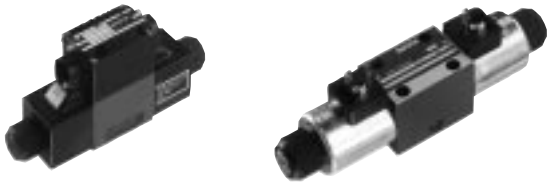
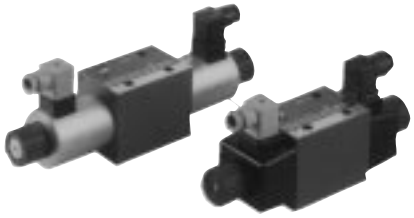
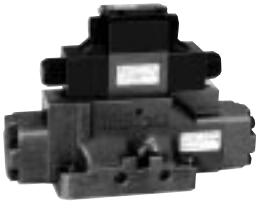
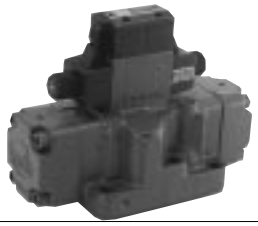
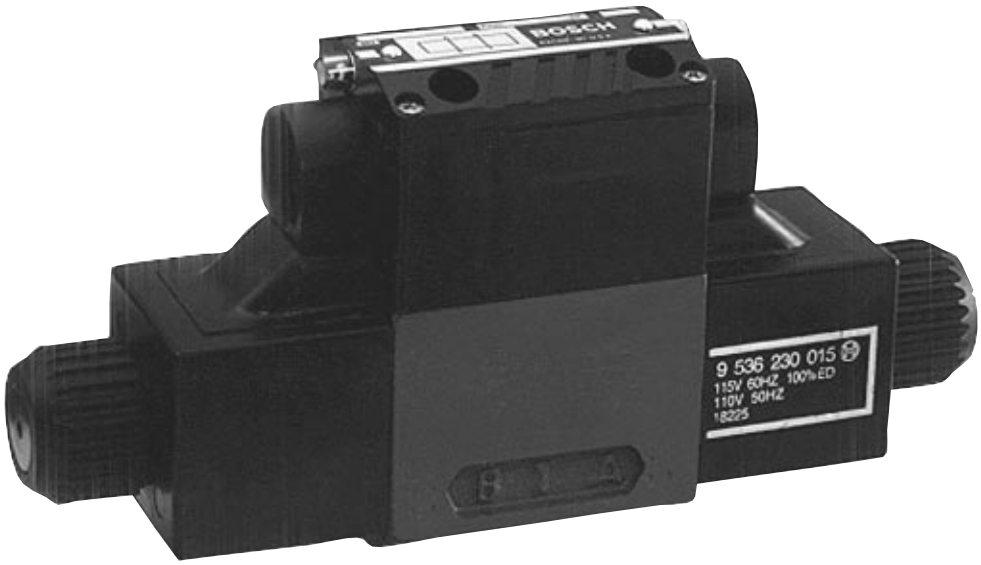
Rexroth
Bosch Group

Directional Control Valves NG6...NG25

Industrial Hydraulics

Index

	DO3 (NG6)	Page 2 to 22
	D05 (NG10)	Page 23 to 42
	D05 (NG10)	Page 43 to 52
	D07 (NG16)	Page 53 to 64
	D08 (NG25) 3000 PSI	Page 65 to 75
	D08 (NG25) 4600 PSI	Page 76 to 87
 OBSOLETE PRODUCT NOT ALL PARTS AVAILABLE	D10 (NG32) 3000 PSI	Page 88 to 96
	Accessories	Page 97 to 100



Features and Benefits

- ☐ **3 chamber design with additional spool guide for high performance**
- ☐ **Wet pin solenoid with increased solenoid forces**
- ☐ **Optimized flow passages result in lower pressure drop**
- ☐ **Manual override**
- ☐ **Solenoid identification per ANSI (energize A results in pressure to A)**
- ☐ **Certified**

Order Guide

This order code describes the desired model variances of the DO3 (NG 6) directional control valves. Standard models are assigned a 10-digit number. See pages 4, 5, & 6.

0	8	1	W	V	0	6	P	1	V	1	0	0	1	WS**	S	1	1	5	/	6	0	-	"D"	51	

SIZE
06 – D03 (NG 6, ISO - 4401)

SEALS
V – VITON STD.

CONTROL TYPE

1 ELECTRICAL 

2 HYDRAULIC PILOT 

4 MECHANICAL (ROLLER) 

6 PNEUMATIC PILOT 

7 MANLEVER 

7 MANUAL LEVER (WITH DETENT G AT**)

SPOOL CODE
*** – SEE SPOOL CHART (PAGES 4, 5 & 6)

ELECTRICAL CONNECTIONS
WS–DIN 43650/ISO4400
KL –WIRING BOX + SENTINAL LIGHTS
KA –WIRING BOX ONLY
KD –WIRING BOX + QUICK CONNECTOR, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KE –WIRING BOX + QUICK CONNECTOR + SENTINEL LIGHTS, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KG –WIRING BOX + QUICK CONNECTOR (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
KM –WIRING BOX + QUICK CONNECTOR + SENTINAL LIGHTS (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
G –DETENT CONTROL TYPE 7 ONLY
EX –FLAME PROOF

SOLENOID VOLTAGES

AC	DC
115/60	012/00
230/60	024/00
Series "D" Dual Freq.	096/00

ADDITIONAL INFORMATION
09 – MANUAL PUSH PIN WITH RUBBER COVER
11 – SPOOL WITH METERING NOTCHES

SOLENOID IDENTIFICATION
51 – U.S. STANDARD (U.S. ANSI B93.9 STD.)

DESIGN SERIES
D - STD
*E - 24 VDC LEAD WIRE COILS

SOLENOID OPTIONS
OMIT: If standard (manual override)
C – COVERED PUSH PIN

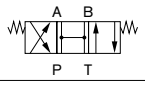
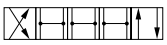
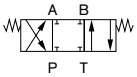
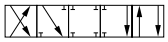
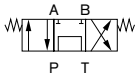
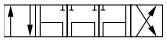
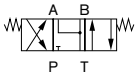
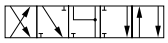
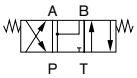
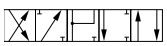
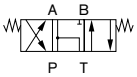
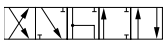
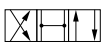
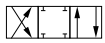
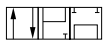
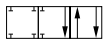
* QUICK CONNECT FOR E SERIES IS MINI CONNECTOR (PG 99)

Product Literature Disclaimer

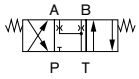
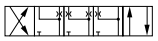
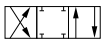
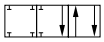
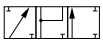
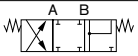
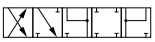
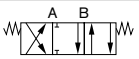
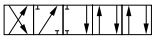
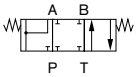
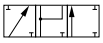
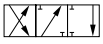
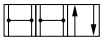
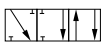
SPECIFICATIONS AND/OR DIMENSIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE. PLEASE CONSULT FACTORY.

Part Numbers

Standard types are assigned a 10-digit part number. Describe unassigned valve combinations with the alpha-numeric order code.

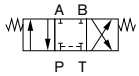
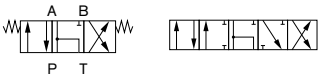
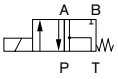
			9 810 231 …							
			KA – WIRING BOX **KD –** WIRING BOX + QUICK CONNECT (3 PIN SING. & 5 PIN DBL. SOL.) **KE –** WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS **KG –** WIRING BOX + QUICK CONNECT (SINGLE SOLENOID 5 PIN) **KL –** WIRING BOX + SENTINEL LIGHTS **KM –** WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS (SINGLE SOL. 5 PIN) **WS –** PLUG CONNECTER (DIN 43650 / ISO 4400) **D11 –** SPOOL WITH METERING NOTCHES*							
			KA	**KD**	**KE**	**KG**	**KL**	**KM**	**WS**	**WS**
SPOOL NO.	SYMBOLS	TRANSITION	110/115 220/230 024/00	110/115 220/230	110/115 220/230 024/00	110/115 220/230	110/115 220/230 024/00	110/115 220/230 024/00	110/115 220/230	12 VDC. 24 VDC. 96 VDC.
000			**069** **102** **714**	**201** **234**	**267** **300** **484**		**135** **168**		**003** **036**	**397** **430****
001			**070** **103** **511**	**202** **235**	**268** **301** **477**		**136** **169** **581**		**004** **037**	**398** **431** **769**
001*			**463**				**512**			**521**
002			**071** **104** **531**	**203** **236**	**269** **302** **492**		**137** **170** **580**		**005** **038**	**399** **432** **754**
002*			**464** **513**							
004			**072** **105** **497**	**204**** **237**	**270** **303** **478**		**138** **171** **516**		**006** **039**	**400** **433** **571**
004*			**465**							
005			**073** **106**	**205** **238**	**271** **304**		**139** **172**		**007** **040**	**401** **434**
006			**074** **107**	**206** **239**	**272** **305**		**140** **173**		**008** **041**	**402** **435**
010			**075** **108** **508**	**207** **240**	**273** **306**	**333** **349**	**141** **174** **552**	**365** **381** **491**	**009** **042**	**403** **436**
011*			**076** **109**	**208** **241**	**274** **307** **487**	**334** **350**	**142** **175**	**366** **382**	**010** **043**	**404** **437** **560**
012			**077** **110** **767**	**209** **242**	**275** **308** **681**	**335** **351**	**143** **176** **551**	**367** **383** **480**	**011** **044**	**405** **438**
014			**078** **111** **649**	**210** **243**	**276** **309**	**336** **352**	**144** **177**	**368** **384** **579**	**012** **045**	**406** **439** **759**
016			**079** **112**	**211** **244**	**277** **310**	**337** **353**	**145** **178**	**369** **385**	**013** **046**	**407** **440**

* Metering notches
** Consult factory

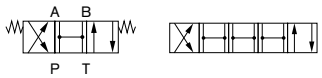
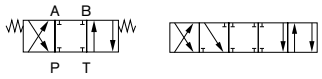
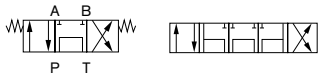
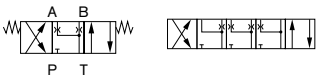
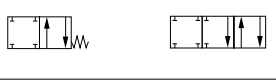
SPOOL NO.	SYMBOLS	TRANSITION	KA 110/115 220/230 024/00	KD 110/115 220/230	KE 110/115 220/230 024/00	KG 110/115 220/230	KL 110/115 220/230 024/00	KM 110/115 220/230 024/00	WS 110/115 220/230	WS 12 VDC. 24 VDC. 96 VDC.
018			**080** **113** **766**	**212** **245**	**278** **311** **479**		**146** **179** **517**		**014** **047**	**408** **441**
018*			**468**						**634**	**689** **684**
020			**081** **114**	**213** **246**	**279** **312** **481**		**147** **180** **518**		**015** **048**	**409** **442** **572**
024			**082** **115****	**214**** **247****	**280**** **313**** **525**	**338**** **354****	**148** **181**	**370**** **386****	**016** **049**	**410** **443** **642**
026			**083** **116**	**215**** **248****	**281**** **314****		**149** **182**		**017** **050****	**696** **444**
027			**084** **117****	**216**** **249****	**282** **315****	**339**** **355****	**150** **183****	**371**** **387****	**018** **051**	**412** **445**
028			**474**		**652**		**475**	**637**	**496**	**656** **677**
031			**085** **118****	**217**** **250****	**283** **316****	**340**** **356****	**151** **184****	**372**** **388****	**019** **052****	**413** **446**
032			**086** **119****	**218**** **251****	**284** **317****	**341**** **357****	**152** **185****	**373**** **389****	**020** **053****	**414** **447**
033			**087** **120**	**219** **252****	**285** **318**** **488**	**342**** **358****	**153** **186****	**374** **390****	**021** **054**	**415** **448**
036			**546**		**678**				**534**	**493**
040			**088** **121****	**220**** **253****	**286**** **319****		**154** **187****		**022** **055****	**695** **449**
041			**089** **122****	**221** **254****	**287**** **320****		**155** **188**		**023** **056****	**417**** **450**
042			**090** **123****	**222** **255**	**288**** **321****		**156**** **189****		**024** **057**	**578** **451**
045			**091** **124****	**223**** **256****	**289** **322**** **667**	**343** **359****	**157** **190****	**375**** **391****	**025** **058****	**419** **452**
062			**092** **125****	**224**** **257****	**290**** **323****		**158**** **191****		**026**** **059**	**420** **453**
068			**093** **126**	**225**** **258****	**291** **324****	**344**** **360****	**159** **192****	**376**** **392****	**027** **060****	**421** **454**
070			**094** **127**	**226** **259****	**292**** **325****	**345**** **361****	**160** **193****	**377**** **393****	**028** **061****	**422**** **455**
074			**095** **128****	**227**** **260****	**293** **326****	**346**** **362****	**161** **194****	**378** **394****	**029** **062****	**423** **456**
087			**096**** **129****	**228**** **261****	**294**** **327****		**162**** **195****		**030**** **063****	**424**** **457**
088			**097**** **130****	**229**** **262****	**295** **328****	**347**** **363****	**163**** **196****	**379**** **395****	**031** **064****	**425**** **458**

* Metering notches
** Consult factory

Part Numbers (continued)

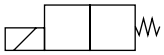
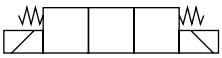
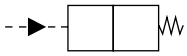
SPOOL NO.	SYMBOLS	TRANSITION	KA 110/115 220/230	KD 110/115 220/230	KE 110/115 220/230	KG 110/115 220/230	KL 110/115 220/230	KM 110/115 220/230	WS 110/115 220/230	WS 12 VDC. 24 VDC. 96 VDC.
089			**472**				**473**		**519**	**489**
091		Pressure port leakage bleeds to tank in the center position	**098*** **131***	**230*** **263**	**296*** **329***		**164*** **197***		**032** **065***	**426** **459**
095			**099*** **132***	**231*** **264***	**297*** **330***		**165*** **198***		**033** **066**	**427*** **460**
923			**100** **133***	**232*** **265***	**298** **331**	**348*** **364***	**166*** **199***	**380** **396***	**034** **067***	**428*** **461**

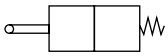
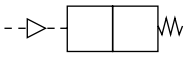
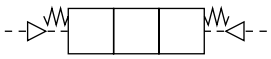
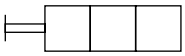
* Consult factory

SPOOL NO.	SYMBOLS	TRANSITION	0 810 091 … 2	4	6	7
000					**365**	**526** **379**
					***372**	
001					**366**	**381** **380**
					373*	
002			**607**		**367**	**383** **382**
004					**368**	**385** **384**
					375*	
010						**387**
			541 **544***	**333** **521****		**386**
012			**358**	**334**	**369**	**389** **388**
			361*		**376***	
014					**370**	
016				**335**		
018						**390**
				336		**–**
020			**359**			
					371	
027						**–**
						391

* With 7/16-20 Ports (SAE #4)
** With position indicator

Weights

	DC AC Ex.	3.3 lbs 3.1 lbs 5.1 lbs	1.5 kg 1.4 kg 2.3 kg
	DC AC Ex.	4.2 lbs 3.8 lbs 8.8 lbs	1.9 kg 1.7 kg 4.0 kg
		2.9 lbs	1.3 kg
		3.3 lbs	1.5 kg

	3.3 lbs	1.5 kg
	2.9 lbs	1.3 kg
	3.3 lbs	1.5 kg
	4.4 lbs	2.0 kg

Characteristics

General	
Design	Spool valve (three chamber system)
Mounting type	Subplate, DO3 (NG 6) – ISO 4401
Mounting Position	as desired (Horizontal preferred)
Ambient temperature	–4 to 120°F (-20 to 50°C)
Seals	Viton
CSA Certified	File Number LR 93267-1

Hydraulic	
Fluid	Premium quality petroleum and water glycol fluids. Refer to the following bulletins for recommendations: S106 - Petroleum Fluids S107 - Fire Resistant Fluids Consult factory for use of water in oil emulsions, high water content and synthentic fluids. Mineral-oil based hydraulic-fluids (DIN/ISO) others on request
Viscosity	60…1600 SUS (10 …350 cSt)
Fluid temperature	–4 to 175°F (–20 to 80°C)
Filtration	Contamination class 19/16, according to ISO 4406 to be realized with filter ß25=75
Direction of flow	As shown on symbol
Operating pressure	Port P, A, B: 4600 PSI (315 bar) Port T* : 3000 PSI (210 bar)
Rated flow	See Δp/Q-curves
Maximum flow	Up to 23 GPM (90 L) see operating limits

* For control type 1 EX 1500 PSI (100 bar)

Electric			
Duty factor	100%		
Solenoid identification	Meets ANSI B93.9 - 1969 (R 1988) Standards		
Enclosure type	*IP 65 to IEC and DIN 40 050 (DIN Connectors)		
Insulation class	C VDE § 5		
Voltage and frequency	See table on page 88 AC-solenoids 230/60 can be used with 220/50 and 115/60 can be used with 110/50 voltage supply		
Voltage tolerance	U_{NOM}±10%		
Power rating DC AC (115/60)	 33W In Rush: ~ 1.5 A	 Holding: ~ 0.54 A	
Response time** DC AC	 Switch-on: 20 to 60 ms Switch-on: 10 to 25 ms	 Switch-off: 10 to 60 ms Switch-off: 50 to 65 ms	
Switching frequency	max. 1800/h		
Power supply	Plug connector to DIN 43 650 ISO 4400	Wiring Box w/ Lead Wires	5 & 3 Pin QC per ANSI B93.55M

*Note: IP 65
→ Protected against low pressure water jets from all direction
→ Dust tight

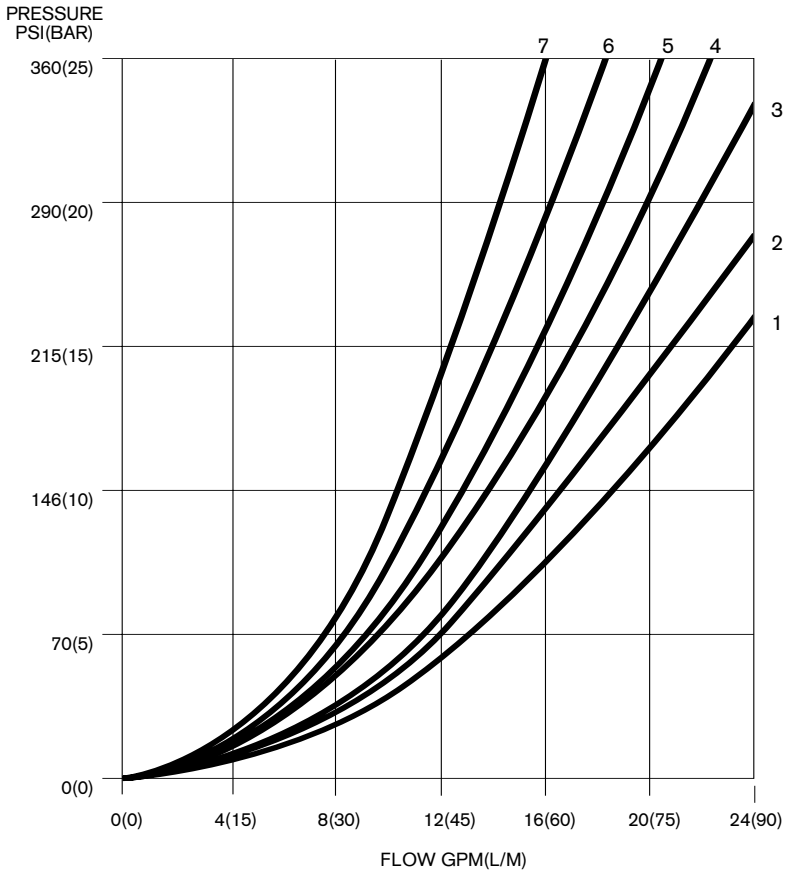
** Response time measured from the switching signal to opening of control edge.

Performance Characteristics

Valve Pressure vs. Flow Performances

Curve Reference Numbers					
Spool Number	Curve Numbers				
	A B	A B	A B		
	P T	P T	P T		
Spool Number	PA	PB	AT	BT	PT
000	1	1	3	1	2
001	2	2	3	3	–
002	7	7	7	7	6
004	2	2	3	1	–
005	4	4	1	1	–
006	5	3	2	3	6
010	2	3	5	4	–
011	4	4	3	3	–
012	3	2	4	5	–
014	3	–	–	4	6
016	2	–	–	3	–
018	2	2	3	3	–
020	2	3	5	4	–
024	2	–	3	–	–
026	2	2	3	3	–
027	3	–	–	3	–
028	2	–	–	1	–
032	2	3	–	–	–
033	1	1	3	1	2
040	2	3	3	–	–
042	2	2	3	3	–
045	–	2	3	–	–
062	4	1	–	1	–
068	3	2	–	–	–
070	–	2	3	3	–
087	2	–	3	–	–
089	1	1	–	4	–
091	6	5	4	2	–

PRESSURE vs. FLOW CURVES



Viscosity = 164 SUS (35 Centistokes)

Performance Characteristics

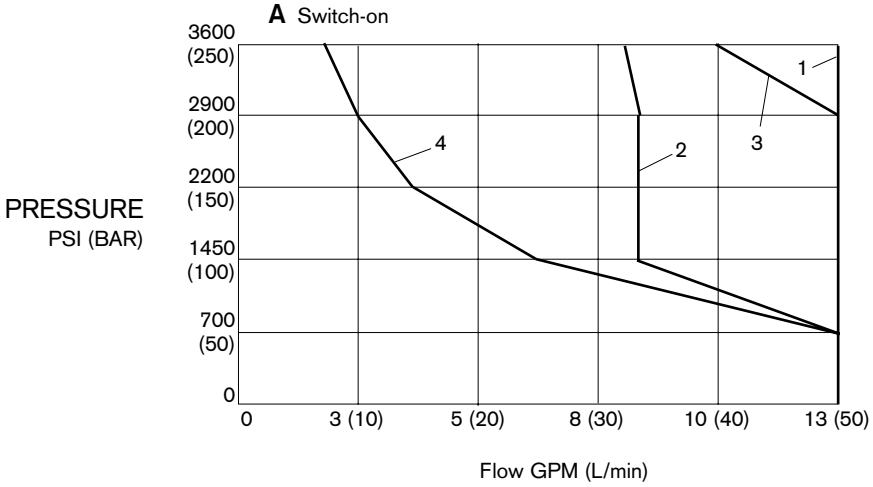
SERIES E

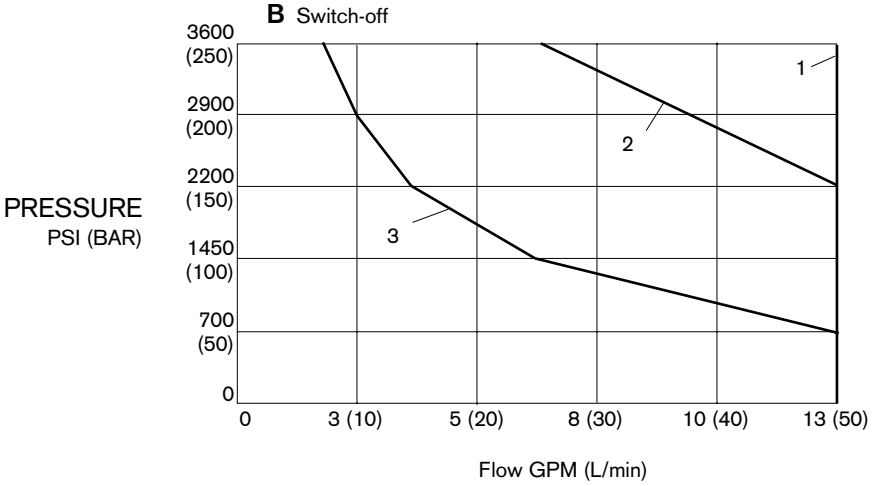
DC Solenoids

Curve Reference Numbers

Spool Number	Curve Numbers (A)	(B)
001	1	1
002	2	2
004	3	1
010	1	1
012	1	1
018	1	1
020	1	1
045	1	1
068	4	3

MALFUNCTION CURVES





Operating limits

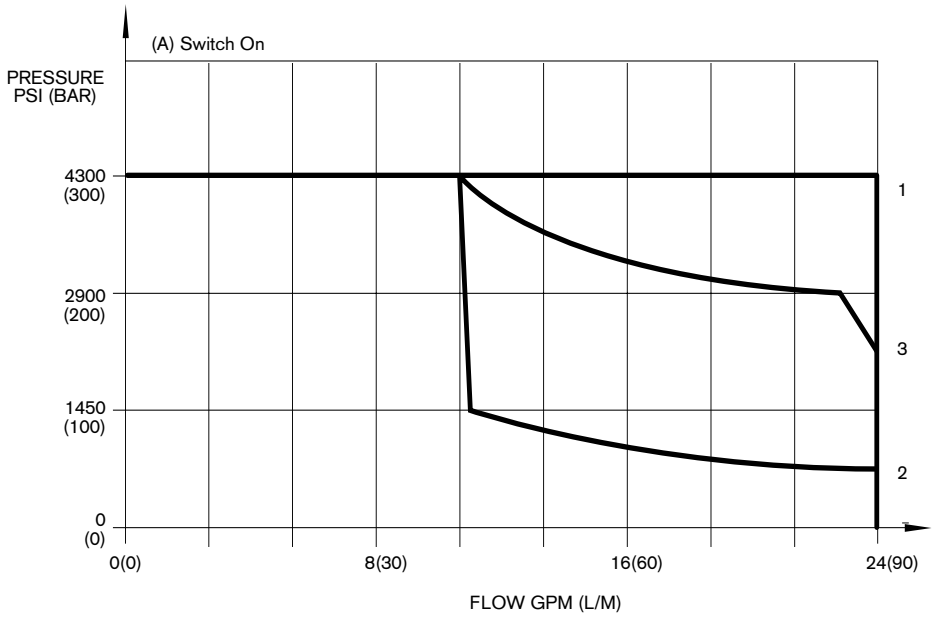
The curves refer to applications with symmetrical flow.
In the case of asymmetric flow (e.g. one port not used) reduced values may result.

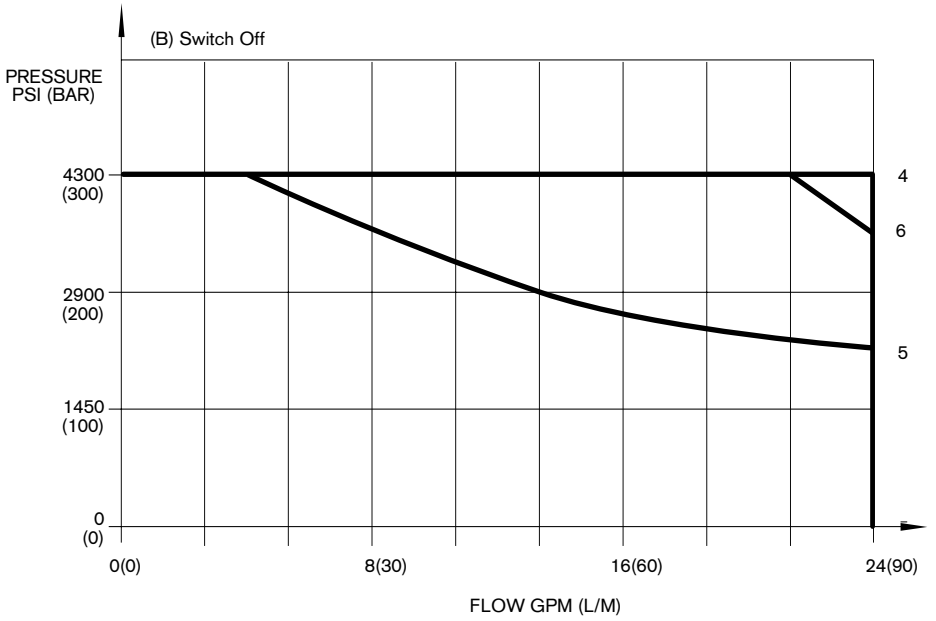
Performance Characteristics

DC-Solenoids

Curve Reference Numbers		
Spool Number	Curve Numbers (A)	(B)
000	1	4
001	1	4
002	2	5
004	3	6
005	1	4
006	–	–
010	1	4
011	–	–
012	1	4
014	2	5
016	1	4
018	1	4
020	1	4
024	3	6
026	3	4
027	–	–
028	3	6
032	–	–
033	1	4
040	–	–
042	3	4
045	1	4
068	–	–
070	–	–
087	–	–
089	–	–
090	–	–
091	–	–

MALFUNCTION CURVES





Operating limits

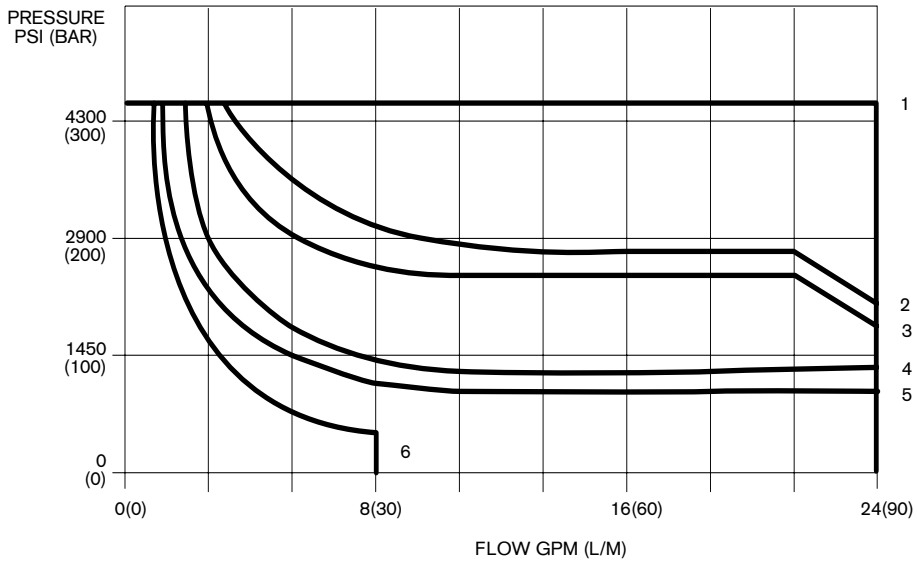
The curves refer to applications with symmetrical flow.
In the case of asymmetric flow (e.g. one port not used) reduced values may result.

Performance Characteristics

AC-Solenoids

Curve Reference Numbers	
Spool Number	Curve Numbers
000	1
001	1
002	4
004	3
005	2
006	–
010	2
011	–
012	2
014	4
016	1
018	2
020	1
024	–
026	2
027	3
028	–
032	5
033	1
040	1
042	–
045	–
062	–
068	5
070	–
087	–
089	–
090	–
091	6

MALFUNCTION CURVES



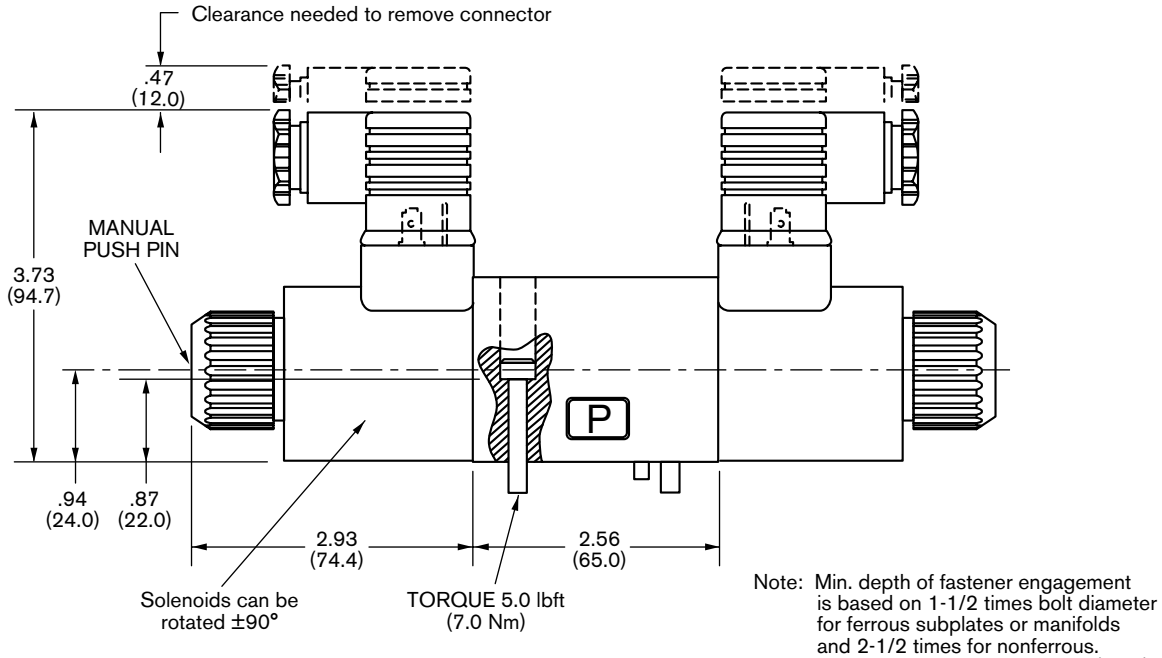
Operating limits

The curves refer to applications with symmetrical flow.
In the case of asymmetric flow (e.g. one port not used) reduced values may result.

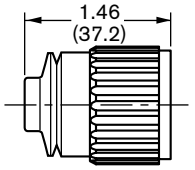
Valve With DC Solenoid DIN

Seal Kit 9 810 231 529

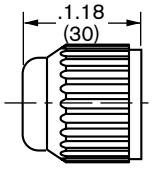
Inches (Millimeters)



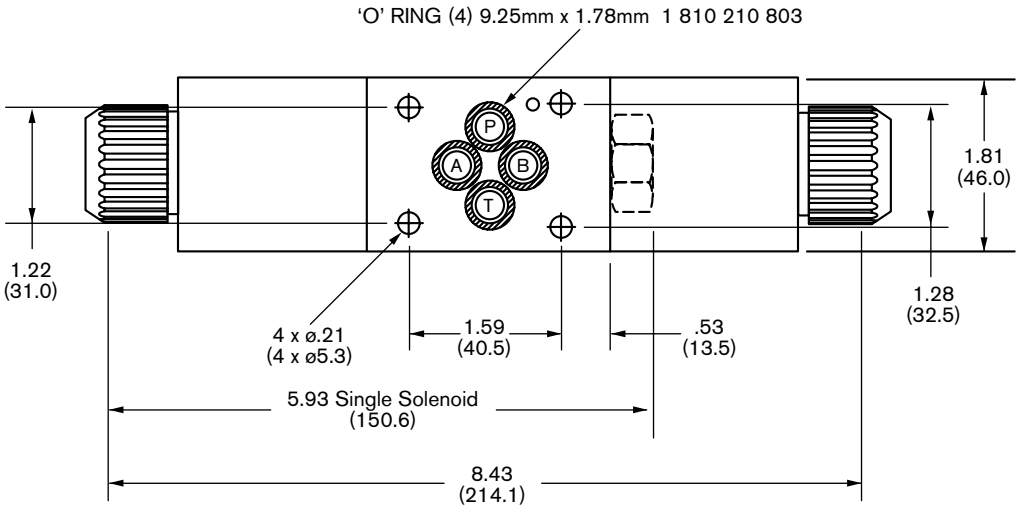
Note: Min. depth of fastener engagement is based on 1-1/2 times bolt diameter for ferrous subplates or manifolds and 2-1/2 times for nonferrous.
Note: Clearance to remove coil 2.93 (74.4)



With Rubber Cover 1 833 343 015



Covered 1 833 343 013

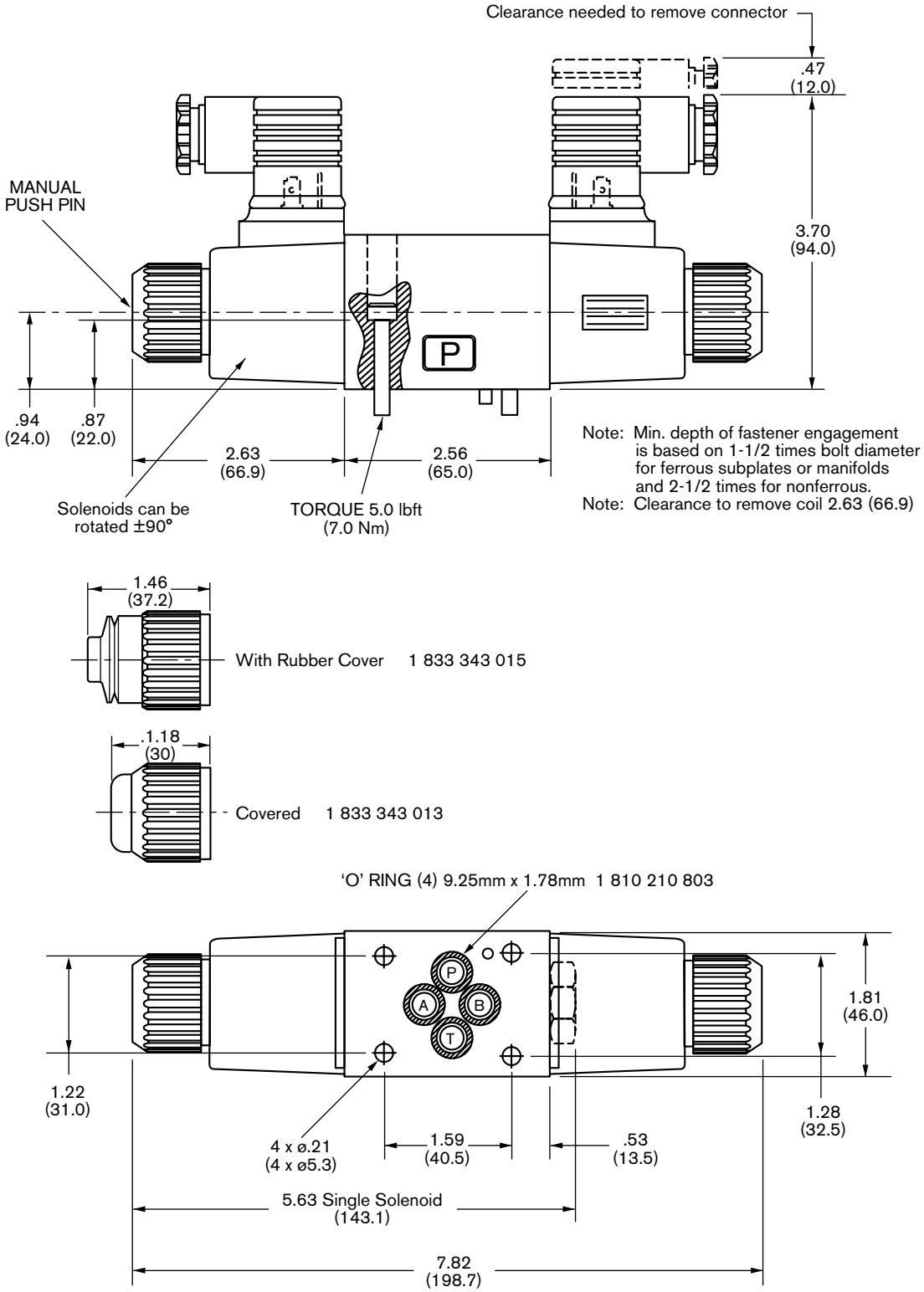


Note: Mounting surface should comply with NFPA T3.5 IM RI-1984 & ANSI B93.7M - 1986 specifications.

Valve With AC Solenoid DIN

Seal Kit 9 810 231 529

Inches (Millimeters)

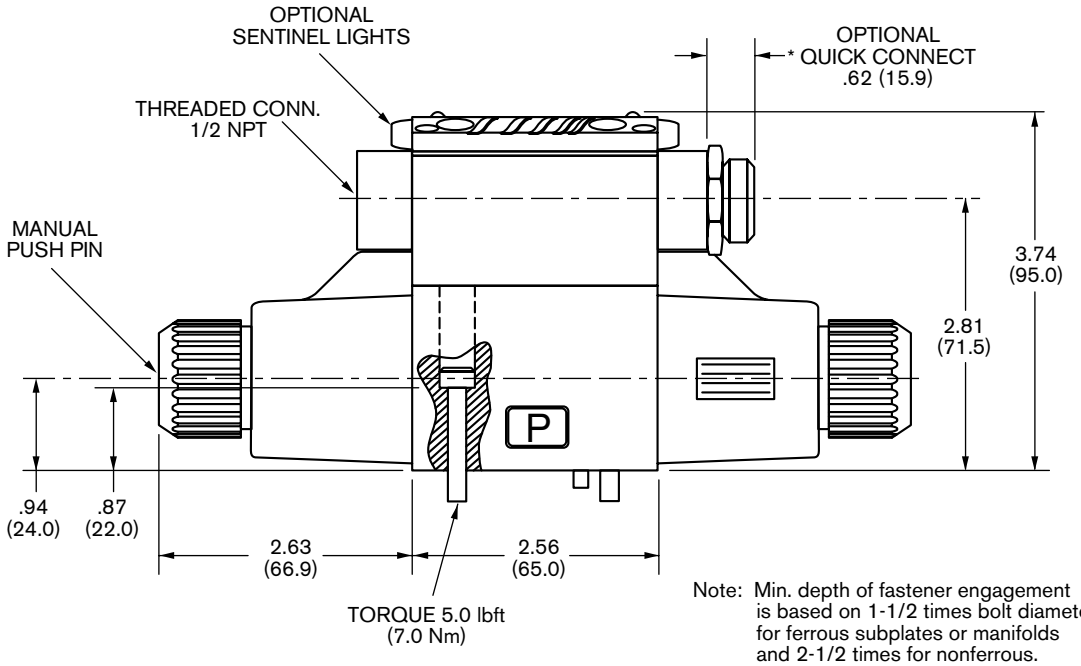


Note: Mounting surface should comply with NFPA T3.5 IM RI-1984 & ANSI B93.7M - 1986 specifications.

Valve with AC/DC Solenoid and Wiring Box

Seal Kit 9 810 231 529

Inches (Millimeters)

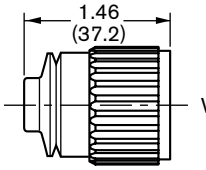


* SEE ACCESSORY SECTION FOR DETAILS

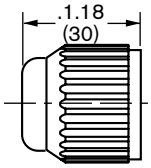
Note: Min. depth of fastener engagement is based on 1-1/2 times bolt diameter for ferrous subplates or manifolds and 2-1/2 times for nonferrous.

Note: Brad Harrison connector installed on cylinder port B side on double solenoid valves and on solenoid side on single solenoid valves.

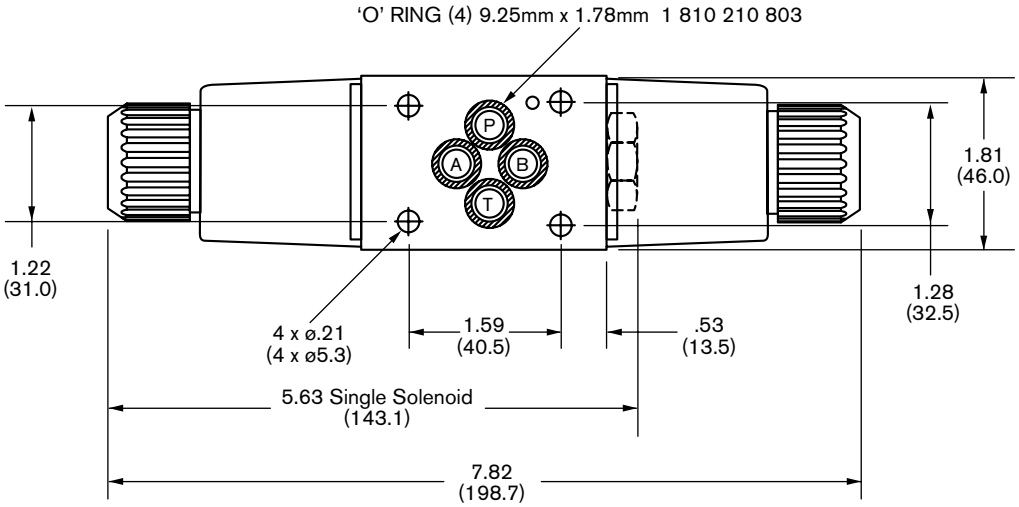
Note: Clearance to remove coil 2.63 (66.9)



With Rubber Cover 1 833 343 015



Covered 1 833 343 013

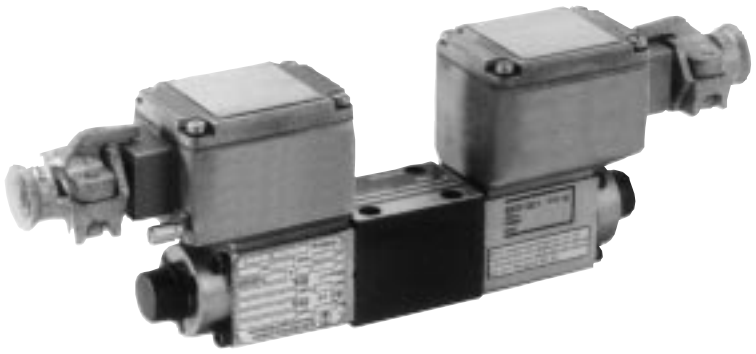


Note: Mounting surface should comply with NFPA T3.5 IM RI-1984 & ANSI B93.7M - 1986 specifications.

Flame Proof Solenoid

Conversion from the standard solenoid to the flame-proof version is not possible.

The solenoid is mounted on the valve body (optional version) with 4 socket-head cap screws.



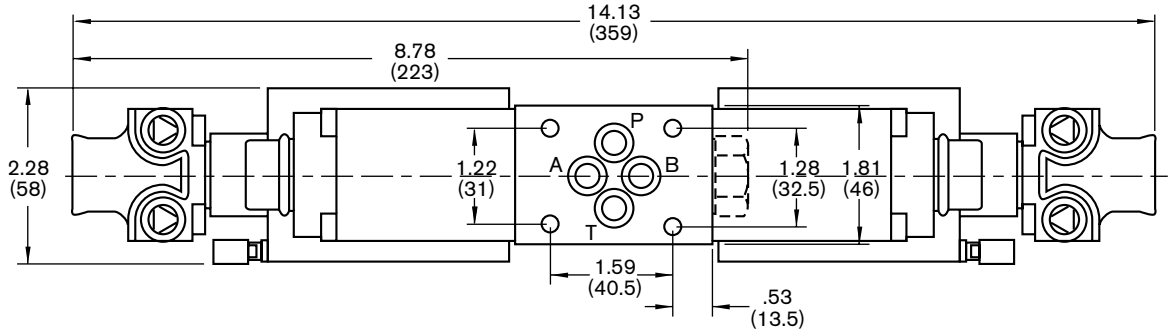
Note: Not CSA Approved

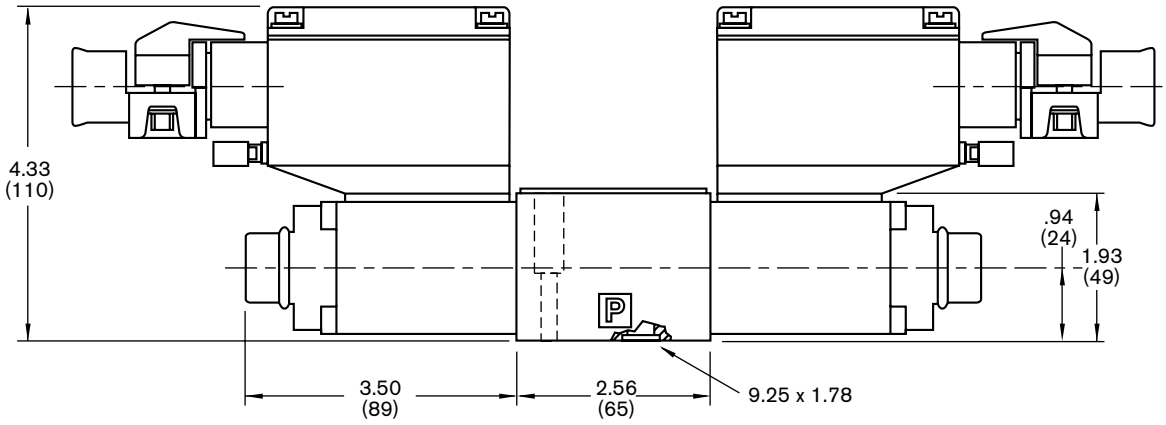
Consult factory for application support and part numbers.

Specifications	
Type of enclosure	IP 65 to IEC and DIN VDE 0470
Flame proof	Type of protection (Ex) sG4
Ambient temperature	–4° to 122°F (–20 to 50°C)
Cyclic duration factor	ED 100%
Power rating	11 W
Voltage tolerance	±10%
Fuses	
Response according to ISO 6403	Switch on/off time 40/120 ms
Power supply	Power gland PG 16 DIN 22 419 for cabel ø 12.5 . . . 14 mm
Switching frequency	max. 18,000/h
Pressure in port T (Solenoid armature)	max. 1500 PSI (100 bar)

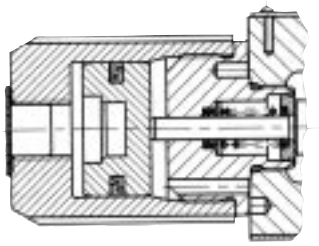
See Catalog #AKY 6/6 1 987 760 610 for more information

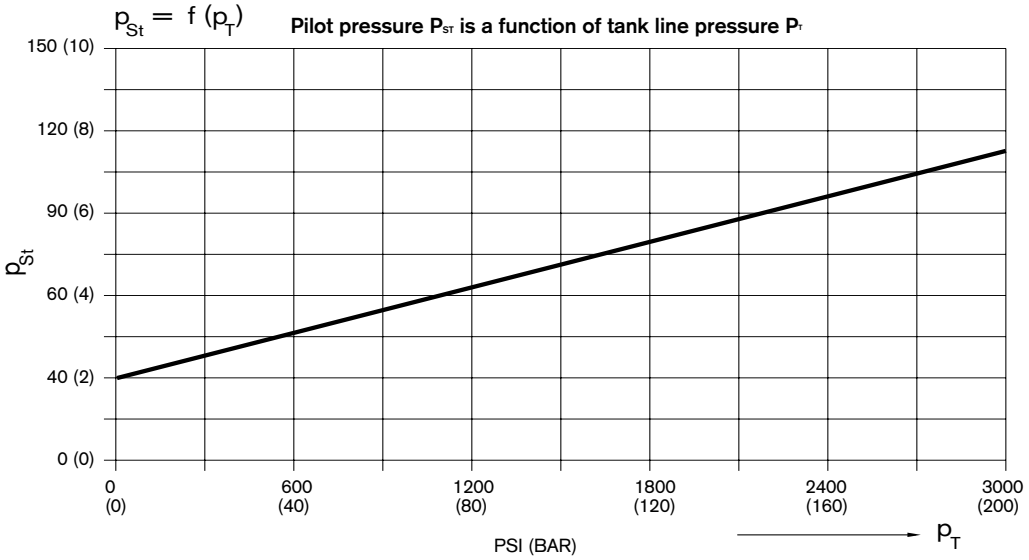
Inches (Millimeters)





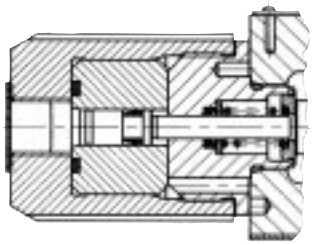
Pneumatic Control

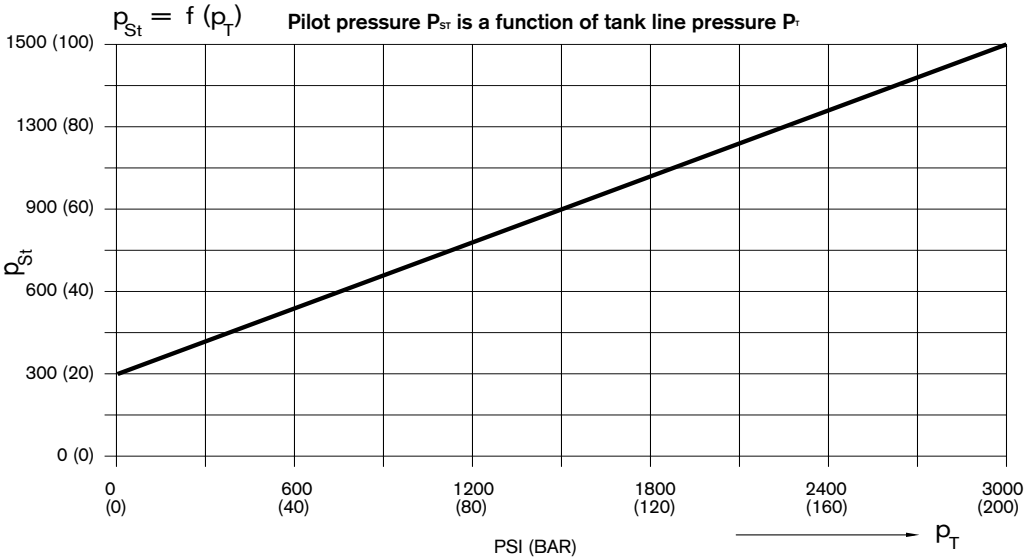




Specifications	
Control pressure	30 PSI (2bar) min,, 150 PSI (10 bar) max.
Pilot volume per valve side	.12 in³ (2cm³)
Response according to ISO 6403	
Switch on	20 to 200 ms
Switch off	30 to 300 ms
	Dependent on pilot pressure and line length

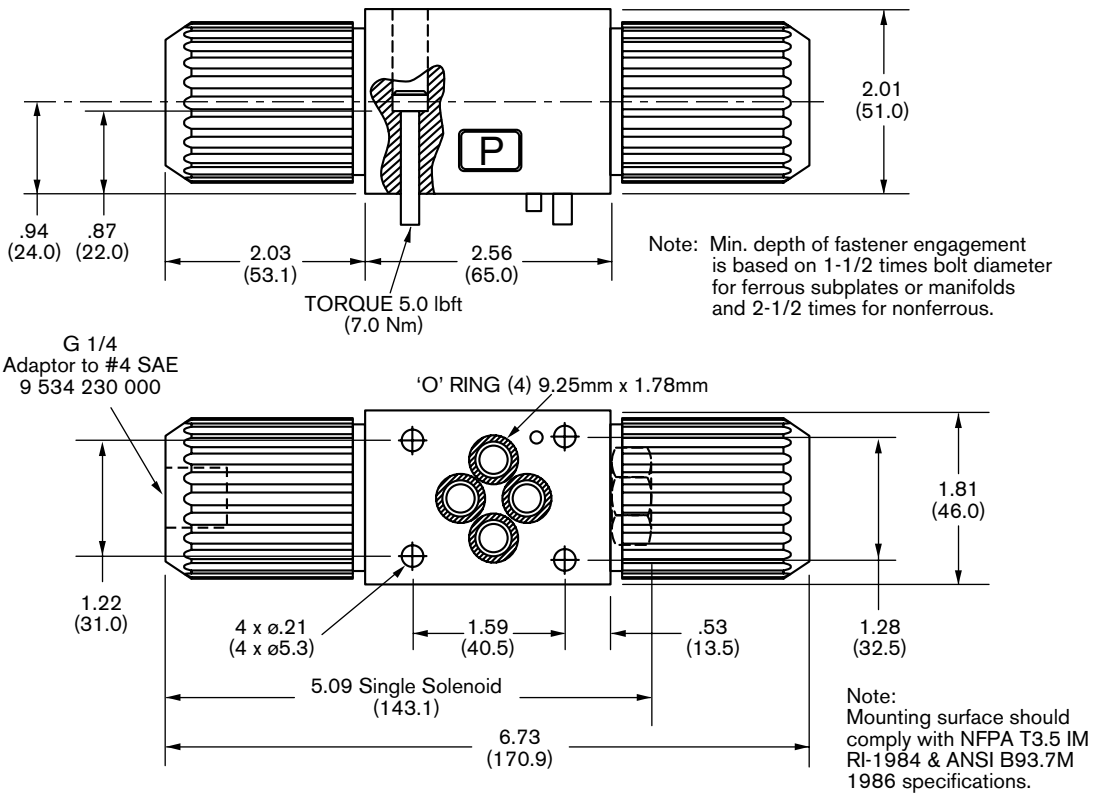
Hydraulic Control





Specifications		
Control pressure	290 PSI (20bar) min, + 0.4 p_T 3000 PSI (210 bar) max.	
Pilot volume per valve side	.02 in³ (0.3cm³)	
Response according to ISO 6403	p_{St} = 700 PSI (50 bar)	p_{St} = 3000 PSI (200 bar)
Switch on	50 to 100 ms	15 to 30 ms
Switch off	60 to 150 ms	60 to 150 ms
	Dependent on pilot pressure and line length. When p_{ST} > 1500 PSI (100 bar), orifice ø 1mm is necessary.	

Inches (Millimeters)



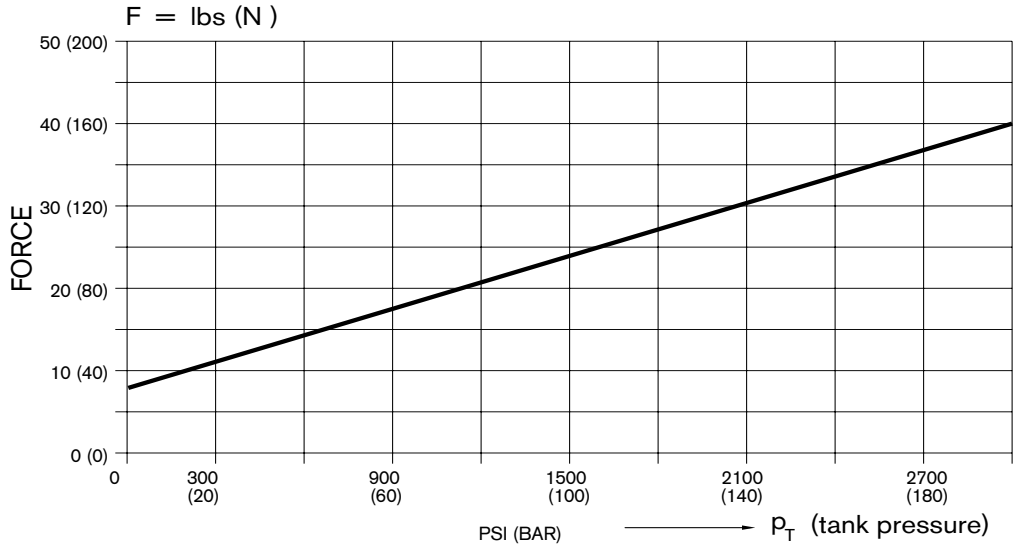
Kit Numbers for the conversion of solenoid control to hydraulic or pneumatic.

Spool Number	Type of Control	
	Hydraulic	Pneumatic
000	**1 817 002 063**	**1 817 002 060**
001	**1 817 002 063**	**1 817 002 060**
002	**1 817 002 063**	**1 817 002 060**
004	**1 817 002 063**	**1 817 002 060**
005	**1 817 002 063**	**1 817 002 060**
006	**1 817 002 063**	**1 817 002 060**
010	**1 817 002 064**	**1 817 002 061**
011	**1 817 002 064**	**1 817 002 061**
012	**1 817 002 064**	**1 817 002 061**
014	**1 817 002 065**	**1 817 002 062**
016	**1 817 002 065**	**1 817 002 062**
018	**1 817 002 063**	**1 817 002 060**
020	**1 817 002 064**	**1 817 002 061**
024	**1 817 002 065**	**1 817 002 062**

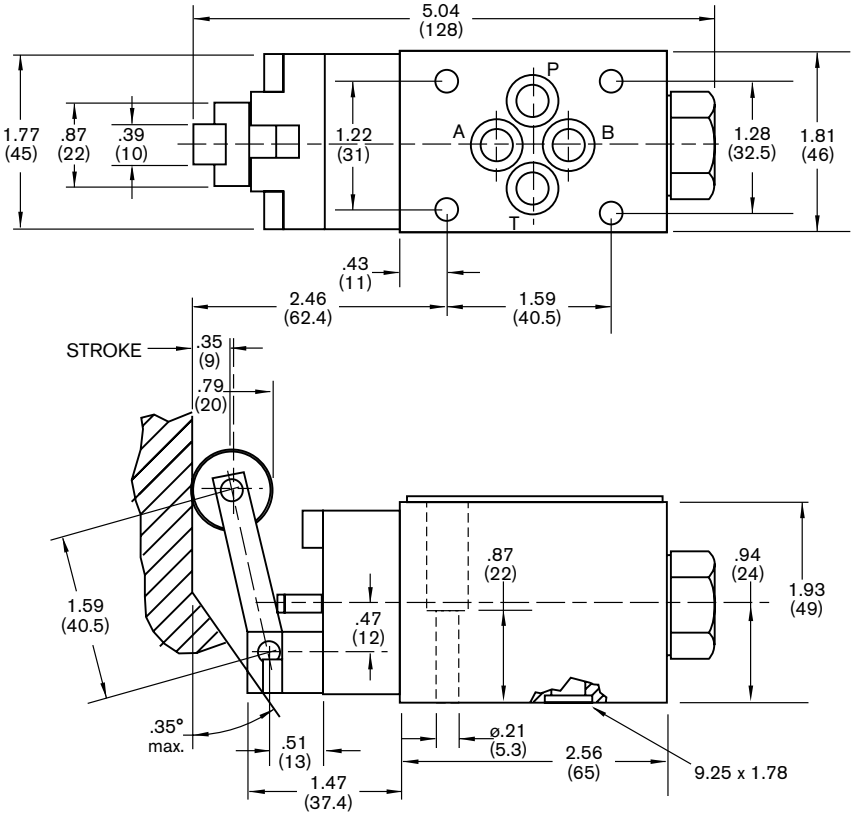
Spool Number	Type of Control	
	Hydraulic	Pneumatic
026	**1 817 002 063**	**1 817 002 060**
027	**1 817 002 064**	**1 817 002 061**
028	**1 817 002 065**	**1 817 002 062**
032	**1 817 002 064**	**1 817 002 061**
033	**1 817 002 065**	**1 817 002 062**
040	**1 817 002 063**	**1 817 002 060**
042	**1 817 002 063**	**1 817 002 060**
045	**1 817 002 065**	**1 817 002 062**
062	**1 817 002 063**	**1 817 002 060**
068	**1 817 002 064**	**1 817 002 061**
070	**1 817 002 065**	**1 817 002 062**
087	**1 817 002 063**	**1 817 002 060**
089	**1 817 002 064**	**1 817 002 061**
091	**1 817 002 063**	**1 817 002 060**

Directional Control Valve

Mechanical Operated



Inches (Millimeters)

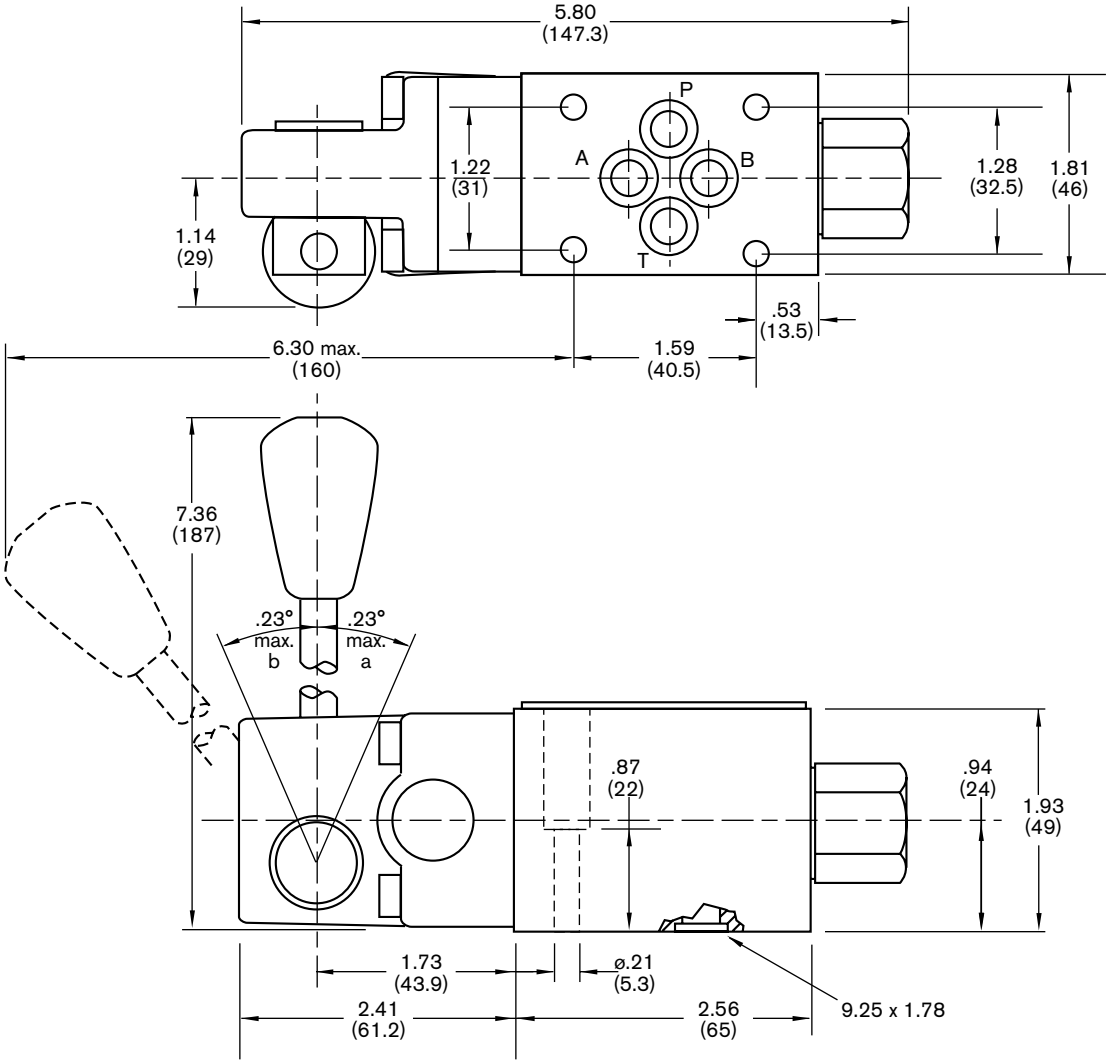


Directional Control Valve

Manual Operated

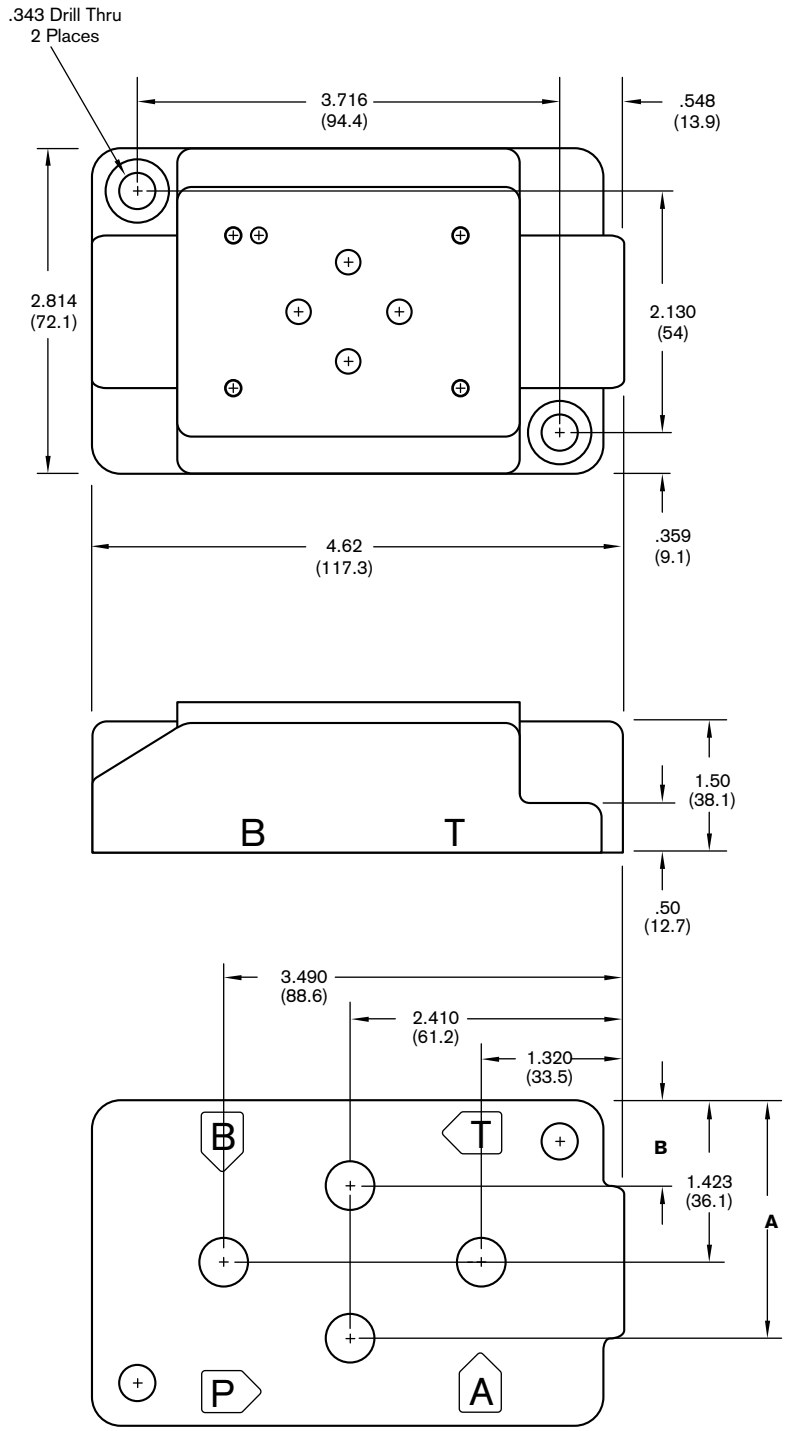
Specifications	
Actuating force	7.8 lbs. (35 N)
Angular movement	±23°

Inches (Millimeters)



Subplates, Bottom Ported

Inches (Millimeters)



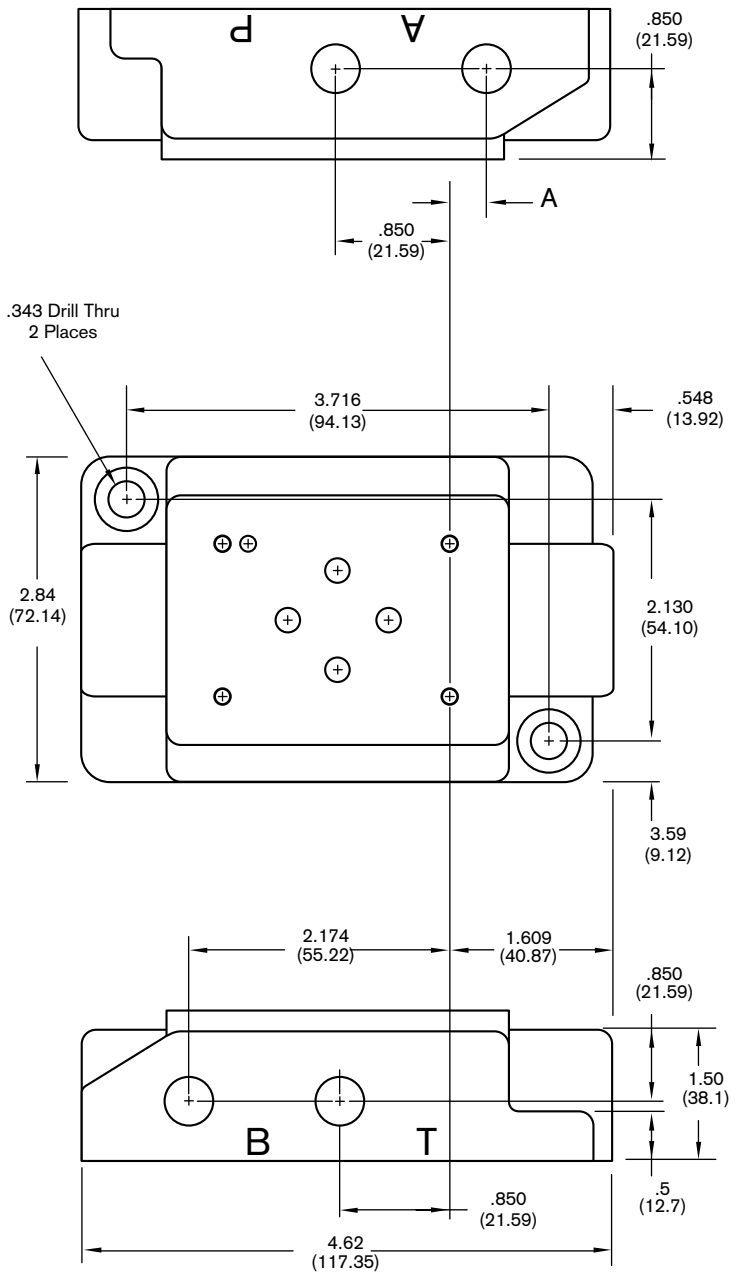
Bottom Ported			
Port Size	A in(mm)	B in(mm)	Part Number
1/4" NPTF	2.017 (51.2)	.829 (21.0)	**9 000 010 148**
3/8" NPTF	2.079 (52.8)	.766 (19.5)	**9 000 010 146**
1/2" NPTF	2.130 (54.1)	.710 (18.0)	**9 000 010 139**
#6 SAE	2.050 (52.0)	.797 (20.2)	**9 000 010 144**
#8 SAE	2.130 (54.1)	.710 (18.0)	**9 000 010 140**

Note: Max. pressure = 4600 psi (315 BAR)

When a subplate is not used a machined pad must be provided.
The mounting surface should comply with NFPA T3.5.1M R1- 1984
and ANSI B93.7M - 1986specifications.

Subplates, Side Ported

Inches (Millimeters)



Side Ported		
Port Size	A in(mm)	Part Number
1/4" NPTF	.474 (12.0)	**9 000 010 147**
3/8" NPTF	.474 (12.0)	**9 000 010 145**
1/2" NPTF	.579 (14.7)	**9 000 010 142**
#6 SAE	.474 (12.0)	**9 000 010 143**
#8 SAE	.579 (14.7)	**9 000 010 141**

Note: Max. pressure = 4600 psi (315 BAR)

When a subplate is not used a machined pad must be provided.
The mounting surface should comply with NFPA T3.5.1M R1- 1984
and ANSI B93.7M - 1986specifications.

Features and Benefits

- ☐ 5 chamber design with additional spool guide lands for increased performance
- ☐ Retained guide tube design for easy interchange of coils
- ☐ Larger .710 in. (18mm) spool diameter provides lower pressure drop
- ☐ Soft shift feature can be retrofitted in the field
- ☐ Optional manual overrides available
- ☐ Certified
- ☐ Solenoid identification per ANSI standards (energize A results in pressure to A)

Order Guide

This order code describes the desired model variances of the DO5 (NG 10) directional control valves. Standard models are assigned a 10-digit number. See pages 25, 26, & 27.

0	8	1	W	V	1	0	P	1	V	1	0	0	1	WS**	S	1	1	5	/	6	0	-	"D"	51	

SIZE
10 – D05 (NG 10, ISO - 4401)

SEALS
V – VITON STD.

CONTROL TYPE

1 ELECTRICAL

2 HYDRAULIC PILOT

4 MECHANICAL (ROLLER)

6 PNEUMATIC PILOT

7 MANUAL LEVER

7 MANUAL LEVER (WITH DETENT G AT**)

SPOOL CODE
*** – SEE SPOOL CHART (PAGES 25, 26, & 27)

ELECTRICAL CONNECTIONS
WS–DIN 43650/ISO4400
KL –WIRING BOX + SENTINAL LIGHTS
KA –WIRING BOX ONLY
KD –WIRING BOX + QUICK CONNECTOR, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KE –WIRING BOX + QUICK CONNECTOR + SENTINEL LIGHTS, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KG –WIRING BOX + QUICK CONNECTOR (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
KM –WIRING BOX + QUICK CONNECTOR + SENTINAL LIGHTS (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
G –DETENT CONTROL TYPE 7 ONLY
EX –FLAME PROOF

SOLENOID VOLTAGES

AC	DC
115/60	012/00
230/60	024/00
Series "D" Dual Freq.	096/00

ADDITIONAL INFORMATION
09 – MANUAL PUSH PIN WITH RUBBER COVER
11 – SPOOL WITH METERING NOTCHES

SOLENOID IDENTIFICATION
51 – U.S. STANDARD (ANSI B93.9-1969)

DESIGN SERIES
(GENERATION)
D - STD
*E - 24VDC LEAD WIRE COILS

SOLENOID OPTIONS
OMIT: If standard (manual override)
C – COVERED PUSH PIN

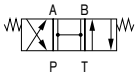
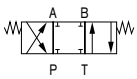
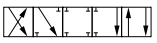
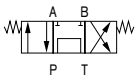
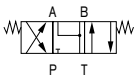
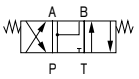
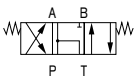
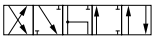
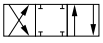
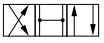
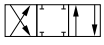
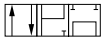
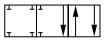
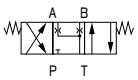
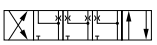
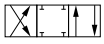
* QUICK CONNECT FOR E SERIES IS MINI CONNECTOR (PG 99)

Product Literature Disclaimer

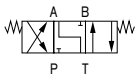
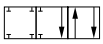
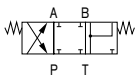
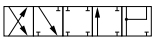
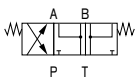
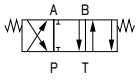
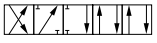
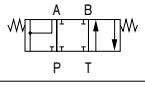
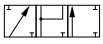
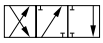
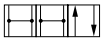
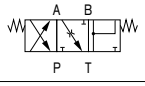
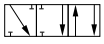
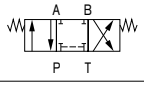
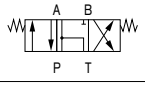
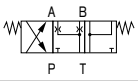
SPECIFICATIONS AND/OR DIMENSIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE. PLEASE CONSULT FACTORY.

Part Numbers

Standard types are assigned a 10-digit part number. Describe unassigned valve combinations with the alpha-numeric order code.

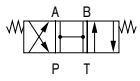
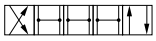
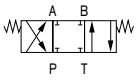
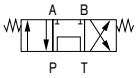
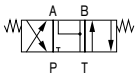
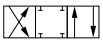
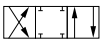
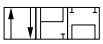
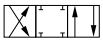
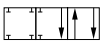
			9 810 232 …								
			KA – WIRING BOX **KD –** WIRING BOX + QUICK CONNECT (BRAD HARR. 3 PIN SING. & 5 PIN DBL. SOL.) **KE –** WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS **KG –** WIRING BOX + QUICK CONNECT (SINGLE SOLENOID 5 PIN) **KL –** WIRING BOX + SENTINEL LIGHTS **KM –** WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS (SINGLE SOL. 5 PIN) **WS –** PLUG CONNECTER (DIN 43650 / ISO 4401) **D11 –** SPOOL WITH METERING NOTCHES								
			KA	**KD**	**KE**	**KG**	**KL**	**KM**	**WS**	**WS**	**--D11**
SPOOL NO.	SYMBOLS	TRANSITION	110/115 220/230 024/00	110/115 220/230	110/115 220/230 024/00	110/115 220/230	110/115 220/230 024/00	110/115 220/230 024/00	110/115 220/230	12 VDC. 24 VDC. 96 VDC.	12 VDC. 24 VDC. 96 VDC.
000			**069** **102***** **561**	**201** **234*****	**267** **300*****		**135** **168**		**003** **036**	**397** **430**	**463** **467** **484****
001			**070** **103** **560**	**202** **235*****	**268** **301** **490**		**136** **169** **551**		**004** **037**	**398** **431**	**464** **468** **485****
002*			**071** **104** **526***	**203** **236**	**269** **302** **588**		**137** **170** **552***		**005** **038**	**399** **432**	**608** **480****
004			**072** **105** **529**	**204** **237*****	**270** **303***** **491**		**138** **171** **534**		**006** **039**	**400** **433** **472**	**498*****
005			**073** **106*****	**205***** **238*****	**271** **304*****		**139** **172*****		**007** **040**	**401** **434** **489**	
006			**074** **107*****	**206** **239*****	**272** **305*****		**140** **173*****		**008** **041**	**402***** **435**	
010			**075** **108**	**207** **240*****	**273** **306**	**333** **349*****	**141** **174**	**365** **381*** **575**	**009** **042**	**403** **436** **508**	
011			**076** **109** **565**	**208** **241**	**274** **307** **591**	**334** **350*****	**142** **175**	**366** **382**	**010** **043*****	**404** **437** **473**	**465** **469** **481****
012			**077** **110** **513**	**209** **242*****	**275** **308***** **578**	**335** **351*****	**143** **176** **553**	**367** **383*** **493**	**011** **044**	**405** **438** **471**	**580****
014*			**078** **111*****	**210** **243*****	**276** **309***** **588**	**336***** **352*****	**144** **177**	**368***** **384*****	**012** **045**	**406** **439**	**482****
016			**079** **112** **562**	**211** **244*****	**277** **310*****	**337** **353*****	**145** **178*****	**369** **385*** **617**	**013** **046**	**407** **440** **610**	**596****
018			**080** **113*** **567**	**212** **245*****	**278** **311***** **492**		**146** **179*****		**014** **047*****	**408** **441**	**466** **470** **483****
020			**081** **114** **564**	**213** **246**	**279** **312***** **494**		**147** **180** **533**		**015** **048**	**409** **442** **525****	
024			**082** **115*****	**214***** **247*****	**280** **313***** **494**	**338***** **354*****	**148** **181*****	**370** **386*****	**016** **049**	**410** **443**	

* Metering notches Std.
** Soft shift with 1 mm orifice
*** Consult factory

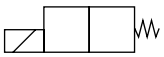
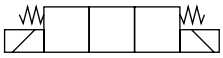
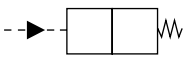
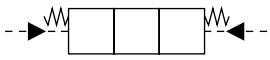
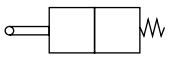
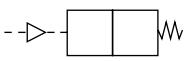
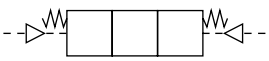
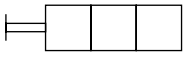
			KA	KD	KE	KG	KL	KM	WS	WS	--D11
SPOOL NO.	SYMBOLS	TRANSITION	110/115 220/230 24/00	110/115 220/230	110/115 220/230	110/115 220/230	110/115 220/230	110/115 220/230	110/115 220/230	12 VDC. 24 VDC. 96 VDC.	12 VDC. 24 VDC. 96 VDC.
026			**083** **116** **615**	**215** **248***	**281** **314***		**149** **182**		**017** **050**	**411** **444**	
027			**084** **117***	**216** **249***	**282** **315***	**339** **355***	**150** **183***	**371** **387***	**018** **051**	**412** **445**	
028			**488**				**487**				
031			**085*** **118**	**217*** **250***	**283*** **316***	**340*** **356***	**151*** **184***	**372*** **388***	**019** **052***	**413*** **446**	
032			**086** **119***	**218*** **251***	**284*** **317***	**341*** **357***	**152*** **185***	**373*** **389***	**020** **053***	**414*** **447**	
033			**087** **120***	**219*** **252***	**285*** **318***	**342*** **358***	**153** **186***	**374*** **390***	**021** **054**	**415** **448**	
040			**088*** **121***	**220*** **253***	**286*** **319***		**154*** **187***		**022** **055***	**416** **449** **535****	
041			**089*** **122***	**221*** **254***	**287** **320***		**155*** **188***		**023** **056***	**417*** **450**	
042			**090** **123**	**222*** **255***	**288** **321***		**156** **189**		**024** **057***	**418*** **451**	
045			**091** **124***	**223*** **256***	**289** **322***	**343*** **359***	**157** **190***	**375** **391***	**025** **058***	**419** **452**	
062			**092*** **125***	**224*** **257***	**290*** **323***		**158*** **191***		**026** **059***	**420*** **453**	
068			**093** **126**	**225*** **258***	**291*** **324***	**344*** **360***	**159** **192***	**376** **392***	**027** **060**	**421*** **454**	
070			**094*** **127***	**226*** **259***	**292*** **325***	**345*** **361***	**160*** **193***	**377*** **393***	**028** **061***	**422*** **455**	
074			**095** **128***	**227*** **260***	**293*** **326***	**346*** **362***	**161*** **194**	**378*** **394***	**029** **062***	**423*** **456***	
087			**096*** **129***	**228*** **261***	**294*** **327***		**162*** **195***		**030*** **063***	**424*** **457**	
088			**097** **130**	**229*** **262***	**295*** **328***	**347*** **363***	**163*** **196***	**379*** **395***	**031** **064***	**425*** **458**	
091		Pressure port leakage bleeds to tank in the center position	**098*** **131***	**230*** **263**	**296*** **329***		**164*** **197***		**032** **065**	**426*** **459**	
095			**099** **132***	**231*** **264***	**297*** **330***		**165*** **198***		**033*** **066***	**427*** **460**	
923			**100*** **133***	**232*** **265***	**298*** **331***	**348*** **364***	**166*** **199***	**380*** **396***	**034** **067**	**428** **461***	
930			**101*** **134***	**233*** **266***	**299** **332***		**167*** **200***		**035*** **068***	**429*** **462**	

* Consult factory

** Soft shift with 1 mm orifice

SPOOL NO.	SYMBOLS	TRANSITION	0 810 001 … 2	4	6	7
000					**860**	
001					**857**	**905** **880**
002					**853**	**906** **881**
004						**907** **882**
010					**861**	
011				**876**	**855**	**883**
012			**859**	**877**	**856**	**908**
014					**854**	
020					**858**	
027			**863**			

Weights

	DC AC Ex.	13.4 lbs 12.3 lbs 15.8 lbs	6.1 kg 5.6 kg 7.2 kg
	DC AC Ex.	17.0 lbs 14.8 lbs 25.7 lbs	7.7 kg 6.7 kg 11.7 kg
		8.8 lbs	4.0 kg
		11.7 lbs	5.3 kg
			
		6.6 lbs	3.0 kg
		7.5 lbs	3.4 kg
			

Function

Five chamber spool type valve with wet pin solenoid

The coil is rotateable and can be mounted in 3 different positions (3 x 90° offset).

Caution: Exchange of DC coil for AC coil not possible.

Soft Shift Adjustment Data

Torque = 3.5 ft./lbs.

When retrofitting, the screw plug is replaced by a throttle screw.

Make sure that the internal cavity of the valve is completely filled with oil, since this is a prerequisite for the proper operation of the soft shift adjustment. All air must be removed from this cavity by bleeding. To do this remove throttle screw and apply a max of 100 PSI to valve tank port.

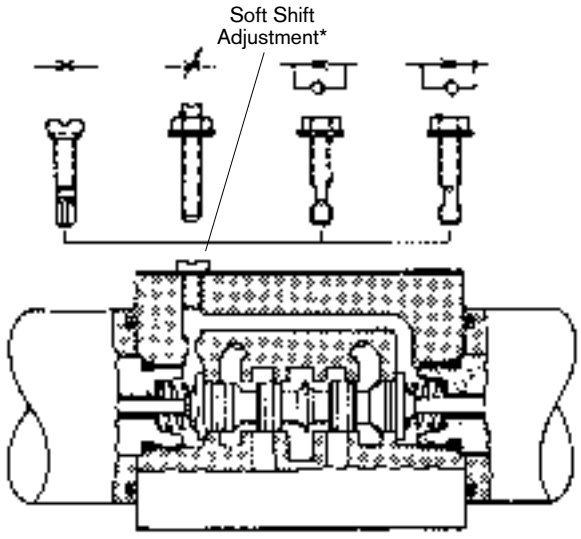
**Caution:

For use with DC solenoids only. Not to be used with AC solenoids. If AC applications are required, please use valves with 96 VDC solenoids and rectifier package 1 834 484 134. For best performance use spools with open cross over or throttled spool.

Typical Code:

0	8	1	W	V	1	0	P	1	V	1	0	0	1	W	S	0	9	6**	/	0	0	D	5	1	*	

11 – THROTTLE SPOOL



* Note: Throttle screw must be ordered separately. See PG 98 for details.

Characteristics

General	
Design	Spool valve (five chamber system)
Mounting type	Subplate, DO5 (NG 10) – ISO 4401
Mounting Position	as desired (Horizontal preferred)
Ambient temperature	–4 to 120°F (-20 to 50°C)
Seals	Viton
CSA Certified	File Number LR 93267-1

Hydraulic	
Fluid	Premium quality petroleum and water glycol fluids. Refer to the following bulletins for recommendations: S106 - Petroleum Fluids S107 - Fire Resistant Fluids Consult factory for use of water in oil emulsions, high water content and synthentic fluids. Mineral-oil based hydraulic-fluids (DIN/ISO) others on request
Viscosity	60…1600 SUS (10 …350 cSt)
Fluid temperature	–4 to 175°F (–20 to 80°C)
Filtration	Contamination class 19/16, according to ISO 4406 to be realized with filter ß25=75
Direction of flow	As shown on symbol
Operating pressure	Port P, A, B: 4600 PSI (315 bar) Port T* : 2300 PSI (160 bar)
Rated flow	See Δp/Q-curves
Maximum flow	Up to 34 GPM (130 L) see operating limits

* For control type 1 2 6

Electric			
Duty factor	100%		
Solenoid identification	Meets ANSI B93.9-1969 (R 1988) Standards		
Enclosure type	*IP 65 to IEC and DIN 40 050		
Insulation class	C VDE § 5		
Voltage and frequency	See table on page 88 AC-solenoids 230/60 can be used with 220/50 and 115/60 can be used with 110/50 voltage supply		
Voltage tolerance	U_{NOM}±10%		
Power rating DC AC	 42W In Rush: ~3.5 A	 Holding: ~1.14 A	
Response time DC AC	 Switch-on:** 65 to 100 ms Switch-on:** 10 to 25 ms	 Switch-off:** 30 to 80 ms Switch-off:** 50 to 65 ms	
Switching frequency	max. 1800/h		
Power supply	Plug connector to DIN 43 650 ISO 4400	Wiring box w/lead wires	5 & 3 pin Q.C. per ANSI B93.55M

*Note: IP 65
- Protected against low pressure water jets from all direction
- Dust tight

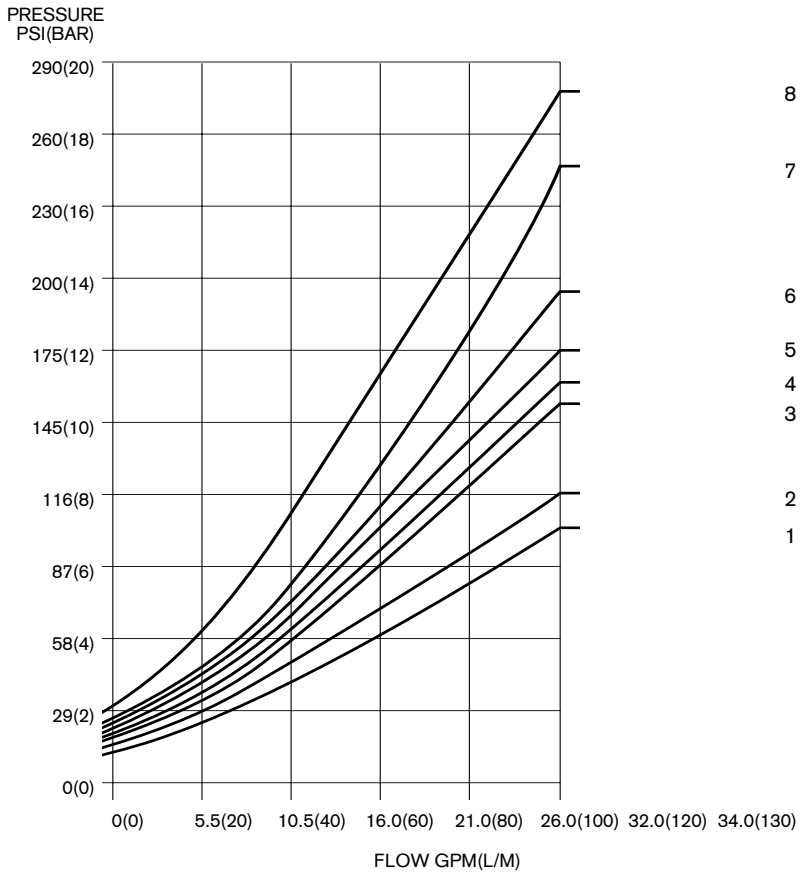
** Valves without soft shift adjustment, measured from the switching signal to opening of control edge.

Performance Characteristics

Valve Pressure vs. Flow Performances

Curve Reference Numbers					
Spool Number	Curve Numbers (B A B A B / T P T P T)				
Spool Number	PA	PB	AT	BT	PT
000	2	2	1	3	–
001	3	3	3	3	–
002	3	2	1	4	8
004	3	3	1	7	–
005	2	2	3	4	–
006	2	2	3	3	6
010	3	3	7	6	–
011	5	3	3	4	–
012	3	3	4	8	–
014	3	–	–	4	8
016	3	–	–	3	–
018	3	3	3	4	–
020	3	3	7	6	–
024	–	3	1	7	–
026	3	3	1	3	–
027	3	–	–	6	–
031	–	3	3	–	–
032	1	4	–	–	–
033	–	2	1	–	–
040	2	5	3	–	–
041	2	4	1	–	–
042	3	3	3	2	–
045	–	3	3	–	–
062	4	2	–	7	–
068	3	3	–	–	–
070	3	–	–	3	–
074	2	–	–	3	–
087	3	7	6	–	–
088	–	–	–	–	–
091	1	2	1	4	–
095	1	1	1	6	8
923					
930					

PRESSURE vs. FLOW CURVES



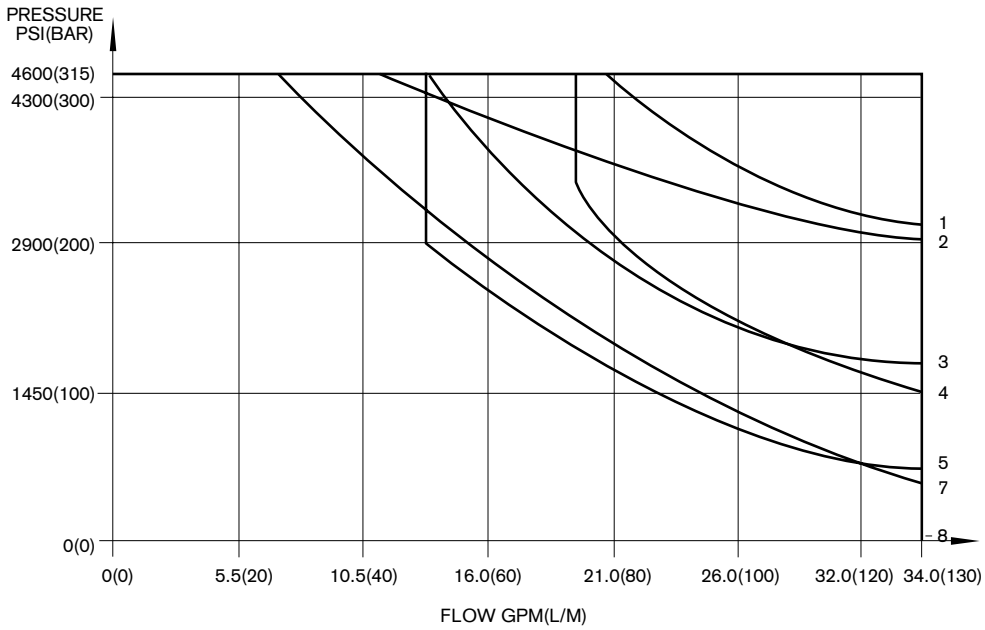
Note: Viscosity = 164 SUS (35 Centistokes)

Performance Characteristics

DC-Solenoids

Curve Reference Numbers	
Spool Number	Curve Numbers
000	3
001	1
002	5
004	1
005	8
006	3
010	8
011	4
012	8
014	5
016	1
018	3
020	8
024	1
026	1
027	2
031	1
032	7
033	3
040	1
041	1
042	1
045	1
062	1
068	7
070	1
074	3
087	1
088	1
091	3
095	7
923	7
933	1

MALFUNCTION CURVES



Operating limits

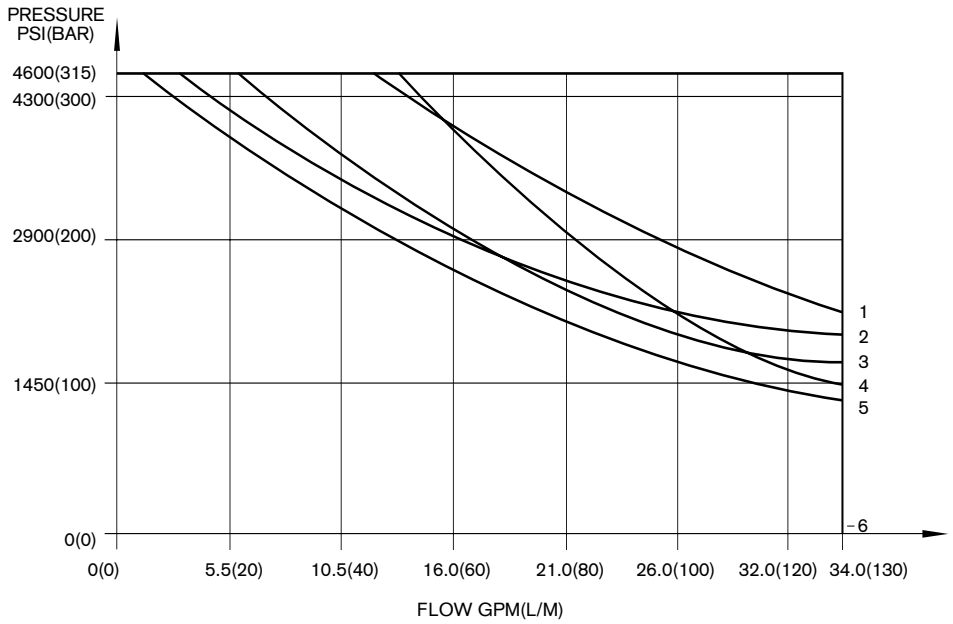
The curves refer to applications with symmetrical flow.
In the case of asymmetric flow (e.g. one port not used) reduced values may result.

Performance Characteristics

AC-Solenoids

Curve Reference Numbers	
Spool Number	Curve Numbers
000	3
001	3
002	5
004	3
005	5
006	5
010	1
011	4
012	1
014	5
016	3
018	3
020	6
024	3
026	3
027	5
031	5
032	5
033	3
040	3
041	2
042	3
045	3
062	3
068	5
070	3
074	3
088	3
095	2
923	2

MALFUNCTION CURVES



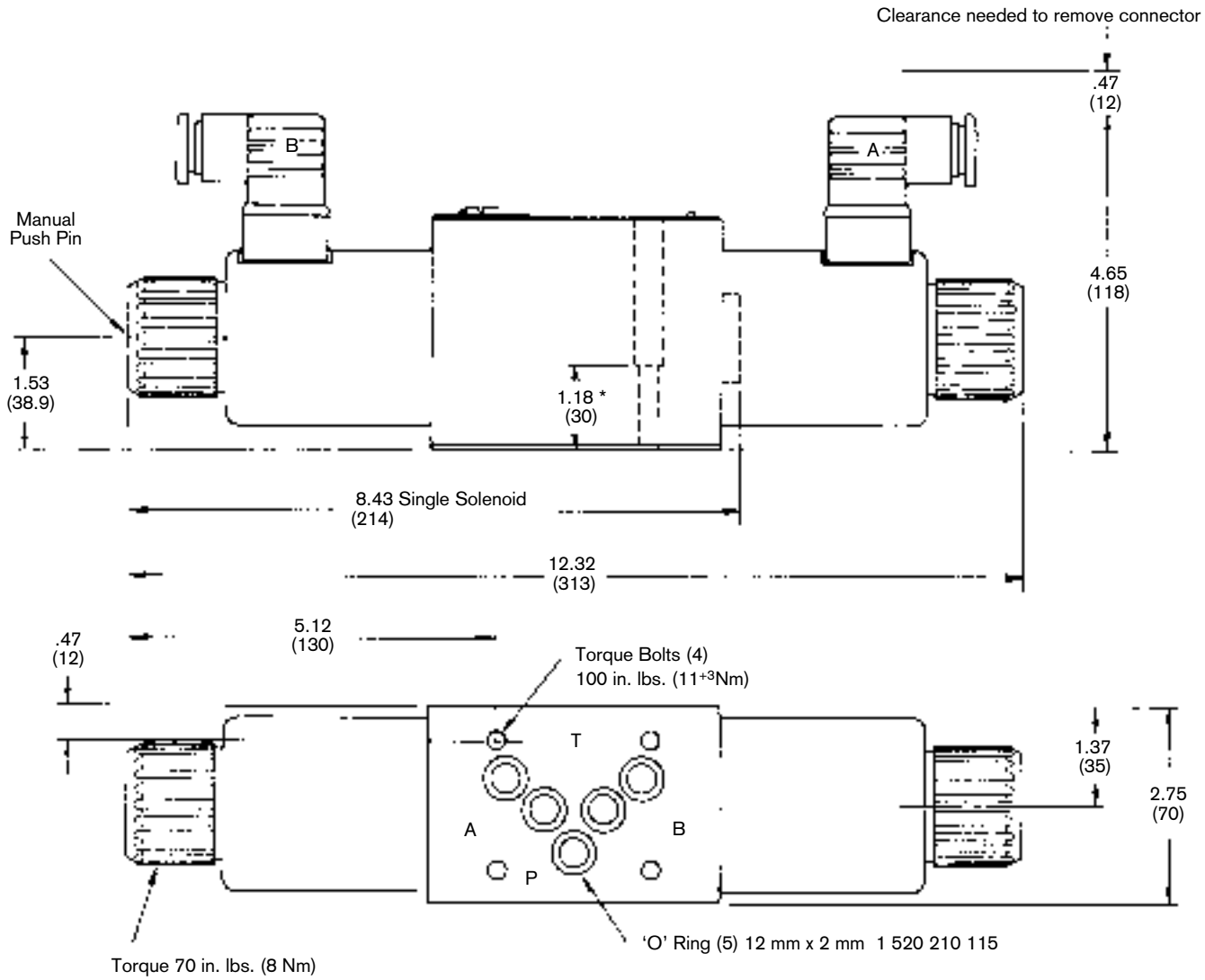
Operating limits

The curves refer to applications with symmetrical flow.
In the case of asymmetric flow (e.g. one port not used) reduced values may result.

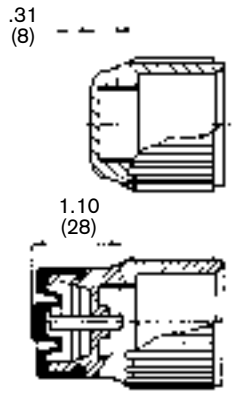
Valve With DC Solenoid DIN

Seal Kit 9 810 232 520

Inches (Millimeters)



Optional manual push pins



Covered
1 833 343 002

With rubber cover
1 833 343 003

*Bolt length change from series "B".

Note: Min. depth of fastener engagement is based on 1 1/2 times bolt dia. for ferrous subplates or manifolds and 2 1/2 times for nonferrous.

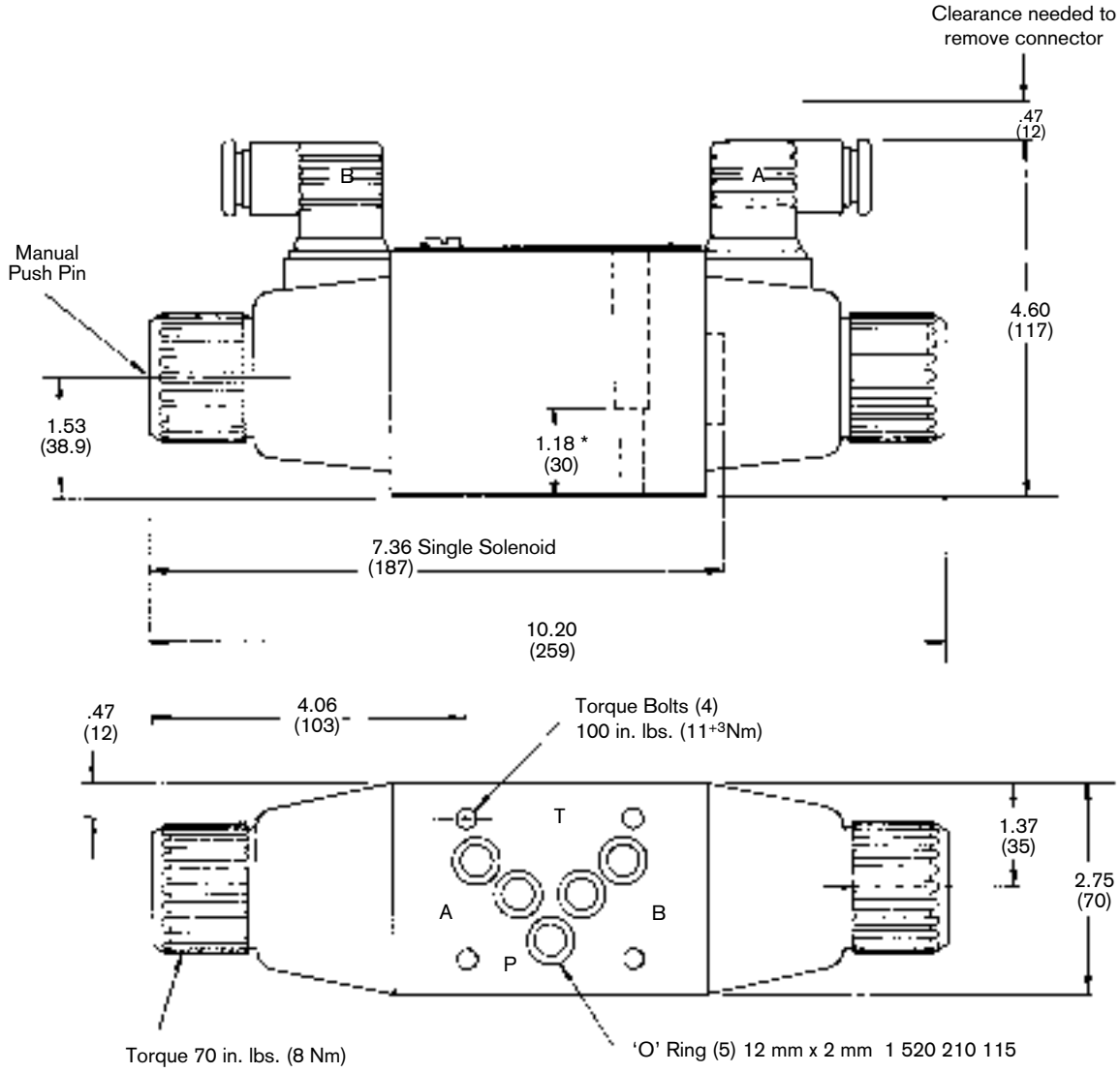
Note: Clearance to remove coil 3.66 (93)

Note: Mounting surface should comply with NFPA T3.51M R1-1984 ANSI B93.7M-1986 specifications.

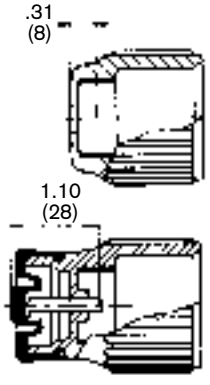
Valve With AC Solenoid DIN

Seal Kit 9 810 232 520

Inches (Millimeters)



Optional manual push pins



Covered
1 833 343 002

With rubber cover
1 833 343 003

*Bolt length change from series "B".

Note: Min. depth of fastener engagement is based on 1 1/2 times bolt dia. for ferrous subplates or manifolds and 2 1/2 times for nonferrous.

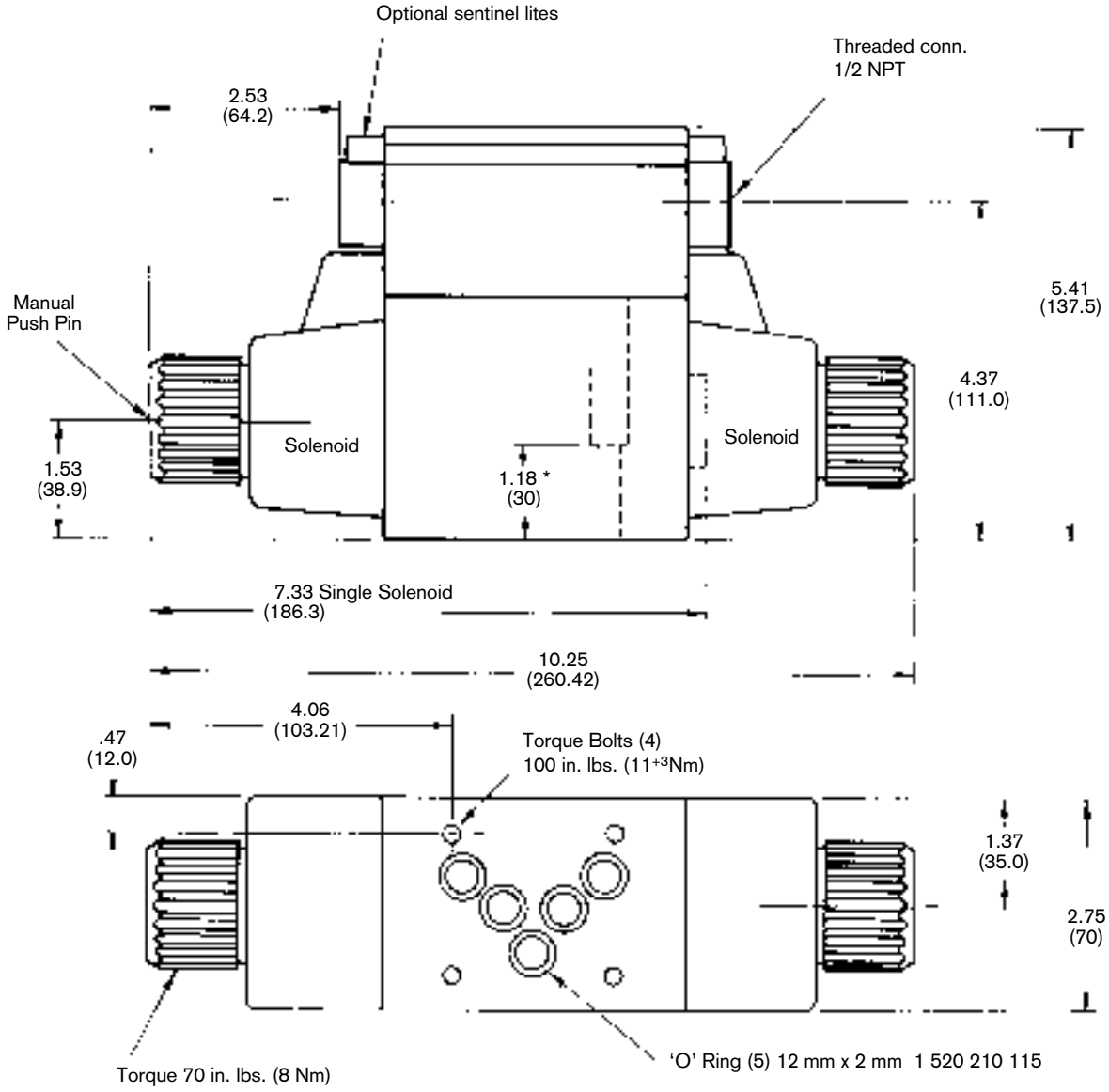
Note: Clearance to remove coil 2.75 (70)

Note: Mounting surface should comply with NFPA T3.51M R1-1984 ANSI B93.7M-1986 specifications.

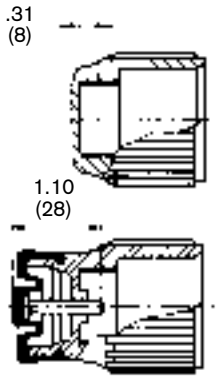
Valve With AC/DC Solenoid And Wiring Box

Seal Kit 9 810 232 520

Inches (Millimeters)



Optional manual push pins



Covered
1 833 343 002

With rubber cover
1 833 343 003

*Bolt length change from series "B".

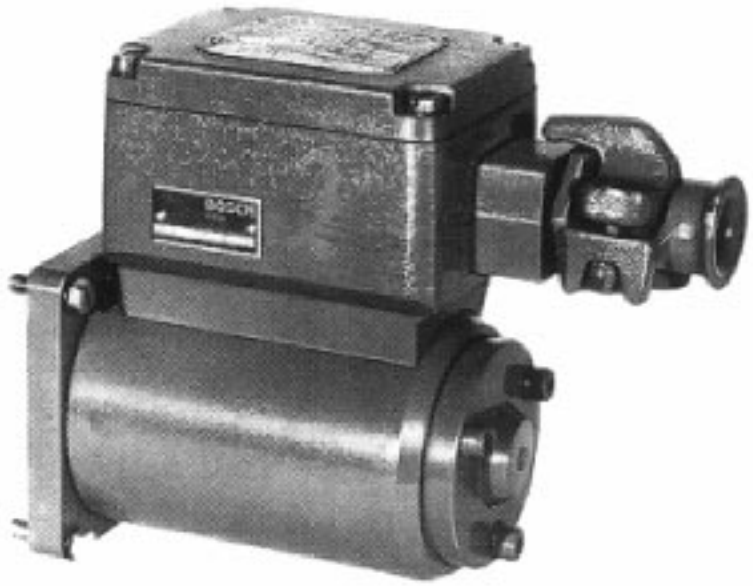
Note: Min. depth of fastener engagement is based on 1 1/2 times bolt dia. for ferrous subplates or manifolds and 2 1/2 times for nonferrous.

Note: Brad Harrison connector installed on cylinder port B side on double solenoid valves and on solenoid side on single solenoid valves. (See Page 79 for details.)

Note: Clearance to remove coil 2.75 (70)

Note: Mounting surface should comply with NFPA T3.51M R1-1984 ANSI B93.7M-1986 specifications.

Flame Proof Solenoid



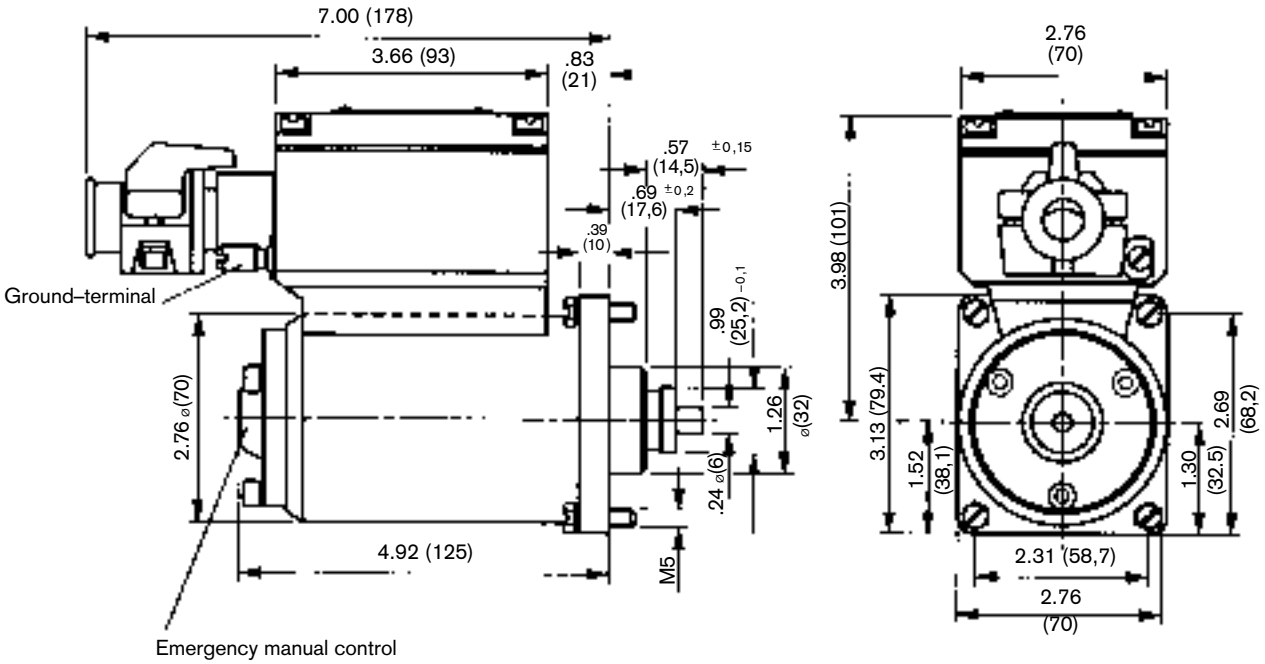
Not CSA Approved.

Consult factory for application support and part numbers.

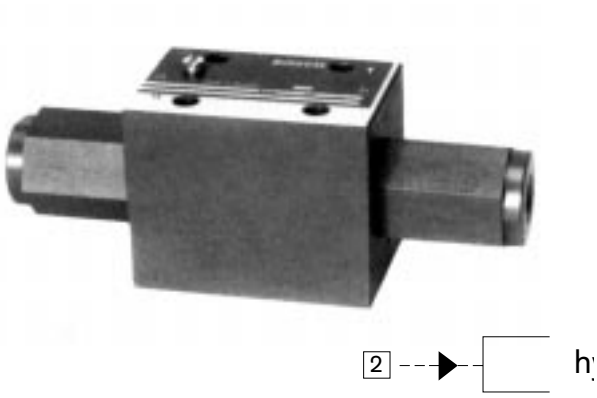
A.C. Solenoid	D.C. Solenoid
110/50	024/00
220/50	110/00
	190/00

Specifications	
Type of enclosure	IP 65 to IEC and DIN 40 050 Type of protection (Ex) sG4
Ambient temperature	–4° to 110°F (–20 to 40°C)
Cyclic duration factor	ED 100%
Power rating	20 W
Insulation clas	C VDE 100 § 5
Voltage tolerance	±10%
Switch on/off time	100/40 ms
Power supply	Power gland PG 16 DIN 22 419
Switching frequency	max. 8000/h
Pressure in port T	max. 1000 PSI (70 bar)

See Catalog #AKY 6/7 1 987 760 611 for more info

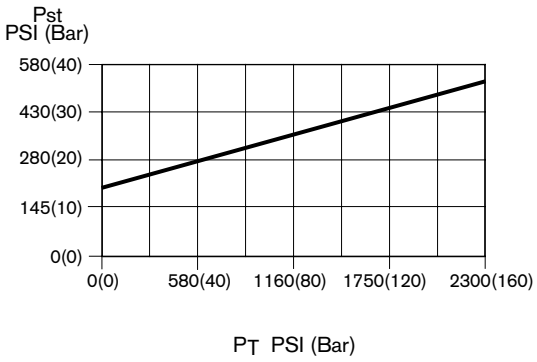


Hydraulic Control



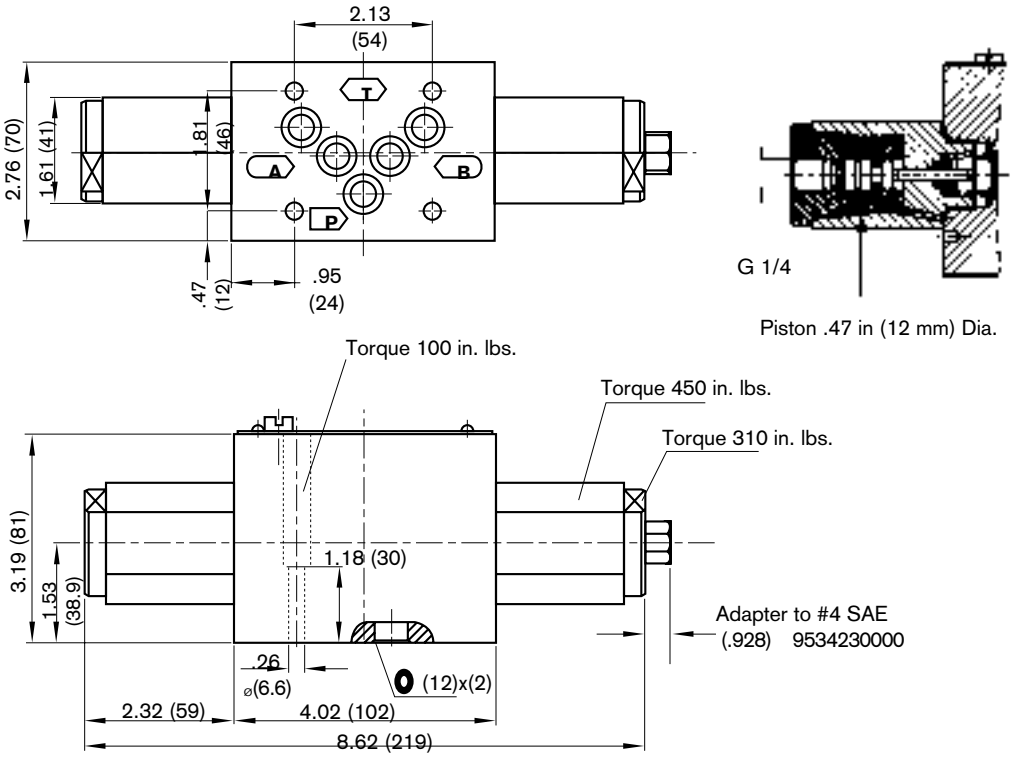
Performance Characteristics

Pilot pressure Pst is a function of tank line Pressure Pt



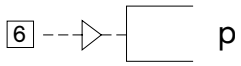
Adapter to #4 SAE 9 534 230 000
Seal Kit 1 817 010 306

Inches (Millimeters)



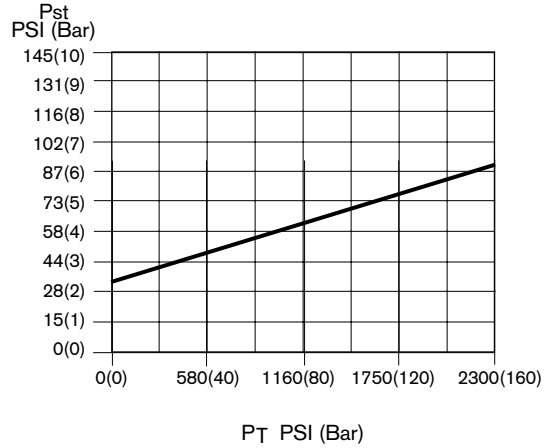
Type of control 2 hydraulic		
Pilot pressure (Pst)	200 PSI (14 bar) min.+ .014 x tank pressure 3600 PSI (250 bar) max.	
Pilot volume per valve side	.03 in³ (0.4 cm³)	
Response times	p_c = 725 PSI (50 bar)	p_c = 2900 PSI (200 bar)
Switch-on	50 to 100 ms	15 to 30 ms
Switch-off	60 to 150 ms	60 to 150 ms
	Dependent on pilot pressure and line length	

Pneumatic Control



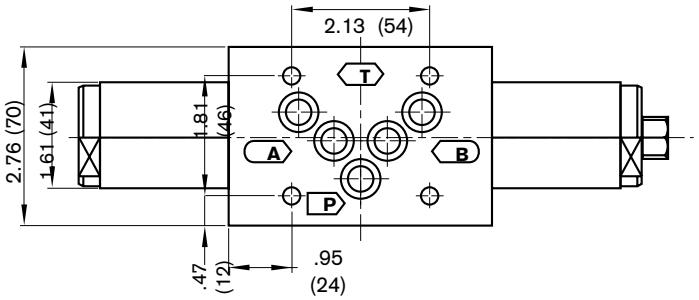
Performance Characteristics

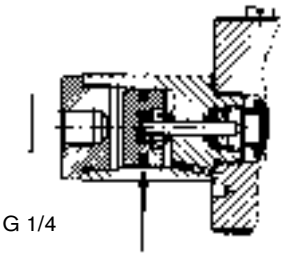
Pilot pressure Pst is a function of tank line Pressure Pt



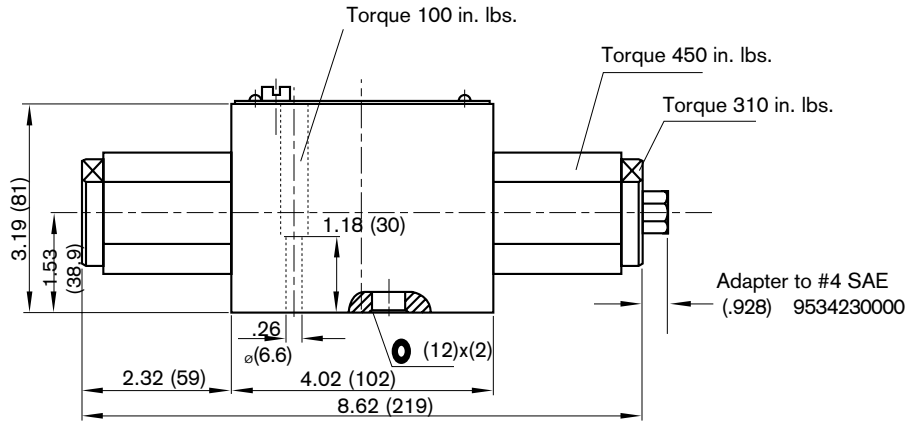
Adapter to #4 SAE 9 534 230 000
Seal Kit 1 817 010 306

Inches (Millimeters)





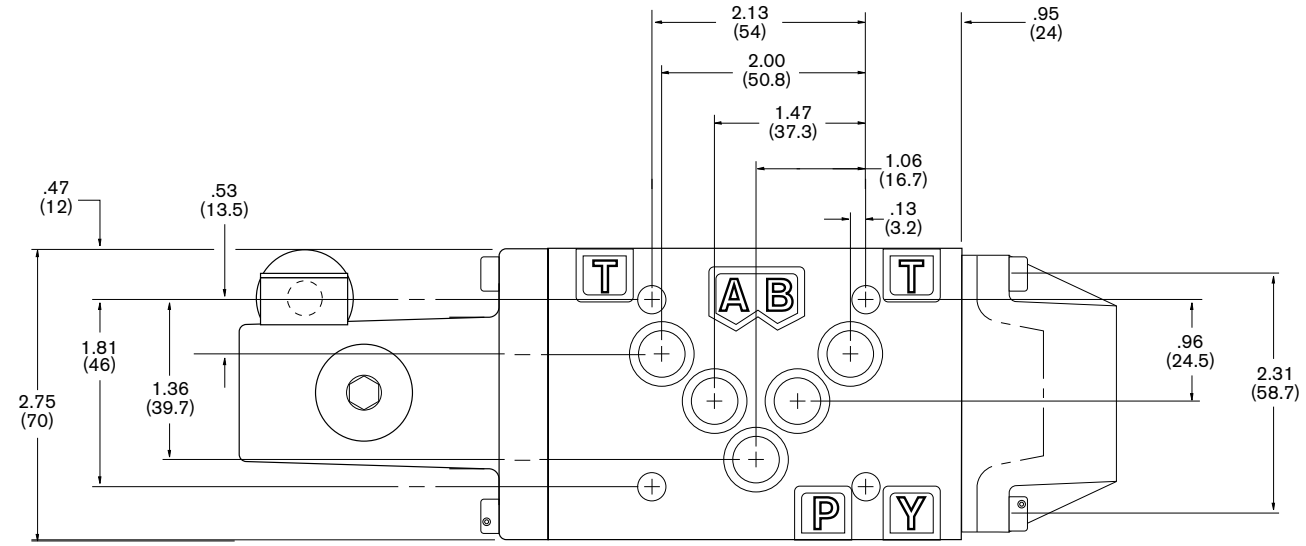
Piston 1.2 in (30 mm) Dia.

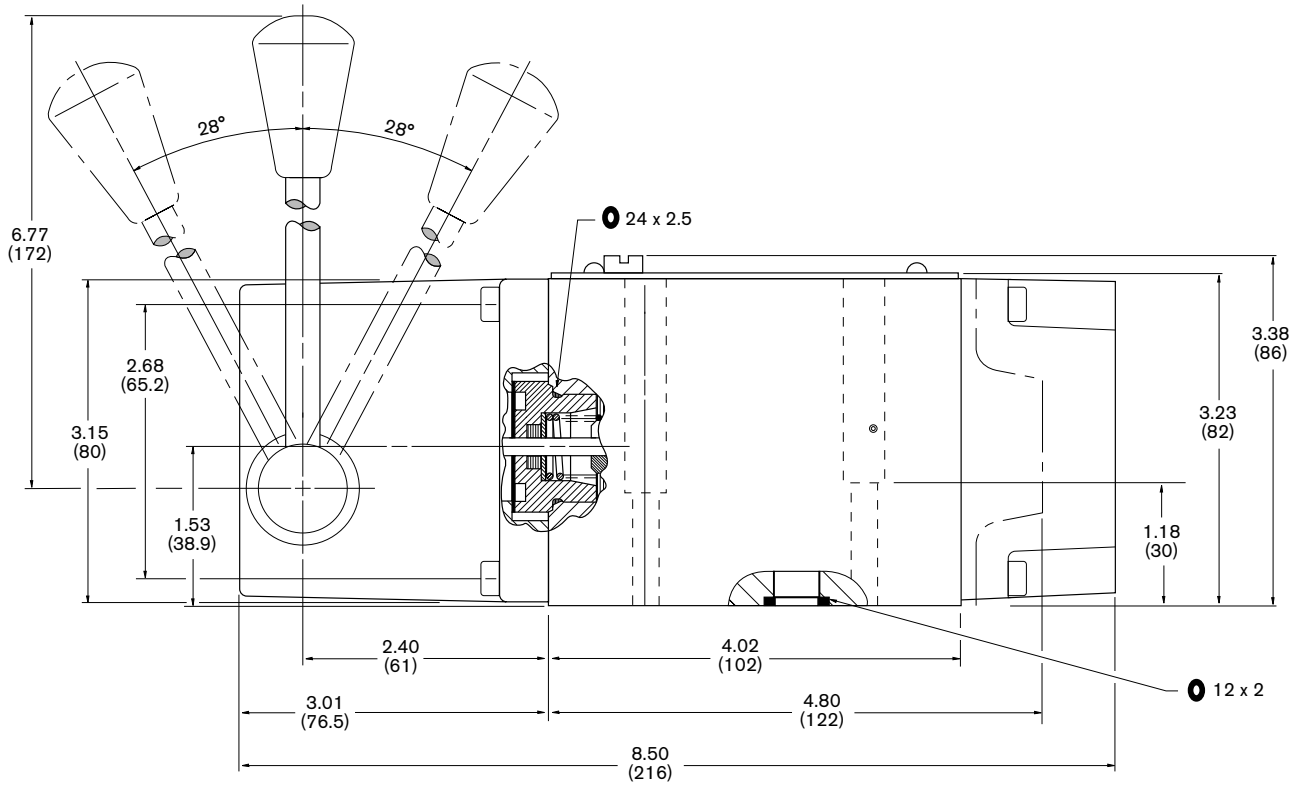


Type of control 6 pneumatic	
Pilot pressure (Pst)	35 PSI (2,5 bar) min.+ 0.023 x tank pressure 145 PSI (10 bar) max.
Pilot volume per valve side	.125 in³ (2 cm³)
Response time Switch-on Switch-off	 20 to 200 ms 80 to 300 ms Dependent on pilot pressure and line length

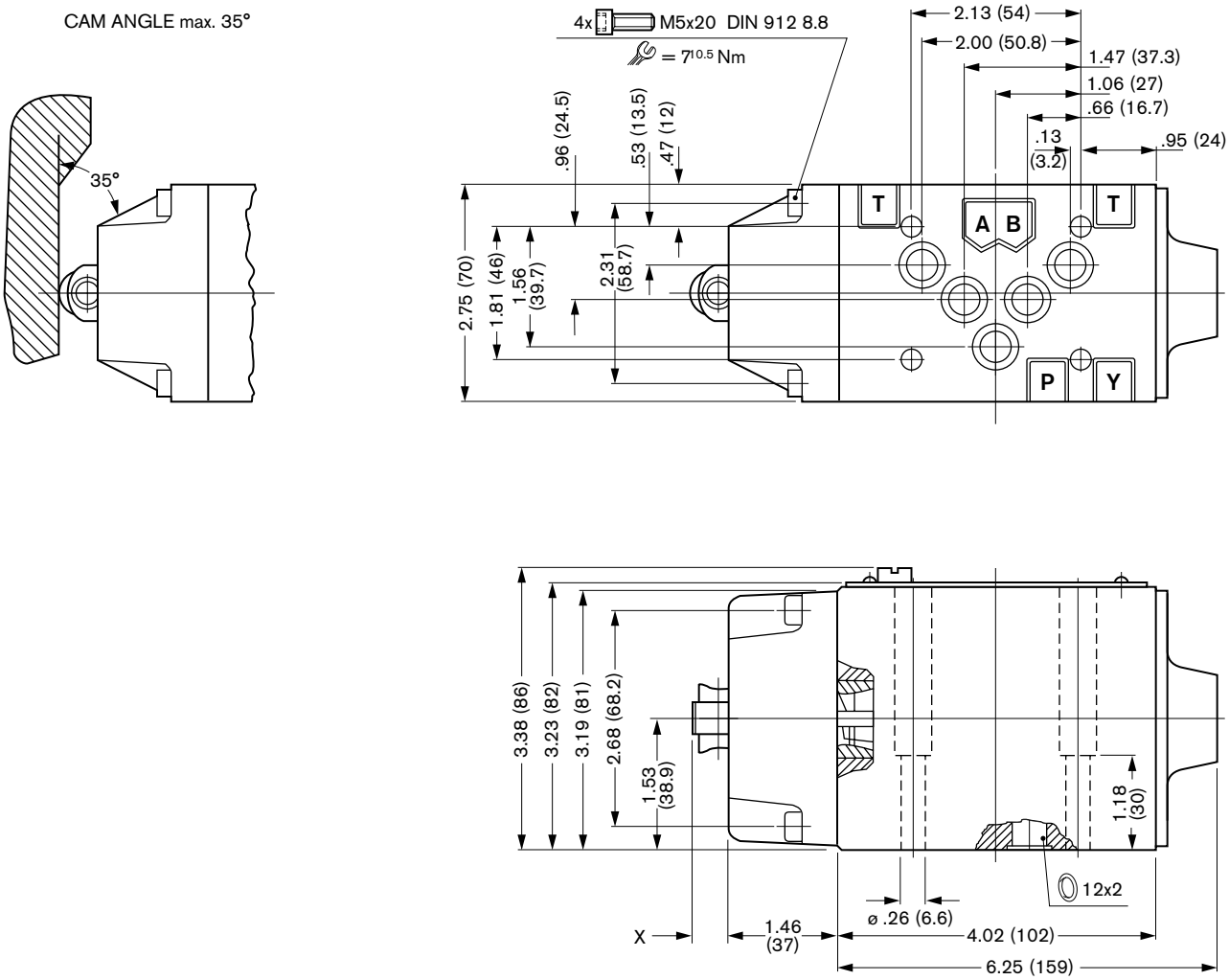
Conversion Kit #1 817 002 058
Except 020 Spool

Lever Operated





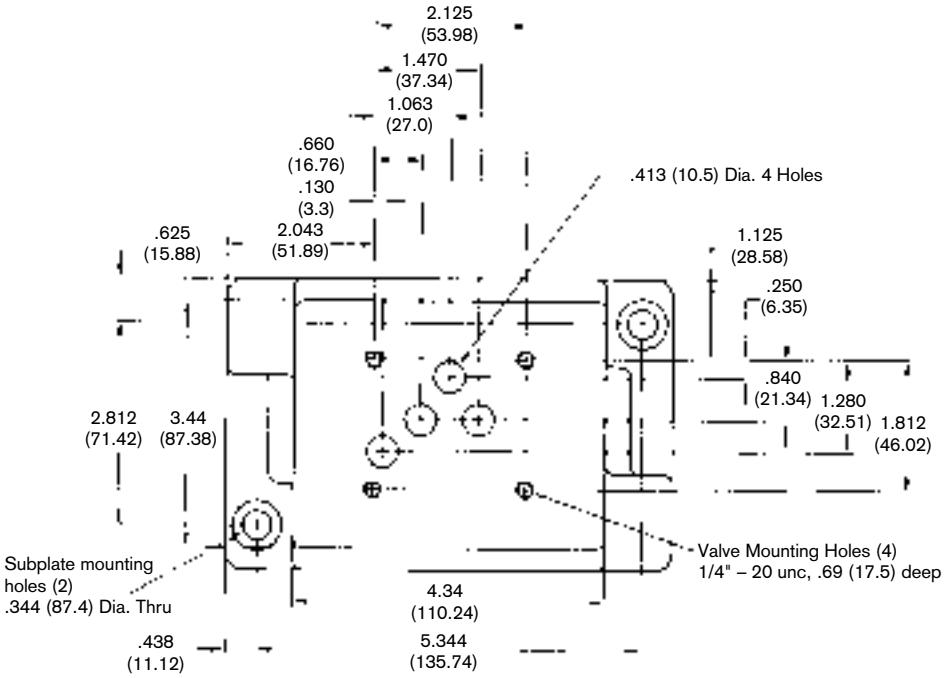
Cam Operated

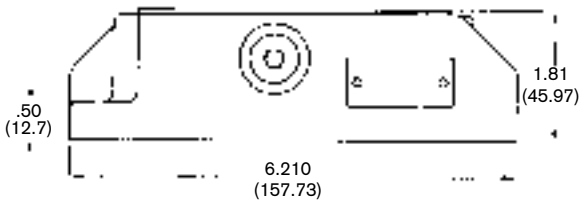


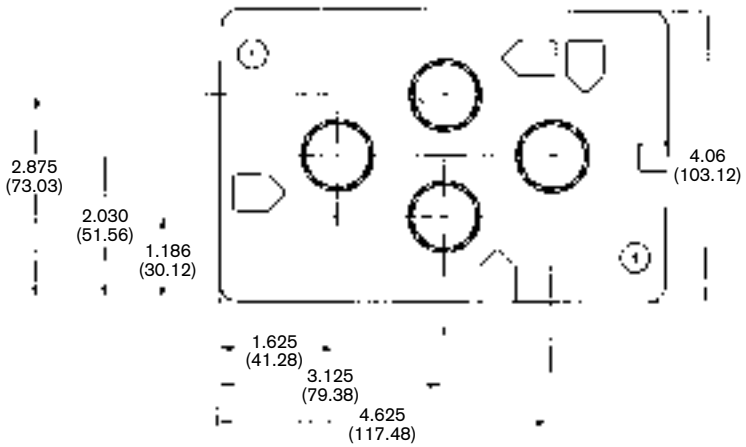
	Normal	Actuated
X	.421 (10.7)	.263 (6.7)

Subplates, Bottom Ported

Inches (Millimeters)







Bolt Kit	
Kit	Part Number
B-180 valve only	**953 675**

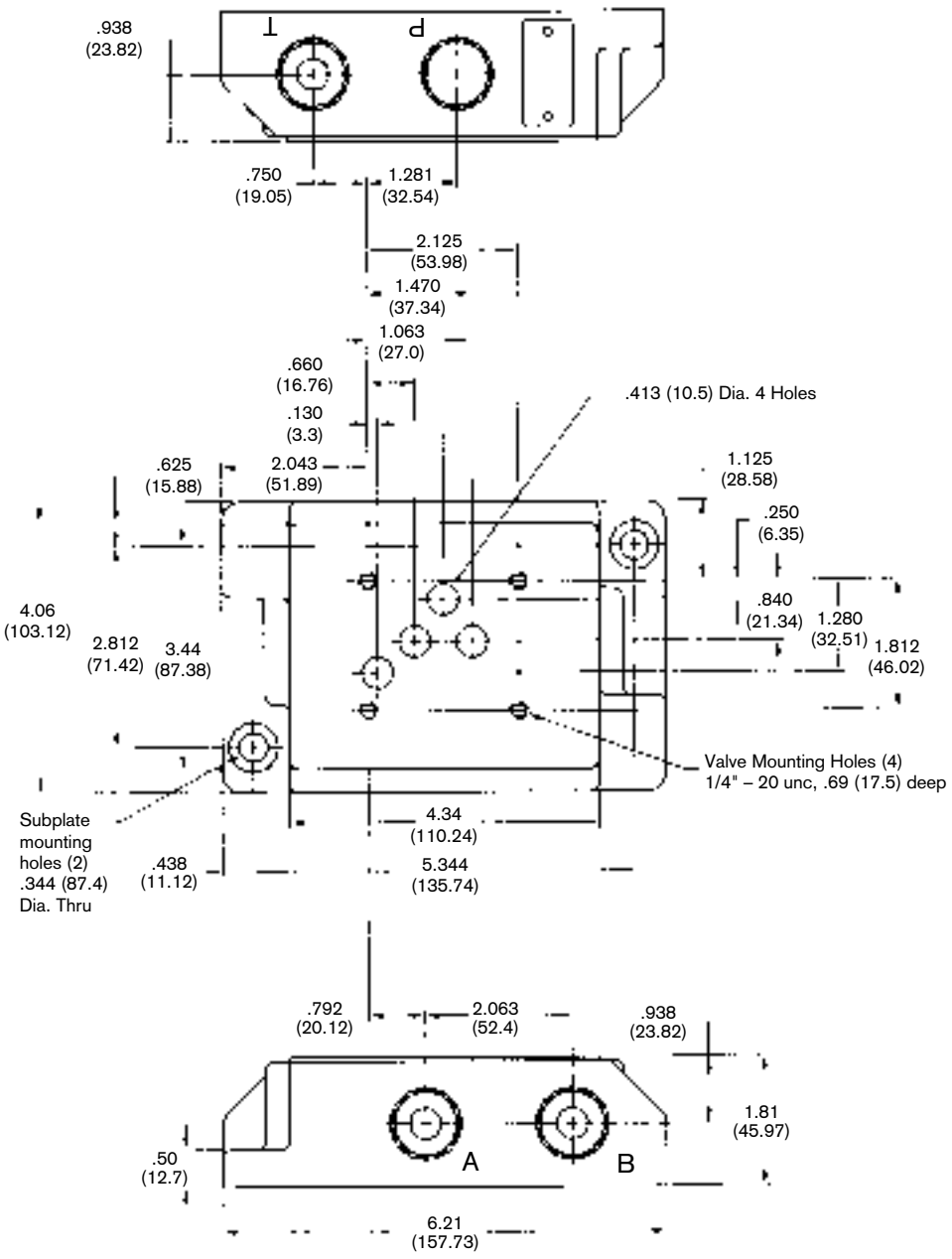
Subplate	
Port Size	Part Number
1/2" NPT	**9 000 010 172**
3/4" NPT	**9 000 010 181**
8 SAE	**9 000 010 174**
12 SAE	**9 000 010 183**

NOTE: Max. Pressure = 4600 PSI
(315 Bar)

When a subplate is not used a machined pad must be provided.
The mounting surface should comply with NFPA T3.5.1M R1-1984 ANSI B93.7M-1986 specification.

Subplates, Side Ported

Inches (Millimeters)



Bolt Kit	
Kit	Part Number
B-180 valve only	**953 675**

Subplate	
Port Size	Part Number
1/2" NPT	**9 000 010 164**
3/4" NPT	**9 000 010 166**
8 SAE	**9 000 010 165**
12 SAE	**9 000 010 175**

NOTE: Max. Pressure = 4600 PSI
(315 Bar)

When a subplate is not used a machined pad must be provided.
The mounting surface should comply with NFPA T3.5.1M R1-1984 ANSI B93.7M-1986 specification.

Features and Benefits

- ☐ **Retained guide tube for easy replacement of coils**
- ☐ **Solenoid identification per U.S. standard. P→A when solenoid “A” is energized**
- ☐ **Optional manual overrides available**
- ☐ **Certified**
- ☐ **Dual frequency solenoids (50 or 60 Hertz)**
- ☐ **Throttling spools are standard**
- ☐ **Pilot pressure valve in P port is optional**

Order Code

This order code describes the desired model variances of the DO5 (NG 10) directional control valves. Standard models are assigned a 10-digit number. See page 45.

0	8	1	W	V	1	0	P	1	V	3															D	5	1	/		

SIZE
10 – D05 (NG 10)

SEALS
V – VITON STD.

CONTROL TYPE

2 – HYDRAULIC
3 – ELECTRICAL

SPOOL CODE

REFER TO SPOOL CHART ON PAGE 45

PILOT CHOKES*

F – FIXED
T – ADJUSTABLE

R – PILOT PRESSURE VALVE IN P*

H – ADJUSTABLE SPOOL STOPS*

PILOT AND DRAIN
XY – EXTERNAL PILOT EXTERNAL DRAIN
PT – INTERNAL PILOT INTERNAL DRAIN
PY – INTERNAL PILOT EXTERNAL DRAIN
XT – EXTERNAL PILOT INTERNAL DRAIN

ELECTRICAL CONNECTIONS
WS – DIN 43650/ISO4400
KL – WIRING BOX + SENTINAL LIGHTS
KA – WIRING BOX ONLY
KD – WIRING BOX + QUICK CONNECTOR, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KE – WIRING BOX + QUICK CONNECTOR + SENTINEL LIGHTS, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KG – WIRING BOX + QUICK CONNECTOR (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
KM – WIRING BOX + QUICK CONNECTOR + SENTINAL LIGHTS (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
G – DETENT CONTROL TYPE 7 ONLY
EX – FLAME PROOF

09 – MANUAL PUSH PIN WITH RUBBER COVER*

51 – SOLENOID IDENTIFICATION PER U.S. STANDARD P→A WHEN SOLENOID "A" IS ENERGIZED (ANSI B93.9)

D – DESIGN SERIES
D - STD
**E - 24VDC LEAD WIRE COILS

SOLENOID OPTIONS*

C – COVERED PUSH PIN

* If these options are not needed, omit them from the code

** QUICK CONNECT FOR E SERIES IS MINI CONNECTOR (PG 99)

SOLENOID VOLTAGES

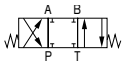
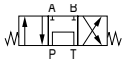
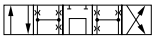
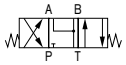
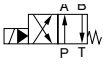
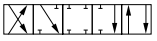
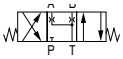
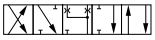
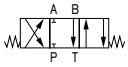
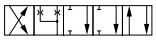
AC	DC
115/60	012/00
230/60	024/00
Series "D" Dual Frequency	

Product Literature Disclaimer

SPECIFICATIONS AND/OR DIMENSIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE. PLEASE CONSULT FACTORY.

Part Numbers

Standard valves are assigned a 10-digit part number. Describe unassigned valve combinations with the alpha-numeric order code.

			9 810 233 …								
			P – INT. PILOT **X –** EXT. PILOT **T –** INT. DRAIN **Y –** EXT. DRAIN	**KA –** WIRING BOX **KD –** WIRING BOX + QUICK CONNECT (3 PIN SINGLE & 5 PIN DOUBLE SOLENOID) **KE –** WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS **KL –** WIRING BOX + SENTINEL LIGHTS **KM –** WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS (SINGLE SOL. 5 PIN) **WS –** PLUG CONNECTER (DIN 43650 / ISO 4400)						
				KA	**KD**	**KE**	**KE**	**KL**	**KM**	**WS**	**WS**
SPOOL NO.	SYMBOLS	TRANSITION	PILOT & DRAIN	110/115	110/115	110/115	24/00	110/115	110/115	110/115	24 VDC.
001			XY	**026**						**029**	
			PT	**022**						**112**	**113**
			TPT							**102**	
002			FPY	**110**							
			XY								
			FXY	**106**							
004			PT	**046**						**049**	
			TPT		**005**						
			TXY		**109**						
010			XY								
			PT	**070**							
			TPY								**114**
018			PY				**104**				
			FXHPT				**003**				
			PT				**004**				
042			XT								**103**

Characteristics

General	
Design	Spool valve
Mounting type	Subplate, pattern NG 10, 16 or 25
Mounting Position	as desired[1]
Direction of flow	As shown on symbol

Hydraulic	
Ambient temperature	–8 to 120°F (–25 to 50°C)
Fluid	Mineral-oil based hydraulic fluids DIN 51 524…51 535 other fluids on request
Viscosity	60…2300 SUS (10 …500 cSt)
Fluid temperature	–8 to 175°F (–25 to 80°C)
Filtration	Contamination class 10, according to NAS 1638 to be realized with filter $ß_{10}$=75
Operating pressure	Port P, A, B: 5075 PSI (350 bar) max. Port T : 4060 PSI (280 bar) max. (at Control oil external)
Pilot Pressure	Pilot port X or P[3] 116 PSI (8 bar) min. 3045 PSI (210 bar) max. at Control 3 Return port X or T 3625 PSI (250 bar) max. at Control 2 1450 PSI (100 bar) max. at Ex-Execution 2320 PSI (160 bar) max. at alternating voltage
Rated flow[2]	Δp = 14.5 PSI (1 bar) 5.4…13.4 GPM (20…50 l/min)
Maximum flow[2]	>43 GPM (160 L/min)
Control volumes (4/3, 4/2)	0.06 in³ (1 cm³)
Total response time	Switch-on Pilot = 700 psi 40…60ms Switch-off Pressure = (50 bar) 35…55ms Switch-on Pilot = 2900 psi 35…55ms Switch-off Pressure = (200 bar) 30…45ms
	Switch-on Pilot = 700 psi 30…40ms Switch-off Pressure = (50 bar) 35…55ms Switch-on Pilot = 2900 psi 25…35ms Switch-off Pressure = (200 bar) 30…45ms

Electric	
Duty factor	100%
Enclosure type	*IP 65 to IEC 529 and DIN 40 050 (DIN Connectors)
Voltage and frequency	See table on page 98 AC-solenoids 230/60 can be used with 220/50 and 115/60 can be used with 110/50 voltage supply
Power supply	Plug connector to DIN 43 650 ISO 4400
Power rating DC AC	 In Rush: 33W Holding: 33W In Rush: ~1.5 A Holding: ~0.54 A
Max. coil temperaure[4]	272°F (150°C)

[1] Symbol diagrams 008 and 20 horizontal

[2] According to symbol diagram

[3] At increased control pressure, reduction of pressure in conjunction with an orifice in th "P" port of the pilot valve is required

[4] As a result of the surface temperatures of the solenoid coils, European standards EN 563 and EN 982 must be observed

*Note: IP 65
- Protected against low pressure water jets from all direction
- Dust tight

Silting Effect (Sticking of the Spool)

In spool-type valves, dirt particles in the gaps between the valve spool and body may generally lead to the spool becoming jammed. This is particularly the case when the large drops in pressure occur over these gaps and when the valve has remained in the same position for a long period.

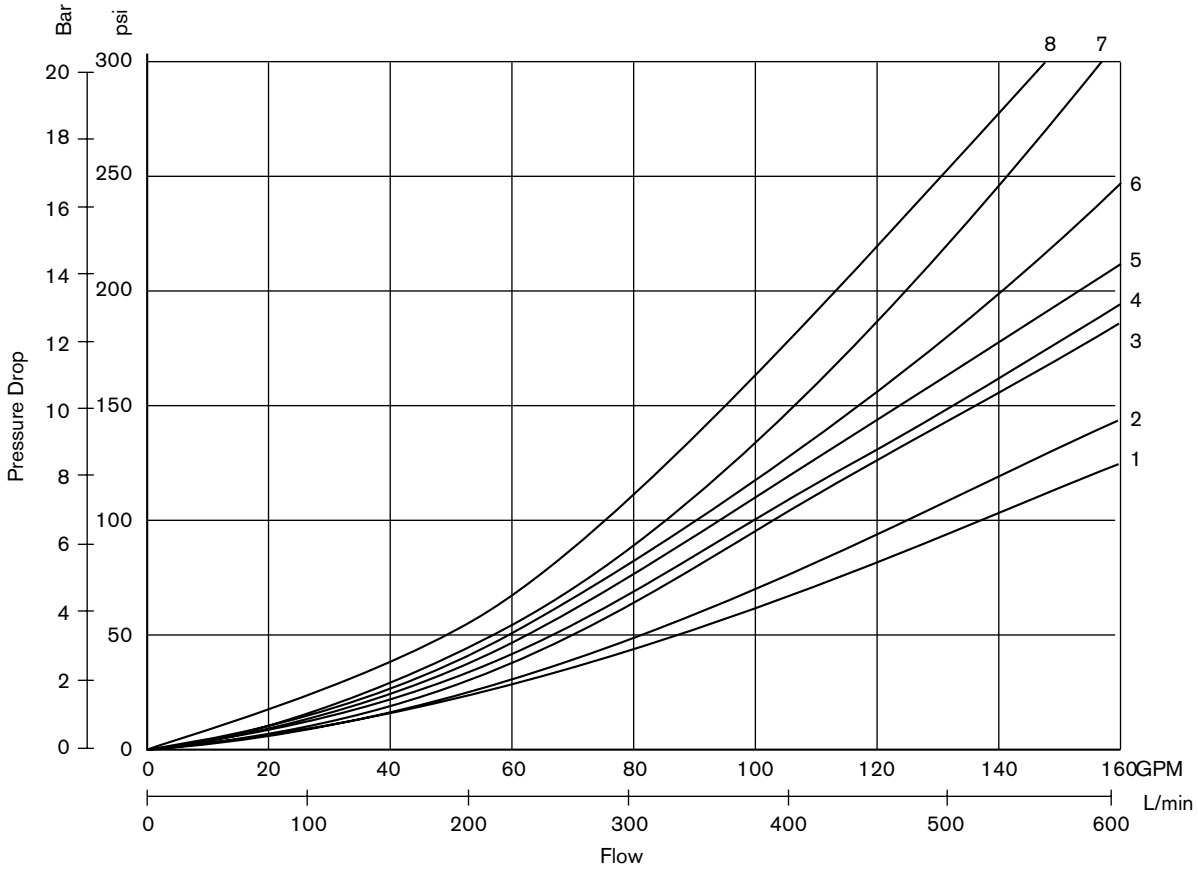
Important on electromagnetic compatibility (EMC)

The circuit must be set up in such a way as to avoid voltage peaks occurring when the solenoids are switched off which may cause interference and impair EMC.

Performance Data

Curve					
Symbol	A B P T		A B P T	A B P T	
	PA	PB	AT	BT	PT
000	2	2	1	3	–
001	3	3	3	3	–
002	3	2	1	4	8
004	3	3	1	7	–
005	2	2	3	4	–
008	3	3	7	6	–
009	3	5	3	4	–
010	3	3	7	6	–
011	5	3	3	4	–
012	3	3	4	8	–
014	3	–	–	4	8
018	3	3	3	4	–
020	3	3	7	6	–
026	3	3	1	3	–
040	2	5	3	–	–
041	2	4	1	–	–
042	3	3	3	2	–
045	–	3	3	–	–
070	3	–	–	3	–

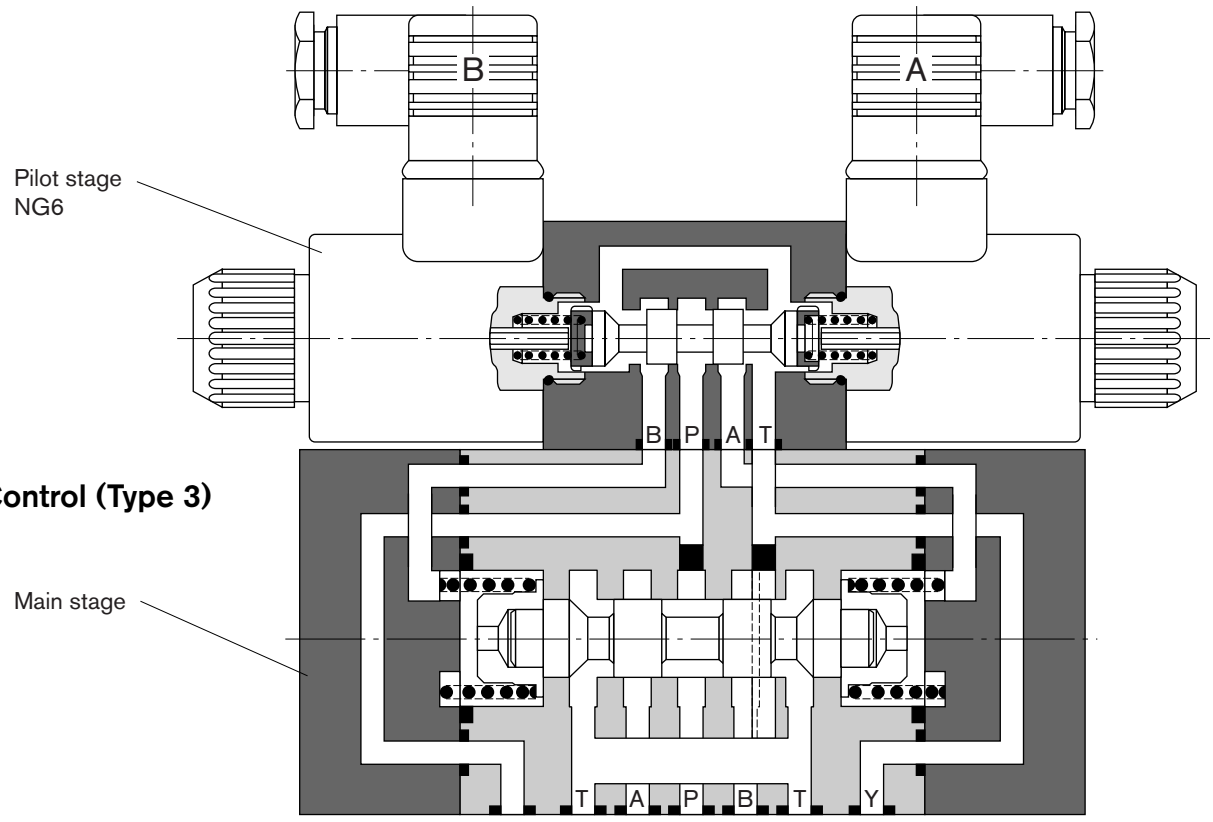
Viscosity = 165 SUS (35 cSt)



Function

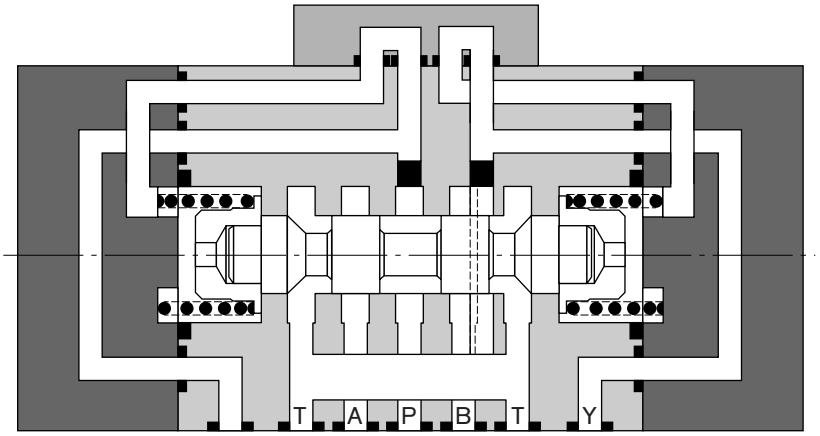
The directional control valves NG 10, 16 and 25 are pilot operated valves in spool design. The main stage of the NG 16 and NG 25 as well as the 002 symbol of the NG 10 directional control valves are fitted as standard with fine-control notches.

The pilot stage, which is connected directly to the main stage by means of a flange, consists of an electrically actuated directional control valve NG 6 with pressure-tight solenoids and replaceable coil. Its power ports A and B are connected to the spring chambers of the main stage. Spool-valve deflection takes place hydraulically via the pilot stage.



Control (Type 3)

Main stage



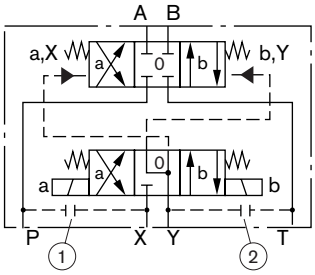
Control (Type 2)

Pilot & Drain Options

Max. Pressure in P or X:
3625 psi (250 bar)
Max. Pressure in T or Y:
3045 psi (210 bar) for type 3 control
3625 psi (250 bar) for type 2 control
1450 psi (100 bar) at Ex-Execution
The retrofitting affects an alternation of the order code and the EDP-number.

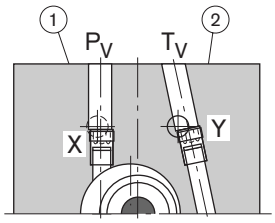
Control oil supply and return is either external via the ports X and Y or internal via the ports P and T. Modification is possible by removing or inserting plugs which are accessible after removing the pilot valve.

Control oil system		
Supply	**Return**	**Plug**
external X	external Y	① ②
Internal P	external Y	②
external X	internal T	①
internal P	internal T	

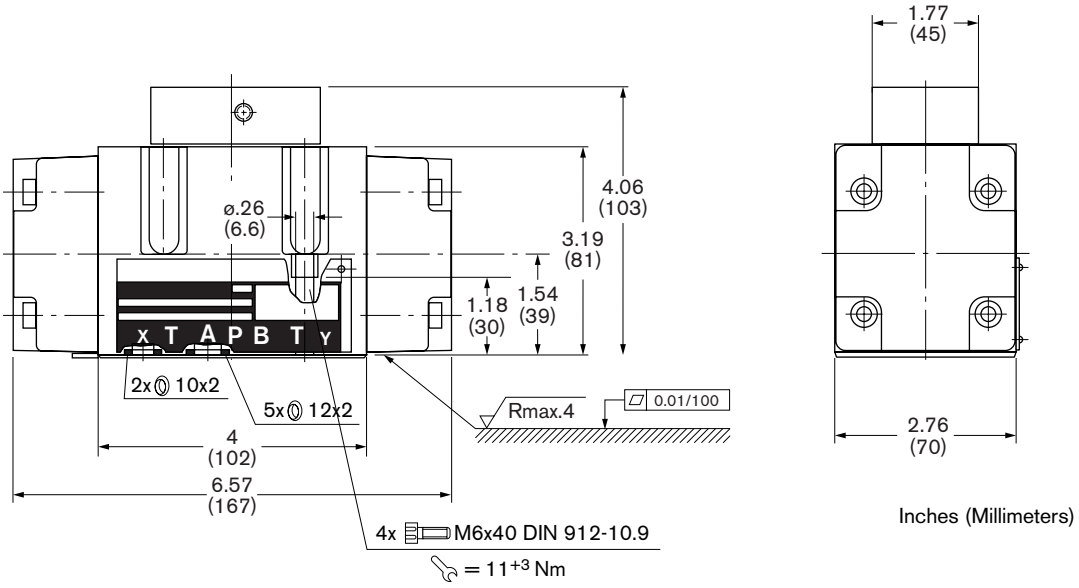


Plug

① ② **#1 813 400 017**
M6 DIN 906 ⬡3

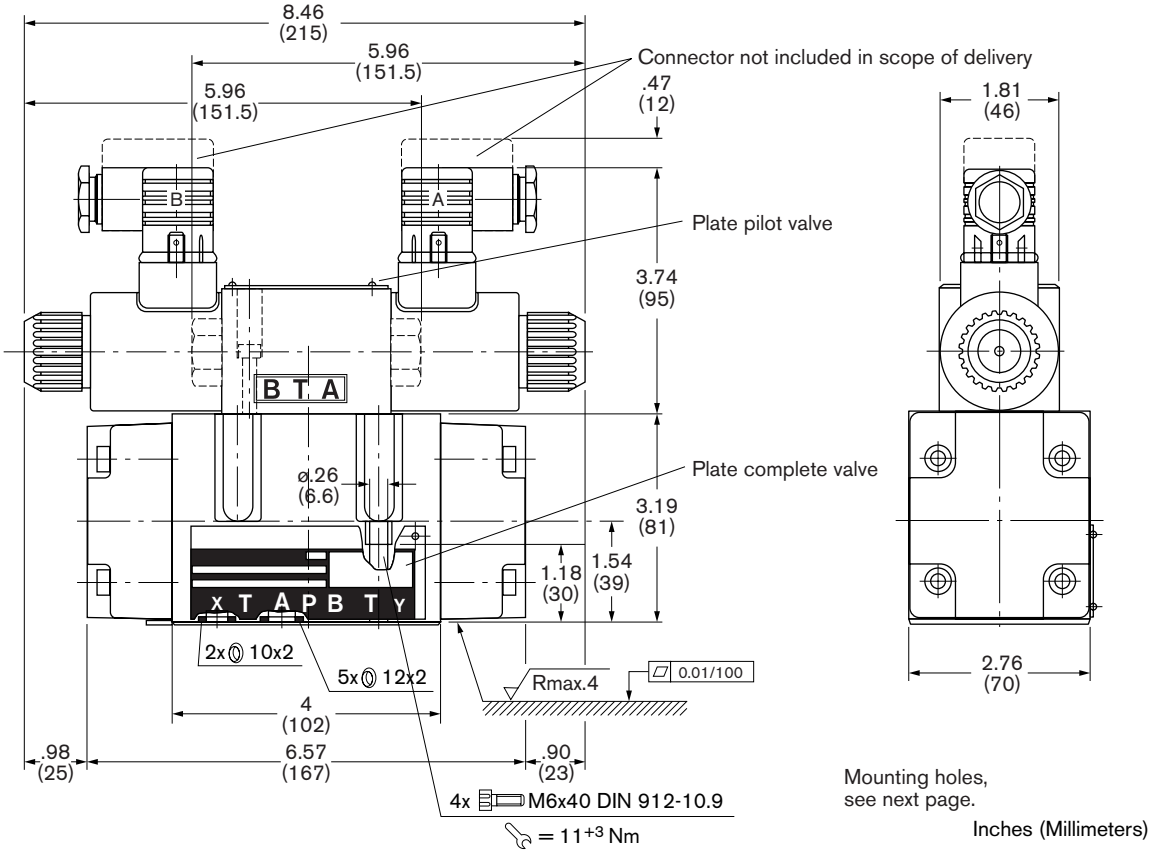


Control (Type 2) Hydraulic Pilot



Inches (Millimeters)

Control (Type 3) Solenoid Pilot



Mounting holes,
see next page.

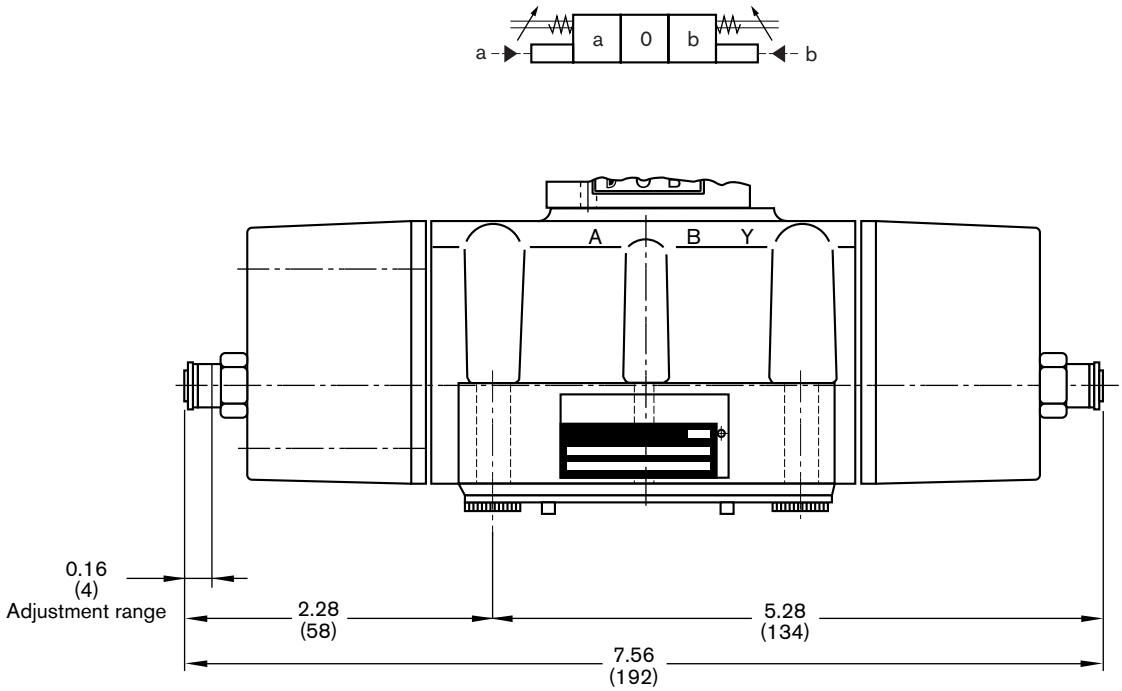
Inches (Millimeters)

Adjustable Spool Stops

Adjustable spool stops are used to limit the stroke of the spool and are located on both ends of the valve. They provide independent control of the actuator speed in either directions.

Limiting the spool stroke creates an orifice between the body and spool in either flow path and turning the screw in will reduce the size of the orifice.

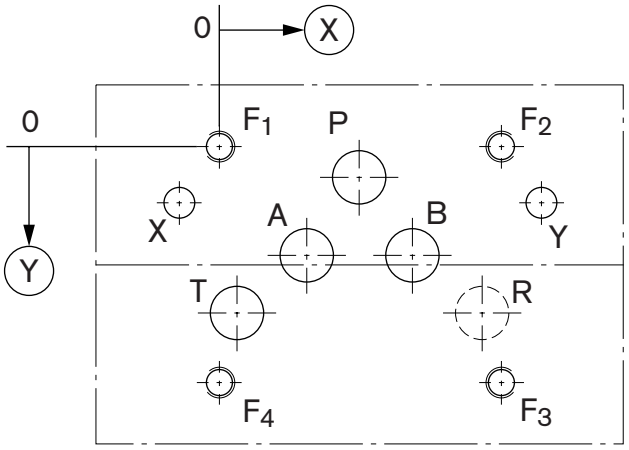
If the flow through both flow paths is equal, the valve will meter-in and out at the same time. When a differential cylinder is used, the stops can be adjusted to obtain the same speed in both directions.



Inches (Millimeters)

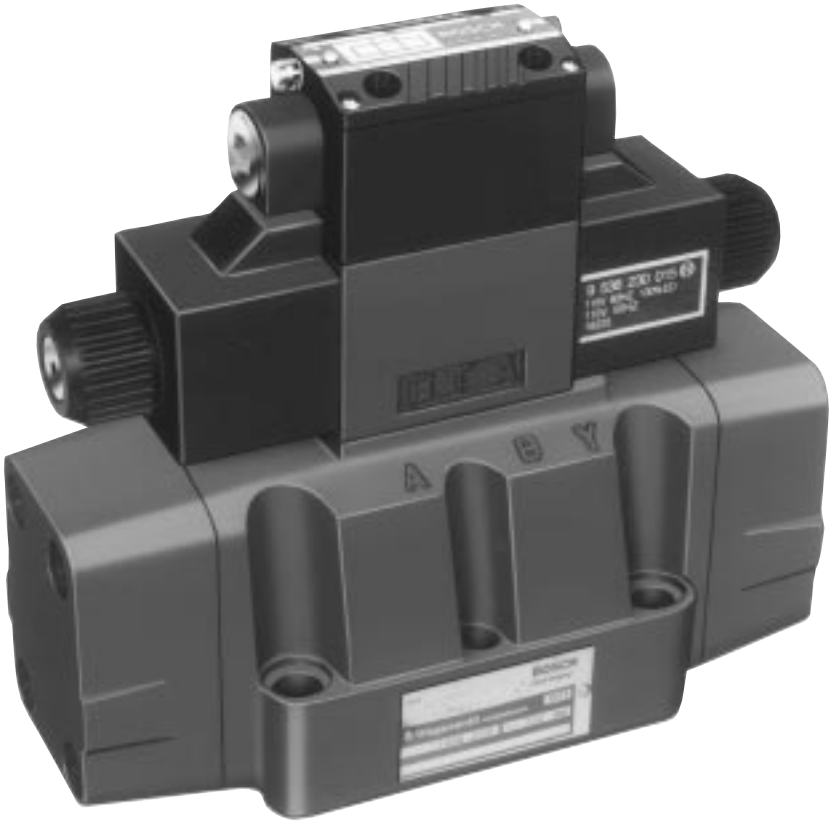
For Conversion	
Description	Part number
Complete end cap assembly including mounting bolts	**1 817 002 087**

Mounting holes



Inches (Millimeters)

	P	A	T	B	F_1	F_2	F_3	F_4	X	Y	R
(X)	.01 (27)	.66 (16.7)	.13 (3.2)	1.47 (37.3)	0 (0)	2.13 (54)	2.13 (54)	0 (0)	-.31 (-8)	2.44 (62)	2 (50.8)
(Y)	2.48 (63)	.84 (21.4)	1.27 (32.5)	.84 (21.4)	0 (0)	0 (0)	1.81 (46)	1.81 (46)	.43 (11)	.43 (11)	1.27 (32.5)
ø	.41[1] (10.5[1])	.41[1] (10.5[1])	.41[1] (10.5[1])	.41[1] (10.5[1])	M 6[2]	M 6[2]	M 6[2]	M 6[2]	.25 (6.3)	.25 (6.3)	.41[1] (10.5[1])



Features and Benefits

- ☐ Retained guide tube for easy replacement of coils
- ☐ Solenoid identification per U.S. standard. P→A when solenoid “A” is energized
- ☐ Optional manual overrides available
- ☐ Certified
- ☐ Dual frequency solenoids (50 or 60 Hertz)
- ☐ Throttling spools are standard
- ☐ Pilot pressure valve in P port is optional

Order Code

This order code describes the desired model variances of the DO7 (NG 16) directional control valves. Standard models are assigned a 10-digit number. See page 55.

0	8	1	W	V	1	6	P	1	V	3															D	5	1	/		

SIZE
16 – D07 (NG 16)

SEALS
V – VITON STD.

CONTROL TYPE

2 – HYDRAULIC
3 – ELECTRICAL

SPOOL CODE

REFER TO SPOOL CHART ON PAGE 55

PILOT CHOKES*

F – FIXED
T – ADJUSTABLE

R – PILOT PRESSURE VALVE IN P*

H – ADJUSTABLE SPOOL STOPS*

PILOT AND DRAIN
XY – EXTERNAL PILOT EXTERNAL DRAIN
PT – INTERNAL PILOT INTERNAL DRAIN
PY – INTERNAL PILOT EXTERNAL DRAIN
XT – EXTERNAL PILOT INTERNAL DRAIN

ELECTRICAL CONNECTIONS
WS–DIN 43650/ISO4400
KL –WIRING BOX + SENTINAL LIGHTS
KA –WIRING BOX ONLY
KD –WIRING BOX + QUICK CONNECTOR, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KE –WIRING BOX + QUICK CONNECTOR + SENTINEL LIGHTS, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KG –WIRING BOX + QUICK CONNECTOR (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
KM –WIRING BOX + QUICK CONNECTOR + SENTINAL LIGHTS (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
G –DETENT CONTROL TYPE 7 ONLY
EX –FLAME PROOF

09 – MANUAL PUSH PIN WITH RUBBER COVER*

51– SOLENOID IDENTIFICATION PER U.S. STANDARD P→A WHEN SOLENOID "A" IS ENERGIZED (ANSI B93.9)

D – DESIGN SERIES
D - STD
**E - 24VDC LEAD WIRE COILS

SOLENOID OPTIONS*

C – COVERED PUSH PIN

* If these options are not needed, omit them from the code

** QUICK CONNECT FOR E SERIES IS MINI CONNECTOR (PG 99)

SOLENOID VOLTAGES

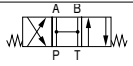
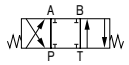
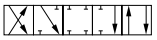
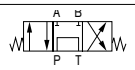
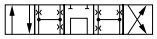
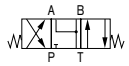
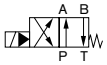
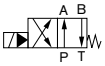
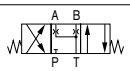
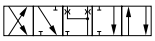
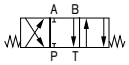
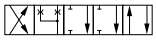
AC	DC
115/60	012/00
230/60	024/00
Series "D" Dual Frequency	

Product Literature Disclaimer

SPECIFICATIONS AND/OR DIMENSIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE. PLEASE CONSULT FACTORY.

Part Numbers

Standard valves are assigned a 10-digit part number. Describe unassigned valve combinations with the alpha-numeric order code.

				9 810 234 …							
				P – INT. PILOT **X –** EXT. PILOT **T –** INT. DRAIN **Y –** EXT. DRAIN	**KA –** WIRING BOX **KD –** WIRING BOX + QUICK CONNECT (3 PIN SINGLE & 5 PIN DOUBLE SOLENOID) **KE –** WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS **KG –** WIRING BOX + QUICK CONNECT (SINGLE SOLENOID 5 PIN) **KL –** WIRING BOX + SENTINEL LIGHTS **KM –** WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS (SINGLE SOL. 5 PIN) **WS –** PLUG CONNECTER (DIN 43650 / ISO 4400)					
				KA	**KD**	**KE**	**KG**	**KL**	**KM**	**WS**	**WS**
SPOOL NO.	SYMBOLS	TRANSITION	PILOT & DRAIN	110/115	110/115	110/115	110/115	110/115	110/115	110/115	24 VDC.
000			XY	**033**		**047**		**059**		**005**	**020**
			RPT								**160**
001			PY			**104**					**099**
			XY	**034**		**048**		**060**		**006**	**021**
			PT	**035**		**049**		**061**		**007**	**022**
			HXY							**008***	**023**
			FXT							**076**	**103**
			FPT	**036**						**009**	
			FRHPT								**093**
			TPT								**106**
			HPT								**113**
			TPY							**130**	**172**
002			RPT								**161**
			XY	**037**		**050**		**062**		**010**	**024**
			TRPT							**111**	
004			XY	**038**		**051**		**063**		**011**	**025**
			XT							**071**	
			PT	**039**		**052**		**064**		**012**	**026**
			FPT	**040**						**013**	
			FXY							**077**	
			FPY								**091**
			PY			**578**					**125**
			TPT								**144**
			TPY			**156**				**164**	**173**
009			XY	**041***		**053**		**065**		**014**	**027**
			THPT							**114**	
010			XY	**042**		**054**		**066**		**015**	**028**
			PT	**043**		**055**		**067**	**082**	**016**	**029**
			PY								**085**
			XT								**092**
			FPY								**090**
			TPT								**148**
			TPY							**162**	
018			TPY								**170**
			XY	**044***		**056***		**068**		**017***	**030**
			PT								**089**
020			FPT								**147**
			XY	**045***		**057**		**069**		**018**	**031**
			FPY							**019**	**097**
			PT	**046**		**058**		**070**			**032**
			PY			**157**					
			TPY								**171**
026			PT					**131**			**098**
			PY								**081**
			XY								**083**
			FPY							**079**	
042			XY								**129**
			PT								**072**
			FPT							**075**	
			PY								**087**
			FXT								**142**
			FPY								**146**
045			PT								**073**
			FPT							**074**	

*Consult factory

Characteristics

General	
Design	Spool valve
Mounting type	Subplate, DO7 (NG 16)
Mounting Position	as desired (Horizontal only for detented valves)
Ambient temperature	–4 to 120°F (-20 to 50°C)
Seals	Viton
CSA Certified	File Number LR 93267-1 (Ecept flame proof solenoids)

Weights	
Hydraulic	17.6 lbs (8 kg)
Electrical 1 Solenoid	19.8 lbs (9 kg)
Electrical 2 Solenoid	20.9 lbs (9.5 kg)
Response time adjustment	2.4 lbs (1.1 kg)

Hydraulic	
Fluid	Petroleum hydraulic fluids and most fire resistant fluids
Viscosity	60…2300 SUS (10 …500 cSt)
Fluid temperature	–4 to 175°F (–20 to 80°C)
Filtration	Contamination class 19/16, according to ISO 4406 to be realized with filter ß25=75
Direction of flow	As shown on symbol
Operating pressure	Port P, A, B: 5075 PSI (350 bar) max. Port T* : 4060 PSI (280 bar) max. w/flame proof solenoids
Pilot Pressure	Pilot port X or P 114 psi (8 bar) min. 3625 psi (250 bar) max. Drain port X or T 3045 psi (210 bar) max. for solenoid operated 3625 PSI (250 BAR) max. for hydraulic piloted 1450 PSI (100 BAR) max. for flame proof solenoid
Maximum flow	80 GPM (300 L/min) see Δ P/Q curve page 57
Control volume	0.37 in3 (6 cm^3) for 3 position valves 0.61 in^3 (10cm^3) for 2 position valves^3
Total response time	Switch-on Pilot = 700 psi 55…75ms Switch-off Pressure = (50 bar) 50…70ms Switch-on Pilot = 2900 psi 50…70ms Switch-off Pressure = (200 bar) 40…60ms
	Switch-on Pilot = 700 psi 30…50ms Switch-off Pressure = (50 bar) 50…70ms Switch-on Pilot = 2900 psi 25…40ms Switch-off Pressure = (200 bar) 40…60ms

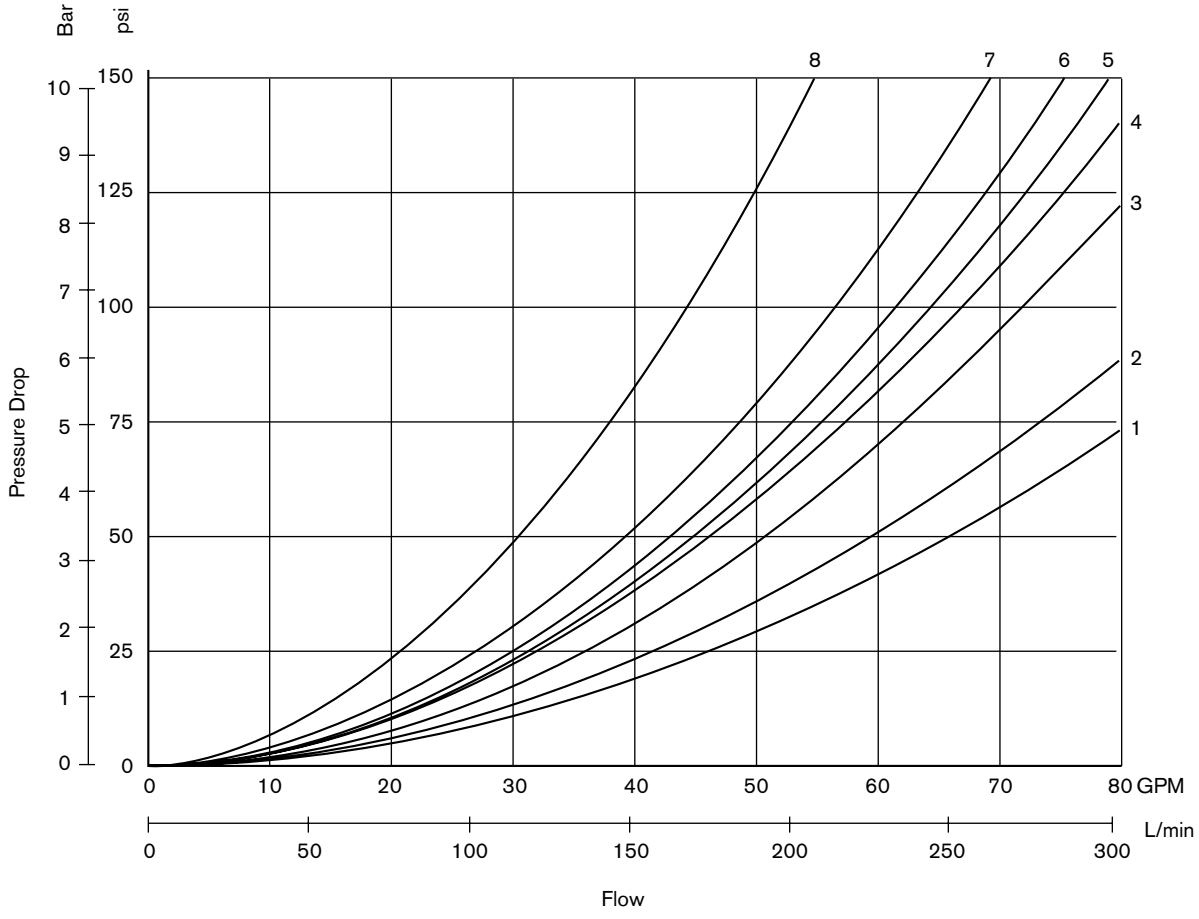
Electric	
Duty factor	100%
Solenoid identification	Meets ANSI B93.9-1969 (R 1988) Standards* P → Awhen Sol. “A” is energized
Enclosure type	*IP 65 to IEC and DIN 40 050 (DIN Connectors)
Insulation class	C VDE § 5
Voltage and frequency	See table on page 88 AC-solenoids 230/60 can be used with 220/50 and 115/60 can be used with 110/50 voltage supply
Voltage tolerance	Nominal Voltage ±10%
Power rating DC AC	 In Rush: 33W Holding: 33W In Rush: ~1.5 A Holding: ~0.54 A

*Note: IP 65
- Protected against low pressure water jets from all direction
- Dust tight

Performance Data

Curve					
Symbol	A B P T		A B P T	A B P T	
	PA	PB	AT	BT	PT
000	3	3	4	5	–
001	1	1	2	7	–
002	4	6	6	8	9
004	3	3	4	4	–
010	3	3	3	4	–
018	3	3	4	5	–
020	3	3	3	4	–
042	3	3	3	2	–
045	–	3	3	–	–

Viscosity = 142 SUS (30.2 cSt)

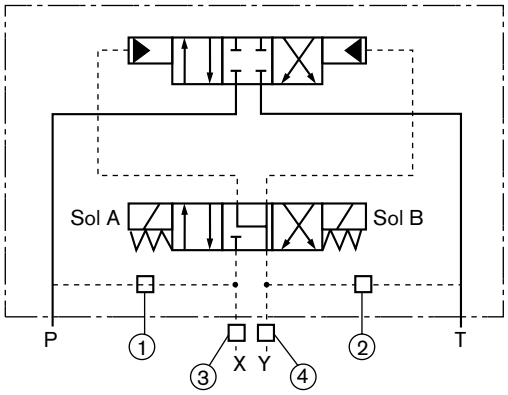


Pilot & Drain Options

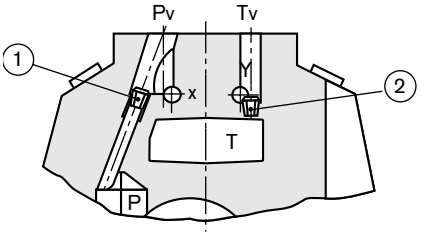
Max. Pressure in P or X:
3625 psi (250 bar)
Max. Pressure in T or Y:
3045 psi (210 bar) for type 3 control
3625 psi (250 bar) for type 2 control
1450 psi (100 bar) when using flame proof solenoid

PY – INT. PILOT, EXT. DRAIN; PLUG PORTS 2 & 3
PT – INT. PILOT, INT. DRAIN; PLUG PORTS 3 & 4
XY – EXT. PILOT, EXT. DRAIN; PLUG PORTS 1 & 2
XT – EXT. PILOT, INT. DRAIN; PLUG PORTS 1 & 4
XY – HYDRAULIC PILOT; PLUG PORTS 1 & 2

Pilot oil supply and drain are either external via the X and Y ports or internal via the P and T ports. Conversion is possible by removing or installing plugs which are accessible after removing the pilot valve. When using internal pilot and drain, the X and Y ports in the subplate must be plugged. With NG 16, the plug ① is accessable only from below, via port P.

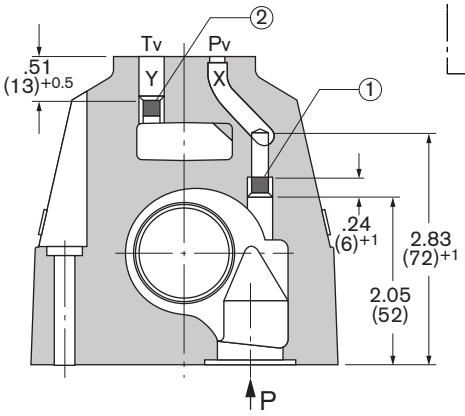


Old Style



Plug Part No.	
① ②	1 813 400 017
	M6 DIN 908 ⬡ 3

New Style

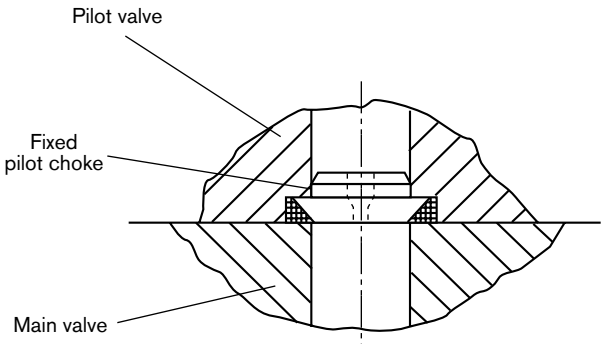


Fixed Pilot Chokes

A fixed pilot choke is an orifice placed in the pilot line to increase the spool shift time. Metering notches on the spool are standard and by increasing the shift time of the spool, the flow paths are opened and closed more gradually which reduces system shock. Fixed pilot chokes can be added to a standard valve at any time by simply removing the pilot valve and inserting the choke in the P port.

The flange machined on the choke holds it captive in the counter-bore for the O-ring. The chokes can be inserted in any of the ports of the pilot valve depending on the desired result. Then a valve is ordered with a fixed pilot choke the 0.030" (Imm) diameter orifice is installed in the P port. Chokes with other size orifice are available and are listed below.

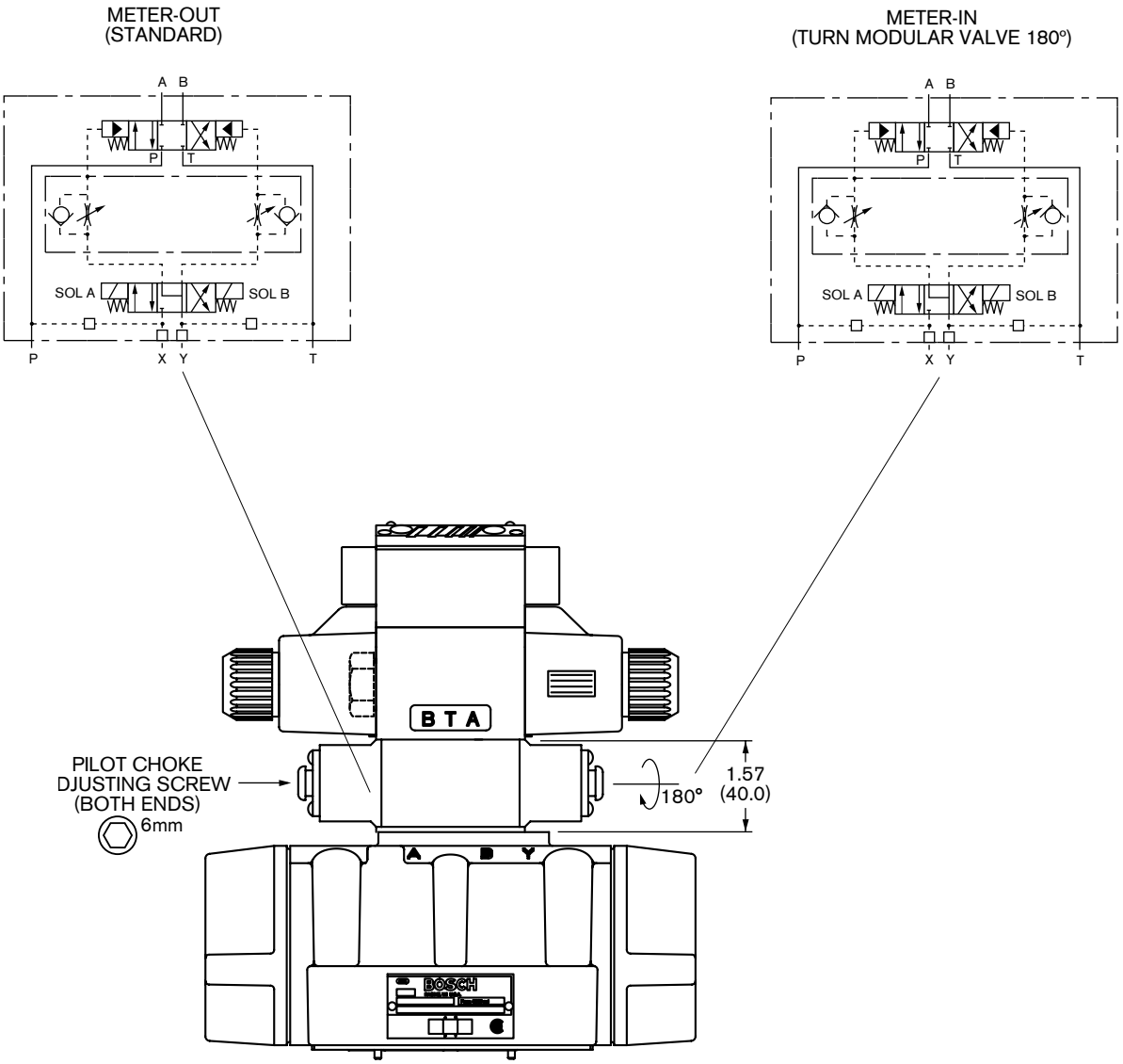
Orifice Sismeter	Part Number
0.030 (0.8mm)	**9 533 230 385**
0.040 (1mm)	**9 533 230 382**
0.050 (1.2mm)	**9 533 230 383**
0.060 (2mm)	**9 533 230 384**



Adjustable Pilot Chokes

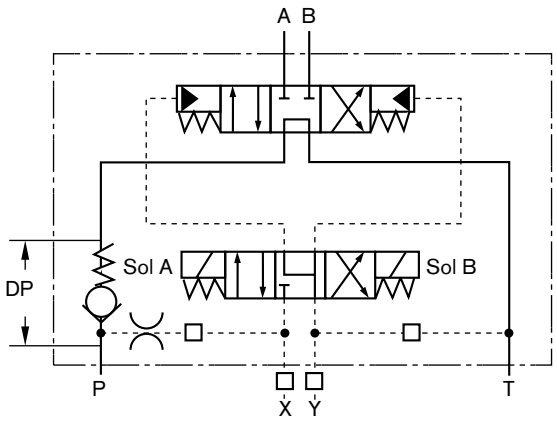
Adjustable chokes consist of a modular flow control valve which contains two non-pressure compensated throttle valves with free flow checks. It provides independent control of the spool shift time in both directions. Because the port pattern is symmet-rical and a seal plate is used, the module can be turned 180° to provide either meter-in or meter-out control.

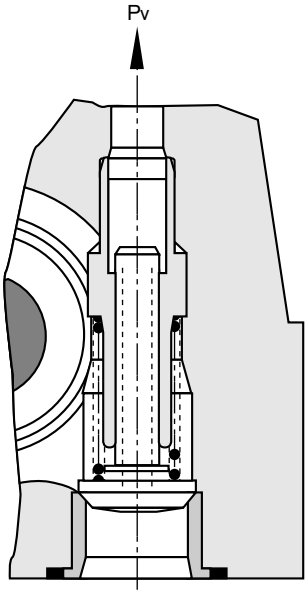
Meter-out is standard. If meter-in is needed, the pilot valve must be removed and the flow control module rotated 180° on its longitudi-nal axis. The locating pin in the bottom mount-ing surface of the flow control module must be removed and installed on the opposite side before reassembly. The seal plate always remains on top of the main valve body. Torque value for the mounting bolts of the pilot valve is 5.0 lb/ft (7.0 Nm).

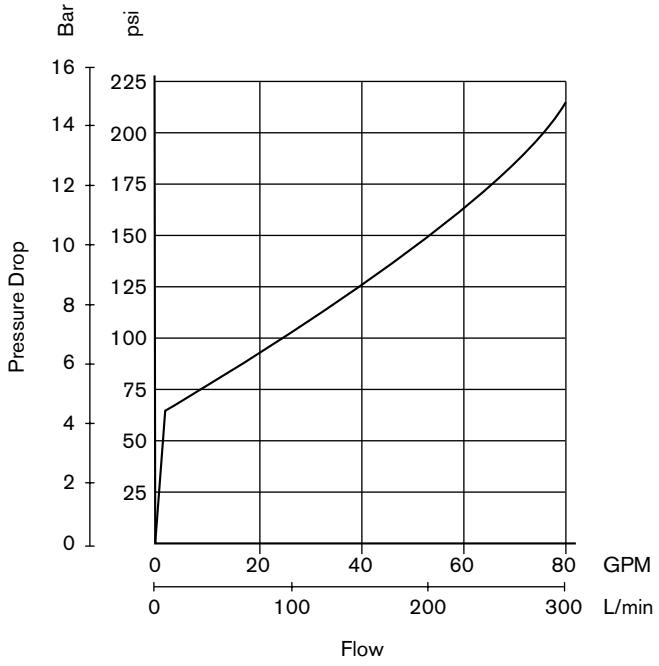


For Conversion	
Description	Part number
NG6 Flow control module w/seal plate (meter out)	**9 810 161 089**
Seal plate	**1 811 037 800**
4 x M5 x 70, DIN 912 – 10.9 (Part number is for one bolt)	**2 910 151 180**

Pilot Pressure Valve







The pilot pressure valve is a slip-in cartridge which fits into a machined cavity in the pressure port of the main valve. It is used to create pilot pressure when using open center spools (000 and 002). Pilot pressure is fed internally to the pilot valve. The pressure drop across the pilot pressure valve is additive to the pressure drop across the main valve. The machined cavity, to accept the pilot pressure cartridge, is standard on all valves.

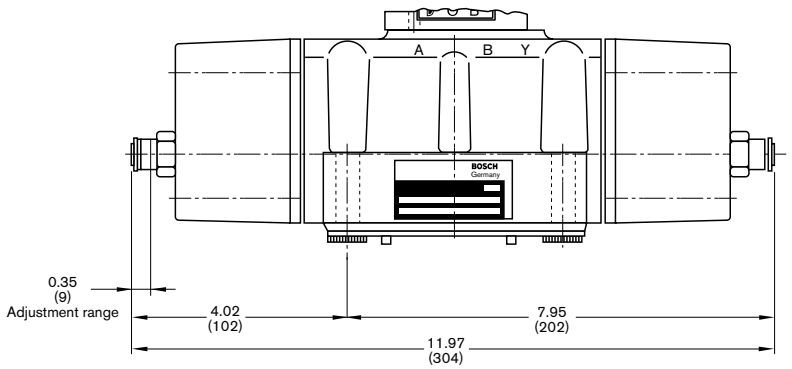
For Conversion	
Description	Part Number
Pilot pressure valve cartidge	**1 817 419 037**

Adjustable Spool Stops

Adjustable spool stops are used to limit the stroke of the spool and are located on both ends of the valve. They provide independent control of the actuator speed in either directions.

Limiting the spool stroke creates an orifice between the body and spool in either flow path and turning the screw in will reduce the size of the orifice.

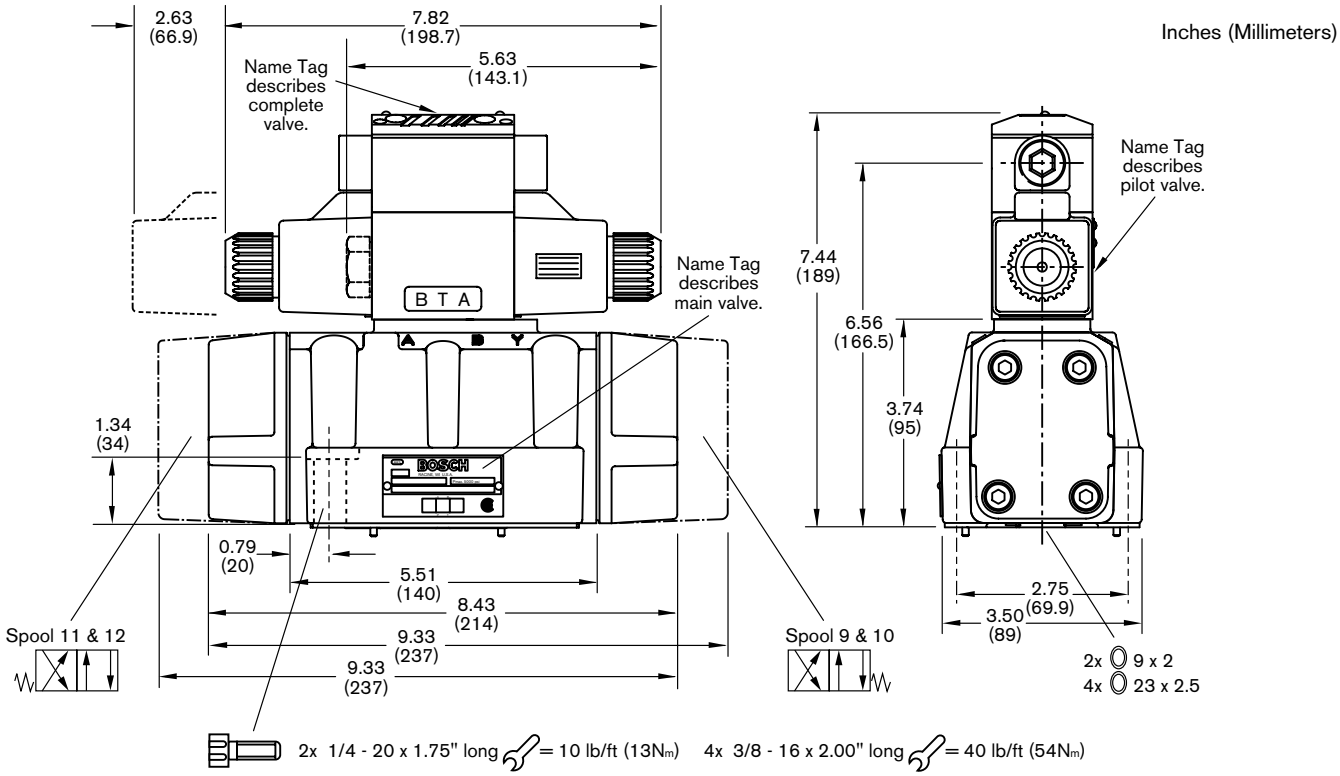
If the flow through both flow paths is equal, the valve will meter-in and out at the same time. When a differential cylinder is used, the stops can be adjusted to obtain the same speed in both directions.



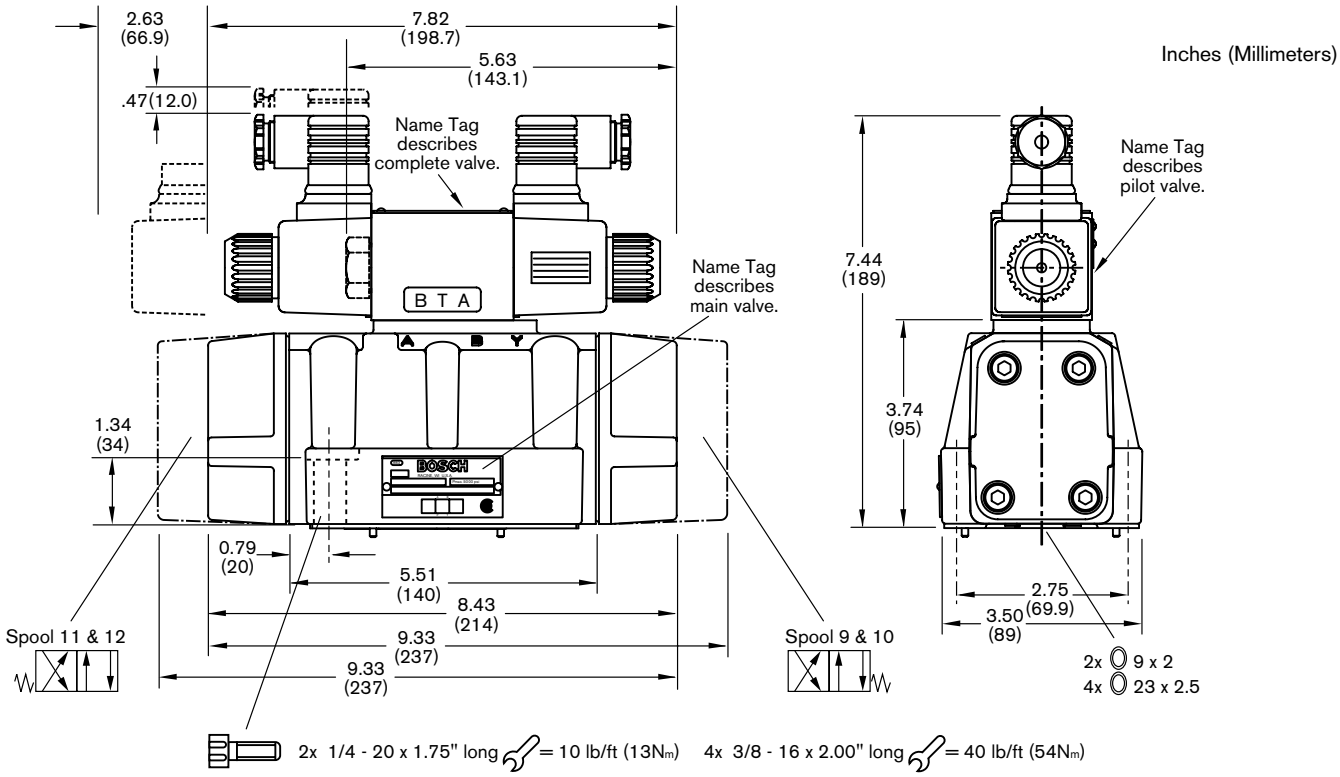
Inches (Millimeters)

For Conversion	
Description	Part number
Complete end cap assembly including mounting bolts	**1 817 002 056**

Valve With AC/DC Solenoid And Wiring Box

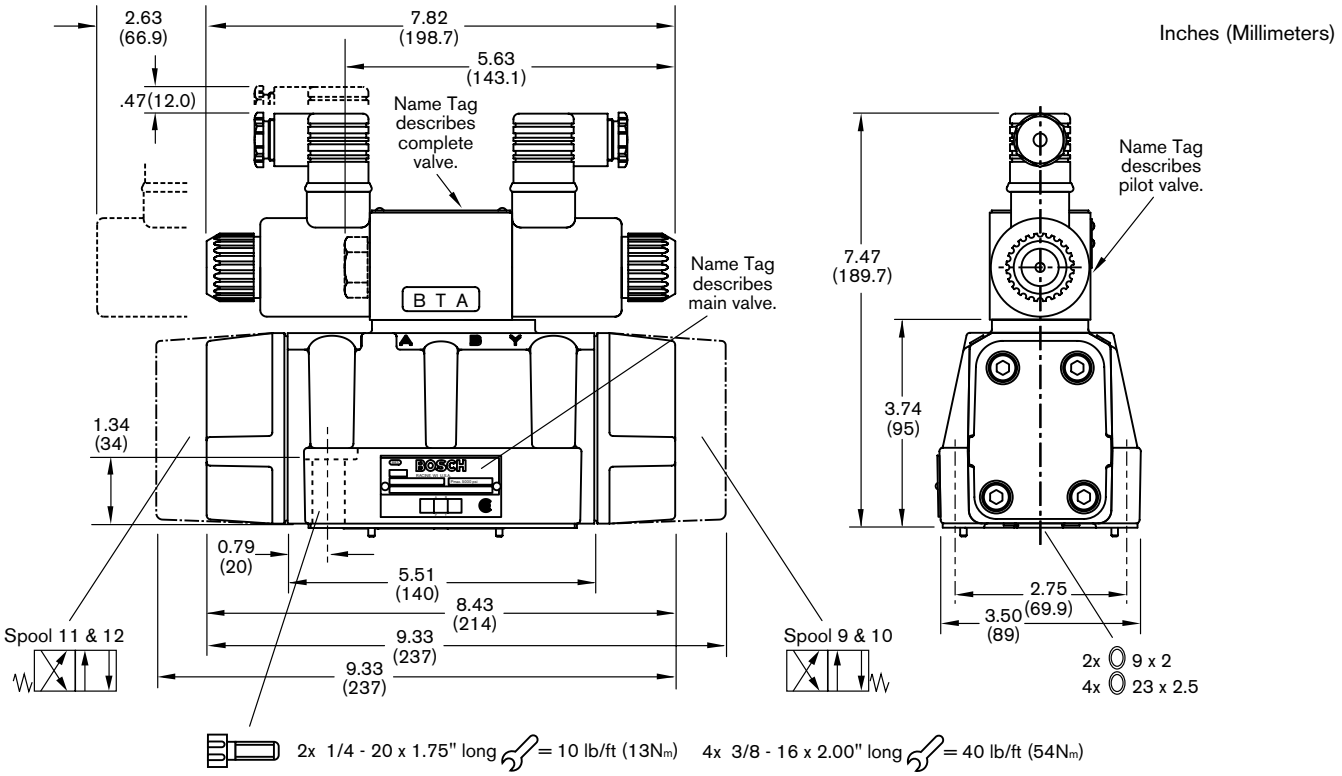


Valve With AC Solenoid (DIN)



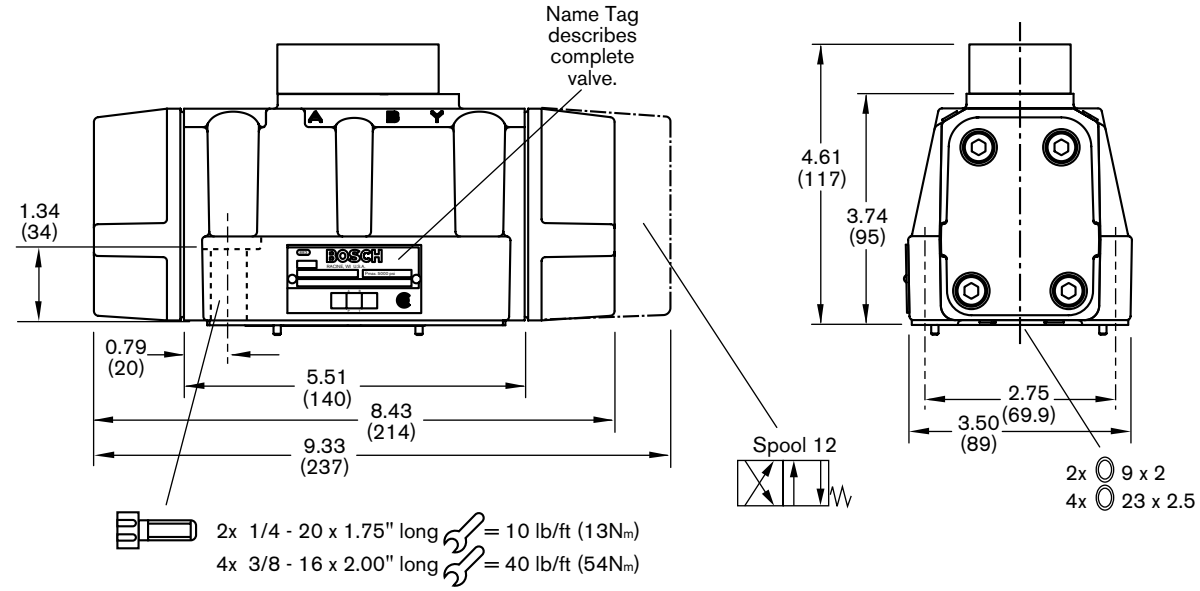
Valve With DC Solenoid (DIN)

Inches (Millimeters)



Hydraulic Controlled (Type 2)

Inches (Millimeters)

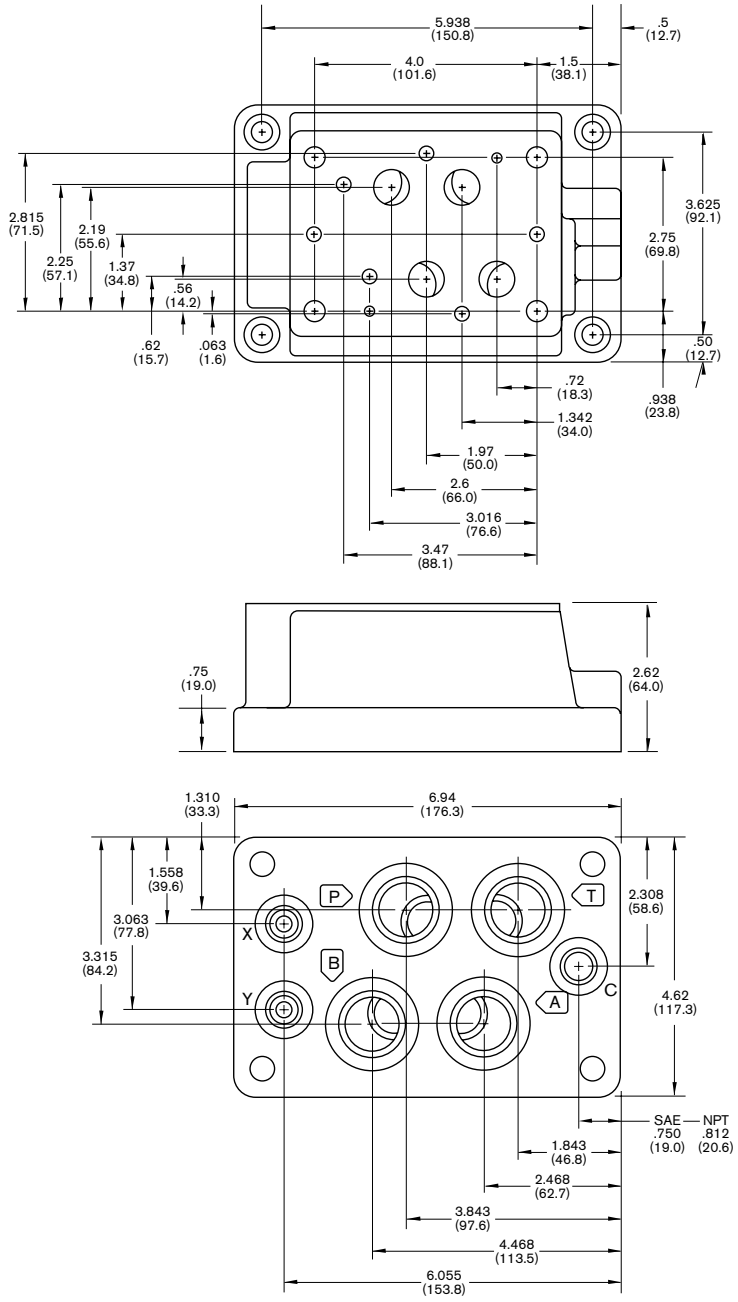


Subplates, Bottom Ported

Inches (Millimeters)

C port is used for load sensing when using proportional valves.

When a subplate is not used, a machined pad must be provided for mounting which is flat to within 0.004 in./in. and has a surface finish of 63 RMS.



P,T,A,B,	X,Y,C,	Maximum pressure	Weight	Part Number
3/4" NPTF	1/4" NPTF	5000 psi	15 lbs.	**9 000 010 201***
1" NPTF		(350 bar)	(6.8 kg)	**9 000 010 202***
#12 SAE	#6 SAE			**9 000 010 203***
#16 SAE				**9 000 010 204***
Bolt kit B-231 (Valve only) 4x 3/8-16 x 2" long 2x 1/4-20 x 1-3/4" long				**953 726**

*Obsolete, consult factory

Features and Benefits

- ☐ Retained guide tube for easy replacement of coils
- ☐ Solenoid identification per U.S. standard. P→A when solenoid “A” is energized
- ☐ Optional manual overrides available
- ☐ Certified Pilot Valve – Main section certification pending
- ☐ Dual frequency solenoids (50 or 60 Hertz)
- ☐ Throttling notches in body are standard
- ☐ Optional load check

Order Guide

This order code describes the desired model variances of the DO8 (NG25) directional control valves. Standard models are assigned a 10-digit number. See page 67.

0	8	1	W	V	2	5	P	1	V	3													D	5	1	/	5	5	/		

SIZE
06 – D08 (NG 25)

SEALS
V – VITON STD.

CONTROL TYPE
2 – HYDRAULIC
3 – ELECTRICAL

SPOOL CODE
SEE SPOOL CHART ON PAGE 67

PILOT CHOKES*
F – FIXED
T – ADJUSTABLE

R – LOAD CHECK IN "P" PORT*

H – ADJUSTABLE SPOOL STOPS*

PILOT AND DRAIN
XY – EXTERNAL PILOT EXTERNAL DRAIN
PT – INTERNAL PILOT INTERNAL DRAIN
PY – INTERNAL PILOT EXTERNAL DRAIN
XT – EXTERNAL PILOT INTERNAL DRAIN

ELECTRICAL CONNECTIONS
WS – DIN 43650/ISO4400
KL – WIRING BOX + SENTINAL LIGHTS
KA – WIRING BOX ONLY
KD – WIRING BOX + QUICK CONNECTOR, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KE – WIRING BOX + QUICK CONNECTOR + SENTINEL LIGHTS, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KG – WIRING BOX + QUICK CONNECTOR (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
KM – WIRING BOX + QUICK CONNECTOR + SENTINAL LIGHTS (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
G – DETENT CONTROL TYPE 7 ONLY
EX – FLAME PROOF

SOLENOID VOLTAGES

AC	DC
115/60	012/00
230/60	024/00
Series "D" Dual Freq.	

09 – MANUAL PUSH PIN WITH RUBBER COVER

55 – LOW PRESSURE VERSION

51 – SOLENOID IDENTIFICATION
PER U.S. STANDARD P>A WHEN SOLENOID "A" IS ENERGIZED (ANSI B93.9)

DESIGN SERIES
(GENERATION)
D - STD
*E - 24VDC LEAD WIRE COILS

SOLENOID OPTIONS*
C – COVERED PUSH PIN

* QUICK CONNECT FOR E SERIES IS MINI CONNECTOR (PG 99)

Product Literature Disclaimer

SPECIFICATIONS AND/OR DIMENSIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE. PLEASE CONSULT FACTORY.

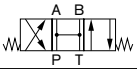
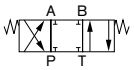
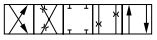
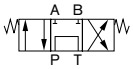
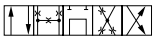
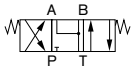
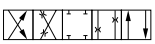
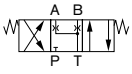
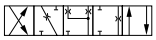
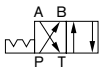
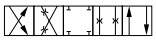
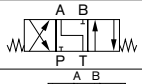
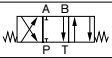
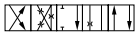
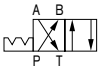
Part Numbers

Standard valves are assigned a 10-digit part number. Describe unassigned valve combinations with the alpha-numeric order code.

9 810 235 …

P – INT. PILOT
X – EXT. PILOT
T – INT. DRAIN
Y – EXT. DRAIN

KA – WIRING BOX
KD – WIRING BOX + QUICK CONNECT (3 PIN SINGLE & 5 PIN DOUBLE SOLENOID)
KE – WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS
KG – WIRING BOX + QUICK CONNECT (SINGLE SOLENOID 5 PIN)
KL – WIRING BOX + SENTINEL LIGHTS
KM – WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS (SINGLE SOL. 5 PIN)
WS – PLUG CONNECTER (DIN 43650 / ISO 4400)

SPOOL NO.	SYMBOLS	TRANSITION	PILOT & DRAIN	KA 110/115	KD 110/115	KE 110/115	KG 110/115	KL 110/115	KM 110/115	WS 110/115	WS 24 VDC.
000			FXY	533							
			PY	506	529						
			XY	583							754
			XT	578		763					769
			RPY	815							
001			HPY		773						
			HPT	524	751						
			PT	505	517	628		547		580	767
			PY	553	576	729		631		536	771
			XY	629	705	626		722		588	839
			FPT	750	519	704					
			TPY	526	760					622	651
			RPT	534	766						
			TXY	566	703						
			XT	687							584
			TPT	610				779		680	
			THPY	623							823
			RHPT	644							
			FHPT	655				725			
			THPT	658							
			FPY	661							
			FRPT	706	724						
			FHXY						731		
			FXY			726		785			
			RPY							800	
002			TXY								590
			PY	507	530			649			
			XY	562		733		573		613	
			XT	563	568	669					
			FXY					666			
			TPY	672							
			RPY	816							
004			TPY	527	522	744		541		589	665
			PT	508	531	545		544		575	715
			PY	555	697	611		581		594	
			XY							667	776
			FPY	621				745		742	
			FPT	523		820		539			
			XT	557	795						
			TPT	609		747		780			648
			RPY			616					
			FHPT	656							
			HPT								698
			RPT			727					
			FXY					784			790
			FPT					539			
005			PT	572		679					
			PY							608	
			XY	564							
009			PT	532		582					
			PY	577							783
			XY	570		617		543			
010			HPT	525							
			PT	512	518	625		551	571		711
			PY	558				709		537	723
			XY	560		627	702			668	764
			XT			624				826	753
			FPT	659				635			696
			FPY	516							
			TPY	567							
			HPY		640						
			FHPT	657							
			FXY	685							789
			RPT		689						
			TPT	782				781			
			RPY	817							
			FXHY								791
018			TPY	520				700		819	841
			PT	511	643	550		549			
			PY	633	620	813				692	
			FPT		521					798	
			HPT					891			
			TPT	718				836			
			RPY	756							
020			RPT	535							
			PT	513	528		642	542		538	712
			XY							827	
			PY	561			675			639	
			FPT	546							
			RPY			615					
			XT		688						
			TPT		755					794	840
			TPY							797	
			FRPT								
026			XT	746							
			PT	510	772	548		612		587	732
			PY	565				614			
			TPT			738				681	
			XY								765
042			PT	509	719						752
			XY		674						
			FPT	654							
			TPY	707							
D4			RPT			730					
			PY	598	514	597					
			FPT					660			
			FPY	595				596			

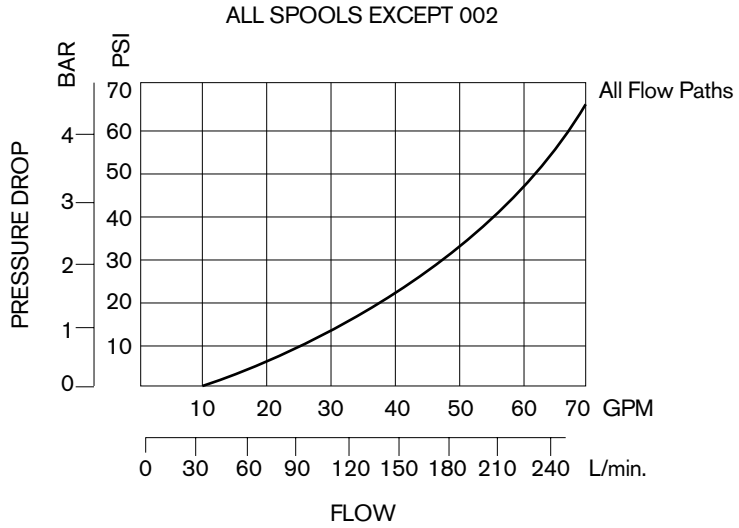
Characteristics

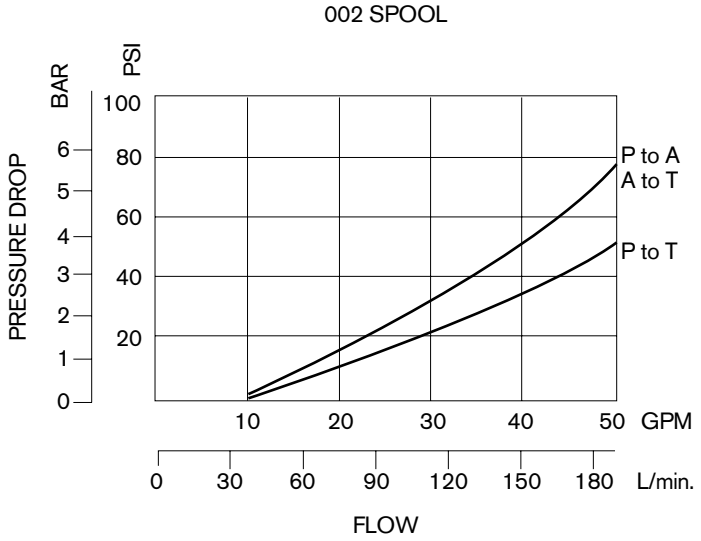
General	
Design	Spool valve
Mounting type	Subplate, DO8 (NG 25)
Mounting Position	as desired (Horizontal only for detented valves)
Ambient temperature	–4 to 120°F (-20 to 50°C)
Seals	Viton
CSA Certified	File Number LR 93267-1 (Except flame proof solenoids)
Weights	
Hydraulic	25.0 (11.3)
Electrical 1 Solenoid	26.6 (12.1)
Electrical 2 Solenoid	27.3 (12.4)
Adjustable Pilot Chokes	2.4 lbs (1.1kg)
Hydraulic	
Fluid	Petroleum hydraulic fluids and most fire resistant fluids
Viscosity	60 – 2300 SUS (10 – 500 cSt)
Fluid temperature	–4 to 175°F (–20 to 80°C)
Filtration	Contamination class 19/16, according to ISO 4406 to be realized with filter ß25=75
Direction of flow	As shown on symbol
Operating pressure	Port P, A, B,T: 3000 PSI (210 bar) max. Port T: 1500 PSI (100 bar) max. w/flame proof solenoids
Pilot pressure	65 PSI (4.5 bar)min. 3000 PSI (210 bar) max.
Maximum flow	75 GPM (284 L/min) see Δ P/Q curve page 59
Control volume	0.5 in^3 (8 cm^3) for 3 position valves
Electric	
Duty factor	100%
Solenoid identification	Meets ANSI/B93.9 - 1969 (R 1988) Standards* P › A when Sol. “A” is energized.
Enclosure type	*IP 65 to IEC and DIN 40 050 (DIN Connectors)
Insulation class	C VDE § 5
Voltage and frequency	See table on page 88 AC-solenoids 230/60 can be used with 220/50 and 115/60 can be used with 110/50 voltage supply
Voltage tolerance	Nominal Voltage ±10%
Power rating DC AC	 In Rush: 33W Holding: 33W In Rush: ~ 1.5A Holding: ~ 0.54A
Response time	25 – 90ms Dependent on control pressure and spool
Switching frequency	max. 1800/h

*Note: IP 65

- Protected against low pressure water jets from all direction
- Dust tight

Performance Data

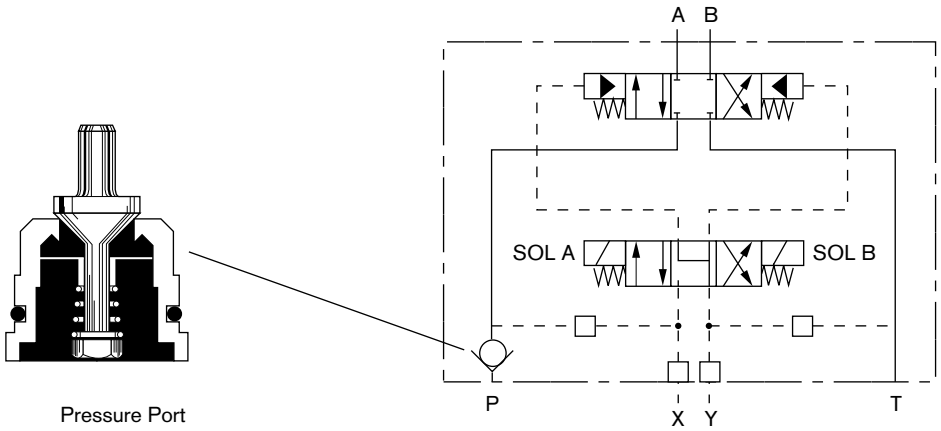




Viscosity = 142 SUS (30.2 cSt)

Pressure Port Check

The pressure port check is a load check which prevents the load from dropping when several valves are connected in parallel. It will not create pilot pressure for internal pilot when using open center spools. The standard valve body is not machined for the check valve cartridge.

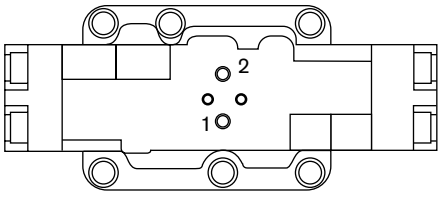


Pressure Port
Check Cartridge

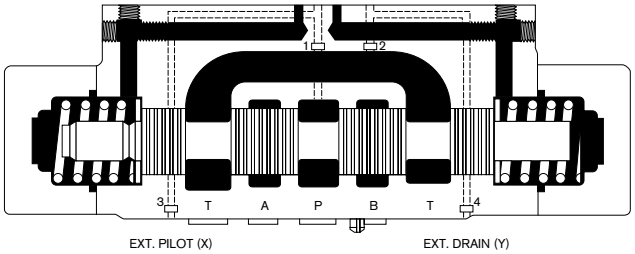
Pilot & Drain Options

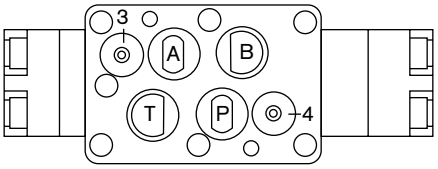
Pilot oil supply and drain are either external via the X and Y ports or internal via the P and T ports. There are four threaded ports and only two plugs (1/16" NPT). The installations of the plugs determines the source of the pilot oil and where it drains. Valves can be converted in the field. When installing plugs in port 1 and 2, care must be taken that the plug is screwed in all the way or both passages will be blocked.

PY – INT. PILOT, EXT. DRAIN; PLUG PORTS 2 & 3
PT – INT. PILOT, INT. DRAIN; PLUG PORTS 3 & 4
XY – EXT. PILOT, EXT. DRAIN; PLUG PORTS 1 & 2
XT – EXT. PILOT, INT. DRAIN; PLUG PORTS 1 & 4
XY – HYDRAULIC PILOT; PLUG PORTS 1 & 2



TOP VIEW WITH PILOT SECTION REMOVED



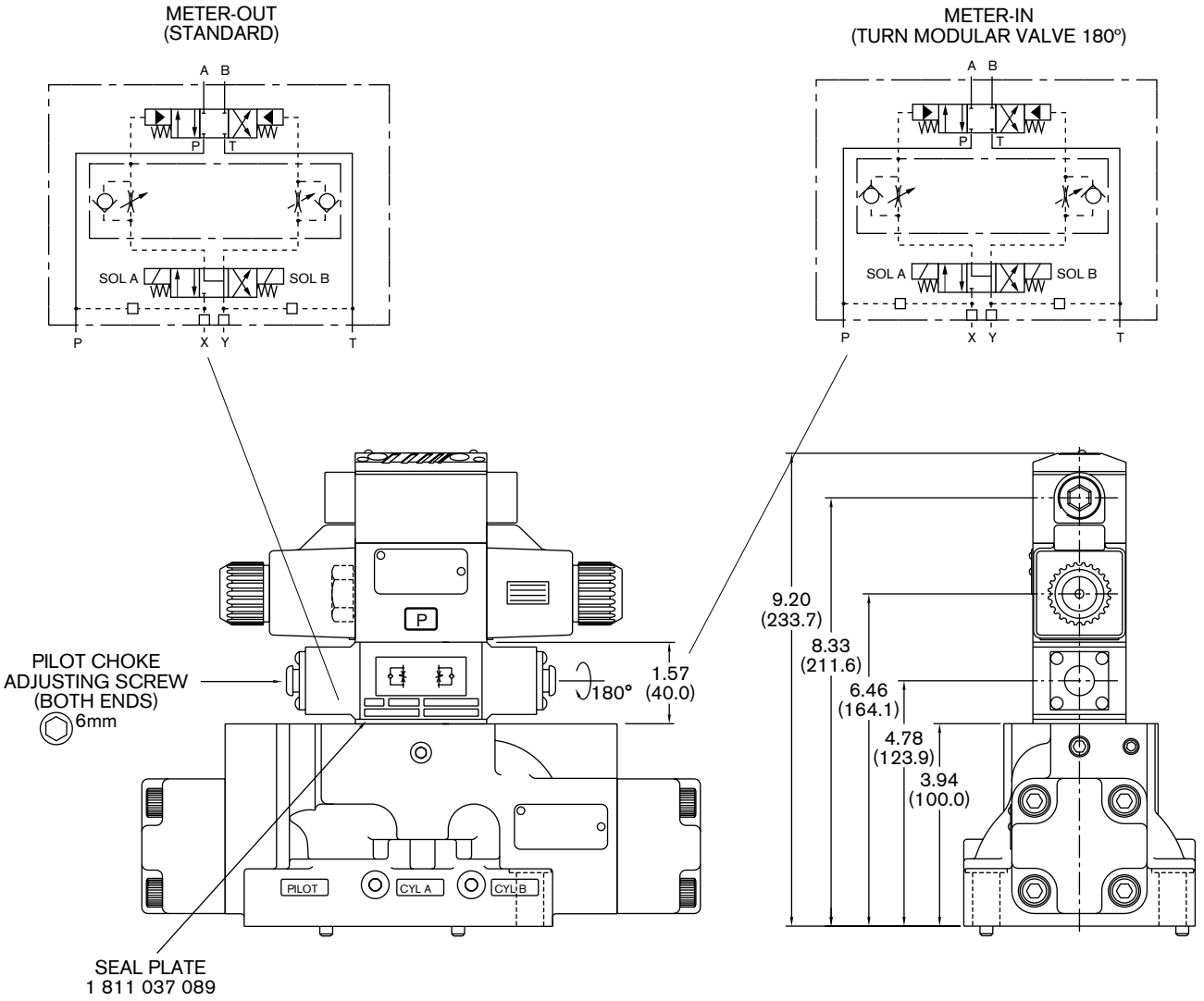


BOTTOM VIEW

Adjustable Pilot Chokes

Adjustable chokes consist of a modular flow control valve which contains two non-pressure compensated throttle valves with free flow checks. It provides independent control of the spool shift time in both directions. Because the port pattern is symmet-rical and a seal plate is used, the module can be turned 180° to provide either meter-in or meter-out control.

Meter-out is standard. If meter-in is needed, the pilot valve must be removed and the flow control module rotated 180° on its longitudi-nal axis. The locating pin in the bottom mount-ing surface of the flow control module must be removed and installed on the opposite side before reassembly. The seal plate always remains on top of the main valve body. Torque value for the mounting bolts of the pilot valve is 5.0 lb/ft (7.0 Nm).

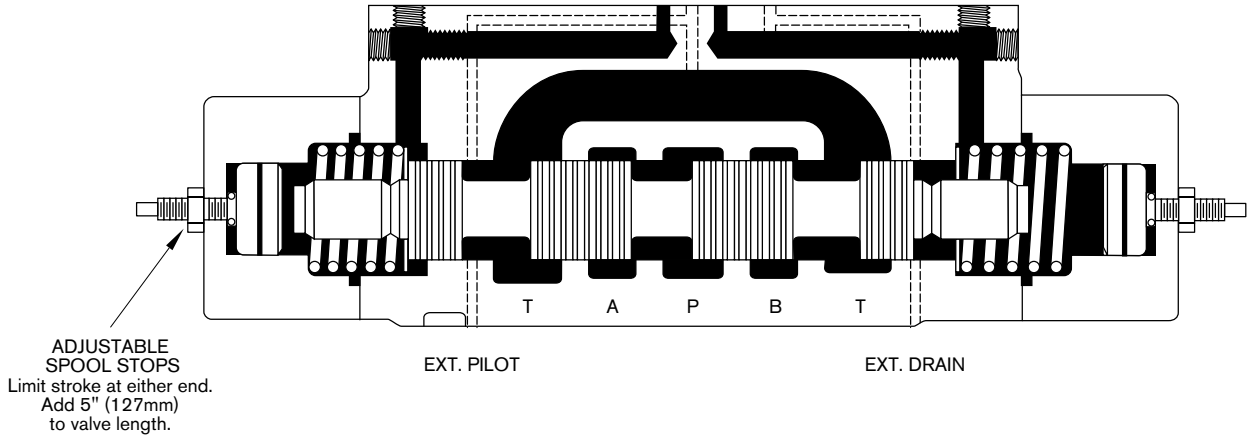


For Conversion	
Description	Part number
NG6 Flow control module w/seal plate (meter out)	**9 810 161 089**
Seal plate	**1 811 037 800**
4 x 10 – 24 x 2 3/4" Long (Bolt kit B-215)	**953 710**

Adjustable Spool Stops

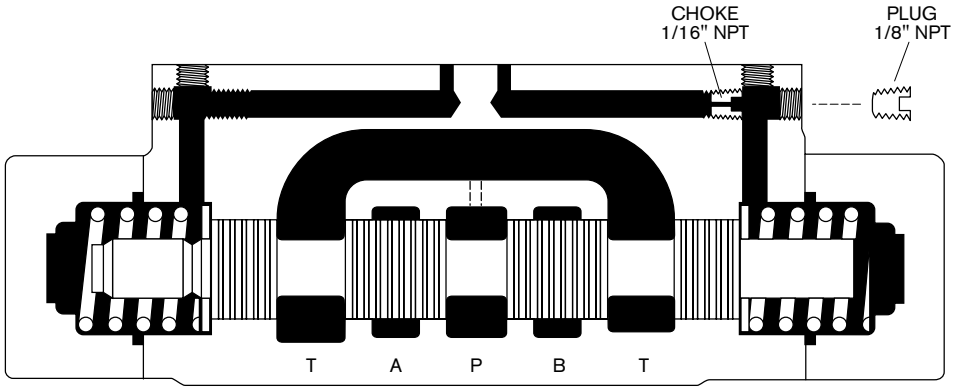
Adjustable spool stops are used to limit the stroke of the spool and are located on both ends of the valve. They provide independent control of the actuator speed in either directions. Limiting the spool stroke creates an orifice between the body and spool in either flow path and turning the screw in will reduce the size of the orifice.

If the flow through both flow paths is equal, the valve will meter-in and out at the same time. When a differential cylinder is used, the stops can be adjusted to obtain equal speed in both directions. Complete end cap assemblies are available to convert standard valves. (778160 is the number for one end cap)



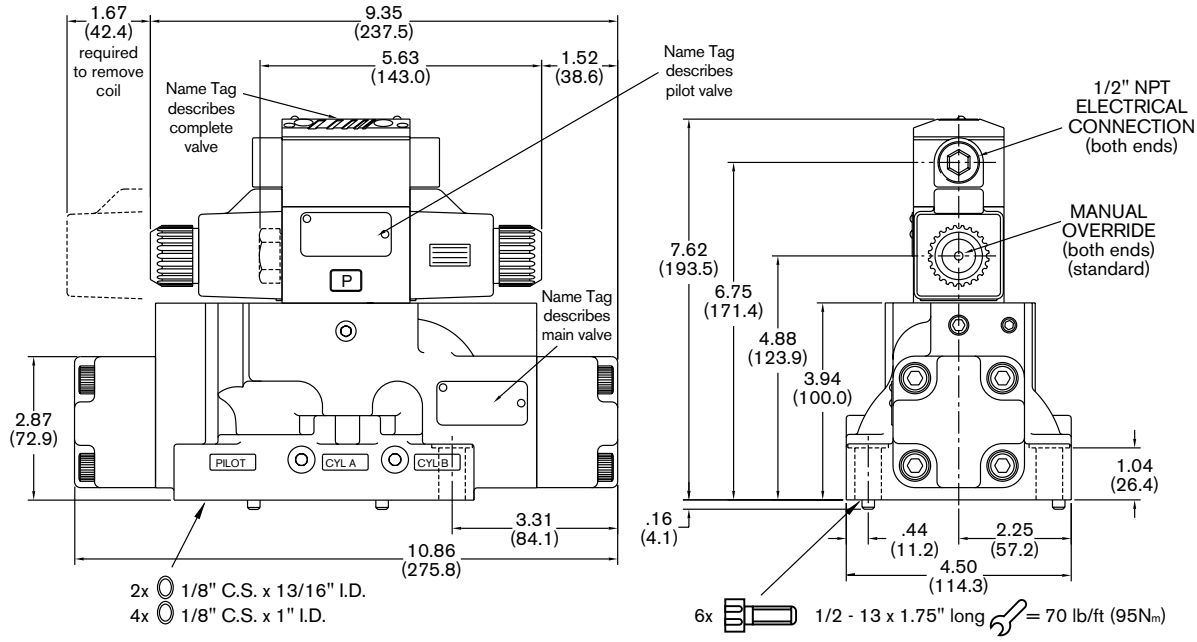
Fixed Pilot Chokes

Fixed pilot chokes consist of two orifices, 1/16” NPT pipe plug with a .040” (1.0) hole (405420), installed in the pilot lines going to each end cap. The orifices restrict the pilot oil and will increase the spool shift time. Metering notches in the body are standard and by slowly shifting the spool, the flow paths are opened and closed more gradually which reduces system shock. Chokes can be added to a standard valve at any time but an 1/8” NPT plug on each end of the main valve must be removed to gain access to the threaded pilot line.



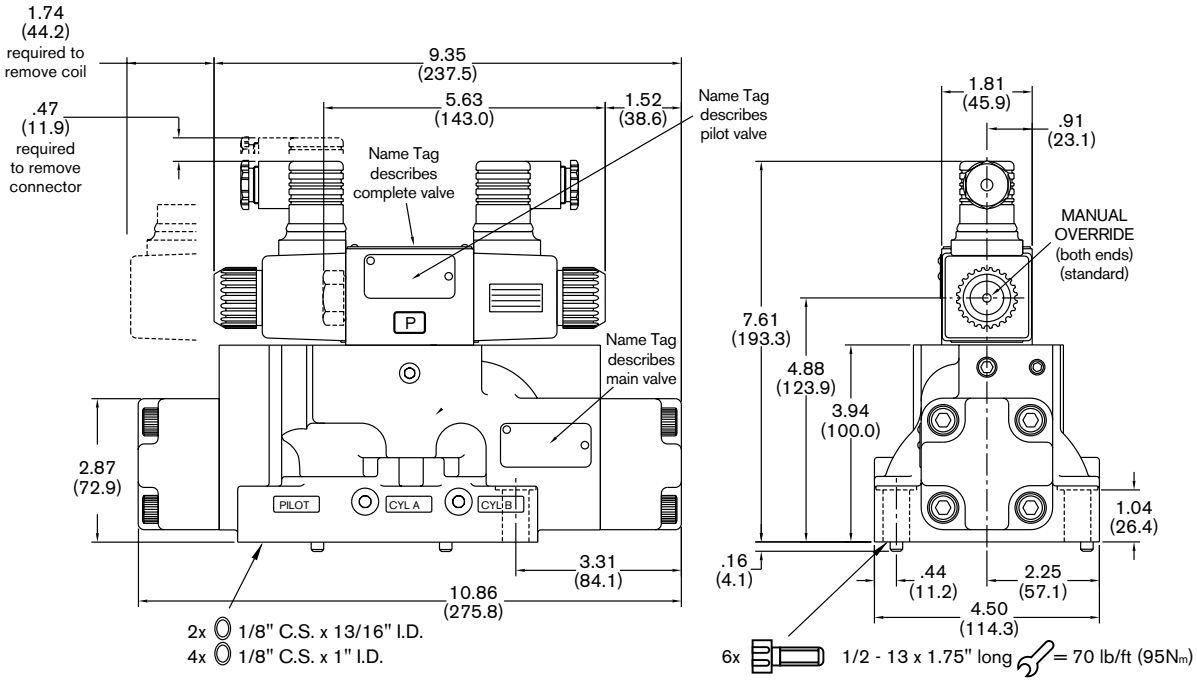
Valve With AC/DC Solenoid & Wiring Box

Inches (Millimeters)



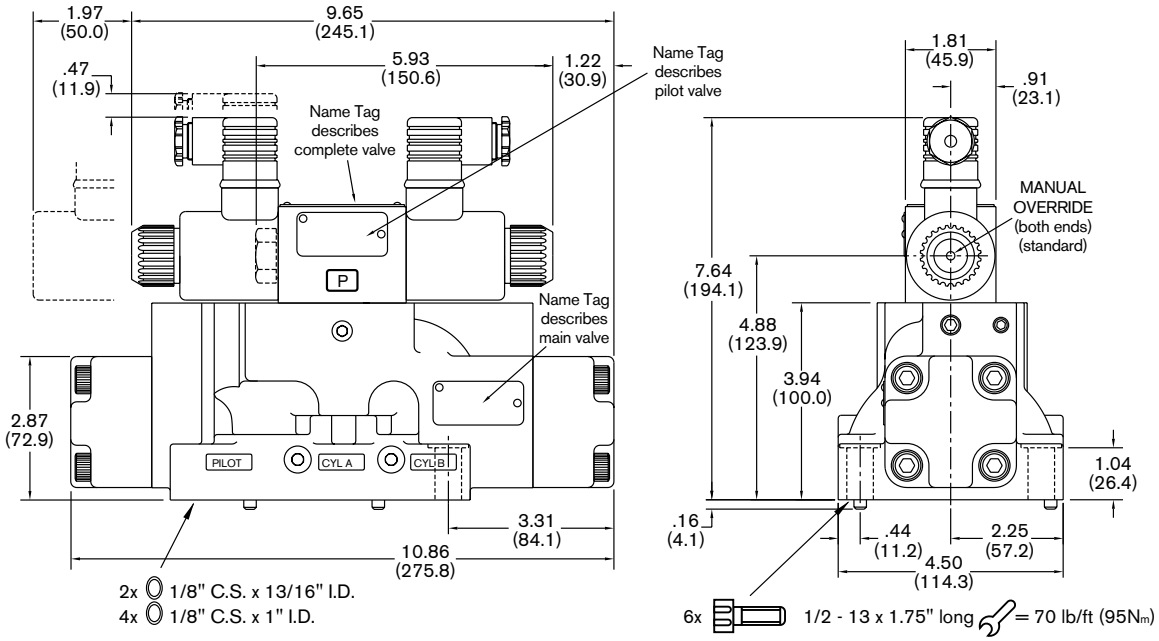
Valve With AC Solenoid (DIN)

Inches (Millimeters)



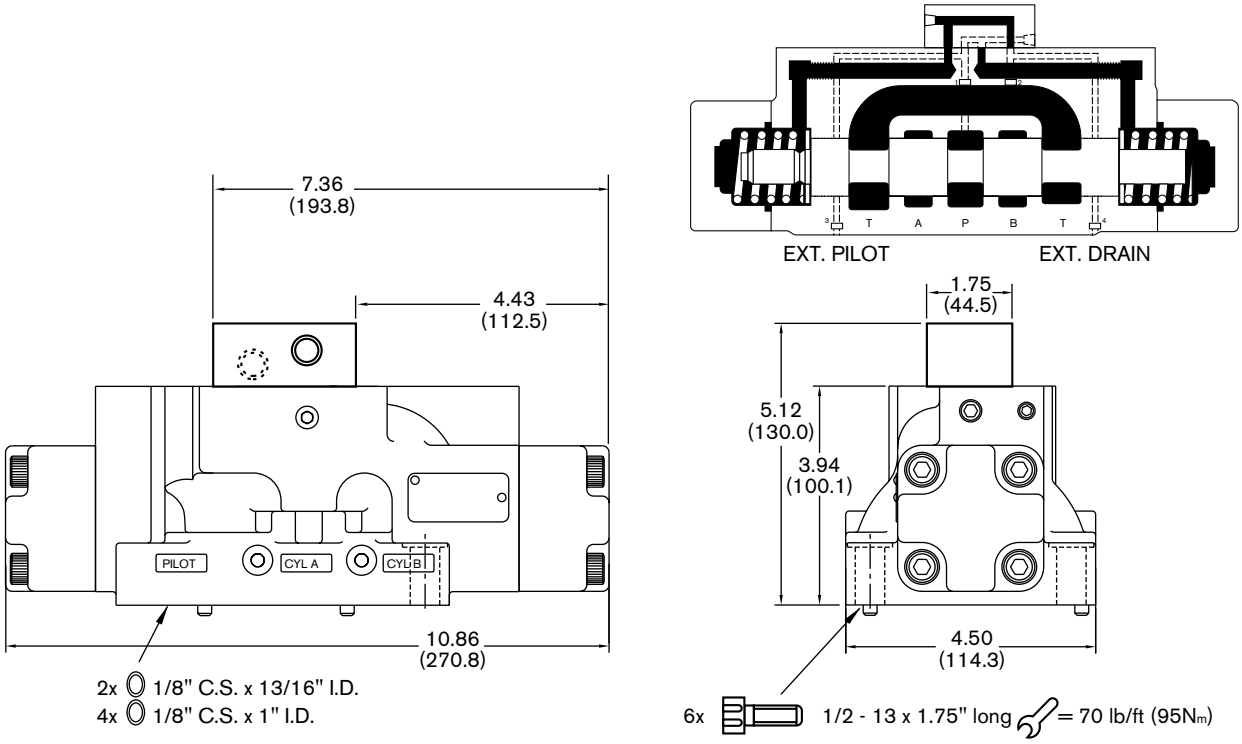
Valve With DC Solenoid (DIN)

Inches (Millimeters)



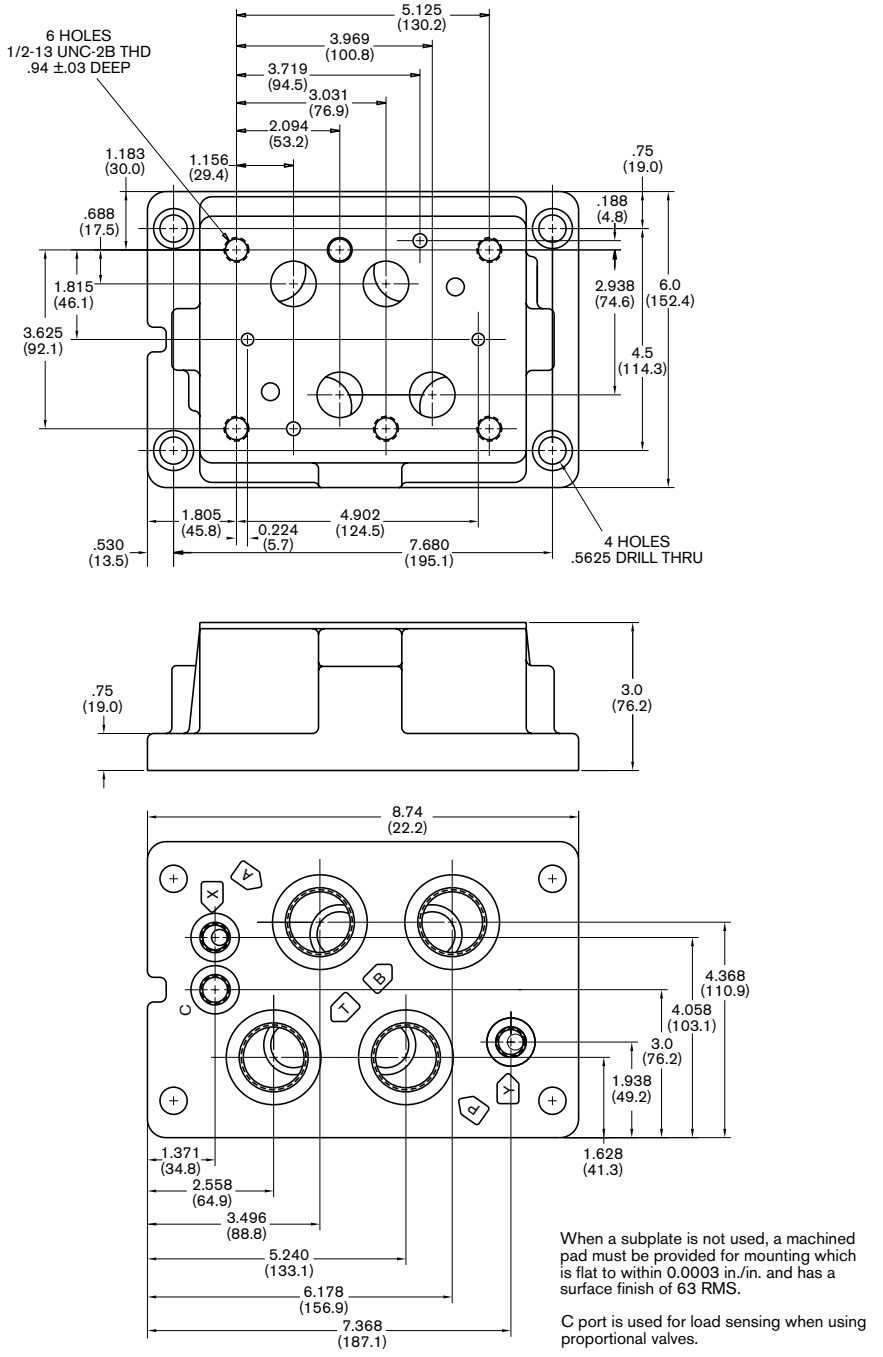
Hydraulically Controlled (Type 2)

Inches (Millimeters)



Subplates, Bottom Ported

Inches (Millimeters)



When a subplate is not used, a machined pad must be provided for mounting which is flat to within 0.0003 in./in. and has a surface finish of 63 RMS.

C port is used for load sensing when using proportional valves.

P,T,A,B	X,Y,C	Pmax PSI (bar)	Weight Lbs. (kg)	Part Number
1" NPTF	1/4"NPTF	5000 (350) (Subplate only)	25(11.3)	**9 000 010 216***
1 1/4"NPTF				**9 000 010 217***
1 1/2"NPTF				**9 000 010 218***
#16 SAE	#6 SAE			**9 000 010 219***
#20 SAE				**9 000 010 220***
#24 SAE				**9 000 010 221***
Bolt kit B – 114 (valve only) 6x 1/2 – 13 x 1.75" Long				**953594**

*Obsolete, consult factory

Features and Benefits

- ☐ **Retained guide tube for easy replacement of coils**
- ☐ **Solenoid identification per U.S. standard. P→A when solenoid “A” is energized**
- ☐ **Optional manual overrides available**
- ☐ **Certified**
- ☐ **Dual frequency solenoids (50 or 60 Hertz)**
- ☐ **Throttling spools are standard**
- ☐ **Pilot pressure valve in P port is optional**

Order Code

This order code describes the desired model variances of the DO8 (NG 25) directional control valves. Standard models are assigned a 10-digit number. See page 68.

0	8	1	W	V	2	5	P	1	V	3															D	5	1	/		

SIZE
25 – D08 (NG 25)

SEALS
V – VITON STD.

CONTROL TYPE

2 – HYDRAULIC
3 – ELECTRICAL

SPOOL CODE

REFER TO SPOOL CHART ON PAGE 78

ADJUSTABLE PILOT CHOKES*

F – FIXED [0.0039 (1mm) dia. orifice]
T – ADJUSTABLE

R – BACK PRESSURE VALVE IN P*

H – ADJUSTABLE SPOOL STOPS*

PILOT AND DRAIN
XY – EXTERNAL PILOT EXTERNAL DRAIN
PT – INTERNAL PILOT INTERNAL DRAIN
PY – INTERNAL PILOT EXTERNAL DRAIN
XT – EXTERNAL PILOT INTERNAL DRAIN

ELECTRICAL CONNECTIONS
WS – DIN 43650/ISO4400
KL – WIRING BOX + SENTINAL LIGHTS
KA – WIRING BOX ONLY
KD – WIRING BOX + QUICK CONNECTOR, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KE – WIRING BOX + QUICK CONNECTOR + SENTINEL LIGHTS, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KG – WIRING BOX + QUICK CONNECTOR (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
KM – WIRING BOX + QUICK CONNECTOR + SENTINAL LIGHTS (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
G – DETENT CONTROL TYPE 7 ONLY
EX – FLAME PROOF

SOLENOID VOLTAGES

AC		DC
115/60	All solenoids	012/00
230/60	are dual frequency (50 or 60hz)	024/00

09 – MANUAL PUSH PIN WITH RUBBER COVER*

51 – SOLENOID IDENTIFICATION PER U.S. STANDARD P→A WHEN SOLENOID "A" IS ENERGIZED (ANSI B93.9)

D – DESIGN SERIES
D – STD
**E – 24VDC LEAD WIRE COIL

SOLENOID OPTIONS*

C – COVERED PUSH PIN

* If these options are not needed, omit them from the code

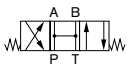
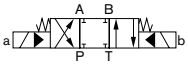
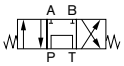
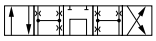
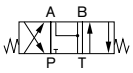
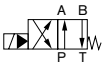
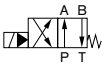
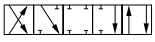
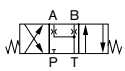
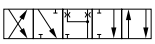
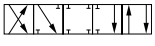
** QUICK CONNECT FOR E SERIES IS MINI CONNECTOR (See PG 99)

Product Literature Disclaimer

SPECIFICATIONS AND/OR DIMENSIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE. PLEASE CONSULT FACTORY.

Part Numbers

Standard valves are assigned a 10-digit part number. Describe unassigned valve combinations with the alpha-numeric order code.

				9 810 235 …								
				P – INT. PILOT **X –** EXT. PILOT **T –** INT. DRAIN **Y –** EXT. DRAIN	**KA –** WIRING BOX **KD –** WIRING BOX + QUICK CONNECT (3 PIN SINGLE & 5 PIN DOUBLE SOLENOID) **KE –** WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS **KG –** WIRING BOX + QUICK CONNECT (SINGLE SOLENOID 5 PIN) **KL –** WIRING BOX + SENTINEL LIGHTS **KM –** WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS (SINGLE SOL. 5 PIN) **WS –** PLUG CONNECTER (DIN 43650 / ISO 4400)							
				KA	**KD**	**KE**	**KG**	**KL**	**KM**	**WS**	**WS**
SPOOL NO.	SYMBOLS	TRANSITION	PILOT & DRAIN	110/115	110/115	110/115	110/115	110/115	110/115	110/115	24 VDC.
000			RPY					**149**			
			RPT					**154**			
			TPY							**110**	
			XY	**033**		**047**		**059**		**005**	**020**
			PY							**077**	**085**
001			XY	**034**		**048**		**060**		**006**	**021**
			PT	**035**		**049**		**061**		**007**	**022**
			PY			**079**					
			HXY							**008**	**023**
			FXT							**076**	
			FPT	**036***						**009**	
			TPT	**073**							
002			XT							**087**	
			XY	**037**		**050**		**062**		**010**	**024**
			PY	**082**							
			RPT	**100**				**150**		**121**	
			TRXT							**156**	
004			XY	**038**		**051**		**063**		**011**	**025**
			PT	**039**		**052**		**064**		**012**	**026**
			FPT	**040***						**013**	
			TPT	**072**						**132**	
			THXY							**080**	
			THPY							**094**	
			THPT								**102**
			PY			**107**					**138**
			HPT		**129**						
			FXY								**151**
			THXY		**157**						
009			PT	**111**							
			XY	**041**		**053**		**065**		**014**	**027**
010			XT	**081**							
			XY	**042**		**054**		**066**		**015**	**028**
			XT	**081**							
			PT	**043**		**055**		**067**		**016**	**029**
			PY							**078**	
			HPT			**105**					
			TPT					**114**			
			TPY					**117**			
018			TXY								**112**
			XY	**044**		**056**		**068**		**017**	**030**
			PY	**099**		**137**					
			TPY							**142**	
			HPT								**144**
020			PY			**106**					
			XY	**045**		**057**		**069**		**018**	**031**
			FPY							**019**	
			PT	**046**		**058**		**070**			**032***
			TPT							**093**	

* Consult factory

Specifications

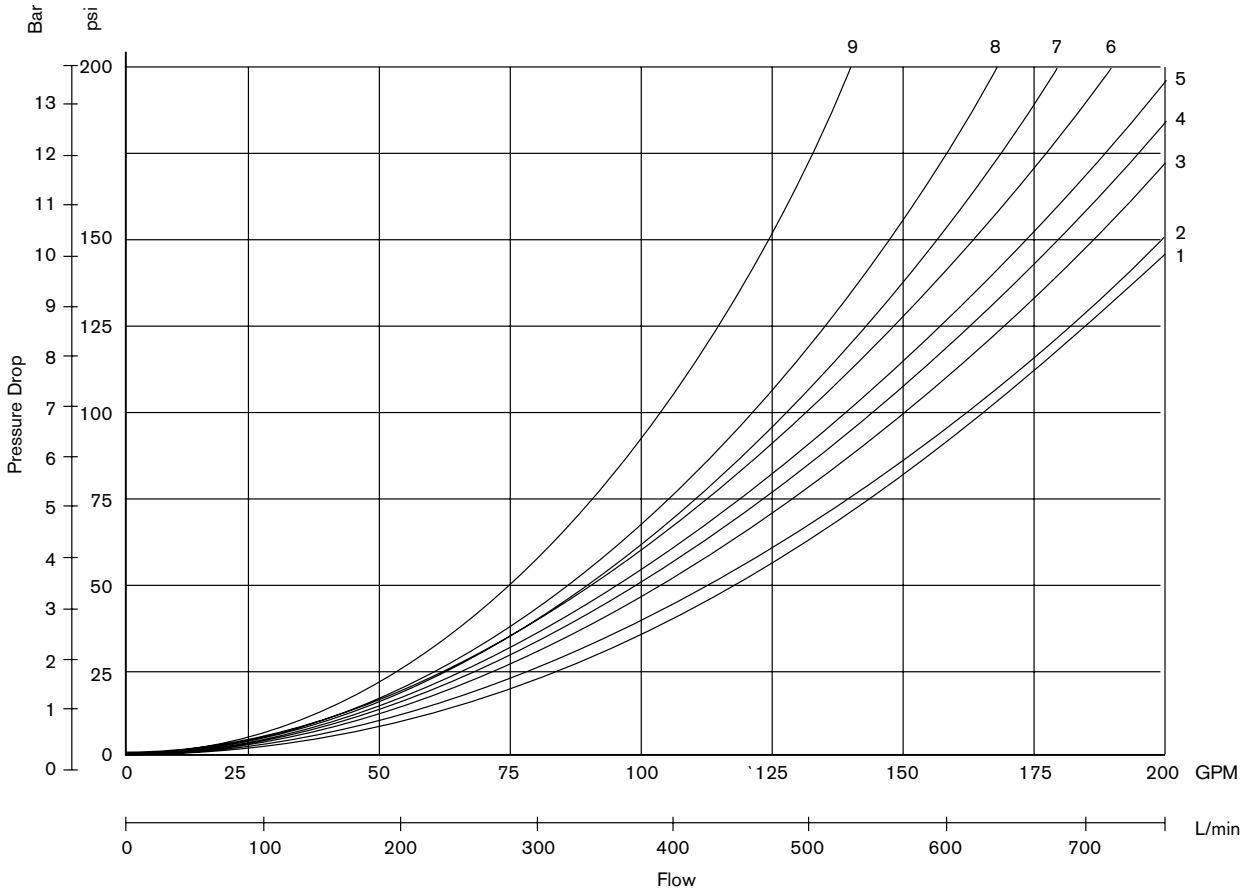
General						
Design	Spool valve					
Mounting type	Subplate, DO8 (NG 25)					
Mounting Position	as desired (Horizontal only for detented valves)					
Ambient temperature	–4 to 120°F (-20 to 50°C)					
Seals	Viton					
CSA Certified	File Number LR 93267-1 (Except flame proof solenoids)					
Weights						
Hydraulic	35.3 lbs (16 kg)					
Electrical 1 Solenoid	37.5 lbs (17 kg)					
Electrical 2 Solenoid	38.5 lbs (17.5)					
Response time adjustment	2.4 lbs (1.1 kg)					
Hydraulic						
Fluid	Petroleum hydraulic fluids and most fire resistant fluids					
Viscosity	60 – 2300 SUS (10 – 500 cSt)					
Fluid temperature	–4 to 175°F (–20 to 80°C)					
Filtration	Contamination class 19/16, according to ISO 4406 to be realized with filter ß25 = 75					
Direction of flow	As shown on symbol					
Operating pressure	Port P, A, B, T: 5075 PSI (350 bar) max. Port T: 4060 PSI (280 bar) max. w/flame proof solenoids					
Pilot pressure	Pilot port X or P 114 psi (8 bar) min. 3625 psi (250 bar) max.					
	Drain port Y or T 3045 psi (210 bar) max. for solenoid operated 3625 psi (250 bar) max. for hydraulic piloted 1450 psi (100 bar) max. for flame proof solenoid					
Maximum flow	185 GPM (700 L/min) see Δ P/Q curve page 70					
Control volume	0.92 in³ (15 cm³) for 3 position valves 1.34 in³ (22 cm³) for 2 position valves					
Total response time	Switch-on Switch-off Switch-on Switch-off	Pilot Pressure Pilot Pressure	= = 	700 psi (50 bar) 2900 psi (200 bar)	⎓ DC	55...75ms 50...70ms 50...70ms 40...60ms
	Switch-on Switch-off Switch-on Switch-off	Pilot Pressure Pilot Pressure	= = 	700 psi (50 bar) 2900 psi (200 bar)	≂ AC	30...50ms 50...70ms 25...40ms 40...60ms
Electric						
Duty factor	100%					
Solenoid identification	Meets ANSI B93.9 - 1969 (R 1988) Standards* P → A when Sol. “A” is energized.					
Enclosure type	*IP 65 to IEC and DIN 40 050 (DIN Connectors)					
Insulation class	C VDE § 5					
Voltage and frequency	See table on page 88 AC-solenoids 230/60 can be used with 220/50 and 115/60 can be used with 110/50 voltage supply					
Voltage tolerance	Nominal Voltage ±10%					
Power rating DC AC	 In Rush: 33W In Rush: ~ 1.5A			 Holding: 33W Holding: ~ 0.54A		

*Note: IP 65
- Protected against low pressure water jets from all direction
- Dust tight

Performance Data

Curve					
Symbol	A B P T		A B P T		A B P T
	PA	PB	AT	BT	PT
000	7	7	5	7	–
001	2	2	1	5	–
002	6	5	4	7	9
004	5	5	5	7	–
010	7	7	1	3	–
018	4	4	7	8	–
020	7	7	1	3	–

Viscosity = 142 SUS (30.2 cSt)



Pilot & Drain Options

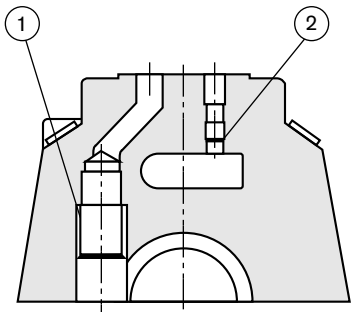
Max. Pressure in P or X:
3625 psi (250 bar)

Max. Pressure in T or Y:

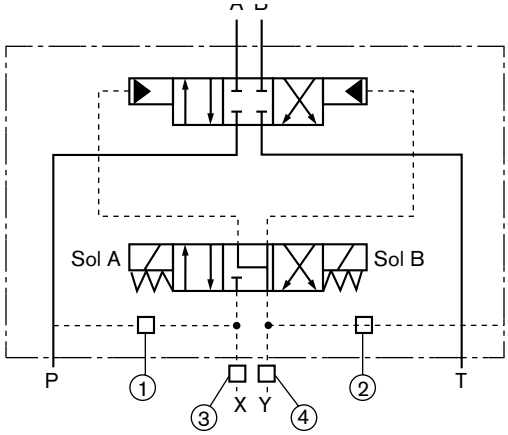
3045 psi (210 bar) for type 3 control
3625 psi (250 bar) for type 2 control
1450 psi (100 bar) when using flame proof solenoid

Pilot oil supply and drain is either external via the x and y ports or internal via the P and T ports. Conversion is possible by removing or installing plugs. Plug no. 1 is accessible from the bottom of the main valve. The pilot valve must be removed to gain access to plug No. 2. When using internal pilot and drain, the X and Y ports in the subplate must be plugged.

PY – INT. PILOT, EXT. DRAIN; PLUG PORTS 2 & 3
PT – INT. PILOT, INT. DRAIN; PLUG PORTS 3 & 4
XY – EXT. PILOT, EXT. DRAIN; PLUG PORTS 1 & 2
XT – EXT. PILOT, INT. DRAIN; PLUG PORTS 1 & 4
XY – HYDRAULIC PILOT; PLUG PORTS 1 & 2



Plug Part No.
① 9 534 230 002 1/4" BSPP ⬡ 7
② 1 813 400 017 M6 DIN 906 ⬡ 3

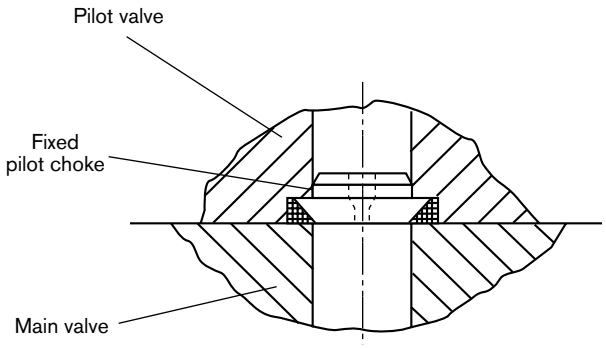


3 AND 4 ARE EXTERNAL OF THE VALVE

Fixed Pilot Chokes

A fixed pilot choke is an orifice placed in the pilot line to increase the spool shift time. Metering notches on the spool are standard and by increasing the shift time of the spool, the flow paths are opened and closed more gradually which reduces system shock. Fixed pilot chokes can be added to a standard valve at any time by simply removing the pilot valve and inserting the choke in the P port. The flange machined on the choke holds it captive in the counterbore for the O-ring. The chokes can be inserted in any of the ports of the pilot valve depending on the desired result. Then a valve is ordered with a fixed pilot choke the 0.040" (lmm) diameter orifice is installed in the P port. Chokes with other size orifice are available and are listed below.

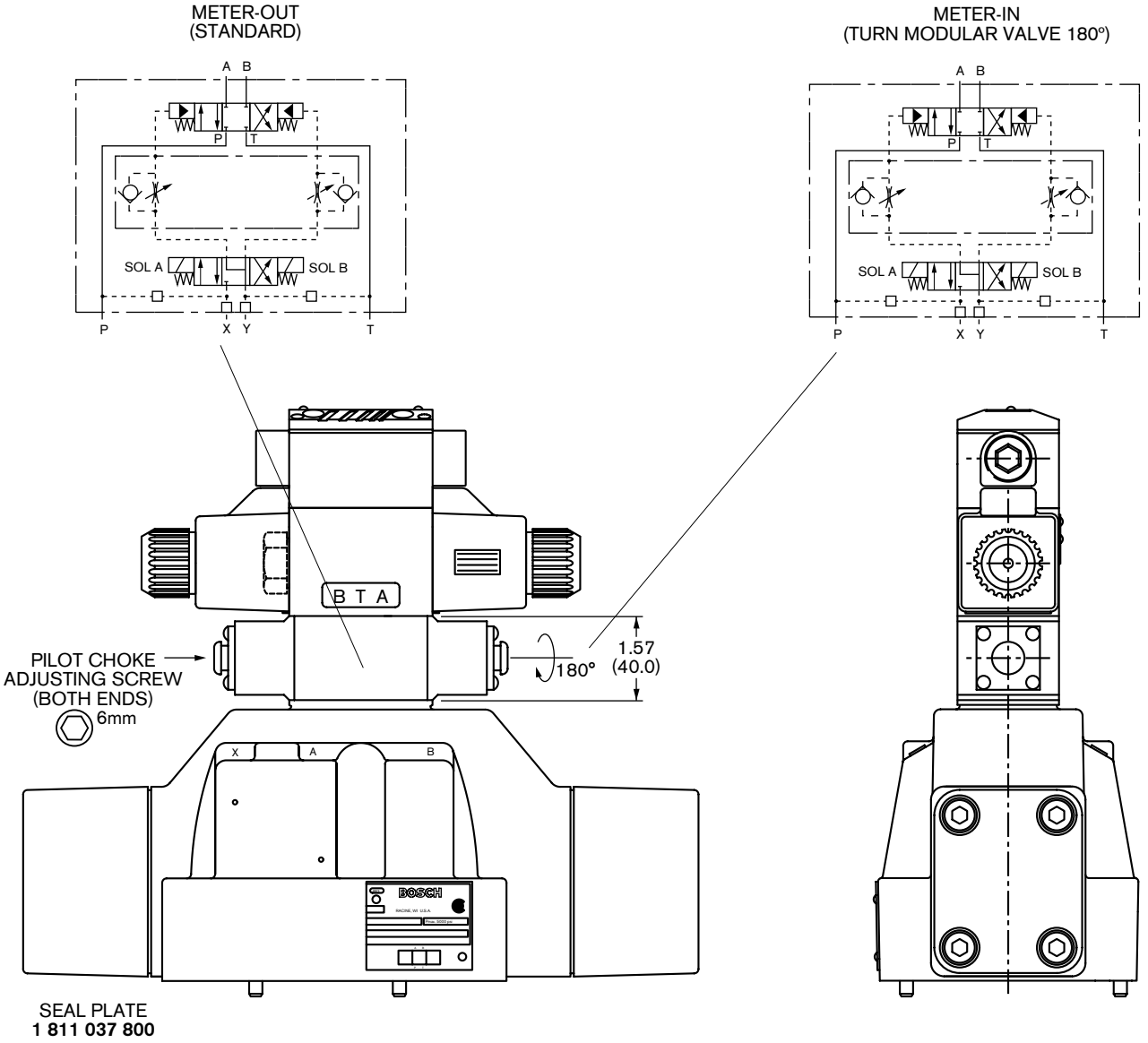
Orifice Diameter	Part Number
0.030 (0.8mm)	**9 533 230 385**
0.040 (1mm)	**9 533 230 382**
0.050 (1.2mm)	**9 533 230 383**
0.060 (2mm)	**9 533 230 384**



Adjustable Pilot Chokes

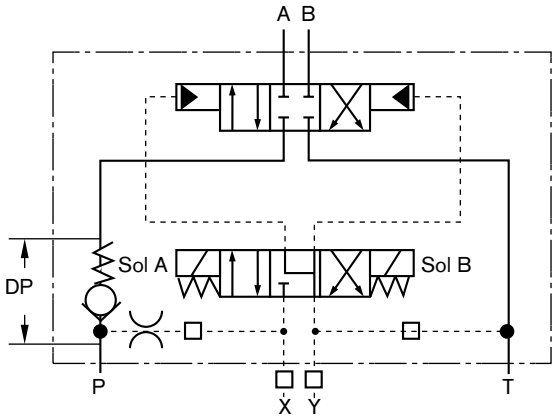
Adjustable chokes consist of a modular flow control valve which contains two non-pressure compensated throttle valves with free flow checks. It provides independent control of the spool shift time in both directions. Because the port pattern is symmetrical and a seal plate is used, the module can be turned 180° to provide either meter-in or meter-out control.

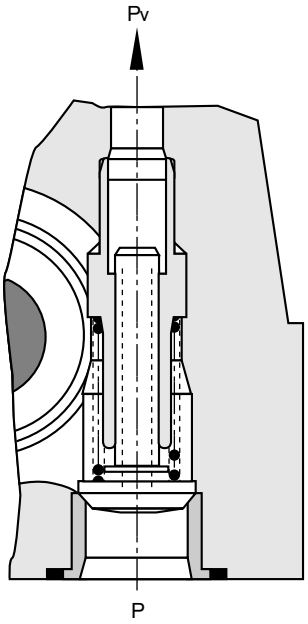
Meter-out is standard. If meter-in is needed, the pilot valve must be removed and the flow control module rotated 180° on its longitudinal axis. The locating pin in the bottom mounting surface of the flow control module must be removed and installed on the opposite side before reassembly. The seal plate always remains on top of the main valve body. Torque value for the mounting bolts of the pilot valve is 5.0 lb/ft (7.0 Nm).

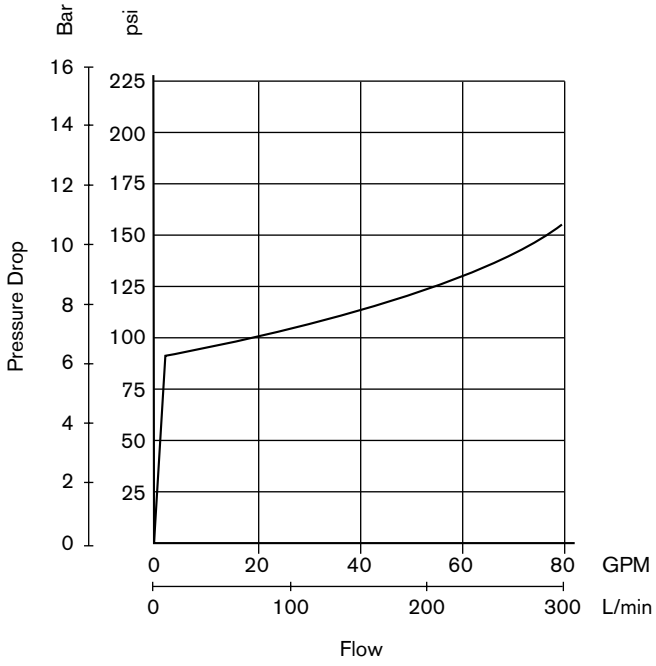


For Conversion	
Description	Part number
NG6 Flow control module w/seal plate (meter out)	**9 810 161 089**
Seal plate	**1 811 037 089**
4 x M 5 x 70, DIN 912 – 10.9 (Part number is for one bolt)	**2 910 151 180**

Pilot Pressure Valve







The pilot pressure valve is a slip-in cartridge which fits into a machined cavity in the pressure port of the main valve. It is used to create pilot pressure when using open center spools (000 and 002). Pilot pressure is fed internally to the pilot valve. The pressure drop across the pilot pressure valve is additive to the pressure drop across the main valve. The machined cavity, to accept the pilot pressure cartridge, is standard on all valves.

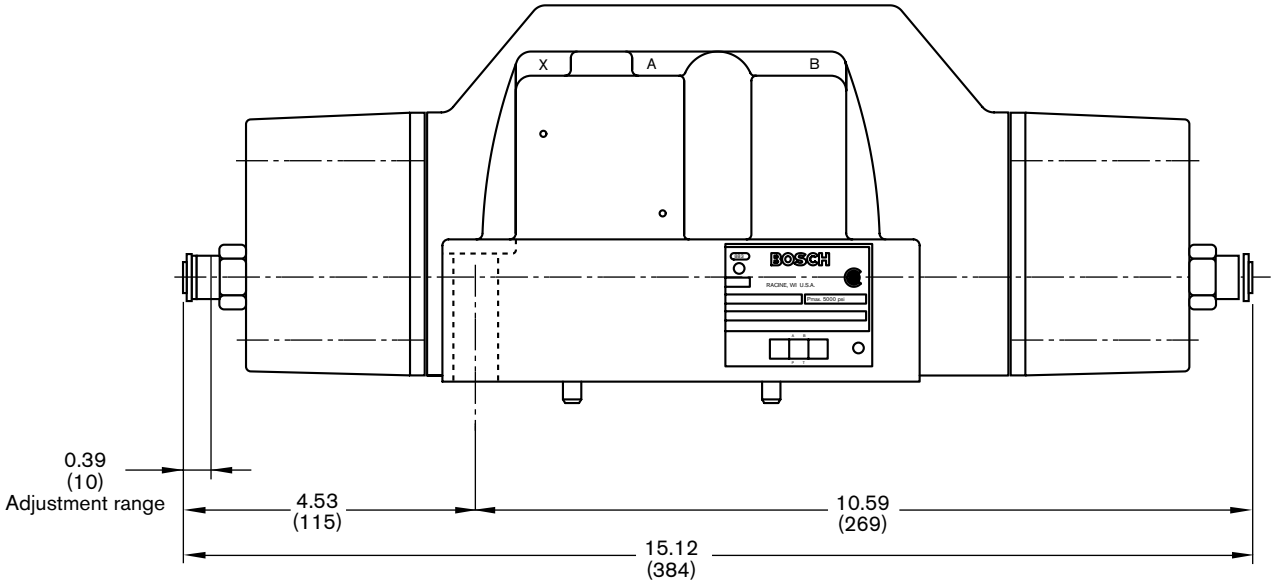
For Conversion	
Description	Part Number
Pilot pressure valve cartidge	**1 817 419 038**

Adjustable Spool Stops

Adjustable spool stops are used to limit the stroke of the spool and are located on both ends of the valve. They provide independent control of the actuator speed in either directions. Limiting the spool stroke creates an orifice between the body and spool in either flow path and turning the screw is will reduce the size of the orifice.

If the flow through both flow paths is equal, the valve will meter-in and out at the same time. When a differential cylinder is used, the stops can be adjusted to obtain the same speed in both directions.

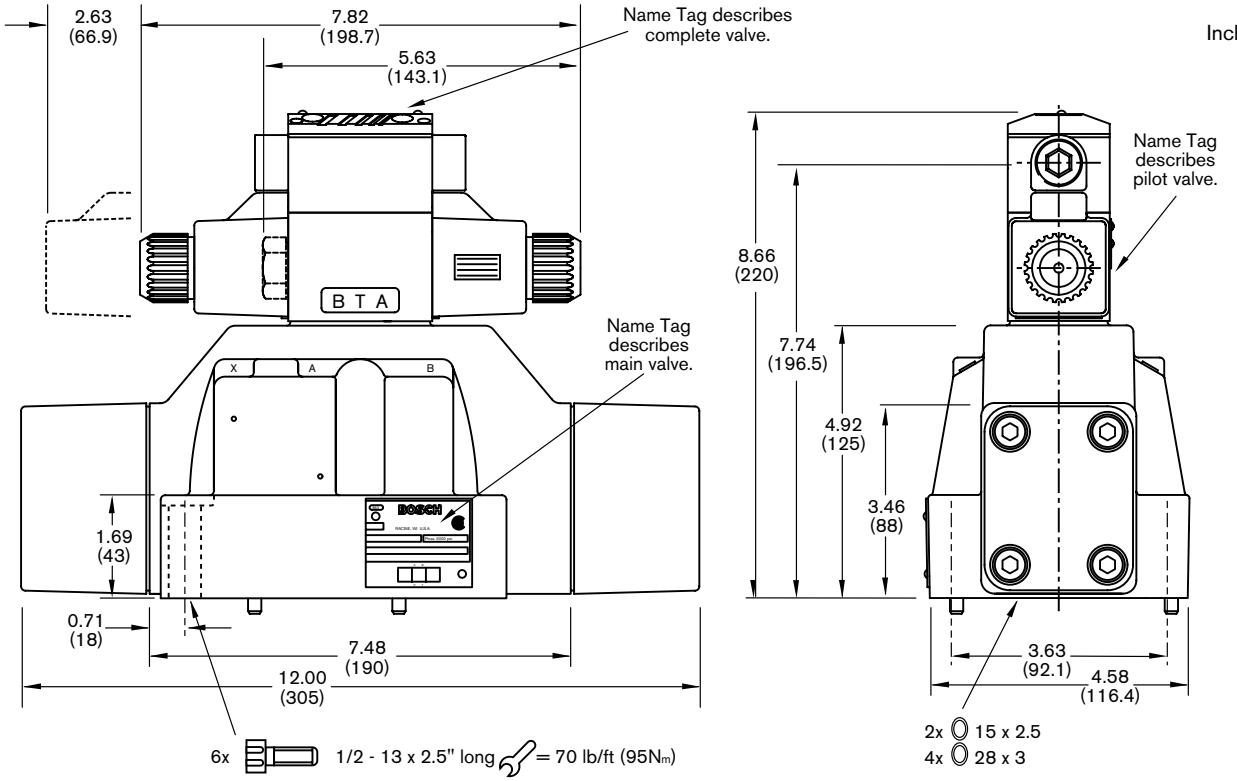
Inches (Millimeters)



For Conversion	
Description	Part number
Complete end cap assembly including mounting bolts	**1 817 002 057**

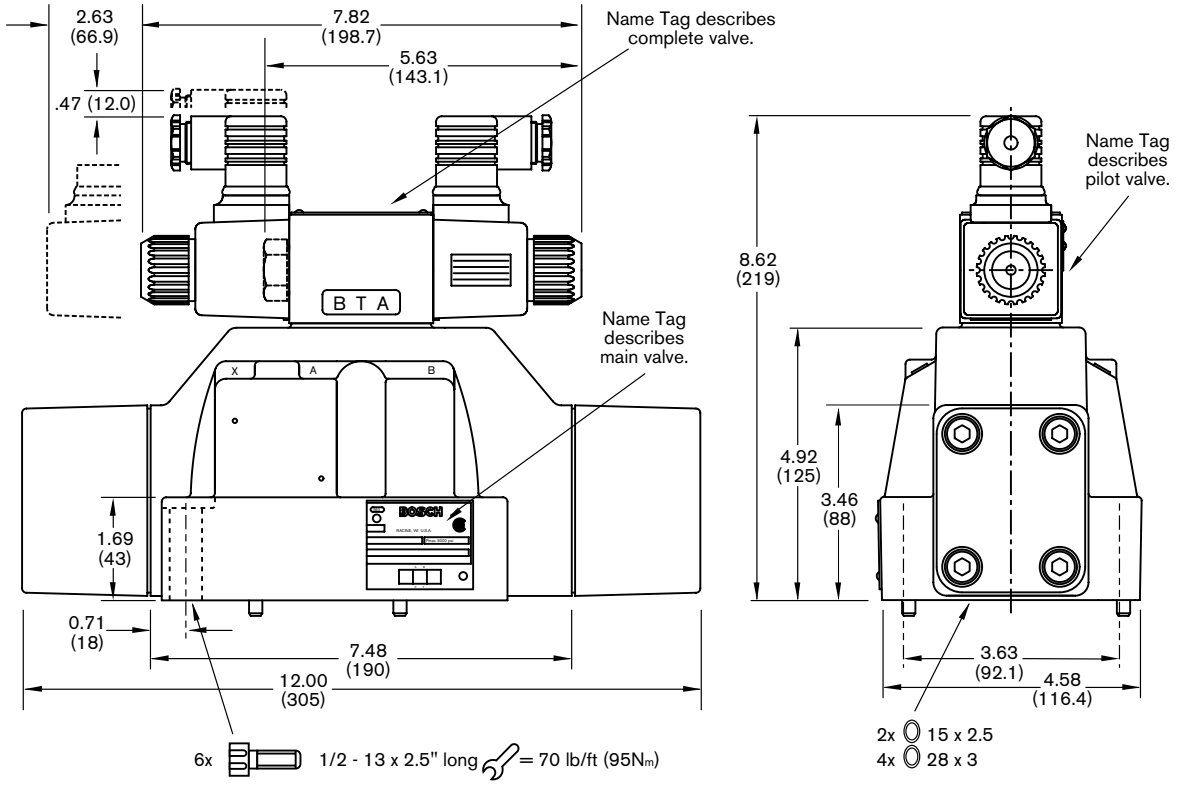
Valve With AC/DC Solenoid And Wiring Box

Inches (Millimeters)



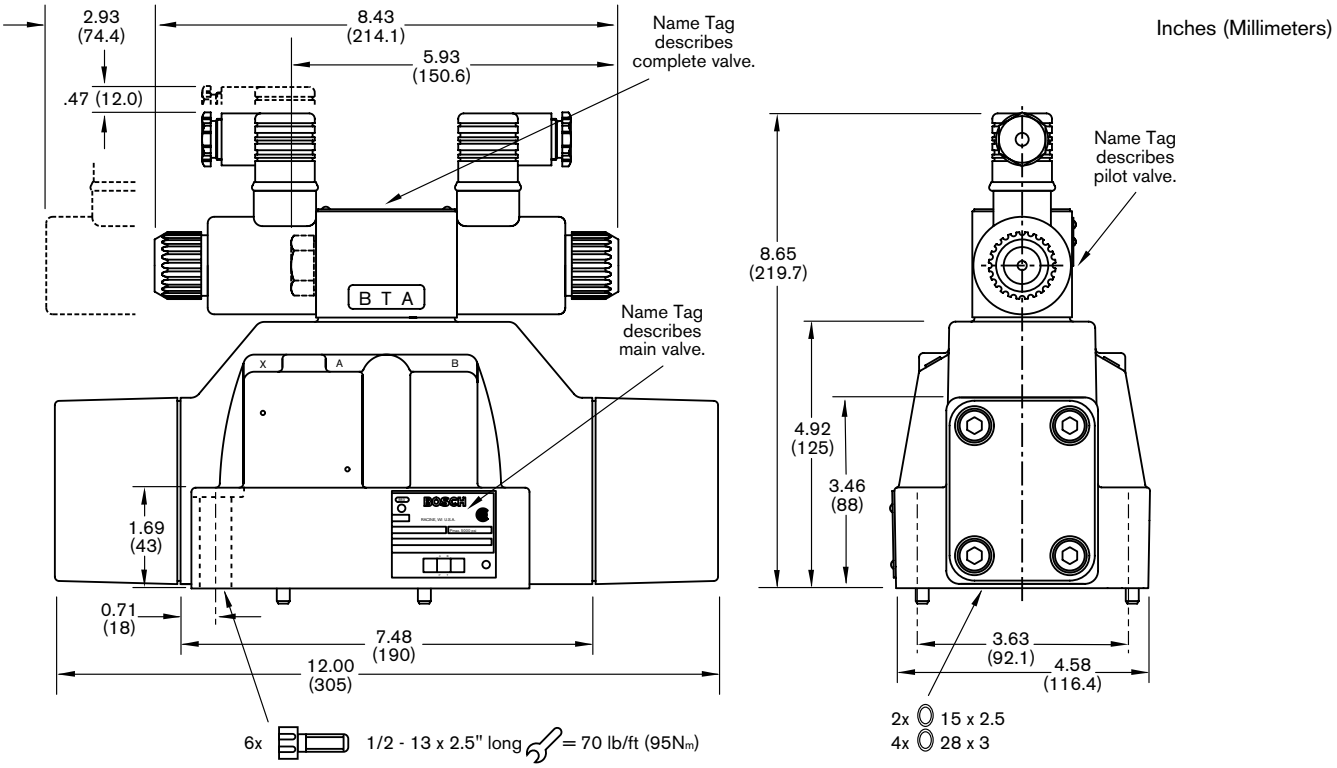
Valve With AC Solenoid (DIN)

Inches (Millimeters)



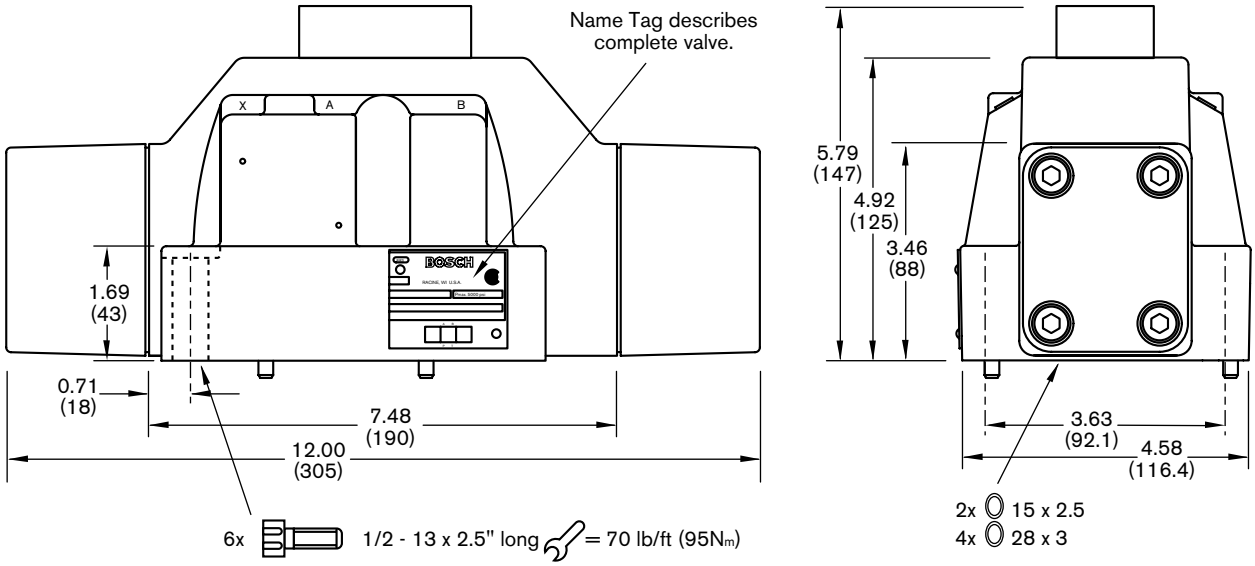
Valve With DC Solenoid (DIN)

Inches (Millimeters)



Hydraulic Controlled (Type 2)

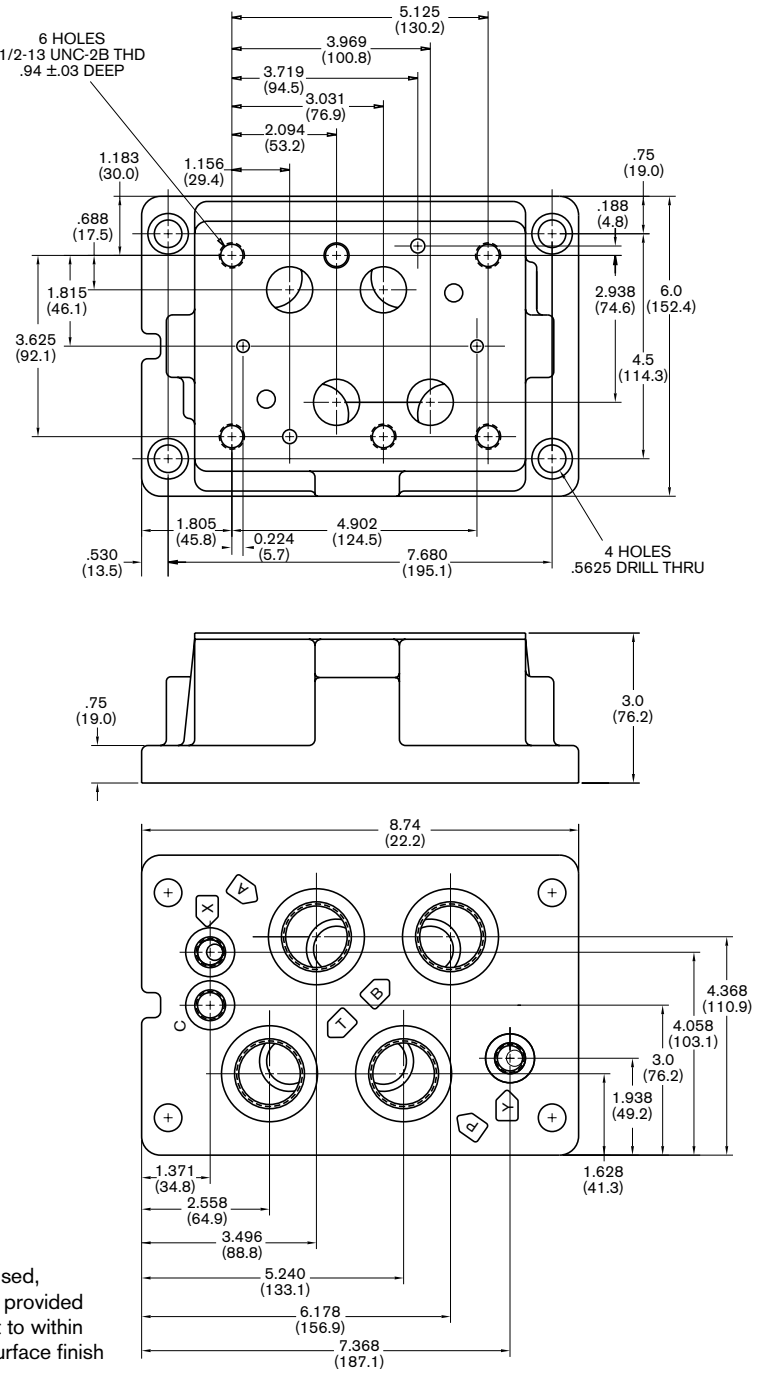
Inches (Millimeters)



Subplates, Bottom Ported

C port is used for load sensing when using proportional valves.

Inches (Millimeters)

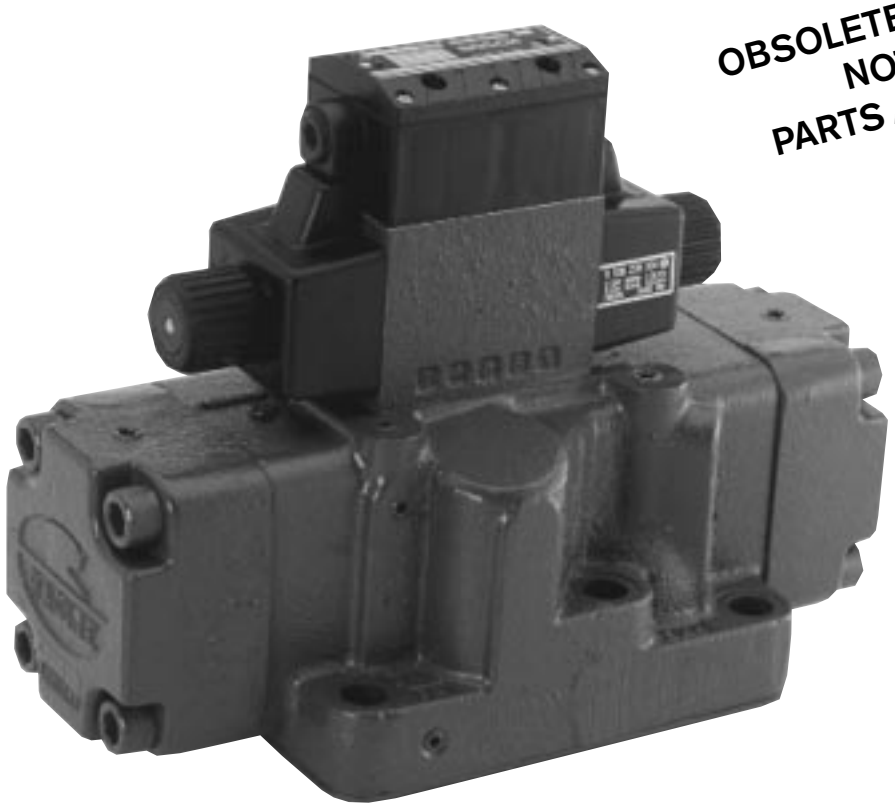


When a subplate is not used, a machined pad must be provided for mounting which is flat to within 0.004 in./in. and has a surface finish of 63 RMS.

P,T,A,B,	X,Y,C,	Maximum Pressure	Weight	Part Number
1" NPTF	1/4" NPTF	5000 psi (350 bar)	25 lbs. (11.3 kg)	**9 000 010 216***
1 1/4" NPTF				**9 000 010 217***
1 1/2" NPTF				**9 000 010 218***
#16 SAE	#6 SAE			**9 000 010 219***
#20 SAE				**9 000 010 220***
#24 SAE				**9 000 010 221***
Bolt kit B-228 (Valve only) 6 x 1/2 – 13 x 2.5" Long				**953 723**

*Obsolete, consult factory

OBSOLETE PRODUCT
NOT ALL
PARTS AVAILABLE



Features and Benefits

- ☐ Retained guide tube for easy replacement of coils
- ☐ Solenoid identification per U.S. standard. P→A when solenoid “A” is energized
- ☐ Optional manual overrides available
- ☐ Certified Pilot Valve – Main section certification pending
- ☐ Dual frequency solenoids (50 or 60 Hertz)
- ☐ Throttling spools are available
- ☐ Optional load check

Order Code

This order code describes the desired model variances of the D10 (NG 32) directional control valves. Standard models are assigned a 10-digit number. See page 90.

0	8	1	W	V	3	2	P	1	V	3															D	5	1	/	5	5	/		

SIZE
32 - D10 (NG32)

SEALS
V – VITON STD.

CONTROL TYPE

2 – HYDRAULIC
3 – ELECTRICAL

SPOOL CODE

REFER TO SPOOL CHART ON PAGE 80.

PILOT CHOKES*

F – FIXED
T – ADJUSTABLE

R – LOAD CHECK IN "P" PORT*

H – ADJUSTABLE SPOOL STOPS*

PILOT AND DRAIN
XY – EXTERNAL PILOT EXTERNAL DRAIN
PT – INTERNAL PILOT INTERNAL DRAIN
PY – INTERNAL PILOT EXTERNAL DRAIN
XT – EXTERNAL PILOT INTERNAL DRAIN

ELECTRICAL CONNECTIONS
WS–DIN 43650/ISO4400
KL –WIRING BOX + SENTINAL LIGHTS
KA –WIRING BOX ONLY
KD –WIRING BOX + QUICK CONNECTOR, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KE –WIRING BOX + QUICK CONNECTOR + SENTINEL LIGHTS, 4 PIN, 12 MM FOR DC SOLENOIDS, 3 PIN CONNECTOR (ANSI B93.55M-1981) FOR SINGLE AC SOLENOIDS, 5 PIN ANSI CONNECTOR FOR DUAL AC SOLENOIDS)
KG –WIRING BOX + QUICK CONNECTOR (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
KM –WIRING BOX + QUICK CONNECTOR + SENTINAL LIGHTS (SINGLE AC SOLENOID ONLY, 5 PIN ANSI)
G –DETENT CONTROL TYPE 7 ONLY
EX –FLAME PROOF

SOLENOID VOLTAGES

AC	DC
115/60	012/00
230/60	024/00
Series "D" Dual Frequency	

09 – MANUAL PUSH PIN WITH RUBBER COVER*

55 – LOW PRESSURE VERSION

51 – SOLENOID IDENTIFICATION
PER U.S. STANDARD P›A WHEN SOLENOID "A" IS ENERGIZED (ANSI B93.9)

D – DESIGN SERIES
D – STD
**E – 24VDC LEAD WIRE COIL

SOLENOID OPTIONS*

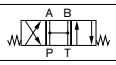
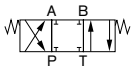
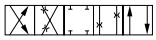
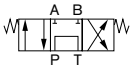
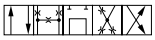
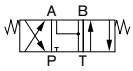
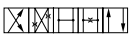
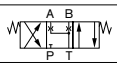
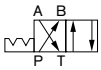
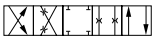
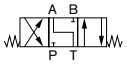
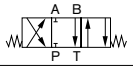
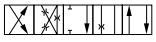
C – COVERED PUSH PIN

* If these options are not needed, omit them from the code

** QUICK CONNECT FOR E SERIES IS MINI CONNECTOR (See PG 99)

Part Numbers

Standard valves are assigned a 10-digit part number. Describe unassigned valve combinations with the alpha-numeric order code.

			9 810 234 …							
			P – INT. PILOT **X** – EXT. PILOT **T** – INT. DRAIN **Y** – EXT. DRAIN	**KA** – WIRING BOX **KD** – WIRING BOX + QUICK CONNECT (3 PIN SINGLE & 5 PIN DOUBLE SOLENOID) **KE** – WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS **KG** – WIRING BOX + QUICK CONNECT (SINGLE SOLENOID 5 PIN) **KL** – WIRING BOX + SENTINEL LIGHTS **KM** – WIRING BOX + QUICK CONNECT + SENTINEL LIGHTS (SINGLE SOL. 5 PIN) **WS** – PLUG CONNECTER (DIN 43650 / ISO 4400)						
				KA	**KD**	**KE**	**KG**	**KL**	**KM**	**WS**	**WS**
SPOOL NO.	**SYMBOLS**	**TRANSITION**	**PILOT & DRAIN**	110/115	110/115	110/115	110/115	110/115	110/115	110/115	24 VDC.
000			XY					**529**			
			TXY					**543**			
001			PT	**505**		**538**		**530**			
			XY	**508**							**536**
			XT	**509**						**585**	
			TXY	**539**							
			TPY	**507**							
			PY	**551**						**581**	**544**
			TPT	**554**							
			THXY	**563**							
			THPY	**567**							
			TXT	**570**							
			HPT	**579**							
002			TXY							**584**	
			PY	**510**							
			XY	**513**				**582**		**557**	**560**
			XT	**512**							
			XT	**514**							
004			TPY			**526**					
			PT	**516**		**527**		**555**		**531**	
			PY	**515**							
			HPT							**568**	
009			XY			**528**					
			TXY					**577**			
010			TPT	**550**		**569**					
			PT	**517**				**532**			
			XY	**518**						**562**	
			PY					**547**			
			FPY					**549**			
018			PT	**520**							
			TPY	**565**							
020			TXY	**542**							
			PT	**523**							
			PY	**522**							
			XT	**548**							
026			PT	**524**							
			XY	**575**							
042			PT	**525**							
			XT		**574**						

Alternative Model Codes forNG32 (D08)(Old numbers are 9 810 234…)							
Old #	**Model Code**	**Old #**	**Bosch Rexroth Description**	**Old #**	**Bosch Rexroth Description**	**Old #**	**Bosch Rexroth Description**
505	4WEH32E6X/6EW110N9ETDA	525	4WEH32U6X/6EW110N9ETDA	546	Consult Factory	566	4WEH32H6X/6EG12N9TDAL
506	4WEH32E6X/6EW220N9ETDAL	526	4WEH32J6X/6EW110N9ES2DK25L	547	4WEH32D6X/6EW110N9EDAL	567	4WEH32E6X/6EW110N9ES2DA/10
507	4WEH32E6X/6EW110N9ES2DA	527	4WEH32J6X/6EW110N9ETDK25L	548	4WEH32D6X/OF6EW110N9TDA	568	4WEH32J6X/6EW110N9ETK4/10
508	4WEH32E6X/6EW110N9DA	528	4WEH32C6X/6EW110N9DK23L	549	4WEH32D6X/6EW110N9ES2DAL	569	4WEH32D6X/6EW110N9ES2DK23L
509	4WEH32E6X/6EW110N9TDA	529	4WEH32H6X/6EW110N9DAL	550	4WEH32D6X/6EW110N9ETS2DA	570	4WEH32E6X/6EW110N9TS2DA
510	4WEH32G6X/6EW110N9EDA/P4.5	530	4WEH32E6X/6EW110N9ETDAL	551	4WEH32E6X/6EW110N9EDA	571	4WH32G6X/
511	Consult Factory	531	4WEH32J6X/6EW110N9ETK4	552	4WPH32J6X/6NE/A	572	Consult Factory
512	4WEH32G6X/6EW110N9TDA	532	4WEH32D6X/6EW110N9ETDAL	553	4WEH32D6X/OF6EW110N9ETK4	573	Consult Factory
513	4WEH32G6X/6EW110N9DA	533	Consult Factory	554	4WEH32E6X/6EW110N9ETS2DAL	574	4WEH32U6X/6EW110N9TDK25
514	4WEH32G6X/6EW110N9S2DA	534	4WH32E6X/V	555	4WEH32J6X/6EW110N9ETDAL	575	4WEH32L6X/6EW110N9DA
515	4WEH32J6X/6EW110N9EDA	536	4WEH32E6X/6EG24N9K4	556	4WEH32F6X/6EW110N9EDA	576	Consult Factory
516	4WEH32J6X/6EW110N9ETDAL	537	Consult Factory	557	4WEH32G6X/6EW110N9TK4	577	4WEH32C6X/6EW110N9S2DAL
517	4WEH32D6X/6EW110N9ETDA	538	4WEH32E6X/6EW110N9ETDK25L	559	4WEH32M6X/6EW110N9ES2DA	579	4WEH32E6X/6EW110N9ETDA/10
518	4WEH32D6X/6EW110N9DA	539	4WEH32E6X/6EW110N9S2DAL	560	4WEH32G6X/6EG24N9K4	580	4WEH32E6X/6EG24N9TS2DA
519	4WEH32D6X/6EG24N9EDA	540	4WEH32E6X/6EG24N9ETDA	561	Consult Factory	581	4WEH32E6X/6EW110N9EK4
520	4WEH32W6X/6EW110N9ETDA	541	4WEH32E6X/6EW220N9ETDAL	562	4WEH32D6X/6EW110N9K4	582	4WEH32G6X/6EW110N9DA
521	Consult Factory	542	4WEH32D6X/OF6EW110N9S2DA	563	4WEH32E6X/6EW110N9S2DA/10	583	4WEH32H6X/6EG24N9S2DA
522	4WEH32D6X/OF6EW110N9EDA	543	4WEH32H6X/6EW110N9S2DAL	564	4WEH32F6X/6EW110N9DAL	584	4WEH32G6X/6EW110N9S2K4
523	4WEH32D6X/OF6EW110N9ETDA	544	4WEH32E6X/6EG24N9EK4	565	4WEH32W6X/6EW110N9ES2DA	585	4WEH32E6X/6EW110N9TK4
524	4WEH32L6X/6EW110N9ETDA	545	4WEH32E6X/6EG24N9EK4				

Characteristics

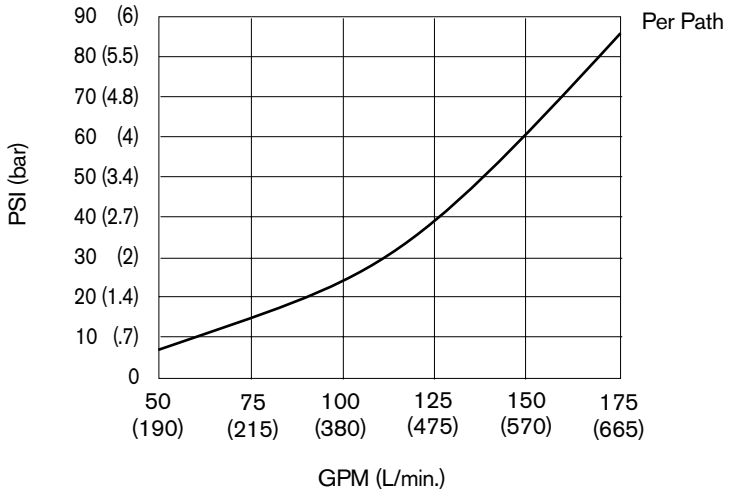
General	
Design	Spool valve
Mounting type	Subplate, D10 (NG 32)
Mounting Position	as desired (Horizontal only for detented valves)
Ambient temperature	–4 to 120°F (-20 to 50°C)
Seals	Viton
CSA Certified	File Number LR 93267-1 (Except flame proof solenoids)
Weights	
Hydraulic	83.2 lbs. (37.8 kg)
Electrical 1 Solenoid	98 lbs. (44.5 kg)
Electrical 2 Solenoid	99 lbs. (44.9 kg)
Adjustable Pilot Chokes	4.4 lbs. (2 kg)
Hydraulic	
Fluid	Petroleum hydraulic fluids and most fire resistant fluids
Viscosity	60 – 2300 SUS (10 – 500 cSt)
Fluid temperature	–4 to 175°F (–20 to 80°C)
Filtration	Contamination class 19/16, according to ISO 4406 to be realized with filter ß25=75
Direction of flow	As shown on symbol
Operating pressure	Port P, A, B,T: 3000 PSI (210 bar) max. Port T: 1500 PSI (100 bar) max. w/flame proof solenoids
Pilot pressure	75 PSI (5.2 bar)min. 3000 PSI (210 bar) max.
Maximum flow	175 GPM (660 L/min) see Δ P/Q curve page 82
Control volume	3.04 in^3 (50 cm^3) for 3 position valves
Electric	
Duty factor	100%
Solenoid identification	Meets ANSI/B93.9 - 1969 (R 1988) Standards* P › A when Sol. “A” is energized.
Enclosure type	*IP 65 to IEC and DIN 40 050 (DIN Connectors)
Insulation class	C VDE § 5
Voltage and frequency	See table on page 88 AC-solenoids 230/60 can be used with 220/50 and 115/60 can be used with 110/50 voltage supply
Voltage tolerance	Nominal Voltage ±10%
Power rating DC AC	 In Rush: 42W In Rush: ~ 3.5A Holding: ~ 1.14A
Response time	50 – 110ms Dependent on control pressure and spool
Switching frequency	max. 1800/h

*Note: IP 65

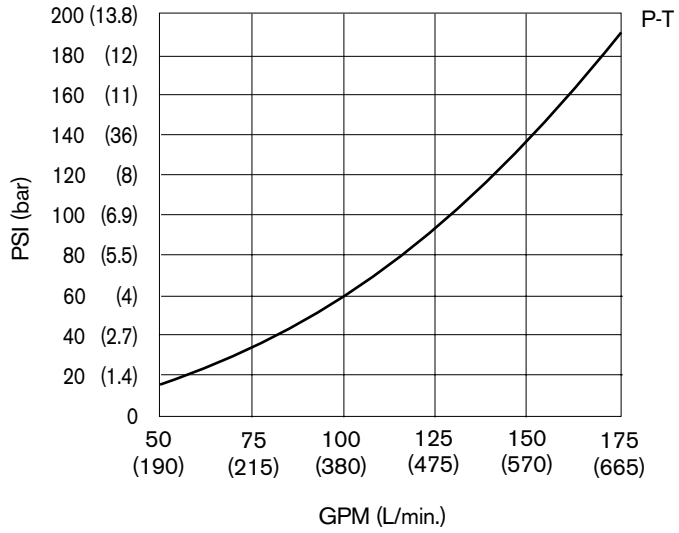
- Protected against low pressure water jets from all direction
- Dust tight

Performance Data

ALL SPOOLS EXCEPT 002



002 SPOOL



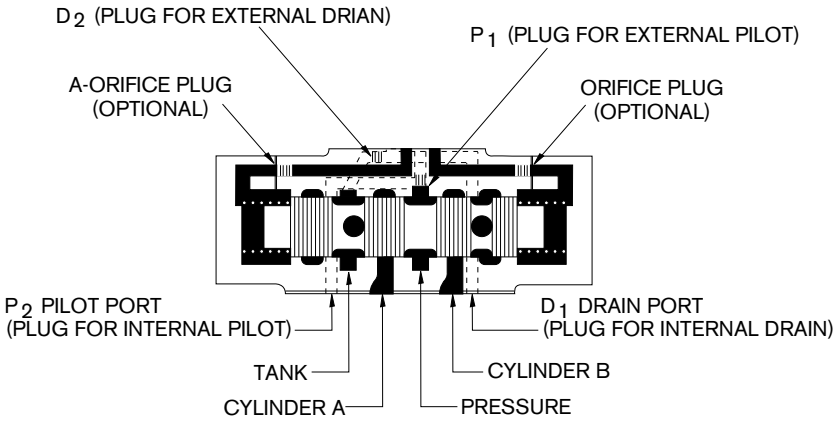
Viscosity = 142 SUS (30.2 cSt)

Pilot & Drain Options

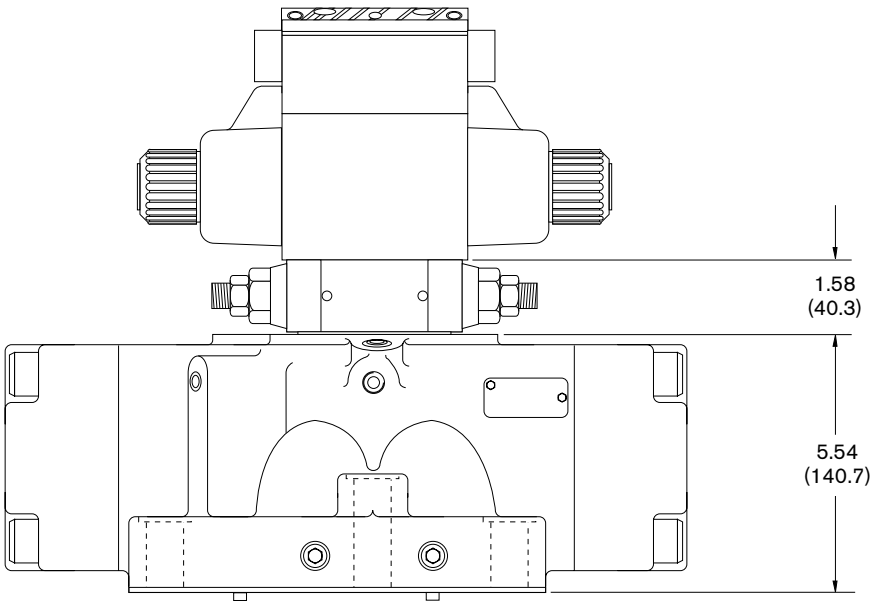
Pilot oil supply and drain are either external via the X and Y ports or internal via the P and T ports. The P_1 and D_2 ports are 1/8" NPT).

The installations of the plugs determines the source of the pilot oil and where it drains. Valves can be converted in the field.

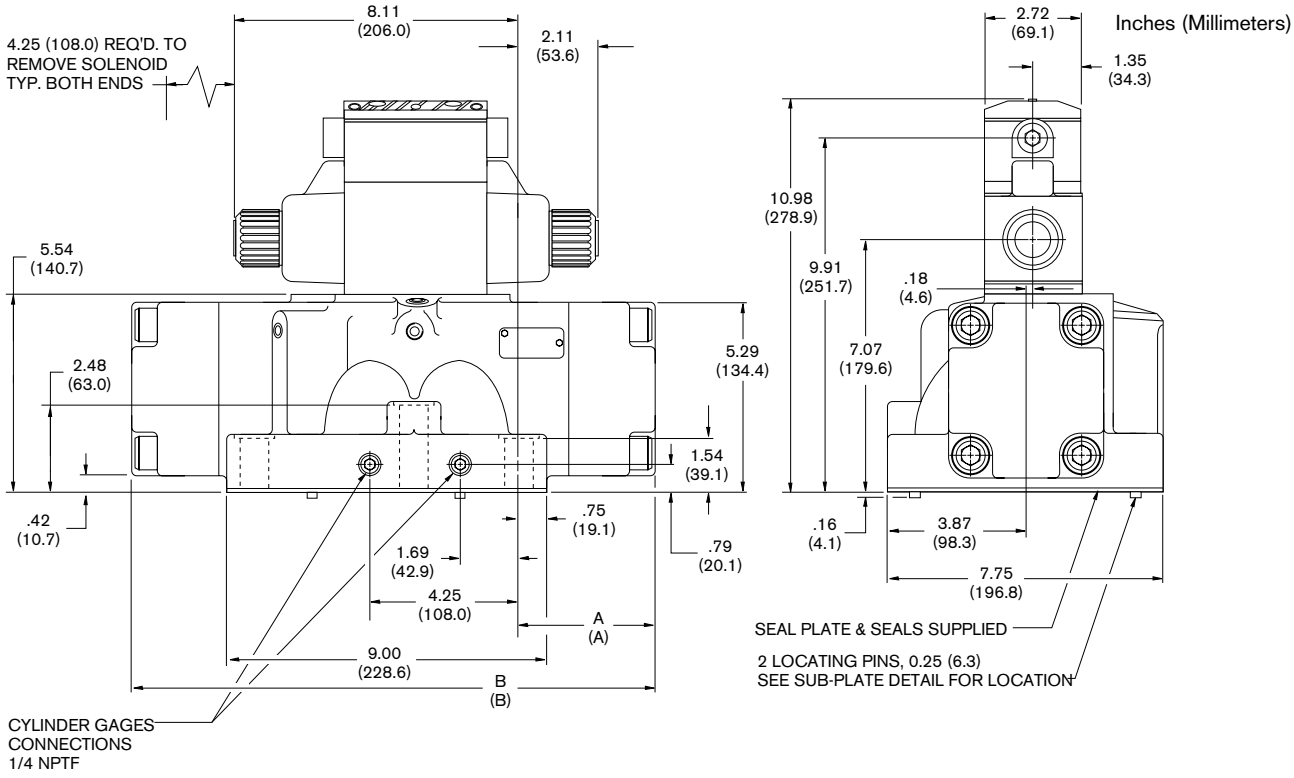
PY – INT. PILOT, EXT. DRAIN; PLUG PORTS P_2 & D_2
PT – INT. PILOT, INT. DRAIN; PLUG PORTS P_2 & D_1
XY – EXT. PILOT, EXT. DRAIN; PLUG PORTS P_1 & D_2
XT – EXT. PILOT, INT. DRAIN; PLUG PORTS P_1 & D_1



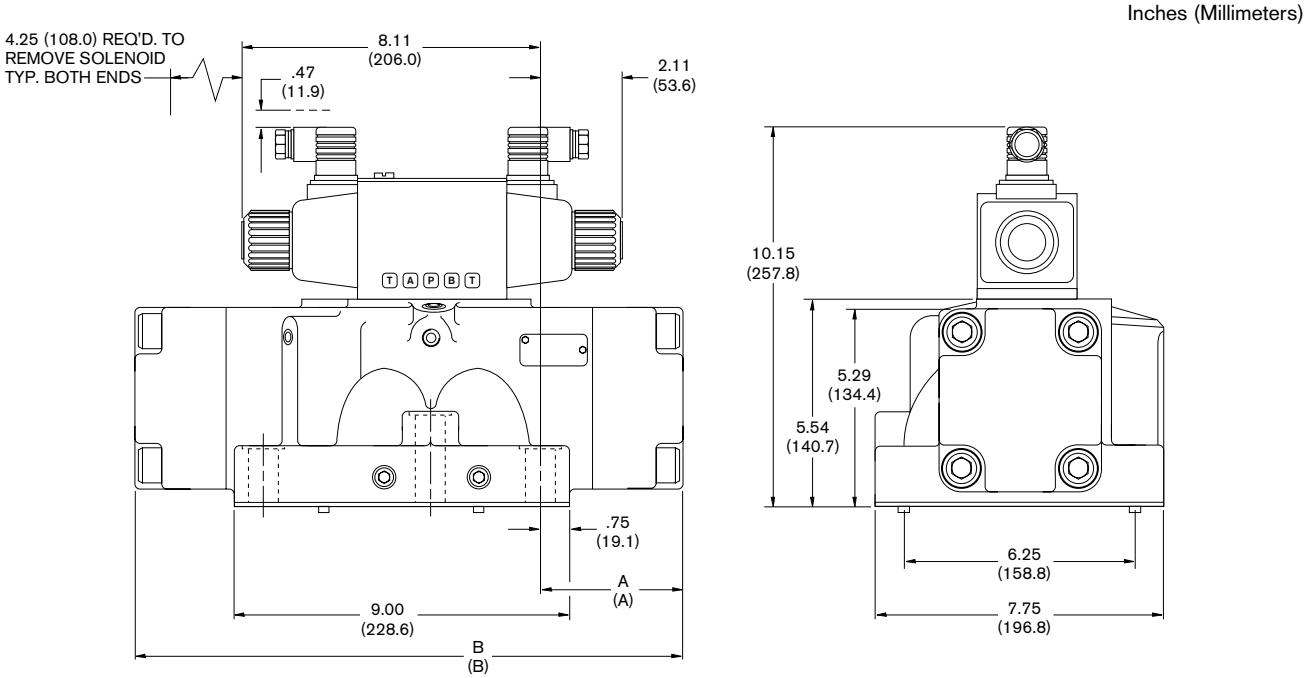
Adjustable Choke Option



Valve With AC/DC Solenoid & Wiring Box

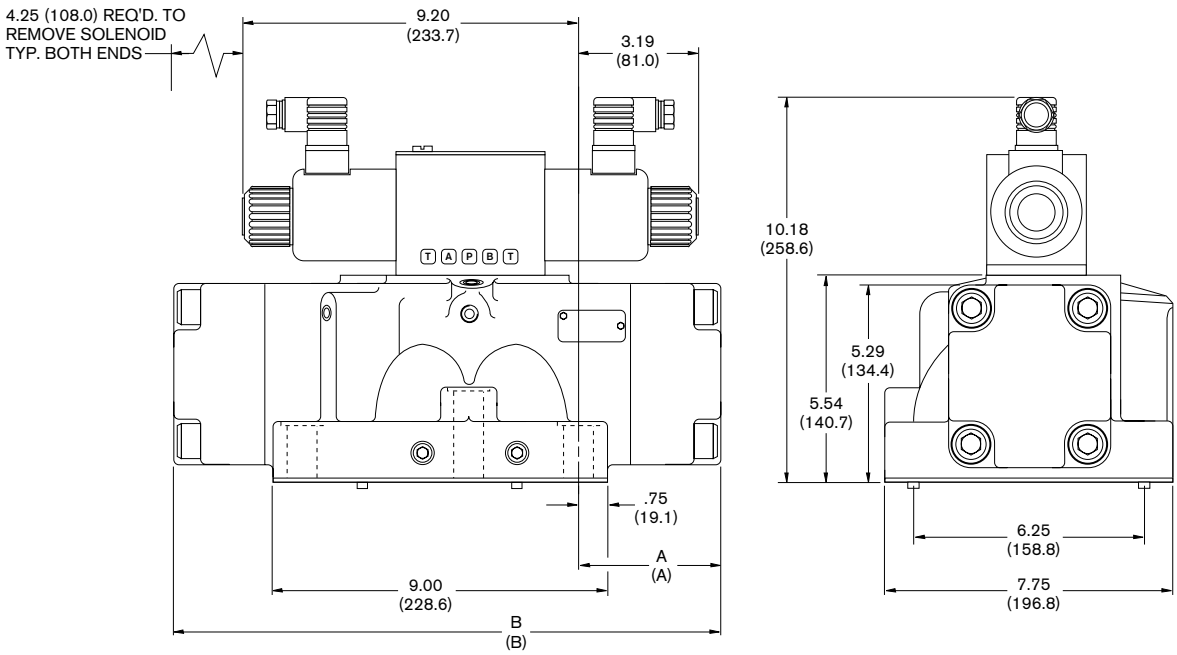


Valve With AC Solenoid (DIN)



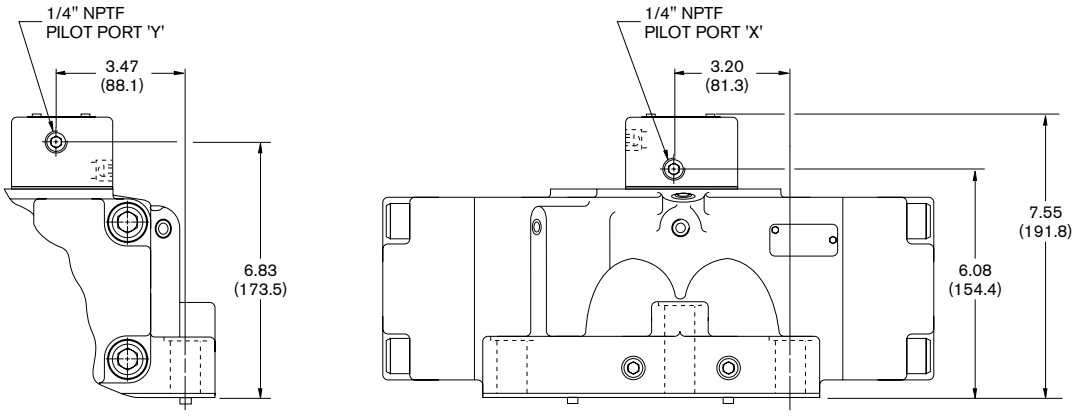
Valve With DC Solenoid (DIN)

Inches (Millimeters)



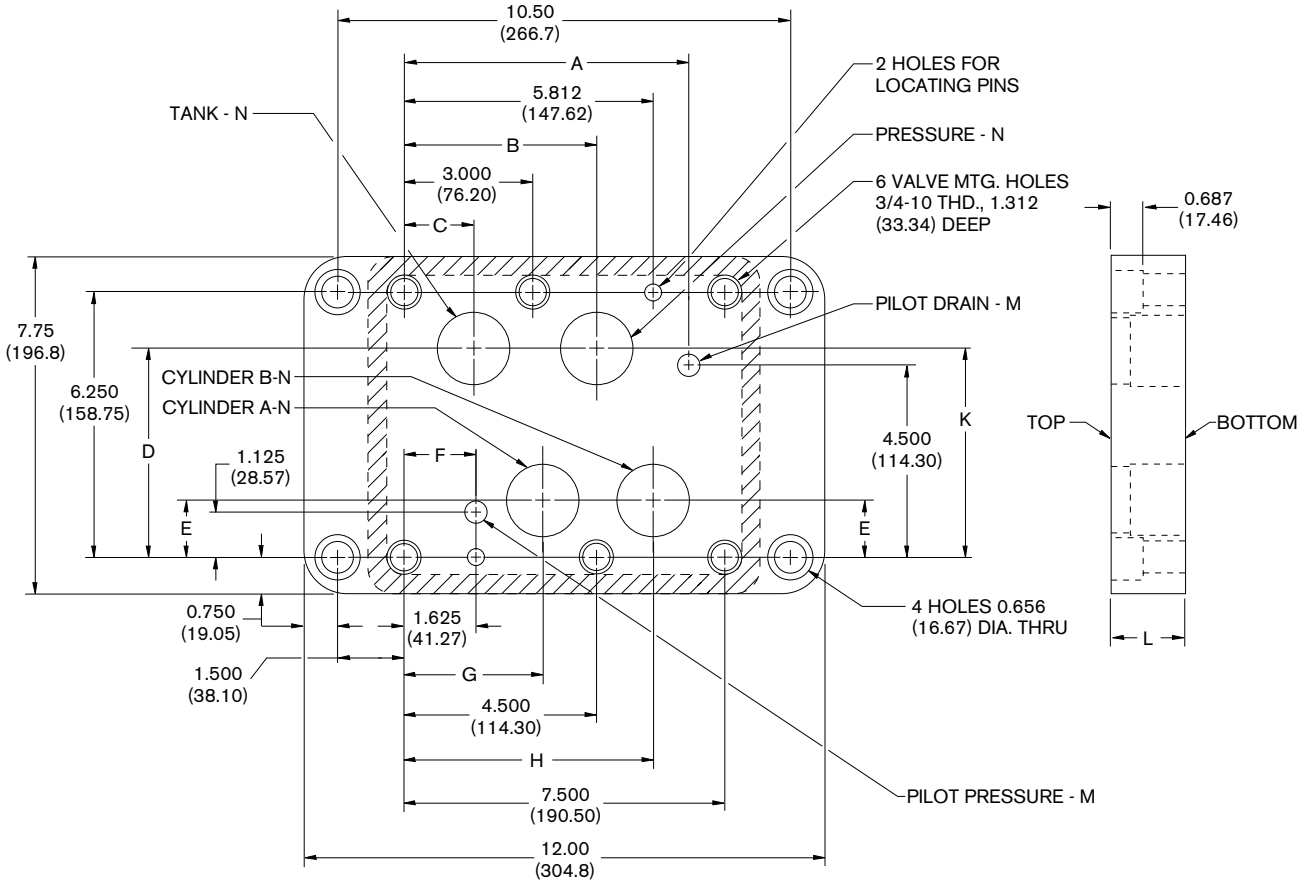
Hydraulically Controlled (Type 2)

Inches (Millimeters)



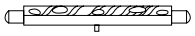
Subplates, Bottom Ported

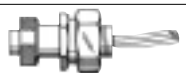
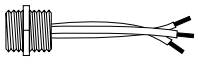
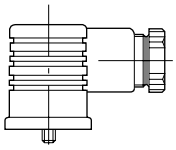
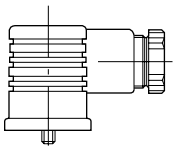
Inches (Millimeters)



MODEL NO.		A	B	C	D	E	F	G	H	J	K	L	M	N
950917	Bottom	6.625 (168.27)	4.500 (114.30)	1.625 (41.27)	4.875 (123.82)	1.375 (34.92)	1.625 (41.27)	3.250 (82.55)	5.812 (147.64)	1.375 (34.92)	4.875 (123.82)	1.750 (44.45)	1/4" NPTF	1-14" NPT
950919	Bottom	6.625 (168.27)	4.500 (114.30)	1.625 (41.27)	4.875 (123.82)	1.375 (34.92)	1.625 (41.27)	3.250 (82.55)	5.812 (147.64)	1.375 (34.92)	4.875 (123.82)	1.750 (44.45)	1/4" NPTF	1-1/2" NPT
950920	Top	6.625 (168.27)	4.5 (114.30)	1.625 (41.27)	4.875 (123.82)	1.375 (34.92)	1.625 (41.27)	3.250 (82.55)	5.182 (147.64)	1.375 (34.92)	4.875 (123.82)	2.125 (53.97)		
	Bottom	7.000 (177.80)	5.125 (130.17)	1.062 (26.99)	4.500 (114.3)	0.937 (23.81)	0.625 (15.87)	2.687 (68.26)	6.312 (160.34)	1.562 (39.69)	5.125 (130.17)	2.125 (53.97)	3/8" NPT	2" NPT

Accessories

Sentinel light assembly			D03 (NG6)	D05 (NG10)
	Port “A”	AC	9 537 230 017	9 537 230 003
	Port “B”	AC	9 537 230 018	9 537 230 004
	Double	AC	9 537 230 016	9 537 230 002
	Port “A”	DC	9 537 230 070	9 537 230 076
	Port “B”	DC	9 537 230 071	9 537 230 077
	Double	DC	9 537 230 069	9 537 230 075
Wiring Box Kit			9 810 231 490	9 810 232 499

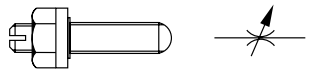
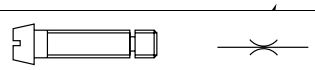
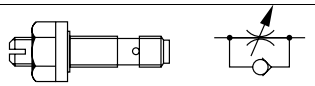
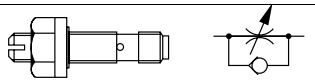
Quick connect			
	Quick Connect female plug w/3 ft. pigtail for flexible conduit	Single Sol. AC	951 901
		Double Sol. AC	951 902
	Quick Connect male plug for wiring box	Single Sol. AC	778 345
		Double Sol. AC	778 346
	Quick Connect male plug for wiring box	Single Sol. DC Double Sol. DC	9 536 230 040
	Plug connector, Standard	Grey (A)	1 834 484 058
		Black (B)	1 834 484 057
	Plug connector with LED indicator lamp 12 - 28 VDC	Grey (A)	1 834 484 136
		Black (B)	1 834 484 137
	Rectifier Plug		1 834 484 134

Subplates			D03 (NG6)	D05 (NG10)	D07 (NG16)	D08 (NG25)	D10 (NG32)
	NFPA T3.51M Bottom Ported	1.4 NPT	9 000 010 148	-	-	-	
		3/8 NPT	9 000 010 146	-	-	-	
		1/2 NPT	9 000 010 139	9 000 010 172	-	-	
		3/4” NPTF	-	9 000 010 181	9 000 010 201*	-	
		1” NPTF	-	-	9 000 101 202*	9 000 010 216*	
		1 1/4” NPTF	-	-	-	9 000 010 217*	950 917*
		1 1/2” NPTF	-	-	-	9 000 010 218*	950 919*
		2" NPTF					950 920*
		#6 SAE	9 000 010 144	-	-	-	
		#8 SAE	9 000 010 140	9 000 010 174	-	-	
		#12 SAE	-	9 000 010 183	9 000 010 203*	-	
		#16 SAE	-	-	9 000 010 204*	9 000 010 219*	
		#20 SAE	-	-	-	9 000 010 220*	
	Side Ported	#24 SAE	-	-	-	9 000 010 221*	
		1/4 NPT	9 000 010 147				
		3/8 NPT	9 000 010 145				
		1/2 NPT	9 000 010 142	9 000 010 164			
		3/4 NPT		9 000 010 166			
		#6 SAE	9 000 010 143				
		#8 SAE	9 000 010 141	9 000 010 165			
		#12 SAE		9 000 010 175			

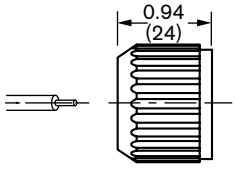
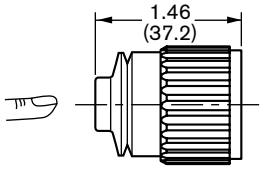
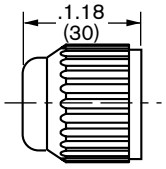
*Obsolete, consult factory

SEAL KITS		D03 (NG6)	D05 (NG10)	D07 (NG16)	D08 (NG25/55)	D08 (NG25)	D10 (NG32)
	Set of Seals (Viton)	9 810 231 529	9 810 232 520	9 810 234 100	9 810 235 600	9 810 235 601	9 810 234 535
BOLT KITS							
	Kit (valve only)	953 611	953 675	953 726	953 594	953 723	953 523

Throttle Screw For Soft Shift Adjustment

Throttle Screw for soft shift adjustment		Wt. Lbs (kg)	Part Number
	Adjustable	.001 (0.005)	1 817 001 005
	Fixed .024 (0.6mm)		1 817 011 094
	.040 (1mm)		1 817 001 095
	*A → B		1 817 001 085
	Adjustable *A ← B		1 817 001 086

* For speed adjustment when spool is moving in reference to cylinder parts

Solenoid Nut		
Standard	With Rubber Cover	Covered
		Inches (Milimeters) 
D03 (NG6) 9 535 230 082	D03 (NG6) 1 833 343 015	D03 (NG6) 1 833 343 013
D05 (NG10) 1 833 343 001	D05 (NG10) 1 833 343 003	D05 (NG10) 1 833 343 002

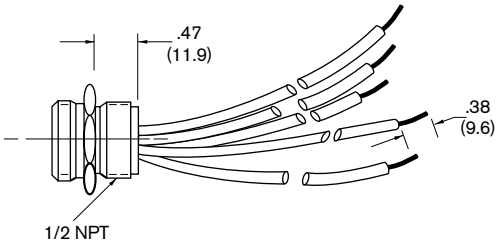
Solenoid Coil	Flying Leads		Din 43650	
Voltage/Frequency	D03 (NG6)	D05 (NG10)	D03 (NG6)	D05 (NG10)
115/60 (Dual Frequency)	9 536 230 015	9 536 230 004	1 837 001 255	1 837 001 212
230/60 (Dual Frequency)	9 536 230 016	9 536 230 005	1 837 001 256	1 837 001 213
12VDC	1 837 001 292	1 837 001 296	1 837 001 226	1 837 001 139
24VDC	1 837 001 293	1 837 001 297	1 837 001 227	1 837 001 140
96VDC	N/A	N/A	1 837 001 232	1 837 001 159
125VDC	N/A	9 536 230 056	N/A	N/A

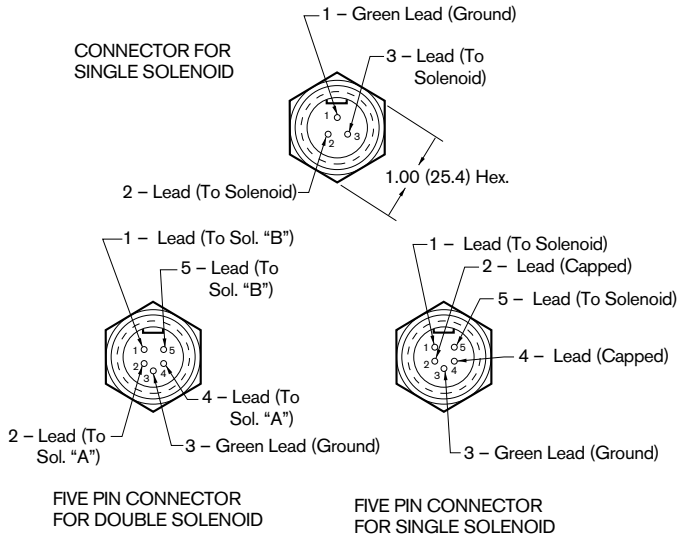
Quick Connect Male Plug

Inches (Milimeters)

AC Solenoids

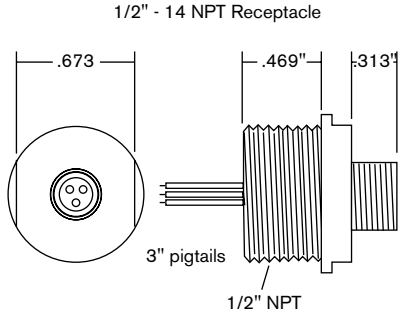
The quick connect male plug is a standard three or five pole electrical connector with 3.25" leads except the ground lead which is 4". All valves ordered with a quick connect are wired to an industry standard (NFPA Standard 13.5.29M) which is shown below. The wiring box has a 1/2" NPT electrical connection on each end in which the quick connect can be installed. On single solenoid valves, the quick connect will be located above the solenoid. On double solenoid valves, it is located on the B port end of the valve. The five pin connector for a single solenoid valve is offered for consumers that use both single and double solenoid valves but want to standardize on one female quick connect plug.

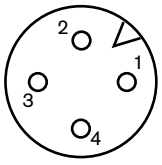




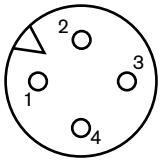
Inches (Milimeters)

DC Solenoids





FACE OF MALE CONNECTOR
MOUNTED ON VALVE

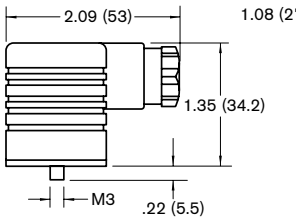


FACE VIEW OF FEMALE
CONNECTOR

PIN #1 - + SOLENOID A
PIN #2 - VALVE GROUND
PIN #3 - COMMON
PIN #4 - + SOLENOID B

NOTE: SINGLE SOLENOID VALVES WIRED ON SOLENOID 'A' PIN.

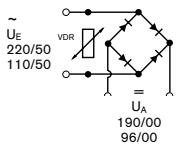
Standard Plug &
Plug With Lite

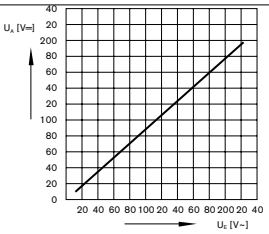


Inches (Millimeters)

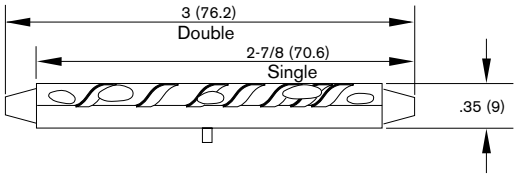
PG 11

Rectifier
Plug

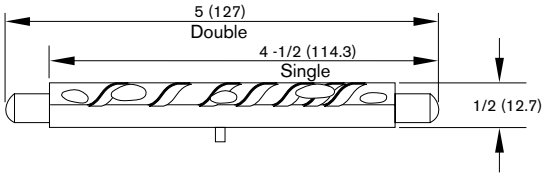




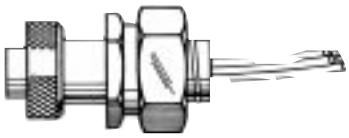
Sentinel Lite D03 (NG6)

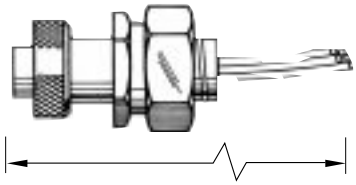


Sentinel Lite D08 (NG10)



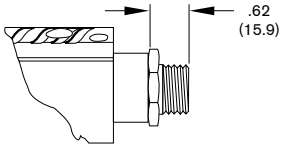
Female Plug AC



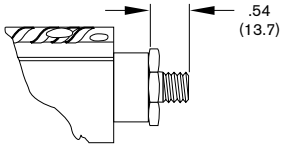


Wire lead length 3
ft. ± 3 in.
(.9m ± 7cm)

Quick Connect AC



Quick Connect DC



Rexroth
Bosch Group

Bosch Rexroth Corporation
Industrial Hydraulics Division
2315 City Line Road
Bethlehem, PA 18017
Phone (610) 694-8300
Fax (610) 694-8467
www.boschrexroth-us.com

Bosch Rexroth Corporation*#
Pneumatics
P.O. Box 13597
1953 Mercer Road
Lexington, KY 40511-1021
Phone (859) 254-8032
Fax (859) 254-4188
(800) 489-4188
Email: customer.pneumatics
@boschrexroth-us.com
www.boschrexroth-us.com

Bosch Rexroth Corporation
Electric Drives and Controls
5150 Prairie Stone Parkway
Hoffman Estates, IL 60192-3707
Phone (847) 645-3600
Fax (847) 645-6201
Email: info@indramat.com
www.boschrexroth-us.com

Bosch Rexroth Corporation
Linear Motion and
Assembly Technologies
816 East Third Street
Buchanan, MI 49107
Phone (616) 695-0151
Fax (616) 695-5363
www.boschrexroth-us.com

Bosch Rexroth Corporation*
Mobile Hydraulics Division
P.O. Box 395
1700 Old Mansfield Road
Wooster, OH 44691-0394
Phone (330) 263-3300
Fax (330) 263-3333
Email: info@rexroth.com
www.boschrexroth-us.com

Bosch Rexroth AG
Zum Eisengiesser 1
D-97816 Lohram Main
Telefon +49 (0) 93 52/18-11
Fax +49 (0) 93 52/18-11 90
Email: pr@rexroth.de
www.boschrexroth.de

*ISO9001 Certified Quality System
#QS9000 Certified Quality System

For more information, you may contact your nearest Bosch Rexroth distributor:

9 535 233 717 4/02