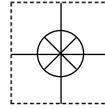


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SVH-141, 142, 143, 144, 145 High Pressure Solenoid Valve



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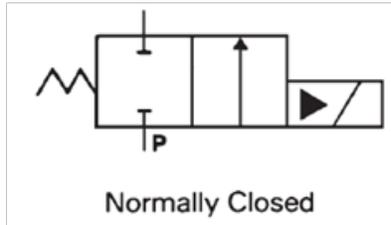
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Product Description:

The OMEGA SVH-14 Series encompasses 2-Way, direct operated, pilot assisted, normally closed solenoid valves with a maximum allowable inlet pressure of 1,500 psi [10.3 MPa]. Maximum allowable differential pressure ($P_{inlet} - P_{outlet}$) depends upon configuration. Since the valve is direct operated, there is zero required minimum differential pressure. The valve is designed for water, non-corrosive liquids and gases, liquids with viscosity approaching that of light oil, hydrocarbon fuels, oxygen, steam, as well as cryogenic liquids.

When the valve is energized, flow occurs from the inlet to outlet. When de-energized, flow stops. The valve will only stop a fluid in the direction of inlet to outlet. P_{inlet} must be greater than or equal to P_{outlet} at all times unless a check valve is installed downstream.



Do not use this valve with dirty fluids, or solutions that will leave large amount of deposits.

Electrical:

Electrical wiring must conform to the nameplate rating. Connect the coil leads to electrical circuit using standard electrical practice. If the coil is located in an inconvenient location, it may be re-oriented as described in the SAFETY section of this manual. Either coil lead can be hot or neutral.

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 the factory based on the requirements of this specification.

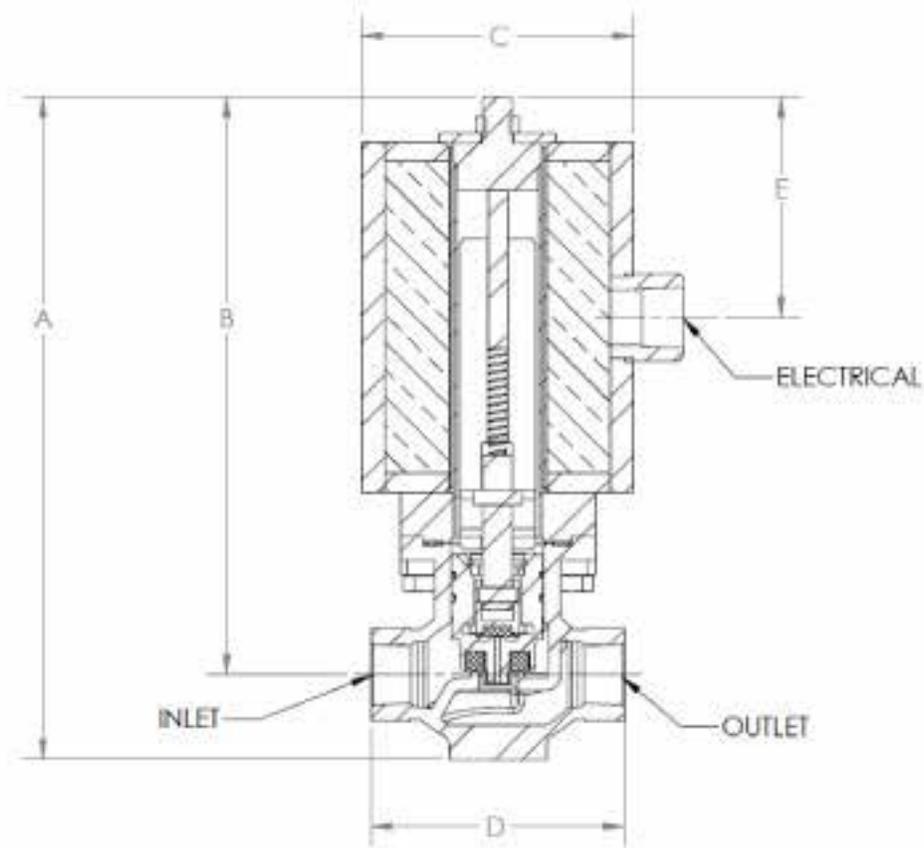
This standard leakage for this product is Class 2.

Class 2 (Allowable Leakage/Min)		
Size	Water (cc)	Air (cc)
0.019	0.08	0.38
0.032	0.13	0.64
0.250	1.00	5.00
0.500	2.00	10.00
0.750	3.00	15.00
1.000	4.00	20.00
1.500	6.00	30.00
2.000	8.00	40.00
2.500	10.00	50.00
3.000	12.00	60.00
4.000	16.00	80.00
6.000	24.00	120.00

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

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

Schematic:



Normally Closed

			Reference Dimensions (inches)				
	Pipe Size	Ship Weight (lbs.)	A	B	C	D	E
SVH-141	½"	15	8.5	7.4	ø 3.5	3.3	2.8
SVH-142	¾"	16	8.8	7.6	ø 3.5	3.5	2.8
SVH-143	1"	18	9.3	7.8	ø 3.5	4.1	2.8
SVH-144	1 ½"	30	11.6	9.8	ø 4.5	4.9	3.3
SVH-145	2"	38	12.4	10.2	ø 4.5	6.0	3.3

Filters:

Foreign matter such as particulates, rust flakes, PTFE tape, pipe dope, etc., can jam moving parts within a solenoid valve, clog the small orifices, or damage softer sealing surfaces. The result can be a failure to open, close, and seal. A strainer/filter with 0.020" gaps or finer is recommended for the SVH-14.

The strainer should be placed upstream (inlet side) and as close to the valve as possible. Be sure to select a model that is safe for the inlet pressure. Size the filter so that the pressure drop across it is acceptable for the flow rate.

Installation:

The SVH-141, 142, 143, and 144 can be mounted in any orientation. The SVH-145 must be mounted vertically with solenoid on top. This is because gravity is used to reset an internal component upon closing.

The NPT valve body threads per ANSI/ASME B1.20.1 require a sealant, such as PTFE tape, by design. 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 eliminate friction trying to unravel the tape.
- Start the tape at least one thread away from the end to eliminate any change of a thread 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 destroy the seal.

There is surprisingly no set specification that dictates exact torque values for taper threads. 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.

Follow the table below for the bolting of flanges:

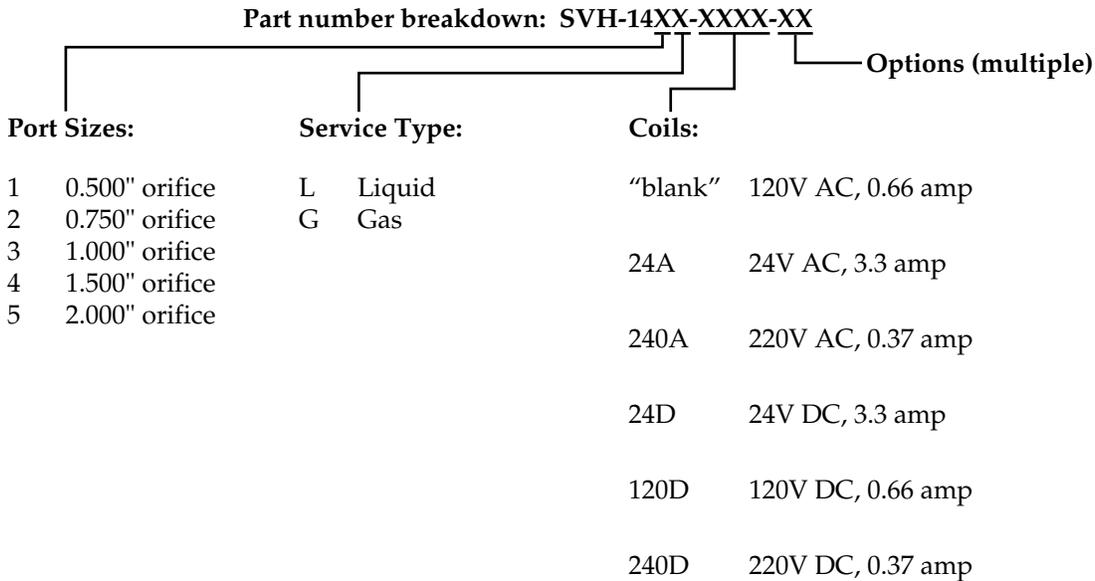
Bolt Size	Hex Head	Torque (ft*lbs) Bronze Flange	Torque (ft*lbs) Stainless Steel Flange
1/4" - 20	7/16"	5	n/a
5/16" - 18	1/2"	10	12
3/8" - 16	9/16"	15	20
7/16" - 14	5/8"	20	32
1/2" - 13	3/4"	30	40

Make sure that connecting pipes or tubes are clean and free of particulates.

Install a filter upstream and close to the solenoid valve (see details in Filter section).

No lubrication is required.

Configurations:



Valve Body Connection:

Standard lead length for all coils is 36". Solenoids have built in rectifiers that allow AC or DC power. Nominal voltages are shown above. Voltage supplied should not exceed ±10% of the nominal value.

Pressures:

Maximum Allowable Differential Pressure (psi)	
SVH-141	1,500
SVH-142	1,200
SVH-143	1,200
SVH-144	1,200
SVH-145	1,200

There is no minimum pressure differential required on the SVH-14 Series.

The SVH-14 was designed per ASTM B16.34. However, the inlet pressure should NEVER be allowed to exceed 1,500 psi.

Open/Close times will depend upon the differential pressure and fluid. The response time is typically less than 0.5 seconds, and is significantly faster towards the high end of the allowable differential pressure.

Materials:

- Valve Body – 316 stainless Steel
- Bonnet Tube – 304 and 430 stainless Steel
- Piston – 303 stainless steel
- Other wetted components – 302, 303, PTFE
- Various spring materials are available
- Durlon 8500 or 9000 gasket

Flow Rate:

The flow rate of a fluid through a valve is a function of the inlet and outlet conditions, liquid or gas properties, and properties of the specific valve. Pressure, temperature, and piping geometry are inlet and outlet conditions. Pertinent liquid properties are composition, density, vapor pressure, viscosity, surface tension, and thermodynamic critical pressure. Pertinent gas properties are composition, density, and ratio of specific heats. Valve characteristics such as flow path, valve travel, and of course size influence flow rate. ANSI/ISA-75.01-1985 (R1995) provides equations to approximate flow.

Through a standard test procedure, a Valve Flow Coefficient "Cv" can be assigned to a particular valve. This coefficient can then be used to approximate flow rates with reasonable accuracy for different fluids and gases at any inlet and outlet conditions. Cv is essentially the number of gallons of water that will flow through a particular valve in 1 minute at exactly 1.0 psi of differential pressure between the inlet and outlet.

	Orifice Diameter (inches)	Cv
SVH-141	0.50	3.5
SVH-142	0.75	7.5
SVH-143	1.00	13
SVH-144	1.50	25
SVH-145	2.00	48

The flow rate through an SVH-14 valve can be **approximated** as follows:

P1 = Inlet Pressure (psi)

P2 = Outlet Pressure (psi)

C_v = Valve flow coefficient (no units)

SG = Specific Gravity (no units) at standard conditions

For a gas:

Calculate P_{Critical} = 0.53*P1

For a constant P1, flow will increase as P2 decreases until reaching P_{Critical}

As P2 falls below P_{Critical}, no further increase of flow rate occurs.

If P2 > P_{Critical}:

$$Q_m = C_v * \sqrt{\frac{P * (P1 - P2)}{SG}} * \sqrt{\frac{520}{T}} \quad \text{SCFM (14.7 psi and 60° F)}$$

If P2 < P_{Critical}:

$$Q_m = C_v * \frac{P1}{\sqrt{2 * SG}} * \sqrt{\frac{520}{T}} \quad \text{SCFM}$$

For a liquid:

$$Q = C_v * \sqrt{\frac{P1 - P2}{SG}} \quad \text{gal/min}$$

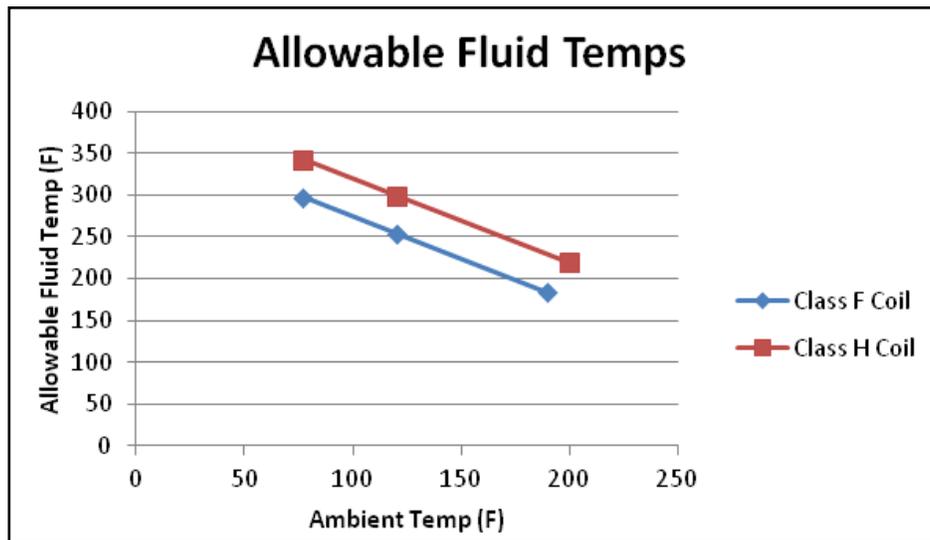
Operating Temperatures:

Solenoids can get very hot from normal usage. The high temperature limit of the SVH-14 Series valve is based upon the coil wire insulation. If the temperature limit is exceeded, permanent and self-perpetuating damage will result. The wire insulation is rated for 200° C.

As solenoid coil wire temperature rises, electrical resistance goes up and less current flows. Since pull force of a solenoid is directly proportional to amperage, a solenoid operating at its upper temperature limit may produce less pull force.

Valves powered by both AC and DC coils may be cycled frequently because there is no in-rush current, as normally seen with AC coil. The diode bridge rectified supplies DC current to the coil.

The SVH-14 can be used with 400° F fluids. For applications utilizing the high end of the temperature range (or slightly beyond) with large flow rates, extensively test the valve to ensure proper functioning.



If the coil is only being powered intermittently for short periods of time, the allowable fluid temperature is 400°F when in an ambient temperature of 77°F.

AC powered coils experience a current "inrush" upon each energize cycle. The number of allowable energize cycles per minute is dependent upon fluid and ambient temperature. It is strongly advised to use DC coils if frequent cycling (>5 time per minute), particularly if fluid temperatures are elevated.

There are other factors not taken into account for maximum allowable fluid temperature. It is suggested that if a fluid temperature is going to be near the high limit, the application should be thoroughly tested to ensure a robust design.

Safety:

Depressurize a system before trying to remove the valve.

Do not remove the coil from the valve and pressurize. While the valve is designed to not burst at pressures approaching four times the rated maximum inlet pressure, the coil actually provides a portion of that inherent strength.

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. Do not grab any portion of the bonnet tube with a wrench or pliers. Doing so can damage the tube, loosen the retainer causing leakage, or damage an o-ring.

The surface temperature of some coils may be >250 degrees Fahrenheit (!) when running hot fluids and held in the energized state.

Troubleshooting:

The SVH-145 valve must be mounted in a horizontal pipe run with the solenoid vertical and on top. All other configurations allow any orientation.

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).

This valve will not act as a check valve. It only blocks flow in the direction of inlet to outlet.

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. Filters/strainers with a mesh size around 0.020" are recommended.

The operating pressure must not exceed the pressure rating on the valve nameplate.

Verify that the power supplied to the solenoid matches the specification that is displayed on the valve nameplate.

Check the coil leads for continuity. If there is no continuity or no resistance at all, you will need to replace the coil.

Regulators mounted upstream from the valve can cause problems. Regulators should be mounted downstream.



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
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OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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