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Model 3300

Installation, Operation, and Maintenance Instructions

1.0 GENERAL

1.1 Model Number Information

Sample Model Number: 3300 - 50 D 1 - 1

| END CONNECTION SIZE | CODE |
|--------------------------------|------|
| 0 to 50 psig (0 to 3.4 bar) | 05 |
| 0 to 100 psig (0 to 6.9 bar) | 10 |
| 0 to 250 psig (0 to 17.2 bar) | 25 |
| 0 to 500 psig (0 to 34.5 bar) | 50 |
| 0 to 1000 psig (0 to 68.9 bar) | 100 |
| 0 to 1500 psig (0 to 103 bar) | 150 |
| 0 to 2500 psig (0 to 172 bar) | 250 |
| 0 to 5000 psig (0 to 345 bar) | 500 |

| CONTROLLER ACTION | CODE |
|-------------------|------|
| Direct | D |
| Reverse | R |

| OUTPUT RANGE | CODE |
|-------------------------------|------|
| 3 to 15 psig (0.2 to 1.0 bar) | 1 |
| 6 to 30 psig (0.4 to 2.0 bar) | 2 |

| OPTIONS | CODE |
|---------|------|
| None | - |
| NACE | N |

| MOUNTING STYLE | CODE |
|---------------------|------|
| No Mounting Bracket | 0 |
| Actuator Yoke | 1 |
| Actuator Housing | 2 |
| Panel | 3 |
| 2-inch Pipestand | 4 |

1.2 Specifications

1.2.1 Input Signal (Bourdon Tube Ranges)

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.9 bar)
- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.5 bar)
- 0 to 1000 psig (0 to 68.9 bar)
- 0 to 1500 psig (0 to 103 bar)
- 0 to 2500 psig (0 to 172 bar)
- 0 to 5000 psig (0 to 345 bar)

1.2.2 Setpoint Adjustment

- Internal manual adjusting knob

1.2.3 Controller Mode

- Proportional (2 to 20% proportional band)

1.2.4 Controller Action

- Direct or Reverse

1.2.5 Controller Output Signal

- 3 to 15 psig (0.2 to 1.0 bar)
- 6 to 30 psig (0.4 to 2.0 bar)

1.2.6 Supply Pressure Requirements

- Type: Clean, dry air or non-corrosive gas
- 20 psig (1.4 bar) for 3 to 15 psig (0.2 to 1.0 bar) output signal
- 35 psig (2.4 bar) for 6 to 30 psig (0.4 to 2.0 bar) output signal

1.2.7 Maximum Working Pressure

- Same as Bourdon Tube rating

1.2.8 Normal Operating Temperature Range

- -40 to 150°F (-40 to 66°C)

1.2.9 Construction Materials

- Case and Cover: Die Cast Aluminum
- Bourdon Tube: 316 Stainless Steel
- Pressure Block: 316 Stainless Steel
- Supply and Output Tubing: 316 Stainless Steel
- Input Pressure Tubing: 316 Stainless Steel
- Nozzle: 316 Stainless Steel
- Orifice Block: Aluminum
- Mounting Bracket: Cadmium-plated steel
316 Stainless Steel (optional)

1.2.10 Connections

- ¼" FNPT

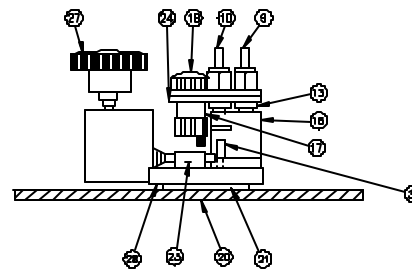
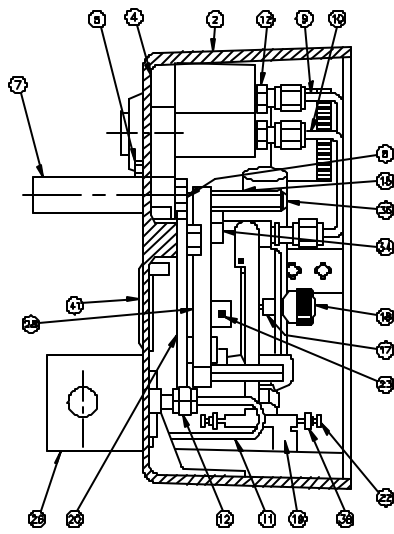
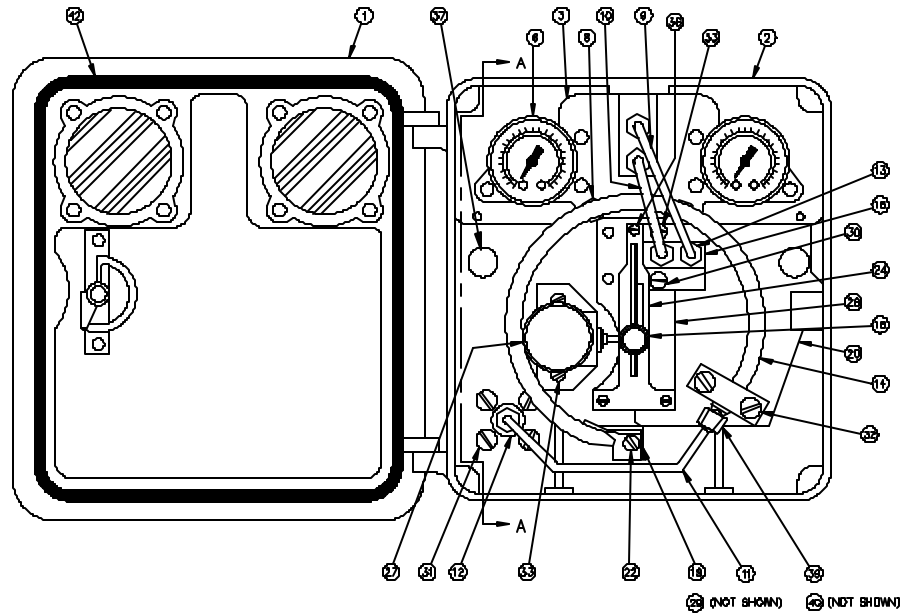
1.2.11 Mounting

- Actuator Yoke
- Actuator Housing
- Panel
- 2-inch pipestand

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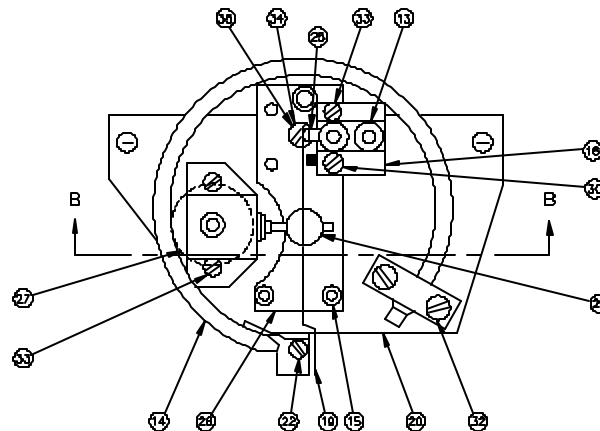
Installation, Operation, and Maintenance Instructions

1.3 Parts List



| ITEM | DESCRIPTION | PART NO. | QTY | MAT'L |
|------------|---------------------------------------|----------|-----|-----------|
| 1 | COVER | 60025 | 1 | ALUM |
| 2 | CASE | 33062 | 1 | ALUM |
| 3 | MANIFOLD | 33004 | 1 | ALUM |
| 4 | MANIFOLD GASKET, BUNA-N | 60185 | 1 | BUNA-N |
| 5 | HEX CAP SCREW, 1/4-28x.30 | 60086 | 8 | 1/8-8 SST |
| 6 | PRESS GAUGE, 0-30 PSI, 1/8 NPT | 60018 | 2 | BRONZE |
| | PRESS GAUGE, 0-80 PSI 1/8 NPT | 60248 | | BRONZE |
| 7 | MOUNTING ADAPTER, 5/16-18 | 33008 | 2 | 303 SST |
| 8 | HEX CAP SCREW, 3/16-10 | 33088 | 2 | 1/8-8 SST |
| 9 | SUPPLY TUBING, 125 DIA x .035 W | 33008 | 1 | 316 SST |
| 10 | OUTPUT TUBING, 125 DIA x .035 W | 33010 | 1 | 316 SST |
| 11 | CONTROL TUBING, 125 DIA x .035 W | 33012 | 1 | 316 SST |
| 12 | CONPR FITTING, 1/8 NPTx1/8 TUBE | 33014 | 3 | 316 SST |
| 13 | CONPR FITTING, 1/16 NPTx1/8 TUBE | 33018 | 2 | 316 SST |
| 14 | BOUJRDON TUBE ASSEMBLY: | | 1 | 316 SST |
| | 0-100 PSI | 33020 | | |
| | 0-250 PSI | 33022 | | |
| | 0-500 PSI | 33024 | | |
| | 0-1000 PSI | 33026 | | |
| | 0-1500 PSI | 33028 | | |
| | 0-2000 PSI | 33030 | | |
| | 0-5000 PSI | 33032 | | |
| | 0-100 PSI | 33021 | | MONEL |
| | 0-250 PSI | 33023 | | |
| | 0-500 PSI | 33025 | | |
| | 0-1000 PSI | 33027 | | |
| | 0-1500 PSI | 33029 | | |
| | 0-2500 PSI | 33031 | | |
| 0-5000 PSI | 33033 | | | |
| 15 | PROP. BAND PLATE STANDOFF | 33034 | 3 | |
| 16 | ORIFICE BLOCK | 33036 | 1 | ALUM |
| 17 | SLIDING BLOCK | 33038 | 1 | 303 SST |
| 18 | SLIDE KNOB | 33040 | 1 | PHENOLIC |
| 19 | FLAPPER | 33042 | 1 | 410 SST |
| 20 | BASE MOUNTING PLATE | 33044 | 1 | ALUM |
| 21 | PLATE DISC SUPPORT | 33046 | 1 | 316 SST |
| 22 | FLAPPER PIVOT SCREW | 33048 | 2 | 1/8-8 SST |
| 23 | PIVOT BLOCK | 33050 | 1 | DELFIN |
| 24 | PROPORTIONAL BAND ADJUST. PLATE | 33052 | 1 | ALUM |
| 25 | NOZZLE, 0.040 ORIFICE | 33054 | 1 | 316 SST |
| 26 | PROCESS PRESSURE BLOCK | 33056 | 1 | 316 SST |
| 27 | PRESSURE ADJUSTMENT KNOB | 33058 | 1 | ALUM/SST |
| 28 | PIVOT MOUNTING PLATE | 33060 | 1 | ALUM |
| 29 | FLAPPER SPRING | 33062 | 1 | 316 SST |
| 30 | MOUNTING SPRING SCREW | 33064 | 1 | 303 SST |
| 31 | ROUND HEAD MACHINE SCREW, 1/4-28x0.82 | 33066 | 4 | 1/8-8 SST |
| 32 | ROUND HEAD MACHINE SCREW, 1/4-28x0.76 | 33068 | 2 | 1/8-8 SST |
| 33 | ROUND HEAD MACHINE SCREW, 10-32x.38 | 33070 | 3 | 1/8-8 SST |
| 34 | SHOULDER SCREW, 0.248 DIAx0.370 | 33072 | 1 | 303 SST |
| 35 | LOCK WASHER | 33074 | 1 | 301 SST |
| 36 | ROUND HEAD MACHINE SCREW, 8-32x0.30 | 33076 | 3 | 1/8-8 SST |
| 37 | HEX CAP SCREW, 3/16-24x.050 | 33078 | 2 | 1/8-8 SST |
| 38 | HEX NUT, REG | 33080 | 2 | 1/8-8 SST |
| 39 | TUBE FITTING NUT, 0.125 | 33082 | 1 | 316 SST |
| | TUBE FITTING NUT, 0.125 5,000 PSI | 33083 | | |
| 40 | TUBE FITTING FERRULE, 0.125 | 33084 | 1 | 316 SST |
| 41 | FLUGH HEAD BUTTON FLUID, 1.25" | 33085 | 1 | POLYETH |
| 42 | COVER GASKET | 60026 | 1 | NEOPRENE |

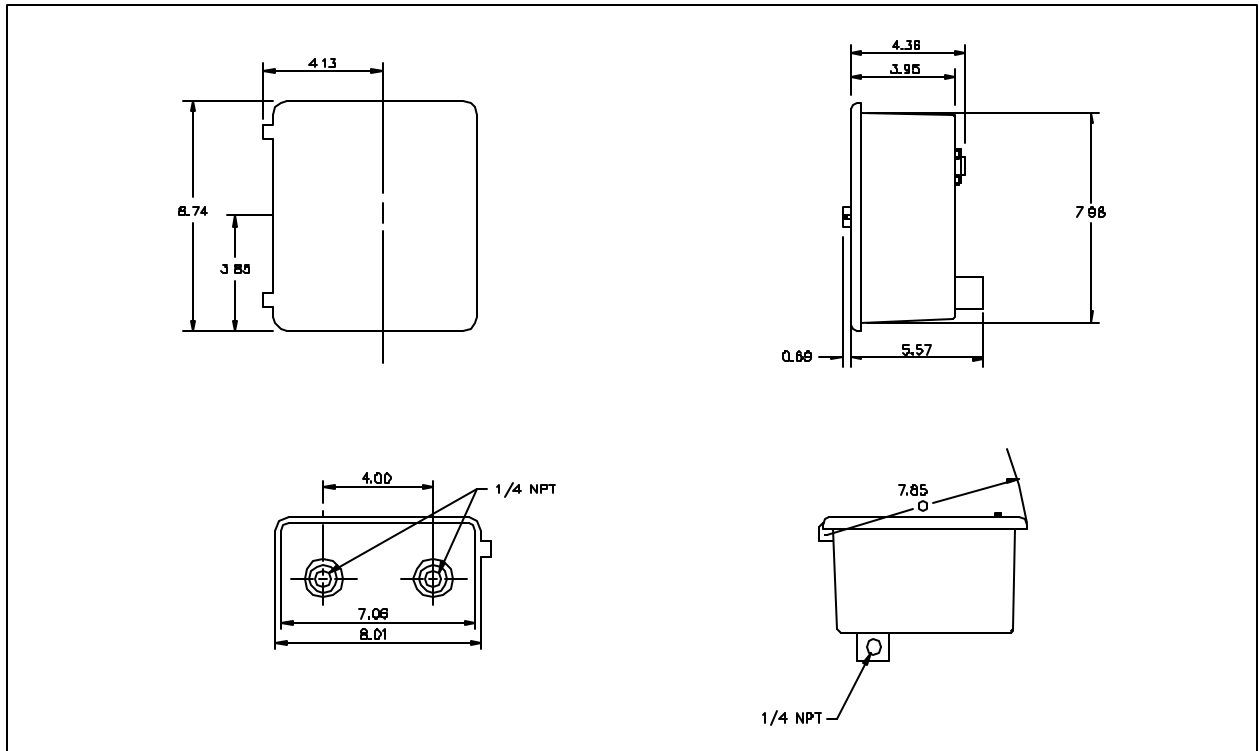
♦ MEETS NAEC MR-01-76 SPECIFICATIONS



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Installation, Operation, and Maintenance Instructions

1.4 Dimensions



2.0 INSTALLATION

2.1 Controller Mounting

2.1.1 Valve Yoke Mounting

1. Install 90° male connector compression-type tubing fittings in supply and output connections on the back of the controller case. Install fitting in actuator control signal port. For reverse-acting actuators, the control signal port is located in the lower diaphragm housing. For direct-acting actuators, the control signal port is located in the upper diaphragm housing.
2. Attach mounting bracket to the standoffs on the back of the controller case, using the provided cap screws and lock washers. To ensure proper installation, verify that the top of the bracket is approximately even with the top of the controller case.
3. Attach mounting bracket to the mounting holes in the valve yoke, using the provided cap screws and lock washers.

2.1.2 Actuator Mounting

1. Install 90° male connector compression-type tubing fittings in supply and output connections on the back of the controller case. Install fitting in actuator control signal port. For reverse-acting actuators, the control signal port is located in the lower diaphragm housing. For direct-acting actuators, the control signal port is located in the upper diaphragm housing.
2. Remove two adjacent actuator housing cap screws.
3. Attach mounting bracket to the back of the controller case, using the provided cap screws and lock washers.
4. Attach mounting bracket to the diaphragm housing, using 1¼" long cap screws and hex nuts.

2.2 Output Tubing Installation

Install 1/4" or 3/8" tubing from the controller output connection at the rear of the controller case to the actuator control signal port. The controller output connection is 1/4" FNPT.

2.3 Supply Piping Installation

To avoid controller damage or control instability, the supply pressure medium should be filtered and pressure-regulated. For a controller with a 3-15 psig output signal, supply pressure medium should be regulated to 20 psig. For a controller with a 6-30 psig output signal, supply pressure medium should be regulated to 35 psig. Install a quality filter-regulator in the supply piping. Install 1/4" or 3/8" tubing from the controller supply connection at the rear of the controller case to the filter-regulator output connection. The controller supply connection is 1/4" FNPT.

2.4 Process Tubing Installation

Install 1/4", 3/8", or 1/2" tubing from the controller input connection at the rear of the controller case to the process line or vessel pressure tap. The controller process connection is 1/4" FNPT.

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Warning!! Personal injury or property damage may result due to leakage or rupture of the controller bourdon tube if process pressure exceeds the bourdon tube pressure limits as specified in section 1.2 of this manual. To avoid overpressure, provide an appropriate overpressure protection device (as required by the appropriate code, regulation, or standard) to ensure that none of those limits will be exceeded.

Install block valves, vents, drains, or seal systems as needed in the process tubing system. For gas service, the process tubing should slope upward toward the controller. For liquid service, the process tubing should slope downward toward the controller. Slope should be a minimum of one inch rise per foot of horizontal line.

A good practice is to install a needle valve in the process sensing line to serve as a pulsation dampener. In addition to increasing control stability, the needle valve will protect the bourdon tube from damage caused by sudden pressure spikes.

The process sensing line should be connected in a straight section of pipe approximately ten (10) pipe diameters from the control valve, and away from pipe bends or elbows. The process sensing line must be connected downstream of the control valve for pressure-reducing control, and upstream of the control valve for back-pressure control.

2.5 Case Vent

The vent connection is located in the bottom of the controller case. Care must be taken to ensure that the controller case vent does not become plugged.

Warning!! If the controller is located in an enclosed or unventilated area and a flammable gas is used as the supply pressure medium, escaping gas may accumulate and form an explosion hazard. To prevent such a situation, the controller case vent should be piped away from the regulator to a well ventilated outdoor location away from air intakes, windows, etc.

3.0 OPERATION

3.1 Adjustments

Refer to the instruction plate located inside the controller cover.

3.1.1 Proportional Band

To adjust proportional band, loosen knob located in the center slot of the proportional band adjusting plate. Slide knob to desired setting and re-tighten.

3.1.2 Setpoint

To adjust the pressure setpoint, turn the knob on the pressure adjustment assembly (clockwise to increase, counterclockwise to decrease).

3.2 Start-up

1. Open all valves in process sensing line.
2. Apply supply pressure to the controller. Supply pressure gauge should read 20 psig for 3-15 psig output, or 35 psig for 6-30 psig output. Adjust supply regulator as required to obtain the correct supply pressure.
3. Set proportional band at 20%.
4. Adjust setpoint setting until the output pressure gauge indicates 50% output (9 psig for 3-15 psig output range, 18 psig for 6-30 psig output range).
5. Slowly open the upstream and downstream isolation block valves and close the bypass valve.
6. If controller output oscillates, partially close the needle valve in the process sensing line. If oscillation continues, adjust the proportional band to a higher setting.
7. Adjust setpoint to the desired pressure.

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4.0 MAINTENANCE

The following maintenance procedures require that the controller be taken out of service.

Warning!! To avoid personal injury or equipment damage, make sure that all pressure is vented from process sensing line before performing maintenance.

4.1 Controller Action Change

Tools required:
7/16" open-end wrench
small flat-blade screwdriver

1. Disconnect and remove supply and output pressure tubing from the orifice block and manifold.
2. Loosen three machine screws and remove the proportional band plate and sliding block assembly.
3. Unhook flapper spring from the flapper, then unscrew spring anchor and machine screw. Spring may remain attached to spring anchor.
4. Transfer orifice block to opposite side of flapper. Install machine screw in top hole and spring anchor in bottom hole, and tighten both. Reconnect spring to flapper.
5. Loosen knob securing sliding block in center slot of proportional band plate. Turn sliding block (with pivot pin) 180 degrees, then re-install in slot and tighten knob.
6. Re-install proportional band plate, making sure that pivot pin is on same side of flapper as the orifice block. When properly positioned, the spring will pull flapper against pin.
7. Re-install supply and output pressure tubing. Longer tubing section is supply. Shorter section is output.

4.2 Bourdon Tube Replacement

1. Disconnect and remove supply and output pressure tubing from the orifice block and manifold.
2. Loosen three machine screws and remove the proportional band plate and sliding block assembly.
3. Unhook flapper spring from the flapper.
4. Unscrew tubing nut from fitting on bourdon tube socket.
5. Remove two machine screws securing bourdon tube to mounting plate. Remove bourdon tube from case.
6. Loosen flapper pivot screws and remove flapper from bourdon tube.
7. Connect flapper to replacement bourdon tube. CAUTION: Do not over-tighten flapper pivot screws. The screws should be tightened sufficiently to prevent slack, but loose enough to allow the flapper to pivot freely.

8. Install, but do not tighten, machine screws that secure bourdon tube to mounting plate.
9. Reconnect, but do not tighten, tubing nut to bourdon tube.
10. Tighten screws to secure bourdon tube to mounting plate.
11. Tighten tubing nut on bourdon tube socket.
12. Connect spring to flapper.
13. Re-install proportional band plate, making sure that pivot pin is on same side of flapper as the orifice block. When properly positioned, the spring will pull flapper against pin.
14. Re-install supply and output pressure tubing.

4.3 Troubleshooting

| Problem | Possible Cause | Fix |
|---|---|---|
| Unable to achieve full pressure reading on output pressure gauge. | <ol style="list-style-type: none"> 1. Output pressure gauge may be defective. 2. Leaks in output pressure tubing or fittings. 3. Nozzle may be obstructed by foreign matter. 4. Flapper may not be perpendicular to nozzle. | <p>Replace gauge.</p> <p>Tighten fittings.</p> <p>Remove nozzle from orifice block and inspect. Remove any obstruction and re-install or replace nozzle.</p> <p>Examine position of flapper relative to nozzle. This may require removal of the proportional band adjustment plate.</p> |
| Cycling or hunting (output pressure is oscillating) | <ol style="list-style-type: none"> 1. Proportional band setting may be too low. 2. Control valve plug or stem may be sticking. | <p>Adjust proportional band to a higher setting.</p> <p>Check operation of control valve, independent of controller.</p> |