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Find the *Parker / Sporlan Valve MKC-2E* at our website: *Click HERE*

SOLENOID VALVES

Installation and Servicing Instructions



NOT FOR USE ON HAZARDOUS OR CORROSIVE FLUIDS

- **The molded MKC-1 coil fits the A3, E3, W3, S4, E5, B6, E6, S6, W6, S7, R183, R184 and R246 series normally closed solenoid valves.**
- **The OMKC-1 coil fits the XWG, XUP and XXF series rapid cycle solenoid valves.**
- **The MKC-2 coil fits the B9, E9, B10, E10, B14, E14, W14, B19, E19, W19, B25, E25, W25, B33, E33, E34, E42 series normally closed solenoid valves and the 180 solenoid pilot control... and all solenoid valves in the field that are equipped with the old style KC-2 coil.**
- **When changing from the old KC model coils to the current MKC molded model coils, discard the coil housing, coil housing bottom plate, two coil sleeves (not used with KC-1 coil) AND THE SPACER.**
- **The OMKC-2 coil fits the OB9, OE9, OB10, OE10, OB14, OE14, OB19, OE19, OB25, OE25, OB33, OE33, OE34, OE42 series normally open solenoid valves and the XRN, XRM, XPO series rapid cycle solenoid valves.**
- **Other Sporlan Valve products using a molded coil are as follows:**
  MKC-1 — OM-1, SORIT, 8D, 12D, 10G, SORIT-PI, 5D, SHGB(E)-8.
  MKC-2 — 16D, DDR-20, SHGB(E)-15, OLDR-15 and OLDR-20.
  OMKC-2 — LDR-15, LDR-20, XTM and XTO.

To insure peak performance, solenoid valves must be selected and applied correctly; however, proper installation procedures are equally important. The following instructions list the essential points for correct installation.

An exploded view of a typical solenoid valve is illustrated in Figures 5, 5A and 6, page 4.

Position — All standard solenoid valves may be mounted horizontal, on its side or in a vertical line with the exception of the following: A3 dated 6-86 or before, MA32, B33, OB33, MA42, MA50, MA5A, MA17A, XWG, XUP, XRN, XRM and XPO series. These valves **MUST** be installed in horizontal lines with the coil housing no more than 45° from vertical, see table on page 2. The direction of flow is indicated by an **arrow** or the word **IN** on the inlet of the valve body. For heat pump applications, valve types C(M)E and C(M)B are typically installed with the directional arrow pointing toward the outdoor coil. Or, the **IN** connection toward the indoor coil.

NOTE: Solenoid valves having a type number starting with the letter "X" are Special Solenoid Valves (non-standard). Contact Sporlan Valve Company, Washington, MO if valve mounting is in question.

SOLDER CONNECTIONS

Because of possible damage to valve components due to the high temperatures of soldering and brazing, "B" Series Solenoid Valves with brass connections are shipped handtight to facilitate disassembly, with the exception of the (M)B33S2 & OB33S2. It is necessary to completely disassemble these valves before any heat is applied to the valve body. The following steps outline recommended procedures when installing these valves.

Soldering Precautions — Solder connections on Sporlan Solenoid Valves are either copper or brass. Any of the commonly used types of solder are satisfactory with these materials. Regardless of the type of solder used, it is important to avoid overheating the valve.

The tip of the soldering torch should be large enough to avoid prolonged heating of the connection during the soldering operation. Overheating can also be minimized by directing the flame away from the valve body.

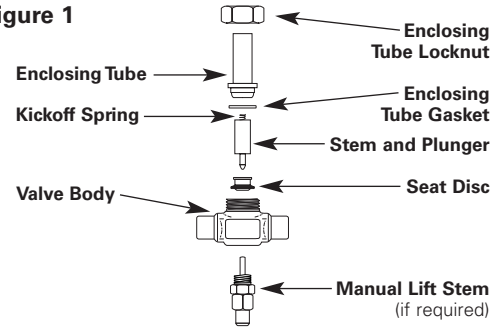
Type A3S1, S4S1, S6S1, S7S1

1. Remove the coil assembly.
2. Locate the word **IN** or the directional **arrow** on the valve body.
3. Place the valve in the line, in the proper direction of flow, and solder.
4. Replace the coil assembly and tighten coil hex screw.

Types B6, B9, B10, B14, B19, B25 Series (Brass Connections)

1. Remove the coil assembly, enclosing tube and nut, all internal parts, and manual lift stem assembly.
2. Locate the word **IN** or the directional **arrow** on the valve body.
3. Place the valve in the line in the proper direction of flow and solder.

■ **Figure 1**



4. Re-assemble as follows, see Figures 1, 5, and 5A:
   a. Place the seat disc into the valve body with the smaller diameter end facing up.
   b. Place the enclosing tube gasket onto the valve body above the threads.
   c. Hold the plunger with one hand so that the pointed end is resting in the pilot port of the disk. Make sure the small spring is in place on the top of the plunger. **(NOTE: Does not apply to normally open and rapid cycle series.)**
   d. With the other hand, place the enclosing tube over the plunger, making sure the enclosing tube gasket is in position.
   e. Replace the enclosing tube locknut and tighten. (See recommended torque in the table on page 2.) **Do not over tighten.**
   f. Replace manual lift stem. Tighten lift stem assembly and seal cap.
   g. Replace the coil assembly. **(NOTE: For normally open and rapid cycle valves replace spacer and spacer cup with coil assembly.)**

NOTE: Excessive tightening of the enclosing tube locknut can damage the valve body bore. Please observe the torques listed on page 2.

Types: All E Series (Extended Copper Connections)

Brazed into the line without disassembly because the valve contains extended connections. Use caution by placing a wet cloth or chill block on the extensions at the body to prevent excessive overheating. Follow Type A3S1 installation instructions.

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Bulletin 30-11, August 2003 Supersedes Bulletin 30-11, November 2000 and all prior publications.

RECOMMENDED TORQUE (ft.–lbs.)

VALVE SERIES①	ENCLOSING TUBE LOCKNUT⑤	ENCLOSING TUBE SCREWS	PILOT VALVE ASSEMBLY LOCKNUT	LOWER BODY LOCKNUT	COIL SCREW	COIL LOCKNUT	FLANGE PLATE BOLTS/ SCREWS	FLANGE CONNECTION BOLTS	MANUAL LIFT STEM ASSEMBLY	SEAL CAP	VALVE MOUNTING POSITION		
											VERTICAL LINE③	HORIZONTAL LINE	ON SIDE③
A3, S4, S6, S7	---	---	---	---	2.3	---	---	---	---	---	YES dated 7-86 or later	YES	
E3, E5	---	---	---	---	2.3	---	---	---	---	---	YES	YES	
W3		1.5 – 1.67											
XWG		---									NO	YES②	
B6, E6, W6	10 – 15	---	---	---	2.3	4.0	---	---	11 – 12	4 – 6	YES	YES	
XUP											NO	YES②	
B9, E9, OB9, OE9	25 – 30	---	---	---	2.3	4.0	---	---	11 – 12	4 – 6	YES	YES	
XRN											NO	YES②	
B10, E10, OB10, OE10	20 – 40	---	---	---	2.3	4.0	---	---	11 – 12	4 – 6	YES	YES	
B14, E14, W14, OB14, OE14													
XRM											NO	YES②	
B19, E19, W19, OB19, OE19	35 – 45	---	---	---	2.3	4.0	---	---	11 – 12	4 – 6	YES	YES	
XPO											NO	YES②	
B25, E25, W25	60 – 65	---	---	---	2.3	4.0	---	---	11 – 12	4 – 6	YES	YES	
OB25, OE25													
B33	25 – 30	---	---	---	2.3	4.0	8 – 12	37	11 – 12	4 – 6	NO	YES②	
E34								---			YES	YES	
OB33								37			NO	YES②	
OE34								---			YES	YES	
E42, OE42	25 – 30	---	---	---	2.3	4.0	13 – 20	---	11 – 12	10 – 15	YES	YES	
MA5A3	25 – 50	---	---	---	---	4.0	---	24	11 – 12	10 – 15	NO	YES	NO
MA17A3								37					
MA32	---	---	---	---	---	4.0	8 – 12	74	11 – 12	10 – 15	NO	YES	NO
MA42							12 – 20						
MA50							25 – 35						
R183, R184, R246	---	6	---	---	2.3	---	---	---	---	---	YES	YES	
8D	10 – 15	---	60 – 65	60 – 65	2.3	---	---	---	---	---	YES	YES	
12D				---			15 – 18						
16D	30 – 35	---	④	---			20 – 24						
10G	10 – 15	---	60 – 65	60 – 65			---						

①Valves with mounting holes use a #8-32 screw torqued not more than 15 in.-lb. **Note:** Standard torque charts do not apply. ②Coil housing to be no more than 45° from the vertical. ③Coil housing must not be below horizontal. ④The 16D pilot assembly is connected to the body with a pipe connection. Apply a light coat of #242 (Blue) Loctite to the male pipe thread and torque to 30-60 ft.-lb. ⑤Do not over tighten the enclosing tube locknut. Damage to the enclosing tube assembly could result from over tightening.

PIPE CONNECTIONS

Types A3, W3, B6, W6, B9, B10, B14, W14, B19, W19, B25, W25, (K)(B)R183, (K)(B)R184, (K)(B)R246 Series

These valves can be installed without disassembly. Avoid excessive amounts of pipe sealing compounds. It will interfere with the valve operation if it comes in contact with the valve's internal parts.

NOTE: When pipe type solenoid valves are installed with pipe to ODF adaptors, the valve must be disassembled prior to brazing the ODF adaptors.

FLANGED CONNECTIONS— PIPE or SOLDER

Solenoid valves with flanged connections may be installed without disassembly. In most cases the flanges are packed disassembled from the valve body. Therefore, they may be installed in the line before the valve is installed. Be certain that the correct flange is installed on the inlet line in order to properly match the flow direction of the valve. If the valve is installed backwards, it will not function properly.

Types MA5A3, MA17A3, MA32P3, MA42P3, MA50P3

Avoid the use of excessive amounts of pipe sealing compounds. It will interfere with the valve operation if it comes in contact with the valve's internal parts.

Types B33S2, MB33S2, OB33S2, MA42S3, MA50S3

These valves are supplied with a two piece flange assembly, a semi-steel flange ring and a brass solder bushing. The flange should be placed on the pipe before the bushing is soldered or brazed. The soldering discussion given under "Solder Connections" applies for these valves except where the discussion deals with non-flanged valves only.

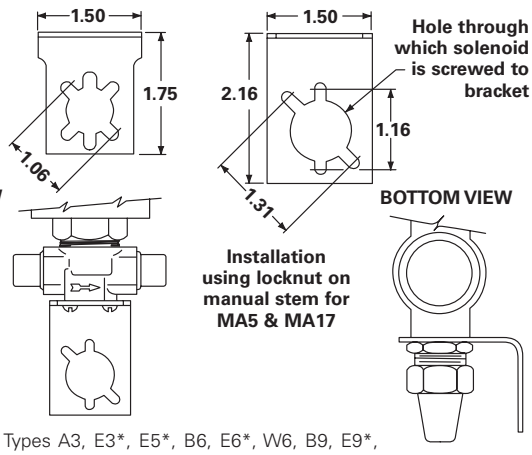
With Types MA42S3 and MA50S3, use the correct flange and bushing that corresponds with its mating flange on the valve to insure correct flow direction.

These valves have male flange connections on the inlet of the valve; therefore, the flange and bushing for the inlet must be the female pair.

INSTALLATION—ALL VALVES

Mounting — A Type 1216-1 universal mounting bracket, Figure 2, is available, when ordered. It fits all standard Sporlan Solenoid Valves except the Types W3, MA32, B33, E33, E34, E42, MA42, MA50, (K)(B)R183, (K)(B)R184, (K)(B)R246 series and the Type 180 Solenoid Pilot Control. The slots in the bracket match the tapped holes in the standard solenoid valves so that they may be secured by two screws supplied with the bracket. A locknut is also furnished for use with Types MA5A3 and MA17A3. Both types of installations are shown in Figure 2. The manual lift stem seal cap is replaced after the locknut is tightened against the bracket.

■ **Figure 2**

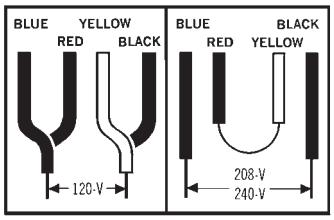


Installation for Types A3, E3*, E5*, B6, E6*, W6, B9, E9*, B10, E10, B14, E14, W14, B19, E19, W19, B25, E25, W25, Series & Types MA5A, MA17A Solenoid Valves.
*Are not supplied standard with mounting holes.

Wiring — Check the electrical specifications of the coil to be sure they correspond to the available electrical service.

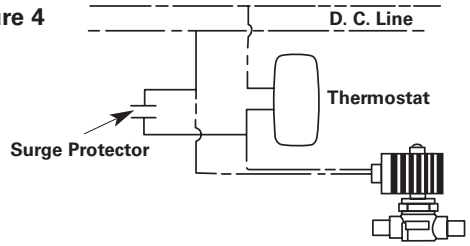
The 1/2" BX conduit connection or junction box on the coil may be rotated to any position by loosening the coil hexscrew. Solenoid valves with four-wire dual voltage coils have a wiring diagram decal, Figure 3, on the coil housing or bracket. This illustrates which wires to connect for either 120, 208 or 240 volt operation. Wiring and fusing (when used) must comply with prevailing local and national wiring codes and ordinances.

■ **Figure 3**



Direct Current Valves — A surge protector is supplied with each solenoid valve with a 115 volt DC coil. The surge protector is necessary to absorb the high counter-voltage generated when the circuit is broken, thereby protecting the electrical contacts of the thermostat. It should be wired as shown in Figure 4.

■ **Figure 4**



TRANSFORMER SELECTION

COIL KIT	24v/50-60c		120v/50-60c		240v/50-60c		Transformer Rating Volt-Amperes
	Current Amperes		Current Amperes		Current Amperes		For 100% of rated MOPD of Valve
	In-rush	Hold-ing	In-rush	Hold-ing	In-rush	Hold-ing	
MKC-1	1.9	.63	.39	.14	.19	.09	60
OMKC-1	1.9	.94	.42	.21	.20	.10	60
MKC-2 OMKC-2	3.1	1.4	.60	.26	.31	.13	100
KC-3	7.9	1.9	1.7	.41	.83	.21	250

SERVICING INSTRUCTIONS

CAUTION — Dangerous hydraulic pressures may develop if a hand valve is installed in the liquid line ahead of the solenoid valve and the hand valve is closed while the solenoid valve is closed. This may cause extrusion of the teflon seat in the disc. Extrusion may cause the valve to fail to open, fail to close and/or have excessive seat leakage. Also the line between these two valves should be pumped down completely before disassembling the solenoid valve for service.

NOTE: The optional manual lift stem is designed to prevent damage to the disc. If the stem is turned in too far, the threads become disengaged. These threads can be re-engaged by applying slight outward force while turning counterclockwise. A thread stop is provided to prevent the stem from backing all the way out of the assembly. Back the stem to the stop and replace the seal cap when service is complete.

TYPICAL MALFUNCTIONS

There are only three possible malfunctions: **1. Coil burnout. 2. Failure to open. 3. Failure to close.** Each is discussed.

1. COIL BURNOUT

Coil burnouts are extremely rare unless caused by one of the following:

1. Improper electrical characteristics.
2. Continuous over-voltage, more than 10%.
3. Under-voltage of more than 15%. This applies only if the operating conditions are such that the reduced MOPD causes stalling of the plunger, which results in excessive current draw.
4. Incomplete magnetic circuit due to the omission of parts such as: coil housing, coil sleeves, coil spring, coil housing bottom plate or plunger on the KC model coil and coil yoke, coil backplate or plunger on the MKC molded model coils.
5. Mechanical interference with plunger movement which may be caused by a deformed enclosing tube.
6. Voltage spike.
7. Valve ambient exceeds 120°F.
8. Fluid or gas temperatures greater than 240°F, while the valve ambient is 120°F.

2. FAILURE TO OPEN (Normally Closed Types)

1. Coil burned out or an open circuit to coil connections.
2. Improper electrical characteristics.
3. In pilot operated valves, dirt, scale or sludge may prevent the piston, disc or diaphragm from lifting. This could also be caused by a deformed body.
4. High differential pressure that exceeds the MOPD rating of the valve.
5. Diameter reduction of synthetic seating material in pilot port because of high temperatures and/or pressures, or severe pulsations. Contact Sporlan Valve Co., Washington, MO.

The problem of dirt can be avoided by installing a Sporlan Catch-All® Filter-Drier upstream from the solenoid valve. The Catch-All® Filter-Drier will retain much smaller particles than a conventional strainer.

Use a Sporlan strainer for water applications upstream of every industrial solenoid valve.

3. FAILURE TO CLOSE

1. Valve is oversized. Pilot operated valves may fail to close due to low pressure drop.
2. In pilot operated valves, dirt, scale or sludge may prevent the piston, disc or diaphragm from closing. This could also be caused by a deformed body.
3. Held open by the manual lift stem.
4. In pilot operated valves only, a damaged pilot port may prevent closing.
5. A floating disc due to severe discharge pulses, contact Sporlan Valve Co., Washington, MO.
6. Have voltage feedback to the coil after the coil de-energizes.

MISCELLANEOUS

1. **Liquid Hammer** — Industrial solenoid valves, or other liquid line valves, may cause liquid hammer when installed on liquid lines with high liquid velocities. If this occurs, it can be minimized by the use of larger pipes, (i.e. lower velocities), or a standpipe installed in the piping near the solenoid valve inlet. Commercially available shock absorbers may also be used to reduce this noise. Recommended maximum velocity is approximately 300 fpm.

2. **AC Hum** — This problem may be caused by a loose coil housing on a KC model coil. On rare occasions this may be caused by loose coil sleeves, in which case deforming them slightly will eliminate the hum. A loose coil hex screw or coil locknut may cause this problem on the MKC molded model coils.

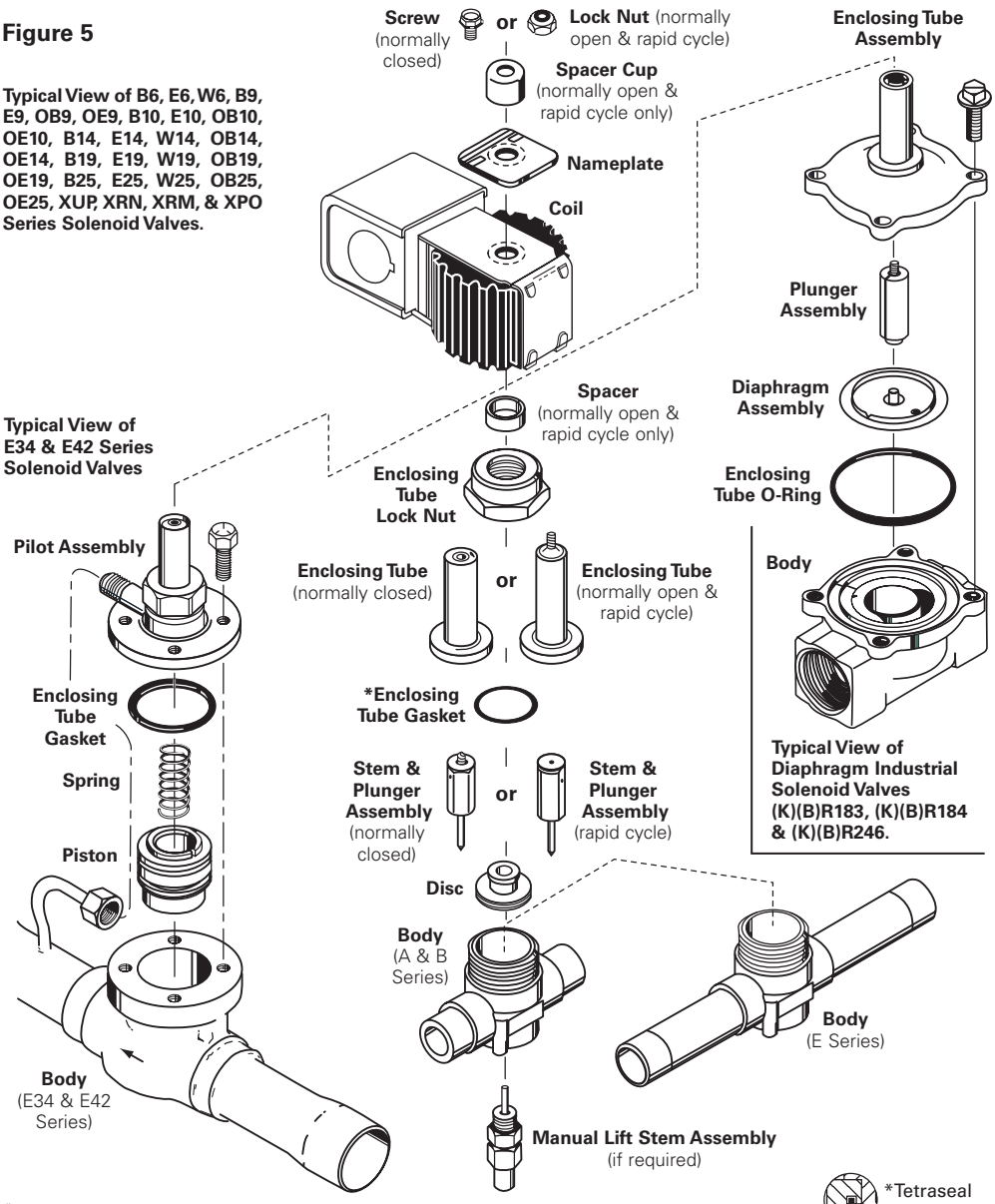
   Foreign material between the magnetic top plug and the plunger in the Types A3, E3, W3, E5, B6, E6, W6, B9, E9, B10, E10, B14, E14, W14, B19, E19, W19, B25, E25, W25, B33, E33, E34 and E42 Series Solenoid valves may cause AC hum also.

   On water applications, deposits may accumulate in the valve which could cause AC hum. This may be eliminated by cleaning or flushing the valve.

3. **Leak Testing** — Special care should be taken when leak testing valves with synthetic gaskets. Gasket materials are slightly permeable. Leak rates of 0.5 oz. per year should be acceptable. Note the sensitivity of electronic leak detectors. Most have the capability of finding a leak smaller than 0.05 oz. per year. Double check small seal leaks with soap bubbles or a halide torch if possible. **Do not over tighten the enclosing tube locknut.** If a leak occurs, change the gasket and verify the metal surfaces have a clean smooth finish.

■ Figure 5

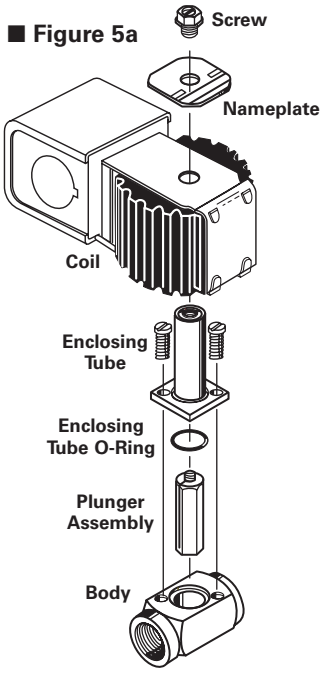
Typical View of B6, E6, W6, B9, E9, OB9, OE9, B10, E10, OB10, OE10, B14, E14, W14, OB14, OE14, B19, E19, W19, OB19, OE19, B25, E25, W25, OB25, OE25, XUP, XRN, XRM, & XPO Series Solenoid Valves.



Typical View of Diaphragm Industrial Solenoid Valves (K)(B)R183, (K)(B)R184 & (K)(B)R246.

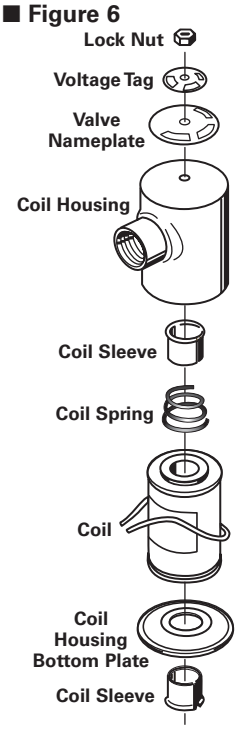
*B and E Series Solenoid Valves have been redesigned. The new design can be easily identified as a thin, synthetic coated metal gasket, known as a Wolverine gasket. The old gasket is a thicker type of O-ring with a square cross section, known as a tetraseal. See the partial cross sections of the valve body at right. The gaskets and the enclosing tubes of the two designs are not interchangeable. The new enclosing tube assembly is included in the replacement parts kits.

■ Figure 5a



Typical View of W3, XOF & XJH Solenoid Valve

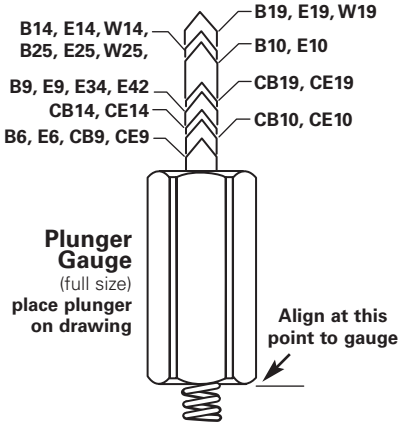
■ Figure 6



Typical View of KC-3 Coil used on valve types: MA5A, MA17A, MA32, MA42 & MA50.

For installation and service instructions on Three-Way Heat Reclaim Valves Type 8D, 12D & 16D, request Form SD-114.

■ Figure 7



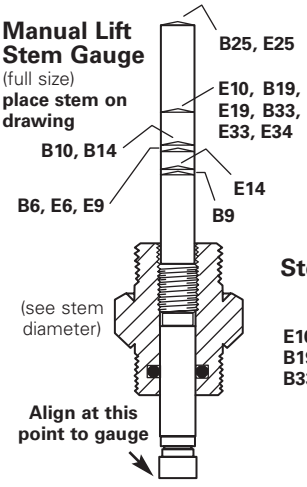


Figure 7 contains a full size plunger gauge, and a manual lift stem gauge for easy identification of parts. Be sure to gauge from the end of the manual lift stem. Do not gauge from the packing gland assembly.

Stem Diameter

.165
E10, B10, E14, B14, B19, E19, B25, E25, B33, E33, E34

.125
E6, B6, E9, B9

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