

Installation & Maintenance Instructions

INTRINSICALLY SAFE — SÉCURITÉ INTRINSÈQUE Exia
3-WAY ELECTRONICALLY ENHANCED
GENERAL PURPOSE, RAINTIGHT, WATERTIGHT VALVE SOLENOIDS
AIR OR INERT GAS SERVICE

ASSEMBLY
HV 272282

Catalog Nos.
WPIS8003A300
WSIS8003A300

Form No.V6971

IMPORTANT: See separate valve installation and maintenance instructions for information on: Operation, Positioning, Mounting, Piping, Filter Requirements for Air or Inert Gas, Flow Controls, Cleaning, Preventive Maintenance, Cause of Improper Operation, Disassembly and Reassembly of Basic Valve.

FOR INTRINSICALLY SAFE LOCATIONS

As requirement for use in an intrinsically safe system, the solenoid must be wired to a specific safety barrier located in a nonhazardous area. This safety barrier limits the electrical power supply's voltage and current to the valve. The safety barrier also acts as a fusing device for the circuit.

For the applicable intrinsically safe hazardous location designations and Factory Mutual (FM) Approved and Canadian Standards Association (CSA) Certified listing of intrinsic safety barriers, see ASCO Control Document Form No. V6969. This control document ensures that the proper safety barrier is selected and wired correctly to the appropriate ASCO "IS" Solenoid Valve to provide an intrinsically safe system.

DESCRIPTION

This 3-way electronically enhanced, intrinsically safe valve solenoid is designed to operate in intrinsically safe circuits. The solenoid enclosure meets Type 1-General Purpose, Type 2-Dripproof, Types 3 and 3S-Raintight, and Type 4-Watertight. Catalog number with prefix "WS" also meet Type 4X-Watertight. When supplied with an Series 300 ASCO IS Solenoid Valve, the valve is designed for use in an intrinsically safe system that will not ignite an explosive atmosphere as defined in Article 500 of the National Electrical Code, NFPA-70.

OPERATION

See basic valve installation and maintenance instructions.

INSTALLATION

Check nameplate for correct catalog number, pressure, voltage, and service.

Temperature Limitations

Fluid and ambient temperature range: -40_C to +60_C (-40_F to + 140_F).

Positioning

Solenoid may be mounted in any position.

Piping (General Instructions)

On some valve constructions, there is pilot exhaust (from the top of the solenoid) when the valve shifts. The pilot exhaust may be connected to the main exhaust if the air or inert gas cannot be exhausted directly to the atmosphere.

⚠ CAUTION: Debris entering 1/8I NPT connection at top of cartridge assembly may cause valve malfunction. Use a breather or muffler to vent to atmosphere or connect to an exhaust system.

Connect piping to valve according to markings on valve body. Refer to flow diagrams provided in **OPERATION** section of basic valve installation and maintenance instructions.

⚠ CAUTION: To avoid damage or accidental disengagement of cartridge assembly from valve body, hold cartridge assembly securely by wrenching flats when installing or removing piping at 1/8I NPT connection on top of the solenoid.

Apply pipe compound sparingly to male pipe threads only. If applied to valve threads, the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point.

⚠ CAUTION: These solenoids are intended for use on clean dry air or inert gas, filtered to 50 micrometres or better. The dew point of the media should be at least 10_C (18_F) below the minimum temperature to which any portion of the clean air/inert gas system could be exposed to prevent freezing. If lubricated air is used, the lubricants must be compatible with Buna N elastomers. Diester oils may cause operational problems. Instrument air in compliance with ANSI/ISA Standard S7.3-1975 (R1981) exceeds the above requirements and is, therefore, an acceptable media for these valves.

Wiring

Wiring must comply with local codes and the National Electrical Code. This solenoid has been designed for use in an intrinsically safe system. As a requirement for use in an intrinsically safe system, the valve must be wired to a specific safety barrier located in a nonhazardous area. The safety barriers acceptable for installation with this valve are listed on ASCO Control Document Form No. V6969.

⚠ CAUTION: Excessive conduit strain on solenoid housing may damage solenoid or cause valve malfunction. Be sure conduit and additional junction boxes within the conduit run to the solenoid housing are properly aligned and supported.

⚠ WARNING: Substitution of components may impair intrinsic safety.

⚠ AVERTISSEMENT: La Substitution de composants peut compromettre la sécurité intrinsèque.

To facilitate wiring, the solenoid enclosure may be rotated 360° depending upon basic valve construction. To rotate, loosen hex nut on top of cartridge assembly. Then rotate solenoid enclosure to desired position and make electrical connection. The solenoid housing has a ½" NPT conduit connection. Maximum wire size is No. 14 AWG stranded copper. A grounding screw (green) and cup washer are provided for grounding connection. Before operating, torque hex nut to 90 ± 10 in-lbs [10,2 ± 1,1 Nm].

Electrical Specifications

Nominal operating voltage range – 24 VDC +/-10%

Minimum series resistance required – 200 ohms

Maximum allowable off-state current – 1 mA

Operating Parameters vs Voltage

Voltage to barrier	Nominal holding current in mA with 300 ohm barrier	Nominal coil watts with 300 ohm barrier
21.6	40	0.38
24.0	46	0.47
26.4	51	0.57

Intrinsically Safe Coil Calculations

The following application information will allow the calculation of the loop current for the ASCO Series 300 intrinsically safe solenoid valve.

Definitions:

V_{supply} – The supply voltage that is supplied to the intrinsically safe barrier

$T_{ambient}$ – The ambient temperature in degrees C that the solenoid valve will operate in. (Maximum = 60°C)

$R_{barrier}$ – The maximum end to end resistance that is specified for the barrier used.

R_{loop} – The maximum resistance in lead wire from the barrier to the valve and back again. The following chart can be used to calculate the loop resistance of some standard wire sizes:

Wire Size	Ohms/1000 ft at 20°C
22 AWG (7x30 stranded)	14.74
20 AWG (7x28 stranded)	9.27
18 AWG (7x26 stranded)	5.83
18 AWG (16x30 stranded)	6.45
16 AWG (19x29 stranded)	4.31

R_{coil} – The resistance of the solenoid coil at $T_{ambient}$ in degrees C

$$R_{coil} = 104 \text{ ohms} \frac{(T_{ambient} - 23)}{254}$$

I_{loop} – Loop current in the circuit, which may be calculated as follows:

$$I_{loop} = \frac{(V_{supply} - 3.2)}{(54 + R_{coil} + R_{loop} + R_{barrier})}$$

This current must always be greater than or equal to 0.028 amps for proper operation of the solenoid valve.

MAINTENANCE

⚠ WARNING: To prevent the possibility of personal injury or property damage, turn off electrical power, depressurize valve, and vent fluid to a safe area before servicing the valve.

⚠ AVERTISSEMENT: Pour éviter la possibilité d'accidents personnels et dommages matériels, avant d'entretenir la vanne couper le courant, décompresser la vanne et aérer les fluides dans une zone sûre.
Cleaning

All solenoid valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to shift. Clean filter when cleaning the valve.

Preventive Maintenance

- S** While in service, the valve should be operated at least once a month to ensure proper opening and closing.
- S** Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Causes of Improper Operation

- S Faulty Control Circuits:** Check the electrical system by energizing the solenoid. A metallic *click* signifies that the solenoid is operating. Absence of the *click* indicates loss of power supply. Check for loose or blown fuses, grounded coil, broken lead wires, terminal connections or damaged safety barrier.
- S Burned—Out Coil:** Check supply voltage; it must be the same as specified on nameplate.
- S Low Current:** Check coil current by disconnecting one lead and connecting an ammeter in series with the lead and safety barrier. Coil current must be a minimum of 28 milliamperes.
- S Low Voltage:** Check the supply voltage at the power supply (input to barrier). The supply voltage must be a minimum of 21.5 volts.

Coil Replacement/Solenoid Disassembly

⚠ WARNING: Substitution of components may impair intrinsic safety.

⚠ AVERTISSEMENT: La Substitution de composants peut compromettre la sécurité intrinsèque.

⚠ CAUTION: This solenoid is provided with a special coil. This coil cannot be replaced by a standard DC coil. The correct replacement coil part number can be obtained from the coil itself or from the ASCO Rebuild Kit Catalog. Be sure your replacement coil is correct.

1. Disassemble solenoid in an orderly fashion using exploded view for identification and placement of parts.
2. Disconnect supply wires to coil and grounding wire from solenoid housing.

⚠ CAUTION: To avoid cartridge damage, hold cartridge assembly securely by wrenching flats when removing piping from 1/8I NPT connection at top of solenoid.

NOTE: On some valve constructions, the 1/8I NPT connection is plugged. It is not necessary to remove the plug.

3. Remove piping or tubing from 1/8I NPT connection on top of solenoid.
4. Remove hex nut from top of cartridge assembly.
5. Loosen cover screws (3) and remove housing cover with spacer, nameplate and cover gasket.

6. Remove upper housing gasket and spacer from top of coil.
7. Remove plugnut gasket from cartridge assembly.
8. Slip coil off cartridge assembly.

NOTE: For complete disassembly of solenoid assembly continue steps.

9. Slip washer off cartridge assembly.
10. If necessary disconnect rigid conduit from solenoid housing.
11. Remove solenoid housing and lower housing gasket from cartridge assembly.

⚠ CAUTION: To avoid damage, use a 1 1/8I wrench on hex base of cartridge assembly when removing.

12. Unscrew cartridge assembly and remove cartridge gasket and orifice gasket.
13. Refer to basic valve installation and maintenance instructions for additional disassembly.

Coil Replacement/Solenoid Reassembly

1. Lubricate orifice gasket, cartridge gasket, plugnut gasket, and upper and lower housing gaskets with DOW CORNINGr 200 Fluid lubricant or an equivalent high-grade silicone fluid.
2. Lubricate the inside diameter of the hole in the spacer with a moderate coat of DOW CORNINGr 111 Compound lubricant or an equivalent high-grade silicone grease.
3. Reinstall orifice gasket, cartridge gasket and cartridge assembly. Then torque cartridge assembly to 175 ± 25 in-lbs [$19,8 \pm 2,8$ Nm].

⚠ CAUTION: To avoid damage, use a 1 1/8I wrench on hex base of cartridge assembly when installing.

4. Reposition housing gasket, solenoid housing, washer and coil on cartridge assembly.
5. Install plugnut gasket in recess of cartridge assembly.
6. Rotate solenoid to desired position.
7. Make electrical hookup to solenoid, see **Wiring** section.
8. Replace spacer, housing gasket and housing cover with nameplate, cover gasket and cover screws. Torque cover screws evenly to 12 ± 2 in-lbs [$1,4 \pm 0,2$ Nm].
9. Install spacer (convex side to cover) and hex nut on top of cartridge assembly. Torque hex nut to 90 ± 10 in-lbs [$10,2 \pm 1,1$ Nm].

⚠ CAUTION: To avoid cartridge damage, hold cartridge assembly securely by wrenching flats when installing piping in 1/8I NPT connection.

10. Make up piping to 1/8I NPT connection at top of solenoid assembly.

⚠ CAUTION: Solenoid must be fully reassembled because the housing and internal parts complete the magnetic circuit.

ORDERING INFORMATION FOR COIL

When Ordering Coils for ASCO valves, order the number stamped on your coil.

Torque Chart

Part Name	Torque Value In--lbs	Torque Value Nm
Cartridge Assembly	175 ± 25	19,8 ± 2,8
Cover Screw (3)	12 ± 2	1,4 ± 0,2
Hex Nut	90 ± 10	10,2 ± 1,1
Terminal Screw (2)	10 ± 2	1,1 ± 0,2

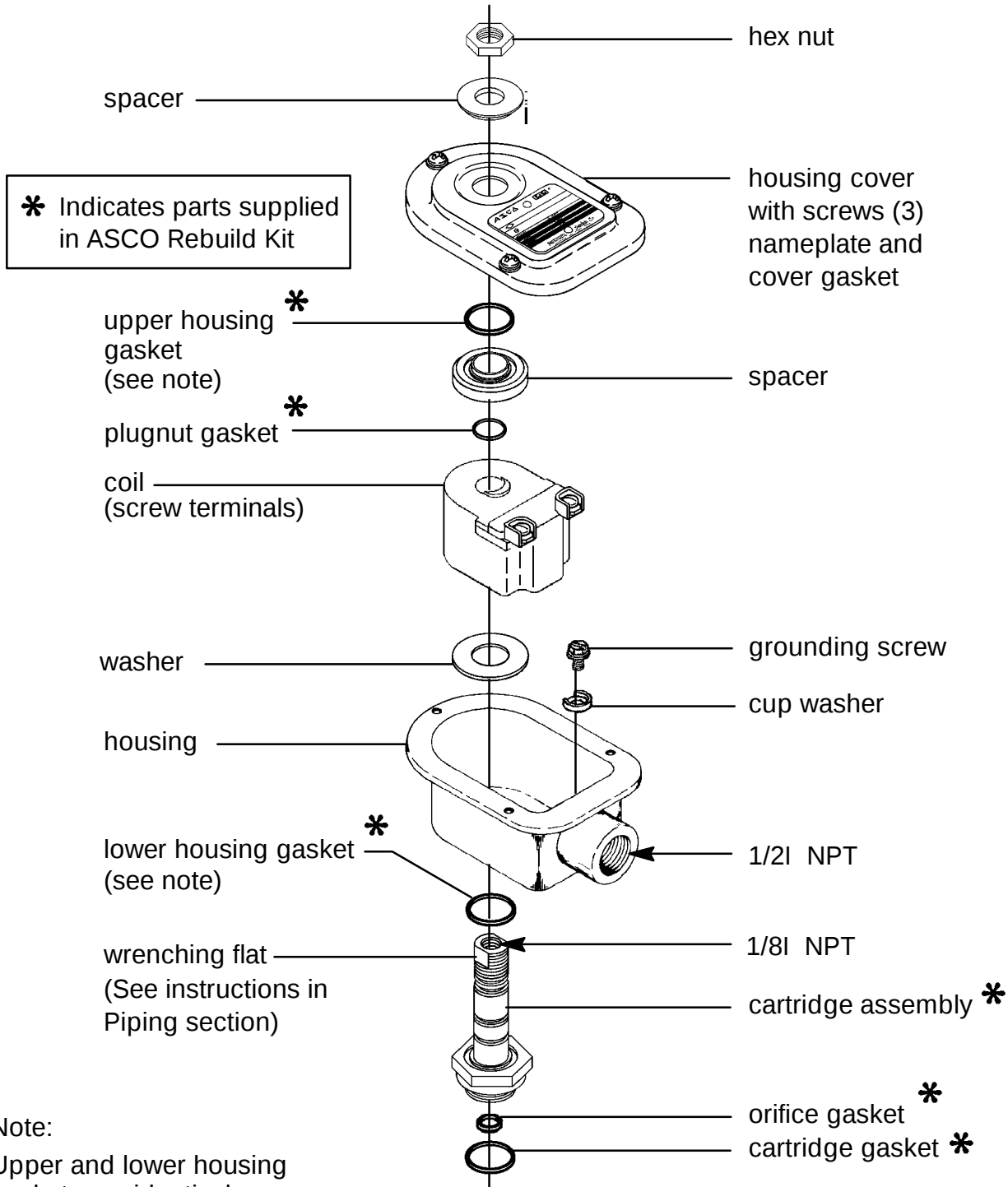


Figure 1. Assembly HV 272282 solenoid.