



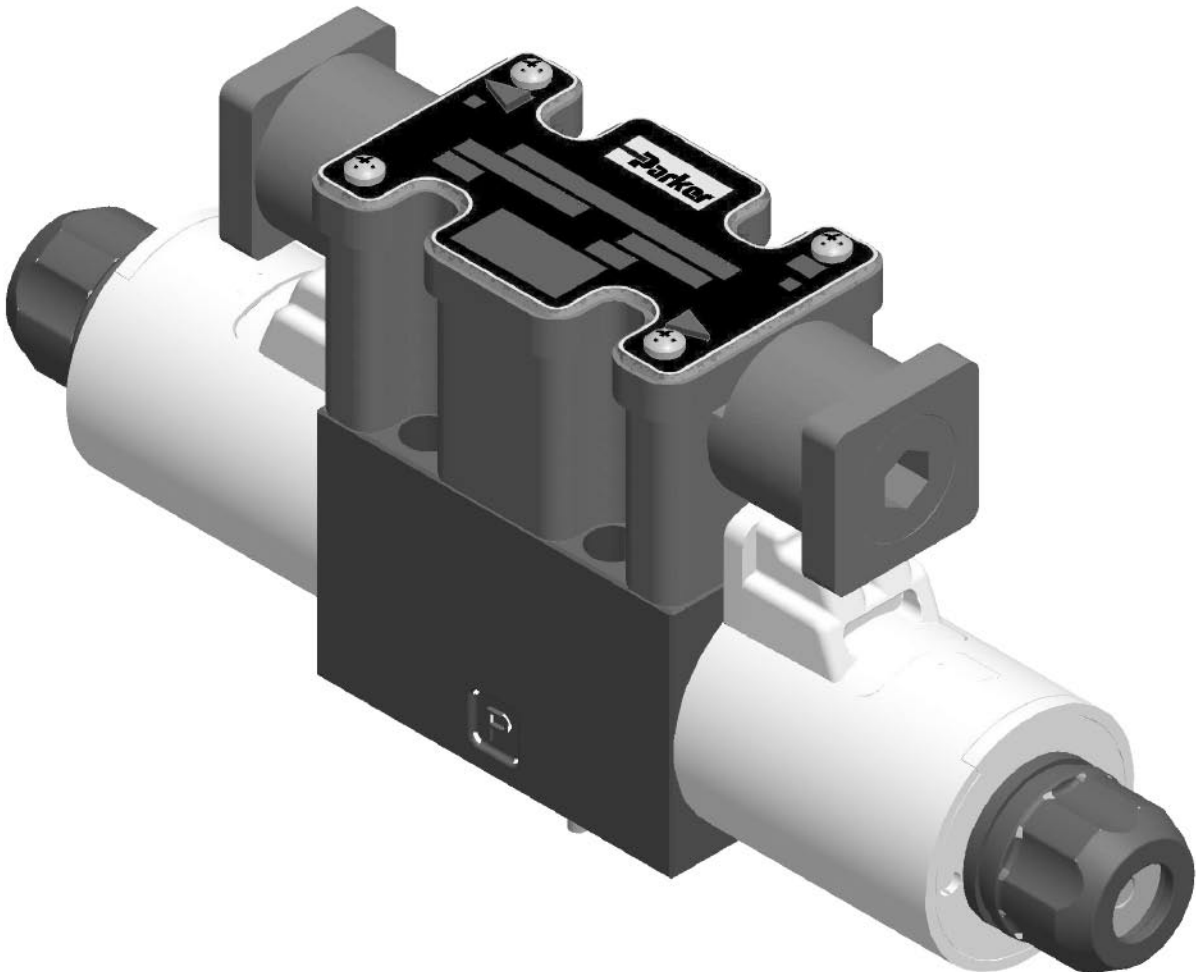
Bulletin HY14-2536-M3/US  
Service Bulletin

# Series D1VW, D Style 91 Design

Effective: May 1, 2007

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## Directional Control Valves



**WARNING – USER RESPONSIBILITY**

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

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**SAFETY GUIDE**

For safety information, see Safety Guide SG HY14-1000 at [www.parker.com/safety](http://www.parker.com/safety) or call 1-800-CParker.

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**Model Code**

Standard Valves.....1-2

**Parts Data**

D1VW\*\*\*D\*\*G5\*-91 (Conduit Box, Plug-In).....3

D1VW\*\*\*D\*\*C\*-91\* (Conduit Box, Leadwire) .....4

D1VW\*\*\*D\*\*P\*-91, D1VW\*\*\*D\*\*W\*-91, D1VW\*\*\*D\*\*S\*-91, D1VW\*\*\*D\*\*M\*-91 (DIN, Spade, Metri-Pak).....5

D1VW\*\*\*D\*\*GGS\*5\*-91 (Conduit Box, Soft Shift, Plug-In).....6

D1VW\*\*\*D\*\*PGS\*-91 (DIN Soft Shift) .....7

D1VW\*\*\*D\*\*EU-91, D1VW\*\*\*D\*\*ED-91, D1VW\*\*\*D\*\*EE-91, D1VW\*\*\*D\*\*EO-91 (Explosion Proof).....8

**Ordering Information** .....9-11

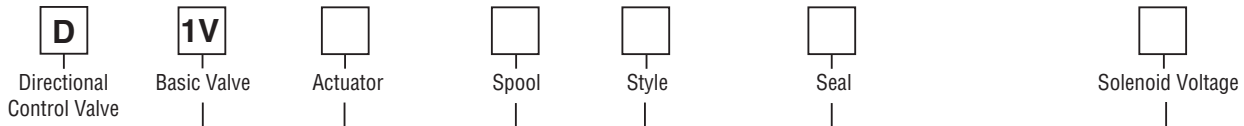
**Spool Chart** ..... 11

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**Coil Data** ..... 13

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**Standard Valves**



NFPA D03  
CETOP 3  
DIN NG6

Code	Description
W*	Solenoid, Wet Pin, Screw-in
HW*	Reversed Wiring

Code	Description
N	Nitrile
V	Fluorocarbon
E*	EPR

Code	Description
A**	24/50 VAC
D	120 VDC
G	198 VDC
J	<b>24 VDC</b>
K	<b>12 VDC</b>
L	6 VDC
N***	220/50 VAC
P***	110/50 VAC
Q**	100/60 VAC
QD	100/60 - 100/50 VAC
R	24/60 VAC
T	<b>240/60 - 220/50 VAC</b>
U	98 VDC
Y	<b>120/60 - 110/50 VAC</b>
Z	250 VDC

\* Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing solenoid A. Note operators reverse sides for #008 and #009 spools. See installation information for details. To configure per DIN standards (A coil over A port, B coil over B port) code valves as D1VHW\*\*\*.

\* Contact HVD for availability.

\*\* High Watt only  
\*\*\* Explosion Proof only.

Code	Symbol	Code	Symbol
001		011	
002		014	
003		015	
004		016	
005		020*	
006		026*	
007		030**	
008*, 009**		081	
010		082	

\* 008, 020 & 026 spools have closed crossover.  
\*\* 009 & 030 spool have open crossover.  
See Universal Spool Chart for other spool options.

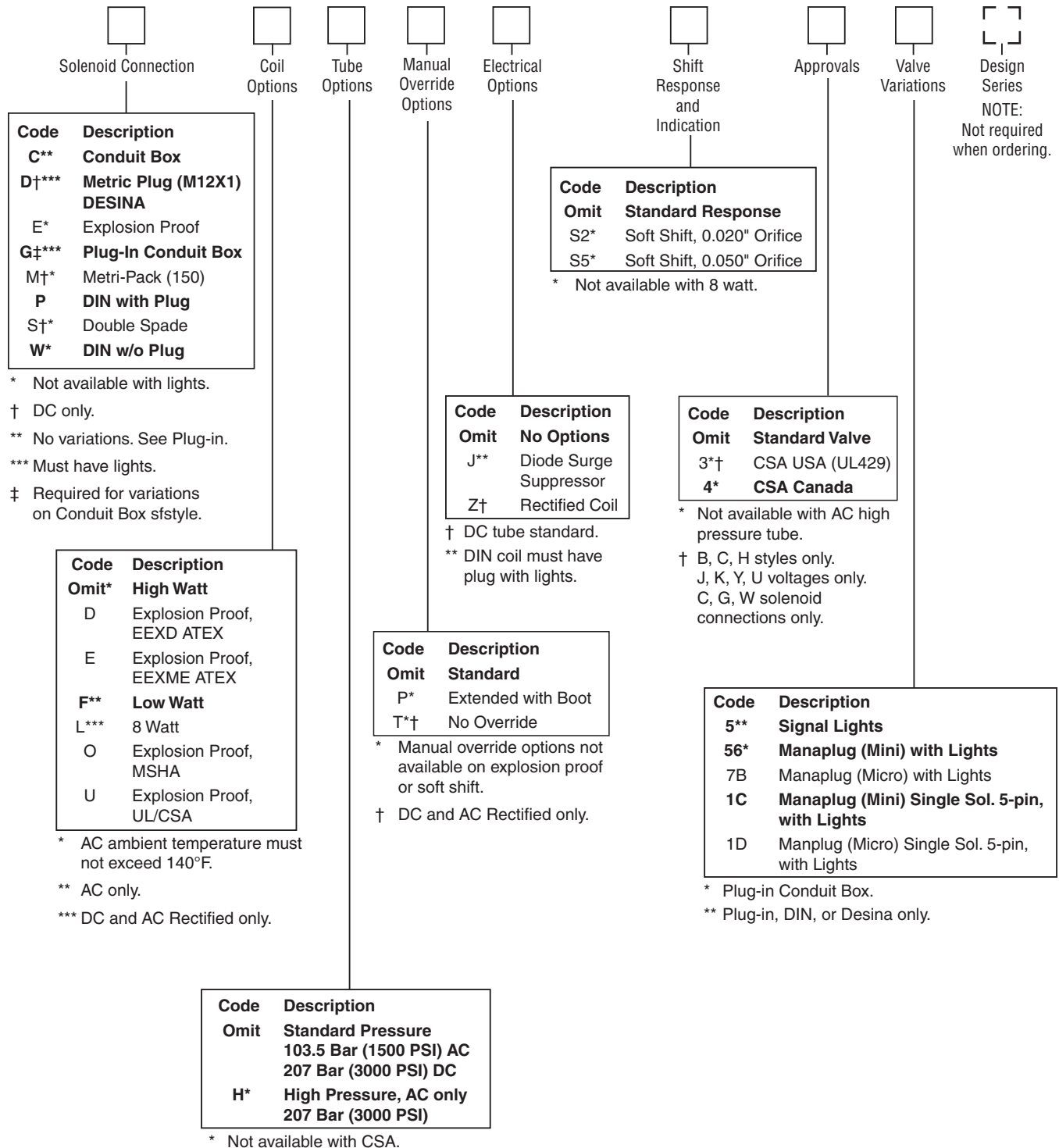
Code	Description	Symbol
B*	Single solenoid, 2 position, spring offset. P to A and B to T in offset position.	
C	Double solenoid, 3 position, spring centered.	
D†	Double solenoid, 2 position, detent.	
E	Single solenoid, 2 position, spring centered. P to B and A to T when energized.	
F‡	Single solenoid, 2 position. Spring offset, energized to center. Position spool spacer on A side. P to A and B to T in spring offset position.	
H*	Single solenoid, 2 position, spring offset. P to B and A to T in offset position.	
K	Single solenoid, 2 position, spring centered. P to A and B to T when energized.	
M‡	Single solenoid, 2 position, spring offset, energized to center position. Spool spacer on B side. P to B and A to T in spring offset position.	

\* 020, 026 and 030 spools only.  
† 020 and 030 spools only.  
‡ High Watt only.

**Bold: Designates Tier I products and options.**

**Non-Bold: Designates Tier II products and options.  
These products will have longer lead times.**

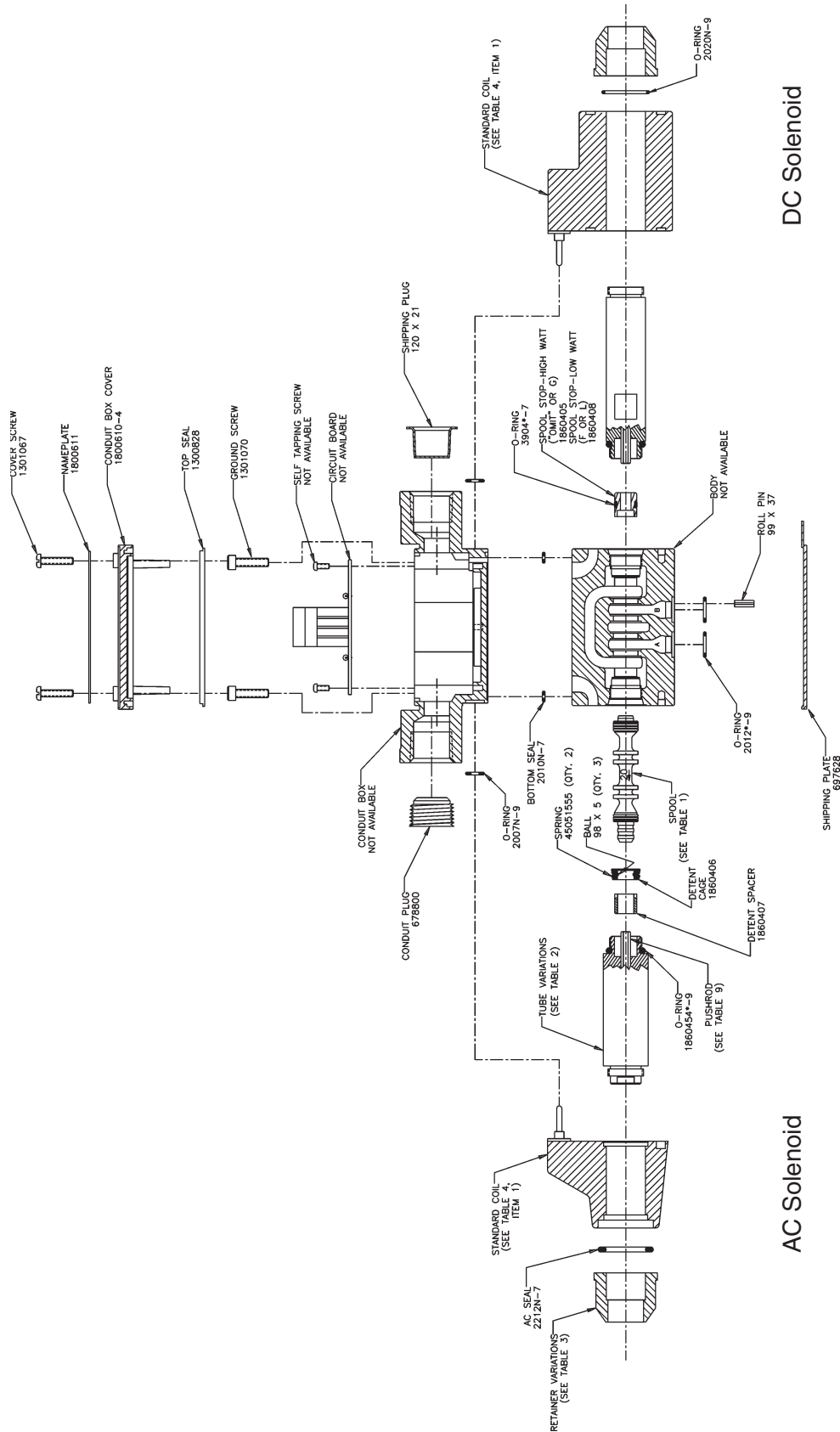
**Standard Valves**



**Bold: Designates Tier I products and options.**

**Non-Bold: Designates Tier II products and options.  
These products will have longer lead times.**

**D1VW\*\*\*D\*\*G5\*-91 Conduit Box, Plug-in**



DC Solenoid

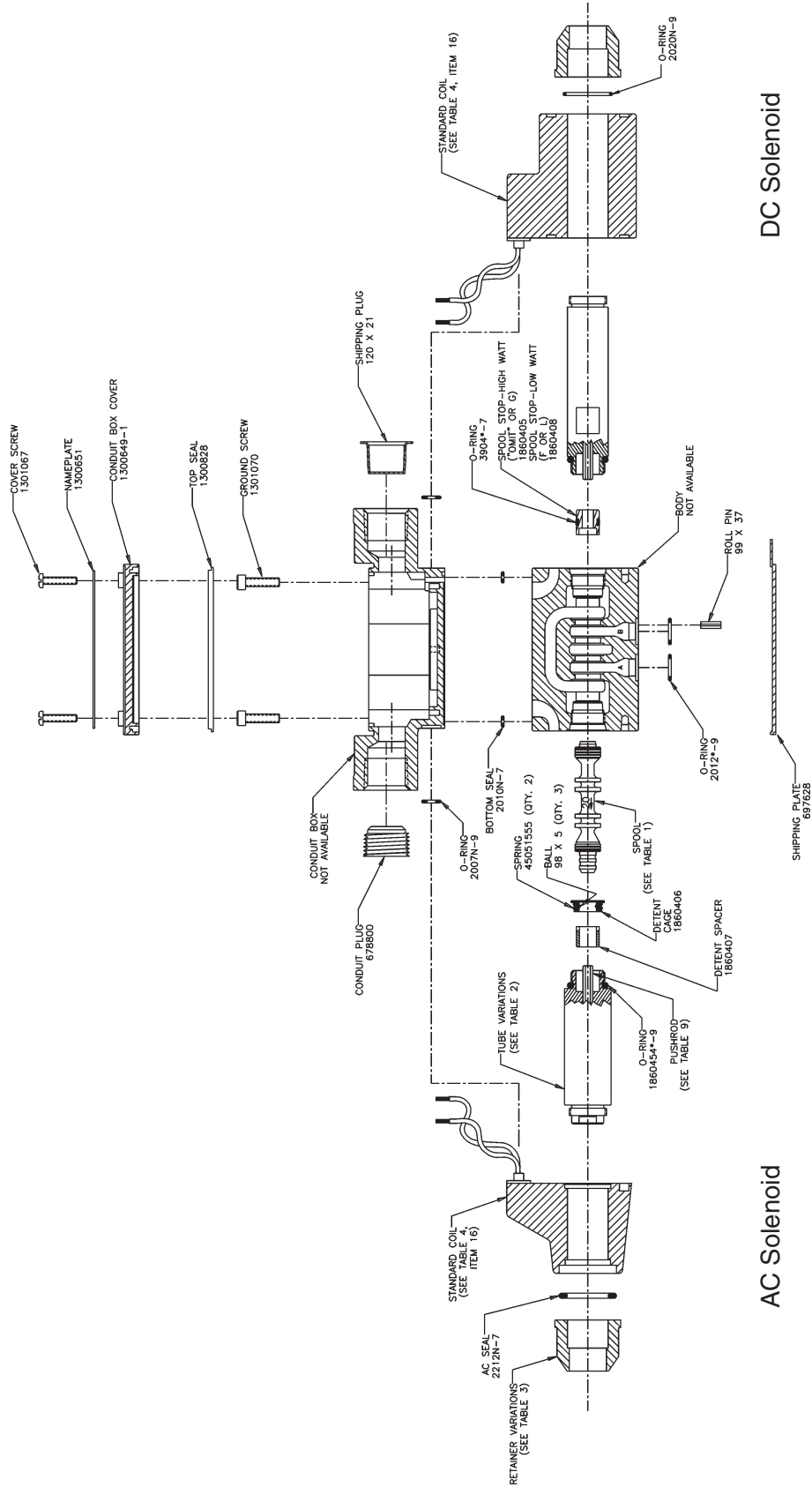
AC Solenoid

D1VW Double A.C. Solenoid Model  
 D1VW Double D.C. Solenoid Model

- Notes:
- 1) AC Solenoid components shown on left side, DC components shown on right side.
  - 2) \* Indicates Seal Compound:  
 N = Nitrile, V = Fluorocarbon, E = EPR.
  - 3) Detent kits:  
 DK020D\*91 (for #020 spool)  
 DK030D\*91 (for #030 spool).



**D1VW\*\*\*D\*\*C\*-91 Conduit Box, Leadwire**



DC Solenoid

AC Solenoid

D1VW Double A.C. Solenoid Model  
 D1VW Double D.C. Solenoid Model

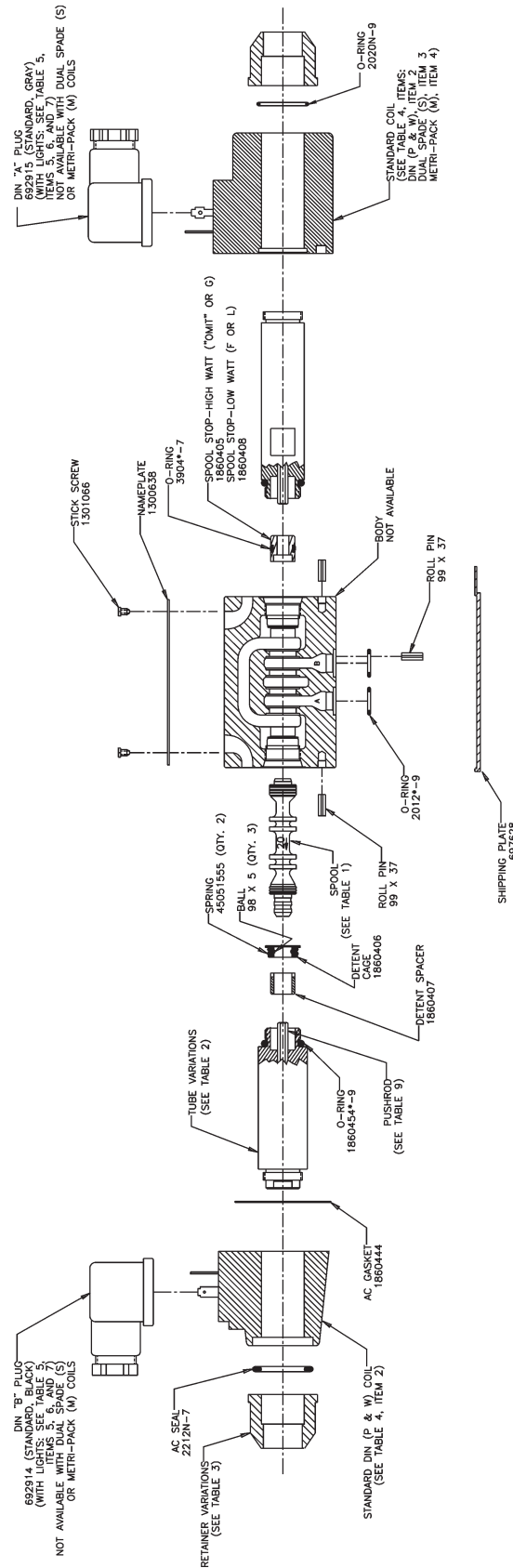
- Notes:
- 1) AC Solenoid components shown on left side, DC components shown on right side.
  - 2) \* Indicates Seal Compound:  
 N = Nitrile, V = Fluorocarbon, E = EPR.
  - 3) Detent kits:  
 DK020D\*91 (for #020 spool)  
 DK030D\*91 (for #030 spool).

**D1VW\*\*\*D\*\*P\*-91**  
**D1VW\*\*\*D\*\*W\*-91**

**DIN with Plug**  
**DIN without Plug**

**D1VW\*\*\*D\*\*S\*-91**  
**D1VW\*\*\*D\*\*M\*-91**

**Dual Spade**  
**Metri-Pack**



**DC Solenoid**

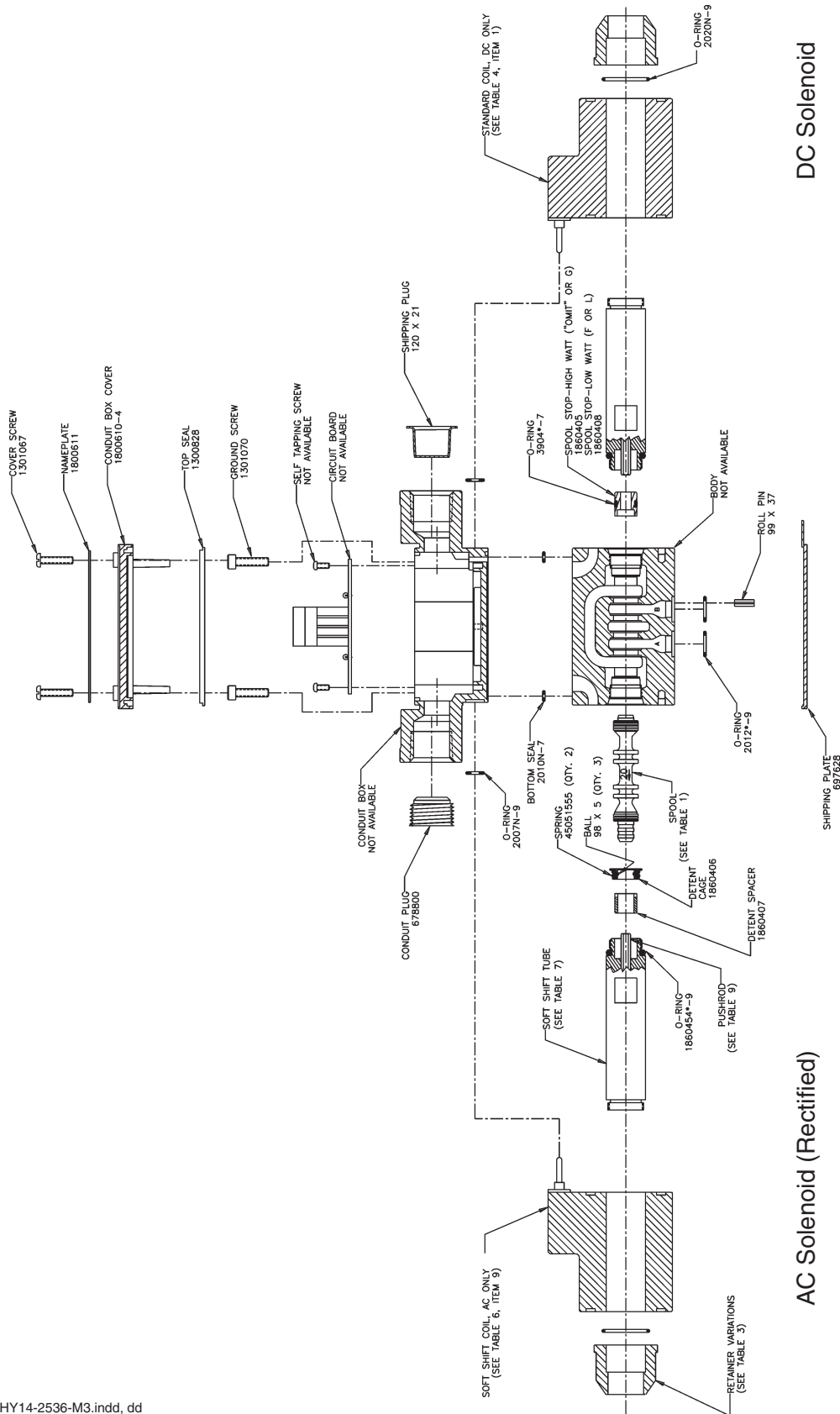
**AC Solenoid**  
 (Not available with 8 watt option)

**D1VW Double A.C. Solenoid Model**  
**D1VW Double D.C. Solenoid Model**

- Notes:
- 1) AC Solenoid components shown on left side, DC components shown on right side.
  - 2) \* indicates Seal Compound: N = Nitrile, V = Fluorocarbon, E = EPR.
  - 3) Detent kits: DK020D\*91 (for #020 spool) DK030D\*91 (for #030 spool).



**D1VW\*\*\*D\*\*GGS\*5\*-91 Conduit Box Soft Shift, Plug-in**



**AC Solenoid (Rectified)**

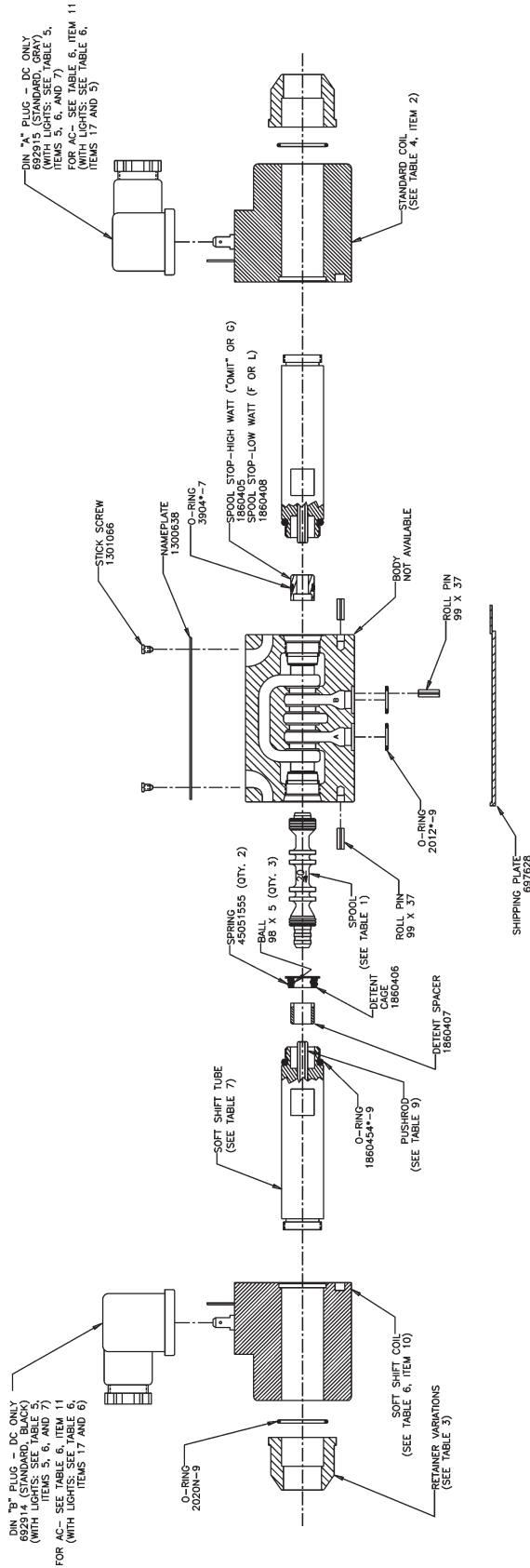
**DC Solenoid**

- Notes:**
- 1) AC Solenoid components shown on left side, DC components shown on right side.
  - 2) \* Indicates Seal Compound:  
 N = Nitrile, V = Fluorocarbon, E = EPR.
  - 3) Detent kits:  
 DK020D\*91 (for #020 spool)  
 DK030D\*91 (for #030 spool).

**D1VW Double A.C. Solenoid Model**  
**D1VW Double D.C. Solenoid Model**



**D1VW\*\*\*D\*\*PGS\*-91    DIN Soft Shift with Plug (Required for AC)**  
**D1VW\*\*\*D\*\*\*WGS\*-91    DIN Soft Shift without Plug (DC Only)**



DC Solenoid

AC Solenoid (Rectified)

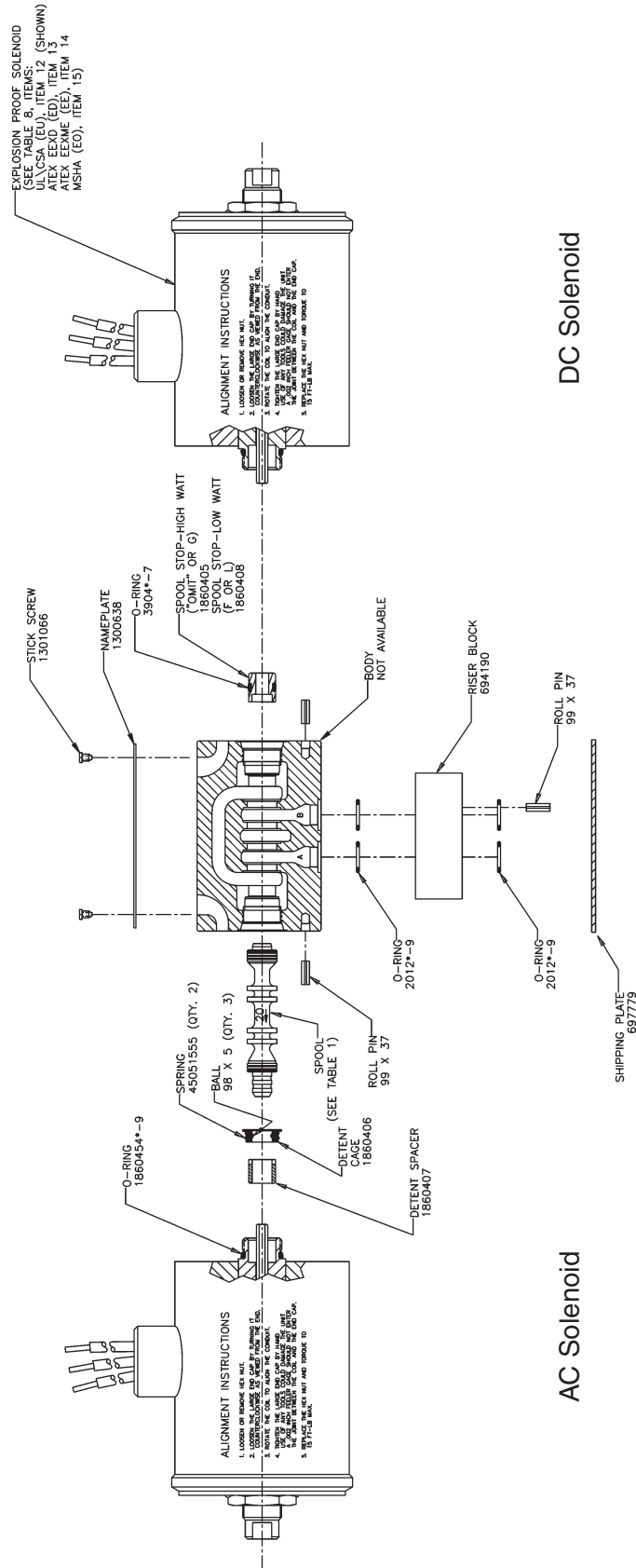
D1VW Double A.C. Solenoid Model  
 D1VW Double D.C. Solenoid Model

**D1VW\*\*\*D\*\*EU-91**  
**D1VW\*\*\*D\*\*ED-91**

**UL / CSA**  
**ATEX EEXD**

**D1VW\*\*\*D\*\*EE-91**  
**D1VW\*\*\*D\*\*EO-91**

**ATEX EEXME**  
**MSHA**



**D1VW Double A.C. Solenoid Explosion Proof Model**  
**D1VW Double D.C. Solenoid Explosion Proof Model**

- Notes:
- 1) AC Solenoid components shown on left side,  
DC components shown on right side.
  - 2) \* indicates Seal Compound:  
N = Nitrile, V = Fluorocarbon, E = EPR.
  - 3) Detent kits:  
DK020D\*91 (for #020 spool)  
DK030D\*91 (for #030 spool).

Code	Part Number	Qty	Description
20	1801304	1	#20 Spool
	1801309	1	#20 Spool (8 Watt Only)
30	1801305	1	#30 Spool
	1801310	1	#30 Spool (8 Watt Only)



Arrow points toward "A" port for all spools.

Code	Part Number	Qty	Description
Omit or F	1860432	2	A.C. Tube 1500 PSI
H	1860431	2	A.C. Tube 3000 PSI
G	1860428		D.C. Tube 3000 PSI
P or FP	1860434	2	Extended A.C. Tube 1500 PSI
HP or FHP	1860433	2	Extended A.C. Tube 3000 PSI
GP or LGP	1860429		Extended D.C. Tube 3000 PSI

Code	Part Number	Qty	Description
All Except P & T	1860437	2	Standard Retainer
P or FP HP or FHP GP or LGP	1860437	2	Extended Override Retainer
	1860452		Extended Override Boot
T	1860438	2	Tamper Proof Retainer

Code	Part Number	Qty	Description
All Except P & T	1860456	2	AC Standard Retainer
	1860437		DC Standard Retainer
P or FP HP or FHP	1860463	2	AC Extended Override Retainer
	1860452		AC Extended Override Boot
P GP or LGP	1860437	2	DC Extended Override Retainer
	1860452		DC Extended Override Boot
T	1860438	2	DC Tamper Proof Retainer

Solenoid Connection			G (Conduit Box) (Plug-In)	P & W (DIN)	S (Dual Spade)	M (Metri-Pack)	C (Conduit Box) (Leadwire)
Code	Description	Qty	Part Number	Part Number	Part Number	Part Number	Part Number
Y*	120/60–110/50 VAC 21 Watt	2	1860422-21-Y	1860423-21-Y	N/A	N/A	1860436-21-Y
T*	240/60–220/50 VAC 21 Watt	2	1860422-21-T	1860423-21-T	N/A	N/A	1860436-21-T
QD	100/60–100/50 VAC	2	N/A	1860423-25-QD	N/A	N/A	N/A
R*	24/60 21 Watt	2	1860422-21-R	N/A	N/A	N/A	1860436-21-R
L*	6 VDC	2	1860410-30-6	1860414-30-6	1860415-30-6	1860413-30-6	1860435-30-6
K*	12 VDC	2	1860410-30-12	1860414-30-12	1860415-30-12	1860413-30-12	1860435-30-12
KL	12 VDC 8 Watt	2	1860410-10-12	1860414-10-12	1860415-10-12	1860413-10-12	1860435-10-12
J*	24 VDC	2	1860410-30-24	1860414-30-24	1860415-30-24	1860413-30-24	1860435-30-24
JL	24 VDC 8 Watt	2	1860410-10-24	1860414-10-24	1860415-10-24	1860413-10-24	1860435-10-24
D*	120 VDC	2	1860410-30-120	1860414-30-120	1860415-30-120	1860413-30-120	1860435-30-120
DL	120 VDC 8 Watt	2	1860410-10-120	1860414-10-120	1860415-10-120	1860413-10-120	1860435-10-120
Z*	250 VDC	2	1860410-30-250	1860414-30-250	1860415-30-250	1860413-30-250	1860435-30-250
ZL	250 VDC 8 Watt	2	1860410-10-250	1860414-10-250	1860415-10-250	1860413-10-250	1860435-10-250
U*	98 VDC	2	N/A	1860414-30-98	N/A	1860413-30-98	N/A
G*	198 VDC	2	N/A	1860414-30-198	N/A	1860413-30-198	N/A

**Table 6 – Soft Shift Coils, AC Rectified Only**

Solenoid Connection			G (Conduit)	P (DIN w/Plug)	DIN Plugs, AC Rectified Only**			
Item			9	10				
Code	Description	Qty	Part Number	Part Number	Item	Description	Qty	Part Number
Y*G	120/60–110/50 VAC	2	1860410-30-98	1860414-30-98	11	Rectified Standard, Plug "A"	2	1301053
T*G	240/60–220/50 VAC	2	1860410-30-214	1860414-30-214		Rectified Standard, Plug "B"	2	1301054
QD*G	100/60–100/50 VAC	2	1860410-30-86	1860414-30-86	17	Rectified with Lights, Plug "A"	2	1300712
					5	Label, "A" Solenoid	1	697047
					17	Rectified with Lights, Plug "B"	2	1300712
					6	Label, "B" Solenoid	1	697048

\*\*Must be rectified plug when using AC with soft shift.

**Table 7 – Soft Shift Tubes, DC or AC Rectified**

Code	Part Number	Qty	Description
GS2	1860430-2	2	3000 PSI Soft Shift Tube, .020" Orifice
GS3	1860430-3	2	3000 PSI Soft Shift Tube, .030" Orifice
GS4	1860430-4	2	3000 PSI Soft Shift Tube, .040" Orifice
GS5	1860430-5	2	3000 PSI Soft Shift Tube, .050" Orifice

**Table 8 – Explosion Proof Coils**

Solenoid Connection			U (UL/CSA)	D (EEXD)	E (EEXME)	O (MSHA)
Item			12	13	14	15
Code	Description	Qty	Part Number	Part Number	Part Number	Part Number
YE	120/60–110/50 VAC	2	1860427-27-Y	1860424-25-Y	1860425-30-Y	1860426-27-Y
TE	240/60–220/50 VAC	2	1860427-27-T	1860424-25-T	1860425-30-T	1860426-27-T
QE	100/60 VAC	2	1860427-27-Q	1860424-25-Q	1860425-30-Q	1860426-27-Q
RE	24/60 VAC	2	1860427-27-R	N/A	1860425-30-R	1860426-27-R
AE	24/50 VAC	2	N/A	1860424-17-A	1860425-30-A	N/A
NE	220/50 VAC	2	1860427-27-N	1860424-25-N	1860425-30-N	N/A
PE	110/50 VAC	2	1860427-27-P	1860424-25-P	1860425-30-P	N/A
LE	6 VDC	2	1860421-33-6	1860418-33-6	1860419-30-6	1860420-33-6
KE	12 VDC	2	1860421-33-12	1860418-33-12	1860419-30-12	1860420-33-12
JE	24 VDC	2	1860421-33-24	1860418-33-24	1860419-30-24	1860420-33-24
DE	120 VDC	2	1860421-33-120	1860418-33-120	1860419-30-120	1860420-33-120
ZE	250 VDC	2	1860421-33-250	1860418-33-250	1860419-30-250	1860420-33-250

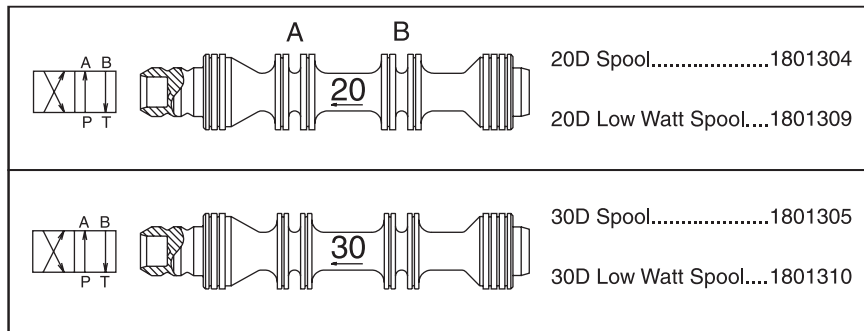
**Table 9 – D1VW-91 Springs and Pushrods**

Valve	Spool	Description	Style	Spring			Pushrod						
				1860447	1860446	1860445	1860400	1860401	1860402	1860403	1860404	1860439	1860441
Standard (Non-Soft Shift) Valve	1, 4, 10, 11, 21, 22	DC-8W	All Except F/M										
		DC-30W	All Except F/M										
		AC-21W	All Except F/M										
		AC-30W	All Except F/M										
		DC-8W	F & M										
		DC-30W	F & M										
		AC-21W	F & M										
		AC-30W	F & M										
	2, 3/15, 5/16, 6, 7, 8, 9, 14, 16, 20, 30	DC-8W	All Except F/M										
		DC-30W	All Except F/M										
		AC-21W	All Except F/M										
		AC-30W	All Except F/M										
		DC-8W	F & M										
		DC-30W	F & M										
		AC-21W	F & M										
		AC-30W	F & M										
	20D/30D	DC-8W	D										
		DC-30W	D										
		AC-21W	D										
		AC-30W	D										
81/82	DC-8W	All Except F/M											
	DC-30W	All Except F/M											
Soft Shift Valve	1, 4, 10, 11, 21, 22	DC-30W	All Except F/M										
		DC-30W	F & M										
	2, 3/15, 5/16, 6, 7, 8, 9, 14, 20, 30	DC-30W	All Except F/M										
		DC-30W	F & M										
	20D/30D	DC-30W	D										
	81/82	DC-30W	All Except F/M										

**Spools**

B-SOLENOID

A-SOLENOID

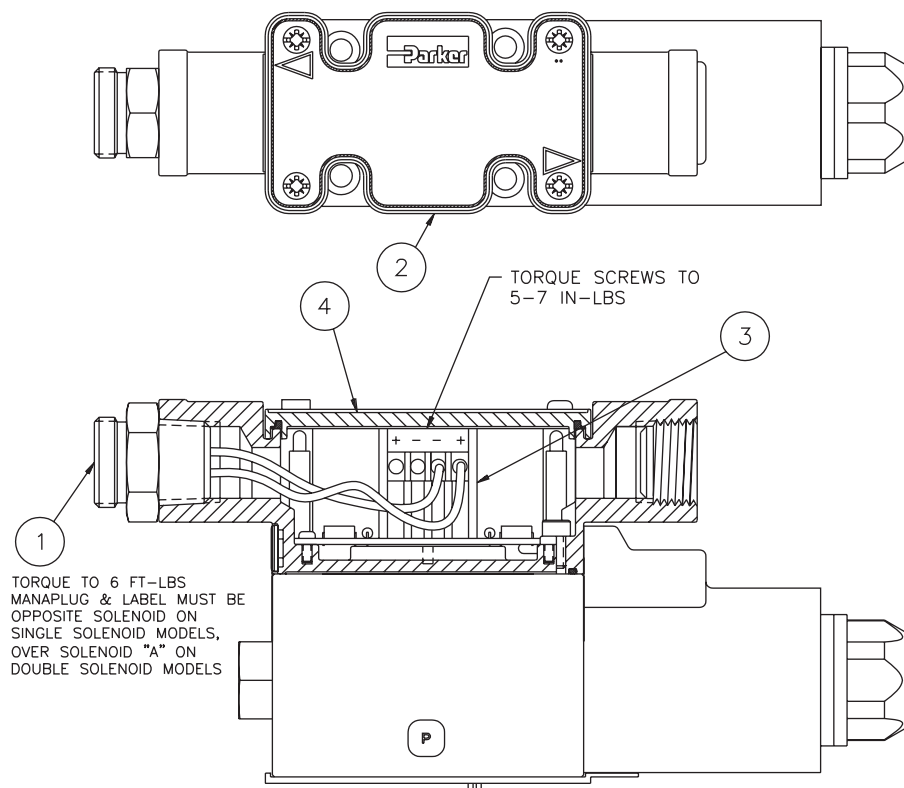


**Variation 56 – Double Solenoid Plug-in Models with Lights and 5-Pin Manaplug (Mini)**

Valve	Spool	Nameplate Marking	Wiring Diagram	Sol. Code	Item	Part Number	Qty	Description
D1VW	All Spools			A L L	1	1302154	1	Manaplug, 5-Pin
					2	697629	1	Warning Label
					4	1800610-4	1	Conduit Box Cover
					5	1800611	1	Nameplate
D1VHW	All Spools							

● Wiring diagrams show the backside of plug.

**Plug-in Conduit Variation**



**Wiring Instructions**

*(Dashed lines indicate wiring thru terminal strip – no assembly required here)*

1. Install manaplug (Item 1) over solenoid "A" on double solenoid models (opposite solenoid on single solenoid models).
2. Slip ground screw (1301070) through ring terminal on green ground wire (from manaplug) and secure to valve body.
3. Insert manaplug wires into terminal strip (Item 3) in box as shown in wiring diagram. Ensure all wire strands are contained by the connector and tighten clamping screws to 0.5 Nm (5 in. lbs.).
4. Install cover on the conduit box.
5. Place warning label (Item 2) on conduit box side, as shown.

Note: H, K and M styles shown

**Solenoid Ratings**

<b>Insulation System</b>	Class F
<b>Allowable Deviation from rated voltage</b>	-15% to +10% for DC and AC rectified coils -5% to +5% for AC Coils
<b>Armature</b>	Wet pin type
<b>CSA File Number</b>	LR60407
<b>Environmental Capability</b>	DC Solenoids meet NEMA 4 and IP67 when properly wired and installed. Contact HVD for AC coil applications.

**Explosion Proof Solenoid Ratings\***

<b>UL &amp; CSA (EU)</b>	Class I, Div 1 & 2, Groups C & D Class II, Div 1 & 2, Groups E, F & G As defined by the NEC
<b>MSHA (EO)</b>	Complies with 30CFR, Part 18
<b>ATEX (ED)</b>	Complies with ATEX requirements for: Exd, Group IIB; EN50014: 1999+ Amds. 1 & 2, EN50018: 2000

\* Allowable Voltage Deviation ±10%.

Note that Explosion Proof AC coils are single frequency only.

Code		Voltage	In Rush Amps Amperage	In Rush Amps D1VW VA	Holding Amps D1VW @ 3MM	Watts D1VW	Resistance D1VW
Voltage Code	Power Code						
D	L	120 VDC	N/A	N/A	0.09 Amps	10 W	1584.00 ohms
			N/A	N/A	0.26 Amps	30 W	528.00 ohms
G		198 VDC	N/A	N/A	0.15 Amps	30 W	1306.80 ohms
J	L	24 VDC	N/A	N/A	0.44 Amps	10 W	51.89 ohms
			N/A	N/A	1.32 Amps	30 W	17.27 ohms
K	L	12 VDC	N/A	N/A	0.88 Amps	10 W	12.97 ohms
			N/A	N/A	2.64 Amps	30 W	4.32 ohms
L	L	6 VDC	N/A	N/A	1.67 Amps	10 W	3.59 ohms
			N/A	N/A	5.00 Amps	30 W	1.20 ohms
Q	F	100 VAC / 60 Hz	1.70 Amps	170 VA	0.56 Amps	24 W	26.0 ohms
QD	F	100 VAC / 60 Hz	1.35 Amps	135 VA	0.41 Amps	18 W	31.2 ohms
QD	F	100 VAC / 50 Hz	1.50 Amps	150 VA	0.57 Amps	24 W	31.2 ohms
R	F	24/60 VAC, Low Watt	6.67 Amps	160 VA	2.20 Amps	23 W	1.52 ohms
T	F	240/60 VAC, Low Watt	0.70 Amps	168 VA	0.22 Amps	21 W	145.00 ohms
T	F	220/50 VAC, Low Watt	0.75 Amps	165 VA	0.26 Amps	23 W	145.00 ohms
U		98 VDC	N/A	N/A	0.10 Amps	30 W	960.00 ohms
Y	F	120/60 VAC, Low Watt	1.40 Amps	168 VA	0.42 Amps	21 W	36.50 ohms
Y	F	110/50 VAC, Low Watt	1.50 Amps	165 VA	0.50 Amps	23 W	36.50 ohms
Z	L	250 VDC	N/A	N/A	0.04 Amps	10 W	6875.00 ohms
			N/A	N/A	0.13 Amps	30 W	1889.64 ohms
<b>Explosion Proof Solenoids</b>							
R		24/60 VAC	7.63 Amps	183 VA	2.85 Amps	27 W	1.99 ohms
T		240/60 VAC	0.76 Amps	183 VA	0.29 Amps	27 W	1.34 ohms
N		220/50 VAC	0.77 Amps	169 VA	0.31 Amps	27 W	1.38 ohms
Y		120/60 VAC	1.60 Amps	192 VA	0.58 Amps	27 W	33.50 ohms
P		110/50 VAC	1.47 Amps	162 VA	0.57 Amps	27 W	34.70 ohms
Q		100/60 VAC	1.90 Amps	192 VA	0.70 Amps	27 W	38.60 ohms
K		12 VDC	N/A	N/A	2.75 Amps	33 W	4.36 ohms
J		24 VDC	N/A	N/A	1.38 Amps	33 W	17.33 ohms
D		120 VDC	N/A	N/A	0.28 Amps	33 W	420.92 ohms
Z		250 VDC	N/A	N/A	0.13 Amps	33 W	1952.66 ohms



## Warning

Before any circuit connection is broken, be sure to turn off all power and relieve system pressure. Lower all vertical loads and cylinders, lock any load which could produce pressure and discharge any accumulators. Plug and cap all lines and openings to prevent contamination from entering the system.

## Cleaning and Inspection

1. Proper cleaning is a critical part of preventive maintenance in the use of directional control valves. All parts should be cleaned with a solvent that is compatible with the system fluid. Compressed air may also work well when cleaning orifices and passage ways, but proper filtration must be employed to remove water and contamination.

**NOTE:** Always make sure all parts have been cleaned before reassembling.

### 2. Inspection

a. Inspect all passage ways for obstructions.

b. Inspect all washers, push pins, plungers and pole faces for signs of wear and/or mushrooming. Inspect all springs for signs of distortion. Replace parts as necessary.

c. Look for nicks and burrs on the spool and bore lands. Nicks in these areas indicate likely contamination of the system fluid.

3. If there are no signs of nicks or burrs on the spool and bore, check the spool clearance as follows:

a. Lubricate the spool and bore with clean system fluid.

b. Insert the spool back into the body and slowly move the spool back and forth. The spool should move freely. If there is any sticking between the spool and the bore, remove the spool and repeat 2b.

c. The spool clearance can also be checked by placing the valve body on end and inserting the spool. Gravity will pull the spool to the other end if there is no sticking.

d. After several attempts have been made without resolution, replace the valve.

## Troubleshooting

### Problem: Valve spool fails to move

	Cause	Recommendation
<b>Mechanical</b>	Recommended flow exceeded	Check maximum flow rate for appropriate spool by spool function.
	Recommended pressure exceeded	Check maximum pressure rating for valve.
	Improper installation connections	Check installation drawings.
	Contamination in system	Disassemble, inspect, clean and flush.
	Improper assembly	Check proper assembly. Refer to drawing for appropriate model.
	Valve has silted	Disassemble and clean valve.
<b>Electrical</b>	Power off	Turn power on.
	Improper voltage	Check voltage requirements for valve model.
	Faulty connection	Check connections.
	Faulty coil	Check coil resistance.

**Problem: Valve produces undesirable response**

	<b>Cause</b>	<b>Recommendation</b>
<b>Mechanical</b>	Recommended flow exceeded	Check maximum flow rate for appropriate spool by spool function.
	Recommended pressure exceeded	Check maximum pressure rating for valve.
	Improper installation connections	Check installation drawings.
	Contamination in system	Disassemble, inspect, clean and flush.
	Improper assembly	Check proper assembly. Refer to drawing for appropriate model.
	Improper fluid	Check fluid recommendations.
	Recommended temperature exceeded (indicated by fluid discoloration or spool tarnishing)	Check maximum temperature recommendations.
	Incorrect orifice size (soft shift only)	Check orifice size for desired response time.
<b>Electrical</b>	Improper voltage	Check voltage requirements for valve model.
	Faulty connection	Check connections.
	Faulty coil	Check coil resistance.



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