HAYWARD FLOW CONTROL

HAYWARD TRUE UNION SOLENOID VALVES

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

PLEASE READ THE FOLLOWING INFORMATION PRIOR TO INSTALLING AND USING ANY HAYWARD PRODUCT. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PRODUCT DAMAGE, PROPERTY DAMAGE, PERSONAL INJURY, OR EVEN DEATH.

1. Hayward Flow Control (Hayward), a division of Hayward Industries, guarantees its products against defective material and workmanship only. Hayward assumes no responsibility for property damage or personal injury resulting from improper installation, misapplication, or abuse of any product.
2. Hayward assumes no responsibility for property damage or personal injury resulting from chemical incompatibility between its products and the process fluids to which they are exposed. Determining whether a particular PVC, CPVC, or PVDF product is suitable for an application is the responsibility of the user. Chemical compatibility charts provided in Hayward literature are based on ambient temperatures of 70°F and are for reference only.
3. Hayward products are designed for use with non-compressible liquids.

WARNING

Hayward PVC, CPVC, and PVDF products should NEVER be used or tested with compressible fluids such as compressed air or nitrogen. Use of PVC, CPVC, and PVDF products in compressible fluid applications may result in product damage, property damage, personal injury, or even death.

4. The maximum recommended fluid velocity through the solenoid valve is five feet per second (5 ft/s). Higher fluid velocity can result in damage due to the water hammer effect.
5. Piping systems must be designed and supported to prevent excess mechanical loading on Hayward products due to system misalignment, weight, shock, vibration, and the effects of thermal expansion and contraction.
6. The effect of temperature on plastic piping systems must be considered when the systems are initially designed. The pressure rating of plastic systems must be reduced with increasing temperature. Maximum operating pressure is dependent upon material selection as well as operating temperature. Before installing any Hayward product, consult Hayward product literature for pressure vs. temperature curves to determine any operating pressure or temperature limitations.
7. PVC and CPVC plastic products become brittle below 40°F. PVDF plastic products become less ductile below 20°F. Use caution in their installation and operation below these temperatures.

WARNING

Hayward PVC and CPVC products should not be used in services with operation temperatures below 34°F. PVDF products should not be used in services with operation temperatures below 10°F.

8. Due to differential thermal expansion rates between metal and plastic, transmittal of pipe vibration and pipe loading forces, **DIRECT INSTALLATION OF HAYWARD FLOW CONTROL PRODUCTS INTO METAL PIPING SYSTEMS IS NOT RECOMMENDED**. Wherever installation of Hayward product into metal piping systems is necessary, it is recommended that at least 10 pipe diameters in length of plastic pipe be installed upstream and downstream of the product to compensate for the factors mentioned above.
9. Published operating requirements are based on testing of new products using clean water at 70°F. Performance is affected by many factors including fluid chemistry, viscosity, specific gravity, flow rate, and temperature. These should be considered when sizing Hayward products.
10. Systems should always be depressurized and drained prior to installing or maintaining any Hayward product.

WARNING

Failure to depressurize and drain system prior to installing or maintaining any Hayward product may result in product damage, property damage, personal injury, or even death.

11. Always follow your site and/or company procedures for any safety training and/or site specific precautions or warnings in addition to those in this document.

The most recent revision to this document is available at https://www.haywardflowcontrol.com/assets/documents/flowcontrol/pdf/iom/sv-series.pdf

1.0 INSTALLATION:

1.1 Installation Considerations:

Hayward True Union SV Series Solenoid Valves are ON/OFF, fail closed, valves intended for use in process systems requiring an instant ON-OFF actuated valve. The valves are manufactured from PVC (Polyvinyl Chloride), CPVC (Chlorinated Polyvinyl Chloride), or PVDF (Polyvinylidene Fluoride). When the solenoid coil is energized, a magnetic field is created which generates an upward pulling force on the valve piston, causing it to open. When the coil is de-energized (electrical power shut-off) the piston spring, the force of inlet pressure, and the piston seal close the valve. There are limits as to how much force the operator can overcome to operate properly. These limitations are governed by the following:

1. The maximum "pull-in" force generated by the solenoid operator.
2. The inlet pressure of the process, applying forces to both the diaphragm to open the valve and to the piston seal to close the valve.
3. The back pressure, applying forces to both the diaphragm to open the valve and to the piston seal to close the valve.
4. The flowing fluid applying forces to both the diaphragm to open the valve and to the piston seal to close the valve.

Several factors affect the proper selection of solenoid valves, including: Maximum operating pressure; maximum back pressure (25 psig for pressures above 25psig); maximum flow rates (gallons per minute); and maximum line velocity (flow rate below 5 feet per second). Due to the rapid rate at which solenoid valves typically close, high fluid velocity may cause “wave surges” (water hammer) which may ultimately result in a failure of the piping system and/or the solenoid valve diaphragm. Use the guidelines below to estimate water hammer effect.

The following wave surge constants may be used to quickly calculate line pressure rise due to water hammer where: “C” = the wave surge constant from the table below, multiplied by -“V”- the fluid velocity in feet per second. The resultant number is then added to the system operating pressure to determine the resulting wave surge (water hammer effect).

Note: Maximum recommended fluid velocity through the Hayward SV Series Solenoid Valve is five (5) feet per second.

PIPE SIZE	¼"	½"	¾"	1"
CONSTANT	40	35	32	31

INSTALLATION NOTES

1. The valve should be installed in an accessible location. This will allow for ease of inspection or service.
2. The solenoid valve may be installed in a vertical, horizontal or upside down position. **CAUTION** should be taken when servicing, as accumulated fluid may be retained in the valve. ALWAYS drain system before servicing.
3. Reliable electrical line voltage supply must be provided to the coil, per table below. Low line voltage will reduce the operating performance and possibly the service life of the coil.

Voltage	Current	Voltage	Current
12 VAC	1.6 amp	12 VDC	1.6 amp
24 VAC	0.8 amp	24 VDC	0.8 amp
120 VAC	0.16 amp	220 VAC	0.09 amp

4. It is recommended that a Hayward “Y-STRAINER” be installed upstream of the valve to prevent clogging or premature wear of the diaphragm due to suspended solids in the process fluid.

CAUTION

Do not install valve directly to pump outlet. Allow a length of at least 5 pipe diameters between pump outlet and valve.

Do not install valve directly after a reducer / expansion fitting. Install at least 5 pipe diameters from an expansion or reducing fitting.

Pipe must be supported upstream and downstream of the valve. Sound piping system design principles should be applied when installing this valve.

Do not install valve directly into a metal system (see pg. 2). Wherever installation of thermoplastic valves into metal piping systems is necessary, it is recommended that at least 10 pipe diameters in length of thermoplastic pipe be installed upstream and downstream of the thermoplastic valve.

Depending on velocity of fluid through the system, solenoid valves can be the source of water hammer. This needs to be taken into account when designing the piping system.

1.2 Transporting, Storing, and Handling the Valve:

Valve should be stored inside factory packaging until product is ready to be installed. Packaged valve should be stored indoors, at room temperature, and out of direct sunlight. Avoid storing packaged valve in location where packaging may become wet. Valve should be moved as close to installation site as possible prior to removing from packaging. Do not cut through tape on box any more than necessary to avoid damaging valve. After removing valve from carton, care must be taken not to damage valve or to allow debris to enter valve.

1.3 Installing the Valve into a System – Mechanical:

WARNING

System must be depressurized and drained prior to installing valve or performing maintenance. Failure to depressurize and drain system prior to installing or maintaining valve may result in product damage, property damage, personal injury, or even death.

WARNING

Fluid velocity through the SV Series Solenoid Valve should not exceed 5ft/s (1.52m/s). Failure to limit fluid velocity through the valve may result in product damage, property damage, personal injury, or even death.

WARNING

Hayward SV Series Solenoid Valves are uni-directional. There is a flow arrow marked on the valve to indicate proper flow direction. The valve must be installed in the proper orientation or damage to the product, or the system, may occur.

1. Remove valve from packaging.
2. Verify that product is defect free and meets specifications.
3. Remove the nut and end connector by rotating the nuts counter clockwise. Verify end connector o-rings are installed in their respective grooves.
4. Place nut over pipe end so that it can engage the end connector once the end connector is connected to the pipe end.

1.3.1 Threaded End Connectors:

1. Wrap male threads of pipe end with PTFE tape. Proper application of PTFE tape will provide a sufficient seal for PVC, CPVC, and PVDF threaded joints.

WARNING

Do not use "pipe dope", liquid sealant, or thread sealant on any PVC, CPVC, or PVDF threaded connections. Pipe dope and thread sealants may react with the PVC, CPVC, or PVDF weakening the material and potentially resulting in failure of the joint, product damage, property damage, personal injury, or even death.

2. Thread the end connector onto the threaded pipe end until "hand tight". Using a strap wrench only (never use a pipe wrench), tighten the end connector onto the pipe only to the point required to form a seal between the end connector and pipe thread; 1/2 turn past hand tight is typically sufficient to form a seal. **(Caution: Tightening beyond this point may introduce excessive stress that could cause failure of the end connector or the threaded end of the pipe.)**

1.3.2 Solvent-Weld End Connectors (PVC and CPVC only):

CAUTION

Valve center cartridge must be disassembled from nuts and end connectors prior to solvent cementing end connections into system, Avoid exposing valve cartridge and end connector o-rings to primer, solvent cement, or their fumes, as damage to the valve could result.

1. Refer to solvent-cement manufacturer's instructions and cure times.
2. **Do not install valve cartridge until solvent cement has fully cured. (Note, this may take as long as 24 hours.)** Reinstall end connectors by threading nuts onto body by rotating in a clockwise direction.

1.3.3 Socket Fusion-Weld End Connectors (PVDF only):

1. Refer to pipe supplier's procedure or your internal fusion procedure.

1.3.4 Mounting the Valve to a Skid or Panel:

1. Hayward SV Series solenoid valves are equipped with a footpad suitable for mounting the valve to a skid or panel. When mounting, a hex head cap screw should be used with the head of the screw placed inside the hex on the footpad, with the screw threads facing away from the valve, and with nuts and washers on the opposite side of the skid / panel. The nuts should be torqued to 5 in-lb.

CAUTION

Do not allow valve to support weight of pipe or other system components. Footpad is intended only to locate valve and should not be used in place of pipe hangers or other pipe supports.

1.4 Installing the Valve into a System -Electrical:

WARNING

To avoid dangerous and potentially fatal electric shock, turn off power to solenoid valve and disconnect the electrical connector to the coil before installing or maintaining the solenoid valve. Failure to turn off and disconnect power may result in product damage, personal injury, or even death.

ELECTRICAL CONNECTIONS

1. The housing of the solenoid operator is non-metallic and should be connected to GROUND through the Hirschmann Connector. The ground terminal is perpendicular to the (2) two parallel power connectors.

2. The (2) two parallel connectors are to be connected to an appropriate power supply. All connections should be done in accordance with local electrical codes.

3. The "PLUG-ON" connector should be installed onto the coil with the supplied rubber gasket and mounting screw. Polarity of the connections to the two parallel power terminals is unimportant.

4. On A.C. (alternating current) installations the internal components are rated at a maximum of one (1) ampere and should be protected by the control circuit to the operator or an in-line fuse. DO NOT EXCEED ONE (1) AMPERE DRAW THROUGH THE SOLENOID OPERATOR.

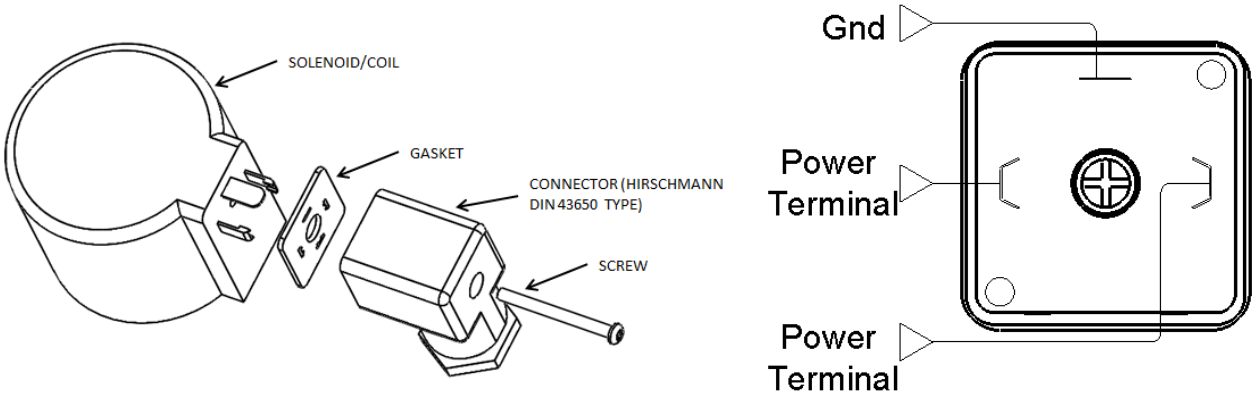


Figure 1. Connector

2.0 OPERATION:

WARNING

Hayward PVC, CPVC, and PVDF products should NEVER be used or tested with compressible fluids such as compressed air or nitrogen. Use of PVC, CPVC, and PVDF products in compressible fluid applications may result in product damage, property damage, personal injury, or even death.

WARNING

The SV Series Solenoid Valve is intended for use in liquid service only. Do not attempt to use this valve for controlling air or gases. Use of this product in air or gas service may result in product damage, property damage, personal injury, or even death.

WARNING

Hayward PVC and CPVC products should not be used in services with operating temperature below 34°F. PVDF products should not be used in services with operation temperatures below 10°F.

WARNING

Fluid velocity through the SV Series Solenoid Valve should not exceed 5ft/s (1.52m/s). Failure to limit fluid velocity through the valve may result in product damage, property damage, personal injury, or even death.

The Hayward Solenoid Valve is rated for 100% duty cycle for continuous ON/OFF/ON cycling operation. The valve can be used in either the closed (electrically de-energized) position, or with an ON-OFF-ON sequence. When operated at 100% duty cycle, the external temperature of the operator can reach approximately 180° F. The valve should not be used in conditions where the coil is energized and held in the open position for extended, or indefinite periods of time.

1. To operate the valve to the open, or energized position, apply power to the coil via electrical system control.
2. To close the valve, de-energize the coil, and the spring will drive the piston to the closed position.

3.0 MAINTENANCE:

WARNING

System must be depressurized and drained prior to installing valve or performing maintenance. Failure to depressurize and drain system prior to installing or maintaining valve may result in product damage, property damage, personal injury, or even death.

WARNING

Make sure the coil has no stored energy, the valve is in fail position, and remove all power from device before performing maintenance.

3.1 Clearing obstruction of the valve port:

Should the orifice of the valve (.405 dia. for 1/4" & 1/2"; .500 dia. for 3/4" & 1" valve) become clogged, the Hayward True Union design allows for quick removal of the valve body for cleaning.

1. Turn off electrical power supply to coil.
2. Shut off all flow in the piping system.
3. Drain all fluid from the piping system and valve. (consult appropriate Saftey Data Sheet data for proper handling of the process fluids)
4. Carefully loosen the bonnet nut connecting the solenoid operator module to the valve body. Remove the bonnet nut with solenoid from the valve body. (NOTE: There is a spring between the solenoid and the cartridge sub-assembly; do not lose the spring.)
5. Remove the cartridge sub-assembly from the valve body by slowly twisting while pulling them apart. (Note: be sure to keep the bonnet o-ring clean for reassembly)
6. Carefully loosen the two (2) union nuts connecting the valve body to the piping system.
7. Remove the two (2) union nuts from the valve body, sliding them onto the adjacent pipe.
8. Carefully remove the valve body from the line.
9. Clean the orifice and internals of the valve as required. Replace cartridge sub-assembly as needed.
10. Reassemble in the reverse order, making sure that spring is in place on the end of the metal core, the bonnet o-ring is clean, and tighten the bonnet nut hand tight only and each of the union nuts. Verify connections have sealed.
11. Turn on electrical supply.

3.2 **Replacing the Cartridge sub-assembly:**

1. Turn off electrical power supply to coil.
2. Shut off all flow in the piping system.
3. Drain all fluid from the piping system and valve. (consult appropriate Saftey Data Sheet data for proper handling of the process fluids)
4. Carefully loosen the bonnet nut connecting the solenoid operator module to the valve body. Remove the bonnet nut with solenoid from the valve body. (NOTE: There is a spring between the solenoid and the cartridge sub-assembly; do not lose the spring.)
5. Remove the cartridge sub-assembly from the valve body by slowly twisting while pulling them apart. (Note: be sure to keep the bonnet o-ring clean for reassembly)
6. Clean the orifice and internals of the valve as required.
7. Install new cartridge sub-assembly.
8. Reassemble in the reverse order, making sure that spring is in place on the end of the metal core, the bonnet o-ring is clean, and tighten the bonnet nut hand tight only and each of the union nuts. Verify connections are sealed.
9. Turn on electrical supply.

3.3 **Replacing the Coil:**

1. Turn off electrical power supply to coil and disconnect the Hirschmann connector from the coil.
2. Shut off all flow in the piping system.
3. Drain all fluid from the piping system and valve. (consult appropriate Saftey Data Sheet data for proper handling of the process fluids)
4. Carefully loosen the bonnet nut connecting the solenoid operator module to the valve body. Remove the bonnet nut with solenoid from the valve body. (NOTE: There is a spring between the solenoid and the cartridge sub-assembly; do not lose the spring.)
5. Install the new coil/bonnet nut sub-assembly by placing the spring into the top of the metal core, placing the coil sub-assembly over the valve body, and tightening the bonnet nut.
6. A new Hirschmann connector is provided with the coil replacement kit. Hayward recommends wiring the new Hirschmann connector to the power supply when a replacement coil is installed. Install the new Hirschmann connector. (see Section 1.4)
7. Connect the new Hirschmann connector to the new coil.
8. Turn on power to the coil and resume operation of the valve.

Visual inspection of the valve DIAPHRAGM or replacement of the SEAL CARTRIDGE is recommended at fifty thousand cycle intervals to assure trouble free operation.

4.0 TROUBLE SHOOTING:

Problem	Cause	Solution
Valve will not open	Incorrect voltage applied to solenoid	Check solenoid and applied voltages
	Connections not installed properly	Check electrical supply and connections
	Inlet pressure is too high	Check inlet pressure does exceed 90psig
	Solenoid coil is burned out	Replace coil
	Valve orifice clogged	Follow procedure from 3.1
Valve will not close	System has a flow restricting device installed downstream inducing high backpressure (i.e. spray nozzle, partially closed valve, etc.)	Remove flow restricting device from system
	Piston face seal is worn	Replace cartridge assembly. See procedure from 3.2
	Valve orifice is clogged	Follow procedure from 3.1
	Valve installed backwards	Re-install valve in correct orientation
	Line velocity too high	Reduce line velocity to 5ft/s or less
	Diaphragm has failed	Replace cartridge assembly. See procedure from 3.2

5.0 PRODUCT SPECIFICATIONS:

CAUTION

Published operating requirements are based on testing of new valves using clean water at 70°F. Valve performance is affected by many factors including fluid chemistry, viscosity, specific gravity, flow rate, and temperature. These should be considered when sizing systems using Hayward products.

WARNING

The maximum recommended system fluid velocity through the SV Series Solenoid Valve is five feet per second (5 ft/s). Higher fluid velocity can create excess water hammer effect, resulting in property damage, personal injury, or even death.

Maximum Operating Pressure: 150 psi @ 70ºF (see Chart 1 for operating pressures at elevated temperatures)

Note that operating pressure is reduced with increasing temperatures.

Maximum Differential Pressure: 90psi

Operating Temperature:

Material	Minimum Operating Temperature	Maximum Operating Temperature
PVC	34°F (1.1°C)	140°F (60.0°C)
CPVC	34°F (1.1°C)	190°F (82.2°C)
PVDF	10°F (-12.2°C)	240°F (115.6°C)

Maximum System Flow Velocity: 5 ft/s (1.5 m/s) for thermoplastic piping systems.

Maximum System Flow Rate: The maximum recommended flow rate (GPM) for the corresponding size in a schedule 80 thermoplastic system that results in a flow velocity of 5ft/s.

Size	Max Flow
1/4” (DN8)	1.2 GPM
1/2” (DN15)	3.8 GPM
3/4” (DN20)	7 GPM
1” (DN25)	11.5 GPM

Flow Capacity; Cv:

Size	Cv
1/4” (DN8)	1.3
1/2” (DN15)	2.3
3/4” (DN20)	3.2
1” (DN25)	3.8

Electrical Coil Rating:

Voltage	Amp Rating	Watt Rating
120VAC	.16 Amps	19.2 Watts
220VAC	.09 Amps	21.6 Watts
12VAC/12VDC	1.6 Amps	19.2 Watts
24VAC/24VDC	0.8 Amps	19.2 Watts

Notes:

1. Coil is UL Recognized and CSA approved.
2. Coil is NEMA 4 rated.
3. Duty cycle of coil is 100% for continuous on/off/on cycling applications.

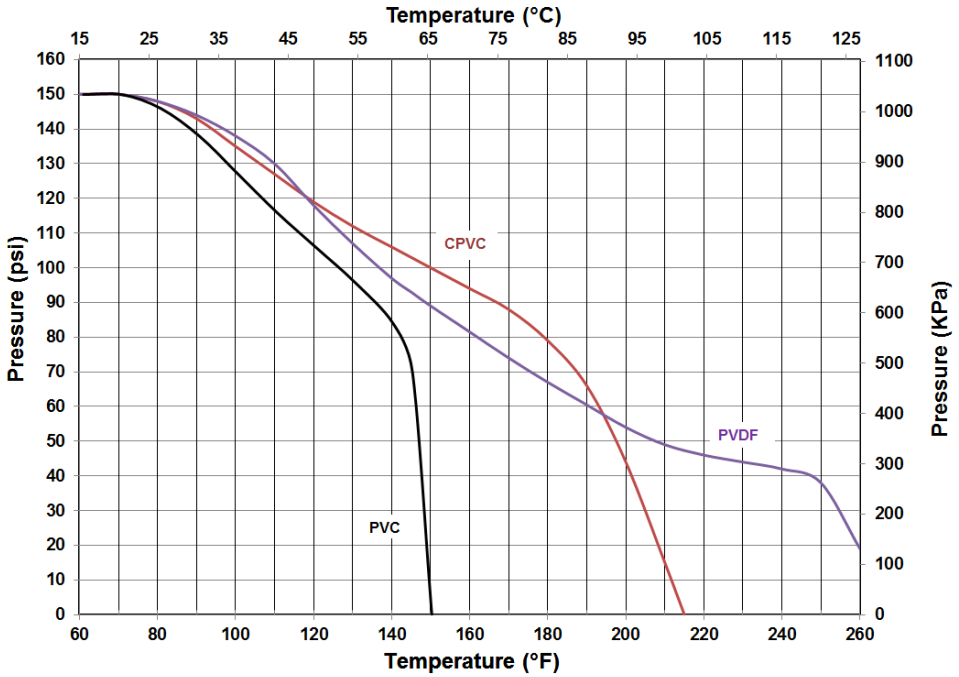
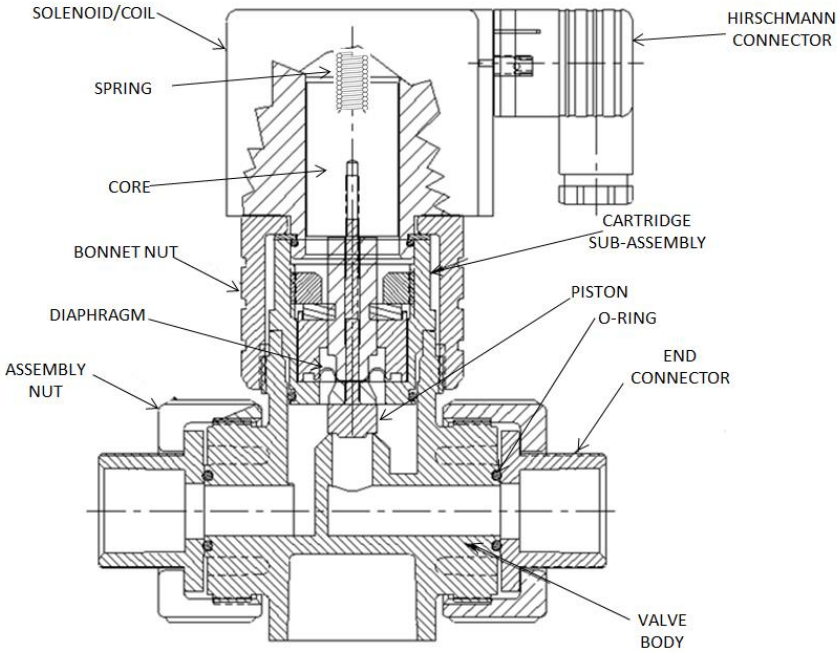
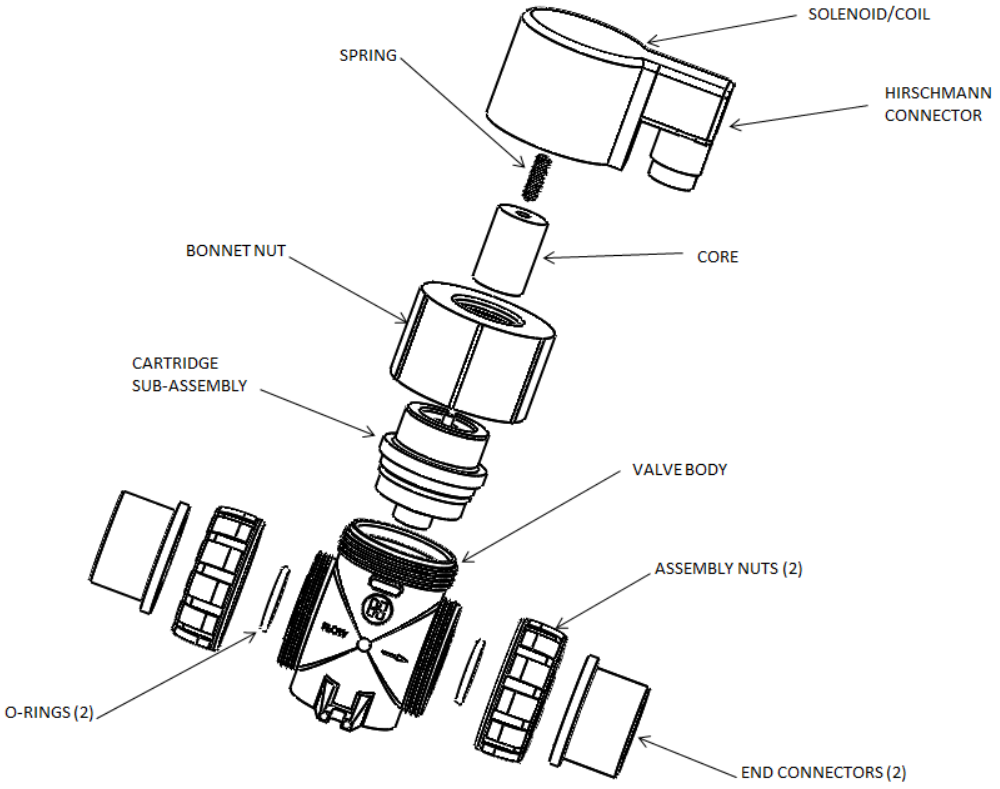


Chart 1: Operating pressures at elevated temperatures for PVC, CPVC, AND PVDF materials.

6.0 PARTS LIST:





7.0 WARRANTY TERMS AND CONDITIONS:

THREE YEAR WARRANTY: All products manufactured by Hayward are warranted against defects in material or workmanship for a period of three years from date of shipment. Our sole obligation under this warranty is to repair or replace, at our option, any product or any part or parts thereof found to be defective. **HAYWARD MAKES NO OTHER REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** The warranty set forth above is the only warranty applicable to Hayward products and in no event shall Hayward be liable for any delay, work stoppage, cartage, shipping, loss of use of equipment, loss of time, inconvenience, loss of profits of any direct or indirect incidental resulting from or attributable to a breach of warranty. **The remedies under this warranty shall be the only remedies available. OUR MAXIMUM LIABILITY SHALL NOT IN ANY EVENT EXCEED THE CONTRACT PRICE FOR THE PRODUCT.**