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INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS

Intrinsically Safe Solenoid Valves Four-Way Normally Closed Types U341B, U341L

FA.7.053 (Rev 0125)

DESCRIPTION AND OPERATING INSTRUCTIONS

General Description: Intrinsically Safe, “IS” Solenoid valves are Designed for use in intrinsically safe systems which can not ignite an explosive atmosphere by either a spark or heat generation. The power level of an intrinsically safe electrical system is therefore extremely low. Each electrical apparatus, (e.g. solenoid valve) within the hazardous area must be further protected by safety barriers. This safety zone barrier limits the electrical power supplies voltage and current to the valve and provides a fusing device for the intrinsically safe circuit. There are two types of barriers: active and passive. Both types of barriers may be used with Parker “IS” solenoid valves

A passive barrier is a typical shunt diode safety barrier design. The characteristic of a Passive Barrier is the relationship of the total “end to end resistance” to total current output. Simply put, it is a restrictive device.

The second type of barrier is an Active Barrier. The I.S. coil can be directly connected to this device without insertion of a Passive Barrier. The Active Barrier is actually an I.S. power supply where the voltage decreases as current draw increases or in some instances, (stabilized output voltage), the voltage remains constant to a predetermined current draw. Should this current level be exceeded, the voltage drops drastically to zero, shutting off the device.

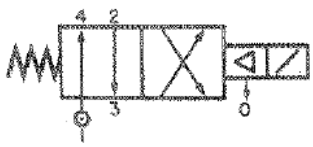
If you need assistance in barrier selection, refer to bulletin B920027 for the applicable intrinsically safe hazardous location designations and a listing of the recommended barriers of I.S. power supplies. Bulletin B920027 will also provide electrical parameters for the different types of available solenoids.

Valve bodies are made of brass, stainless steel or aluminum. Solenoid enclosure are available with three different types of electrical connections: screw terminals for leads 3 x 1.5 mm2, flying leads 2 m long 1 mm2 OD and "DIN" standard plug interface and 3 pin amp plug (din 43650 type A) with Pg 11 gland. 1/2 NPT conduit HUB adaptors are available.

Approvals: Factory Mutual (FM) class No. 3610.

Principle of Operation

Four way normally closed pilot operated valves, type U341B



ANSI Symbol
U341B

In the deenergized condition pressure is applied to port 1. Flow is from port 1 to port 4 and port 2 to port 3. In the energized condition flow is from port 1 to port 2 and port 4 to port 3.

Note: Sleeve port is the pilot exhaust port. Do not block.

CAUTION

A minimum pressure differential and also a minimum flow requirement of 28 SCFH is required for proper valve operation.
Refer to the nameplate for minimum and maximum pressure range of the valve.

Directional control pilot operated manifold mounted valves, Type U341L

ANSI Symbol
U34L

In the deenergized condition pressure is applied to the P port. Flow is from port P to port B and port A to port R. Port S is sealed. In the energized condition flow is from port P to port A and port B to port S. Port R is sealed.

Note: Sleeve port is the pilot exhaust port. Do not block. A minimum pressure differential is required for proper valve operation.
Refer to nameplate for minimum and maximum pressure range of the valve.

INSTALLATION INSTRUCTIONS

Mounting Position and Pressure Limits: Valves can be mounted directly on piping and are designed to operate in any position. If some lubrication is required by other pneumatic elements, to avoid oil accumulation in the sleeve, it is recommended that the valve sleeve be mounted above a horizontal plane to allow for drainage. Line pressure must conform to nameplate rating.

Piping: Remove protective closures from the body and sleeve ports. Connect line pressure to the inlet port. Refer to ANSI Symbol for the pressure port. Arrow on body indicated direction of flow. Use of thread compound or sealants is permissible.
Caution: Do not allow foreign particles or thread compound to enter valve. Tightening torques should not exceed 175 in-lbs for the 1/4" NPT, 225 in-lbs for the 3/8" NPT, 300 in-lbs for the 1/2" NPT, 450 in-lbs for the 3/4" NPT, 600 in-lbs for the 1" NPT, 700 in-ibs for the 1 1/4" NPT, 750 in-lbs for the 1 1/2" NPT and 950 in-lbs for the 2" NPT body port size. Caution: Only the wrench flats provided should be used in appling torque. Do not use valve or housing as a lever.

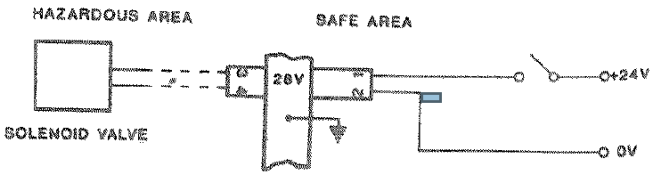


FIGURE 1A

Figure 1A shows a good method of driving an IS solenoid-operated valve, in a hazardous area. The control switch has to float, but the circuit fails safe on ground faults and employs a simple 1-channel barrier.

The resistance of the solenoid valves should be about equal to that of the barrier, to give maximum power transfer. Low consumption valves can be operated in parallel from the same barrier.

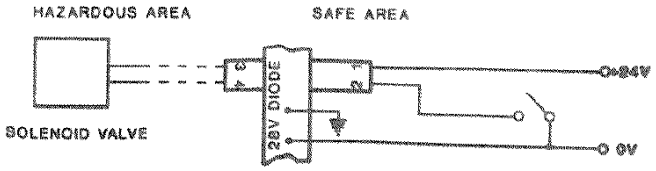


FIGURE 1B

If the switch is on ground as in most electronic systems, Figure 1B, then a 2-channel barrier must be used and the circuit does not fail sate, since a ground fault on the lower line looks like a closed switch and energizes the load.

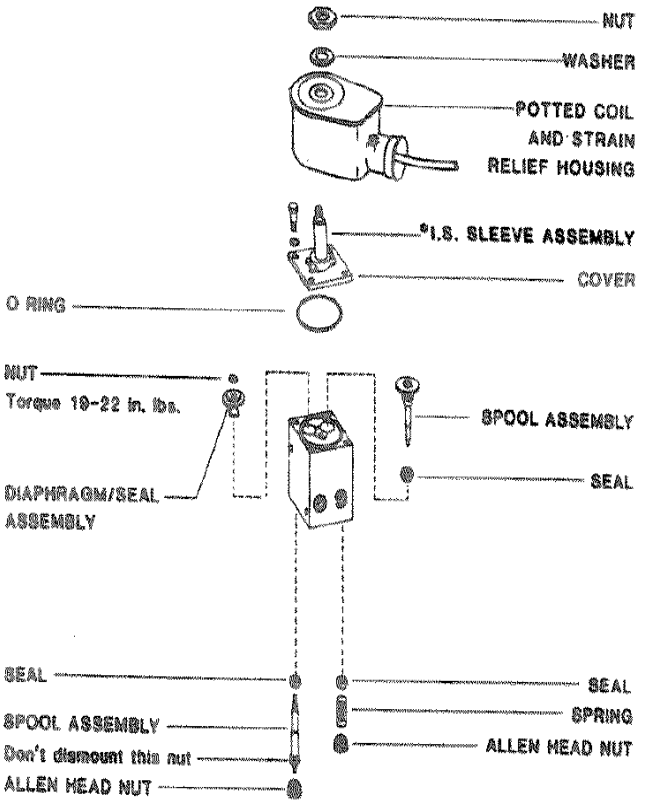
ENTITY PARAMETERS

Vmax. = 30 Volts, I max = 100 ma, Ci = 0, Li = 3.3 mh.

1. For guidance on installation, see ISA 12.6.

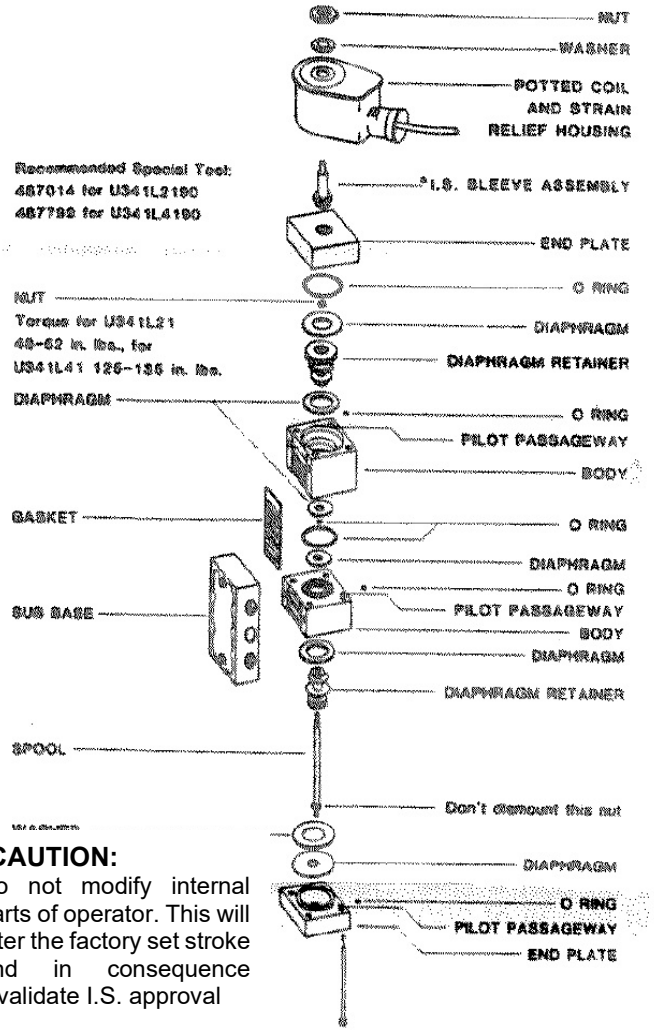
2. The safe area apparatus must not be supplied from nor contain a potential with reference to ground exceeding 250V RMS or 250V DC.

FIGURE 2 – Type U341B



***CAUTION:** Do not modify internal parts of operator. This will alter the factory set stroke and in consequence invalidate I.S. approval

FIGURE 3 – Type U341L



***CAUTION:**
Do not modify internal parts of operator. This will alter the factory set stroke and in consequence invalidate I.S. approval

DISASSEMBLY INSTRUCTIONS (see figs, 2 & 3)

NOTE

Valves can not be repaired without the use of special tools - see text)

Shut off the supply pressure and electrical current to the valve. The valve should be removed from the line. For ease of service, the U341L is simply removed from its manifold base.

To remove the coil/housing assembly, disconnect the coil wires. Unscrew the housing nut. The nameplate/ coil/housing assembly can now be removed.

Unscrew the sleeve flange and remove. **

CAUTION

Do not attempt to alter the sleeve/plunger assembly in any way. Doing this will invalidate "IS" approval. New assemblies can be purchased. Contact Fluid Control Division for further details.

** To disassemble the internal parts of Type U341L it is not necessary to remove the sleeve assembly.

Type U34183490

NOTE

Valve can not be repaired without special tool 487271.

Unscrew cover screws and remove the cover. Remove spool assembly from port 1 side. From the spool assembly on port 3 side unscrew the nut. The diaphragm assembly may now be removed from the body. Unscrew the allen head nuts on the side opposite the cover. The remaining spool assembly and components may now be removed.

Type U341L

NOTE

Valve can not be repaired without special tool 487014.

Unscrew the four body screws located on the opposite side of the sleeve assembly. Unscrew the nut on the spool located on the sleeve assembly side. The spool assembly may now be removed from the body. End plates may also be removed from the body.

REASSEMBLY INSTRUCTIONS (refer to figure 2)

Type U341B3490 (refer to figure 2)

NOTE

Valve can not be repaired without special tool 487271.

Place valve body on side so port 4 and port 2 are pointing upwards.

Locate spool with the preassembled nut. Assemble seal (without O-ring) onto spool so seal is pointing away from the nut. Insert spool assembly into bottom hole on port 4 side. Tighten allen head nut with an input torque of 300-310 in-lbs.

Place valve body upright so port 4 and port 2 are pointing toward you.

Locate diaphragm/seal assembly. Assemble onto spool that is located in the body on port 4 side. Check to see that spool travel is not restricted. Tighten nut with an input torque of 19-22 in-lbs.

Locate spool with preassembled diaphragm. Locate seal assembly (without O-ring). Assemble seal assembly onto the spool. Position seal so it is on the opposite side of O-ring in the spool assembly. Insert into body. Assemble O-ring into body. Place cover on body so spools will mate with holes in covers. Tighten cover nuts with an input torque of 82-92 in-lbs.

Place valve body on side so port 4 and port 2 are pointing upwards.

Check spool travel on port 2 side. Must move freely. Assemble seal assembly onto spool. Main seal side to be inserted into body first. Assemble spring and tighten allen head nut with an input torque of 300-310 in-lbs.

Tighten sleeve assembly with an input torque of 260- 270 in-lbs.

CAUTION

Do not attempt to modify internal parts of the operator in any way. This will alter the factory set stroke and in consequence invalidate "IS" approval.

Reassemble coil/housing to sleeve assembly. Tighten housing nut with an input torque of 43-53 in-lbs.

Refer to installation instructions for remaining installation.

Type U341L (refer to figure 3)

Recommended special tool 487014 for U341L2190 and 487799 for U341L4190.

Assemble the largest diaphragm onto the diaphragm retainer.

Assemble O-ring to pilot passageway in end plate (one without sleeve flange thread).

Reassembly of body with two slots.

Assemble middle size diaphragm to the body.

Diaphragm must be in the middle groove.

Assemble washer to the larger end of body, insert diaphragm assembly into body. Countersink on washer must be facing diaphragm.

Assemble smaller diaphragm to diaphragm retainer.

Assemble O-rings to body.

Insert spool through diaphragm retainer. Pre-assembled nut on spool must be on side with the larger diaphragm.

Reassembly of body with three slots.

Assemble middle size diaphragm to the body.

Diaphragm must be in the middle groove.

Insert diaphragm assembly into body.

Assemble smaller diaphragm: to diaphragm retainer and O-ring to diaphragm retainer.

Assemble body with three slots to body with two slots so pilot passageway is aligned.

Assemble nut to spool and tighten with an input torque of 48-52 in-lbs. for U341L2190 and 125-130 in-lbs. for U341L4190.

Assemble O-rings to body pilot passageway and O-ring to remaining end plate (one with sleeve flange threads). Assemble end plates to the bodies. Make sure pilot passageway in the end plates and bodies are aligned.

Tighten screws with an input torque of 82-92 in-ibs.

Tighten sleeve assembly with an input torque of 260-270 in-lbs.

CAUTION

Do not attempt to modify internal parts of the operator in any way. This will alter the factory set stroke and in consequence invalidate "IS" approval.

Reassemble coil/housing to sleeve assembly. Tighten housing nut with an input torque of 43-53 in-lbs.

Refer to installation instructions for remaining installation.

Replacement parts are available on certain valve families; consult factory. When ordering replacement parts specify valve number from nameplate and describe

parts required.

Media Filtration: Normally not required although dirt or foreign material in media may cause excessive leakage, excessive wear or, in exceptional cases, malfunction. Recommended filtration of 5-25 microns is recommended for the 3 and 4 way valves. Install the filter in the inlet side as close to the valve as possible. Clean periodically depending on service conditions.

Electrical Connection: Electrical supply must conform to nameplate rating. In order to maintain an intrinsically safe system connect coil leads to electrical circuit containing an approved safety barrier, as shown in Figure 1A and 1B. For guidance on installation see ISA 12.6. (See bulletin B920027 for recommended "IS" barriers). The housing nut may be loosened to rotate housing to the desired position before installation. Once the electrical connection has been made and the solenoid has been positioned, retighten housing nut with an input torque of 43-53 in-ibs.

CAUTION

It is important to observe the polarity as shown in Figs. 1A and 1B. The blue lead wire is negative (-) and the black wire is positive (+). Reverse wiring can damage the coil.

MAINTENANCE

CAUTION

Do not attempt to modify internal parts of the operator in any way. This will alter the factory set stroke and inconsequence invalidate "IS" approval.

Note: Depending on service conditions, fluid being used, filtration and lubrication it may be required to periodically clean and/or replace worn components.
See Disassembly Instructions.
Caution: Do not expose plunger assembly, diaphragms, seals and 0-rings to any type of commercial cleaning fluid or kerosene. Parts should be cleaned with a mild soap and water solution.

TROUBLE SHOOTING

Problems	Procedure
Valve Fails to operate	1. Check the electrical supply at Barrier or at output of power source 2. Check pressure at valve inlet. It must be at least equal to the minimum pressure stamped on the nameplate. It should not go below the minimum pressure while valve is operating. For U341B valve families check for minimum required flow (28 SCFH). 3. Check coil with OHM meter for shorts or open coil in safe area. 4. Check Safety Barrier connections and fuse.
Valve is sluggish or inoperative - electrical supply and pressure checks out	1. Check diaphragms for tears or abrasions. Replace if torn or abraded. 2. Check for clogged or obstructed bleed passageways. Passageways must be clean and free of all obstructions that restrict internal flow. Clean metal parts with solvent and/or compressed air. Do not put wire into passageway. 3. Check to see if minimum flow of 28 SCFH is being delivered to the inlet port of U34B34 family.
External Leakage Sleeve Flange At Flange Joint between Body and Cover	Tighten sleeve with an input torque of 260-270 in-Lbs. For U341L retighten the four body screws with an input torque of 82-92 in-lbs. For U341B retighten as follows: cover screws with an input torque of 82-92 In-lbs. The larger plug opposite the sleeve with an input torque of 300- 310 in-lbs. The smaller plug opposite the sleeve with an input torque of 82-92 in-lbs. if leakage persists, replacement of diaphragm assembly or flange O-ring may be required and/or bodies or covers with damaged sealing surfaces may have to be repaired or replaced.
Internal Leakage	Inspect the diaphragm or orifice seal. Remove and wash in a warm water mild soap solution, replace any damaged parts. **CAUTION** Do not adjust the sleeve/plunger operator. Stroke has been factory preset. Altering stroke will invalidate the "IS" approval.