



1600 Series Liquid Level Controllers

General Instructions

The SOR® 1600 Series Level Controllers are designed for use in liquid level and interface level applications with pneumatic instrumentation. For assistance with the calibration and maintenance procedures found in these General Instructions, please visit the SOR Inc. Youtube channel for video walkthroughs.



NOTE: If you suspect that a product is defective, contact the factory or the SOR Representative in your area for a Return Material Authorization number (RMA). This product should only be installed by trained and authorized personnel.

Installation

- Before beginning installation, inspect the level controller for damage that may have occurred during shipment and remove all cardboard packing material.
- The 1600 Series Level Controllers normally ship unassembled as 3 separate parts:
 - The level controller body assembly.
 - The displacer with swivel.
 - The displacer arm.
- Thoroughly clean the vessel connection surface to remove any accumulated debris. Threaded and gasketed surfaces on the controller’s process connection should also be cleaned before installing the level controller.
- When installing the level controller, apply PTFE tape or pipe thread sealant for units with NPT connections. For units with flanged connections, install with a suitable gasket between the flange faces.

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Design and specifications are subject to change without notice.

For latest revision, go to
SORInc.com

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- Connect the displacer arm with the level controller body by inserting the displacer arm into the body opening, located on the backside of the controller case. Ensure the displacer arm is aligned within the body before screwing the arm in.
 - If the level controller will utilize a vertically-oriented displacer: screw the displacer swivel onto the displacer arm then connect the swivel and displacer.
 - If the level controller will utilize a horizontally-oriented displacer: if necessary, first unscrew the swivel from the displacer before connecting the displacer to the displacer arm.



Refer to Page 12 for mounting reference drawings

START UP

Pneumatic Pilot

- ① Connect supply pressure to the connection point labeled “SUPPLY” on the backside of the controller case. On the model 1600 sealed controller it is the top connection, while on the model 1601 non-sealed controller it is the right connection when facing the backside of the controller case. Connect the device the pneumatic signal is being output to with the connection point labelled “OUTPUT”.

Electric Pilot

If the 1600 Series level controller was supplied with an electronic switch rather than a pneumatic pilot, the switch will carry the following ratings:



Electrical power must be disconnected before cover is removed. Failure to do so could result in severe personal injury or substantial plant damage.

The SPDT electric pilot uses an explosion proof electric switch to eliminate the need for a pneumatic gas supply. This is beneficial when reducing fugitive emissions by no longer using natural gas to power on site pneumatic devices. The electric pilot is typically used to send an electric signal on high or low level to an electric actuator on a valve or to a pump for pump control.

| | |
|------------------------|---|
| Contact Rating | 15A @ 125, 250 & 480VAC |
| Agency Approval Rating | DIV 1&2, Class I, Groups B, C. & D , DIV 1&2, Class II, Groups E, F & G, II2G ExdIIB + H2 T6 Gb |
| Agency | UL, CSA, ATEX, IECEx, INMETRO |
| Wiring Diagram | |

- ② Open the controller case and move the torque bar back and forth by hand and verify the displacer arm moves freely and is not resting against anything. The displacer arm must be oriented approximately parallel with the ground – if needed, rotate the adjusting knob under the balance spring to adjust the displacer arm resting position.

LEVEL ADJUSTMENT

- ① After completing Start Up procedure and with the displacer arm oriented parallel with the ground, the level set point is ready to be adjusted.
 - a. To Lower the Level Set Point: Rotate the adjusting knob clockwise to increase spring tension of the balance spring.
 - b. To Raise the Level Set Point: Rotate the adjusting knob counterclockwise to decrease spring tension of the balance spring.
- ② After the level set point is satisfactorily set, the proportional band (dump cycle) is ready to be adjusted. A larger dump cycle corresponds to a larger span between the controller on and off points, while conversely a smaller dump cycle results in less time passing between dumping due to the shortened span between the on and off points.
 - a. Loosen the thumb screw, located on the sensitivity fulcrum.
 - b. To Decrease the Dump Cycle: Move the sensitivity fulcrum along the flapper bar in the direction of the pilot, i.e. towards the smaller numbers.
 - c. To Increase the Dump Cycle: Move the sensitivity fulcrum along the flapper bar opposite the direction of the pilot, i.e. towards the larger numbers.
 - d. A larger dump cycle corresponds to a larger span between the controller on and off points, while conversely a smaller dump cycle results in less time passing between dumping due to the shortened span between on and off.
 - e. Once the dump cycle is appropriately set, tighten the thumb screw on the sensitivity fulcrum.

LIQUID LEVEL INTERFACE

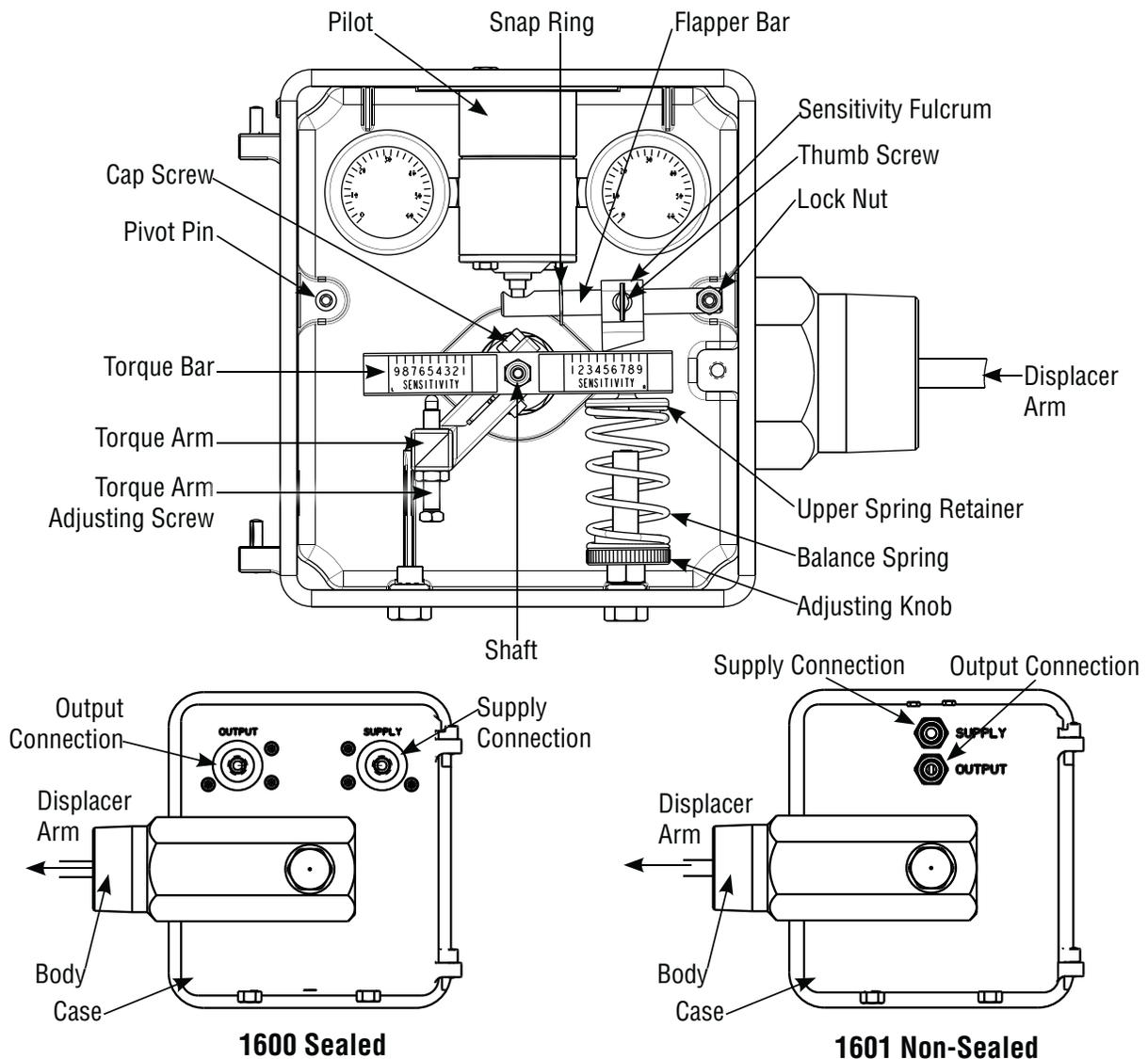
- ① Loosen the thumb screw, located on the sensitivity fulcrum, and position the sensitivity fulcrum 1/4" away from the snap ring (see reference diagram Page 4).
 - a. Begin by slowly rotating the adjusting knob counterclockwise to reduce tension on the spring, and then allow the upper liquid level to rise until the displacer is fully submerged.
 - b. Once the displacer is submerged in only the upper liquid, this adjustment can be fine-tuned by slowly rotating the adjusting knob clockwise to increase spring tension until the level controller emits an output pressure signal.
 - c. Slowly rotate the adjusting knob counterclockwise to reduce spring tension until the level controller stops sending an output pressure signal.

- 2 Allow the lower liquid level to rise until it reaches the appropriate interface level set point.
 - a. The interface level set point can be fine-tuned by slowly rotating the adjusting knob clockwise to increase spring tension until the level controller emits an output pressure signal.
 - b. Slowly rotate the adjusting knob counterclockwise to reduce spring tension until the level controller stops sending an output pressure signal.
- 3 If a longer dump cycle is required, loosen the thumb screw and slide the sensitivity fulcrum away from the snap ring (towards the larger numbers). Re-tighten the thumb screw and then repeat steps 1) and 2) of the above procedure.



The torque arm calibration is pre-set at the factory and should not be adjusted. If the torque arm calibration has been tampered with, adjust it such that the torque bar is parallel with the case bottom while the displacer arm is positioned in the middle of the body. See reference diagram on Page 4.

Reference Diagram





The following procedure is only for the level controller and does not apply to the pilot. See Page 6 for pilot removal/replacement instructions.

LEVEL CONTROLLER FIELD DISASSEMBLY

- 1 Slowly rotate the adjusting knob counterclockwise until there is no tension on the balance spring.
- 2 Remove the balance spring and upper spring retainer from the controller case.
- 3 Unscrew the lock nut from the flapper bar. Separate the flapper bar from the pivot pin.



Do not remove either of the pivot pins from the controller case. Do not remove the sensitivity fulcrum or the thumb screw from the flapper bar.

- 4 Unscrew the lock nut from the torque bar. Separate the torque bar from the shaft.
- 5 Hold the torque arm in place and then loosen the two cap screws until the torque arm moves freely about the shaft.



Unless the case mounting orientation is being converted, the torque arm adjusting screw position does not need to change.

- 6 Separate the torque arm and the spacer from the shaft.
- 7 There are two hex bolts located behind the torque arm that attach the controller case to the body. Unscrew these bolts and separate the controller case and body.

LEVEL CONTROLLER FIELD REASSEMBLY

- 1 Reattach the controller case to the body with two hex bolts, tightening the bolts to 6 ft-lbs.
- 2 Slide the washer then the spacer onto the shaft.
- 3 If the torque arm adjusting screw has been removed or adjusted, situate the adjusting screw such that there is an equal amount of thread above and below the torque arm.
- 4 Slide the torque arm back onto the shaft and position the torque arm adjusting screw perpendicular to the controller body. Loosely attach the two cap screws that hold the torque arm on the shaft. The torque arm should still move freely about the shaft.
- 5 Slide the torque bar back onto the shaft. With the round tip of the torque arm adjusting screw touching the torque bar, adjust the torque arm until the torque bar is parallel with the displacer arm.



Do not overtighten the lock nut to the torque bar. The lock nut should be loose enough for the torque bar to rotate with ease.

- ⑥ Slide the torque bar back off of the shaft. Beginning with the cap screw closest to the slotted end of the torque arm, secure the torque arm to the shaft by tightening the cap screws to 100 in-lbs.



Do not overtighten the cap screws.

- ⑦ Slide the torque bar back onto the shaft, making sure the hole for the spring retainer is facing downward. Screw the lock nut back onto the shaft while still leaving 1/16” of space between the lock nut and torque bar.
- ⑧ Slide the flapper bar back onto the pivot pin and re-attach the lock nut – if converting the case mounting orientation:
 - a. Unscrew the thumb screw from the sensitivity fulcrum and screw it back into the opposite side of the sensitivity fulcrum. The sensitivity fulcrum should be secured in approximately the same position on the flapper bar.
 - b. For Left Hand Direct Acting / Right Hand Reverse Acting, slide the flapper bar onto the left pivot pin.
 - c. For Right Hand Direct Acting / Left Hand Reverse Acting, slide the flapper bar back onto the right pivot pin.



Do not overtighten the lock nut to the flapper bar. The flapper bar must rotate freely around the pivot pin.

- ⑨ Position the upper spring retainer so it is seated in the hole on the underside of the torque bar, and then re-install the balance spring between the adjusting knob and upper spring retainer.

LEVEL CONTROLLER CASE MOUNTING CONVERSION

- ① Completely disassemble the level controller following the procedure on Page 4.
- ② Reassemble the level controller with the following modifications:
 - a. The torque arm adjusting screw should be rotated 90° from its original position.
 - b. The thumb screw should be removed from the sensitivity fulcrum and re-installed on the opposite side.
 - c. The torque arm, torque arm adjusting screw, sensitivity fulcrum, torque bar, flapper bar, balance spring and stud bolt should all be re-assembled into the opposite side of the controller case.

Pneumatic Pilot Removal/Replacement



For electric switch pilot, consult factory for repair-replacement.

- 1 Disconnect the supply and output lines from the backside of the controller case.
- 2 For the 1600 sealed controller, the pilot is attached to the case by four bolts mounted through the pilot clamp. Undo these bolts and remove the pilot from the controller case.
- 3 For the 1601 non-sealed controller, the pilot is attached to the case by two cap screws mounted through the top of the case. Undo the cap screws and remove the pilot from the controller case.
- 4 Either replace the pilot completely or rebuild it using a pilot repair kit. See Page 12 for part numbers of replacement pilots and pilot repair kits.
- 5 Re-install the pilot by reversing the steps followed above. For the 1600 sealed controller, it is recommended that the pilot gasket be replaced even if it does not appear to be damaged.



For best performance with your 1600 series Liquid Level Controller, only genuine SOR replacement parts and repair kits should be used. See Page 12 for part numbers.

Level Controller Pilot Action Conversion

- 1 Slowly rotate the adjusting knob counterclockwise until there is no tension on the balance spring.
- 2 Unscrew the lock nut from the flapper bar. Separate the flapper bar from the pivot pin.
- 3 Unscrew the thumb screw from the sensitivity fulcrum and screw it back into the opposite side of the sensitivity fulcrum.
- 4 Slide the flapper bar onto the opposite pivot pin it was removed from. The thumb screw on the sensitivity fulcrum should be facing outwards.
- 5 Screw the lock nut back on to secure the flapper bar to the pivot pin.



Do not overtighten the lock nut to the flapper bar. The flapper bar must rotate freely around the pivot pin.

- 6 The pilot action conversion is now complete and the level controller is ready for recalibration. See Page 2 for Level Adjustment procedure.

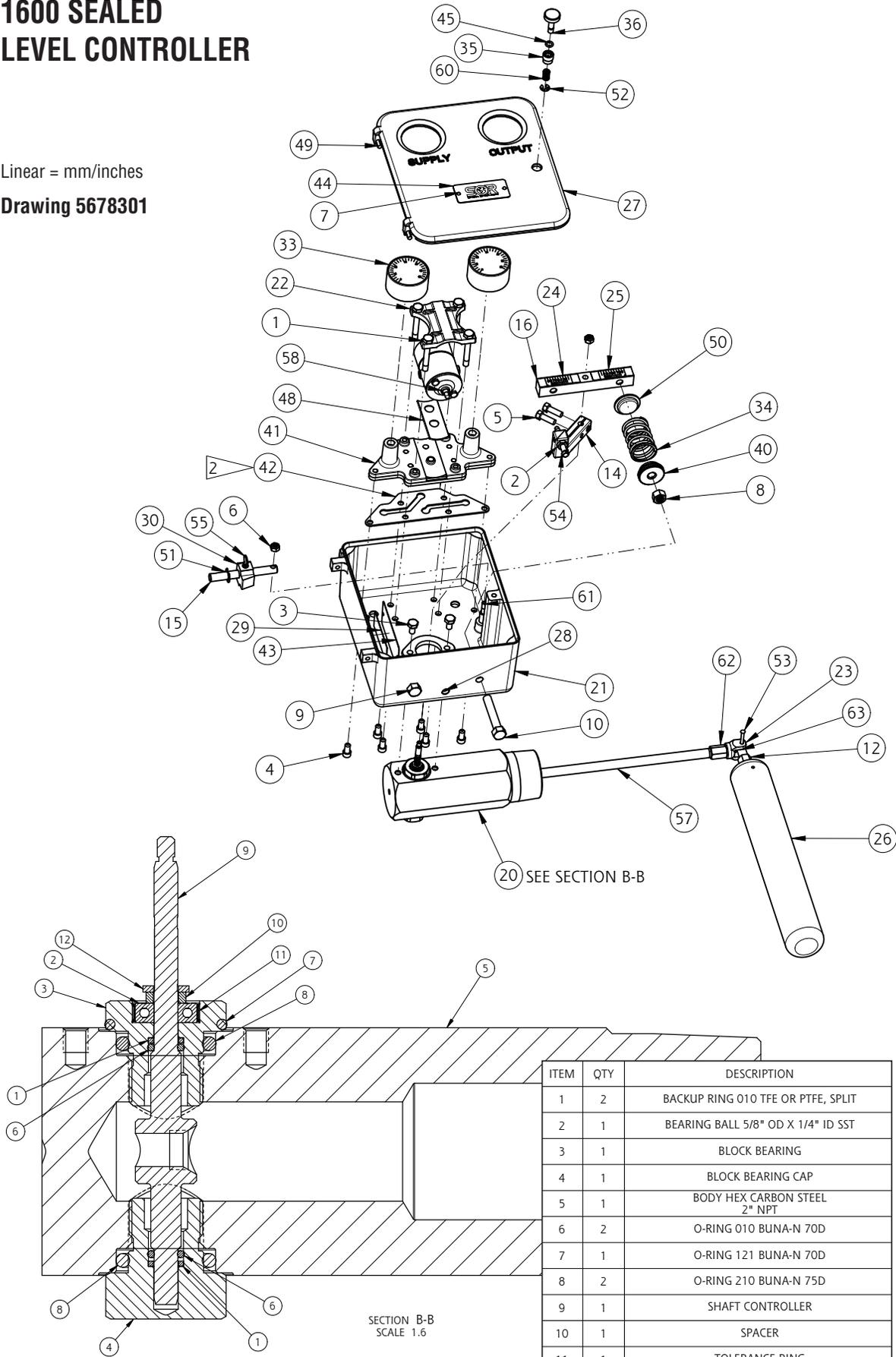
Parts List

1600 SEALED LEVEL CONTROLLER

| ITEM | QTY | DESCRIPTION |
|------|-----|---|
| 1 | 4 | 1/4-20 X 2 HEX HEAD BOLT |
| 2 | 1 | 1/4-28 HEX JAM NUT SST |
| 3 | 2 | 1/4-28 X 1/2 HEX HEAD BOLT |
| 4 | 6 | 1/4-28 X 1/2 HEXSOCH SCR |
| 5 | 2 | 1/4-28 X 3/4 HEXHD SCREW |
| 6 | 2 | 10-32 HEX LOCK NUT NYLON INSERT 18-8SST |
| 7 | 2 | 2 X 1/8 ROUND HEAD METALLIC DRIVE SCREW |
| 8 | 1 | 3/8-24 HEX NUT |
| 9 | 1 | 3/8-24 X 1/2 HEXHD SCR SST |
| 10 | 1 | 3/8-24 X 2-1/4 HEXHD SCR SST FULL THREAD |
| 11 | 8 | 4-40 X 3/16 HEXHD SCREW |
| 12 | 1 | ADPTR 1/4"NPTM X 1/8"NPTF 316SST |
| 13 | 2 | BACKUP RING 010 TFE OR PTFE, SPLIT |
| 14 | 1 | BAR ADJUSTING LEVER ALUMINUM |
| 15 | 1 | BAR FLAPPER |
| 16 | 1 | BAR TORQUE |
| 17 | 1 | BEARING BALL 5/8" OD X 1/4" ID SST |
| 18 | 1 | BLOCK BEARING |
| 19 | 1 | BLOCK BEARING CAP |
| 20 | 1 | BODY HEX CARBON STEEL 2" NPT |
| 21 | 1 | CASE CONTROLLER MACHINED |
| 22 | 1 | CASTING CLAMP |
| 23 | 1 | CASTING CLEVIS SWIVEL |
| 24 | 1 | DECAL SENSITIVITY LH |
| 25 | 1 | DECAL SENSITIVITY RH |
| 26 | 1 | DISPLACER 1-7/8" DIA X 12" LONG |
| 27 | 1 | DOOR MACHINED |
| 28 | 1 | FILTER SCREEN PS-1500 |
| 29 | 1 | FOAM TAPE ADHESIVE BOTH SIDES 1" WIDE X 0.02" THICK |
| 30 | 1 | FULCRUM SENSITIVITY NYLON W/10-32 UNF |
| 31 | 1 | GASKET 1/4"OD CORD 20 DUROMETER - SHORE A |
| 32 | 2 | GASKET LENS |
| 33 | 2 | GAUGE PRESSURE 2" |
| 34 | 1 | HEAVY DUTY SPRING |
| 35 | 1 | INSERT DOOR KNOB |
| 36 | 1 | KNOB DOOR SST |
| 37 | 1 | LABEL 1600 SERIES LIQUID LEVEL CONTROLLER |
| 38 | 2 | LENS DOOR |
| 39 | 2 | LENS HOLDER |
| 40 | 1 | LOWER SPRING RETAINER |
| 41 | 1 | MANIFOLD MACHINED |
| 42 | 1 | MANIFOLD/CASE GASKET |
| 43 | 1 | NAMEPLATE CONTROLLER |
| 44 | 1 | NAMEPLATE SOR LOGO 3/4" TALL SIZE 6 BLANK 0720562 |
| 45 | 3 | O-RING 010 BUNA-N 70D |
| 46 | 1 | O-RING 121 BUNA-N 70D |
| 47 | 2 | O-RING 210 BUNA-N 75D |
| 48 | 1 | PILOT/MANIFOLD GASKET BUNA N |
| 49 | 2 | PIN GROOVED DOWEL 3/16" DIA X 3/4" LG |
| 50 | 1 | RETAINER SPRING UPPER |
| 51 | 1 | RETAINING RING 3/8" EXTERNAL E-STYLE |
| 52 | 1 | RETAINING RING 7/32" EXT E-STYLE |
| 53 | 1 | RIVET 1/8"DIA X 1"LG SST OVAL HD SEMI-TUBE |
| 54 | 1 | SCREW ADJUSTING 1/4-28 UNF-2A |
| 55 | 1 | SCREW THUMB 10-32 X 1/2" LG 18-8SST |
| 56 | 1 | SHAFT CONTROLLER |
| 57 | 1 | SHAFT FLOAT 1/8" NPT |
| 58 | 1 | SNAP PILOT ASSEMBLY SEALED |
| 59 | 1 | SPACER |
| 60 | 1 | SPRING DOOR LATCH |
| 61 | 2 | STUD FLAPPER BAR |
| 62 | 1 | SWIVEL FEMALE ADAPTER |
| 63 | 1 | SWIVEL MALE ADAPTER |
| 64 | 1 | TOLERANCE RING |
| 65 | 1 | WASHER .468 OD X .255 ID X .060/.066 THK SS |

1600 SEALED LEVEL CONTROLLER

Linear = mm/inches
Drawing 5678301



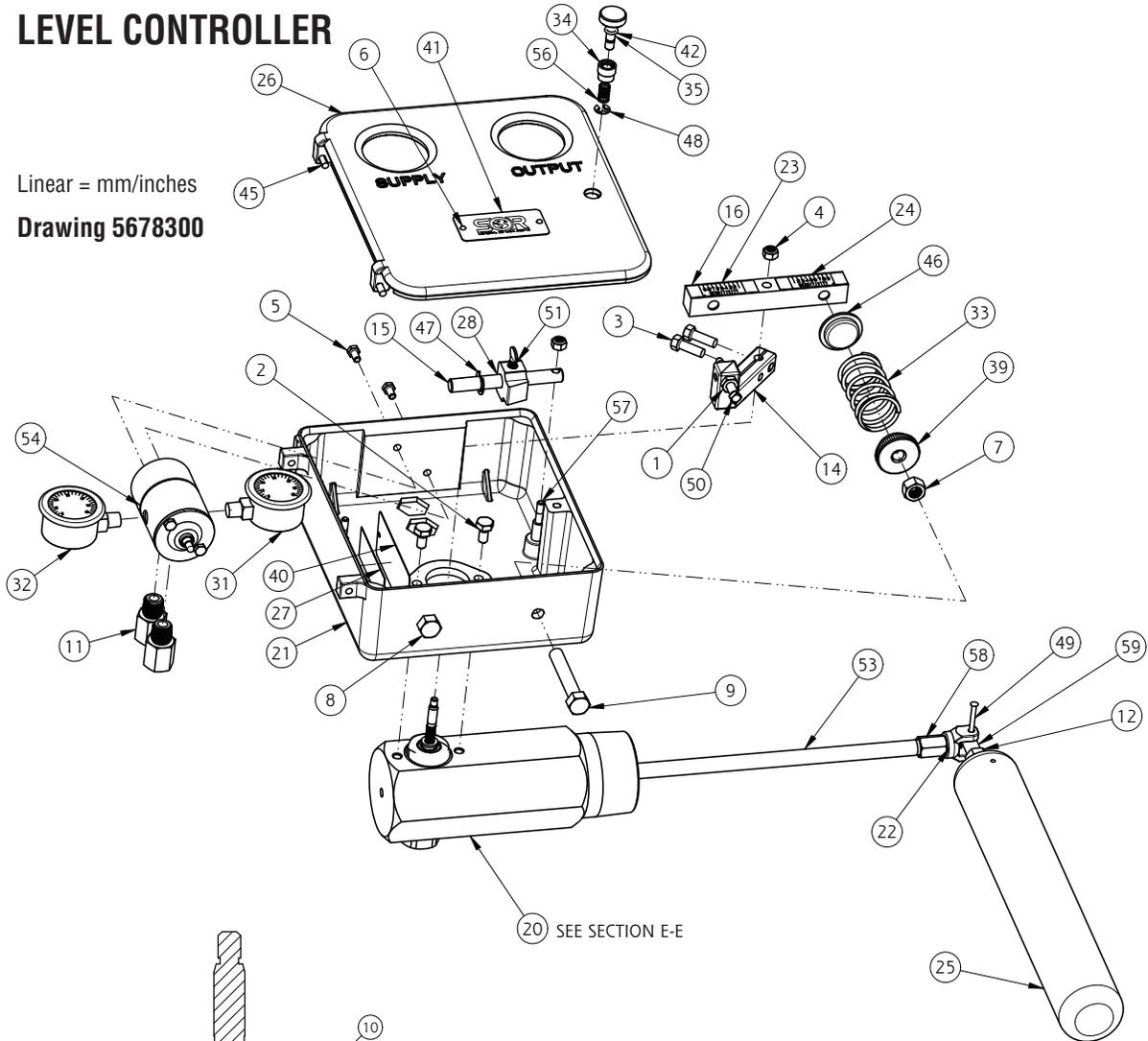
| ITEM | QTY | DESCRIPTION |
|------|-----|---|
| 1 | 2 | BACKUP RING 010 TFE OR PTFE, SPLIT |
| 2 | 1 | BEARING BALL 5/8" OD X 1/4" ID SST |
| 3 | 1 | BLOCK BEARING |
| 4 | 1 | BLOCK BEARING CAP |
| 5 | 1 | BODY HEX CARBON STEEL 2" NPT |
| 6 | 2 | O-RING 010 BUNA-N 70D |
| 7 | 1 | O-RING 121 BUNA-N 70D |
| 8 | 2 | O-RING 210 BUNA-N 75D |
| 9 | 1 | SHAFT CONTROLLER |
| 10 | 1 | SPACER |
| 11 | 1 | TOLERANCE RING |
| 12 | 1 | WASHER .468 OD X .255 ID X .060/.066 THK SS |

1601 NON-SEALED LEVEL CONTROLLER

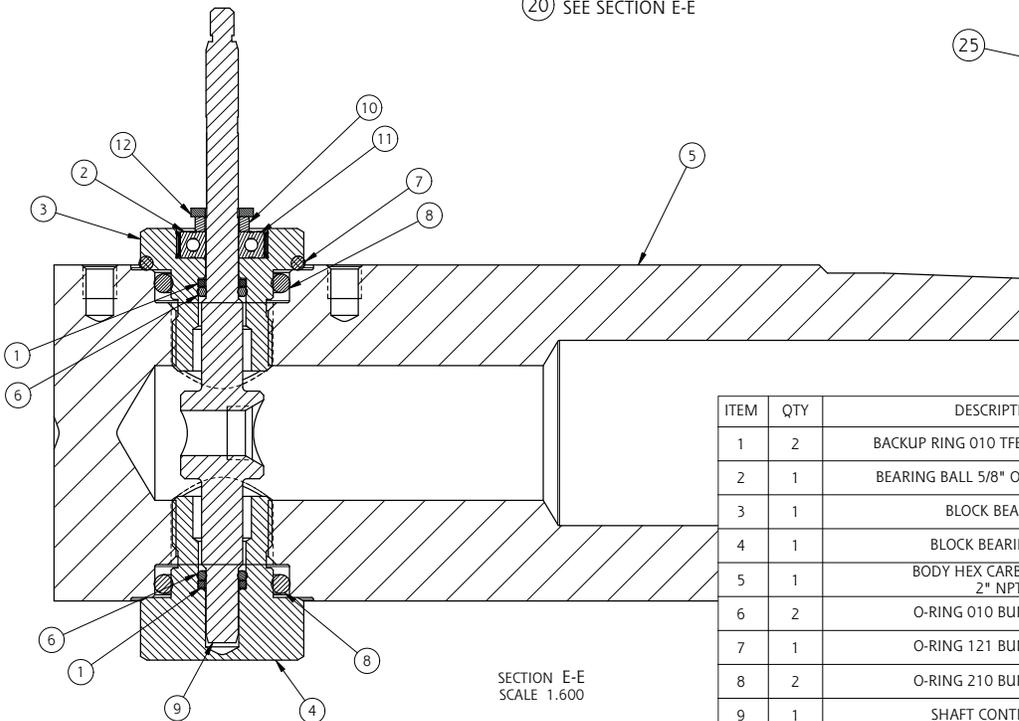
| REFERENCE ASSEMBLY | | | | | |
|--------------------|-----|---|----|---|---|
| ITEM | QTY | DESCRIPTION | | | |
| 1 | 1 | 1/4-28 HEX JAM NUT SST | 32 | 1 | GAUGE PRESSURE 1-1/2" RH |
| 2 | 2 | 1/4-28 X 1/2 HEX HEAD BOLT | 33 | 1 | HEAVY DUTY SPRING |
| 3 | 2 | 1/4-28 X 3/4 HEXHD SCREW | 34 | 1 | INSERT DOOR KNOB |
| 4 | 2 | 10-32 HEX LOCK NUT NYLON INSERT 18-8SST | 35 | 1 | KNOB DOOR SST |
| 5 | 2 | 10-32 X 3/8 HEX HEAD SCREW SST | 36 | 1 | LABEL 1600 SERIES LIQUID LEVEL CONTROLLER |
| 6 | 2 | 2 X 1/8 ROUND HEAD METALLIC DRIVE SCREW | 37 | 2 | LENS DOOR |
| 7 | 1 | 3/8-24 HEX NUT | 38 | 2 | LENS HOLDER |
| 8 | 1 | 3/8-24 X 1/2 HEXHD SCR SST | 39 | 1 | LOWER SPRING RETAINER |
| 9 | 1 | 3/8-24 X 2-1/4 HEXHD SCR SST FULL THREAD | 40 | 1 | NAMEPLATE CONTROLLER |
| 10 | 8 | 4-40 X 3/16 HEXHD SCREW | 41 | 1 | NAMEPLATE SOR LOGO 3/4" TALL SIZE 6 BLANK 0720562 |
| 11 | 2 | ADAPTER 1/4"NPTM X 1/4" NPTF | 42 | 3 | O-RING 010 BUNA-N 70D |
| 12 | 1 | ADPTR 1/4"NPTM X 1/8"NPTF 316SST | 43 | 1 | O-RING 121 BUNA-N 70D |
| 13 | 2 | BACKUP RING 010 TFE OR PTFE, SPLIT | 44 | 2 | O-RING 210 BUNA-N 75D |
| 14 | 1 | BAR ADJUSTING LEVER ALUMINUM | 45 | 2 | PIN GROOVED DOWEL 3/16" DIA X 3/4" LG |
| 15 | 1 | BAR FLAPPER | 46 | 1 | RETAINER SPRING UPPER |
| 16 | 1 | BAR TORQUE | 47 | 1 | RETAINING RING 3/8" EXTERNAL E-STYLE |
| 17 | 1 | BEARING BALL 5/8" OD X 1/4" ID SST | 48 | 1 | RETAINING RING 7/32" EXT E-STYLE |
| 18 | 1 | BLOCK BEARING | 49 | 1 | RIVET 1/8"DIA X 1"LG SST OVAL HD SEMI-TUBE |
| 19 | 1 | BLOCK BEARING CAP | 50 | 1 | SCREW ADJUSTING 1/4-28 UNF-2A |
| 20 | 1 | BODY HEX CARBON STEEL 2" NPT | 51 | 1 | SCREW THUMB 10-32 X 1/2" LG 18-8SST |
| 21 | 1 | CASE CONTROLLER MACHINED | 52 | 1 | SHAFT CONTROLLER |
| 22 | 1 | CASTING CLEVIS SWIVEL | 53 | 1 | SHAFT FLOAT 1/8" NPT |
| 23 | 1 | DECAL SENSITIVITY LH | 54 | 1 | SNAP PILOT ASSEMBLY |
| 24 | 1 | DECAL SENSITIVITY RH | 55 | 1 | SPACER |
| 25 | 1 | DISPLACER 1-7/8" DIA X 12" LONG | 56 | 1 | SPRING DOOR LATCH |
| 26 | 1 | DOOR MACHINED | 57 | 2 | STUD FLAPPER BAR |
| 27 | 1 | FOAM TAPE ADHESIVE BOTH SIDES 1" WIDE X 0.02" THICK | 58 | 1 | SWIVEL FEMALE ADAPTER |
| 28 | 1 | FULCRUM SENSITIVITY NYLON W/10-32 UNF | 59 | 1 | SWIVEL MALE ADAPTER |
| 29 | 1 | GASKET 1/4"OD CORD 20 DUROMETER - SHORE A | 60 | 1 | TOLERANCE RING |
| 30 | 2 | GASKET LENS | 61 | 1 | WASHER .468 OD X .255 ID X .060/.066 THK SS |
| 31 | 1 | GAUGE PRESSURE 1-1/2" LH | | | |

1601 NON-SEALED LEVEL CONTROLLER

Linear = mm/inches
Drawing 5678300



20 SEE SECTION E-E



SECTION E-E
SCALE 1.600

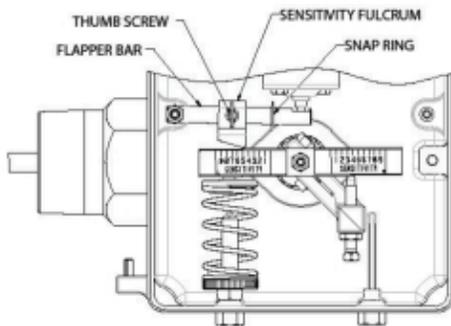
| ITEM | QTY | DESCRIPTION |
|------|-----|---|
| 1 | 2 | BACKUP RING 010 TFE OR PTFE, SPLIT |
| 2 | 1 | BEARING BALL 5/8" OD X 1/4" ID SST |
| 3 | 1 | BLOCK BEARING |
| 4 | 1 | BLOCK BEARING CAP |
| 5 | 1 | BODY HEX CARBON STEEL 2" NPT |
| 6 | 2 | O-RING 010 BUNA-N 70D |
| 7 | 1 | O-RING 121 BUNA-N 70D |
| 8 | 2 | O-RING 210 BUNA-N 75D |
| 9 | 1 | SHAFT CONTROLLER |
| 10 | 1 | SPACER |
| 11 | 1 | TOLERANCE RING |
| 12 | 1 | WASHER .468 OD X .255 ID X .060/.066 THK SS |

Repair Kits

| | | | |
|---|--------------------------------|----------------------|----------|
| Sealed Door Assembly | | 5678484P | |
| Standard Door Assembly | | 5678483P | |
| Displacer Assembly Kits | Displacer Kit 12" 316SST | 5678481P | |
| | Displacer Kit 12" PVC | 5678480P | |
| | Displacer Kit 24" 316SST | 5678482P | |
| Pilot Repair Kits | Quick Opening | 5678476P | |
| | Throttling | 5678477P | |
| | Swivel Assembly Kit | 5678485P | |
| | Process Seal Repair Kit BUNA-N | 5678478P | |
| | Process Seal Repair Kit VITON | 5678479P | |
| Pneumatic Pilot Replacement Kits | | | |
| | Throttling | Quick Opening | |
| Sealed (1600) | With Plugs | 5678390P | 5678292P |
| Non-Sealed (1601) | Brass | 5678388P | 5678393P |
| | Vibration Resistant Brass | 5678386P | 5678395P |
| | 316SS | 5678389P | 5678394P |
| | Vibration Resistant 316SS | 5678387P | 5678396P |
| | Without Plugs | 5678392P | 5678123P |

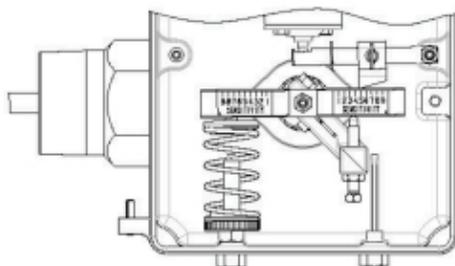
Mounting Reference Drawings

LEFT HAND MOUNT



DIRECT ACTING

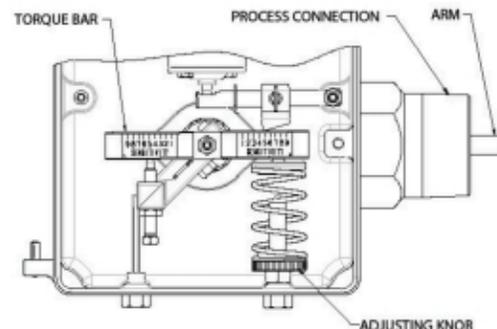
Rising Level INCREASES Pilot Output



REVERSE ACTING

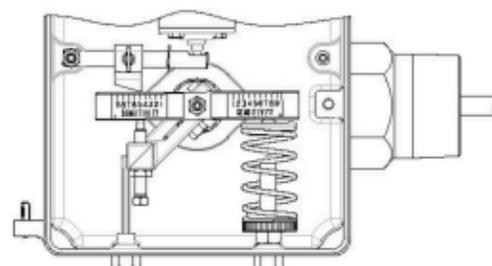
Rising Level DECREASES Pilot Output

RIGHT HAND MOUNT



DIRECT ACTING

Rising Level INCREASES Pilot Output

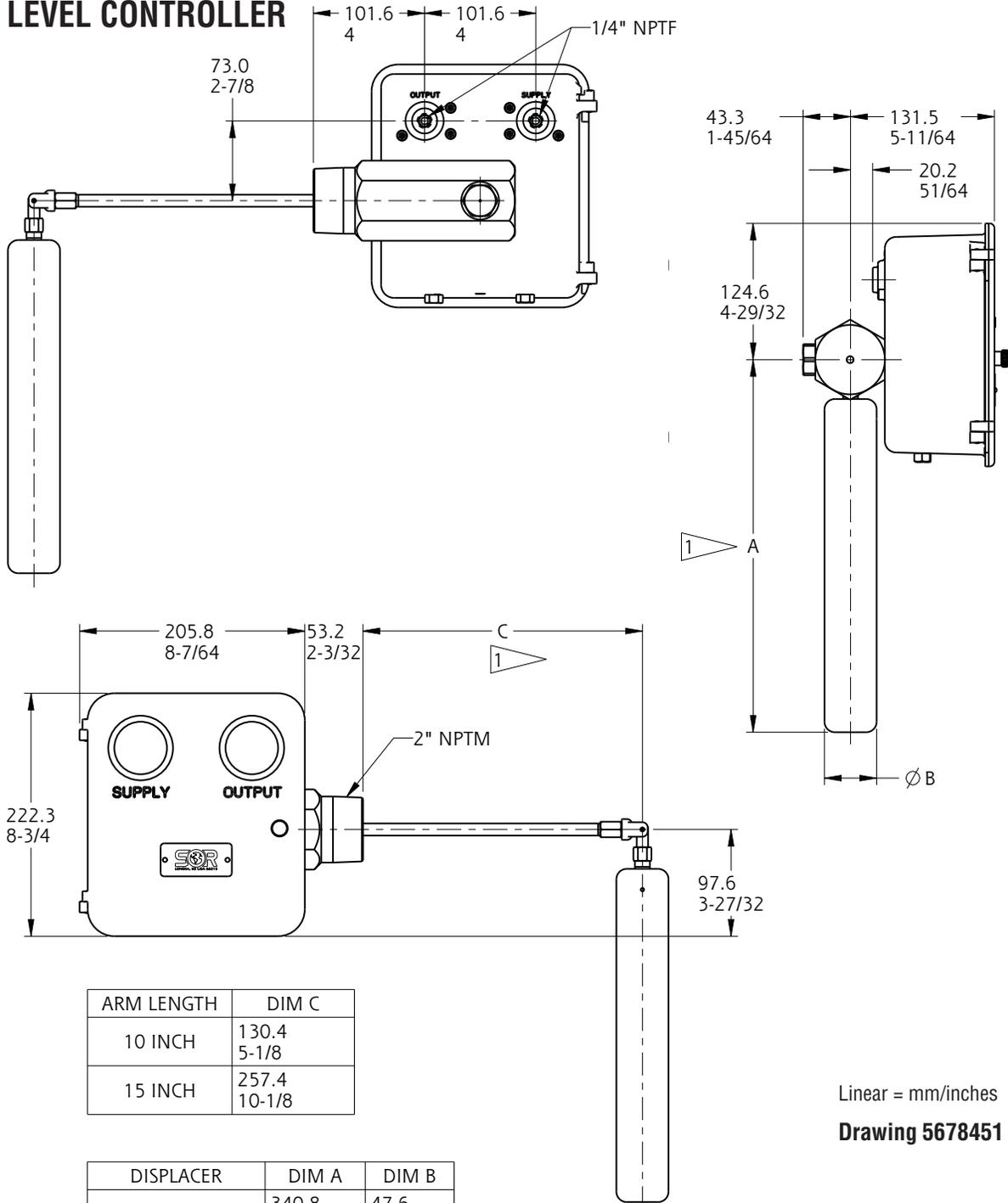


REVERSE ACTING

Rising Level DECREASES Pilot Output

Dimensions

1600 SEALED LEVEL CONTROLLER



| ARM LENGTH | DIM C |
|------------|-----------------|
| 10 INCH | 130.4 5-1/8 |
| 15 INCH | 257.4 10-1/8 |

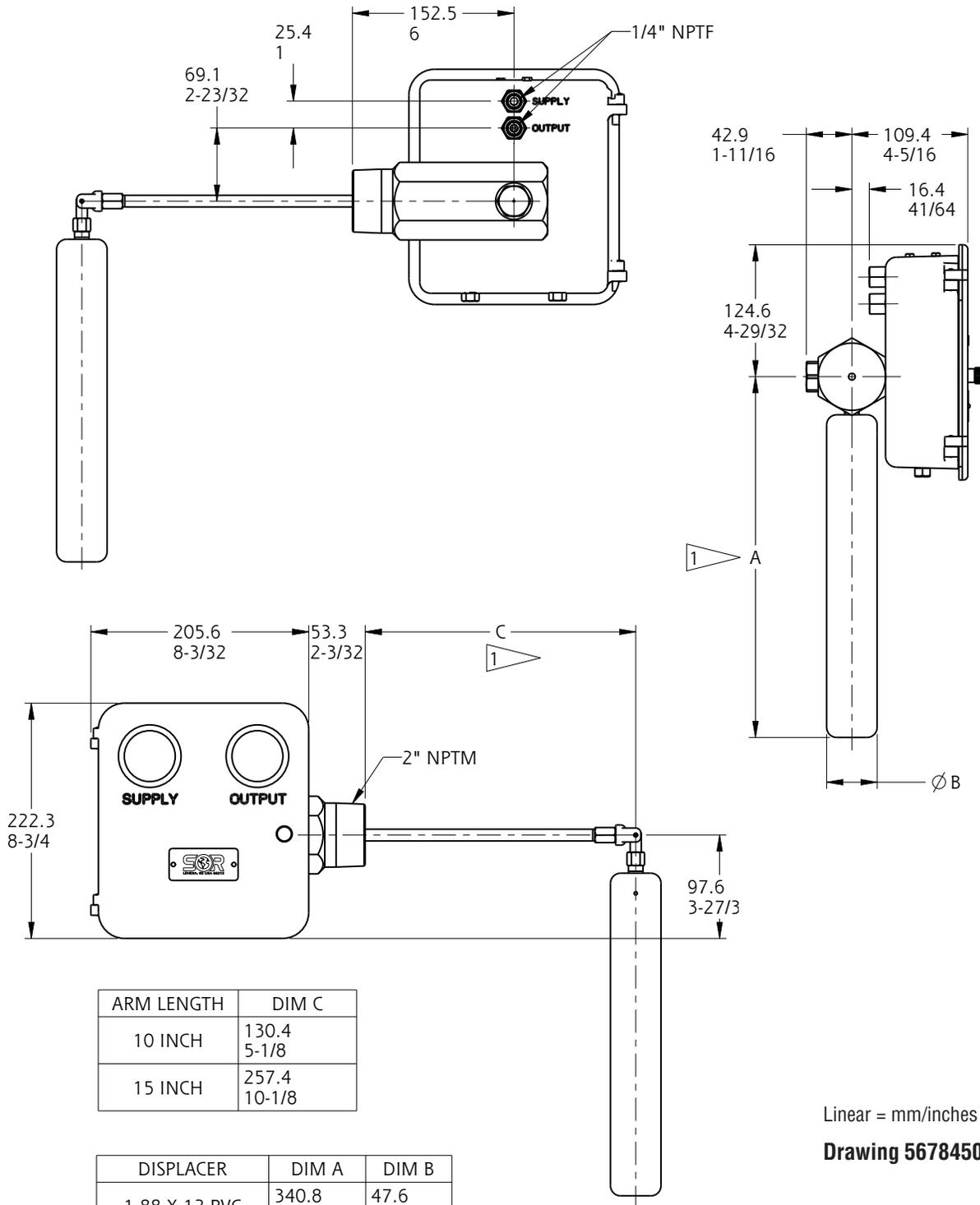
| DISPLACER | DIM A | DIM B |
|------------------|-------------------|-----------------|
| 1.88 X 12 PVC | 340.8 13-27/64 | 47.6 1-7/8 |
| 1.66 X 12 316SST | 340.8 13-27/64 | 42.2 1-21/32 |
| 1.66 X 24 316SST | 645.6 25-27/64 | 42.2 1-21/32 |

Linear = mm/inches
Drawing 5678451

Dimensions are for reference only. Contact the factory for certified drawings for a particular model number.

NOTES:
 1. DIMENSION APPROXIMATE AND BASED ON A FIVE THREAD ENGAGEMENT.

1601 NON-SEALED LEVEL CONTROLLER



Linear = mm/inches

Drawing 5678450

Dimensions are for reference only. Contact the factory for certified drawings for a particular model number.

NOTES:
 1. DIMENSION APPROXIMATE AND BASED ON A FIVE THREAD ENGAGEMENT.

Troubleshooting



Before beginning maintenance or troubleshooting, isolate the level controller from the process and ensure that all pressure has been vented from the controller body. Disconnect and vent the supply and output lines connected to the back of the controller case.

| Symptom | Probable Cause(s) | Corrective Action(s) |
|---|---|---|
| <p>The output pressure gauge is indicating an output signal when:</p> <ul style="list-style-type: none"> ■ Fluid level is below the displacer on a direct action controller. ■ Fluid level is above the displacer on a reverse action controller. | <ul style="list-style-type: none"> ■ There is too much tension on the balance spring, resulting in too much force on the torque bar. ■ The displacer arm is set too high or the displacer is contacting an object inside the vessel. | <ul style="list-style-type: none"> ■ Slowly rotate the adjusting knob counterclockwise to reduce spring tension until the level controller stops sending an output pressure signal. Check the output pressure gauge again when the liquid level rises (direct action) or falls (reverse action). ■ Move the torque arm up and down to check the displacer arm position. <ul style="list-style-type: none"> —If the torque arm moves only in one direction, this indicates the displacer arm is riding at the top/bottom of the vessel connection. —If the torque arm moves too easily, this indicates the displacer is no longer connected to the displacer arm. —Adjust the displacer arm so it's centered in the vessel connection. |
| <p>The output pressure gauge is indicating no output signal when:</p> <ul style="list-style-type: none"> ■ Fluid level is above the displacer on a direct action controller ■ Fluid level is below the displacer on a reverse action controller. | <ul style="list-style-type: none"> ■ There is not enough tension on the balance spring, resulting in not enough force on the torque bar. ■ The displacer arm is set too low or the displacer is contacting an object inside the vessel. | <ul style="list-style-type: none"> ■ Slowly rotate the adjusting knob clockwise to increase spring tension until the level controller begins sending an output pressure signal. Check the output pressure gauge again when the liquid level falls (direct action) or rises (reverse action). ■ Move the torque arm up and down to check the displacer arm position. <ul style="list-style-type: none"> —If the torque arm moves only in one direction, this indicates the displacer arm is riding at the top/bottom of the vessel connection. —If the torque arm moves too easily, this indicates the displacer is no longer connected to the displacer arm. —Adjust the displacer arm so it's centered in the vessel connection. |

| Symptom | Probable Cause(s) | Corrective Action(s) |
|---|--|--|
| <ul style="list-style-type: none"> ■ The controller fails to repeat at the same liquid level after each dump cycle, and occasionally fails to dump or shut off at all. ■ The torque bar appears difficult to move, and when depressed the torque bar does not return to original position quickly. | <p>Foreign material has accumulated inside the level controller body.</p> | <p>Disconnect the level controller from the process and flush the debris out of the body using a suitable solvent solution.</p> |
| <p>The pilot bleeds supply pressure continuously.</p> | <ul style="list-style-type: none"> ■ For a snap pilot, foreign debris has become trapped under the ball inside the pilot. ■ For a throttling pilot, foreign debris has become trapped under the pin inside the pilot. | <p>Remove the pilot from the controller case using the procedure on Page 5. Unscrew the cap screws from the bottom of the pilot which allows it to come apart. Carefully clean all of the pilot components and then reassemble the pilot and install it back into the controller case.</p> |
| <p>In an interface level application:</p> <ul style="list-style-type: none"> ■ Sometimes the vessel overfills or drains completely (especially with changing process temperature). ■ Additionally, the displacer arm is not riding at the top/ bottom of the vessel connection nor is the displacer contacting an object inside the vessel. | <p>The specific gravities of the upper and lower liquid are close and a temperature change is causing them to vary and become too close for interface level detection. The displacer is not large enough to detect the difference in the specific gravities.</p> | <p>Contact SOR customer service and provide the exact specific gravities or API gravities for both the upper and lower liquid of the interface. SOR engineering will determine appropriate displacer sizing per the provided application parameters.</p> |



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