.8	M6xØ1.9
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.5	M6xØ1.6	M6xØ1.7	M6xØ1.8	M8xØ1.9	M8xØ2.2
Cartridge [5]	CE016C08*	CE025C08*	CE032C08*	CE040C08*	CE050C08*	CE063C08*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.0	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK401					

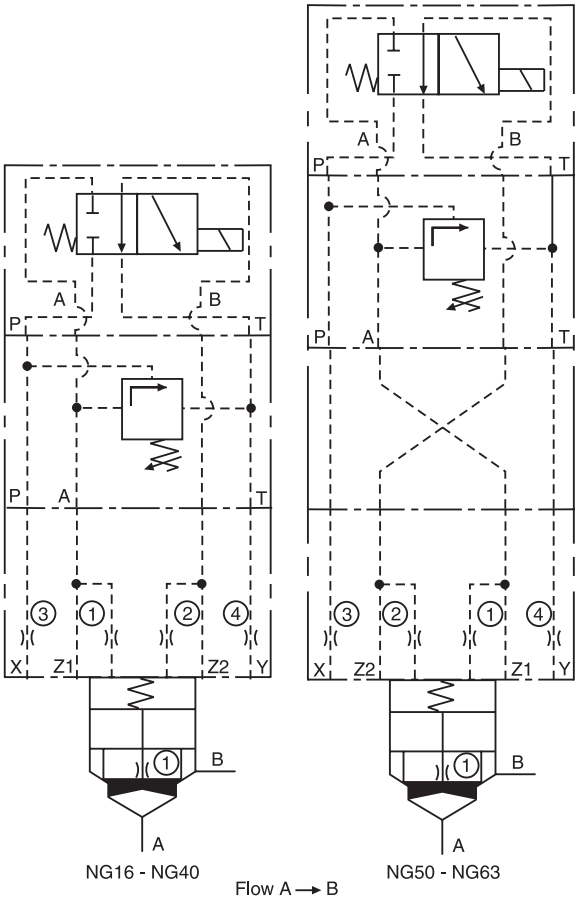
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

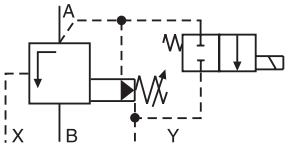
[1] Complete type see Catalog HY14-2502/US, Series D1VW.
[2] Complete types see Pilot Valves
[3] Includes O-rings and mounting bolts
[4] Complete type see Ordering Information C*C
[5] Complete type see Ordering Information CE*

Combination-Pressure.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Unloading Valve with Electrical Vent Function, Normally Closed





	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
4/2 DC Valve [1]	D1VW78K*					
Pressure Valve [2]	DAFA100xZ07x					
Adaptor Plate [3]	without				PADA1007/A-B/B-A	
Cover [4]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.4	M5xØ1.5	M5xØ1.6	M5xØ1.7	M6xØ1.8	M6xØ1.9
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.5	M6xØ1.6	M6xØ1.7	M6xØ1.8	M8xØ1.9	M8xØ2.2
Cartridge [5]	CE016C08*	CE025C08*	CE032C08*	CE040C08*	CE050C08*	CE063C08*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.0	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK401					

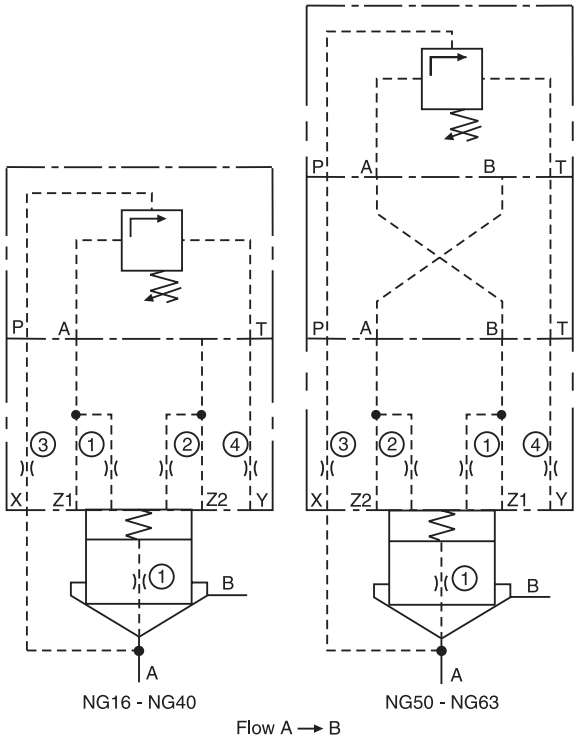
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

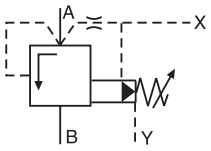
[1] Complete type see Catalog HY14-2502/US, Series D1VW.
[2] Complete types see Pilot Valves
[3] Includes O-rings and mounting bolts
[4] Complete type see Ordering Information C*C
[5] Complete type see Ordering Information CE*

Combination-Pressure.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Pressure Sequence Valve



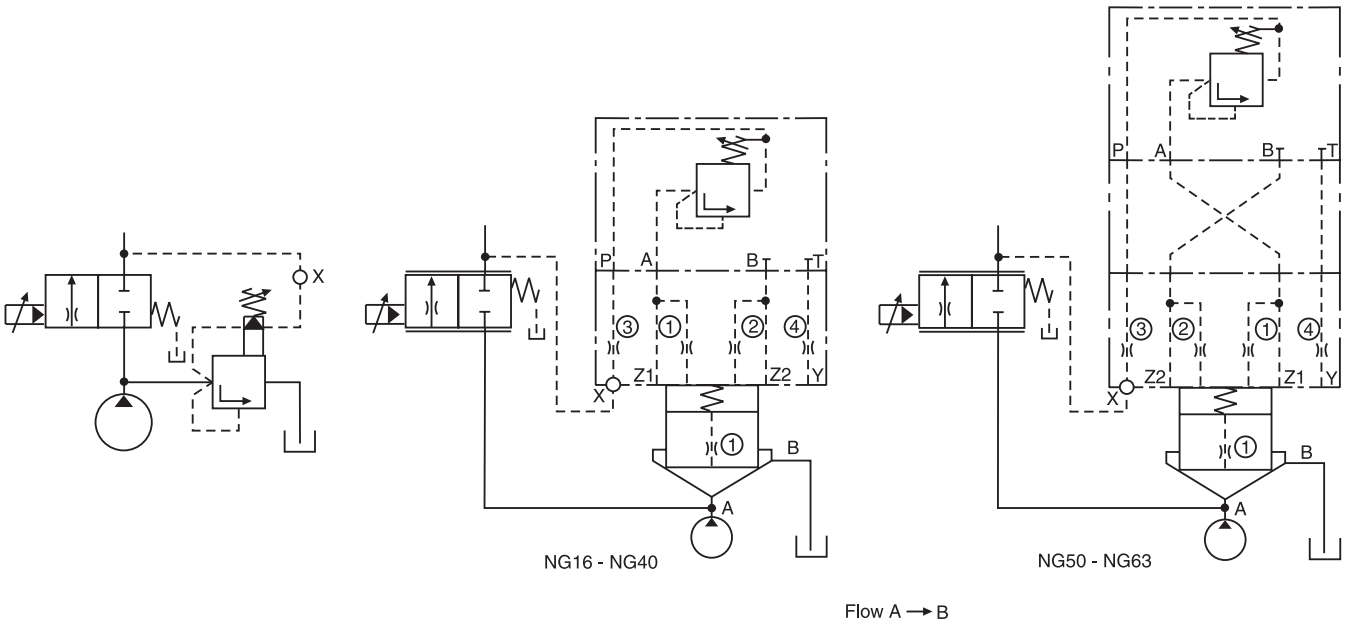


	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Press. Sequence Valve [1]	DNLA100xP07x					
Adaptor Plate [2]	without				PADA1007/A-B/B-A	
Cover [3]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.1	M5xØ1.3	M5xØ1.4	M5xØ1.5	M6xØ1.6	M6xØ1.7
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ0.9	M6xØ1.1	M6xØ1.2	M6xØ1.3	M8xØ1.4	M8xØ1.5
Cover Orifice ④	M5xØ1.3	M6xØ1.5	M6xØ1.7	M6xØ1.8	M8xØ2.0	M8xØ2.2
Cartridge [4]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*
Poppet Orifice ①	1/16NPT x Ø00					
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK401					

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete types see Pilot Valves
[2] Includes O-rings and mounting bolts
[3] Complete type see Ordering Information C*C
[4] Complete type see Ordering Information CE*

3-Way Compensator
(in Combination with Proportional Throttle Valve)

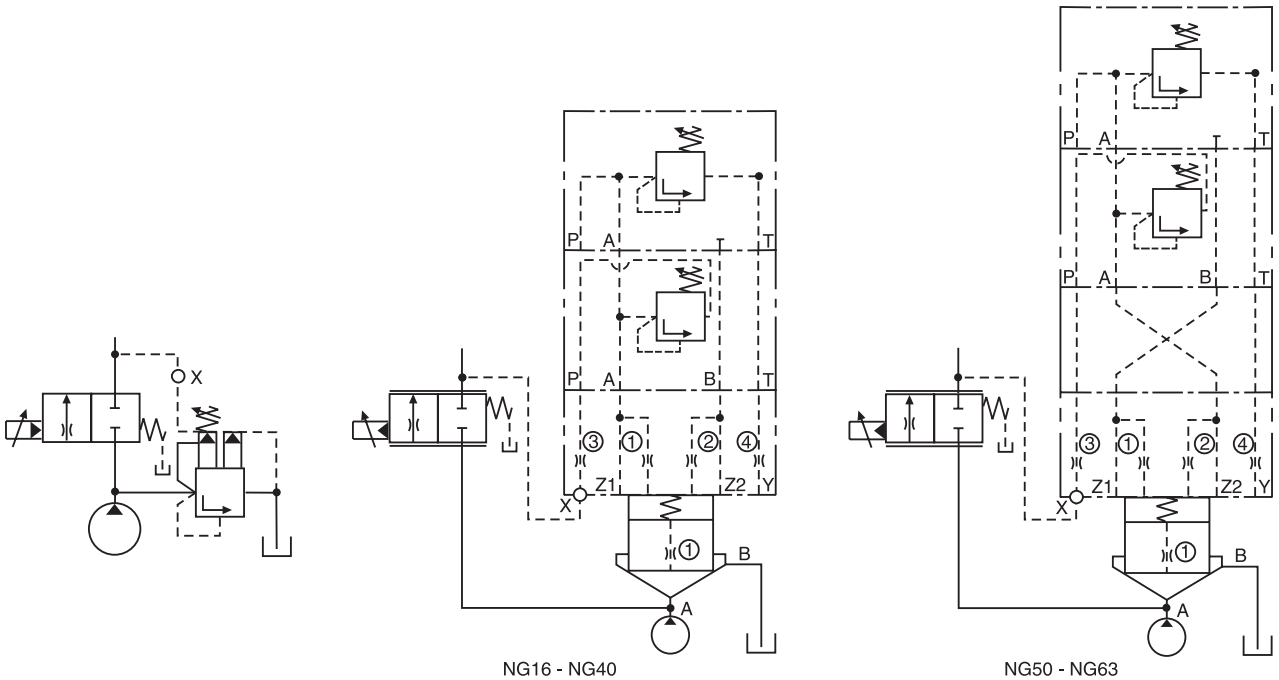


	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Preload Valve [1]	DSBA100xP07x					
Adaptor Plate [2]	without				PADA1007/A-B/B-A	
Cover [3]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.1	M5xØ1.3	M5xØ1.4	M5xØ1.5	M6xØ1.6	M6xØ1.7
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.3	M6xØ1.5	M6xØ1.7	M6xØ1.8	M8xØ2.0	M8xØ2.2
Cartridge [4]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4	1/16NPT x Ø1.5
Spring	1.6 Bar (3.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK401					

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Pilot Valves
[2] Includes O-rings and mounting bolts
[3] Complete type see Ordering Information C*C
[4] Complete type see Ordering Information CE*

3-Way Compensator with Mechanical Maximum Pressure Protection (in Combination with Proportion Throttle Valve)

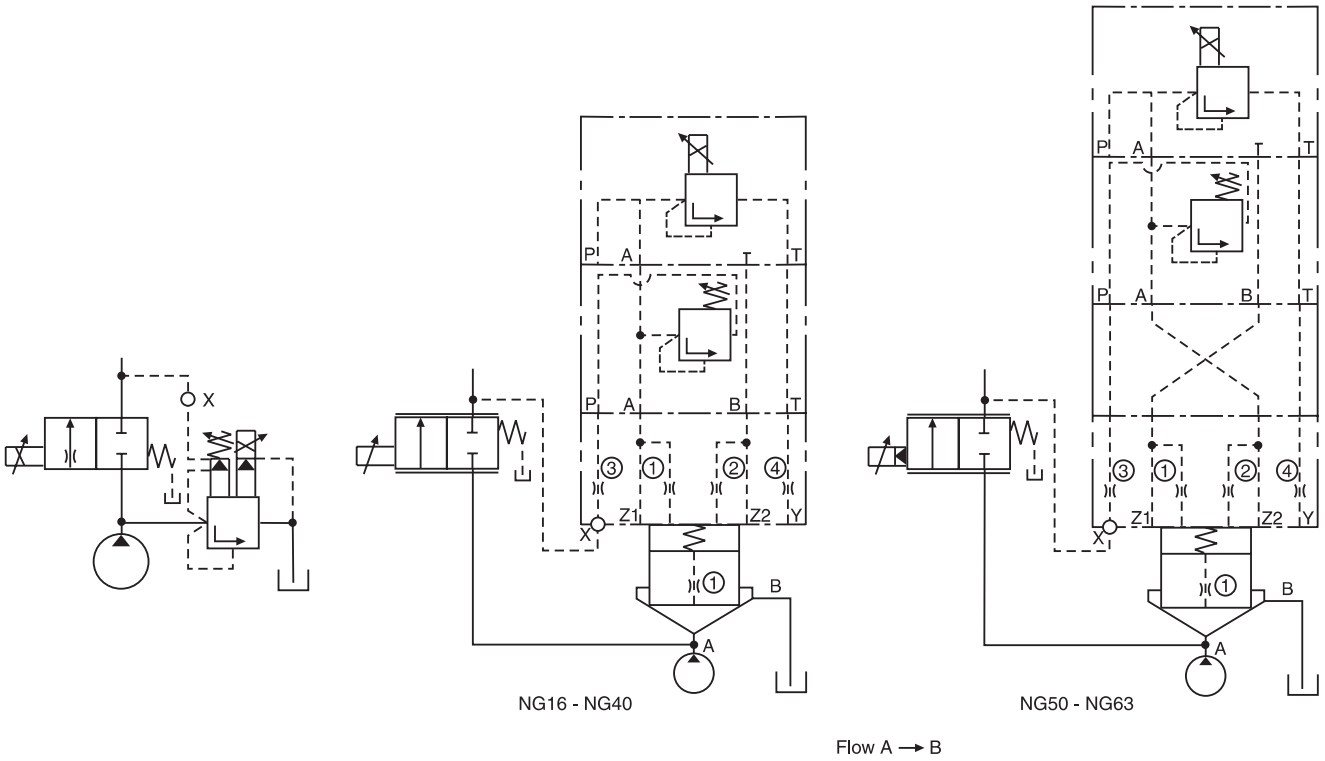


	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Pressure Valve [1]	DSDA100xP07x					
Preload Valve [2]	DSBA100xZ07x					
Adaptor Plate [3]	without				PADA1007/A-B/B-A	
Cover [4]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.1	M5xØ1.3	M5xØ1.4	M5xØ1.5	M6xØ1.6	M6xØ1.7
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.3	M6xØ1.5	M6xØ1.7	M6xØ1.8	M8xØ2.0	M8xØ2.2
Cartridge [5]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4	1/16NPT x Ø1.5
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK401					

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Pilot Valve Examples
[2] Includes O-rings and mounting bolts
[3] Complete type see Ordering Information C*C
[4] Complete type see Ordering Information CE*

3-Way Compensator
with Proportional Pessure Relief Valve for Pressure Control



	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Prop. Pressure Valve [1]	RE06MxW2V1KW*					
Preload Valve [2]	DSBA100xZ07x					
Adaptor Plate [3]	without				PADA1007/A-B/B-A	
Cover [4]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.1	M5xØ1.3	M5xØ1.4	M5xØ1.5	M6xØ1.6	M6xØ1.7
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.3	M6xØ1.5	M6xØ1.7	M6xØ1.8	M8xØ2.0	M8xØ2.2
Cartridge [5]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4	1/16NPT x Ø1.5
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 BK88)
Bolt Kit Pilot	BK401					

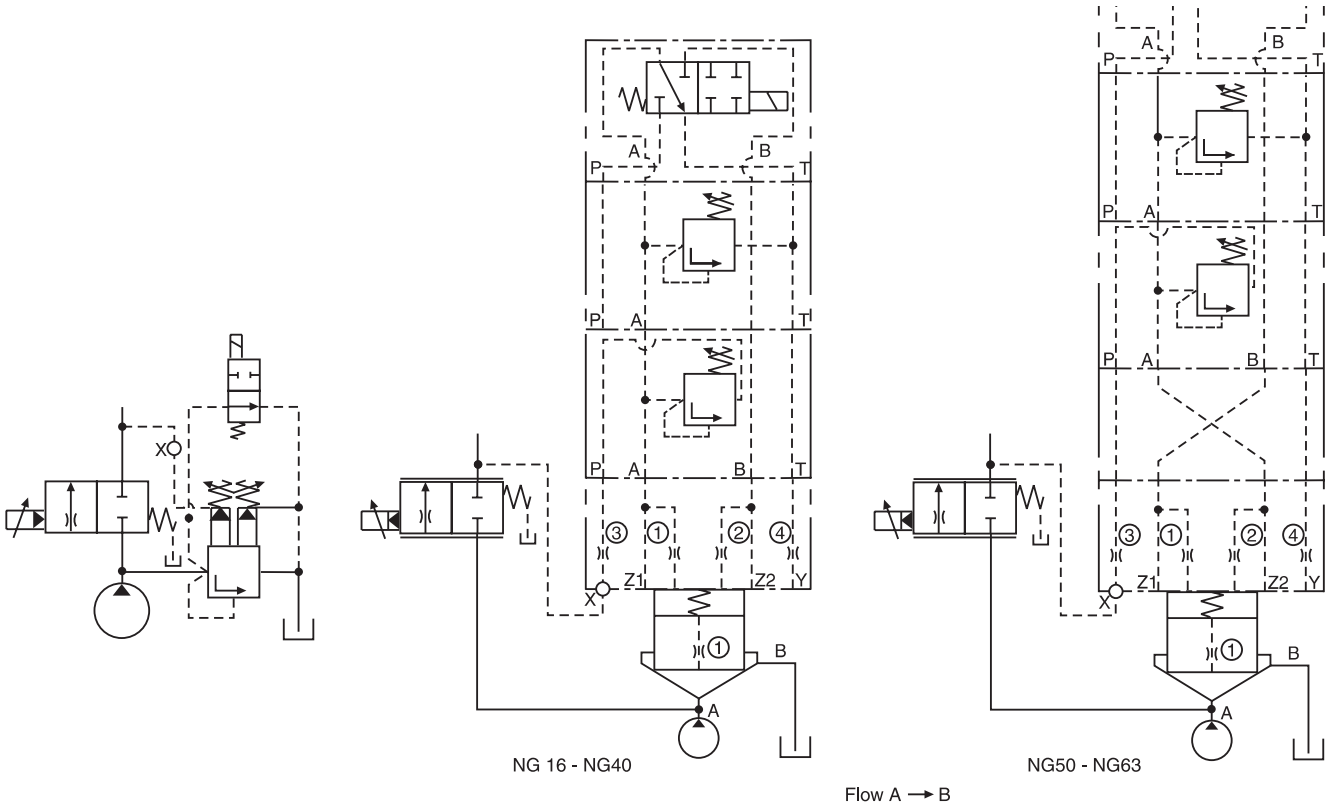
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Catalog HY14-2550/US, Series RE06M*W.
[2] Complete type see Pilot Valves
[3] Includes O-rings and mounting bolts
[4] Complete type see Ordering Information C*C
[5] Complete type see Ordering Information CE*

Combination-Pressure.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

3-Way Compensator with Mechanical Maximum Pressure Protection and Electrical Vent Function, Normally Open, (in Combination with Proportional Throttle Valve)



	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
4/2 DC Valve [1]	D1VW76K*					
Press. Valve [2]	ZUDB1ATxZ07x					
Preload Valve [3]	DSBA100xZ07x					
Adaptor Plate [4]	without				PADA1007/A-B/B-A	
Cover [5]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.1	M5xØ1.3	M5xØ1.4	M5xØ1.5	M6xØ1.6	M6xØ1.7
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.3	M6xØ1.5	M6xØ1.7	M6xØ1.8	M8xØ2.0	M8xØ2.2
Cartridge [6]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4	1/16NPT x Ø1.5
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK424					

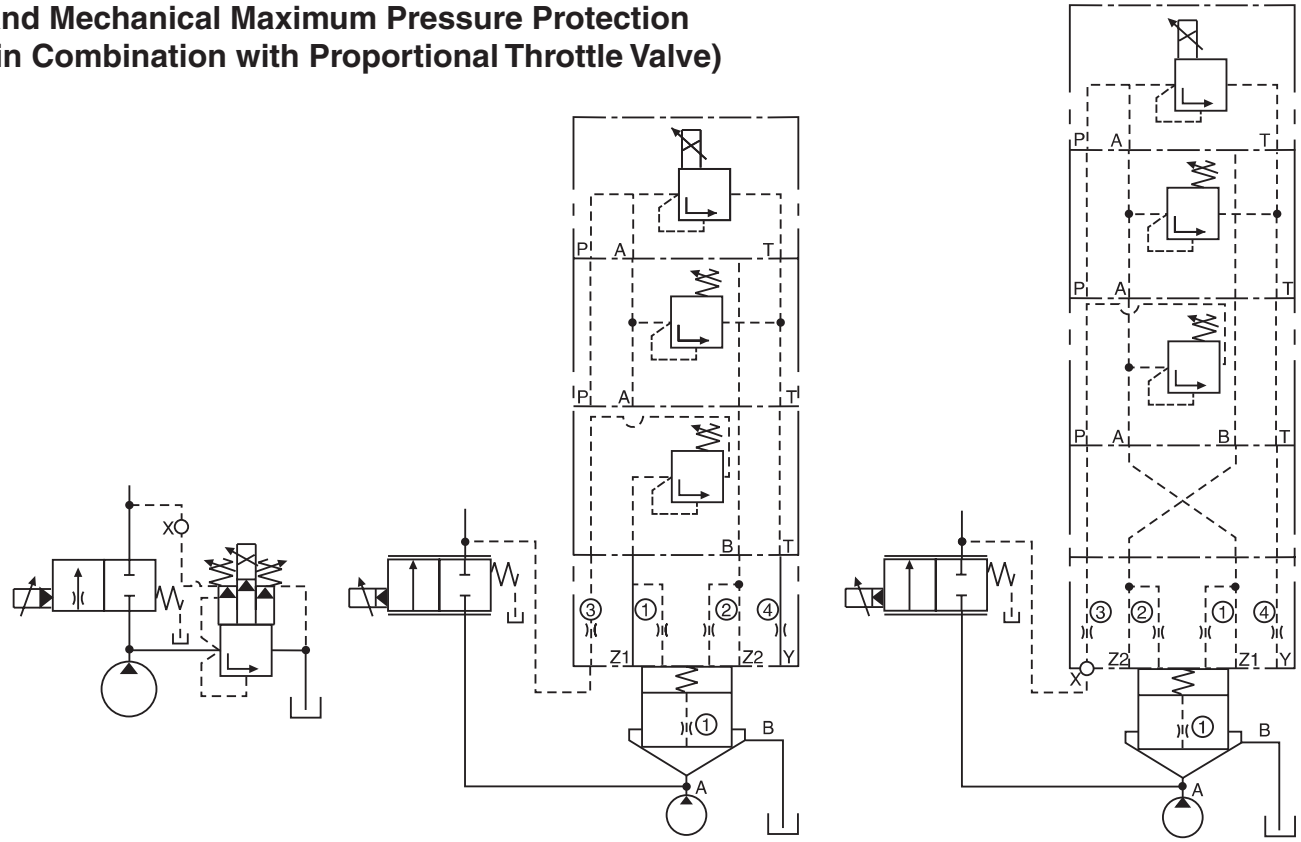
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Catalog HY14-2502/US, Series D1VW.
[2] Complete type see Pilot Valves
[3] Includes O-rings and mounting bolt
[4] Complete type see Ordering Information C*C
[5] Complete type see Ordering Information CE*

Combination-Pressure.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

3-Way Compensator with Proportional Pressure Relief Function and Mechanical Maximum Pressure Protection (in Combination with Proportional Throttle Valve)



Flow A → B

	Type					
Description	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Prop. Pressure Valve [1]	RE06MxW2V1KW*					
Press. Valve [2]	ZUDB1ATxZ07x					
Preload Valve [3]	DSBA100xZ07x					
Adaptor Plate [4]	without				PADA1007/A-B/B-A	
Cover [5]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*
Cover Orifice ①	M5xØ1.1	M5xØ1.3	M5xØ1.4	M5xØ1.5	M6xØ1.6	M6xØ1.7
Cover Orifice ②	M5xØ00				M6xØ00	
Cover Orifice ③	M5xØ99	M6xØ99			M8xØ99	
Cover Orifice ④	M5xØ1.3	M6xØ1.5	M6xØ1.7	M6xØ1.8	M8xØ2.0	M8xØ2.2
Cartridge [6]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*
Poppet Orifice ①	1/16NPT x Ø0.9	1/16NPT x Ø1.1	1/16NPT x Ø1.2	1/16NPT x Ø1.3	1/16NPT x Ø1.4	1/16NPT x Ø1.5
Spring	1.6 Bar (23.2 PSI), Type S (order no. see spare parts)					
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Bolt Kit Pilot	BK424					

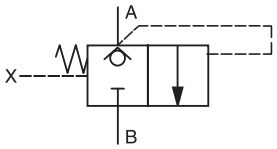
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

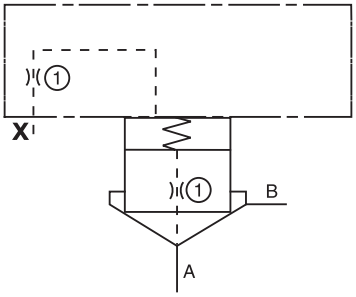
[1] Complete type see Catalog HY14-2550/US, Series RE06M*W
[2] Complete type see Pilot Valves
[4] Included O-rings and mounting bolts
[5] Complete type see Ordering Information C*C
[6] Complete type see Ordering Information CE*

Combination-Pressure.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

2-Way Seat Valve, Flow A ⇒ B



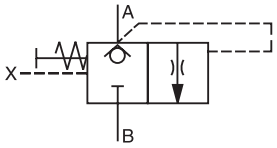


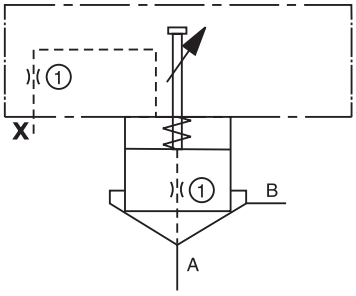
Description	Type							
	NG16	NG25	NG32	NG40	NG50	NG63	NG80	NG100
Cover [1]	C016AA*	C025AA*	C032AA*	C040AA*	C050AA*	C063AA*	C080AA*	C100AA*
Cover Orifice ①	1/16xØ0.8	1/16xØ1.0	1/16xØ1.2	1/8xØ1.5	1/8xØ1.8	1/8xØ2.0	1/8xØ2.2	1/8xØ2.5
Cartridge [2]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*	CE080C01*	CE100C01*
Poppet Orifice ①	1/16xØ00							
Spring	1.6 Bar (23.2 PSI), Type S (Order no. see spare parts)							
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)	BK419 BK135)	BK420 (BK90)

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Ordering Information C*A
[2] Complete type see Ordering Information CE*

2-Way Seat Valve with Stroke Limiter, Flow A ⇒ B



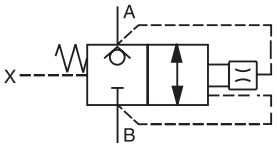


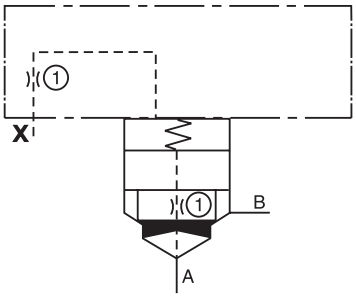
Description	Type							
	NG16	NG25	NG32	NG40	NG50	NG63	NG80	NG100
Cover [1]	C016B**	C025B**	C032B**	C040B**	C050B**	C063B**	C080B**	C100B**
Cover Orifice ①	M6xØ0.8	M6xØ1.0	1/16xØ1.2	1/16xØ1.5	1/16xØ1.8	1/8xØ2.0	1/8xØ2.2	1/8xØ2.5
Cartridge [2]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*	CE080C01*	CE100C01*
Poppet Orifice ①	1/16xØ00							
Spring	1.6 Bar (23.2 PSI), Type S (Order no. see spare parts)							
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)	BK419 BK135)	BK420 (BK90)

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Ordering Information C*B
[2] Complete type see Ordering Information CE*

2-Way Functions with Dampening Poppet, Flow A ⇔ B



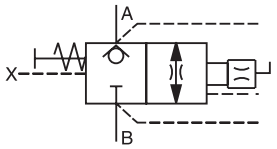


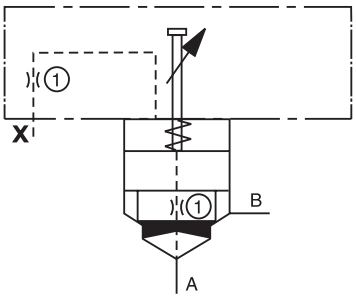
Description	Type							
	NG16	NG25	NG32	NG40	NG50	NG63	NG80	NG100
Cover [1]	C016AA*	C025B*	C032AA*	C040AA*	C050AA*	C063AA*	C080AA*	C100AA*
Cover Orifice ①	1/16xØ0.8	1/16xØ1.0	1/16xØ1.2	1/8xØ1.5	1/8xØ1.8	1/8xØ2.0	1/8xØ2.2	1/8xØ2.5
Cartridge [2]	CE016C08*	CE025C08*	CE032C08*	CE040C08*	CE050C08*	CE063C08*	CE080C08*	CE100C08*
Poppet Orifice ①	1/16xØ00							
Spring	1.6 Bar (23.2 PSI), Type S (Order no. see spare parts)							
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)	BK419 (BK135)	BK420 (BK90)

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Ordering Information C*A
[2] Complete type see rdering Information CE*

2-Way Functions with Stroke Limiter and Dampening Poppet, Flow A ⇔ B



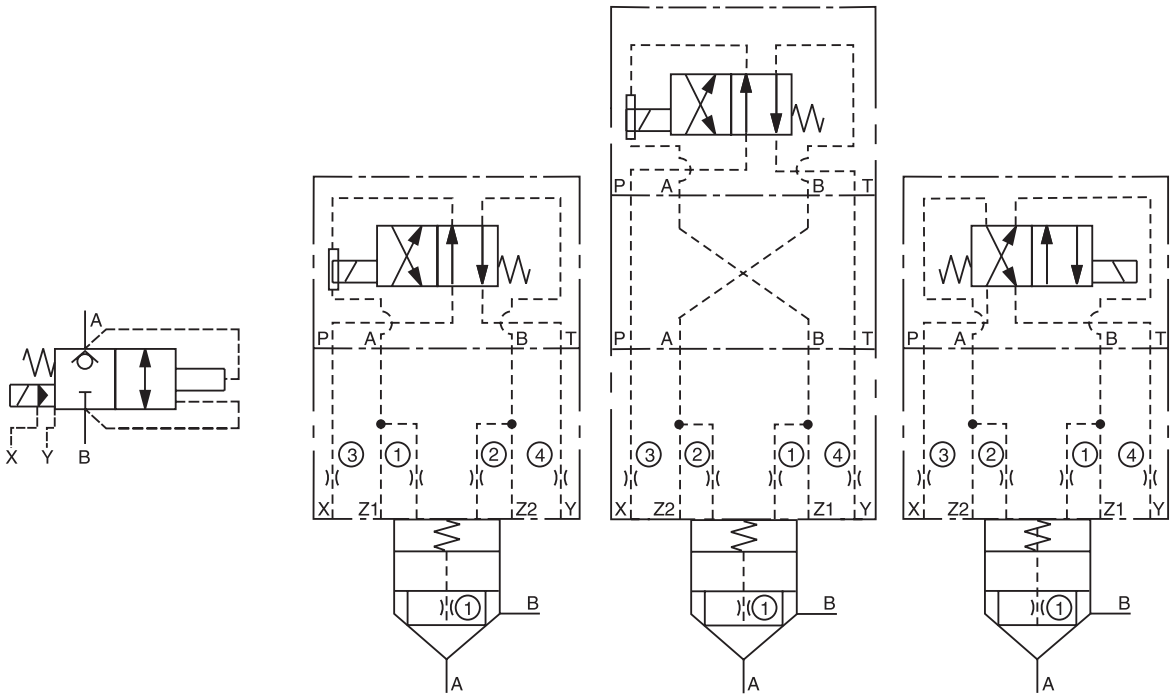


Description	Type							
	NG16	NG25	NG32	NG40	NG50	NG63	NG80	NG100
Cover [1]	C016B*	C025B*	C032B*	C040B*	C050B*	C063B*	C080B*	C100B*
Cover Orifice ①	M6xØ0.8	M6xØ1.0	1/16xØ1.2	1/16xØ1.5	1/16xØ1.8	1/8xØ2.0	1/8xØ2.2	1/8xØ2.5
Cartridge [2]	CE016C08*	CE025C08*	CE032C08*	CE040C08*	CE050C08*	CE063C08*	CE080C08*	CE100C08*
Poppet Orifice ①	1/16xØ00							
Spring	1.6 Bar, (23.2 PSI) Type S (Order no. see spare parts)							
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)	BK419 (BK135)	BK420 (BK90

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Ordering Information C*B
[2] Complete type see Ordering Information CE*

2-Way Seat Valve with Pilot, Normally Closed, Flow A ⇔ B



NG16 - 40 with Pilot NG06

NG50 - 63 with Pilot NG06

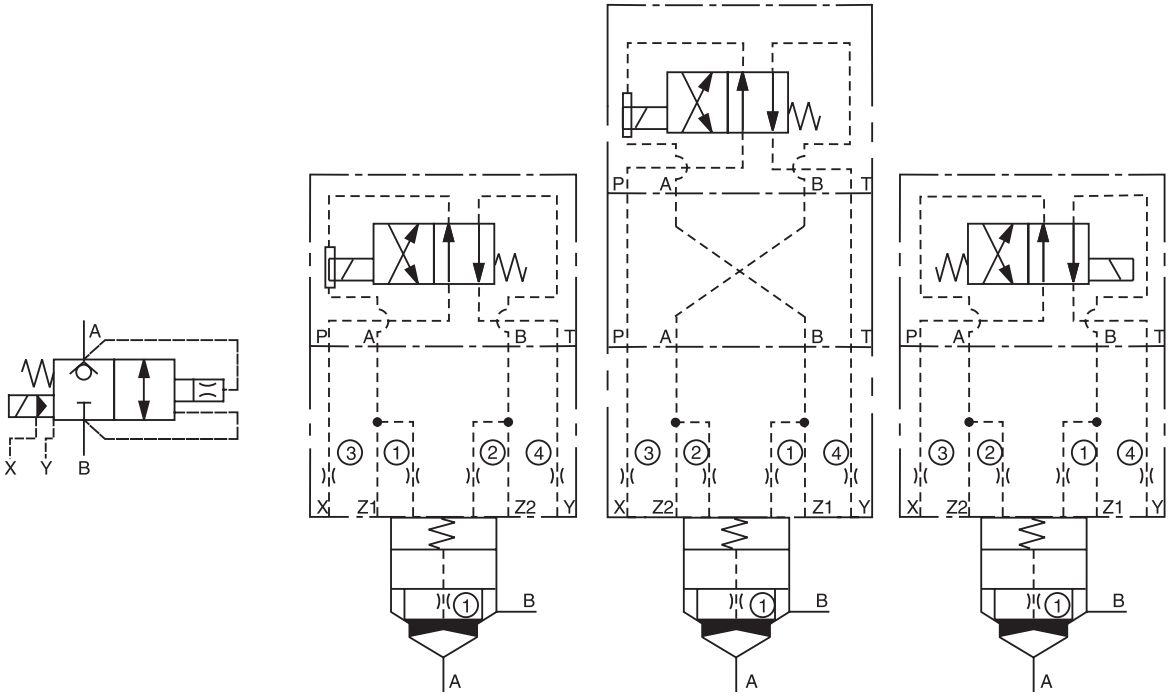
NG50 - 100 with Pilot NG10

Description	Type									
	Pilot NG6						Pilot NG10			
	NG16	NG25	NG32	NG40	NG50	NG63	NG50	NG63	NG80	NG100
4/2-DC Valve [1]	D1VW20B*						D3W20H*			
Adaptor Plate [2]	without				PADA1007/A-B/B-A		without			
Cover [3]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*	C050CA*	C063CA*	C080CA*	C100CA*
Cover Orifice ①	M5xØ0.8	M5xØ1.0	M5xØ1.2	M5xØ1.5	M6xØ1.8	M6xØ2.0	M6xØ1.8	M6xØ2.0	1/16xØ2.2	1/16xØ2.5
Cover Orifice ②	M5xØ00				M6xØ00				1/16xØ00	
Cover Orifice ③	M5xØ1.0	M6xØ1.2	M6xØ1.5	M6xØ1.8	M8xØ2.0	M8xØ2.2	M8xØ2.0	M8xØ2.2	M10x1xØ2.5	M10x1xØ3.0
Cover Orifice ④	M5xØ99	M6xØ99			M8xØ99C				M10x1xØ99	
Cartridge [2]	CE016C04*	CE025C04*	CE032C04*	CE040C04*	CE050C04*	CE063C04*	CE050C04*	CE063C04*	CE080C04*	CE100C04*
Poppet Orifice ①	1/16NPTxØ00									
Spring	1.6 Bar (23.2 PSI), Type S (Order no. see spare parts)									
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)	BK417 (BK87)	BK418 (BK88)	BK419 (BK135)	BK420 (BK90)
Bolt Kit Pilot	BK375						BK385			

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Catalog HY14-2502/US, Series D1VW, D3W.
[2] Includes O-rings and mounting bolts
[3] Complete type see Ordering Information C*C
[4] Complete type see Ordering Information CE*

2-Way Seat Valve with Pilot and Dampening Poppet, Normally Closed, Flow A ⇔ B



NG16 - 40 with Pilot NG06

NG50 - 63 with Pilot NG06

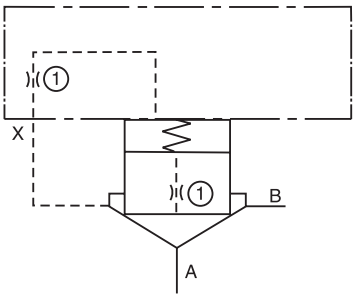
NG50 - 100 with Pilot NG10

Description	Type									
	Pilot NG06						Pilot NG10			
	NG16	NG25	NG32	NG40	NG50	NG63	NG50	NG63	NG80	NG100
4/2-DC Valve [1]	D1VW20B*						D3W20H*			
Adaptor Plate [2]	without				PADA1007/A-B/B-A		without			
Cover [3]	C016CA*	C025CA*	C032CA*	C040CA*	C050CA*	C063CA*	C050CA*	C063CA*	C080CA*	C100CA*
Cover Orifice ①	M5xØ0.8	M5xØ1.0	M5xØ1.2	M5xØ1.5	M6xØ1.8	M6xØ2.0	M6xØ1.8	M6xØ2.0	1/16xØ2.2	1/16xØ2.5
Cover Orifice ②	M5xØ00				M6xØ00				1/16xØ00	
Cover Orifice ③	M5xØ1.0	M6xØ1.2	M6xØ1.5	M6xØ1.8	M8xØ2.0	M8xØ2.2	M8xØ2.0	M8xØ2.2	M10x1xØ2.5	M10x1xØ3.0
Cover Orifice ④	M5xØ99	M6xØ99			M8xØ99C				M10x1xØ99	
Cartridge [2]		CE025C08*	CE032C08*	CE040C08*	CE050C08*	CE063C08*	CE050C08*	CE063C08*	CE080C08*	CE100C08*
Poppet Orifice ①	1/16NPTxØ00									
Spring	1.6 Bar (23.2 PSI), Type S (Order no. see spare parts)									
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)	BK417 (BK87)	BK418 (BK88)	BK419 (BK135)	BK420 (BK90)
Bolt Kit Pilot	BK375						BK385			

Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Catalog HY14-2502/US, Series D1VW, D3W.
[2] Inclusive O-rings and mounting bolts
[3] Complete type see Ordering Information C*C
[4] Complete type see Ordering Information CE*

Check Valve, Flow A ⇒ B



Description	Type							
	NG16	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Cover [1]	C016AA*	C025AA*	C032AA*	C040AA*	C050AA*	C063AA*	C080AA*	C100AA*
Cover Orifice ①	M5xØ00				M6xØ99		1/16xØ99	
Cartridge [2]	CE016C01*	CE025C01*	CE032C01*	CE040C01*	CE050C01*	CE063C01*	CE080C01*	CE100C01*
Poppet Orifice ①	1/16NPTxØ00							
Spring	1.6 Bar (23.2 PSI), Type S (Order no. see spare parts)							
Bolt Kit Cover	BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)	BK419 (BK135)	BK420 (BK90)

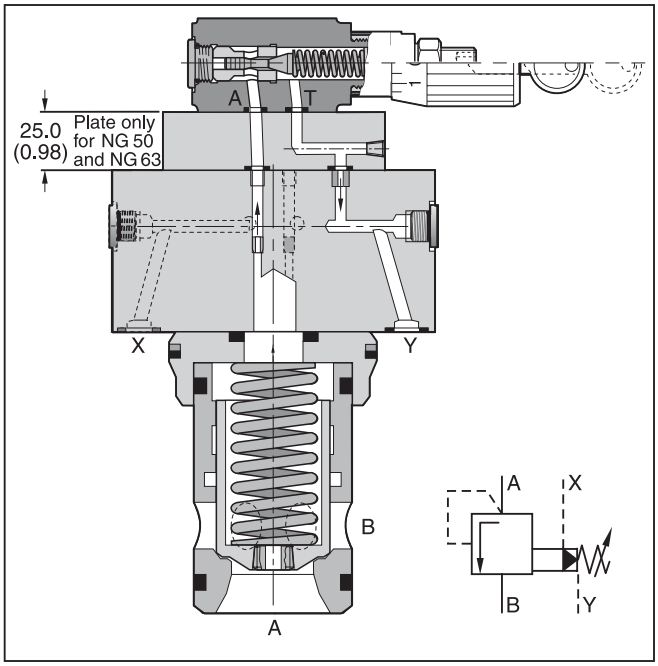
Shown orifice Ø and springs are recommendations.
xxØ00 = plug
xxØ99 = open

[1] Complete type see Ordering Information C*A
[2] Complete type see Ordering Information CE*

General Description

Series R*E pressure relief valves consist of a manual adjustment pilot stage and a cartridge main stage.

The R*E model codes include the pilot valves, covers and cartridges that are also offered as seperate items. See combination examples for details.



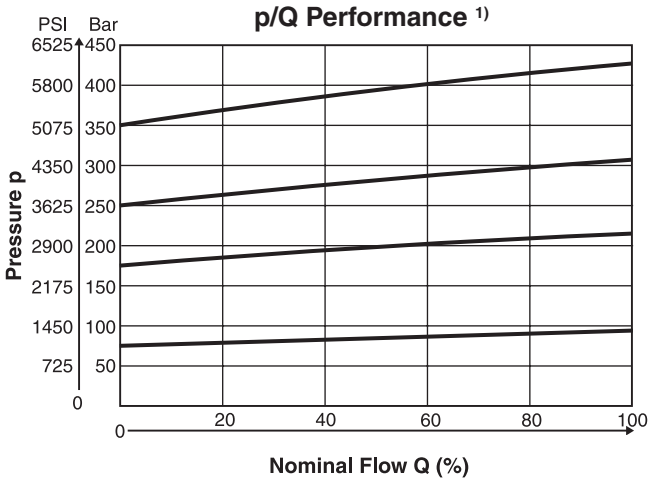
Features

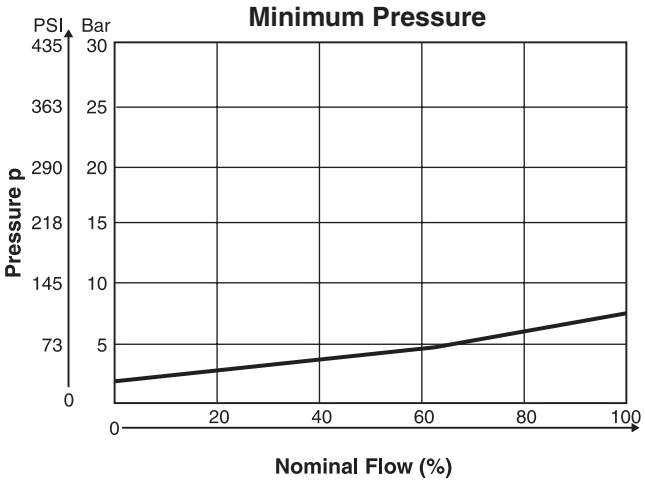
- Pilot operated with manual adjustment.
- Cavity and mounting pattern according to ISO 7368.
- 4 pressure ranges.
- 2 adjustment modes:
  - Hexagon screw with lock nut
  - DIN lock
- Remote control via port X.
- 6 sizes, NG16 to NG63.
- Optional mechanical maximum pressure adjustment.

Specifications

General						
Size	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Interface	Slip-in mounting acc. ISO 7368					
Mounting Position	As desired, horizontal mounting prefered					
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)					
Hydraulic						
Maximum Operating Pressure	Ports A and X up to 350 Bar (5075 PSI), Ports B and Y depressurized					
Pressure Range	75, 175, 250, 350 Bar (1088, 2538, 3625, 5075 PSI)					
Nominal Flow	220 LPM (58 GPM)	500 LPM (132 GPM)	950 LPM (251 GPM)	1400 LPM (370 GPM)	2300 LPM (609 GPM)	4000 LPM (1058 GPM)
Fluid	Hydraulic oil according to DIN 51524 ... 525					
Viscosity Recommended	30 to 50 cSt (mm^2s)					
Viscosity Permitted	20 to 380 cSt (mm^2s)					
Fluid Temperature	-20°C to +70°C (-4°F to +158°F)					
Filtration	ISO 4406 - (1999) ; 18/16/13					

Performance Curves





1) The performance curves are measured with external drain.
For internal drain the tank pressure has to be added to curve.

Ordering Information

R		E			1	S			
Pressure Relief Valve	Nominal Size	Slip-in Mounting ISO 7368	Pressure Range	Adjustment	Pilot Oil Pilot Internal Drain External	Poppet Spring	Seals	Design Series NOTE: Not required when ordering.	Spool Type

Code	Description
16	NG16
25	NG25
32	NG32
40	NG40
50	NG50
63	NG63

Code	Description
07	up to 70 Bar (1015 PSI)
17	up to 175 Bar (2538 PSI)
25	up to 250 Bar (3625 PSI)
35	up to 350 Bar (5075 PSI)

Code	Description
S	Hexagon Screw with Lock Nut
L	Key Lock

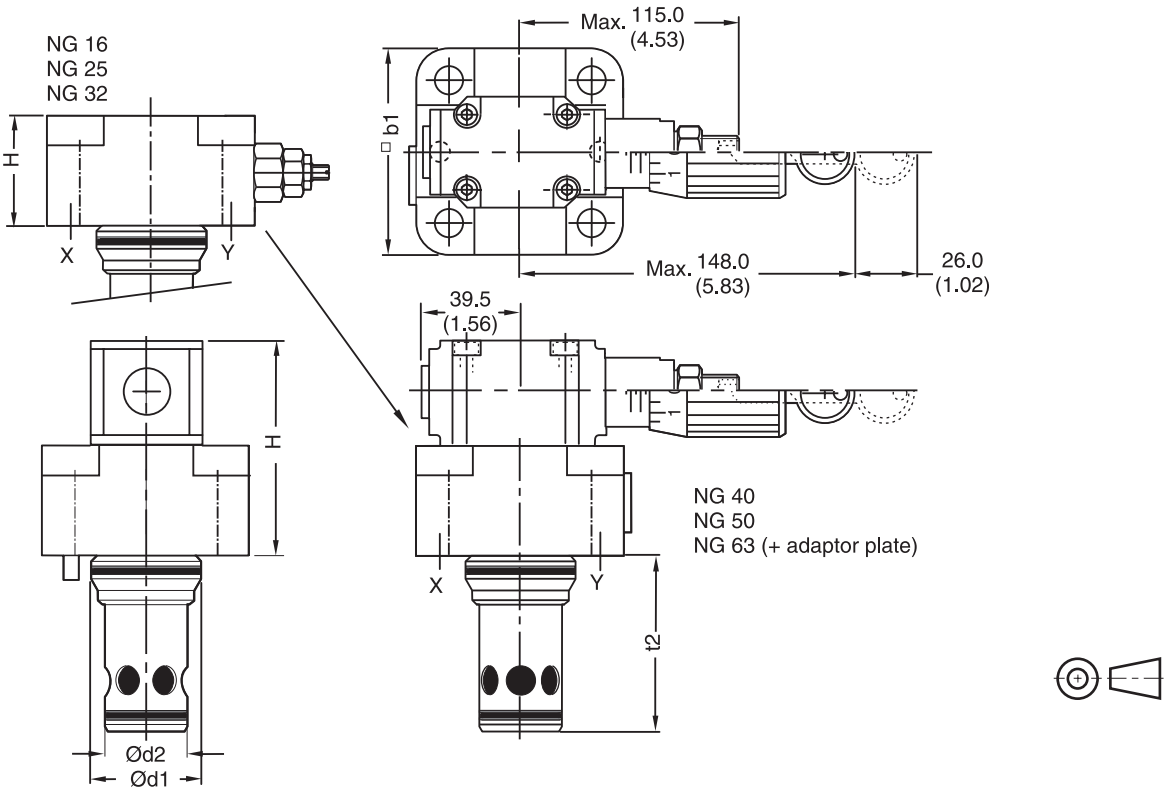
Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
Omit	Standard
S07	With Poppet Seals

Weight:

R16E	2.2 kg (4.9 lbs.)
R25E	3.5 kg (7.7 (lbs.)
R32E	4.9 kg (10.8 lbs.)
R40E	8.0 kg (17.6 lbs.)
R50E	13.7 kg (30.2 lbs.)
R63E	22.8 kg (50.3 lbs.)

Inch equivalents for millimeter dimensions are shown in (**)



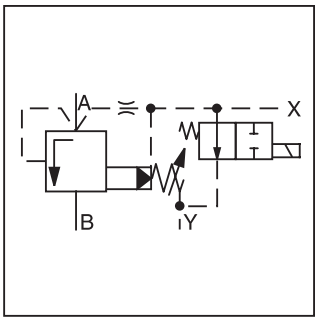
Size	H	b_1	d_1	d_2	t_2
NG16	40.0 (1.57)	79.0 [1] (3.11)	32.0 (1.26)	25.0 (0.98)	58.0 (2.28)
NG25	45.0 (1.77)	85.0 (3.35)	45.0 (1.77)	34.0 (1.34)	72.0 (2.83)
NG32	50.0 (1.97)	102.0 (4.02)	60.0 (2.36)	45.0 (1.77)	85.0 (3.35)
NG40	103.0 (4.06)	125.0 (4.92)	75.0 (2.95)	55.0 (2.17)	105.0 (4.13)
NG50	138.0 (5.43)	140.0 (5.51)	90.0 (3.54)	68.0 (2.68)	122.0 (4.80)
NG63	153.0 (6.02)	180.0 (7.09)	120.0 (4.72)	90.0 (3.54)	155.0 (6.10)

NG	Bolt Kit -		Kit	
			Nitrile	Fluorocarbon
16	BK414 (BK84)	33 Nm (24.3 lb.-ft.)	SK-R16E	SK-R16EV
25	BK391 (BK77)	115 Nm (84.8 lb.-ft.)	SK-R25E	SK-R25EV
32	BK415 (BK85)	281 Nm (207.2 lb.-ft.)	SK-R32E	SK-R32EV
40	BK416 (BK86)	553 Nm (407.8 lb.-ft.)	SK-R40E	SK-R40EV
50	BK417 (BK87)	553 Nm (407.8 lb.-ft.)	SK-R50E	SK-R50EV
63	BK418 (BK88)	1910 Nm (1408.6 lb.-ft.)	SK-R63E	SK-R63EV

General Description

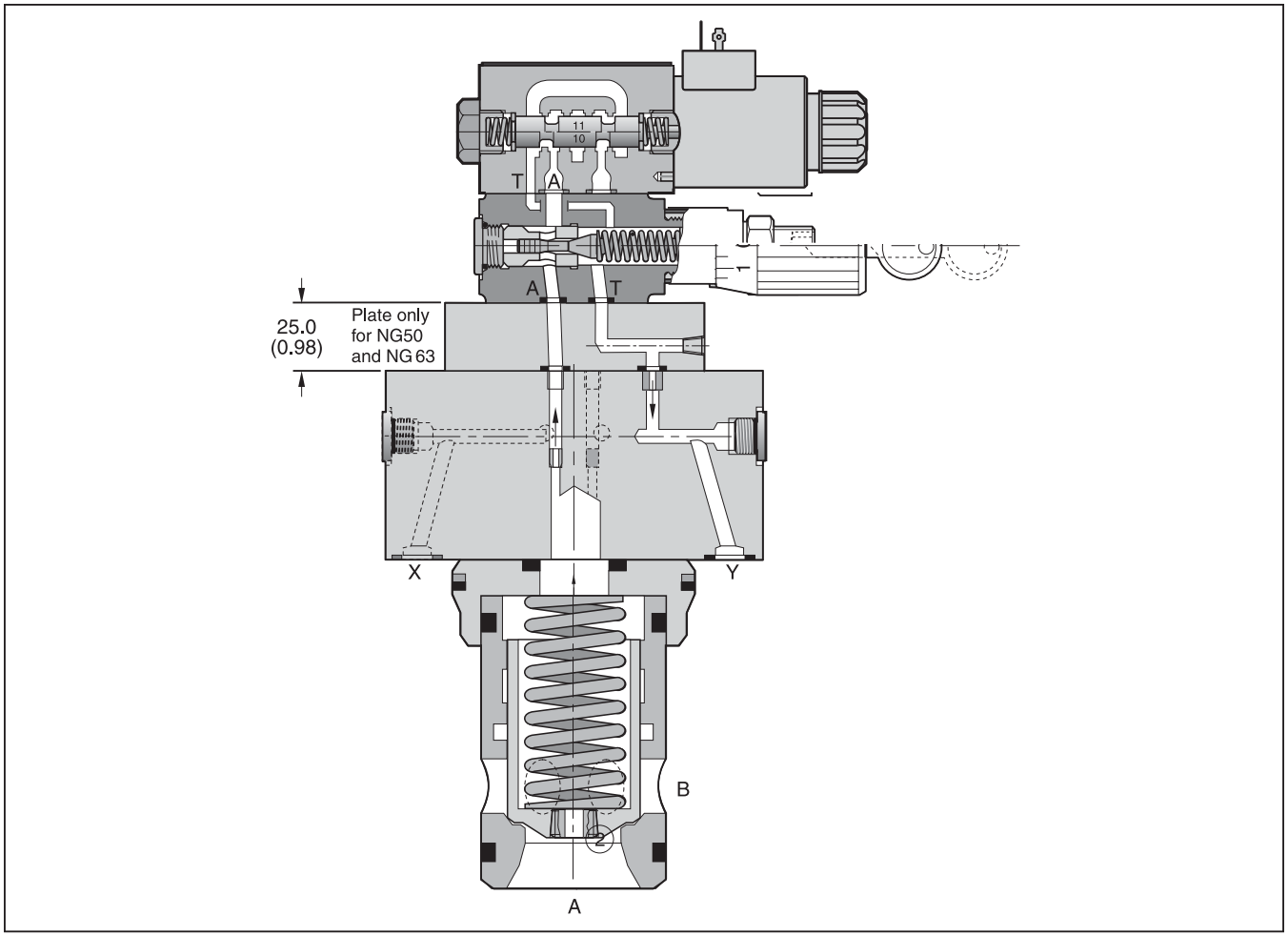
Series RS*E pressure relief valves consist of a manual adjusted pilot stage with a directional valve for an electrically controlled vent function and a cartridge main part.

The RS*E model codes embrace the pilot valves, covers and cartridges that are also offered as seperate items. See combination examples for details.



Features

- Pilot operated with manual adjustment.
- Cavity and mounting pattern according to ISO 7368.
- 4 pressure ranges.
- 2 switching types (series RS*E).
- 2 adjustment modes:
  - Hexagon screw with lock nut
  - DIN lock
- Remote control via port X.
- 6 sizes, NG16 to NG63.
- Optional mechanical maximum pressure adjustment.

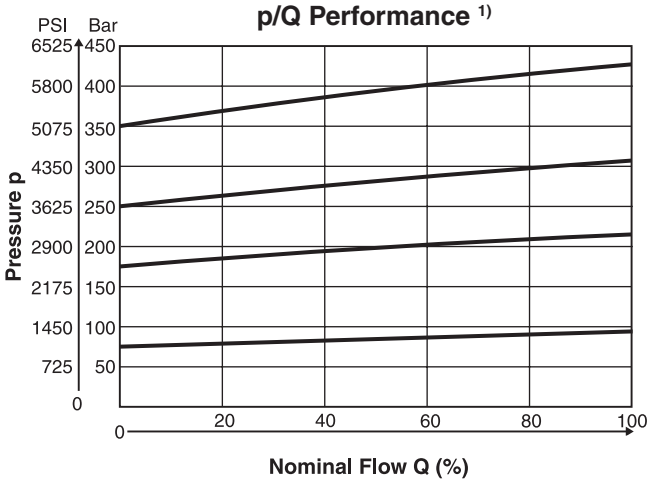


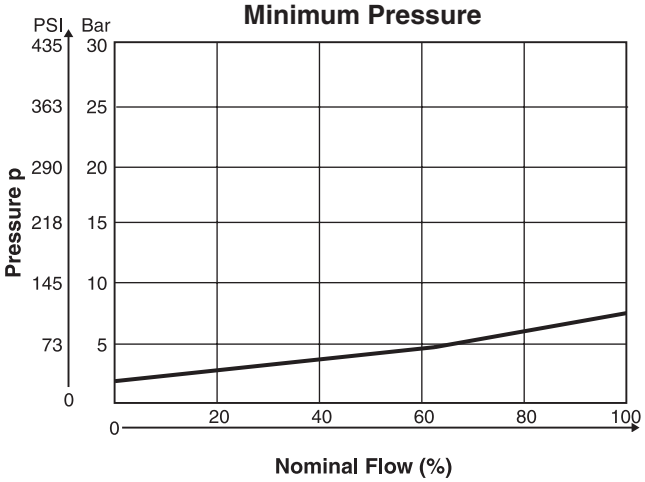
RS_E.indd, dd

Specifications

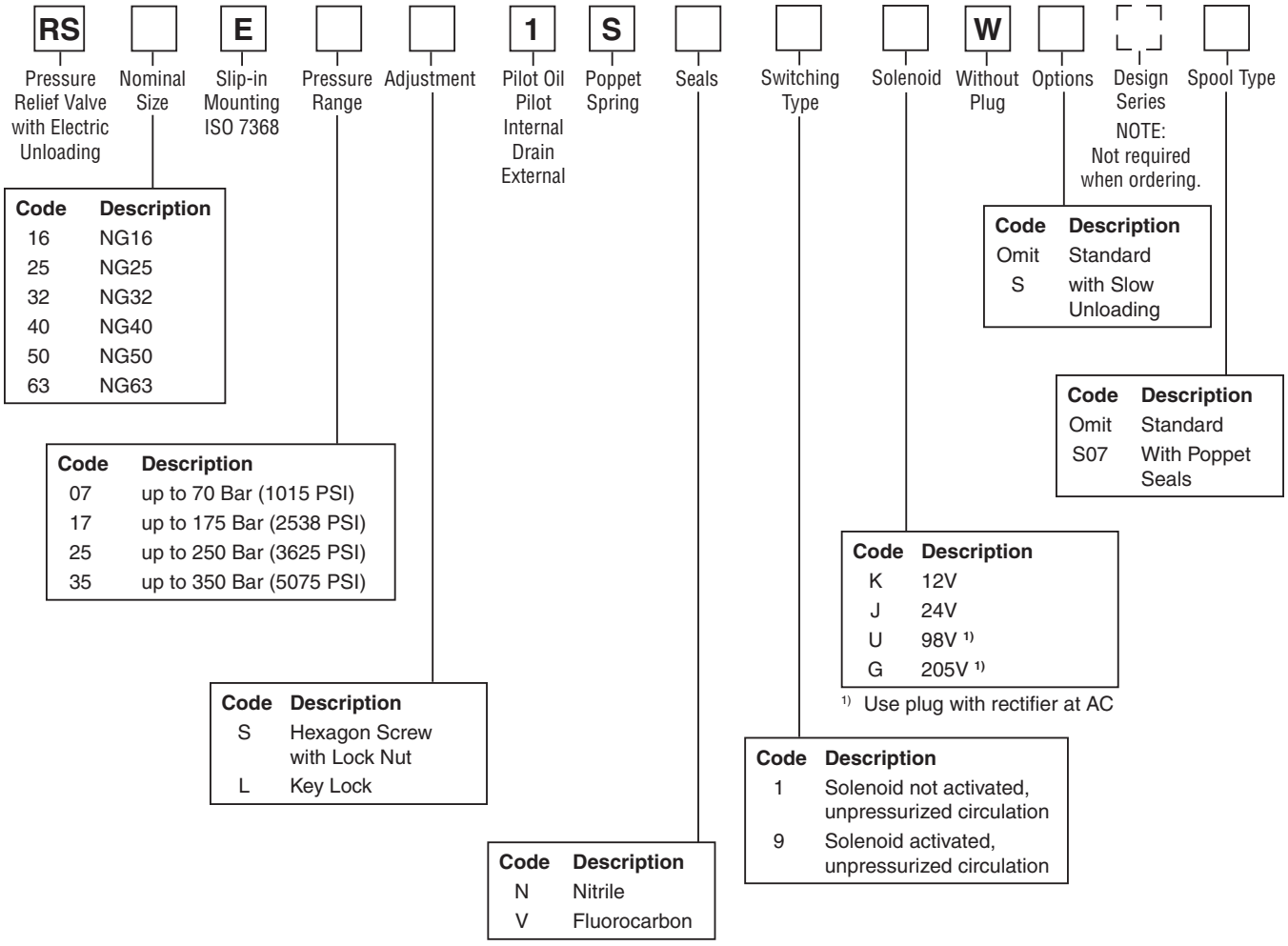
General						
Size	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Interface	Slip-in mounting acc. ISO 7368					
Mounting Position	As desired, horizontal mounting prefered					
Ambient Temperature	-20 to +80°C (-4 to +176°F)					
Hydraulic						
Maximum Operating Pressure	Ports A and X: 350 Bar (5075 PSI), ports B and Y: depressurized					
Pressure Range	75, 175, 250, 350 Bar (1088, 2538, 3625, 5075 PSI)					
Nominal Flow	220 LPM (58 GPM)	500 LPM (132 GPM)	950 LPM (251 GPM)	1400 LPM (370 GPM)	2300 LPM (609 GPM)	4000 LPM (1058 GPM)
Fluid	Hydraulic oil according to DIN 51524 ... 525					
Viscosity, recommended	30 to 50 cSt (mm^2/s)					
Viscosity, permitted	20 to 380 cSt (mm^2/s)					
Fluid Temperature	-20 to +70°C (-4 to +158°F)					
Filtration	ISO 4406 - (1999) ; 18/16/13					
Electrical (Solenoid)						
Duty Ratio	100% ED; CAUTION: coil temperature up to 180°C (356°F) possible					
Maximum Switching Frequency	16000 switchings per hour					
Protection Class	IP 65 in according with EN 60529 (plugged and mounted)					
Direct Current **Code**	K	J	U	G		
Supply Voltage **Power** **Current**	12 VDC 31 W 2.5 amps	24 VDC 31 W 1.25 amps	98 VDC 31 W 0.31 amps	205 VDC 31 W 0.15 amps		
Solenoid Connection	Connector as per EN 175301-803					
Wiring Minimum	3 x 1.5 mm² recommended					
Wiring Length Maximum	50m (164 ft.) recommended					

Performance Curves





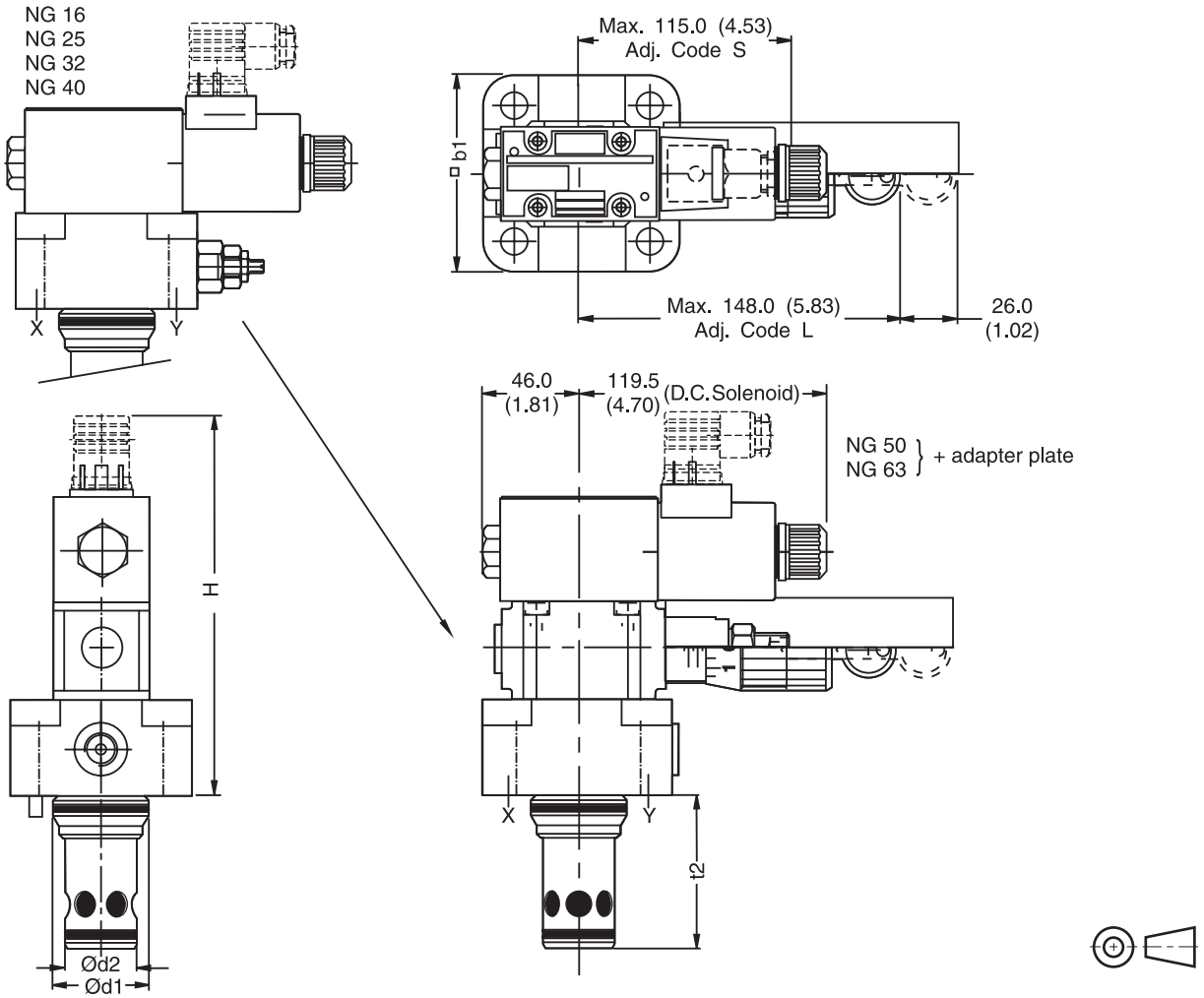
1) The performance curves are measured with external drain.
For internal drain the tank pressure has to be added to curve.



Weight:

RS16E	2.7 kg (6.0 lbs.)
RS25E	5.2 kg (11.5 (lbs.)
RS32E	6.4 kg (14.1 lbs.)
RS40E	9.5 kg (20.9 lbs.)
RS50E	15.2 kg (33.5 lbs.)
RS63E	24.3 kg (53.6 lbs.)

Inch equivalents for millimeter dimensions are shown in (**)



Size	H	b_1	d_1	d_2	t_2
NG16	135.0 (5.31)	79.0 [1] (3.11)	32.0 (1.26)	25.0 (0.98)	56.0 (2.20)
NG25	140.0 (5.51)	85.0 (33.5)	45.0 (1.77)	34.0 (1.34)	72.0 (2.83)
NG32	145.0 (5.71)	102.0 (4.02)	60.0 (2.36)	45.0 (1.77)	85.0 (3.35)
NG40	196.0 (7.72)	125.0 (4.92)	75.0 (2.95)	55.0 (2.17)	105.0 (4.13)
NG50	231.0 (9.09)	140.0 (5.51)	90.0 (3.54)	68.0 (2.68)	122.0 (4.80)
NG63	246.0 (9.69)	180.0 (7.09)	120.0 (4.72)	90.0 (3.54)	155.0 (6.10)

[1] width 65mm (2.65 in.)

NG	Bolt Kit -		Kit	
			Nitrile	Fluorocarbon
16	BK414 (BK84)	33 Nm (24.3 lb.-ft.)	SK-RS16E	SK-RS16EV
25	BK391 (BK77)	115 Nm (84.8 lb.-ft.)	SK-RS25E	SK-RS25EV
32	BK415 (BK85)	281 Nm (207.2 lb.-ft.)	SK-RS32E	SK-RS32EV
40	BK416 (BK86)	553 Nm (407.8 lb.-ft.)	SK-RS40E	SK-RS40EV
50	BK417 (BK87)	553 Nm (407.8 lb.-ft.)	SK-RS50E	SK-RS50EV
63	BK418 (BK88)	1910 Nm (1408.6 lb.-ft.)	SK-RS63E	SK-RS63EV

RS_E.indd, dd

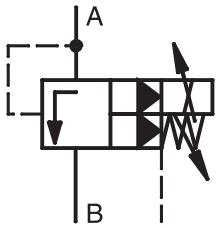
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series RE*E*W proportional pressure relief valves consist of a proportional pilot stage and a slip-in cartridge main stage. A mechanical maximum pressure stage is optionally available. For sizes NG25 and NG32 a screw-in cartridge is used, for sizes NG40, NG50 and NG63 an additional sandwich unit.

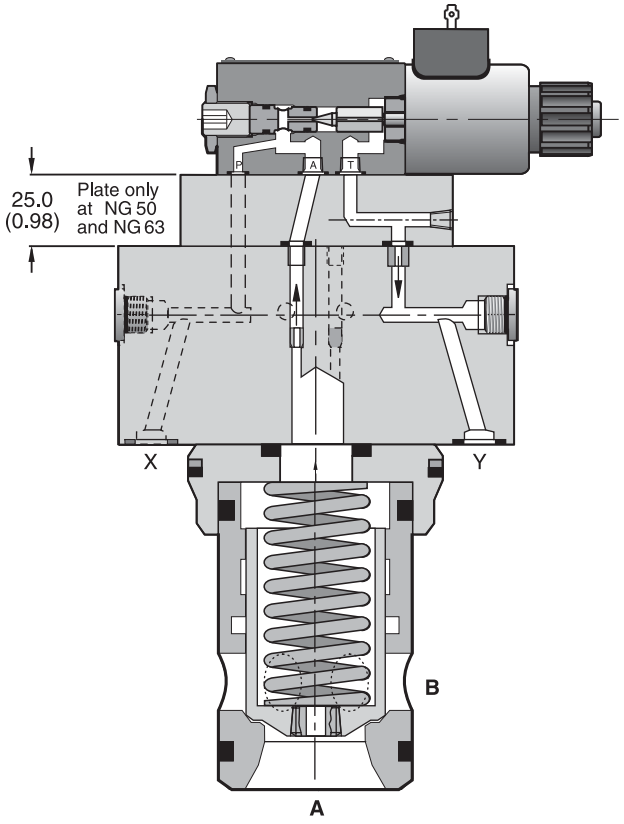
The RE*W model code embraces the pilot valves, covers and cartridges that are also offered as separate items. See combination examples for details.

In combination with the digital power amplifier PCD00A-400 the valve parameters can be saved, changed and duplicated.



Features

- Pilot operated with proportional solenoid.
- Continuous adjustment by proportional solenoid.
- Optional mechanical maximum pressure stage.
- Cavity and mounting pattern according to ISO 7368.
- 4 pressure ranges.
- 6 sizes, NG16 to NG63.



Specifications

General						
Size	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Interface	Slip-in mounting acc. ISO 7368					
Mounting Position	As desired, horizontal mounting prefered					
Ambient Temperature	-20 to +80°C (-4 to +176°F)					
Hydraulic						
Maximum Operating Pressure	Ports A and X: 350 Bar (5075 PSI), Ports B and Y: depressurized					
Pressure Range	105, 175, 250, 350 Bar (1523, 2538, 3625, 5075 PSI)					
Nominal Flow	220 LPM (58 GPM)	500 LPM (132 GPM)	950 LPM (251 GPM)	1400 LPM (370 GPM)	2300 LPM (609 GPM)	4000 LPM (1058 GPM)
Fluid	Hydraulic oil according to DIN 51524 ... 525					
Viscosity, recommended	30 to 50 cSt (mm^2/s)					
Viscosity, permitted	20 to 380 cSt (mm^2/s)					
Fluid Temperature	-20 to +70°C (-4 to +158°F)					
Filtration	ISO 4406 - (1999) ; 18/16/13					
Electrical (Proportional Solenoid)						
Duty Ratio	100% ED					
Protection Class	IP 65 in according with EN 60529 (plugged and mounted)					
Nominal Voltage	12 VDC (maximum current 2.3 amps), 16 VDC (maximum current 1.3 amps)					
Coil Resistance	4 Ohm at 20°C (68°F)					
Solenoid Connection	Connector as per EN 175301-803					
Power Amplifier, recommended	PCD00A-400					

Ordering Information

RE	□	E	□	W	1	S	□	1	□	W	□	□	□
Proportional Pressure Relief Valve	Nominal Size	Slip-in Mounting ISO 7368	Pressure Range	Offboard Electronics	Pilot Oil Pilot Internal Drain External	Poppet Spring	Seals	Normally Open	Solenoid	Without Plug	Options	Design Series	Spool Type

NOTE: Not required when ordering.

Code	Description
16	NG10
25	NG25
32	NG32
40	NG40
50	NG50
63	NG63

Code	Description
10	up to 105 Bar (1523 PSI)
17	up to 175 Bar (2538 PSI)
25	up to 250 Bar (3625 PSI)
35	up to 350 Bar (5075 PSI)

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
K	12V, 2.3A
X	16V, 1.3A

Code	Description
Omit	Standard
M	Mechanical Maximum Adjustment

Code	Description
Omit	Standard
S07	With Poppet Seals

Weight:

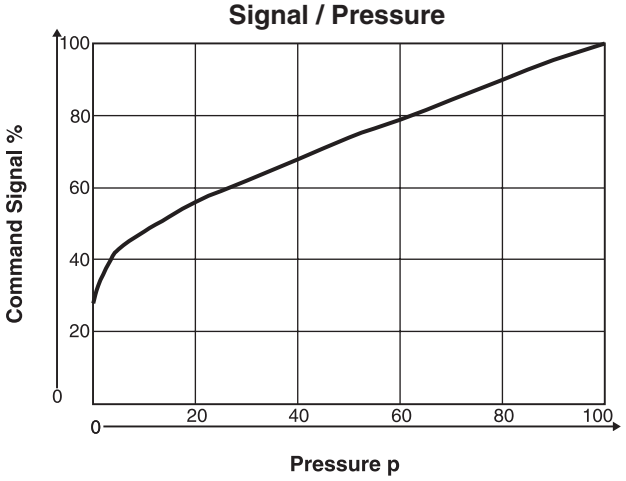
RE16E*W 2.7 kg (6.0 lbs.)
RE25E*W 5.2 kg (11.5 (lbs.)
RE32E*W 6.4 kg (14.1 lbs.)
RE40E*W 9.5 kg (20.9 lbs.)
RE50E*W 15.2 kg (33.5 lbs.)
RE63E*W 24.3 kg (53.6 lbs.)

RE_E_W.indd, dd

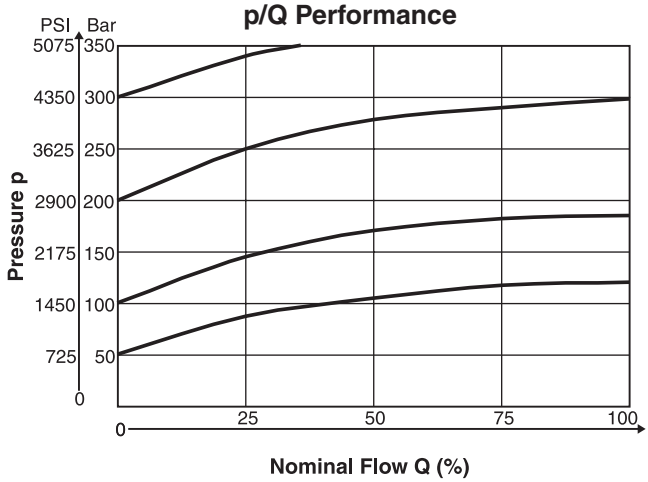
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

The performance curves are measured with external drain. For internal drain the tank pressure has to be added to curve.

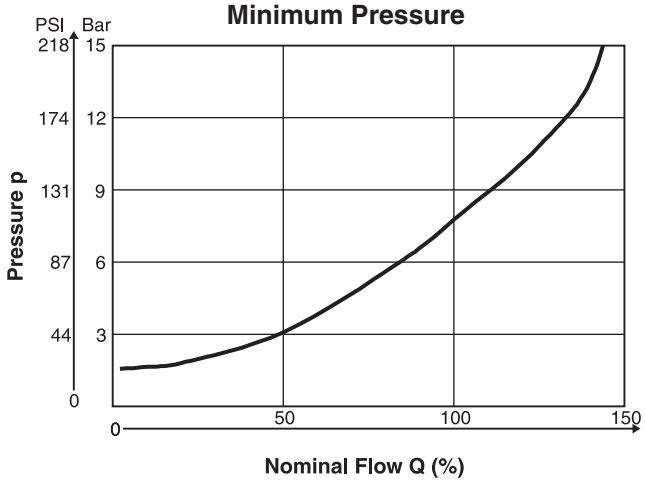
Signal / Pressure



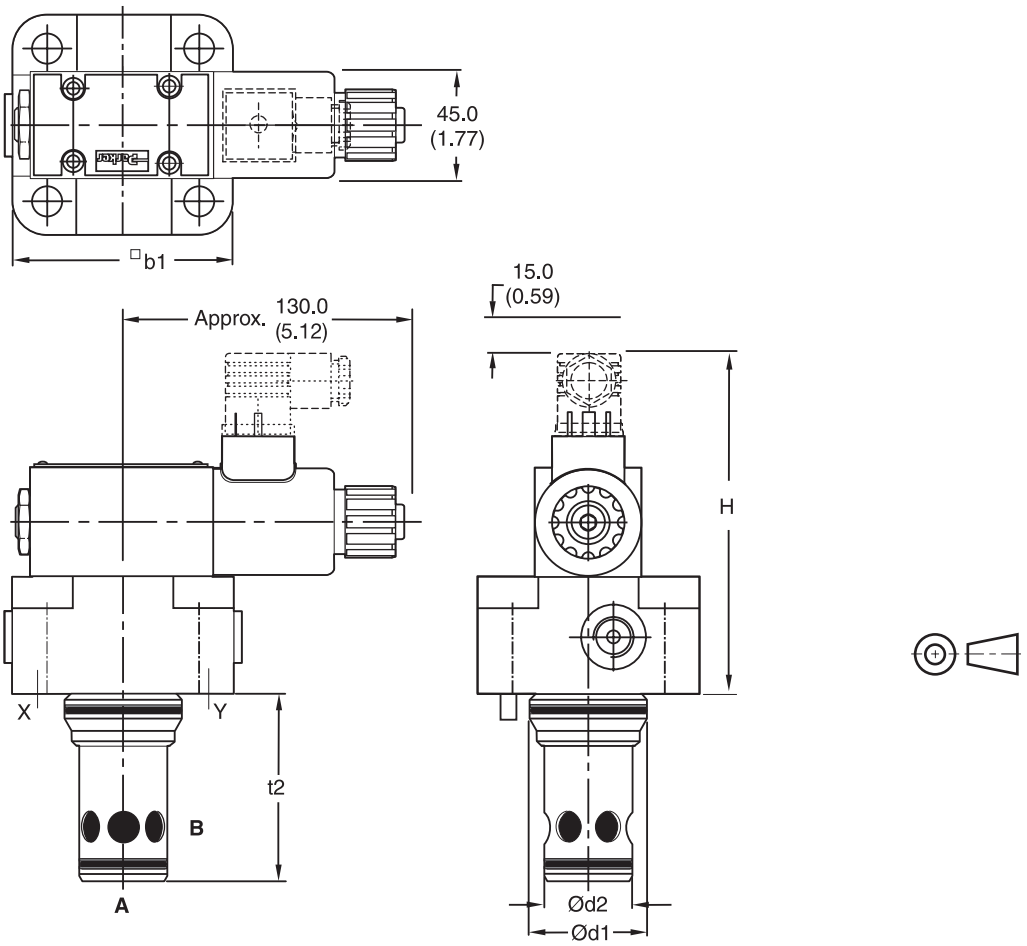
p/Q Performance



Minimum Pressure



Inch equivalents for millimeter dimensions are shown in (**)



Size	H	b_1	d_1	d_2	t_2
NG16	135.0 (5.31)	79.0 [1] (3.11)	32.0 (1.26)	25.0 (0.98)	56.0 (2.20)
NG25	140.0 (5.51)	85.0 (33.5)	45.0 (1.77)	34.0 (1.34)	72.0 (2.83)
NG32	145.0 (5.71)	102.0 (4.02)	60.0 (2.36)	45.0 (1.77)	85.0 (3.35)
NG40	137.0 (5.39) [2] 179.0 (7.05) [2]	125.0 (4.92)	75.0 (2.95)	55.0 (2.17)	105.0 (4.13)
NG50	172.0 (6.77) [2] 214.0 (8.43) [2]	140.0 (5.51)	90.0 (3.54)	68.0 (2.68)	122.0 (4.80)
NG63	187.0 (7.36) [2] 229.0 (9.02) [2]	180.0 (7.09)	120.0 (4.72)	90.0 (3.54)	155.0 (6.10)

[1] width 65mm (2.56 in.)
[2] with mechanical maximum adjustment

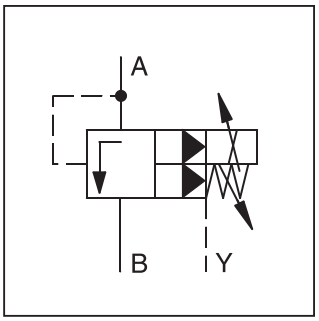
NG	Bolt Kit -		Kit	
			Nitrile	Fluorcarbon
16	BK414 (BK84)	33 Nm (24.3 lb.-ft.)	SK-RE16E	SK-RE16EV
25	BK391 (BK77)	115 Nm (84.8 lb.-ft.)	SK-RE25E	SK-RE25EV
32	BK415 (BK85)	281 Nm (207.2 lb.-ft.)	SK-RE32E	SK-RE32EV
40	BK416 (BK86)	553 Nm (407.8 lb.-ft.)	SK-RE40E	SK-RE40EV
50	BK417 (BK87)	553 Nm (407.8 lb.-ft.)	SK-RE50E	SK-RE50EV
63	BK418 (BK88)	1910 Nm (1408.6 lb.-ft.)	SK-RE63E	SK-RE63EV

General Description

Series RE*E*T proportional pressure relief valves consist of a proportional pilot stage with onboard electronics and a slip-in cartridge main stage. A mechanical maximum pressure stage is optionally available. For sizes NG25 and NG32 a screw-in cartridge is used; for sizes NG40, NG50 and NG63 an additional sandwich unit.

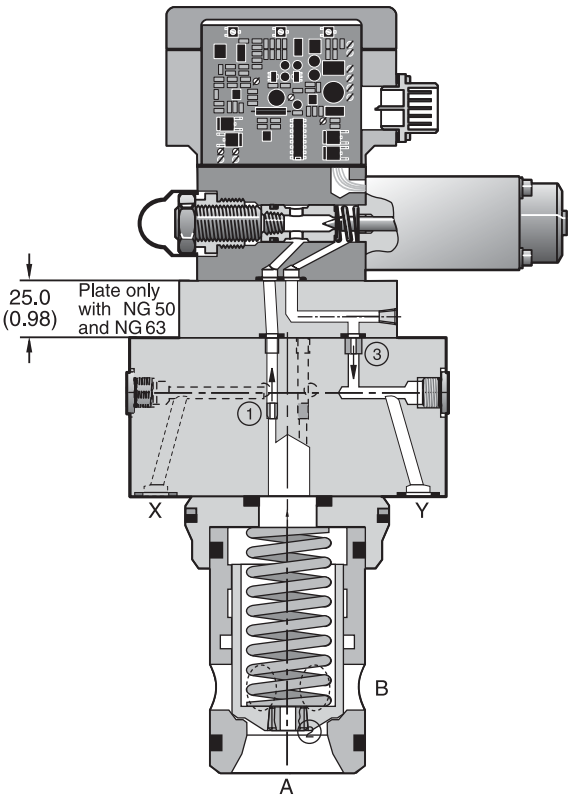
The valve comes factory set with linearized characteristics.

The RE*T model code embraces the pilot valves, covers and cartridges that are also offered as separate items. The pilot valve with onboard electronics (RE06M*T) is not shown in the combination examples



Features

- Pilot operated with proportional solenoid.
- Onboard electronics.
- Optional mechanical maximum pressure stage.
- Factory setting.
- Ramp time adjustment.
- Linearized characteristics.
- 4 pressure ranges.
- Cavity and mounting pattern according to ISO 7368.
- 6 sizes, NG16 to NG63.



RE_E_T.indd, dd

Specifications

General						
Size	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Interface	Slip-in mounting acc. ISO 7368					
Mounting Position	As desired, horizontal mounting prefered					
Ambient Temperature	-20 to +80°C (-4 to +176°F)					
Hydraulic						
Maximum Operating Pressure	Ports A and X: 350 Bar (5075 PSI), ports B and Y: depressurized					
Pressure Range	105, 175, 250, 350 Bar (1523, 2538, 3625, 5075 PSI)					
Nominal Flow	220 LPM (58 GPM)	500 LPM (132 GPM)	950 LPM (251 GPM)	1400 LPM (370 GPM)	2300 LPM (609 GPM)	4000 LPM (1058 GPM)
Fluid	Hydraulic oil according to DIN 51524 ... 525					
Viscosity, recommended	30 to 50 cSt (mm^2/s)					
Viscosity, permitted	20 to 380 cSt (mm^2/s)					
Fluid Temperature	-20 to +70°C (-4 to +158°F)					
Filtration	ISO 4406 - (1999) ; 18/16/13					
Electrical (Proportional Solenoid)						
Duty Ratio	100% ED					
Protection Class	IP 65 in according with EN 60529 (plugged and mounted)					
Supply Voltage	14.5 VDC to 30 VDC					
Ripple in Supply Voltage	5% maximum					
Current Consumption	2.8 amps maximum					
Input Range **Voltage Input** **Current Input**	0 to +10V maximum / 10k Ohm 4 to +20mA / 500 Ohm					
Adjustment Range of Ramp Time	0 to 5s					
Installation Cross-section	1 mm^2 minimum, shielded					
Cable Length	50 m (164 ft.) maximum					
Electrical Connection	No. 5004072; 6 pole + PE / Connector as per EN 175201-804 / cable - 8 to 10 mm					

Ordering Information

RE		E		T	1	S		1		0			
Proportional Pressure Relief Valve w/Electric Unloading	Nominal Size	Slip-in Mounting ISO 7368	Pressure Range	Offboard Electronics	Pilot Oil Pilot Internal Drain External	Poppet Spring	Seals	Normally Open	Command Signal	Electrical Attachments	Options	Design Series	Spool Type

NOTE: Not required when ordering.

Code	Description
16	NG16
25	NG25
32	NG32
40	NG40
50	NG50
63	NG63

Code	Description
10	up to 105 Bar (1523 PSI)
17	up to 175 Bar (2538 PSI)
25	up to 250 Bar (3625 PSI)
35	up to 350 Bar (5075 PSI)

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
F	Voltage input 0 to +10V with ref. output +10V
R	Current input 4 to 20mA

Code	Description
Omit	Standard
M	Mechanical Maximum Adjustment

Code	Description
Omit	Standard
S07 [1]	With Poppet Seals

[1] Not for NG16

Weight:

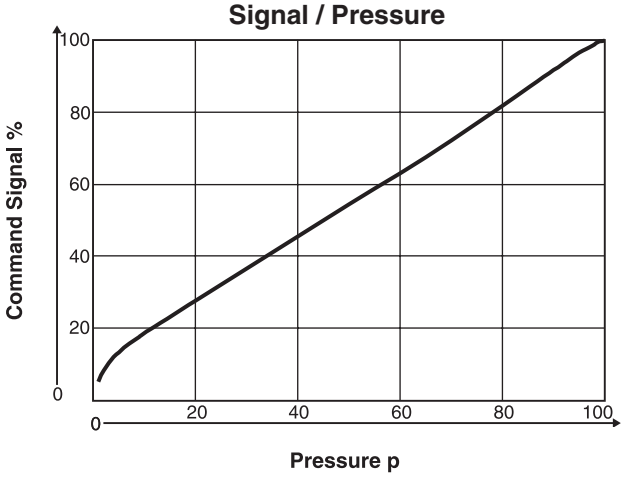
RE16E*T	2.7 kg (6.0 lbs.)	RE40E*T	9.5 kg (20.9 lbs.)
RE25E*T	5.2 kg (11.5 (lbs.)	RE50E*T	15.2 kg (33.5 lbs.)
RE32E*T	6.4 kg (14.1 lbs.)	RE63E*T	24.3 kg (53.6 lbs.)

RE_E_T.indd, dd

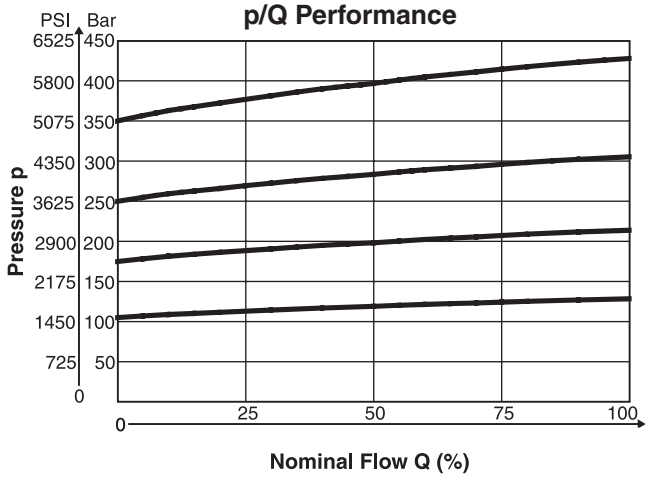
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

The performance curves are measured with external drain. For internal drain the tank pressure has to be added to curve.

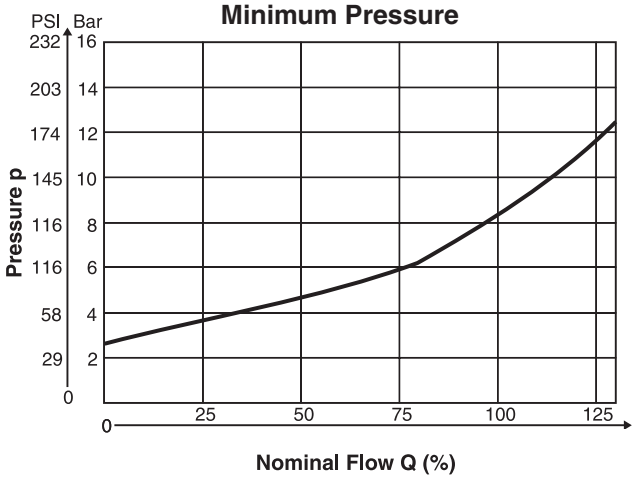
Signal / Pressure



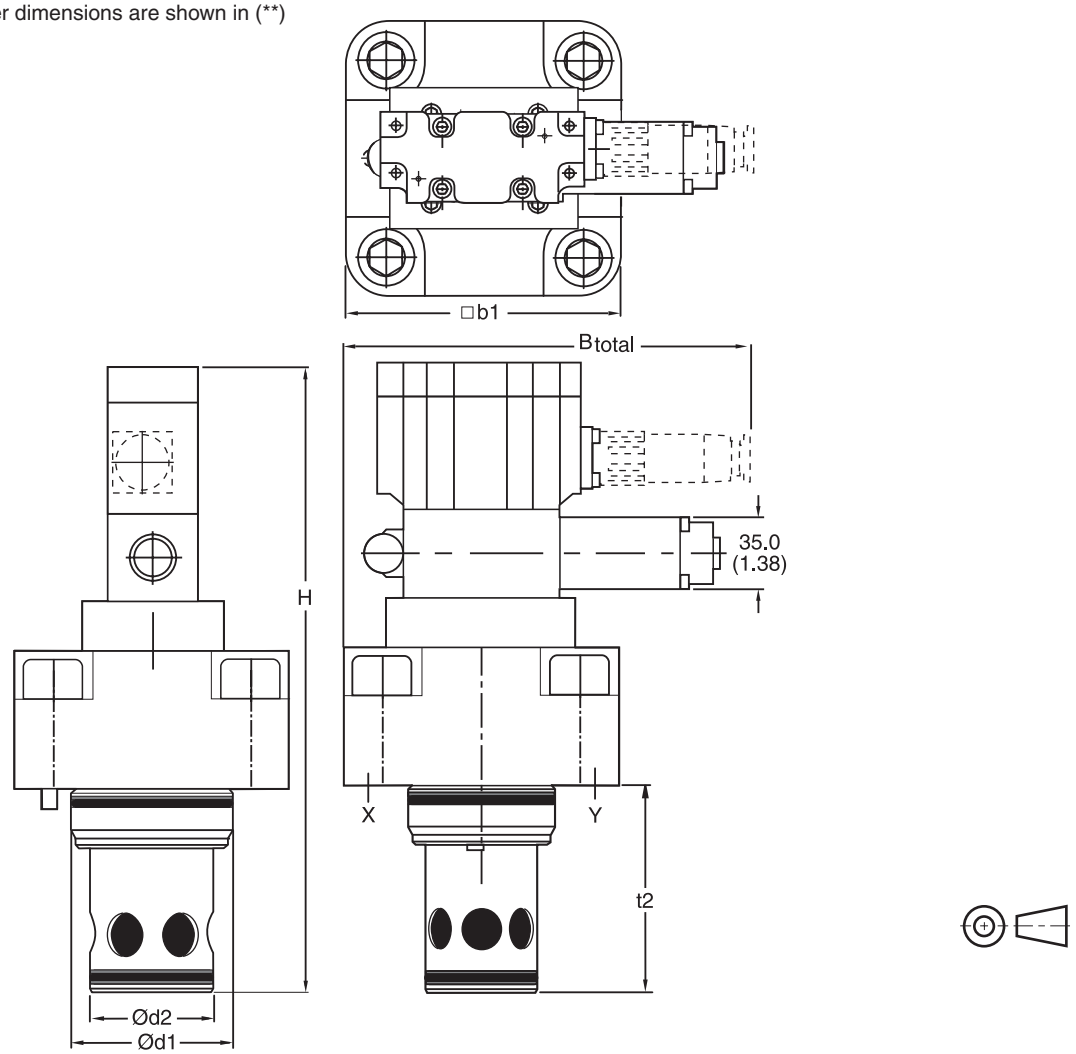
p/Q Performance



Minimum Pressure



Inch equivalents for millimeter dimensions are shown in (**)



Size	H	b_1	d_1	d_2	t_2
NG16	177.0 (6.97)	79.0 [1] (3.11)	32.0 (1.26)	25.0 (0.98)	56.0 (2.20)
NG25	122.0 (4.80)	85.0 (33.5)	45.0 (1.77)	34.0 (1.34)	72.0 (2.83)
NG32	127.0 (5.00)	102.0 (4.02)	60.0 (2.36)	45.0 (1.77)	85.0 (3.35)
NG40	137.0 (5.39) [2] 179.0 (7.05) [2]	125.0 (4.92)	75.0 (2.95)	55.0 (2.17)	105.0 (4.13)
NG50	172.0 (6.77) [2] 214.0 (8.43) [2]	140.0 (5.51)	90.0 (3.54)	68.0 (2.68)	122.0 (4.80)
NG63	187.0 (7.36) [2] 229.0 (9.02) [2]	180.0 (7.09)	120.0 (4.72)	90.0 (3.54)	155.0 (6.10)

[1] width 65mm (2.56 in.)
[2] with mechanical maximum adjustment

NG	Bolt Kit -		Kit	
			Nitrile	Fluorocarbon
16	BK414 (BK84)	33 Nm (24.3 lb.-ft.)	SK-RE16E	SK-RE16EV
25	BK391 (BK77)	115 Nm (84.8 lb.-ft.)	SK-RE25E	SK-RE25EV
32	BK415 (B K85)	281 Nm (207.2 lb.-ft.)	SK-RE32E	SK-RE32EV
40	BK416 (BK86)	553 Nm (407.8 lb.-ft.)	SK-RE40E	SK-RE40EV
50	BK417 (BK87)	553 Nm (407.8 lb.-ft.)	SK-RE50E	SK-RE50EV
63	BK418 (BK88)	1910 Nm (1408.6 lb.-ft.)	SK-RE63E	SK-RE63EV

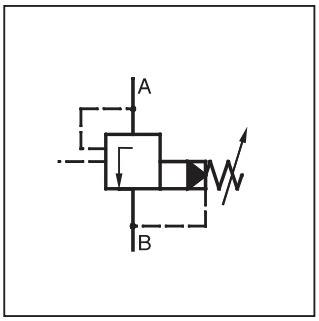
RE_E_T.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

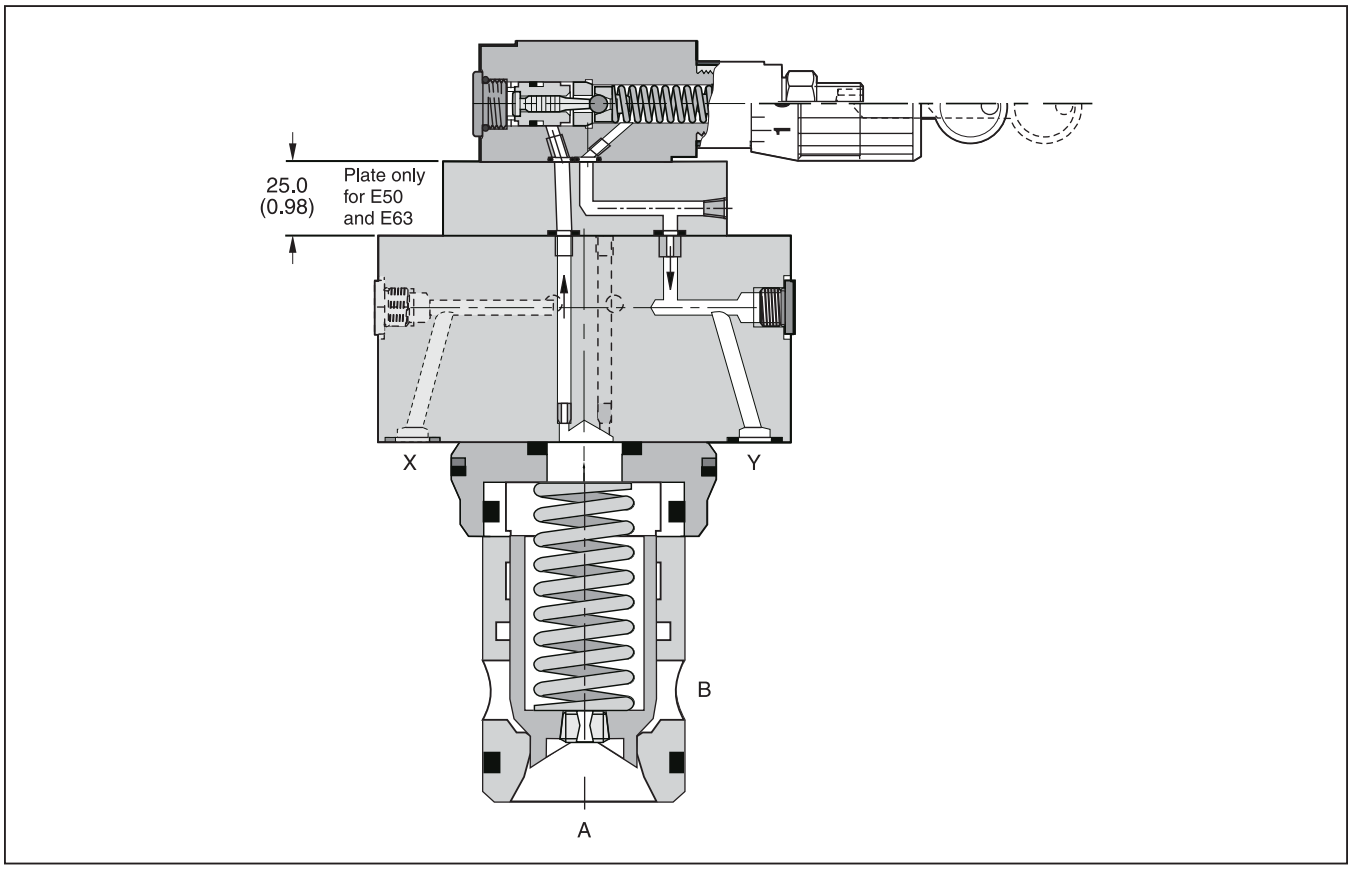
Series UR*E unloading valves consist of a mechanical pilot stage and a slip-in cartridge main stage. These valves are used to unload a circuit at low pressure. The mechanically adjustable pressure signal to unload the main stage has to be applied to port X. The pressure differential between opening and closing is 13%.

The UR*E model codes embrace the pilot valves, covers and cartridges that are also offered as separate items. See combination examples for details.



Features

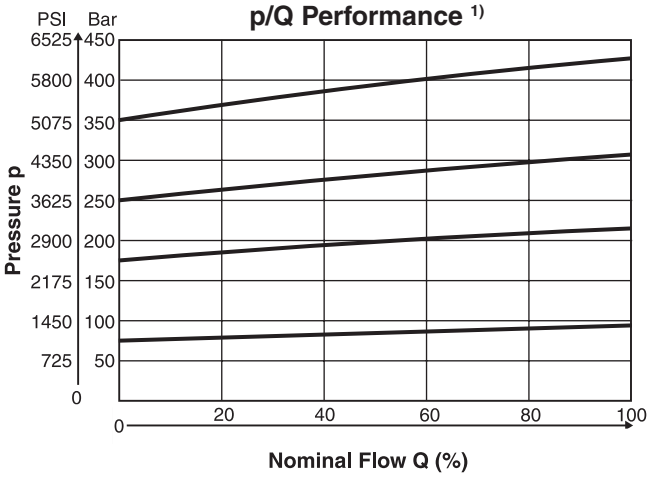
- Pilot operated unloading valve.
- Cavity and mounting pattern according to ISO 7368.
- 4 pressure ranges.
- 2 adjustment modes:
  - Hexagon screw with lock nut
  - DIN lock
- 6 sizes, NG16 to NG63.

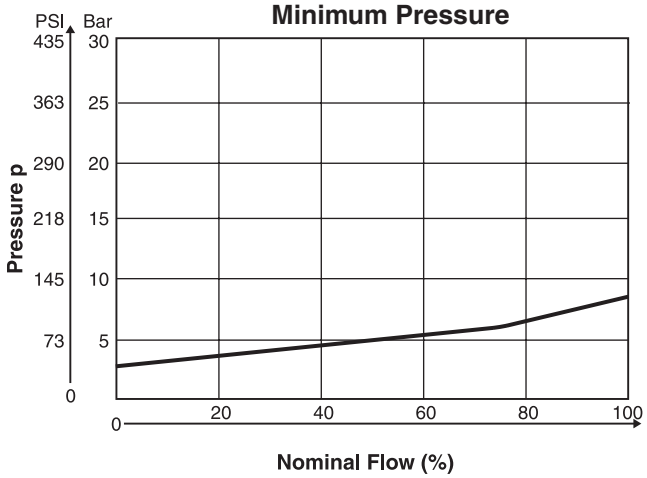


Specifications

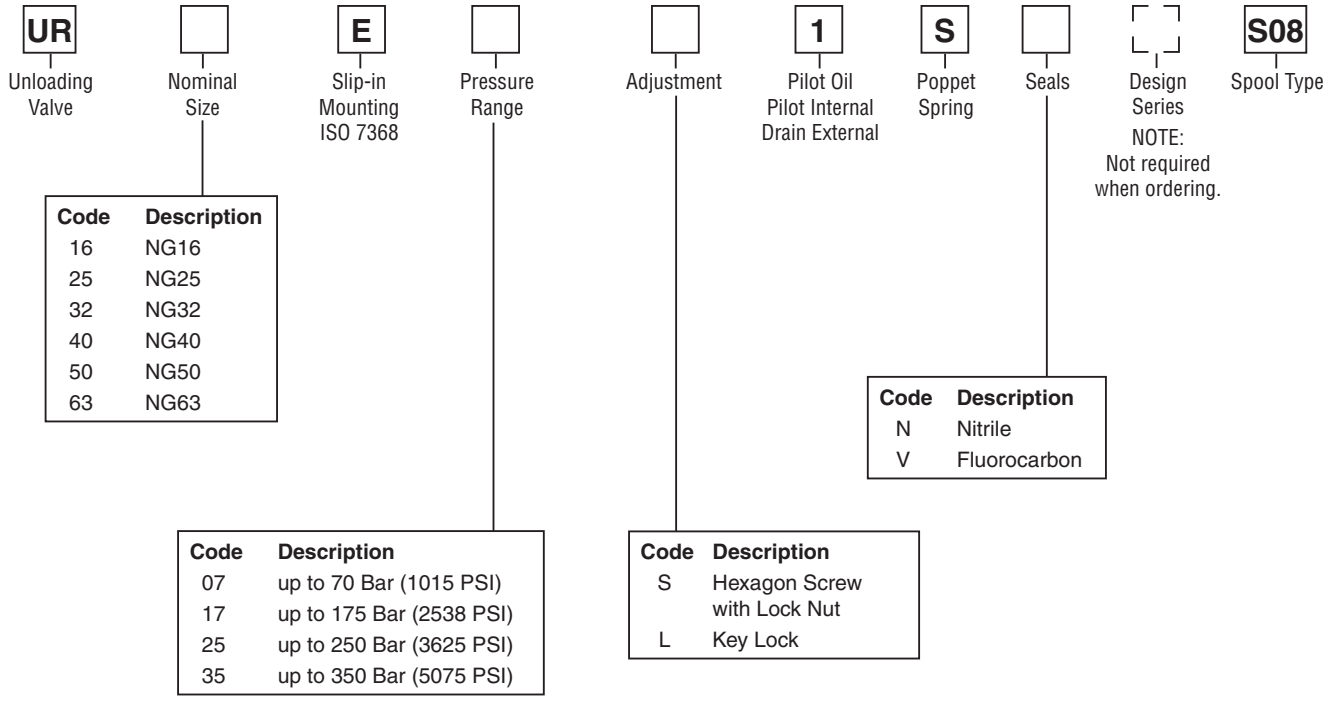
General						
Size	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	NG63
Interface	Slip-in mounting acc. ISO 7368					
Mounting Position	As desired, horizontal mounting prefered					
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)					
Hydraulic						
Maximum Operating Pressure	Ports A and X: up to 350 Bar (5075 PSI), Ports B and Y: depressurized					
Pressure Range	75, 175, 250, 350 Bar (1088, 2538, 3625, 5075 PSI)					
Pressure Differential	13%					
Nominal Flow	220 LPM (58 GPM)	500 LPM (132 GPM)	950 LPM (251 GPM)	1400 LPM (370 GPM)	2300 LPM (609 GPM)	4000 LPM (1058 GPM)
Fluid	Hydraulic oil according to DIN 51524 ... 525					
Viscosity Recommended	30 to 50 cSt (mm^2/s)					
Viscosity Permitted	20 to 380 cSt (mm^2/s)					
Fluid Temperature	-20°C to +70°C (-4°F to +158°F)					
Filtration	ISO 4406 - (1999) ; 18/16/13					

Performance Curves





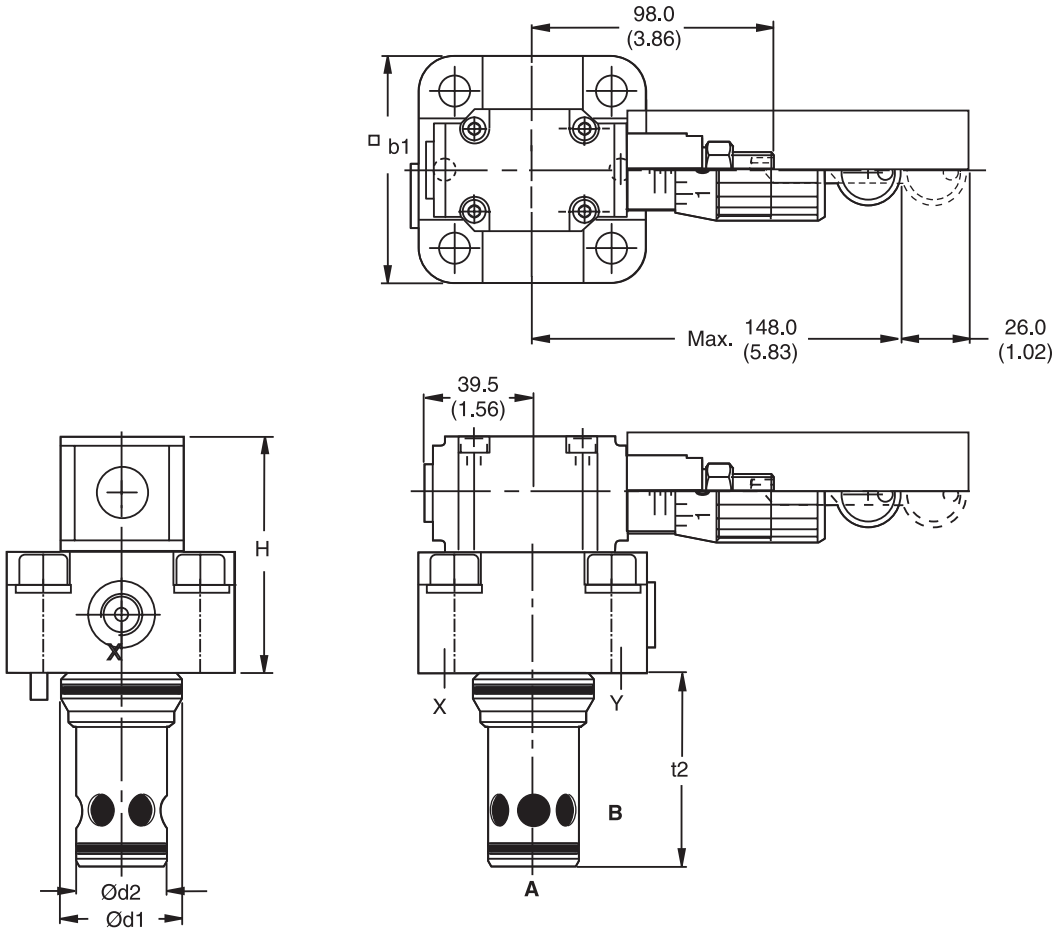
1) The performance curves are measured with external drain.
For internal drain, the tank pressure has to be added to curve.



Weight:

UR16E	2.2 kg (4.9 lbs.)
UR25E	3.5 kg (7.7 (lbs.)
UR32E	4.9 kg (10.8 lbs.)
UR40E	8.0 kg (17.6 lbs.)
UR50E	13.7 kg (30.2 lbs.)
UR63E	22.8 kg (50.3 lbs.)

Inch equivalents for millimeter dimensions are shown in (**)



Size	H	b_1	d_1	d_2	t_2
NG16	40.0 (1.57)	79.0 [1] (3.11)	32.0 (1.26)	25.0 (0.98)	58.0 (2.28)
NG25	45.0 (1.77)	85.0 (33.5)	45.0 (1.77)	34.0 (1.34)	72.0 (2.83)
NG32	50.0 (1.97)	102.0 (4.02)	60.0 (2.36)	45.0 (1.77)	85.0 (3.35)
NG40	103.0 (4.06)	125.0 (4.92)	75.0 (2.95)	55.0 (2.17)	105.0 (4.13)
NG50	138.0 (5.43)	140.0 (5.51)	90.0 (3.54)	68.0 (2.68)	122.0 (4.80)
NG63	153.0 (6.02)	180.0 (7.09)	120.0 (4.72)	90.0 (3.54)	155.0 (6.10)

[1] width 65mm

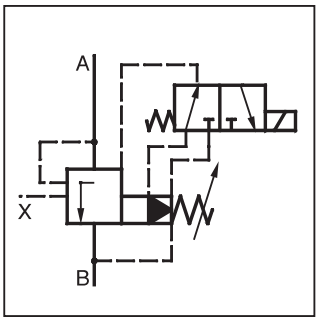
NG	Bolt Kit -		Kit	
			Nitrile	Fluorocarbon
16	BK414 (BK84)	33 Nm (24.3 lb.-ft.)	SK-R16E	SK-R16EV
25	BK391 (BK77)	115 Nm (84.8 lb.-ft.)	SK-R25E	SK-R25EV
32	BK415 (BK85)	281 Nm (207.2 lb.-ft.)	SK-R32E	SK-R32EV
40	BK416 (BK86)	553 Nm (407.8 lb.-ft.)	SK-R40E	SK-R40EV
50	BK417 (BK87)	553 Nm (407.8 lb.-ft.)	SK-R50E	SK-R50EV
63	BK418 (BK88)	1910 Nm (1408.6 lb.-ft.)	SK-R63E	SK-R63EV

UR_E.indd, dd

General Description

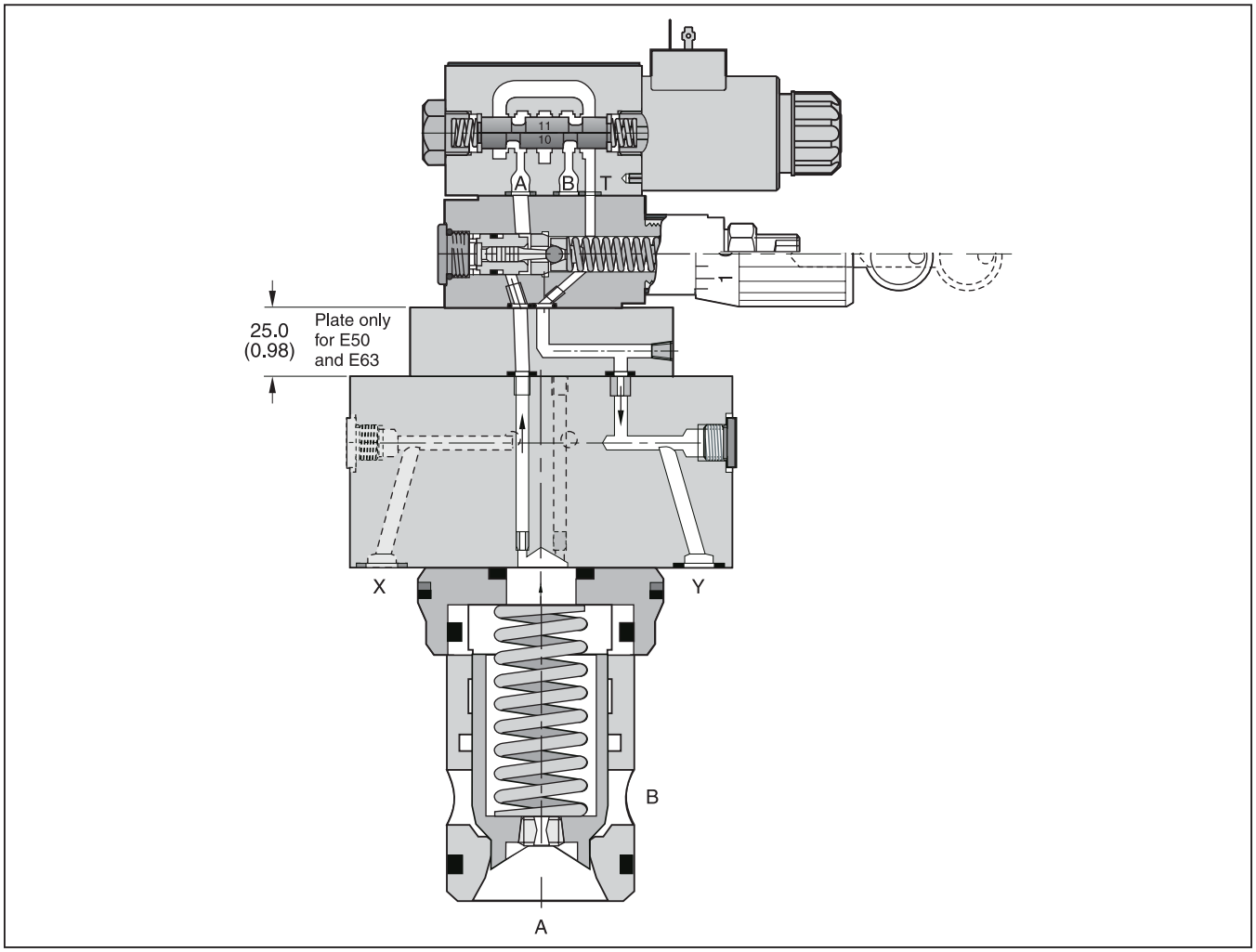
Series US*E unloading valves consist of a mechanical pilot stage and a slip-in cartridge main stage. These valves are used to unload a circuit at low pressure. The mechanically adjustable pressure signal to unload the main stage has to be applied to port X. The pressure differential between opening and closing is 13%.

In addition, Series US*E is vented by electrical operation. The US*E model codes embrace the pilot valves, covers and cartridges that are also offered as separate items. See combination examples for details.



Features

- Pilot operated unloading valve.
- Cavity and mounting pattern according to ISO 7368.
- 4 pressure ranges.
- 2 adjustment modes:
  - Hexagon screw with lock nut
  - DIN lock
- 6 sizes, NG16 to NG63.



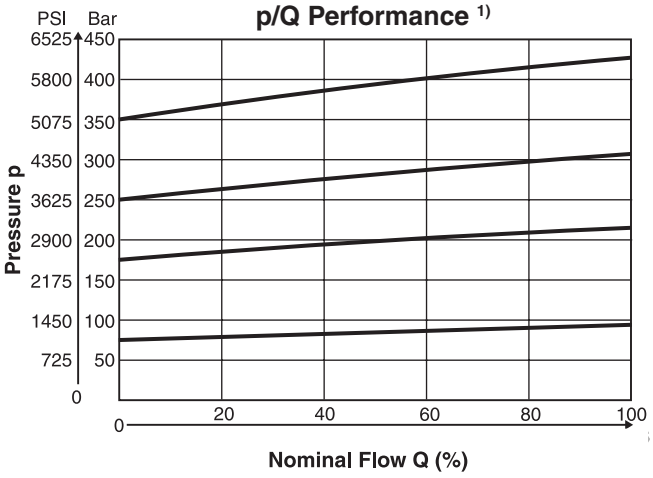
US_E.indd, dd

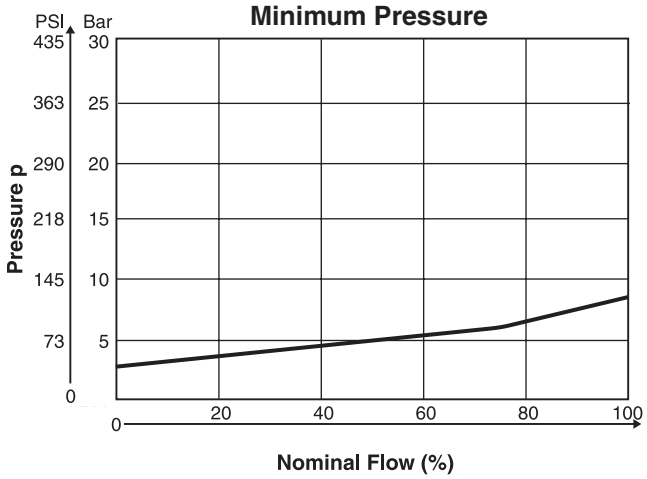
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Specifications

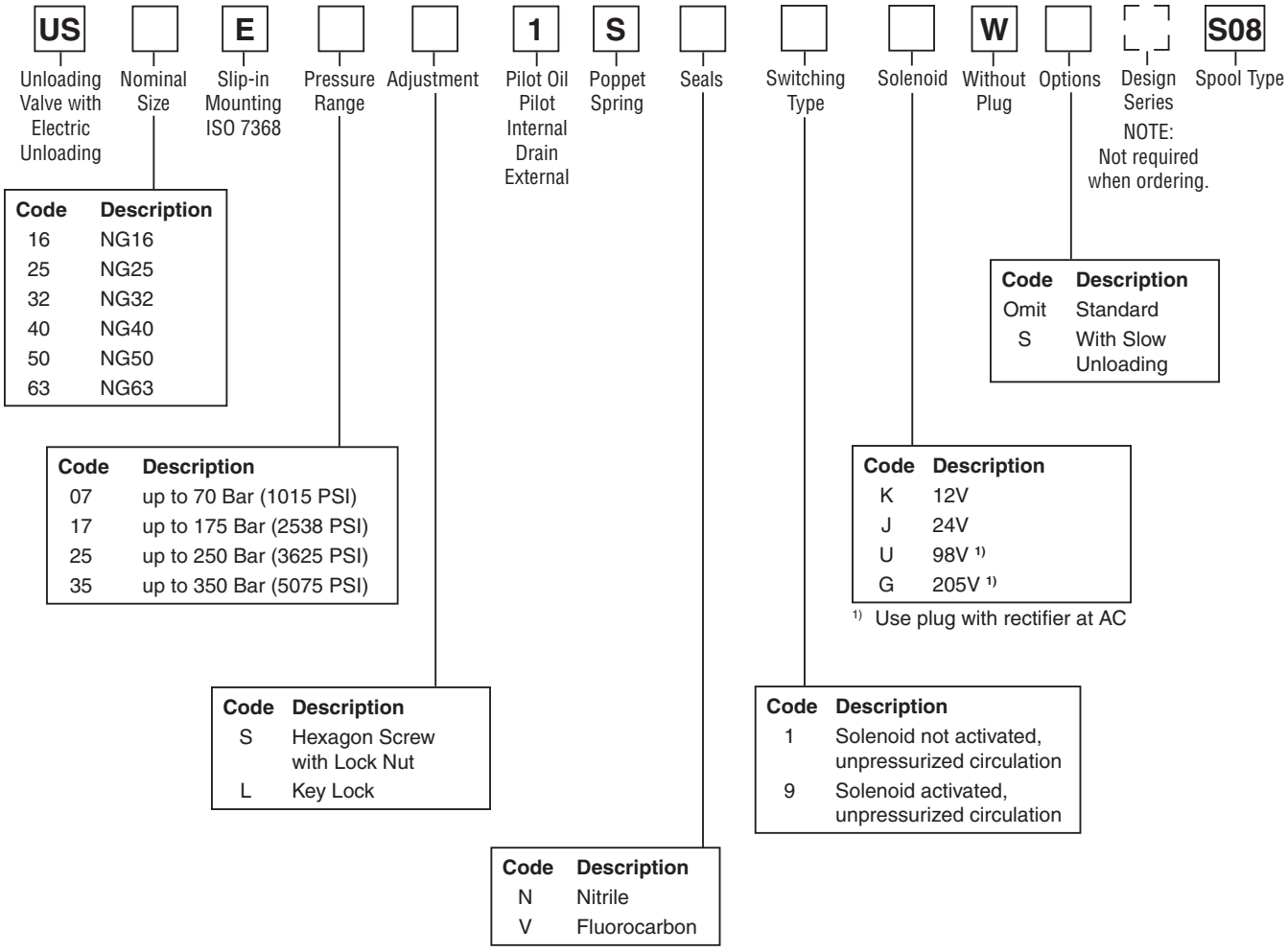
General						
Size	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Interface	Slip-in mounting acc. ISO 7368					
Mounting Position	As desired, horizontal mounting prefered					
Ambient Temperature	-20 to +80°C (-4 to +176°F)					
Hydraulic						
Maximum Operating Pressure	Ports A and X: 350 Bar (5075 PSI), Ports B and Y: depressurized					
Pressure Range	75, 175, 250, 350 Bar (1088, 2538, 3625, 5075 PSI)					
Pressure Differential	13%					
Nominal Flow	220 LPM (58 GPM)	500 LPM (132 GPM)	950 LPM (251 GPM)	1400 LPM (370 GPM)	2300 LPM (609 GPM)	4000 LPM (1058 GPM)
Fluid	Hydraulic oil according to DIN 51524 ... 525					
Viscosity, recommended	30 to 50 cSt (mm^2/s)					
Viscosity, permitted	20 to 380 cSt (mm^2/s)					
Fluid Temperature	-20 to +70°C (-4 to +158°F)					
Filtration	ISO 4406 - (1999) ; 18/16/13					
Electrical (Solenoid)						
Duty Ratio	100% ED; CAUTION: coil temperature up to 180°C (356°F) possible					
Maximum Switching Frequency	16000 switchings per hour					
Protection Class	IP 65 in according with EN 60529 (plugged and mounted)					
Direct Current **Code**	K	J	U	G		
Supply Voltage **Power** **Current**	12V 31W 2.5A	24V 31W 1.25A	98V 31W 0.31A	205V 31W 0.15A		
Solenoid Connection	Connector as per EN 175301-803					
Wiring	3 x 1.5 mm^2 minimum, recommended					
Wiring Length	50m (164 ft.) maximum, recommended					

Performance Curves





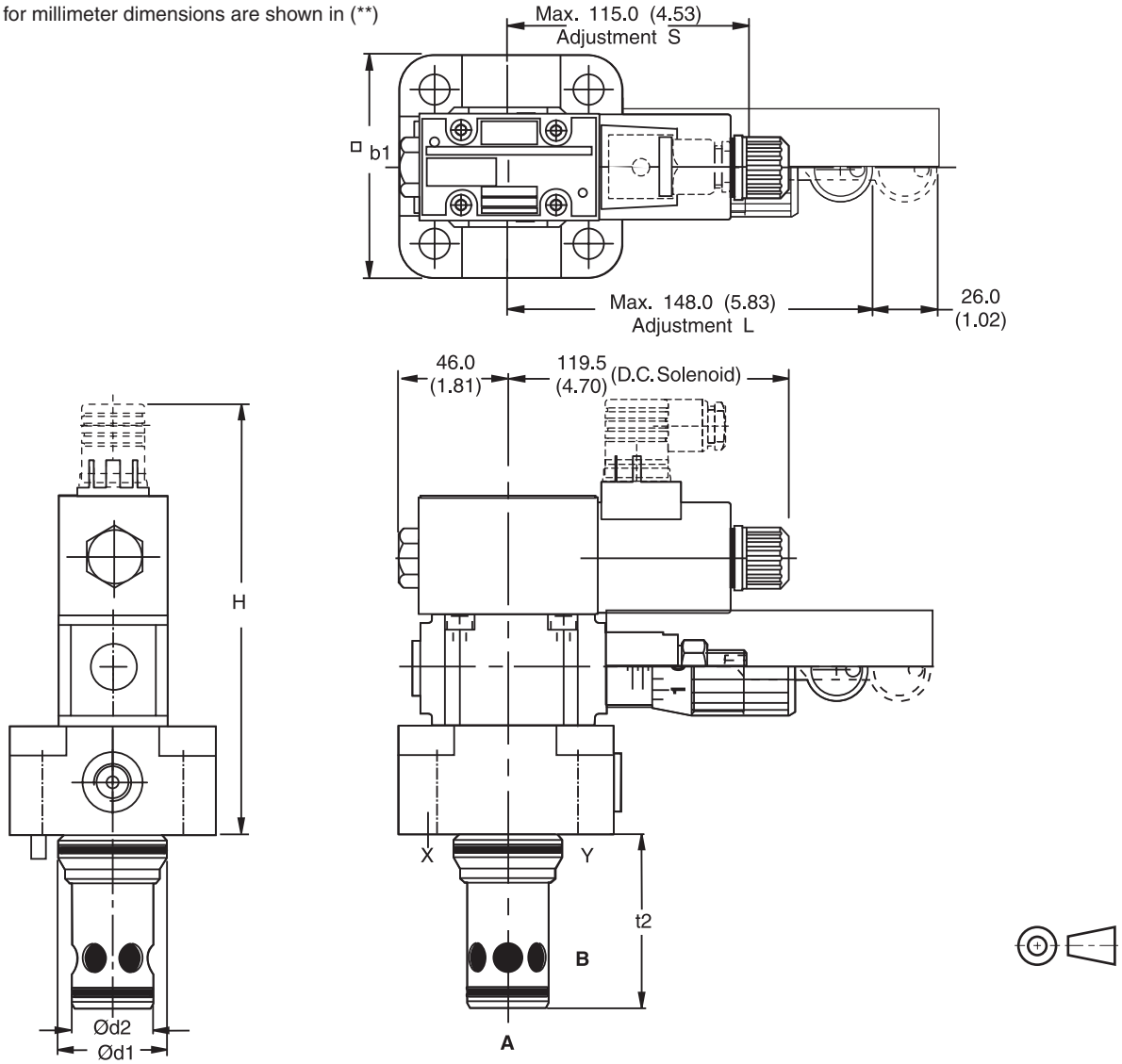
1) The performance curves are measured with external drain.
For internal drain the tank pressure has to be added to curve.



Weight:

US16E	2.7 kg (6.0 lbs.)
US25E	5.2 kg (11.5 (lbs.)
US32E	6.4 kg (14.1 lbs.)
US40E	9.5 kg (20.9 lbs.)
US50E	15.2 kg (33.5 lbs.)
US63E	24.3 kg (53.6 lbs.)

Inch equivalents for millimeter dimensions are shown in (**)



Size	H	b_1	d_1	d_2	t_2
NG16	177.0 (6.97)	79.0 [1] (3.11)	32.0 (1.26)	25.0 (0.98)	56.0 (2.20)
NG25	181.0 (7.13)	85.0 (33.5)	45.0 (1.77)	34.0 (1.34)	72.0 (2.83)
NG32	186.0 (7.32)	102.0 (4.02)	60.0 (2.36)	45.0 (1.77)	85.0 (3.35)
NG40	196.0 (7.72)	125.0 (4.92)	75.0 (2.95)	55.0 (2.17)	105.0 (4.13)
NG50	231.0 (9.09)	140.0 (5.51)	90.0 (3.54)	68.0 (2.68)	122.0 (4.80)
NG63	246.0 (9.69)	180.0 (7.09)	120.0 (4.72)	90.0 (3.54)	155.0 (6.10)

[1] width 65mm

NG	Bolt Kit -		Kit	
			Nitrile	Fluorocarbon
16	BK414 (BK84)	33 Nm (24.3 lb.-ft.)	SK-RS16E	SK-RS16EV
25	BK391 (BK77)	115 Nm (84.8 lb.-ft.)	SK-RS25E	SK-RS25EV
32	BK415 (BK85)	281 Nm (207.2 lb.-ft.)	SK-RS32E	SK-RS32EV
40	BK416 (BK86)	553 Nm (407.8 lb.-ft.)	SK-RS40E	SK-RS40EV
50	BK417 (BK87)	553 Nm (407.8 lb.-ft.)	SK-RS50E	SK-RS50EV
63	BK418 (BK88)	1910 Nm (1408.6 lb.-ft.)	SK-RS63E	SK-RS63EV

US_E.indd, dd

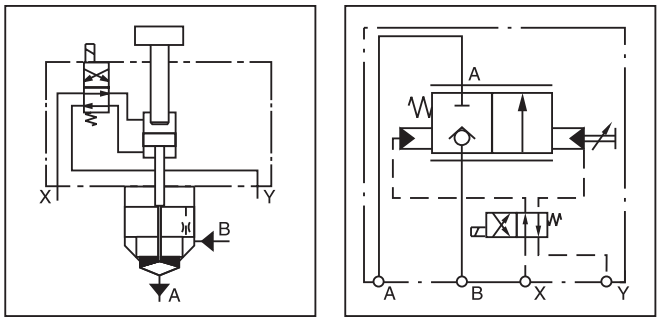
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

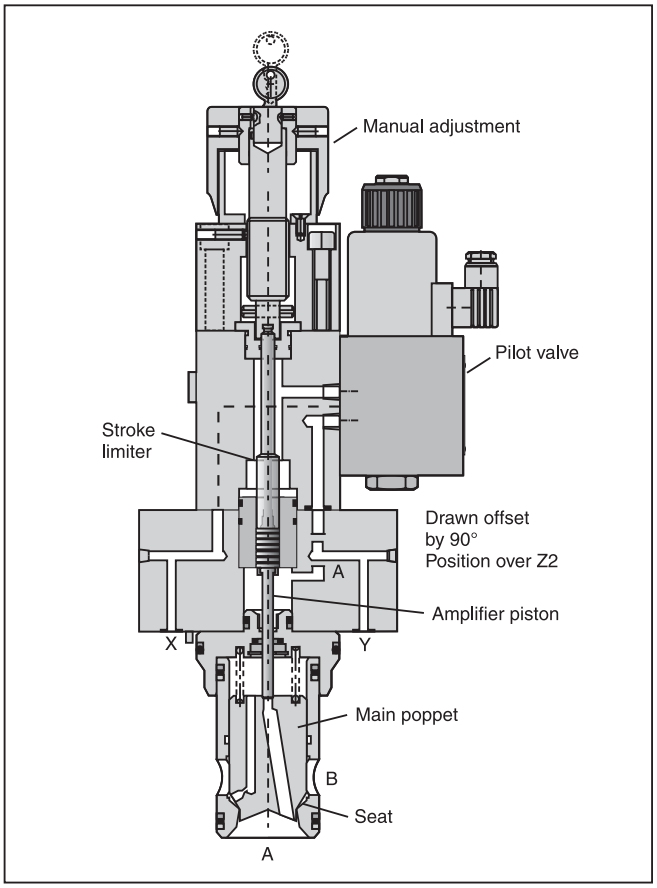
General Description

Accumulator discharge valves are preferably used in hydraulic systems where high volume flow rates are discharged from accumulators over a short operating period (in the range of milliseconds).

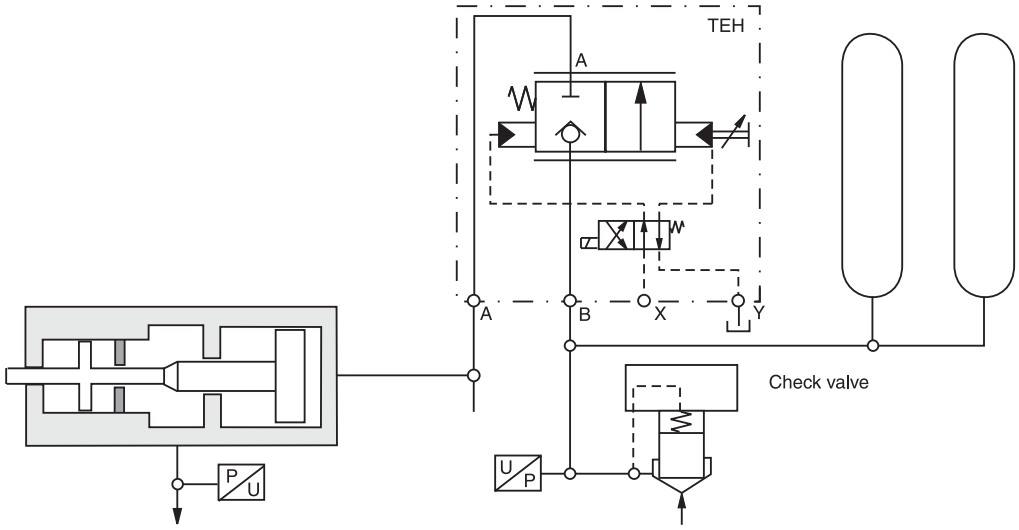
Typical applications are injection moulding and die casting machines as well as hydraulic presses.

The amplifier piston is pressed down onto the main poppet by pilot pressure in the X-line and pushes the main poppet into the seat. By switching the pilot valve the pilot pressure pushes the amplifier piston against the manual adjusted stroke limiter. The main poppet is forced by pressure in the B-line to follow the amplifier piston immediately and opens the adjusted area for flow from B to A. In the neutral position, the flow from B to A is blocked. With pilot pressure in X flow from A to B is blocked as well. Without pilot pressure oil can pass from A to B through the orifice in the poppet.





Example Accumulator System for an injection Cylinder



TEH.indd, dd

Specifications

General						
Size	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Interface	Slip-in cartridge according to ISO 7368					
Mounting Position	Unrestricted					
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)					
Extracting Tools	See Accessories					
Hydraulic						
Maximum Operating Pressure	Ports A, B and X: up to 350 Bar (5075 PSI), Port Y: 10 Bar (145 PSI) maximum					
Nominal Flow Δ **p= 10 Bar (145 PSI)**	950 LPM (251 GPM)	1400 LPM (370 GPM)	2300 LPM (609 GPM)	4000 LPM (1058 GPM)	6000 LPM (1577 GPM)	9500 LPM (2513 GPM)
Fluid	Hydraulic oil according to DIN 51524 ... 525					
Viscosity Recommended	30 to 80 cSt (mm^2/s)					
Viscosity Permitted	20 to 380 cSt (mm^2/s)					
Fluid Temperature	0°C to +60°C (-+32°F to +140°F)					
Filtration	ISO 4406 - (1999) ; 18/16/13					
Pilot Valve	4/2 flow control valve, See Catalog HY14-2502/US Type D1VW			4/2 flow control valve, See Catalog HY14-2502/US Type D3W		

Ordering Information

TEH	[ ]	E	L	0	9	[ ]	[ ]	W	[ ]	[ ]
Throttle Valve with Shut-off Function	Nominal Size	Cartridge Valve ISO 7368	Manual Adjustment with DIN-Lock	Spool Form	Flow Code	Flow Direction	Seals	Plug Socket without Plug	Solenoid Voltage	Design Series

NOTE: Not required when ordering.

Code	Description
032	NG32
040	NG40
050	NG50
063	NG63
080	NG80
100	NG100

Code	Description
A	A to B
B	B to A

Code	Description
N	Nitrile
V	Fluorocarbon

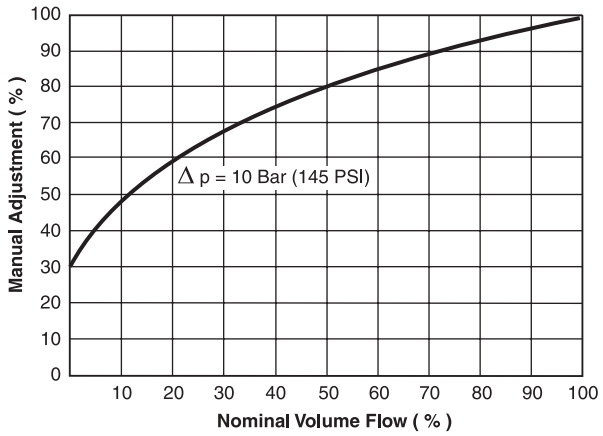
Code	Description
J	24V= / 1.25A
U	98V= / 0.31A *
G	205V= / 0.15A *

* For 110V / 50 Hz or 220V / 50 Hz use plug with rectifier

Weight:

TEH032	9.0 kg (19.8 lbs.)	TEH063	38.0 kg (83.8 lbs.)
TEH040	13.0 kg (28.7 (lbs.)	TEH080	62.0 kg (136.7 lbs.)
TEH050	22.0 kg (48.5 lbs.)	TEH100	85.0 kg (187.4 lbs.)

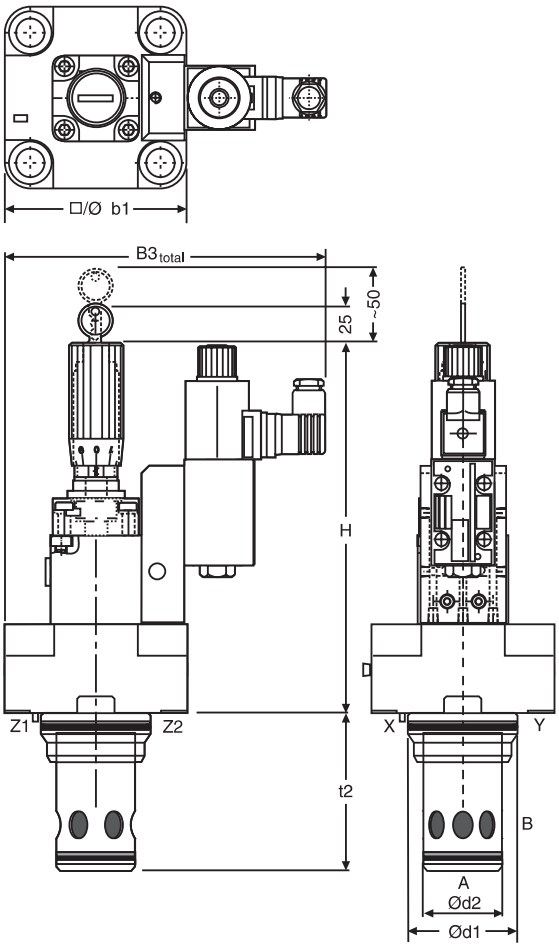
Performance Curve



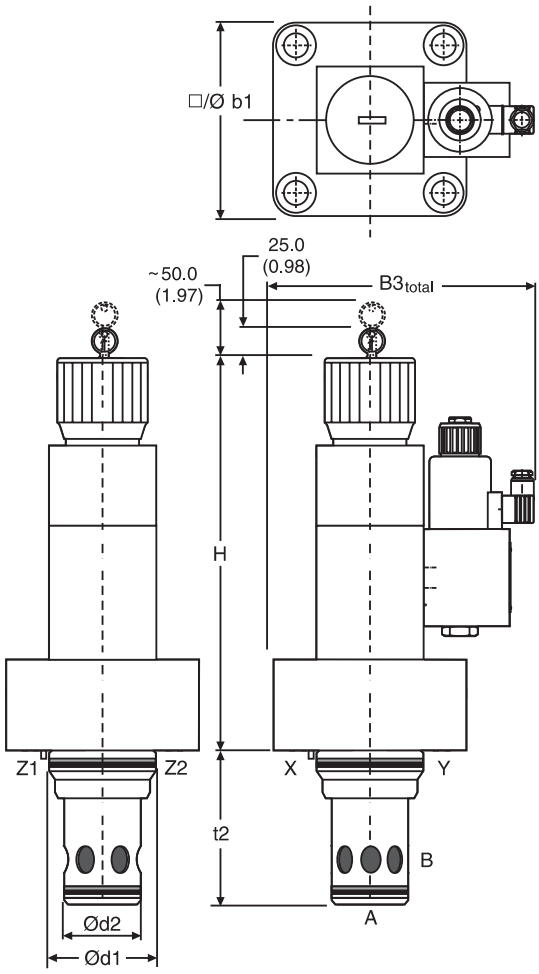
TEH.indd, dd

Inch equivalents for millimeter dimensions are shown in (**)

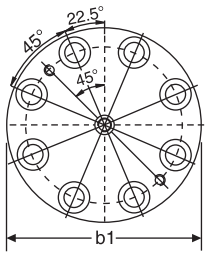
NG32 to 50

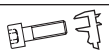
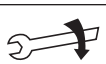


NG63 to 100



Size	32	40	50	63	80	100
H	255.0 (10.04)	265.0 (10.43)	275.0 (10.83)	407.0 (16.02)	427.0 (16.81)	442.0 (17.04)
b1	102.0 (4.02)	125.0 (4.92)	140.0 (5.51)	180.0 (7.09)	Ø250.0 (9.84)	Ø300.0 (11.81)
$d1^{H7}$	60.0 (2.36)	75.0 (2.95)	90.0 (3.54)	120.0 (4.72)	145.0 (5.71)	180.0 (7.09)
$d2^{H7}$	45.0 (1.77)	55.0 (2.17)	68.0 (2.68)	90.0 (3.54)	110.0 (4.33)	135.0 (5.31)
$t2^{+0.1}$	85.0 (3.35)	105.0 (4.13)	122.0 (4.80)	155.0 (6.10)	205.0 (8.07)	245.0 (9.65)
$B3_{total}$	205.0 (8.07)	216.0 (8.50)	224.0 (8.82)	255.0 (10.04)	290.0 (11.42)	315.0 (12.40)



NG	Bolt Kit - 		Kit ⬭ Nitrile	Kit ⬭ Fluorocarbon
32	BK415 (BK85)	281 Nm (207.2 lb.-ft.)	SK-TEH032EN-20	SK-TEH032EV-20
40	BK416 (BK86)	553 Nm (407.8 lb.-ft.)	SK-TEH040EN-20	SK-TEH040EV-20
50	BK417 (BK87)	553 Nm (407.8 lb.-ft.)	SK-TEH050EN-20	SK-TEH050EV-20
63	BK418 (BK88)	1910 Nm (1408.6 lb.-ft.)	SK-TEH063EN-20	SK-TEH063EV-20
80	BK419 (BK135)	935 Nm (689.6 lb.-ft.)	SK-TEH080EN-20	SK-TEH080EV-20
100	BK420 (BK90)	1910 Nm (1408.6 lb.-ft.)	SK-TEH100EN-20	SK-TEH100EV-20

TEH.indd, dd

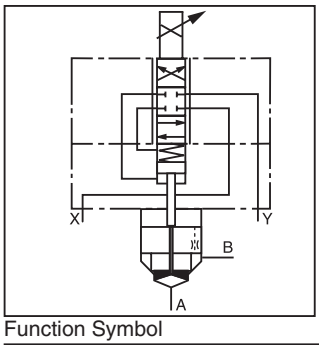
Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

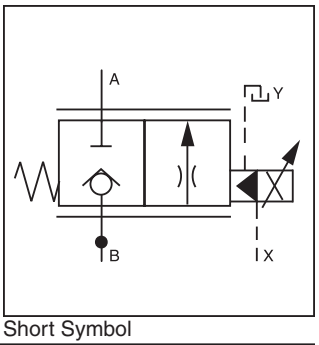
Series TDA 2/2 way proportional throttle valves are used to control large oil flows.

Features

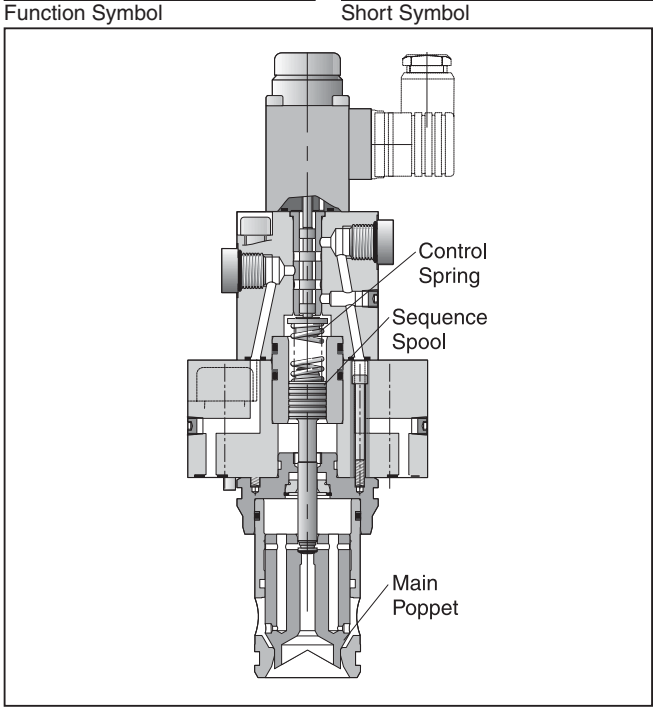
- Cavity and mounting pattern according to ISO 7368.
- Fail-safe function at power failure.
- Leak-free from port B to A.
- Pressure differential up to 350 Bar (5075 PSI) possible.
- 8 sizes NG16 up to NG100.



Function Symbol



Short Symbol



Function

The TDA valve has a 3-stage design consisting of the first solenoid operated pilot stage with a spool in sleeve design, the second pilot stage with the control spring and the sequence spool and as main stage the poppet in the sleeve. The proportional solenoid operates the pilot spool against the feedback of the control spring and controls the position of the sequence spool. The main poppet follows the position of the sequence spool and provides an open area for flow from B to A (optional A to B) in proportion to the solenoid current. The poppet is positioned independent of the differential pressure, which can become as high as the maximum working pressure.

In combination with the digital power amplifier PCD00A-400 the valve parameters can be saved, changed and duplicated.

Ordering Information

TDA	☐	E	W	0	9	☐	2	☐	☐	W	⌜⌝
Proportional Throttle Valve	Nominal Size	Slip-in Valve DIN ISO 7368	Design	Poppet Shape	Nominal Flow	Flow Direction	Piloting	Seals	Solenoid Voltage	Plug Socket without Plug	Design Series

NOTE: Not required when ordering.

Code	Description
016	NG16
025	NG25
032	NG32
040	NG40
050	NG50
063	NG63
080	NG80
100	NG100

Code	Description
A	A to B
B	B to A

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
L	6 VDC
X	16 VDC

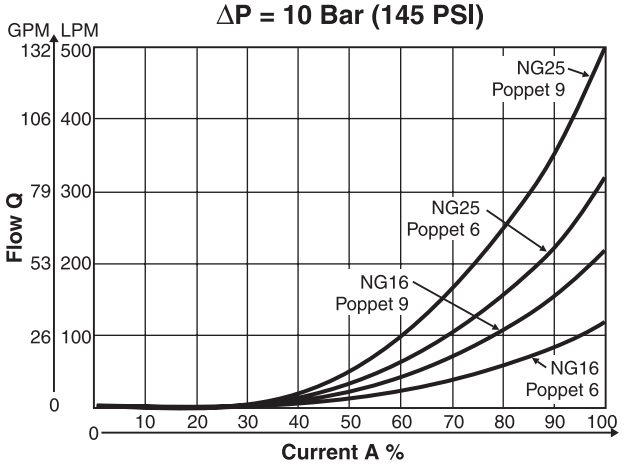
Weight:

TDA016	3.1 kg (6.8 lbs.)	TDA050	15.0 kg (33.1 lbs.)
TDA025	4.3 kg (9.5 (lbs.)	TDA063	33.0 kg (72.8 lbs.)
TDA032	5.8 kg (12.8 lbs.)	TDA080	63.0 kg (138.9 lbs.)
TDA040	9.2 kg (20.3 lbs.)	TDA100	87.0 kg (191.8 lbs.)

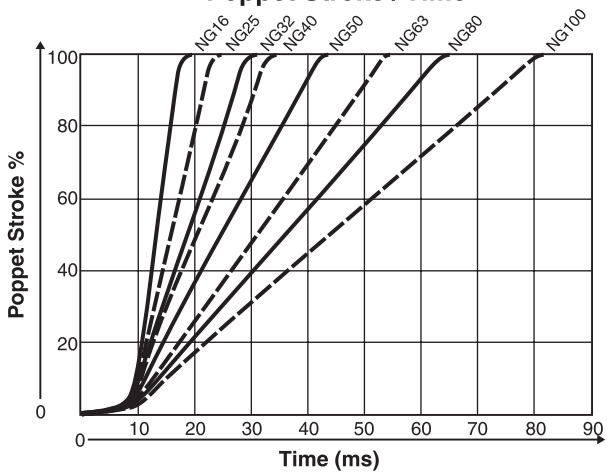
General								
Size	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Interface	Slip-in cartridge according to ISO 7368							
Mounting Position	Unrestricted							
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)							
Hydraulic	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Maximum Operating Pressure	Ports A, B and X: 350 Bar (5075 PSI), Port Y 10: Bar (145 PSI) maximum							
Nominal Flow LPM **Δp = 10 Bar (145 PSI) GPM**	220 (58)	500 (132)	950 (251)	1400 (370)	2300 (609)	4000 (1058)	6000 (1587)	9500 (2513)
Flow Direction	See Ordering Information							
Fluid	Hydraulic oil according to DIN 51524 ... 525							
Viscosity, recommended	30 to 80 cSt (mm^2/s)							
Viscosity, permitted	20 to 380 cSt (mm^2/s)							
Fluid Temperature	0°C to +60°C (+32°F to +140°F)							
Filtration	ISO 4406 - (1999) ; 18/16/13							
Minimum Pilot Pressure	> 25% of system pressure							
Minimum Operating Pressure	Port A to B at 10 Bar (145 PSI), B to A at 15 Bar (208 PSI)							
Pilot Oil Supply	Depending on flow direction A or B using X or external X							
Pilot Oil Drain	External using Y, 10 Bar (145 PSI) maximum							
Pilot Oil at p = 100 Bar (1450 PSI)	Port X to Y < 1.5 LPM (0.4 GPM)							
Opening Point	At 30% of nominal current							
Manufacturing Tolerance	±5% of Qnom							
Static / Dynamic	**NG16**	**NG23**	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Hysteresis	< 3%							
Repeatability	< 1%							
Response time **px = 50 Bar (725 PSI)**	20 ms	25 ms	30 ms	35 ms	45 ms	55 ms	65 ms	80 ms
Electrical (Proportional Solenoid)								
Duty Ratio	100% ED							
Protection Class	IP 65 in according with EN 60529 (plugged and mounted)							
Solenoid Code	**L**				**X**			
Size	**NG16-50**		**NG63-100**		**NG16-50**		**NG63-100**	
Solenoid Voltage **Nominal Current (100% ED)**	6 VDC 2.6 amps				16 VDC 1.05 amps			
Nominal Resistance	2.2 Ohm		2.5 Ohm		11.3 Ohm		14 Ohm	
Power Amplifier, recommended	PCD00A-400							
Solenoid Connection	Connector as per EN 175301-803							

The pilot pressure in X-line must be at least 25% (NG16-40) or 45% (NG50-100) of the pressure in the draining-off line of the cartridge to make sure that the main poppet closes safely without malfunction.

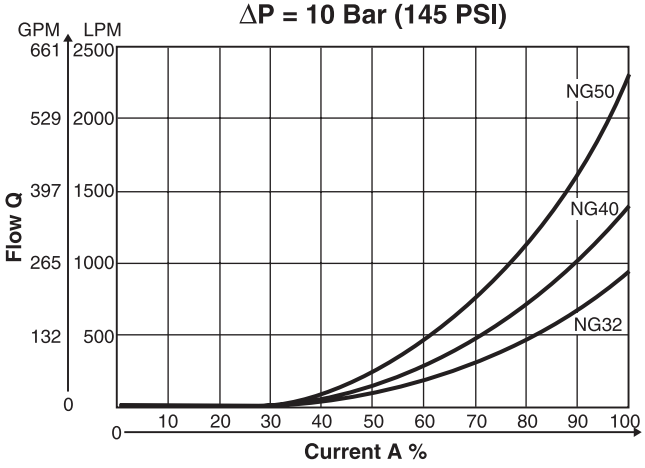
NG16 and NG25 Solenoid Current
ΔP = 10 Bar (145 PSI)



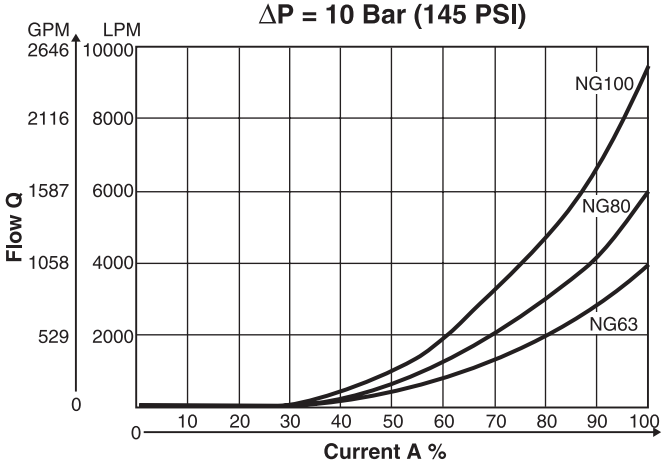
Poppet Stroke / Time



NG32, NG40 and NG50 Solenoid Current
ΔP = 10 Bar (145 PSI)



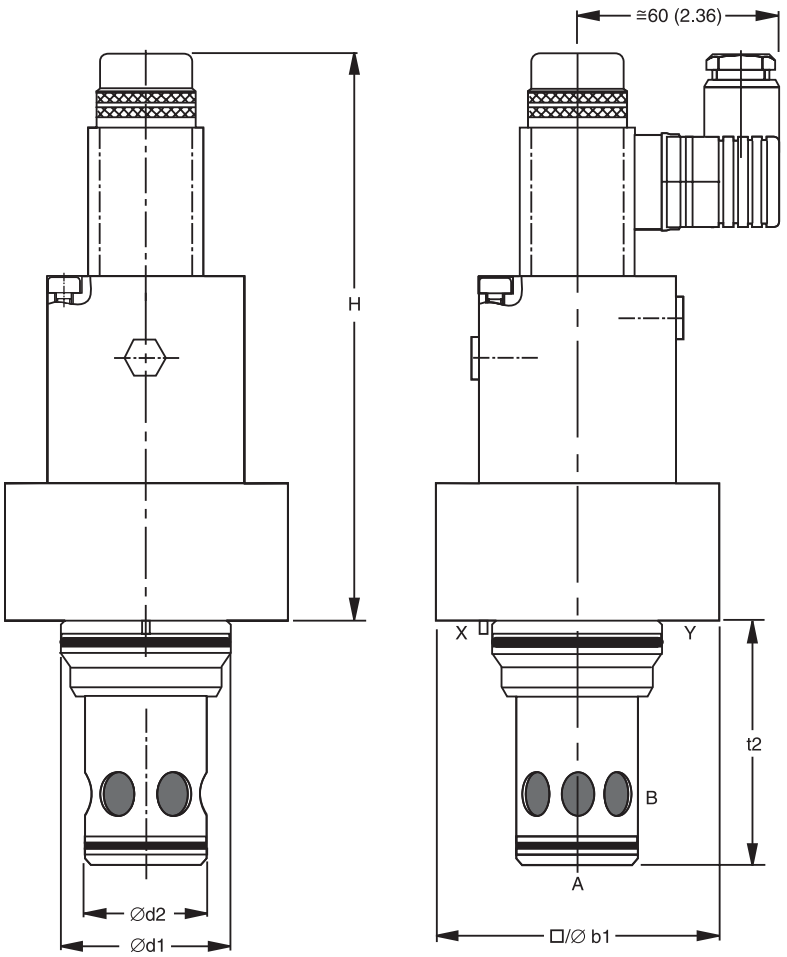
NG63, NG80 and NG100 Solenoid Current
ΔP = 10 Bar (145 PSI)



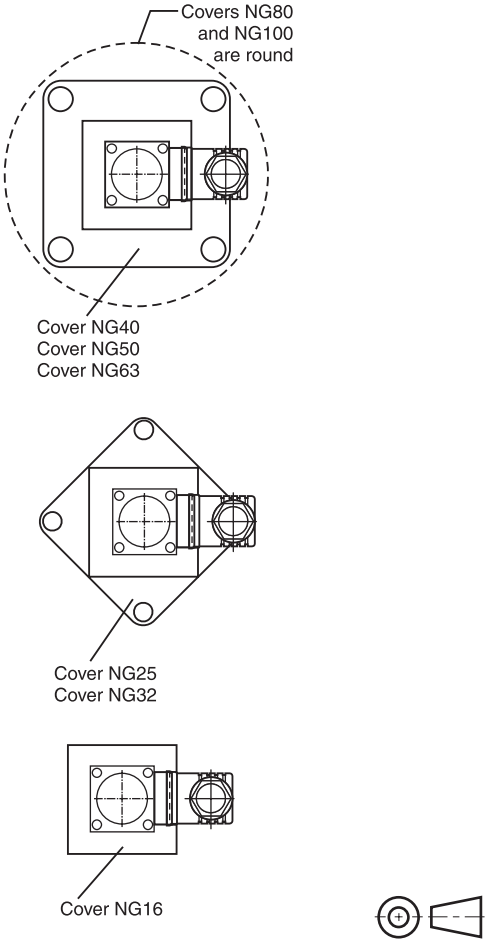
$$\Delta p_{actual} = \left(\frac{Q_{actual}}{Q_{nominal}}\right)_2 \bullet \Delta p_{nominal}$$

Inch equivalents for millimeter dimensions are shown in (**)

Valves



Valve Covers



Size	NG16	NG25	NG32	NG40	NG50	NG63	NG80	NG100
H	168.0 (6.61)	173.0 (6.81)	178.0 (7.01)	262.0 (10.31)	198.0 (7.80)	287.0 (11.30)	327.0 (12.87)	342.0 (13.46)
b1	65.0 (2.56)	85.0 (3.35)	102.0 (4.02)	125.0 (4.92)	140.0 (5.51)	180.0 (7.09)	Ø250.0 (9.84)	Ø300.0 (11.81)
$d1^{H7}$	32.0 (1.26)	45.0 (1.77)	60.0 (2.36)	75.0 (2.95)	90.0 (3.54)	120.0 (4.72)	145.0 (5.71)	180.0 (7.09)
$d2^{H7}$	25.0 (0.98)	34.0 (1.34)	45.0 (1.77)	55.0 (2.17)	68.0 (2.68)	90.0 (3.54)	110.0 (4.33)	135.0 (5.31)
$t2^{+0.1}$	56.0 (2.20)	72.0 (2.83)	85.0 (3.35)	105.0 (4.13)	122.0 (4.80)	155.0 (6.10)	205.0 (8.07)	245.0 (9.65)

NG	Bolt Kit -		Kit	
			Nitrile	Fluorocarbon
16	BK-M8x100-4pcs	33 Nm (24.3 lb.-ft.)	SK-TDA016EN-20	SK-TDA016EV-20
25	BK391 (BK77)	115 Nm (54.8 lb.-ft.)	SK-TDA025EN-20	SK-TDA025EV-20
32	BK415 (BK85)	281 Nm (207.2 lb.-ft.)	SK-TDA032EN-20	SK-TDA032EV-20
40	BK416 (BK86)	553 Nm (407.8 lb.-ft.)	SK-TDA040EN-20	SK-TDA040EV-20
50	BK417 (BK87)	553 Nm (407.8 lb.-ft.)	SK-TDA050EN-20	SK-TDA050EV-20
63	BK418 (BK88)	1910 Nm (1408.6 lb.-ft.)	SK-TDA063EN-20	SK-TDA063EV-20
80	BK419 (BK135)	935 Nm (689.6 lb.-ft.)	SK-TDA080EN-20	SK-TDA080EV-20
100	BK420 (BK90)	1910 Nm (1408.6 lb.-ft.)	SK-TDA100EN-20	SK-TDA100EV-20

TDA.indd, dd

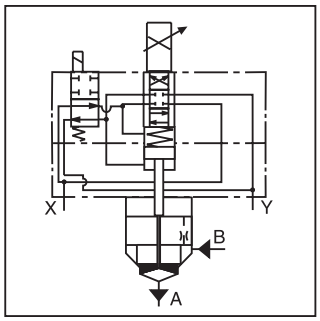
General Description

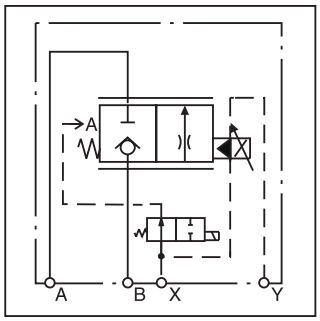
Accumulator discharge valves are preferably used in hydraulic systems where high flow rates are discharged from hydraulic accumulators over a short operating period (in the range of milliseconds).

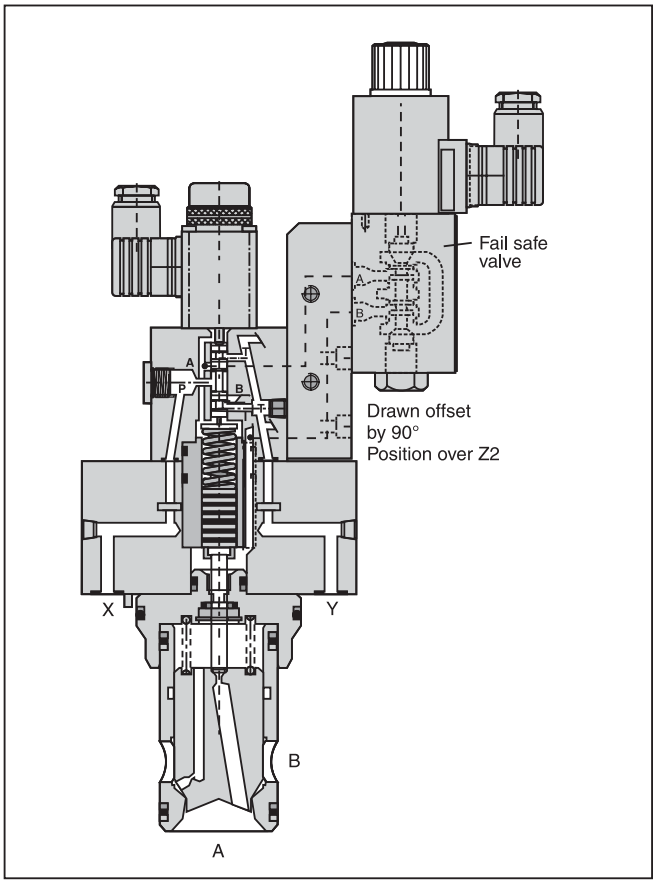
Typical applications are injection molding and die casting machines as well as hydraulic presses.

Basically the function of an accumulator discharge valve corresponds to the function of a TDA throttle valve. In addition a directional valve is integrated in the pilot circuit to meet the relevant safety regulations.

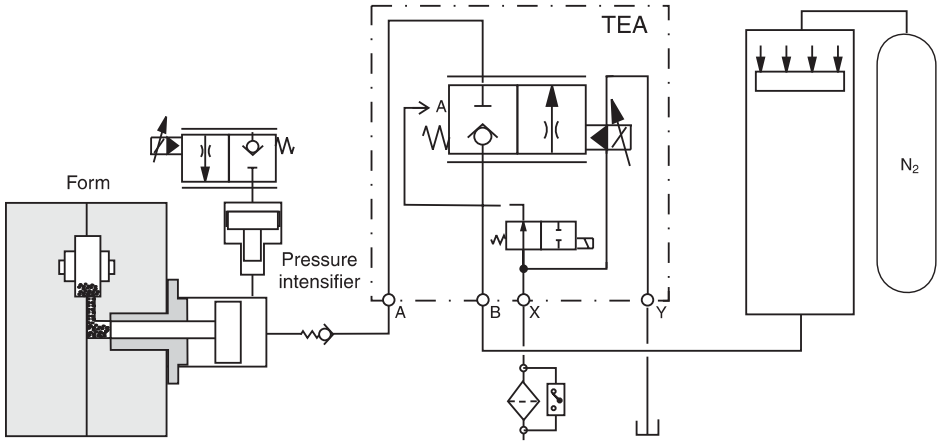
The directional valve provides the safety function. When the solenoid is deenergized and the spring is in the end position, pilot pressure from X presses the control piston into lower end position and, the main poppet is closed. As a result the flow from B to A or from the reservoir system to the machine is blocked.







Example: Accumulator System in a Die Casting Machine



General						
Size	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Interface	Slip-in cartridge according to ISO 7368					
Mounting Position	Unrestricted					
Ambient Temperature	-20 to +80°C (-4 to +176°F)					
Hydraulic	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Maximum Operating Pressure	Ports A, B and X: 350 Bar (5075 PSI), Port Y: 10 Bar (145 PSI) maximum					
Nominal Flow Δp **= 10 Bar (145 PSI)**	950 LPM (251) GPM	1400 LPM (370) GPM	2300 LPM (609) GPM	4000 LPM (1058) GPM	6000 LPM (1587 GPM	9500 LPM (2513) GPM
Fluid	Hydraulic oil according to DIN 51524 ... 525					
Viscosity, recommended	30 to 80 cSt (mm^2/s)					
Viscosity, permitted	20 to 380 cSt (mm^2/s)					
Fluid Temperature	0 to +60°C (+32°F to +140°F)					
Filtration	ISO 4406 - (1999) ; 18/16/13					
Minimum Pilot Pressure	< 25% of system pressure					
Minimum Operating Pressure	Port A to B at 10 Bar (145 PSI), B to A at 15 Bar (208 PSI)					
Pilot Oil Supply	Depending on flow direction A or B using X or external X					
Pilot Oil at p = 100 Bar (1450 PSI)	Port X to Y < 1.5 LPM (0.4 GPM)					
Opening Point	At 30% of nominal current					
Manufacturing Tolerance	±5% of Qnom					
Static / Dynamic	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Hysteresis	< 3%					
Repeatability	< 1%					
Response time px = 50 Bar (725 PSI)	30 ms	35 ms	45 ms	55 ms	65 ms	80 ms
Electrical (Proportional Solenoid)						
Duty Ratio	100% ED					
Protection Class	IP 65 in according with EN 60529 (plugged and mounted)					
Solenoid Code	**L**			**X**		
Size	**NG16-50**		**NG63-100**	**NG16-50**		**NG63-100**
Solenoid Voltage Nominal Current (100% ED)	6 VDC 2.6 amps			16 VDC 1.05 amps		
Nominal Resistance	2.2 Ohm		2.5 Ohm	11.3 Ohm		14 Ohm
Power Amplifier, recommended	PCD00A-400					
Solenoid Connection	Connector as per EN 175301-803					
Pilot Valve	4/2 flow control valve, See Catalog HY14-2502/US Type D1VW			4/2 flow control valve, See Catalog HY14-2502/US Type D3W		

Ordering Information

TEA	[ ]	E	W	0	9	[ ]	2	[ ]	[ ]	W	[ ]	[ ]
Proportional Throttle Valve with Shut-off Function	Nominal Size	Cartridge Valve ISO 7368	Design	Spool Form	Flow Code	Flow Direction	Pilot Oil Guide	Seals	Proportional Solenoid Voltage	Plug Socket without Plug	Solenoid Voltage	Design Series

NOTE: Not required when ordering.

Code	Description
032	NG32
040	NG40
050	NG50
063	NG63
080	NG80
100	NG100

Code	Description
A	A to B
B	B to A

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
L	6 VDC
X	16 VDC

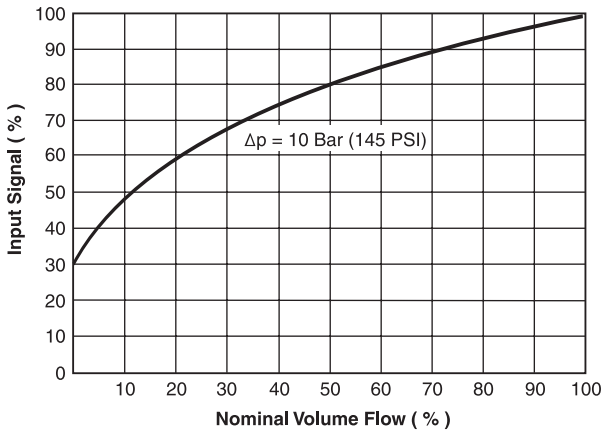
Code	Description
J	24V= / 1.25A
U	98V= / 0.31A *
G	205V= / 0.15A *

* For 110V / 50 Hz or 220V / 50 Hz use plug with rectifier

Weight:

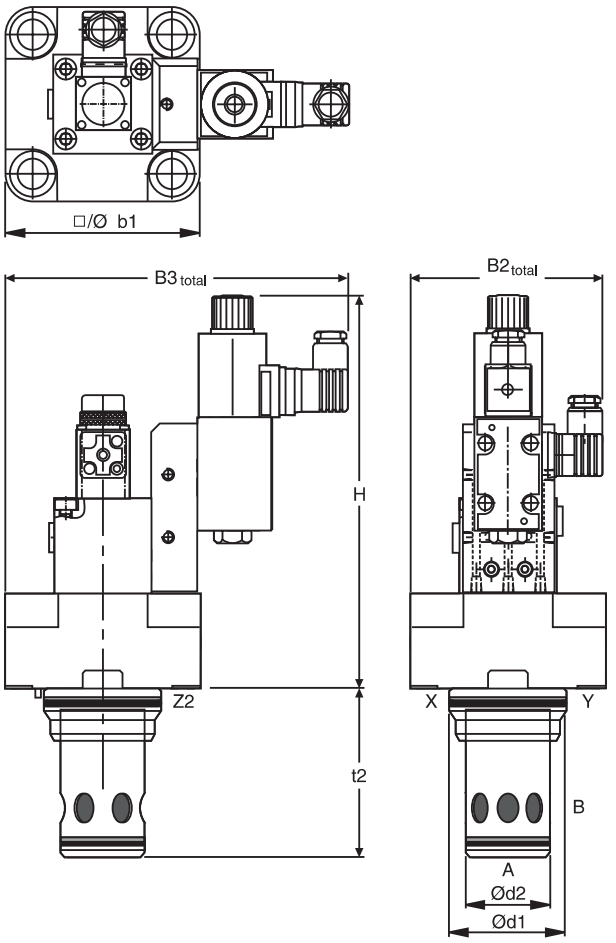
TEA032	9 kg (19.8 lbs.)
TEA040	13 kg (28.7 (lbs.)
TEA050	22 kg (48.5 lbs.)
TEA063	38 kg (83.8 lbs.)
TEA080	62 kg (136.7 lbs.)
TEA100	85 kg (187.4 lbs.)

Performance Curve

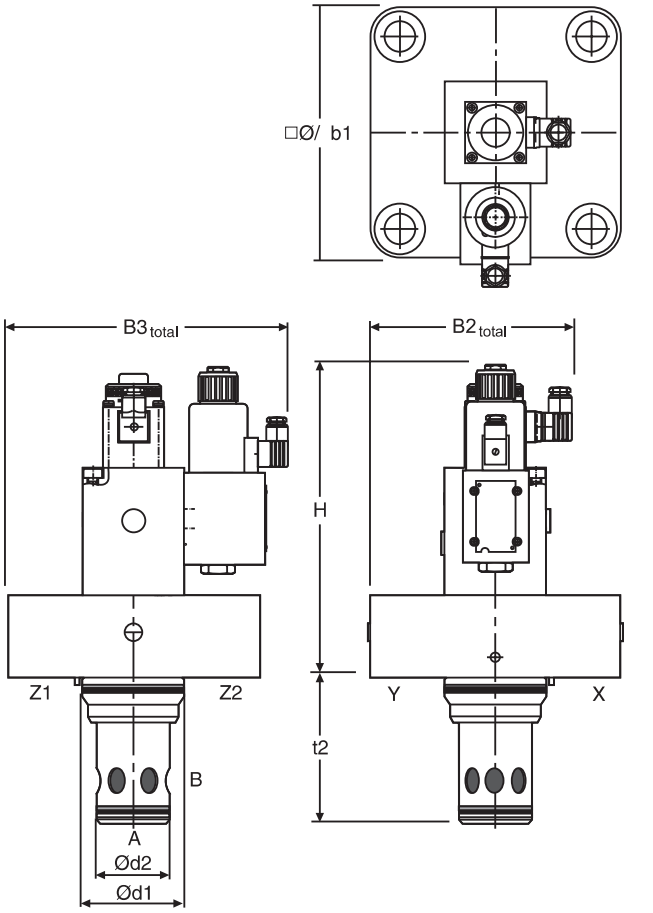


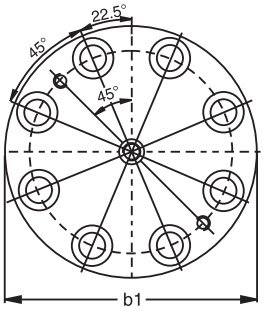
Inch equivalents for millimeter dimensions are shown in (**)

NG32 to NG50



NG63 to NG100





Size	32	40	50	63	80	100
H	250.0 (98.4)	260.0 (10.24)	270.0 (10.63)	312.0 (12.28)	337.0 (13.27)	352.0 (13.86)
b1	102.0 (4.02)	125.0 (4.92)	140.0 (5.51)	180.0 (7.09)	Ø250.0 (9.84)	Ø300.0 (11.81)
$d1^{H7}$	60.0 (2.36)	75.0 (2.95)	90.0 (3.54)	120.0 (4.72)	145.0 (5.71)	180.0 (7.09)
$d2^{H7}$	45.0 (1.77)	55.0 (2.17)	68.0 (2.68)	90.0 (3.54)	110.0 (4.33)	135.0 (5.31)
$t2^{+0.1}$	85.0 (3.35)	105.0 (4.13)	122.0 (4.80)	155.0 (6.10)	205.0 (8.07)	245.0 (9.65)
$B2_{total}$	106.0 (4.17)	118.0 (4.65)	125.0 (4.92)	158.0 (6.22)	193.0 (7.60)	218.0 (8.58)
$B3_{total}$	205.0 (8.07)	216.0 (8.50)	224.0 (8.82)	255.0 (10.04)	290.0 (11.42)	315.0 (12.40)

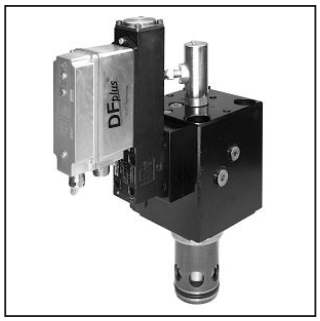
NG	Bolt Kit -		Kit	
			Nitrile	Fluorocarbon
32	BK415 (BK85)	281 Nm (207.2 lb.-ft.)	SK-TEA032EN-20	SK-TEA032EV-20
40	BK416 (BK86)	553 Nm (407.8 lb.-ft.)	SK-TEA040EN-20	SK-TEA040EV-20
50	BK417 (BK87)	553 Nm (407.8 lb.-ft.)	SK-TEA050EN-20	SK-TEA050EV-20
63	BK418 (BK88)	1910 Nm (1408.6 lb.-ft.)	SK-TEA063EN-20	SK-TEA063EV-20
80	BK419 (BK135)	935 Nm (689.6 lb.-ft.)	SK-TEA080EN-20	SK-TEA080EV-20
100	BK420 (BK90)	1910 Nm (1408.6 lb.-ft.)	SK-TEA100EN-20	SK-TEA100EV-20

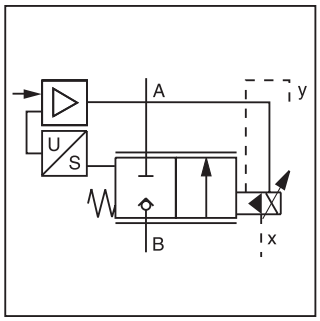
TEA.indd, dd

Notes

General Description

Series TDL 2/2 way, proportional throttle valves are used in applications where high flow has to be precisely controlled with a very fast response time. Typical applications are die casting, injection moulding and hydraulic presses.



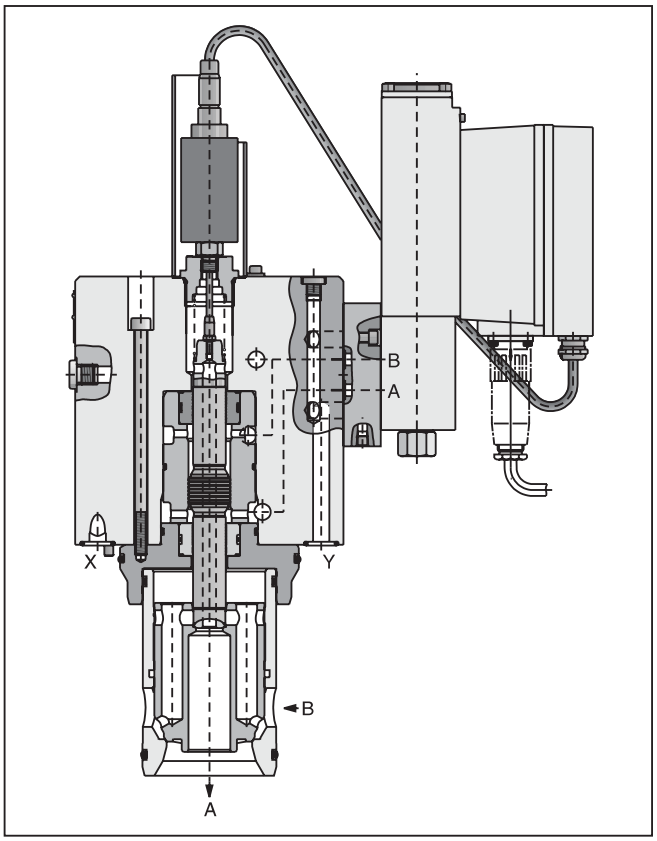


Function

The TDL valve has a 3-stage design consisting of the DFplus pilot valve, the hydraulic follow-up system with LVDT and the main stage with poppet and sleeve.

With the DFplus pilot valve the TDL achieves extremely fast response times: from 14ms (NG40) up to 22ms (NG100) with an adjustment precision of 0.5% of the nominal adjusted flow. The follow-up spool enables the poppet to be positioned independent of the differential pressure, which can become as high as the maximum working pressure.

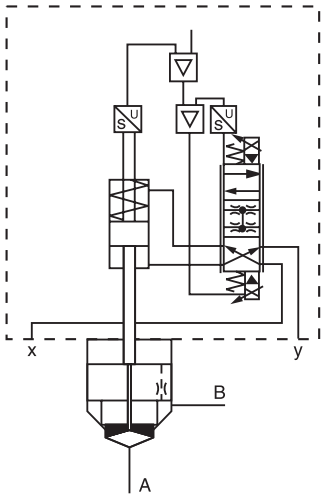
The optimum dynamics are achieved at a control pressure >50 bar. The TDL has integrated electronics controlling both the position of the follow-up piston and the spool position of the DFplus pilot valve. All this makes the TDL a completely factory set unit with minimum or no need for on-site setting.



Features

- Pilot operated 2/2 way proportional throttle valve.
- Cavity and mounting pattern according to ISO 7368.
- For speed and position control.
- Fast step response.
- Flow direction B to A.
- Completely calibrated unit with integrated electronics.
- Fail safe position.
- 5 sizes NG40 up to NG100.

Function Symbol



General					
Size	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Interface	Slip-in cartridge according to ISO 7368				
Mounting Position	Unrestricted				
Ambient Temperature	-20 to +80°C (-4 to +176°F)				
Extracting Tool	See Accessories				
Hydraulic	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Maximum Operating Pressure	Ports A, B and X: 350 Bar (5075 PSI), Port Y: 10 Bar (145 PSI) maximum				
Nominal Flow **Δp = 20 Bar (290 PSI)**	2500 LPM (661) GPM	4100 LPM (1085) GPM	6800 LPM (1799) GPM	9500 LPM (2153) GPM	13500 LPM (3571 GPM
Flow Direction	B to A				
Fluid	Hydraulic oil according to DIN 51524 ... 525				
Viscosity, recommended	30 to 80 cSt (mm^2/s)				
Viscosity, permitted	20 to 380 cSt (mm^2/s)				
Fluid Temperature	0 to +60°C (+32°F to +140°F)				
Filtration	ISO 4406 - (1999) ; 18/16/13				
Minimum Pilot Pressure	50% of system presssure				
Pilot Oil Supply	Depending on flow direction B using X or external X				
Pilot Oil Drain	External using Y, 10 Bar (145 PSI) maximum				
Leakage at p = 175 Bar (2538 PSI)	Port X to Y				
Releae Off	NG40 to NG63 <1.2 LPM (0.3 GPM), NG80 to NG100 <2.0 LPM (0.5 GPM)				
Enable On	NG40 to NG63 <2.5 LPM (0.7 GPM), NG80 to NG100 <4.0 LPM (1.1 GPM)				
Supply Pressure at Port B	Approximately 5 Bar (73 PSI), minimum				
Pilot Fluid Flow	13 LPM (3.4 GPM)	24 LPM (6.3 GPM)	42 LPM (11.1 GPM)	54 LPM (14.3 GPM)	65 LPM (17.2 GPM)
Static / Dynamic	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Hysteresis	< 1%				
Repeatability	< 0.5%				
Response Time **t at px = 50 Bar (725 PSI)**	12 ms	16 ms	20 ms	17.5 ms	22 ms
Electrical					
Protection Class	IP 65				
Supply Voltage	22 to 30V, ripple < 5% eff., surge free				
Waviness, permitted	5%, maximum				
Power Consumption	2.8 amps, maximum				
Input Signal Range: **Voltage Input** **Current Input** **Release Input**	 0 to +10 VDC / 100k Ohm 0 to +20 mA / 250 Ohm 5 to 30 VDC				
Wiring	1.0 mm^2, minimum, shielded				
Wiring Length	50m (164 ft.), maximum				

[1] Flow at different Δp $\quad Q_{actual} = Q_{nominal} \cdot \sqrt{\frac{\Delta p_{actual}}{20}}$

Ordering Information

TDL	[ ]	E	H	9	9	B	2	[ ]	[ ]	0	[ ]
Proportional Throttle Valve with LVDT	Nominal Size	Slip-in Cartridge	Closed Pilot Circle, Fast Valve Type, Integrated Electronics	Sinus Poppet	Nominal Flow	Flow Direction B to A	Pilot Oil Supply External, Drain External	Seals	Electronics	Standard Electronics	Design Series NOTE: Not required when ordering.

Code	Description
040	NG40
050	NG50
063	NG63
080	NG80
100	NG100

Code	Description
N	Nitrile
V	Fluorocarbon

Code	Description
B	Supply Voltage 0...+10 VDC
E	Supply 0...+20 mA

Weight:

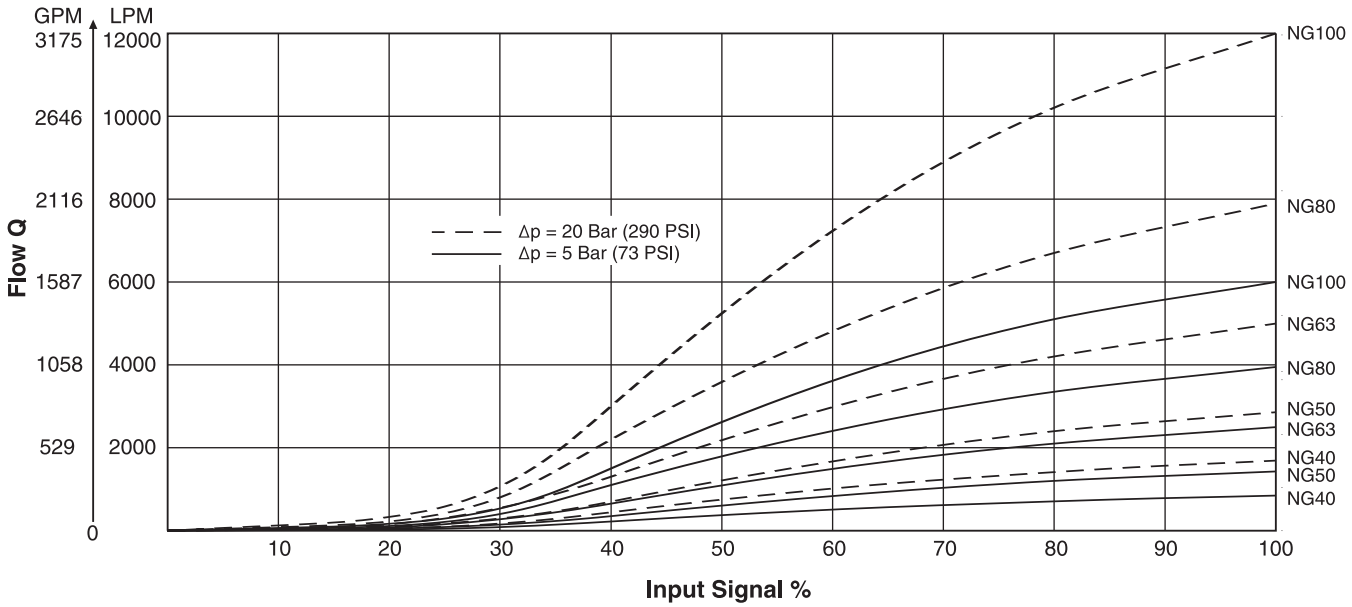
TDL040	15.0 kg (33.1 (lbs.)
TDL050	26.0 kg (57.3 lbs.)
TDL063	52.0 kg (114.7 lbs.)
TDL080	105.0 kg (231.5 lbs.)
TDL100	157.0 kg (346.2 lbs.)

Please order plugs separately

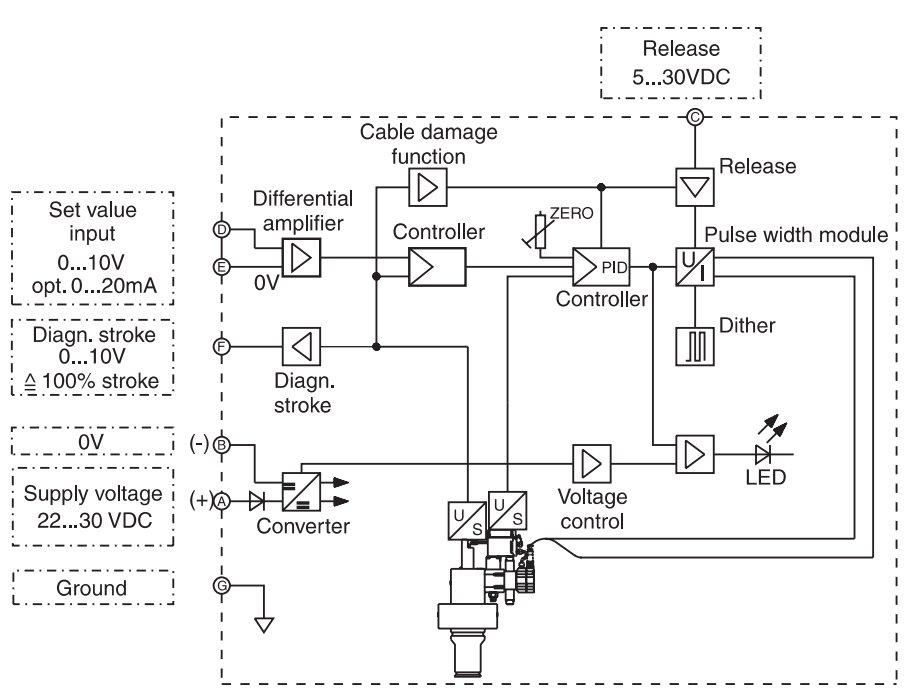
Performance Curves

Flow / Signal Line

Δp = 5 to 20 Bar (73 to 218 PSI) Constant, Viscosity 25mm²/s

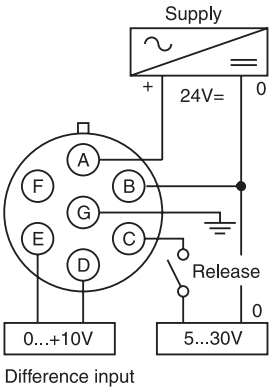


Block Circuit Diagram Electronics

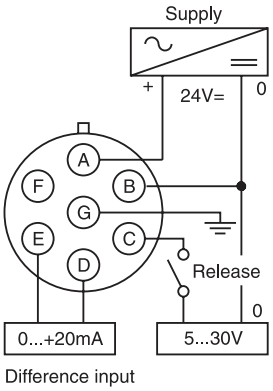


Connection Diagrams

Electronics Code B



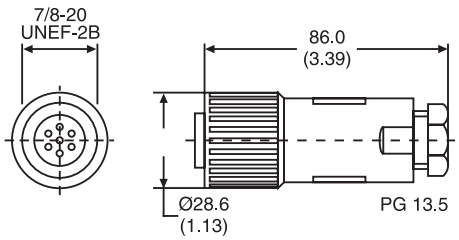
Electronics Code E



Connector

Inch equivalents for millimeter dimensions are shown in (**)

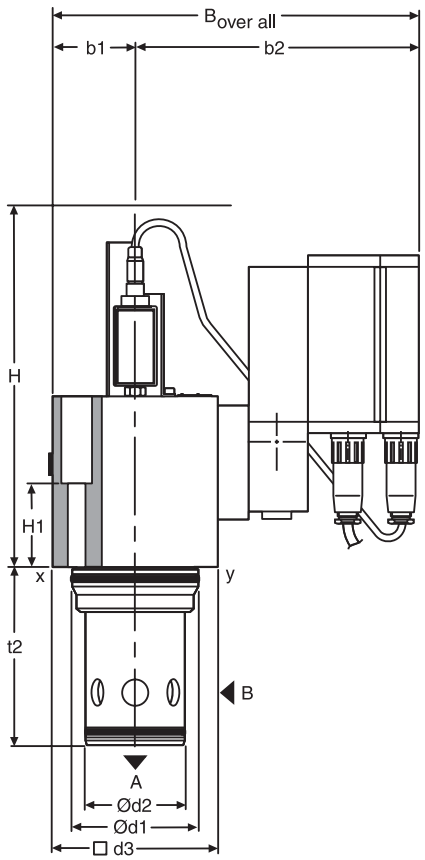
EMV Conforming

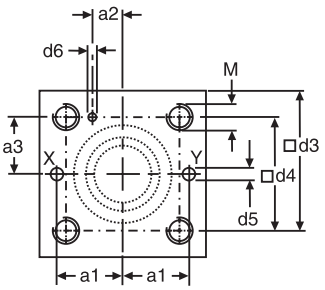


ID no. 5004072
Please order plugs separately

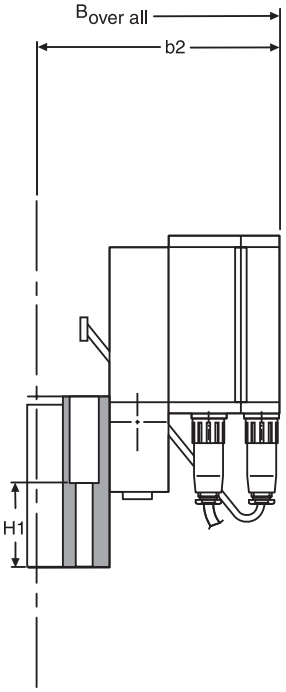
Inch equivalents for millimeter dimensions are shown in (**)

NG50 to NG63

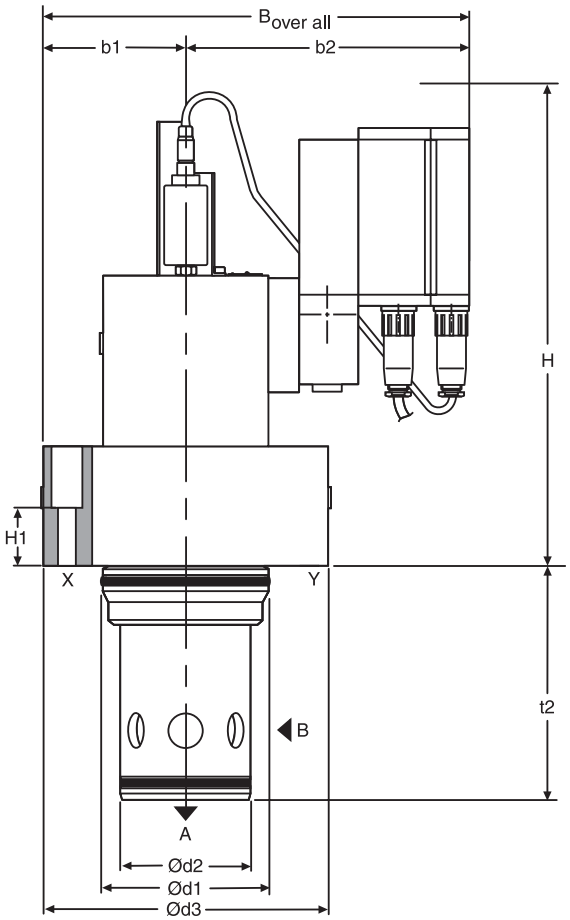


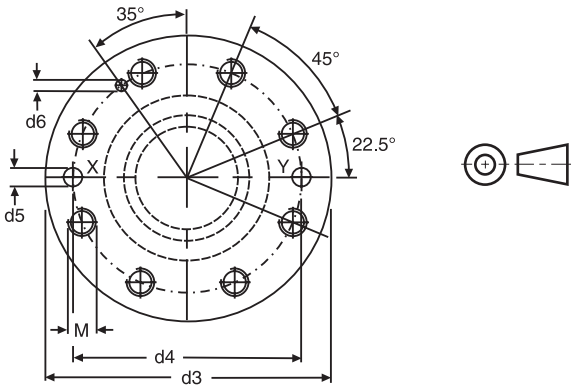


Pilot Valve NG40



Pilot Valve NG80 to NG100

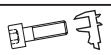




Inch equivalents for millimeter dimensions are shown in (**)

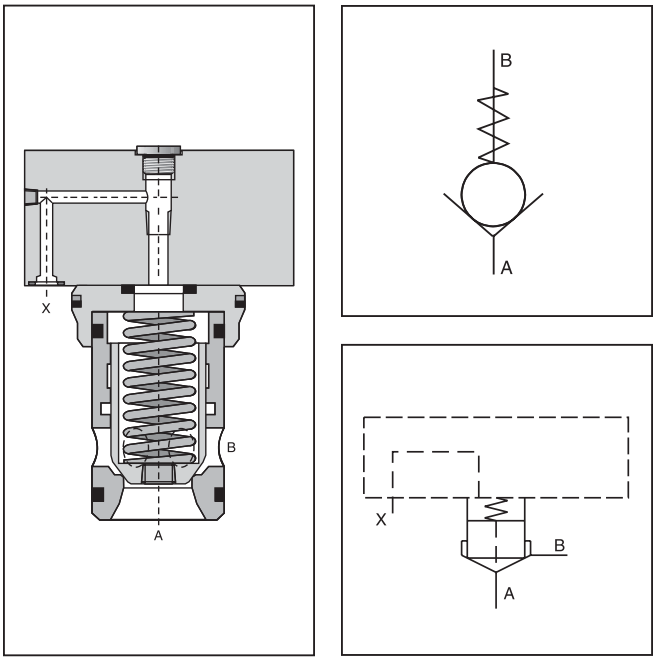
NG	$B_{o.a.}$	H	H1	$t2_{+0.1}$	a1	a2	a3	b1
40	275.0 (10.83)	280.0 (11.02)	90.0 3.54)	105.0 (4.13)	50.0 ±0.2 (1.97 ±.01)	23.0 ±0.2 (0.91 ±.01	42.0 ±0.2 (1.65 ±.01	62.5 (2.46)
50	355.0 (13.98)	330.0 (12.99)	130.0 (5.12)	122.0 (4.80)	58.0 ±0.2 (2.28 ±.01	30.0 ±0.2 (1.18 ±.01	50.0 ±0.2 (1.97 ±.01	70.0 (2.76)
63	395.0 (15.55)	325.0 (12.80)	115.0 (4.53)	155.0 (6.10)	75.0 ±0.2 (2.95 ±.01	38.0 ±0.2 (1.50 ±.01	62.5 ±0.2 (2.46 ±.01	90.0 (3.54)
80	385.0 (15.16)	425.0 (16.73)	80.0 (3.15)	205.0 (8.07)	—	—	—	125.0 (4.92)
100	425.0 (16.73)	440.0 (17.32)	89.0 (3.50)	245.0 (9.65)	—	—	—	150.0 (5.91)

NG	b2	Ød1$_{H7}$	Ød1$_{H7}$	d3	d4	Ød5 max.	Ød6	M
40	210.0 (8.27)	75.0 (2.95)	55.0 (2.17)	125.0 (4.92)	85.0 ±0.2 (3.35 ±.01)	10.0 (0.39)	6+0.22x10	M20x45
50	285.0 (11.22)	90.0 (3.54)	68.0 (2.68)	140.0 (5.51)	100 ±0.2 (3.94 ±.01)	10.0 (0.39)	8+0.22x10	M20x45
63	305.0 (12.01)	120.0 (4.72)	90.0 (3.54)	180.0 (7.09)	125 ±0.2 (4.92 ±.01)	12.0 (0.47)	8+0.22x10	M30x65
80	260.0 (10.24)	145.0 (5.71)	110.0 (4.33)	250.0 (9.84)	200 ±0.2 (7.87 ±.01)	16.0 (0.63)	10+0.22x10	M24x55
100	275.0 (10.83)	180.0 (7.09)	135.0 (5.31)	300.0 (11.81)	245 ±0.2 (9.65 ±.01)	20.0 (0.79)	10+0.22x10	M30x65

NG	Bolt kit - 		Kit	
			Nitrile	Fluorocarbon
40	BK-M20x120-4pcs	553 Nm (407.8 lb.-ft.)	SK-TDL040EN-38	SK-TDL040EV-38
50	BK-M20x160-4pcs	553 Nm (407.8 lb.-ft.)	SK-TDL050EN-38	SK-TDL050EV-38
63	BK-M30x180-4pcs	1910 Nm (1408.6 lb.-ft.)	SK-TDL063EN-38	SK-TDL063EV-38
80	BK-M24x120-8pcs	935 Nm (689.6 lb.-ft.)	SK-TDL080EN-38	SK-TDL080EV-38
100	BK-M30x140-8pcs	1910 Nm (1408.6 lb.-ft.)	SK-TDL100EN-38	SK-TDL100EV-38

General Description

Series C1DB check valves consist of a slip-in valve, that is designed for a compact block installation.



Features

- Installation hole and mounting pattern according to ISO 7368.
- 4 different springs.
- 8 sizes NG16 to NG100.

Specifications

General								
Size	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
Interface	2-way cartridge valve, according to ISO 7368 : 1989							
Mounting Position	Unrestricted							
Ambient Temperature	-40°C to +60°C (-40°F to +140°F)							
Hydraulic								
Maximum Operating Pressure	Ports A, B and X 350 Bar (5075 PSI), port Y 10 Bar (145 PSI) maximum							
Nominal Flow **LPM** / **GPM**	250 (66)	450 (119)	900 (238)	1300 (344)	1800 (476)	3600 (952)	5250 (1389)	8000 (2116)
Flow Direction	See Symbols							
Fluid	Hydraulic oil according to DIN 51524 ... 536							
Viscosity, recommended	30 to 80 cSt (mm^2/s)							
Viscosity, permitted	20 to 380 cSt (mm^2/s)							
Fluid Temperature	-20°C to +60°C (-4°F to +140°F)							
Filtration	ISO 4406 - (1999) ; 18/16/13							
Nominal Pressure	350 Bar (5075 PSI)							
Opening Spring Pressure	L = 0.1 Bar (1.5 PSI), N = 0.5 Bar (7.3 PSI), S = 1.6 Bar (23.2 PSI), U = 4.0 Bar (58.0 PSI)							

Ordering Information

	C1DB	101	E	0	/	0		99	00
Seals	Check Valve	Cover	Slip-in Valve	Valve Size		Design Series	Closing Spring		

Code	Description
Omit	Nitrile
V	Fluorocarbon

Code	Description
16	NG16
25	NG25
32	NG32
40	NG40
50	NG50
63	NG63
80	NG80
100	NG100

Code	Description [1)]
L	0.1 Bar (1.5 PSI)
N	0.5 Bar (7.3 PSI)
S	1.6 Bar (23.2 PSI)
T	2.5 Bar (36.3 PSI)
U	4.0 Bar (58.0 PSI)

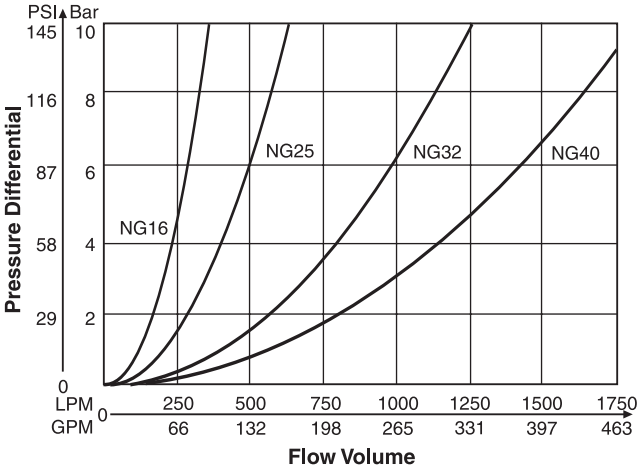
Weight:

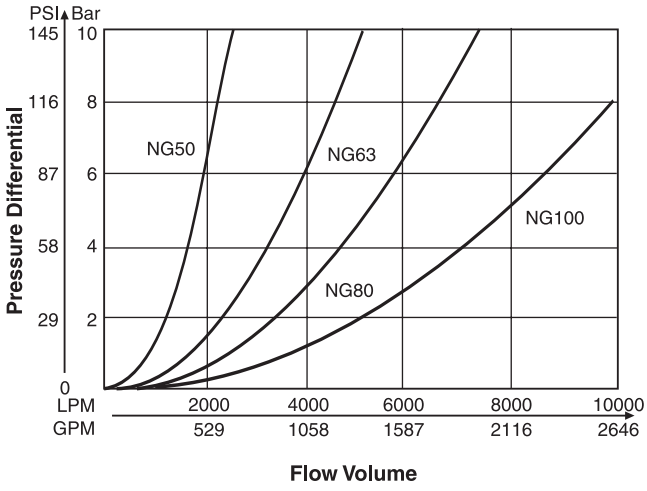
C1DB16	1.2 kg (2.6 lbs.)
C1DB25	2.5 kg (5.5 (lbs.)
C1DB32	3.9 kg (8.6 lbs.)
C1DB40	7.0 kg (15.4 lbs.)
C1DB50	11.4 kg (25.1 lbs.)
C1DB63	21.8 kg (48.1 lbs.)
C1DB80	45.0 kg (99.2 lbs.)
C1DB100	74.0 kg (163.2 lbs.)

Springs

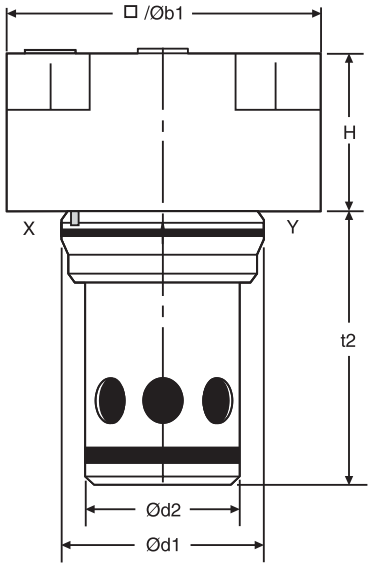
	Ordering Number							
Spring Type	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**	**NG80**	**NG100**
L (0.1 Bar) (1.5 PSI)	45051368	45051375	45051376	45051382	45051384	45051388	45051395	45051400
N (0.5 Bar) (7.3 PSI)	45051369	45051374	45051377	45051381	45051385	45051389	45051396	45051401
S (1.6 Bar) (23.2 PSI)	45051370	45051372	45051378	45051380	45051386	45051390	45051397	45051402
U (4.0 Bar) (58.0 PSI)	45051371	45051373	45051379	45051383	45051387	45051391	45051398	45051403

Performance Curves





Inch equivalents for millimeter dimensions are shown in (**)



Size	NG16	NG25	NG32	NG40	NG50	NG63	NG80	NG100
H	40.0 (1.57)	45.0 (1.77)	50.0 (1.97)	60.0 (2.36)	70.0 (2.76)	85.0 (3.35)	105.0 (4.13)	120.0 (4.72)
b1	65.0 (2.56)	85.0 (3.35)	102.0 (4.02)	125.0 (4.92)	140.0 (5.51)	180.0 (7.09)	250.0 (9.84)	300.0 (11.81)
$d1^{H7}$	32.0 (1.26)	45.0 (1.77)	60.0 (2.36)	75.0 (2.95)	90.0 (3.54)	120.0 (4.72)	145.0 (5.71)	180.0 (7.09)
$d2^{H7}$	25.0 (0.98)	34.0 (1.34)	45.0 (1.77)	56.0 (2.20)	68.0 (2.68)	90.0 (3.54)	110.0 (4.33)	135.0 (5.31)
$t2^{+0.1}$	55.5 (2.19)	72.0 (2.83)	85.0 (3.35)	105.0 (4.13)	122.0 (4.80)	155.0 (6.10)	205.0 (8.07)	245.0 (9.65)

NG	Bolt Kit -		Kit	
			Nitrile	Fluorcarbon
16	BK414 (BK84)	33 Nm (24.3 lb.-ft.)	SK-CB-E160	SK-CB-E160V
25	BK391 (BK77)	115 Nm (54.8 lb.-ft.)	SK-CB-E250	SK-CB-E250V
32	BK415 (BK85)	281 Nm (207.2 lb.-ft.)	SK-CB-E320	SK-CB-E320V
40	BK416 (BK86)	553 Nm (407.8 lb.-ft.)	SK-CB-E400	SK-CB-E400V
50	BK417 (BK87)	553 Nm (407.8 lb.-ft.)	SK-CB-E500	SK-CB-E500V
63	BK418 (BK88)	1910 Nm (1408.6 lb.-ft.)	SK-CB-E630	SK-CB-E630V
80	BK419 (BK135)	935 Nm (689.6 lb.-ft.)	SK-CB-E630	SK-CB-E630V
100	BK420 (BK90)	1910 Nm (1408.6 lb.-ft.)	SK-CB-E630	SK-CB-E630V

General Description

Series SVLB hydraulically pilot operated check valves allow free flow from A to B. The counter-flow direction is blocked.

When pressure is applied to control port X, the ring chamber flow from B to A is released. The pilot control ratio is 6:1.

Function

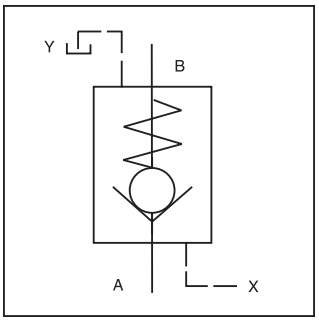
When no pressure is applied to the X-port, the flow from B to A is blocked, because the pressure in B is also effective on top of the poppet.

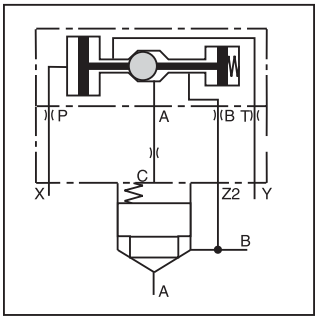
Pressurizing the X-port relieves the area on top of the poppet to the drain port and allows flow from B to A.

The seat design of the SVLB valve series provides leak-free separation of port A and B in the closed position.

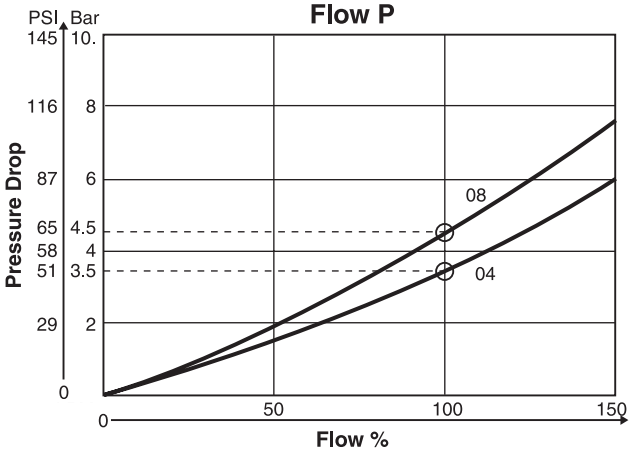
Features

- Pilot operated check valve.
- Cavity and mounting pattern acc. to ISO 7368.
- Dampening poppet optional.
- 5 sizes NG16 to NG50.

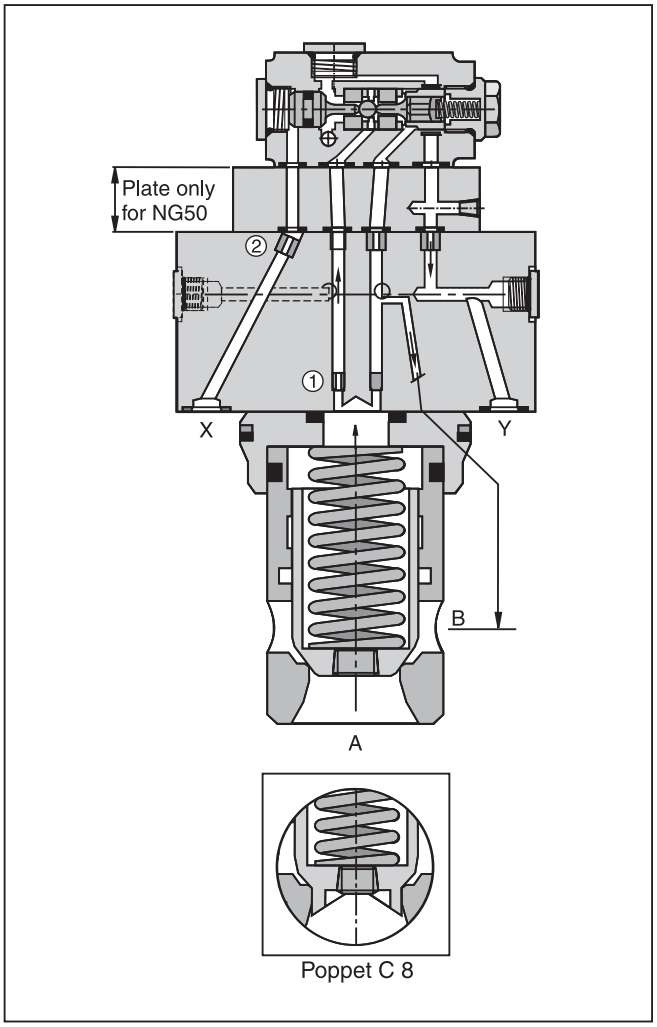




Performance Curves



Poppet Type 04, 08, without spring



Poppet C 8

Ordering Information

	SVL	B	10		6	E			
Seals	Hydraulically Operated Check Valve	Slip-in Mounting	Design Style according to ISO 7368	Poppet Type	Pilot Control Ratio 6:1	Slip-in Cartridge Valve	Valve Size	Closing Spring	Design Series

NOTE: Not required when ordering.

Code	Description
Omit	Nitrile
V	Fluorocarbon

Code	Description
4	04
8 [1]	08

[1] with damping nose

Code	Description
16	NG16
25	NG25
32	NG32
40	NG40
50	NG50

Code	Description
N	0.5 Bar (7.3 PSI)
S	1.6 Bar (23.2 PSI)
T	2.5 Bar (36.3 PSI
U	4.0 Bar (58.0 PSI)

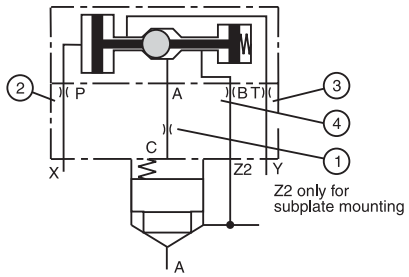
Weight:

SVLB16	2.3 kg (5.1 lbs.)
SVLB25	3.2 kg (7.1 (lbs.)
SVLB32	4.6 kg (10.1 lbs.)
SVLB40	7.8 kg (17.2 lbs.)
SVLB50	12.0 kg (26.5 lbs.)

Specifications

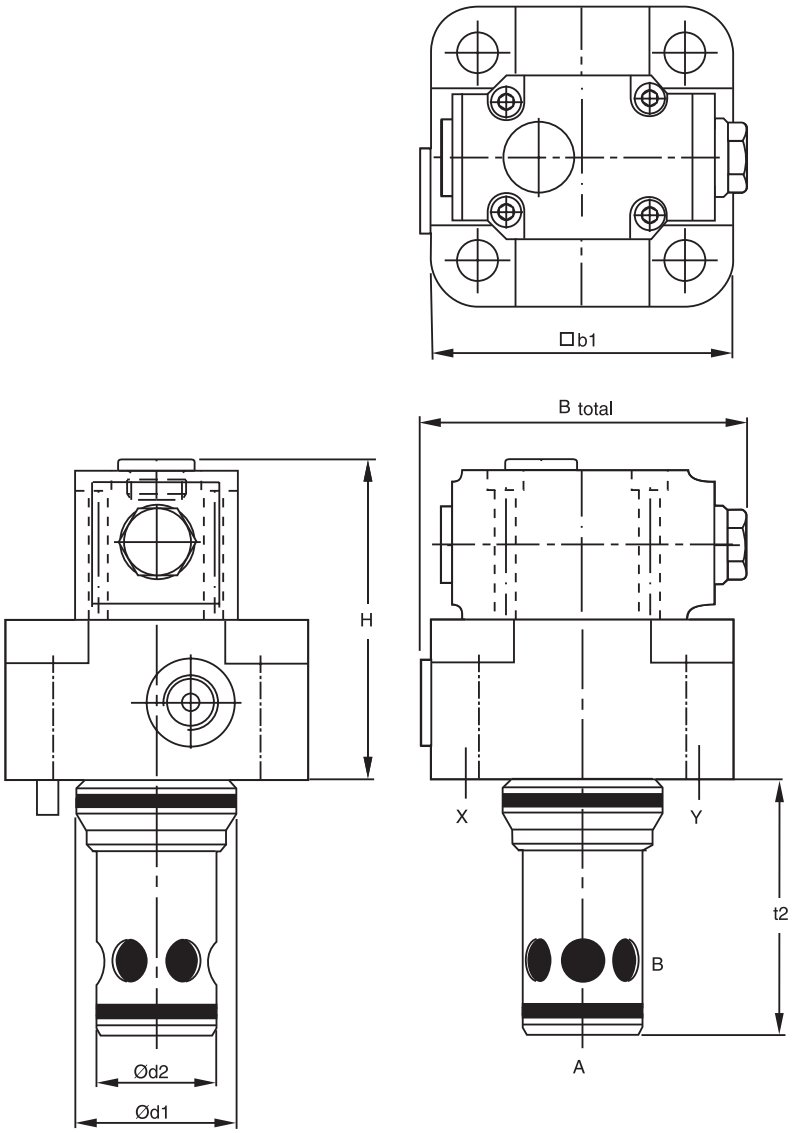
General					
Size	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**
Interface	Slip-in mounting, according to ISO 7368 : 1989				
Mounting Position	Unrestricted				
Ambient Temperature	-20°C to +80°C (-4°F to +176°F)				
Hydraulic					
Maximum Operating Pressure	350 Bar (5075 PSI)				
Nominal Flow **LPM** / **GPM**	250 (66)	450 (119)	900 (238)	1300 (344)	1800 (476)
Fluid	Hydraulic oil according to DIN 51524 ... 525				
Viscosity, recommended	30 to 50 cSt (mm²/s)				
Viscosity, permitted	20 to 380 cSt (mm²/s)				
Fluid Temperature	-20°C to +70°C (-4°F to +158°F)				
Filtration	ISO 4406 - (1999) ; 18/16/13				

Standard Orifices



E16	E25	E32	E40	E50
open (M5)	open (M5)	open (M5)	open (M5)	open (M6)
Ø1.2 (M5)	Ø1.2 (M6)	Ø1.2 (M6)	Ø1.2 (M6)	Ø1.2 (M8)
open (M5)	open (M6)	open (M6)	open (M6)	open (M8)
Ø1.0 (M5)	Ø1.2 (M5)	Ø1.3 (M5)	Ø1.5 (M5)	Ø2.0 (M6)

Inch equivalents for millimeter dimensions are shown in (**)



Size	NG16	NG25	NG32	NG40	NG50
H	84.0 (3.31)	88.0 (3.46)	93.0 (3.66)	103.0 (4.06)	138.0 (5.43)
b1	79.0* (3.11)	85.0 (3.35)	102.0 (4.02)	125.0 (4.92)	140.0 (5.51)
$d1^{H7}$	32.0 (1.26)	45.0 (1.77)	60.0 (2.36)	75.0 (2.95)	90.0 (3.54)
$d2^{H7}$	25.0 (0.98)	34.0 (1.34)	45.0 (1.77)	55.0 (2.17)	68.0 (2.68)
$t2^{+0.1}$	56.0 (2.20)	72.0 (2.83)	85.0 (3.35)	105.0 (4.13)	122.0 (4.80)
Bges.	99.0 (3.90)	94.0 (3.70)	103.0 (4.06)	125.0 (4.92)	140.0 (5.51)

1) width 65mm (2.56 in.)

NG	Bolt Kit -		Kit	
			Nitrile	Fluorcarbon
16	BK414 (BK84)	33 Nm (24.3 lb.-ft.)	SK-SVLB10-E16	SK-SVLB10-E16V
25	BK391 (BK77)	115 Nm (54.8 lb.-ft.)	SK-SVLB10-E25	SK-SVLB10-E25V
32	BK415 (BK85)	281 Nm (207.2 lb.-ft.)	SK-SVLB10-E32	SK-SVLB10-E32V
40	BK416 (BK86)	553 Nm (407.8 lb.-ft.)	SK-SVLB10-E40	SK-SVLB10-E40V
50	BK417 (BK87)	553 Nm (407.8 lb.-ft.)	SK-SVLB10-E50	SK-SVLB10-E50V

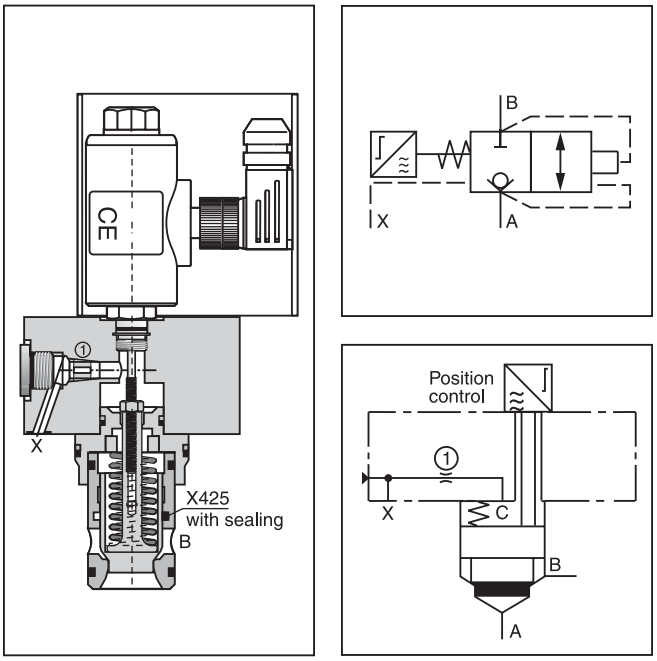
SVLB.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

General Description

Series C10DEC 2/2 way seat valves are equipped with an inductive switch to monitor the closed position. After the poppet is lifted from the seat, the design of the poppet ensures that only a minimum amount of oil can pass the seat before the inductive switch changes the signal.

The poppet has a 60/40 area ratio (AA = 0.6 AC, AB = 0.4 Ac) and is capable for flow from A to B and B to A.



Features

- German trade association certificate, No. 00 077.
- Cavity and mounting pattern acc. to DIN ISO 7368.
- Monitored closed position.
- Inductive switch CE conform.
- Optional poppet sealing.
- 6 sizes NG16 up to NG63.

Ordering Information

	C	10	D	E	C	101	E		/	0		99	00	
Seals	2/2 Way Valve	Poppet Shape	Hydraulically Operated	Design Series	Inductive Monitoring German Trade Association Certificate 00 077	Cover	Slip-in Cartridge	Valve Size		Cavity and Mounting Pattern DIN ISO 7368	Spring	① Orifice		Poppet Seal

Code	Description
Omit	Nitrile
V	Fluorocarbon

Code	Description
16	NG16
25	NG25
32	NG32
40	NG40
50	NG50
63	NG63

Code	Description [1]
L	0.1 Bar (1.5 PSI)
N	0.5 Bar (7.3 PSI)
S	1.6 Bar (23.2 PSI)
U	4.0 Bar (58.0 PSI)

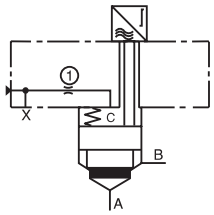
Code	Description
Omit	None
X425	Only with Spring Codes S and U

Code	Description
99	Without Orifice, Open Orifice Options

Weight:

C10DEC*16 1.5 kg (3.3 lbs.)
C10DEC*25 2.7 kg (6.0 (lbs.)
C10DEC*32 4.3 kg (9.5 lbs.)
C10DEC*40 7.4 kg (16.3 lbs.)
C10DEC*50 12.0 kg (26.5 lbs.)
C10DEC*63 23.0 kg (50.7 lbs.)

○ Orifice (See Accessories)



Orifice Recommendation and Thread

Orifice	NG16	NG25	NG32	NG40	NG50	NG63
No.: 1	1/16 Ø0.8	1/16 Ø1.2	1/16 Ø1.5	1/8 Ø2.0	1/8 Ø2.5	1/8 Ø3.0

Orifices Ø in mm, thread in NPT

Seal and Bolt Kits

Nominal Size		16	25	32	40	50	63
Seal Kit	Fluorocarbon	SK-CBE16V	SK-CBE25V	SK-CBE32V	SK-CBE40V	SK-CBE50V	SK-CBE63V
	Nitrile	SK-CBE16	SK-CBE25	SK-CBE32	SK-CBE40	SK-CBE50	SK-CBE63
Bolt Kit		BK414 (BK84)	BK391 (BK77)	BK415 (BK85)	BK416 (BK86)	BK417 (BK87)	BK418 (BK88)
Recommended Torque	Nm (lb.-ft.)	27 (19.9)	94 (69.3)	234 (172.6)	460 (339.3)	460 (339.3)	1570 (1157.9)

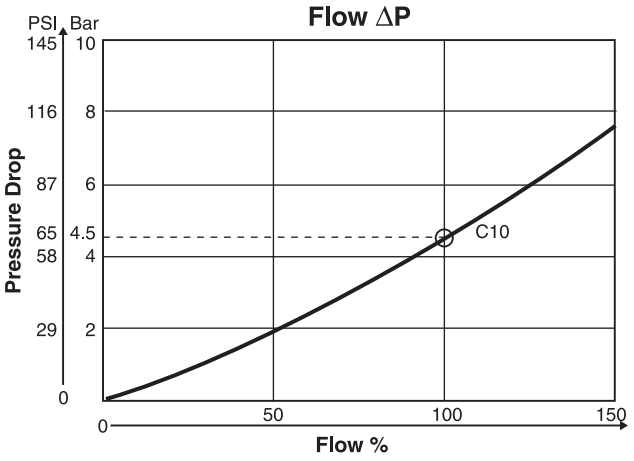
Attention! The switch may only be adjusted by the valve manufacturer. The exchange of individual modules is not permitted.

C10D_C.indd, dd

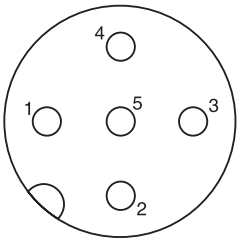
Specifications

General						
Size	**NG16**	**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Interface	2-way slip-in cartridge valve, according to DIN ISO 7368					
Mounting Position	Unrestricted					
Operation	Hydraulic					
Ambient Temperature	-40°C to +60°C (-40°F to +140°F)					
Hydraulic						
Maximum Operating Pressure	350 Bar (5075 PSI)					
Nominal Flow LPM **Δp = 5 Bar (73 PSI) GPM**	220 (58)	450 (119)	900 (238)	1300 (344)	1800 (476)	3600 (952)
Fluid	Hydraulic oil according to DIN 51524 ... 525					
Viscosity, Recommended	30 to 80 cSt (mm^2/s)					
Viscosity, Permitted	20 to 380 cSt (mm^2/s)					
Fluid Temperature, Recommended	+30°C to +50°C (+86°F to +122°F)					
Fluid Temperature, Permitted	-20°C to +60°C (-4°F to +140°F)					
Filtration	NAS 1638 class 9, to be achieved by ß10 > 75					
Control Volume at Maximum Stroke	2.03 (cm^3)	6.45 (cm^3)	12.21 (cm^3)	20.32 (cm^3)	39.40 (cm^3)	94.56 (cm^3)
Control Surface (Surface C = 100%) A/B	Approximately 60% / 40% related on surface C					
Opening Pressure Flow Direction B to A	L = 0.25 Bar (3.6 PSI), N 1.25 Bar (18.1 PSI), S = 4.0 Bar (58.0 PSI), U = 10.0 Bar (58.0 PSI)					
Opening Pressure Flow Direction A to B	L = 0.16 Bar (2.3 PSI), N 0.85 Bar (12.3 PSI), S = 2.7 Bar (39.2 PSI), U = 6.6 Bar (95.7 PSI)					
Electrical (Position Control per IEC 61076-2-101 (M12x1)						
Protection Class	IP65 in accordance with EN60529 (plugged and mounted)					
Ambient Temperature	0°C to +50°C (+32°F to +122°F)					
Supply Voltage / Ripple	18V to 42V / 10%					
Current Consumption without Load	≤ 30mA					
Output Current per Channel, Ohmic	400mA, maximum					
Output Load per Channel, Ohmic	100k Ohm, minimum					
Output Drop at 0.2A	≤1.1 VDC, maximum					
Output Drop at 0.4A	≤1.6 VDC, maximum					
EMC	EN50081-1 / EN50082-2					
Ambient Field Strength	<1200A/m, maximum tolerance					
Distance to Next AC Solenoid	>0.1 m (3.9 in.), minimum					
Interface	Mx12x1					
Wiring	5 x 0.25 mm^2, minimum, brad shield recommended					
Wiring Length	50 m (164 ft.), minimum recommended					

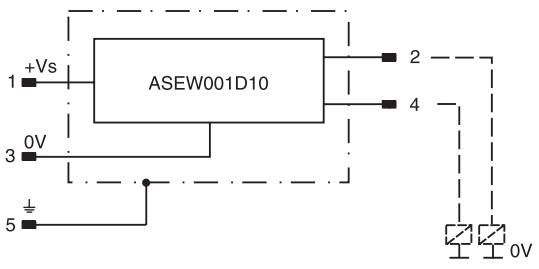
Performance Curve



M12 Pin Assignment



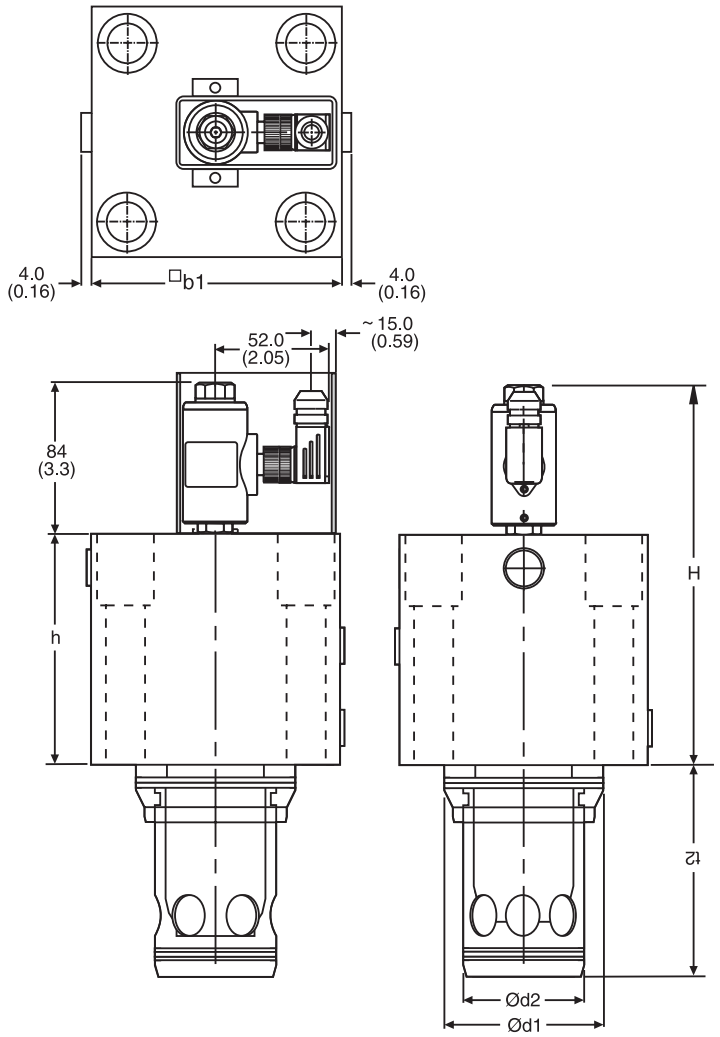
1 + Supply 18...42V
2 Normally open
3 0V
4 Normally closed
5 Earth ground



C10D_C.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Inch equivalents for millimeter dimensions are shown in (**)



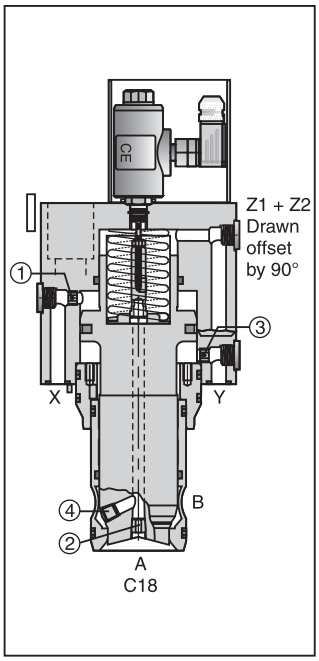
Cavity and mounting patterm according to ISO7368

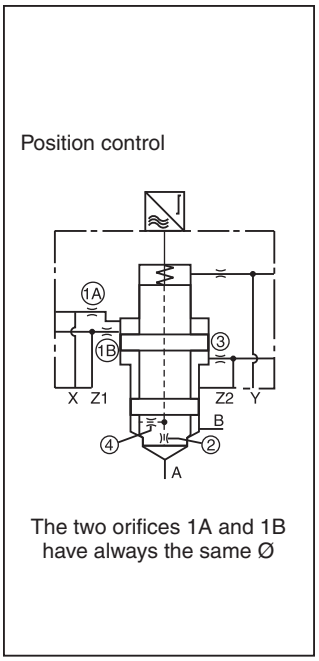
Nominal Size	H	h	b1	d1	d2	t2 +0.1
16	130.0 (5.12)	40.0 (1.57)	79.0 [1)] (3.11)	32.0 (1.26)	25.0 (0.98)	56.0 (2.20)
25	135.0 (5.31)	45.0 (1.77)	85.0 (3.35)	45.0 (1.77)	34.0 (1.34)	72.0 (2.87)
32	140.0 (5.51)	50.0 (1.97)	102.0 (4.02)	60.0 (2.36)	45.0 (1.77)	85.0 (3.35)
40	150.0 (5.91)	60.0 (2.36)	125.0 (4.92)	75.0 (2.95)	55.0 (2.17)	105.0 (4.13)
50	160.0 (6.30)	70.0 (2.76)	140.0 (5.51)	90.0 (3.54)	68.0 (2.68)	122.0 (4.80)
63	175.0 (6.89)	85.0 (3.35)	180.0 (7.09)	120.0 (4.72)	90.0 (3.54)	155.0 (6.10)

[1)] width 65mm (2.56 in.)

General Description

Series C18DEC 2/2 way, monitored seat valves with cartridge design according to ISO 7368 are preferably used for safety circuits: mainly for safety guards, mould form tools and locking mechanisms for presses and injection moulding machines. Pilot pressure actively opens and closes the main poppet, independent of pressure in the main ports.





Features

- German trade association certificate, No. 00 078.
- Cavity and mounting pattern acc. to DIN ISO 7368.
- Monitored closed position.
- Inductive switch CE conform.
- Active design with separate control surfaces.
- Sealing between control surfaces and connection B.
- 5 sizes NG25 up to NG63.

Ordering Information

	C	18	D	E	C	107	E		/ 0			
Seals	2/2 Way Valve	Poppet Shape	Hydraulically Operated	Design Series	Inductive Monitoring German Trade Association Certificate 00 078	Cover	Slip-in Cartridge	Valve Size	Cavity and Mounting Pattern DIN ISO 7368	Spring	Orifice	

Code	Description
Omit	Nitrile
V	Fluorocarbon

Code	Description
S	1.6 Bar (23.2 PSI)
U	4.0 Bar (58.0 PSI)

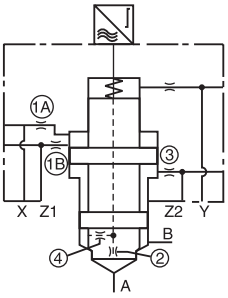
Code	Description
99	Without Orifice, Open

Code	Description
25	NG25
32	NG32
40	NG40
50	NG50
63	NG63

Weight:

C18DEC*25 3.2 kg (7.1 lbs.)
C18DEC*32 6.7 kg (14.8 (lbs.)
C18DEC*40 8.7 kg (19.2 lbs.)
C18DEC*50 13.8 kg (30.4 lbs.)
C18DEC*63 26.3 kg (58.0 lbs.)

○ Orifice (See Accessories)



Orifice Thread

Orifice	NG25	NG32	NG40	NG50	NG63
1	M6	M6	M6	*1/16	*1/8
2	M6	M6	M6	*1/16	*1/16
3	M6	M6	M6	*1/16	*1/8
4	M6	M6	M6	*1/16	*1/16

* Thread in NPT

Orifice Recommendation

Orifice	NG25	NG32	NG40	NG50	NG63
1 - 4	Ø 1.2	Ø 1.5	Ø 2.0	Ø 2.5	Ø 3.0

Depending on function, plugs must be used.

Seal and Bolt Kits

Nominal Size		25	32	40	50	63
Seal Kit	Fluorocarbon	SK-C13DB10-E25V	SK-C13DB10-32V	SK-C13DB-E40V	SK-C13DB10-E50V	SK-C13DB10-E63V
	Nitrile	SK-C13DB10-E25	SK-C13DB10-32	SK-C13DB10-E40	SK-C13DB10-E50	SK-C13DB10-E63
Bolt Kit		BK391 (BK77)	BK-M16x90-4pcs	BK-M20x110-4pcs	BK-M20x120-4pcs	BK-M30x160-4pcs
Recommemded Torque	Nm (lb.-ft.)	94 (69.3)	234 (172.6)	460 (39.3)	460 (339.3)	1570 (1157.9)

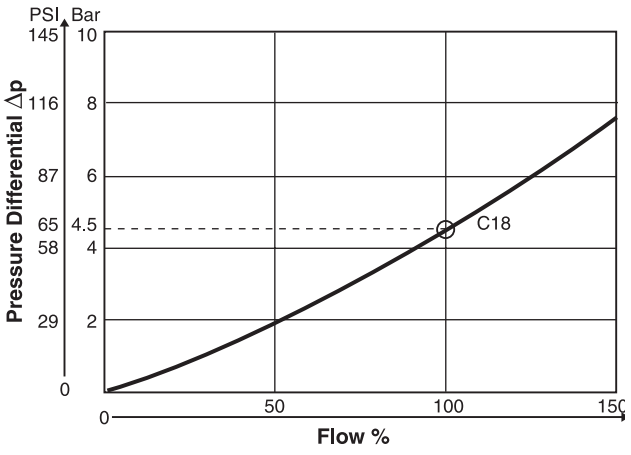
Attention! The switch may only be adjusted by the valve manufacturer. The exchange of individual modules is not permitted.

C18DEC.indd, dd

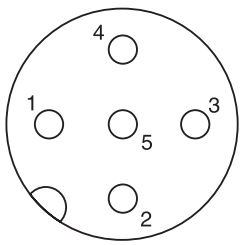
Specifications

General						
Size		**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Interface		2-way slip-in cartridge valve, according to DIN ISO 7368				
Mounting Position		Unrestricted				
Operation		Hydraulic				
Ambient Temperature		-40°C to +60°C (-40°F to +140°F)				
Hydraulic						
Maximum Operating Pressure		350 Bar (5075 PSI)				
Nominal Flow, Δp = 5 Bar (73 PSI)		450 LPM (119 GPM)	900 LPM (238 GPM)	1300 LPM (344 GPM)	1800 LPM (476 GPM)	3600 LPM (952 GPM)
Fluid		Hydraulic oil according to DIN 51524 ... 525				
Viscosity, Recommended		30 to 80 cSt (mm^2/s)				
Viscosity, Permitted		20 to 380 cSt (mm^2/s)				
Fluid Temperature, Recommended		+30°C to +50°C (+86°F to +122°F)				
Fluid Temperature, Permitted		-20°C to +60°C (-4°F to +140°F)				
Filtration		NAS 1638 class 9, to be achieved by ß10 > 75				
Control Volume Spring Chamber Surface C		6.45 (cm^3)	12.21 (cm^3)	20.32 (cm^3)	39.40 (cm^3)	94.56 (cm^3)
Control Surface	**F/C**	100%				
	FSt	123.8%	108.6%	121.5%	117.0%	121.0%
	FA/B	Approximately 60% / 40% related on surface C				
Opening Pressure Flow Direction B to A		L=0.25 Bar (3.6 PSI), N=1.25 Bar (18.1 PSI), S=4.0 Bar (58.0 PSI), U=10.0 Bar (5=145.0 PSI)				
Opening Pressure Flow Direction A to B		L=0.16 Bar (2.3 PSI), N=0.85 Bar (12.3 PSI), S=2.7 Bar (39.2 PSI), U=6.6 Bar (95.7 PSI)				
Electrical (Position Control per IEC 61076-2-101 (M12x1)						
Protection Class		IP65 in accordance with EN60529 (plugged and mounted)				
Ambient Temperature		0°C to +50°C (+32°F to +122°F)				
Supply Voltage / Ripple		18V to 42V / 10%				
Current Consumption without Load		≤ 30mA				
Output Current per Channel, Ohmic		400mA, maximum				
Output Load per Channel, Ohmic		100k Ohm, minimum				
Output Drop at 0.2A		≤1.1V, maximum				
Output Drop at 0.4A		≤1.6V, maximum				
EMC		EN50081-1 / EN50082-2				
Ambient Field Strength		<1200A/m, maximum tolerance				
Distance to Next AC Solenoid		>0.1 m (3.9 in.), minimum				
Interface		Mx12x1				
Wiring		5 x 0.25 mm^2, minimum, brad shield recommended				
Wiring Length		50 m (164 ft.), maximum recommended				

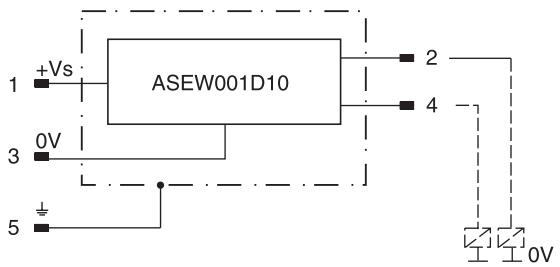
Performance Curve



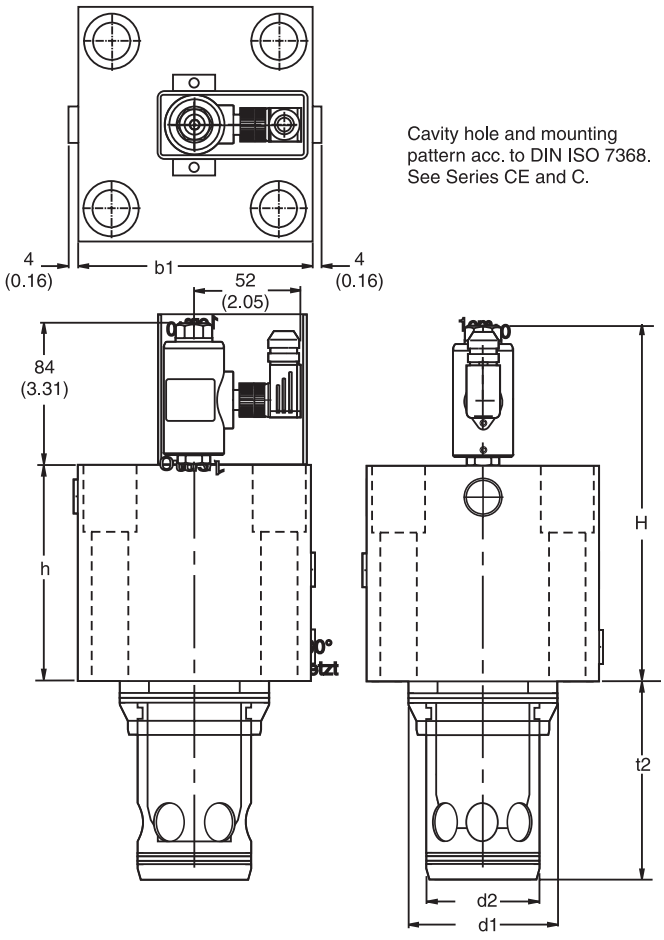
M12 Pin Assignment



1 + Supply 18...42V
2 Normally open
3 0V
4 Normally closed
5 Earth ground

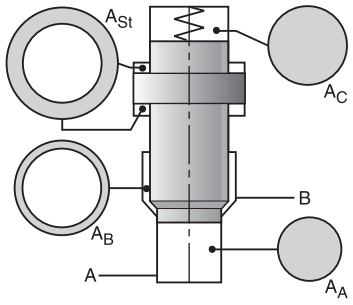


Inch equivalents for millimeter dimensions are shown in (**)



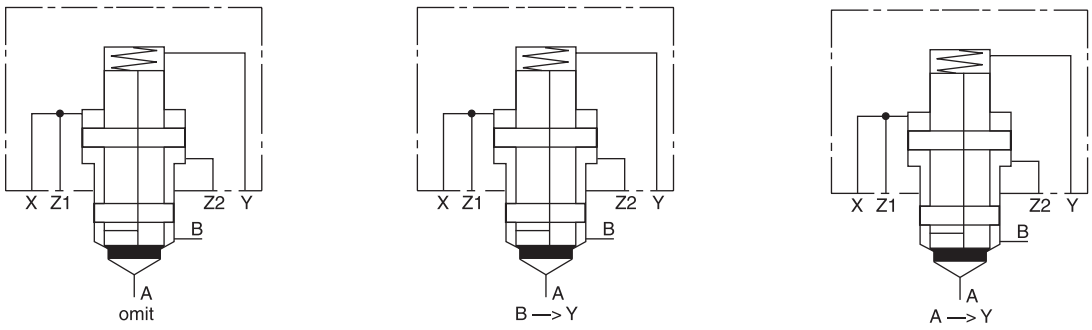
Nominal Size	25	32	40	50	63
H	174.0 (6.85)	174.0 (6.85)	194.0 (7.64)	214.0 (8.14)	234.0 (9.21)
h	90.0 (3.54)	90.0 (3.54)	110.0 (4.33)	130.0 (5.12)	150.0 (5.91)
b1	85.0 (3.35)	102.0 (4.02)	125.0 (4.92)	140.0 (5.51)	180.0 (7.09)
d1	45.0 (1.77)	60.0 (2.36)	75.0 (2.95)	90.0 (3.54)	120.0 (4.72)
d2	34.0 (1.34)	45.0 (1.77)	55.0 (2.17)	68.0 (2.68)	90.0 (3.54)
12 +0.1	72.0 (2.83)	85.0 (3.35)	105.0 (4.13)	122.0 (4.80)	155.0 (6.10)

Control Surfaces



NG	A_A [%]	A_B [%]	A_C [%]	A_{St} [%]
25	60	40	100	124
32	60	40	100	109
40	60	40	100	121
50	60	40	100	117
63	60	40	100	121

Pilot Guide Inside the Poppet



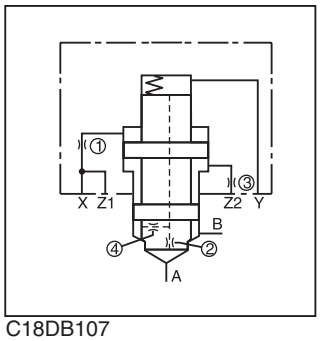
General Description

Series C18DB 2/2 way seat valves with cartridge design according to ISO 7368 are preferably used where opening and closing should be controlled by pilot pressure only, independent of the pressure in the main ports.

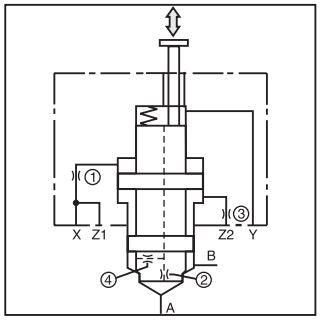
Series C18DB is offered as hydraulically controlled valve (C18DB107), with additional stroke limiter (C18DBN112) and with the mounting pattern for a pilot valve (C18DB121).

Features

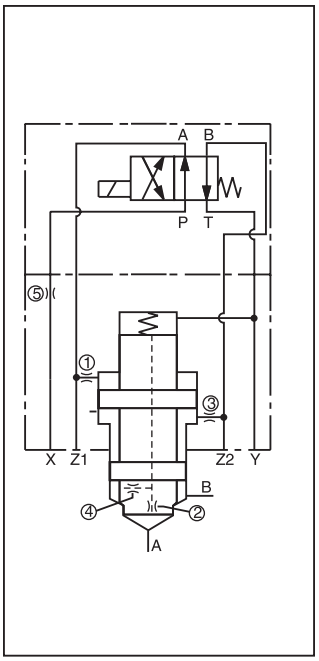
- Cavity and mounting pattern acc. to DIN ISO 7368.
- Active design with separate control areas.
- Sealing between control surfaces and connection B.
- Up to 5 sizes:
  - C18DB107 - 5 sizes NG25 up to NG63
  - C18DBN112 - 3 sizes NG25 up to NG40
  - C18DB121 - 2 sizes NG32 up to NG40



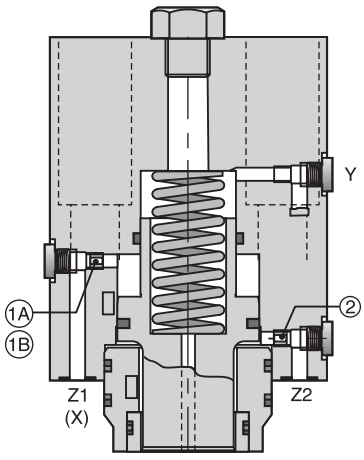
C18DB107



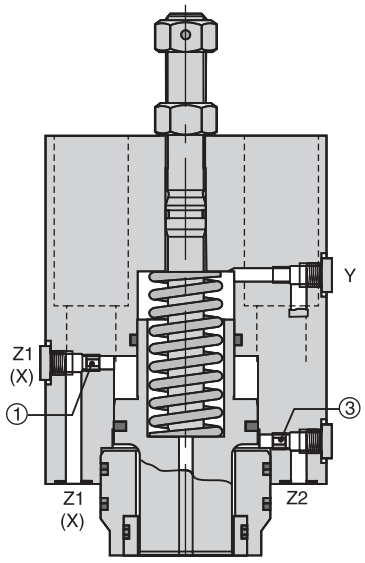
C18DBN112



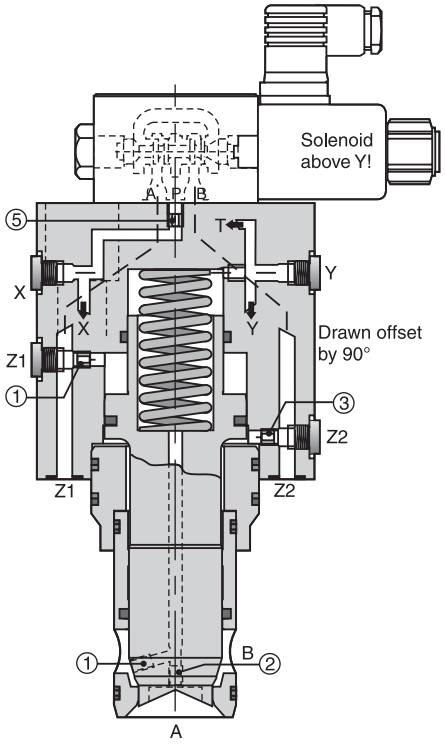
C18DB121



C18DB107



C18DBN112

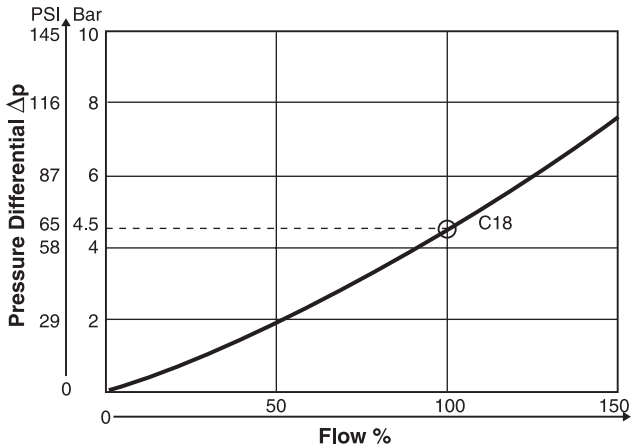


C18DB121

Specifications

General						
Size		**NG25**	**NG32**	**NG40**	**NG50**	**NG63**
Interface		2-way slip-in cartridge valve, according to DIN ISO 7368				
Mounting Position		Unrestricted				
Operation		Hydraulic				
Ambient Temperature		-40°C to +60°C (-40°F to +140°F)				
Hydraulic						
Maximum Operating Pressure		350 Bar (5075 PSI)				
Nominal Flow, Δp = 5 Bar (73 PSI)		450 LPM (119 GPM)	900 LPM (238 GPM)	1300 LPM (344 GPM)	1800 LPM (476 GPM)	3600 LPM (952 GPM)
Fluid		Hydraulic oil according to DIN 51524 ... 525				
Viscosity, Recommended		30 to 80 cSt (mm^2/s)				
Viscosity, Permitted		20 to 380 cSt (mm^2/s)				
Fluid Temperature, Recommended		+30°C to +50°C (+86°F to +122°F)				
Fluid Temperature, Permitted		-20°C to +60°C (-4°F to +140°F)				
Filtration		NAS 1638 class 9, to be achieved by ß10 > 75				
Control Volume Spring Chamber Surface C		6.45 (cm^3)	12.21 (cm^3)	20.32 (cm^3)	39.40 (cm^3)	94.56 (cm^3)
Control Surface	**FC**	100%				
	FSt	123.8%	108.6%	121.5%	117.0%	121.0%
	FA/B	Approxiamtely 60% / 40% related on surface C				
Opening Pressure Flow Direction B to A		L=0.25 Bar (3.6 PSI), N=1.25 Bar (18.1 PSI), S=4.0 Bar (58.0 PSI), U=10.0 Bar (145.0 PSI)				
Opening Pressure Flow Direction A to B		L=0.16 Bar (2.3 PSI), N= 0.85 Bar (12.3 PSI), S=2.7 Bar (39.2 PSI), U=6.6 Bar (95.7 PSI)				

Performance Curve



	C	18	D	B			E		/ 0	
Seals	2/2 Way Valve	Poppet with Damping	Hydraulically Operated	Design Series	Stroke Limiter	Cover	Slip-in Cartridge	Nominal Size	Cavity and Mounting Pattern DIN ISO 7368	Spring

Code	Description
Omit	Nitrile
V	Fluorocarbon

Code	Description
Omit	Cover 107 and 121, No Stroke Limiter
N	Cover 112, with Stroke Limiter, Adjustment Spindle and Lock Nut

Code	Description
107	Standard, without Add. Function
112	With Stroke Limiter, only NG25, NG32 and NG40
121	Designed for DC Pilot Valves NG32 and NG40 only

Code	Description
16	NG16
25	NG25
32	NG32
40	NG40
50	NG50
63	NG63

Code	Description
S	1.6 Bar (23.2 PSI)
U	4.0 Bar (58.0 PSI)

Weight:

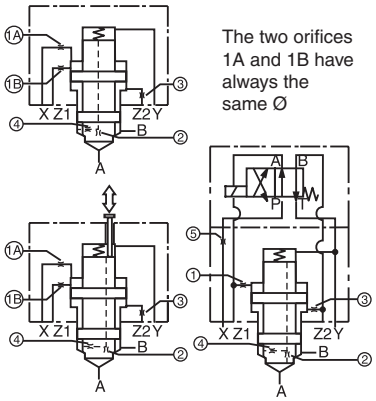
C18DB*25	3.2 kg (7.1 lbs.)
C18DB*32	6.7 kg (14.8 lbs.)
C18DB*40	8.7 kg (19.2 lbs.)
C18DB*50	13.8 kg (30.4 lbs.)
C18DB*63	26.3 kg (58.0 lbs.)

① ② ③ ④ ⑤ Orifice

Only for '121' Cover
Omit for '107' and '112'

Code	Description [1]
99	Without Orifice, Open Orifice Options
00	Plug, Closed Orifice Options

[1] only for code 121



The two orifices 1A and 1B have always the same Ø

◯ Orifices (See Accessories)

Orifice Thread

Orifice	NG25	NG32	NG40	NG50	NG63
1	M6	M6	M6	*1/16	*1/8
2	M6	M6	M6	*1/16	*1/16
3	M6	M6	M6	*1/16	*1/8
4	M6	M6	M6	*1/16	*1/16
5	—	M6	M6	—	—

* Thread in NPT

Orifice Recommendation

Orifice	NG25	NG32	NG40	NG50	NG63
①-⑤	Ø 1.2	Ø 1.5	Ø 2.0	Ø 2.5	Ø 3.0

Depending on function, plugs and orifices must be used.

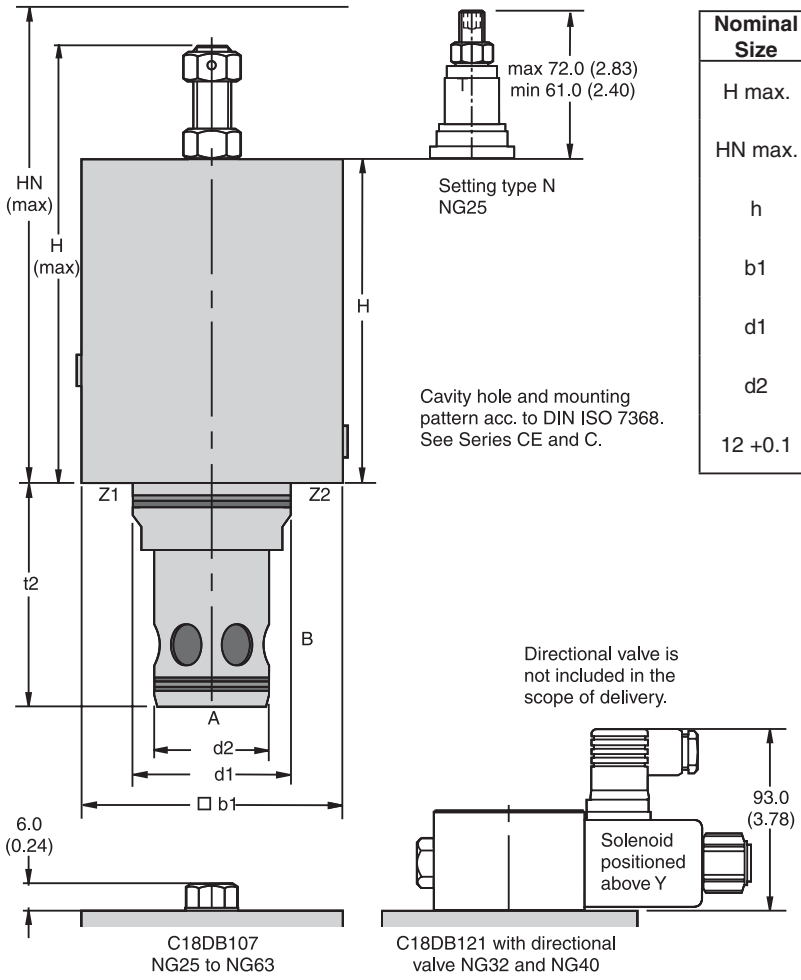
Seal Kits

Nominal Size		25	32	40	50	63
Seal Kit	Fluorocarbon	SK-C13DB10-E25V	SK-C13DB10-32V	SK-C13DB-E40V	SK-C13DB10-E50V	SK-C13DB10-E63V
	Nitrile	SK-C13DB10-E25	SK-C13DB10-32	SK-C13DB10-E40	SK-C13DB10-E50	SK-C13DB10-E63

Mounting Kits

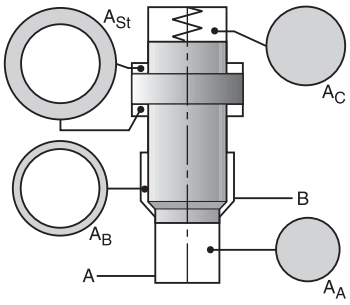
Nominal size		25	32	40	50	63
Cover code 107 Consisting of:		BK391 (BK77)	BK-M16x90-4pcs	BK-M20x110-4pcs	BK-M20x120-4pcs	BK-M30x160-4pcs
Cover code 112 Consisting of:		BK391 (BK77)	BK-M16x90-4pcs	BK-M20x110-4pcs	—	—
Cover code 121 Consisting of:		—	BK-M16x90-4pcs	BK-M20x110-4pcs	—	—
Recommended Torque	Nm (lb.-ft.)	94 (69.3)	234 (172.6)	460 (339.3)	460 (339.3)	1570.0 (1157.9)

Inch equivalents for millimeter dimensions are shown in (**)



Nominal Size	25	32	40	50	63
H max.	234.0 (9.21)	142.0 (5.59)	208.0 (8.19)	189.0 (7.44)	241.0 (9.49)
HN max.	162.0 (6.38)	197.0 (7.76)	227.0 (8.94)	202.0 (7.95)	222.0 (8.74)
h	90.0 (3.54)	125.0 (4.92)	140.0 (5.51)	130.0 (5.12)	150.0 (5.91)
b1	85.0 (3.35)	102.0 (4.02)	125.0 (4.92)	140.0 (5.51)	180.0 (7.09)
d1	45.0 (1.77)	60.0 (2.36)	75.0 (2.95)	90.0 (3.54)	120.0 (4.72)
d2	34.0 (1.34)	45.0 (1.77)	55.0 (2.17)	68.0 (2.68)	90.0 (3.54)
12 +0.1	72.0 (2.83)	85.0 (3.35)	105.0 (4.13)	122.0 (4.80)	155.0 (6.10)

Control Surfaces



NG	A_A [%]	A_B [%]	A_C [%]	A_{St} [%]
25	60	40	100	124
32	60	40	100	109
40	60	40	100	121
50	60	40	100	117
63	60	40	100	121

A hydraulic system that operates economically, safely, and trouble-free requires careful planning, as well as proper installation and start-up. Conscientious maintenance has a considerable effect on the service life of the hydraulic elements.

The following methods are to be observed when starting up and performing maintenance. There are helpful tips for fault correction in the troubleshooting section.

The information given in these instructions are of a general nature and require other professional procedures. The commissioning of the hydraulic equipment must be in accordance with the putting into operation of the entire machine or installation, and shall be done by experts who have the special hydraulic knowledge. For a safe and successful start-up, the information for installation and commissioning of each component particularly must be observed.

Technical Safety Instructions

The hydraulic system is to be planned and executed so that personnel cannot be endangered during possible malfunctions. This requires that the diverse pumps and devices are operated within their specified operating pressure ranges. Possible damage to the system and the electrical control system must be limited to a minimum.

Welding performed afterwards on oil reservoir may only be carried out by specialists at their own risk. Remaining oil and the cleaning cover must be removed.

Preventive steps must be introduced to avoid danger through the welding work.

Further measures must be arranged, depending on where the hydraulic system is set up, such as whether an oil receiver must be provided in water protection areas, etc., or whether hardly inflammable liquids must be used with an increased fire hazard.

Hydraulic Accumulator

For putting in operation and using accumulators the national rules, guidelines and regulations must be observed.

⚠ **Hydraulic accumulators must be pre-charged only with nitrogen. Therefore, the filling up of the accumulator must be done according to the instructions of the producer by using only the special tools.**

The testing documents of the hydraulic accumulators and safety valves must be stored separately. If necessary, they must be presented to the safety commissioner. It`s not allowed to remove the lead seal of the safety valves. Observe information signs.

Transport

The power unit or the completely mounted manifold was properly packed and handed over to the transport company. If there are damages, please contact the manufacturer or your transport company.

For further transportation the hydraulic must be handled with care.

Storage

The power unit, manifolds and components must be protected from contamination, as well as from mechanical and weather damage.

Suitable measures must be taken to prevent corrosion if they are stored for longer periods of time without final painting.

Mounting

The pipe connection joints of the unit must be connected with the externally mounted devices and manifolds or the machine according to the positions shown in the hydraulic scheme.

Particularly the following points are to be observed:

- Use cold-drawn precision steel pipes, with the exception of nominal widths bigger than or equal NW50.
- Observe pipe cross-sections and permissible working pressure.
- Remove plastic plugs immediately before beginning pipeline work.
- Assemble pipe bends using bending devices.
- The pipe cross-section may not be pinched when bending.
- The pipes, after being cut to their exact lengths, are to be thoroughly debarred and cleaned.
- Fittings corresponding to pressure and environmental conditions are to be used on the system, and the manufacturer's assembly instructions followed.
- Pipelines are to be lain and tightened without stress.
- Heat-treated pipes must be mechanically cleaned and descaled.
- Drain lines are not to be crimped, and if possible, at a falling angle to the tank, above the oil level.
- If hose lines must be used, they must be selected according to the pressure and the environmental conditions of the system. Note their stability, working pressure, and nominal width.
- The pipes must be sufficiently mounted with pipe brackets to avoid vibrations.
- It is advisable to provide venting connections at the highest position in the pipeline network.
- The power units, the manifolds and the connected parts of the system must be installed and mounted safely for operation.

Fluids

In order to facilitate the selection of suitable fluids, we refer to the following chapter. This contains information about appropriate oil types. The fluids must meet the requirements of DIN 51524 sections 1 and 2.

Separate instructions must be observed for other fluids (e.g. compatibility with sealing materials).

Commissioning

⚠ **Start-up may only be carried out by specialists. Particularly the special instructions of the manufacturer and the producer of the components must be observed.**

The hydraulic scheme, the parts list, and the control system flow chart should be present. The planned pressure setting must be indicated for all pressure valves in the hydraulic scheme.

Starting-up Safety Instructions

Before start-up the assembly of the complete hydraulic equipment must be inspected by specialists. Particularly the following points are to be observed:

- Mounting of pipes including clamping.
- Accurate connection of pressure and return pipes.
- Accurate connection of the pilot pressure pipes.
- Accurate assembly of the hydraulic components.
- Accurate connection of the power unit.
- Accurate connection of the manifolds.
- Accurate connection of the cylinder and hydraulic motors.
- Accurate connection of the electrics.
- Hydraulic equipment must be mounted safely for the operation.
- Parts of the entire system where driven by the hydraulics must be mounted safely for the operation.

Before start-up of the hydraulic system the specialists must prepare all necessary requirements to protect individuals and parts of the system against damage.

The start-up must be done very carefully according to the safety regulation.

Filling

Before the hydraulic fluid is poured into the tank, its interior must be checked again for cleanliness, and be cleaned if necessary.

The tank is to be filled using a fine filter, so that the desired cleanliness class of the fluid is ensured when starting up. Special filling units or equipment provided with the system are especially suitable for this, e.g. the return line filter.

The oil type is indicated on a separate sign next to the filling opening.

Flushing

After filling the reservoir with fluid, we recommend the flushing of the fluid inside the hydraulic system where the fluid flushes around many times in the reservoir.

Before starting the flushing the servovalves and proportional valves must be removed and replaced by flushing plates to avoid damages of these valves according contamination. Start-up up of the components and the function of the entire system should only begin once the required minimum cleanliness and the operating temperature are reached.

It is recommended to flush the long pipelines by short circuiting the pressure and return lines, especially for large, central pressure oil stations. This prevents the installation dirt from entering the pilot valves (especially important for servo and proportional valves) or the drives (cylinder, hydro-motors, etc.). The diverse measures should be coordinated during design.

Electrical Connections

Are the correct current and voltage types available?

- Motor
  Check available current with the E-motor type plate.
- Solenoids
  Are the type of current (~ or =) and the voltage correct? Check the labels of these devices.
- Plugs
  The electronic connections must be done according to the technical rules by using the appropriate plugs.
- Grounding
  Power units, parts of the system and single mounted components must be grounded.

Pumps and Devices

The pump case must be filled with the clean operating hydraulic fluid before start-up to lubricate the bearing with oil.

Particularly the special start-up instructions for pumps and hydraulic and electric devices must be observed.

The following section contains only the most important aspects:

- Pumps
  It is advantageous to keep the pressure setting low at first when starting the pump for the first time. The pressure compensator for variable displacement pumps and the pressure limiting valve for fixed displacement pumps are set to approx. 15 - 20 Bar (218 - 290 PSI).
- Pressure Valves
  Depending on the machine function, first begin with a minimum pressure setting. Enter pressure onto the measuring location plate after the final pressure is established.

  An exception are the design-tested and preset accumulator safety valves.

Pumps and Devices (continued)

- Pressure Unloading Valves
  For setting the pressure unloading valves according the pressure information in hydraulic schematic particularly the start-up instructions for this valve must be observed.
- Throttle Valves
  Set every drive (cylinder etc.) in steps via the throttle or flow control valves at the desired speed or stroke time.
- Directional Valves
  Select the direction using the electric control system for electrically operated valves.

⚠ **Manual override of the solenoid requires a suitable tool.**

- Proportional Valves
  Proportional pressure flow and DC valves must be first started with a low electrical command signal.
- Hydraulic Accumulators
  If hydraulic accumulators are assembled into the system, these must be verified at and/or filled up to the correct gas pre-load level. Suitable testing and filling equipment is necessary.

⚠ **Hydraulic accumulators may only be filled with nitrogen for reasons of safety. The pre-loading coordinated with the working pressure is indicated in the hydraulic scheme.**

In general, the following applies:

Gas pre-loading = min. working pressure x 0.9

After testing or filling, the hydro-storage can be switched into the system via ball valve.

Switch On

First the motor is quickly switched on and directly switched off to determine the rotation direction. The correct rotation direction is indicated by an arrow on the pump housing. If the rotation direction is incorrect, reverse the polarity of the e-motor. The pump is started by multiple short start-ups (on-off operation). After approx. 1 min run time, the working pressure can be set to its nominal value (see also **"Troubleshooting" 1.1** and **1.2**).

Start-up information provided by the pump manufacturer has higher priority than these instructions.

Air Bleeding

Air in the hydraulic system is very disadvantageous and undesirable for the control system. The system must be carefully vented, especially for the first start-up, for oil changes, or when lines and valves were opened. All functions are run through, one after the other, in no-load operation with low pressure and with full cylinder stroke.

The pipeline network is vented at its highest point. The fitting can be loosened a little so that the air can escape with only a small amount of oil escaping. When the oil is no longer foaming, the fitting is retightened.

If the air bleeding cylinder is provided with venting screws, these should be used for venting. It must be noted, however, that the full cylinder stroke must be travelled several times. These venting screws must be at the top for horizontally arranged cylinders.

After filling the cylinder, the oil level in the tank must be checked, and refilled as necessary.

Filter

The function and service life of pumps and hydro-devices are strongly affected by the cleanliness of the fluid. Dirt is the greatest enemy of hydraulic systems. There are three important sources of dirt to watch out for:

- Contamination arising during installation, installation dirt.
- Contamination arising during operation, operation dirt.
- Impurities from the environment.

The correct filtering method is specified during system planning or determined by the necessary cleanliness class. Depending on requirements, pressure or return line filtering as well as additional bypass flow filtration is used. Only a return line filter with $\beta_{25} \geq 75$ (25 µm filter) is used for noncritical systems. Thus contamination of the tank is prevented, and the pump only sucks in clean oil. Pressure filters are used for systems with higher demands, e.g. smallest oil flows ($Q > 200$ cm³/min) or high, constant pressure on pressure valves.

Pressure filters are to be installed whenever proportional valves are used. Typically, filters with fineness of $\beta_{10} \geq 75$ (10 µm) or $\beta_3 \geq 75$ (3 µm) are used. Filters can only fulfil their function when built-in filter cartridges are cleaned or replaced in time, especially in the initial operating period. During operation, the level of pollution is checked by mechanical or electrical level. For further information, see **'Oil Change'.**

Servicing and Maintenance

Service work may only be carried out by specialists. This requires knowledge of the machine's functions regarding switching on and off, as well as measures of safety engineering.

⚠ **Work on systems that include accumulators may only be carried out after the fluid pressure is unloaded.**

Regular Inspection

The hydraulic system is subject to a simple inspection at short, regular intervals. An automatic monitoring system is already partly provided. Particularly the following is inspected:

- Oil level in the tank.
- Working temperature is not to exceed 60ºC (140º).
- Condition of the fluid (visual inspection, color and smell of the hydraulic oil).

Regular Inspection (continued)

- Working pressures.
- Gas pre-load pressure on the accumulator.
- Leaks on the pump, valves, and pipelines.
- Filter elements, for cleanliness (see **'Filter'**).
- Hose must be checked according to conditions and age.
- All mechanical and electronic sensors must be checked on function.
- All parts of the entire system must be checked on damage.
- Cleanliness must be checked.
- All safety equipment and labelling must be checked.

Oil Change

The frequency of oil changes is dependent on:

- Kind of liquid (aging).
- Filtering.
- Operating and environmental conditions (operating temperature).

Prescribed change intervals

The required cleanliness class as per ISO 4406 or NAS 1638 is dependent on the use of hydraulic components. It requires conscientious planning for filtering and periodic fluid inspection in order to guarantee the desired service life of the pumps and devices. Under these conditions, an oil change can be considerably delayed, or, depending on the evaluation of laboratory tests, completely omitted.

We refer to the service of well known oil or filter suppliers concerning fluid laboratory tests.

It is mandatory to inspect the breather filters regularly.

Spare Parts

Original spare parts are to be used for repairs. For questions about purchasing spare parts or for malfunctions, please contact our After Sales Service.

Warrantry

Fault correction without charge is only possible within the framework of the arranged guarantee. The information given in these instructions are of a general nature and require other professional procedures. Assistance with installation, start-up, and maintenance by our personnel can be arranged according to our service conditions.

Additional regulations and guidelines

Particularly we recommend the following regulations and guidelines:

- International standard ISO 4413.
- German standard VDMA 24572.
  Checklist for the inspection of hydraulic systems in industrial machines.

1. Excessive Noise in the System

Cause	Reason	Remedy
1.1 Cavitation in the system.	Suction filter is blocked.	Clean or recondition.
	Internal width of the suction line is too small. Or: Objects in the suction line.	Install pipes with larger internal width.
	Too many bends in the suction line.	Lay new pipes or use pipes with larger internal width.
	Local constrictions in the suction line, e.g. partially closed valve, spring is too strong in check valve, damaged pipe or kinked hose.	Make valves accessible or change pipes or hoses are to be repaired or replaced.
	Fluid is too cold.	Use electric heating to warm pressure fluid to the recommended temperature.
	Viscosity of fluid is too high.	Check fluid.
	Vapor forms.	Lower working temperature to the correct value: Refill fluid or replace with suitable fluid.
	Feed pump fails.	Repair feed pump or replace.
	Speed of pump is too high.	Check speed of the motor (see also specifications in the hydraulic plan).
	Completely sealed tank.	Install breather.
	Suction line is too small or too long.	Increase diameter of the suction line.
1.2 Foam or air in the fluid.	Fluid level in the tank is too low.	Refill oil. For systems with strongly changing oil level: Only fill between the minimum and maximum oil level.
	Incorrect tank design.	Improve design.
	Return line ends in tank above the fluid level.	Lay return flow line lower than the fluid level.
	Incorrect fluid.	Replace with the correct fluid, if necessary, contact the system supplier.
	Shaft seal on pump allows air to penetrate.	Replace seal.
	Fitting in the suction line allows air to invade.	Tighten fitting or replace.
	Porous suction hose.	Recondition hose.
	Poor air bleeding.	Vent system.

(continued on next page)

1. Excessive Noise in the System

Cause	Reason	Remedy
1.3 Mechanical vibrations.	Faulty alignment or loose coupling.	Aligning or tightening.
	Vibrations in the pipelines.	Tighten or improve mounting.
	Pump defective or damaged.	Repair or replace.
	Unsuitable pump type.	Replace with more suitable pump type.
	Drive defective or damaged.	Repair or replace.
	Unsuitable drive type.	Replace with more suitable drive type.
	Pressure valve is unstable (oscillates).	Set correctly or replace with more suitable valve.

2. No Pressure or Insufficient Pressure

Cause	Reason	Remedy
2.1 Pump does not deliver correctly.	Penetration of air into the suction lines.	See error **1.2.**
2.2 High pump temperature.	Worn out or damaged pump.	Repair or replace.
	Too little fluid viscosity.	See error **1.1.**
	Insufficient or incorrectly adjusted cooling.	Improve cooling line or adjust correctly. Ensure flow of cooling water.
2.3 Pump speed is too low or drive performance too small.	Coupling or belts slip or motor is faulty.	Remove defect parts.
	Motor is too small.	Use the correct driving motor.
2.4 Loss due to leakage from the pressure side in the return line.	Incorrect pressure setting.	Correct setting.
	Safety valve does not close because of dirt or there are defective parts.	Clean, repair or replace damaged parts.
	Directional valve or another valve is open because dirt or some other defective part is present, or due to electrical failure.	Damaged device is to be determined, adjusted, cleaned, repaired, or replaced.
	Damage to the cylinder hole, piston rod, or seal.	Damaged parts are to be repaired, replaced.
	Failure of piston seal, because the seal material is not suitable for the fluid used.	Use seals made of the correct material.
2.5 Feed pump fails (only for piston pump with feed pump).	Damaged pump, faulty drive, unsuitable fluid viscosity.	See error **1.3.**

3. Pressure Pulsations or Flow Fluctuations

Cause	Reason	Remedy
3.1 Cavitation in the pump.	See error **1.1.**	See error **1.1.**
3.2 Foam or air in the fluid.	See error **1.2.**	See error **1.2.**
3.3 Mechanical vibrations.	See error **1.3.**	See error **1.3.**
3.4 Unstable pressure relief or safety valves.	See error **1.3.**	See error **1.3.**
	Damaged valve seat.	Repair or replace.
	Valve has insufficient or no damping.	Install a more suitable device or damping equipment.
3.5 Valves stick.	Contamination.	Drain fluid, clean system and parts, fill with clean fluid.
	Defective or warped.	Replace device, remove warping.
3.6 Unsteady pump delivery.	Unsuitable pump type or pump design.	Replace with more suitable pump after contacting the pump system manufacturer.
3.7 Air in the system, which causes an irregular or yielding motion.	System is incompletely vented.	see error **1.2.**
	Electrical system is defective e.g. valves switch constantly.	Find and remove faults.

4. Too Little or No Pressure Flow

Cause	Reason	Remedy
4.1 Cavitation of the pump.	See error **1.1.**	See error **1.1.**
4.2 Foam formation or air in the fluid.	See error **1.2.**	See error **1.2.**
4.3 Defective pump.	See error **1.2.**	See error **1.2.**
4.4 Pump speed is too low or drive performance too small..	See error **2.3.**	See error **2.3.**
4.5 Loss due to leakage from the pressure side to the return line.	See error **2.4.**	See error **2.4.**

5. Liquid Temperature is Too High

Cause	Reason	Remedy
5.1 Overflow losses.	Pressure setting on pump is too high or safety valve is set too low.	Correct setting.
	Oil flows out at accumulator safety block.	Close accumulator drain valve on accumulator safety block.
5.2 Loss due to leakage from the pressure side in the return line.	Valves function poorly and seals are faulty.	See error **2.4.**
	Fluid has incorrect viscosity (viscosity is too low).	Remove fluid and fill up system with fluid that has viscosity recommended by the manufacturer.
5.3 Fluid is delivered under pressure via safety and pressure limiting circulation valve into the tank, although pressure fluid is not needed.	Design of switching for system is not correct.	Provide the correct control system, e.g. switching to depressurised.
	Faulty function of the air bleeding system as a result of dirt or faulty parts.	Clean, or if necessary, repair.
	Safety pressure is set too low.	Correct setting.
5.4 Insufficient cooling.	Failure of the cooling water supply.	Check cooling water supply, temperature and function of shut-off valve.
	Failure of the ventilating fan.	Check function of the oil-air-heat exchanger acc. to manufacturers instruction.
	Deposits in the cooling water line.	Clean.
5.5 Insufficient carrying away of heat.	System has insufficient cooling surface to carry off delivered heat.	Install cooling system and/or increase tank capacity and surface.
	An increase in machine performance without corresponding increase in the cooling capacity.	Improve cooling system and/or tank capacity and surface.
5.6 Overheated pump.	Wear in the pump.	Repair or replace.
	Working with fluid whose viscosity is too low.	See error **5.2.**
	Insufficient flushing of the pump.	Increase diameter of the drain line and provide a flushing of the pump housing.
5.7 Fluid circulates too quickly.	Fluid supply is insufficient.	Increase fluid capacity.
	Fluid level is too low in the system.	Fill up system to the recommended level.
5.8 Too much viscous friction.	Cross-section is too small in the pipelines and valves.	Install pipes and valves that have the correct size.

General Description

The hydraulic fluid is an important component of every operating hydraulic systems. The fluid covers several tasks:

- Power transmission
- Wear protection resp. wear reduction
- Heat transfer

The importance of the fluid may be seen in the following statement: “Statistical data indicate that more than 80% of all failures of hydraulic components are cause-related to an improper condition of the hydraulic fluid.”

The selection and the maintenance and/or control of the fluid for a hydraulic system are of major importance. The main criteria for this selection are given in the following.

Power Transmission

An important index for the power transmission behaviour of a hydraulic fluid is the bulk module E_{oil}, measured in bar. It describes how much the volume of a fluid content is reduced under pressure.

A “hard“ hydraulic fluid (high bulk module) transmits pressures very fast and leads to a stiff hydraulic system. This is appreciated in closed loop controlled systems. "Stiff" systems are achieved by small pressurized volumes, hard surrounding walls (pipes instead of flexible hoses) and high viscose fluids. Beside that pressure increases the bulk module of mineral oil.

A “soft“ hydraulic system is more subject to instability, but it is in general quieter, because high frequent pressure ripple is damped better.

The air content of the fluid plays an important role. Mineral oil contains some 9% air in solution under atmospheric pressure. If caused by underpressure in a hydraulic circuit (pump inlet, high fluid velocity in orifices or by turbulences due to high return line speed into the reservoir), part of this air occurs as bubbles, the systems stiffness is drastically reduced, which can cause several problems.

The viscosity of the hydraulic fluid has a high influence on the **dynamic power transmission**. A high viscosity, that means a “thick“ fluid, leads to a worse fluidity, which means:

- Pressure relief function (optionally proportional).
- With optional vent function.
- 3 sizes (SAE 3/4", 1", 1-1/4").
- Load compensated flow in combination with F5C.
- Higher pressure losses in pipes and components.
- Reduction of hydraulic-mechanical efficiency.
- More pressure drop in suction line, filling losses, cavitation.
- Sealing and lubrication gaps are not fully filled, loss of lubrication.

A too low viscosity leads to the following problems:

- Higher leakage across all sealing gaps in the pump and in valves.
- Thinner lubrication film causes more direct metal-to-metal contact and more wear in glide and roller bearings.

For these reasons the selection of the right viscosity and the best viscosity: temperature index need highest attention. Some of the selection criteria are:

- Function principle of hydraulic pumps and motors used in the system.
- Nominal pressure, nominal temperature (and range).
- Environmental temperature (and range).
- Length of piping.

The following limits are to be considered:

- Optimum working viscosity regarding efficiency, economy and safety.

  $\nu_{opt} = 20 – 40\ mm^2/s$
- Working viscosity for full operability.

  $\nu_{operation} = 16 – 100\ mm^2/s$
- Viscosity limits for reduced operating conditions (speed of rotation, pressure, load cycle).

  $\nu_{limit} = 12 – 300\ mm^2/s$
- Lowest viscosity limit, start of the damaging metal-to-metal contact, only for short time and max. 50% nominal pressure.

  $\nu_{min} = 8\ mm^2/s$
- Highest start up viscosity, suction limit of pumps, only for short time when suction line is short and straight.

  $\nu_{Start} = 800\ mm^2/s$
- The recommended temperature range (fluid temperature) for the operation of a hydraulic system is between 30°C and 70°C, -30°C as the lowest and +90°C as the highest limit never should be exceeded depending on a fluid capable of these temperatures.

Mineral oil is offered in different viscosity classes
(VG, viscosity grade). The characteristic number describes the nominal viscosity in mm ^{2}/s at 40°C:

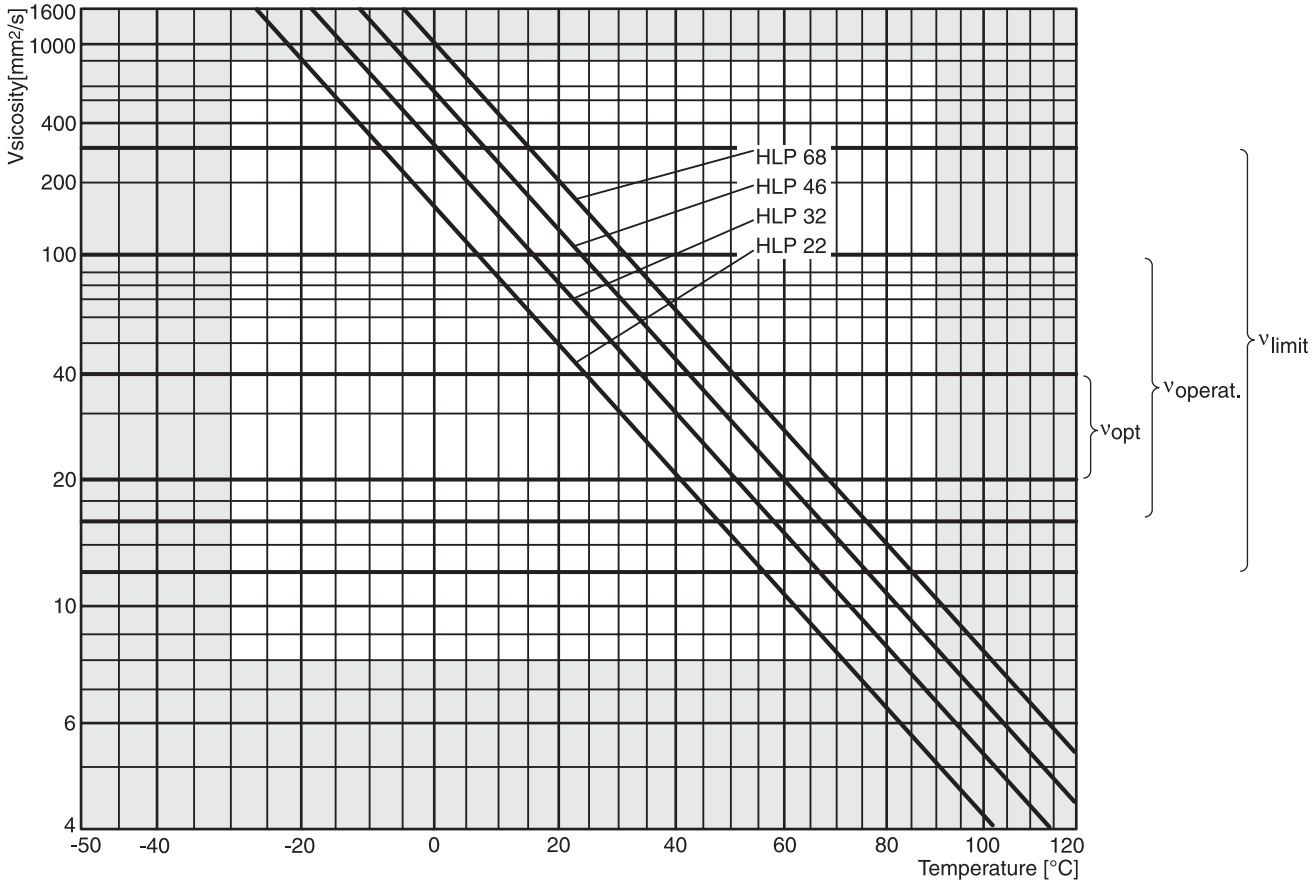
VG 22 arctic conditions, extremely long pipes

VG 32 wintery conditions

VG 46 normal conditions, closed buildings

VG 68 tropical conditions

Viscosity: Temperature Diagram for Mineral Oil



The correlation between viscosity and temperature usually is described in the double logarithmic diagram above.

Wear Protection with respect to Wear Reduction

In hydraulic components there are many gliding contacts partly under high (side) loads. Beside the correct viscosity, which on the one hand is responsible for the required supply of lubricating fluid to the gap, and on the other hand assures a stable lubricating film, the wear reduction capability of the hydraulic fluid is of major importance.

Load carrying capability is determined in the FZG normal test A/8.3/90 according to DIN 51 354 part 2 (gear transmission test rig, 12 defined load steps at 90°C start temperature and 8.3 m/s circumferance speed).

Depending on the nominal working pressure the following load carrying capability is recommended:

Nominal Pressure	Load Carrying Capability
80 – 125 Bar (1160 – 1813 PSI)	≥ 5
125 – 200 Bar (1813 – 2900 PSI)	5 – 6
200 – 250 Bar (2900 – 3625 PSI)	7 – 9
250 – 320 Bar (3625 – 4640 PSI)	≥ 10
> 320 Bar (4640 PSI)	≥ 12

Max pressure limit: 1.25 x nominal pressure

Mineral oils are offered according to DIN 51 524 in different fluid types:

- HL-fluids according to DIN 51 524 part 2, normal working load conditions, load carrying capability 6 – 10.
- HLP-fluids according to DIN 51 524 part 3, higher working load conditions, load carrying capability > 10.

Modern HLP fluids today usually come with a load carrying capability >12. They are equipped with wear prohibiting additives, which ensure a high safety of operation even under severe working conditions.

Beside the wear reduction due to the elasto-hydrodynamic properties of the hydraulic fluid, which are expressed in the FZG value, the behavior of the fluid in a mixed friction situation is very important for the use of a fluid in heavy duty hydraulic applications. In hydraulic components mixed friction occurs permanently, because the velocity difference between two components in contact very often is below the minimum velocity for hydrodynamic lubrication.

During mixed friction, i. e.: at a direct metal-to-metal contact between two surfaces, the “lubricity” of a fluid is most important. The lubricity is measured according to DIN 51 347 and is expressed as a specific load in N/mm², at which wear does not yet occur. This value sometimes also is called the “Brugger Value”.

It is measured in a test device which moves two cylindrical test elements under a defined load. On one of the test elements a wear mark is created. This wear mark grows during the first seconds of the test, but then stays for several minutes at a constant size. The size of this wear mark gives a reading for the specific “wear free” load for this particular fluid in N/mm².

For general applications this value has to be at least:

30 N/mm², measured in accordance with DIN 51 347-2.

For heavily loaded hydraulic equipment and fast cycling machines and/or high dynamic loads, this value should not be below:

50 N/mm², measured in accordance with DIN 51 347-2.

But a fluid can maintain its wear prohibiting capabilities only, when it is not contaminated with hard and aggressive particles. Therefore in the interest of a long functional life of all components the **filtration of the hydraulic fluid** needs special attention.

The sealing and gliding gaps in hydraulic components typically are in the range of 3 – 10 µm. That means they are in the same size range as most of the particles found in a hydraulic fluid.

The smaller the number of particles in a hydraulic fluid, the lower the wear of the hydraulic components will be. And wear is by nearly 90% the root cause for failure of hydraulic pumps and motors.

To ensure a disruption-free operation of a general hydraulic system, at least a fluid quality (cleanliness level) of 20/18/15 according to ISO 4406 is required. The characteristic values indicate, how many particles in the size range >2 µm (value 1), >5µm (value 2) and >15 µm (value 3) are present in one ml of a fluid. The value 20 stands for 5.000 – 10.000 particles per ml, the 18 stands for 1.300 – 2.500 particles per ml, and the 15 for 160 – 320 particles per ml.

That illustrates that in a hydraulic fluid of the cleanliness level 20/18/15, a huge number of particles is distributed in the fluid content. That also indicates that this fluid quality is good enough only for general and low pressure applications.

When the requirements in functional safety and operational life are higher, or with high-pressure applications, Parker recommends a cleanliness level 18/16/13 according to ISO 4406. The fluid then is allowed to contain 320 – 640 particles >5µm and 40 – 80 particles >15 µm per ml.

To achieve such a cleanliness level the hydraulic circuit must be equipped with a suitable filtration system. But it has to be considered that filters never perform an absolut cleaning of the fluid. A filter element with a ß-value of e.g.: $ß_{10} \geq 75$ does not retain all particles larger than 10µm. Still 1/75 of all particles larger than 10µm will pass the element.

This review shows:

- A reservoir filling of 100 l contains billions of contamination particles.
- Even a “10µ filter“ will let pass millions of particles > 10 µm.

On top of that, the following needs to be considered:

- Across a breather and through the piston rod seal and wiper of a hydraulic cylinder, particles can enter a hydraulic system.
- Wear on pumps, motors and valves adds more particles to the fluid.
- Mineral oil delivered in barrels typically has a cleanliness level of 21/19/16 according to ISO 4406 or worse.

Therefore, it is very important to pay highest attention also to the systems filtration in respect of its layout, its supervision and its maintenance.

The load to the fluid in hydraulic systems leads to its **aging**. Therefore, the fluid needs to be checked for its perfect condition. This check should be performed at least twice a year and include as a minimum requirement the determination of neutralization number, viscosity, colour index and cleanliness level.

The operational life of the fluid depends very much on the operating pressure, the operating temperature, the circulation number (delivery of all pumps divided by the reservoir content) and the type of the fluid. General statements to the average time of usage, therefore, are impossible.

Heat Dissipation

The temperature has an important influence on the properties of the hydraulic fluid. Viscosity, lubricity, aging and other significant features depend directly or indirectly on the temperature. That indicates that the thermal balance of a hydraulic system needs to be considered during the layout and design. On the one hand the fluid is stressed by a high temperature; on the other hand, the fluid is the medium to transport the heat away from resistors, orifices and other throttling devices and friction zones. Therefore, during layout it has to be made sure that nowhere in the system a local overheating by dissipated heat can occur. That could destroy seals, lead to a failure of components due to a lack of lubricity or finally lead to a destruction of the fluid itself.

A final comment on **seals**. A good hydraulic system should not show that it operates with a fluid. There should be no leakage at all. In general hydraulic components are leak-free. More than 90% of all problems occur at interfaces:

- Ports.
- Flange interfaces of valves.
- Connectors.

The assembly of the system is the main cause for problems in this area. Nevertheless, the system ‘hydraulic fluid & elastomeric seal’ is extremely sensitive. Temperature, chemical incompatibility and mechanical damages are the most frequent causes for a failure of this system. Please contact Parker if you have any question about this topic.

Parker does not give an explicit recommendation for a certain fluid product, fluid brand or fluid manufacturer. The permanent research and development in the field of hydraulic fluids and seal materials make it impossible to test all possible combinations for compatibility with our components. The recommendations made here and the discussion of possible restrictions, relevant standards and other useful literature should help to select the right fluid for a hydraulic system and to design the power unit in a way that it is able to fulfill all requirements.

Special Fluids for Environment Protection

All statements made above are in principle also valid for these fluids. Regarding the selection/definition of the required viscosity level, the cleanliness level and the lubrication and wear protection behaviour, all criteria discussed in the mineral oil section have to be applied accordingly.

The following special fluid features and conditions are to be considered:

Fluids Based on Natural Ingredients

- Good lubrication, viscosity-temperature characteristics better than standard mineral oil.
- Density slightly higher than mineral oil, therefore, check for good suction conditions!
- Pourpoint approx. -30°, therefore, not suitable for low temperature operation.
- Accelerated aging. First fluid change after 500 h, second change after another 1.000 h. Then all 2.000 h or annually, if less than 2.000 h annual operation.
- High affinity to water. The ingression of water has to be avoided under all conditions. At temperature above 50°C destroys the fluid if water is present.
- Can be mixed with mineral oil (under loss of biological degradability!).
- Internal coating of reservoirs etc.to be compatible with the fluid. Check with fluid supplier.

Fluids Based on Esters (Synthetical Esters)

- The same remarks as for fluids based on natural ingredients.

Fluids Based on Polyglycol (not HFC/Water Glycol)

- Good lubrication, viscosity-temperature characteristics better than standard mineral oil.
- Aging/durability according to actual knowledge similar to mineral oil.
- Pourpoint approx. -40°C, be careful at low temperatures!
- Density significantly higher than at mineral oil. Therefore, the max. input speeds for self priming pumps are to be reduced by 20%.
- Use fluorocarbon as seal material. Our hydraulic components are tested with mineral oil; they need to be emptied completely before installation!
- Normal paints and coatings are destroyed. Please contact fluid supplier!
- Never mix with mineral oil, solid sediments will develop and block filters, orifices etc!

⚠ Note

Even bio-degradable fluids need to be disposed of according to special disposing rules (like mineral oil). Prior to the use of these fluids, we recommend to contact our specialists.

Fluids According to DIN 51 502 (HF Fluids)

These fluids are fire resistant. The following classes are used:

HFA	oil in water emulsion: 95 – 98% water
HFB	water in oil emulsion: >40% water
HFC	water containing solutions: 35 – 55% water (polyglycol)
HFD	water-free fluids (mainly phosphoric acid ester)

The operation of Parker hydraulic components with HFD fluids within the limits of the fluid suppliers specification (temperature range, filtration, seal material compatibility), and the viscosity limits of our components is possible without restrictions.

The operation with HFC involves certain restrictions regarding pressure limitation and bearing life reduction in rotating units. Please contact our specialists.

Parker does not give a general release for the operation with HFA and HFB fluids. In certain cases a special approval can be given upon request.

If you are not sure whether our products can be used with a special fluid or not, please contact us. Our specialists are glad to answer your questions and to give you any necessary support.

Offer of Sale

The items described in this document and other documents or descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors are hereby offered for sale at prices to be established by Parker Hannifin Corporation, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any such items, when communicated to Parker Hannifin Corporation, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

1. Terms and Conditions of Sale: All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer, Acceptance of Seller's products shall in all events constitute such assent.

2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment from Parker Hannifin Corporation. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED. NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.**

5. Limitation Of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property, Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

9/91-P

terms-safety.indd, dd

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

Parker Safety Guide for Selecting and Using Hydraulic Valves and Related Accessories

WARNING: Failure or improper selection or improper use of Parker Hydraulic Valve Division (HVD) Valves or related accessories ("Products") can cause death, personal injury and property damage. Possible consequences of failure or improper use of these Products include but are not limited to:

- Valves or parts thereof thrown off at high speed
- High velocity fluid discharge
- Explosion or burning of the conveyed fluid
- Contact with suddenly moving or falling objects controlled by the Valve
- Injections by high-pressure fluid discharge
- Contact with fluid that may be hot, cold, toxic or otherwise injurious
- Injuries resulting from injection, inhalation or exposure to fluids
- Injury from handling a heavy item (dropped, awkward lift)
- Electric shock from improper handling of solenoid connections
- Injury from slip or fall on spilled or leaked fluid

Before selecting or using any of these Products, it is important that you read and follow the instructions below. In general, the Products are not approved for in-flight aerospace applications. Consult the factory for the few that are FAA approved.

1.0 GENERAL INSTRUCTIONS

1.1 **Scope**: This safety guide provides instructions for selecting and using (including assembling, installing and maintaining) these Products. For convenience all items in this guide are called "Valves". This safety guide is a supplement to and is to be used in conjunction with the specific Parker catalogs for the specific Valves and/or accessories being considered for use. See item 1.6 below for obtaining those catalogs.

1.2 **Fail-Safe:** Valves can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of the Valve or Valve Assembly will not endanger persons or property.

1.3 **Safety Devices:** Never disconnect, override, circumvent or otherwise disable any safety lockout on any system whether powered by HVD Valves or any motion control system of any manufacturer. (e.g. Automatic shut-off on a riding lawn mower should the operator get out of the seat).

1.4 **Distribution:** Provide a copy of this safety guide to each person that is responsible for selecting or using HVD Valve Products. Do not select HVD Valves without thoroughly reading and understanding this safety guide as well as the specific Parker catalogs for the Products considered or selected.

1.5 **User Responsibility:** Due the wide variety of operating conditions and applications for Valves, HVD and its distributors do not represent or warrant that any particular Valve is suitable for any specific system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing is solely responsible for:

- Making the final selection of the Valve
- Assuring that the user's requirements are met and that the application presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the Valves are used.
- Assuring compliance with all applicable government and industry standards.

1.6 **Additional Questions:** Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com , for the telephone numbers of the appropriate technical service department. For additional copies of this or any other Parker Safety Guide go to www.parker.com and click on the safety button on the opening page. Catalogs and/or catalog numbers for the various HVD Valve Products can be obtained by calling HVD at 440-366-5100. Phone numbers and catalog information is also available on the Parker website, www.parker.com .

2.0 VALVE SELECTION INSTRUCTIONS

2.1 **Pressure:** Valve selection must be made so that the maximum working pressure of the Valve is equal to or greater than the maximum system pressure. Surge, impulse or peak transient pressures in the system must be below the maximum working pressure of the Valve. Surge, impulse and peak pressures can usually be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond intervals. Mechanical pressure gauges indicate only average pressure and cannot be used to determine surge, impulse or peak transient pressures. Burst pressure ratings if given or known are for manufacturing purposes only and are not an indication that the Product can be used in applications at the burst pressure or otherwise above the maximum working pressure.

2.2 **Temperature:** The fluid temperature must be regulated or controlled so that the operating viscosity of the fluid is maintained at a level specified for the particular Valve product. Such ranges are given in the product catalogs or can be obtained from the appropriate customer service department for the particular Valve product.

2.3 **Fluid Compatibility:** The fluid conveyed in Valves has direct implications on the Valve selection. The fluid must be chemically compatible with the Valve component materials. Elastomer seals, brass, cast iron, aluminum for example all are potentially affected by certain fluids. Additionally, fluid selection affects the performance of various Valves. Considerations relative to fluid selection are outlined in the specific HVD Valve product catalog. Of particular importance is that the fluid be for hydraulic use, contain the proper additives and wear inhibitors. See 1.6 "Additional Questions" above for information to obtain such HVD catalogs.

2.4 **Changing Fluids:** If a system requires a different fluid, it should be done with the guidance in number 2.3 above. Additionally, it may be necessary to flush the system (including the Valves) to remove any of the previous fluid. Consult the Parker Valve Division for guidance.

2.5 **Size:** Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage due to heat generation or excessive fluid velocity.

2.6 **Placement:** Installation of Valves must take into account the orientation of the Valve and the proximity of the Valve to other parts of the system. This includes but is not limited to closeness to hot and cold areas, access for servicing and operation as well as orientation for proper connectors.

2.7 **Ports:** Connection of Valves in systems can be by threaded ports, sub-base surfaces, flanges and manifolds. In all cases, the proper fitting, surface or mounting hardware must be selected to properly seal and contain the system fluid so as to avoid the adverse conditions listed in the initial warning box above. Specifically, if using threaded ports, the designer must make sure that the mating fitting is of the compatible thread. Also, the instructions provided by the connector hardware supplier must be read and understood so as to properly assemble the connector. The Parker Safety Guide for using Hose, Tubing and Fittings and Related Accessories is but one reference to this end.

2.8 **Environment:** Care must be taken to insure that the Valve and Valve Assemblies are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental conditions including but not limited to ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals and air pollutants can cause degradation and premature failure.

2.9 **Electric Power:** For Valves requiring electric power for control, it is imperative that the electricity be delivered at the proper voltage, current and wattage requirements. To obtain the proper control requirements please refer to the respective Parker product catalog for the specific Valve that is intended for use. If further guidance is required, call the appropriate technical service department identified in the respective Parker product catalog.

2.10 **Specifications and Standards:** When selecting Valves, government, industry and Parker specifications and recommendations must be reviewed and followed as applicable.

2.11 **Accessories:** All accessories used in conjunction with any Parker Valve product must be rated to the same requirements of the Valve including but not limited to pressure, flow, material compatibility, power requirements. All of these items must be examined as stated in the "VALVE INSTALLATION INSTRUCTIONS" paragraph 3.0.

(continued on next page)

3.0 VALVE INSTALLATION INSTRUCTIONS

3.1 **Component Inspection:** Prior to use, a careful examination of the Valve(s) must be performed. The Valve intended for use must be checked for correct style, size, catalog number and external condition. The Valve must be examined for cleanliness, absence of external defects or gouges, cracked or otherwise deformed parts or missing items. The mounting surface or port connections must be protected and free of burrs, scratches, corrosion or other imperfections. Do NOT use any item that displays any signs of nonconformance. In addition, any accessory including but not limited to fittings, bolt kits, hoses, sub bases, manifolds, and electrical connectors must be subjected to the same examination.

3.2 **Handling Valves:** Many Valves whether HVD Valves or of another manufacturer can be large, bulky or otherwise difficult to handle. Care must be taken to use proper lifting techniques, tools, braces, lifting belts or other aids so as not to cause injury to the user, any other person or to property.

3.3 **Filtration:** Fluid cleanliness is a necessity in any hydraulic system. Fluid filters must be installed and maintained in the system to provide the required level of fluid cleanliness. Filters can be placed in the inlets, pressure lines and return lines. The level of cleanliness required is specified in the HVD product catalog for the specific Valve(s) selected or intended for use. For additional information on Filter selection contact Parker Filter Division at 800-253-1258 or 419-644-4311.

3.4 **Servo Valves:** Application of Servo Valves in general requires knowledge and awareness of "closed loop control theory" and the use of electronic controls for successful and safe operation. Individuals who do not have such experience or knowledge must gain training before use of such Products. Parker offers both classroom training as well as manuals to assist in gaining this knowledge. These aids can be obtained by contacting Hydraulic Valve Division at 440-366-5100, calling the general Parker help line 800-CPARKER or going to the Parker web site at www.parker.com.

3.5 **Accessory Ratings:** All accessories used in combination with the selected or intended Valve product must be rated and compatible with the selected Valve. Specifically, the items must be of equal or greater rating including but not limited to pressure, flow, power, size, port style, thread connectors and material.

3.6 **Connection Styles:** It is the responsibility of the user of the Parker product to properly select connectors and accessories that match the connections on the sub plate, Valve, flange or threaded connection or manifold. It is also the responsibility of the installer to possess adequate skill and knowledge including but not limited to thread preparation, torque technique, hose assembly and inspection, tube preparation and assembly, and fitting installation. Parker Tube Fitting Division (www.parker.com/tfd) catalog 4300 and Parker Hose Products (www.parkerhose.com) catalog 4400 describe some basic technical information relative to proper fitting assembly.

3.7 **Electrical Connections:** All electrical connections must be made to the applicable codes and local safety requirements.

3.8 **Gauges and Sensors:** The user must install sufficient gauges and sensors in the system so as to be able to determine the condition of the system. This includes but is not limited to pressure gauges, flow meters, temperature sensors and site gauges. These are of utmost importance should removal or disassembly of a Valve, portion of a Valve or portion of the system become necessary. Refer to "VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS" for details and especially item 4.8.

3.9 **System Checkout:** Once installed, the Valve installation must be tested to insure proper operation and that no external leakage exists. All safety equipment must be in place including but not limited to safety glasses, helmets, ear protection, splash guards, gloves, coveralls and any shields on the equipment. All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Valve maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potentially hazardous areas while testing and using.

4.0 VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS

4.1 **Maintenance Program:** Even with proper installation, Valves and Valve System life may be significantly reduced without a continuing maintenance program. The severity of the application and risk potential must determine the frequency of the inspection and the replacement of the Products so that Products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at a minimum, must include instructions 4.2 through 4.10. An FMEA (Failure Mode and Effects Analysis) is recommended in determining maintenance requirements.

4.2 **Visual Inspection-Valves:** Any of the following conditions require immediate shut down and replacement of the Valve.

- Evidence that the Valve is in partial dis-assembly.
- Visible crack or suspicion of a crack in the Valve housing or bent, cracked or otherwise damaged solenoid.
- Missing or partially extending drive pin on a flow control knob.
- Missing, loose components, obstructions or other condition impeding the motion or function of the manual knob, lever, foot pedal or other mechanical operator of a hydraulic Valve.
- Any evidence of burning or heat induced discoloration.
- Blistered, soft, degraded or loose cover of any kind.
- Loose wire or electrical connector.

4.3 **Visual Inspection-Other:** The following conditions must be tightened, repaired, corrected or replaced as required.

1. Fluid on the ground must be cleaned immediately. Also, the source of the fluid must be determined prior to running the equipment again.
2. Leaking port or excessive external dirt build-up.
3. System fluid level is too low or air is entrapped or visible in the reservoir.
4. Equipment controlled by the Valve or Valve assembly has been losing power, speed, efficiency

4.4 **Filter Maintenance:** System filters must be maintained and kept in proper working order. The main service requirement is periodic replacement of the filter element or screen. Contact Parker Filter Division at 800-253-1258 or 419-644-4311 for further filter maintenance details.

4.5 **Functional Test:** See "System Checkout" number 3.9 above in "VALVE INSTALLATION INSTRUCTIONS".

4.6 **Replacement Intervals:** Valves and Valve Systems will eventually age and require replacement. Seals especially should be inspected and replaced at specific replacement intervals based on previous experience, government or industry recommendations, or when failures could result in unacceptable downtime, damage or injury risk. At a minimum seals must be replaced whenever service is rendered to a Valve product.

4.7 **Adjustments, Control Knobs, and Other Manual Controls:** System Pressure and Flow are typically adjusted by knobs and/or handles. A set-screw or lock-nut secures the adjustment device so as to maintain the desired setting. This set-screw or lock-nut must first be loosened prior to making any adjustments and re-tightened after adjustment on the HVD Valve. All adjustments must be made in conjunction with pressure gauges and/or flow meters (or by watching the speed of the actuator in the case of setting flow only). See paragraph "Gauges and Sensors" above in the section "VALVE INSTALLATION INSTRUCTIONS'. Under no circumstances should any control knob, adjustment stem, handle, foot pedal or other actuating device be forced beyond the mechanical stop(s) on the Valve. For example, the Parker Safety Notice Bulletin **HY14-3310-B1/US** for HVD Colorflow Valves specifically restricts the adjustment torque to "hand adjust" or "less than 10 ft/lbs" if it cannot be adjusted by hand. Failure to adhere to this may force the knob beyond the stop point allowing it to be ejected at high speed resulting in death, personal injury and property damage. For complete safety instructions on HVD Colorflow Valves, copies of Safety Notice **Bulletin HY14-3310-B1/US** can be obtained directly from the Hydraulic Valve Division at 440-366-5100 or from the Parker web site at www.parker.com by selecting the "Safety" button. Parker help line 800-CPARKER is on call 24/7 as well should there be any question about the use of a HVD Valve. Additionally, when making adjustments, always adjust the Valve with all parts of your body to the side of the Valve (that is, the knob is not pointing toward you or anyone else).

4.8 **High pressure Warning:** Hydraulic power is transmitted by high-pressure fluids through hoses, fittings and valves, pumps and actuators. This condition can be dangerous and potentially lethal and, therefore, extreme caution must be exercised when working with fluids under pressure. From time to time, hoses, Valves, tubes or fittings fail if they are not replaced at proper time intervals. Typically these failures are the result of some form of misapplication, abuse, wear, or failure to perform proper maintenance. When such failure occurs, generally the high pressure fluid inside escapes in a stream which may or may not be visible to the user. Under no circumstances should the user attempt to locate the leak by "feeling" with their hands or any other part of their body. High-pressure fluids can and will penetrate the skin and cause severe tissue damage and possible loss of limb or life. Even seemingly minor hydraulic fluid injection injuries must be treated immediately by a physician with knowledge of the tissue damaging properties of hydraulic fluid.

If a hose, tube, fitting or Valve failure occurs, immediately shut down the equipment and leave the area until pressure has been completely released from the system. Simply shutting down the pump may or may not eliminate the pressure in the system. It may take several minutes or even hours for the pressure to be relieved so that the leak area can be examined safely. Once the pressure has been reduced to zero, the suspected leaking item can be taken off the equipment and examined. It must always be replaced if a failure has occurred. Never attempt to patch or repair a connector (especially a hose) or Valve that has failed. Consult the nearest Parker distributor or the appropriate Parker division for component replacement information. Never touch or examine a failed hydraulic component unless it is obvious that the item no longer contains fluid under pressure.

Parker Hydraulics International Sales Offices

North America

Motion & Control Division – Montreal
2001 rue de l'aviation
Dorval, Quebec, H9P 2X6
Tel: 514-684-3000
Fax: 514-684-4191

Motion & Control Division – Calgary
3141B – 16th Street N.E.
Calgary, Alberta T2E 7K8
Tel: 403-291-9284
Fax: 403-291-9285

Mexico
Parker Hannifin de Mexico, S.A. C.V
Via de Ferrocarril a Matamoros 730
Apodaca, N.L. C.P. 66600, Mexico
Tel: 01-8181-566036 y 96

Europe

Austria
Parker Hannifin GmbH
Badener Strasse 12
AT-2700 Wiener Neustadt, Austria
Tel: 43 2622-23501 970
Fax: 43 2622-23501 977

Belarus
Parker Hannifin Corporation
Pr. Nezavisimosti, 11, Office 524
BY-220030 Minsk, Belarus
Tel: 375 17 209 9399
Fax: 375 17 209 9227

Belgium
Parker Hannifin SA NV
ZI Sud 2
23, Rue du Bosquet
BE-1400 Nivelles, Belgium
Tel: 32 67 280 900
Fax: 32 67 280 999

Czech Republic/Slovakia
Parker Hannifin s.r.o.
Parkerova 623
CZ-250 67 Klecany, Czech Republic
Tel: 420 284 083 111
Fax: 420 284 083 112

Denmark
Parker Hannifin Denmark A/S
Industriparken 35-37
DK-2750 Ballerup, Denmark
Tel: 45 43 56 04 00
Fax: 45 43 73 31 07

Finland
Parker Hannifin Oy
Ylästöntie 16
FI-01520 Vantaa, Finland
Tel: 358 20 753 2500
Fax: 358 20 753 2200

Europe

France
Parker Hannifin France SAS
142, rue de la Forêt
FR-741 30 Contamine sur Arve, France
Tel: 33 4-50 25 80 25
Fax: 33 4-50 03 67 37

Germany/Switzerland
Parker Hannifin GmbH & Co. KG
Pat-Parker-Platz 1
DE-41564 Kaarst, Germany
Tel: 49 (0) 2131 4016 0
Fax: 49 (0) 2131 4016 9199

Greece
Parker Hannifin Corporation
197 Syngrou Av.
GR-171 21 Athens, Greece
Tel: 0030 210 933-6450
Fax: 0030 210 933-6451

Hungary
Parker Hannifin Corporation
Hungarian Trade Representative Office
Egressy u. 100
HU-1149 Budapest, Hungary
Tel: 36 1 220 4155
Fax: 36 1 422 1525

Ireland
Parker Hannifin Ireland Ltd
Baldonnell Business Park
Baldonnell, Naas Road
IE-Co. Dublin, Ireland
Tel: 353 (0)1 466 63 70
Fax 353 (0)1 466 63 76

Italy
Parker Hannifin SpA
Via Privata Archimede 1
IT-200 94 Corsico (MI), Italy
Tel: 39 02-45 19 21
Fax: 39 02-44 79 340

Latvia (Lithuania, Kaliningrad)
Parker Hannifin Corporation
79A Slokas Street, Office No. 6
LV-1007 Riga, Latvia
Tel: 371 74 52 601
FAx: 371 74 52 608

The Netherlands
Parker Hannifin BV
Edisonstraat 1
NL-7575 AT Oldenzaal, The Netherlands
Tel: 31 541 585 000
Fax: 31 541 585 459

Norway
Parker Hannifin A/S
Berghagan
PO Box 3008
NO-1402 Ski, Norway
Tel: 47 64-91 10 00
Fax: 47 64-91 10 90

Europe

Poland
Parker Hannifin Sp.zo.o
ul. Równolegla 8
PL-02-435 Warszawa, Poland
Tel: 48 22 573 24 00
Fax: 48 22 573 24 03

Portugal
Parker Hannifin Portugal, Lda
Travessa da Bataria 184 R/C
Dto./1 Esq.
PT-4450-625 Leça da Palmeira, Portugal
Tel: 351 22 999 7360
Fax: 351 22 996 1527

Romania
Hidro Consulting Impex SRL
Bld Ferdinand nr 27, Sect 2
RO-021381 Bucharest, Romania
Tel: 40 21 252 13 82
Fax: 40 21 252 33 81

Russia
Moscow
Parker Hannifin LLC
8-go Marta str., 6A, build 1
RU-127083 Moscow, Russia
Tel: 7 495 645 21 56
Fax: 7 495 612 18 60

Sakhalin
Parker Hannifin LLC
Branch Office Sakhalin
Pr. Mira 1
RU-693012 Yuzhno-Sakhalinsk, Russia
Tel: 7 4242 42 35 27
Fax: 7 4242 42 35 27

Ukraine
Parker Hannifin Corporation
Representation Office in Ukraine
vul. Velyka Vasylkivska 9/2 Office 59
UA-01004 Kyiv, Ukraine
Tel: 380 44 494 2731/2732/2724
Fax: 380 44 494 2730

Azerbaijan
Parker Hannifin plc
Azpar, Technical Representative
140 Alovsat Guliyev St. Apt. 10
AZ-1000 Baku, Azerbaijan
Tel: 99 412 598 3966
Fax: 99 412 598 3966

Kazakhstan
Parker Hannifin
Gateway Ventures CA Ltd,
Representative
7A Kabanbai Batira
KZ-480100 Alamty, Kazakhstan
Tel: 7 3272 505 800
Fax: 7 3272 505 801

(continued on next page)

Parker Hydraulics International Sales Offices

Europe

Slovenia
Parker Hannifin Corporation
Vel. Bucna vas 7
SI-8000 Novo mesto, Slovenia
Tel: 386 7 337 6650
Fax: 386 7 337 6651

Spain
Parker Hannifin España SA
P.O. Box No. 74
P. I. Las Monjas, c/Estaciones, 8
ES-28850 Torrejón de Ardoz
Madrid, Spain
Tel: 34 91-675 73 00
Fax: 34 91-675 77 11

Sweden
Parker Hannifin AB
Fagerstagatan 51
Box 8314
SE-163 08 Spånga, Sweden
Tel: 46 8 5979 50 00
Fax: 46 8 5979 51 10

Parker Hannifin AB
Almenäsvägen 22
SE-501 78 Borås, Sweden
Tel: 46 33 700 52 00
Fax: 46 33 13 89 40

Turkey
Parker Hannifin Corporation
Liaison Office of Turkey
Merter Is Merkezi
Gen. Ali Riza Gurcan cad. No: 2 / 67
TR-34067 Merter/Istanbul, Turkey
Tel: 90 212 482 91 06/07
Fax: 90 212 482 91 10

United Kingdom
Parker Hannifin Ltd
Tachbrook Park Drive
Tachbrook Park
UK-Warwick, CV34 6 TU, England
Tel: 44 1926 317 878
Fax: 44 1926 317 855

Asia Pacific

China
Parker Tejing
Hydraulic Tianjin
21 Hongyuan Road
Xiqing Development Zone
CN-Tianjin 300385, China
Tel: 86 22 5838 8899
Fax: 86 22 5838 8917

India
Parker Hannifin India Pvt Ltd
Plot No. EL-26, MIDC, TTC Industrial Area
Mahape,
IN-Navi Mumbai 400 709, India
Tel: 91 22 5613 7081/7082/7083/7084
Fax 91 22 2768 6841/6618

Japan
Parker Hannifin Japan Ltd
Shirokanedai Building 2nd Floor
3-2-10, Shirokanedai, Minato-ku
JP-Tokyo, 108-0071, Japan
Tel: 81 3 6408 3900
Fax: 81 3 5449 7201

Malaysia
Parker Hannifin Singapore Pte Ltd
(Malaysia Branch Office)
Lot 558A, Jalan Subang 3
Off Persiaran Subang
Sungai Penaga Industrial Park
MY-47610 Subang Jaya, Malaysia
Tel: 60 (0)3 5638 1476
Fax: 60 (3)3 5638 1527

New Zealand
Parker Hannifin (N.Z.) Ltd
3 Bowden Road
Mt. Wellington, Auckland, New Zealand
Tel: 64 9 574 1744
Fax: 64 9 573 1529

Singapore
Parker Hannifin Singapore Pte Ltd
No. 11 Fourth Chin Bee Road
SG-Singapore 619702,
Republic of Singapore
Tel: 65 6887 6300
Fax: 65 6265 5125

Asia Pacific

Taiwan
Parker Hannifin Taiwan Co., Ltd
No. 40, Wuchiuan 3rd Rd.,
Wuku Industrial Park
Taipei County, Taiwan 248, R.O.C.
Tel: 886 2 2298 8987
Fax: 886 2 2298 8982

Thailand
Parker Hannifin Thailand Co., Ltd
1023, 3rd floor, TPS building
Pattanakarn Road, Suanluang
Bangkok 10250, Thailand
Tel: 662 717 8140
Fax: 662 717 8148

Latin America

Argentina
Parker Hannifin Argentina SAIC
Stephenson 2711 esq. Costa Rica
1667 Tortuguitas
Buenos Aires, Argentina
Tel: 54 3327 44 4129
Fax: 54 3327 44 4199

Chile
Parker Hannifin Chile Ltda
Av. Americo Vespucio 2760-E
Conchali - Santiago, Chile
Tel: 56-2-623-1216
Fax: 56-2-623-1421

Venezuela
Parker Hannifin de Venezuela, SA
Av. Principal con calle Miraima
Edificio Draza, Boleita Norte
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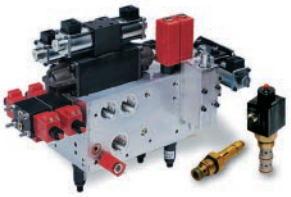

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Motion & Control Division – Milton
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Mexico
Parker Hannifin de México
Av eje uno norte num 100
Parque Industrial Toluca 2000
Toluca, Mex C.P. 50100
Tel: 52 722 2754200
Fax: 52 722 2799308

Europe

Europe Hydraulics Group
Parker Hannifin Corporation
Parker House
55 Maylands Avenue
Hemel Hempstead, Herts
HP2 4SJ England
Tel: 44 1442 458000
Fax: 44 1442 458085

Latin America

Brazil
Hydraulics Division
Parker Hannifin Ind. e Com. Ltda
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Cachoeirinha RS, 94930-000 Brazil
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Eastern Region
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Gulf Region
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Tel: 317-519-8490
Fax: 866-390-4986

Asia Pacific

Asia Pacific Headquarters
Parker Hannifin Hong Kong Ltd
8/F, Kin Yip Plaza
9 Cheung Yee Street
HK-Cheung Sha Wan, Hong Kong
Tel: 852 2428 8008
Fax: 852 2425 6896

Australia Headquarters
Parker Hannifin Pty Ltd.
9 Carrington Road
Castle Hill, NSW 2154, Australia
Tel: 612 9634 7777
Fax: 612 9842 5111

China Headquarters
Parker Hannifin Motion & Control (Shanghai) Co., Ltd
280 Yunqiao Road,
Jin Qiao Export Processing Zone
CN-Shanghai 201206, China
Tel: 86 21 5031 2525
Fax: 86 21 5834 3714

Korea Headquarters
Parker Hannifin Korea Ltd
6F Daehwa Plaza
169 Samsung-dong, Gangnam-gu
KR-Seoul, 135-090, Korea
Tel: 82 2 559 0400
Fax: 82 2 556 8187

South Africa

Parker Hannifin Africa Pty Ltd
Parker Place
10 Berne Avenue Aeroport
P.O. Box 1153
ZA-Kempton Park 1620,
Republic of South Africa
Tel: 27 11 961 0700
Fax: 27 11 392 7213

Middle East

Egypt
Parker Hannifin Corporation
8B Zahraa Maadi
Region 17F
Cairo, Egypt
Tel: (20) 2 5194018
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Parker Hannifin Corporation
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