CLARK - COOPER DIV.
MAGNATROL VALVE CORPORATION
STANDARD & HIGH PRESSURE SOLENOID VALVES

HIGH PRESSURE SOLENOID VALVES

Installation, Operation and Maintenance Manual

Controls The Flow Of:

- Gases & Liquids Up To 10,000 PSIG
- Natural Gas, Hydrogen, Nitrogen & Other High Pressure Gases
- Cryogenics
- Flammable Liquids & Gases

Technical Manual EH – 1.2

General Information about valve sizing:

Valves with a “Full Port” have an internal seat diameter that is the same as the nominal pipe size, i.e. a 1 inch pipe size valve with a full port has a 1 inch diameter seat. Valves with a “Reduced Port” have an internal seat diameter that is smaller than the nominal pipe size.

The valve’s flow coefficient, Cv, is a value that is determined by flow testing for each valve size. Full port valves will have a higher Cv than reduced port valves. The Cv rating for each valve is listed in the tables found in the valve catalog.

The definition of Cv is the # of gallons of water that will flow through the valve with a 1 PSI pressure differential when the valve is open.

The equations below can be used to determine:

- Flow Rate, given the Cv and ΔP
- Cv, given the Flow Rate and ΔP
- ΔP, given the Flow Rate and Cv

Cv = Valve’s flow coefficient (dimensionless value)
S = Specific Gravity (1.0 for air or water)
T = Absolute Temperature in °R (°R = °F + 460)
P_1 = Inlet Pressure in PSIG
ΔP = Pressure Differential in PSI across valve in the open position
V = Specific Volume in Cubic Feet per Pound

For Liquids:

A

$$GPM = Cv\sqrt{\frac{\triangle P}{S}}$$

B

$$Cv = GPM\sqrt{\frac{S}{\triangle P}}$$

C

$$\triangle P = \left(\frac{GPM}{Cv}\right)^2 (S)$$

For Air and Gasses:

A

$$SCFH = 1360\ Cv\sqrt{\frac{(P_1 + 15)\triangle P}{T\ S}}$$

B

$$Cv = \frac{SCFH}{1360}\sqrt{\frac{T\ S}{(P_1 + 15)\triangle P}}$$

C

$$\triangle P = \left(\frac{T\ S}{P_1 + 15}\right)\left(\frac{SCFH}{1360\ Cv}\right)^2$$

For Steam:

A

$$LB/HR. = 63\ Cv\sqrt{\frac{\triangle P}{V}}$$

B

$$Cv = \frac{LB/HR.}{63}\sqrt{\frac{V}{\triangle P}}$$

C

$$\triangle P = (V)\left(\frac{LB/HR.}{63\ Cv}\right)^2$$

Installation: Before installing the valve, make sure the operating pressure, service and electrical requirements are compatible with your installation. Never apply incompatible fluids or exceed the pressure and temperature rating of the valve. Valve should be installed and maintained by qualified personnel only.

IMPORTANT: Before installing the valve, be sure the system is clean and free from debris that may become lodged inside the valve preventing proper operation.

Valve Orientation:

EH30, EH40 and EH50 valves are designed to operate using a horizontal inlet pipe with the outlet facing downwards and the solenoid on top. EH30 valves that are supplied with the Universal Mount option can be installed in any orientation.

EH70 valves can be installed in any orientation.

The arrow on the valve body indicates the direction of flow.

Pipelines need to be properly supported to prevent strains on the valve body.

IMPORTANT: To protect valve internals and ensure trouble free operation, install a suitable strainer or filter on the inlet side as close to the valve as possible. Follow manufacturer's recommendations for installation and maintenance.

End Connections:

Female Pipe Thread: The use of Teflon® tape, or other appropriate thread sealant, on all pipe thread connections is recommended. Care must be taken to prevent excess tape from entering the valve. For EH70 valves, always use the hexagonal portion of the valve body casting when applying torque or clamping. Never apply torque or pressure to other areas of the valve.

Welded End (EH70 valves only): It is recommended that any end connection requiring welding be performed with the valve internals removed from the valve body. Damage to the seals inside of the valve may occur if temperature rises above 400°F. If necessary, the body may be wrapped with a water soaked rag to help dissipate heat. Ensure that any slag or debris is not allowed to enter the valve.

Flanged, Union or other type end connection: Always use appropriately rated, mating end connections when connecting to the valve. Any seals or gaskets should be made from materials compatible with the fluid or valve service.

Electrical Connections:

Wiring, conduit and conduit connections must comply with National and Local Electrical Codes, as appropriate.

Solenoids that are rated as explosion-proof and are being installed in a hazardous atmosphere must have an explosion-proof, conduit isolation fitting installed no more than 1 inch from the solenoid's conduit connection.

The standard solenoid enclosure has a 1/2" FNPT conduit connection. The solenoid may be rotated 360° to facilitate wiring connections by loosening the top nut, rotating the solenoid to the desired position then re-tightening the top nut.

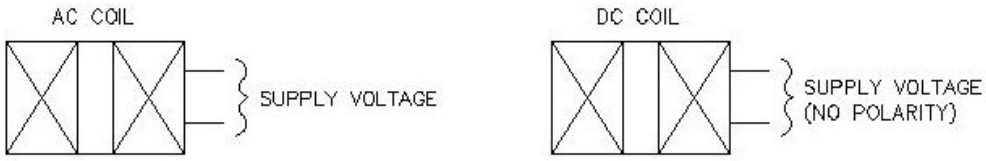
Lead wires supplied with the solenoid are a minimum of 18" long. The wire gauge size is determined by the solenoid's power requirements and is a minimum of 18 AWG. The wire used to connect to the power source should be the same or heavier gauge wire size as the lead wires.

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

Fuses or circuit breakers are recommended and should be sized according to the inrush amperage and holding amperage requirements of the solenoid (see nameplate or contact the factory, phone: 856-829-4580, email: techsupport@clarkcooper.com).

The solenoid should not be cycled continuously more than 4 times per minute, unless it has been designed for a high cycle rate.

Wiring diagram:



CAUTION: During normal operation, the solenoid can become hot. DO NOT touch solenoid during operation. Allow to cool before handling.

IMPORTANT: After the valve has been installed, it is recommended to cycle the valve dry and under normal operating conditions to allow the seals to properly seat under pressure.

Basic Information:

Pilot Operated valves work by opening a small pilot orifice to relieve pressure above the main piston allowing it to open. *Direct Operated* valves pull directly on the piston to open the valve.

EH30 and EH70 Series valves operate from zero PSI up to the rated pressure. EH40 and EH50 Series valves operate from a minimum pressure of 50 PSI and 100 PSI respectively up to the rated pressure.

Note: Pilot orifices and internal bleed holes are relatively small and can become obstructed by particulates in the fluid. Therefore, it is important to run clean fluids through the valve.

All EH Series valves are designed to operate with the fluid flowing in one direction. Fluid flows into the valve above the seat and out of the valve below the seat. The valve will not prevent fluid from flowing in the reverse direction, except for the EH50 Series valve equipped with the optional, integrated check valve which will prevent reverse flow.

Maintenance and Repairs:

It is recommended to periodically inspect the valve to insure that it is operating properly.

If the valve is not functioning properly, it can be returned to the factory for a complete failure analysis. Upon authorization, the valve will be restored to "like new" condition.

The valve can also be repaired by qualified personnel in a properly equipped workshop. In many instances, the valve can be repaired while it is still installed in the pipeline.

DANGER: NEVER ATTEMPT TO DIS-ASSEMBLE A VALVE THAT IS UNDER PRESSURE. THIS MAY RESULT IN SERIOUS INJURY AND/OR DEATH.

These repair and maintenance instructions should be used as a guide. Many Clark-Cooper valves are customized for specific applications. Therefore, these instructions may not provide all the necessary information required to properly service all models.

Solenoid Replacement (EH30, EH40, EH50 and EH70):

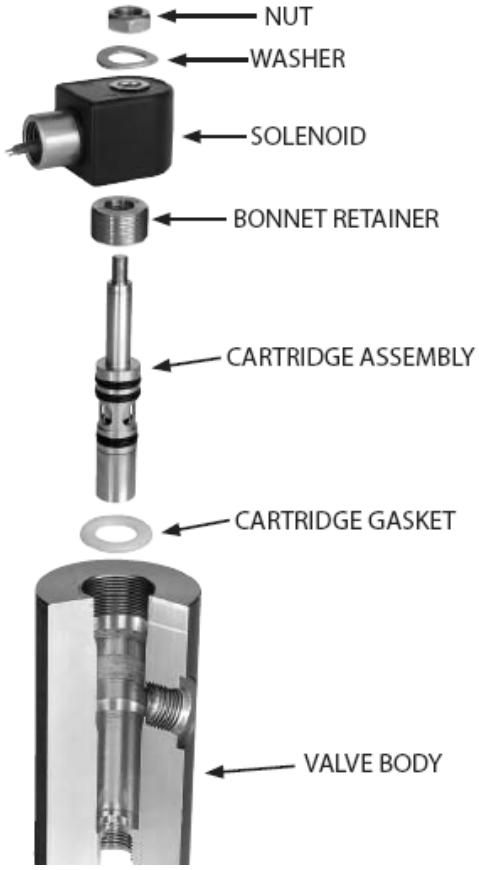
1. Disconnect the solenoid from the power supply.
2. Remove the top solenoid nut and washer.
3. Remove the solenoid and replace with new solenoid.
4. Replace washer and nut.
5. Position the conduit connection as necessary and tighten the nut.
6. Reconnect the power supply.

Piston Assembly Replacement for EH30 valves:

1. Lock out pressure to the valve. The valve inlet and outlet **MUST BE** at atmospheric pressure (0 PSIG) prior to servicing the valve.
2. Disconnect the solenoid from the power supply.
3. Remove the top solenoid nut, washer and solenoid.
4. Remove the Bonnet Retainer using Spanner Wrench (Part # A35801600000).
5. Lift the bonnet off the valve body and remove the piston assembly.
6. Install new piston assembly and replace the body/bonnet o-ring in the groove on the bottom of the bonnet.
7. Re-assemble the bonnet onto the valve body.
8. Screw the bonnet retainer into place and tighten using the spanner wrench.
9. Re-assemble the solenoid, washer and nut onto the bonnet.
10. Position the conduit connection as necessary and tighten the nut.
11. Reconnect the power supply.

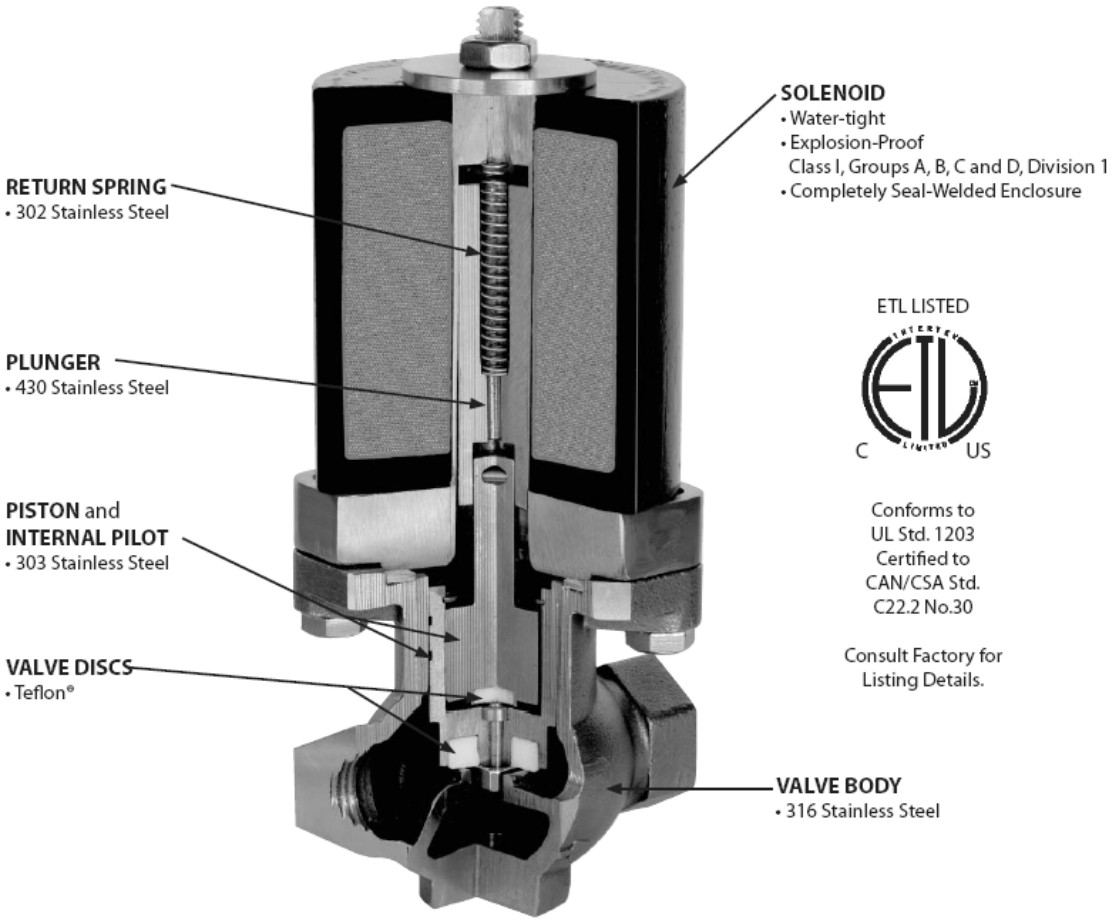
Cartridge Assembly Replacement for EH40 and EH50 valves:
(EH50 valve illustrated below)

1. Lock out pressure to the valve. The valve inlet and outlet **MUST BE** at atmospheric pressure (0 PSIG) prior to servicing the valve.
2. Disconnect the solenoid from the power supply.
3. Remove the top solenoid nut, washer and solenoid.
4. Remove the Bonnet Retainer using Spanner Wrench (Part # A35801600000).
5. Remove Cartridge Assembly and Cartridge Gasket.
6. Install new Cartridge Assembly and Gasket.
7. Screw the bonnet retainer into place and tighten using the spanner wrench.
8. Re-assemble the solenoid, washer and nut onto the bonnet.
9. Position the conduit connection as necessary and tighten the nut.
10. Reconnect the power supply.



Piston Assembly Replacement for EH70 valves:

1. Lock out pressure to the valve. The valve inlet and outlet **MUST BE** at atmospheric pressure (0 PSIG) prior to servicing the valve.
2. Disconnect the solenoid from the power supply.
3. Remove the top solenoid nut, washer and solenoid.
4. Remove the Body/Bonnet bolts.
5. Lift the bonnet off the valve body and remove the piston assembly.
6. Install new piston assembly and replace the body/bonnet gasket in the top of the valve body.
7. Re-assemble the bonnet onto the valve body.
8. Tighten the body/bonnet bolts.
9. Re-assemble the solenoid, washer and nut onto the bonnet.
10. Position the conduit connection as necessary and tighten the nut.
11. Reconnect the power supply.



REQUEST FOR QUOTE

We appreciate the opportunity to quote on your requirements.

For immediate quote: Fill in the information below and CALL 856-829-4580
For same day quote: Fill in the information below and FAX to 856-829-7303
For next day quote: Email your requirements to techsupport@clarkcooper.com or use the Request For Quote form on our website www.clarkcooper.com

YOUR COMPANY INFORMATION

Date: _____

Name: _____ Dept. or Title: _____

Company: _____ Phone: _____

Address: _____ Fax: _____

City: _____ State: _____ Zip: _____ Email: _____

Type of Business: ❑ Resale / Distributor ❑ OEM ❑ End User

VALVE INFORMATION

Quantity: _____ Requested Delivery: _____

Valve Type:
❑ EH30 Series
❑ EH40 Series
❑ EH50 Series
❑ EH70 Series

Flow Designation: *(check one)*
❑ Normally Closed (Energize to Open)
❑ Normally Open (Energize to Close)

Valve Features

Pipe Size: _____

End Connection:
❑ NPT
❑ 150#FL
❑ 300#FL
❑ Other: _____

Solenoid Features

Voltage:
❑ AC _____ Volts ____Hz
❑ DC _____Volts

Enclosure Construction:
❑ Watertight ❑ Explosion Proof
❑ Other: _____

Operating Conditions

Fluid: _____
Max. Op. Press. Diff.: _____
Fluid Temp: _____
Viscosity: _____
Flow Rate or C_v: _____
Max. Press. Drop: _____
Ambient Temp: _____

Options / Application Notes: _____

_____

_____

_____

_____

CONTACT INFORMATION

CLARK-COOPER DIVISION, MAGNATROL VALVE CORPORATION

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