

Swagelok® Electronic Pressure Controller

Hazardous Locations Safety Manual



This manual contains important information for the safe and effective operation of the Swagelok® Electronic Pressure Controller (SEPC) in hazardous locations. Users must read and understand its contents before operating the system.

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Safety

Safety Summary

Follow any enclosed instructions and refer to the product application guide for detailed product information. When using a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user. Improper selection or misuse of the product may result in serious personal injury or property damage.

Signal Words and Safety Alert Symbols Used

WARNING:

Statements that indicate a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION:

Statements that indicate a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE:

Statements that indicate a hazardous situation which, if not avoided, could result in damage to the equipment or other property.

 Safety alert symbol indicating a potential personal injury hazard.

Warnings



WARNING:

Read the entire safety information section and user manual before using this product. Failure to do so can result in serious injury.



WARNING:

The Certification and hazardous type protection may be impaired if the Swagelok Electronic Pressure Controller is used in a manner not specified by Swagelok. Refer to these instructions for the correct method of installation, operation, and use.



WARNING:

To avoid personal injury and/or damage to equipment, do not attempt to remove an Swagelok Electronic Pressure Controller (SEPC) from a system while it is under pressure.



WARNING:

Users must contact their gas or liquid supplier for specific safety precautions and instructions.



WARNING:

Do not open when an explosive atmosphere may be present.



WARNING:

Potential static hazard. Clean only with a water wetted cloth.



CAUTION:

Swagelok Electronic Pressure Controllers are not “safety accessories” as defined in the Pressure Equipment Directive 2014/68/EU.



CAUTION:

Do not use the Electronic Pressure Controller as a shutoff device.



AVERTISSEMENT:

Veillez lire attentivement les consignes de sécurité et le manuel d'utilisation avant d'utiliser ce produit. Le non-respect de ces consignes peut entraîner des blessures graves.



AVERTISSEMENT:

La certification et la protection contre les dangers peuvent être altérées si le régulateur de pression électronique est utilisé d'une manière non spécifiée par Swagelok. Consultez ces instructions pour connaître la méthode d'installation, d'utilisation et de fonctionnement correcte.



AVERTISSEMENT:

Pour éviter toute blessure corporelle et/ou tout dommage à l'équipement, n'essayez pas de retirer un Swagelok régulateur de pression électronique d'un système lorsqu'il est sous pression.



AVERTISSEMENT:

Les utilisateurs doivent contacter leur fournisseur de gaz ou de liquide pour connaître les précautions et instructions de sécurité spécifiques.



AVERTISSEMENT:

Ne pas ouvrir lorsqu'une atmosphère explosive peut être présente.



AVERTISSEMENT:

Risque d'électricité statique potentiel. Nettoyer seulement avec un linge imbibé d'eau.



PRUDENCE:

Les régulateurs de pression électroniques Swagelok ne sont pas des « accessoires de sécurité » au sens de la directive 2014/68/UE relative aux équipements sous pression.



PRUDENCE:

N'utilisez pas le régulateur de pression électronique comme dispositif d'arrêt.

General Information

Product Marking



Figure 1. North American HAZLOC Option

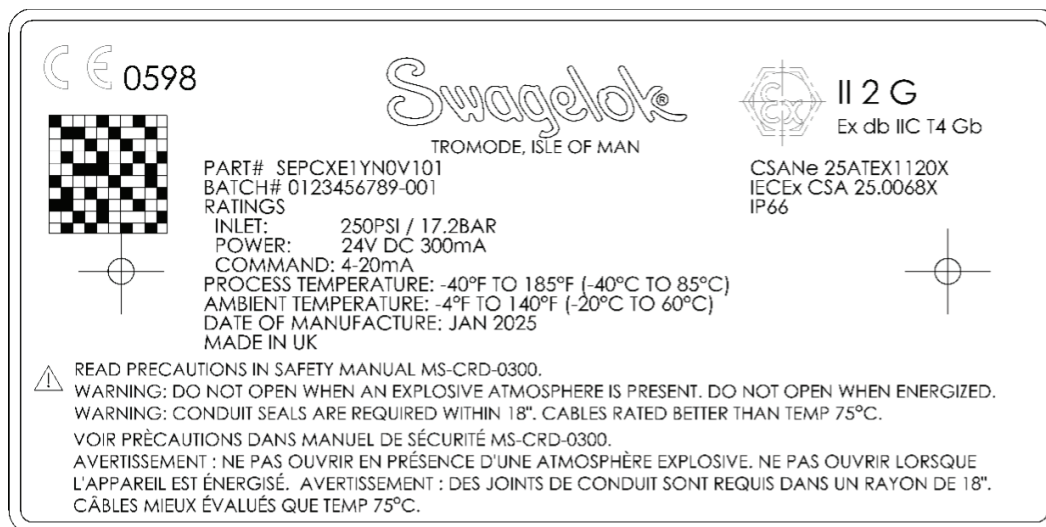


Figure 2. ATEX & IECEx Option

SEPC Function

The Swagelok Electronic Pressure Controller is designed to regulate the pressure of inert gas in proportion to the command signal by monitoring pressure from its installed pressure transducer. These are typically installed in conjunction with a ratio regulator to extend its functional pressure control range.

- The SEPC can be purchased as part of a regulator assembly directly from Swagelok, or as a stand-alone unit for custom installations.
- For examples of typical setups see Appendix A, on page 17.

Ratings and Specifications

Characteristic	Rating			
Controller				
Operating Pressure	0 to 250 psig (0 to 17.2 bar)			
Proof Pressure	500 psig (34.4 bar)			
Burst Pressure	1000 psig (68.9 bar)			
Operating Temperature	Control Media: -40 to 122°F (-40° to 50°C)			
	Ambient: -4 to 140°F (-20 to 60°C) 90% RH non-condensing inside enclosure			
Transducer Range	G	M	X	Y
Operating Pressure	250 psig (17.2 bar)	1500 psig (103 bar)	8000 psig (551 bar)	14,500 psig (1000 bar)
Overpressure Limit	899 psig (62 bar)	2900 psig (200 bar)	17,400 psig (1200 bar)	21,750 psig (1500 bar)
Operating Temperature	Process Media: −40 to 185°F (−40 to 85°C)			
	Ambient: −4 to 140°F (−20 to 60°C)			
Environment				
Ingress Protection	IEC-60529 IP66			
North American Class-Division	Class I Division 1 Groups B, C, D, T4			
North American Zone (USA)	Class I Zone 1 AEx db IIC T4 Gb			
North American Zone (Canada)	Ex db IIC T4 Gb			
ATEX (Europe)	II 2 G Ex db IIC T4 Gb			
IECEX (International)	Ex db IIC T4 Gb			
Electrical				
Power Supply	24V DC SELV Class 2 300 ma (fuse: 400 ma)			
Control Signal	4 to 20ma			
Digital Control	Modbus RTU (available on request)			
Connections				
Control Inlet	1/8 in. NPT Female			
Control Vent	1/8 in. NPT Female			
Control Outlet	3/4 in. Swagelok Tube Stub & 1/8 NPT Female			
Pressure Transducer	1/4 in. NPT Female			
Electrical Entry	3/4 in. NPT Female			

 **WARNING:**
Do not exceed the stated operating conditions of the Swagelok Electronic Pressure Controller or its accessories.

Specific Conditions of Use

For All Hazardous Locations

1. It is the user's responsibility to ensure that the earth continuity of the equipment is maintained via the mounting arrangement.
2. All sealing fittings must be certified as flameproof 'db' and have a minimum IP66 rating equal to the marking on the enclosure.
3. The product label indicates that the process temperature range is -40°C to +85°C; taking this into account the user/installer shall take precautions that ensure that the operating ambient temperature of the overall equipment assembly is between -20°C to +60°C.
4. To minimize the risk of electrostatic charge, provisions shall be made for adequate grounding, and equipment shall be installed in such a manner so that accidental discharge does not occur.
5. End users shall follow specific installation and operating instructions supplied by the manufacturer to prevent exceeding the heat dissipating limits for the desired temperature code for an operating ambient.
6. Do not repair or modify the flamepath.

Additional for North American locations

1. Wiring shall be in accordance with wiring method per the Canadian Electrical Code (CEC) for installation in Canada and per the National Electrical Code (NFPA 70) for installation within the U.S.
2. Final acceptance of this equipment when installed is subject to the jurisdiction of the local inspection authority.
3. The equipment must be powered by a suitable external SELV/Class 2 power supply.

Installation

Points of Attention Before Installation

This unit can be equipped with a variety of different options. Before installing, you should fully understand the functions of the supplied options and the suitability of your controller for the intended application.

- It may be necessary to remove the assembly from the system during maintenance or service. Ensure that this is possible.
- The SEPC is suitable for inert gases only. To control other media, it must be used in conjunction with a dome loaded or ratio loaded pressure regulator. Ensure compatibility between the regulator's materials of construction and the system media.
- Swagelok recommends the use of a non-venting regulator when the process media is hazardous or toxic.
- Verify that the controller, its connections, and any accessories are undamaged.
- Verify that the controller and any accessories are suitable for the system operating pressure and temperature and have suitable connections.
- At the time of delivery, some auxiliary ports may be plugged. Remove these plugs and connect accessories if desired.
- If inlet/outlet fittings are being used, assemble them to the controller (per manufacturer's instructions) prior to installing the controller in the system. Ensure that the tubing/pipework and the regulator are adequately supported and that there is no mechanical load on the connections.

Mounting

1. Install the controller into the pressure system (when ordered in conjunction with a Swagelok regulator, this step will be conducted by the factory). The control outlet is designed with a 1/8" NPT female connection for field installation, or a 3/4" Swagelok tube sub for direct mounting to a Swagelok regulator.
 - When used to directly control inert gas connect the control outlet to your system.
 - When used in conjunction with a dome loaded regulator to control low-pressure media, connect the control outlet to the dome connection of your dome loaded pressure regulator.
 - When used in conjunction with a ratio loaded regulator to control high-pressure media, connect the control outlet to the dome connection of your ratio loaded pressure regulator.
2. Additional support can be achieved via the two mounting holes on the enclosure.



WARNING:

Additional support is required, unless directly mounted to a Swagelok process regulator via the 3/4 in. tube stub.



AVERTISSEMENT:

Un support supplémentaire est requis, sauf en cas de montage direct sur un régulateur de process Swagelok via le raccord de tube de 3/4 in.

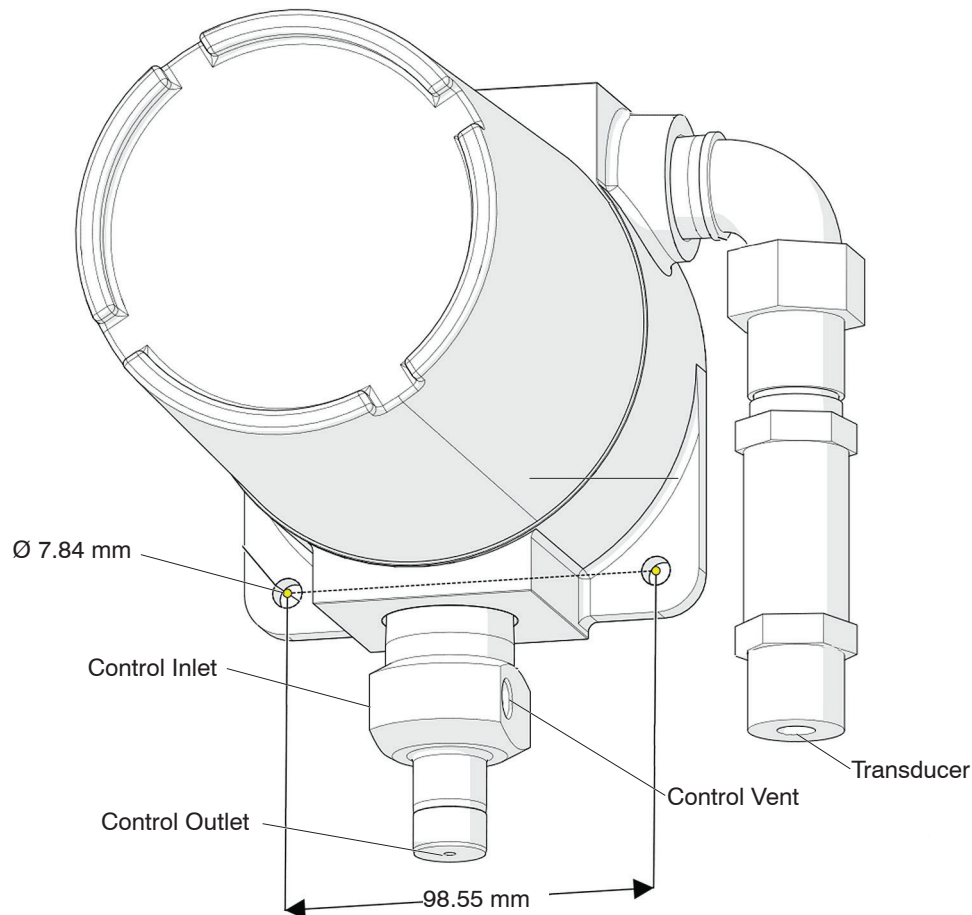


Figure 3. Pressure Controller

Control Gas Supply

1. Connect the inert gas feed to the control inlet connection.
 - Maximum control gas feed pressure is 17.2 bar.
 - Lower feed pressures could limit the working range of your system. For example, if used with a 100:1 ratio regulator with a max working pressure of 1000 bar, installing a 7 bar inert gas supply would limit the workable range to 700 bar (7 x 100).
2. If required, connect the control vent port to a vent line.
 - This port will only vent excess control gas and is required to allow the unit to lower the set point during normal operation.



WARNING:

Only use an inert gas as a control medium. This unit is not rated to directly control flammable gases.



CAUTION:

Do not plug the control vent port. Vented pressure could become trapped in the controller. This would alter the regulator set pressure and any trapped pressure could be released upon disassembly. The port must be open to atmosphere either directly or via a vent line.



CAUTION:

Ensure all upstream tubing/pipework is clean and free from debris. Any swarf, lint, wire, etc., may damage the controller and cause a leak at the seat.



AVERTISSEMENT:

Utilisez uniquement un gaz inerte comme moyen de contrôle. Cet appareil n'est pas conçu pour contrôler directement les gaz inflammables.



PRUDENCE:

Ne pas boucher l'orifice de ventilation du régulateur. La pression d'échappement pourrait rester emprisonnée dans le régulateur. Cela modifierait la pression de consigne du régulateur et toute pression emprisonnée pourrait être libérée lors du démontage. L'orifice doit être ouvert à l'atmosphère, soit directement, soit via une conduite de ventilation.



PRUDENCE:

Assurez-vous que tous les tubes/tuyaux en amont sont propres et exempts de débris. Les copeaux, peluches, fils, etc. peuvent endommager le contrôleur et provoquer une fuite au niveau du siège.

Transducer Connection

1. Connect the transducer's pressure connection to the pressure that requires controlling. See **Appendix A:** Typical installation configurations for examples.
 - For pressure reducing systems, this will be the outlet of the controller or regulator.
 - For back pressure systems, this will be the inlet of the controller or regulator.



WARNING:

The transducer is installed by the factory and forms part of the explosion proof housing. Do not remove or tamper with the transducer's installation; doing so could invalidate its accreditation.



CAUTION:

Ensure that the outlet line is connected to the transducer port before applying pressure to the regulator. Failing to do so may lead to damage and non-functioning of the regulator and no pressure regulation will occur.



CAUTION:

Never install a shut-off valve between the transducer and pressure regulator. Doing so may lead to damage and non-functioning of the regulator and no pressure regulation will occur.



CAUTION:

The distance between the regulator outlet and the box can affect the regulator response time. This distance should be kept to a minimum.



AVERTISSEMENT:

Le transducteur est installé en usine et fait partie intégrante du boîtier antidéflagrant. Ne retirez pas et ne modifiez pas l'installation du transducteur, car cela pourrait invalider son accréditation.



PRUDENCE:

Assurez-vous que la conduite de sortie est connectée au port du transducteur avant d'appliquer la pression au régulateur. Le non-respect de cette consigne peut endommager le régulateur et le rendre inopérant. Aucune régulation de pression ne sera alors effectuée.



PRUDENCE:

N'installez jamais de vanne d'arrêt entre le transducteur et le régulateur de pression. Cela pourrait endommager le régulateur et empêcher son fonctionnement, et la régulation de pression serait impossible.



PRUDENCE:

La distance entre la sortie du régulateur et la boîte affecte le temps de réponse du régulateur. Cette distance doit être réduite au minimum.

Electrical Connections

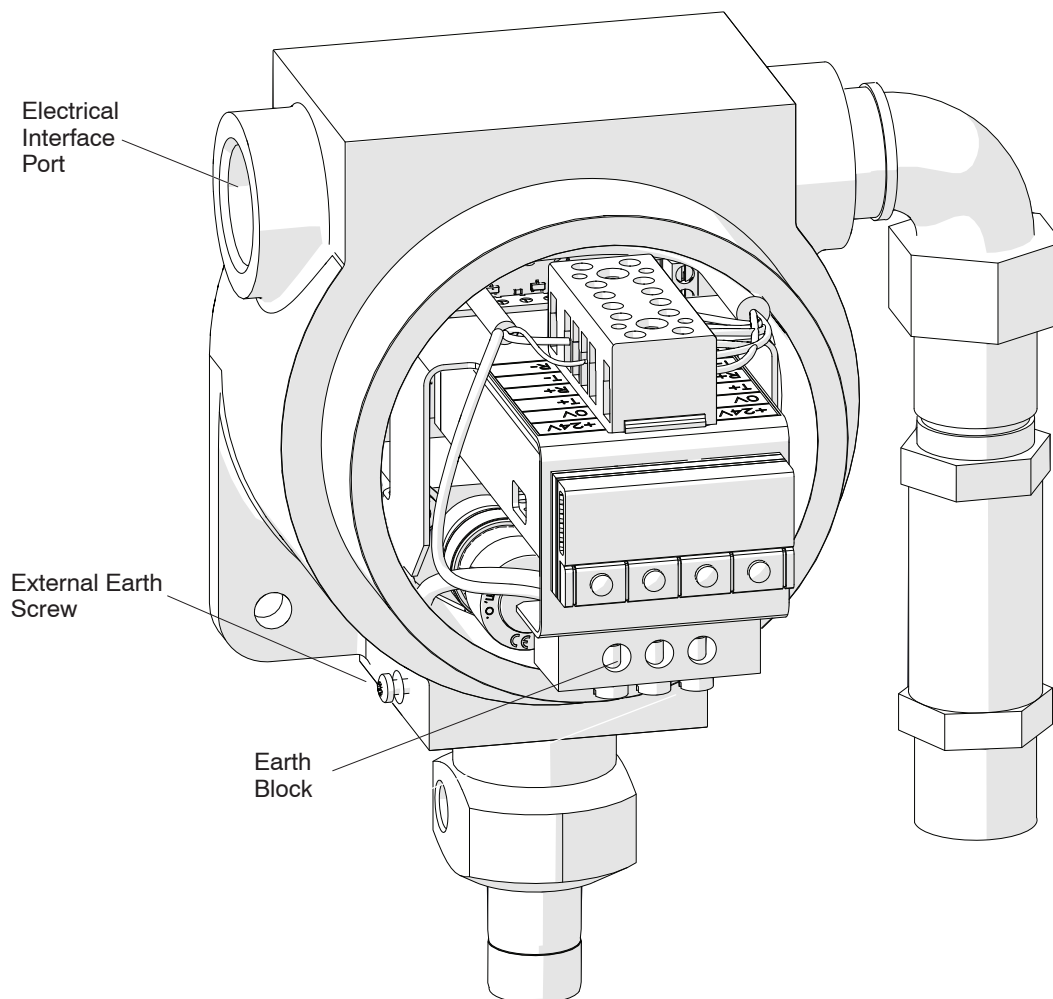


Figure 4. Electrical Connections

1. Remove the electrical box lid.
 - Before opening the electrical box lid, a 1.5 mm hex key will be required to loosen the small locking screw located in the lid lip.
2. Install appropriate conduit or gland into the electrical interface port per your local codes.



WARNING:

All cable entry devices and blanking elements shall be certified in type of explosion protection flameproof enclosure “db”, suitable for the conditions of use and correctly installed.



AVERTISSEMENT:

Tous les dispositifs d'entrée de câbles et les éléments d'obturation doivent être certifiés selon le type de boîtier antidéflagrant de protection contre les explosions « db », adaptés aux conditions d'utilisation et correctement installés.

3. Connect 24V DC power
 - +24V DC power to pin 1
 - 0V DC power to pin 2



WARNING:

Turn off power to the controller before opening electrical box lid. Failure to do so may result in an explosion hazard.



WARNING:

Power supply must be fused with a 400 ma time-delay or time-lag fuse. Failure to do so may result in damage to the equipment.



WARNING:

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



WARNING:

Cable length should not exceed 30 m (98 ft).



AVERTISSEMENT:

L'alimentation doit être protégée par un fusible temporisé ou à action retardée de 400 mA. Le non-respect de cette consigne pourrait endommager l'équipement.



AVERTISSEMENT:

Coupez l'alimentation du contrôleur avant d'ouvrir le couvercle du boîtier électrique. Le non-respect de cette consigne peut entraîner un risque d'explosion.



AVERTISSEMENT:

L'alimentation ne doit pas dépasser 110 % de la tension nominale.



AVERTISSEMENT:

La longueur du câble ne doit pas dépasser 30 m (98 pieds).

4. Connect command signal.
 - 4 to 20 ma + to pin 4
 - 4 to 20 ma – to pin 6

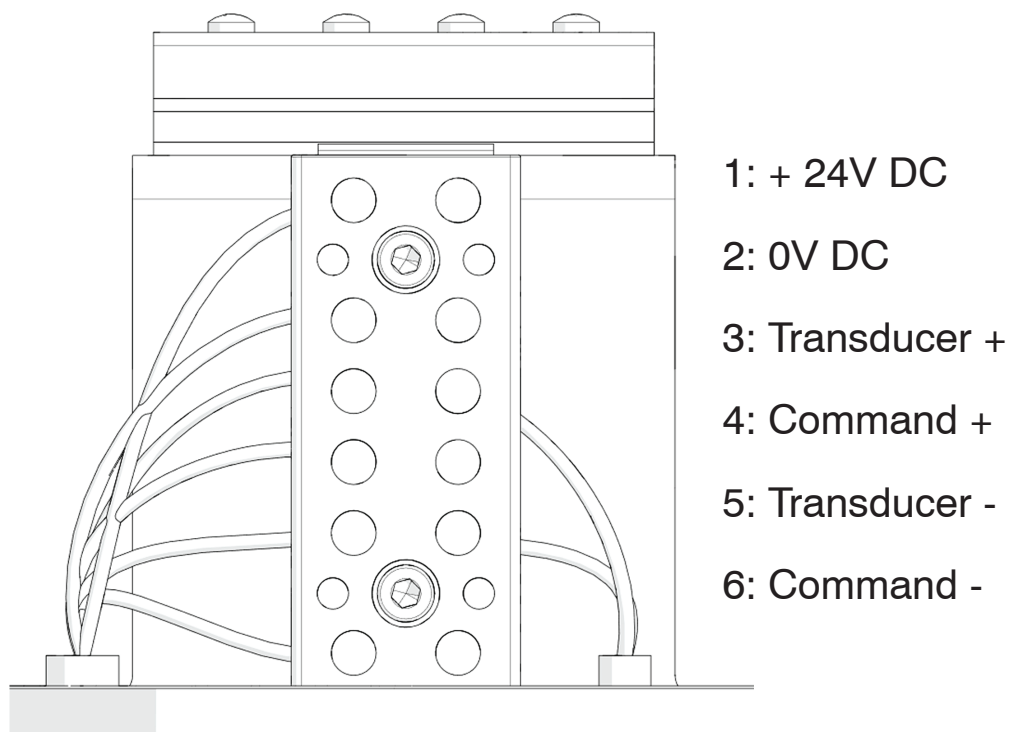


Figure 5. Electrical Connector

5. Connect the ground to earth bonding block using 2mm² (14 AWG) minimum lead in accordance with your local wiring codes.
6. Connect the ground to the External Earth Screw using a 4mm² (11 AWG) minimum lead in accordance with your local wiring codes.



CAUTION:

The transmitter enclosure is a grounded device. To tie to earth ground, ensure a stable ground connection is made to the connected system. To avoid potential injury or damage to equipment, exercise caution in hazardous locations so there are not multiple grounds in a single area.



PRUDENCE:

Le boîtier de l'émetteur est un appareil mis à la terre. Pour le raccordement à la terre, assurez-vous qu'une connexion à la terre stable est établie avec le système connecté. Pour éviter tout risque de blessure ou d'endommagement du matériel, soyez prudent dans les zones dangereuses afin d'éviter la présence de plusieurs mises à la terre dans une même zone.

7. Setup the PID control options per MS-CRD-0301 (when ordered in conjunction with a Swagelok regulator, this step will be conducted by the factory).
8. Replace the electrical box lid and tighten the locking screw.

Operation

Points of Attention Before Operation



CAUTION:

The product can be hot or cold, depending on the environmental temperature and the process media temperature. Take the necessary precautions before operating or touching the product.



PRUDENCE:

Le produit peut être chaud ou froid, selon la température ambiante et celle du fluide de traitement. Prenez les précautions nécessaires avant d'utiliser ou de toucher le produit.

Adjusting the Set Pressure

- To set the SEPC, ensure that the supply pressure is greater than the required set pressure, but does not exceed the maximum rating of the regulator.
- If the SEPC is connected to a regulator and that regulator is non-venting, it must be able to flow in order for it to reduce the outlet pressure.
- Turn on power to the controller.
- To set the assembly to 0% full scale, send a command signal of 4 ma to the command signal inputs. This will set the target pressure to 0% full scale, venting control gas from the control output until the transducer reads zero.
- To set the assembly to 100% full scale, send a command signal of 20 ma to the command signal inputs. This will set the target pressure to 100% full scale, increasing the control gas output until the transducer reads 100% full scale.
- Any percent between these values can be set.
- Units installed by Swagelok will be pre-configured and shipped with a calibration record indicating the calibrated full-scale output. For information on how to setup or change the PID control options see, MS-CRD-0301.

Controller Operation

- When power is applied, the controller will run through a start-up routine for 4 seconds.
- After start-up the controller will immediately start regulating the control gas output in proportion to the command signal.
- While running, the controller will display the current outlet pressure reading from the pressure transducer. This can be changed to display other values, see MS-CRD-0301 for details.
- If the command signal is removed or broken, the controller will vent the output to zero.
- When power is removed, the controller will hold the current pressure in the output indefinitely.

Maintenance



WARNING:

Incorrect or improper repair or servicing of this product can cause serious personal injury and property damage.



AVERTISSEMENT:

Une réparation ou un entretien incorrect ou inapproprié de ce produit peut entraîner de graves blessures corporelles et des dommages matériels.

Any disassembly and/or reassembly of this unit beyond what is detailed below must be performed in accordance with IEC 60079-19, Explosive Atmospheres - Part 19: Equipment Repair, Overhaul, and Reclamation. As such, these units are deemed not to be field serviceable and should be returned to the factory to repair.

Filter Replacement

The inlet port is installed with a 40-micron filter. If this filter becomes clogged, it can reduce the performance of the unit. The filter should be replaced with a new, clean filter.

1. Remove the old inlet filter from the inlet port (marked 'Inlet') using a filter pick tool. Discard old filter.

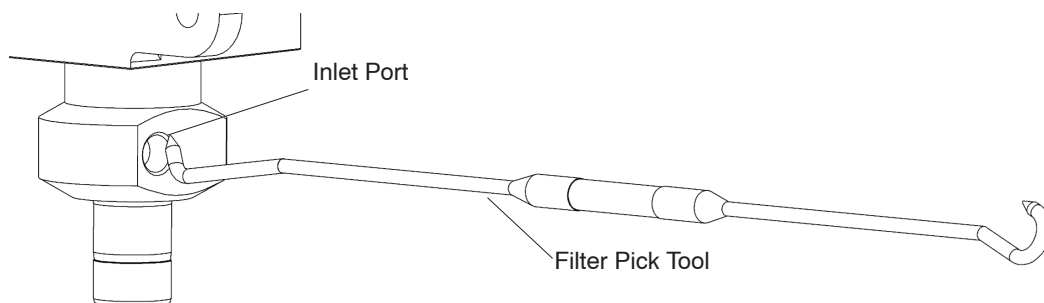


Figure 6. Filter Pick Tool

NOTICE:

Be careful not to scratch the sides of the inlet port. Leakage could result.

2. Insert the new inlet filter in the inlet port (marked "Inlet") using the filter insertion tool.

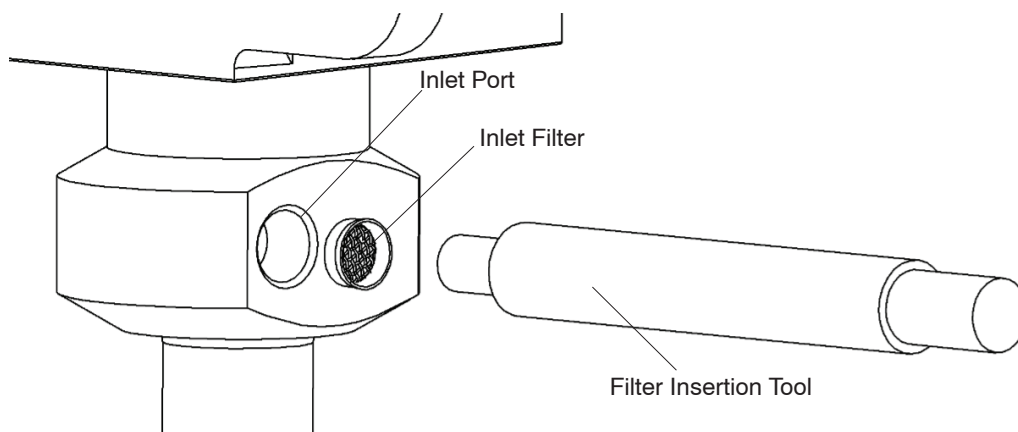


Figure 7. Filter Insertion Tool

NOTICE:

Do not insert the inlet filter with a sharp tool. Damage to the filter could result.

Points of Attention Before Removal from the System

- Follow all local system safety and maintenance procedures when removing the unit.



WARNING:

Before removing a regulator from the system and to avoid personal injury, you must:

- Depressurize the system.
- Purge the system to remove any residual system media left in the regulator.
- Always vent to a safe environment away from people and ensure there is adequate ventilation.



CAUTION:

Check if the process media is hazardous or toxic. If required, take the necessary safety precautions to ensure a safe workspace and your personal safety.



CAUTION:

The product can be hot or cold, depending on the environmental temperature and the process media temperature. Take the necessary precautions before operating or touching the product.



AVERTISSEMENT:

Avant de retirer un régulateur du système, afin d'éviter toute blessure, vous devez :

- Dépressuriser le système ;
- Purger le système pour éliminer tout résidu de fluide présent dans le régulateur ;
- Toujours ventiler vers un environnement sûr, loin des personnes, et veiller à une ventilation adéquate.



PRUDENCE:

Vérifiez si le fluide utilisé est dangereux ou toxique. Si nécessaire, prenez les précautions de sécurité nécessaires pour garantir un espace de travail sûr et votre sécurité personnelle.



PRUDENCE:

Le produit peut être chaud ou froid, en fonction de la température ambiante et de la température du milieu de traitement.

Removal from the System

1. Isolate the SEPC from all pressure sources by closing all appropriate upstream valves in the system.
2. With the SEPC set, open all appropriate downstream valves to allow pressure to vent from the regulator.



WARNING:

Check if the process media is hazardous or toxic. If required, take the necessary safety precautions to ensure a safe workspace and your personal safety.



AVERTISSEMENT:

Assurez-vous que toute la pression à l'entrée, à la sortie et au dôme a été entièrement évacuée. La libération accidentelle de la pression résiduelle peut entraîner des blessures graves.

3. Isolate the SEPC from all electrical sources.



WARNING:

Turn off power to the controller before opening electrical box lid. Failure to do so may result in an explosion hazard.



AVERTISSEMENT:

Coupez l'alimentation du contrôleur avant d'ouvrir le couvercle du boîtier électrique. Le non-respect de cette consigne peut entraîner un risque d'explosion.

4. Ensure any appropriate lifting equipment is available to enable the regulator to be supported and handled once disconnected from the system.
5. Ensure that any control feed is disconnected.
6. Disconnect and remove the controller from the system.

Appendix A: Typical Installation Configurations

Direct dome loaded regulator

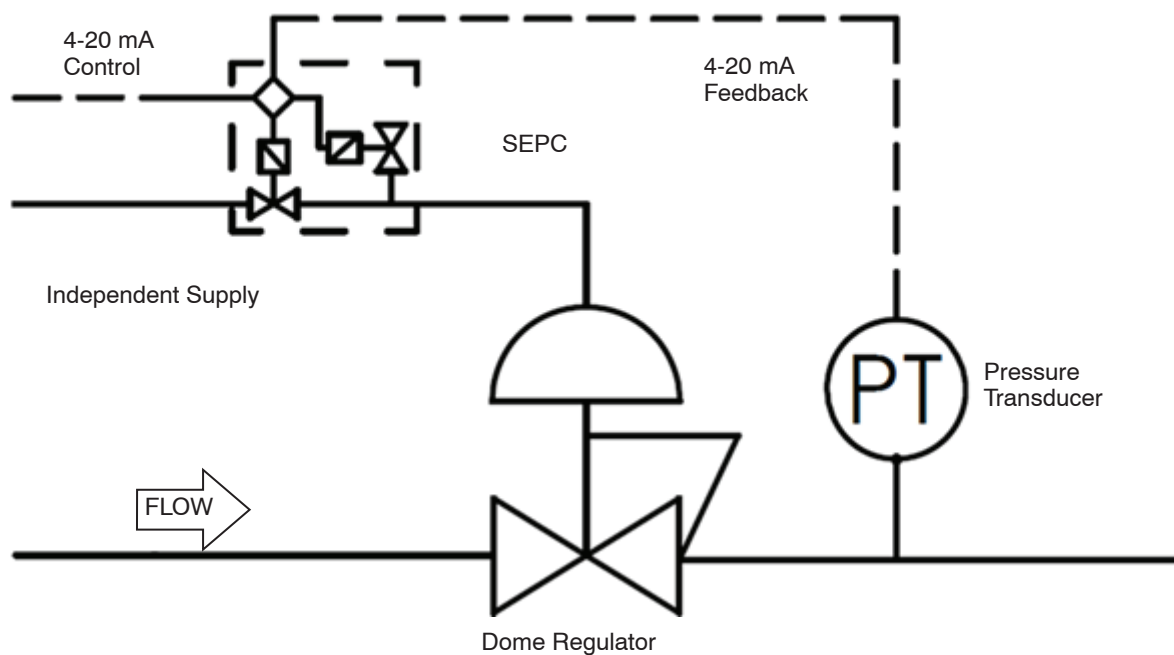


Figure 8. *Direct Dome Loaded Regulator*

Ratio loaded regulator

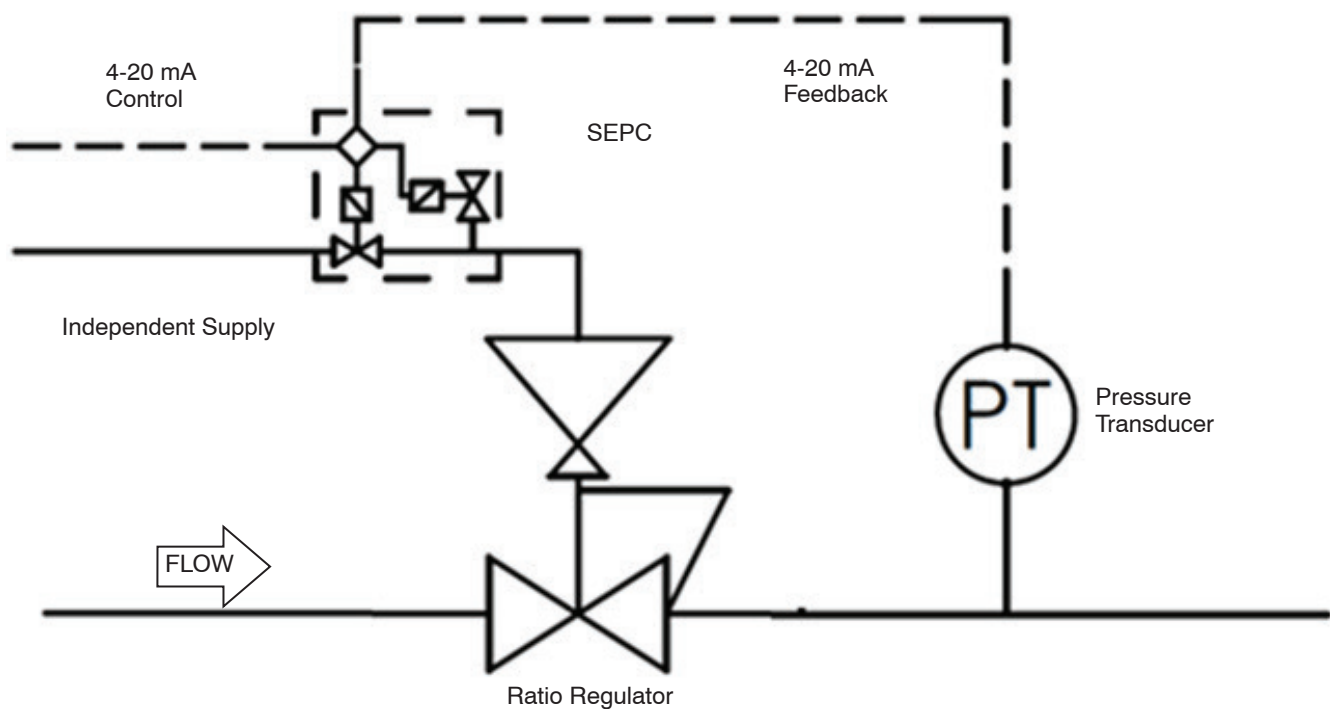


Figure 9. Ratio Loaded Regulator

Ratio pilot, dome loaded regulator

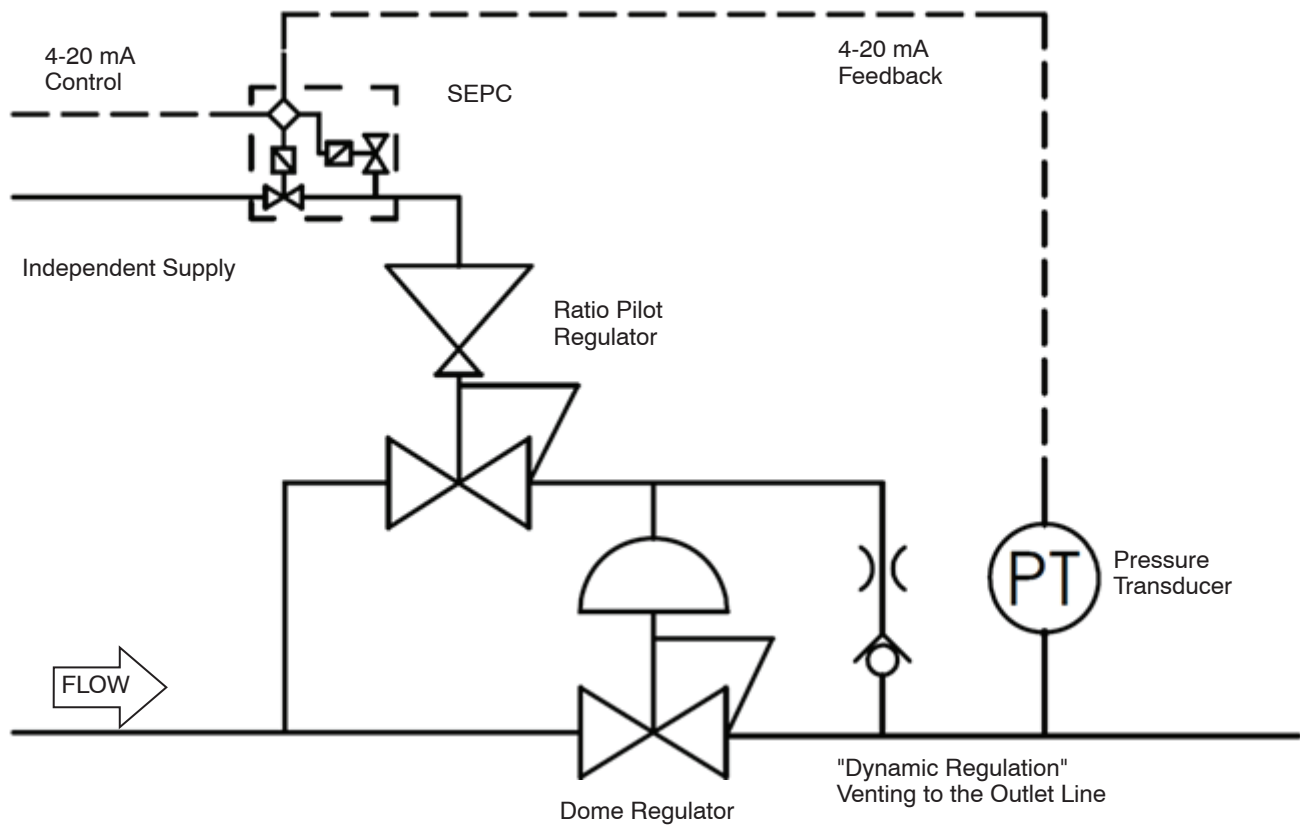


Figure 10. Ratio Pilot, Dome Loaded Regulator

Troubleshooting

Symptom	Cause	Remedy
The outlet pressure creeps up without adjusting the controller.	A damaged control valve.	Return to Swagelok controller service.
The outlet pressure does not increase when a command signal is applied.	Command signal wire is not connected correctly.	Check wiring of control signal.
	Controller settings are incorrect.	Refer to MS-CRD-0301 for settings.
	Controller or inlet valve is damaged.	Return to Swagelok for servicing of the controller.
The outlet pressure does not decrease when a command signal is applied.	Controller settings are incorrect.	Refer to MS-CRD-0301 for settings.
	Controller or outlet valve is damaged.	Return to Swagelok for servicing of the controller.
The outlet pressure rises above the command value, and continues to rise to equal the inlet pressure.	Outlet transducer wire is not connected correctly.	Check wiring of outlet transducer.
	Outlet transducer scale has not been setup correctly.	Refer to MS-CRD-0301 for settings.
	Outlet transducer is damaged.	Return to Swagelok for servicing of the controller.
The required outlet pressure cannot be reached.	The inlet pressure to the controller is not high enough.	Ensure that the inlet pressure to the controller is equal to or greater than the desired set pressure.
The time to reach required outlet pressure is slower than when the system was first installed.	Inlet filter has become clogged.	Replace inlet filter.

Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty.

For a copy, visit swagelok.com or contact your authorized Swagelok representative.

