



Republic/Manatrol

Hydraulic and Pneumatic Control Valves

Catalog HY14-3000/US



 **WARNING**

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Offer of Sale

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated in the "Offer of Sale".

© Copyright 2006, 1996 Parker Hannifin Corporation, All Rights Reserved

Contents**In-Line Mounted Flow Control Valves**

Series 133, 135, 143	Needle	D2 - D3
Series S133, S135, S143	Needle, Soft Seat	D2 - D3
Series T143, T148	Toggle	D4
Series 154	Needle, High Pressure	D5 - D6
Series 6611	Flow Combiner / Divider	D7
Series FS	Flow Control	D8 - D12
Series PC*MS	Pressure Compensated	D13 - D17
Series TPC	Temperature & Pressure Compensated	D18 - D22
Series FG3PKC	Temperature & Pressure Compensated	D23 - D26
Series MVI	Cartridge-type Needle	D27 - D30
Series D	Cam-Operated, 2-Way	D31 - D47
Series NS	Needle	D48 - D51

D

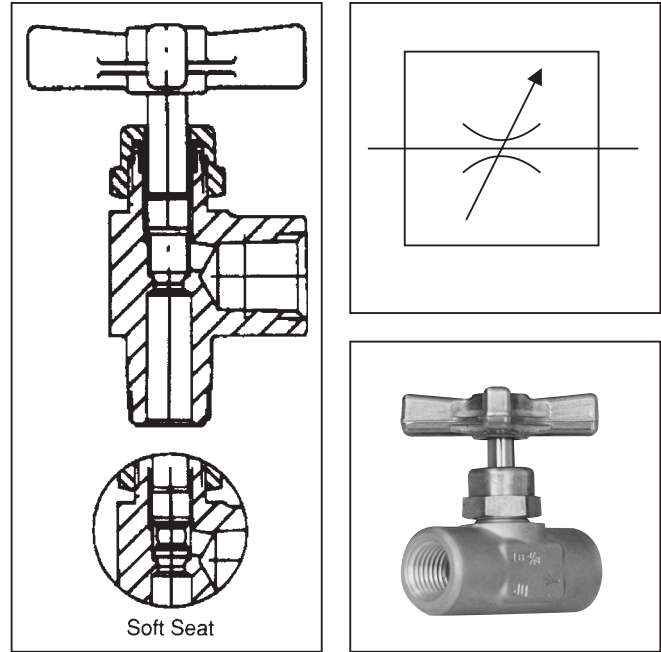
General Description

Series 133, 135, 143 and S133, S135, S143 needle valves are capable of metering flow of a wide variety of liquids and gases. A soft seat design can be used when zero leakage is required.

Features

- Low-priced brass needle valves available in metal and soft seat designs.
- Special stem designs offer precision control of small volume flows.
- External pipe threaded ports are counterbored to accept solder-type tube fittings.
- Stops, prevents stems from being screwed out accidentally.
- In the soft seat type the resiliency of the captive thermoplastic nose assures positive shut-off.

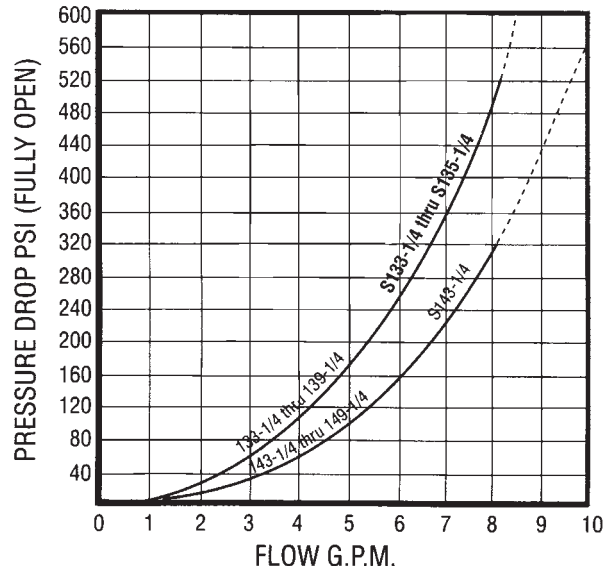
D



Specifications

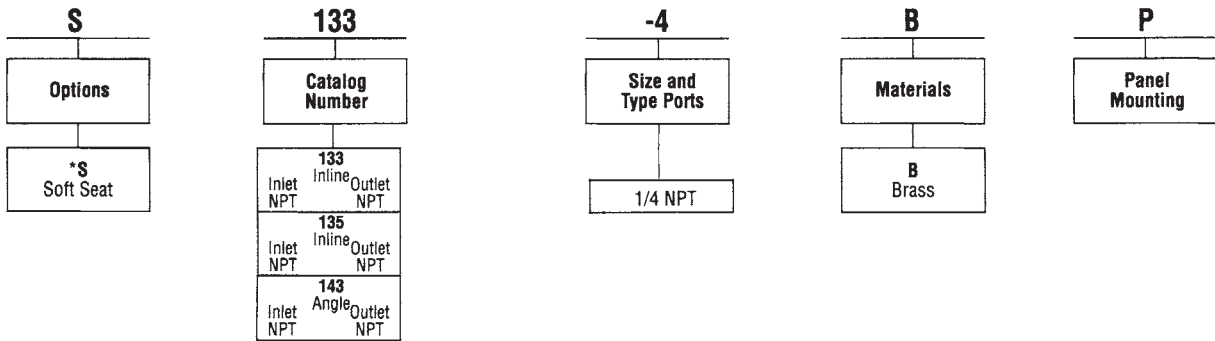
Service Applications	133, 135, 143: Liquids S133, S135, S143: Gases and liquids
Maximum Operating Pressure	133, 135, 143: Working: 345 Bar (5000 PSI) Proof: 517.5 Bar (7500 PSI) Burst: 862.5 Bar (12,500 PSI) S133, S135, S143: 207 Bar (3000 PSI)
Sizes	NPT: 1/4
Ports	NPT: Pipe threads
Internal Leakage	Zero
Mounting	In-line or panel. Maximum panel thickness 1/2". Panel hole diameter 17/32".
Material	Body: Brass Cap: Brass Cap Washer: 316 Stainless Steel Locknut: Brass Stem: 303 or 316 Stainless Steel Stem Nose Soft Seat: Thermoplastic Washers: 304 Stainless Steel Packing: PTFE Handle: Aluminum alloy star (metal seat)
Operating Temperature	133, 135, 143: Brass: -54°C to 93°C (-65°F to 200°F) Consult factory for special temps. S133, S135, S143: Stainless Steel: -54°C to 93°C (-65°F to 200°F)

Performance Curves



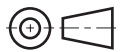
Size	CV Factors		Weights (Approx.)
	Inline	Angle	
1/4	.19	.37	.25 Lb.

Ordering Information

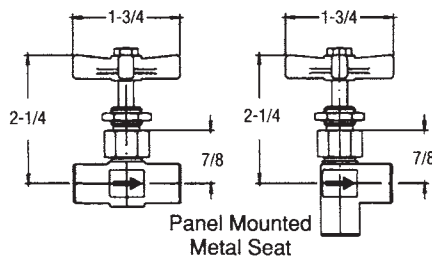


Dimensions

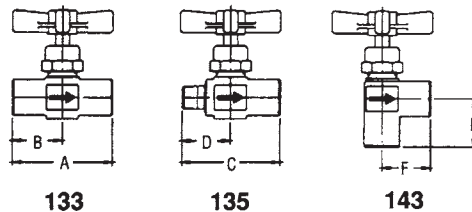
Dimensions are shown in inches



Handle and Centerline



Flow Direction of Soft Seat is Reverse of Arrows Shown Below



Dimensions Apply to Both Regular and Panel-Mounting Types, Metal and Soft Seat

Dash Number	Size		A	B	C	D	E	F	G	H	J
	Tube	Pipe									
1/4	—	1/4	1-7/8	15/16	1-13/16	7/8	1-3/4	7/8	15/16	—	—

General Description

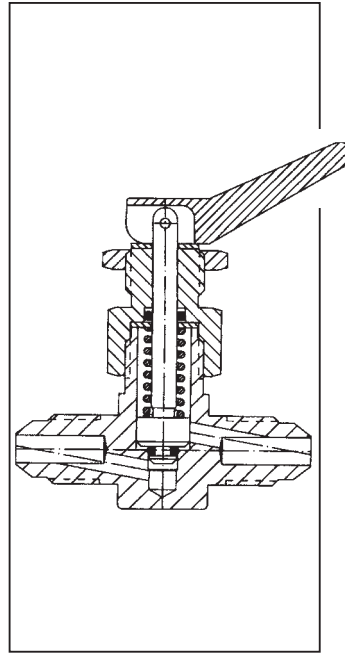
Series T143 and T148 toggle valves can be used on vacuum and gas applications. These toggle valves are used when quick, positive on-off action is required as well as zero leakage.

Features

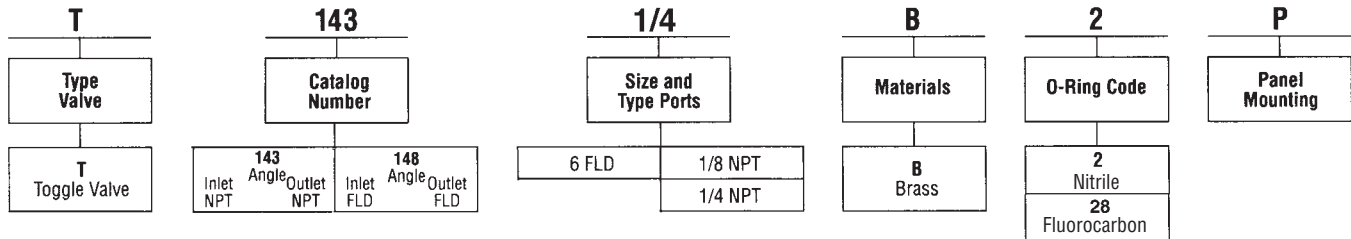
- Zero leakage.
- Pneumatic or hydraulic service.
- Wide selection of fitting ends in both in-line & angle porting.
- External pipe threaded ports are counterbored to accept solder-type tube fittings.

Specifications

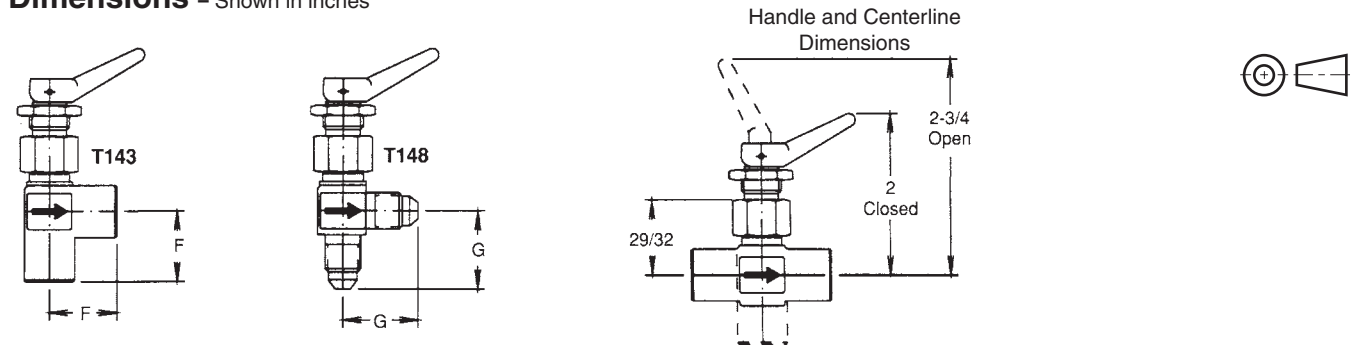
Service App.	Gases and liquids		Material (Cont'd)	Packing and Seat: Synthetic rubber Spring: AMS5673 Stainless Steel Spring pins: 420 Stainless Steel
Maximum Operating Pressure	Working: 13.8 Bar (200 PSI) Proof: 20.7 Bar (300 PSI)			
Ports	NPT: Pipe threads	FLD: Flared tube connection SAE 37° MS33656	Operating Temperature	-54°C to 121°C (-65°F to 250°F)
Internal Leakage	Zero			
Mounting	Panel. Maximum panel thickness 1/4". Panel hole diameter 17/32".			
Material	Body, Cap Stem, Locknut, Washers : Brass	Handle: Nylon		



Ordering Information



Dimensions – Shown in inches



Dash No.	Size		A	B	C	D	E	F	G	H
	Tube	Pipe								
1/8	—	1/8	1-3/4	7/8	—	27/32	1-11/16	7/8	—	—
1/4	—	1/4	1-7/8	15/16	1-13/16	7/8	1-3/4	7/8	—	—
6	3/8	—	—	—	—	15/16	1-7/8	—	31/32	7/8

Size	CV Factors		Weight (In Lbs.)
	Series 143	Exceptions 148	
1/8	.35	—	.13
1/4, 6	.40	.37	.25

3000-D1.p65, dd

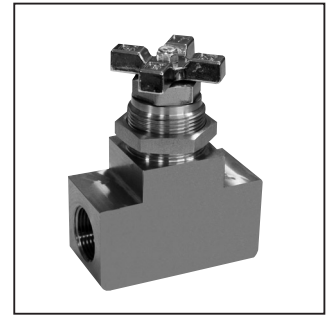
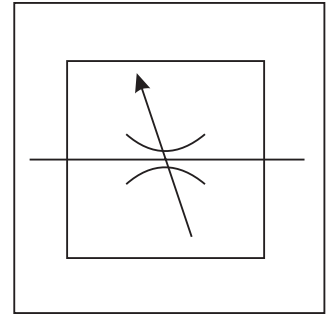
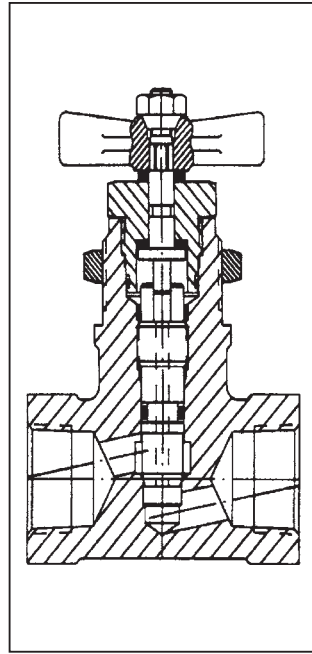


General Description

Series 154 needle valves meter flow on systems with pressures up to 690 Bar (10,000 PSI).

Specifications

Service App.	Water and Hydraulic Oil
Maximum Operating Pressure	Working: 690 Bar (10,000 PSI) Proof: 1035 Bar (15,000 PSI) Burst: 1725 Bar (25,000 PSI)
Sizes	Rising Stem type: IST: 4, 6, 8 Non-rising stem type: NPT: 1
Ports	NPT: Pipe threads IST: Internal straight threads (tube connection) AND10050 O-ring seal
Internal Leakage	Zero
Mounting	In-line or panel. Maximum panel thickness rising stem type 1/4"; Panel hole diameter 49/64". Non-rising stem type 3/4"; panel hole diameter 1-49/64"
Material	Body: 303 Stainless Steel Cap: 303 Stainless Steel Handle: 303 Stainless Steel Stem: 303 Stainless Steel Locknut: 303 Stainless Steel Packing Washer Follower: 303 Stainless Steel Stem: 440 Stainless Steel Stem Washers: Nylon O-rings: Synthetic Rubber Packing & Back-up rings: PTFE Handle: Aluminum alloy
Operating Temperature	Rising stem type: -54°C to 204°C (-65°F to 400°F) Non-rising stem type: -54°C to 107°C (-65°F to 225°F)



D

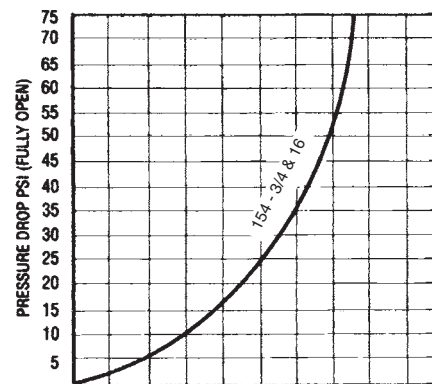
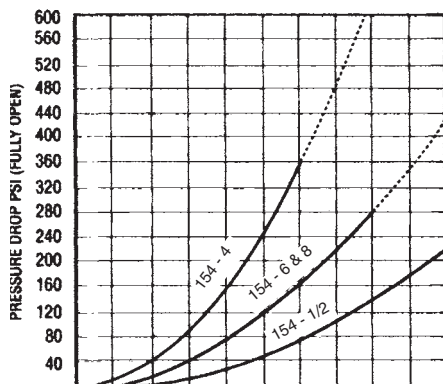
Features

- Forged stainless steel needle valve for 690 Bar (10,000 PSI) service.
- Pressure-balanced design and non-rising stem of 3/4" and 1" sizes greatly reduce torque requirements and increase packing life.

Size		CV Factor	Weight (Lbs.)
Tube	Pipe		
4	1/8	0.35	0.88
6	1/4	0.55	0.88
8	3/8	0.6	1.18

Performance Curves

Media - Hydraulic Oil
MIL-H-6083 @ 21°C - 32°C (70°F - 90°F)



3000-D1.p65, dd

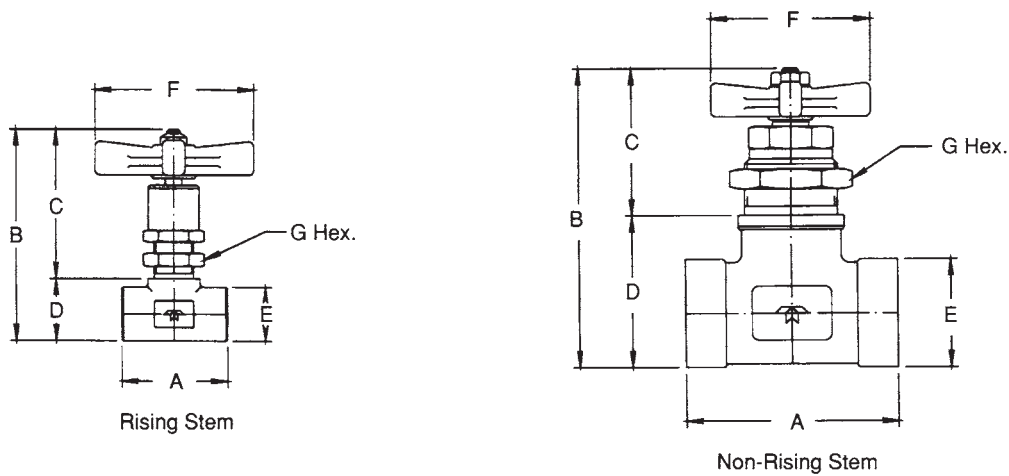
Ordering Information

154	-1		SS	2	P
Catalog Number	Size and Type Ports		Materials	O-Ring Code	Panel Mounting (Optional)
154 Inline Forged Stainless Steel	4 IST	3/4 NPT	SS Stainless Steel	2 Nitrile	
	6 IST	1 NPT			
	8 IST				

D

Dimensions

Shown in inches



Valve Size	A	B Closed	C Open	C Closed	D	E	F	G Hex
3/4, 1	4	5-7/16	2-11/16	2-11/16	1-13/16	1-7/8		2
4, 6	1-7/8	3-61/64	3-7/64	2-51/64	21/32	1	3	1
8	2-3/8	4-27/64	3-9/64	2-53/64	29/32	1-3/8	3	1

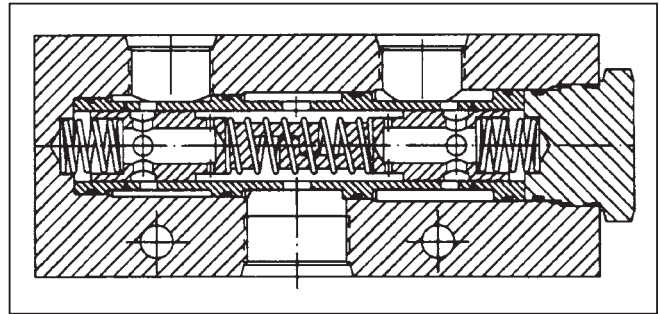
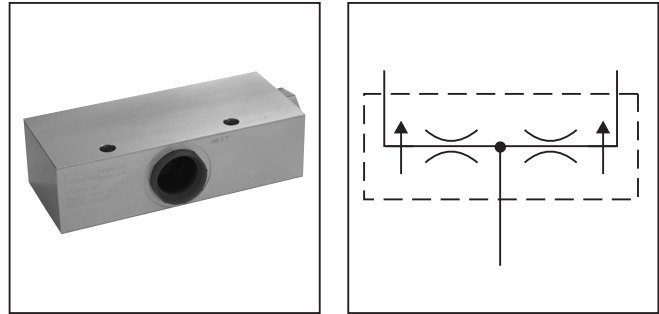
Phase Out

General Description

Series 6611 flow divider or flow combiner valves provide division of flow from a pump into equal parts, normally used to divide flow from one pump to two actuators. The valve serves as a combiner in the reverse direction.

Specifications

Service App.	Hydraulic
Maximum Operating Pressure	Working: 207 Bar (3000 PSI) Proof: 310.5 Bar (4500 PSI) Burst: 517.5 Bar (7500 PSI)
Rated Flow Input	3/4" Size: 30.3 to 94.6 LPM (8 to 25 GPM) 1" Size: 53.0 to 151.4 LPM (14 to 40 GPM)
Ratio Division	50/50
Flow Accuracy	±10%
Ports	NPTF SAE
Material	Body and Retainer: Aluminum alloy All others: Steel, hardened O-rings: Synthetic Rubber Back-up rings: PTFE
Operating Temperature	-40°C to 107°C (-40°F to 225°F)

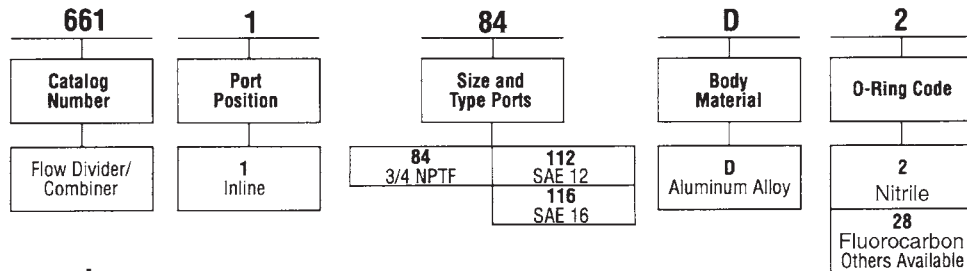


D

Features

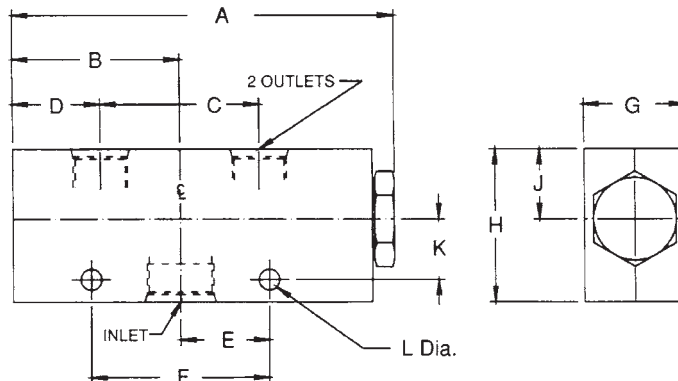
- Provides division of flow from a pump into equal parts, normally used to divide flow from one pump to two actuators.
- Serves as a combiner in the reverse direction.

Ordering Information



Weight:
 3/4" to 1" Size 2 kg (4.44 lbs.)

Dimensions – Shown in inches



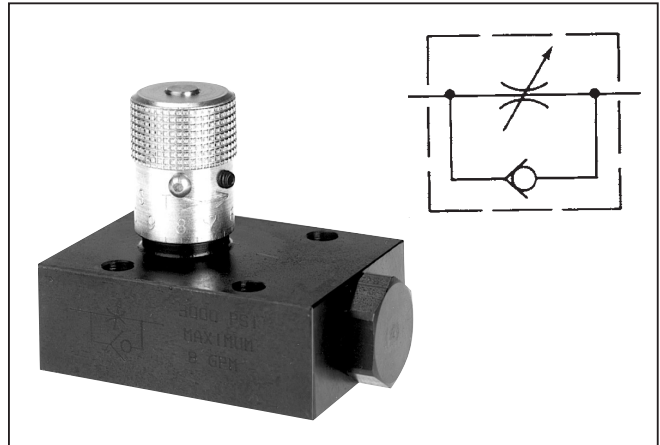
Catalog Number	Inlet Port	Outlet Port	A	B	C	D	E	F	G	H	J	K	L
6611-112D2	SAE 12	SAE 10											
6611-84D2	3/4 NPTF	1/2 NPTF	7-3/8	3-1/4	3-1/8	1-11/16	1-3/4	3-1/2	2	3	1-3/8	1-3/16	.406
6611-116D2	SAE 16	SAE 12											

3000-D1.p65, dd

General Description

Series FS flow control valves provide precise control of flow and shutoff in one direction, and automatically permit full flow in the opposite direction.

A two-step needle allows fine adjustment at low flow by using the first three turns of the adjusting knob; the next three turns open the valve to full flow, and also provide standard throttling adjustments.



Features

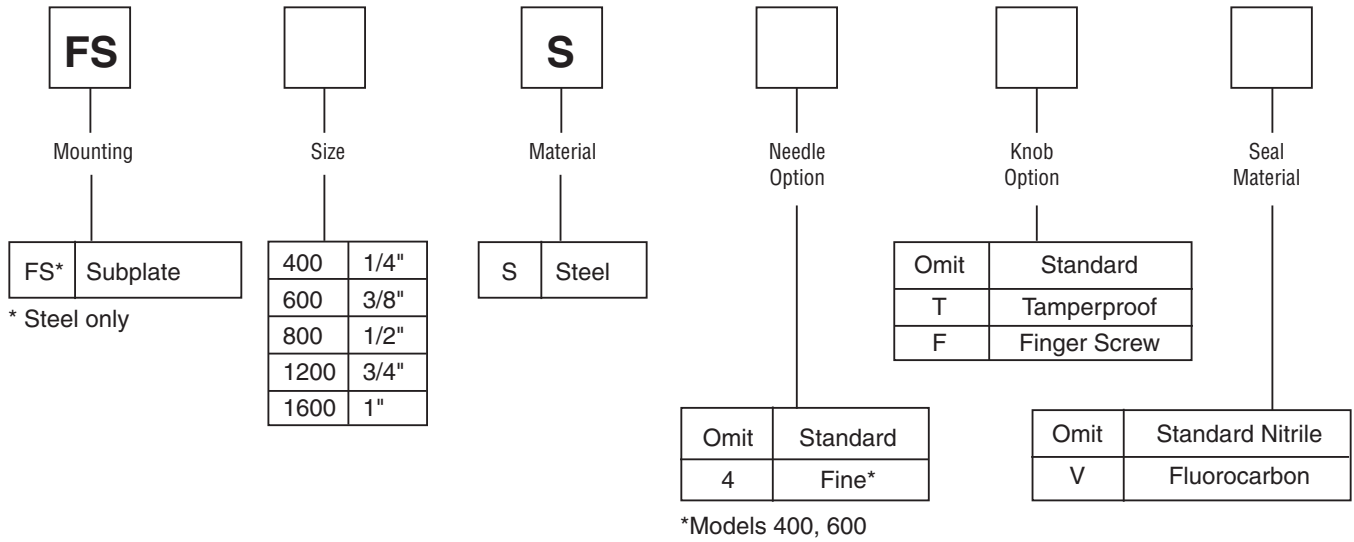
- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- A simple set screw locks the valve on any desired setting.
- Stainless steel poppets are standard.

Specifications

Maximum Operating Pressure	210 Bar (3000 PSI)
Nominal Cracking Pressure	0.3 Bar (5 PSI) For return check poppet
Poppet Style	Solid metal poppet, steel
Needles	Standard needle on all models except: Fine needle option on FS400 and FS600

Flow Data

Model Number	Free Flow Rate, Max. GPM (LPM)	Free Flow Orifice Area in ²	Free Flow Cv	Orifice Area, Effective Control Flow, in ²	Effective Control Flow Cv	Port Size
FS400	5 (19)	0.068	1.56	.0194	.433	1/4
FS600	8 (30)	0.099	2.27	.0344	.787	3/8
FS800	15 (57)	0.224	5.11	.0427	.976	1/2
FS1200	25 (95)	0.348	7.95	.1080	2.470	3/4
FS1600	40 (151)	0.453	10.35	.2300	5.250	1



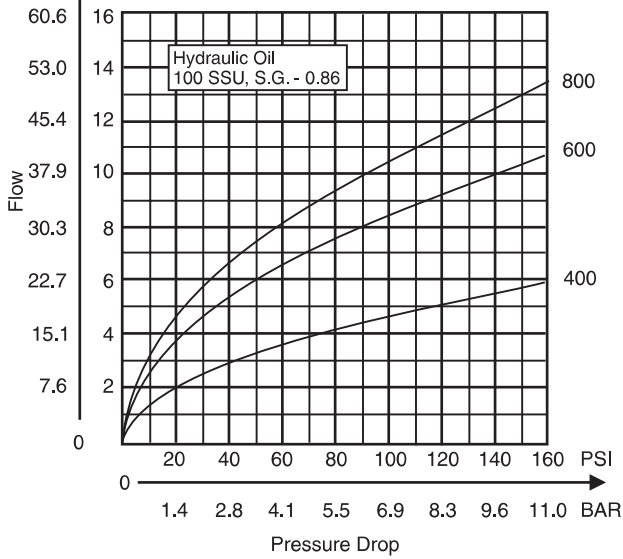
Bolt Kits To order bolt kits, specify bolt kit number

Valve	Bolt Kit	Bolt Specification*	Bolt Torque
FS400S	BK01	1/4-20 x 1-1/4"	13 Ft.-Lbs.
FS600S	BK02	1/4-20 x 1-1/2"	13 Ft.-Lbs.
FS800S	BK04	1/4-20 x 1-3/4"	13 Ft.-Lbs.
FS1200S	BK08	5/16-18 x 2-1/4"	27 Ft.-Lbs.
FS1600S	BK10	5/16-18 x 2-1/2"	27 Ft.-Lbs.

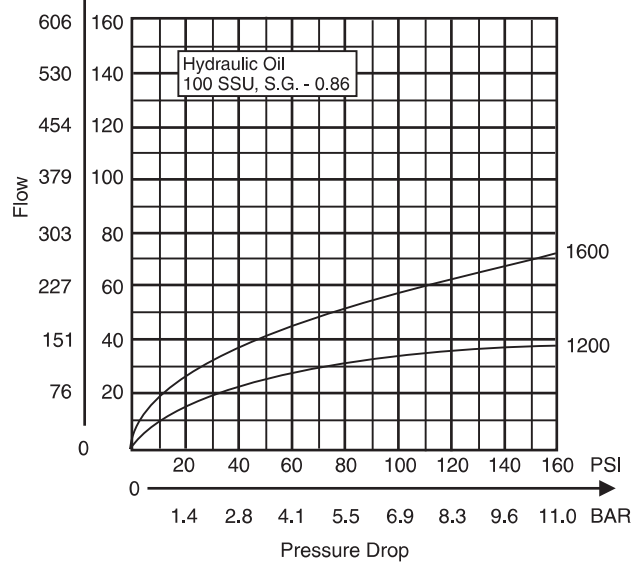
*Use SAE Grade 8 or Better.

D

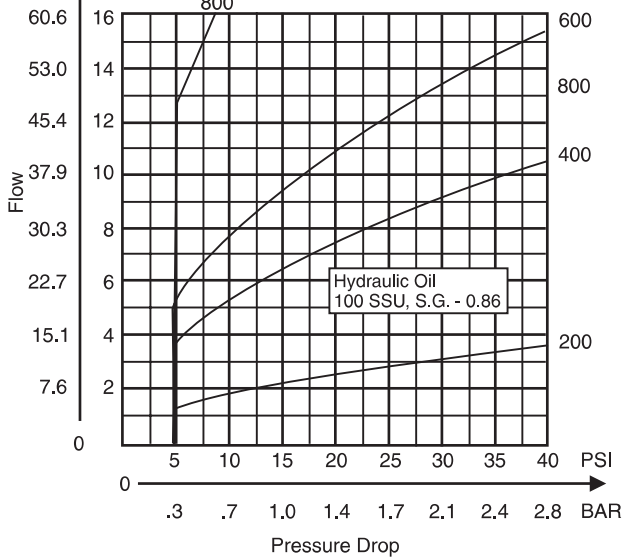
“FS” Series 400 thru 800
Controlled Flow vs. Pressure Drop
Needle Full Open



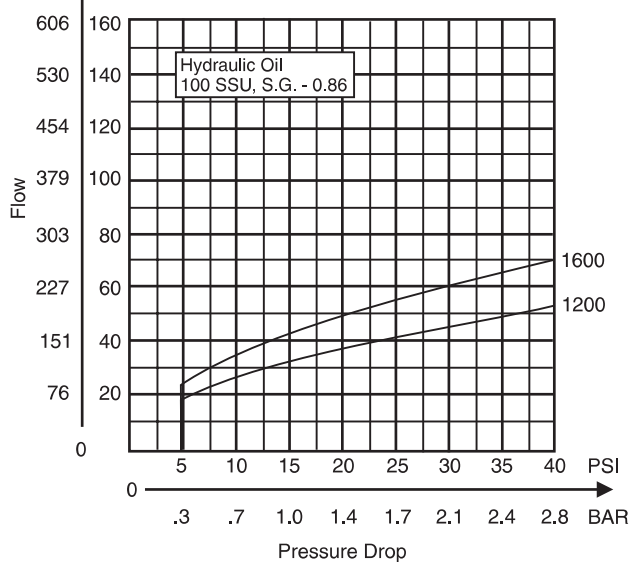
“FS” Series 1200 thru 1600
Controlled Flow vs. Pressure Drop
Needle Full Open



“FS” Series 400 thru 800
Free Flow vs. Pressure Drop
Needle Full Closed



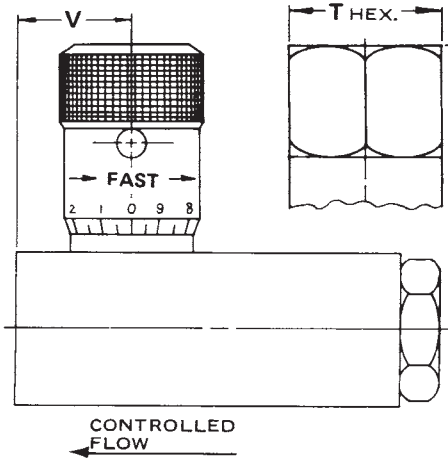
“FS” Series 1200 thru 1600
Free Flow vs. Pressure Drop
Needle Full Closed



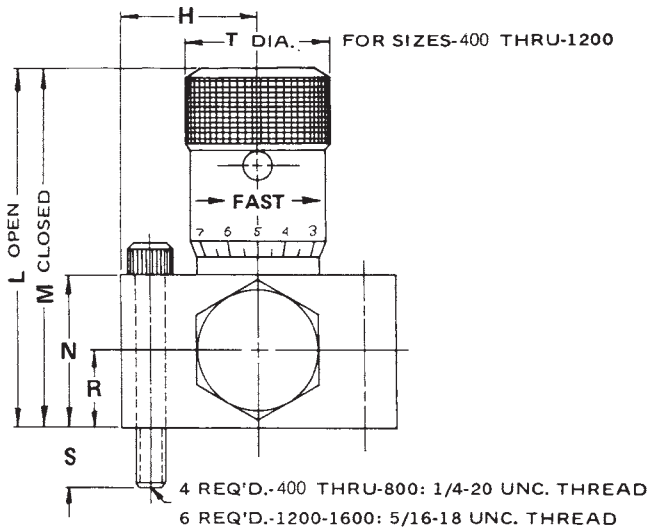
Millimeter equivalents for inch dimensions are shown in (**)

Models FS400 through FS 1600

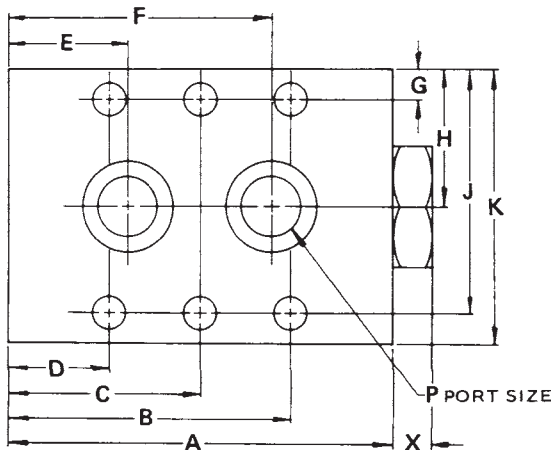
Subplate mounted Flow Control Valves



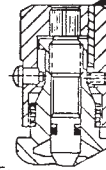
NOTE:
 HEX KNOB
 IS STANDARD
 ON 1600 SIZE.



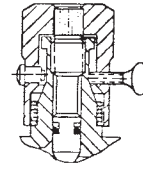
4 REQ'D.-400 THRU-800: 1/4-20 UNC. THREAD
 6 REQ'D.-1200-1600: 5/16-18 UNC. THREAD



Knob Options



Tamperproof
 Option (Code "T")
 permanently locks
 knob at desired
 flow setting by
 installing a pin
 in predrilled hole.



Finger screw
 option (Code "F")
 provides this
 thumbscrew in
 place of set screw.

	Valve Model				
	FS400	FS600	FS800	FS1200	FS1600
A	2.50 (63.5)	2.75 (69.9)	3.19 (81.0)	4.09 (103.9)	5.00 (127.0)
B	1.94 (49.3)	2.03 (51.6)	2.34 (59.4)	3.55 (90.2)	4.38 (111.3)
C	—	—	—	2.05 (52.1)	2.50 (63.5)
D	.56 (14.2)	.72 (18.3)	.84 (21.3)	.55 (14.0)	.62 (15.7)
E	.75 (19.1)	.88 (22.4)	1.00 (25.4)	.99 (25.1)	1.38 (35.1)
F	1.75 (44.5)	1.88 (47.8)	2.19 (55.6)	3.12 (79.2)	3.62 (92.0)
G	.22 (5.6)	.25 (6.4)	.25 (6.4)	.31 (7.9)	.31 (7.9)
H	.88 (22.4)	1.00 (25.4)	1.12 (28.4)	1.38 (35.1)	1.50 (38.1)
J	1.53 (38.9)	1.75 (44.5)	2.00 (50.8)	2.44 (62.0)	2.69 (68.3)
K	1.75 (44.5)	2.00 (50.8)	2.25 (57.2)	2.75 (69.9)	3.00 (76.2)
L	2.21 (56.1)	2.65 (67.3)	3.29 (83.6)	4.35 (110.5)	5.76 (146.3)
M	2.01 (51.1)	2.40 (61.0)	3.00 (76.2)	3.76 (95.5)	5.10 (129.5)
N	.87 (22.1)	1.00 (25.4)	1.25 (31.8)	1.75 (44.5)	2.00 (50.8)
P	.28 (7.1)	.41 (10.4)	.47 (11.9)	.66 (16.8)	.88 (22.4)
R	.43 (10.9)	.50 (12.7)	.62 (15.7)	.87 (22.1)	1.00 (25.4)
S	.38 (9.7)	.50 (12.7)	.50 (12.7)	.50 (12.7)	.50 (12.7)
T	.81 (20.6)	1.00 (25.4)	1.18 (30.0)	1.37 (34.8)	1.87 (47.5)
V	.84 (21.3)	1.00 (25.4)	1.21 (30.7)	1.52 (38.6)	1.78 (45.2)
X	.31 (7.9)	.32 (8.1)	.32 (8.1)	.42 (10.7)	.42 (10.7)



Millimeter equivalents for inch dimensions are shown in (**)

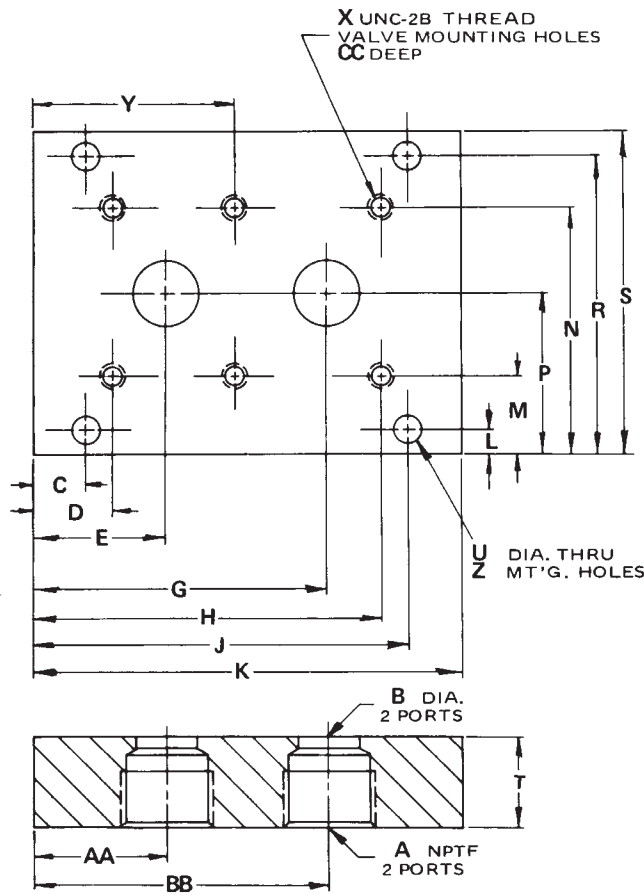
Subplate

Models FS400 through FS1600

Reference Data Only
 (Subplates are not available)



D

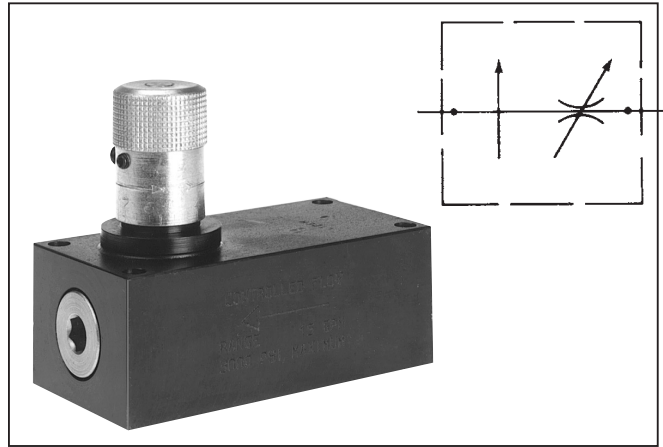


	Valve Numbers				
	FS 400	FS 600	FS 800	FS 1200	FS 1600
A	1/4"	3/8"	1/2"	3/4"	1"
B	.281 (7.1)	.406 (10.3)	.469 (11.9)	.656 (16.7)	.875 (22.2)
C	.375 (9.5)	.375 (9.5)	.500 (12.7)	.344 (8.7)	.344 (8.7)
D	.562 (14.3)	.843 (21.4)	.875 (22.2)	.750 (19.1)	1.125 (28.6)
E	.750 (19.1)	1.000 (25.4)	1.031 (26.2)	1.188 (30.2)	1.875 (47.6)
G	1.750 (44.5)	2.000 (50.8)	2.219 (56.4)	3.312 (84.1)	4.125 (104.8)
H	1.938 (49.2)	2.156 (54.8)	2.375 (60.3)	3.750 (95.3)	4.875 (123.8)
J	2.125 (54.0)	2.625 (66.7)	2.750 (69.9)	4.156 (105.6)	5.656 (143.7)
K	2.50 (63.5)	3.00 (76.2)	3.25 (82.6)	4.50 (114.3)	6.00 (152.4)
L	.344 (8.7)	.250 (6.4)	.438 (11.1)	.344 (8.7)	.344 (8.7)
M	.844 (21.4)	.750 (19.1)	1.125 (28.6)	1.062 (27.0)	1.062 (27.0)
N	2.156 (54.8)	2.250 (57.2)	2.875 (73.0)	3.188 (81.0)	3.438 (87.3)
P	1.500 (38.1)	1.500 (38.1)	2.000 (50.8)	2.125 (54.0)	2.250 (57.2)
R	2.656 (67.5)	2.750 (69.9)	3.562 (90.5)	3.906 (99.2)	4.156 (105.6)
S	3.00 (76.2)	3.00 (76.2)	4.00 (101.6)	4.25 (108.0)	4.50 (114.3)
T	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.250 (31.8)
U	.281 (7.1)	.281 (7.1)	.359 (9.1)	.422 (10.7)	.422 (10.7)
X	1/4-20	1/4-20	1/4-20	5/16-18	5/16-18
Y	—	—	—	2.250 (57.2)	3.000 (76.2)
Z	4	4	4	6	6
AA	.750 (19.1)	1.000 (25.4)	1.031 (26.2)	1.188 (30.2)	1.875 (47.6)
BB	1.750 (44.5)	2.000 (50.8)	2.219 (56.4)	3.312 (84.5)	4.125 (104.8)
CC	.505 (12.8)	.525 (13.3)	.525 (13.3)	.525 (13.3)	.525 (13.3)

General Description

Series PC*MS pressure compensated flow control valves are designed to regulate flow at a selected rate, then maintain this flow constant within $\pm 5\%$ as inlet and outlet pressures vary. However, changes in fluid temperature will prevent flow from holding constant.

Series PCMS valves can be adjusted for required flows after being installed.



Features

- Available with reverse flow check.
- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- A simple set screw locks the valve on any desired setting.

Specifications

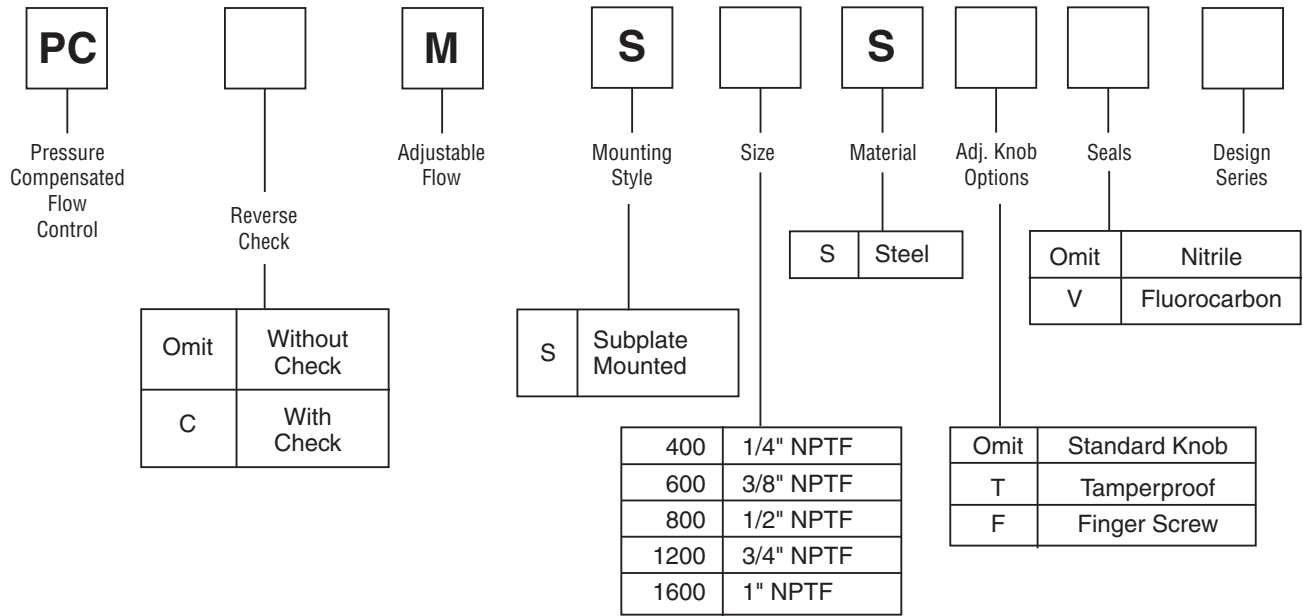
Service App.	Meter-in/meter-out and bleedoff circuits
Maximum Operating Pressure	210 Bar (3000 PSI)
Minimum Pressure Inlet / Outlet Differential	7 Bar (100 PSI) for sizes 1/4" and 3/8" 11 Bar (150 PSI) for sizes 1/2" through 1" Reverse-flow check valve optional

Flow Data

Valve Model	Flow		Reverse Flow, max. thru check, GPM (LPM)	Pressure Drop ΔP at max. Reverse Flow thru check, PSI (Bar)	Mounting	Port Size, in.
	Minimum GPM (LPM)	Maximum GPM (LPM)				
PC*MS400S	0.3 (1)	3.0 (11)	5 (19)	40 (3)	Subplate	1/4
PC*MS600S	0.6 (2)	6.0 (23)	8 (30)	40 (3)	Subplate	3/8
PC*MS800S	1/5 (6)	15.0 (57)	20 (76)	114 (8)	Subplate	1/2
PC*MS1200S	2.5 (10)	25.0 (95)	35 (132)	120 (8)	Subplate	3/4
PC*MS1600S	5.0 (19)	50.0 (189)	60 (227)	140 (10)	Subplate	1

* For optional reverse-flow check, insert “C” in model number at asterisk (*).

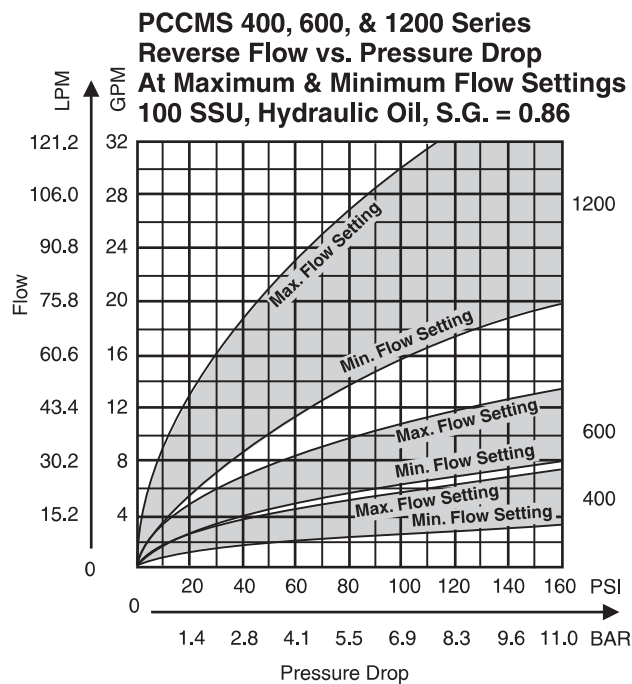
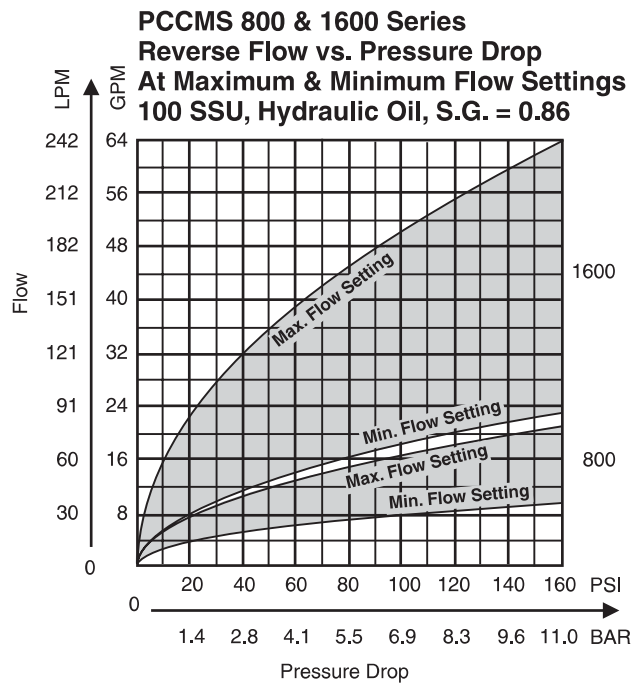
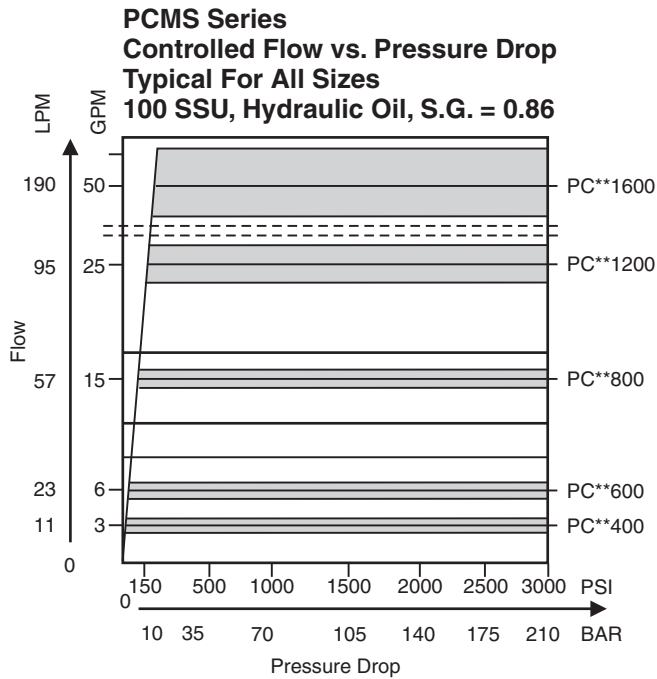
D



D

Bolt Kits

Valve No.	Bolt Kit	Bolts (SAE8 or better)	Torque (ft. lb.)
PCMS400S	BK02	1/4-20 x 1-1/2	15
PCMS600S	BK04	1/4-20 x 1-3/4	15
PCMS800S	BK60	1/4-20 x 2-1/4	15
PCMS1200S	BK25	5/16-18 x 2-3/4	30
PCMS1600S	BK46	5/16-18 x 3-1/4	30

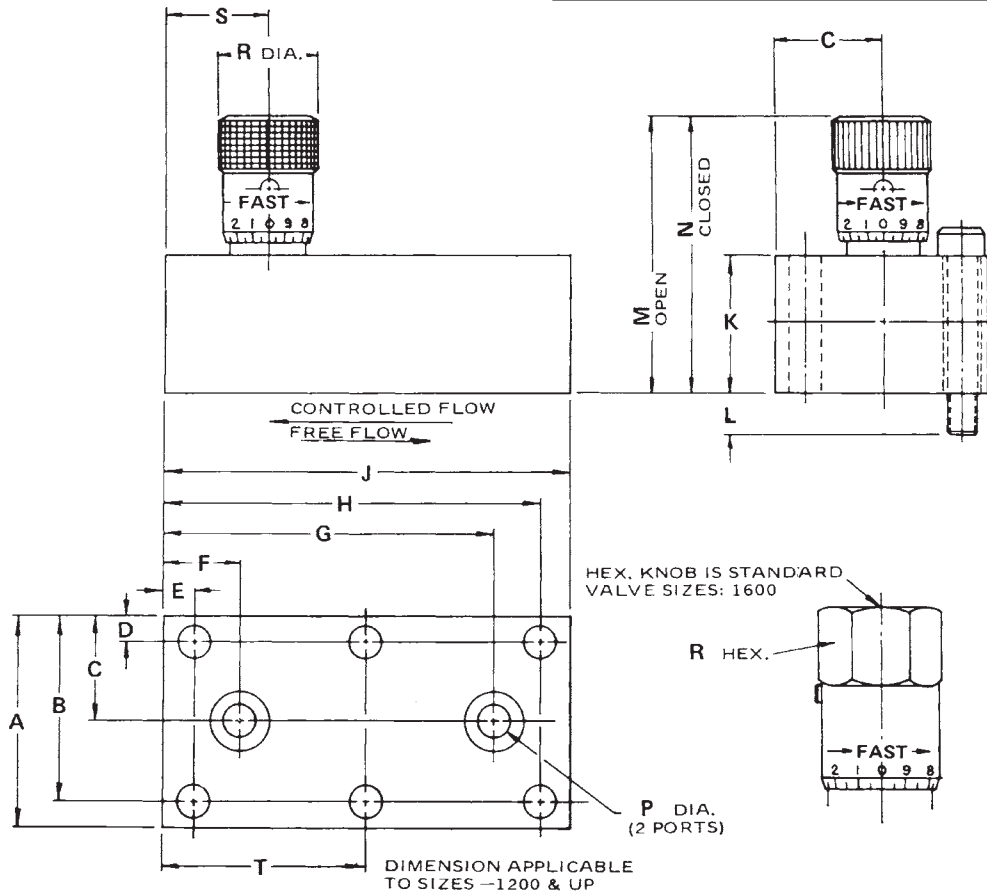
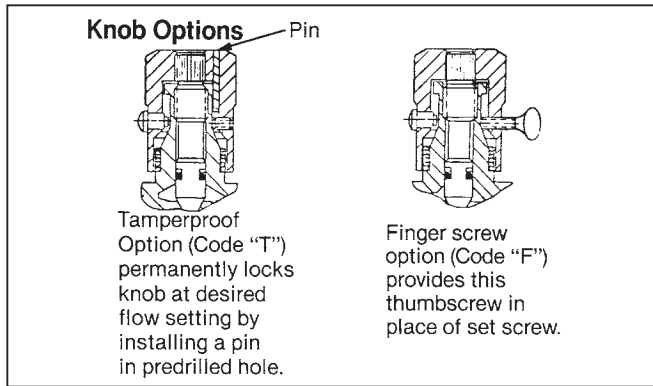


D

Millimeter equivalents for inch dimensions are shown in (**)

Model PCMS400S thru PCMS 1600S

Manifold mounted, pressure compensated
Flow Control Valves



Valve Model																	
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T
PC*MS400S	1.75 (44.5)	1.53 (38.9)	.88 (22.4)	.22 (5.6)	.25 (6.4)	.62 (15.7)	2.75 (69.9)	3.12 (79.2)	3.38 (85.9)	1.12 (28.4)	.38 (9.7)	2.47 (62.7)	2.27 (57.7)	.28 (7.1)	.81 Dia. (20.6)	.84 (21.3)	—
PC*MS600S	2.00 (50.8)	1.75 (44.5)	1.00 (25.4)	.25 (6.4)	.25 (6.4)	.66 (16.8)	3.34 (84.8)	3.75 (95.3)	4.00 (101.6)	1.25 (31.8)	.50 (12.7)	2.89 (73.4)	2.67 (67.8)	.34 (8.6)	1.00 Dia. (25.4)	1.00 (25.4)	—
PC*MS800S	2.25 (57.2)	2.00 (50.8)	1.12 (28.4)	.25 (6.4)	.25 (6.4)	.75 (19.1)	3.88 (98.6)	4.38 (111.3)	4.62 (117.3)	1.75 (44.5)	.50 (12.7)	4.04 (102.6)	3.74 (95.0)	.47 (11.9)	1.19 Dia. (30.2)	1.75 (44.5)	—
PC*MS1200S	2.75 (69.9)	2.44 (62.0)	1.38 (35.1)	.31 (7.9)	.38 (9.7)	1.00 (25.4)	4.62 (117.3)	5.25 (133.4)	5.62 (142.7)	2.25 (57.2)	.50 (12.7)	5.06 (128.5)	4.56 (115.8)	.66 (16.8)	1.38 Dia. (35.1)	1.59 (40.4)	2.81 (71.4)
PC*MS1600S	3.00 (76.2)	2.69 (68.3)	1.50 (38.1)	.31 (7.9)	.50 (12.7)	1.25 (31.8)	5.50 (139.7)	6.25 (158.8)	6.75 (171.5)	2.75 (69.9)	.50 (12.7)	6.90 (175.3)	6.23 (158.2)	.88 (22.4)	1.88 Hex. (47.8)	1.94 (49.3)	3.38 (85.9)

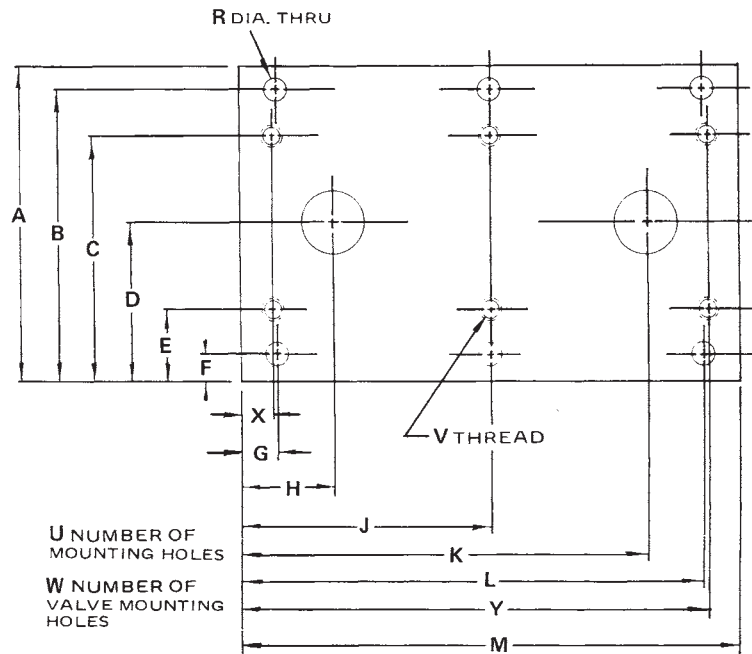
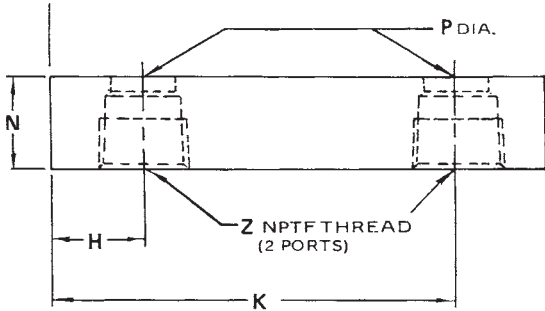
3000-D1.p65, dd

Millimeter equivalents for inch dimensions are shown in (**)

Subplate

Reference Data Only

(Subplates are not available)



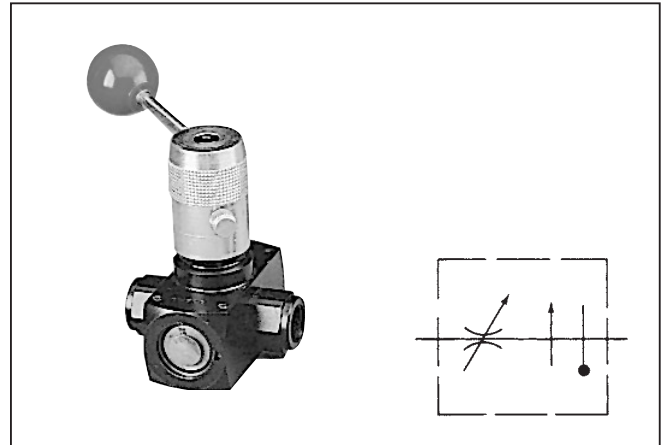
Valve Model	PCMS400S	PCMS600S	PCMS800S	PCMS 1200S	PCMS 1600S
N.P.T.F. Port Size	1/4—18	3/8—18	1/2—14	3/4—14	1—11-1/2
A	2.75 (69.9)	3.00 (76.2)	3.50 (88.9)	4.00 (101.6)	4.50 (114.3)
B	2.500 (63.5)	2.750 (69.9)	3.188 (81.0)	3.688 (93.7)	4.125 (104.8)
C	2.031 (51.6)	2.250 (57.2)	2.625 (66.7)	3.062 (77.8)	3.438 (87.3)
D	1.375 (34.9)	1.500 (38.1)	1.750 (44.5)	2.000 (50.8)	2.250 (57.2)
E	.719 (18.3)	.750 (19.1)	.875 (22.2)	.938 (23.8)	1.062 (27.0)
F	.250 (6.4)	.250 (6.4)	.312 (7.9)	.312 (7.9)	.375 (9.5)
G	.250 (6.4)	.250 (6.4)	.312 (7.9)	.375 (9.5)	.500 (12.7)
H	.625 (15.9)	.656 (16.7)	.750 (19.1)	1.000 (25.4)	1.250 (31.8)
J	—	—	—	2.812 (71.4)	3.375 (85.7)
K	2.750 (69.9)	3.344 (84.9)	3.875 (98.4)	4.625 (117.5)	5.500 (139.7)
L	3.125 (79.4)	3.750 (95.3)	4.312 (109.5)	5.250 (133.4)	6.250 (168.3)
M	3.375 (85.7)	4.000 (101.6)	4.625 (117.5)	5.625 (142.9)	6.750 (171.5)
N	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)
P	.281 (7.1)	.343 (8.7)	.468 (11.9)	.656 (16.7)	.875 (22.2)
R	.281 (7.1)	.281 (7.1)	.359 (9.1)	.359 (9.1)	.422 (10.7)
U	4	4	4	6	6
V	1/4—20	1/4—20	1/4—20	5/16—18	5/16—18
W	4	4	4	6	6
X	.250 (6.4)	.250 (6.4)	.250 (6.4)	.375 (9.5)	.500 (12.7)
Y	3.125 (79.4)	3.750 (95.3)	4.375 (111.1)	5.250 (133.4)	6.250 (168.3)
Z	1/4—18	3/8—18	1/2—14	3/4—14	1—11-1/2

General Description

Series TPC valves are pressure compensated and are insensitive to variations in oil temperature. These valves are ideal for use on meter-in, meter-out or bleed-off circuits.

Features

- Maintains constant flow with changing inlet and outlet pressures. Minimum pressure differential between inlet and outlet ports must be 100 PSI (7 Bar) for Model TPC600 to function properly; 150 PSI (10.5 Bar) for Model TPC1200.
- Maintains flow setting within approximately $\pm 5\%$ variation over pressure drop range 100 to 3000 PSI (7 to 210 Bar).
- Optional reverse flow check valves available on Models TPCC600 and TPCC1200; check valve cracking pressure is 5 PSI (0.4 Bar).
- Insensitivity to oil temperature change allows constant flow rate over a wide change of fluid temperature.
- Optional lunge control available on Model TPC600 to limit compensator piston travel. This control prepositions the compensator piston to minimize actuator lunge.



Specifications

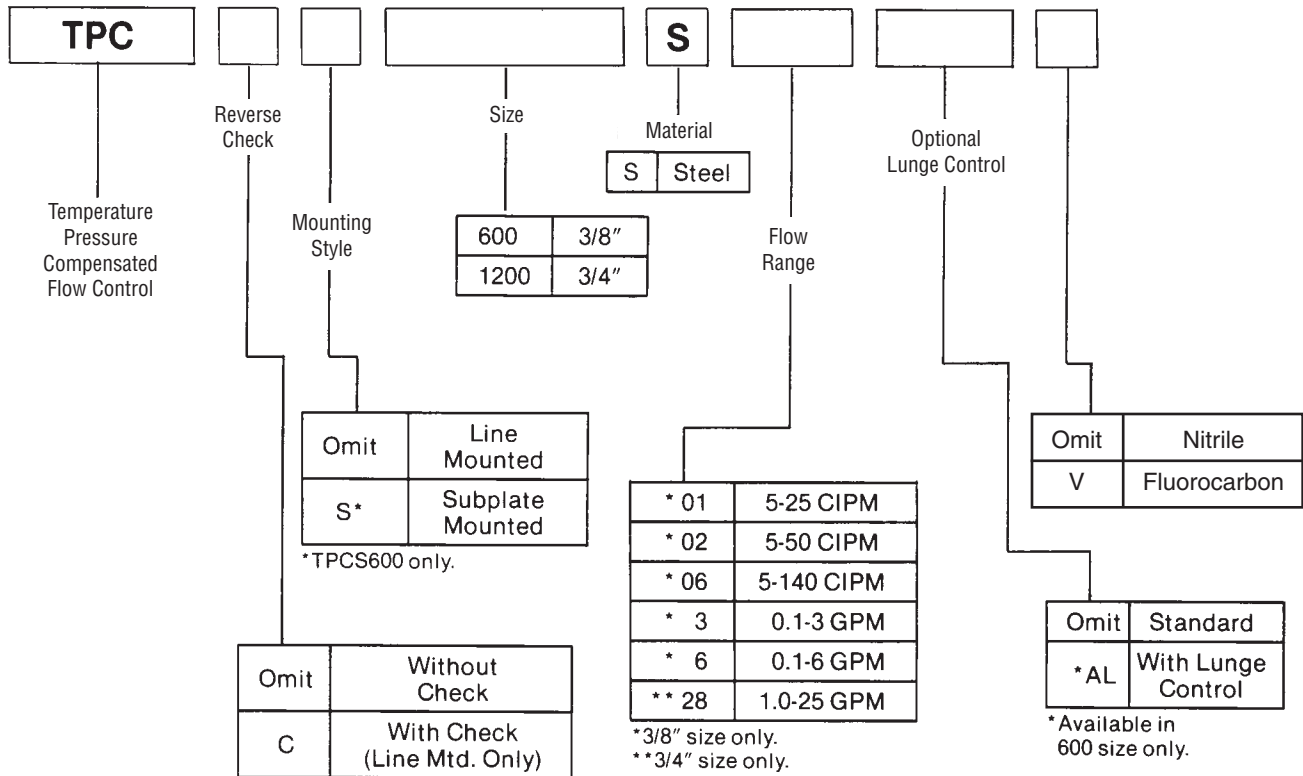
Maximum Operating Pressure	3000 PSI (210 Bar)
Pressure Compensation	TPC600 100 PSI (7 Bar) Minimum TPC1200 150 PSI (10.5 Bar)
Flow Setting	$\pm 5\%$ 100 to 3000 PSI (7 to 210 Bar)

Quick Reference Data Chart

Valve Model	Flow (max.) GPM (L/M)	Reverse Flow (max.) (thru check) GPM (L/M)	Pressure Drop ΔP at max. (reverse flow thru check) PSI (Bar)	Mounting	Port Size, in.
TPC600	6 (23)	12 (45)	40 (3)	In-line	3/8 NPTF
TPCS600	6 (23)	—	—	Subplate	3/8
TPC1200	25 (95)	35 (133)	40 (3)	In-line	3/4 NPTF

Needle Flow Chart

FLOW RANGES — TPC600			TEMPERATURE COMPENSATION RANGE (For an 80-220 SSU viscosity change)	
Needle Number	Min. Flow	Max. Flow	Flow Range	% Flow Variation
01	5 CIPM (81.96 CC/M)	25 CIPM (410 CC/M)	5-25 CIPM (82-410 CC/M)	$\pm 5\%$
02	5 CIPM (81.96 CC/M)	50 CIPM (820 CC/M)	5-50 CIPM (82-820 CC/M)	$\pm 5\%$
06	5 CIPM (81.96 CC/M)	140 CIPM (2300 CC/M)	5-139 CIPM (82-2279 CC/M) 51-140 CIPM (836-2295 CC/M)	$\pm 5\%$ $\pm 3\%$
3	0.06 GPM (.22 L/M)	3 GPM (12 L/M)	0.1-1.0 GPM (.4-4 L/M) 1.0-3.0 GPM (4-8 L/M)	$\pm 5\%$ $\pm 3\%$
6	0.12 GPM (.45 L/M)	6 GPM (23 L/M)	0.1-1.9 GPM (.4-8 L/M) 2.0-4.0 GPM (8-15 L/M) 4.0-6.0 GPM (8-23 L/M)	$\pm 5\%$ $\pm 4\%$ $\pm 3\%$
TPC1200				
28	0.1 GPM (.4 L/M)	25 GPM (95 L/M)	1.0-3.0 GPM (.4-8 L/M) 3.0-8.0 GPM (8-30 L/M) 8.0-25 GPM (30-95 L/M)	$\pm 7\%$ $\pm 5\%$ $\pm 3\%$



NOTE: See Needle Flow Chart in Engineering Performance section for flow information.

Example: "TPCC600S02ALV" means Series TPC Valve, with reverse-flow check valve, in-line mounting size 3/8", flow range of 5 to 50 CIPM, lunge control option, Fluorocarbon seals.

Bolt Kits

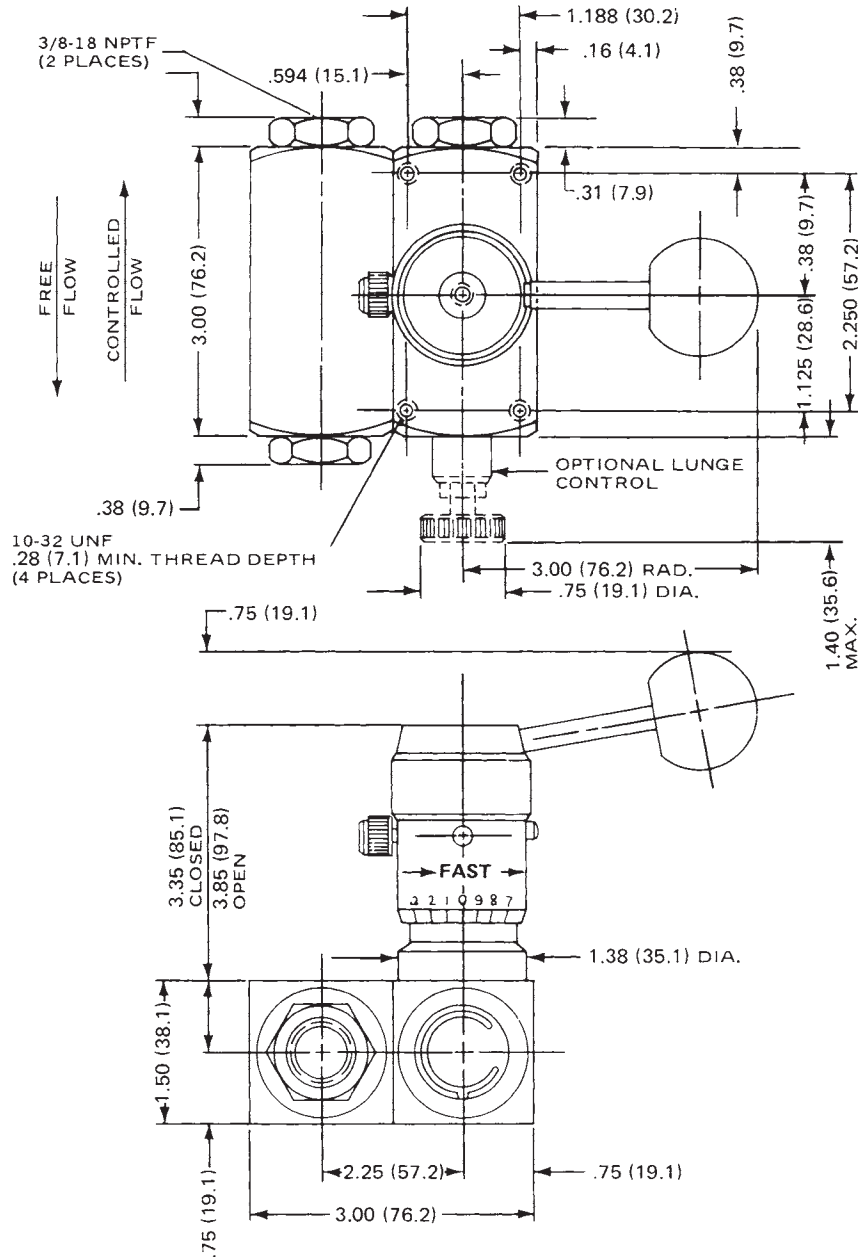
TPCS600	Bolt Kit No. BK07	Bolt specification 5/16" - 18 x 1"	Bolt torque 19 ft. lb.
---------	-------------------	------------------------------------	------------------------



Millimeter equivalents for inch dimensions are shown in (**)

Model TPCC600S

In-line mounted, pressure compensated, temperature insensitive
 Flow Control Valve with check

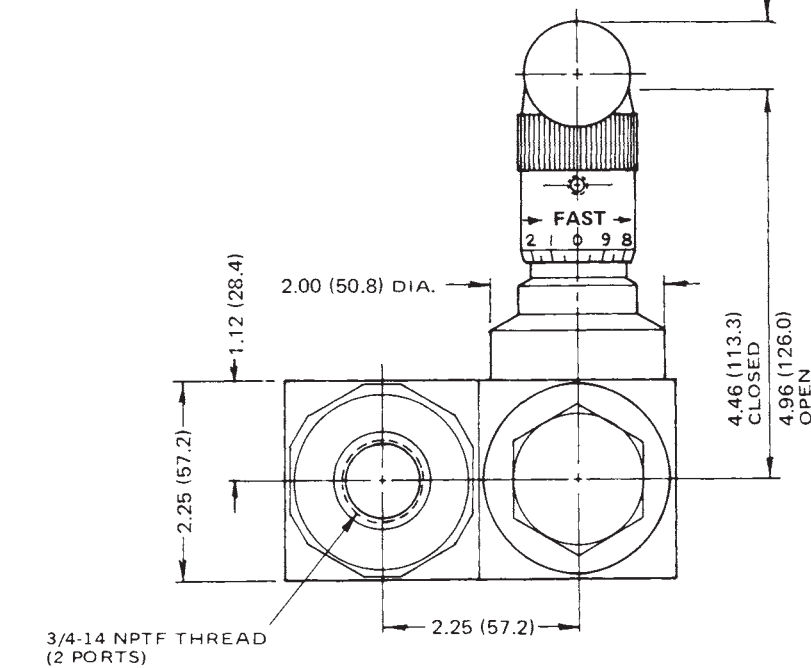
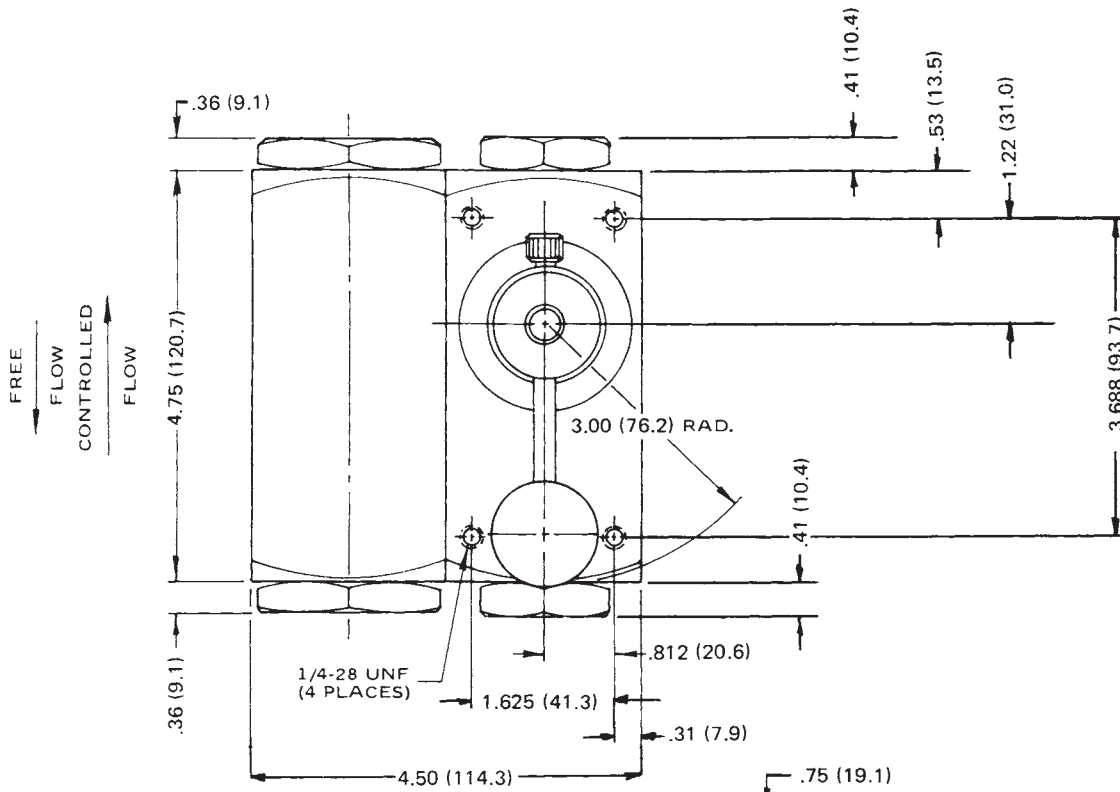


D

Millimeter equivalents for inch dimensions are shown in (**)

Model TPCC1200S-28

In-line mounted, pressure compensated, temperature insensitive
 Flow Control Valve



Weight
 12.7 Lb. (6 Kg)

D

Millimeter equivalents for inch dimensions are shown in (**)

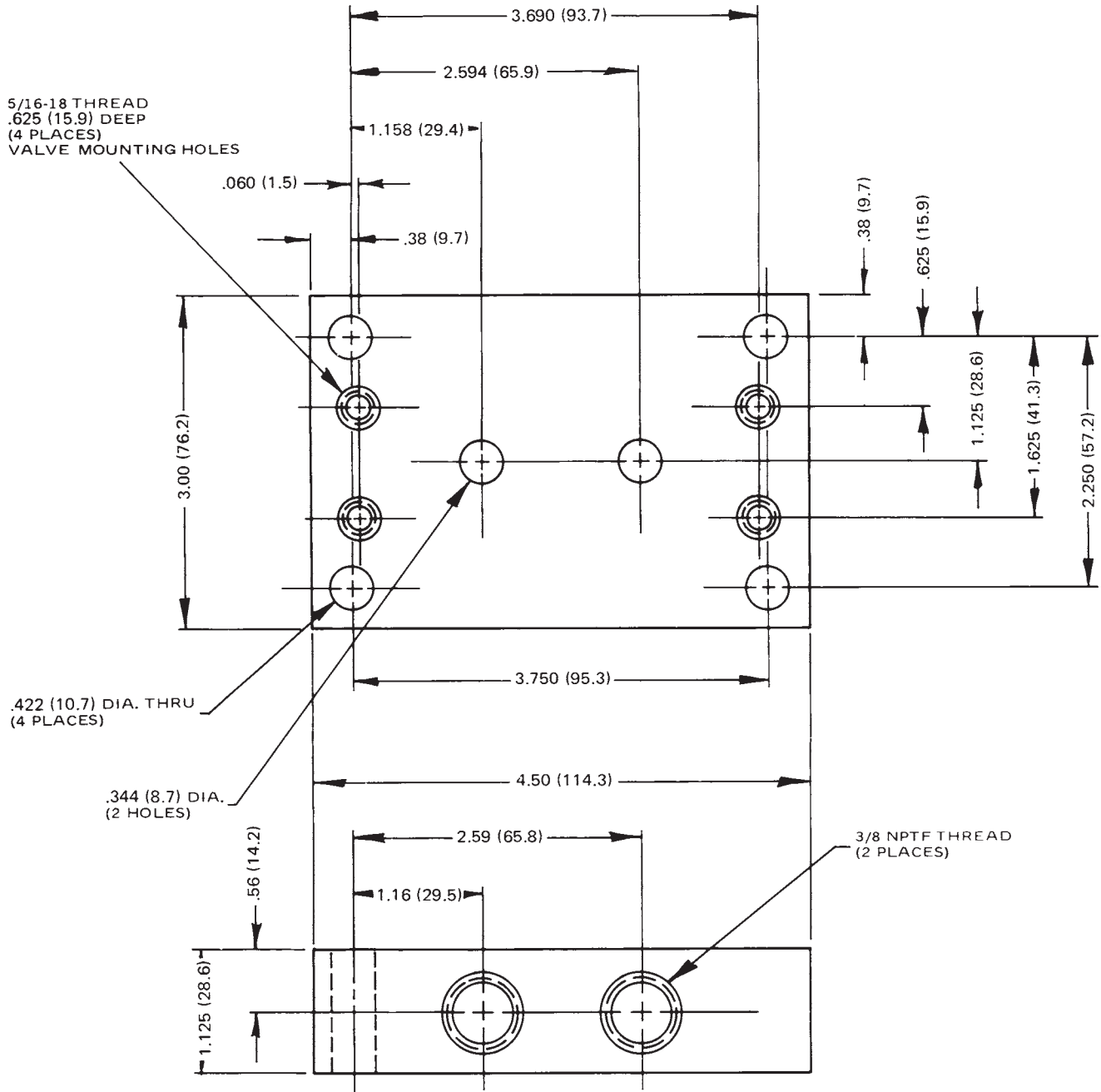
Subplate

Use bolt kit BK-07 for mounting series TPCS600S valve on this subplate.

Reference Data Only
(Subplates are not available)



D

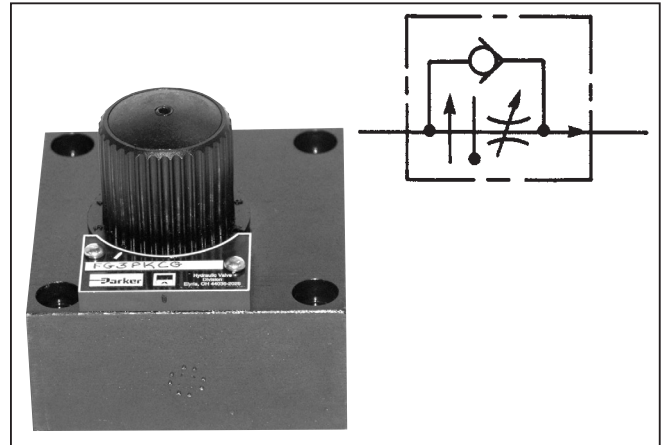


General Description

Series FG3PKC pressure and temperature compensated flow control valves regulate flow and may be used for applications requiring meter-in, meter-out and bleed-off.

Features

- Maintains constant flow with changing inlet and outlet pressures. The minimum pressure differential between inlet and outlet ports must be 100 PSI (7 Bar) to function properly.
- Maintains flow setting within approximately $\pm 5\%$ variation over pressure drop range 100 to 3000 PSI (7 to 205 Bar).
- Has an adjustable flow setting. See needle chart for controlled flow range.
- Trim adjustment option allows valve to be adjusted $\pm 5\%$ when valve is locked in a flow setting.
- Subplate mounted valve is standard with reverse flow check valve. (See Reverse Flow Chart.) Check valve cracking pressure is 5 PSI (0.3 Bar).
- Designed to give a constant flow rate over a wide change of fluid temperature. Refer to needle chart for percentage change in flow.
- Available with optional lunge control for limiting compensator piston travel. This control prepositions the compensator piston to reduce actuator lunge or jump.



Specifications

Maximum Operating Pressure	207 Bar (3000 PSI)
Pressure Compensation	7 Bar (100 PSI) Minimum
Flow Setting	$\pm 5\%$ 7 to 207 Bar (100 to 3000 PSI)

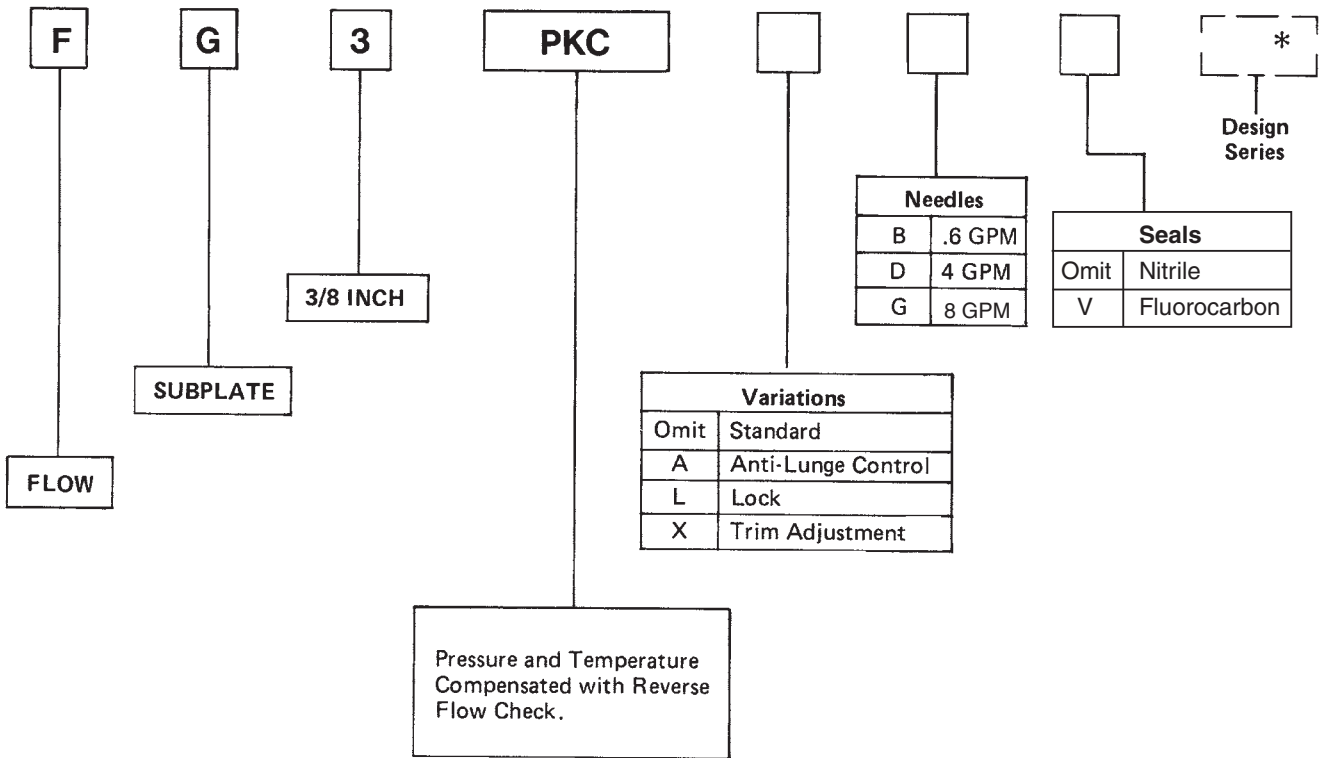
D

Flow Data

Valve Model	(Max.) Controlled Flow	(Max.) Reverse Flow	Pressure Drop ΔP @ (Max.) Reverse Flow	Mounting Style	Subplate Port Size	Port Location
FG3PKC	8 GPM (30 L/M)	12GPM (45L/M)	65 PSI (4.4 Bar)	Subplate (NFPA) 2F02	3/8 NPTF	Bottom

Needle Flow Chart FG3PKC

FLOW RANGES			TEMPERATURE COMPENSATION RANGE (For an 80-220 SSU viscosity change)	
Needle	Minimum Flow	Maximum Flow	Flow Range	% Flow Variation
B	5 CIPM (81.96 CC/M)	140 CIPM (.6 GPM)	5-50 CIPM (82-820 CC/M) 51-140 CIPM (836-2295 CC/M)	$\pm 7\%$ $\pm 5\%$
D	5 CIPM (81.96 CC/M)	925 CIPM (4 GPM)	.1-1.0 GPM (.4-4 L/M) 1.0-4 GPM (4-16 L/M)	$\pm 5\%$ $\pm 3\%$
G	5 CIPM (81.96 CC/M)	1848 CIPM (8 GPM)	.12-1.0 GPM (.5-4 L/M) 2.0-4.0 GPM (8-15 L/M) 4.0-8.0 GPM (15-30 L/M)	$\pm 5\%$ $\pm 3\%$ $\pm 3\%$



Weight: 4 Kg (8.5 lbs.)

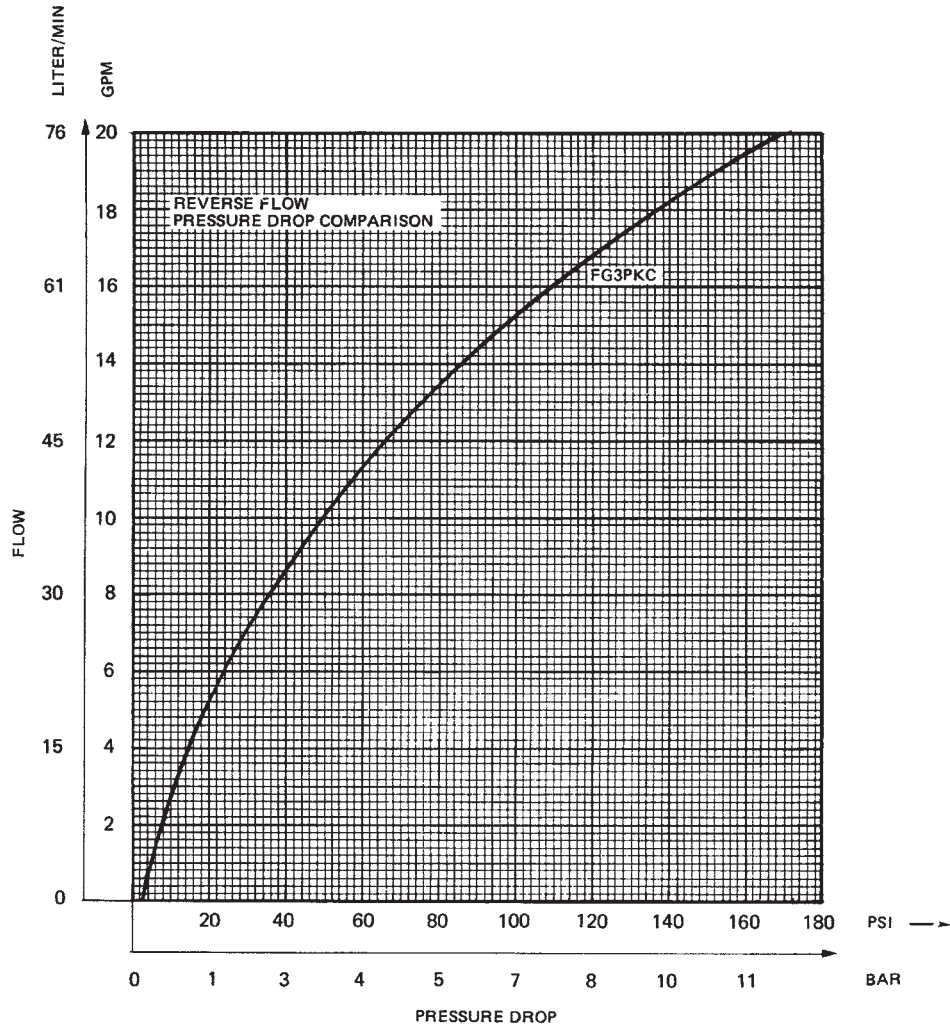
SUBPLATE

Valve	Subplate	Ports	Location
FG3PKC	058062-2	3/8" NPTF	Bottom

BOLT KIT

Valve	Bolt Kit	Bolt Specification*	Bolt Torque
FG3PKC	BK 12	5/16-18 x 2"	19 Ft.-Lbs.

*USE SAE GRADE #8 OR BETTER



D

Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change as per chart.	VISCOSITY CORRECTION FACTOR							
	Viscosity (SSU)	75	150	200	250	300	350	400
	Percentage of ΔP (Approx.)	93	111	119	126	132	137	141

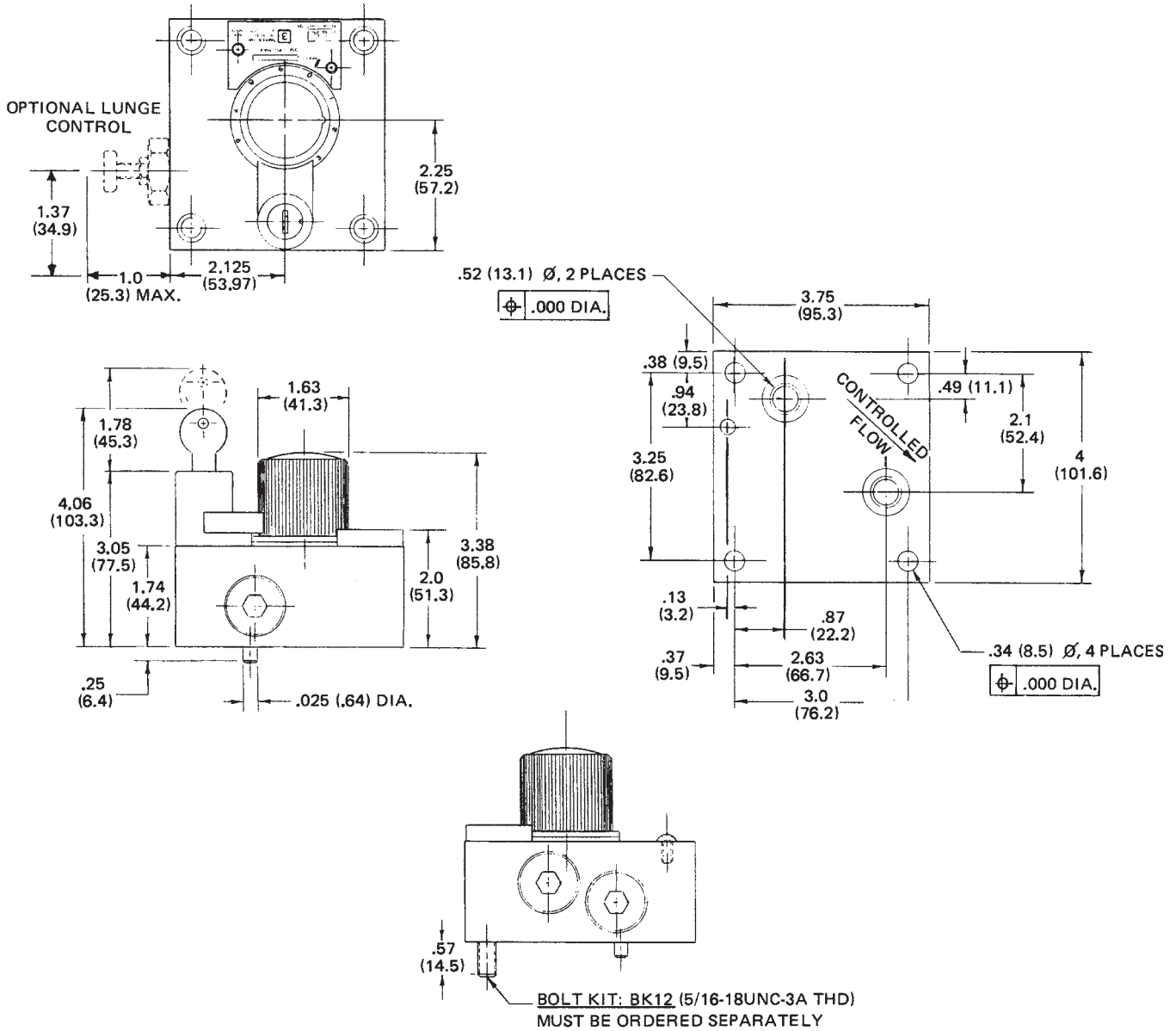
Millimeter equivalents for inch dimensions are shown in (**)

Model FG3PKC**10**

Manifold mounted, temperature insensitive, pressure compensated
Flow Control Valve



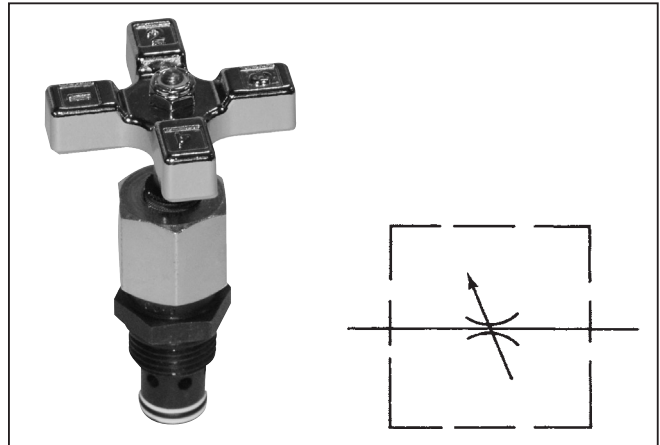
D



General Description

Series MVI cartridge-type needle valves are designed for installation in a precision-machined cavity made in the manifold of the machine. Detailed instructions for machining the required cavity for the valve are given on page D30.

Properly installed in precision-machined cavities, these needle valves provide precise metering control and full shutoff of flow. An o-ring and backup ring installed on the cartridge fully isolate the inlet and outlet ports of the machined cavity from each other.



Features

- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- Fine and Micro-fine needles available for extremely fine control.
- High efficiency o-ring stem seal that eliminates packing.

Specifications

Maximum Operating Pressure	340 Bar (5000 PSI)
Flow	See table
Needles	Standard 30° taper Optional fine V-notch for Series MVI400 valves only Optional 0.006" slotted for Series MVI400 only
Material	Steel, compatible in steel or aluminum manifold block cavities



Flow Data

Valve Model	Flow (Max.) GPM (L/M)	ΔP @ Max. Flow	Orifice Area in ² Full Open	C _v * Factor	Valve Size
MVI400	5 (19)	100 PSI (7 Bar)	0.0216	0.493	1/4"
MVI400-2	2.8 (11)	200 PSI (14 Bar)	0.0081	0.186	1/4"
MVI400-3	0.5 (2)	200 PSI (14 Bar)	0.0014	0.032	1/4"
MVI600	8 (30)	35 PSI (3 Bar)	0.0567	1.294	3/8"
MVI800	15 (57)	45 PSI (3 Bar)	0.0845	1.930	1/2"
MVI1200	25 (95)	51 PSI (4 Bar)	0.1400	3.205	3/4"

*C_v factor — Flow of water in GPM that valve will pass @ ΔP of 1 PSI.

MVI

Cartridge
 Needle Valve

Size

400	1/4"
600	3/8"
800	1/2"
1200	3/4"

S

Material

S	Steel
---	-------

Optional
 Needle

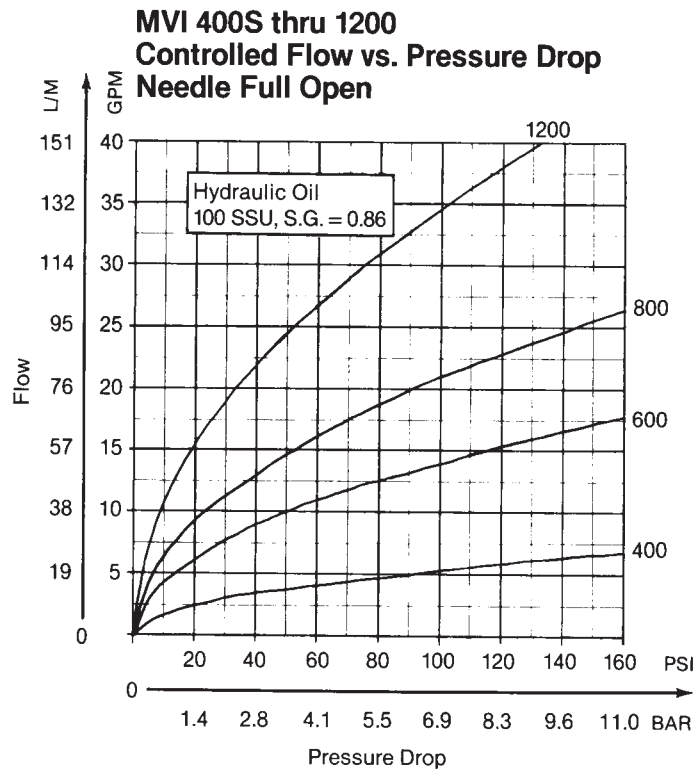
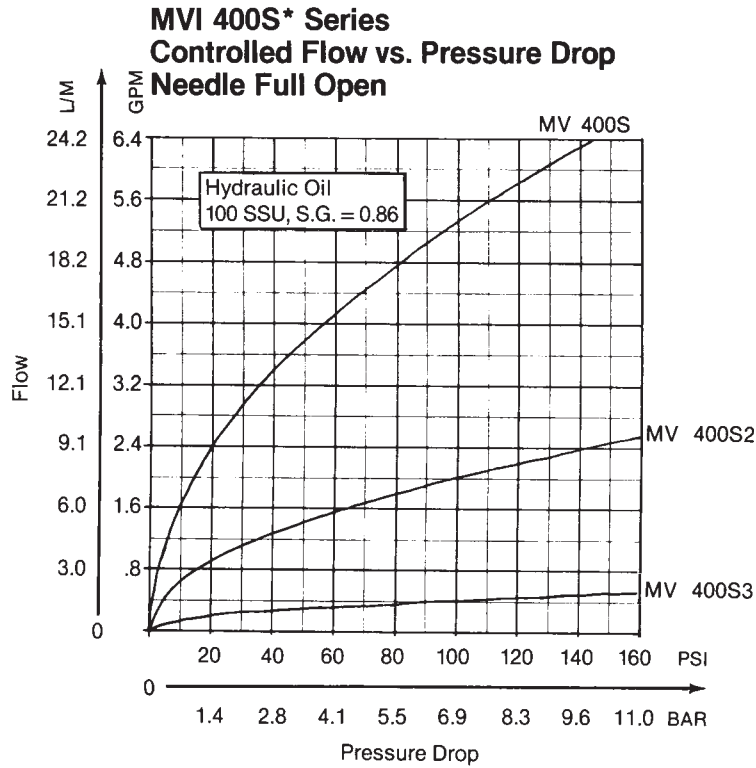
Omit	Standard
2*	Fine
3*	Micro- Fine

*Available on
 MVI400 only

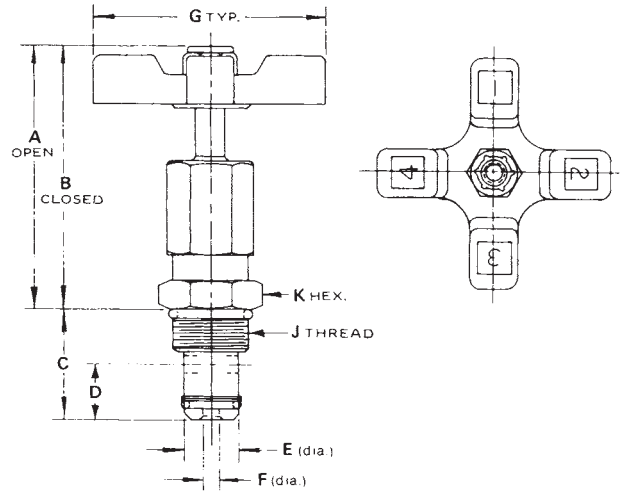
Seals

Omit	Nitrile
V	Fluorocarbon

D



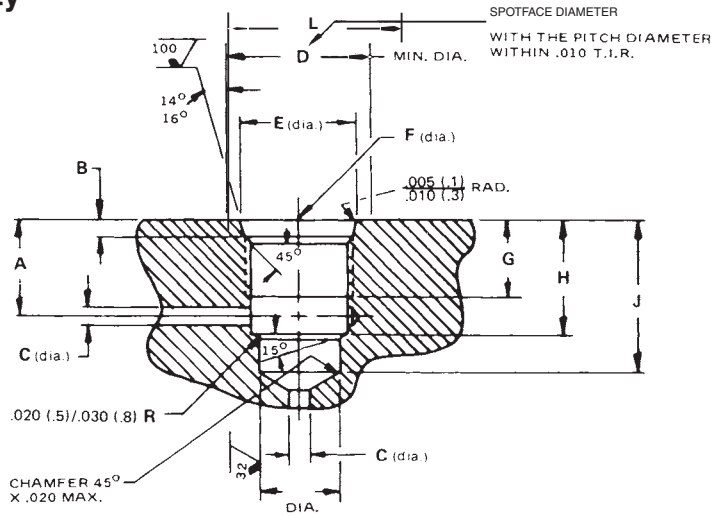
Millimeter equivalents for inch dimensions are shown in (**)



D

Valve Model	A	B	C	D	E	F	G	J	K	Wt. lb. (kg)
MVI400S*	2.54 (64.5)	2.34 (59.4)	1.00 (25.4)	0.43 (10.9)	.56 (14.2)	.18 (4.6)	2.00 (50.8)	3/4-16UNF-2A	.87 (22.1)	0.4 (0.2)
MVI600S	3.16 (80.3)	2.86 (72.6)	1.18 (30.0)	0.53 (13.5)	.62 (15.7)	.31 (7.9)	2.50 (63.5)	7/8-14UNF-2A	1.00 (25.4)	0.6 (0.3)
MVI800S	3.59 (91.2)	3.09 (78.5)	1.56 (39.6)	0.60 (15.2)	.80 (20.3)	.37 (9.4)	3.25 (82.6)	1-1/16-12UN-2A	1.25 (31.8)	1.2 (0.5)
MVI1200S	4.00 (101.6)	3.45 (87.6)	1.71 (43.4)	0.75 (19.1)	1.06 (26.9)	.46 (11.7)	3.87 (98.3)	1-5/16-12UN-2A	1.50 (38.1)	2.0 (0.9)

Machining the Cavity



Valve Model	A	B	C	D	E	F	G	H	J	K	L
MVI400S	.56 (14.2)	.100/.115 (2.5/2.9)	.21 (5.3)	.87 (22.1)	.811/.816 (20.6/20.7)	3/4-16 UNF-2B	.56 (14.2)	.70 (17.8)	1.06 (26.9)	.562/.564 (14.3/14.3)	1.188 (30.2)
MVI600S	.65 (16.5)	.100/.115 (2.5/2.9)	.32 (8.1)	1.00 (25.4)	.942/.947 (23.9/24.1)	7/8-14 UNF-2B	.65 (16.5)	.85 (21.6)	1.25 (31.8)	.624/.626 (15.8/15.9)	1.344 (34.1)
MVI800S	.95 (24.1)	.130/.145 (3.3/3.7)	.40 (10.2)	1.25 (31.8)	1.148/1.153 (29.2/29.3)	1-1/16-12 UN-2B	.75 (19.1)	1.18 (30.0)	1.62 (41.1)	.811/.813 (20.6/20.7)	1.625 (41.3)
MVI1200S	.97 (24.6)	.130/.145 (3.3/3.7)	.50 (12.7)	1.50 (38.1)	1.398/1.403 (35.3/35.6)	1-5/16-12 UN-2B	.75 (19.1)	1.25 (31.8)	1.78 (45.2)	1.062/1.064 (26.9/26.9)	1.910 (48.5)

3000-D1.p65, dd

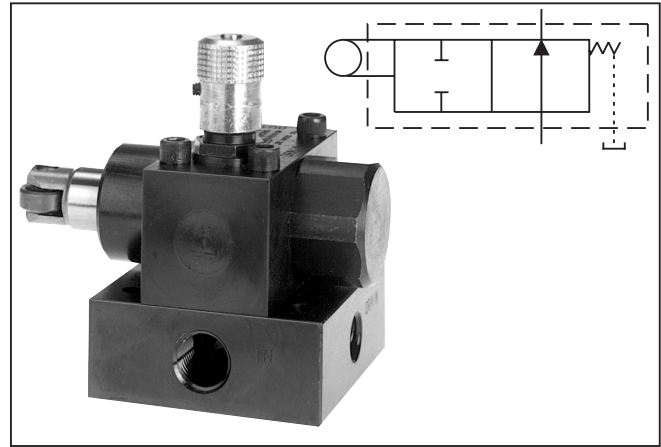
General Description

Series D deceleration valve is a cam operated 2-way valve with tapered spool. As the cam depresses the plunger, flow through the valve is gradually decreased to the cut-off point.

This valve is also available as a normally closed, cam operated 2-way valve.

Specifications

Maximum Operating Pressure	210 Bar (3000 PSI)
Maximum Flow	See flow vs. pressure drop curves, reverse flow vs. pressure drop, flow vs. plunger travel curves
Nominal Flow	D600 37.9 LPM (10 GPM) D1200 132.5 LPM (35 GPM)
Port Configurations	See dimensional drawings and/or ordering information for configuration availability



Features

- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- A simple set screw locks the valve on any desired setting.



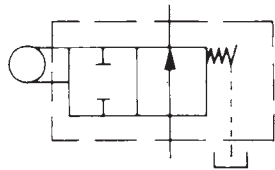
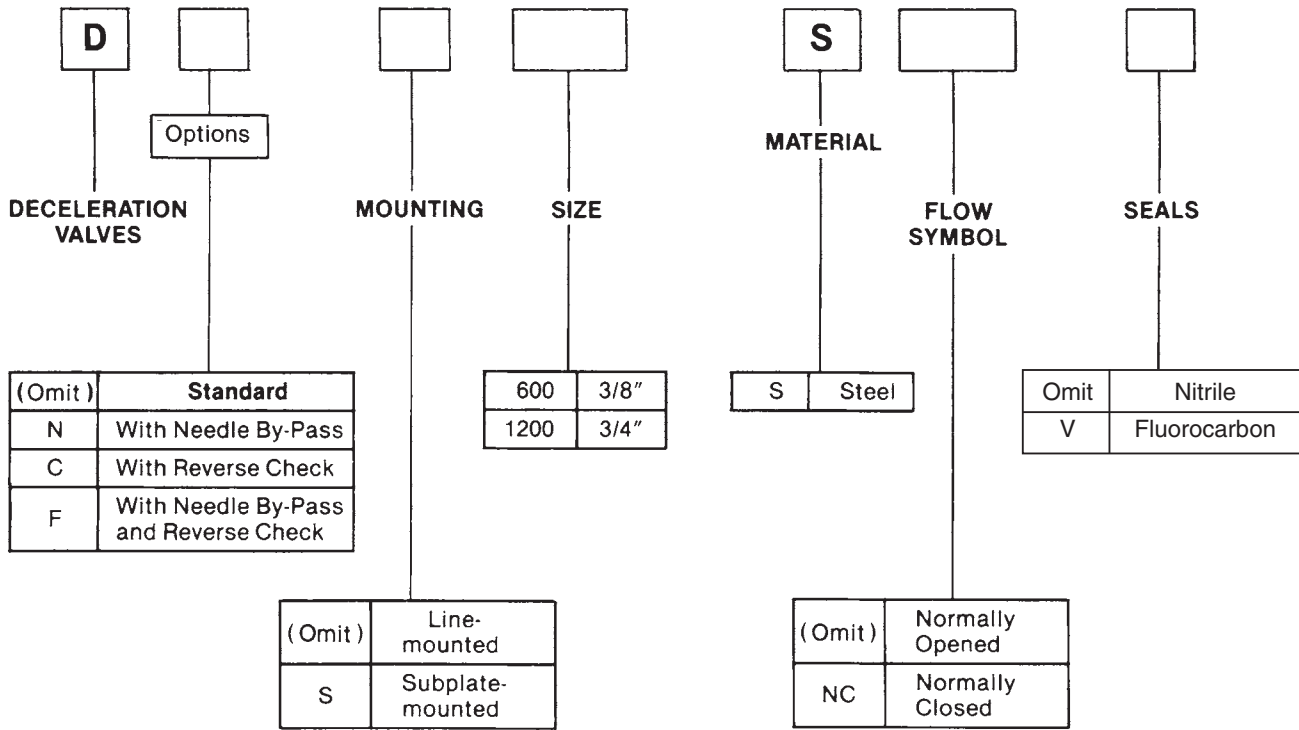
Flow Data

Valve Model	Flow, max., GPM (L/M)	Pressure Drop ΔP @ (Max.) PSI (Bar) (Plunger Full Open)	Mounting	Port Size	Subplate Port Location
D600	19 (72)	200 (14)	Inline	3/8 NPTF	—
DC600	19 (72)	200 (14)	Inline	3/8 NPTF	—
DF600	19 (72)	200 (14)	Inline	3/8 NPTF	—
DN600	19 (72)	200 (14)	Inline	3/8 NPTF	—
DNS600	19 (72)	200 (14)	Subplate	3/8 NPTF	Side
DS600	19 (72)	200 (14)	Subplate	3/8 NPTF	Side
D1200	60 (227)	120 (8)	Inline	3/4 NPTF	—
DC1200	60 (227)	120 (8)	Inline	3/4 NPTF	—
DF1200	60 (227)	120 (8)	Inline	3/4 NPTF	—
DFS1200	60 (227)	120 (8)	Subplate	3/4 NPTF	Bottom
DN1200	60 (227)	120 (8)	Inline	3/4 NPTF	—
DNS1200	60 (227)	120 (8)	Subplate	3/4 NPTF	Bottom
DS1200	60 (227)	120 (8)	Subplate	3/4 NPTF	Bottom
DCS1200	60 (227)	120 (8)	Subplate	3/4 NPTF	Bottom

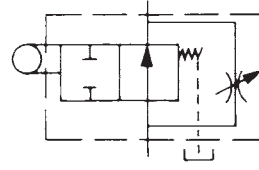
Reverse Flow

Valve Model	With Check GPM (L/M)	With Needle	With Check & Needle GPM (L/M)	Flow Path
D**600S**	19 (72)	N.O. or N.C. valve reverse flow is proportional to needle setting	19 (72)	Normally Open or Closed
D**1200S**	60 (227)		60 (227)	Normally Open or Closed

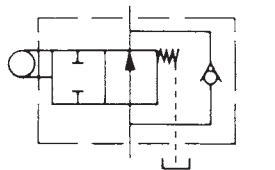
3000-D1.p65, dd



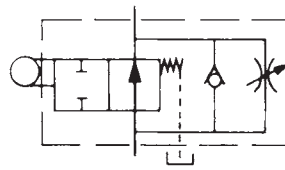
STANDARD
 DECELERATION VALVE



DECELERATION VALVE
 WITH NEEDLE BY-PASS



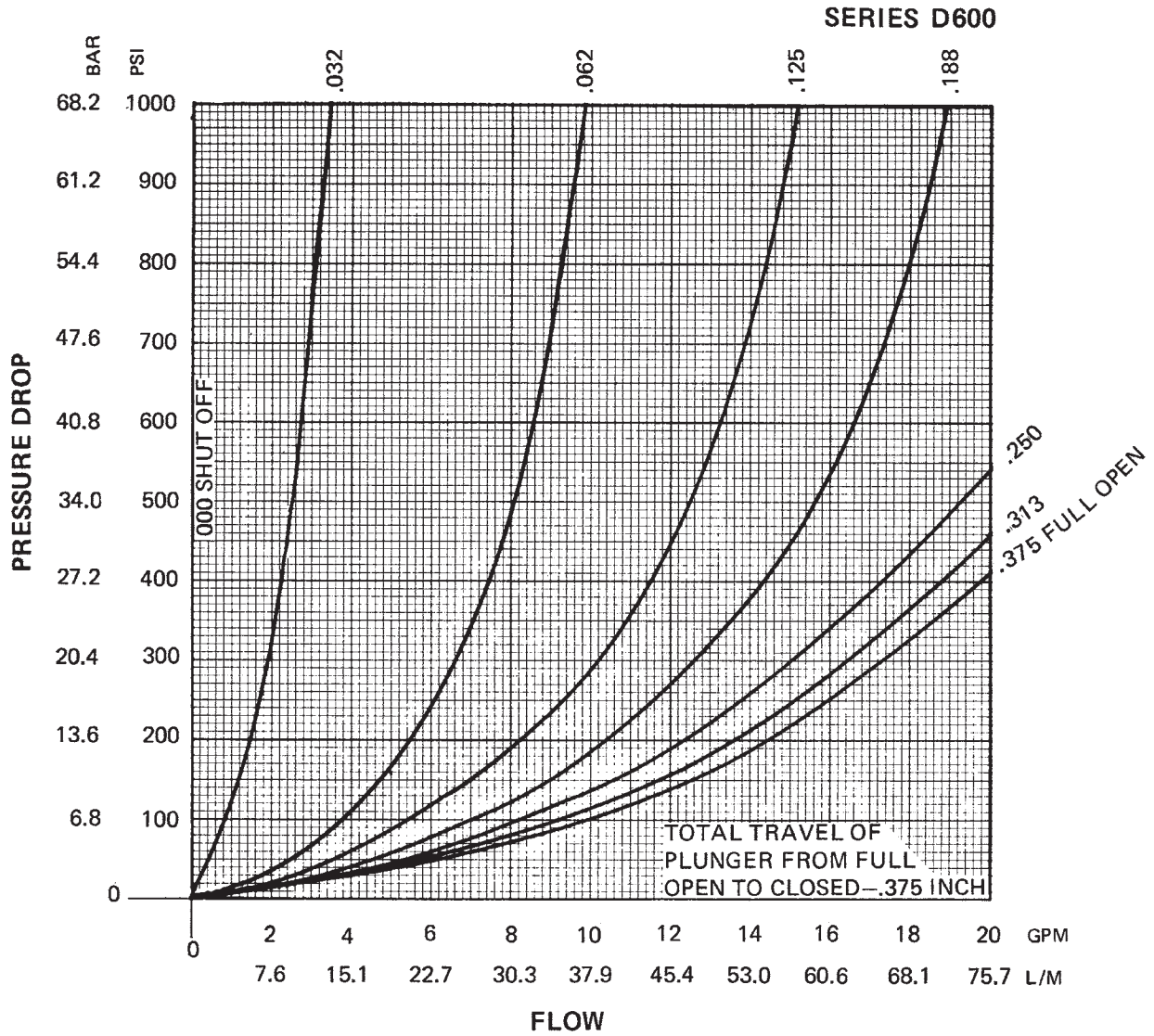
DECELERATION VALVE
 WITH REVERSE CHECK



DECELERATION VALVE
 WITH NEEDLE BY-PASS
 AND REVERSE CHECK.

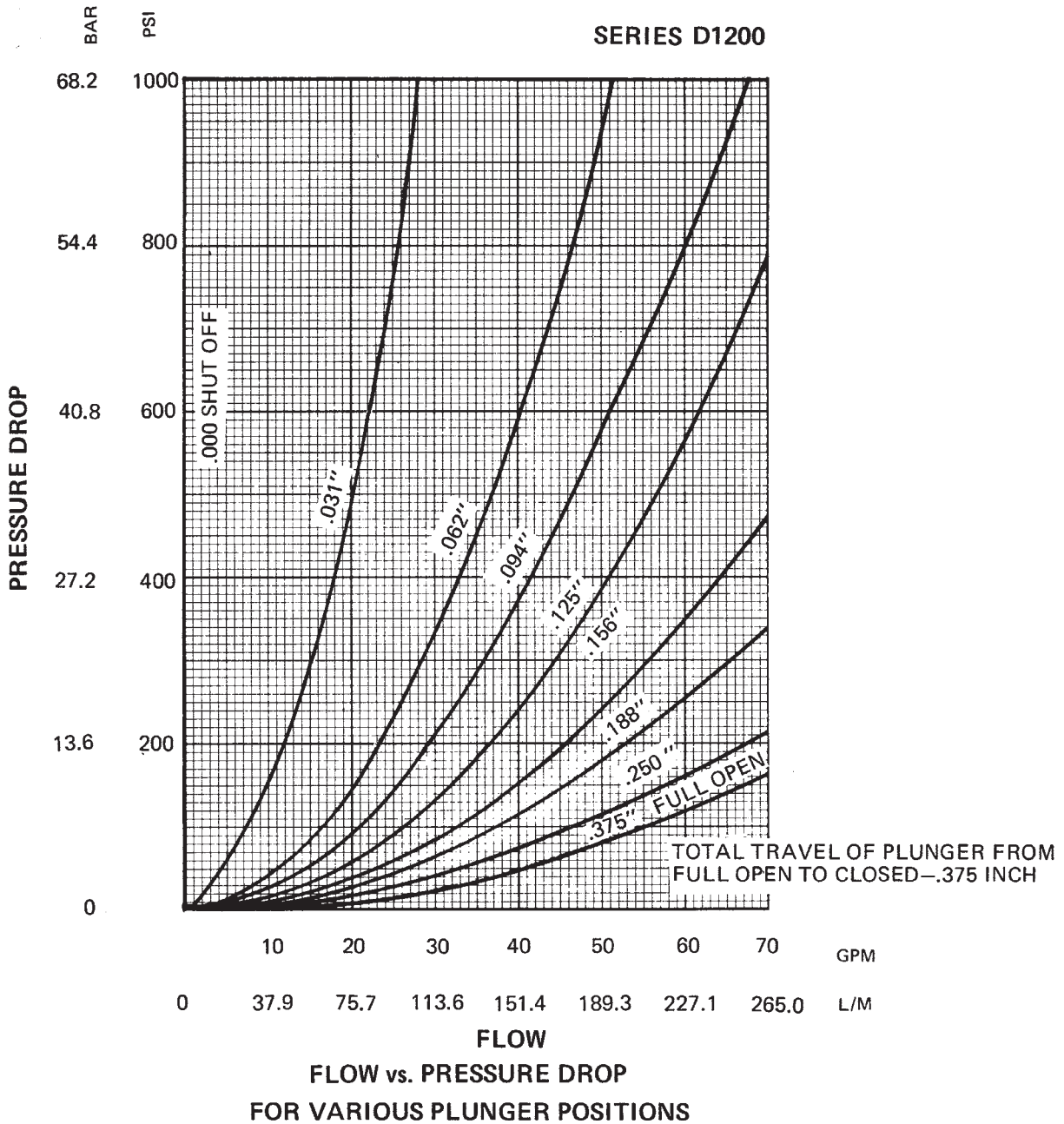
Bolt Kits

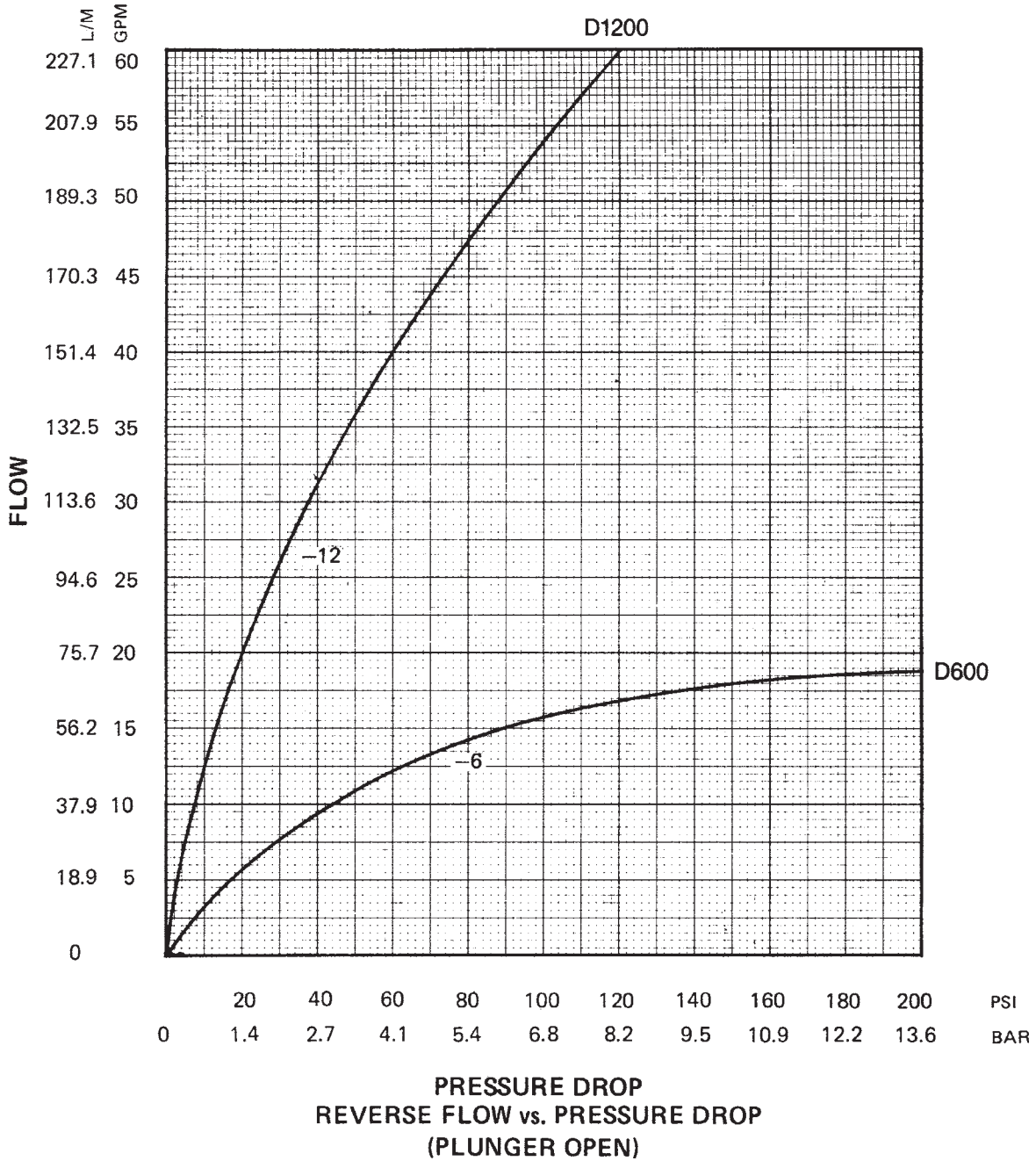
Valve	Bolt Kit	Bolts SAE Grade 8 or Better	Bolt Torque
DNS600S DS600S	BK06	1/4-20 x 2"	19 FT.-LBS.
DCS1200S DFS1200S	BK38	3/8-16 x 1-3/4"	34 FT.-LBS.
DNS1200S DS1200S	BK11	3/8-16 x 2-3/4"	34 FT.-LBS.



**FLOW vs. PRESSURE DROP
 FOR VARIOUS PLUNGER POSITIONS**

D



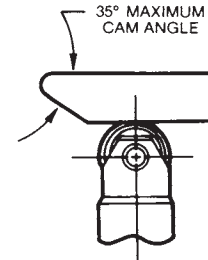
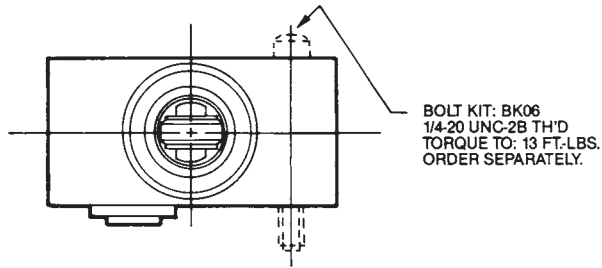


D

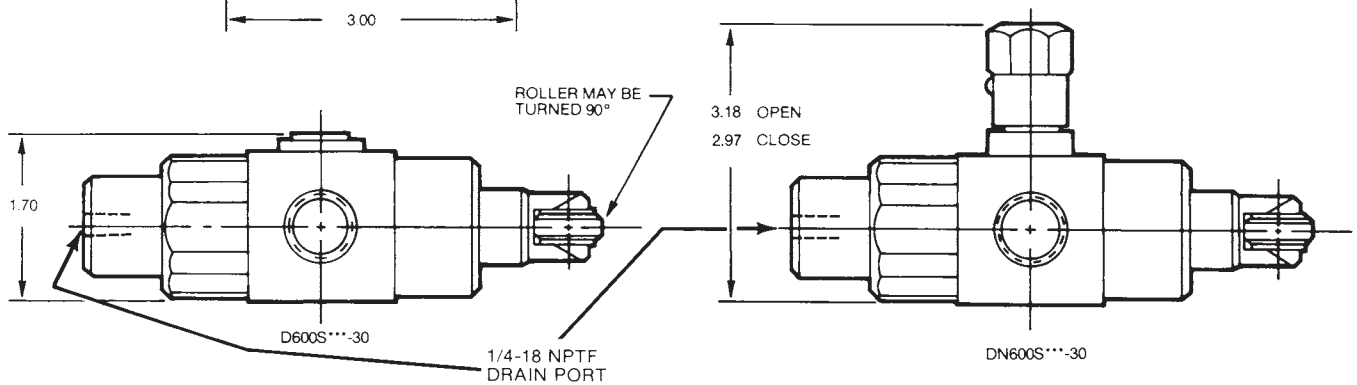
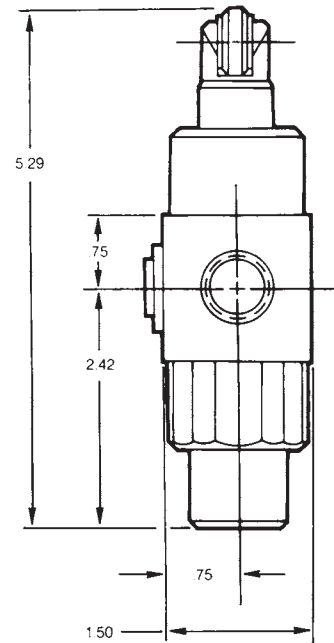
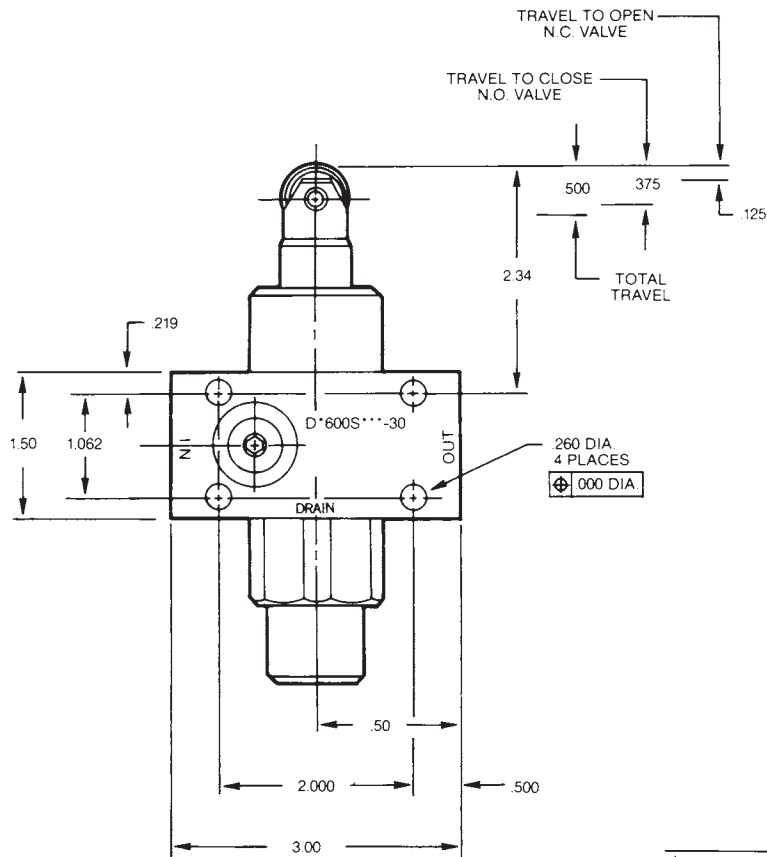
Dimensions are shown in inches

Models D600S and DN600S

In-line mounted Deceleration Valves



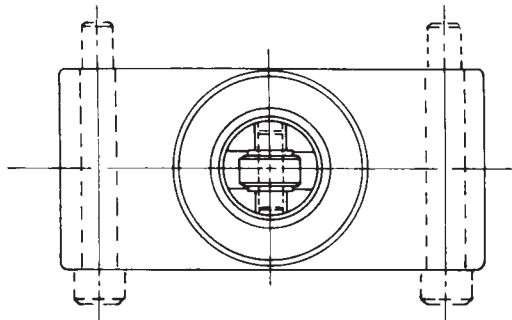
D



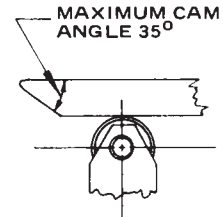
Millimeter equivalents for inch dimensions are shown in (**)

Model D1200S

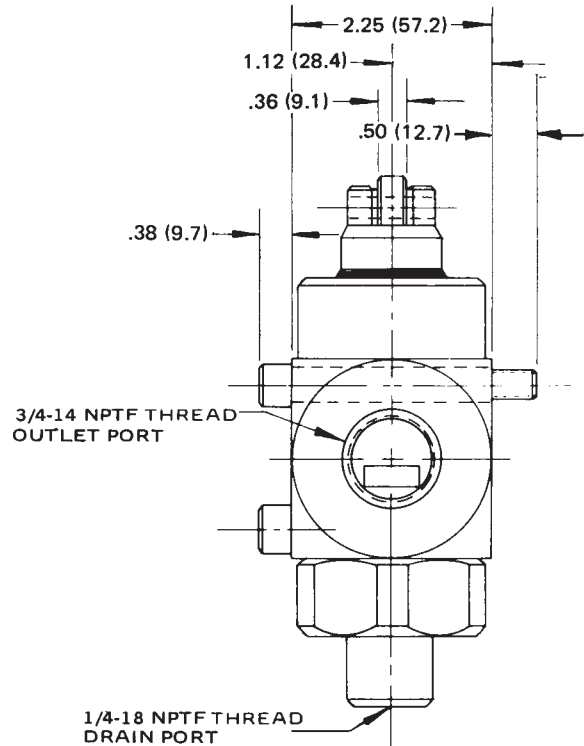
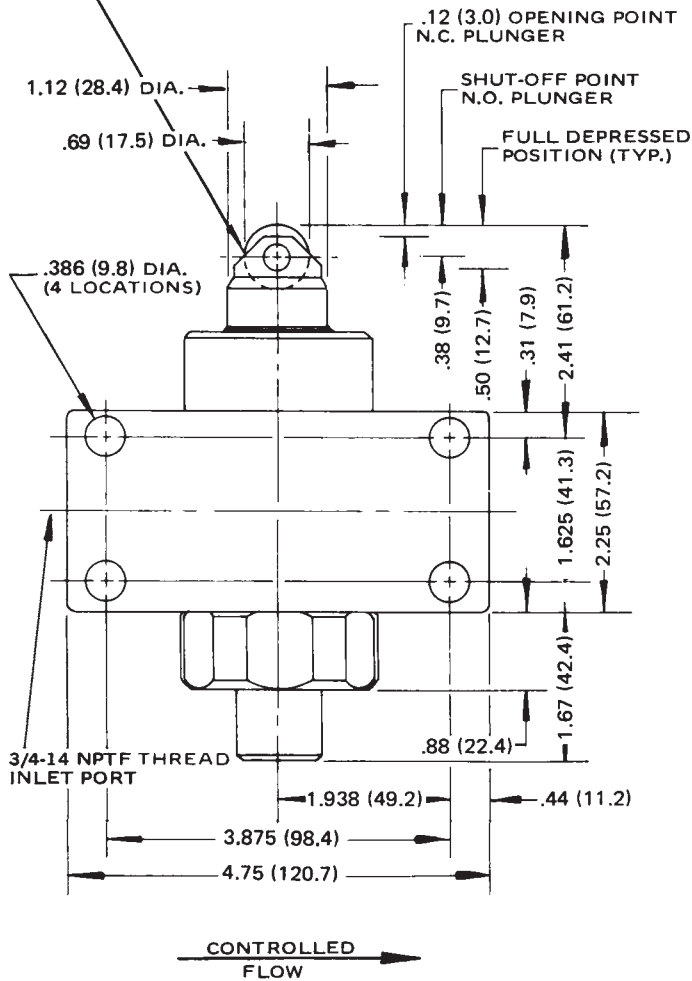
In-line mounted, normally-open/normally-closed
Deceleration Valves



Weight
6.5 Lb. (3.0 Kg.)



PLUNGER AND ROLLER
TO BE ASSEMBLED IN
PLANE AS SHOWN.
CAN BE ROTATED 90°
FROM POSITION SHOWN.



1. WORKING PRESSURE, MAX.:
3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK
PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER:
50 Lbs. (22.8 Kg.) (DRAIN PRESSURE
INCREASES FORCE REQ'D. TO
DEPRESS PLUNGER.)

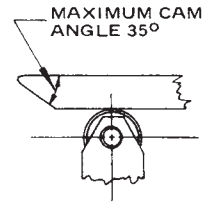


Millimeter equivalents for inch dimensions are shown in (**)

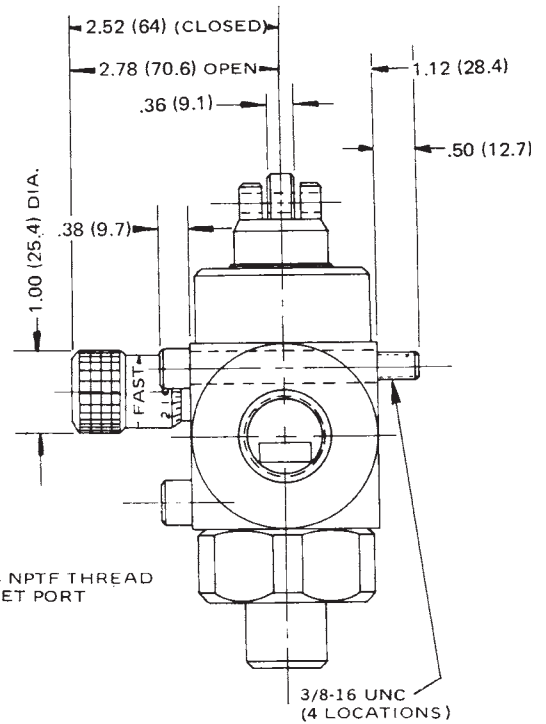
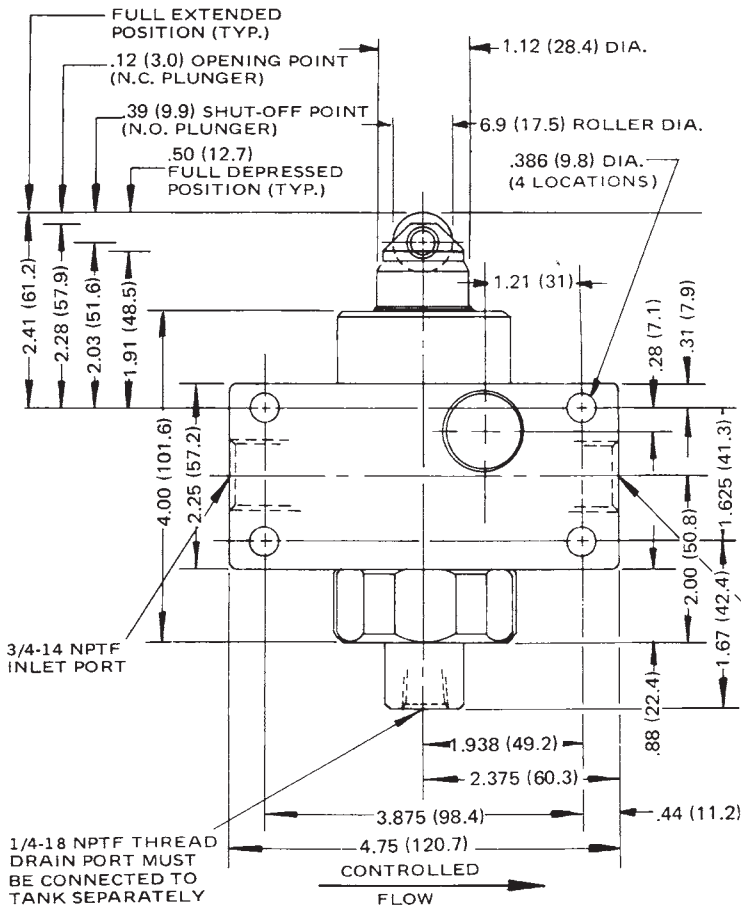
Model DN1200S

In-line mounted Deceleration Valve
 with bypass needle

Weight
 7.5 Lb. (3.4 Kg.)



D

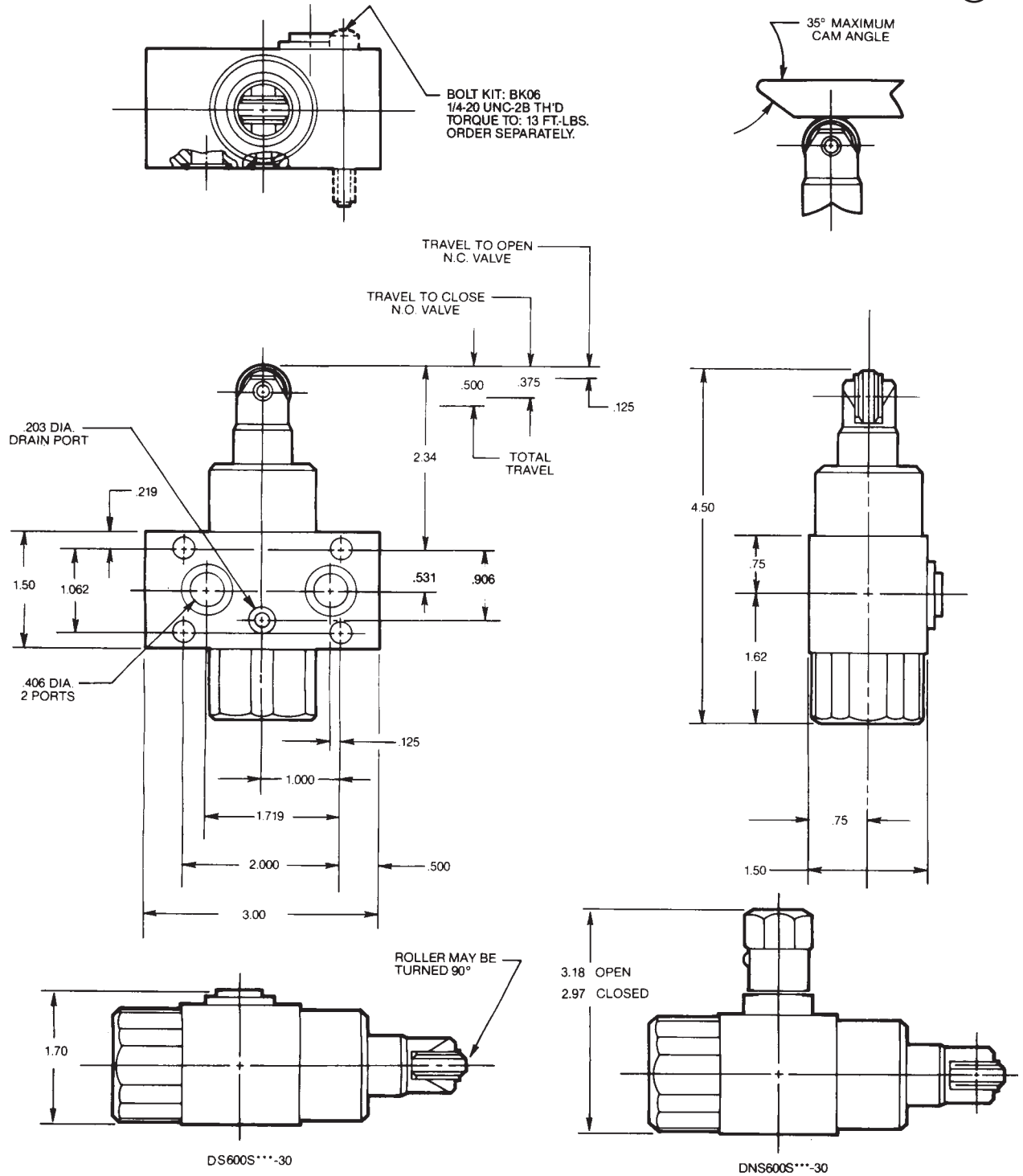


1. WORKING PRESSURE, MAX.: 3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER: 50 Lbs. (22.8 Kg.) (DRAIN PRESSURE INCREASES FORCE REQ'D. TO DEPRESS PLUNGER)

Dimensions are shown in inches

Models DNS600S – DS600S

Manifold mounted Deceleration Valves

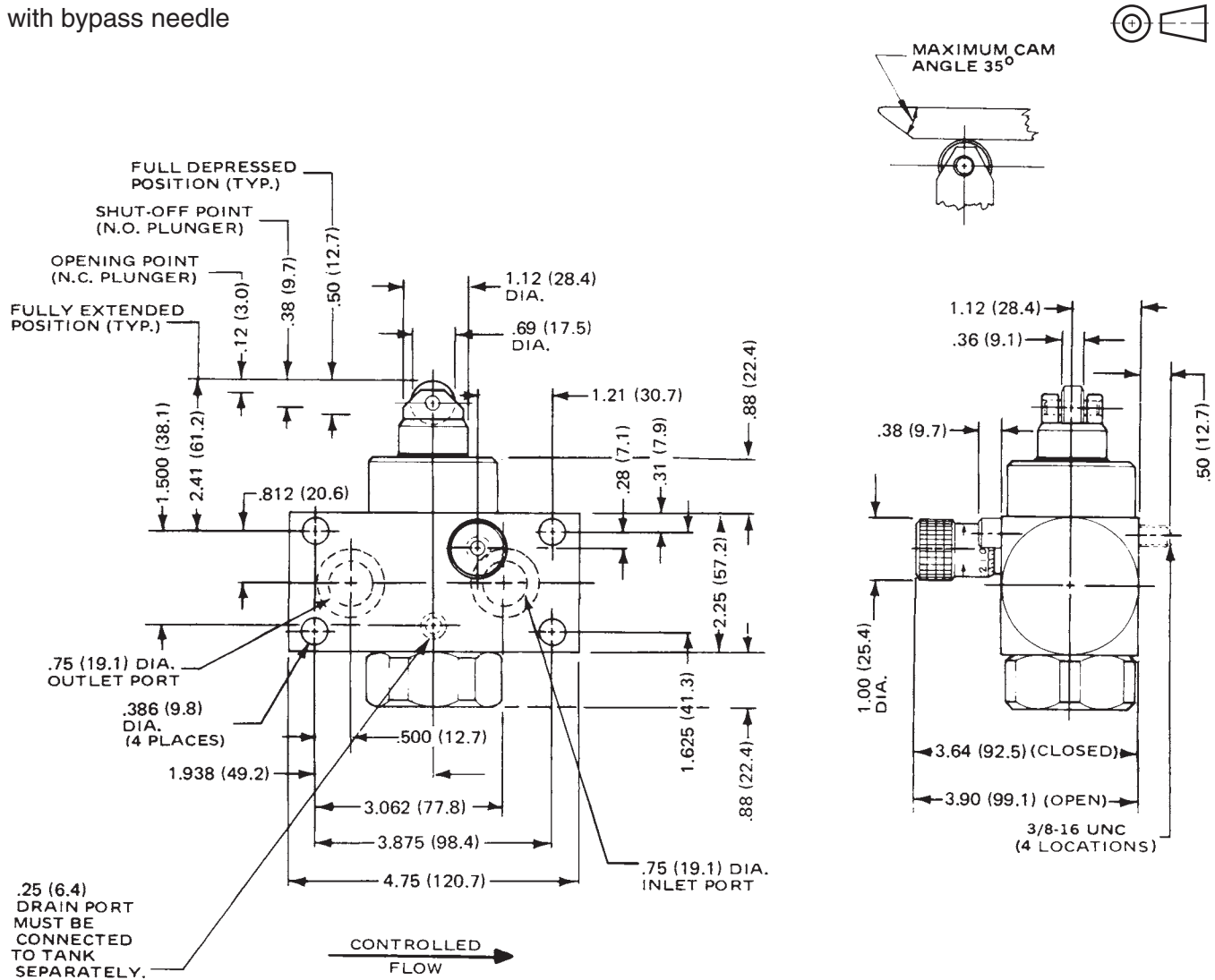


Millimeter equivalents for inch dimensions are shown in (**)

Model DNS1200S

Manifold mounted Deceleration Valve
with bypass needle

D



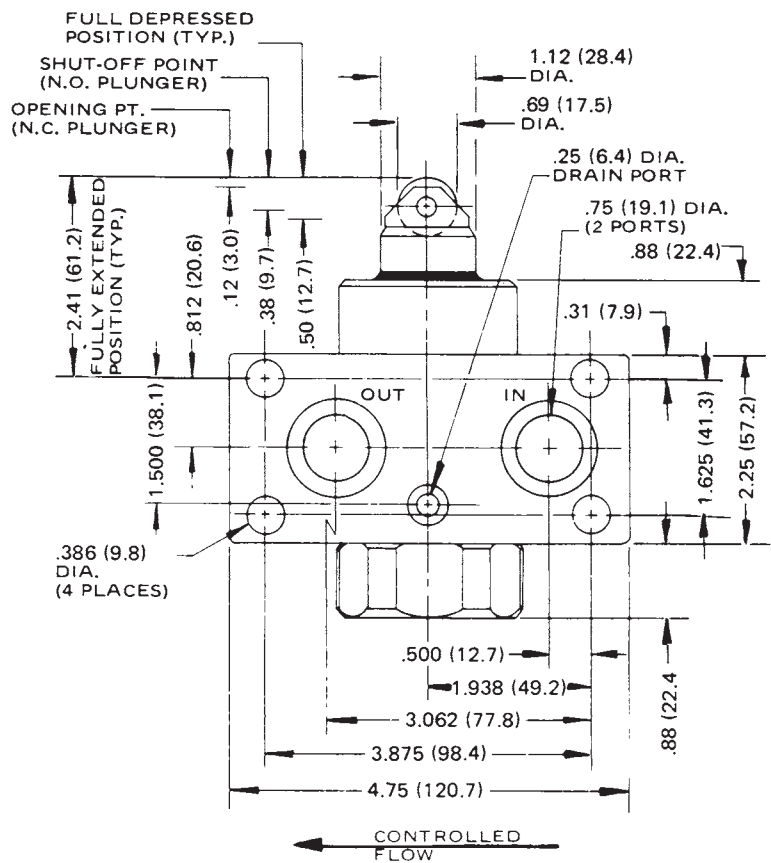
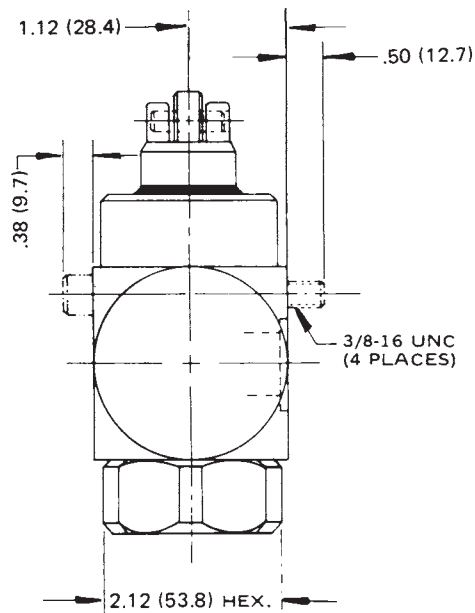
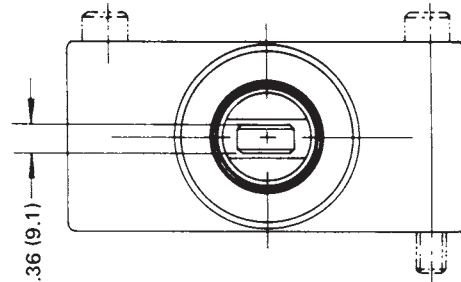
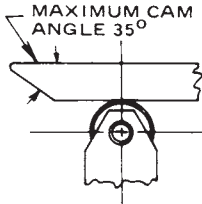
1. WORKING PRESSURE, MAX.: 3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER: 50 Lbs. (22.8 Kg.) (DRAIN PRESSURE INCREASES FORCE REQ'D. TO DEPRESS PLUNGER.)

Weight
7.5 Lb. (3.4 Kg.)

Millimeter equivalents for inch dimensions are shown in (**)

Model DS1200S

Manifold mounted, normally open/normally closed
Deceleration Valve



NOTES:

1. MAX. WORKING PRESSURE 3000 PSI.
 2. DRAIN-MAX. ALLOWABLE BACK PRESSURE 30 PSI.
 3. FORCE-REQ'D. TO DEPRESS PLUNGER 50 LBS.
- "DRAIN PRESSURE INCREASES FORCE REQ'D. TO DEPRESS PLUNGER."



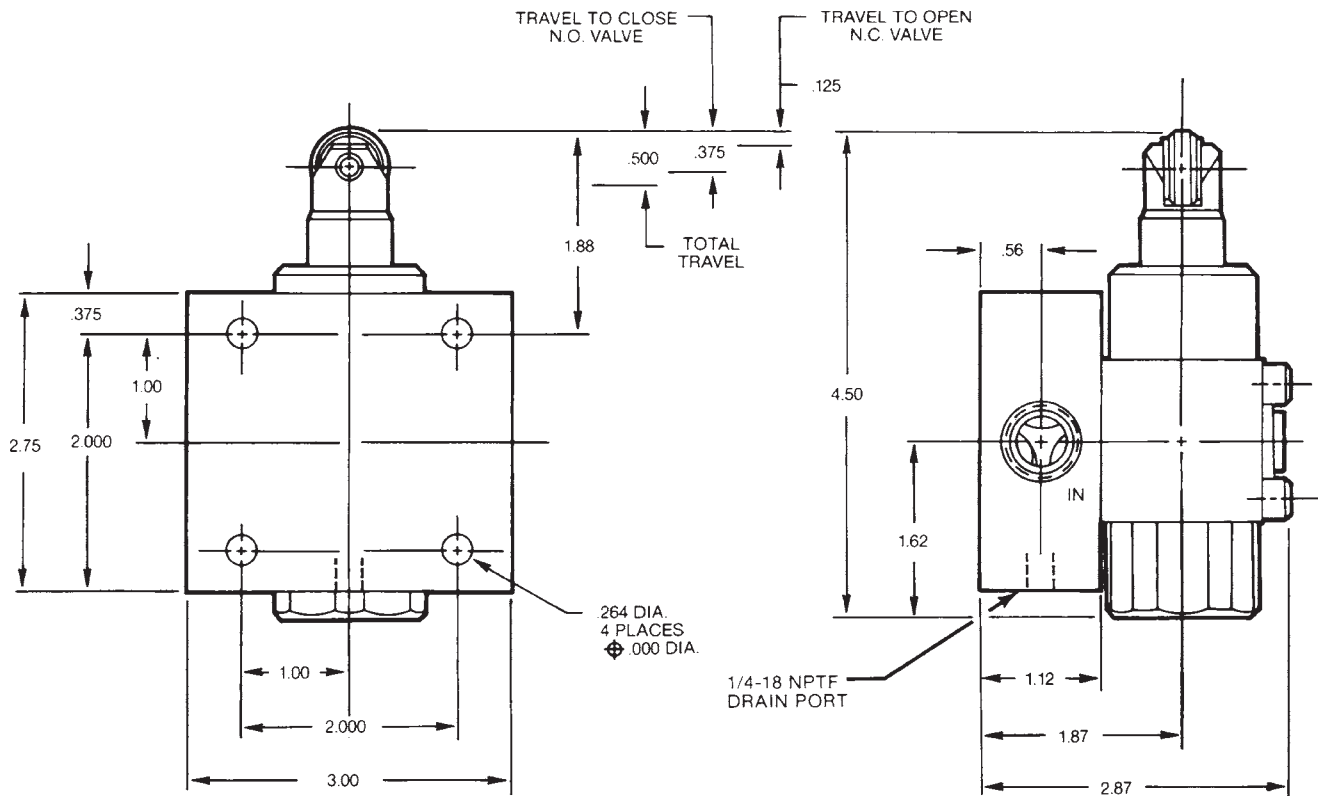
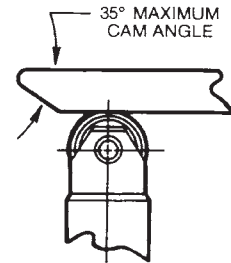
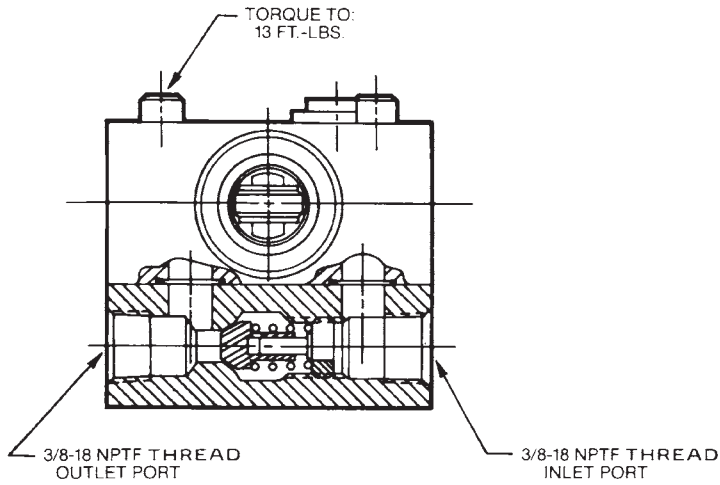
Dimensions are shown in inches

Model DC600S

In-line mounted Deceleration Valve
 with reverse check



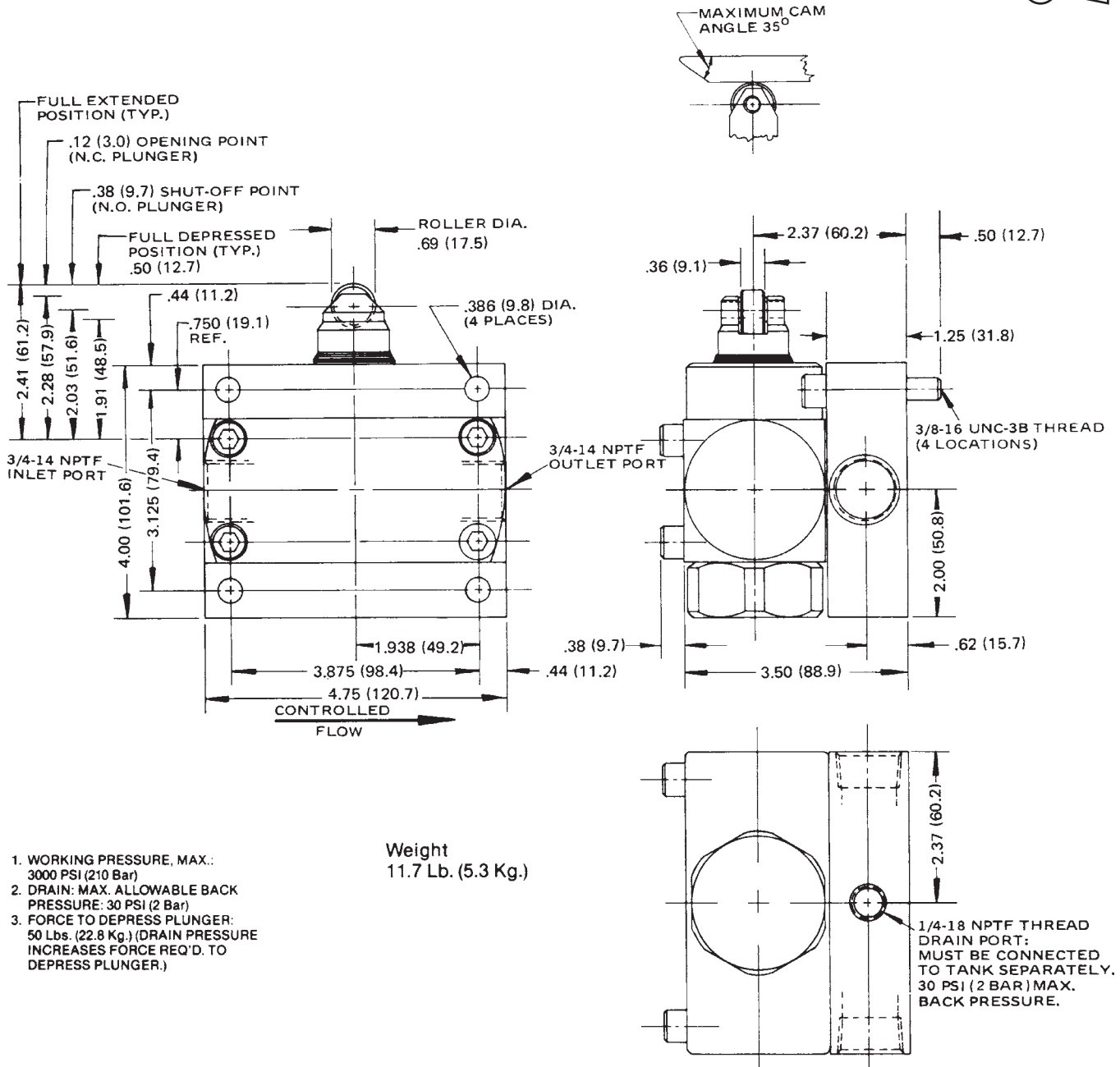
D



Millimeter equivalents for inch dimensions are shown in (**)

Model DC1200S

In-line mounted Deceleration Valve
 with reverse check



1. WORKING PRESSURE, MAX.: 3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER: 50 Lbs. (22.8 Kg.) (DRAIN PRESSURE INCREASES FORCE REQ'D. TO DEPRESS PLUNGER.)

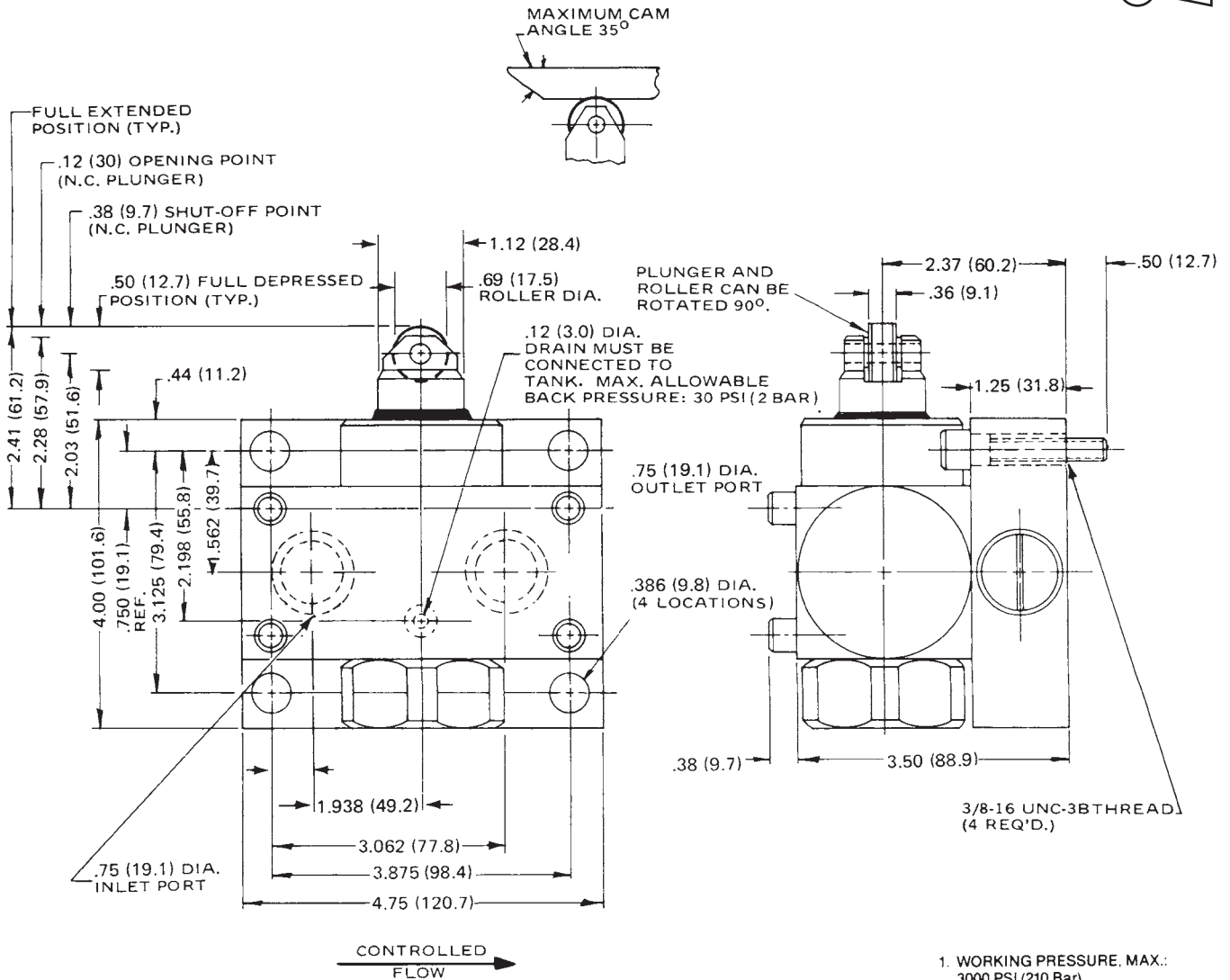
Millimeter equivalents for inch dimensions are shown in (**)

Model DCS1200S

Manifold mounted Deceleration Valve
with reverse check



D

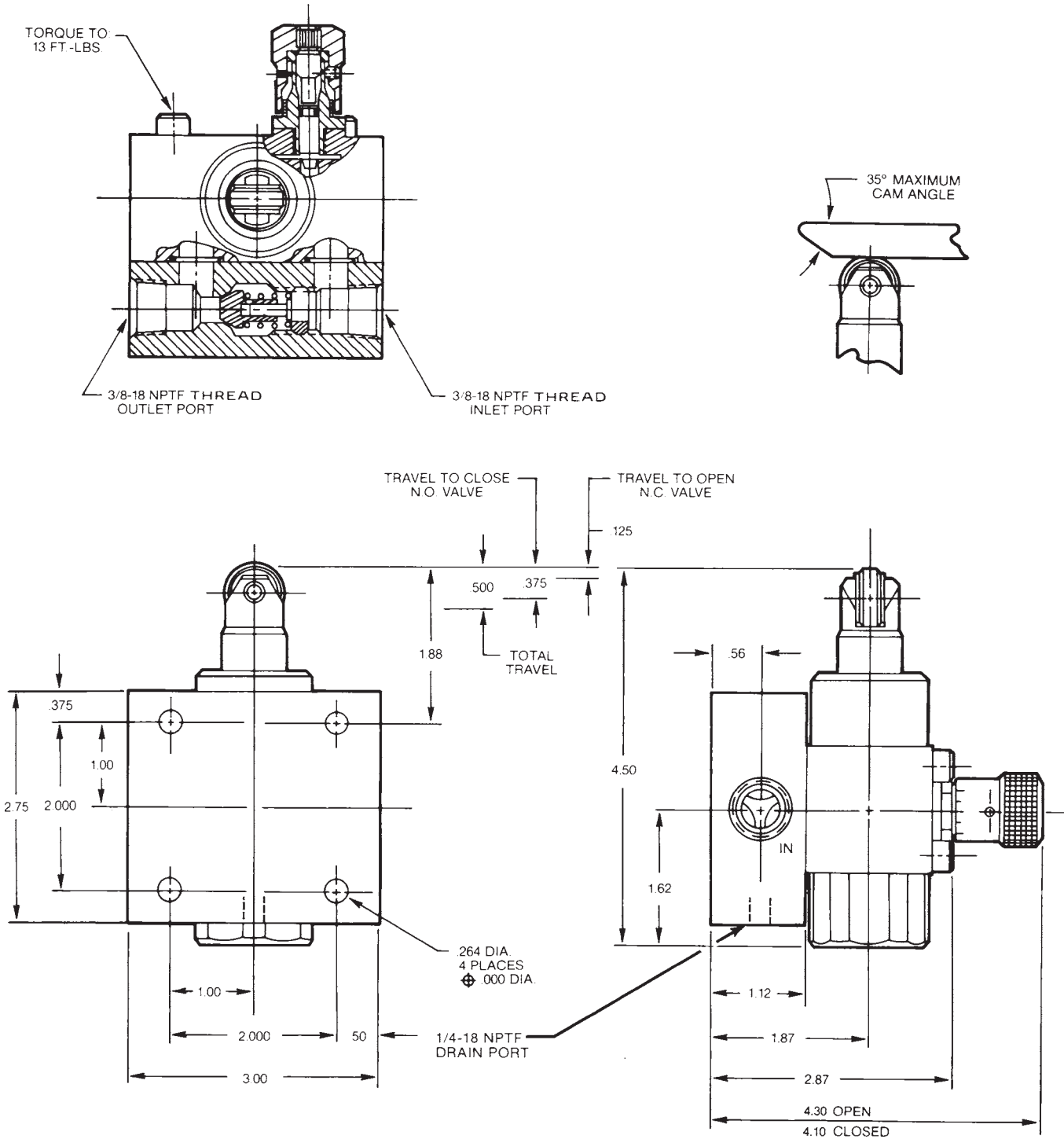


1. WORKING PRESSURE, MAX.: 3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER: 50 Lbs. (22.8 Kg.) (DRAIN PRESSURE INCREASES FORCE REQ'D. TO DEPRESS PLUNGER.)

Dimensions are shown in inches

Model DF600S

In-line mounted Deceleration Valve
with reverse check and bypass needle



D

Millimeter equivalents for inch dimensions are shown in (**)

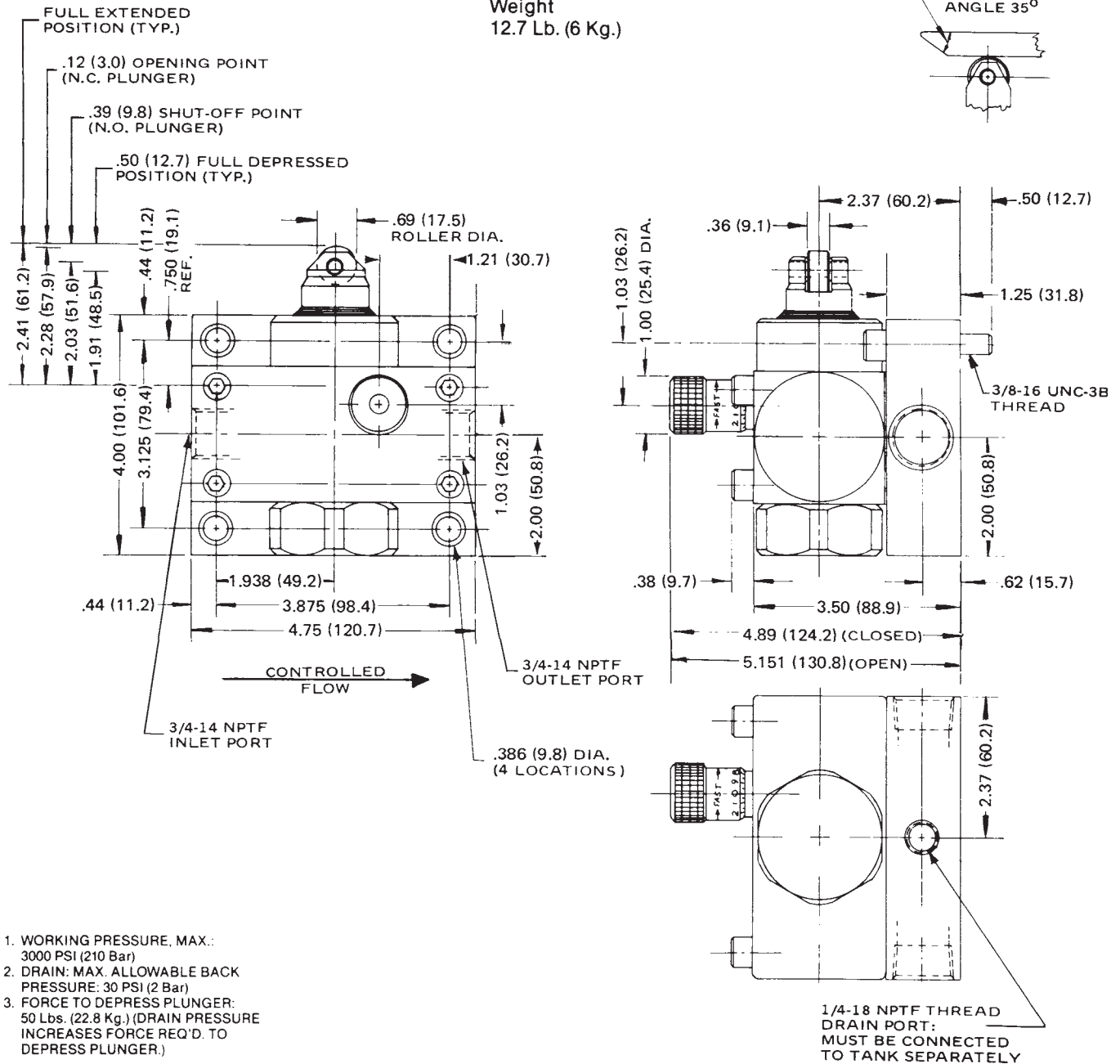
Model DF1200S

In-line mounted Deceleration Valve
with reverse check and bypass needle



Weight
12.7 Lb. (6 Kg.)

D



1. WORKING PRESSURE, MAX.:
3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK
PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER:
50 Lbs. (22.8 Kg.) (DRAIN PRESSURE
INCREASES FORCE REQ'D. TO
DEPRESS PLUNGER.)

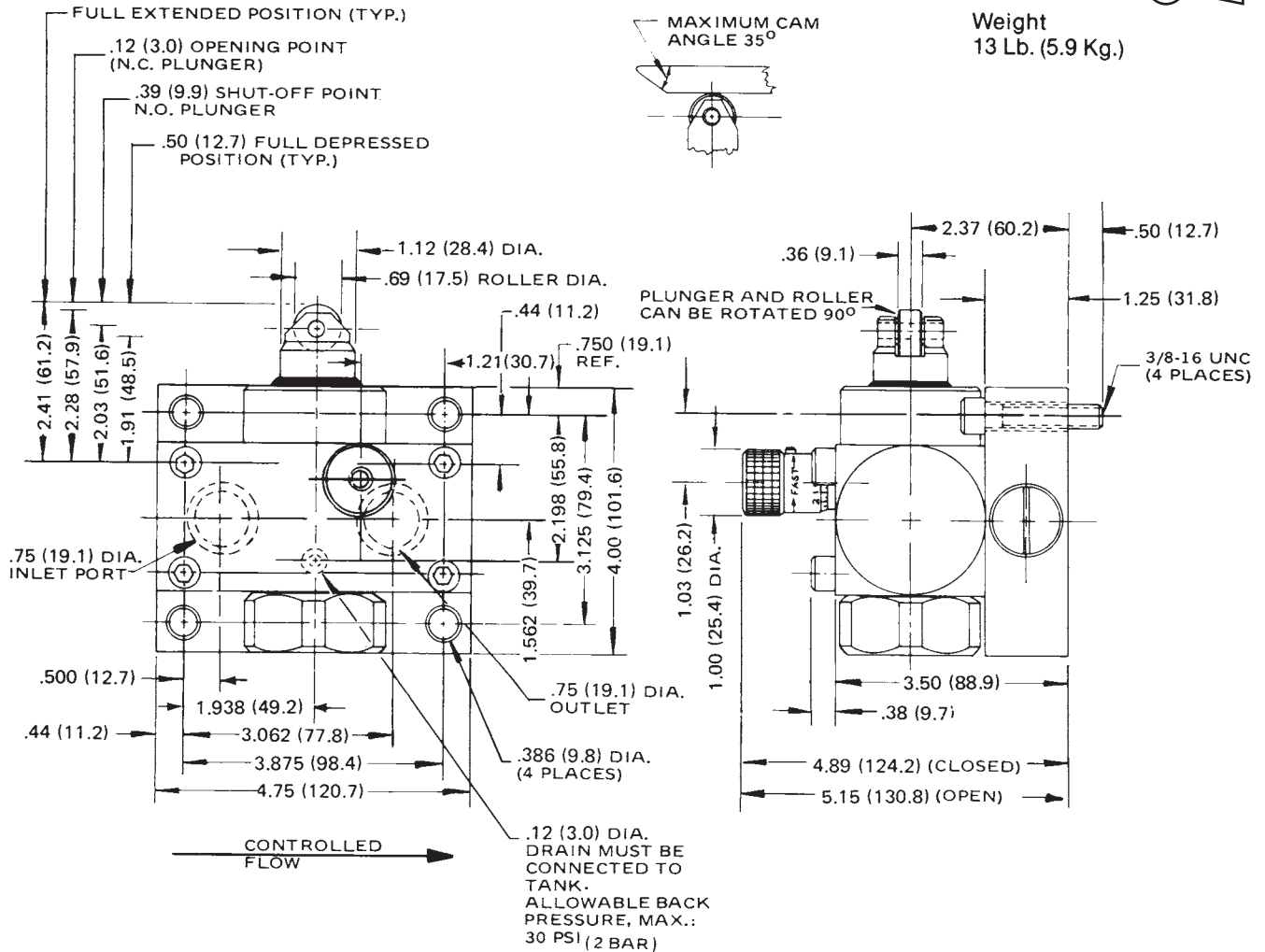
Millimeter equivalents for inch dimensions are shown in (**)

Model DFS1200S

Manifold mounted Deceleration Valve
with reverse check and bypass needle



Weight
13 Lb. (5.9 Kg.)



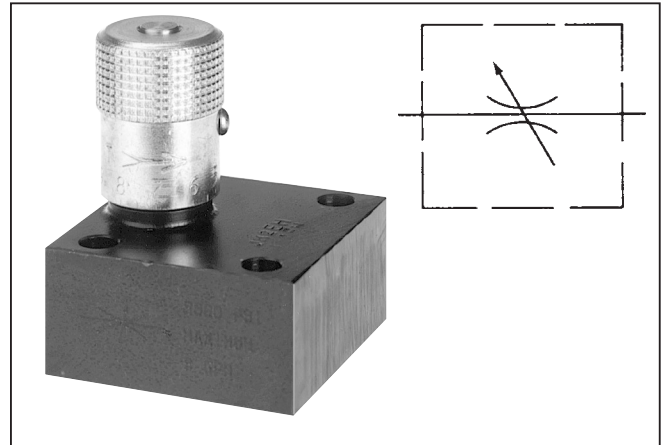
1. WORKING PRESSURE, MAX.: 3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER: 50 Lbs. (22.8 Kg.) (DRAIN PRESSURE INCREASES FORCE REQ'D. TO DEPRESS PLUNGER.)

General Description

Series NS needle valves provide excellent speed control and shutoff for hydraulic applications where a reverse-flow check valve is not required. They also take minimum space for installation, conserving space.

The two-step needle valve allows fine tuning at low flow with the first three turns of the adjusting knob, with full-open flow plus conventional precision throttling with the final three turns of the knob.

Exclusive "Colorflow" color bands permit fast, accurate setting and time-saving return to a previous setting.



Features

- The exclusive "Colorflow" color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- A simple set screw locks the valve on any desired setting.

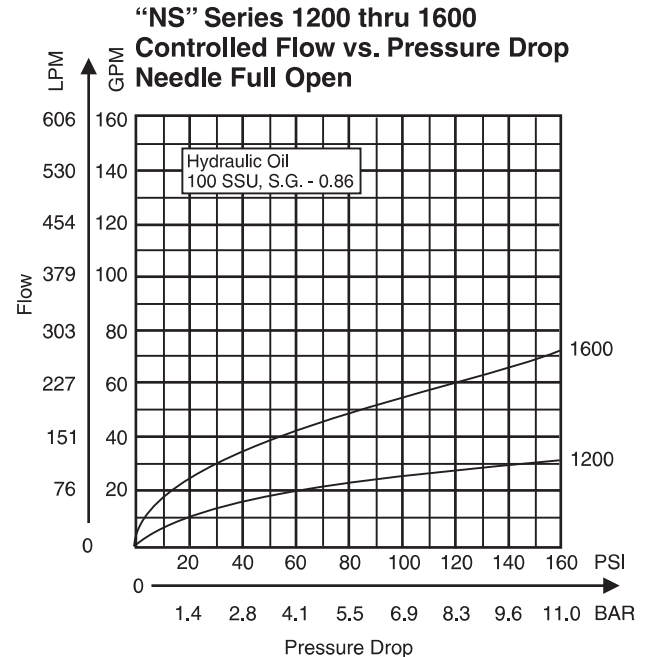
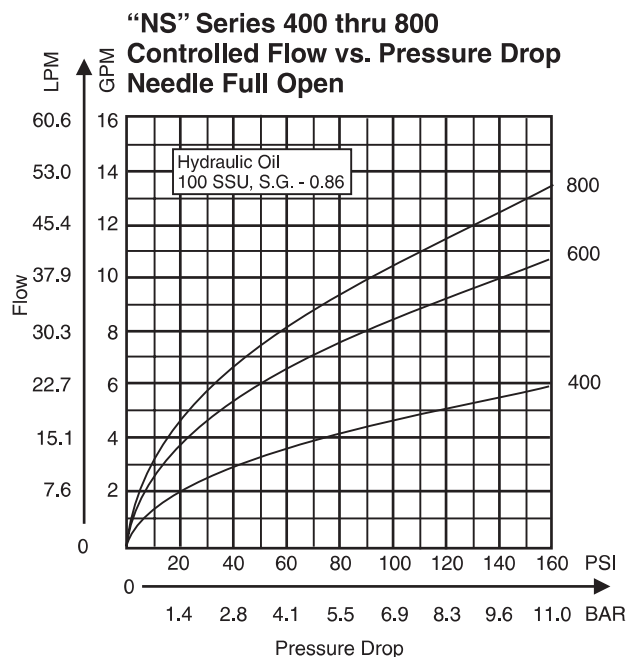
Flow Data

Valve Model	Flow, Max. GPM (L/M)	Orifice Area Control Flow (Sq. In.)	Effective Control Flow CV	Port Size
NS400	5 (19)	.0194	.443	1/4
NS600	8 (30)	.0344	.787	3/8
NS800	15 (57)	.0427	.976	1/2
NS1200	25 (95)	.1080	2.470	3/4
NS1600	40 (151)	.2300	5.250	1

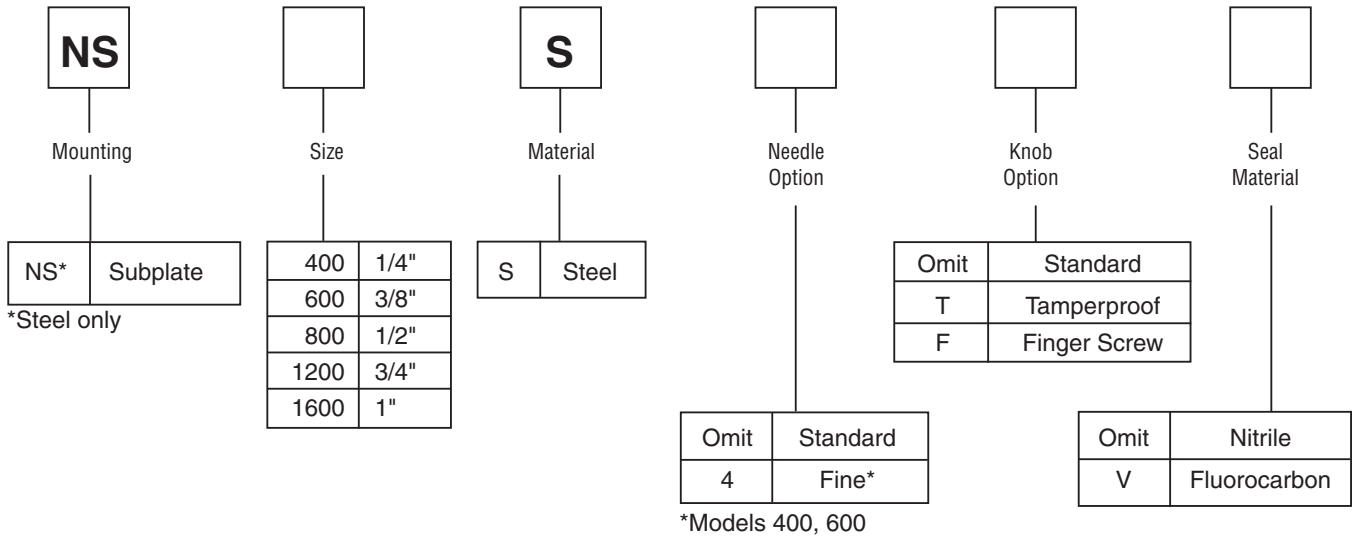
D Specifications

Maximum Operating Pressure	210 Bar (3000 PSI)
Needles	Standard Needle on all models Fine needle optional on Models NS400 and NS600
Nominal Flow	D600 37.9 LPM (10 GPM) D1200 132.5 LPM (35 GPM)
Port Configurations	See dimensional drawings and/or ordering information for configuration availability

Performance Curves



3000-D1.p65, dd

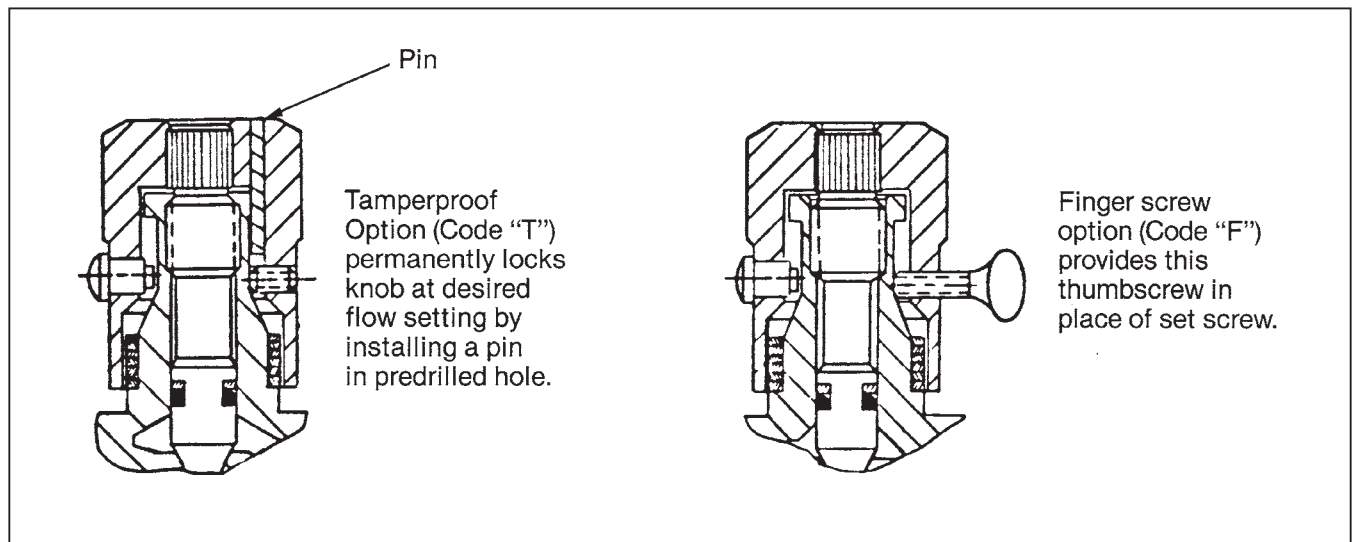


Bolt Kits

Valve	Bolt Kit	Bolt Specification*	Bolt Torque
NS400	BK01	1/4-20 x 1-1/4"	9 Ft.-Lbs.
NS600	BK02	1/4-20 x 1-1/2"	9 Ft.-Lbs.
NS800	BK02	1/4-20 x 1-1/2"	9 Ft.-Lbs.
NS1200	BK05	5/16-18 x 1-3/4"	19 Ft.-Lbs.
NS1600	BK08	5/16-18 x 2-1/4"	19 Ft.-Lbs.

*Use SAE Grade 8 or Better.

Knob Options



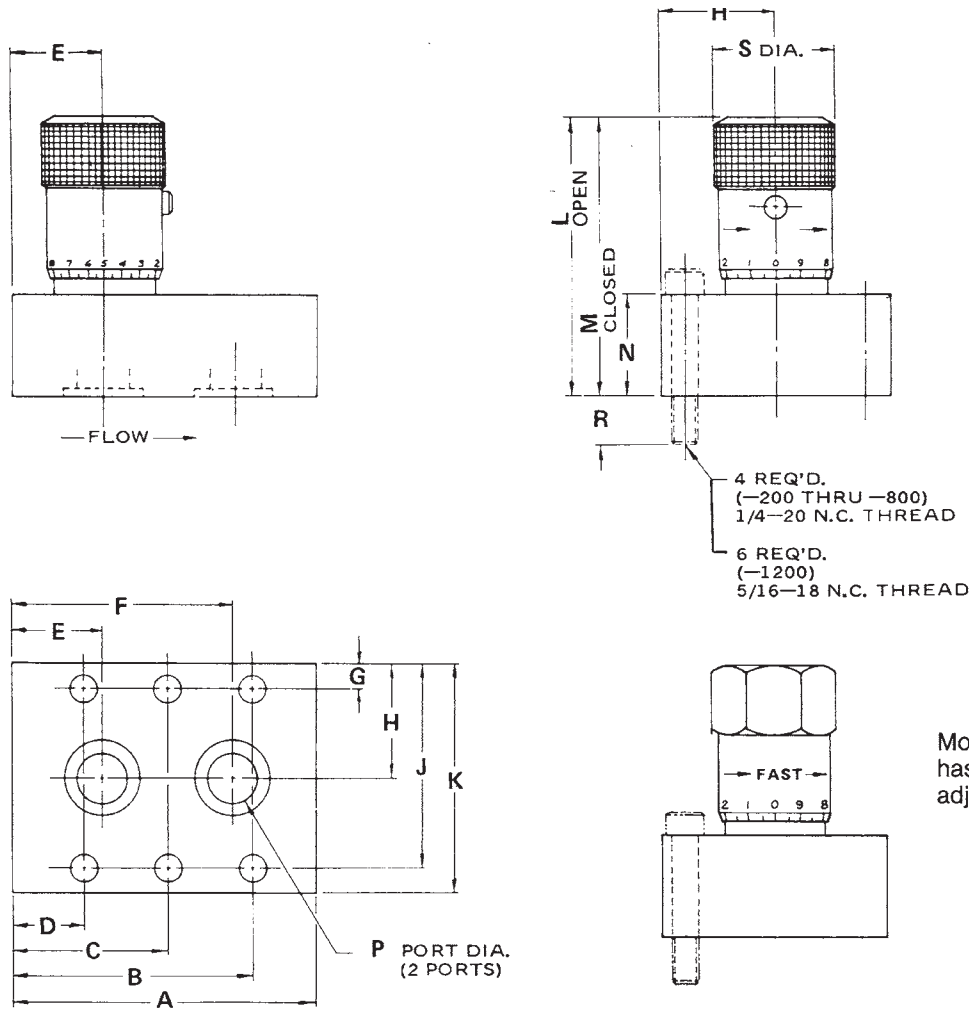
Millimeter equivalents for inch dimensions are shown in (**)

Models NS400S through NS1600S

Manifold mounted Needle Valves



D



Model NS1600S has hex. head adjusting knob.

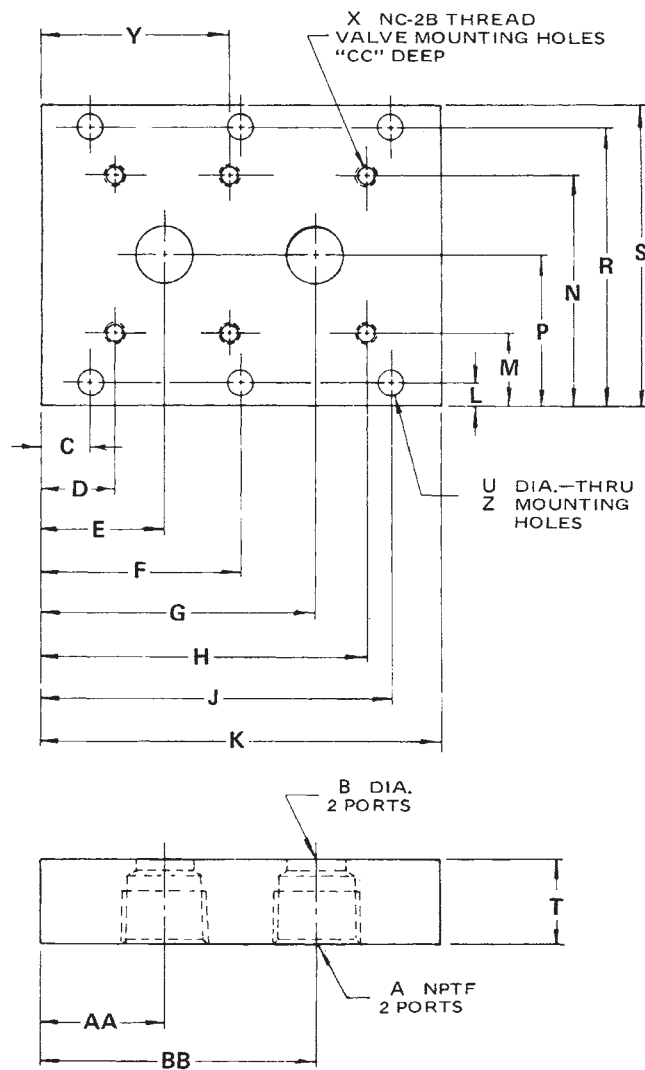
Valve Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	Weight Lb. (Kg)
NS400S	1.88 (47.8)	1.62 (41.1)		.25 (6.4)	.44 (11.2)	1.44 (36.6)	.22 (5.6)	.88 (22.4)	1.53 (38.9)	1.75 (44.5)	2.15 (54.6)	1.95 (49.5)	.88 (22.4)	.28 (7.1)	.44 (11.2)	.81 (20.6)	0.8 (0.4)
NS600S	2.00 (50.8)	1.66 (42.2)		.34 (8.6)	.50 (12.7)	1.50 (38.1)	.25 (6.4)	1.00 (25.4)	1.75 (44.5)	2.00 (50.8)	2.65 (67.3)	2.40 (61.0)	1.00 (25.4)	.34 (8.6)	.50 (12.7)	1.00 (25.4)	1.3 (0.6)
NS800S	2.97 (75.4)	2.23 (56.6)		.73 (18.5)	.89 (22.6)	2.08 (52.8)	.25 (6.4)	1.12 (28.4)	2.00 (50.8)	2.25 (57.2)	3.04 (77.2)	2.75 (69.9)	1.00 (25.4)	.47 (11.9)	.50 (12.7)	1.18 (30.0)	2.3 (1.0)
NS1200S	3.69 (93.7)	3.34 (84.8)	1.84 (46.7)	.34 (8.6)	.78 (19.8)	2.92 (74.2)	.31 (7.9)	1.38 (35.1)	2.44 (62.0)	2.75 (69.9)	3.72 (94.5)	3.13 (79.3)	1.12 (28.4)	.66 (16.8)	.63 (16.0)	1.37 (34.8)	3.7 (2.0)
NS1600S	4.38 (111.3)	4.06 (100.1)	2.19 (55.6)	.31 (7.9)	1.06 (26.9)	3.31 (84.1)	.31 (7.9)	1.50 (38.1)	2.69 (68.3)	3.00 (76.2)	5.51 (140.0)	4.85 (123.2)	1.75 (44.5)	.88 (22.4)	.50 (12.7)	1.87 (47.5)	8.0 (4.0)

Millimeter equivalents for inch dimensions are shown in (**)

Subplate

Reference Data Only

(Subplates are not available)



	Valve Series				
	NS -400	NS -600	NS -800	NS -1200	NS -1600
NPTF Port Size	1/4	3/8	1/2	3/4	1
B	.281 (7.1)	.406 (10.3)	.469 (11.9)	.656 (16.7)	.875 (22.2)
C	.375 (9.5)	.375 (9.5)	.500 (12.7)	.344 (8.7)	.344 (8.7)
D	.562 (14.3)	.843 (21.4)	.875 (22.2)	.750 (19.1)	1.125 (28.6)
E	.750 (19.1)	1.000 (25.4)	1.031 (26.2)	1.188 (30.2)	1.875 (47.6)
G	1.750 (44.5)	2.000 (50.8)	2.219 (56.4)	3.312 (84.1)	4.125 (104.8)
H	1.938 (49.2)	2.156 (54.8)	2.375 (60.3)	3.750 (95.3)	4.875 (123.8)
J	2.125 (54.0)	2.625 (66.7)	2.750 (69.9)	4.156 (105.6)	5.656 (143.6)
K	2.50 (63.5)	3.00 (76.2)	3.25 (82.6)	4.50 (114.3)	6.00 (152.4)
L	.344 (8.7)	.250 (6.4)	.438 (11.1)	.344 (8.7)	.344 (8.7)
M	.844 (21.4)	.750 (19.1)	1.125 (28.6)	1.062 (27.0)	1.062 (27.0)
N	2.156 (54.8)	2.250 (57.2)	2.875 (73.0)	3.188 (81.0)	3.438 (87.3)
P	1.500 (38.1)	1.500 (38.1)	2.000 (50.8)	2.125 (54.0)	2.250 (57.2)
R	2.656 (67.5)	2.750 (69.9)	3.562 (90.5)	3.906 (99.2)	4.156 (105.6)
S	3.00 (76.2)	3.00 (76.2)	4.00 (101.6)	4.25 (108.0)	4.50 (114.3)
T	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.250 (31.8)
U	.281 (7.1)	.281 (7.1)	.359 (9.1)	.422 (10.7)	.422 (10.7)
X	1/4-20	1/4-20	1/4-20	5/16-18	5/16-18
Y	—	—	—	2.250 (57.2)	3.000 (76.2)
Z	4 Holes	4 Holes	4 Holes	6 Holes	6 Holes
AA	.750 (19.1)	1.000 (25.4)	1.031 (26.2)	1.188 (30.2)	1.875 (47.6)
BB	1.750 (44.5)	2.000 (50.8)	2.219 (56.4)	3.312 (84.5)	4.125 (104.8)
CC	.505 (12.8)	.525 (13.3)	.525 (13.3)	.525 (13.3)	.525 (13.3)



**This is
a blank page**

**Must remove
text before
printing**

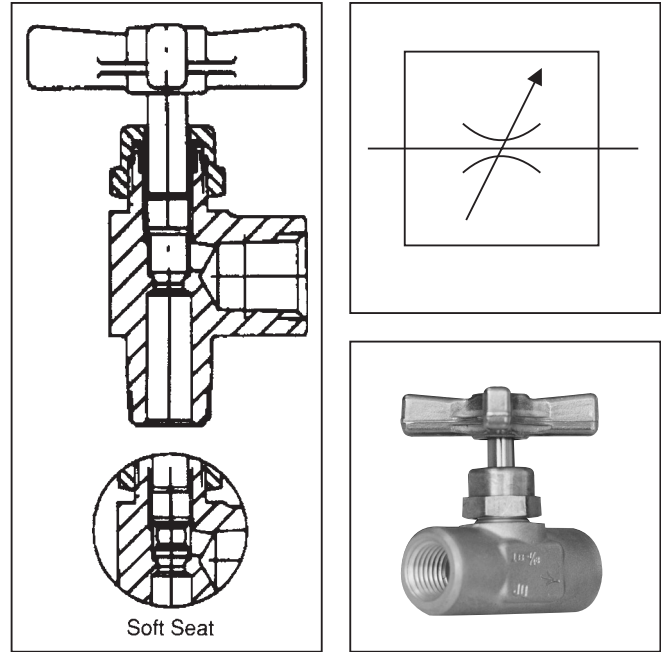
General Description

Series 133, 135, 143 and S133, S135, S143 needle valves are capable of metering flow of a wide variety of liquids and gases. A soft seat design can be used when zero leakage is required.

Features

- Low-priced brass needle valves available in metal and soft seat designs.
- Special stem designs offer precision control of small volume flows.
- External pipe threaded ports are counterbored to accept solder-type tube fittings.
- Stops, prevents stems from being screwed out accidentally.
- In the soft seat type the resiliency of the captive thermoplastic nose assures positive shut-off.

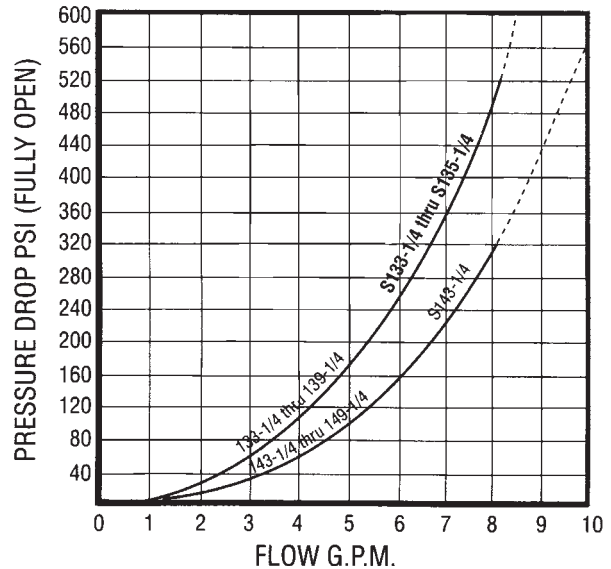
D



Specifications

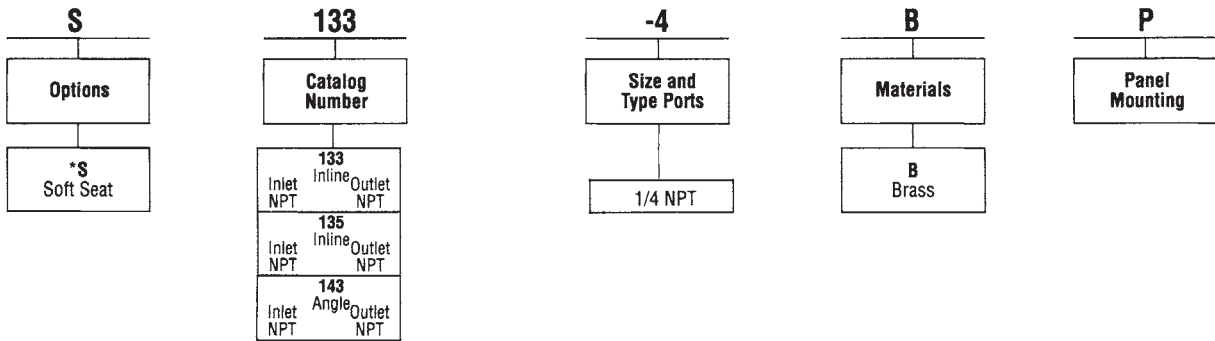
Service Applications	133, 135, 143: Liquids S133, S135, S143: Gases and liquids
Maximum Operating Pressure	133, 135, 143: Working: 345 Bar (5000 PSI) Proof: 517.5 Bar (7500 PSI) Burst: 862.5 Bar (12,500 PSI) S133, S135, S143: 207 Bar (3000 PSI)
Sizes	NPT: 1/4
Ports	NPT: Pipe threads
Internal Leakage	Zero
Mounting	In-line or panel. Maximum panel thickness 1/2". Panel hole diameter 17/32".
Material	Body: Brass Cap: Brass Cap Washer: 316 Stainless Steel Locknut: Brass Stem: 303 or 316 Stainless Steel Stem Nose Soft Seat: Thermoplastic Washers: 304 Stainless Steel Packing: PTFE Handle: Aluminum alloy star (metal seat)
Operating Temperature	133, 135, 143: Brass: -54°C to 93°C (-65°F to 200°F) Consult factory for special temps. S133, S135, S143: Stainless Steel: -54°C to 93°C (-65°F to 200°F)

Performance Curves



Size	CV Factors		Weights (Approx.)
	Inline	Angle	
1/4	.19	.37	.25 Lb.

Ordering Information

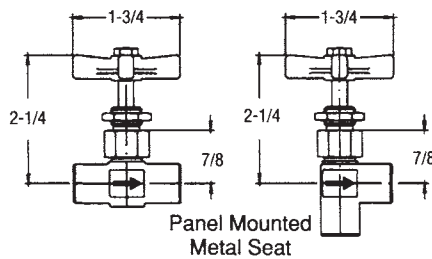


Dimensions

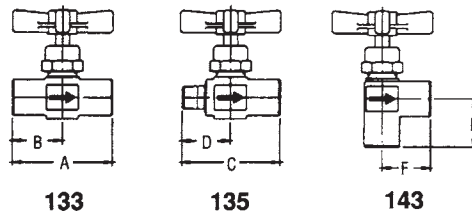
Dimensions are shown in inches



Handle and Centerline



Flow Direction of Soft Seat is Reverse of Arrows Shown Below



Dimensions Apply to Both Regular and Panel-Mounting Types, Metal and Soft Seat

Dash Number	Size		A	B	C	D	E	F	G	H	J
	Tube	Pipe									
1/4	—	1/4	1-7/8	15/16	1-13/16	7/8	1-3/4	7/8	15/16	—	—

General Description

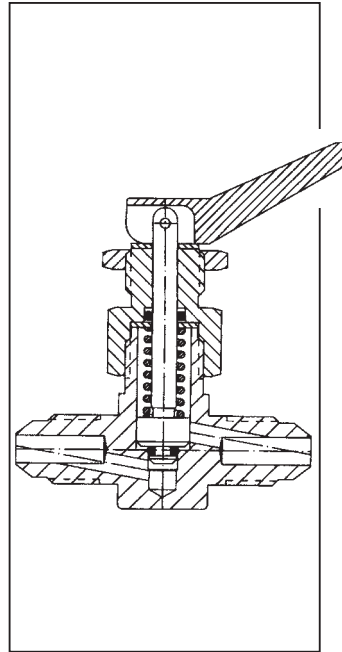
Series T143 and T148 toggle valves can be used on vacuum and gas applications. These toggle valves are used when quick, positive on-off action is required as well as zero leakage.

Features

- Zero leakage.
- Pneumatic or hydraulic service.
- Wide selection of fitting ends in both in-line & angle porting.
- External pipe threaded ports are counterbored to accept solder-type tube fittings.

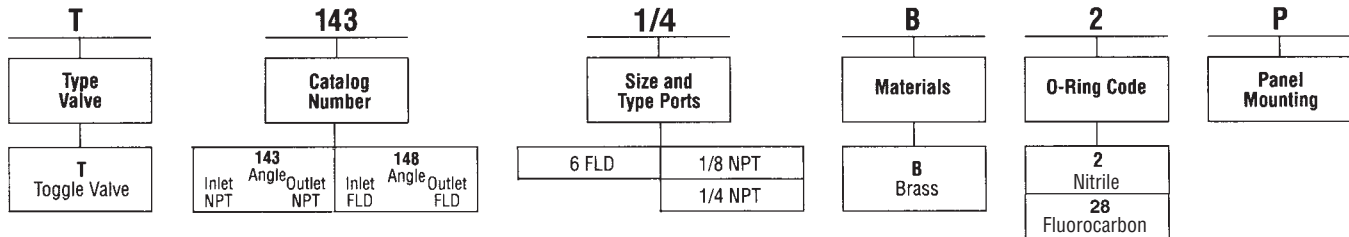
Specifications

Service App.	Gases and liquids
Maximum Operating Pressure	Working: 13.8 Bar (200 PSI) Proof: 20.7 Bar (300 PSI)
Ports	NPT: Pipe threads FLD: Flared tube connection SAE 37° MS33656
Internal Leakage	Zero
Mounting	Panel. Maximum panel thickness 1/4". Panel hole diameter 17/32".
Material	Body, Cap Stem, Locknut, Washers : Brass Handle: Nylon

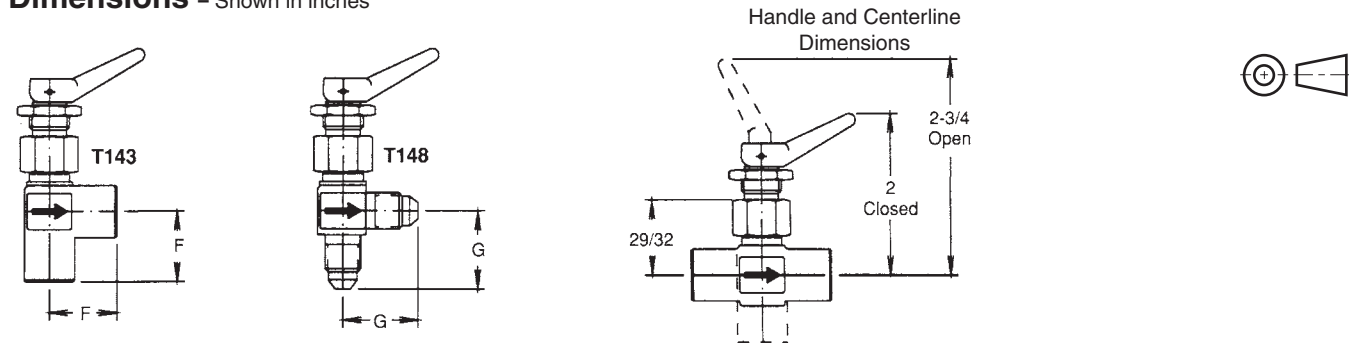


Material (Cont'd)	Packing and Seat: Synthetic rubber Spring: AMS5673 Stainless Steel Spring pins: 420 Stainless Steel
Operating Temperature	-54°C to 121°C (-65°F to 250°F)

Ordering Information



Dimensions - Shown in inches



Dash No.	Size		A	B	C	D	E	F	G	H
	Tube	Pipe								
1/8	—	1/8	1-3/4	7/8	—	27/32	1-11/16	7/8	—	—
1/4	—	1/4	1-7/8	15/16	1-13/16	7/8	1-3/4	7/8	—	—
6	3/8	—	—	—	—	15/16	1-7/8	—	31/32	7/8

Size	CV Factors		Weight (In Lbs.)
	Series 143	Exceptions 148	
1/8	.35	—	.13
1/4, 6	.40	.37	.25

3000-D1.p65, dd

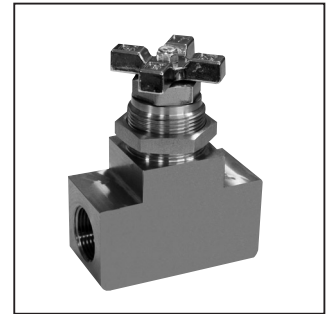
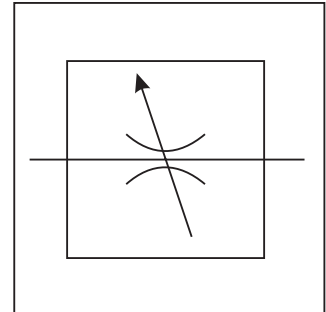
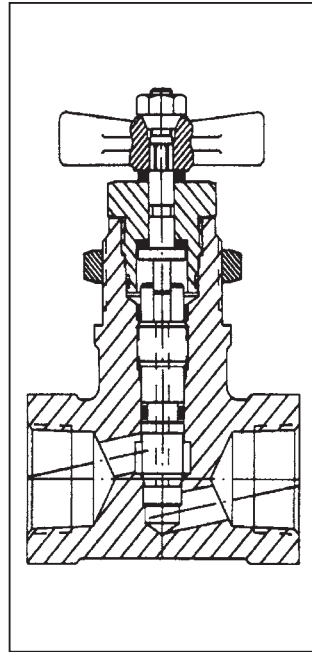


General Description

Series 154 needle valves meter flow on systems with pressures up to 690 Bar (10,000 PSI).

Specifications

Service App.	Water and Hydraulic Oil
Maximum Operating Pressure	Working: 690 Bar (10,000 PSI) Proof: 1035 Bar (15,000 PSI) Burst: 1725 Bar (25,000 PSI)
Sizes	Rising Stem type: IST: 4, 6, 8 Non-rising stem type: NPT: 1
Ports	NPT: Pipe threads IST: Internal straight threads (tube connection) AND10050 O-ring seal
Internal Leakage	Zero
Mounting	In-line or panel. Maximum panel thickness rising stem type 1/4"; Panel hole diameter 49/64". Non-rising stem type 3/4"; panel hole diameter 1-49/64"
Material	Body: 303 Stainless Steel Cap: 303 Stainless Steel Handle: 303 Stainless Steel Stem: 303 Stainless Steel Locknut: 303 Stainless Steel Packing Washer Follower: 303 Stainless Steel Stem: 440 Stainless Steel Stem Washers: Nylon O-rings: Synthetic Rubber Packing & Back-up rings: PTFE Handle: Aluminum alloy
Operating Temperature	Rising stem type: -54°C to 204°C (-65°F to 400°F) Non-rising stem type: -54°C to 107°C (-65°F to 225°F)



D

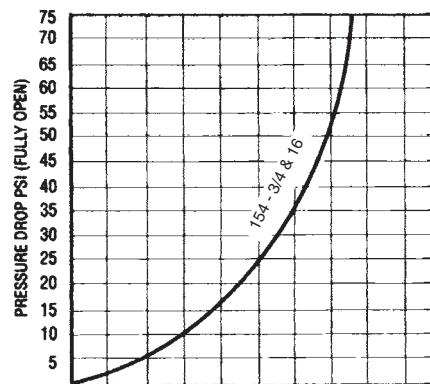
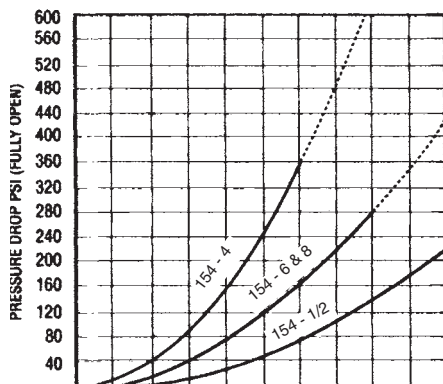
Features

- Forged stainless steel needle valve for 690 Bar (10,000 PSI) service.
- Pressure-balanced design and non-rising stem of 3/4" and 1" sizes greatly reduce torque requirements and increase packing life.

Size		CV Factor	Weight (Lbs.)
Tube	Pipe		
4	1/8	0.35	0.88
6	1/4	0.55	0.88
8	3/8	0.6	1.18

Performance Curves

**Media - Hydraulic Oil
 MIL-H-6083 @ 21°C - 32°C (70°F - 90°F)**



3000-D1.p65, dd



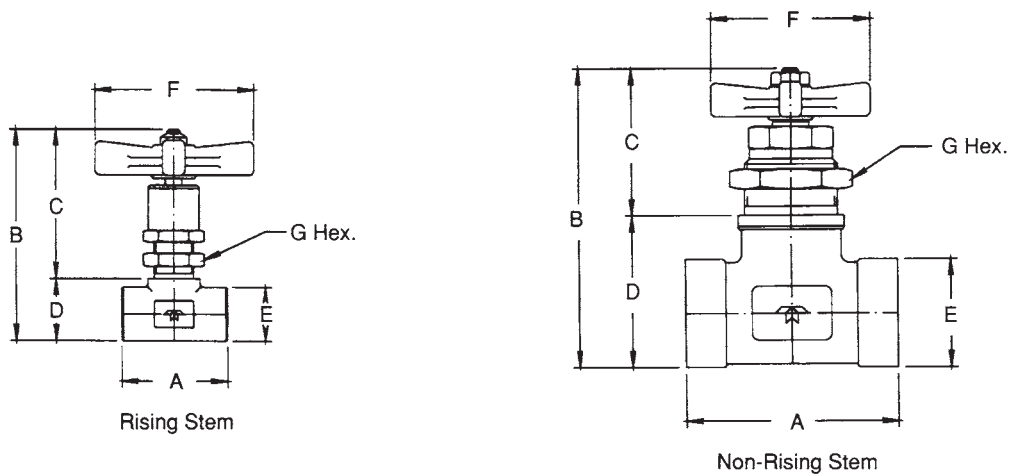
Ordering Information

154	-1	SS	2	P						
Catalog Number	Size and Type Ports	Materials	O-Ring Code	Panel Mounting (Optional)						
154 Inline Forged Stainless Steel	<table border="1"> <tr> <td>4 IST</td> <td>3/4 NPT</td> </tr> <tr> <td>6 IST</td> <td>1 NPT</td> </tr> <tr> <td>8 IST</td> <td></td> </tr> </table>	4 IST	3/4 NPT	6 IST	1 NPT	8 IST		SS Stainless Steel	2 Nitrile	
4 IST	3/4 NPT									
6 IST	1 NPT									
8 IST										

D

Dimensions

Shown in inches



Valve Size	A	B Closed	C Open	C Closed	D	E	F	G Hex
3/4, 1	4	5-7/16	2-11/16	2-11/16	1-13/16	1-7/8		2
4, 6	1-7/8	3-61/64	3-7/64	2-51/64	21/32	1	3	1
8	2-3/8	4-27/64	3-9/64	2-53/64	29/32	1-3/8	3	1

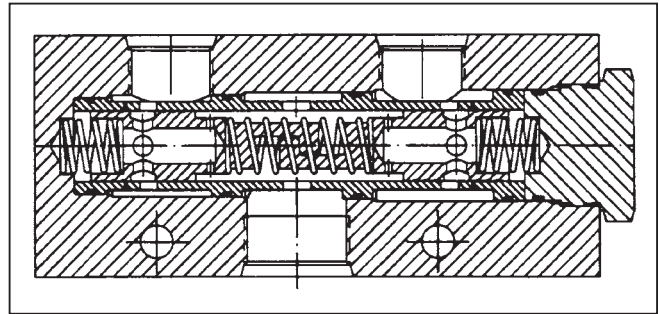
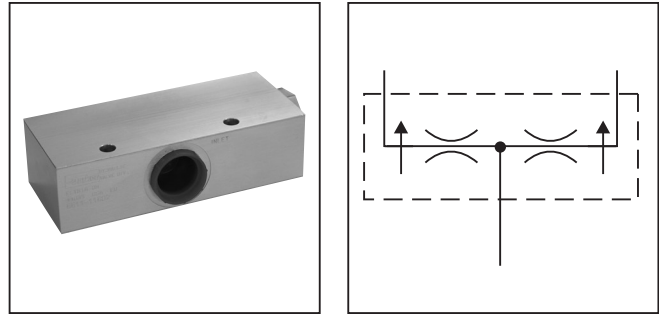
Phase Out

General Description

Series 6611 flow divider or flow combiner valves provide division of flow from a pump into equal parts, normally used to divide flow from one pump to two actuators. The valve serves as a combiner in the reverse direction.

Specifications

Service App.	Hydraulic
Maximum Operating Pressure	Working: 207 Bar (3000 PSI) Proof: 310.5 Bar (4500 PSI) Burst: 517.5 Bar (7500 PSI)
Rated Flow Input	3/4" Size: 30.3 to 94.6 LPM (8 to 25 GPM) 1" Size: 53.0 to 151.4 LPM (14 to 40 GPM)
Ratio Division	50/50
Flow Accuracy	±10%
Ports	NPTF SAE
Material	Body and Retainer: Aluminum alloy All others: Steel, hardened O-rings: Synthetic Rubber Back-up rings: PTFE
Operating Temperature	-40°C to 107°C (-40°F to 225°F)

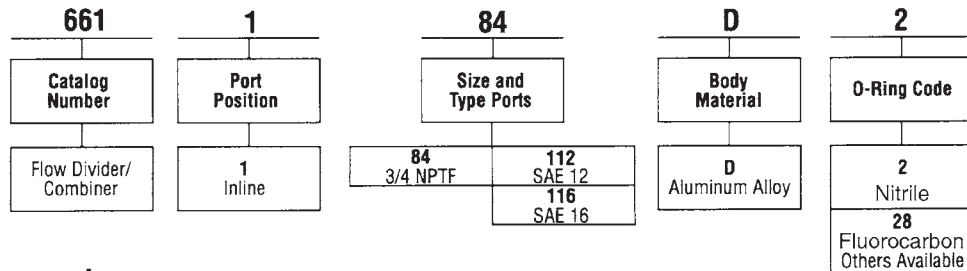


D

Features

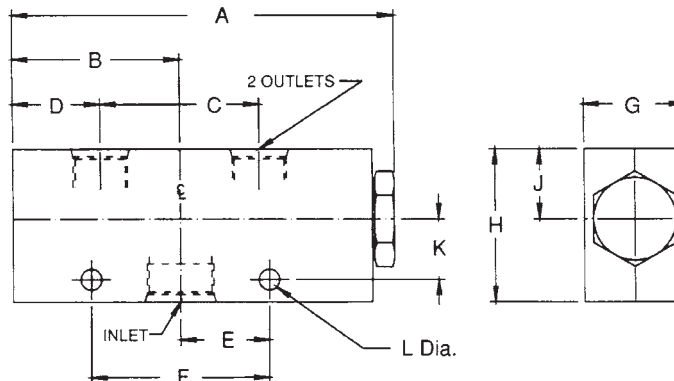
- Provides division of flow from a pump into equal parts, normally used to divide flow from one pump to two actuators.
- Serves as a combiner in the reverse direction.

Ordering Information



Weight: 3/4" to 1" Size 2 kg (4.44 lbs.)

Dimensions – Shown in inches



Catalog Number	Inlet Port	Outlet Port	A	B	C	D	E	F	G	H	J	K	L
6611-112D2	SAE 12	SAE 10											
6611-84D2	3/4 NPTF	1/2 NPTF	7-3/8	3-1/4	3-1/8	1-11/16	1-3/4	3-1/2	2	3	1-3/8	1-3/16	.406
6611-116D2	SAE 16	SAE 12											

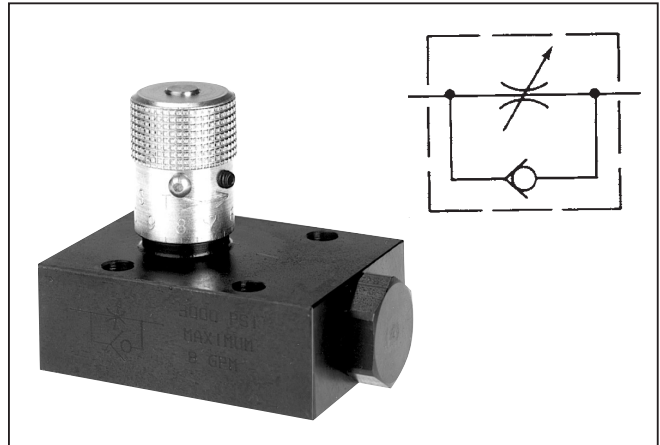
3000-D1.p65, dd



General Description

Series FS flow control valves provide precise control of flow and shutoff in one direction, and automatically permit full flow in the opposite direction.

A two-step needle allows fine adjustment at low flow by using the first three turns of the adjusting knob; the next three turns open the valve to full flow, and also provide standard throttling adjustments.



Features

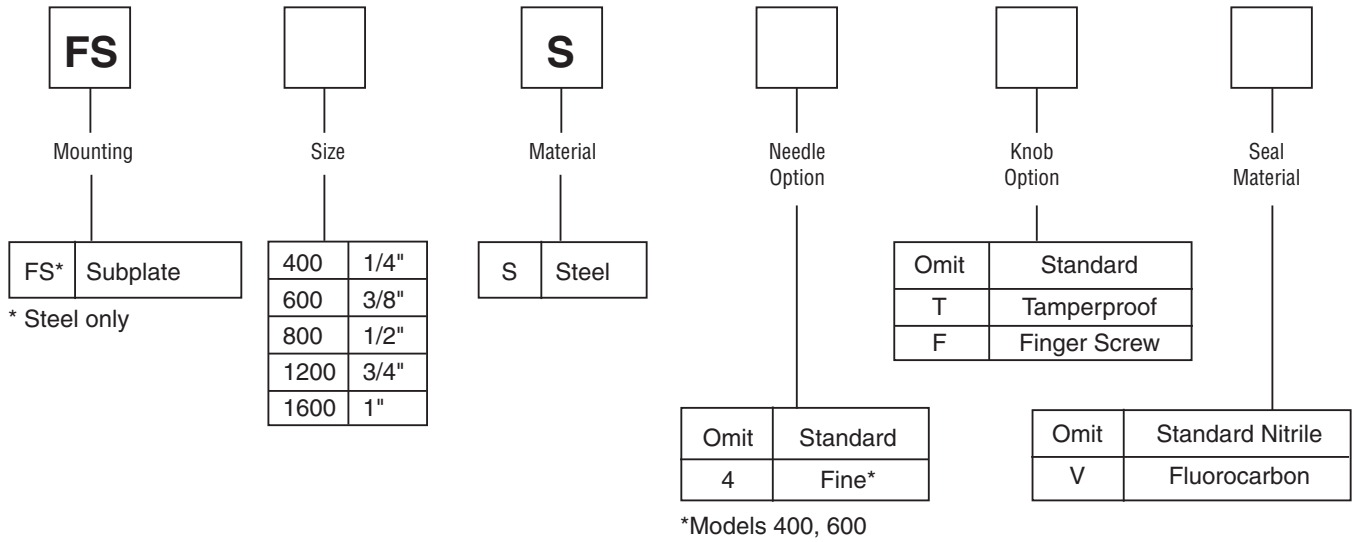
- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- A simple set screw locks the valve on any desired setting.
- Stainless steel poppets are standard.

Specifications

Maximum Operating Pressure	210 Bar (3000 PSI)
Nominal Cracking Pressure	0.3 Bar (5 PSI) For return check poppet
Poppet Style	Solid metal poppet, steel
Needles	Standard needle on all models except: Fine needle option on FS400 and FS600

Flow Data

Model Number	Free Flow Rate, Max. GPM (LPM)	Free Flow Orifice Area in ²	Free Flow Cv	Orifice Area, Effective Control Flow, in ²	Effective Control Flow Cv	Port Size
FS400	5 (19)	0.068	1.56	.0194	.433	1/4
FS600	8 (30)	0.099	2.27	.0344	.787	3/8
FS800	15 (57)	0.224	5.11	.0427	.976	1/2
FS1200	25 (95)	0.348	7.95	.1080	2.470	3/4
FS1600	40 (151)	0.453	10.35	.2300	5.250	1



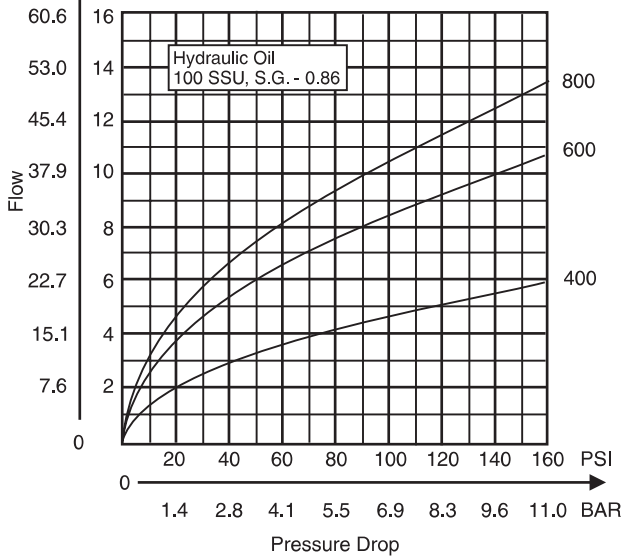
Bolt Kits To order bolt kits, specify bolt kit number

Valve	Bolt Kit	Bolt Specification*	Bolt Torque
FS400S	BK01	1/4-20 x 1-1/4"	13 Ft.-Lbs.
FS600S	BK02	1/4-20 x 1-1/2"	13 Ft.-Lbs.
FS800S	BK04	1/4-20 x 1-3/4"	13 Ft.-Lbs.
FS1200S	BK08	5/16-18 x 2-1/4"	27 Ft.-Lbs.
FS1600S	BK10	5/16-18 x 2-1/2"	27 Ft.-Lbs.

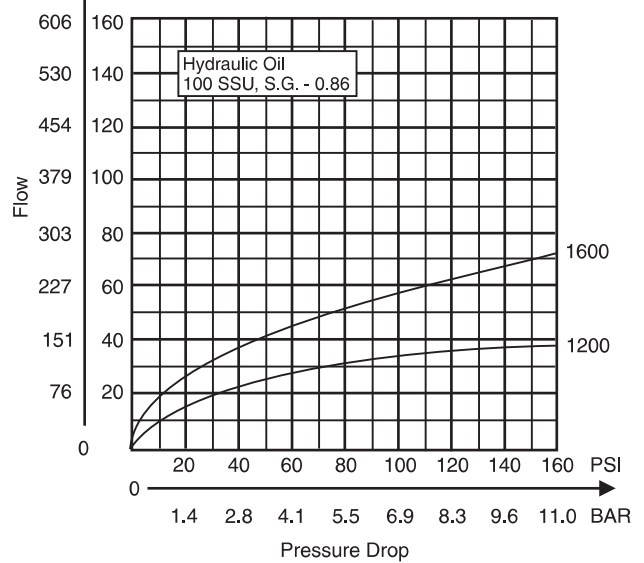
*Use SAE Grade 8 or Better.

D

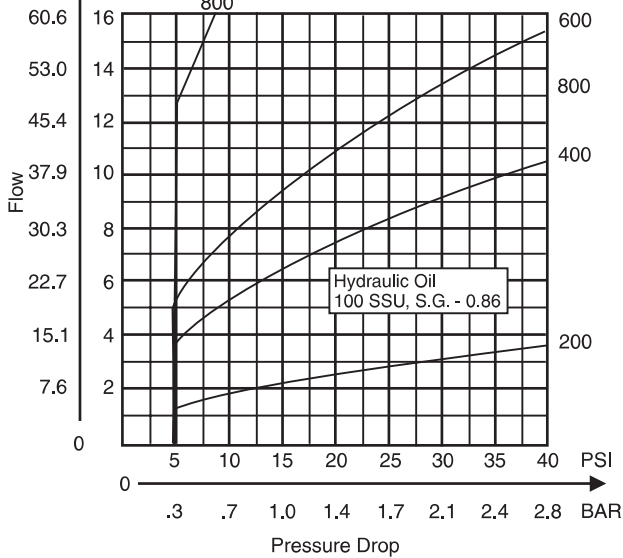
“FS” Series 400 thru 800
Controlled Flow vs. Pressure Drop
Needle Full Open



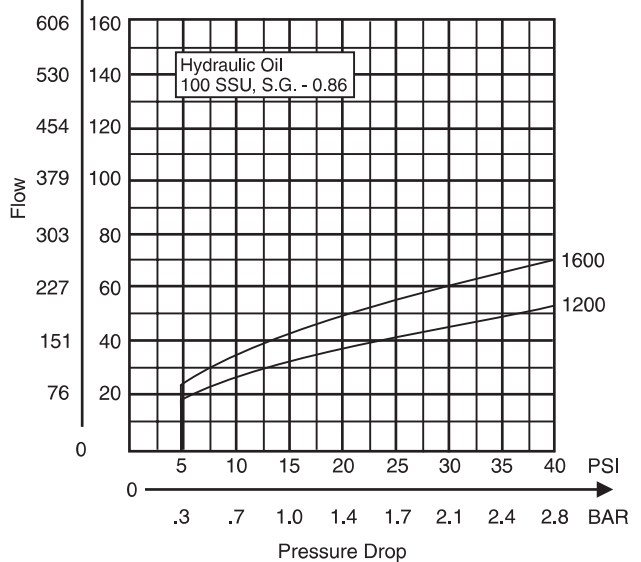
“FS” Series 1200 thru 1600
Controlled Flow vs. Pressure Drop
Needle Full Open



“FS” Series 400 thru 800
Free Flow vs. Pressure Drop
Needle Full Closed



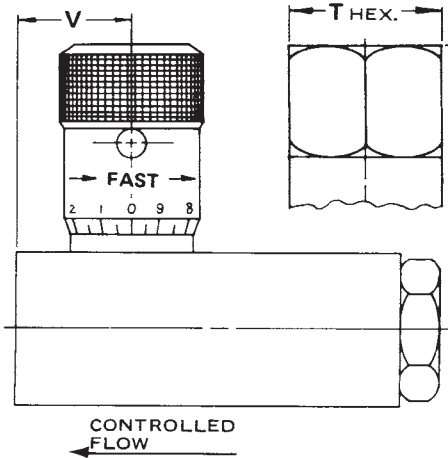
“FS” Series 1200 thru 1600
Free Flow vs. Pressure Drop
Needle Full Closed



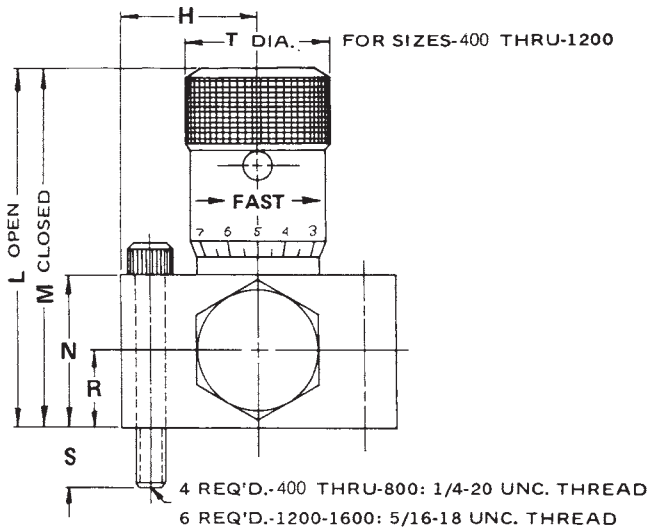
Millimeter equivalents for inch dimensions are shown in (**)

Models FS400 through FS 1600

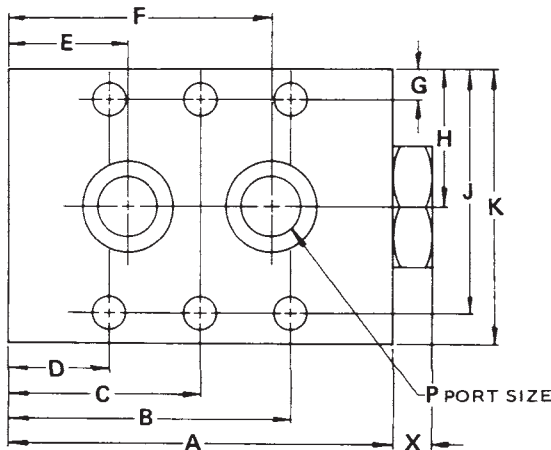
Subplate mounted Flow Control Valves



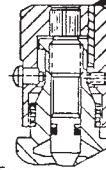
NOTE:
 HEX KNOB
 IS STANDARD
 ON 1600 SIZE.



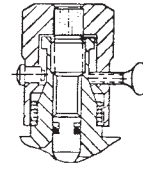
4 REQ'D.-400 THRU-800: 1/4-20 UNC. THREAD
 6 REQ'D.-1200-1600: 5/16-18 UNC. THREAD



Knob Options



Tamperproof
 Option (Code "T")
 permanently locks
 knob at desired
 flow setting by
 installing a pin
 in predrilled hole.



Finger screw
 option (Code "F")
 provides this
 thumbscrew in
 place of set screw.

	Valve Model				
	FS400	FS600	FS800	FS1200	FS1600
A	2.50 (63.5)	2.75 (69.9)	3.19 (81.0)	4.09 (103.9)	5.00 (127.0)
B	1.94 (49.3)	2.03 (51.6)	2.34 (59.4)	3.55 (90.2)	4.38 (111.3)
C	—	—	—	2.05 (52.1)	2.50 (63.5)
D	.56 (14.2)	.72 (18.3)	.84 (21.3)	.55 (14.0)	.62 (15.7)
E	.75 (19.1)	.88 (22.4)	1.00 (25.4)	.99 (25.1)	1.38 (35.1)
F	1.75 (44.5)	1.88 (47.8)	2.19 (55.6)	3.12 (79.2)	3.62 (92.0)
G	.22 (5.6)	.25 (6.4)	.25 (6.4)	.31 (7.9)	.31 (7.9)
H	.88 (22.4)	1.00 (25.4)	1.12 (28.4)	1.38 (35.1)	1.50 (38.1)
J	1.53 (38.9)	1.75 (44.5)	2.00 (50.8)	2.44 (62.0)	2.69 (68.3)
K	1.75 (44.5)	2.00 (50.8)	2.25 (57.2)	2.75 (69.9)	3.00 (76.2)
L	2.21 (56.1)	2.65 (67.3)	3.29 (83.6)	4.35 (110.5)	5.76 (146.3)
M	2.01 (51.1)	2.40 (61.0)	3.00 (76.2)	3.76 (95.5)	5.10 (129.5)
N	.87 (22.1)	1.00 (25.4)	1.25 (31.8)	1.75 (44.5)	2.00 (50.8)
P	.28 (7.1)	.41 (10.4)	.47 (11.9)	.66 (16.8)	.88 (22.4)
R	.43 (10.9)	.50 (12.7)	.62 (15.7)	.87 (22.1)	1.00 (25.4)
S	.38 (9.7)	.50 (12.7)	.50 (12.7)	.50 (12.7)	.50 (12.7)
T	.81 (20.6)	1.00 (25.4)	1.18 (30.0)	1.37 (34.8)	1.87 (47.5)
V	.84 (21.3)	1.00 (25.4)	1.21 (30.7)	1.52 (38.6)	1.78 (45.2)
X	.31 (7.9)	.32 (8.1)	.32 (8.1)	.42 (10.7)	.42 (10.7)



Millimeter equivalents for inch dimensions are shown in (**)

Subplate

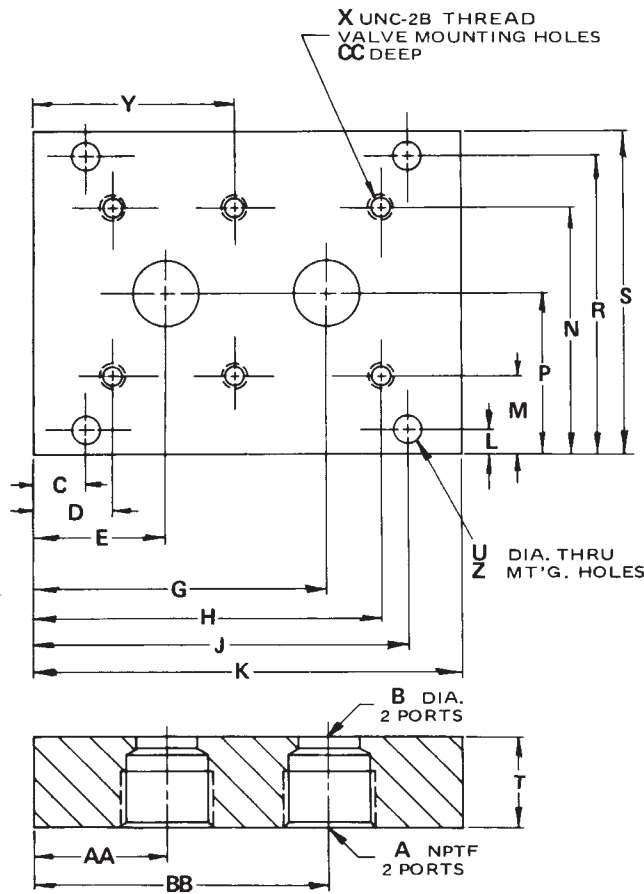
Models FS400 through FS1600

Reference Data Only

(Subplates are not available)



D

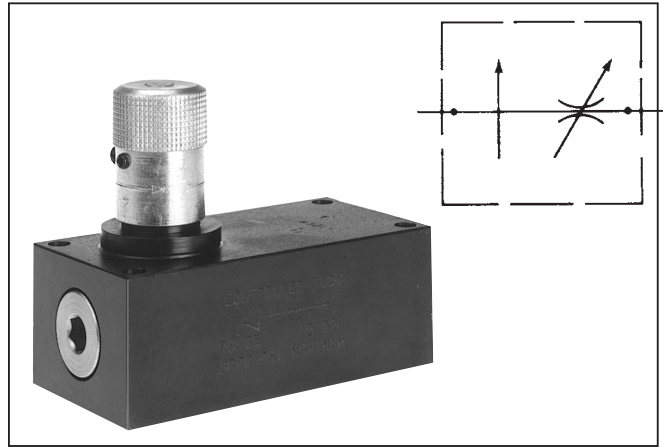


	Valve Numbers				
	FS 400	FS 600	FS 800	FS 1200	FS 1600
A	1/4"	3/8"	1/2"	3/4"	1"
B	.281 (7.1)	.406 (10.3)	.469 (11.9)	.656 (16.7)	.875 (22.2)
C	.375 (9.5)	.375 (9.5)	.500 (12.7)	.344 (8.7)	.344 (8.7)
D	.562 (14.3)	.843 (21.4)	.875 (22.2)	.750 (19.1)	1.125 (28.6)
E	.750 (19.1)	1.000 (25.4)	1.031 (26.2)	1.188 (30.2)	1.875 (47.6)
G	1.750 (44.5)	2.000 (50.8)	2.219 (56.4)	3.312 (84.1)	4.125 (104.8)
H	1.938 (49.2)	2.156 (54.8)	2.375 (60.3)	3.750 (95.3)	4.875 (123.8)
J	2.125 (54.0)	2.625 (66.7)	2.750 (69.9)	4.156 (105.6)	5.656 (143.7)
K	2.50 (63.5)	3.00 (76.2)	3.25 (82.6)	4.50 (114.3)	6.00 (152.4)
L	.344 (8.7)	.250 (6.4)	.438 (11.1)	.344 (8.7)	.344 (8.7)
M	.844 (21.4)	.750 (19.1)	1.125 (28.6)	1.062 (27.0)	1.062 (27.0)
N	2.156 (54.8)	2.250 (57.2)	2.875 (73.0)	3.188 (81.0)	3.438 (87.3)
P	1.500 (38.1)	1.500 (38.1)	2.000 (50.8)	2.125 (54.0)	2.250 (57.2)
R	2.656 (67.5)	2.750 (69.9)	3.562 (90.5)	3.906 (99.2)	4.156 (105.6)
S	3.00 (76.2)	3.00 (76.2)	4.00 (101.6)	4.25 (108.0)	4.50 (114.3)
T	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.250 (31.8)
U	.281 (7.1)	.281 (7.1)	.359 (9.1)	.422 (10.7)	.422 (10.7)
X	1/4-20	1/4-20	1/4-20	5/16-18	5/16-18
Y	—	—	—	2.250 (57.2)	3.000 (76.2)
Z	4	4	4	6	6
AA	.750 (19.1)	1.000 (25.4)	1.031 (26.2)	1.188 (30.2)	1.875 (47.6)
BB	1.750 (44.5)	2.000 (50.8)	2.219 (56.4)	3.312 (84.5)	4.125 (104.8)
CC	.505 (12.8)	.525 (13.3)	.525 (13.3)	.525 (13.3)	.525 (13.3)

General Description

Series PC*MS pressure compensated flow control valves are designed to regulate flow at a selected rate, then maintain this flow constant within $\pm 5\%$ as inlet and outlet pressures vary. However, changes in fluid temperature will prevent flow from holding constant.

Series PCMS valves can be adjusted for required flows after being installed.



Features

- Available with reverse flow check.
- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- A simple set screw locks the valve on any desired setting.

Specifications

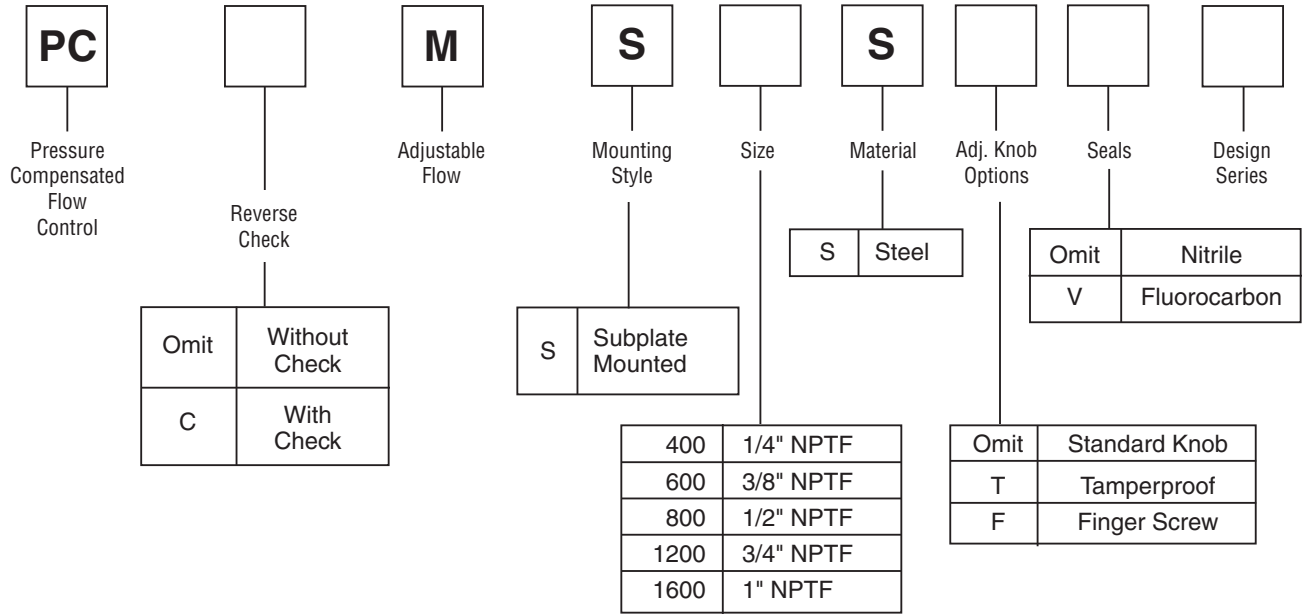
Service App.	Meter-in/meter-out and bleedoff circuits
Maximum Operating Pressure	210 Bar (3000 PSI)
Minimum Pressure Inlet / Outlet Differential	7 Bar (100 PSI) for sizes 1/4" and 3/8" 11 Bar (150 PSI) for sizes 1/2" through 1" Reverse-flow check valve optional

Flow Data

Valve Model	Flow		Reverse Flow, max. thru check, GPM (LPM)	Pressure Drop ΔP at max. Reverse Flow thru check, PSI (Bar)	Mounting	Port Size, in.
	Minimum GPM (LPM)	Maximum GPM (LPM)				
PC*MS400S	0.3 (1)	3.0 (11)	5 (19)	40 (3)	Subplate	1/4
PC*MS600S	0.6 (2)	6.0 (23)	8 (30)	40 (3)	Subplate	3/8
PC*MS800S	1/5 (6)	15.0 (57)	20 (76)	114 (8)	Subplate	1/2
PC*MS1200S	2.5 (10)	25.0 (95)	35 (132)	120 (8)	Subplate	3/4
PC*MS1600S	5.0 (19)	50.0 (189)	60 (227)	140 (10)	Subplate	1

* For optional reverse-flow check, insert “C” in model number at asterisk (*).

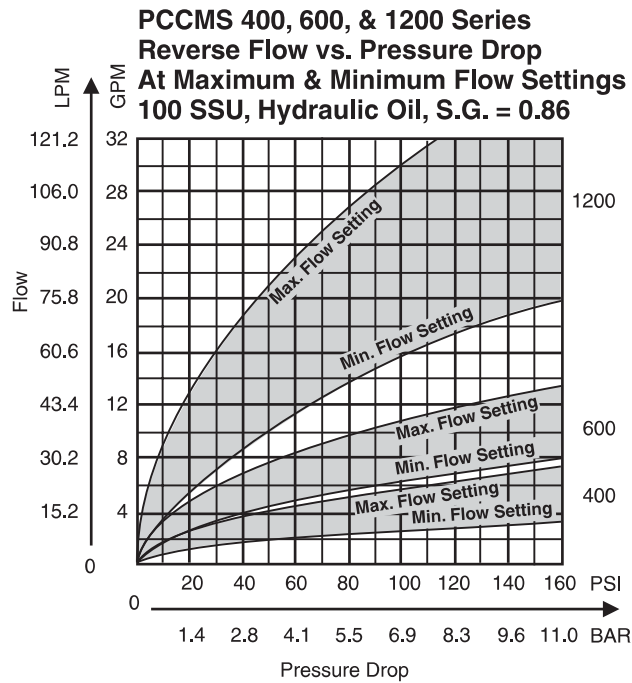
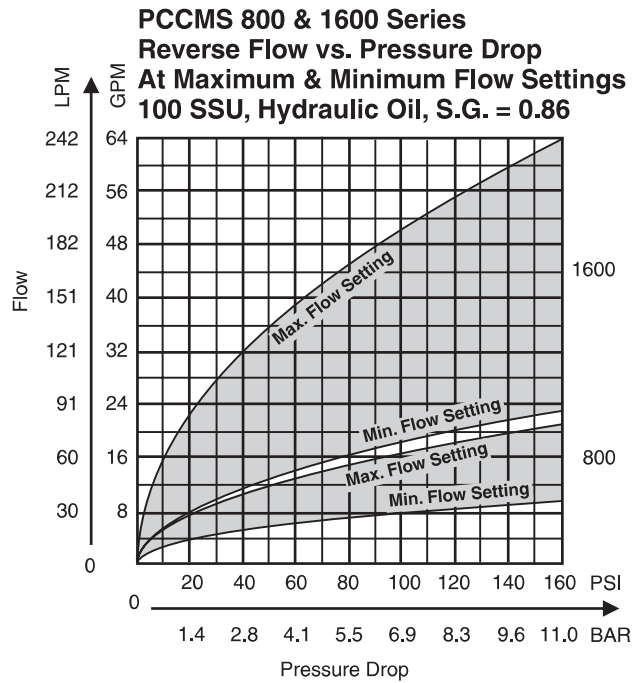
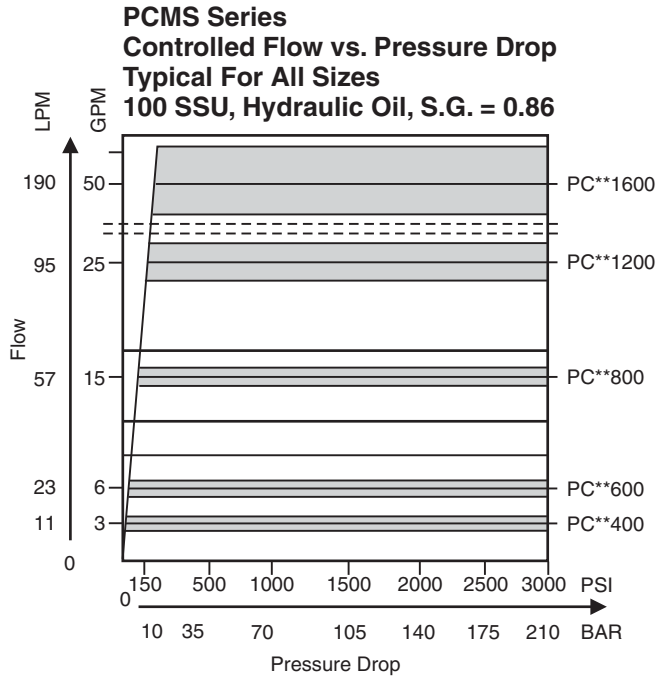
D



D

Bolt Kits

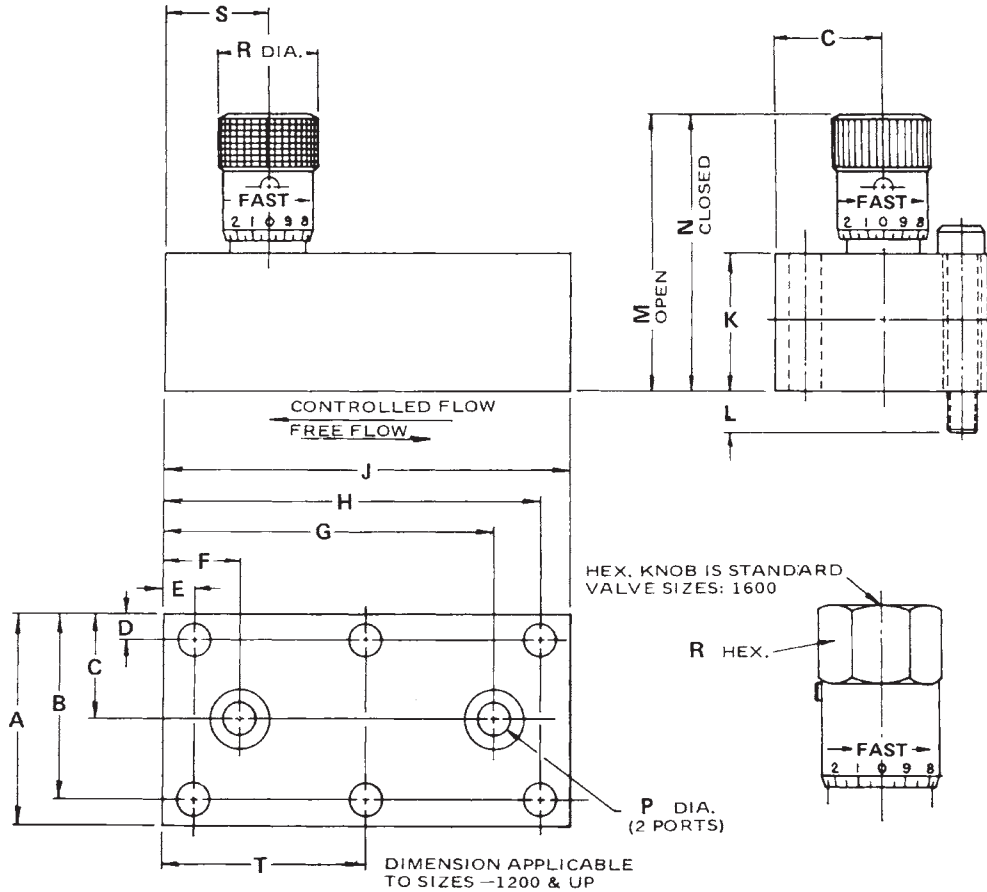
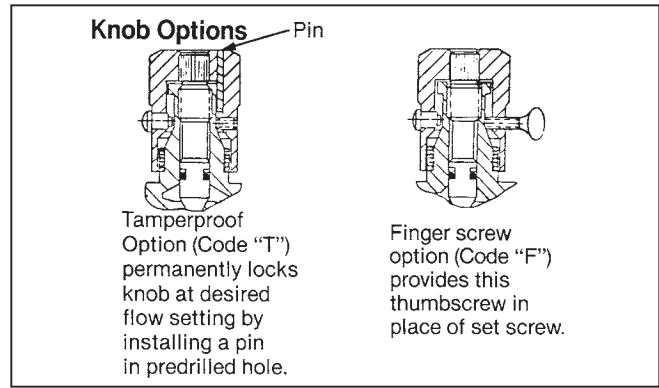
Valve No.	Bolt Kit	Bolts (SAE8 or better)	Torque (ft. lb.)
PCMS400S	BK02	1/4-20 x 1-1/2	15
PCMS600S	BK04	1/4-20 x 1-3/4	15
PCMS800S	BK60	1/4-20 x 2-1/4	15
PCMS1200S	BK25	5/16-18 x 2-3/4	30
PCMS1600S	BK46	5/16-18 x 3-1/4	30



Millimeter equivalents for inch dimensions are shown in (**)

Model PCMS400S thru PCMS 1600S

Manifold mounted, pressure compensated
Flow Control Valves



Valve Model																	
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T
PC*MS400S	1.75 (44.5)	1.53 (38.9)	.88 (22.4)	.22 (5.6)	.25 (6.4)	.62 (15.7)	2.75 (69.9)	3.12 (79.2)	3.38 (85.9)	1.12 (28.4)	.38 (9.7)	2.47 (62.7)	2.27 (57.7)	.28 (7.1)	.81 Dia. (20.6)	.84 (21.3)	—
PC*MS600S	2.00 (50.8)	1.75 (44.5)	1.00 (25.4)	.25 (6.4)	.25 (6.4)	.66 (16.8)	3.34 (84.8)	3.75 (95.3)	4.00 (101.6)	1.25 (31.8)	.50 (12.7)	2.89 (73.4)	2.67 (67.8)	.34 (8.6)	1.00 Dia. (25.4)	1.00 (25.4)	—
PC*MS800S	2.25 (57.2)	2.00 (50.8)	1.12 (28.4)	.25 (6.4)	.25 (6.4)	.75 (19.1)	3.88 (98.6)	4.38 (111.3)	4.62 (117.3)	1.75 (44.5)	.50 (12.7)	4.04 (102.6)	3.74 (95.0)	.47 (11.9)	1.19 Dia. (30.2)	1.75 (44.5)	—
PC*MS1200S	2.75 (69.9)	2.44 (62.0)	1.38 (35.1)	.31 (7.9)	.38 (9.7)	1.00 (25.4)	4.62 (117.3)	5.25 (133.4)	5.62 (142.7)	2.25 (57.2)	.50 (12.7)	5.06 (128.5)	4.56 (115.8)	.66 (16.8)	1.38 Dia. (35.1)	1.59 (40.4)	2.81 (71.4)
PC*MS1600S	3.00 (76.2)	2.69 (68.3)	1.50 (38.1)	.31 (7.9)	.50 (12.7)	1.25 (31.8)	5.50 (139.7)	6.25 (158.8)	6.75 (171.5)	2.75 (69.9)	.50 (12.7)	6.90 (175.3)	6.23 (158.2)	.88 (22.4)	1.88 Hex. (47.8)	1.94 (49.3)	3.38 (85.9)

3000-D1.p65, dd

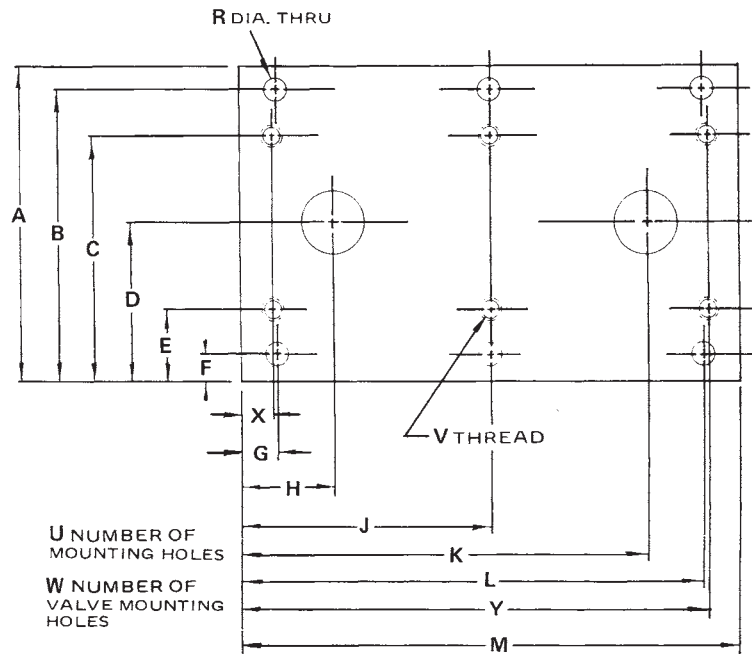
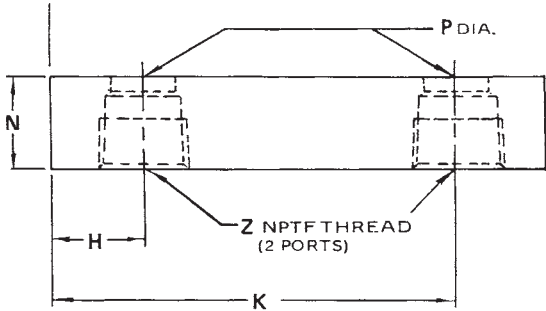


Millimeter equivalents for inch dimensions are shown in (**)

Subplate

Reference Data Only

(Subplates are not available)



D

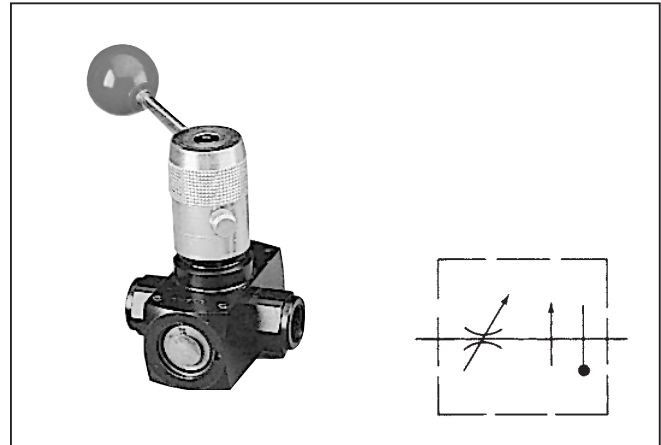
Valve Model	PCMS400S	PCMS600S	PCMS800S	PCMS 1200S	PCMS 1600S
N.P.T.F. Port Size	1/4—18	3/8—18	1/2—14	3/4—14	1—11-1/2
A	2.75 (69.9)	3.00 (76.2)	3.50 (88.9)	4.00 (101.6)	4.50 (114.3)
B	2.500 (63.5)	2.750 (69.9)	3.188 (81.0)	3.688 (93.7)	4.125 (104.8)
C	2.031 (51.6)	2.250 (57.2)	2.625 (66.7)	3.062 (77.8)	3.438 (87.3)
D	1.375 (34.9)	1.500 (38.1)	1.750 (44.5)	2.000 (50.8)	2.250 (57.2)
E	.719 (18.3)	.750 (19.1)	.875 (22.2)	.938 (23.8)	1.062 (27.0)
F	.250 (6.4)	.250 (6.4)	.312 (7.9)	.312 (7.9)	.375 (9.5)
G	.250 (6.4)	.250 (6.4)	.312 (7.9)	.375 (9.5)	.500 (12.7)
H	.625 (15.9)	.656 (16.7)	.750 (19.1)	1.000 (25.4)	1.250 (31.8)
J	—	—	—	2.812 (71.4)	3.375 (85.7)
K	2.750 (69.9)	3.344 (84.9)	3.875 (98.4)	4.625 (117.5)	5.500 (139.7)
L	3.125 (79.4)	3.750 (95.3)	4.312 (109.5)	5.250 (133.4)	6.250 (168.3)
M	3.375 (85.7)	4.000 (101.6)	4.625 (117.5)	5.625 (142.9)	6.750 (171.5)
N	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)
P	.281 (7.1)	.343 (8.7)	.468 (11.9)	.656 (16.7)	.875 (22.2)
R	.281 (7.1)	.281 (7.1)	.359 (9.1)	.359 (9.1)	.422 (10.7)
U	4	4	4	6	6
V	1/4—20	1/4—20	1/4—20	5/16—18	5/16—18
W	4	4	4	6	6
X	.250 (6.4)	.250 (6.4)	.250 (6.4)	.375 (9.5)	.500 (12.7)
Y	3.125 (79.4)	3.750 (95.3)	4.375 (111.1)	5.250 (133.4)	6.250 (168.3)
Z	1/4—18	3/8—18	1/2—14	3/4—14	1—11-1/2

General Description

Series TPC valves are pressure compensated and are insensitive to variations in oil temperature. These valves are ideal for use on meter-in, meter-out or bleed-off circuits.

Features

- Maintains constant flow with changing inlet and outlet pressures. Minimum pressure differential between inlet and outlet ports must be 100 PSI (7 Bar) for Model TPC600 to function properly; 150 PSI (10.5 Bar) for Model TPC1200.
- Maintains flow setting within approximately $\pm 5\%$ variation over pressure drop range 100 to 3000 PSI (7 to 210 Bar).
- Optional reverse flow check valves available on Models TPCC600 and TPCC1200; check valve cracking pressure is 5 PSI (0.4 Bar).
- Insensitivity to oil temperature change allows constant flow rate over a wide change of fluid temperature.
- Optional lunge control available on Model TPC600 to limit compensator piston travel. This control prepositions the compensator piston to minimize actuator lunge.



Specifications

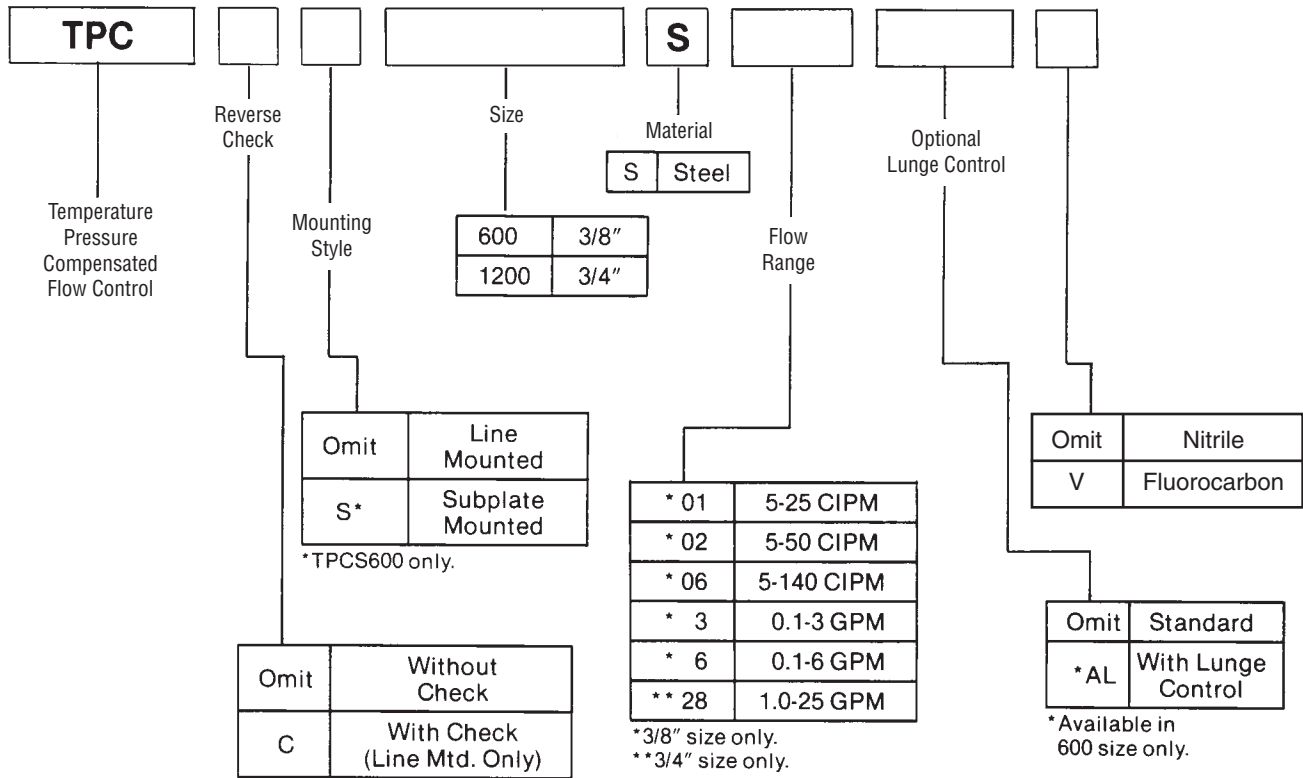
Maximum Operating Pressure	3000 PSI (210 Bar)
Pressure Compensation	TPC600 100 PSI (7 Bar) Minimum TPC1200 150 PSI (10.5 Bar)
Flow Setting	$\pm 5\%$ 100 to 3000 PSI (7 to 210 Bar)

Quick Reference Data Chart

Valve Model	Flow (max.) GPM (L/M)	Reverse Flow (max.) (thru check) GPM (L/M)	Pressure Drop ΔP at max. (reverse flow thru check) PSI (Bar)	Mounting	Port Size, in.
TPC600	6 (23)	12 (45)	40 (3)	In-line	3/8 NPTF
TPCS600	6 (23)	—	—	Subplate	3/8
TPC1200	25 (95)	35 (133)	40 (3)	In-line	3/4 NPTF

Needle Flow Chart

FLOW RANGES — TPC600			TEMPERATURE COMPENSATION RANGE (For an 80-220 SSU viscosity change)	
Needle Number	Min. Flow	Max. Flow	Flow Range	% Flow Variation
01	5 CIPM (81.96 CC/M)	25 CIPM (410 CC/M)	5-25 CIPM (82-410 CC/M)	$\pm 5\%$
02	5 CIPM (81.96 CC/M)	50 CIPM (820 CC/M)	5-50 CIPM (82-820 CC/M)	$\pm 5\%$
06	5 CIPM (81.96 CC/M)	140 CIPM (2300 CC/M)	5-139 CIPM (82-2279 CC/M) 51-140 CIPM (836-2295 CC/M)	$\pm 5\%$ $\pm 3\%$
3	0.06 GPM (.22 L/M)	3 GPM (12 L/M)	0.1-1.0 GPM (.4-4 L/M) 1.0-3.0 GPM (4-8 L/M)	$\pm 5\%$ $\pm 3\%$
6	0.12 GPM (.45 L/M)	6 GPM (23 L/M)	0.1-1.9 GPM (.4-8 L/M) 2.0-4.0 GPM (8-15 L/M) 4.0-6.0 GPM (8-23 L/M)	$\pm 5\%$ $\pm 4\%$ $\pm 3\%$
TPC1200				
28	0.1 GPM (.4 L/M)	25 GPM (95 L/M)	1.0-3.0 GPM (.4-8 L/M) 3.0-8.0 GPM (8-30 L/M) 8.0-25 GPM (30-95 L/M)	$\pm 7\%$ $\pm 5\%$ $\pm 3\%$



NOTE: See Needle Flow Chart in Engineering Performance section for flow information.

Example: "TPCC600S02ALV" means Series TPC Valve, with reverse-flow check valve, in-line mounting size 3/8", flow range of 5 to 50 CIPM, lunge control option, Fluorocarbon seals.

Bolt Kits

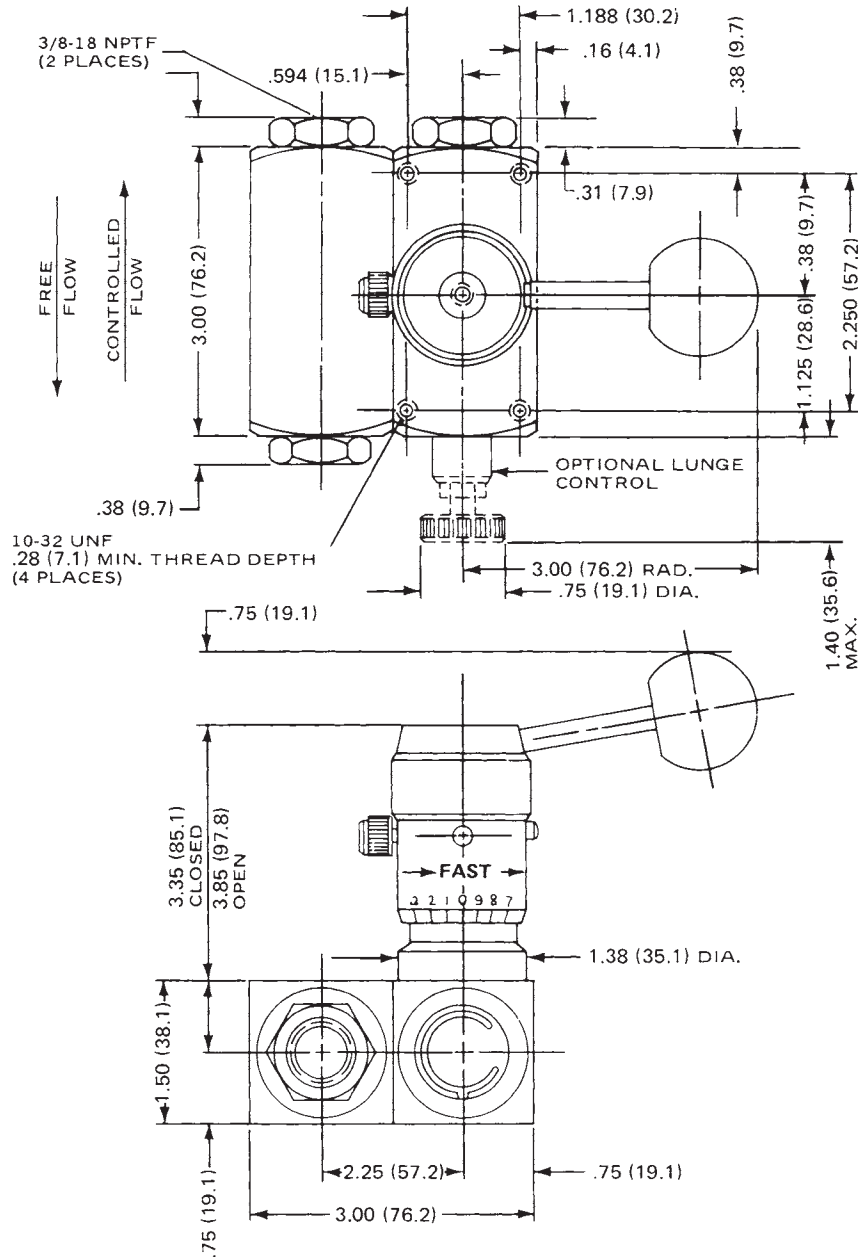
TPCS600	Bolt Kit No. BK07	Bolt specification 5/16" - 18 x 1"	Bolt torque 19 ft. lb.
---------	-------------------	------------------------------------	------------------------



Millimeter equivalents for inch dimensions are shown in (**)

Model TPCC600S

In-line mounted, pressure compensated, temperature insensitive
 Flow Control Valve with check



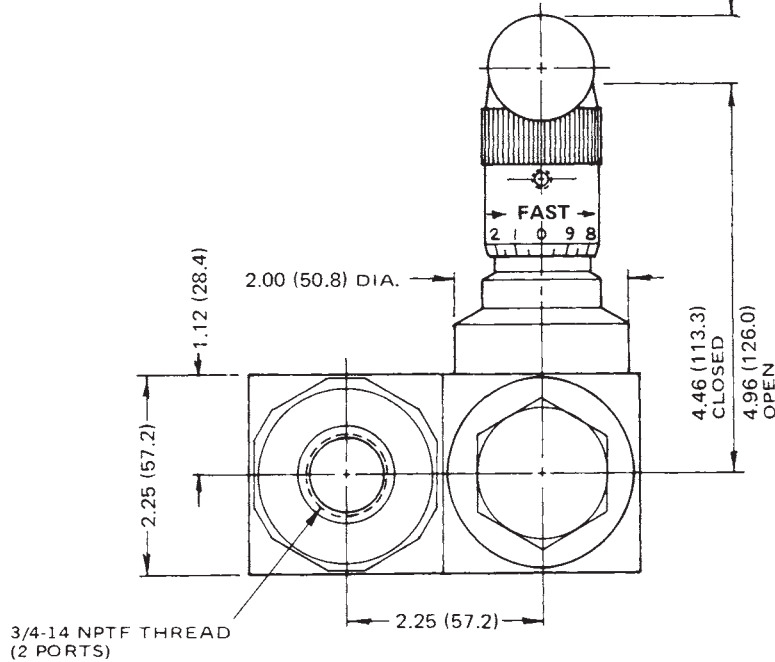
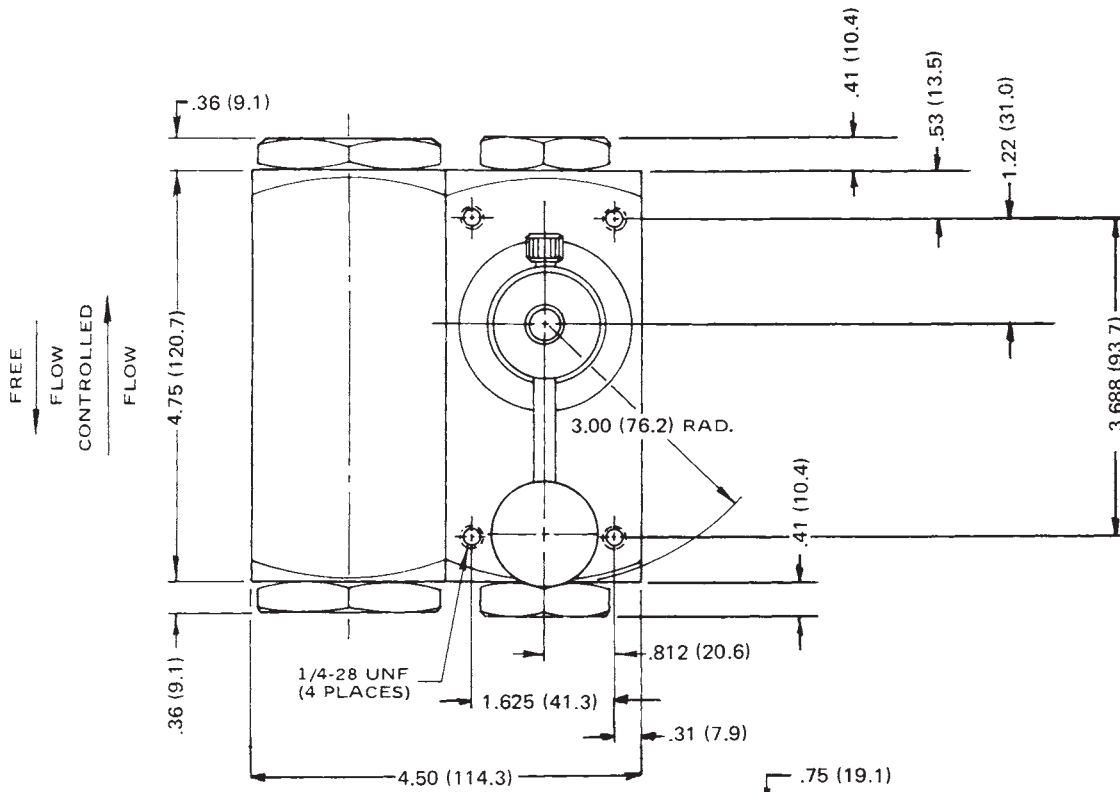
Weight
 4.3 Lb. (3 Kg)

D

Millimeter equivalents for inch dimensions are shown in (**)

Model TPCC1200S-28

In-line mounted, pressure compensated, temperature insensitive
 Flow Control Valve



Weight
 12.7 Lb. (6 Kg)

D

Millimeter equivalents for inch dimensions are shown in (**)

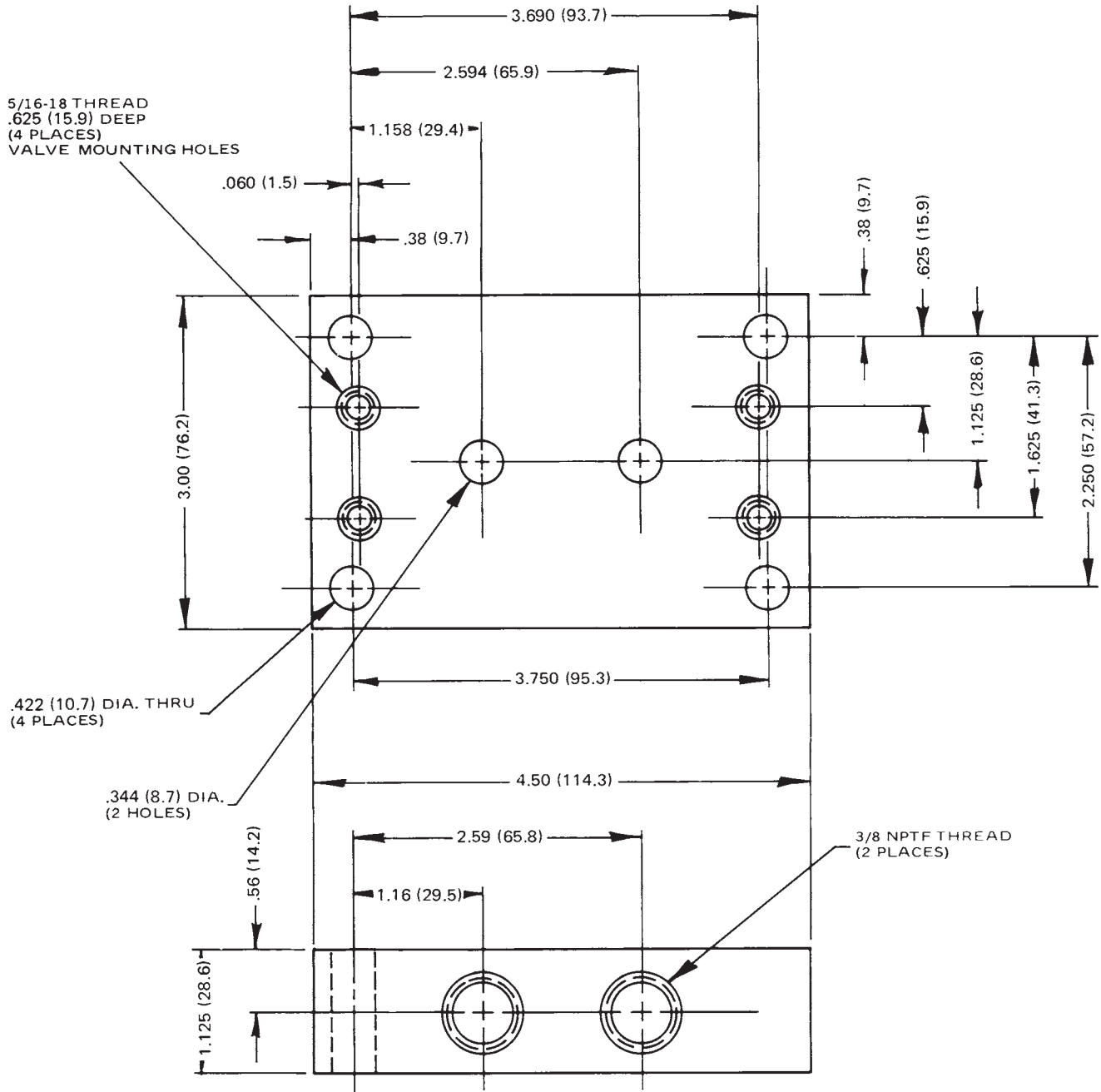
Subplate

Use bolt kit BK-07 for mounting series TPCS600S valve on this subplate.

Reference Data Only
(Subplates are not available)



D

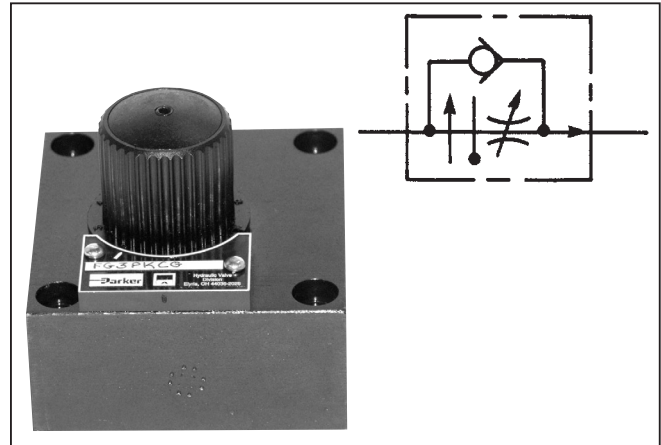


General Description

Series FG3PKC pressure and temperature compensated flow control valves regulate flow and may be used for applications requiring meter-in, meter-out and bleed-off.

Features

- Maintains constant flow with changing inlet and outlet pressures. The minimum pressure differential between inlet and outlet ports must be 100 PSI (7 Bar) to function properly.
- Maintains flow setting within approximately $\pm 5\%$ variation over pressure drop range 100 to 3000 PSI (7 to 205 Bar).
- Has an adjustable flow setting. See needle chart for controlled flow range.
- Trim adjustment option allows valve to be adjusted $\pm 5\%$ when valve is locked in a flow setting.
- Subplate mounted valve is standard with reverse flow check valve. (See Reverse Flow Chart.) Check valve cracking pressure is 5 PSI (0.3 Bar).
- Designed to give a constant flow rate over a wide change of fluid temperature. Refer to needle chart for percentage change in flow.
- Available with optional lunge control for limiting compensator piston travel. This control prepositions the compensator piston to reduce actuator lunge or jump.



Specifications

Maximum Operating Pressure	207 Bar (3000 PSI)
Pressure Compensation	7 Bar (100 PSI) Minimum
Flow Setting	$\pm 5\%$ 7 to 207 Bar (100 to 3000 PSI)

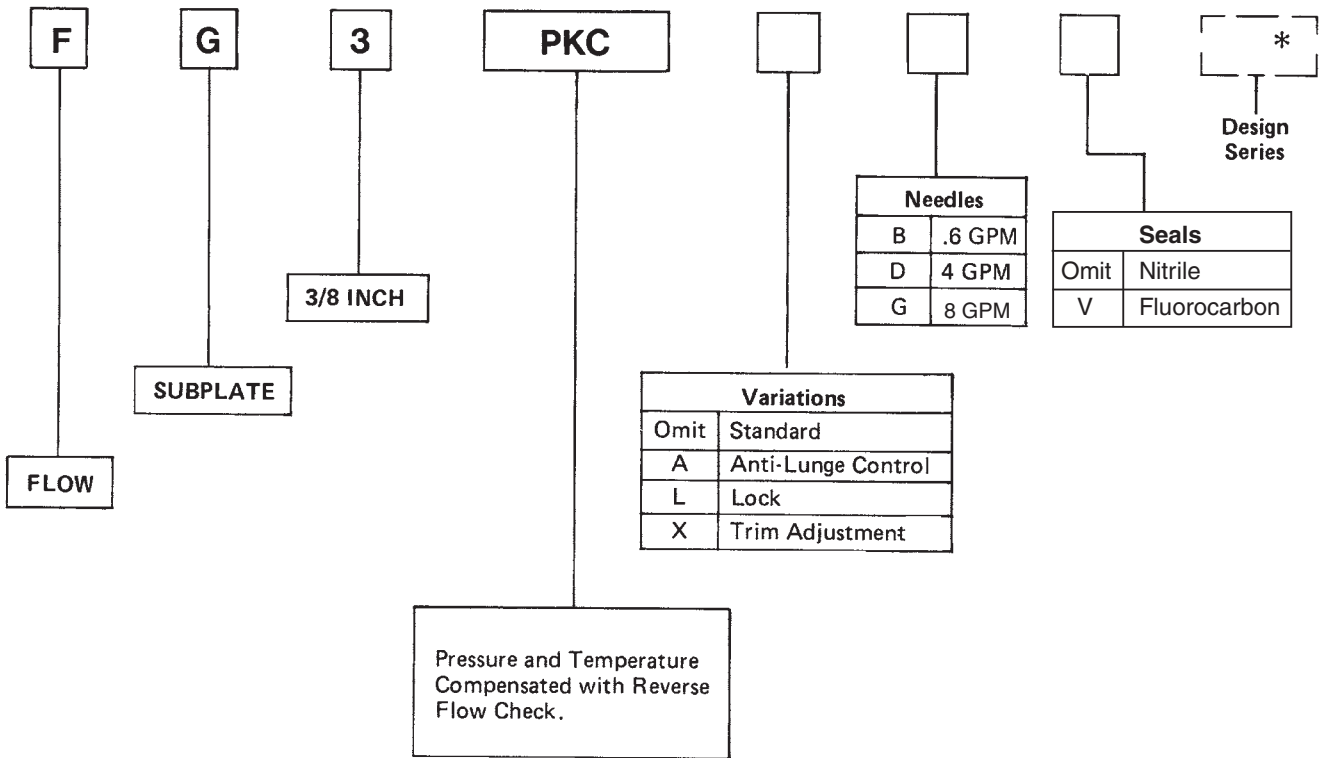
D

Flow Data

Valve Model	(Max.) Controlled Flow	(Max.) Reverse Flow	Pressure Drop ΔP @ (Max.) Reverse Flow	Mounting Style	Subplate Port Size	Port Location
FG3PKC	8 GPM (30 L/M)	12GPM (45L/M)	65 PSI (4.4 Bar)	Subplate (NFPA) 2F02	3/8 NPTF	Bottom

Needle Flow Chart FG3PKC

FLOW RANGES			TEMPERATURE COMPENSATION RANGE (For an 80-220 SSU viscosity change)	
Needle	Minimum Flow	Maximum Flow	Flow Range	% Flow Variation
B	5 CIPM (81.96 CC/M)	140 CIPM (.6 GPM)	5-50 CIPM (82-820 CC/M) 51-140 CIPM (836-2295 CC/M)	$\pm 7\%$ $\pm 5\%$
D	5 CIPM (81.96 CC/M)	925 CIPM (4 GPM)	.1-1.0 GPM (.4-4 L/M) 1.0-4 GPM (4-16 L/M)	$\pm 5\%$ $\pm 3\%$
G	5 CIPM (81.96 CC/M)	1848 CIPM (8 GPM)	.12-1.0 GPM (.5-4 L/M) 2.0-4.0 GPM (8-15 L/M) 4.0-8.0 GPM (15-30 L/M)	$\pm 5\%$ $\pm 3\%$ $\pm 3\%$



Weight: 4 Kg (8.5 lbs.)

SUBPLATE

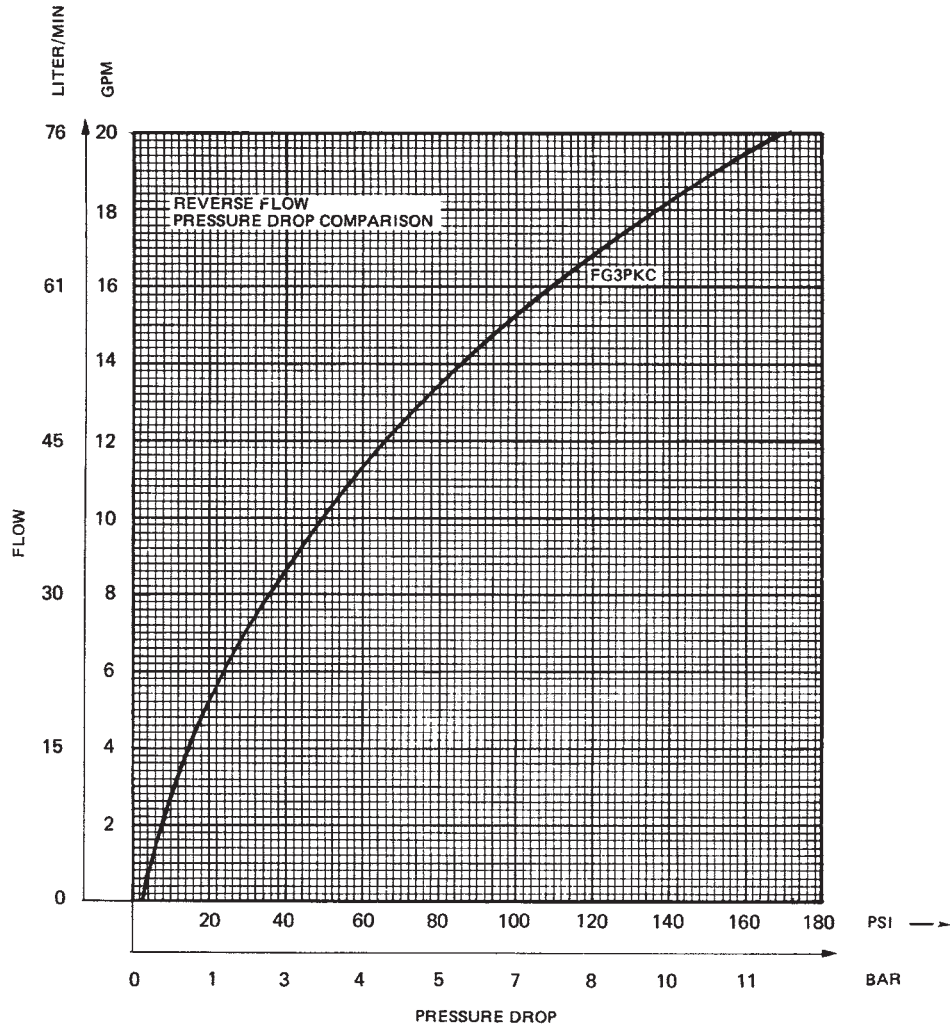
Valve	Subplate	Ports	Location
FG3PKC	058062-2	3/8" NPTF	Bottom

BOLT KIT

Valve	Bolt Kit	Bolt Specification*	Bolt Torque
FG3PKC	BK 12	5/16-18 x 2"	19 Ft.-Lbs.

*USE SAE GRADE #8 OR BETTER

D



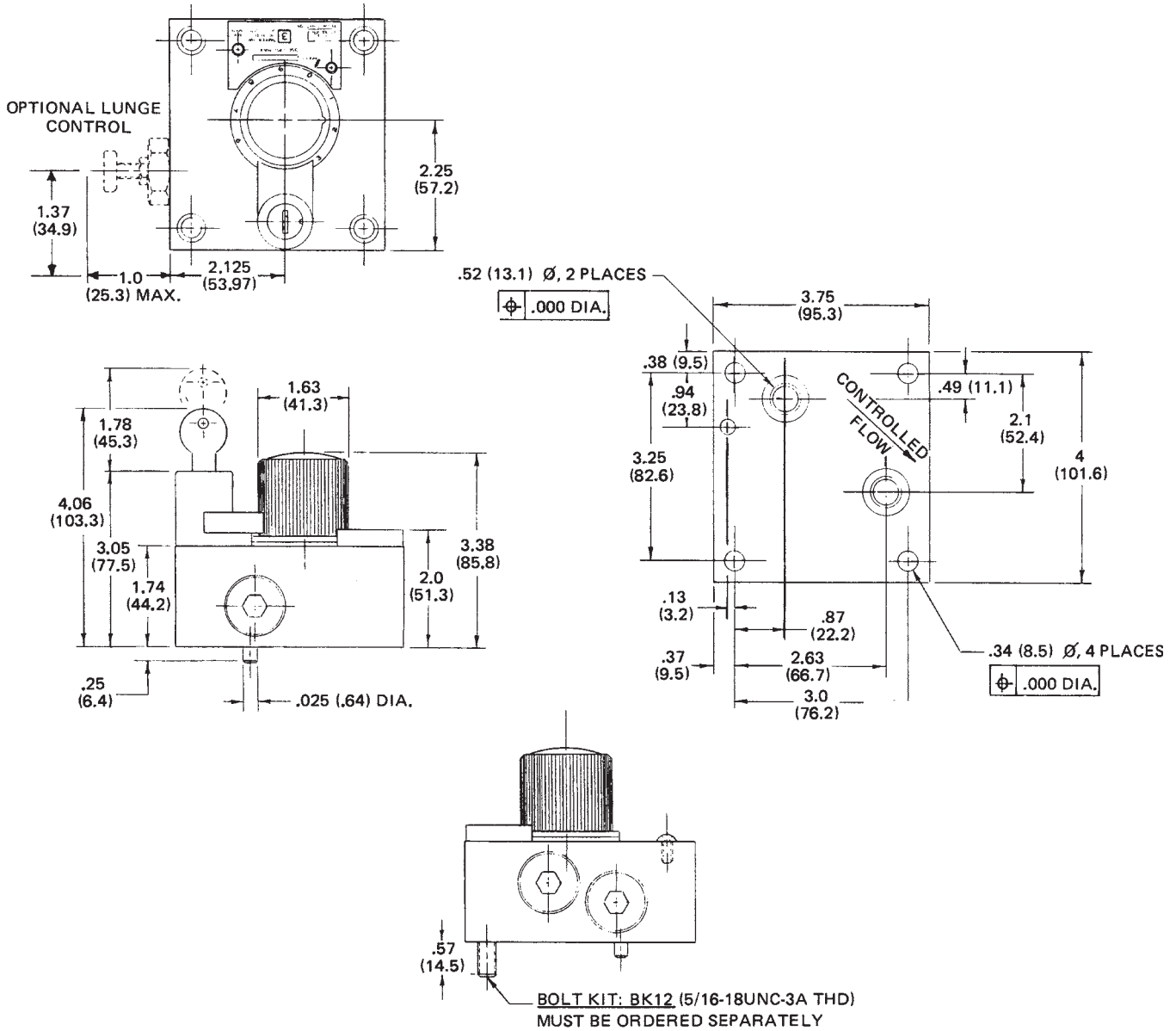
D

Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change as per chart.	VISCOSITY CORRECTION FACTOR							
	Viscosity (SSU)	75	150	200	250	300	350	400
	Percentage of ΔP (Approx.)	93	111	119	126	132	137	141

Millimeter equivalents for inch dimensions are shown in (**)

Model FG3PKC**10**

Manifold mounted, temperature insensitive, pressure compensated
Flow Control Valve

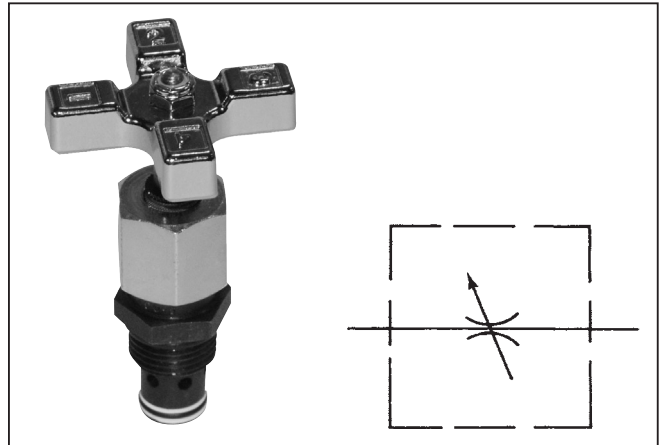


D

General Description

Series MVI cartridge-type needle valves are designed for installation in a precision-machined cavity made in the manifold of the machine. Detailed instructions for machining the required cavity for the valve are given on page D30.

Properly installed in precision-machined cavities, these needle valves provide precise metering control and full shutoff of flow. An o-ring and backup ring installed on the cartridge fully isolate the inlet and outlet ports of the machined cavity from each other.



Features

- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- Fine and Micro-fine needles available for extremely fine control.
- High efficiency o-ring stem seal that eliminates packing.

Specifications

Maximum Operating Pressure	340 Bar (5000 PSI)
Flow	See table
Needles	Standard 30° taper Optional fine V-notch for Series MVI400 valves only Optional 0.006" slotted for Series MVI400 only
Material	Steel, compatible in steel or aluminum manifold block cavities



Flow Data

Valve Model	Flow (Max.) GPM (L/M)	ΔP @ Max. Flow	Orifice Area in ² Full Open	C _v * Factor	Valve Size
MVI400	5 (19)	100 PSI (7 Bar)	0.0216	0.493	1/4"
MVI400-2	2.8 (11)	200 PSI (14 Bar)	0.0081	0.186	1/4"
MVI400-3	0.5 (2)	200 PSI (14 Bar)	0.0014	0.032	1/4"
MVI600	8 (30)	35 PSI (3 Bar)	0.0567	1.294	3/8"
MVI800	15 (57)	45 PSI (3 Bar)	0.0845	1.930	1/2"
MVI1200	25 (95)	51 PSI (4 Bar)	0.1400	3.205	3/4"

*C_v factor — Flow of water in GPM that valve will pass @ ΔP of 1 PSI.

MVI

Cartridge
 Needle Valve

Size

400	1/4"
600	3/8"
800	1/2"
1200	3/4"

S

Material

S	Steel
---	-------

Optional
 Needle

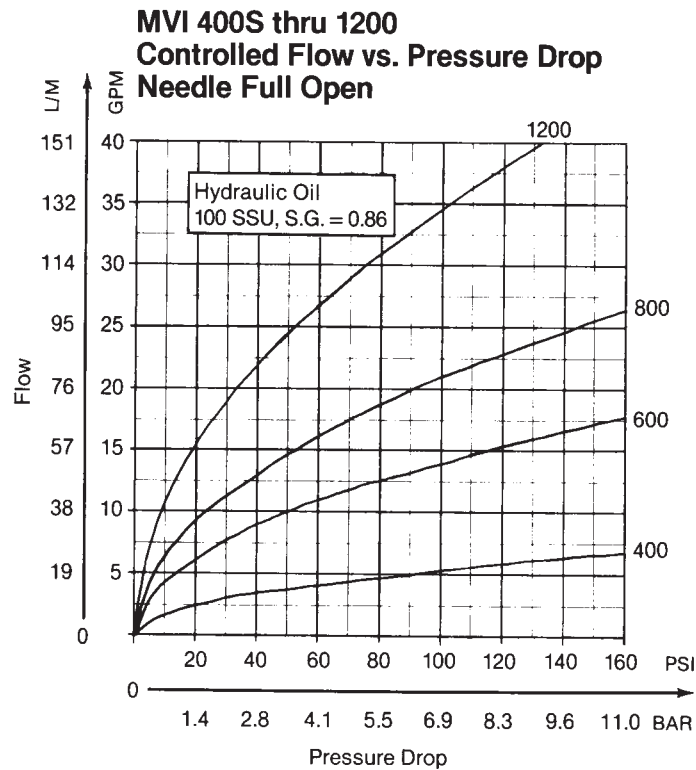
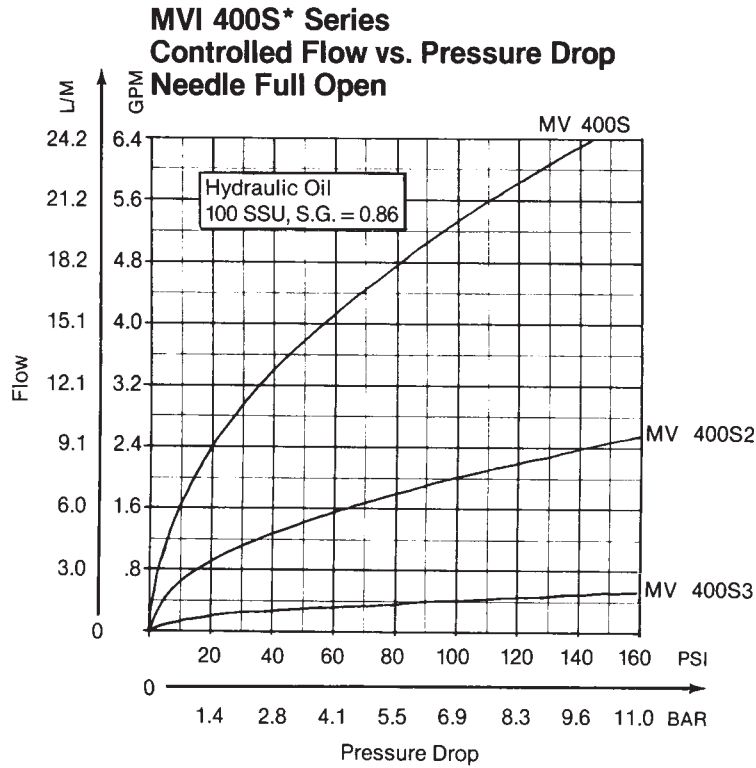
Omit	Standard
2*	Fine
3*	Micro- Fine

*Available on
 MVI400 only

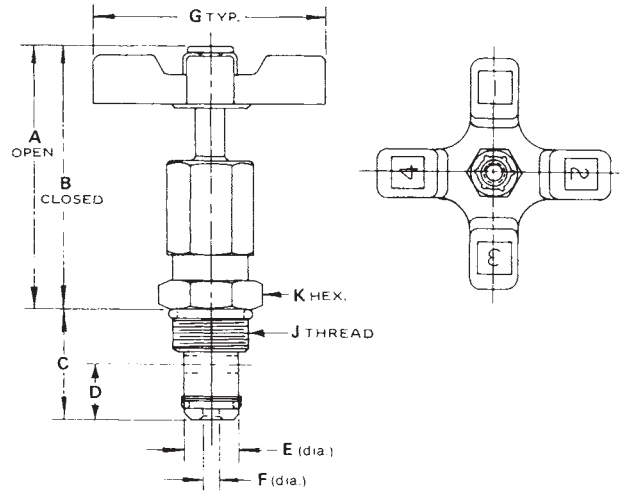
Seals

Omit	Nitrile
V	Fluorocarbon

D



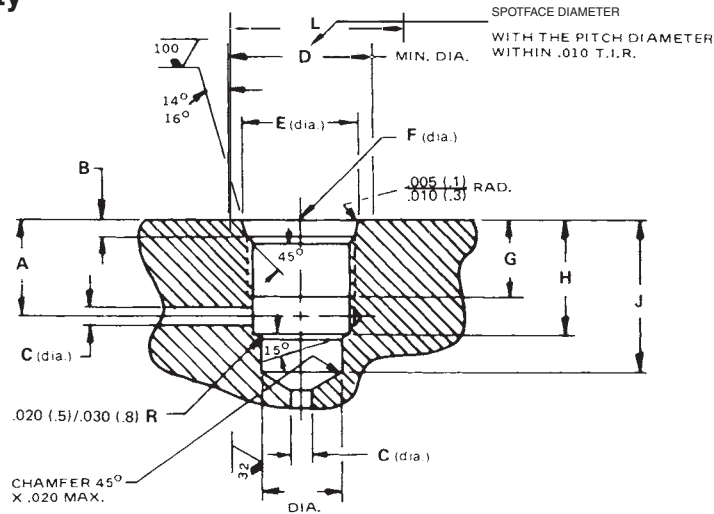
Millimeter equivalents for inch dimensions are shown in (**)



D

Valve Model	A	B	C	D	E	F	G	J	K	Wt. lb. (kg)
MVI400S*	2.54 (64.5)	2.34 (59.4)	1.00 (25.4)	0.43 (10.9)	.56 (14.2)	.18 (4.6)	2.00 (50.8)	3/4-16UNF-2A	.87 (22.1)	0.4 (0.2)
MVI600S	3.16 (80.3)	2.86 (72.6)	1.18 (30.0)	0.53 (13.5)	.62 (15.7)	.31 (7.9)	2.50 (63.5)	7/8-14UNF-2A	1.00 (25.4)	0.6 (0.3)
MVI800S	3.59 (91.2)	3.09 (78.5)	1.56 (39.6)	0.60 (15.2)	.80 (20.3)	.37 (9.4)	3.25 (82.6)	1-1/16-12UN-2A	1.25 (31.8)	1.2 (0.5)
MVI1200S	4.00 (101.6)	3.45 (87.6)	1.71 (43.4)	0.75 (19.1)	1.06 (26.9)	.46 (11.7)	3.87 (98.3)	1-5/16-12UN-2A	1.50 (38.1)	2.0 (0.9)

Machining the Cavity



Valve Model	A	B	C	D	E	F	G	H	J	K	L
MVI400S	.56 (14.2)	.100/.115 (2.5/2.9)	.21 (5.3)	.87 (22.1)	.811/.816 (20.6/20.7)	3/4-16 UNF-2B	.56 (14.2)	.70 (17.8)	1.06 (26.9)	.562/.564 (14.3/14.3)	1.188 (30.2)
MVI600S	.65 (16.5)	.100/.115 (2.5/2.9)	.32 (8.1)	1.00 (25.4)	.942/.947 (23.9/24.1)	7/8-14 UNF-2B	.65 (16.5)	.85 (21.6)	1.25 (31.8)	.624/.626 (15.8/15.9)	1.344 (34.1)
MVI800S	.95 (24.1)	.130/.145 (3.3/3.7)	.40 (10.2)	1.25 (31.8)	1.148/1.153 (29.2/29.3)	1-1/16-12 UN-2B	.75 (19.1)	1.18 (30.0)	1.62 (41.1)	.811/.813 (20.6/20.7)	1.625 (41.3)
MVI1200S	.97 (24.6)	.130/.145 (3.3/3.7)	.50 (12.7)	1.50 (38.1)	1.398/1.403 (35.3/35.6)	1-5/16-12 UN-2B	.75 (19.1)	1.25 (31.8)	1.78 (45.2)	1.062/1.064 (26.9/26.9)	1.910 (48.5)

3000-D1.p65, dd



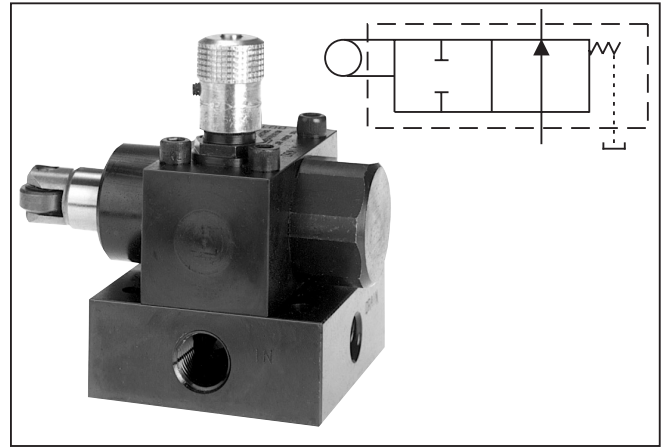
General Description

Series D deceleration valve is a cam operated 2-way valve with tapered spool. As the cam depresses the plunger, flow through the valve is gradually decreased to the cut-off point.

This valve is also available as a normally closed, cam operated 2-way valve.

Specifications

Maximum Operating Pressure	210 Bar (3000 PSI)
Maximum Flow	See flow vs. pressure drop curves, reverse flow vs. pressure drop, flow vs. plunger travel curves
Nominal Flow	D600 37.9 LPM (10 GPM) D1200 132.5 LPM (35 GPM)
Port Configurations	See dimensional drawings and/or ordering information for configuration availability



Features

- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- A simple set screw locks the valve on any desired setting.



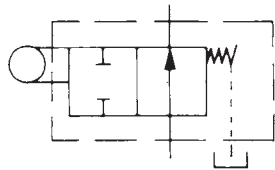
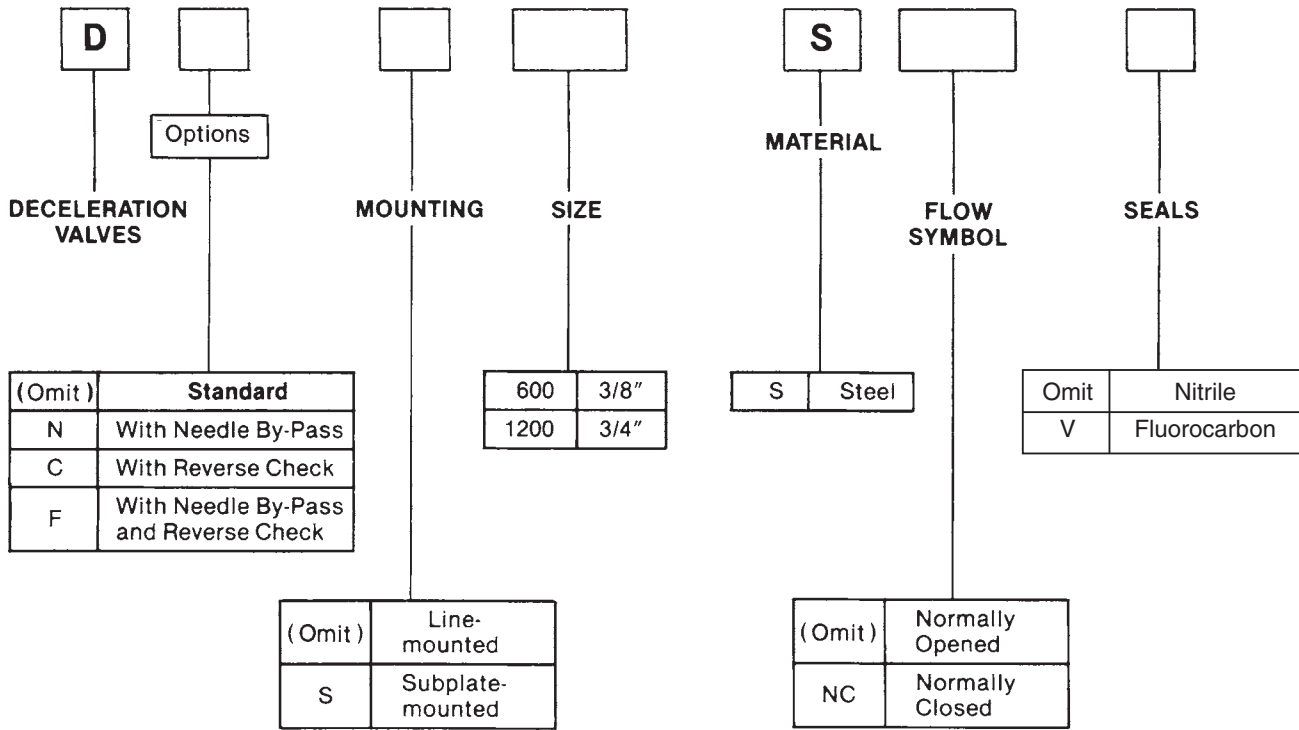
Flow Data

Valve Model	Flow, max., GPM (L/M)	Pressure Drop $\Delta P @$ (Max.) PSI (Bar) (Plunger Full Open)	Mounting	Port Size	Subplate Port Location
D600	19 (72)	200 (14)	Inline	3/8 NPTF	—
DC600	19 (72)	200 (14)	Inline	3/8 NPTF	—
DF600	19 (72)	200 (14)	Inline	3/8 NPTF	—
DN600	19 (72)	200 (14)	Inline	3/8 NPTF	—
DNS600	19 (72)	200 (14)	Subplate	3/8 NPTF	Side
DS600	19 (72)	200 (14)	Subplate	3/8 NPTF	Side
D1200	60 (227)	120 (8)	Inline	3/4 NPTF	—
DC1200	60 (227)	120 (8)	Inline	3/4 NPTF	—
DF1200	60 (227)	120 (8)	Inline	3/4 NPTF	—
DFS1200	60 (227)	120 (8)	Subplate	3/4 NPTF	Bottom
DN1200	60 (227)	120 (8)	Inline	3/4 NPTF	—
DNS1200	60 (227)	120 (8)	Subplate	3/4 NPTF	Bottom
DS1200	60 (227)	120 (8)	Subplate	3/4 NPTF	Bottom
DCS1200	60 (227)	120 (8)	Subplate	3/4 NPTF	Bottom

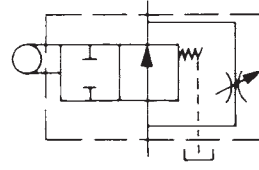
Reverse Flow

Valve Model	With Check GPM (L/M)	With Needle	With Check & Needle GPM (L/M)	Flow Path
D**600S**	19 (72)	N.O. or N.C. valve reverse flow is proportional to needle setting	19 (72)	Normally Open or Closed
D**1200S**	60 (227)		60 (227)	Normally Open or Closed

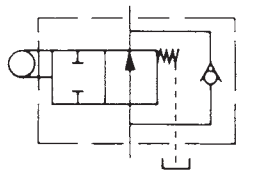
3000-D1.p65, dd



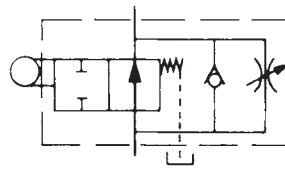
STANDARD
 DECELERATION VALVE



DECELERATION VALVE
 WITH NEEDLE BY-PASS



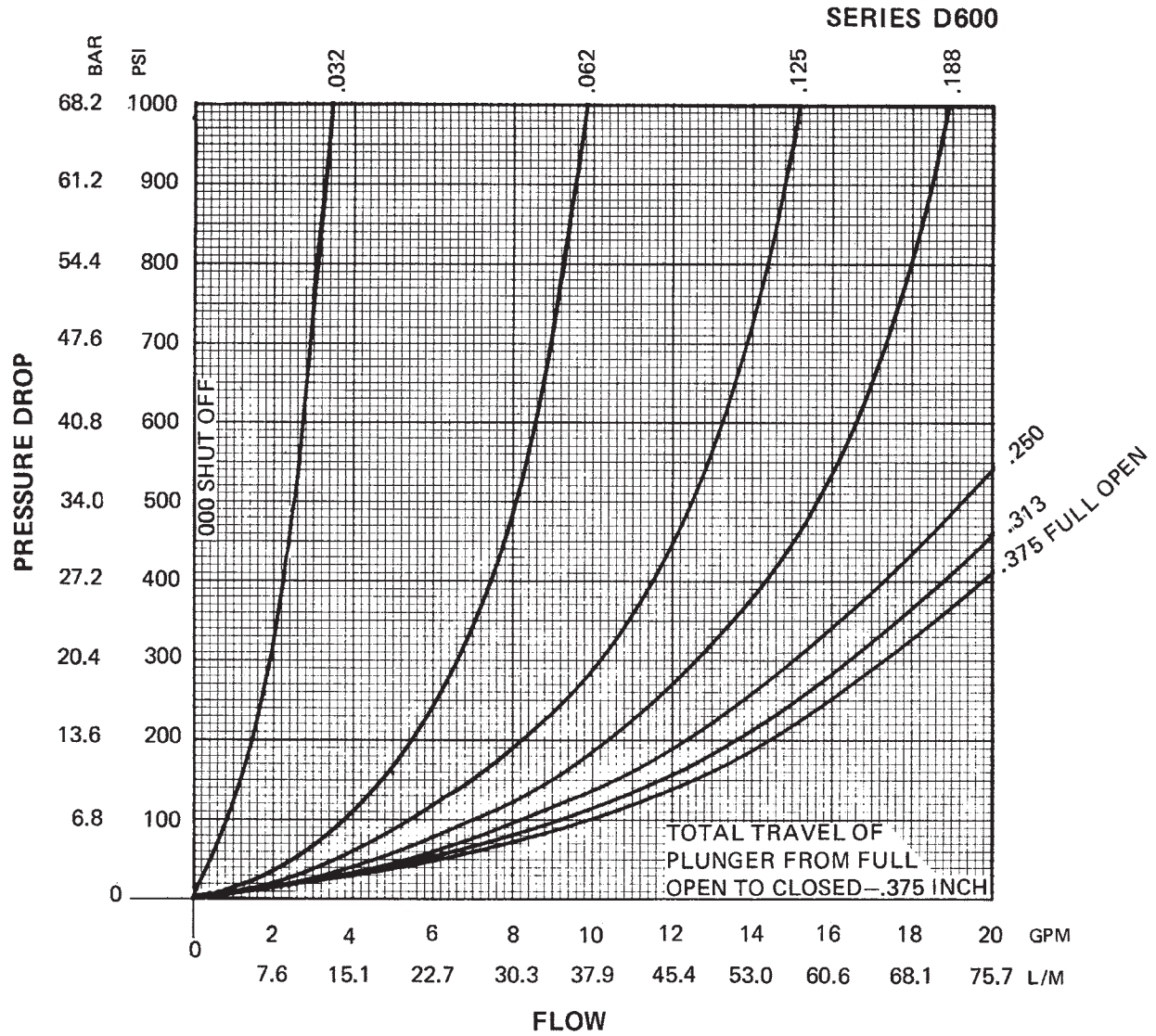
DECELERATION VALVE
 WITH REVERSE CHECK



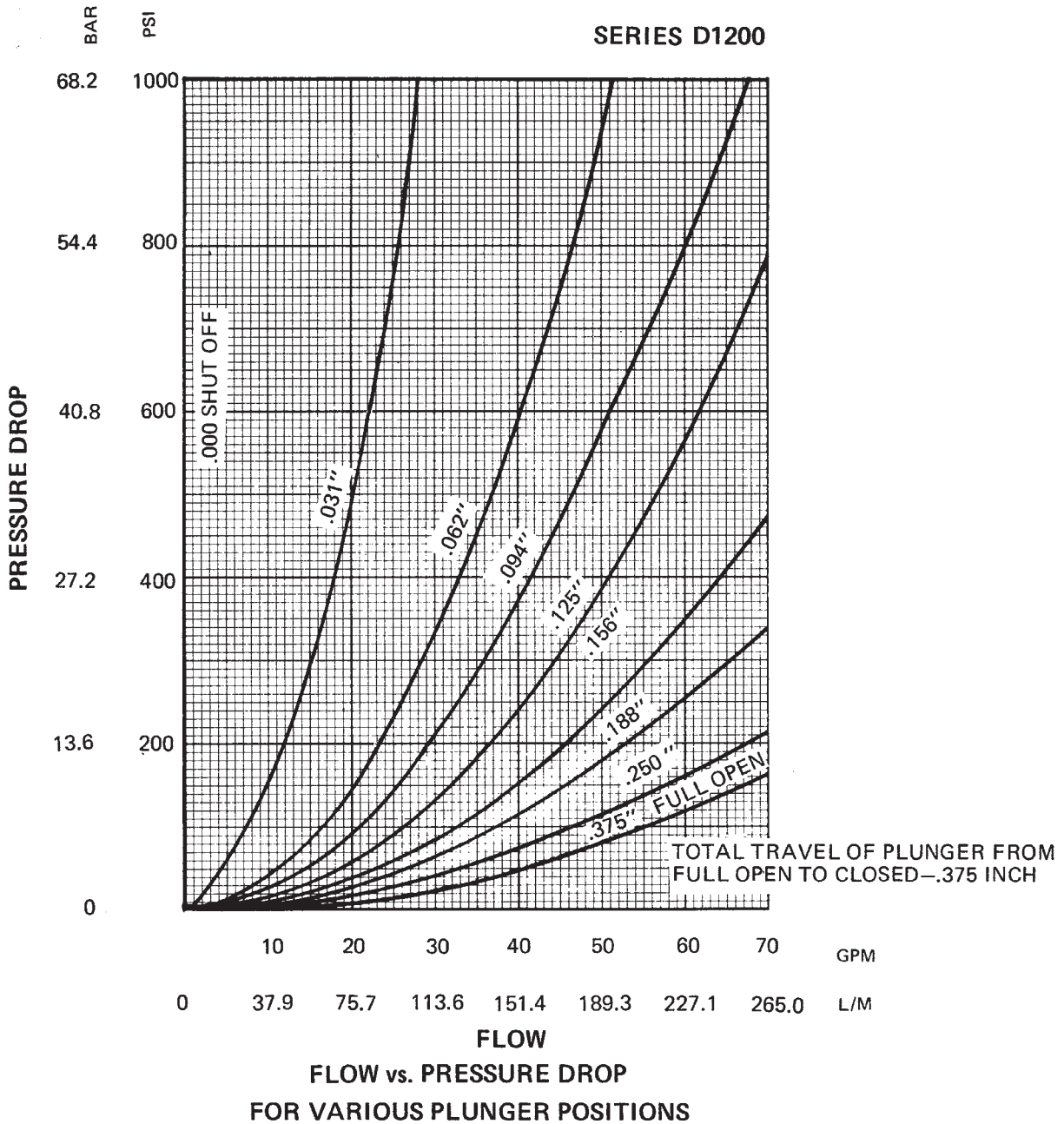
DECELERATION VALVE
 WITH NEEDLE BY-PASS
 AND REVERSE CHECK.

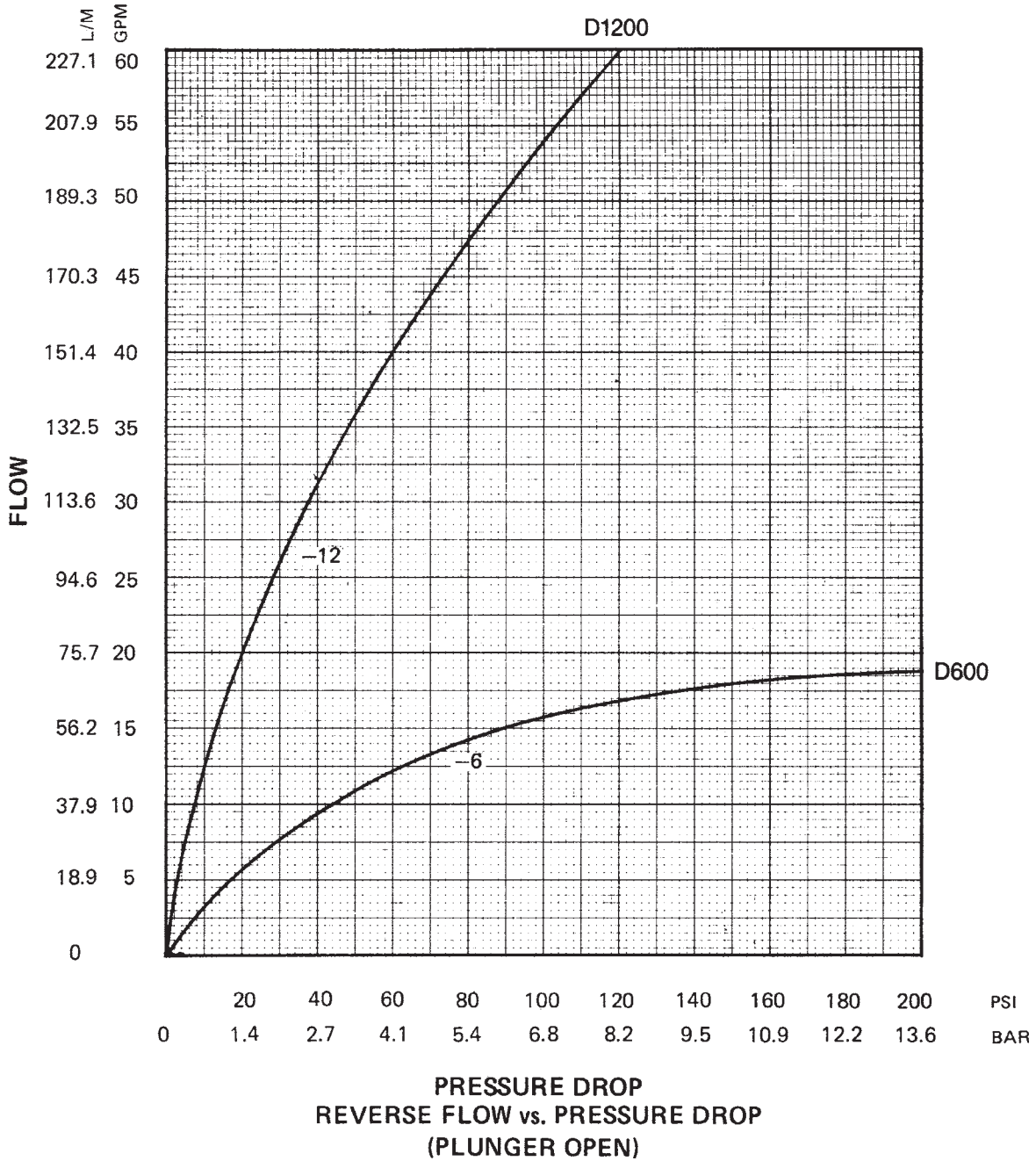
Bolt Kits

Valve	Bolt Kit	Bolts SAE Grade 8 or Better	Bolt Torque
DNS600S DS600S	BK06	1/4-20 x 2"	19 FT.-LBS.
DCS1200S DFS1200S	BK38	3/8-16 x 1-3/4"	34 FT.-LBS.
DNS1200S DS1200S	BK11	3/8-16 x 2-3/4"	34 FT.-LBS.



D



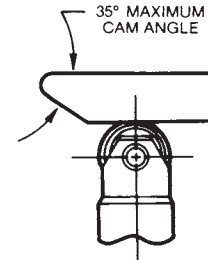
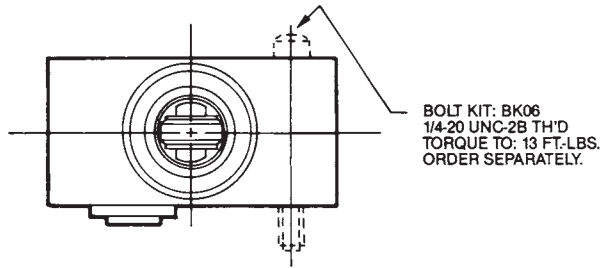


D

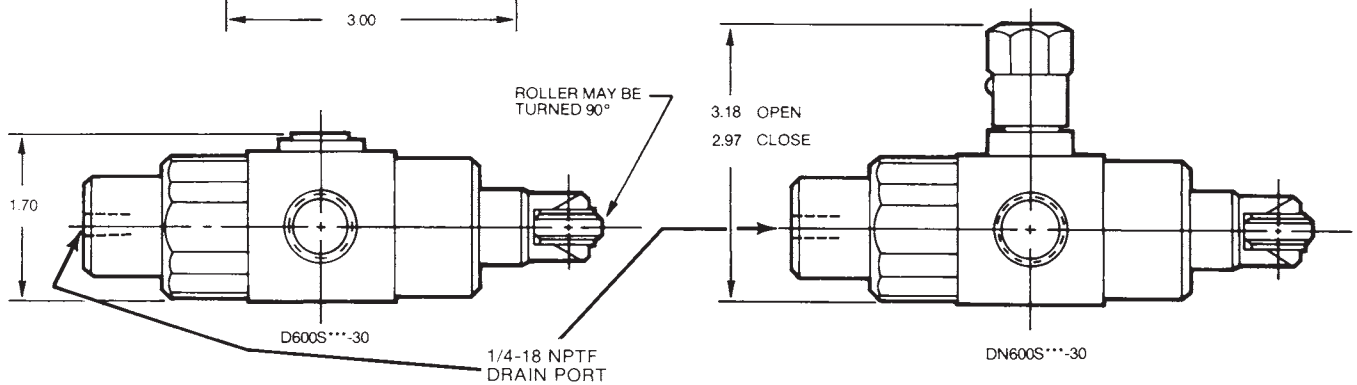
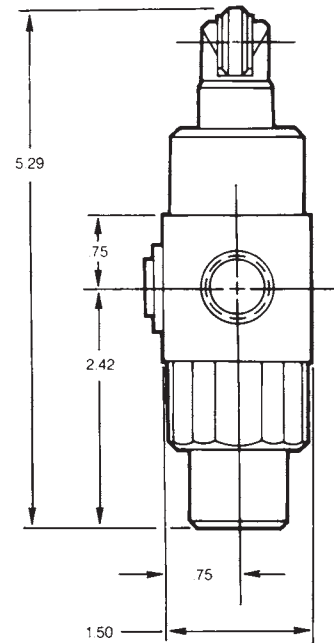
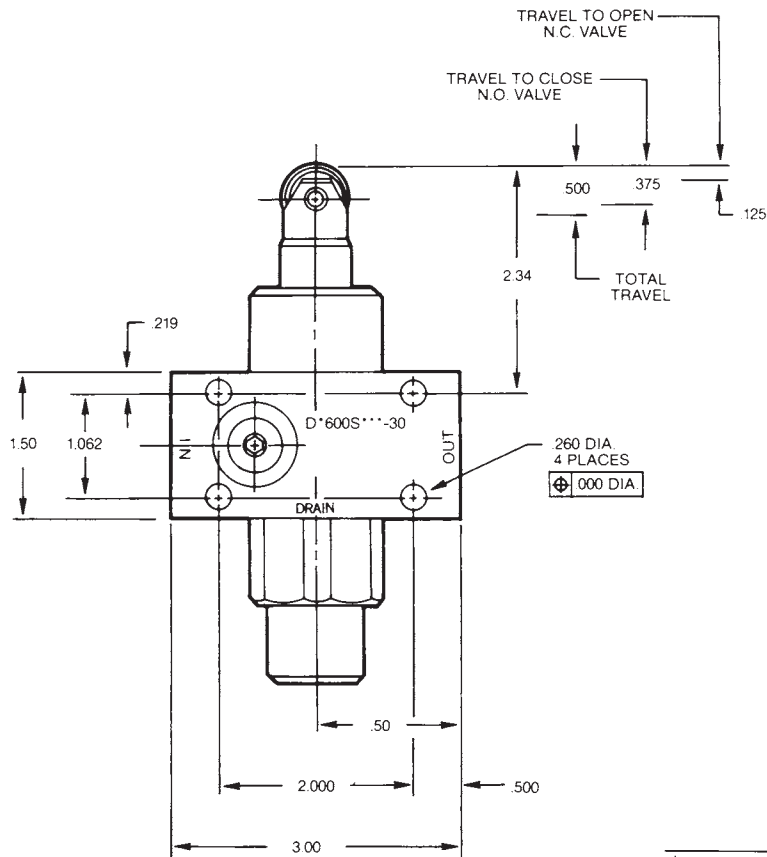
Dimensions are shown in inches

Models D600S and DN600S

In-line mounted Deceleration Valves



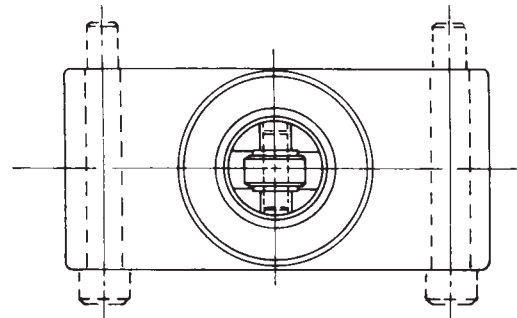
D



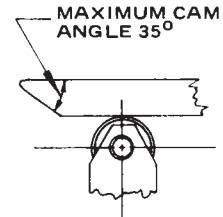
Millimeter equivalents for inch dimensions are shown in (**)

Model D1200S

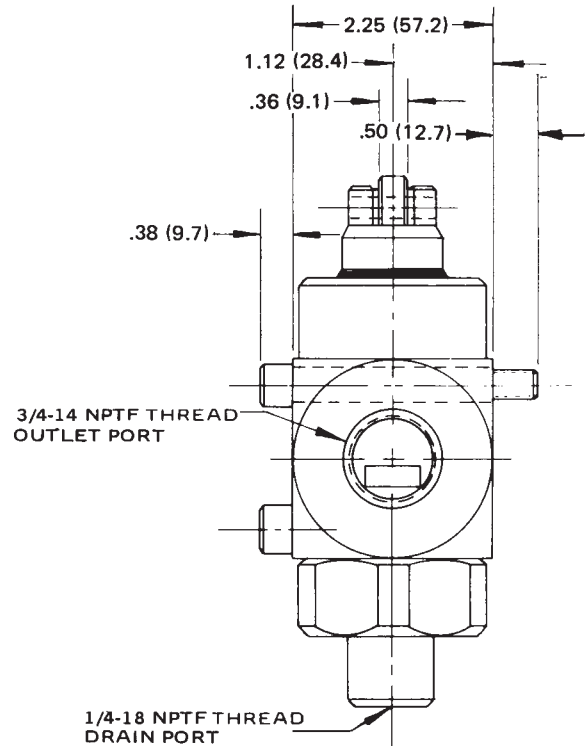
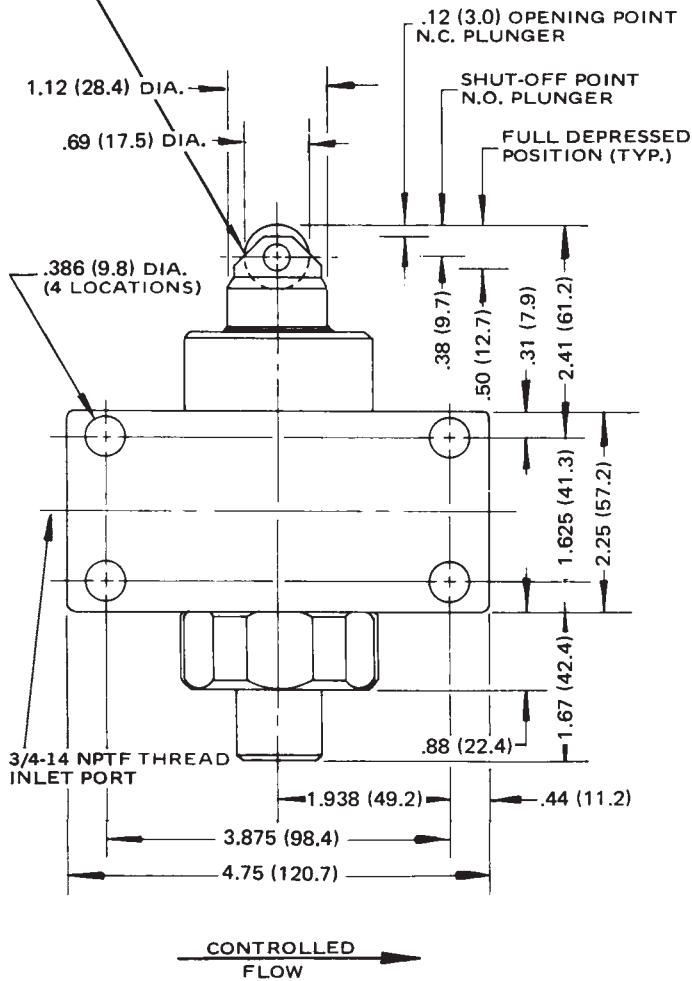
In-line mounted, normally-open/normally-closed
Deceleration Valves



Weight
6.5 Lb. (3.0 Kg.)



PLUNGER AND ROLLER
TO BE ASSEMBLED IN
PLANE AS SHOWN.
CAN BE ROTATED 90°
FROM POSITION SHOWN.



1. WORKING PRESSURE, MAX.:
3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK
PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER:
50 Lbs. (22.8 Kg.) (DRAIN PRESSURE
INCREASES FORCE REQ'D. TO
DEPRESS PLUNGER.)

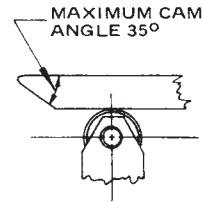


Millimeter equivalents for inch dimensions are shown in (**)

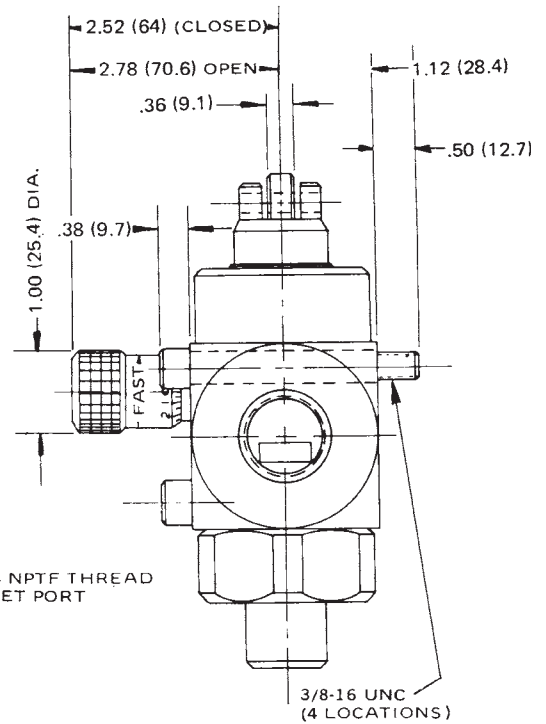
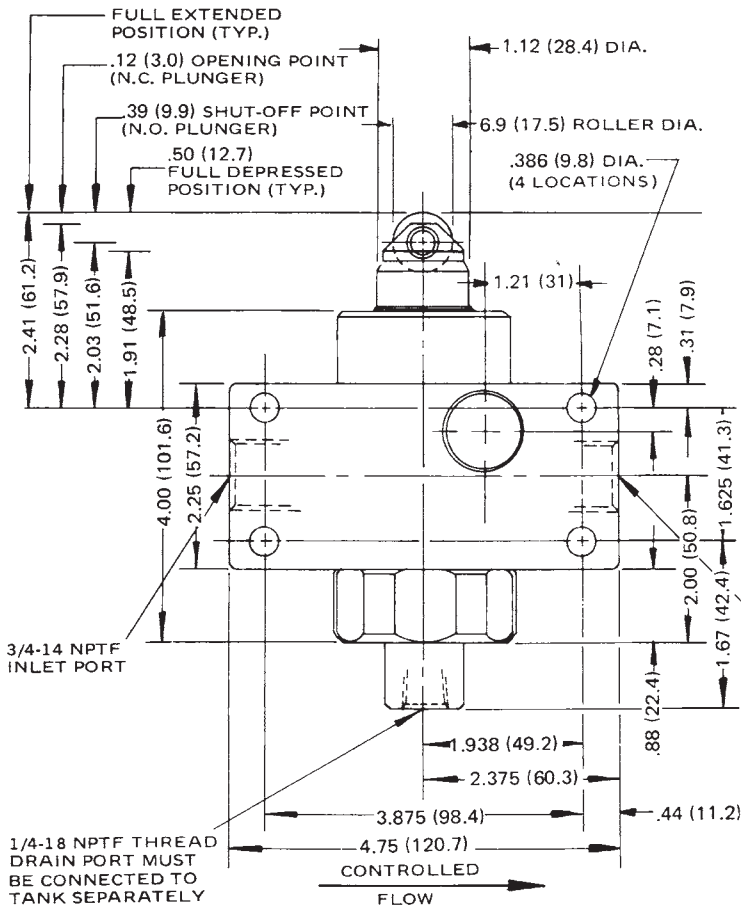
Model DN1200S

In-line mounted Deceleration Valve
 with bypass needle

Weight
 7.5 Lb. (3.4 Kg.)



D

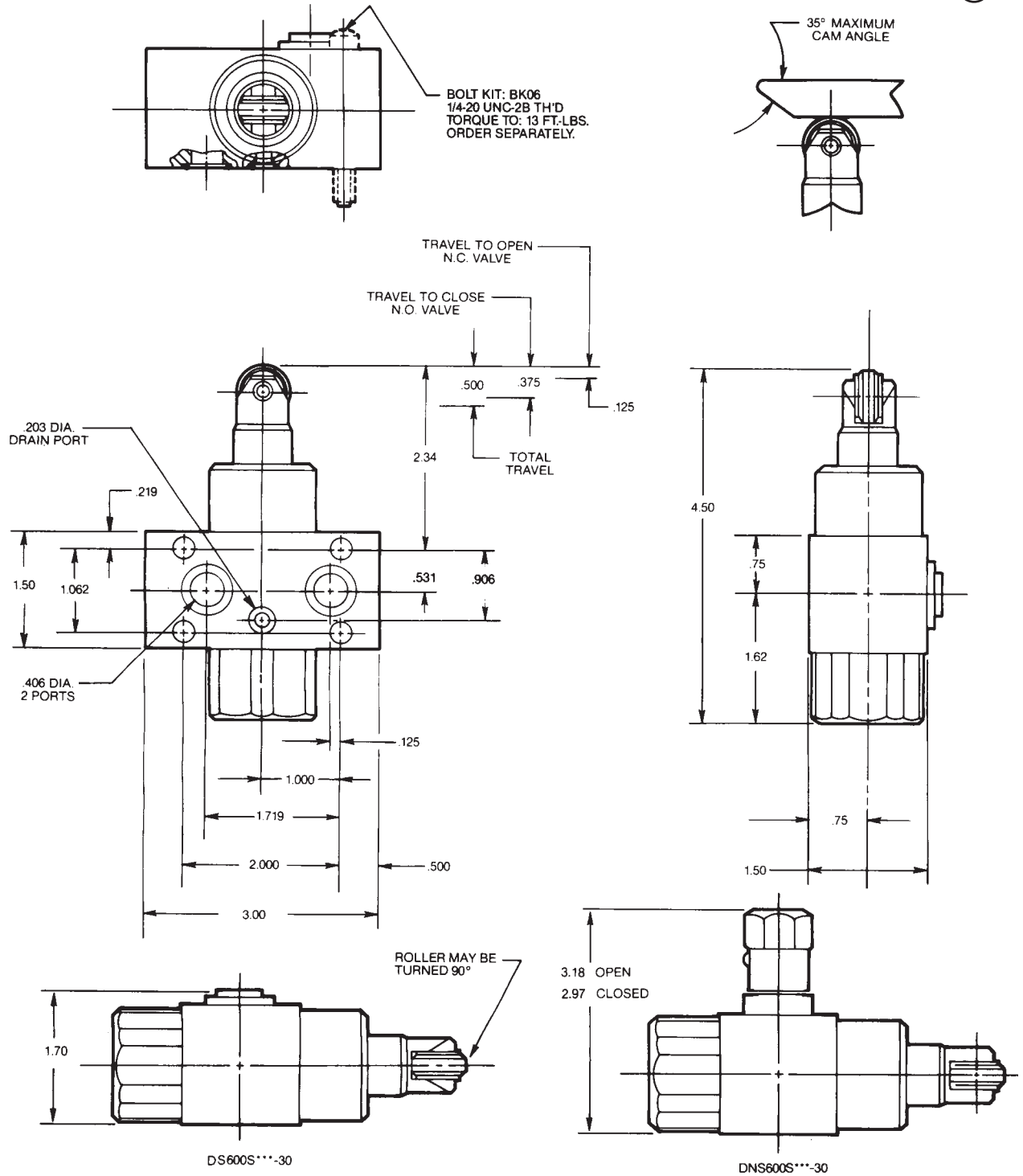


1. WORKING PRESSURE, MAX.: 3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER: 50 Lbs. (22.8 Kg.) (DRAIN PRESSURE INCREASES FORCE REQ'D. TO DEPRESS PLUNGER)

Dimensions are shown in inches

Models DNS600S – DS600S

Manifold mounted Deceleration Valves

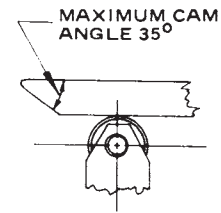


D

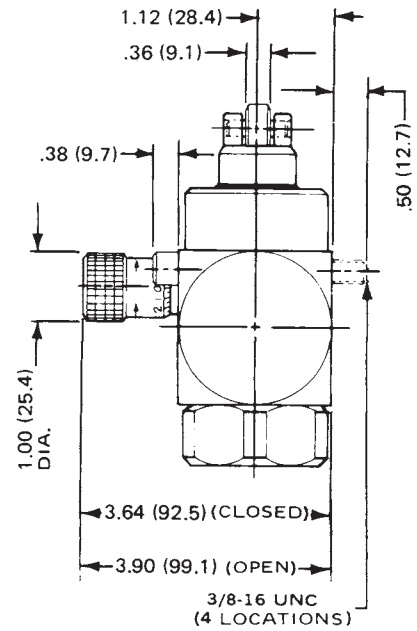
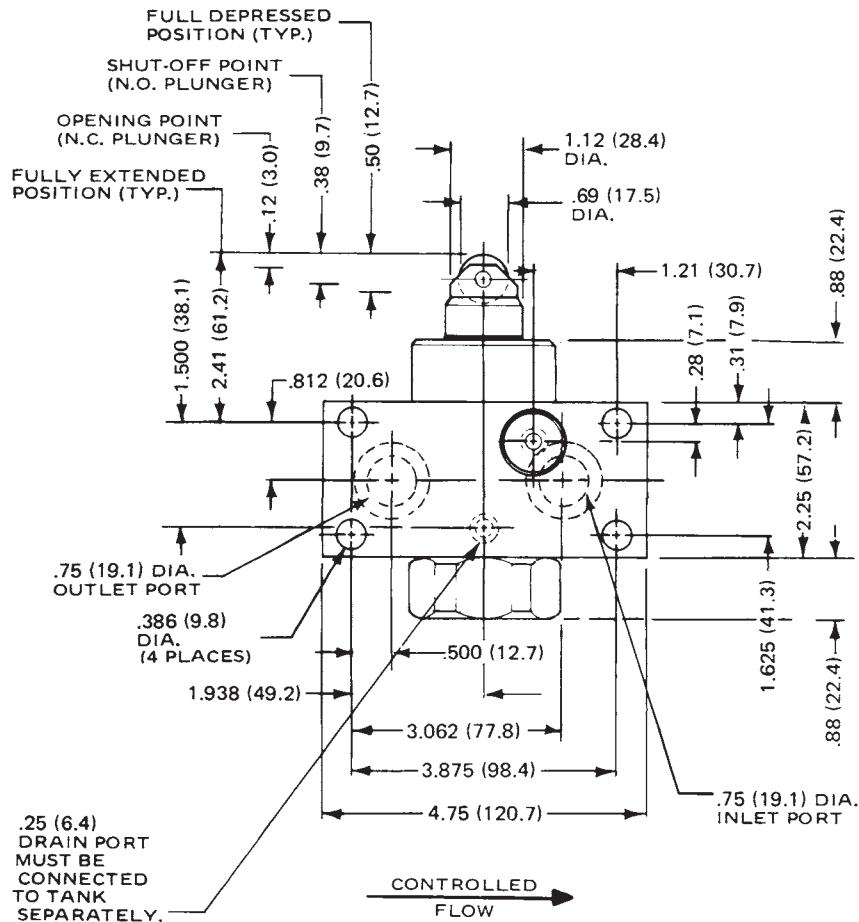
Millimeter equivalents for inch dimensions are shown in (**)

Model DNS1200S

Manifold mounted Deceleration Valve
with bypass needle



D



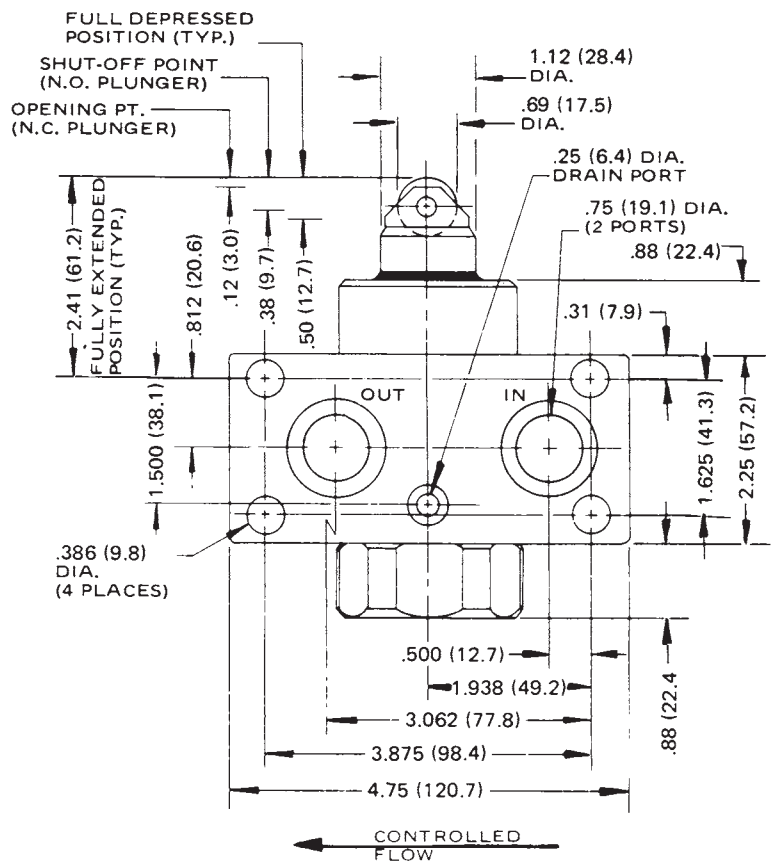
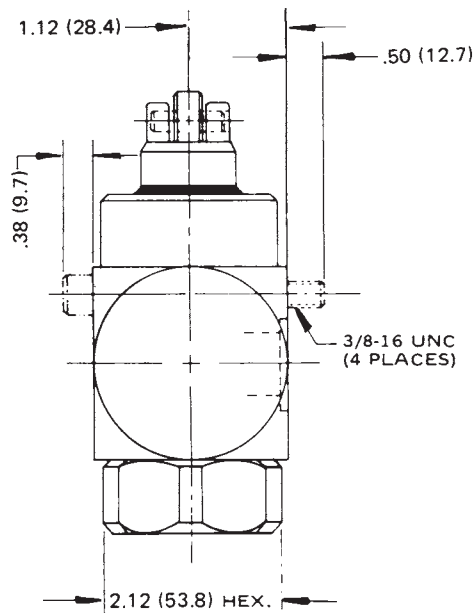
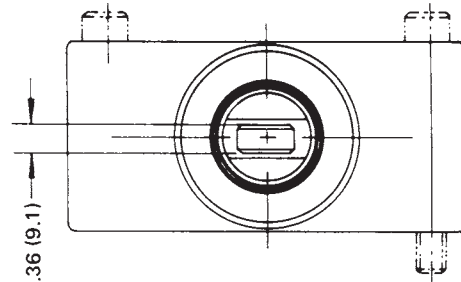
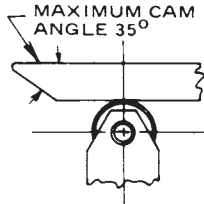
1. WORKING PRESSURE, MAX.:
3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK
PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER:
50 Lbs. (22.8 Kg.) (DRAIN PRESSURE
INCREASES FORCE REQ'D. TO
DEPRESS PLUNGER.)

Weight
7.5 Lb. (3.4 Kg.)

Millimeter equivalents for inch dimensions are shown in (**)

Model DS1200S

Manifold mounted, normally open/normally closed
Deceleration Valve



NOTES:

1. MAX. WORKING PRESSURE 3000 PSI.
 2. DRAIN-MAX. ALLOWABLE BACK PRESSURE 30 PSI.
 3. FORCE-REQ'D. TO DEPRESS PLUNGER 50 LBS.
- "DRAIN PRESSURE INCREASES FORCE REQ'D. TO DEPRESS PLUNGER."



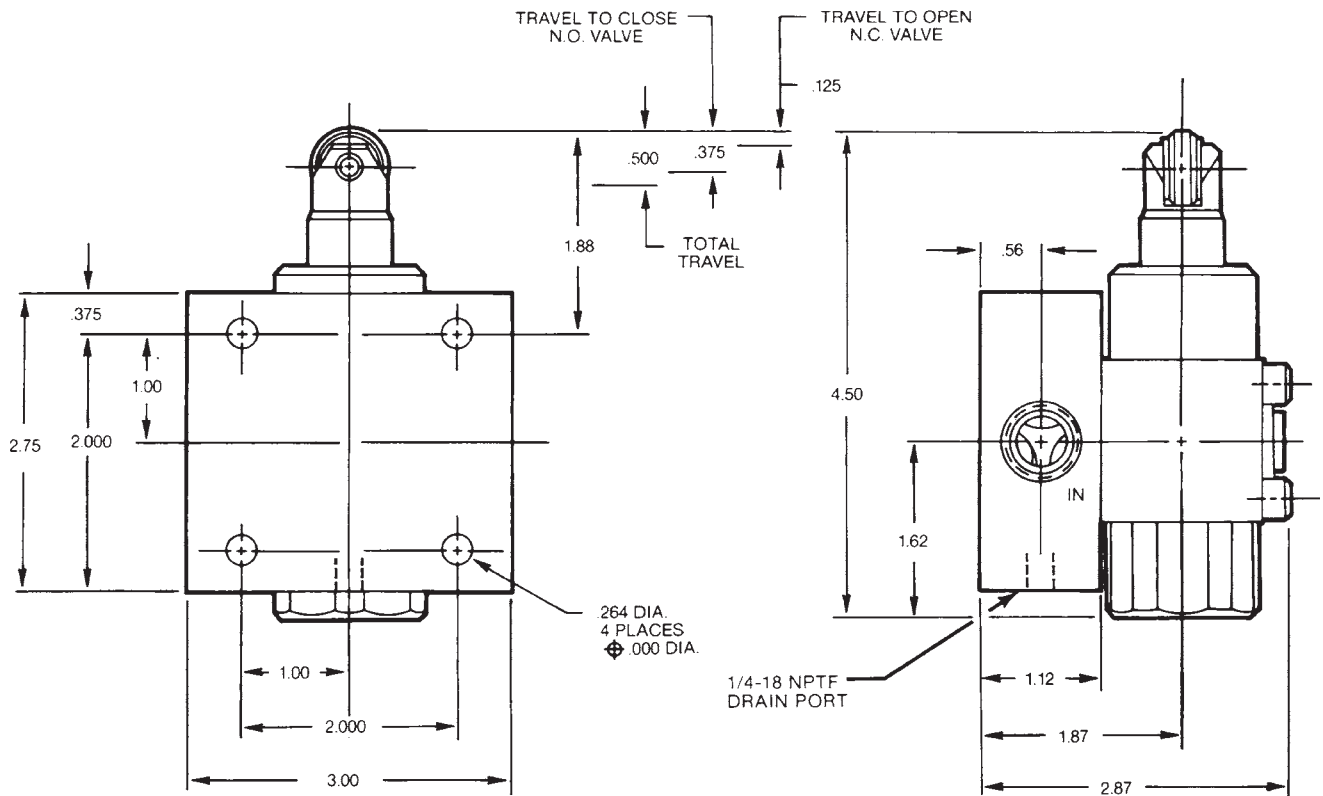
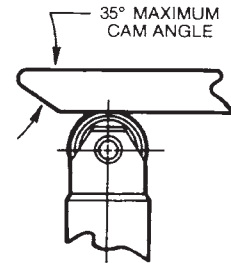
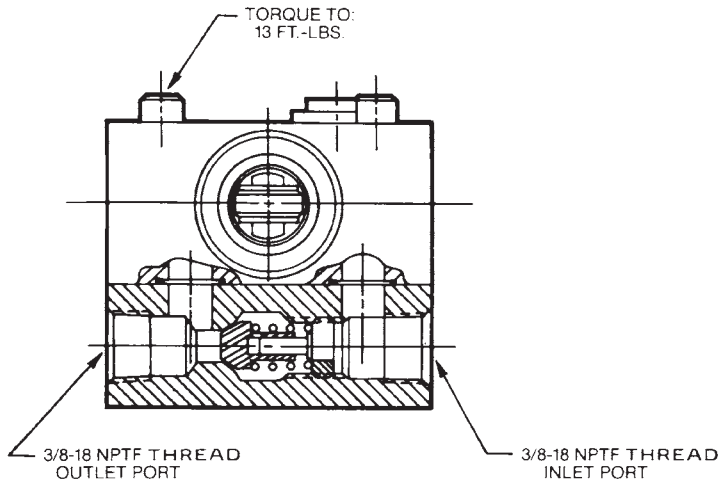
Dimensions are shown in inches

Model DC600S

In-line mounted Deceleration Valve
with reverse check



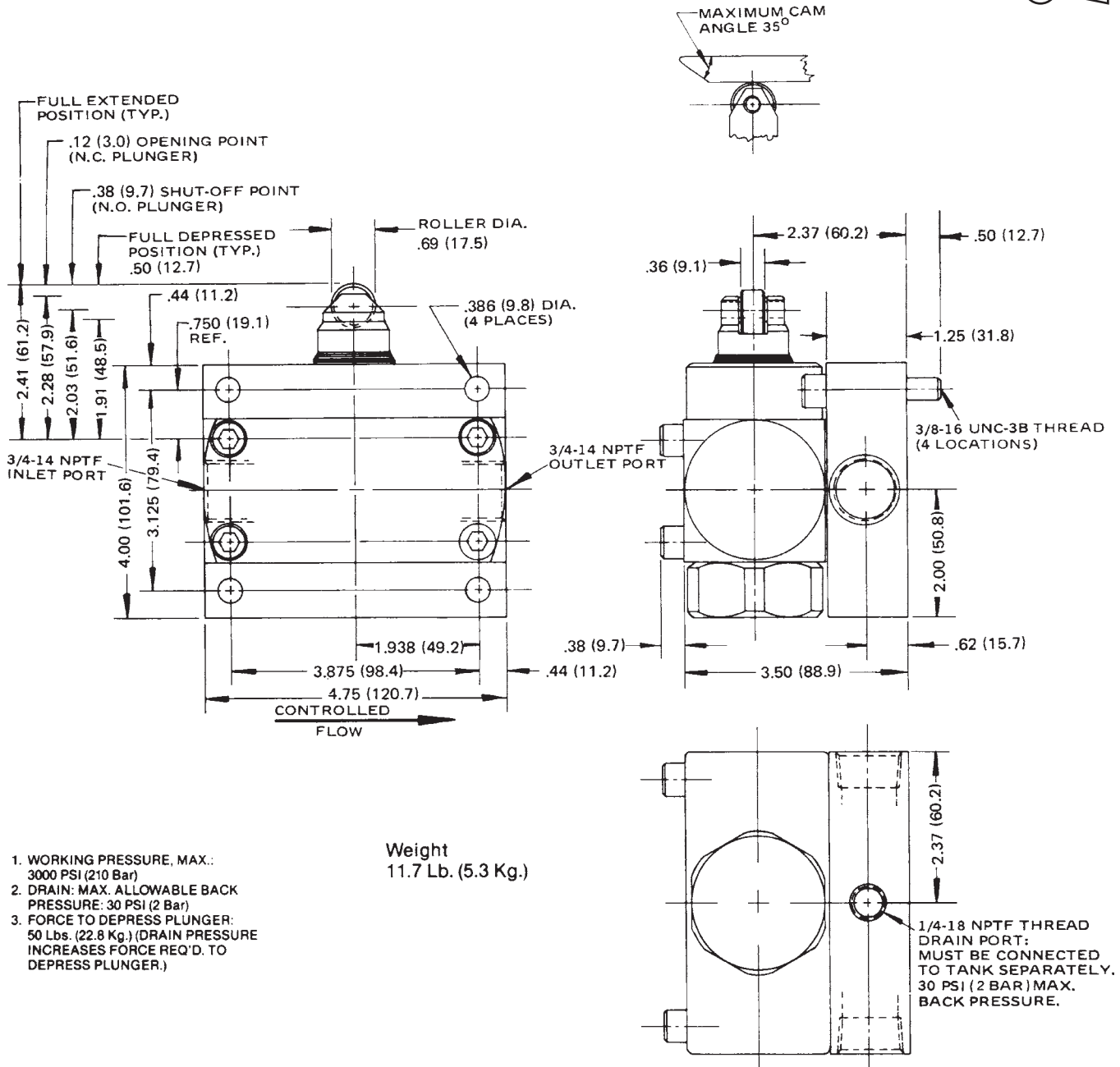
D



Millimeter equivalents for inch dimensions are shown in (**)

Model DC1200S

In-line mounted Deceleration Valve
 with reverse check



1. WORKING PRESSURE, MAX.: 3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER: 50 Lbs. (22.8 Kg.) (DRAIN PRESSURE INCREASES FORCE REQ'D. TO DEPRESS PLUNGER.)



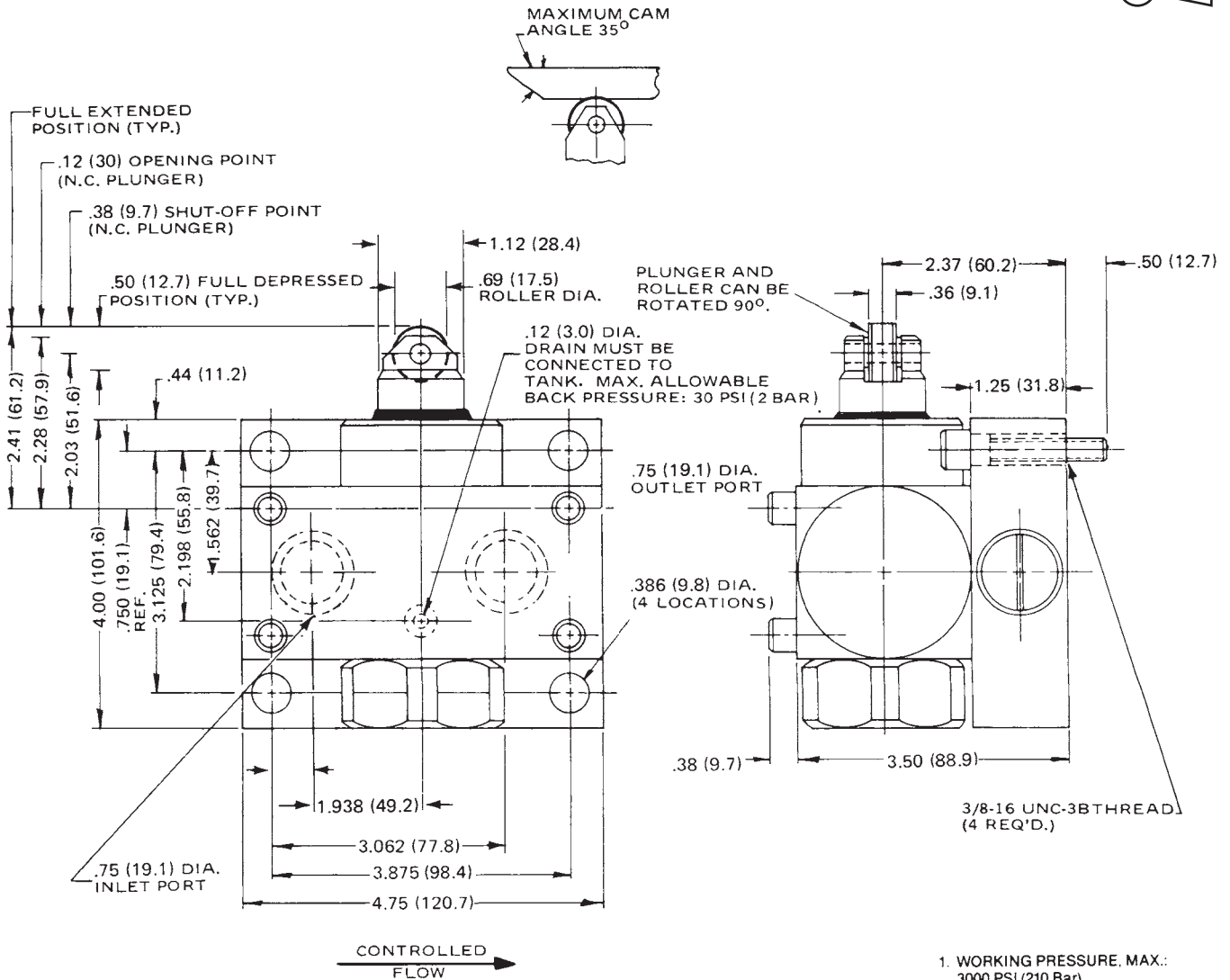
Millimeter equivalents for inch dimensions are shown in (**)

Model DCS1200S

Manifold mounted Deceleration Valve
with reverse check



D

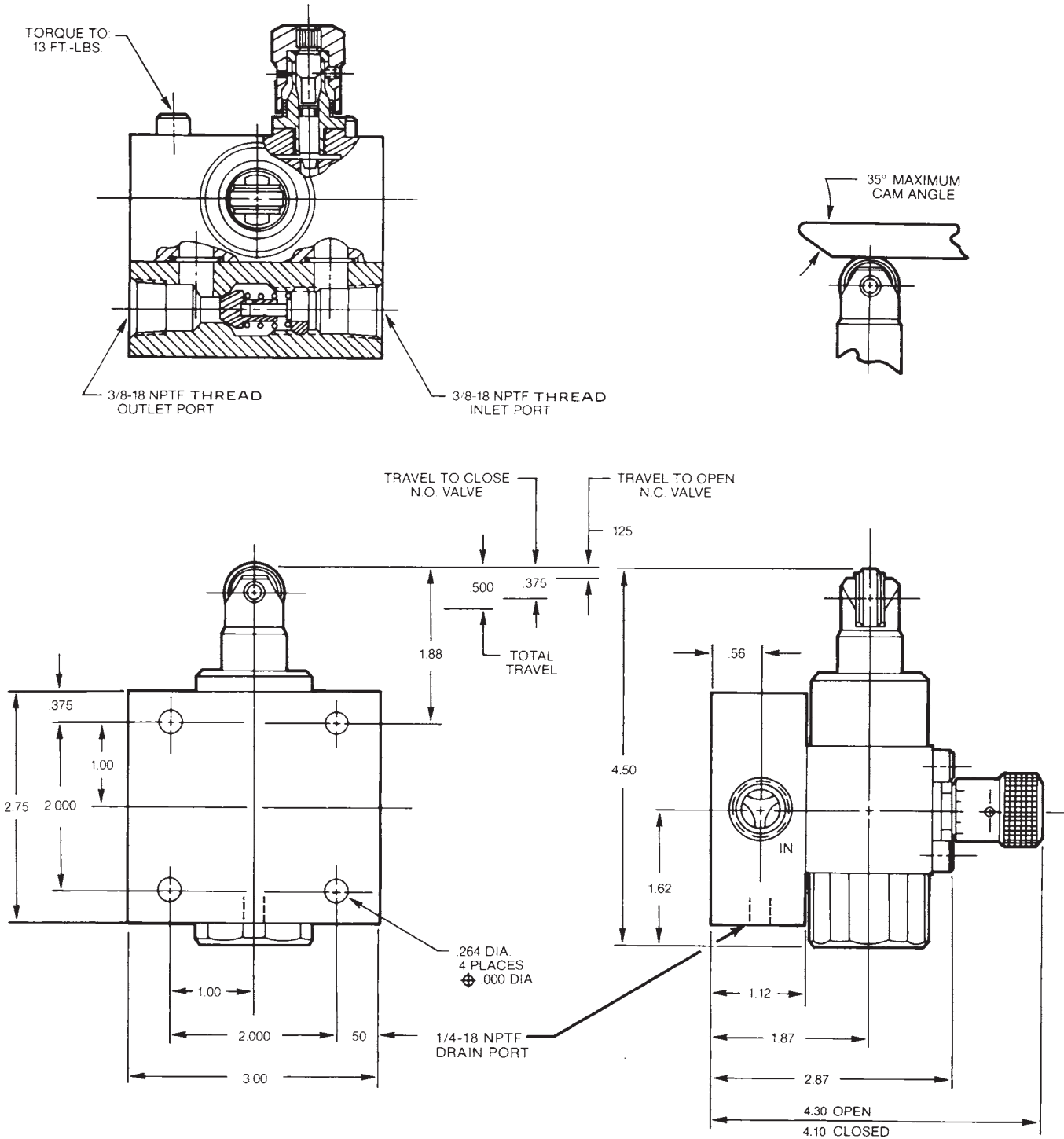


1. WORKING PRESSURE, MAX.: 3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER: 50 Lbs. (22.8 Kg.) (DRAIN PRESSURE INCREASES FORCE REQ'D. TO DEPRESS PLUNGER.)

Dimensions are shown in inches

Model DF600S

In-line mounted Deceleration Valve
with reverse check and bypass needle



D

Millimeter equivalents for inch dimensions are shown in (**)

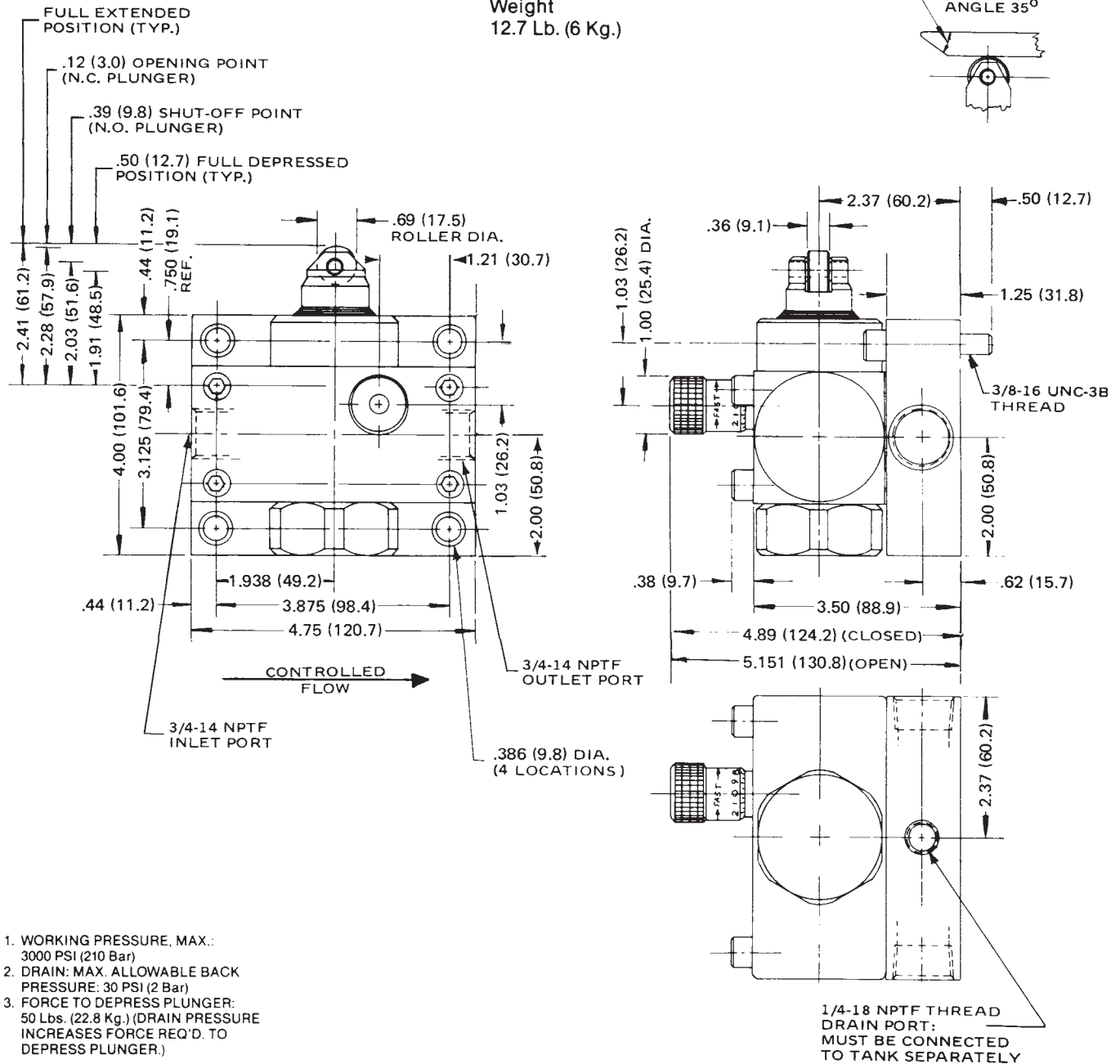
Model DF1200S

In-line mounted Deceleration Valve
with reverse check and bypass needle



Weight
12.7 Lb. (6 Kg.)

D



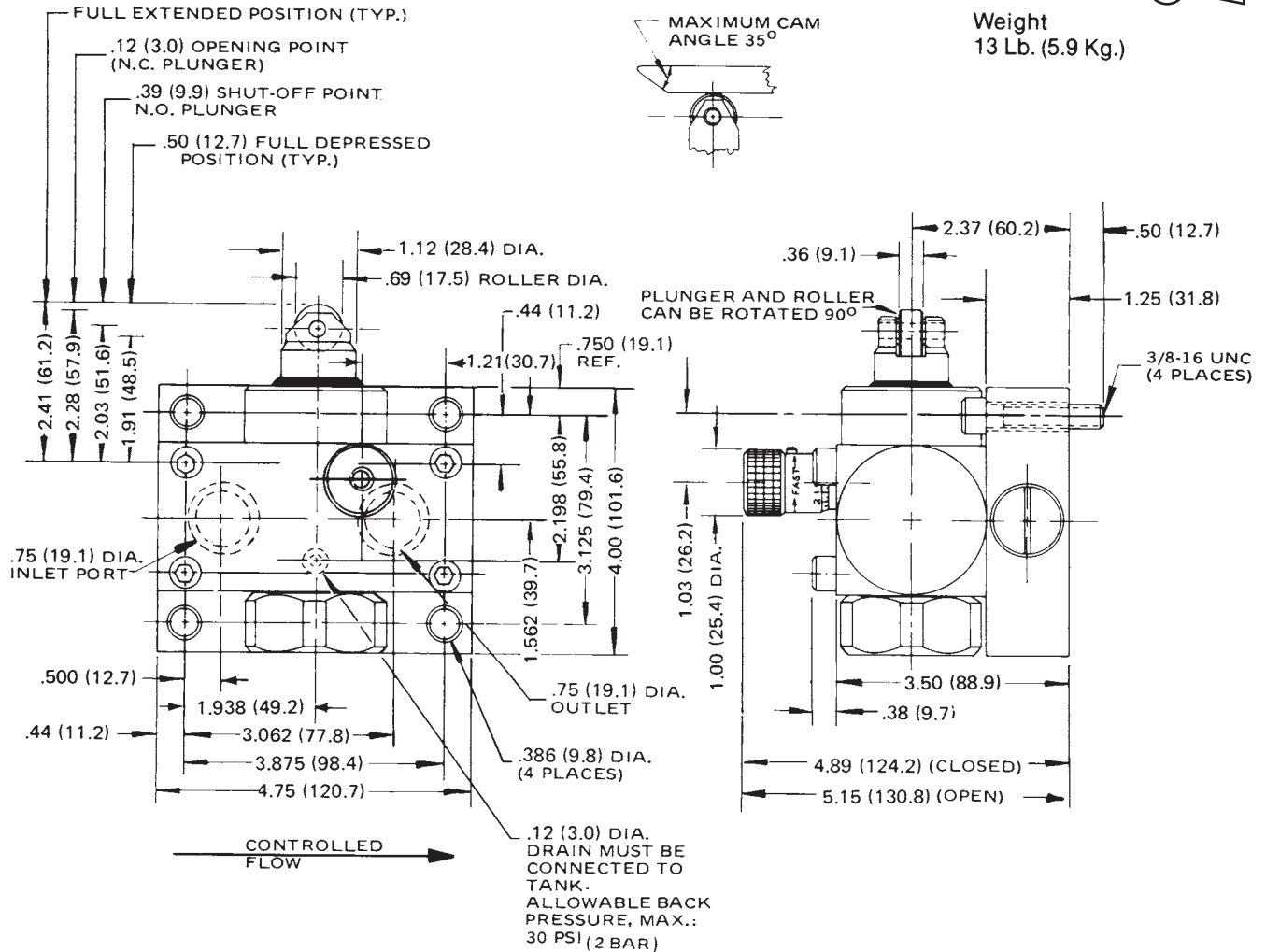
Millimeter equivalents for inch dimensions are shown in (**)

Model DFS1200S

Manifold mounted Deceleration Valve
with reverse check and bypass needle



Weight
13 Lb. (5.9 Kg.)



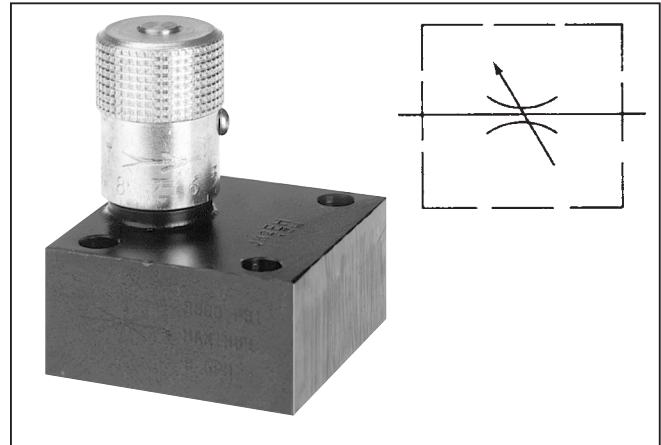
1. WORKING PRESSURE, MAX.: 3000 PSI (210 Bar)
2. DRAIN: MAX. ALLOWABLE BACK PRESSURE: 30 PSI (2 Bar)
3. FORCE TO DEPRESS PLUNGER: 50 Lbs. (22.8 Kg.) (DRAIN PRESSURE INCREASES FORCE REQ'D. TO DEPRESS PLUNGER.)

General Description

Series NS needle valves provide excellent speed control and shutoff for hydraulic applications where a reverse-flow check valve is not required. They also take minimum space for installation, conserving space.

The two-step needle valve allows fine tuning at low flow with the first three turns of the adjusting knob, with full-open flow plus conventional precision throttling with the final three turns of the knob.

Exclusive “Colorflow” color bands permit fast, accurate setting and time-saving return to a previous setting.



Features

- The exclusive “Colorflow” color-band reference scale on the valve stem is a great convenience and time-saver in setting the valve originally and in returning it to any previous setting.
- A simple set screw locks the valve on any desired setting.

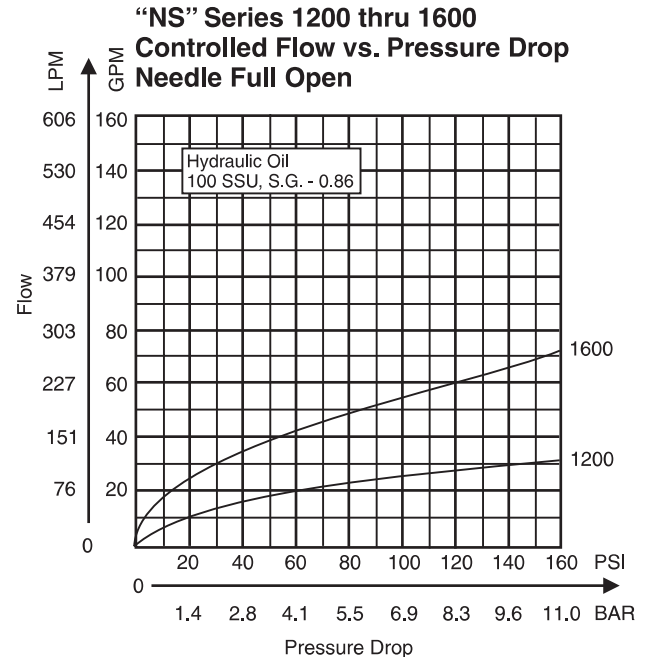
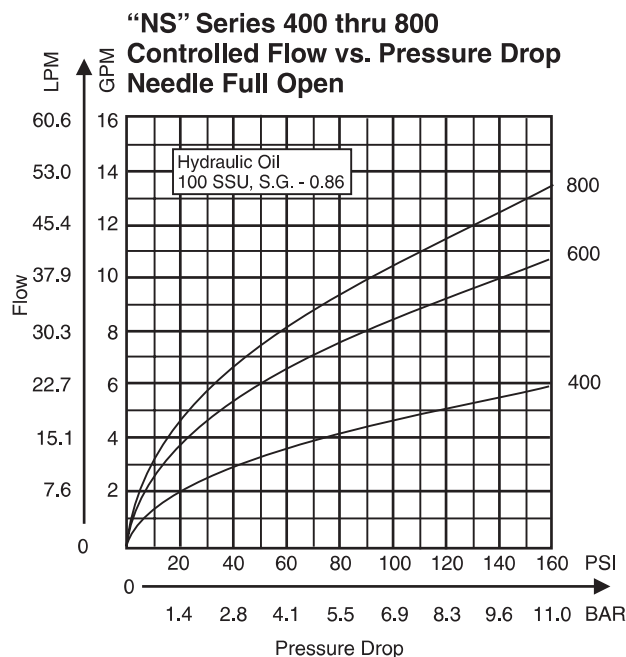
Flow Data

Valve Model	Flow, Max. GPM (L/M)	Orifice Area Control Flow (Sq. In.)	Effective Control Flow CV	Port Size
NS400	5 (19)	.0194	.443	1/4
NS600	8 (30)	.0344	.787	3/8
NS800	15 (57)	.0427	.976	1/2
NS1200	25 (95)	.1080	2.470	3/4
NS1600	40 (151)	.2300	5.250	1

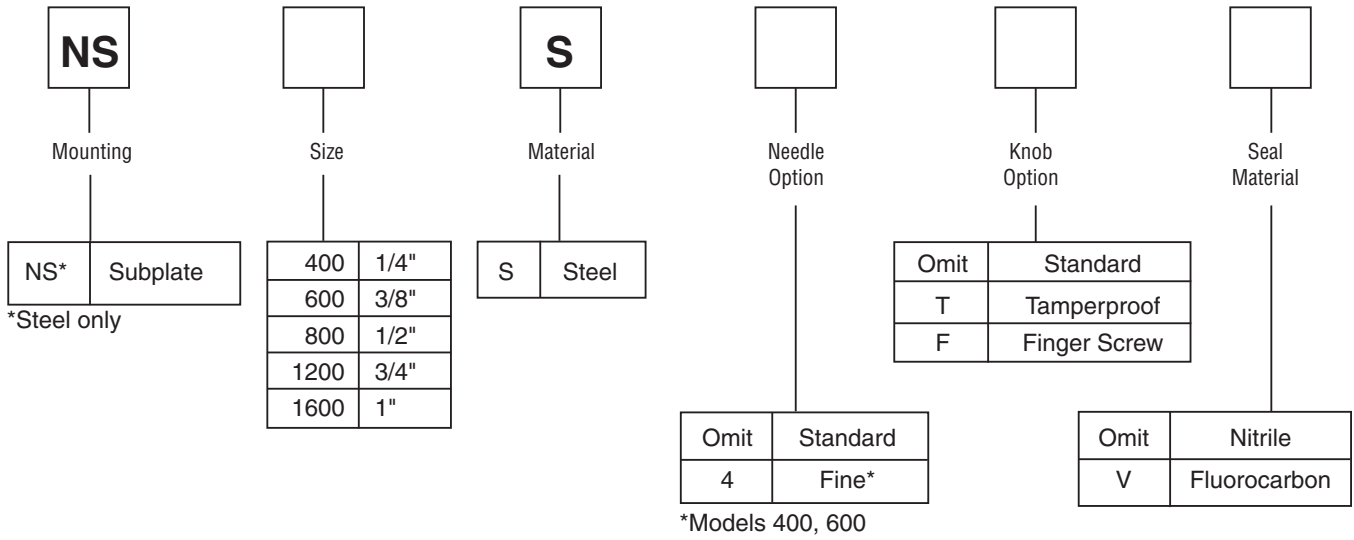
D Specifications

Maximum Operating Pressure	210 Bar (3000 PSI)
Needles	Standard Needle on all models Fine needle optional on Models NS400 and NS600
Nominal Flow	D600 37.9 LPM (10 GPM) D1200 132.5 LPM (35 GPM)
Port Configurations	See dimensional drawings and/or ordering information for configuration availability

Performance Curves



3000-D1.p65, dd

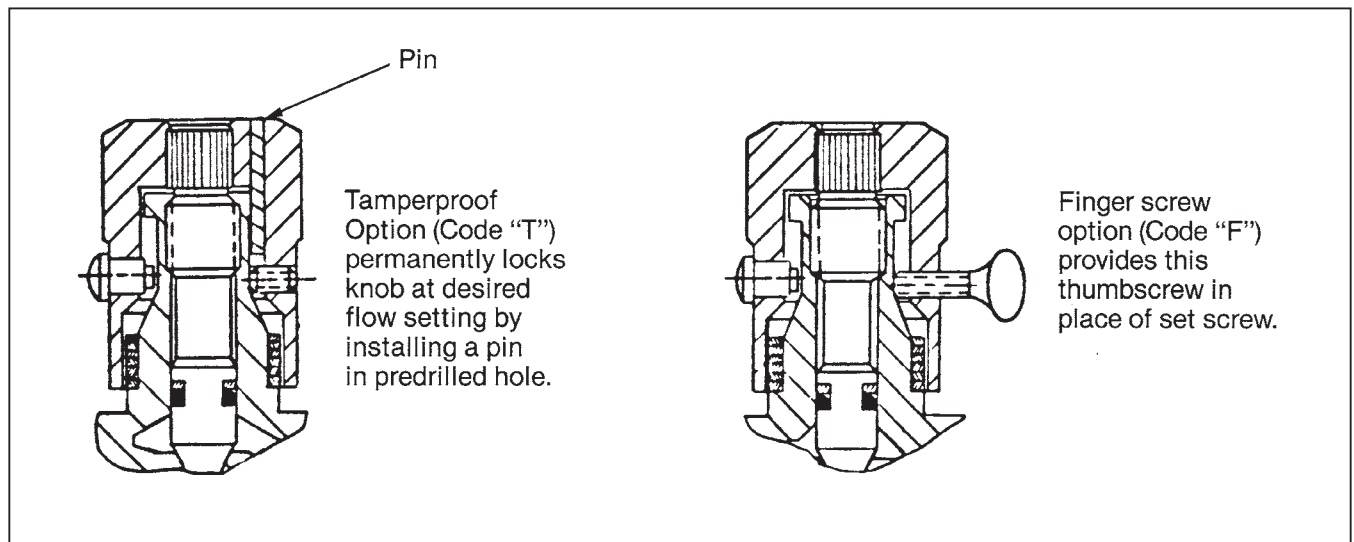


Bolt Kits

Valve	Bolt Kit	Bolt Specification*	Bolt Torque
NS400	BK01	1/4-20 x 1-1/4"	9 Ft.-Lbs.
NS600	BK02	1/4-20 x 1-1/2"	9 Ft.-Lbs.
NS800	BK02	1/4-20 x 1-1/2"	9 Ft.-Lbs.
NS1200	BK05	5/16-18 x 1-3/4"	19 Ft.-Lbs.
NS1600	BK08	5/16-18 x 2-1/4"	19 Ft.-Lbs.

*Use SAE Grade 8 or Better.

Knob Options



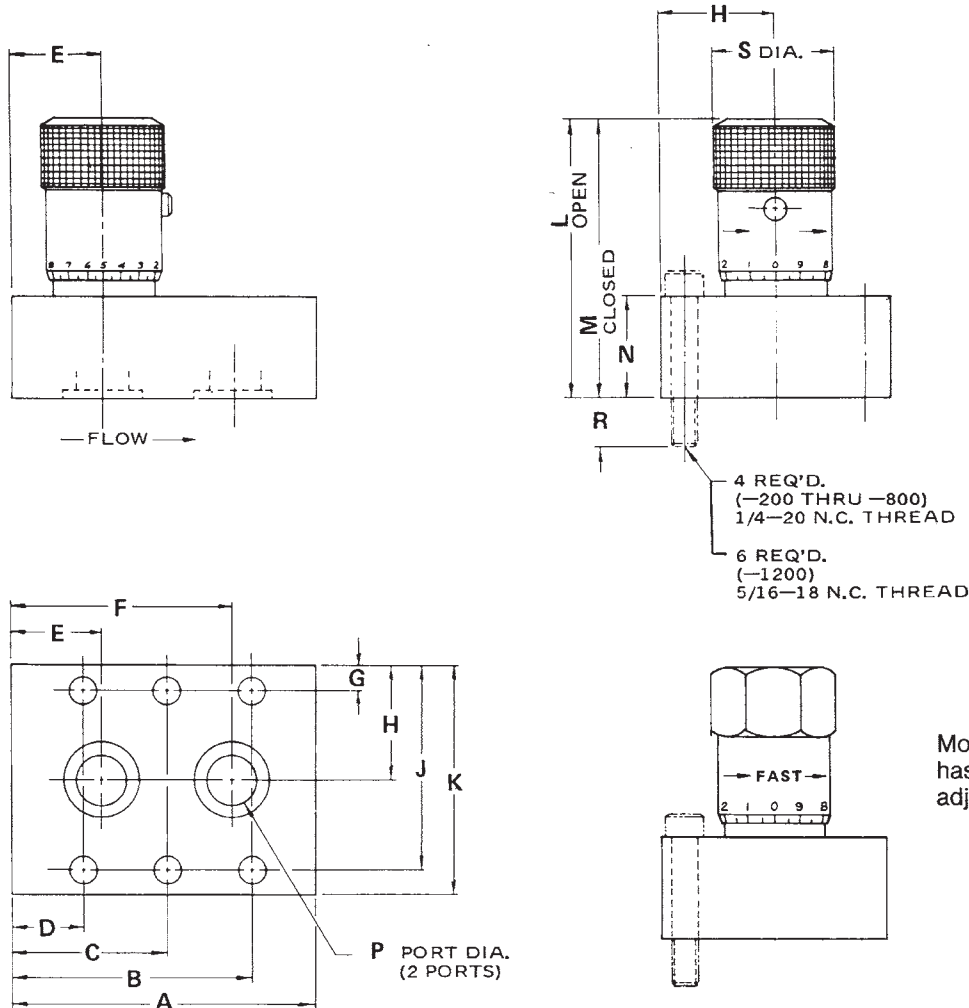
Millimeter equivalents for inch dimensions are shown in (**)

Models NS400S through NS1600S

Manifold mounted Needle Valves



D



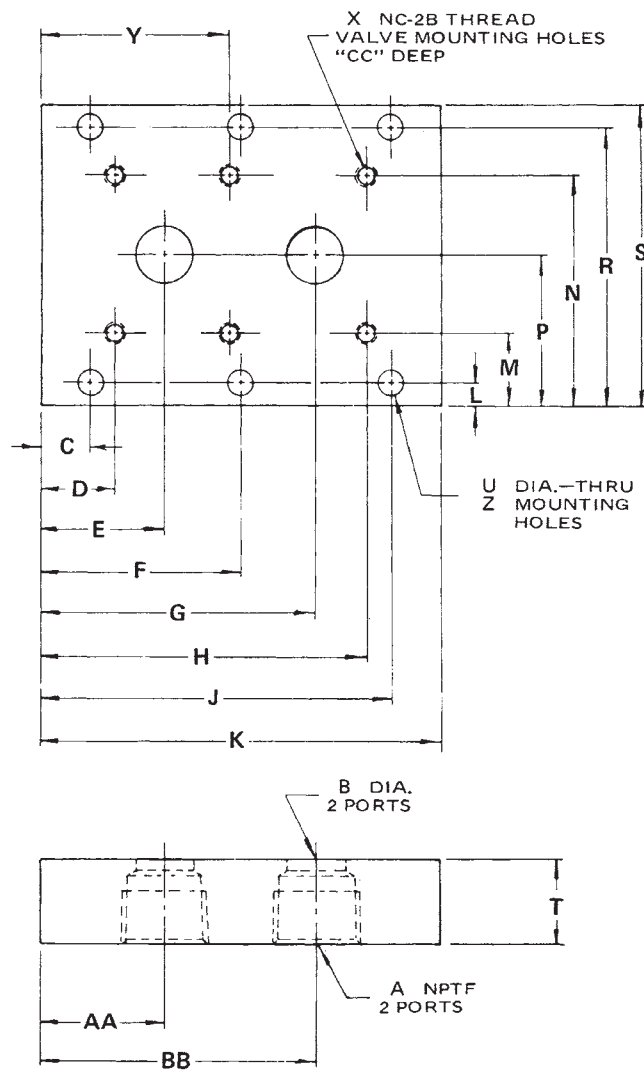
Valve Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	Weight Lb. (Kg)
NS400S	1.88 (47.8)	1.62 (41.1)		.25 (6.4)	.44 (11.2)	1.44 (36.6)	.22 (5.6)	.88 (22.4)	1.53 (38.9)	1.75 (44.5)	2.15 (54.6)	1.95 (49.5)	.88 (22.4)	.28 (7.1)	.44 (11.2)	.81 (20.6)	0.8 (0.4)
NS600S	2.00 (50.8)	1.66 (42.2)		.34 (8.6)	.50 (12.7)	1.50 (38.1)	.25 (6.4)	1.00 (25.4)	1.75 (44.5)	2.00 (50.8)	2.65 (67.3)	2.40 (61.0)	1.00 (25.4)	.34 (8.6)	.50 (12.7)	1.00 (25.4)	1.3 (0.6)
NS800S	2.97 (75.4)	2.23 (56.6)		.73 (18.5)	.89 (22.6)	2.08 (52.8)	.25 (6.4)	1.12 (28.4)	2.00 (50.8)	2.25 (57.2)	3.04 (77.2)	2.75 (69.9)	1.00 (25.4)	.47 (11.9)	.50 (12.7)	1.18 (30.0)	2.3 (1.0)
NS1200S	3.69 (93.7)	3.34 (84.8)	1.84 (46.7)	.34 (8.6)	.78 (19.8)	2.92 (74.2)	.31 (7.9)	1.38 (35.1)	2.44 (62.0)	2.75 (69.9)	3.72 (94.5)	3.13 (79.3)	1.12 (28.4)	.66 (16.8)	.63 (16.0)	1.37 (34.8)	3.7 (2.0)
NS1600S	4.38 (111.3)	4.06 (100.1)	2.19 (55.6)	.31 (7.9)	1.06 (26.9)	3.31 (84.1)	.31 (7.9)	1.50 (38.1)	2.69 (68.3)	3.00 (76.2)	5.51 (140.0)	4.85 (123.2)	1.75 (44.5)	.88 (22.4)	.50 (12.7)	1.87 (47.5)	8.0 (4.0)

Millimeter equivalents for inch dimensions are shown in (**)

Subplate

Reference Data Only

(Subplates are not available)



	Valve Series				
	NS -400	NS -600	NS -800	NS -1200	NS -1600
NPTF Port Size	1/4	3/8	1/2	3/4	1
B	.281 (7.1)	.406 (10.3)	.469 (11.9)	.656 (16.7)	.875 (22.2)
C	.375 (9.5)	.375 (9.5)	.500 (12.7)	.344 (8.7)	.344 (8.7)
D	.562 (14.3)	.843 (21.4)	.875 (22.2)	.750 (19.1)	1.125 (28.6)
E	.750 (19.1)	1.000 (25.4)	1.031 (26.2)	1.188 (30.2)	1.875 (47.6)
G	1.750 (44.5)	2.000 (50.8)	2.219 (56.4)	3.312 (84.1)	4.125 (104.8)
H	1.938 (49.2)	2.156 (54.8)	2.375 (60.3)	3.750 (95.3)	4.875 (123.8)
J	2.125 (54.0)	2.625 (66.7)	2.750 (69.9)	4.156 (105.6)	5.656 (143.6)
K	2.50 (63.5)	3.00 (76.2)	3.25 (82.6)	4.50 (114.3)	6.00 (152.4)
L	.344 (8.7)	.250 (6.4)	.438 (11.1)	.344 (8.7)	.344 (8.7)
M	.844 (21.4)	.750 (19.1)	1.125 (28.6)	1.062 (27.0)	1.062 (27.0)
N	2.156 (54.8)	2.250 (57.2)	2.875 (73.0)	3.188 (81.0)	3.438 (87.3)
P	1.500 (38.1)	1.500 (38.1)	2.000 (50.8)	2.125 (54.0)	2.250 (57.2)
R	2.656 (67.5)	2.750 (69.9)	3.562 (90.5)	3.906 (99.2)	4.156 (105.6)
S	3.00 (76.2)	3.00 (76.2)	4.00 (101.6)	4.25 (108.0)	4.50 (114.3)
T	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.125 (28.6)	1.250 (31.8)
U	.281 (7.1)	.281 (7.1)	.359 (9.1)	.422 (10.7)	.422 (10.7)
X	1/4-20	1/4-20	1/4-20	5/16-18	5/16-18
Y	—	—	—	2.250 (57.2)	3.000 (76.2)
Z	4 Holes	4 Holes	4 Holes	6 Holes	6 Holes
AA	.750 (19.1)	1.000 (25.4)	1.031 (26.2)	1.188 (30.2)	1.875 (47.6)
BB	1.750 (44.5)	2.000 (50.8)	2.219 (56.4)	3.312 (84.5)	4.125 (104.8)
CC	.505 (12.8)	.525 (13.3)	.525 (13.3)	.525 (13.3)	.525 (13.3)

