

# OPERATING AND MAINTENANCE MANUAL

*Series 1001, 1001A, 1001XL Level Control*



*Series 1001*



*Series 1001A*

## TABLE OF CONTENTS

<b>INTRODUCTION</b>	<b>1</b>
Scope	1
Controller Identification	1
<b>PRINCIPLE OF OPERATION</b>	<b>3</b>
<b>PILOT OPERATION</b>	<b>4</b>
<b>1.0 LEVEL CONTROLLER INSTALLATION AND START-UP</b>	<b>5</b>
1.1 Level Adjustment	6
1.2 Liquid Level Interface	6
<b>2.0 LEVEL CONTROLLER MAINTENANCE</b>	<b>6</b>
2.1 Level Controller Preventitive Maintenance	6
2.2 Level Controller Disassembly	7
2.3 Level Controller Reassembly	7
2.4 Pilot Removal/ Replacement	8
2.5 Level Controller Case Mounting Conversion	8
2.6 Level Controller Pilot ActionConversion	8
2.7 Level Controller Body Disassembly	9
2.8 Level Controller Body Reassembly	9
<b>3.0 REPAIR KITS</b>	<b>9</b>
<b>TROUBLE DIAGNOSIS</b>	<b>11</b>
<b>TABLES</b>	
Table 1 — Model Designation	2
Table 2 — Wiring Diagrams	10
Table 3 — Trouble Diagnosis	11

# OPERATING AND MAINTENANCE MANUAL

## Series 1001, 1001A, 1001XL Level Control

### INTRODUCTION

#### CAUTION!

You will see warning boxes like this throughout the manual. Please read and strictly observe these warnings to prevent personal injury or equipment damage. Before you begin the installation, operation or maintenance of equipment, make sure to completely review and understand the instructions in this manual.

#### Scope

The information contained in this manual is about the **1.5” through 6.0” Norriseal Series 1001, 1001A and 1001XL Level Controllers**. Please refer to separate manuals for all other controllers, valves, positioners and their optional accessories.

#### Description

The Series 1001, 1001A and 1001XL Level Controllers are designed for liquid level and interface control applications calling for either modulating (“Throttle”) or on/off (“Snap”) pneumatic service. These controllers can either be direct or reverse acting. Electric switch models are also available.

Norriseal level controllers are equipped standard with either a horizontal or vertical PVC (1.88 x 12 inch) displacer. Displacer options include Acrylic and 316L S.S. materials in various lengths and diameters including hinged models to accommodate a wide range of applications.

The 1001 has a small case and a knurled knob screw closure. Both 1001A and the 1001XL have larger casing, a lever latch door closing mechanism and a sealed door. The 1001 and 1001A have the case mounted on the side (left or right) of the body. The 1001XL casing is center back mounted.

#### CAUTION!

*Before attempting to disassemble or repair this device, make sure that pressure has been relieved. Failure to do this will cause personal injury and/or damage to the device. In addition, the fluid that projects from the device after failure to comply with these warnings will cause injury to people, equipment and the environment.*

#### Controller Identification

Always use Norriseal replacement parts with identical nameplate information. When looking for your controller model number, note that it will have 13 characters (ex: 2SM60-SRDA-BG). Refer to Table 1, “Model Designation”, for specific controller names and types.

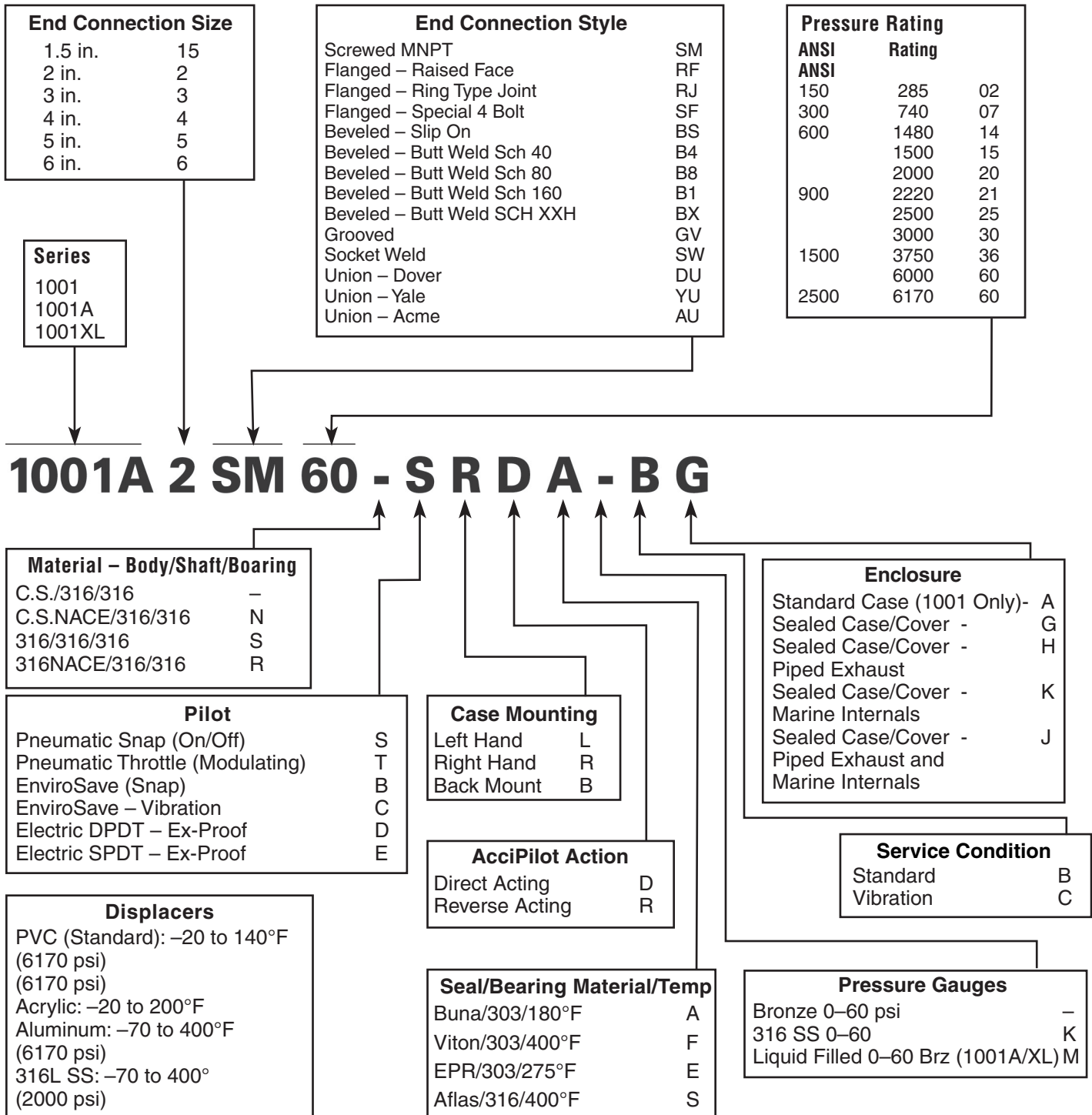
On the inside of the controller’s case (near the lower door hinge) you will find a nameplate that includes the model and serial numbers. This plate also includes other assembly information, such as supply and output pressures, displacer material and rating, body size and material, ANSI class, and pressure and temperature limits.



# OPERATING AND MAINTENANCE MANUAL

## Series 1001, 1001A, 1001XL Level Control

**TABLE 1—MODEL DESIGNATION**



# OPERATING AND MAINTENANCE MANUAL

## Series 1001, 1001A, 1001XL Level Control

### WARNING!

Do not exceed the maximum allowable pressures for the level controller body or the maximum allowable pressure at the maximum temperature for the level controller. You will find these numbers on the nameplate in the controller's case. If pressure to the level controller can exceed these limits, install relief valves or other protection devices in the pressure lines.

### CAUTION!

Do not exceed the designated operating pressure and temperature limits on controller bodies and displacer material. When ordered, these parts are configured to meet particular conditions. Do not apply any other conditions to the controller without first contacting your Norriseal sales office or your sales representative.

## PRINCIPAL OF OPERATION

### Force of Balance Principle

The operation of the Series 1001, 1001A and the 1001XL Level Controllers is based on the Force Balance Principle. A spring balances the weight of a displacement sensing element. As liquid rises around the displacer, the amount of force available to the pilot is proportional to the weight of the liquid displaced. That force moves the lever and fulcrum which triggers the pilot thrust pin. The higher the level, the greater the force to the pilot thrust pin.

The control is "direct acting" (the rising liquid level increases the pilot output) when the pivot point of the lever is on the spring side of the control case. The control is "reverse acting" (rising level decreases pilot output) when the pivot point of the lever is on the opposite side of the control case from the spring.

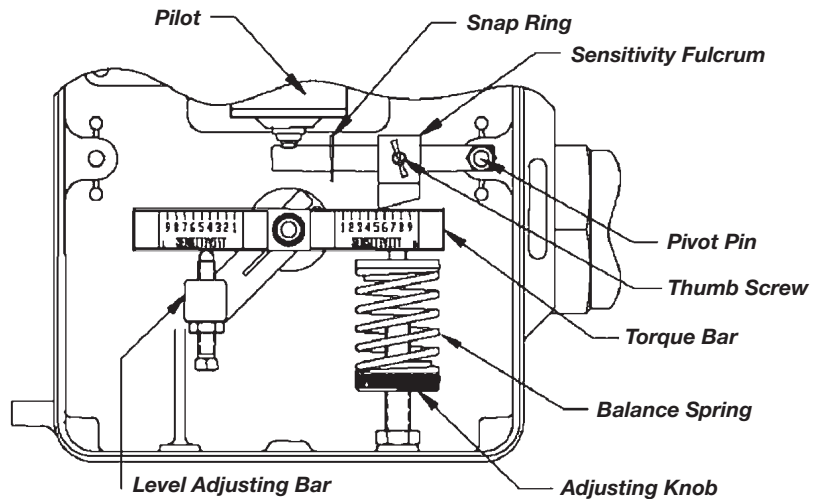


Figure 1 — Direct acting, right hand mount controller

### Adjusting Proportional Band

Proportional band is the measurement used to determine the ratio between used and total displacer length. For example, if 6 inches of level change will develop a 3 to 5 psi output signal with a 12 inch long vertical displacer, the level controller is said to have a 50% proportional band.

By moving the fulcrum closer to the pivot pin, the proportional band is increased. Likewise, moving the fulcrum toward the snap ring decreases the proportional band. A 3 to 15 psi or 6 to 30 psi output signal may be obtained over any portion of the displacer by adjusting the fulcrum.

### Adjusting Level

The spring is used to balance the weight of the displacer. As level

increases, the weight of the displacer decreases. The spring tension increases and is transmitted to the pilot thrust pin through the lever and fulcrum.

By increasing tension on the spring, a lower level is sensed. By decreasing tension on the spring a higher level is required to produce the same force as before.

Hydrocarbon liquid can cause a reduction in the spring compression without causing output from the pilot. If properly adjusted, water (which has a higher specific gravity) will change the weight of the displacer. This will produce an output and measure the interface level of water and hydrocarbon. The ability to have this wide range of control makes liquid interface sensing possible.

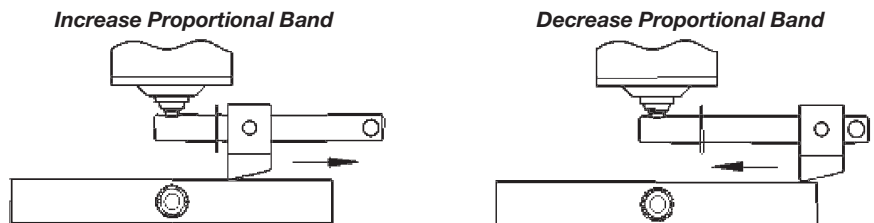


Figure 2 — Adjusting proportional band

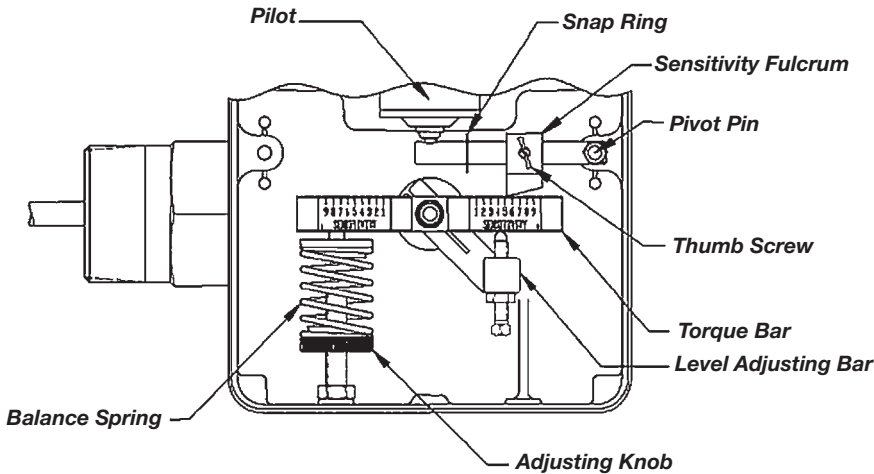


Figure 3 – Reverse acting, left hand mount controller

### Snap, Relief, and Envriosave™ Pilots

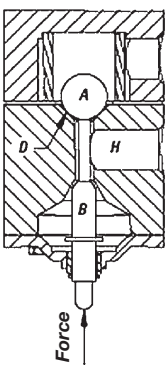


Figure 4 – Snap pilot

The upper seat is sealed by a ball seat. On Snap pilots, the ball seat is metal. On Relief and Envriosave™ pilots an elastomeric seat ensures zero-leakage seals. The upper seat controls supply air and the ball is held in the closed position by the supply air pressure. When mechanical force upward from the thrust pin is more than the supply air pressure holding the ball to the seat, the ball snaps upward, supply air flows downward and leaves through the output port. The lower port is sealed by the spherical end of the thrust pin, preventing supply air from escaping.

The ball seat seals the supply air and opens the lower exhaust port once the upward force on the thrust pin decreases and supply air pressure overcomes the upward force. The exhaust port vents gas from the con-

trol valve actuator.

The relief pilot allows for a faster exhaust of supply air due to larger passageway between the supply air and the output port.

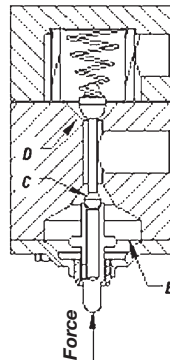


Figure 5 – Snap pilot

### Throttle Pilot

The throttle pilot has two seats as well. However, this device uses a diaphragm to sense pressure/force and a spring to assist in closing pressure on the thrust pin. Operationally, the throttle pilot is similar to the Snap pilot. The only difference is that the output pressure is proportional to the mechanical force applied to the thrust pin. As the force of the thrust pin changes, the pilot tries to maintain equilibrium by either decreasing (exhausting) or increasing output loading pressure. When the pressures of the pilot are balanced, supply air does not flow.

### Electric Pilot Switches

There are two standard types of switches: 1) SPDT (Single Pole Double Throw) and 2) DPDT (Double Pole Double Throw). Both can come in Explosion-Proof or Hermetically Sealed configurations.

Hermetically Sealed switch pilots are terminated in a junction box UL listed Class I, Div. 1, Groups C&D and Class II, Div. 1, Groups E, F & G. The switches themselves are hermetically sealed for hazardous location listed UL and CSA Class I, Division 1, Groups A, B, C & D and Class II, Div. 1, Groups E, F & G.

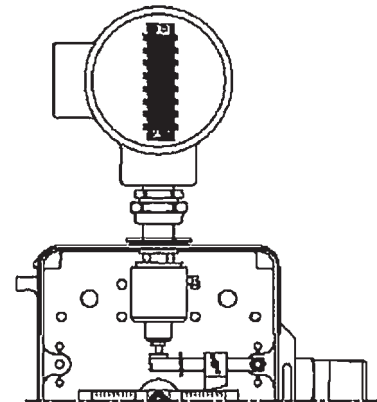


Figure 6 – Hermetically sealed electric switch

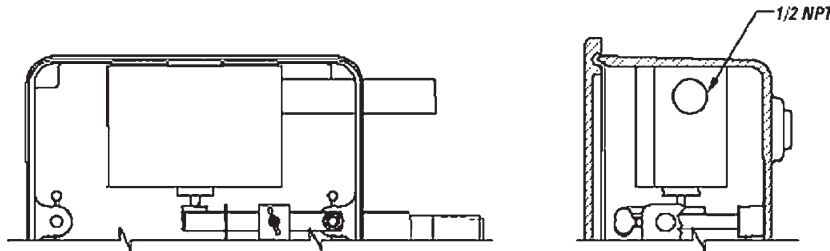


Figure 7 – Explosion-proof electric switch

**Explosion-Proof** switch pilots listed by UL and CSA for use in hazardous locations Class I, Div. 1, Groups C & D and Class II, Div. 1, Groups E, F & G. A switch listed for Class I, Div. 1, Group B is available. CSA requires the following statement for Class I, Group B: (see figure 7 next page)

### CAUTION!

To prevent the emission of hot particles, joint surfaces must be thoroughly cleaned before closing the cover.

## 1.0 LEVEL CONTROLLER INSTALLATION AND START-UP

### WARNING!

Turn off and lock out all electrical power before beginning installation.

### DANGER!

Level controllers with the electric switch option require special attention. Install approved conduit seals within 18 inches (0.5 M) of the enclosure as required by National and Canadian Electrical Codes. Serious personal injury and/or property damage can result if seals are not installed.

### CAUTION!

1. When making a connection to the vessel, observe all safety requirements of the area where the work is being done. Be especially

careful of pressure vessels.

2. To prevent condensation from entering the enclosure, install a conduit seal with a drain loop. Moisture will cause equipment damage and/ or malfunction.
3. Be sure that all wiring and conduit conforms to the requirements of the National Electric Code and any agencies that have jurisdiction over installation. Make sure to fully observe warnings in the area around you (ex: explosion hazards).

opening in the controller body. Carefully align the displacer arm in the body and screw the arm into the shaft. If this is a vertical installation, screw the swivel onto the free end of the displacer arm. Screw the displacer either into the free end of the displacer arm (horizontal application) or the free end of the swivel (vertical application).

4. Install the controller using good piping practice. For flanged bodies, use a suitable gasket between the body and vessel flanges. For threaded (NPT) bodies, use pipe thread sealant on external pipe threads.

### CAUTION!

The bodies are rated ANSI 150, 300, 600, 900, 1500 or 2500 class. Do not install the level controller in a system where the working pressures can exceed those marked on the nameplate of the controller.

1. After unpacking the new controller, look for any evidence of shipping damage. Shipping damage claims must be filed with the company who delivered the package(s). Remove any foreign material that may have collected during packing and shipping. Remove the flange or thread protectors from the body and connection.
2. Insure that screwed and gasket surfaces on both the controller and the vessel are free of any foreign materials.
3. The controller normally ships in 3 or 4 pieces: 1) the controller body/case assembly, 2) the displacer, 3) the displacer arm and 4) the swivel (for vertical installations only).

Insert the displacer arm in the

1. Connect instrument air to the controller supply connection on the back of the controller. The supply and output connections are clearly marked. On the 1001 controller, it is the upper connection. On the 1001A and 1001XL controllers, it is the connection on the right when looking at the rear of the controller case. Connect the control valve signal line to the output connection.
2. Open the case and rock the torque bar by hand to make sure the displacer arm is moving freely and is NOT resting against the vessel nozzle or other obstruction. The arm must be reasonably parallel to the ground. If necessary, turn the adjusting knob under the Balance Spring

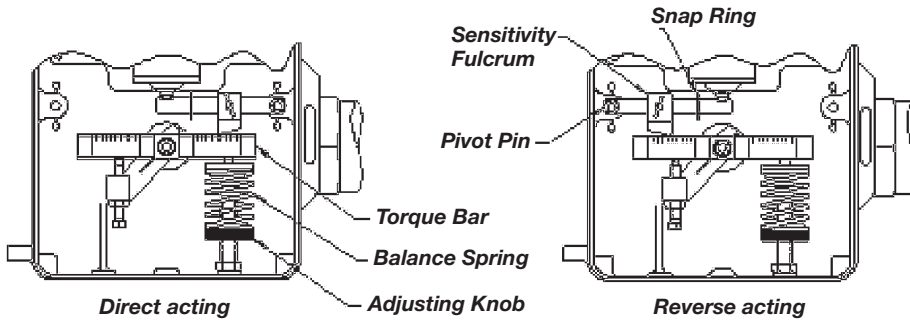


Figure 8 – How to make level adjustments

to position the arm in the center of the connection opening.

### 1.1 LEVEL ADJUSTMENT

1. **See note on the last page!**
2. Once the displacer arm is centered in the vessel nozzle (see 1.0, Step 6) you may lower or raise the level. **TO LOWER THE LEVEL**, turn the adjusting knob under the Balance Spring **CLOCKWISE** to increase compression on the Balance Spring. **TO RAISE THE LEVEL**, turn the knob **COUNTER-CLOCKWISE** to decrease compression on the Balance Spring.
3. Adjust the proportional band (“dump span”) by first loosening the thumb screw on the Sensitivity Fulcrum. To **DECREASE** the proportional band and **INCREASE SENSITIVITY**, slide the fulcrum along the Flapper Bar toward the snap ring (or pilot). To reverse the action, slide the fulcrum along the Flapper Bar away from the snap ring (or pilot). When the span is adjusted properly tighten the thumb screw on the Sensitivity Fulcrum.

### 1.2 LIQUID LEVEL INTERFACE

1. Set the Sensitivity Fulcrum  $\frac{1}{4}$  inch from the snap ring, reduce the spring tension slowly by turning the adjusting knob **COUNTER CLOCKWISE**, and let the **UPPER** fluid rise to submerge the displacer. You can fine tune this after the displacer is fully submerged in the **UPPER** fluid by slowly increasing spring tension (by turning the adjusting knob **CLOCKWISE**) until an output signal is obtained. Then back the tension off slowly (turning the adjusting knob **COUNTER-CLOCKWISE**) until the output signal pressure returns to zero.
2. Let the lower fluid rise until the desired interface level is reached. Fine tune this by slowly increasing spring tension (turning adjusting knob **CLOCKWISE**) until an output signal is obtained. Then back the tension off the Balance Spring slowly (turning the adjusting knob **COUNTER-CLOCKWISE**) until the output signal pressure returns to zero.
3. If you need a longer dump span, move the fulcrum farther away from the snap ring and repeat the above procedure.

## 2.0 LEVEL CONTROLLER MAINTENANCE

### WARNING!

Before you begin repairs, isolate the controller from the system and make sure that all pressure is released from the controller body. Shut off and vent the supply and output (signal air) lines to the controller. If you are repairing an electric pilot, disconnect all the power to the controller.

1. After thoroughly reading the warning above, isolate the controller from the process by shutting off the output and supply lines to the controller. If the pilot is electric, turn off and lock out all electrical power to the controller.
2. Release the process pressure.

Controller parts are built to withstand a great deal of wear under normal operating conditions. They will rarely need to be repaired. However, normal maintenance is important. The following sections describe the procedures for disassembling and re-assembling the controller.

### 2.1 LEVEL CONTROLLER PREVENTATIVE MAINTENANCE

1. Under normal circumstances, O-rings and the bearings on the main shaft should last for many years. If a leak occurs, replace the O-rings.
2. If the controller is used in high-paraffin service or interface control with a horizontal displacer, after three months, remove and inspect the body of the controller for debris buildup. Use the initial three month buildup of debris to determine the frequency of future inspections.

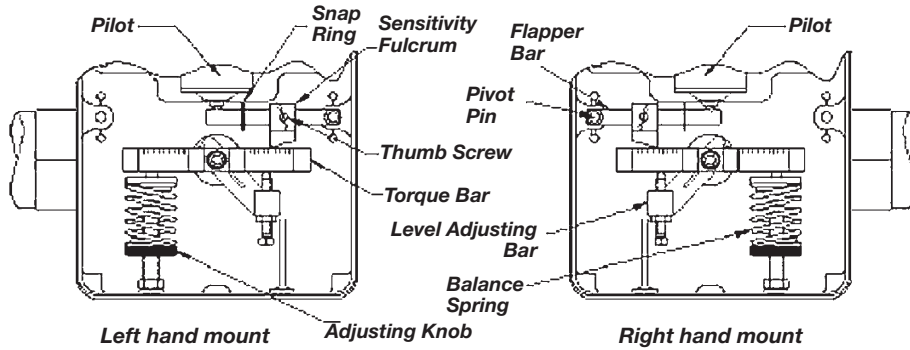


Figure 9 – How to make level adjustments

## 2.2 LEVEL CONTROLLER DISASSEMBLY

**NOTE:** These instructions do not apply to the pilot. They are strictly for the level controller. Should you need to remove or replace the pilot refer to Paragraph 2.4.

1. Relax all tension on the balance spring.
2. Remove the balance spring and upper spring retainer.
3. Remove the lock nut from the flapper bar. Slide the flapper bar off the pivot pin. **DO NOT REMOVE EITHER PIVOT PIN** from the case. They are not meant to be removed. In addition, **DO NOT REMOVE THE SENSITIVITY FULCRUM** or the thumb screw.
4. Remove the lock nut from the torque bar. Slide the torque bar off of the shaft.
5. While holding the level adjusting bar, loosen the two cap screws until the level adjusting bar is free on the shaft. (**NOTE: It is not necessary to remove or manipulate the adjusting screw on the level adjusting bar unless converting the case mounting.**)

6. Slide the level adjusting bar and the spacer from the shaft.
7. Remove the two cap screws holding the case to the body. Remove the case from the body.

## 2.3 LEVEL CONTROLLER REASSEMBLY

1. Mount the case to the body with two cap screws. Tighten the screws to 6 foot-pounds.
2. Slide the washer on the shaft and then the spacer.
3. If the level adjusting screw has been removed or adjusted during disassembly, position the screw so that there is an equal amount of thread showing above and below the level adjusting bar. The cap on the level adjusting screw will be pointing **AWAY** from the two cap screws on the shaft end of the level adjusting bar.
4. Slide the level adjusting bar onto the shaft against the spacer with the level adjusting screw **OPPOSITE** the controller body. Loosely secure (**DO NOT TIGHTEN**) the cap screws that hold the bar to the shaft.

5. Temporarily slide the torque bar onto the shaft. Position the level adjusting bar so that the torque bar is parallel with the displacer arm when the round tip of the level adjusting screw is touching the torque bar.
6. Remove the torque bar and tighten the cap screws that secure the level adjusting bar to the shaft, starting with the screw nearest the slotted end of the level adjusting bar, taking care not to over-tighten.
7. Slide the torque bar back onto the shaft with the counter-sunk hole for the spring retainer facing down. Secure the torque bar with the lock nut leaving a 1/16th inch clearance between the nut and the torque bar. (**NOTE: Leave it loose enough for the torque arm to move freely.**)
8. Slide the flapper bar onto the pivot pin. If converting the case mounting, remove the thumb screw from the sensitivity fulcrum and screw it into the opposite side of the fulcrum. Try to keep the fulcrum positioned in the same place on the flapper bar. Use the left pivot pin for left hand mount direct acting or right hand mount for reverse acting. The right pivot pin should be used for right hand mount direct acting or left hand mount reverse acting. Secure the flapper bar with the lock nut. (**NOTE: DO NOT tighten this nut; the flapper bar must move freely.**)
9. Install the spring and upper spring retainer, centering the retainer pin with the hole in the torque bar.

### 2.4 PILOT REMOVAL/ REPLACEMENT

#### **WARNING!**

Before you begin repairs, isolate the controller from the system and make sure that all pressure is released from the controller body. Shut off and vent the supply and output (signal air) lines to the controller. If you are repairing an electric pilot, disconnect all the power to the controller.

#### **CAUTION!**

DO NOT try to replace a pneumatic pilot with an electric pilot or vice versa. Pneumatic and electric pilot cases are not interchangeable.

#### A. Pneumatic Pilots

1. Remove the supply and output lines from the rear of the controller.
2. For the 1001 controller, the pilot is held in place by two cap screws mounted through the top of the case. Remove these cap screws and remove the pilot from the case.
3. For the 1001A and 1001XL, the pilot is held in place by four cap screws in the Pilot Clamp. Remove these four cap screws and remove the pilot from the case.
4. If necessary, rebuild the pilot following the instructions provided in the Pilot Re-build Kit (PRK). Alternately the pilot can be totally replaced. Pilot action may be converted from snap to throttle or vice versa by using a Pilot Conversion Kit (PCK). Use only genuine Norriseal parts, kits and pilots.
5. Re-install the pilot by reversing

instructions #1-#3. It is also recommended that you replace the pilot gasket even if it appears to not need replacing.

#### B. Electric Switches – Explosion Proof

1. **DISCONNECT THE POWER SUPPLY CIRCUIT BEFORE CONTINUING.**
2. Disconnect the wire leads. Remove the screws holding the basic switch in the case and then remove the basic switch.
3. Place the new switch in the insulator, insert the screws and place the assembly in the case.
4. Tighten the screws and connect the lead-in-wires.
5. Be certain the small compression spring is returned to its position between the top of the basic switch and the internal lever (or above the internal lever in the case of the CCW actuated switches.)

#### C. Electric Switches – Hermetically Sealed

1. **DISCONNECT THE POWER SUPPLY CIRCUIT BEFORE CONTINUING.**
2. Disconnect the wire leads. Remove the switch by first taking off the conduit coupling on the top of the case, then the switch nut, washer and the O-ring. Remove the switch adapter by loosening the four screws holding it in place.
3. Put the new switch in the switch adapter, tighten the screws and place the assembly in the case.
4. Put the O-ring, washer and

switch nut back on and tighten it. Replace and tighten the conduit coupling and connect the lead-in wires.

### 2.5 LEVEL CONTROLLER CASE MOUNTING CONVERSION

1. Completely disassemble the controller (refer to 2.2).
2. Reassemble the controller (refer to 2.3). The level adjusting screw should be placed at a 90° angle to that in the original configuration. The thumb screw in the fulcrum should be screwed into the opposite side of the fulcrum. The level adjusting bar, level adjusting screw, fulcrum, torque bar, flapper bar, balance spring and stud bolt will all be on opposite sides of the case from the original configuration.

### 2.6 LEVEL CONTROLLER PILOT ACTION CONVERSION

1. Relax all tension on the balance spring.
2. Remove the lock nut from the flapper bar. Slide the flapper bar off the pivot pin.
3. Remove the thumb screw from the sensitivity fulcrum and replace it in the opposite hole on the fulcrum.
4. Replace the flapper bar on the pivot pin on the opposite side of the case, with the thumb screw on the sensitivity fulcrum pointing out.
5. Loosely secure the flapper bar with the lock nut. NOTE: DO NOT tighten this nut; the flapper bar must move freely.

1. Adjust the tension on the balance spring (refer to 1.1).

### 2.7 LEVEL CONTROLLER BODY DISASSEMBLY

1. Remove the body from the controller assembly (refer to 2.2).
2. Remove the two bearing blocks (1 ¼ inch wrench) and the shaft. Remove and discard the O-rings in the body, on the shaft and in the bearing blocks.

### 2.8 LEVEL CONTROLLER BODY REASSEMBLY

1. Using new O-rings, install the large O-ring over the threads of the bearing block. Install the new Teflon backup rings in each bearing block, pressing them into place with a 5/16 inch diameter rod. Install the new

O-rings in each bearing block, pressing them into place with the same rod. NOTE: Using light oil on the O-rings will help.

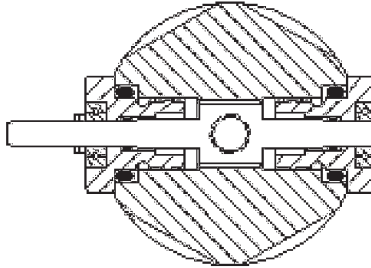


Figure 10 – End-on cutaway view of controller body. As shown, the case would mount to the left of the body

#### CAUTION!

*If the bearing blocks are removed from the body for any reason, the backup rings and O-rings must be re-packed (pressed into place). It is recommended that new backup rings and new O-rings be used.*

Replace the outboard bearing block (with the “hubcap”) on the side of the body **AWAY** from the case mounting bolt holes.

Insert the shaft into the body and firmly seat in the outboard bearing.

Replace the remaining bearing block on the body and tighten.

Reattach the body to the case (refer to 2.3, step 1).

### 3.0 REPAIR KITS

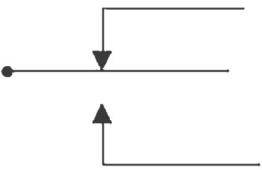
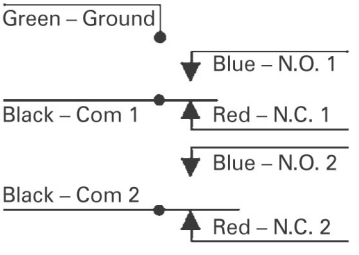
Norriseal provides three types of repair kits for use in controller maintenance: a Level Seals Kit (LSK), a Pilot Repair Kit (PRK) and a Pilot Conversion Kit (PCK). Contact the Norriseal sales office or your local sales representative to order the right kit for your application.

# OPERATING AND MAINTENANCE MANUAL

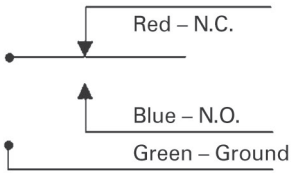
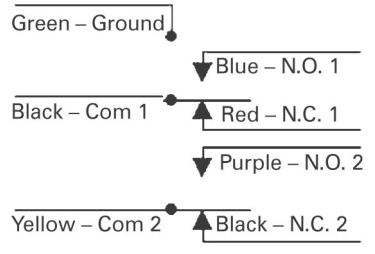
## Series 1001, 1001A, 1001XL Level Control

**TABLE 2—WIRING DIAGRAMS**

### STANDARD SWITCH

CODE	CIRCUITRY	ELECTRICAL RATING
"E" EXQ	 <p>Single Pole Double Throw (SPDT)</p>	UL and CSA Listed:  15 amps, 125, 250 or 450 VAC 0.50 amp 125 VDC 0.25 amp 250 VDC
"D" EXD-Q	 <p>Double Pole Double Throw (SPDT)</p>	UL and CSA Listed:  10 amps, 125 or 250 VAC 0.30 amp 125 VDC 0.15 amp 250 VDC

### HERMETICALLY SEALED SWITCH

CODE	CIRCUITRY	ELECTRICAL RATING
"K" Hermeticor	 <p>Single Pole Double Throw (SPDT)</p>	UL, CSA and FM Listed:  11 amps, 125/250 VAC  5 amps Res, 25 VDC 0.50 amps, 125 VDC
"L" Hermetic	 <p>Double Pole Double Throw (SPDT)</p>	UL, CSA and FM Listed:  11 amps, 125/250 VAC  5 amps Res, 28 VDC 0.50 amps 125 VDC

# OPERATING AND MAINTENANCE MANUAL

## Series 1001, 1001A, 1001XL Level Control

**TABLE 3 — TROUBLE DIAGNOSIS**

**WARNING!**

Before attempting to disassemble or repair this device, make sure that pressure going through the valve is gone. Failure to do this will cause personal injury and/ or damage to the device. In addition, the fluid that projects from the device after failure to comply with these warnings will cause injury to people, equipment and the environment.

Symptom	Probable Cause(s)	Corrective Action(s)
Pilot output pressure gauge indicates output pressure signal when fluid level is <b>below</b> displacer on a <b>direct action controller OR</b> when fluid level is <b>above</b> displacer on a <b>reverse acting controller</b> .	<ul style="list-style-type: none"> <li>Balance spring is too compressed putting too much pressure on the torque bar.</li> <li>The displacer arm is set too high or the displacer is hitting something inside the vessel.</li> </ul>	<ul style="list-style-type: none"> <li>Back off the spring retainer until the output pressure signal goes off. Re-check when the fluid level rises (<b>direct acting</b>) or falls (<b>reverse acting</b>).</li> <li>Check the displacer arm by moving the leveling adjusting bar up and down. If the adjusting bar will move in only one direction, this indicates the displacer arm is riding at either the top or bottom of the vessel connection. If it moves too freely, the displacer has become disconnected from the displacer arm. Re-center the displacer arm in the vessel connection.</li> </ul>
Pilot output pressure gauge indicates no output pressure signal when fluid level is <b>above</b> displacer on a <b>direct acting controller OR</b> when the fluid level is <b>below</b> displacer on a <b>reverse acting controller</b> .	<ul style="list-style-type: none"> <li>Balance spring is not compressed enough and, as a result, not putting enough pressure on the torque bar.</li> <li>The displacer arm is set too low or the displacer is hitting something inside the vessel.</li> </ul>	<ul style="list-style-type: none"> <li>Compress the spring retainer until an output pressure signal is indicated on the output pressure gauge. Re-check when the fluid level falls (<b>direct action</b>) or rises (<b>reverse acting</b>).</li> <li>Check the displacer arm by moving the leveling adjusting bar up and down. If the adjusting bar will move in only one direction, this indicates the displacer arm is riding at either the top or bottom of the vessel connection. If it moves too freely, the displacer has become disconnected from the displacer arm. Re-center the displacer arm in the vessel connection.</li> </ul>
Controller does not repeat at the same fluid level after each dump and sometimes fails to either dump or shut-off. (The torque bar does not bounce back fast when depressed and appears to be hard to move.)	<ul style="list-style-type: none"> <li>Paraffin or debris has built up inside the level control body.</li> </ul>	<ul style="list-style-type: none"> <li>Remove controller from service and clean out the body with a solvent.</li> </ul>
A pneumatic pilot bleeds air continuously.	<ul style="list-style-type: none"> <li>Foreign matter under the ball on a snap control pilot or under the peanut on a throttle control pilot <b>OR</b> The tru-arc ring on the snap pilot thrust pin is dislocated.</li> </ul>	<ul style="list-style-type: none"> <li>Remove the pilot (refer to 2.4). Remove the two cap screws from the bottom of the pilot. Clean the pilot thoroughly. If it is a snap pilot, make sure the measurement between the tru-arc ring and the bottom of the pin is <math>\frac{3}{4}</math> inch. If not, gently tap the tru-arc ring into the proper location. Reassemble the pilot.</li> </ul>



# OPERATING AND MAINTENANCE MANUAL

*Series 1001, 1001A, 1001XL Level Control*

*This page intentionally left blank.*

**HEADQUARTERS, MANUFACTURING PLANT AND SALES**



**[www.norriseal.com](http://www.norriseal.com)**

11122 West Little York • Houston, Texas 77041

T: (713)466-3552 • F: (713)896-7386

*Due to the continuous improvement at Norriseal,  
specifications and/or prices are subject  
to change without notice or obligation.*