



“Solid solutions in a fluid world”™

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NFPA SIZE:
D03 & D05

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED



Series 35
High Flow
High Pressure
Directional Valves

FEATURES

- ✓ **High Flow/ High Pressure:** Up to 25 gpm (D03) and 40 gpm (D05)/ 5,000 psi working pressure*.
- ✓ **Oil Immersed, Quiet Solenoid Design:** Moving core immersed in hydraulic oil provides quiet operation.
- ✓ **High Tank Port Pressure:** Up to 3,000 psi tank port back pressure (Check each spool type for max. allowable)
- ✓ **Twin Tank Line Design:** Upper and lower channels to tank port greatly reduce pressure drop.
- ✓ **Wiring:** Electrical box with indicator lights and terminal strip connection standard. DIN connector provided standard on DIN style coils. (Connectors may optionally be supplied with lights.)
- ✓ **Electric Shockless:** Valve coils available electric shockless (rectified)- reducing voltages spikes, extending relay contact life, and providing even quieter operation. (Option X)
- ✓ **Hydraulic Shockless:** Spool shifting time is increased up to four times by metering the oil in the core tube. (Option F)
- ✓ **Maintenance:** Indicator lamps to diagnose connection; Plug-in coils provide easy changing without disturbing wiring.
- ✓ **High Reliability:** Valve designed to last 30 million spool shifts under proper use.
- ✓ **Bolt Kit included with valve standard**

*Some spools rated less- check max. pressures and flows page 4.

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED



NFPA SIZE:
D03 & D05



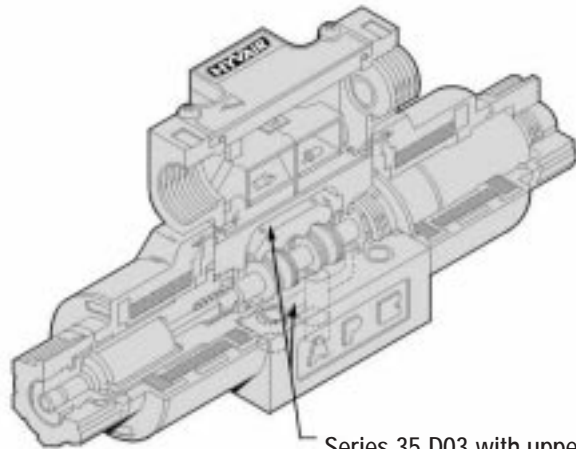
Model D03S
Electrical Box



Model D03SD
DIN Coils

INTERNAL STRUCTURE

NFPA D03



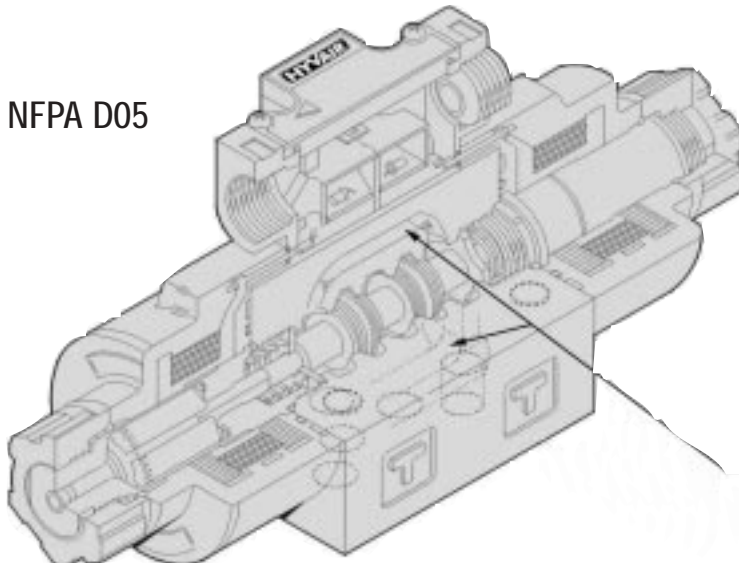
Series 35 D03 with upper and lower
return lines to T port.



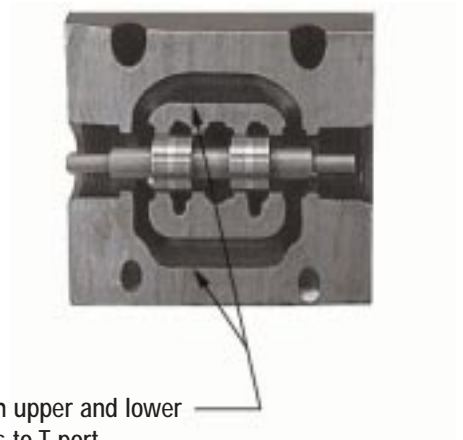
Electrical box with indicator lights and terminal
strip connection standard

Electrical boxes shown with optional rectifiers
(Code X)

NFPA D05



Series 35 D05 with upper and lower
return lines to T port.





NFPA SIZE:
D03 & D05

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED

Specifications

Size		D03	D05
Maximum Flow Rates*		25 gpm (94 lpm)	40 gpm (151 lpm)
Maximum Operating Pressure	P, A, B, Ports*	5000 psi (350 bar)	5000 psi (350 bar)
	T Port- Including Surges	3000 psi (205 bar)	2300 psi (158 bar)
Internal Leakage	@ 3000 psi	0.18 cu-in/ min (3 ml/ min)	0.22 cu-in/ min (3.5 ml/ min)
Maximum Cycle Rate	Solenoid (AC/DC)	AC: 300 cycles/ min / DC: 240 cycles/ min	
	Shockless Solenoid	120 cycles/ min	
Mounting Surface	NFPA	T3.5.1.MR1-D03	T3.5.1.MR1-D05
	ISO	ISO 4401- 03	ISO 4401- 05
Weight	AC Single Solenoid	3.1 lbs (1.4 kg)	7.9 lbs (3.6 kg)
	AC Double Solenoid	4.0 lbs (1.8 kg)	9.2 lbs (4.2 kg)
	DC Single Solenoid	3.3 lbs (1.5 kg)	8.6 lbs (3.9 kg)
	DC Double Solenoid	4.4 lbs (2.0 kg)	12.3 lbs (5.6 kg)
Operating Conditions	Working Temperature	-4 - 160° F (-20 - 70°C)	
	Operating Viscosity	80- 300 SUS (17- 65 cSt // 150 SUS Optimum)	
	Max. Start-up Viscosity	1500 SUS (315 cSt)	
	Filtration	25 micron or less, (ISO 18/15)	
	Recommended Fluids	Petroleum Based Fluids- ISO VG32-68, Most Vegetable Oils	

*Some spools rated less- check max. pressures and flows below. Flows are reduced if valve is used as 2 way or 3 way only- consult factory.
For continuous flow conditions or high cycling applications, a recommended max. flow rating is: 1/2 x maximum flow rating.

Series 35		Type	Standard		Type	Shockless		Type	Standard- AC		Type	Standard- DC		Type	Shockless	
		Model	D03S-	D03SD-	Model	D03SF-	D03SDF-	Model	D05S-AC	D05SD-AC	Model	D05S-DC	D05SD-DC	Model	D05SF-	D05SDF-
Symbol	Valve Spool Type		Max. operating pressure psi (bar)	Max. flow gpm (lpm)		Max. operating pressure psi (bar)	Max. flow gpm (lpm)		Max. operating pressure psi (bar)	Max. flow gpm (lpm)		Max. operating pressure psi (bar)	Max. flow gpm (lpm)		Max. operating pressure psi (bar)	Max. flow gpm (lpm)
	1A		5000 (350)	20 (75)		3600 (250)	12 (45)		5000 (350)	32 (120)		5000 (350)	40 (150)		3600 (250)	32 (120)
	1AY		5000 (350)	16 (60)		3600 (250)	12 (45)		5000 (350)	32 (120)		5000 (350)	40 (150)		3600 (250)	32 (120)
	2B		5000 (350)	25 (94)		3600 (250)	12 (45)		5000 (350)	32 (120)		5000 (350)	40 (150)		3600 (250)	32 (120)
	2C		3600 (250)	12 (45)		3600 (250)	10 (38)		3600 (250)	17 (65)		3600 (250)	25 (94)		3600 (250)	21 (80)
	2F		5000 (350)	16 AC (60) 20 DC (75)		3600 (250)	12 (45)		5000 (350)	32 (120)		5000 (350)	40 (150)		3600 (250)	32 (120)
	2H		5000 (350)	12 (45)		3600 (250)	12 (45)		5000 (350)	32 (120)		5000 (350)	40 (150)		3600 (250)	32 (120)
	2K		5000 (350)	16 AC (60) 20 DC (75)		3600 (250)	12 (45)		5000 (350)	32 (120)		5000 (350)	40 (150)		3600 (250)	32 (120)
	2T		5000 (350)	25 (94)		3600 (250)	12 (45)		5000 (350)	32 (120)		5000 (350)	32 (150)		3600 (250)	32 (120)
	3A		5000 (350)	25 (45)		3600 (250)	12 (45)		5000 (350)	32 (120)		5000 (350)	32 (150)		3600 (250)	32 (120)

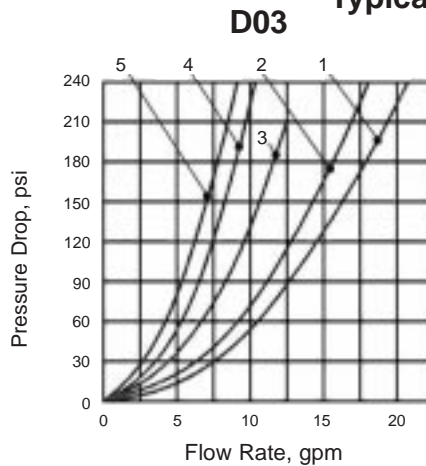
DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED



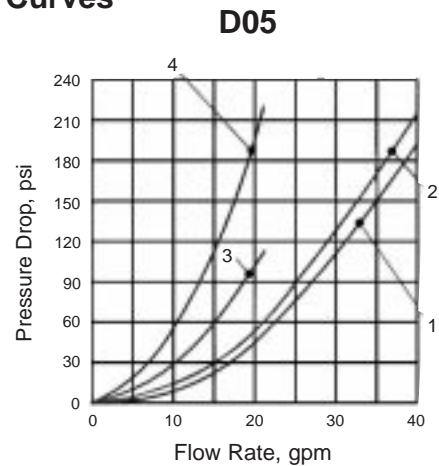
NFPA SIZE:
D03 & D05

Typical Pressure Drop Curves



Viscosity of hydraulic fluid: 150SUS (32mm²/s)

Note: For maximum pressure and flows refer to specifications on page 4.



Description	D03 Flow Path					Valve Spool Type	D05 Flow Path				
	P→A	P→B	A→T	B→T	P→T		P→A	P→B	A→T	B→T	P→T
Spring Offset, (Closed in Transition)	2	2	2	2		1A	2	2	2	2	
Spring Offset, (Open in Transition)	1	1	1	1		1AY	1	1	2	2	
Spring Centered, All Ports Blocked	2	2	2	2		2B	2	2	2	2	
Spring Centered, P to T, A & B Blocked	5	5	4	4	3	2C	4	4	4	4	3
Spring Centered, P to Blocked, A & B to T	2	2	1	1		2F	2	2	1	1	
Spring Centered, All Ports Open	1	1	1	1	1	2H	1	1	1	1	1
Spring Centered, P & B Blocked, A to T	2	2	1	2		2K	2	2	1	2	
Spring Centered, P to A & B, T Blocked	1	1	2	2		2T	1	1	2	2	
Detented (Closed in Transition)	2	2	2	2		3A	2	2	2	2	

*Above curves may be used for spring centered, single coil valves: (Use 2B curve for 5B valve)

Other Configurations

Examples of Code "R"- Reversed

(symbols shown in simplified form)



D03SD-2B
(standard)

D03SD-2BR
(no change to DIN coil valve, electrical box flipped for opposite coil markings)



D03SD-1A
(standard)



D03SD-1AR
(coil supplied reversed from normal position & spool reversed)



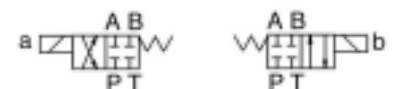
(symbol shown blocked during valve transition only)



D03SD-5B
(standard)



D03SD-5BR
(right or "b" coil side of valve provided)





NFPA SIZE:
D03 & D05

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED

Common 115

D03	D05	Symbol
D03S-1A-115A-35	D05S-1A-115A-35	A
D03S-1AY-115A-35	D05S-1AY-115A-35	AY
D03S-2B-115A-35	D05S-2B-115A-35	B
D03S-2C-115A-35	D05S-2C-115A-35	C
D03S-2F-115A-35	D05S-2F-115A-35	F
D03S-2H-115A-35	D05S-2H-115A-35	H
D03S-2K-115A-35	D05S-2K-115A-35	K
D03S-2T-115A-35	D05S-2T-115A-35	T
D03S-3A-115A-35	D05S-3A-115A-35	A

Common Configurations

Electrical Box



D03S-1*-
D03S-5*-



D03S-2*-
D03S-3A-



D05S-1*-
D05S-5*-



D05S-2*-
D05S-3A-



Din Coil



D03SD-1*-
D03SD-5*-



D03SD-2*-
D03SD-3A-



D05SD-1*-
D05SD-5*-



D05SD-2*-
D05SD-3A-

D0*-SP-***-DC
Single Spade Connector
Now Available

Ordering Information



SOLENOID DIRECTIONAL VALVE PART NUMBERING SYSTEM:

D03 S-2 B-115 A-35 Example: D03 Valve, double solenoid, 3 position, spring centered, all ports blocked in center, 115 volt- ac coils

Size	Code	Actuator	Code	Configuration	Code	Spool Function	Voltage	Current/ Connector
D03	S	Solenoid	1	Single solenoid • 2 position spring offset	A	P to A, B to T	12	A AC
D05	SD	Soln. w/ Din Coil	2	Double solenoid • 3 position spring centered	AY	P to A, B to T	24	D DC
	SX	Electric Shockless	3	Double solenoid • 2 position no center, detented	B	All Ports Blocked	115	W/ Light DIN only:
	SDX	Electric Shockless Din Coil	5	Single solenoid • 2 position spring centered	C	A & B Blocked P to T	230	AL AC
	SF	Hydraulic Shockless			F	A & B to T P Blocked		DL DC
	SDF	Hydraulic Din Coil- Shockless			H	All Ports Open		

Seal Options: "V" for Viton- specify after current type Ex: D03S-2B-115A-V-35

Specify: (special order)
SL for lead wire
SP for single spade plug

Notes:
Other Voltages available.
Lights included standard on electrical box style.

Code "R" (reversed)
added behind spool
code for flow supplied
opposite of standard.
Codes 1AR & 1AYR: spool & coil reversed
Codes 2*R & 3AR: electrical box reversed
Code 5*R: coil provided on reversed b side

A spool is closed in transition
AY spool is open in transition

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED



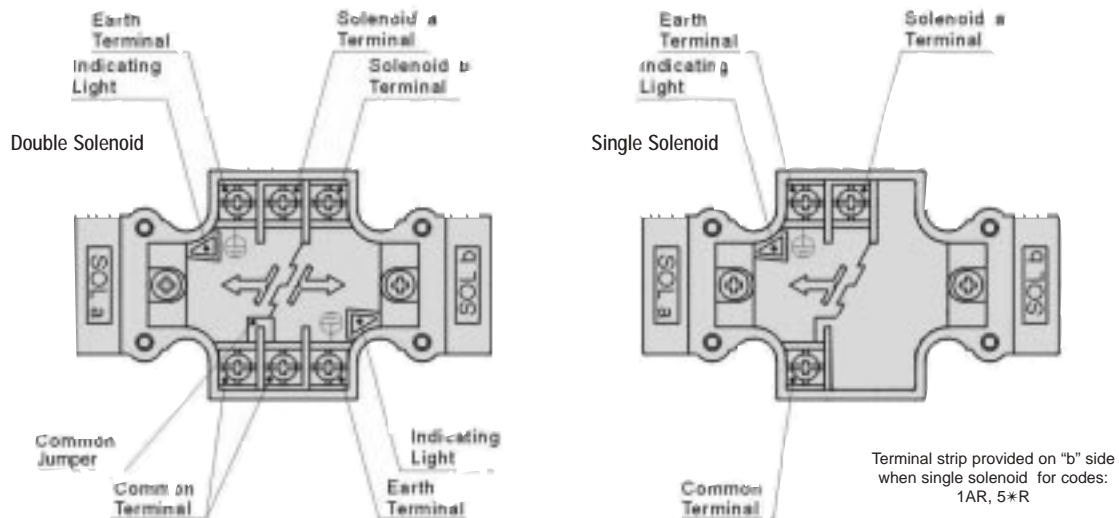
NFPA SIZE:
D03 & D05

Electrical Information

D03	Solenoid Coil Specifications											
Solenoid Voltage	115V-AC			230V-AC			115V-RAC (rectified)		230V-RAC (rectified)		12V-DC	24V-DC
Coil Model D03S (Elect. Box)	2BH-C1/C3			2BH-C2/C4			2BF-R1/R3		2BF-R2/R4		2BH-D1	2BH-D2
Coil Model D03SD (DIN)	2AH-C1/C3			2AH-C2/C4			2AF-R1/R3		2AF-R2/R4		2AH-D1	2AH-D2
Applied Voltage	AC110		AC120	AC220		AC240	AC110	AC120	AC220	AC240	DC12	DC24
Frequency (Hz)	50	60	60	50	60	60	50 / 60		50 / 60			
Starting Current (A)	2.2	2.0	2.2	1.1	1.0	1.0						
Holding Current (A)	0.54	0.41	0.47	0.25	0.19	0.23	0.31	0.32	0.15	0.16	2.5	1.25
Holding Power (W)	25	22	28	25	22	28	30	32	30	32	30	30
Permissible Voltage Range (V)	80-120			180-240			80-130		180-250		10.8-13.2	21.6-26.4
Insulation Resistance (MΩ)	100 or above (500V)											

D05	Solenoid Coil Specifications											
Solenoid Voltage	115V-AC			230V-AC			115V-RAC (rectified)		230V-RAC (rectified)		12V-DC	24V-DC
Coil Model D05S (Elect. Box)	3BH-C1/C3			3BH-C2/C4			3EB-R1/R3		3EB-R2/R4		3EB-D1	3EB-D2
Coil Model D05SD (DIN)	3AH-C1/C3			3AH-C2/C4			3EA-R1/R3		3EA-R2/R4		3EA-D1	3EA-D2
Applied Voltage	AC110		AC120	AC220		AC240	AC110	AC120	AC220	AC240	DC12	DC24
Frequency (Hz)	50	60	60	50	60	60	50 / 60		50 / 60			
Starting Current (A)	5.5	4.6	5.0	2.7	2.3	2.5						
Holding Current (A)	1.1	0.86	1.0	0.52	0.42	0.48	0.46	0.49	0.22	0.24	3.0	1.5
Holding Power (W)	36	34	42	36	34	32	31	34	30	33	31	36
Permissible Voltage Range (V)	80-120			180-240			80-130		180-250		10.8-13.2	21.6-26.4
Insulation Resistance (MΩ)	100 or above (500V)											

Electrical Box Wiring



Notes:

- DIN Coils manufactured to accept standard 3 pin DIN 43 650 and ISO 4400 connectors.
- AC Coils are rated for both 50/60Hz (rewiring not required)
- DC coils are not polarity sensitive
- Rectifier is supplied: in the electrical box- D03S, D05S in the coil (internal)- D03SD, D05SD
- Hydraulic shockless AC valves are always supplied with rectifier.
- Hydraulic shockless valves will not operate as shockless until the tank line has become filled with oil- occurs automatically after the first few cycles. Mounting valve below the reservoir oil level or using check valve ensures that the tank line remains filled.
- Do not supply electrical power to the AC coils unless the coil is mounted on the valve.
- Do not exceed voltage specifications shown above.
- Electrical power should be maintained on detented valves (spool code 3A). Detent only maintains start-up position of the valve.



NFPA SIZE:
D03

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED

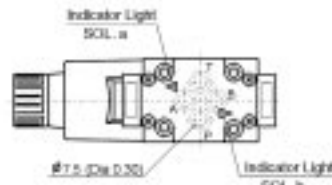
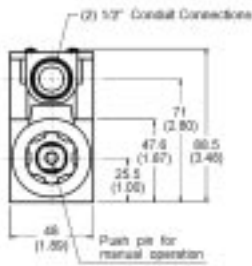
Dimensional/ Mounting Data

Electrical Box Type

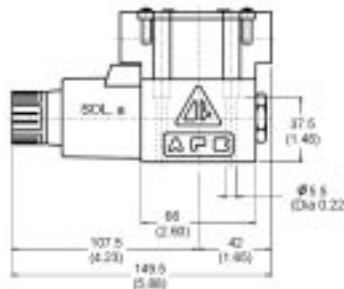
D03S
D03SF
D03SX

Units: mm/ (Inch)

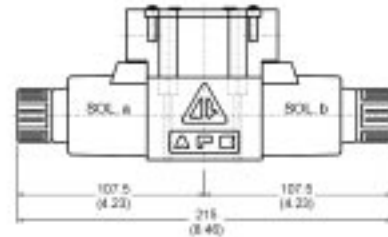
Note: Use (4) 10-24 SHCS X 1-3/4"
mounting screws



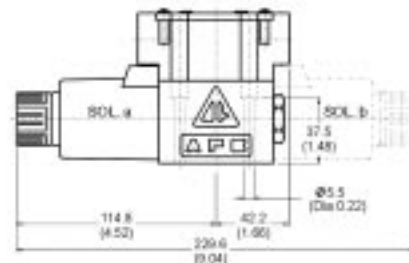
AC Solenoid



AC Solenoid



DC Solenoid

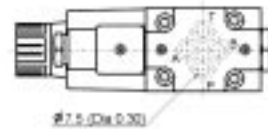
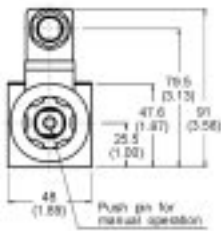


DIN Type

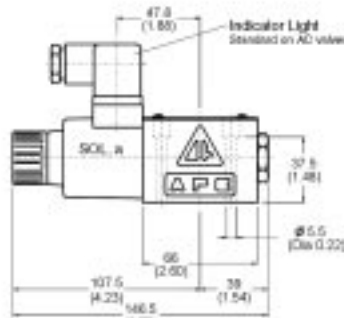
D03SD
D03SDF
D03SDX

Units: mm/ (Inch)

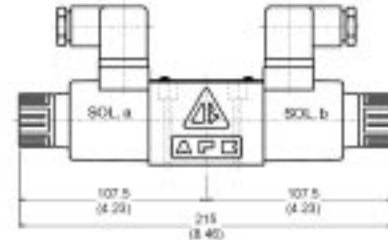
Note: Use (4) 10-24 SHCS X 1-3/4"
mounting screws



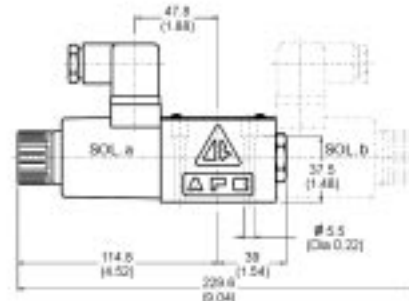
AC Solenoid



AC Solenoid



DC Solenoid

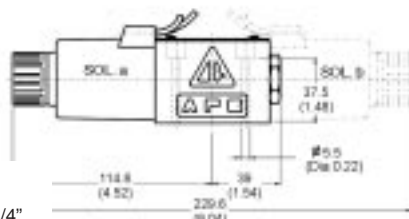


Lead Wire Type

D03SL

Units: mm/ (Inch)

Note: Use (4) 10-24 SHCS X 1-3/4"
mounting screws



D03 Mounting Orientation

DIRECTIONAL CONTROL VALVES

SOLENOID ACTUATED, DIRECT OPERATED



NFPA SIZE:
D05

Dimensional Data D05

Electrical Box Type

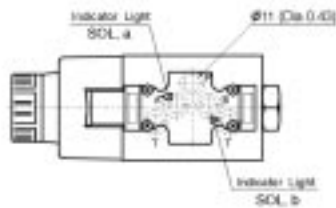
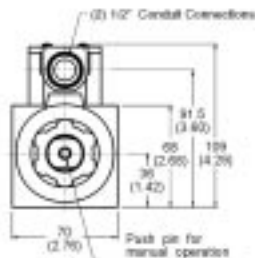
D05S

D05SF

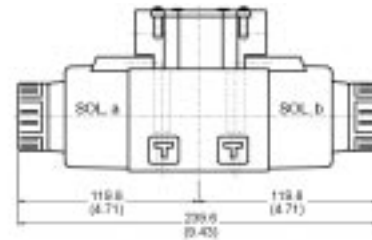
D05SX

Units: mm/ (Inch)

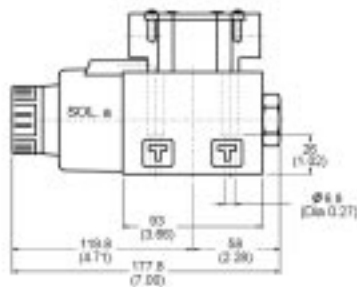
Note: Use (4) 1/4-20 SHCS X 1-1/2"
mounting screws



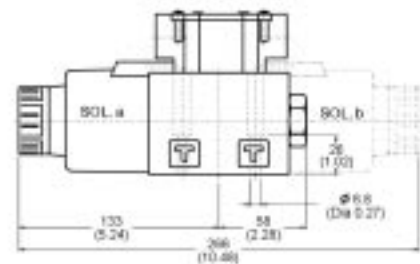
AC Solenoid



AC Solenoid



DC Solenoid



DIN Type

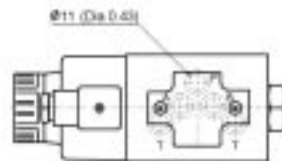
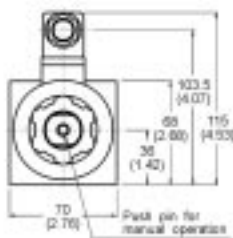
D05SD

D05SDF

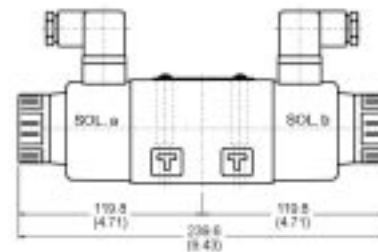
D05SDX

Units: mm/ (Inch)

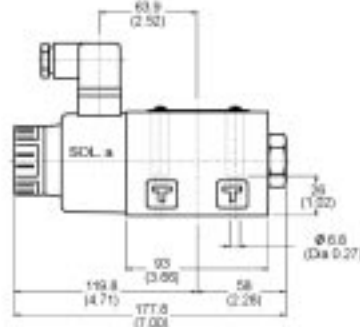
Note: Use (4) 1/4-20 SHCS X 1-1/2"
mounting screws



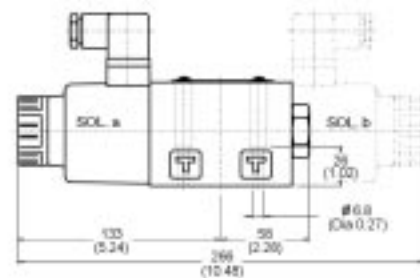
AC Solenoid



AC Solenoid



DC Solenoid

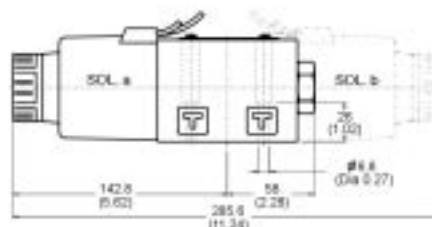


Lead Wire Type

D05SL

Units: mm/ (Inch)

Note: Use (4) 1/4-20 SHCS X 1-1/2"
mounting screws



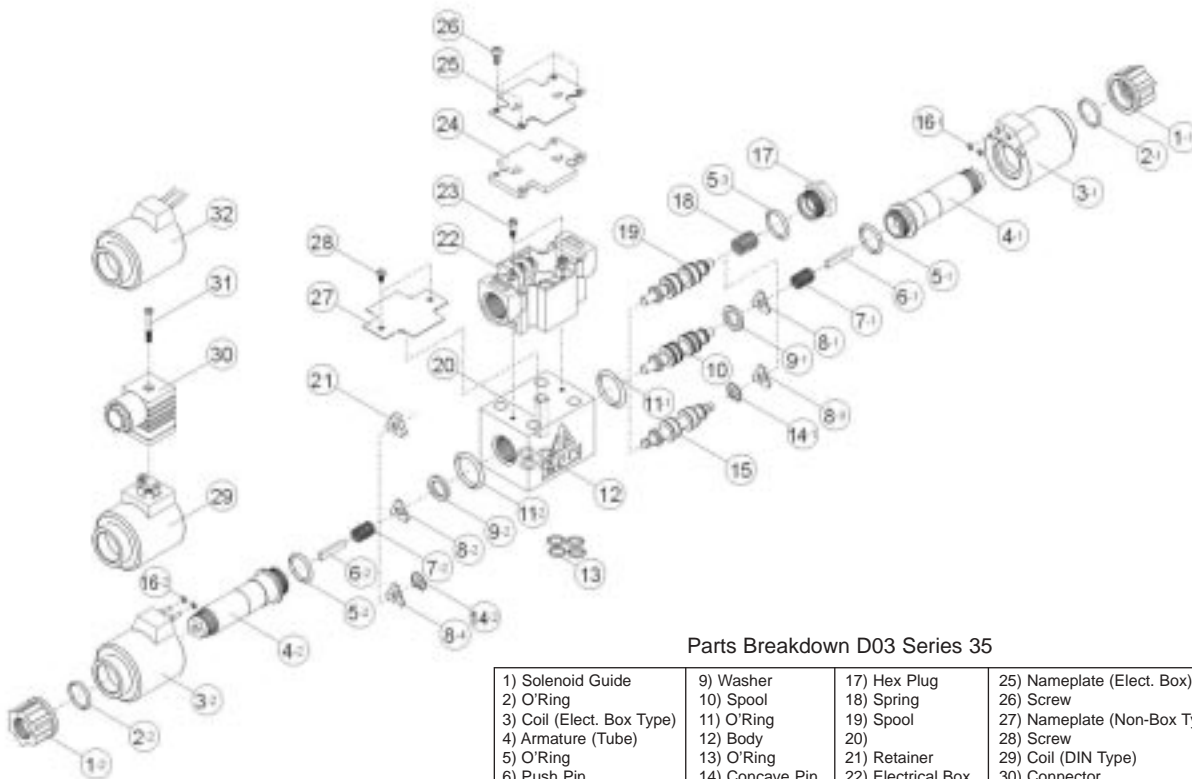


NFPA SIZE:
D03 & D05

DIRECTIONAL CONTROL VALVES

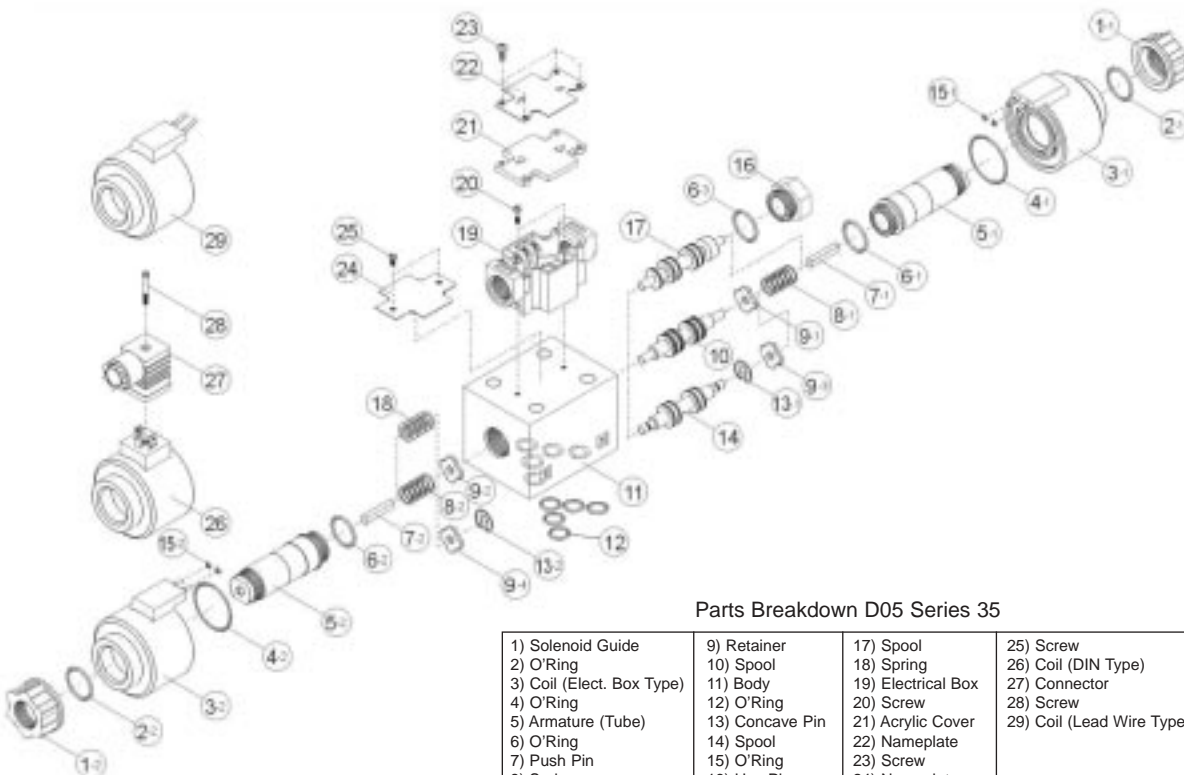
SOLENOID ACTUATED, DIRECT OPERATED

Illustrated Parts Breakdown



Parts Breakdown D03 Series 35

1) Solenoid Guide	9) Washer	17) Hex Plug	25) Nameplate (Elect. Box)
2) O'Ring	10) Spool	18) Spring	26) Screw
3) Coil (Elect. Box Type)	11) O'Ring	19) Spool	27) Nameplate (Non-Box Types)
4) Armature (Tube)	12) Body	20) Retainer	28) Screw
5) O'Ring	13) O'Ring	21) Electrical Box	29) Coil (DIN Type)
6) Push Pin	14) Concave Pin	22) Connector	30) Connector
7) Spring	15) Spool	23) Screw	31) Screw
8) Retainer	16) O'Ring	24) Acrylic Cover	32) Coil (Lead Wire Type)



Parts Breakdown D05 Series 35

1) Solenoid Guide	9) Retainer	17) Spool	25) Screw
2) O'Ring	10) Spool	18) Spring	26) Coil (DIN Type)
3) Coil (Elect. Box Type)	11) Body	19) Electrical Box	27) Connector
4) O'Ring	12) O'Ring	20) Screw	28) Screw
5) Armature (Tube)	13) Concave Pin	21) Acrylic Cover	29) Coil (Lead Wire Type)
6) O'Ring	14) Spool	22) Nameplate	
7) Push Pin	15) O'Ring	23) Screw	
8) Spring	16) Hex Plug	24) Nameplate	