

# HAYWARD TRUE UNION SOLENOID VALVES

## INSTALLATION, OPERATION, AND MAINTENANCE INSTRUCTIONS

**PLEASE READ THE FOLLOWING INFORMATION PRIOR TO INSTALLING AND USING HAYWARD VALVES, STRAINERS, FILTERS, AND OTHER ASSOCIATED PRODUCTS. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN SERIOUS INJURY.**

1. Hayward guarantees its products against defective material and workmanship only. Hayward assumes no responsibility for damage or injuries resulting from improper installation, misapplication, or abuse of any product.
2. Hayward assumes no responsibility for damage or injury resulting from chemical incompatibility between its products and the process fluids to which they are subjected. Compatibility charts provided in Hayward literature are based on ambient temperatures of 70F and are for reference only. Customer should always test to determine application suitability.
3. Consult Hayward literature to determine operating pressure and temperature limitations before installing any Hayward product. Note that the maximum recommended fluid velocity through any Hayward product is five feet per second. Higher flow rates can result in possible damage due to the water hammer effect. Also note that maximum operating pressure is dependent upon material selection as well as operating temperature.
4. Hayward products are designed primarily for use with non-compressible liquids. They should NEVER be used or tested with compressible fluids such as compressed air or nitrogen.
5. Systems should always be depressurized and drained prior to installing or maintaining Hayward products.
6. Temperature effect on piping systems should always be considered when the systems are initially designed. Piping systems must be designed and supported to prevent excess mechanical loading on Hayward equipment due to system misalignment, weight, shock, vibration, and the effects of thermal expansion and contraction.
7. Because PVC and CPVC plastic products become brittle below 40F, Hayward recommends caution in their installation and use below this temperature.
8. Published operating torque requirements are based upon testing of new valves using clean water at 70F. Valve torque is affected by many factors including fluid chemistry, viscosity, flow rate, and temperature. These should be considered when sizing electric or pneumatic actuators.
9. Due to differential thermal expansion rates between metal and plastic, transmittal of pipe vibration, and pipe loading forces **DIRECT INSTALLATION OF METAL PIPE INTO PLASTIC CONNECTIONS IS NOT RECOMMENDED.** Wherever installation of plastic valves into metal piping systems is necessary, it is recommended that at least 10 pipe diameter in length of plastic pipe be installed upstream and downstream of the plastic valve to compensate for the factors mentioned above.

Hayward True Union plastic solenoid valves are designed for process systems requiring an instant ON-OFF actuated valve. They are designed for "FAIL CLOSE" service and will provide bubble-tight shutoff in the event of an electrical failure. The valves are manufactured from PVC (Polyvinyl Chloride) or CPVC (Chlorinated Polyvinyl Chloride) and will operate safely at pressures and temperatures as shown on the chart below.

The valves are two-way direct acting, normally closed. They can be used for pressurized service to 120 PSIG, vacuum service to 26" HG or drainage applications. They do not require any line pressure to aid in opening or closing. There are no minimum pressure requirements.

The TRUE UNION Design allows for ease of removal from the piping system without having to disconnect any piping or electrical connections.

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

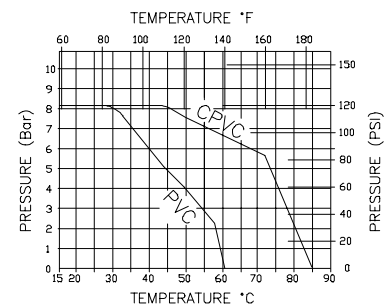
### **FEATURES**

1. UL & CSA approved NEMA IV coil.
2. 100% or Continuous duty cycle operation.
3. TRUE UNION Design: Valve body can be removed without piping or electrical disconnection.
4. Body Mounting Lugs: For laboratory or panel mount.
5. All plastic construction: No metal parts in contact with process fluid.

Voltage	Current	Voltage	Current
12 VAC	1.6 amp	12 VDC	0.8 amp
24 VAC	0.8 amp	24 VDC	0.8 amp
120 VAC	1.6 amp	220 VAC	0.9 amp

### **INSTALLATION**

1. The valve should be installed in an accessible location. This will allow for ease of inspection or service.
2. 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.
3. It is recommended that a Hayward "Y-STRAINER" be installed upstream of the valve to prevent clogging or premature wear of the diaphragms due to suspended solids in the process fluid.



## MOUNTING POSITIONS

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.

## PIPING INSTALLATION

### 1. THREADED CONNECTIONS:

All piping connections should be made using an acceptable PVC sealant to ensure a proper seal. Apply a maximum of (3) three turns of Teflon tape or PVC pipe sealant to the male threads of the pipe. Screw the pipe into the end connector of the valve **HAND TIGHT**. Using a **STRAP WRENCH**, tighten (1/2) one half turn further. Overtightening may damage the end connector.

### 2. SOCKET CONNECTION:

Socket end connections are manufactured to ASTM D2467-87A. Solvent cementing of socket end connections to pipe should be performed per ASTM specifications D2855-87. Cut pipe square. Chamfer and deburr pipe. Surfaces must be cleaned and free of dirt, moisture, oil and other foreign material. Remove assembly nuts and end connectors from valve body. Slide assembly nuts, with threads facing valve, onto pipe to which the end connector is to be cemented. Apply primer to inside socket surface of end connector. Never allow primer or cement to contact valve internal components or end connector o-ring sealing surfaces, as leaking may result. Use a scrubbing motion. Repeat applications may be necessary to soften the surface of the socket. Next, liberally apply primer to the male end of the pipe to the length of the socket depth. Again apply to the socket, without delay apply cement to the pipe while the surface is still wet with primer. Next apply cement lightly, but uniformly to the inside of the socket. Apply a second coat of cement to the pipe, and assemble the end connector to the pipe, rotating the end connector 1/4 turn in one direction as it is slipped to full depth on to the pipe. The end connector should be held in position for approx. 30 seconds to allow the connection to "set". After assembly wipe off excess cement. Full set time is a minimum of 30 minutes at 60 to 100 F. Full cure time should be based on the chart below.

### JOINT CURE SCHEDULE:

The cure schedules are suggested as guides. They are based on laboratory test data, and should not be taken to be the recommendations of all cement manufacturers. Individual manufacturer's recommendations for their particular cement should be followed.

Temperature Range During Cure Period(B) °F(°C)	Test Pressure Sizes 1/2 to 1-1/4 In	
	Up to 180 PSI (1240 kPa)	Above 180 370 PSI (1240 to 2550 kPa)
60 to 100 (15 to 40)	1 h	6 h
40 to 60 ( 5 to 15)	2 h	12 h
20 to 40 ( -7 to 5)	6 h	36 h
10 to 20) (-15 to 7)	8 h	48 h
Colder than 10 (-15)	Extreme care should be exercised on all joints made where pipe, fittings or cement is below 10°F.	

A: It is important to note that at temperatures colder than 20°F on sizes that exceed 3 in., test results indicate that many variables exist in the actual cure rate of the joint. The data expressed in these categories represent only estimated averages. In some cases, cure will be achieved in less time, but isolated test results indicate that even longer periods of cure may be required.

B: These cure schedules are based on laboratory test data obtained on Net Fit Joints (NET FIT=in a dry fit the pipe bottoms snugly in the fitting socket without meeting interference).

### ELECTRICAL CONNECTIONS

**IMPORTANT, Before beginning any electrical connections to the solenoid valve operator, be sure the electrical power to the connection service is off.**

The housing of the solenoid operator is non-metallic and should be connected to **GROUND** through the Hirshmann Connector. THE GROUND TERMINAL IS PERPENDICULAR TO THE (2) TWO PARALLEL POWER CONNECTORS.

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. The "PLUG-ON" connector should be installed onto the coil, using the rubber gasket and mounting screw supplied. POLARITY OF THE CONNECTIONS TO THE POWER TERMINALS IS UNIMPORTANT.

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.**

### OPERATION

The Hayward Solenoid Valve is rated for 100% and **CONTINUOUS DUTY** operation. The valve can be used in either the open (electrically energized) position, or with an **ON-OFF** sequence, cycled as frequently as desired. When operated 100% or **CONTINUOUS DUTY** the temperature of the operator can reach approximately 180° F.

## **HOW IT WORKS:**

The Hayward Solenoid Valve is a TWO-WAY, DIRECT ACTING, NORMALLY CLOSED (fail close) actuated valve. 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) both the piston spring and the force of inlet pressure on the piston seal close the valve. It must be understood that 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. Line velocity (flow rate in gallons per minute) applying forces to both the diaphragm to (Open the valve and to the piston seal to close

PIPE SIZE	1/4"	1/2"	3/4"	1"	1 1/2"	2"
CONSTANT	40	35	32	31	27	25

the valve.

Each solenoid model has unique operating characteristics, making it essential properly select the correct model based on process parameters. MAXIMUM INLET PRESSURE (120 PSIG), MAXIMUM BACK PRESSURE (25 PSIG FOR PRESSURES ABOVE 25 PSIG), MAXIMUM FLOW RATES (GALLONS PER MINUTE) AND MAXIMUM LINE VELOCITY (FLOW RATE BELOW 5

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 LINE VELOCITY IN FEET PER SECOND THE RESULTANT NUMBER IS THEN ADDED TO THE LINE PRESSURE TO DETERMINE THE RESULTING WAVE SURGE (WATER HAMMER EFFECT) MAXIMUM RECOMMENDED FLUID VELOCITY IS FIVE (5) FEET PER SECOND.

FEET PER SECOND). DUE TO THE RAPID RATE AT WHICH SOLENOID VALVES TYPICALLY CLOSE, HIGH LINE VELOCITY MAY CAUSE "WAVE SURGES"(WATER HAMMER) WHICH MAY ULTIMATELY RESULT IN A FAILURE OF THE PIPING SYSTEM AND OR THE SOLENOID VALVE DIAPHRAGMS. See chart below to calculate "WATER HAMMER EFFECT".

## **SERVICING THE VALVE**

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 supply.
2. Shut off all flow in the piping system.
3. Drain all fluid from the piping system and valve. (consult appropriate **MSDS** data for proper handling of the process fluids)
4. Carefully loosen the bonnet nut connecting the solenoid operator module to the valve body.
5. Carefully loosen the two (2) union nuts connecting the valve body to the piping system.
6. Remove the two (2) union nuts from the valve body, sliding them onto the adjacent pipe.
7. Carefully remove the valve body from the solenoid operator, pulling the valve downward until the operator clears the metal solenoid core and spring.
8. Remove the bonnet assembly from the valve body by slowly twisting while pulling them apart. (Note: be sure to keep the bonnet o-ring clean for reassembly)
9. Clean the orifice and internals of the valve as required.
10. Reassemble in the reverse order, making sure that the bonnet o-ring is clean and **HAND TIGHTEN ONLY** each of the union nuts and the bonnet nut.
11. Turn on electrical supply.

## **OPERATION TIPS**

- 1) Be sure that the system is clean before installing the valve. It is recommended that a Hayward Y-STRAINER or BASKET STRAINER be installed upstream of the solenoid valve as insurance against clogging and for extending the life of the diaphragms.
- 2) If the flow requirement of the system is greater than the capacity of the largest Hayward Solenoid Valve, two (2) or more can be installed in parallel, to satisfy the application.
- 3) There is a flow arrow molded into the outside of the valve body, indicating proper installation direction.

## TROUBLE SHOOTING

SHOULD THE SOLENOID VALVE FAIL TO OPERATE AS EXPECTED, CHECK THE FOLLOWING::

### 1. VALVE WILL NOT OPEN:

- a) Check electrical supply and connections. Be sure valve supplied is rated with the correct voltage
- b) Inlet pressure is too high. (exceeds 120 PSIG)
- c) Solenoid coil is burned out. (typically the result fluid leaking into the coil from ruptured diaphragms caused by excessive dirt in the process, or the result of water hammer).
- d) Valve orifice clogged.

### 2. VALVE WILL NOT CLOSE:

- a) System has a flow restricting device installed downstream inducing high backpressure (i.e. spray nozzle, partially closed valve, etc.)
- b) Piston seal is worn. Replace cartridge assembly.
- c) Valve orifice is clogged.
- d) Valve installed backwards. Check flow direction.
- e) Line velocity too high. (exceeds 5 F.P.S.)
- f) Diaphragms failed.

