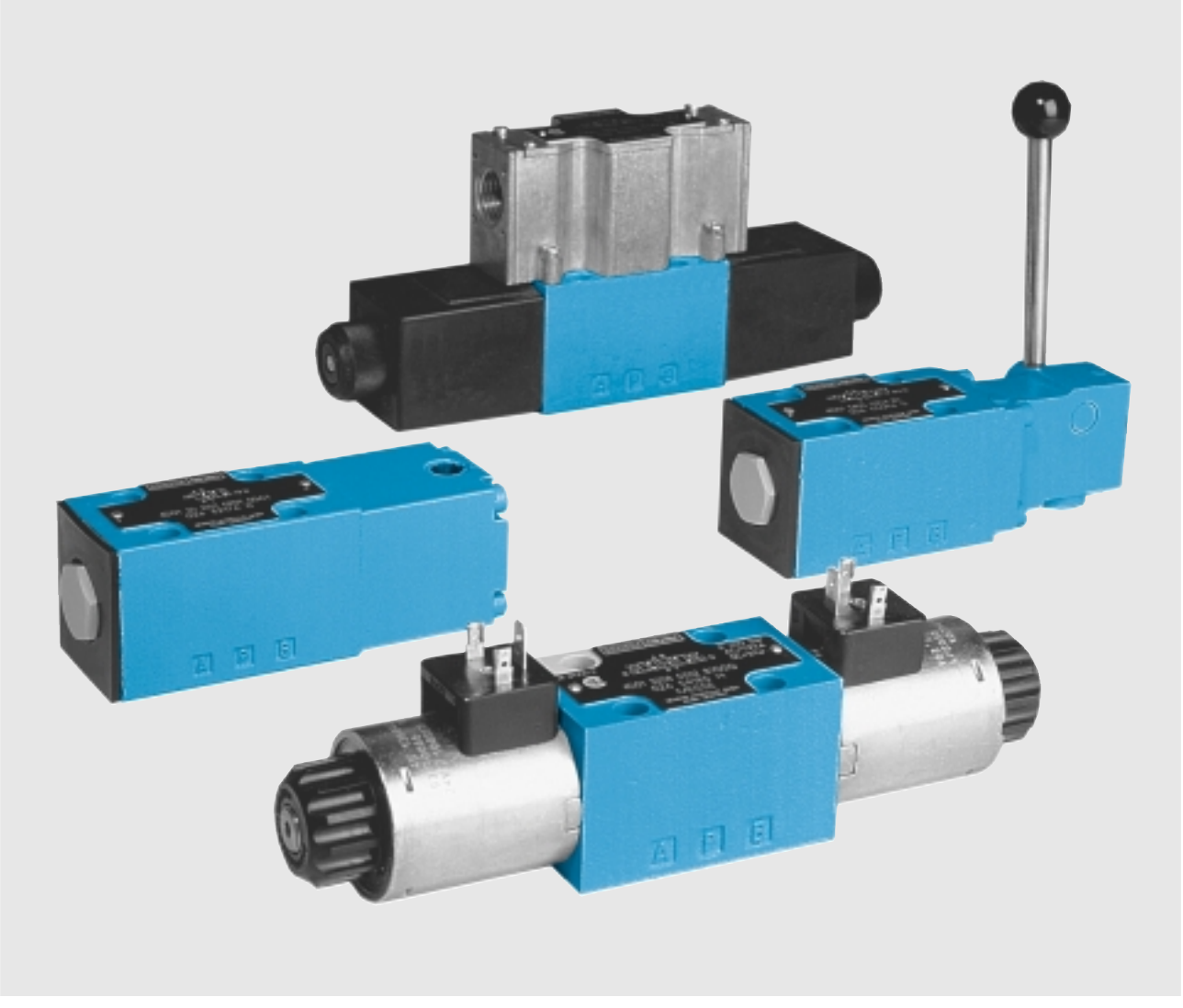
DENISON HYDRAULICS
Directional Control Valves

Series A4D01 – Design B, NFPA D03, Cetop 3

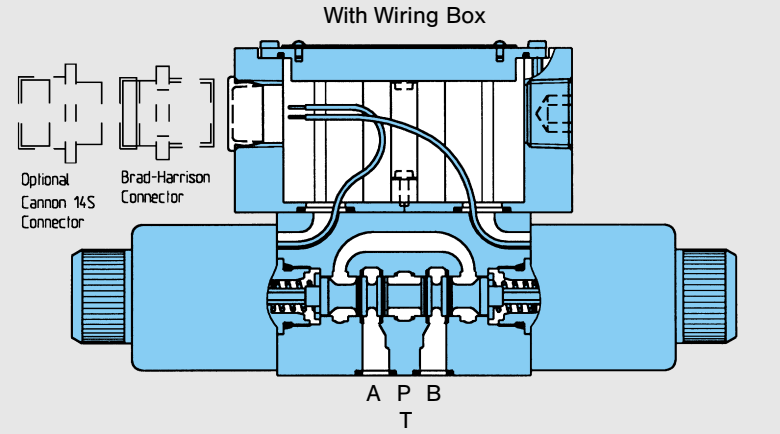


Publ. 4–AM 3060–B, replaces 4–AM 306–A

DENISON Hydraulics

FEATURES

- CSA certificate as standard (solenoid operation).
- Low pressure drop at high flow rates, due to optimized flow paths in body and spool design.
- Mounting configuration conform to ISO 4401.
- Wide variety of spool types available, including detent.
- Interchangeability of spools and bodies due to high precision manufacturing processes.
- Position control by inductive detector.
- Soft shift version available.
- Low electrical power consumption (31 W / 24 VDC).
- Change of solenoid coil is fast and simple without risk of oil leakage.
- Pressure up to 210 bar (DC) / 140 bar (AC) allowable in the tank port.
- All components designed and tested for a minimum life of 10 million cycles.
- Every valve is factory tested prior to delivery.
- Worldwide DENISON Service.



Example: Solenoid operation

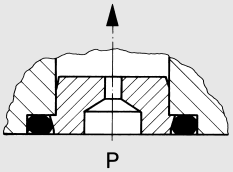
DESCRIPTION

DENISON's direct operated Directional Control Valve A4D01 conforms to Cetop 3 standard interface.
They are designed to be subplate or manifold mounted or used in conjunction with the stack valves system (see also Bulletin 8–EN 5650).
Both the valve mounting interface and electrical connection methods available conform to the accepted International Standards Cetop, ISO and DIN.
The five annuli body design gives a precise guide for many types of spools.
High precision economical manufacturing processes allow interchangeability of spools without the need for selective assembly.
For any applications which are not covered by the ordering code details, please contact your local DENISON office.

OPERATION

The Directional Control A4D01 consists principally of a spool, body and either one or two actuators, depending on the application. The spool is shifted either by use of solenoids, mechanical actuator, hydraulic or pneumatic actuator, allowing oil under pressure from port P to flow to either port A or B, and subsequently connecting the alternate port to the tank. De-energizing the actuator allows the spring to return the spool to the centre or offset position. The manual override option allows for manual operation of the spool.

ORIFICE



In certain operating conditions a higher flow-volume can take place than the functional limit of the valve permits.
In this case an orifice is necessary in the P-port of the valve.
For order details refer to page 3 or 4.

Ordering Code | Back to Content

ORDERING CODE – SOLENOID OPERATION

Model No.: A4D01 –. . .. – .. .. – B 1 ... – .. ..

1 2 3 4 5 6 7 8 9 10 11 12 13 14

1 Series
01 = Cetop 03

2 Body
3 = Standard
F = only for spools 55, 56

3 Control
1 = 1 solenoid
2 = 2 solenoids
7 = 2 solenoids, 2 pos. detents
(only for spools 11, 12, 51, 52 & 91)

4 Spool Type
refer to pages 5 and 6

5 Spool Position
01 = 2 (a, b), Spring offset to pos. "b", energized to "a"
02 = 2 (a, b), Spring offset to pos. "a", energized to "b"
03 = 3 (a, o, b), Spring centered pos. "o"
05 = 2 (o, b), Spring centered pos. "o", energized to "b"
06 = 2 (o, a), Spring centered pos. "o", energized to "a"
09 = 2 pos. detents (for control option 7)

6 End Cap
01 = for control 1
02 = for controls 2, 7
Versions with inductive detector:
SA = for control 1: neutral position controlled } For AC & DC sol. (see page 14)
SB = for control 1: "a" or "b" position controlled
TC = for control 2: "a" or "b" position controlled } For DC sol. only (see page 15)
SC = for control 2: "b" or "a" position controlled
TA = for control 2: "o" position controlled
SA = for control 2: "o" position controlled

7 Design Letter

8 Seal Class
1 = NBR-seals (Standard)
4 = EPR-seals
5 = FPM-seals (Viton®)

9 Solenoid Voltage
W01 = 115 V / 60 Hz } AC
W02 = 230 V / 60 Hz
W06 = 115 V / 50 Hz
W07 = 230 V / 50 Hz
G0R = 12 V } DC
G0Q = 24 V
G0D = 27 V

Order information for plug-in connectors see pages 9 or 10

1* Valve Accessories / Modifications
01 = anchor tube with manual override and closed nut (only DC)
10 = orifice 1.0 mm in P
12 = orifice 1.2 mm in P
28 = wiring box with 6'' flying leads
32 = anchor tube without manual override
52 = anchor tube with manual override and rubber cover
81 = wiring box with 6'' flying leads and terminal strips
G3 = anchor tube with manual override and soft shift orifice (only for DC version with 3 pin socket)
K6 = anchor tube with palm button manual override (only DC)

Model no.: A4D01 –. . .. – .. .. – B 1 – .. ..

1 2 3 4 5 6 7 8 9 10 11 12

1 **Series**
01 = Cetop 03

2 **Body**
3 = Standard
F = only for spools 55, 56

3 **Control**
4 = Lever operated
5 = Cam operated
D = Pneumatic operation, one-side
E = Pneumatic operation, both-sides
F = Pneumatic operation, both-sides (2 pos. det.)
Q = Hydraulic operation, one-side
R = Hydraulic operation, both-sides
S = Hydraulic operation, both sides (2 pos. det.)

4 **Spool Type**
refer to pages 5 and 6

5 **Spool Position**
01 = 2 (a, b), Spring offset to pos. ”b”, activated to ”a”
02 = 2 (a, b), Spring offset to pos. ”a”, activated to ”b”
03 = 3 (a, o, b), Spring centering pos. ”o”
05 = 2 (o, b), Spring centering pos. ”o”, activated to ”b”
06 = 2 (o, a), Spring centering pos. ”o”, activated to ”a”
07 = 3 pos. detents (for control 4)
09 = 2 pos. detents (for control 4)

6 **End Cap**
01 = for controls D and Q
02 = for controls E, F, R and S
04 = for controls 4 and 5
05 = for control 4 and spool pos. 07 and 09

7 **Design Letter**

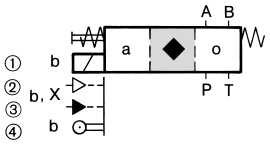
8 **Seal Class**
1 = NBR-seals (Standard)
4 = EPR-seals
5 = FPM-seals (Viton®)

9.. **Valve Accessories / Modifications**
10 = orifice 1.0 mm in P
12 = orifice 1.2 mm in P

① 1-Solenoid operation
② pneumatic operation
③ hydraulic operation
④ Cam operation
} A-Side

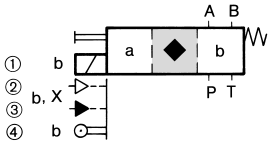
① 1-Solenoid operation
② pneumatic operation
③ hydraulic operation
④ Cam operation
} B-Side

Spool position 06
Spring centering



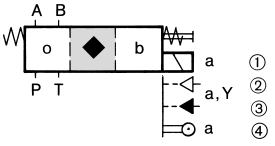
● 01
02
● 03
● 07
● 08
09
10
● 46
55
56
● 64
65
0X

Spool position 01
spring offset



● 11
● 12
● 51
52
81
91
0C
0Y

Spool position 05
Spring centering



● 01
02
● 03
● 07
● 08
09
10
● 46
55
56
● 64
65
0X

● standard spools
◆ transfer configuration only (not switched position)

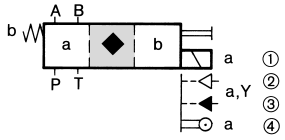
Ordering Code | Back to Content

① 1-Solenoid operation
② pneumatic operation
③ hydraulic operation
④ Cam operation

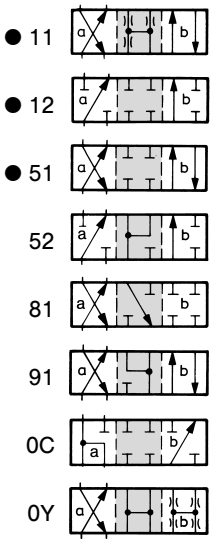
} B-Side

① 2-Solenoid operation
② pneumatic operation, both sides
③ hydraulic operation, both sides
④ Lever operation

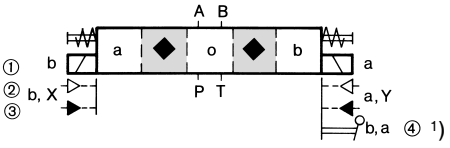
Spool position 02
Spring offset



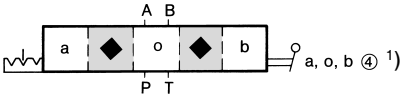
● 11
● 12
● 51
52
81
91
0C
0Y



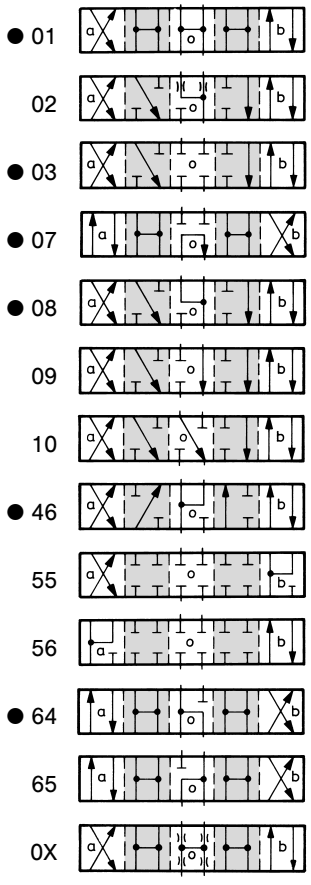
Spool position 03
Spring centering



Spool position 07
3 pos. detents

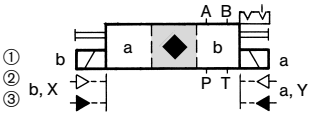


● 01
02
● 03
● 07
● 08
09
10
● 46
55
56
● 64
65
0X

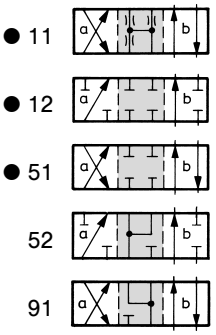


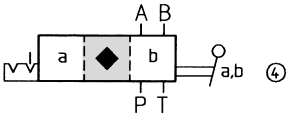
1) Lever operation not with spools 02, 55, 56

Spool position 09
2 pos. detents

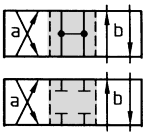


● 11
● 12
● 51
52
91





● 11
● 51

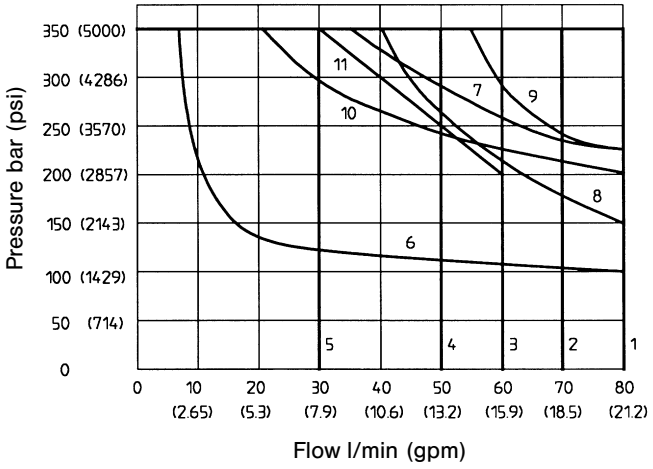


● standard spools
◆ transfer configuration only (not switched position)

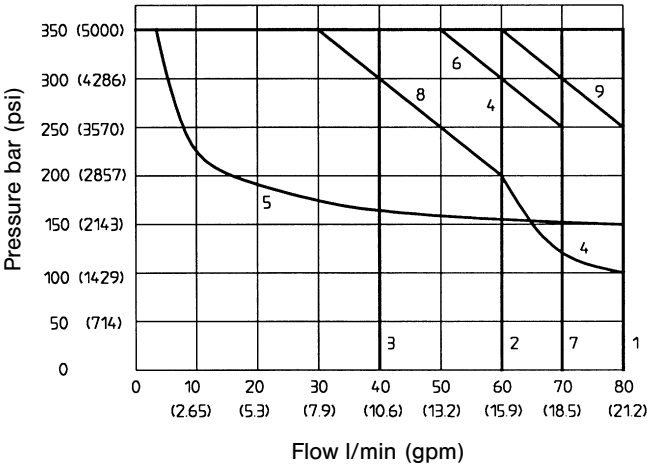
FUNCTIONAL LIMITS

The functional limits have been obtained with warm solenoid condition and at 10 % undervoltage.
All flow data given is considered as 2 flow directions (e. g. P→B and simultaneously from A→T).
For only one flow direction (4-Way-Valve used as 3-Way-Valve) the permissible flow must be lower.

Valve with Standard DC-Solenoid



Valve with Standard AC-Solenoid

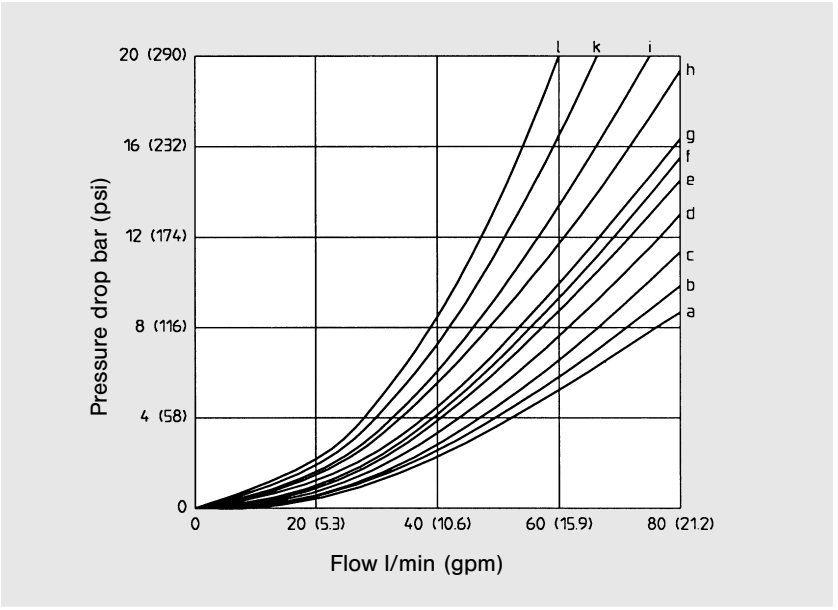


Spool type	DC Curve no.	AC Curve no.
01 02 03	4 9 1	2 6 2
07 08 09	5 7 10	3 2 7
10 11 12 [1])	10 2 (1) 6 (8)	7 1 (1) 5 (9)
46 51 52	3 2 (1) 6 (8)	4 2 (1) 5 (9)
55 56 64	9 9 5	9 9 3
65 81 91	5 3 (1)	3 1 (1)
0C 0Y 0X	1 11 11	1 8 8

( ) Curves for spool with detents

[1]) Only if port A or B is closed

PRESSURE DROP



All Performance Data given is typical and can be influenced by application.
Oil temperature 50 °C (120 °F); oil viscosity 40 cSt.

	Spool type																			
	01	02	03	07	08	09	10	11	12	46	51	52	55	56	64	65	81	91	0C	0Y	0X
P→A	a	e	d	l	d	c	c	c	h	a	e	f	g	g	h	l	b	i	k	a	b
P→B	a	e	d	l	d	c	c	c	h	a	e	f	g	g	l	h	b	i	k	a	b
P→T	b	–	–	i	–	–	–	–	–	–	–	–	–	–	k	k	–	–	k	–	–
A→T	c	c	d	l	a	e	a	d	–	g	g	–	f	–	k	l	e	d	–	e	c
B→T	c	c	d	l	b	a	e	d	–	g	g	–	–	f	l	k	e	d	–	e	c

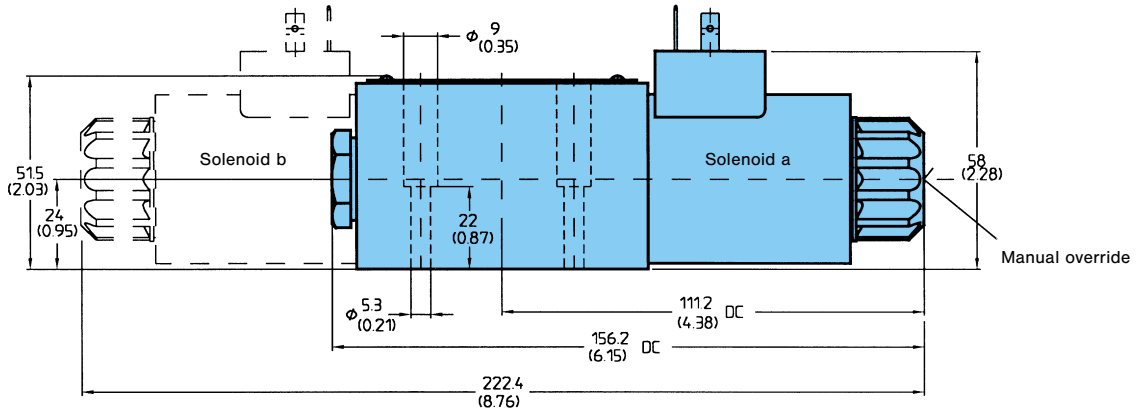
CHARACTERISTICS

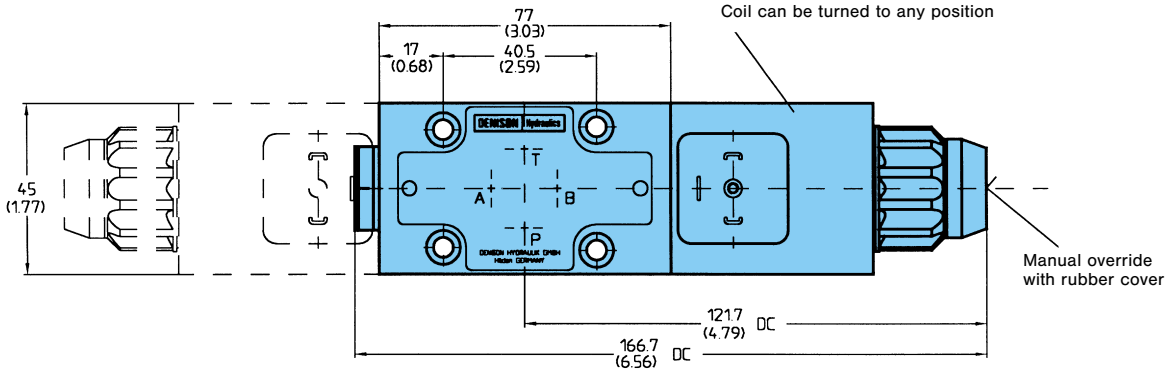
• Design	Sliding spool valve
• Type of mounting	Subplate
• Mounting position	Optional but horizontal optimal
• Ambient temperature range	– 20 . . . + 50 °C (0 . . . 120 °F)
• Operating pressure (P, A, B)	up to 350 bar (5000 psi)
• Max. flow	80 l/min (21.1 gpm) (see diagrams)
• Fluid	Mineral oil according to DIN 51524 and 51525 (For other fluids please consult DENISON)
• Viscosity range	10 . . . 650 cSt, optimal 30 cSt
• Fluid temperature range	– 18 . . . + 80 °C (0 . . . 176 °F)
• Contamination level	Max. permissible contamination level according to NAS 1638 Class 8 (Class 9 for 15 Micron and smaller) or ISO 17/14

If the performance characteristics outlined above do not meet your own particular requirements, please consult your local DENISON Office.

• Nominal voltage	See ordering code page 3
• Power input	31 W
• Permissible pressure T	...210 bar (3000 psi)
• Solenoid response time	
– sol. energized	...46 ms
– sol. de-energized	...27 ms
– quick energizing [1])	...30 ms
• Permissible voltage difference	+ 5...– 10 %
• max. coil temperature	+ 180 °C (350 °F)
• Temperature class	H
• Relative operating period	100 %
• Type of protection	IP 65
• Cycle (1/H)	...16.000
• Weight – 1 sol.	1.4 kg (3.08 lbs)
– 2 sol.	1.7 kg (3.75 lbs)

[1]) double voltage





Port function

P = Pressure

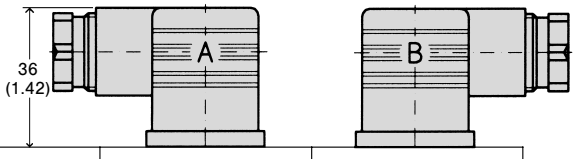
T = Tank

A + B = User

Seals for ports P, A, B, T

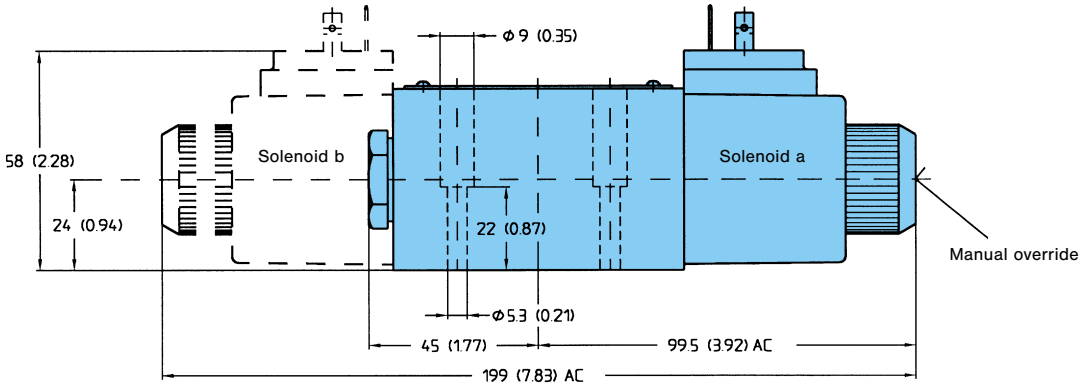
9.25 x 1.78	691–00012–0

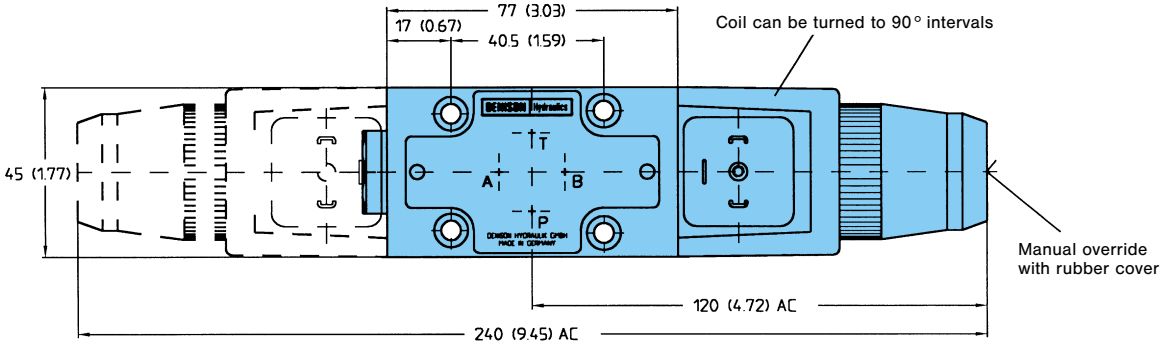
Plug-in connectors according to ISO 4400



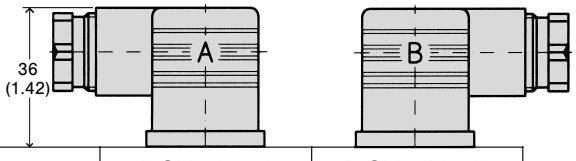
Versions	A-Side (grey)	B-Side (black)
Standard < 250 V PG 11	167–01007–8	167–01008–8
with LED (red) 15...30 V	167–01100–8	167–01101–8
with bridge rectifier 12...250 V	167–01076–8	167–01014–8

• Nominal voltage	See ordering code page 3
• Power input	31 W
• Permissible pressure T	...140 bar (2000 psi)
• Holding	78 VA
• Inrush	264 VA
• Solenoid response time	
– sol. energized	...20 ms
– sol. de-energized	...18 ms
• Permissible voltage difference	+ 5...– 10 %
• max. coil temperature	+ 180 °C (350 °F)
• Temperature class	H
• Relative operating period	100 %
• Type of protection	IP 65
• Cycle (1/H)	...7.200
• Weight – 1 sol.	1.5 kg (3.3 lbs)
– 2 sol.	1.8 kg (4 lbs)





Plug-in connectors according to ISO 4400



Versions	A-Side (grey)	B-Side (black)
Standard < 250 V PG 11	167–01007–8	167–01008–8
with LED (red) 15...30 V	167–01100–8	167–01101–8
with bridge rectifier 12...250 V	167–01076–8	167–01014–8

Port function

P = Pressure

T = Tank

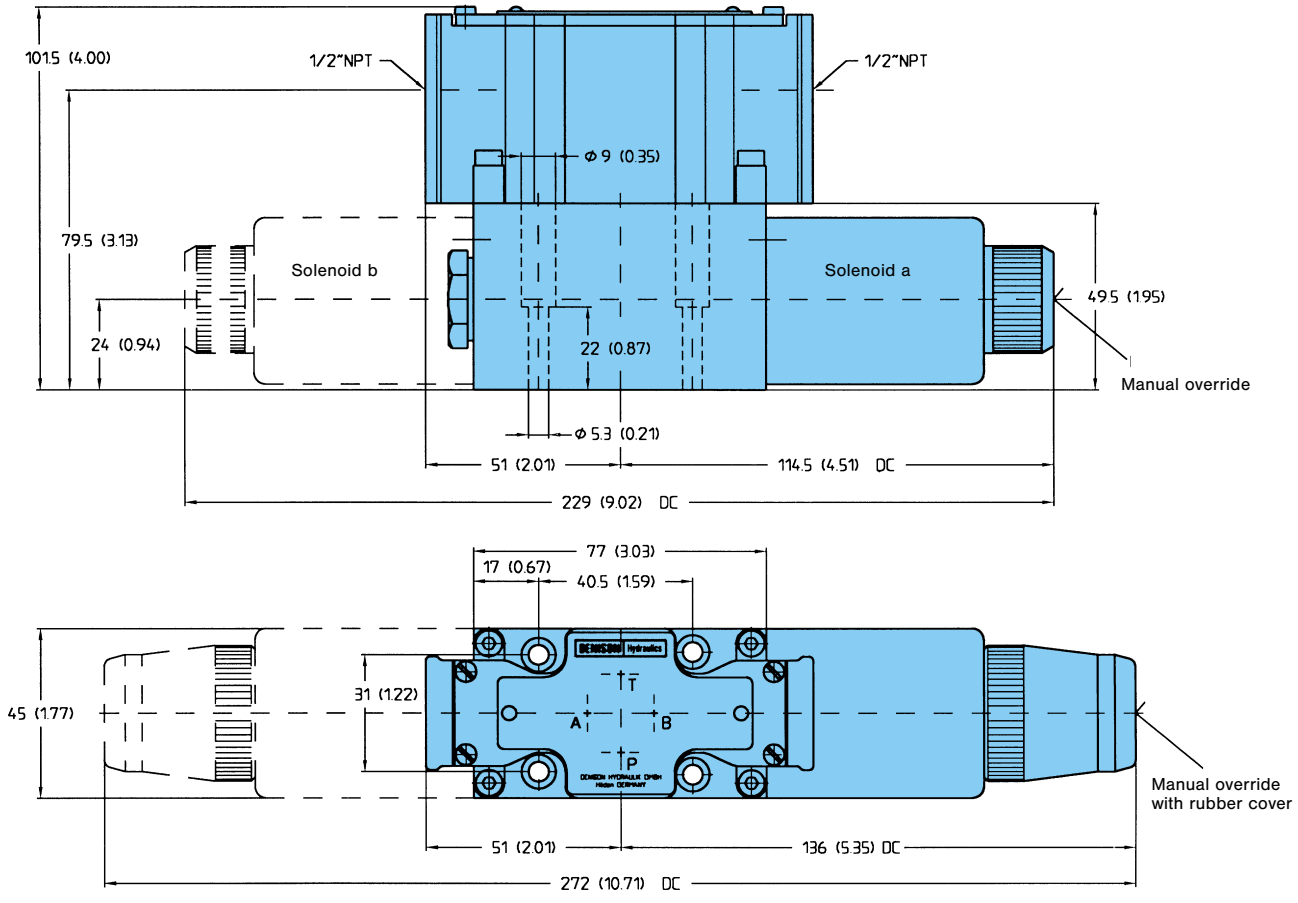
A + B = User

Seals for ports P, A, B, T

9.25 x 1.78	691–00012–0

• Nominal voltage	See ordering code page 3
• Power input	31 W
• Permissible pressure T	...210 bar (3000 psi)
• Solenoid response time	
– sol. energized	...46 ms
– sol. de-energized	...27 ms
– quick energizing [1])	...30 ms
• Permissible voltage difference	+ 5...– 10 %
• max. coil temperature	+ 180 °C (350 °F)
• Temperature class	H
• Relative operating period	100 %
• Type of protection	IP 65
• Cycle (1/H)	...16.000
• Weight	1.9 kg (4.2 lbs)

[1]) double voltage



Port function

P = Pressure

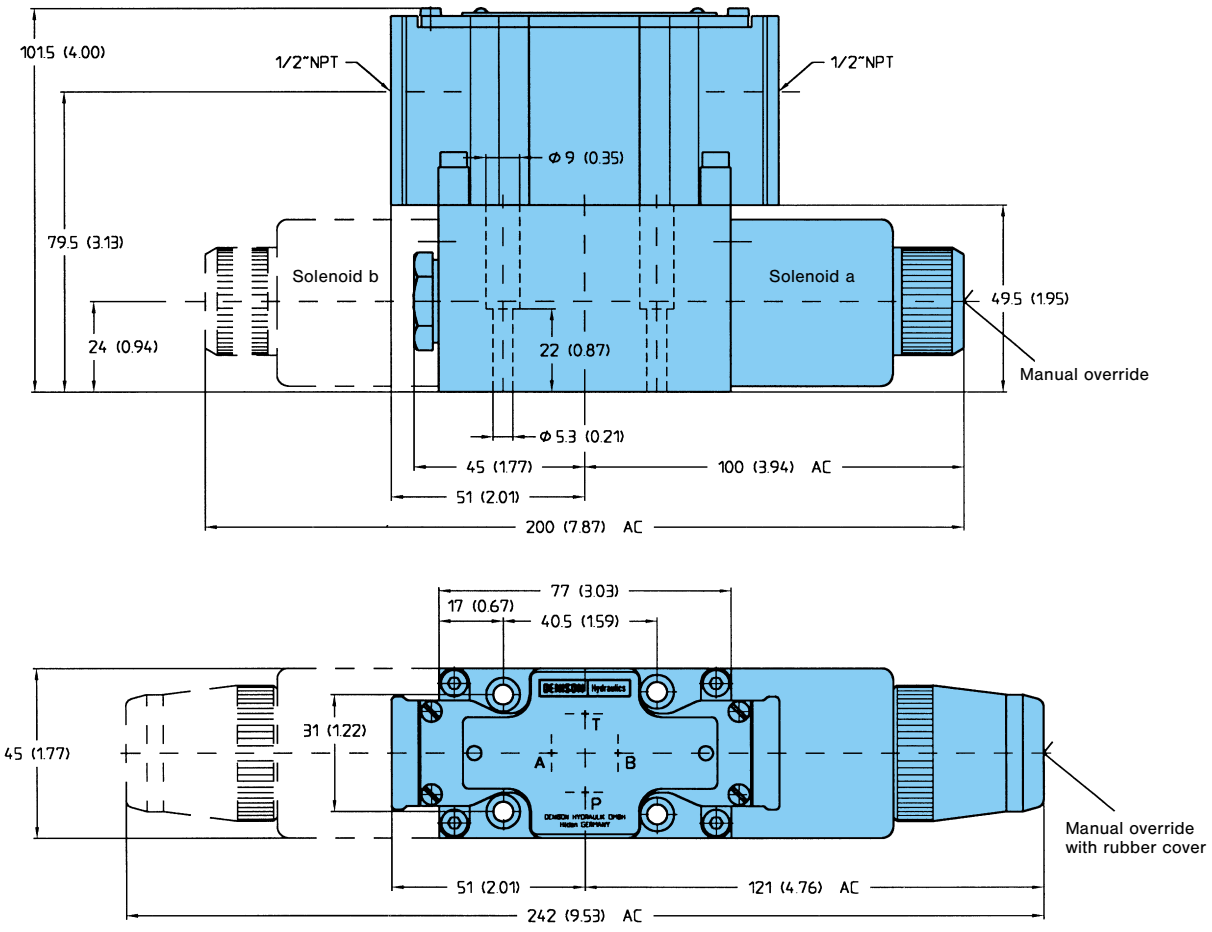
T = Tank

A + B = User

Seals for ports P, A, B, T

9.25 x 1.78	691–00012–0

• Nominal voltage	See ordering code page 3
• Power input	31 W
• Permissible pressure T	...140 bar (2000 psi)
• Holding	78 VA
• Inrush	264 VA
• Solenoid response time	
– sol. energized	...20 ms
– sol. de-energized	...18 ms
• Permissible voltage difference	+ 5...– 10 %
• max. coil temperature	+ 180 °C (350 °F)
• Temperature class	H
• Relative operating period	100 %
• Type of protection	IP 65
• Cycle (1/H)	...7.200
• Weight	1.7 kg (3.8 lbs)



Port function

P = Pressure

T = Tank

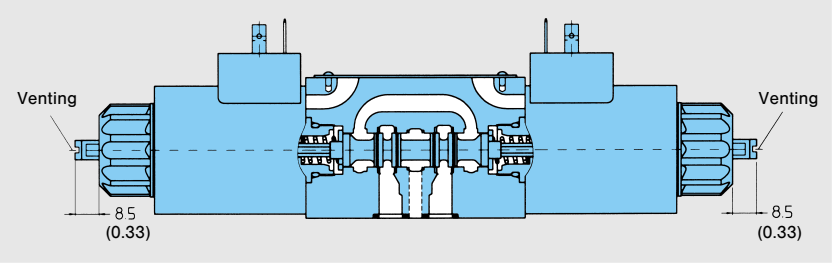
A + B = User

Seals for ports P, A, B, T

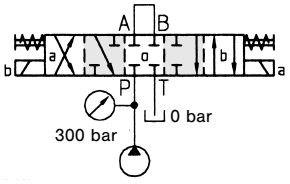
9.25 x 1.78	691–00012–0

DENISON offers the Directional Control Valve in Cetop 3 size with a "soft shift" option (G3). A special solenoid type permits a multiple increase in the standard solenoid response time.

The Option G3 delivers:
–Reduced pressure shocks in venting operations.
–Reduced system noise during spool transition.
–Increased lifetime of the valve and system.

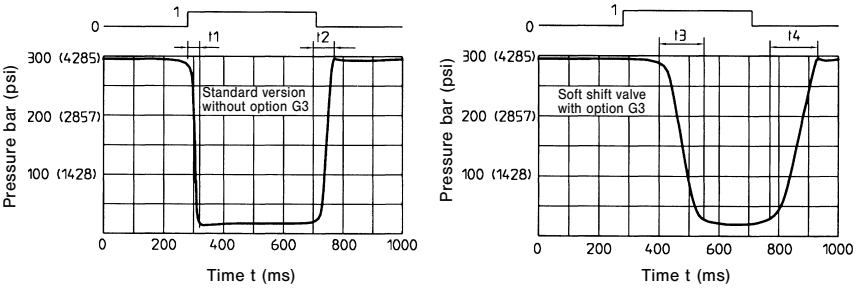


Circuit design



Example pressure unloading P→A t_3:
300 bar (4.285 psi);
60 l/min (15.9 gpm);
36 cSt; 50 °C (120 °F);
A4D01–3203–0302–B1 G0Q–G3

Pressure shift sequence of spool stroke o→a or o→b



Response times (ms) for 24 V DC Solenoid

	t_1	t_2	t_3	t_4
Spool stroke	35...40	55...60	300...500	400...800
Pressure change	20...25	35...40	80...200	80...400
Note: Response time will be influenced by changes in viscosity, pressure or flow.				

Ordering code: **A4D01–....–....–B1... – G3**

Solenoid voltage and current
G0R = 12 VDC
G0Q = 24 VDC
G0H = 48 VDC

With rectifier [1])

DC-Output	AC-Input
GAN = 102 VDC	115 V / 50 (60) Hz
GAG = 205 VDC	230 V / 50 (60) Hz
GAR = 98 VDC	110 V / 50 (60) Hz

Modification
G3 = soft shift

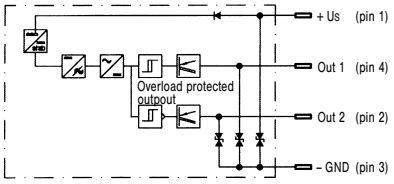
[1]) For applications with AC input voltage a DC solenoid with rectifier connector must be used!

Depending on spool type, the functional limits of the soft shift valve will be reduced with as much as 25 % in comparison to the data in this bulletin.

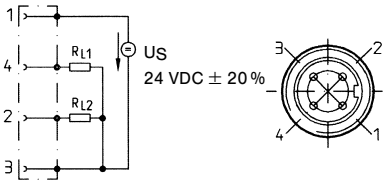
Note: Ensure that the solenoid tube cartridges are filled with oil at all times. For that the tube cartridges have venting screws (see above). In applications above the oil level, the use of a check valve 1...2 bar (14...28 psi) in the tank line is recommended.

Ordering Code | Back to Content

Block diagram and connection of the inductive detector



Socket connector



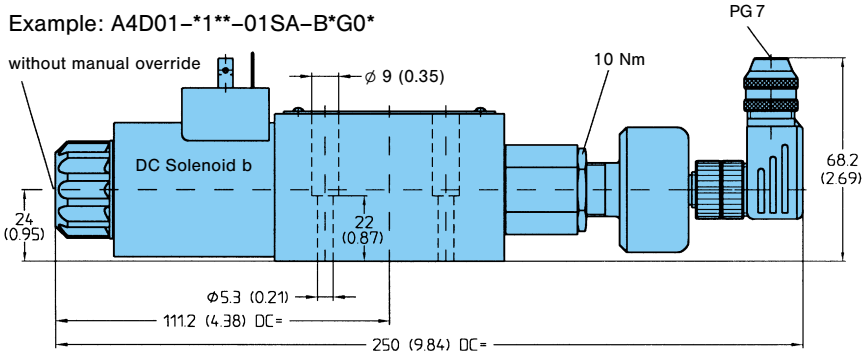
RL1, RL2 = e.g. coil resistance of the switch relay ≧ 60 Ω

• Function		P-channel FET, contact positive
• Supply voltage Us (full wave bridge with capacitor)		24 V ± 20 % (19.2 V . . . 28.8 V)
• Reverse polarity protection		max. 300 V installed
• Ripple voltage		10 %
• Current consumption		approx. 20 mA each circuit
• Outputs	Out 1:	NC contact positive (not short circuit protection)
	Out 2:	NO contact positive
• Output voltage	– Signal L	Us – 2.5 V
	– Signal 0	< 1.8 V
• Output current		< 400 mA at Us + 20 %
• Environmental protection		IP 65
• Operating temperature range		0 °C . . . + 85 °C (32 . . . 185 °F)
• Wire cross-sectional area		4 x 0.5 mm² (0.0008 in²)
• Tensile strength of transmitting conduit		p dyn. 315 bar (4500 psi)
• CE Declaration of conformity no.		00 02 002 9 93

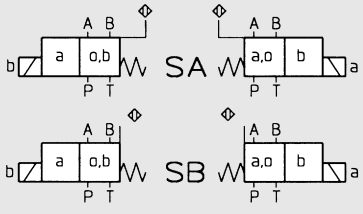
Attention:

EMC only ensured when using screened cables and screened plug casing!

Example: A4D01–*1**–01SA–B*G0*



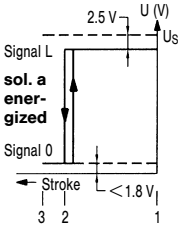
Spool position



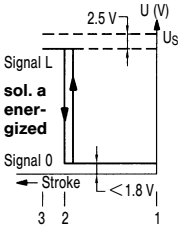
Model Code (for AC & DC solenoids)	Spool pos. monitoring	Inductive detector on	Output signals neutral position	Output signals solenoid energized
A4D01–*1**–02(05)SA–B	neutral = a, o	spool pos. a, o	Out 1 = L Out 2 = 0	Out 1 = 0 Out 2 = L
A4D01–*1**–02(05)SB–B	end = b	spool pos. a, o	Out 1 = L Out 2 = 0	Out 1 = 0 Out 2 = L
A4D01–*1**–01(06)SA–B	neutral = o, b	spool pos. o, b	Out 1 = L Out 2 = 0	Out 1 = 0 Out 2 = L
A4D01–*1**–01(06)SB–B	end = a	spool pos. o, b	Out 1 = L Out 2 = 0	Out 1 = 0 Out 2 = L

Example: Us = 24 V; Signal L = 21.5 V; Signal 0 ≦ 1.8 V

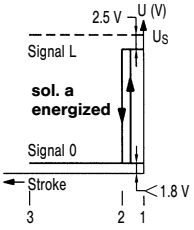
A4D01–*1**–**SB
Out 1



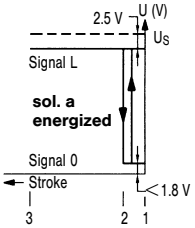
Out 2



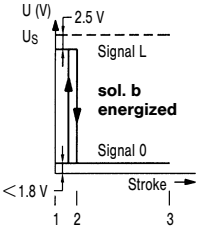
A4D01–*1**–**SA
Out 1



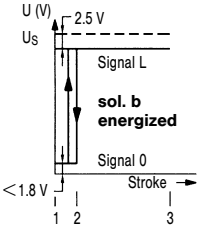
Out 2



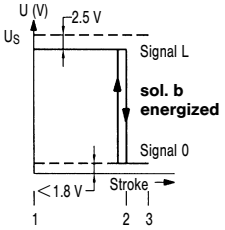
A4D01–*1**–**SA
Out 1



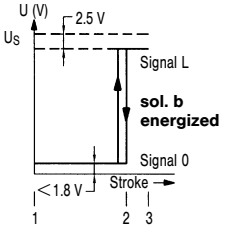
Out 2



A4D01–*1**–**SB
Out 1

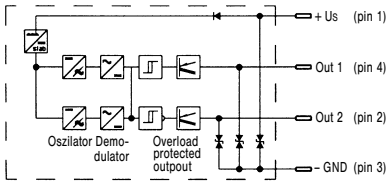


Out 2

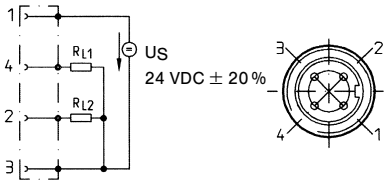


Pos. 1 = Neutral position; Pos. 2 = Switch point; Pos. 3 = End position

Block diagram and connection of the inductive detector



Socket connector



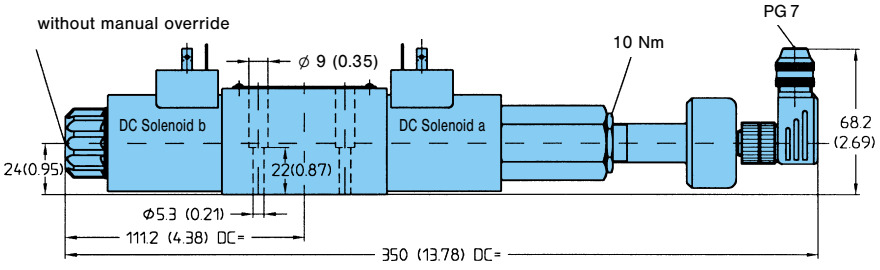
RL1, RL2 = e.g. coil resistance of the switch relay ≧ 60 Ω

• Function		P-channel FET, contact positive
• Supply voltage Us (full wave bridge with capacitor)		24 V ± 20 % (19.2 V...28.8 V)
• Reverse polarity protection		max. 300 V installed
• Ripple voltage		10 %
• Current consumption		approx. 20 mA each circuit
• Outputs	Out 1:	NC contact positive (not short circuit protection)
	Out 2:	NO contact positive
• Output voltage – Signal L		Us – 2.5 V
– Signal 0		< 1.8 V
• Output current		< 400 mA at Us + 20 %
• Environmental protection		IP 65
• Operating temperature range		0 °C...+ 85 °C (32...185 °F)
• Wire cross-sectional area		4 x 0.5 mm² (0.0008 in²)
• Tensile strength of transmitting conduit		p dyn. 140 bar (2000 psi)
• CE Declaration of conformity no.		00 02 002 9 93

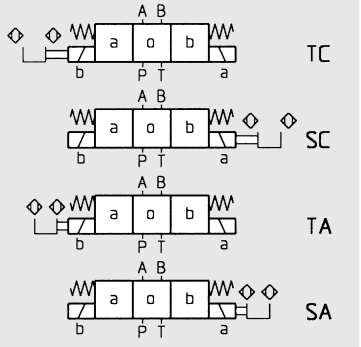
Attention:

EMC only ensured when using screened cables and screened plug casing!

Example: A4D01–32**–03SC



Spool position 03



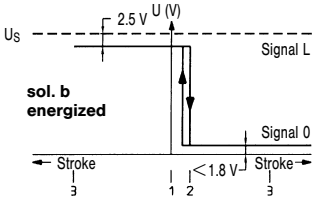
Model Code (for DC solenoids only)	Monitoring spool pos. a–o–b	Inductive detector on	Output signals neutral position	sol. a energized	sol. b energized
A4D01–32**–03TC–B*G0*	end = a, b	spool pos. a	Out 1 = L Out 2 = L	Out 1 = 0 Out 2 = L	Out 1 = L Out 2 = 0
A4D01–32**–03SC–B*G0*	end = b, a	spool pos. b	Out 1 = L Out 2 = L	Out 1 = L Out 2 = 0	Out 1 = 0 Out 2 = L
A4D01–32**–03TA–B*G0*	neutral = o	spool pos. a	Out 1 = L Out 2 = L	Out 1 = 0 Out 2 = L	Out 1 = L Out 2 = 0
A4D01–32**–03SA–B*G0*	neutral = o	spool pos. b	Out 1 = L Out 2 = L	Out 1 = L Out 2 = 0	Out 1 = 0 Out 2 = L

Example: Us = 24 V; Signal L = 21.5 V; Signal 0 ≦ 1.8 V

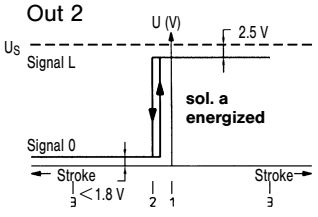
Monitoring neutral Position ±

A4D01–32**–03SA

Out 1

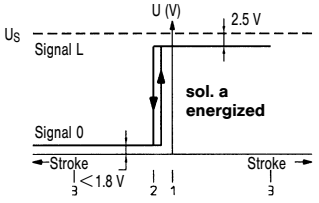


Out 2

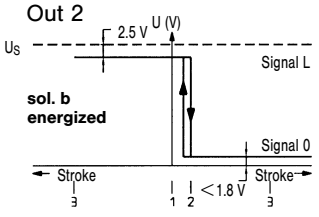


A4D01–32**–03TA

Out 1



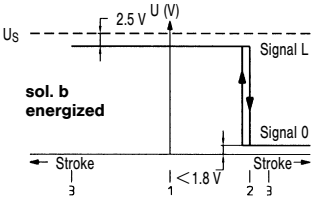
Out 2



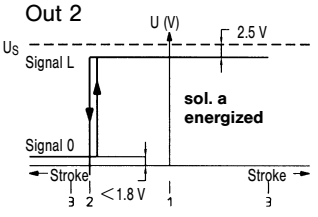
Monitoring end Position ±

A4D01–32**–03SC

Out 1

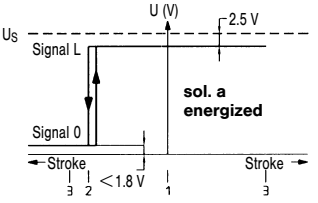


Out 2

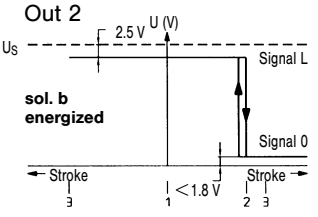


A4D01–32**–03TC

Out 1



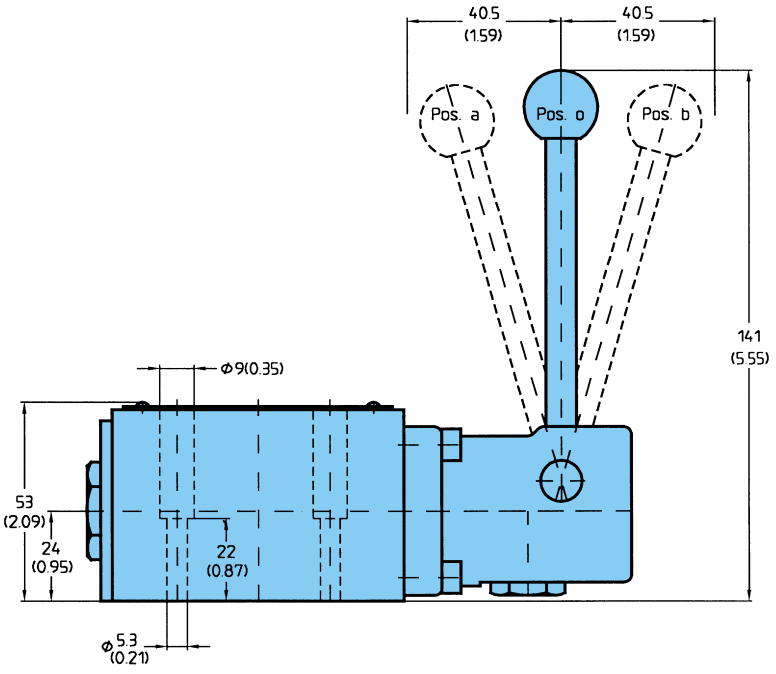
Out 2

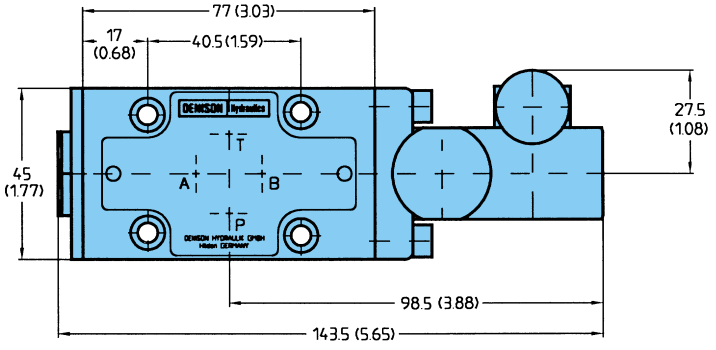


Pos. 1 = Neutral position; Pos. 2 = Switch point; Pos. 3 = End position

Ordering Code | Back to Content

• Functional Limits	60 l/min (15.9 gpm) for spools 01, 02, 03, 08, 09, 10, 46, 55, 56, 0X at 350 bar (5000 psi) 40 l/min (10.6 gpm) for spools 07, 64, 65 at 350 bar (5000 psi)
• Operating force	30 N (6.7 lbs)
• Angle of operation	± 17°
• Max. tank pressure	160 bar (2300 psi)
• Weight	1.7 kg (3.8 lbs)





Port function

P = Pressure

T = Tank

A + B = User

Seals for ports P, A, B, T

9.25 x 1.78	691–00012–0

- Functional Limits at 350 bar (5000 psi)

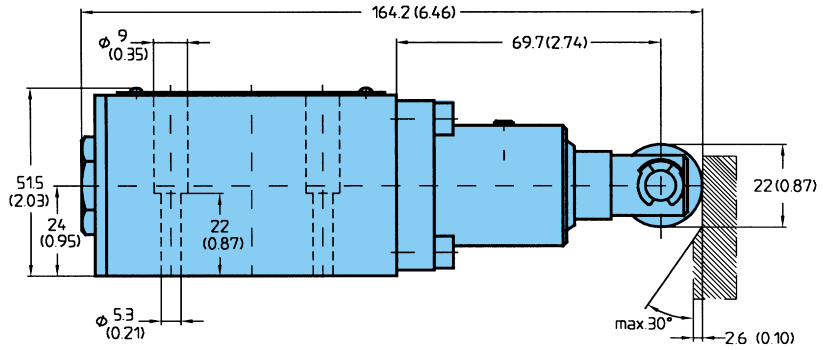
60 l/min (15.9 gpm) for spools 01, 02, 03, 08, 09, 10, 11, 46, 51, 55, 56, 81, 91, 0C
10 l/min (2.6 gpm) for spools 12, 52
35 l/min (9.3 gpm) for spools 07, 64, 65, 0Y, 0X

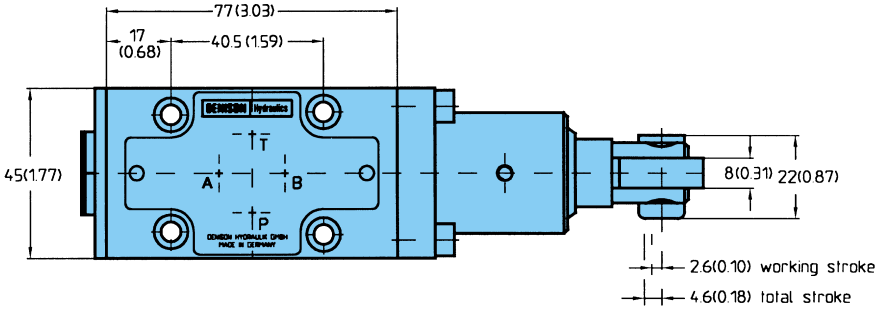
- Operating force F [1])

		at tank pressure 0 bar (0 psi)			at tank pressure 20 bar (286 psi)		
		neutral	working stroke	total stroke	neutral	working stroke	total stroke
at operating pressure	100 bar	35 N	135 N	195 N	60 N	160 N	220 N
	(1430 psi)	(7.9 lbs)	(30.3 lbs)	(43.8 lbs)	(13.5 lbs)	(36 lbs)	(49.5 lbs)
	200 bar	35 N	155 N	195 N	60 N	180 N	220 N
	(2860 psi)	(7.9 lbs)	(34.8 lbs)	(43.8 lbs)	(13.5 lbs)	(40 lbs)	(49.5 lbs)
	350 bar	35 N	175 N	195 N	60 N	200 N	220 N
	(5000 psi)	(7.9 lbs)	(39.3 lbs)	(43.8 lbs)	(13.5 lbs)	(45 lbs)	(49.5 lbs)

[1]) depending on operating and tank pressure at max. flow

- Max. tank pressure: 20 bar (286 psi)
- Weight: 1.4 kg (3.1 lbs)





Port function

P = Pressure

T = Tank

A + B = User

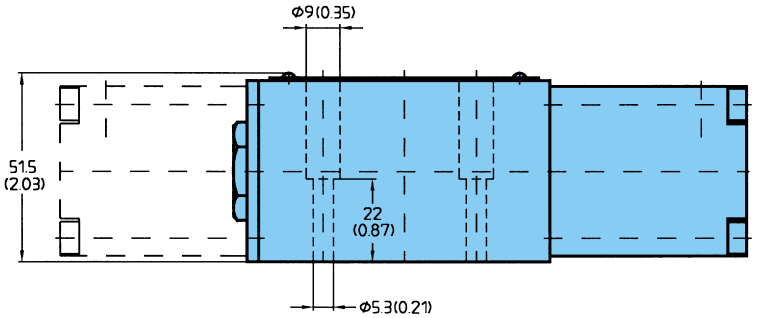
Seals for ports P, A, B, T

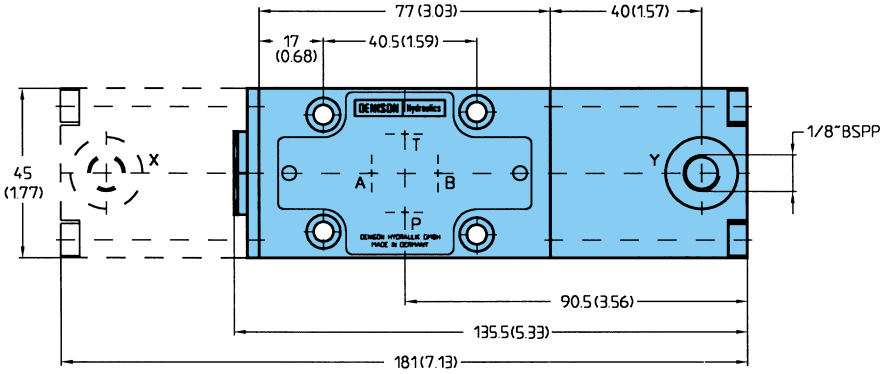
9.25 x 1.78	691–00012–0

• Functional Limits at 350 bar (5000 psi)	60 l/min (15.9 gpm) for spools 01, 02, 03, 08, 09, 10, 11, 46, 51, 55, 56, 81, 91, 0C
	10 l/min (2.6 gpm) for spools 12, 52
	35 l/min (9.3 gpm) for spools 07, 64, 65, 0Y, 0X
• Pilot pressure	4 . . . 12 bar (58 . . . 174 psi)
– at tank pressure 0 bar (psi)	min. 4 bar (58 psi)
– at tank pressure 160 bar (2300 psi)	min. 6 bar (87 psi)
– max. allowed	12 bar (174 psi)
• Tank pressure max.	160 bar (2300 psi)
• Pilot volume	3.2 cm^3 (0.195 in^3)
• Response time [1]	
– on	50 . . . 200 ms
– off	100 . . . 200 ms

[1] depending on pilot pressure and pipe length

• Weight	
– operated one side	1.7 kg (3.8 lbs)
– operated both sides	2.3 kg (5.1 lbs)





Port function

P = Pressure

T = Tank

A + B = User

X + Y = Pilot ports

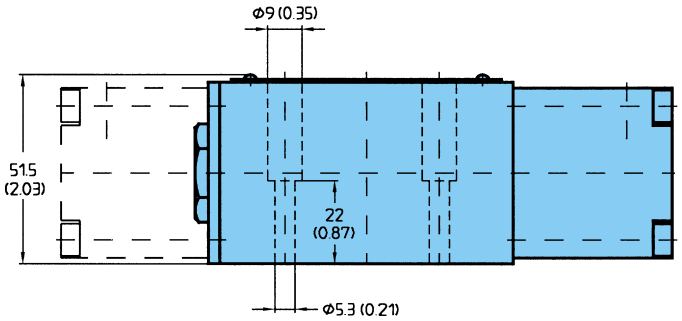
Seals for ports P, A, B, T

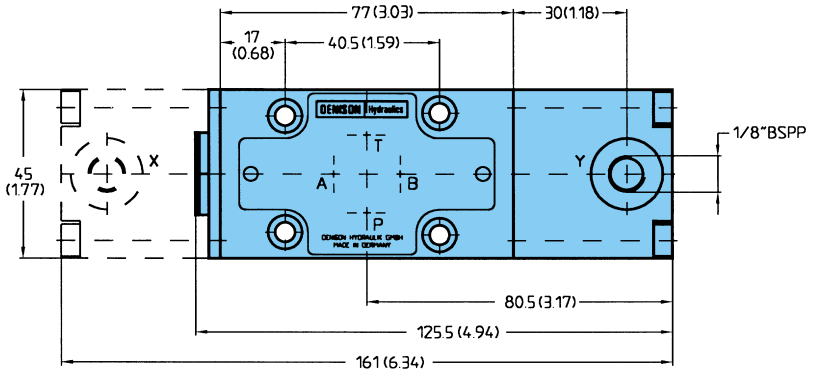
9.25 x 1.78	691–00012–0

• Functional Limits at 350 bar (5000 psi)	60 l/min (15.9 gpm) for spools 01, 02, 03, 08, 09, 10, 11, 46, 51, 55, 56, 81, 91, 0C	
	10 l/min (2.6 gpm) for spools 12, 52	
	35 l/min (9.3 gpm) for spools 07, 64, 65, 0Y, 0X	
• Max. tank pressure	160 bar (2300 psi)	
• Pilot pressure	min. 10 bar (145 psi) > tank pressure	
	max. 210 bar (3000 psi)	
• Pilot volume (each side)	1 cm³ (0.061 in³)	
• Response time [1]	pp 50 bar (714 psi)	pp 200 bar (2857 psi)
– on	50...100 ms	15...40 ms
– off	60...160 ms	60...160 ms

[1] depending on pilot pressure and pipe length

• Weight	
– operated one side	1.6 kg (3.6 lbs)
– operated both sides	2.2 kg (4.8 lbs)





Port function

P = Pressure

T = Tank

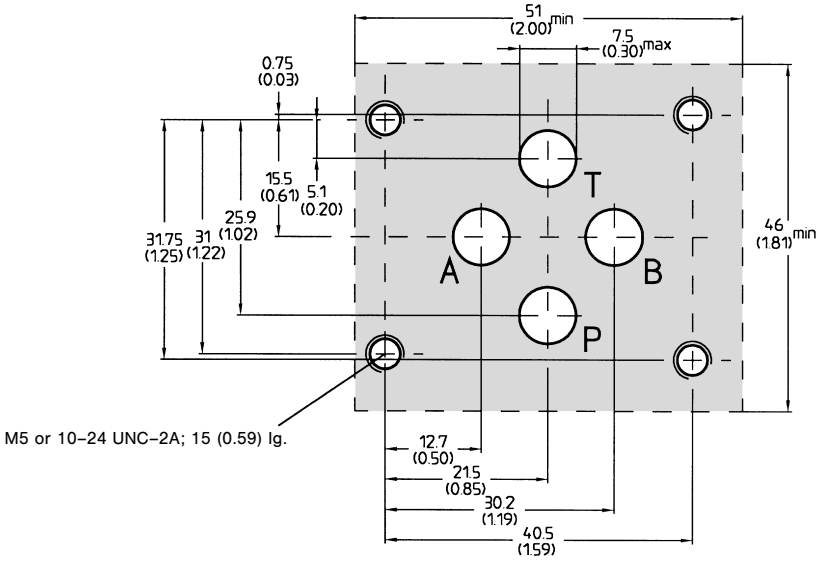
A + B = User

X + Y = Pilot ports

Seals for ports P, A, B, T

9.25 x 1.78	691–00012–0

Mounting configuration conform to ISO 4401



Block mounting face

Flatness 0.01 mm / 100 mm (.003/3.93 inches) length

Surface finish 0,8

Valve Mounting Screws

Dimension	Order-No.
M 5 x 30, DIN 912; 10.9	700–70834–8
or	
10–24 UNC–2A x 1¼" (SAE)	358–10183–8

Torque 8.3 Nm