Installation and Operation Manual
EH70

2/2 Pilot Assisted, Direct Operating Solenoid Valve

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Installation:

The EH70 sizes ½" and ¾" will operate in any orientation. The 1" EH70 may be mounted in any direction, however, not positioning the coil vertical and on top will require some flow and pressure differential to exist in order to guarantee closing. This is due to the heavier internal components. EH70 sizes 1 ½" and 2" must be mounted with the coil vertical and on top for proper operation.

Piping or tubing needs to be adequately supported to prevent strains on the valve body.

It is recommended that the welding of any end connection be performed with the valve internals removed from the valve body. Damage to the seals and gaskets may occur otherwise. Ensure that any weld debris does not enter the valve. Always use mating end connections and seals/gaskets compatible and rated for the fluid pressure and type.

There is no minimum required pressure differential between the inlet and outlet to open the EH70 series valves. When mounted vertically upright with the coil on top, there is no minimum required pressure differential to close all sizes of EH70 valves. If mounted horizontally or upside down, the smaller EH70 valve sizes ½" and ¾" will operate normally. The 1" EH70 will require some fluid flow to guarantee closing. EH70 sizes 1 ½" and 2" should ALWAYS be mounted vertically with the coil on top.

When NPT valve body threads per ANSI/ASME B1.20.1 are used, they require a sealant such as PTFE tape. Follow the sealant manufacturer installation instructions. Some general guidelines are:

- Use only 2 to 3 wraps (max) of PTFE tape around the external thread.
- Looking at the external thread, wrap the PTFE tape clockwise. When the threads are turned together, this will prevent unraveling of the tape.
- Start the tape at least one thread away from the end to eliminate any chance of tape getting in the flow path.
- Do not combine thread sealant and PTFE tape.
- Do not back off a connection simply to adjust orientation. This may break the thread seal.

There are few specifications that cite torque values for NPT threads per ANSI B1.20.1. UL STD 429 – 2003 does make recommendations in Table 27.1. A reputable fitting manufacturer goes as far as to make the statement below:

"As a general rule, pipe fittings with tapered threads should not be assembled to a specific torque because the torque required for a reliable joint varies with thread quality, port and fitting materials, sealant used, and other factors. Where many of these factors are well-controlled, such as particular jobs on an assembly floor, a torque range that produces the desired results may be determined by test and used in lieu of turns count for proper joint assembly."

Due to our agreement with this statement, we err on the side of caution and do not publish installation torque values for NPT threads.

Flange bolt torque is dependent upon bolt and gasket material. Consult with the gasket manufacturer on required compression and corresponding bolt torque. Be sure that these torque values are adjusted if anti-seize compound is used.

Make sure that connecting pipes or tubes are clean and free of particulates. Filters should be sized to catch particulates of 0.016" and larger (40 Mesh).

The moving parts within the valve do not require lubrication. Please do not add any.

Sealing:

Six different valve seat leakage classifications are defined by ANSI/FCI 91-2-2001. All valves must pass a leakage test prior to the leaving Clark Cooper based on the requirements of this specification.

This standard leakage for the EH70 is Class 2. Consult Clark Cooper sales if you have a specific requirement. Other classes are optional.

Class 2 (Allowable Leakage/Min)		
Size	Water (cc)	Air (cc)
0.019	0.01	0.38
0.032	0.01	0.64
0.250	0.10	5.00
0.500	0.20	10.00
0.750	0.30	15.00
1.000	0.40	20.00
1.500	0.60	30.00
2.000	0.80	40.00
2.500	1.00	50.00
3.000	1.20	60.00
4.000	1.60	80.00
6.000	2.40	120.00

Standard

Class 4 (Allowable Leakage/Min)		
Size	Water (cc)	Air (cc)
0.019	0.10	0.04
0.032	0.10	0.06
0.250	0.10	0.50
0.500	0.10	1.00
0.750	0.10	1.50
1.000	0.10	2.00
1.500	0.10	3.00
2.000	0.10	4.00
2.500	0.10	5.00
3.000	0.10	6.00
4.000	0.10	8.00
6.000	0.10	12.00

Optional

Class 5 (Allowable Leakage/Min)		
Size	Water (cc)	Air (cc)
0.019	.1 / 10 Min	0.00
0.032	.1 / 10 Min	0.01
0.250	.1 / 10 Min	0.05
0.500	.1 / 10 Min	0.10
0.750	.1 / 10 Min	0.15
1.000	.1 / 10 Min	0.20
1.500	.1 / 10 Min	0.30
2.000	.1 / 10 Min	0.40
2.500	.1 / 10 Min	0.50
3.000	.1 / 10 Min	0.60
4.000	.1 / 10 Min	0.80
6.000	.1 / 10 Min	1.20

Optional

Table 1 – Sealing Classes

Electrical:

Electrical wiring must conform to the nameplate rating. Wiring, conduit, and conduit connections must comply with National and Local Electrical Codes. The standard solenoid enclosure has a ½" NPT conduit connection. The wire used to connect to the power source should be the same or heavier gauge that the coil wires.

Unless noted otherwise, all solenoids are designed to operate at ±10% of the nominal voltage. Check the valve nameplate for specific voltage and amperage requirements.

When configured with an explosion proof certified coil, the valve units must be permanently mounted and require a conduit seal within 1" of solenoid.

Fuses or circuit breakers are recommended and should be sized according to the coil amperage.

The coil may be re-oriented as described in the Coil Removal/Reorientation section of this manual. Either coil lead can be hot or neutral.

Pipe & Orifice Size	Maximum Inlet Pressure (psig)	C_v	Coil	Voltages Available	Current (amps)
1/2"	1500	3.5	200 Series	24V AC/DC	3.29
3/4"	1200	7.5		120V AC/DC	0.74
1"	1200	13		220V AC/DC	0.44
1 1/2"	1200	25	300 Series	24V AC/DC	4.80
				120V AC/DC	1.00
2"	1200	48		220V AC/DC	0.44

Table 2

Section View:

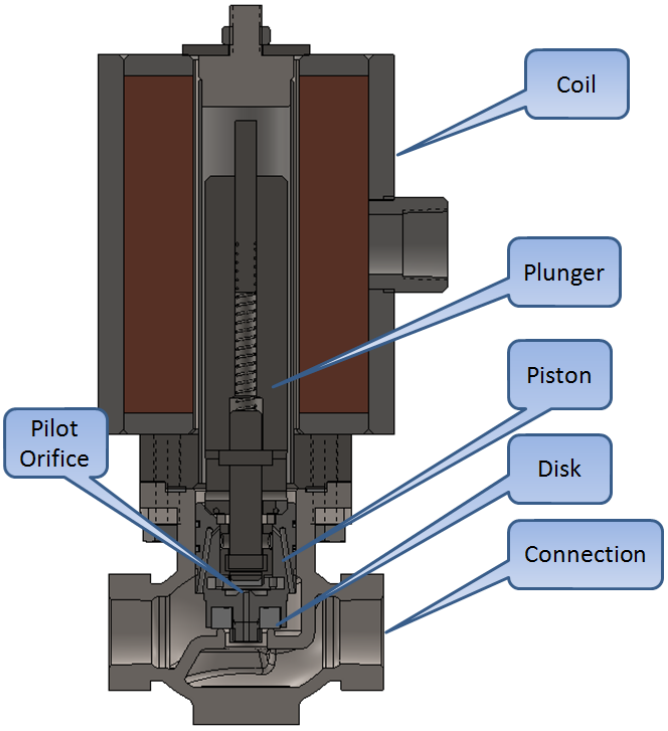

Figure 1 – Cross Section View

EH70 Body to Bonnet Bolt Torque				
Valve Size	**Bolt/Stud Size**	**ASTM A193 Class**	**Socket Size**	**Torque**
½" - ¾"	5/16 - 18	2 (high yield)	1/2"	265 in-lbs
1"	3/8 - 16	2 (high Yield)	9/16"	300 in-lbs
1½" (N/O)	7/16-14	1	5/8"	360 in-lbs
1½" (N/C)	1/2-13	1	3/4"	68 **ft**-lbs
2"	7/16-14	1	5/8"	384 in-lbs

Table 3 – Bonnet bolt torques

Bonnet bolts are installed with a small amount of anti-seize compound appropriate for stainless steel per Table 3.

Coil Removal/Reorientation:

1. Disconnect the power supply.
2. Depressurize a system before trying to remove the valve.
3. Do not pressurize the valve without the coil installed. While the valve is designed to not burst at pressures approaching four times the rated maximum inlet pressure, the coil provides a portion of that inherent strength.
4. If the wires from the coil need to be directed a certain way, loosen the nut on top of the coil before trying to position.
5. To remove the coil, first remove the nut and washer. The coil should easily slide off of the bonnet tube.
6. Do not grab any portion of the bonnet tube with a wrench or pliers.
7. The surface temperature of some coils may be >300°F (!).

Troubleshooting:

1. NEVER attempt to disassemble a valve that is under pressure. This may result is a serious injury or death(!).
2. The valve must be mounted in a horizontal pipe run with the solenoid vertical and on top. Other orientations will prevent proper operation. See Installation section.
3. The valve must be mounted in the correct 'flow direction' as indicated by the arrow on the side of the valve body. The valve should be mounted with the high-pressure side piping at the back of the arrow (inlet) and the low-pressure side piping at the front of the arrow (outlet).
4. This valve will not act as a check valve. It only blocks flow in the direction of inlet to outlet.

5. Foreign matter such as particulates, PTFE tape, pipe dope, etc., can jam moving parts within the valve or clog very small orifices. The result can be a failure to open and/or close completely. See the section on filters/strainers in this manual.
6. The operating pressure must not exceed the pressure rating on the valve nameplate.
7. Verify that the power supplied to the solenoid matches the specification that is displayed on the valve nameplate.
8. The coils on EH70's have diodes, and cannot be checked for continuity with a multimeter. Instead, apply the nameplate voltage, and verify the correct amperage per Table 2.
9. This valve is designed and tested for use with gases, water, and fluids with viscosity similar to water. Viscous fluids may slow or inhibit operation.
10. If bonnet flange leakage is detected, first verify fastener ASTM A193 Class (either 1 or 2). Check fastener torque per Table 3 if Class 2. Consult Clark Cooper engineering if fastener is Class 1. If re-torque does not stop leak, remove fasteners and check for gasket or gasket face damage (scratches), particulates, etc. Consult Clark Cooper engineering thereafter if the gasket does not seal perfectly at maximum rated pressure.

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