1 YEAR
WARRANTY

OMEGA®

User's Guide

Shop online at omega.com®

e-mail: info@omega.com
For latest product manuals:
www.omegamanual.info

ISO 9001
CERTIFIED
CORPORATE QUALITY
STAMFORD, CT

SVH-111 / SVH-112
High Pressure Solenoid Valves

omega.com info@omega.com

Servicing North America:

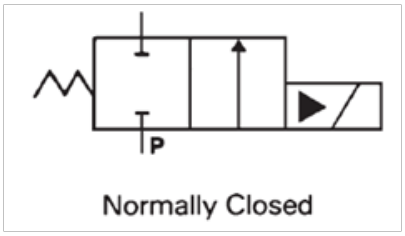
U.S.A.: Omega Engineering, Inc., One Omega Drive, P.O. Box 4047
Stamford, CT 06907-0047 USA
Toll-Free: 1-800-826-6342 (USA & Canada only)
Customer Service: 1-800-622-2378 (USA & Canada only)
Engineering Service: 1-800-872-9436 (USA & Canada only)
Tel: (203) 359-1660 Fax: (203) 359-7700
e-mail: info@omega.com

For Other Locations Visit omega.com/worldwide

Product Description:

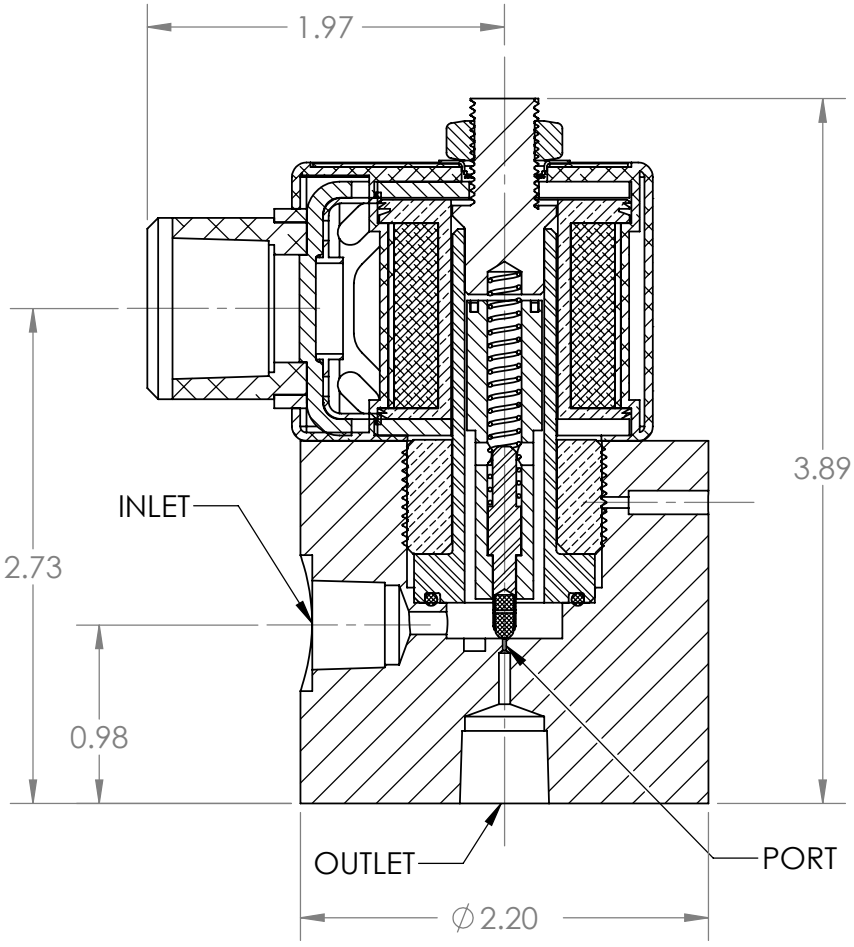
The OMEGA SVH-11 Series encompasses 2-Way, direct acting, normally closed solenoid valves with a maximum allowable inlet pressure of 10,000 psi [68.9 MPa]. Maximum allowable differential pressure (Pinlet – Poutlet) depends upon the configuration. The valve will open and close with zero differential pressure. It can be used with gases, water, non-viscous liquids, hydrogen, and cryogenics.

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. It does not stop fluid from moving in the reverse direction, i.e. P_{inlet} must be greater than or equal to P_{oulet} at all times.



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

Schematic:



Normally Closed

Configurations:

Part number breakdown: SVH-11X-XXXX-XX

Options (multiple)

Port Sizes:		**Coils:**	
1	0.019" Orifice	"blank"	120V AC 22 W for normally closed, Temperature Class H
2	0.032" Orifice		
		240A	240V AC 22 W for normally closed, Temperature Class H
		24A	24V AC 22 W for normally closed, Temperature Class H
		12D	12V DC 22 W for normally closed, Temperature Class H
		24D	24V DC 22 W for normally closed, Temperature Class H
		120D	120V DC 22 W for normally closed, Temperature Class H

Standard lead length for all coils is 18". Explosion Proof coils are available with NEMA Type 7 & 9 protection.

Standard coils including integrated DIN connector, have NEMA type 1, 2, 3, 4, and 4x protection.

Valve Body Connections:

¼-18 NPT per ANSI/ASME B1.20.1 at the inlet and outlet.

Pressures:

Maximum Allowable Differential Pressure (psi) For Normally Closed Valve		
	AC Coil	DC Coil
SVH-111	10,000	5,000
SVH-112	4,000	2,000

Maximum Allowable Differential Pressure (psi) For Normally Open Valve		
	AC Coil	DC Coil
SVH-111	7,500	5,500
SVH-112	3,500	2,500

There is no minimum pressure differential requirement on the SVH-11 valve.

The SVH-11 was designed to withstand pressures approaching four times maximum allowable inlet pressure at room temperature without bursting. However, the inlet pressure should NEVER be allowed to exceed 10,000 psi. In actual usage, the connections would begin to leak far below the burst pressure.

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 – 316 and 430 Stainless Steel
Piston - Polyether ether ketone
Other wetted components – 302, 303, and 430 stainless, PTFE, copper (AC powered only)

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 "C_V" 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. C_V 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 (in)	Approximate C_V
SVH-111	0.019	0.005
SVH-112	0.032	0.020

The flow rate through an SVH-11 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 PCritical = 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:

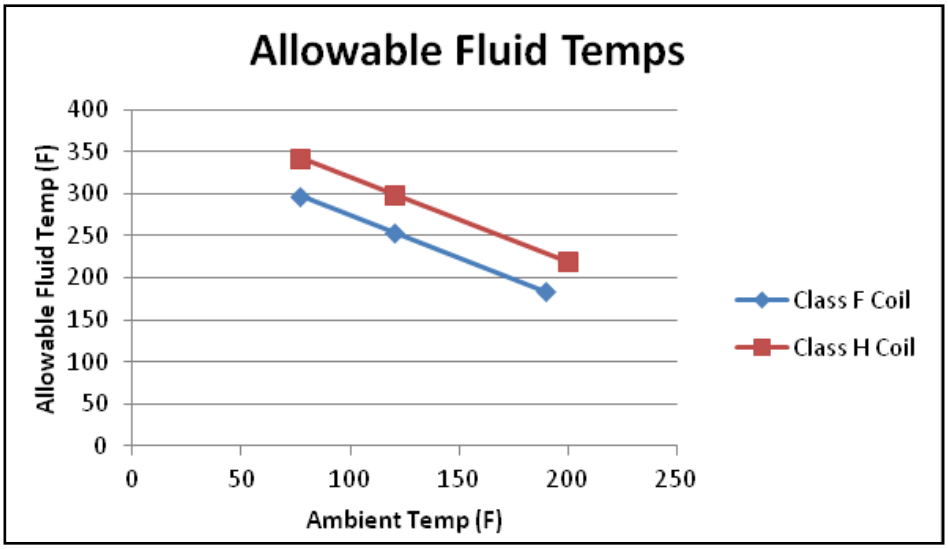
$$Q = C_V * \sqrt{\frac{P1 - P2}{SG}} \quad \text{gal/min}$$

Operating Temperatures:

Solenoids will get very hot from normal usage (>250°F). The high temperature limit of the valve is based upon the coil wire insulation. If the temperature limit is exceeded, permanent and self-perpetuating damage will result.

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.

The 22 watt coils are temperature Class H. The 10 watt coils are temperature Class F. The charts below give guidelines for allowable fluid temperature for a given ambient temperature assuming that the coil is being held in the energized state.



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.

Installation:

The SVH-11 must be mounted in the vertical orientation with the coil on top. This is because gravity is used to reset an internal component upon closing.

The ¼-18 NPT valve body threads per ANSI/ASME B1.20.1 require a sealant, such as OMEGA PTFE tape, by design. Do not use an excessive amount on the inlet, as this may go into the valve and cause problems. After applying 175 in*lbs of torque to the NPT connection, pressurize and look for leaks. Re-tighten slightly if necessary.

Make sure that connecting pipes are clean.

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

No lubrication is required.

Filters:

Foreign matter such as particulates, rust flakes, PTFE tape, pipe dope, etc., can jam moving parts within a solenoid valve, clog the small orifice, or damage softer sealing surfaces. The result can be a failure to open, close, and seal. A strainer/filter with 60 mesh (0.009" gaps) or finer is recommended for the SVH-11.

The strainer should be placed upstream (inlet side) and as close to the valve as possible.

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

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 plyers. Doing so can damage the tube, loosen the retainer causing leakage, or damage an o-ring.

The surface temperature of some coils may be around 300 degrees Fahrenheit (!) when running hot fluids and held in the energized state.

Troubleshooting:

1. The valve must be mounted in a horizontal pipe run with the solenoid vertical and on top. Other orientations will prevent proper operation.

2. 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).

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

4. 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. 60 mesh (0.009" opening) filters/strainers are recommended.

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

6. Verify that the power supplied to the solenoid matches the specification that is displayed on the valve nameplate. Valves cannot be converted from DC to AC or AC to DC by simply changing the coil.

7. Check the coil leads for continuity. If there is no continuity or no resistance at all, you will need to replace the coil. A jammed plunger can cause coil burnout. Replacing the coil may temporarily cure the symptom but not the actual cause.

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

9. This valve is designed and tested for use with gases, water, and fluids with viscosity similar to water.

10. If chatter or buzzing is ever noticed, remove power and consult customer service. This could indicate jammed components and could eventually burn out a coil or fatigue sealing surfaces.

MADE IN USA

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.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

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
3. Repair instructions and/or specific problems relative to the product.

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.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

Shop online at omega.com℠

TEMPERATURE

- ☑ Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- ☑ Wire: Thermocouple, RTD & Thermistor
- ☑ Calibrators & Ice Point References
- ☑ Recorders, Controllers & Process Monitors
- ☑ Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- ☑ Transducers & Strain Gages
- ☑ Load Cells & Pressure Gages
- ☑ Displacement Transducers
- ☑ Instrumentation & Accessories

FLOW/LEVEL

- ☑ Rotameters, Gas Mass Flowmeters & Flow Computers
- ☑ Air Velocity Indicators
- ☑ Turbine/Paddlewheel Systems
- ☑ Totalizers & Batch Controllers

pH/CONDUCTIVITY

- ☑ pH Electrodes, Testers & Accessories
- ☑ Benchtop/Laboratory Meters
- ☑ Controllers, Calibrators, Simulators & Pumps
- ☑ Industrial pH & Conductivity Equipment

DATA ACQUISITION

- ☑ Data Acquisition & Engineering Software
- ☑ Communications-Based Acquisition Systems
- ☑ Plug-in Cards for Apple, IBM & Compatibles
- ☑ Data Logging Systems
- ☑ Recorders, Printers & Plotters

HEATERS

- ☑ Heating Cable
- ☑ Cartridge & Strip Heaters
- ☑ Immersion & Band Heaters
- ☑ Flexible Heaters
- ☑ Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- ☑ Metering & Control Instrumentation
- ☑ Refractometers
- ☑ Pumps & Tubing
- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments

M-5387/0414