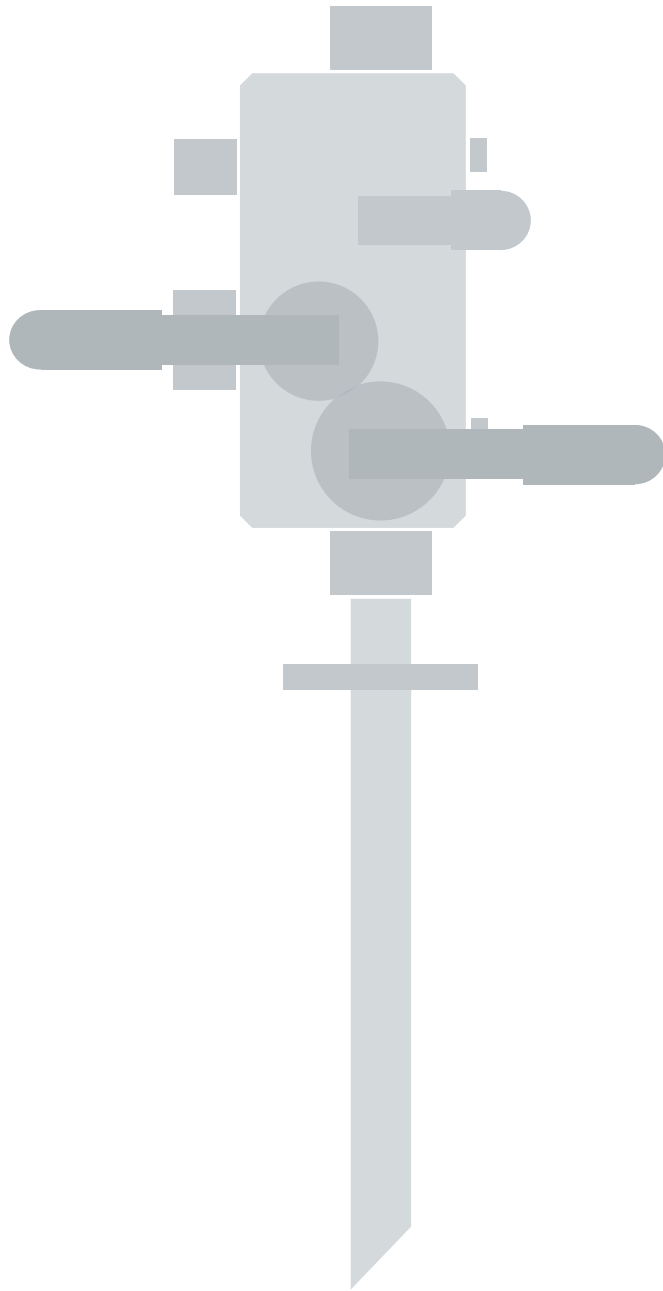


Sample Probe Module

*A Swagelok® Pre-Engineered
Subsystem*

User's Manual

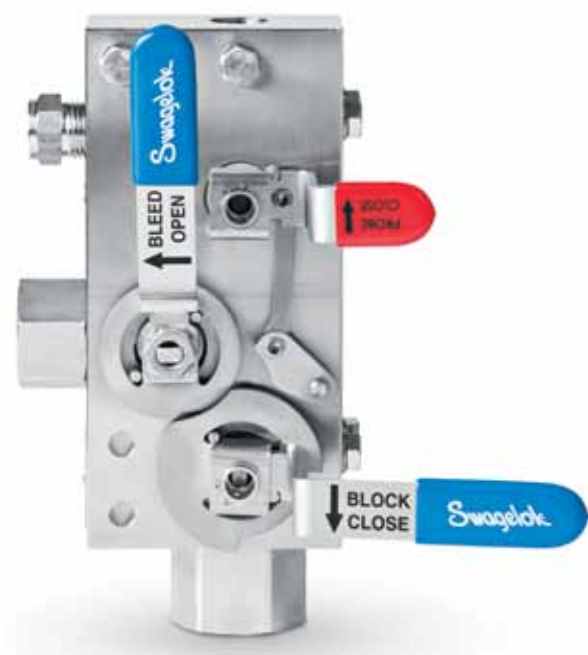


Swagelok®

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Sample Probe Module (SPM) System Manual



Introduction

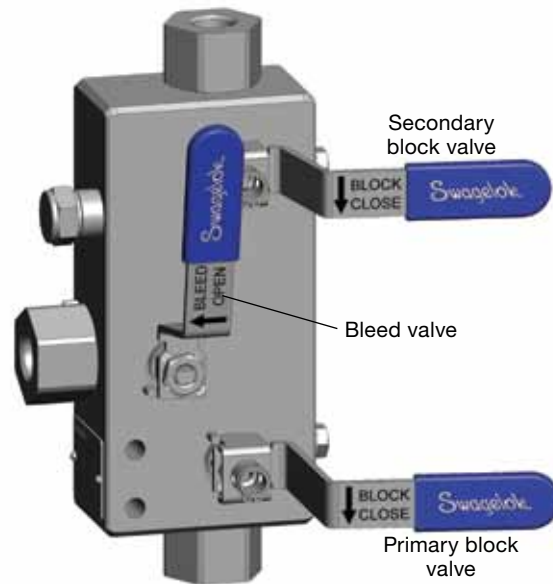
The Swagelok® Sample Probe Module (SPM) is a pre-engineered solution for use in online process analyzers, that consists of a welded sample probe (SPW) or retractable probe (SPR) and a block-and-bleed sample probe valve (SPV).

Configurations

The SPV is available in four configurations. See the *Sample Probe Module Application Guide*, MS-02-425, for additional information.

SPV61

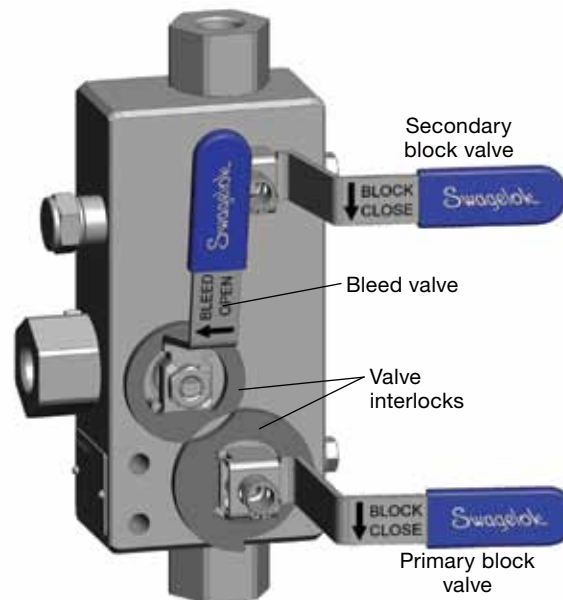
The SPV61 is a double block and bleed valve containing a primary block valve, a secondary block valve, and a bleed valve. No interlocks are used on this configuration. This configuration is intended for use with welded probes.



SPV61

SPV62

The SPV62 is a double block and bleed valve containing a primary block valve, a secondary block valve, and a bleed valve with the addition of mechanical valve interlocks between the primary block valve and the bleed valve. This configuration is intended for use with welded probes.



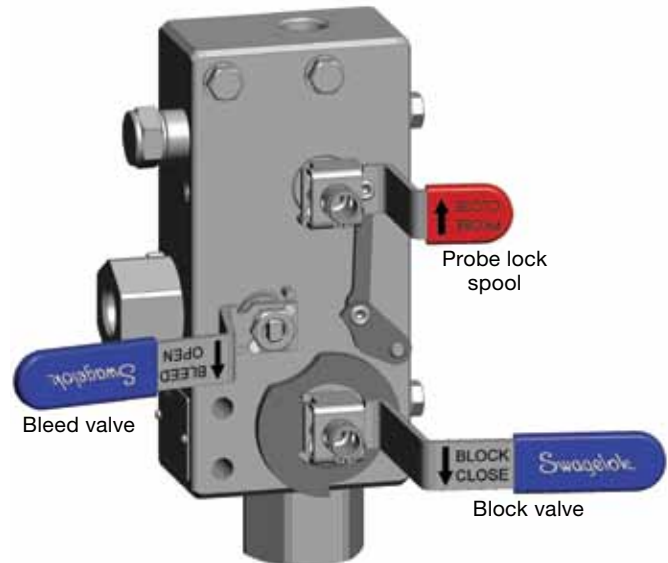
SPV62

Configurations

SPV63

The SPV63 is a single block and bleed valve containing a primary block valve, a bleed valve, and a probe lock spool with a patent-pending probe interlock.

The spool has thru-hole geometry optimized for 1/4 in. and 3/8 in. retractable tube probes.

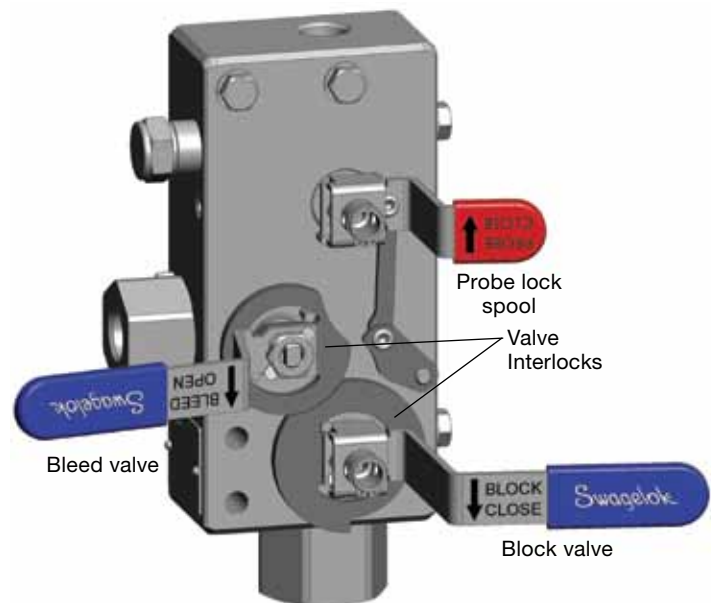


SPV63

SPV64

SPV64 a single block and bleed valve containing a primary block valve, a bleed valve, and a probe lock spool with a patent-pending probe interlock with the addition mechanical valve interlocks between the primary block valve and the bleed valve.

The SPV64 is optimized for 1/4 in. and 3/8 in. retractable tube probes.



SPV64

Dimensions

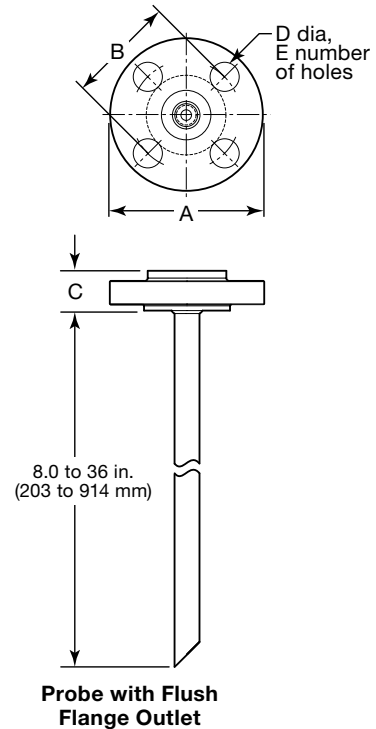
Dimensions, in inches (millimeters), are for reference only and are subject to change.

SPW Welded Probes

Outlet and Inlet Flange

ASME B16.5 Flanges

Nominal Flange Size	ASME Class	Dimensions, in.				Mounting Holes
		A	B	C	D	
3/4 in.	150	3.88	2.75	0.57	0.62	4
	600	4.62	3.25	1.13	0.75	4
	1500	5.13	3.50	1.51	0.88	4
1 in.	150	4.25	3.12	0.63	0.62	4
	600	4.88	3.50	1.20	0.75	4
1 1/2 in.	150	5.00	3.88	0.76	0.62	4
	600	6.12	4.50	1.39	0.88	4
	1500	7.00	4.88	1.76	1.13	4
2 in.	150	6.00	4.75	0.83	0.75	4
	600	6.50	5.00	1.51	0.75	8



DIN 2526 Form C Flanges

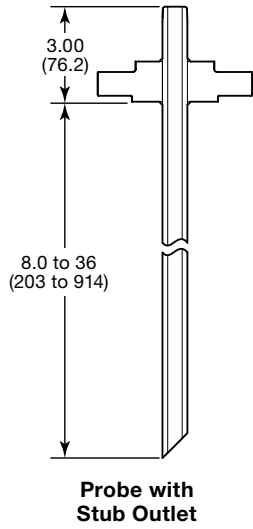
Nominal Flange Size	DIN Class	Dimensions, mm				Mounting Holes
		A	B	C	D	
25 mm	PN16	115	85	18	14	4
	PN40	115	85	20	14	4
40 mm	PN16	150	110	19	18	4
	PN40	150	110	21	18	4
50 mm	PN16	165	125	21	18	4
	PN40	165	125	23	18	4

JIS B2220 Flanges

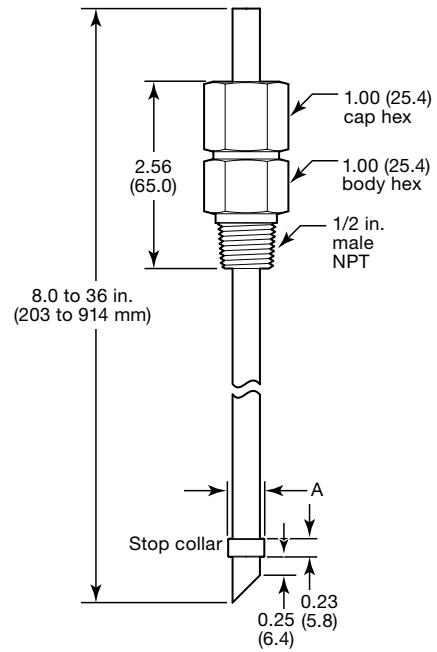
Nominal Flange Size	JIS Class	Dimensions, mm				Mounting Holes
		A	B	C	D	
25 mm	16	125	90	15	19	4
	40	130	95	23	19	4
40 mm	16	140	105	18	19	4
	40	160	120	26	23	4
50 mm	16	155	120	18	19	8
	40	165	130	28	19	8

Dimensions

SPW Welded Probes



SPR Retractable Probes

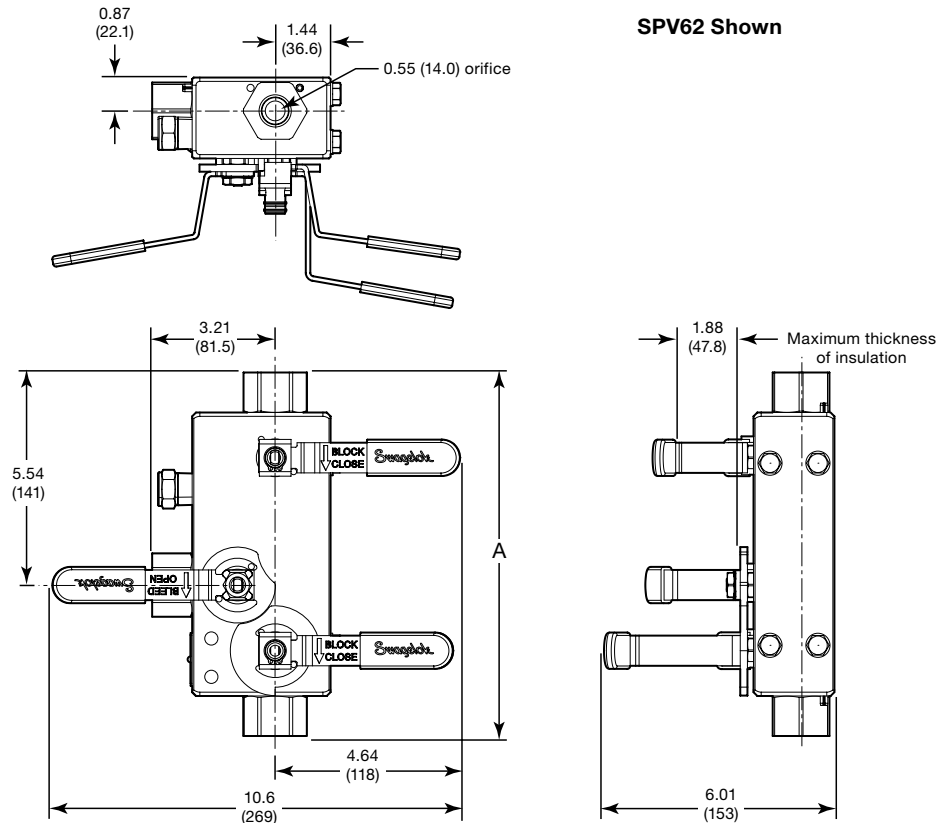


Tube Size	A, in. (mm)
1/4 in.	0.38 (9.6)
3/8 in.	0.50 (12.7)

Dimensions

Dimensions, in inches (millimeters), are for reference only and are subject to change.

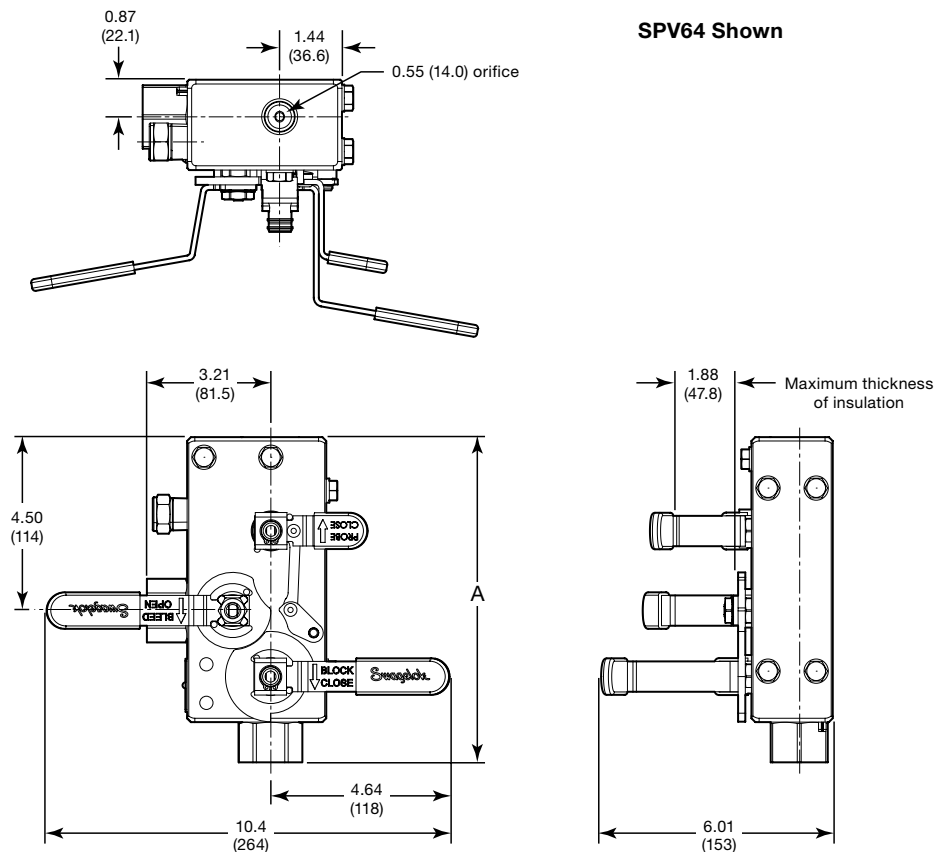
Double Block-and-Bleed SPV Sample Probe Valves (SPV61, SPV62)



Inlet Size	A, in. (mm)
1/2, 3/4 in.	9.48 (241)
1 in.	9.74 (247)

Dimensions

Single Block-and-Bleed SPV Sample Probe Valves (SPV63, SPV64)



Inlet Size	A, in. (mm)
1/2, 3/4 in.	8.44 (214)
1 in.	8.69 (221)

Weight, All Configurations

22 lb (10 kg)

Installation

SPV61 and SPV62 Sample Probe Valve with SPW Welded Probe Installation



Warning

Depressurize the system before installing the SPV and SPW.

1. Relieve pressure from the system.
2. Verify the probe is the correct length for your application. Swagelok recommends the end of the probe reach the middle third of the process pipe.
3. Connect the SPW probe to a flanged process nozzle. Use the visual indicator on the flange to orient the angled cut on the end of the probe downstream.
4. Actuate all valves on the SPV to the

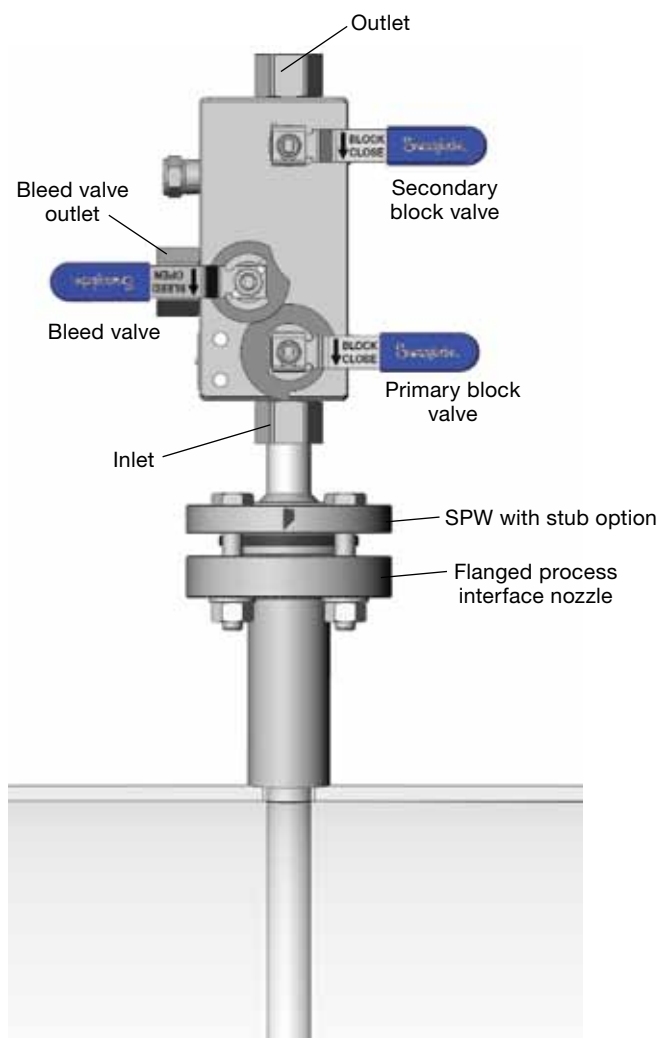


Probe Visual Indicator

closed position.

5. Connect the SPV inlet to the SPW.
 - a. SPW with pipe stub outlet - connect the SPV inlet directly to the NPT pipe stub on the SPW. (Use adapter fittings as necessary for different size connections.)
 - b. SPW with flange outlet - use a flange adapter and appropriate pipe fittings (not supplied) to connect the SPV inlet to the SPW outlet flange.
6. Connect the outlet of the SPV to the system outlet line.
7. Connect the bleed valve outlet of the SPV to the system vent line.
8. If necessary, add support by mounting to any of the four heater mounting holes (longer M8 bolts may be needed) or the two thru holes on the lower left corner of the body. Additional support is more likely to be needed when any of the following conditions exist.
 - a. The SPV is mounted horizontally.
 - b. The SPV does not have a rigid outlet or bleed valve outlet connection (Configurations 61 and 63).
 - c. The SPV does not have a heater connected with rigid conduit.
 - d. The SPV inlet connection is 1/2 in. NPT.
 - e. The valve will experience significant vibration.
9. Supply pressure and check for inlet connection leaks using Snoop® liquid leak detector.
10. Open the primary and secondary block valves and check for connection leaks using Snoop liquid leak detector.

Installation



SPV62 with SPW Welded Probe

Installation

SPV63 and SPV64 Sample Probe Valve with SPR Retractable Probe Installation



Warning

You must depressurize the system before installing the SPV and SPR.

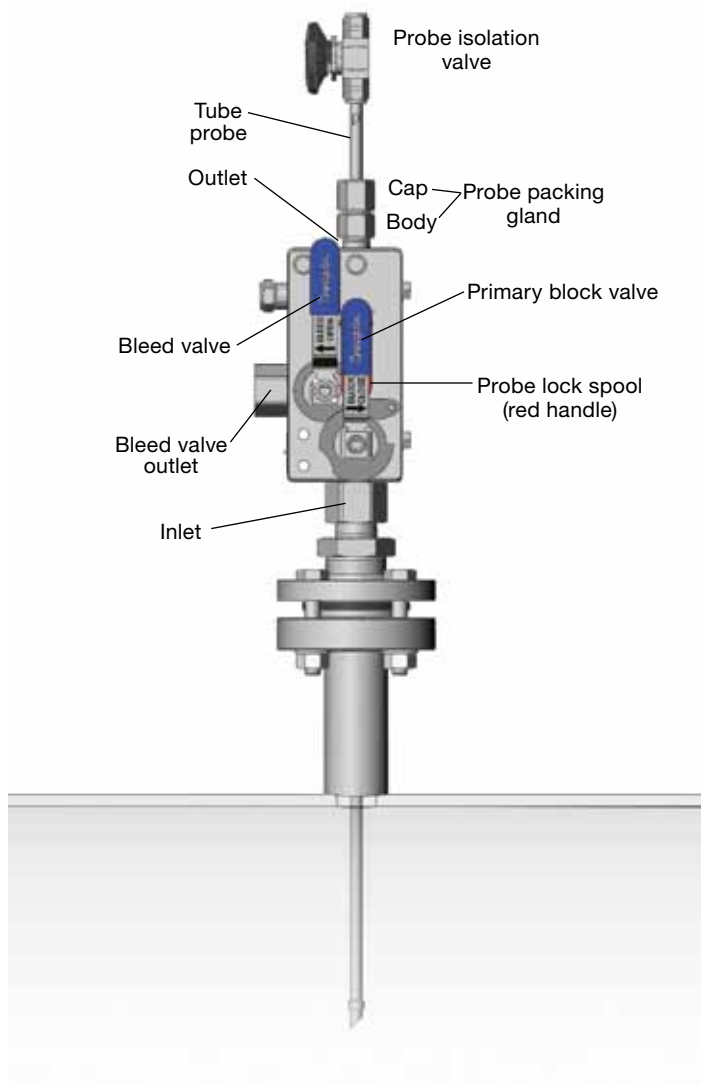
1. Relieve pressure from the system.
2. Actuate both valves and the probe lock spool on the SPV to the closed position.
3. Connect the valve inlet to the sample supply line.
4. Connect the bleed valve outlet to the system vent line.
5. Verify the probe is the correct length for your application. Swagelok recommends the end of the probe reach the middle third of the process pipe.
6. For SPRs without the optional probe isolation valve, install an appropriate isolation valve to the outlet of the tube probe. Orient the valve with the handle upstream.
7. Actuate the isolation valve to the closed position.
8. Connect the retractable probe packing gland body to the 1/2 in. NPT SPV outlet.
9. Tighten the probe packing gland cap according to the table.
10. If necessary, add support by mounting to any of the four heater mounting holes (longer M8 bolts may be needed) or the two thru holes on the lower left corner of the body. Additional support is more likely to be needed when any of the following conditions exist.
 - a. The SPV is mounted horizontally.
 - b. The SPV does not have a rigid outlet or bleed valve outlet connection.
 - c. The SPV does not have a heater connected with rigid conduit.
 - d. The SPV inlet connection is 1/2 in. NPT.
 - e. The valve will experience significant vibration.
11. Check for inlet connection leaks using Snoop liquid leak detector.
12. Open the primary block valve. Verify the bleed valve is in the closed position. Check for connection leaks using Snoop liquid leak detector.
13. Open the probe lock spool.
14. Slightly loosen the probe packing gland cap 1/64 turn at a time until the probe can be inserted through the SPV.
15. Install the probe to the desired insertion depth. Use the visual indicator on the tube probe for orientation.

Seal Material		
Fluorocarbon FKM	PTFE	Grafoil®
Torque, ft·lb (N·m)		
55 to 60 (74.5 to 81.3)	55 to 60 (74.5 to 81.3)	90 to 100 (122 to 135)



16. Set the probe in the desired orientation, typically with the cut angle facing downstream. Tighten the packing gland cap according to the table.
17. Supply pressure and check for connection leaks using Snoop liquid leak detector.
18. Connect the outlet port of the probe isolation valve to the system outlet line.

Installation



SPV64 with SPR Retractable Probe

Installation

SPV Sample Probe Valve Installation

Assemble Swagelok tube fittings according to *Swagelok Tube Fitting Installations for 1 in. (25 mm) and Smaller Fittings*, page 27.



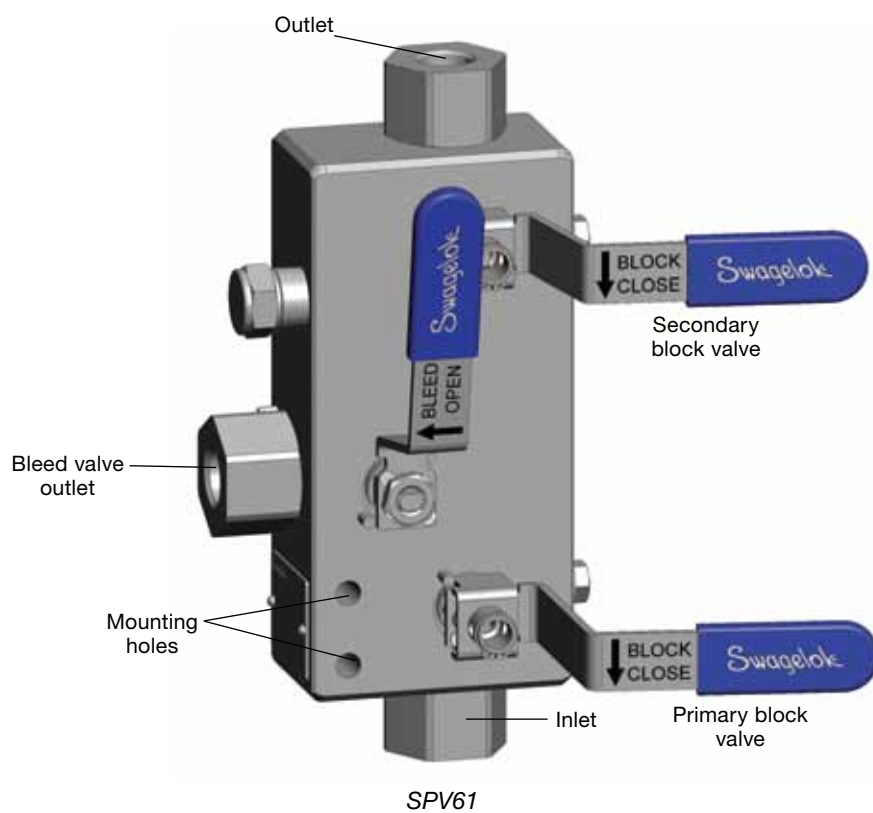
Warning

You must depressurize the system before installing the SPV.

1. Relieve pressure from the system.
2. Actuate all valves to the closed position.
3. Connect the valve inlet to the sample supply line.
4. Configurations 61 and 62 only: Connect the outlet to the outlet line.
5. Configurations 63 and 64 only: It is recommended to plug the outlet port until a retractable probe is installed.
6. Connect the bleed valve outlet to the system vent line.
7. If necessary, add support by mounting to any of the four heater mounting holes (longer M8 bolts may be needed) or the two thru holes on the lower left corner of the body. Additional support is more likely to be needed when any of the following conditions exist.
 - a. The SPV is mounted horizontally.
 - b. The SPV does not have a rigid outlet or bleed valve outlet connection (Configurations 61 and 63).
 - c. The SPV does not have a heater connected with rigid conduit.
 - d. The SPV inlet connection is 1/2 in. NPT.
 - e. The SPV will experience significant vibration.
8. Supply pressure to the valve and check for connection leaks using Snoop liquid leak detector.
9. Open the primary block valve and check for connection leaks using Snoop liquid leak detector.
10. Open the secondary block valve and check for connection leaks using Snoop liquid leak detector (Configurations 61 and 62).

Note: The probe interlock valve on Configurations 63 and 64 does not have a seat shut-off seal and will always allow flow to pass through in both the open and closed positions.

Installation



Operation

General notes:

1. The valve is closed when the handle crosses the flow path.
2. The valve is open when the handle is inline with the flow path.

SPV61

All valve handles are free to open and close.

SPV62

The secondary block valve (SBV) is free to open and close.

The primary block valve (PBV) and the bleed valve (BLV) are interlocked which prevents specific valve handles from being actuated under certain conditions. When either the PBV or BLV is open the other is locked closed.

The PBV and the BLV can be closed at the same time.

SPV63

The bleed valve (BLV) is free to open and close.

The primary block valve (PBV) can only be closed when the probe lock spool (PLS) is in the closed position. This prevents a probe from being inserted through the valve and damaging the PBV sealing ball. When the PBV is in the closed position, interlocks prevent the PLS from being opened. When the PBV is in the open position the PLS can be opened to allow the insertion of a retractable probe.

SPV64

The valve contains a primary block valve (PBV), a bleed valve (BLV) and a probe lock spool (PLS), with interlocks between the PBV and PLS as well as valve interlocks between the PBV and BLV.

The primary block valve (PBV) and the bleed valve (BLV) are interlocked which prevents specific valve handles from being actuated under certain conditions. When either the PBV or BLV is open the other is locked closed.

The PBV and the BLV can be closed at the same time.

The primary block valve (PBV) can only be closed when the probe lock spool (PLS) is in the closed position. This prevents a probe from being inserted through the valve and damaging the PBV sealing ball. When the PBV is in the closed position, interlocks prevent the PLS from being opened. When the PBV is in the open position the PLS can be opened to allow the insertion of a retractable probe.

Maintenance

Follow these steps before performing any downstream system maintenance.

SPV Sample Probe Valve with SPW Welded Probe

1. Close the primary block valve.
2. Open the bleed valve.

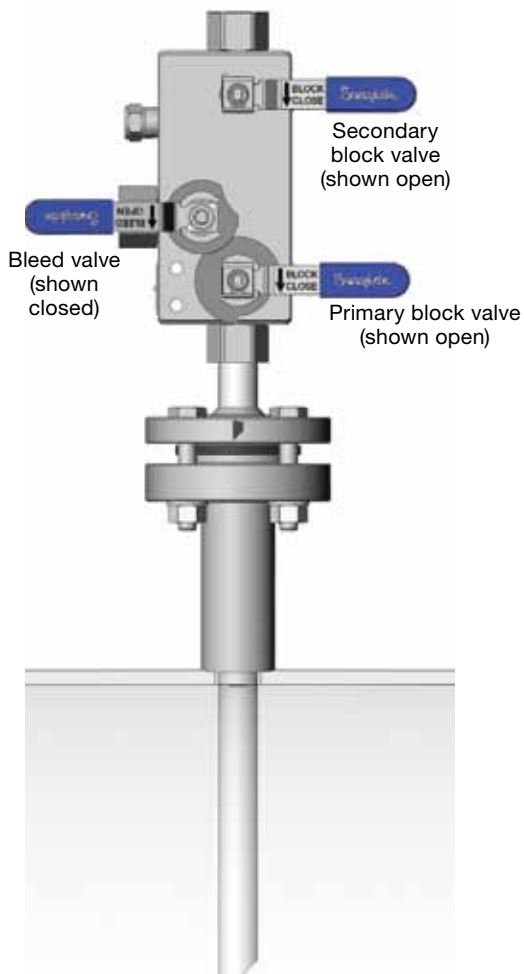
Note: This will depressurize the downstream analytical system to the next check valve.

3. Close the secondary block valve.



Warning

The probe is still under pressure from the process line. Depressurize the process line and system before performing any maintenance on the valve or the probe.



SPV62 with SPW Welded Probe

Maintenance

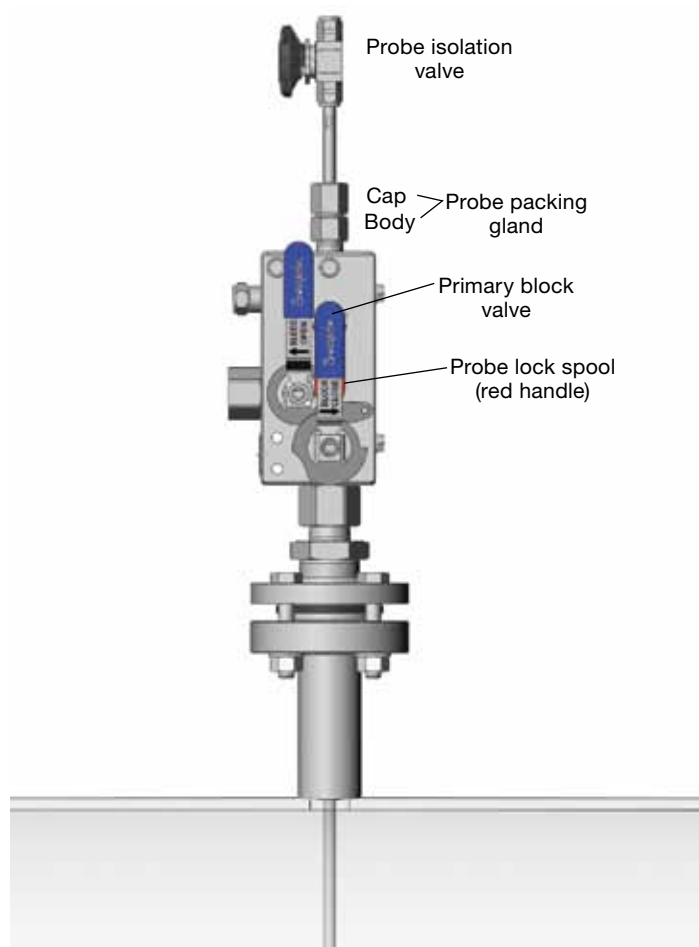
SPV Sample Probe Valve with SPR Retractable Probe - Removing the Probe



WARNING

Excessive loosening of the probe packing gland will result in sudden extraction of the probe from the system or leakage.

1. Slightly loosen the probe packing gland cap 1/64 turn at a time until the probe can be retracted by pulling it through the SPV.
2. Pull the probe through the SPV until the stop collar contacts the probe packing gland body.
3. Close the probe lock spool (PLS).
4. Close the primary block valve (PBV).
5. Open the bleed valve (BLV).
Note: This will depressurize the downstream analytical system to the next check valve.
6. Remove the probe from the SPV by removing the probe packing gland body.



SPV64 with SPR Retractable Probe

SPV Heater Option

General Safety



WARNING: HOT SURFACE

External surfaces of this product may reach temperatures of over 250°F (120°C) during normal operation.

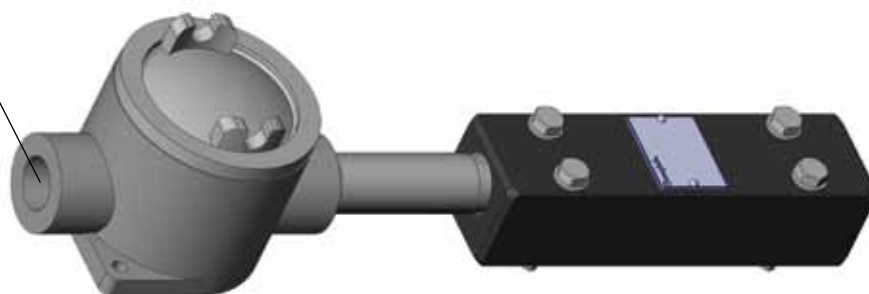
Configurations

The optional heater comes in two voltages (120 VAC or 240 VAC) and the heater block comes in two materials (316 stainless steel or black anodized aluminum).

All heaters contain a non-resettable thermal fuse that interrupts power to the heater before the heater reaches 392°F (200°C).

All heaters include a solid state PID temperature controller that can be adjusted from 50 to 300°F (10 to 148°C)

3/4 in. Female NPT



Heater Assembly

SPV Heater Option

Heater Installation

SPV heater kits mount to the SPV to heat and maintain a specific temperature. The heater can be set to maintain the heater block temperature from 50°F to 300°F (10°C to 148°C). The environmental temperature rating of the heater is -4°F to 122°F (-20°C to 50°C).

Kit Contents

- Heater assembly



- (4) M8 × 55 hex head screws



- (4) M8 lock washers

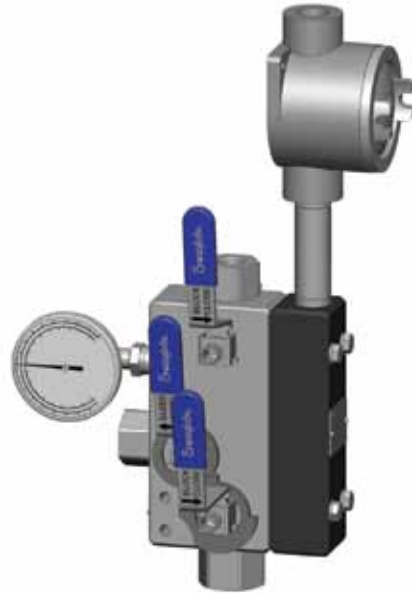
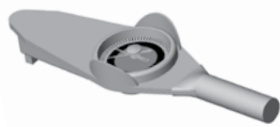


Tools needed

- 13 mm wrench or socket



- Torque wrench capable of 120 in.-lbs (13.5 N·m)



SPV62 with Heater Installed

SPV Heater Option

Heater Installation

1. Remove the four M8 hex screws covering the heater mounting holes on the valve body mounting surface.
2. Clean the valve body mounting surface.
3. Position the heater on the body and assemble using the supplied M8 × 55 mounting bolts and washers. Tighten the bolts to 120 in.·lbs (13.5 N·m).
4. Remove the junction box cover and make the wire and conduit connections. The installation must meet local codes. The junction box has a 3/4 in. female NPT thread connection. The electrical source and wires must meet the minimum wire gauge size and maximum current draw for a 110/240 VAC 500W 50/60 Hz heater draw.



WARNING

Disconnect power to the heater before opening electrical box lid. Failure to do so may result in electric shock and may also present an explosion hazard.



WARNING

The supply must not exceed 110 % of the rated voltage.

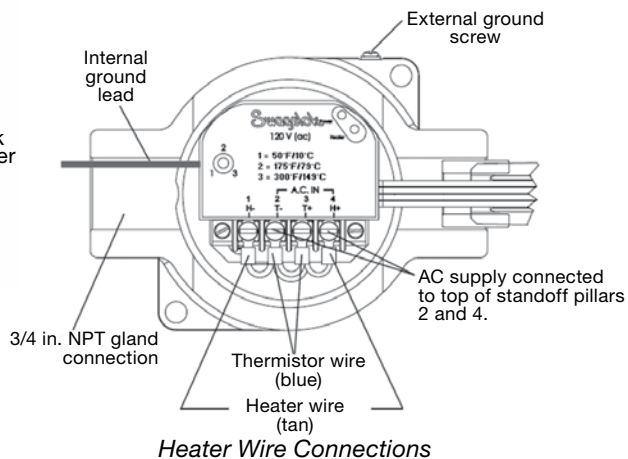
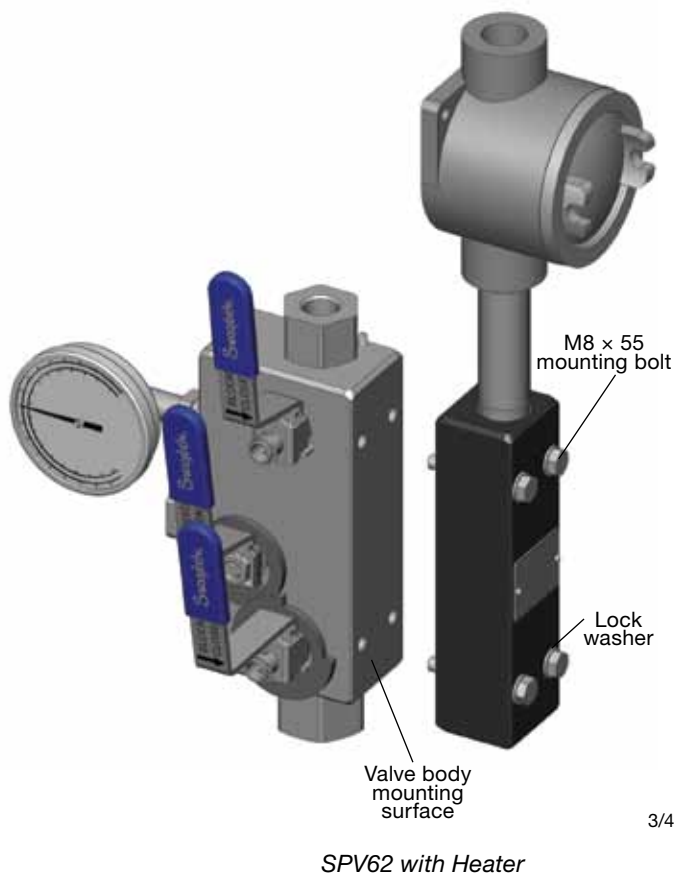


CAUTION

Use appropriate wire and connections to withstand the temperature range of the heater.

Note: There is a limited thread engagement of the terminal block mounting screws in the aluminum mounting plate. The use of anaerobic thread locking adhesive and a low tightening torque are recommended.

- a. Make a ground connection, an internal ground and an external ground screw are provided.
 - b. Connect the AC supply to the standoff pillars labeled 2 and 4.
5. Replace the junction box cover.
 6. The handles on the SPV valve have large stand-off distances to accommodate up to 1 in. (25 mm) thick insulation around the heater and valve assembly.



SPV Heater Option

Heater Operation



WARNING

Disconnect power to the heater before opening electrical box lid and setting the temperature. Failure to do so may result in electric shock and may also present an explosion hazard.

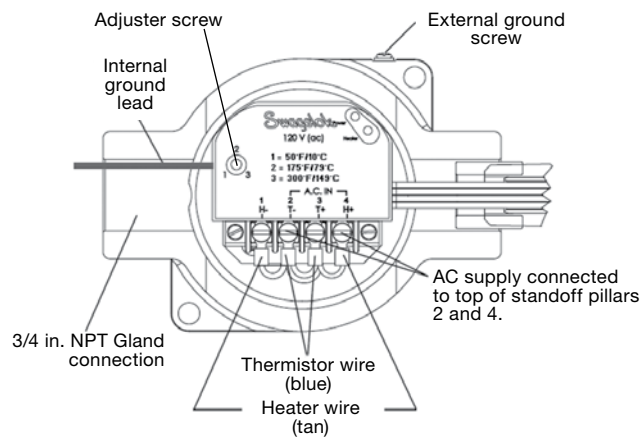
1. Disconnect power to the heater.
2. Remove the electrical box lid.
3. Turn the adjuster screw located on the control unit to the required temperature position/setting as indicated on the label.

Note: Turn the screw fully counterclockwise for position 1 and fully clockwise for position 3.

4. Replace the electrical box lid.
5. Reconnect unit to power.

Note: It is recommended to insulate the valve and heater assembly by wrapping the assembly with insulation when there is a temperature difference of more than 50°F (10°C) between the set temperature and the environmental temperature.

Allow at least 60 minutes for the temperature to reach the revised set point. The temperature of the valve body can be monitored using the optional dial thermometer or by other user supplied means. Depending on environmental conditions and whether the valve is insulated, more time may be required for the heater to reach the set temperature.



Heater Wire Connections

SPV Probe Packing Gland Lockout Bracket Option

Configuration

This option prevents unintentional loosening of the probe packing gland cap or removal of the probe fitting with a retractable probe.

Installation

The probe lock kit is designed to be installed on SPV Configurations 63 or 64.

Kit Contents:

- Base plate



- Cover plate



- (1) M8 countersink screw



- (1) M8 shoulder screw



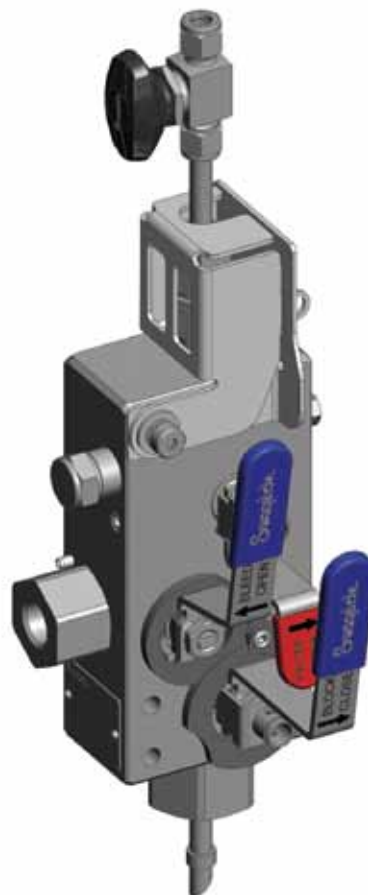
- (1) Flat washer



- (1) Wave spring washer



- Thread lock adhesive



SPV64 with Probe Gland Lockout Bracket

Tools needed:

- 5 mm hex key



- 13 mm wrench or socket



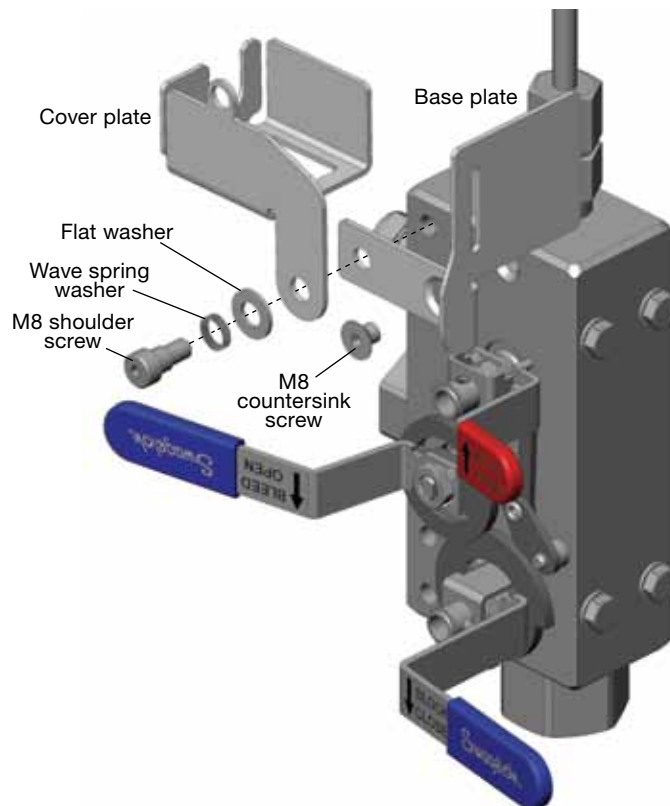
- Torque wrench capable of 120 in.-lbs (13.5 N·m)



SPV Probe Packing Gland Lockout Bracket Option

Installation

1. Remove the two existing M8 hex screws.
2. Align both holes in the base plate to the threaded holes on the SPV body.
3. Apply a couple drops of thread lock adhesive to the thread of the M8 countersink screw. Use the M8 countersink screw to hold the base plate in position but do not tighten at this time.
4. Place the cover plate on top of the base plate and align the left hole in the cover plate with the left hole on the base plate with the left threaded hole on the SPV body.
5. Place the wave spring washer then the flat washer over the shoulder of the M8 shoulder screw.
6. Apply a couple drops of thread lock adhesive to the thread of the M8 shoulder screw. Install the screw through the cover plate, base plate and into the valve body. Turn the shoulder screw clockwise until the shoulder fits through the washer and cover plate and stops against the base plate but do not tighten at this time.
 Note: The cover plate will lock in position if the washer is not aligned properly.
7. Rotate the cover plate counterclockwise to expose the M8 countersink screw. Tighten the M8 countersink screw to 120 in.-lbs (13.5 N·m).
8. Tighten the M8 shoulder screw to 120 in.-lbs (13.5 N·m). The cover plate can should swing/pivot from the fully open position to the fully locked position and the lock ring on the cover plate should pass through the slot on the base plate.



Exploded View of Probe Packing Gland Lockout Bracket Option

Troubleshooting

Symptom	Cause	Remedy
SPM Troubleshooting		
SPV62 and SPV64		
Primary block valve will not open.	Primary block valve is locked closed by the bleed valve.	Close the bleed valve. The bleed valve must be closed before the primary block valve can be opened.
Bleed valve will not open.	Bleed valve is locked closed by the primary block valve.	Close the primary block valve. The primary block valve must be closed before the bleed valve can be opened.
SPV63 and SPV64		
Primary block valve will not close.	Primary block valve is locked open by the probe lock valve.	Retract the probe (if installed) then close the probe lock valve. The probe lock valve must be closed before the primary block valve can be closed.
Probe lock valve will not fully open.	Probe lock valve is locked closed by the primary block valve.	Open the primary block valve. The primary block valve must be opened before the probe lock valve can be opened.
Probe lock valve will not fully close.	A probe is installed through the valve and preventing the probe lock valve from closing.	Fully retract the probe until the stop collar contacts the packing gland body. Close the probe lock valve.
	The probe is impeding closing of the probe lock valve.	Verify that the probe is fully retracted. If it is, then the distance from the back stop of the stop collar to the end of the probe may be too long.
SPR and SPW assemblies		
Low flow or no flow downstream of the tube probe.	The probe is partially or fully clogged.	Clean out the probe. Consider a probe with a larger inside diameter.
	The angle cut on the probe end is incorrect.	Change the probe orientation so the open end faces downstream.
Sample response time is too slow.	Excessive internal volume.	Reduce the internal volume. Consider a probe with a smaller inside diameter.
	Excessive gas pressure.	Reduce the gas pressure downstream. Consider installing a Swagelok Field Station Module immediately downstream.
There is leakage around the packing gland.	The packing gland cap needs to be adjusted.	Tighten the packing gland cap according to the torque table on page 12.
	The packing gland sealant needs to be replaced.	Replace the packing gland sealant.

Troubleshooting

Symptom	Cause	Remedy
Heater Troubleshooting		
Heater block does not heat up and reach the set temperature.	Heater not getting appropriate power.	Check voltage at the supply terminals 2 and 4. Should be around 120V or around 240V, depending on heater.
	Controller set temperature is below ambient temperature.	Adjust controller set temperature to above ambient temperature.
	Thermal fuse tripped.	Check continuity across terminals 1 and 4. If no continuity then replace heater block.
	Faulty reading from thermistor.	Check resistance across terminals 2 and 3. If the resistance is zero or infinity then thermistor is faulty. Return unit to factory. A properly functioning thermistor will show a steady increase in resistance while heating up and a steady decrease while cooling down.
	Excessive heat losses preventing heater from reaching set temperature or causing more time for heater to reach the set temperature.	Insulate valve body and heater or decrease the set temperature.
Heater block does not cool down and reach the set temperature.	Controller set temperature is below ambient temperature.	Ambient temperature must be below controller set temperature and the process temperature for heater to cool down. Adjust controller set temperature to above ambient temperature or reduce ambient temperature or reduce process temperature.
	Faulty reading from thermistor.	Check resistance across terminals 2 and 3. If the resistance is zero or infinity then thermistor is faulty and return unit to factory. A properly functioning thermistor will show a steady increase in resistance while heating up and a steady decrease while cooling down.
	Cooling down takes too long.	Larger temperature differences between set point and ambient temperatures may result in increased cooling times. Allow more time for heater to cool down.
Temperature fluctuates and does not stabilize.	Ambient or process temperature is fluctuating.	Reduce ambient and/or process temperature fluctuations.
	Controller PID settings too aggressive for the application.	Reset controller and if symptom/problem persists return unit to factory.

Swagelok Tube Fitting Instructions for 1 in. (25 mm) and smaller fittings

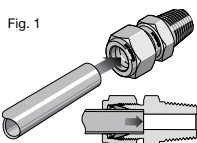


Fig. 1

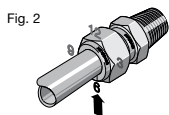


Fig. 2

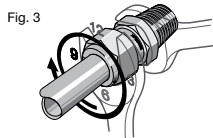


Fig. 3

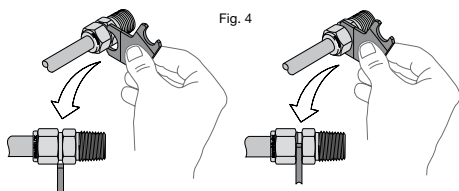


Fig. 4

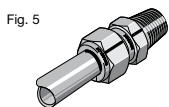


Fig. 5

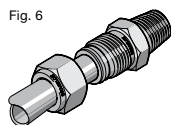


Fig. 6

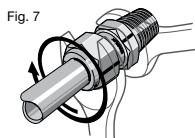


Fig. 7

Installation

These instructions apply to both traditional fittings and to fittings with the advanced back-ferrule geometry.

1. Fully insert the tube into the fitting and against the shoulder; rotate the nut finger-tight. *Fig. 1.*

High-Pressure Applications and High

Safety-Factor Systems: Further tighten the nut until the tube will not turn by hand or move axially in the fitting.

2. Mark the nut at the 6 o'clock position. *Fig. 2.*
3. While holding the fitting body steady, tighten the nut one and one-quarter turns to the 9 o'clock position. *Fig. 3.*

Note: For 1/16, 1/8, and 3/16 in.; 2, 3, and 4 mm tube fittings, tighten the nut three-quarters turn to the 3 o'clock position.

Gaugeability

On initial installation, the Swagelok gap inspection gauge assures the installer or inspector that a fitting has been sufficiently tightened.

Position the Swagelok gap inspection gauge next to the gap between the nut and body. *Fig. 4.*

- If the gauge will not enter the gap, the fitting is sufficiently tightened.
- If the gauge will enter the gap, additional tightening is required.

Reassembly Instructions — You may disassemble and reassemble Swagelok tube fittings many times.

Warning

Always depressurize the system before disassembling a Swagelok tube fitting.

1. Prior to disassembly, mark the tube at the back of the nut; mark a line along the nut and fitting body flats. *Fig. 5.*

Use these marks to ensure you return the nut to the previously pulled-up position.

2. Insert the tube with preswaged ferrules into the fitting body until the front ferrule seats against the fitting body. *Fig. 6.*
3. While holding the fitting body steady, rotate the nut with a wrench to the previously pulled-up position as indicated by the marks on the tube and the flats; at this point you will feel a significant increase in resistance. *Fig. 7.*
4. Tighten the nut slightly.

Caution

Do not use the gap inspection gauge with reassembled fittings.

Caution

Do not mix or interchange parts with those of other manufacturers.

For additional information, see the *Gaugeable Tube Fittings and Adapter Fittings* catalog, MS-01-140.

40G Series Valve Packing Adjustment

IMPORTANT

This valve is factory tested with nitrogen at 1000 psig (69 bar), or the rated pressure if lower than 1000 psig (69 bar).

Periodic maintenance: Packing adjustments may be required during the service life of the valve to prevent leakage.

Adjusting the Packing

1. Adjust the packing by turning the packing bolt clockwise in 1/16-turn increments until leak-tight performance is achieved.
2. Test valve for proper function and operation.

⚠ Before removing any installed valve from the system, you must

- depressurize the system
- cycle the valve
- purge the valve

Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit swagelok.com or contact your authorized Swagelok representative.

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