

VOG Series

VOG15.01xU1 Oil Safety Shut-off Valves with Proof of Closure (POC)



Oil Safety Shutoff Valve

Description

The VOG15 is an electro-hydraulically actuated three-way oil valve designed to provide safety shut-off control for industrial and commercial burner applications. The normally closed port on the valve is rated for safety shut-off function and the normally open port located on the bottom of the valve is typically used for recirculation of heavier oils. A 3/4-inch NPT pipe plug (provided) must be used in the bottom port for two-way applications.

The compact VOG15 actuator opens slowly when power is applied and closes in less than a second when power is interrupted. A visible position indicator on the front of the actuator displays position, and a light indicates when the actuator is powered.

Features

- UL listed, FM approved, CSA certified, ISO 9001 and ISO 14001 certified.
- Proof of Closure (POC) with Over Travel
- UL listed as watertight in the vertical position
- Visual position indication
- "Power on" indication light
- Quick connect wiring terminals
- Optional auxiliary switch available
- Actuator can be rotated 360° with respect to valve for easy field wiring and installation.
- Low, 20 VA power consumption.

Application

The VOG15 is designed to be used as a two- or three-way valve on industrial and commercial burners firing No. 2 to No. 6 fuel oil having a maximum viscosity of 5,000 SSU.

Product Numbers

Table 1.

Product Number	Operating Voltage (VAC)	Proof of Closure Switch	Auxiliary Switch ¹	Type of Switch
VOG15.012U1	110/120	x	x	SPDT, SPDT
VOG15.011U1		x	–	SPDT

1. Switches cannot be field installed.

Specifications

As a safety shut-off valve

UL 429, FM 7400, CSA C22.2 No.139

Agency approvals

Power supply

Operating voltage 110/120 VAC
 Operating frequency 50/60 Hz
 Power consumption 20 VA Max
 Duty cycle Continuous

Operating Environment

Ambient operating temperature 15°F to 140°F
 Maximum Oil Temperature 300°F
 Maximum Oil Pressure 300 PSIG
 Maximum Differential Pressure 300 PSID
 Maximum Oil Viscosity 5000 SSU (1087 cST)
 Mounting Position Any position except upside down *
 * Watertight in Vertical Position Only

Physical Characteristics

Actuator Aluminum, Plastic
 Valve
 Body Forged brass
 Stem and Seat Stainless steel
 Seal PTFE
 Packing Viton + PTFE
 Thermal Barrier High temperature glass reinforced plastic
 Assembly Weight 4.5 lb

Connections

Piping Connections 3/4" NPT (3/4" x 1/2" NPT bushings provided)
 Conduit connections Two 1/2-inch NPSM (for flexible conduit only)
 Electrical connection Spring loaded terminals for up to 14 AWG wires

Operating characteristics

Stroke 0.26 inch
 Opening time (full open) < 7 seconds *
 Closing time (full closed) < 1 second
 Flow characteristics
 With common Fuel Oils See Table 2a, 2b ,3a, 3b
 Cv (single valve) 4.4
 Cv (two valves piped in series) 3.1
 * Opening times will increase at actuator temperatures below 35 °F

Auxiliary features

Proof of closure switch Non-adjustable
 Auxiliary switch Non-adjustable, changes state at > 80% stroke
 Switch rating (POC and Aux) 6A/250 Vac resistive

Operation

The electro-hydraulic actuator consists of a cylinder filled with oil, a piston containing an electric oscillating pump, and a relief system. When power is supplied to the actuator, the relief system closes, and the pump moves the piston downward in the cylinder, opening the oil valve. When power to the actuator is interrupted, the relief system opens and the oil valve closes in less than one second.

A position indicator, visible through the transparent portion of the terminal cover, shows the entire stroke range of the actuator. The oil valve only uses about 1/4-inch of the actuator's stroke. A light, which is visible through the lower left transparent portion of the terminal cover, indicates when the actuator receives power. A non-adjustable SPDT POC over travel switch signals the valve closed position after the oil valve has closed. If equipped, an SPDT auxiliary switch changes state when the oil valve is more than 80% open.

Installation

**WARNING:**

- Personal injury or loss of life may occur if you do not follow procedures as specified.
- All installations must be performed by qualified personnel only.
- **DO NOT** use the actuator as a wrench when piping the oil valve. If a large enough force is applied to the actuator, the thermal barrier can be broken. **ALWAYS** use a wrench on the provided valve body wrench flats when piping the oil valve.
- The actuator meets NEMA 4 requirements when mounted in the vertical position and liquid tight conduit is used.
- The actuator has two knock-outs for the installation of 1/2"-14 NPSM conduit connectors.
- Flexible conduit must be used. Hard conduit (EMT or Rigid Type) is not permitted.
- The VOG15 is shipped with three 3/4" NPT to 1/2" NPT bushings and one 3/4" NPT plug. The bushings are included to adapt the valve ports to 1/2" NPT if necessary, and the 3/4" NPT plug must be installed in the oil valve's bottom port for two-way operation.
- Use suitable pipe thread sealant on all piping connections.

Wiring and Switches

(See *Terminal Designations*)

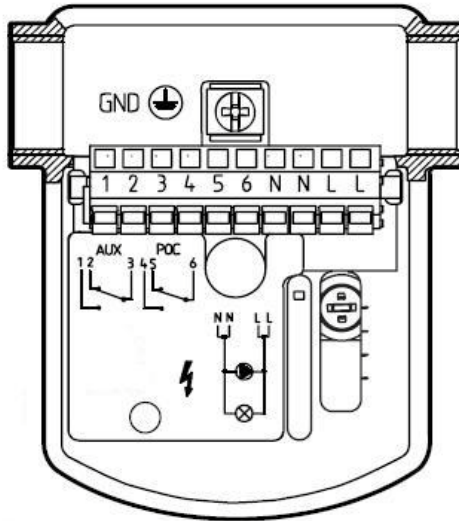
- The actuator is equipped with spring-loaded terminals for 14 AWG wires.
- The terminal marked GND, located above the wiring terminals, must be connected to the electrical ground.
- The two "L" terminals are interconnected and the two "N" terminals are interconnected. The second "L" terminal and the second "N" terminal are intended as a convenient wiring point for a second oil valve.
- Insert one wire into the opening of the terminal while pressing the lever downward with a screwdriver or hard object. Make sure that all strands insert into the opening.
- Wiring must meet all relevant electrical codes.

- NOTES:**
1. The Auxiliary Switch is not adjustable. This switch changes state when the oil valve is > 80% open.
 2. The Auxiliary Switch must not be used for proof of closure detection or other safety interlock functions.
 3. The Proof of Closure Switch is non-adjustable.

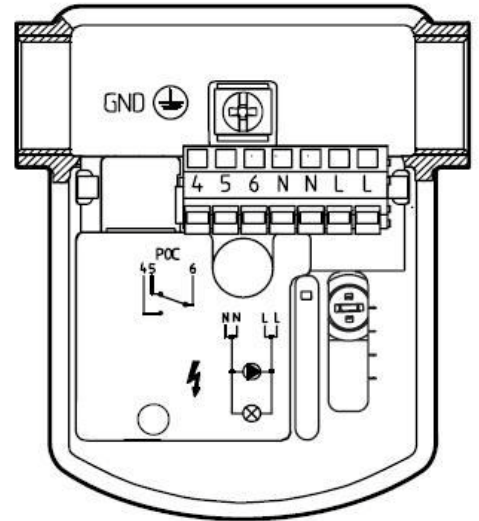
Service

There are no serviceable parts on the VOG15.01xU1 series oil valves. If damaged or inoperative, replace the entire oil valve assembly. Tag wires before replacing VOG15.

Terminal Designations



VOG15.012U1



VOG15.011U1

Terminals:

1. Auxiliary switch NO
2. Auxiliary switch NC
3. Auxiliary switch Common
4. Proof of closure switch NO
5. Proof of closure switch NC
6. Proof of closure switch Common

- L = Line (terminals internally connected)
N = Neutral (terminals internally connected)

Figure 1. Terminal Designations.

Table 2a. Sizing a Single Oil Valve for No. 2 Oil.

Approximate flow of No. 2 oil (Degrees API = 34, Specific Gravity @ 60°F = 0.86, Heating Value = 141,000 BTU/GAL)													
Temp (°F)	20		40		60		80		100		120		
Viscosity (SSU)	57		47		40		38		34		33		
Specific Gravity	0.87		0.86		0.86		0.85		0.84		0.83		
	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	
DP Across 1 Oil Valve - PSID Valve Cv = 4.4	2	363.4	51.2	375.5	52.9	388.2	54.7	394.0	55.5	407.8	57.5	409.8	57.8
	4	513.9	72.5	531.0	74.9	549.0	77.4	557.1	78.6	576.7	81.3	579.5	81.7
	6	629.4	88.7	650.3	91.7	672.4	94.8	682.4	96.2	706.3	99.6	709.8	100.1
	8	726.7	102.5	750.9	105.9	776.5	109.5	787.9	111.1	815.6	115.0	819.6	115.6
	10	812.5	114.6	839.5	118.4	868.1	122.4	880.9	124.2	911.8	128.6	916.3	129.2
	15	995.1	140.3	1028.2	145.0	1063.2	149.9	1078.9	152.1	1116.8	157.5	1122.2	158.2
	20	1149.1	162.0	1187.3	167.4	1227.7	173.1	1245.8	175.7	1289.5	181.8	1295.8	182.7
	25	1284.7	181.1	1327.4	187.2	1372.6	193.5	1392.9	196.4	1441.7	203.3	1448.8	204.3
	30	1407.3	198.4	1454.1	205.0	1503.6	212.0	1525.8	215.1	1579.3	222.7	1587.1	223.8
	35	1520.1	214.3	1570.7	221.5	1624.1	229.0	1648.0	232.4	1705.9	240.5	1714.2	241.7
	40	1625.0	229.1	1679.1	236.8	1736.2	244.8	1761.8	248.4	1823.7	257.1	1832.6	258.4
	45	1723.6	243.0	1781.0	251.1	1841.6	259.7	1868.7	263.5	1934.3	272.7	1943.7	274.1
50	1816.8	256.2	1877.3	264.7	1941.2	273.7	1969.8	277.7	2038.9	287.5	2048.9	288.9	

Table 2b. Sizing a Single Oil Valve for No. 6 Oil.

Approximate flow of No. 6 oil (Degrees API = 15, Specific Gravity @ 60°F = 0.96, Heating Value = 151,000 BTU/GAL)													
Temp (F)	200		220		240		260		280		300		
Viscosity (SSU)	125		90		79		60		56		46		
Specific Gravity	0.92		0.91		0.90		0.89		0.89		0.88		
	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	
DP Across 1 Oil Valve - PSID Valve Cv = 4.4	2	316.6	47.8	328.8	49.6	336.0	50.7	352.6	53.2	360.7	54.5	372.5	56.2
	4	447.7	67.6	464.9	70.2	475.1	71.7	498.6	75.3	510.0	77.0	526.7	79.5
	6	548.3	82.8	569.4	86.0	581.9	87.9	610.7	92.2	624.7	94.3	645.1	97.4
	8	633.1	95.6	657.5	99.3	671.9	101.5	705.2	106.5	721.3	108.9	744.9	112.5
	10	707.9	106.9	735.1	111.0	751.2	113.4	788.4	119.1	806.5	121.8	832.9	125.8
	15	866.9	130.9	900.3	136.0	920.0	138.9	965.6	145.8	987.7	149.1	1020.0	154.0
	20	1001.1	151.2	1039.6	157.0	1062.4	160.4	1115.0	168.4	1140.5	172.2	1177.8	177.9
	25	1119.2	169.0	1162.3	175.5	1187.8	179.4	1246.6	188.2	1275.1	192.5	1316.9	198.8
	30	1226.1	185.1	1273.3	192.3	1301.1	196.5	1365.6	206.2	1396.8	210.9	1442.6	217.8
	35	1324.3	200.0	1375.3	207.7	1405.4	212.2	1475.0	222.7	1508.7	227.8	1558.1	235.3
	40	1415.7	213.8	1470.3	222.0	1502.4	226.9	1576.8	238.1	1612.9	243.5	1665.7	251.5
	45	1501.6	226.7	1559.4	235.5	1593.6	240.6	1672.5	252.5	1710.7	258.3	1766.8	266.8
50	1582.8	239.0	1643.8	248.2	1679.8	253.6	1762.9	266.2	1803.3	272.3	1862.3	281.2	

Table 3a. Sizing Two Oil Valves for No. 2 Oil – Valves Piped in Series.

Approximate flow of No. 2 oil (Degrees API = 34 , Specific Gravity @ 60°F = 0.86, Heating Value = 141,000 BTU/GAL)													
Temp (°F)	20		40		60		80		100		120		
Viscosity (SSU)	57		47		40		38		34		33		
Specific Gravity	0.87		0.86		0.86		0.85		0.84		0.83		
	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	
DP Across 2 Oil Valves - PSID Cv of two valves (in series) = 3.1	2	256.0	36.1	264.5	37.3	273.5	38.6	277.6	39.1	287.3	40.5	288.7	40.7
	4	362.1	51.0	374.1	52.7	386.8	54.5	392.5	55.3	406.3	57.3	408.3	57.6
	6	443.4	62.5	458.2	64.6	473.8	66.8	480.8	67.8	497.6	70.2	500.1	70.5
	8	512.0	72.2	529.1	74.6	547.1	77.1	555.1	78.3	574.6	81.0	577.4	81.4
	10	572.5	80.7	591.5	83.4	611.6	86.2	620.6	87.5	642.4	90.6	645.6	91.0
	15	701.1	98.9	724.4	102.1	749.1	105.6	760.1	107.2	786.8	110.9	790.7	111.5
	20	809.6	114.1	836.5	117.9	865.0	122.0	877.7	123.8	908.5	128.1	913.0	128.7
	25	905.1	127.6	935.2	131.9	967.1	136.4	981.3	138.4	1015.8	143.2	1020.7	143.9
	30	991.5	139.8	1024.5	144.5	1059.4	149.4	1075.0	151.6	1112.7	156.9	1118.2	157.7
	35	1071.0	151.0	1106.6	156.0	1144.3	161.3	1161.1	163.7	1201.9	169.5	1207.7	170.3
	40	1144.9	161.4	1183.0	166.8	1223.3	172.5	1241.3	175.0	1284.8	181.2	1291.1	182.0
	45	1214.4	171.2	1254.8	176.9	1297.5	182.9	1316.6	185.6	1362.8	192.2	1369.4	193.1
50	1280.0	180.5	1322.6	186.5	1367.6	192.8	1387.8	195.7	1436.5	202.5	1443.5	203.5	

Table 3b. Sizing Two Oil Valves for No. 6 Oil – Valves Piped in Series.

Approximate flow of No. 6 oil (Degrees API = 15 , Specific Gravity @ 60°F = 0.96, Heating Value = 151,000 BTU/GAL)													
Temp (F)	200		220		240		260		280		300		
Viscosity (SSU)	125		90		79		60		56		46		
Specific Gravity	0.92		0.91		0.90		0.89		0.89		0.88		
	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	GPH	BTU/HR x 10 ⁶	
DP Across 2 Oil Valves - PSID Cv of two valves (in series) = 3.1	2	223.0	33.7	231.6	35.0	236.7	35.7	248.4	37.5	254.1	38.4	262.4	39.6
	4	315.4	47.6	327.6	49.5	334.7	50.5	351.3	53.0	359.4	54.3	371.1	56.0
	6	386.3	58.3	401.2	60.6	410.0	61.9	430.3	65.0	440.1	66.5	454.5	68.6
	8	446.1	67.4	463.3	70.0	473.4	71.5	496.8	75.0	508.2	76.7	524.8	79.3
	10	498.7	75.3	517.9	78.2	529.3	79.9	555.5	83.9	568.2	85.8	586.8	88.6
	15	610.8	92.2	634.3	95.8	648.2	97.9	680.3	102.7	695.9	105.1	718.7	108.5
	20	705.3	106.5	732.5	110.6	748.5	113.0	785.6	118.6	803.5	121.3	829.8	125.3
	25	788.5	119.1	818.9	123.7	836.8	126.4	878.3	132.6	898.4	135.7	927.8	140.1
	30	863.8	130.4	897.1	135.5	916.7	138.4	962.1	145.3	984.1	148.6	1016.3	153.5
	35	933.0	140.9	969.0	146.3	990.2	149.5	1039.2	156.9	1063.0	160.5	1097.8	165.8
	40	997.4	150.6	1035.9	156.4	1058.5	159.8	1110.9	167.8	1136.4	171.6	1173.6	177.2
	45	1057.9	159.7	1098.7	165.9	1122.7	169.5	1178.3	177.9	1205.3	182.0	1244.8	188.0
50	1115.2	168.4	1158.1	174.9	1183.5	178.7	1242.1	187.6	1270.5	191.8	1312.1	198.1	

NOTE: Calculations for two valves piped in series are based on a Cv = 3.1. This Cv was experimentally determined by using a 5" long 3/4" schedule 40 pipe nipple between the two shut-off valves.

Dimensions

(Dimensions in inches)

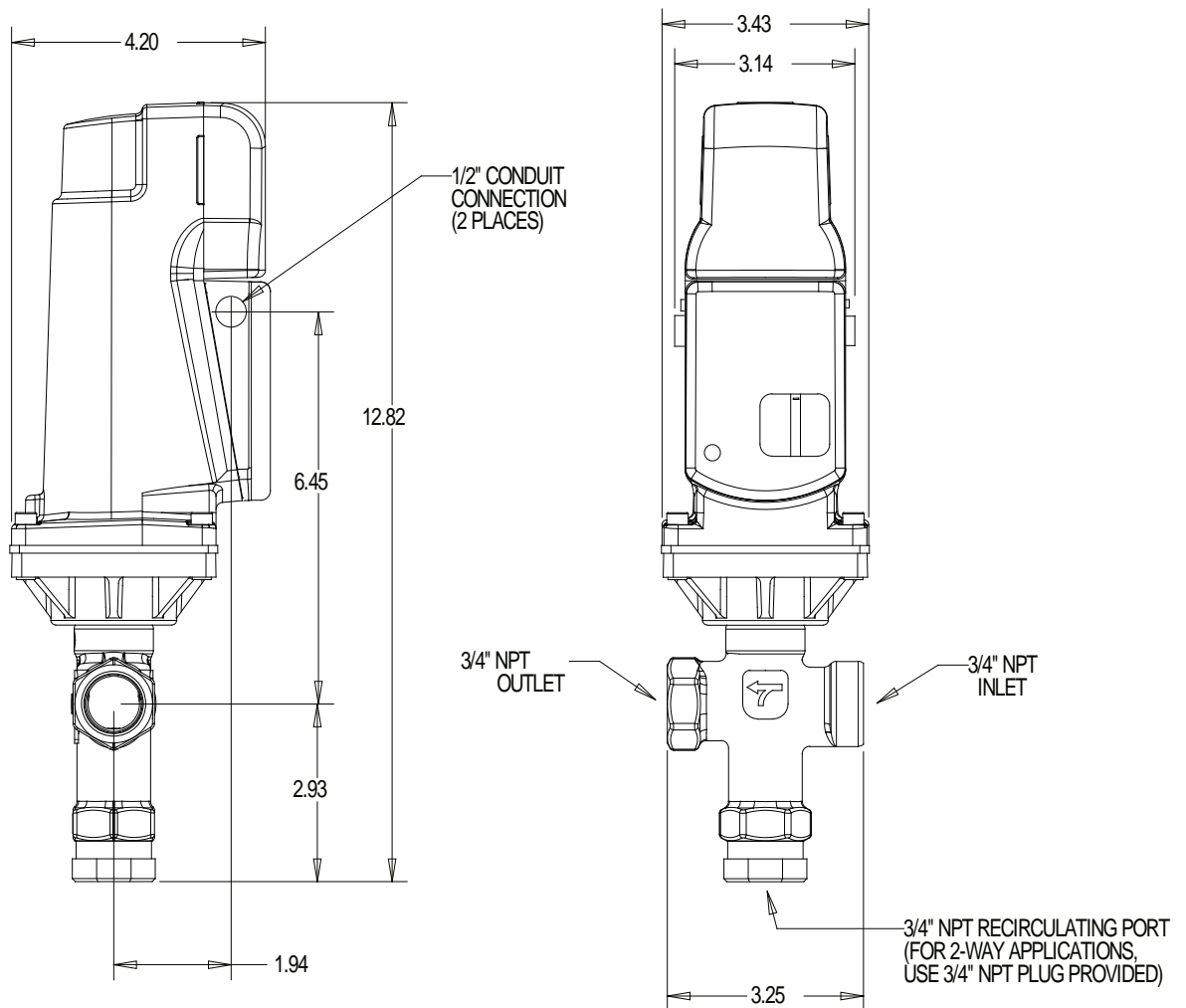


Figure 3. VOG15.01xU1 Dimensions.

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