Solenoid Valves

Types E and E-HP Series – PED Cat. II

Installation and Servicing Instructions
SD-456 / 32019

The Sporlan E and E-HP Series are direct acting or pilot operated solenoid valves. They may be used in the liquid, suction, or discharge gas lines.

EUROPEAN FLAMMABLE REFRIGERANT AND FLAMMABLE ATMOSPHERE COMPLIANCE

The products marked within this Bulletin are designed to be used with A2L, A2, and A3 flammable refrigerants. These products comply with the "Pressure Equipment Directive" (2014/68/EU).

Products bearing the CE mark have been certified to meet the appropriate category requirements. Products falling under Sound Engineering Practice (SEP) have been verified to comply however do not receive the CE mark as stated in the Pressure Equipment Directive referenced above.

All local requirements or codes regarding use of flammable refrigerants in refrigeration and air-conditioning systems must be followed.

GENERAL

1. The Sporlan (O)MKC-1 and (O)MKC-2 solenoid coils are designed to be used with the (O)E and (O)E-HP series solenoid valve, to be installed in refrigeration and air conditioning systems.
2. The ambient temperature range is -40°C (-40°F) to 50°C (120°F) and the fluid temperature range is -40°C (-40°F) to 116°C (240°F).
3. The pressure parameters MOPD and MRP are marked on each valve.

MAINTENANCE, INSTALLATION AND SERVICE

Only authorized persons who are certified in installing and maintaining refrigeration and air conditioning systems containing flammable hydrocarbons must do the installation and maintenance. All local requirements or codes regarding use of hydrocarbons in refrigeration and air conditioning systems must be followed.

The refrigeration or air conditioning system must be designed so no abnormal impact (e.g. vibration, liquid hammer, pressure pulsations) can create risk for damage to the system.

In case of refrigerant leaks, Sporlan electric valves should only be applied to equipment whose final use location complies with EN378.

When replacing parts, ONLY use Sporlan replacement parts.

Parker Hannifin – Sporlan Division takes no responsibility for the classification of the refrigeration and/or air conditioning systems.

SPECIAL CONDITIONS OF USE ⚠ AND SAFETY

1. Electrostatic charge buildup on the coil external surface has to be prevented either during installation or service. If the Sporlan solenoid valve must be handled, do so using a damp cloth in order to avoid electrostatic buildup.
2. Protect the Sporlan solenoid valve and coil against external impact that may cause a spark.
3. The Sporlan solenoid coils should not be energized when removed from the valve. Doing so could cause a coil failure (burnout). To avoid burnout DO NOT SEPARATE SOLENOID COIL FROM VALVE WHEN ENERGIZED.
4. To avoid any possible spark DO NOT SEPARATE THE DIN CONNECTION WHEN ENERGIZED.
5. The use of tools in Zone 2 should be subject to a permit-to-work system.
6. All electrical equipment must be suitably certified for its intended hazardous location and installed/inspected in accordance with the latest edition of EN60079-14 and EN60079-17.

PED NAMEPLATE DATA

Item Number	Type	PS (bar)	TS (°C)	V (L)	DN
4084-63004	E35S190E-34	48.2	-40°C to 116°C	0.3	25
4117-63003	E35S1110E-34	48.2	-40°C to 116°C	0.3	32

APPLICATION INSTRUCTIONS

Nominal Voltage	Frequency	Power (W)		Ambient Temperature (°C)	Permissible Voltage Variation (%)
		(0)MKC-1E	(0)MKC-2E		
24	50	10	15	50	-15%/+10%
120	50	10	15	50	-15%/+10%
220-240	50	10	15	50	-15%/+10%

7. To avoid electrostatic charging, steps must be taken to ensure the equipotential bonding is maintained through all isolated parts. Isolation of conductive parts will cause an ignition hazard.
8. The service (process) temperature shall be limited to a range of -40°C (-40°F) to +115°C (+240°F). The service temperature shall be considered at contact with the solenoid coil and in the process fluid.
9. The solenoid coil shall be protected from ultraviolet light.

INSTALLATION - POSITION AND BRAZING

To ensure peak performance, the Sporlan E and E-HP Series solenoid valves must be selected and applied correctly; however, proper installation precautions are equally important. The following are essential points for correction installation.

A. **Position** – The E and E-HP Series valves may be mounted horizontal, on its side, or in a vertical line. The coil position must be between horizontal and vertical. The direction of flow is indicated by an **arrow** or the word **IN** on the inlet of the valve body.

B. **Soldering Precautions** - The solder connections on the Sporlan E and E-HP Series solenoid valves are copper. 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 soldering operation. Overheating can also be minimized by directing the flame away from the valve body.

Types E Series and E-HP Series (Extended Copper Connections)

The Sporlan E and E-HP Series valves can be brazed into the line without disassembly because the valve contains extended connections. Use caution by placing a wet cloth or chill block around the body at the extensions to prevent excessive overheating.

1. Prior to brazing, remove the coil assembly. The Sporlan solenoid coils should not be energized when removed from the valve. Doing so could cause a coil failure (burnout).
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 the coil screw.

The intended life expectancy of the valve with coil is 500,000 cycles provided the valve and coil are applied and operated within their design intent and the system is free of contaminants.

The date code of the valve is week-year. It is stamped into the bottom of the valve body or on the side of the valve body. The date code for the coil is day-year. It is etched on the coil.

For sizing information, please reference Bulletin 30-10.

INSTALLATION - WIRING

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

TRANSFORMER SELECTION

Coil Kit	24v/ 50c Current Amperes		120v/ 50c Current Amperes		240v/ 50c Current Amperes		Transformer Rating Volt-Amperes
	In-rush	Holding	In-rush	Holding	In-rush	Holding	For 100% of rated MOPD of Valve
MKC-1E	1.9	.63	.39	.14	.19	.09	60
OMKC-1E	1.9	.94	.42	.21	.20	.10	60
MKC-2E OMKC-2E	3.1	1.4	.60	.26	.31	.13	100

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.

TYPICAL MALFUNCTIONS

There are only three possible malfunctions:

- Coil burnout
- Failure to open
- Failure to close

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 (50°C)
8. Fluid or gas temperatures greater than 240°F (115°C), while the valve ambient is 120°F (50°C)

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 Division, 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.

FAILURE TO CLOSE

1. Valve is oversized, pilot-operated valves may fail to close due to a 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 Division, Washington, Mo.
6. Have voltage feedback to the coil after the coil
7. De-energizes

MISCELLANEOUS

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.

AC Hum – This problem may be caused by a loose coil. 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 E Series and E-HP Series Solenoid valves may cause AC hum also.

Leak Testing – Special care should be taken when leak testing valves with synthetic gaskets. Gasket materials typically have a miniscule permeability. Leak rates of 14.7 mL (0.5 oz.) per year, depending on the valve size, is acceptable in most cases. Note the sensitivity of electronic leak detectors. Most have the capability of finding a leak smaller than 1.47 mL (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.

INSTALLATION PRECAUTIONS (Assembly/Disassembly)

1. Do not attempt to disassemble the valve before pumping the system down. Make absolutely certain the pressure in the lines is no more than 0.14 to 0.20 bar (2 or 3 psi) above atmospheric pressure before removing any valve parts (except coil assembly).

2. The solenoid coil must not be energized unless it is installed on the valve. To do so would cause coil to overheat and burn out.
3. The solenoid coil should be fused in accordance with local codes.
4. If additional brazing is required after the system has been charged, additional precautions are necessary. Pump the entire system down and purge the section where brazing is to be done. Do not use a solenoid valve as a safety shut off while making repairs to a system. After reducing the pressure to atmospheric, the valve may be opened and internal parts removed. The area should be vented thoroughly to prevent formation of dangerous fumes which could result from the refrigerant in the presence of an open flame.
5. Make sure the line and/or valve body is cooled sufficiently before reassembly to avoid damage to synthetic materials.
6. If a hand valve is installed ahead of a solenoid valve, it should be closed only to service the system. The hand valve should be opened as soon as the service is complete.

   If the solenoid valve were closed and the hand valve remains closed, trapping liquid between the two, dangerous hydrostatic pressures could result causing bodily injury.
7. Do not twist the valve assembly by pulling or pushing on the enclosing tube or coil assembly.
8. Do not carry a coil assembly or complete valve by the coil leads. This could damage the coil and cause a coil burnout.
9. Pipe type solenoid valves should be disassembled prior to installation if pipe to sweat adapters are to be used for installation.
10. Electrically ground the coil.
11. Before energizing the valve, verify that the supply voltage and frequency matches the solenoid coil marking.

RECOMMENDED TORQUE - Nm (ft.–lbs.)

Valve Series [1]	Enclosing Tube Locknut [2]	Enclosing Tube Screws	Pilot Valve Assembly Locknut	Lower Body Locknut	Coil Screw	Coil Locknut "O" Series	Flange Plate Bolts/ Screws	Flange Connection Assembly	Manual Lift Stem Assembly	Seal Cap	Valve Mounting Position		
											Vertical Line[3]	Horizontal Line	On Side [3]
E2, E3, E5	-	-	-	-	3.1 (2.3)	-	-	-	-	-	Yes	Yes	
E6, E8	13.5-20 (10-15)	-	-	-	3.1 (2.3)	5.4 (4.0)	-	-	15-16 (11-12)	5.4-8.1 (4-6)	Yes	Yes	
E10S1, 0E10S1	27-54 (20-40)	-	-	-	3.1 (2.3)	5.4 (4.0)	-	-	15-16 (11-12)	5.4-8.1 (4-6)	Yes	Yes	
E14, OE14	27-54 (20-40)	-	-	-	3.1 (2.3)	5.4 (4.0)	-	-	15-16 (11-12)	5.4-9.4 (4-7)	Yes	Yes	
E19, OE19	61-68 (45-50)	-	-	-	3.1 (2.3)	5.4 (4.0)	-	-	15-17 (11-13)	5.4-10.8 (4-8)	Yes	Yes	
E25, OE25	81-88 (60-65)	-	-	-	3.1 (2.3)	5.4 (4.0)	-	-	15-17 (11-13)	5.4-10.8 (4-8)	Yes	Yes	
E35, OE35	13.5-20 (10-15)	-	-	-	3.1 (2.3)	5.4 (4.0)	-	-	15-16 (11-12)	5.4-8.1 (4-6)	Yes	Yes	
E43, OE43	13.5-20 (10-15)	-	-	-	3.1 (2.3)	5.4 (4.0)	-	-	15-16 (11-12)	5.4-8.1 (4-6)	Yes	Yes	

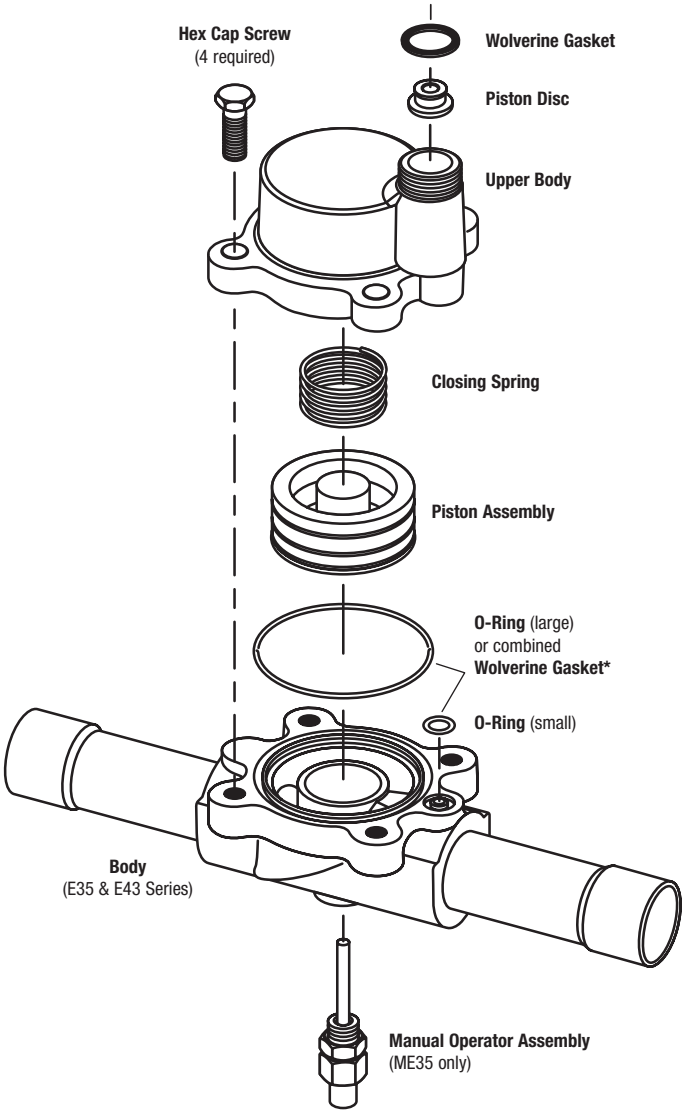
[1] Valves with mounting holes use a No. 8-32 screw torqued not more than 1.7 Nm (15 in.-lb).

[2] Do not over tighten the enclosing tube locknut. Damage to the enclosing tube assembly could result from over tightening.

[3] Coil housing must not be below horizontal. **Note:** Standard ASTM torque charts do not apply.

Figure 1

Typical View of
E35 and E43 Series



* The E35 Series body and upper housing with o-rings (date code 3317 or older) are NOT interchangeable with the E35 Series body and upper housing with Wolverine Gasket (date code 3417 and newer). Interchanging parts for the O-ring and Wolverine gasket designs will result in an external leak.

COILS and INTERNAL PARTS KITS for VALVE TYPE

Valve Series	Replacement Coil Kit Number	Internal Parts Kit Number
E2, E3, E5	MKC-1	None
E6, ME6		KS-E6
OE6	OMKC-1	KS-OE6/OE8
E8, ME8	MKC-1	KS-E8
OE8	OMKC-1	KS-OE6/OE8
E10S1, ME10S1	MKC-1	KS-E10S1
OE10S1	OMKC-1	KS-OE10S1
E14, ME14	MKC-2	KS-E14
OE14	OMKC-2	KS-OE14
E19, ME18	MKC-2	KS-E19
OE19	OMKC-2	KS-OE19
E25, ME25	MKC-2	KS-E25
OE25	OMKC-2	KS-OE25
E35, ME35	MKC-1	KS-E35
OE35	OMKC-1	KS-OE35W
E43, ME43	MKC-1	KS-E43
OE43	OMKC-1	KS-OE43

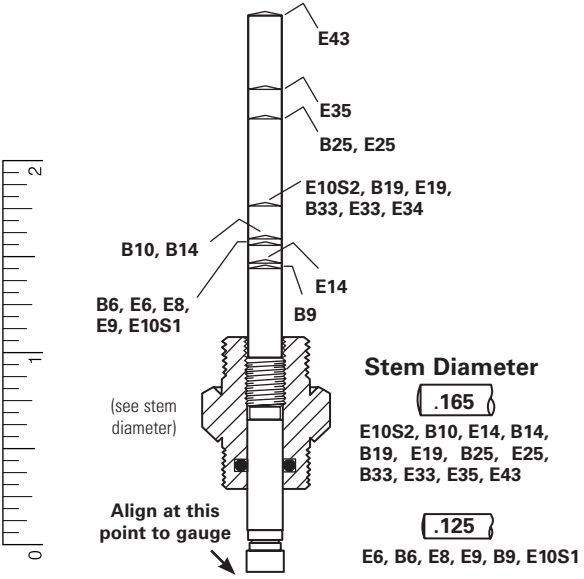
MODEL NOMENCLATURE

Valves	(0)(M)	E10	S	1	5	0	A	E	-HP
Model Option Number	1	2	3	4	5	6	7	8	9

Option Number	Allowable Nomenclature	Description
1	0	Normally Open (optional)
	M	Manually Operated (optional)
	Null	Normall Closed, No Manual Lift Stem
2	E2, E3, E5, E6, E8, E10, E14, E19 or E25, E35, E43	Valve Series
3	S	Connection Type: Solder Connections
4	1	Coil Size: MKC-1E
	2	Coil Size: MKC-2E
5	Number 2 through 9	Fitting Size: 1/8 in. (6.35mm) increments (ex. 2 = 1/4 in., 10 = 2-1/2 in.)
6	0	ODF x ODF Connection Option
	1	ODF x ODM Connection Option
	2	ODM x ODF Connection Option
	3	ODM x ODM Connection Option
7	A	ATEX Certified
8	E	Coil Connection Type: DIN Connection
9	HP	High Pressure Application (optional)
	Null	Stanard Non HP Model

Figure 2

Manual Lift Stem Gauge (full size)
Place stem on drawing



Listed by Canadian Standards Association
Guide-440-A-O File No. 19953

GENERAL PURPOSE SOLENOID VALVES

Basic Valve	Ambient Temp. Rating °C (°F)	Fluid Temp. Rating °C (°F)
E2, E3	50 (120)	115 (240)
E5	50 (120)	115 (240)
E6	50 (120)	115 (240)
E8	50 (120)	115 (240)
E10S1	50 (120)	115 (240)
E14	50 (120)	115 (240)
E19	50 (120)	115 (240)
E25	50 (120)	115 (240)
E35	50 (120)	115 (240)
E43	50 (120)	115 (240)

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FOR USE ON AIR CONDITIONING AND REFRIGERATION SYSTEMS ONLY.

 SD-409 / 32019

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