

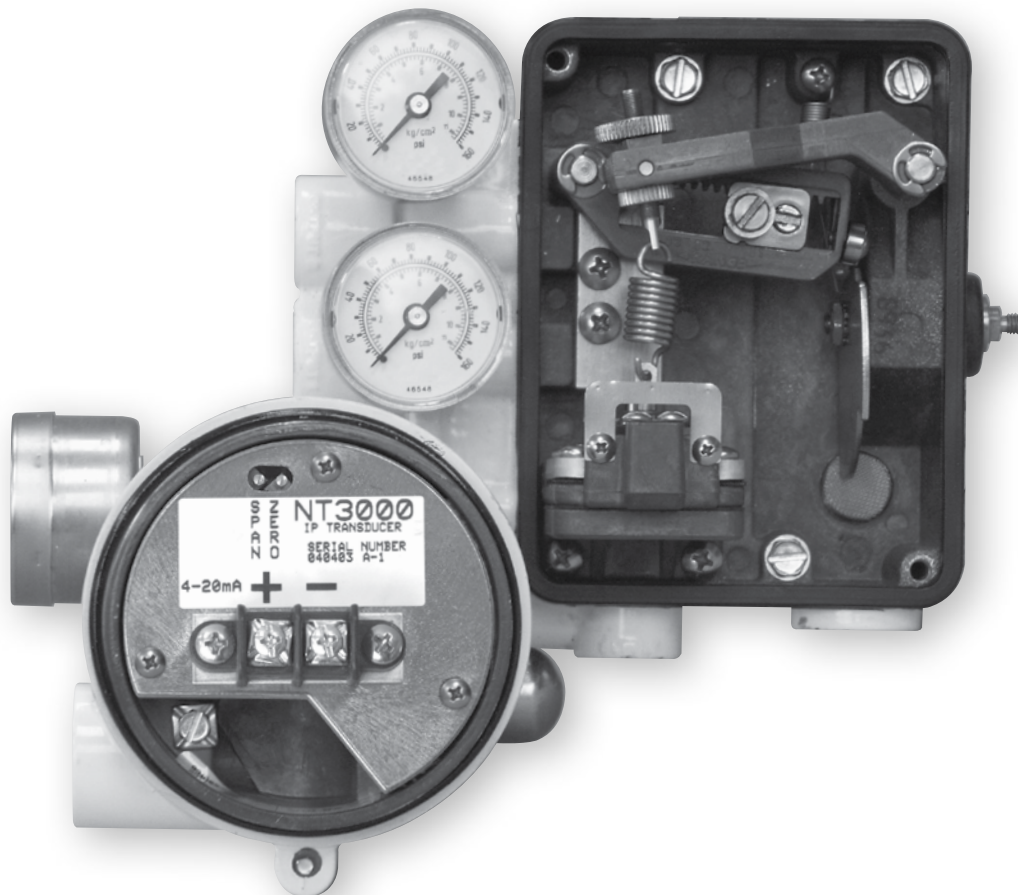


# USER INSTRUCTIONS

## ***NT3000 Series Electro-Pneumatic Transducer Module***

FCD VLENIM0047-05 – 07/10

***Installation  
Operation  
Maintenance***



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## General Information

This bulletin is designed to assist in installing, calibrating, troubleshooting and performing maintenance as required for the Flowserve Valtek® NT 3000 series electro-pneumatic transducer.

Product users and maintenance personnel should read thoroughly and follow exactly the instructions contained in this bulletin prior to operation of the transducer. If there is any question concerning this bulletin, call a Flowserve representative.

To avoid possible injury to personnel or damage to equipment, users must strictly adhere to WARNING and CAUTION notes. Modifying this product, substituting non-factory or inferior parts, or using maintenance procedures other than outlined could drastically affect performance, be hazardous to personnel and equipment, and may void existing warranties.

- **WARNING: This product has electrical conduit connections in thread sizes ½-inch NPT or M20 (distinguished by the letter “M” stamped on the conduit port) which appear identical but are not interchangeable. Forcing dissimilar threads together will damage equipment, cause personal injury and void hazardous location certifications. Conduit fittings must match equipment housing threads before installation. If threads do not match, obtain suitable adapters or contact a Flowserve office.**

**NOTE:** Numbers in parenthesis correspond to the part item numbers in Figure 8.

The Valtek NT 3000 series electro-pneumatic transducer is used with a milliampere electrical control signal. It is interchangeable with the XL series or Beta series pneumatic positioners and can be mounted on either Valtek linear or rotary actuators without modification.


Since the positioner is insensitive to supply pressure changes and can handle supply pressures from 30 to 150 psi, a supply regulator is usually not required; however, a coalescing air filter is highly recommended.

- **WARNING: Substitution of components may impair intrinsic safety.**

**NOTE:** The air supply should conform to ISA-7.0.01 (a dew point at least 18°F / -7.8°C below ambient temperature, particle size below five microns, oil content not to exceed one part per million).

- **WARNING: When installed in a Group II, category IG location, steps should be taken to reduce the possibility of impacts and friction.**

The NT 3000 series transducer is certified for the following locations:

FM/CSA	Intrinsically Safe: See Figure 1 Class I, Div. 1, Groups A, B, C, D Class I, Zone 0, AEx ia IIC T4 = -20°C to +80°C Non Incendive Class I, Div. 2, Groups ABCD T4 = -20°C to +80°C Explosion-proof: Class I, Div. 1, Groups BCD DIP Class II, III, Div. 1, Groups EFG T4 = -20°C to +80°C	NEMA Type 4X
ATEX	 <b>II 2 G</b> <b>Ex d IIB + H2 T4/T5/T6</b> T6 Tamb -40°C to +40°C T5, Tamb -40°C to +75°C T4, Tamb -40°C to +110°C <b>II 2 D</b> <b>Ex tD A21 IP66 T40°C, T75°C, T110°C</b> T40°C [-40°C to +40°C] T75°C [-40°C to +75°C] T110°C [-40°C to +110°C]  <b>II 1 G</b> <b>Ex ia T4 Ga</b> T4= -40°C to +80°C <b>II 1 D</b> <b>Ex iaD 20 T90°C</b> T90°C [-40°C to +80°C]	IP66
ANZEx	<b>Ex d, IIB + H<sub>2</sub> T6 IP65</b> T6= -20°C to +40°C <b>Ex ia IIC T4/T5</b> T4= -20°C to +100°C T5= -20°C to +65°C <b>Ex n IIC T6</b> T6= -20°C to +40°C	IP66

## Transducer Operation

The NT 3000 is considered an ‘active’ I/P transducer. An active device has gain and controls the current through transistors, diodes, capacitors, resistors, and integrated circuits. A ‘passive’ transducer has no gain characteristics and consists of a large coil with a fixed resistance (i.e., fixed voltage drop). The effective impedance of an active transducer varies with the input current. The NT 3000 transducer is a current-powered device that can be modeled as a 5.7 V zener diode in series with a 17-ohm resistor. For a DCS system output of 4-20 mA, the voltage drop across the transducer varies between 5.7 V and 6.1 V while the impedance varies between 1330 ohms and 270 ohms. Flowserve recommends an operating voltage of 6.5 VDC (i.e., the DCS system should allow for at least 6.5 V loop load across the NT 3000 terminals; not that a 6.5 V supply is connected to the transducer).

◦ **WARNING: Do not exceed the maximum supply voltage and current while in service.**

The transducer receives a 4 to 20 mA signal and converts it to a 3-15 psi output signal.

The supply pressure to the NT 3000 is filtered as it passes through a field-replaceable, coalescing filter element in the transducer. The air then passes through an internal pressure regulator that regulates the pressure to approximately 23 psi. The supply pressure then goes through an orifice that restricts the flow and air consumption. Refer to Figures 2 and 3.

The air is further controlled to 3-15 psi using a diaphragm flapper that is attracted by an electromagnet to a nozzle. A temperature-compensated piezoresistive pressure sensor mounted on a circuit board senses the transducer output pressure. The pressure sensor and circuitry create a feedback loop that determines how much current to send to the electromagnet for a desired pressure output. The electromagnet in the feedback loop varies the nozzle-flapper spacing, which regulates the I/P output pressure to 3-15 psi.

## Converting Positioner Input Signal

XL series or Beta series positioners can be adapted to 4 to 20 mA (I/P) or pneumatic signal (3-15 psi). For pneumatic operation, the positioner is fitted with the pneumatic adapter. For electrical operation, the positioner is equipped with the NT 3000 transducer. Refer to the appropriate Flowserve Installation, Operation, Maintenance Instructions.

## Calibration

Valtek positioners mounted on valves are calibrated at the factory; however, it may be necessary to recalibrate the transducer before operating the valve. The zero and span of the NT 3000 transducer are set to close tolerances at the factory and normally do not need adjustment.

If required, the NT 3000 transducer can be recalibrated either while mounted on the XL or Beta positioner or while mounted on a calibration manifold. Calibration manifolds are available from the factory (PN 097370.999.000). To calibrate the I/P transducer zero and span settings, refer to Figures 4 or 5 and proceed as follows.

**NOTE:** Although calibration can be accomplished using the output pressure gauge on the I/P transducer, its accuracy is  $\pm 3$  percent. It is recommended that the standard gauge be removed for calibration and that more accurate calibration equipment of  $\pm 0.1$  percent of span be used. The pressure gauge port is 1/8-inch NPT.

1. Connect the 30-150 psi supply pressure to the positioner or calibration manifold.
2. Remove the I/P transducer housing cover.
  - **WARNING: Disconnect power to the I/P module before removing the housing cover in explosive atmospheres; otherwise, personal injury may occur.**
3. Connect an adjustable current source to the terminal block on the circuit board.

**NOTE:** The zero and span adjustments are multi-turn potentiometers (pots) that have no stops on the ends of their travel; however, they have a slip clutch to prevent damage from over-adjustment. The pots also make a clicking noise when they have reached the limits of their adjustment.

4. Apply a 4 mA signal to the input. Adjust the zero trim pot to achieve a 3 psi output. The output will increase with clockwise rotation of the zero trim pot.
5. Increase the input signal to 20 mA. Adjust the span trim pot to achieve a 15 psi output. The output will increase with clockwise rotation of the span.
6. Recheck the zero setting by repeating Step 4. The span adjustment may affect the zero setting.
7. Repeat Steps 4, 5 and 6 until the proper adjustments are obtained.

Figure 1 – Intrinsically Safe Installation Schematic

Class I, Division 2. Applications must be installed as specified in NEC Section 501-4 when barriers are not used. (Refer to ANSI/ISA RP12.6 for guidance on installation.)

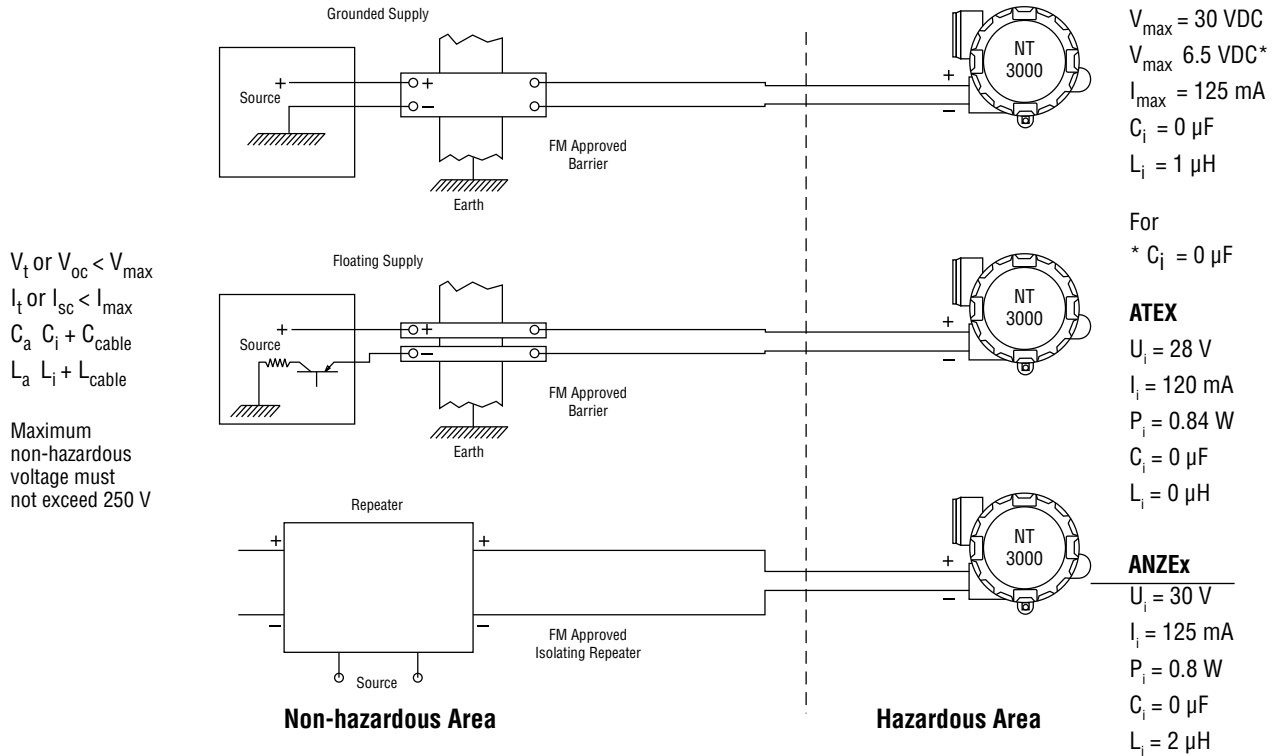


Figure 2 – NT 3000 Transducer Schematic

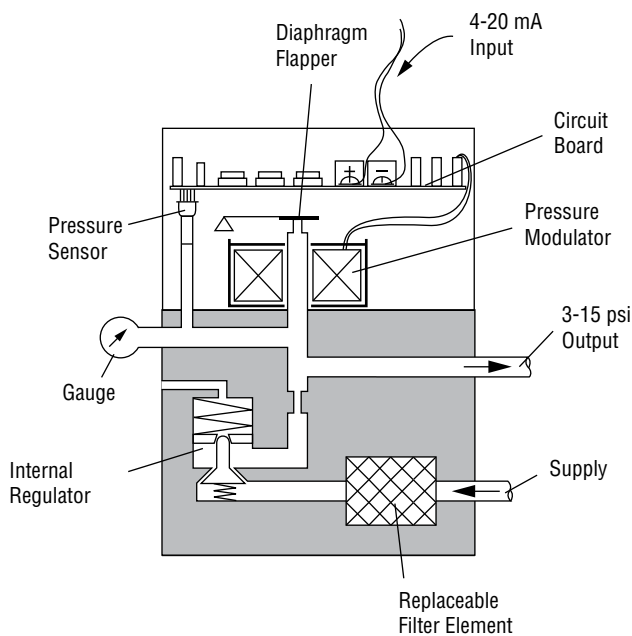


Figure 3 – NT 3000 Transducer Orifice Screw



## Adjusting the Pressure Regulator Output

The setpoint of the internal pressure regulator is set at the factory and normally does not need adjustment. However, if it is necessary to check or adjust the pressure regulator, refer to Figure 8 then proceed as follows.

1. Disconnect the positioner's air supply (or calibration manifold).
2. Detach the vent cover (20) and unscrew the vent element (21). For vented models, the pipe fitting replaced the vent cover and element.
3. Plug the vent port with a 1/8-inch NPT plug, being certain the plug is airtight.
4. Plug the electrical port with a 1/2-inch NPT plug, being certain the electrical port is airtight.
5. Be certain housing cover (1) is screwed on airtight.
6. Reconnect or turn on the supply pressure to the positioner or calibration manifold.
7. Observe pressure indicated by the pressure gauge on the NT 3000 transducer. With the ports plugged and cover on, the indicated pressure is the setpoint of the internal pressure regulator. Its value should be 23 psi ( $\pm 3$  psi). If the setpoint is within this range it needs no further adjustment, proceed to Step 9. If it is not within this range, continue with Step 8.
8. Remove pressure regulator setscrew (40). Apply a drop of thread locking compound (Loctite No. 222 or equivalent) to the setscrew. Install and turn the setscrew clockwise until the pressure indicated by the I/P transducer pressure gauge on the NT 3000 transducer is 23 psi ( $\pm 3$  psi).
9. Disconnect the air supply pressure to the positioner (or calibration manifold).
10. Remove the 1/8-inch NPT plug from the vent port and reinstall the vent element (21) and the vent cover (20) into the I/P transducer housing. If vented model is used, replace pipe fitting instead of vent cover and element.
11. Remove the 1/2-inch NPT plug from electrical port.
12. Reconnect the air supply pressure to the positioner.

## Adjusting the Pressure Modulator

The pressure modulator is factory set and normally does not need adjustment; however, if adjustment is necessary refer to Figures 6 and 7, proceed as follows.

**NOTE:** Although the pressure modulator can be adjusted using the standard output pressure gauge on the NT 3000 transducer, its accuracy is  $\pm 3$  percent. It is recommended that the standard gauge be removed for calibration and more accurate calibration equipment of  $\pm 0.1$  percent of span be used or use a manifold block with an accurate pressure sensor. The pressure gauge port is 1/8-inch NPT.

1. Remove the NT 3000 transducer housing cover (1).
  - o **WARNING: Disconnect power to the I/P transducer before removing the housing cover in explosive atmospheres; otherwise, personal injury may occur.**
2. Disconnect the loop power electrical connection from the circuit board.
3. Apply supply air pressure to the NT 3000 transducer and observe the pressure indicated by the NT 3000 transducer pressure gauge. If the indicated pressure is  $2.00 \pm 0.20$  psi the pressure modulator is adjusted correctly; reconnect the loop power electrical connection to the circuit board and reinstall the housing cover. If the indicated pressure is not  $2.0 \pm 0.20$  psi, turn off the supply pressure and continue with step 4.
4. Remove the three screws (3) holding the circuit board in place and carefully pull the circuit board straight out of the housing. Disconnect the pressure modulator electrical connector from the bottom of the circuit board.
5. Securely plug the pressure sensor port with a .188 inch diameter rod. Be careful not to damage the pressure sensor O-ring (46) in the pressure sensor port.
  - o **WARNING: Rod may be ejected from port with high pressures. Use care to avoid personal injury.**

A damaged O-ring must be replaced with the appropriate part from Soft Goods Kit 5. Remove O-ring with a small screwdriver.
6. Connect the air supply pressure to the positioner.

7. Remove the “Factory Calibrated” sticker from the pressure modulator cover (8). Turn the setscrew (6) until the pressure indicated on the pressure gauge on the NT 3000 transducer is 2.0 psi ( $\pm 0.20$  psi). This is the correct pressure modulator adjustment.
8. Disconnect the air supply pressure to positioner.
9. Remove the rod plugging the pressure sensor port.
10. Reconnect the pressure modulator electrical connector to the bottom of the circuit board.
11. Reinstall the circuit board by engaging the pressure sensor tube and pressing it straight into the housing. Be careful not to damage the pressure sensor O-ring or pinch the modulator connector wires while installing the circuit board. Apply thread locking compound to the three circuit board screws and replace.
12. Reinstall the housing cover and reconnect the air supply pressure.
13. Check the span and zero calibration.

Figure 4 – Beta Positioner with NT 3000 Transducer

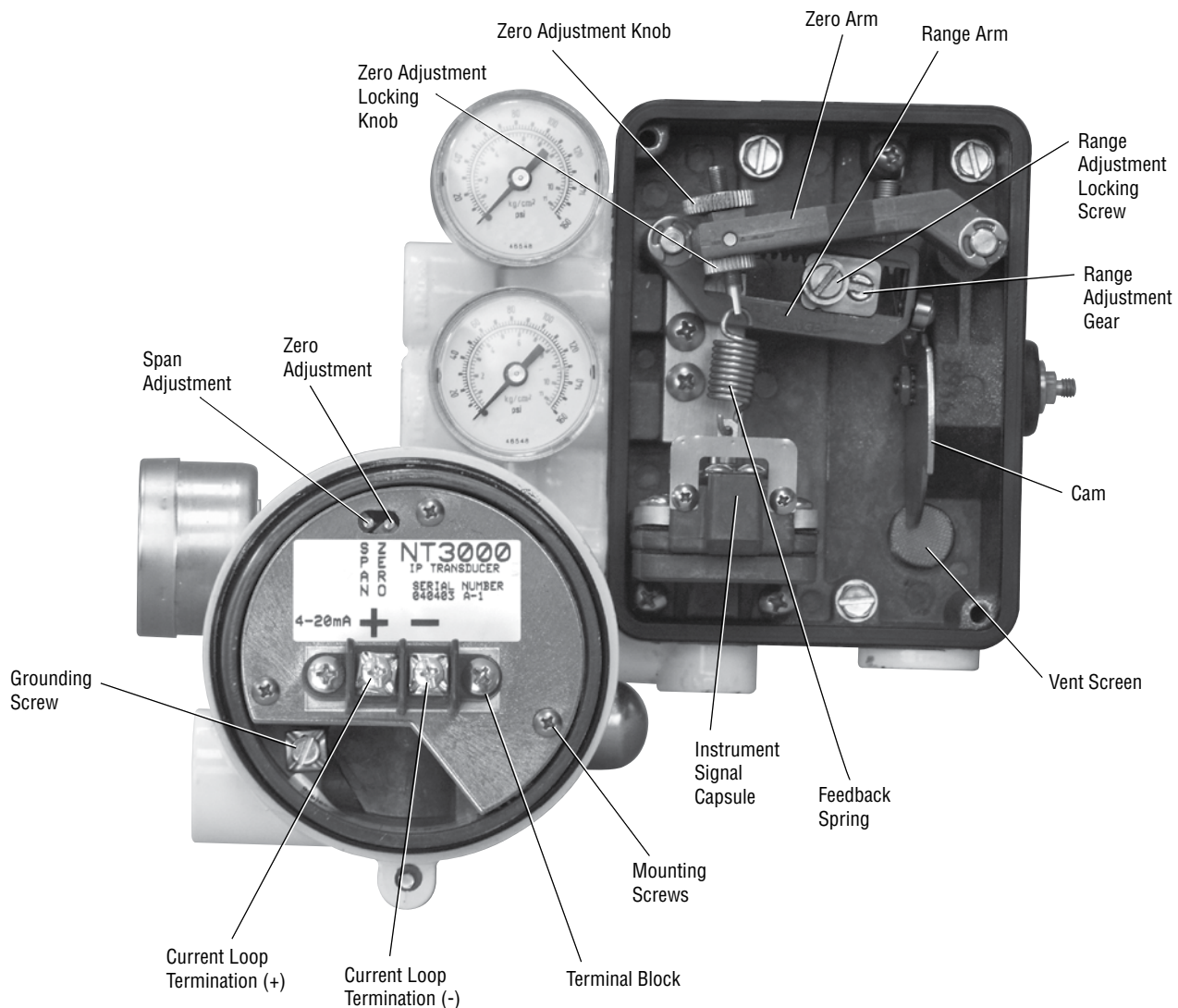


Figure 5 – XL Positioner with NT 3000 Transducer

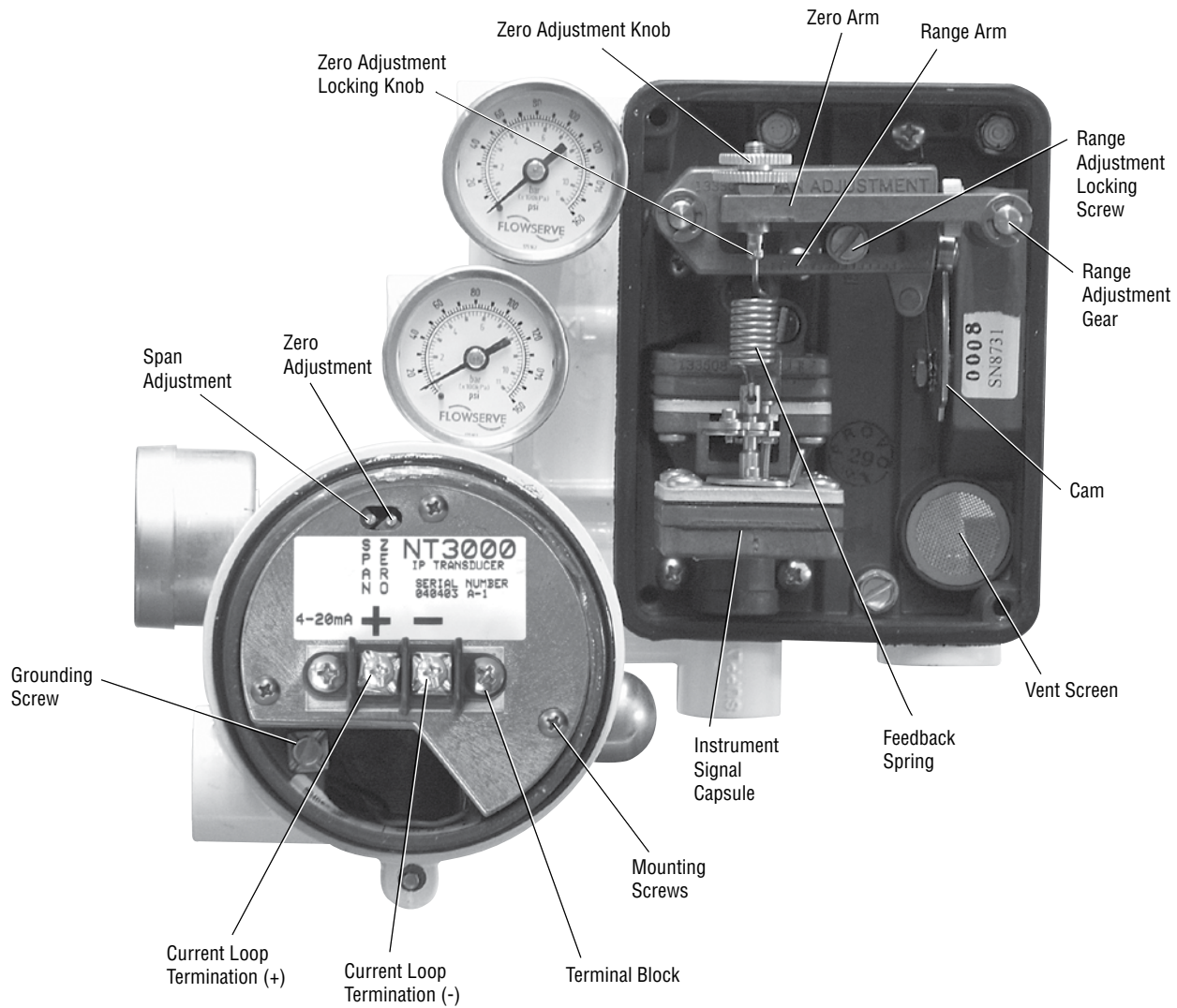
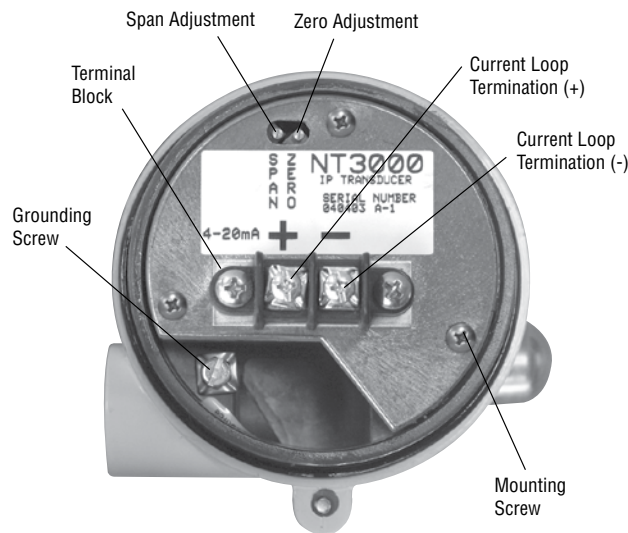




Figure 6 – NT 3000 Transducer Circuit Board (housing cover removed)



## Maintenance

### Inspection and Replacement of the Transducer Orifice

To service or replace the NT 3000 transducer orifice, refer to Figures 3 and 8 then proceed as follows:

1. Disconnect air supply pressure to the positioner.
2. Remove the orifice screw (44) from the transducer housing (12). Examine the O-rings (42, 43) on the orifice screw for wear. Replace if necessary (see spare parts kits for ordering).
3. Examine the orifice for blockage. If blocked, the orifice must be replaced.
4. Tightly replace cleaned or new orifice screw and O-rings into housing.
5. Reconnect the air supply pressure to the positioner.

### Service and Replacement of the Transducer Filter

The coalescing filter element in the NT 3000 module should be checked every six months and replaced when necessary. To check or replace filter, refer to Figure 8 and proceed as follows:

1. Disconnect air supply pressure to the positioner.
2. Remove the filter cover (24) from the housing (45), being careful not to damage the O-ring (23).

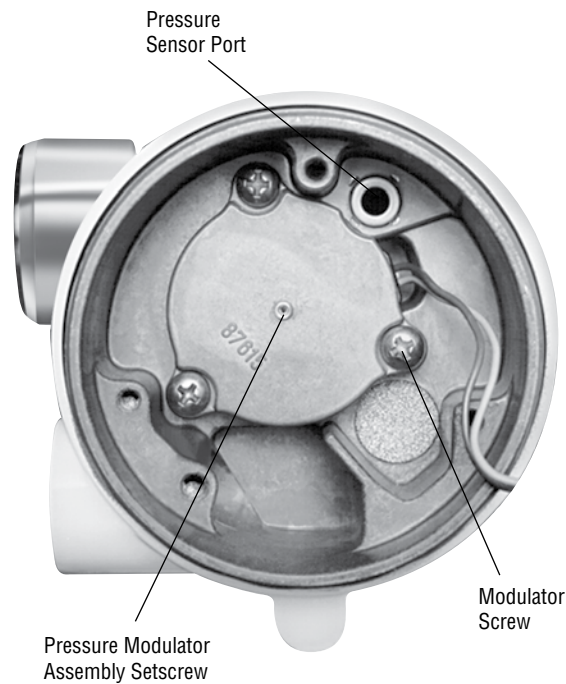
3. Remove the filter element (22) from the housing and examine it; if plugged or dirty, replace with a new filter.
4. Reinstall the filter after first cleaning the sealing surfaces. Install the filter in the housing, and tightly fasten on the filter cover.
5. Reconnect the air supply pressure to the positioner.

### Service and Replacement of the Transducer Vent Element (not applicable for vented model)

To disassemble and reassemble the NT 3000 vent element, refer to Figure 8 and proceed as follows:

1. Disconnect air supply pressure to the positioner.
2. Remove the two vent cover screws (19) from the housing (45). Remove the vent cover (20) from the housing.
3. Examine the vent element (21) by unscrewing it from the housing; if plugged or dirty, replace with a new vent element.
4. Reinstall the vent element. Place a small amount of thread locking compound on the vent cover screws and tightly secure the vent element cover.
5. Reconnect the air supply pressure to the positioner.

Figure 7 – NT 3000 Transducer Pressure Modulator (circuit board removed)



## Service and Maintenance of the Transducer Circuit Board

To replace the circuit board, refer to Figures 6 and 8 then proceed as follows.

- o **WARNING: The circuit board is an electrostatic sensitive device. Use appropriate ESD protective devices when handling.**
1. Disconnect air supply pressure to the positioner.
  2. Remove the NT 3000 transducer housing cover (1).
  - o **WARNING: Disconnect power to the I/P transducer before removing the housing cover in explosive atmospheres; otherwise, personal injury may occur.**
  3. Disconnect the loop power electrical connections from the circuit board (4).
  4. Remove the three circuit board mounting screws (3) and carefully pull the circuit board straight out of the housing.
  5. Disconnect the pressure modulator (11) electrical connector from the bottom of the circuit board.
  6. If the plastic enclosure in the circuit board assembly (see Figure 8) is separated, O-ring should be installed in the hole in the housing base (position B), and not on the post on the bottom of the circuit board (position A), prior to reassembling.
  7. Reconnect the pressure modulator electrical connector to the circuit board.
  8. Reinstall the circuit board by engaging the pressure sensor tube and pressing it straight into the housing. Be careful not to damage the O-ring with the pressure sensor or pinch the modulator connector wires while installing the circuit board. Apply thread locking compound to the three circuit board mounting screws, replace and tighten.
  9. Reconnect the loop power electrical connections to the terminal block noting polarity.
  10. Reinstall the housing cover and reconnect the air supply pressure.
  11. Check the span and zero calibration (see Calibration).

## Disassembly and Reassembly of the Transducer Pressure Regulator

To disassemble and reassemble the NT 3000 module, refer to Figure 8, and proceed as follows:

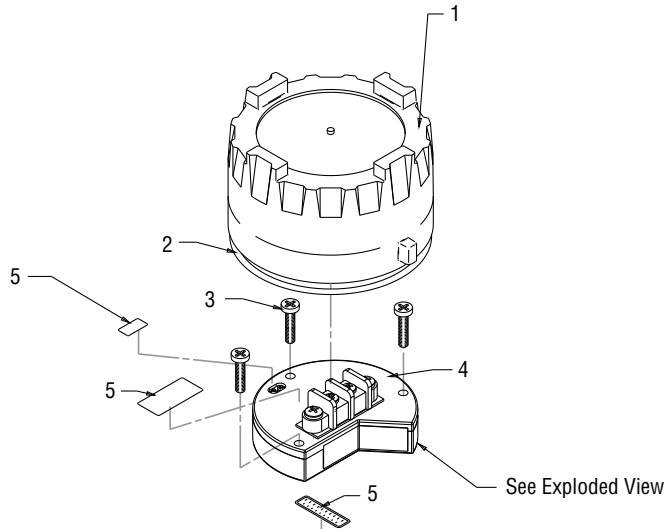
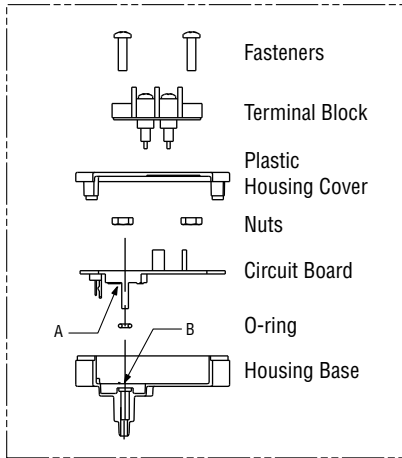
1. Disconnect air supply pressure to the positioner.
2. Remove the regulator setscrew (40) from the pressure regulator cover (38).
  - o **WARNING: The pressure regulator has an internal spring that is preloaded. Removing the setscrew relieves this preload. This must be done before the pressure regulator cover is removed; otherwise personal injury may occur.**
3. Remove the pressure gauge (41).
4. Remove the pressure regulator cover (38) by evenly removing its two mounting screws (39). The pressure regulator preload will be further reduced as these screws are removed. If vented model is used, remove the regulator cover gasket.
5. Remove the regulator spring button (37), the regulator spring (36), and diaphragm retainer (35).
6. Gently remove the regulator diaphragm assembly (assembly comprising items 31, 32, 33, and 34).
7. Using a  $\frac{7}{16}$ -inch socket wrench, remove the poppet guide screw (30), its O-ring (29), the regulator poppet (28) and the poppet spring (27).
8. Before reassembly, clean the regulator cavity. Replace or clean necessary parts before reassembly.
9. To reassemble, place the poppet spring (27) into the housing cavity. Place the poppet guide O-ring (29) on the poppet guide screw (30) and insert the regulator poppet (28) through the bottom of the guide screw. Screw the guide screw into the housing being careful not to overtighten. A maximum torque of 5 to 6 inch-pounds is sufficient. Make sure the poppet is free to move up and down and has spring load.
10. Gently push the diaphragm assembly (assembly comprising items 31, 32, 33, and 34) into the bore.
11. Install the regulator spring (36) and the diaphragm retainer (35) in the bore and then place the regulator spring button (37) on the spring. Place a small amount of thread locking compound (Loctite 222 or equivalent) on the regulator cover screws (39) and tightly secure the pressure regulator cover (38). If vented model is used, make sure the regulator cover gasket is installed.
12. Place a small amount of thread sealant compound on the threads of the pressure gauge (41) and tightly thread it into the housing.
13. Apply a small amount of thread locking compound (Loctite 222 or equivalent) on the regulator setscrew (40) and install it into the regulator cover (38).
14. Adjust setpoint of the pressure regulator by following the instructions as outlined in the "Adjusting Pressure Regulator Output" section of this manual.
15. Reconnect the air supply to the positioner.

## Removal and Replacement of the Transducer Pressure Modulator

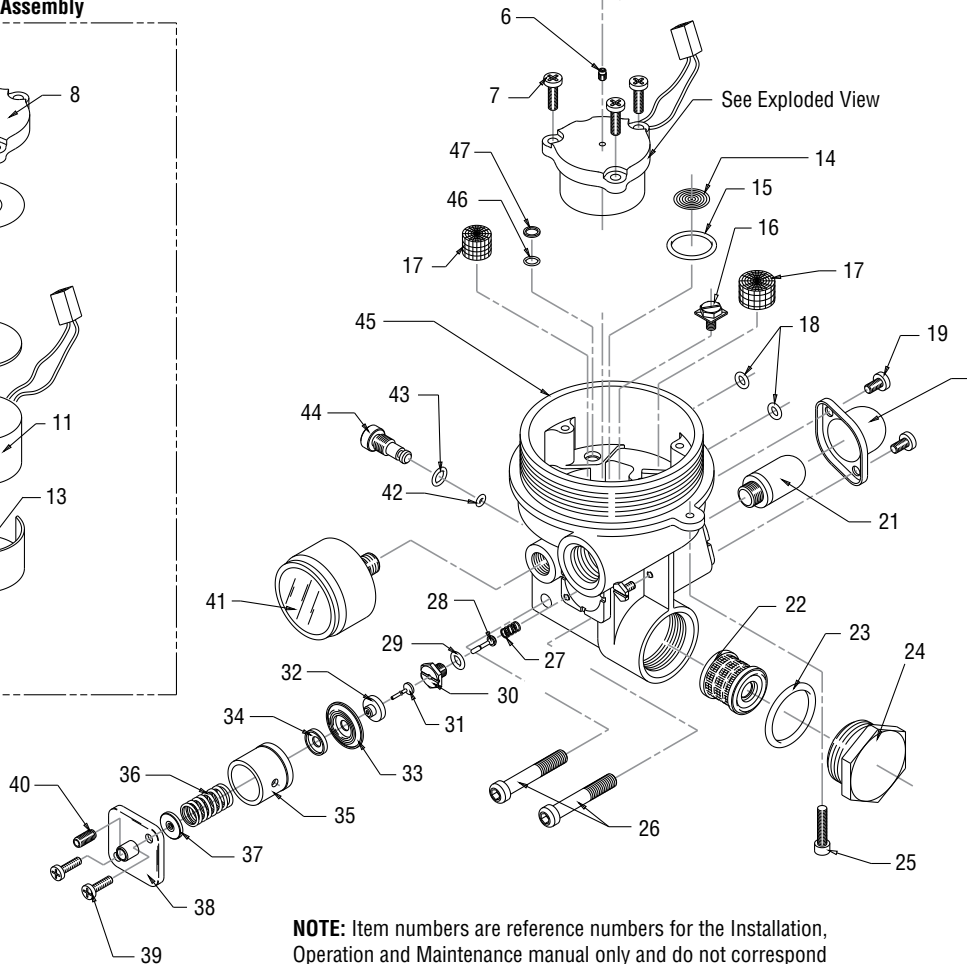
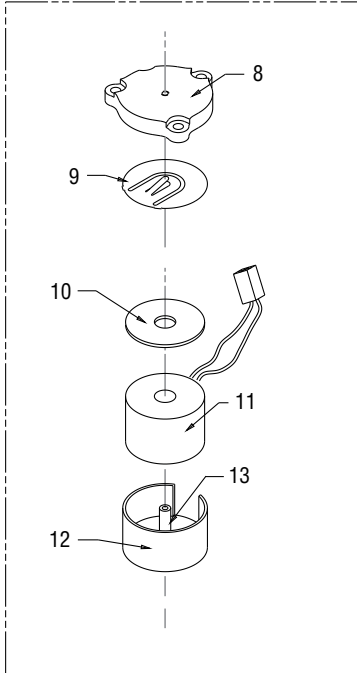
Removal and replacement of the NT 3000 pressure modulator should only be performed by a certified service center.

Figure 8 – NT 3000 Transducer, Exploded View

### Exploded View of Circuit Board and Housing



### Pressure Modulator Assembly



**NOTE:** Item numbers are reference numbers for the Installation, Operation and Maintenance manual only and do not correspond to Bill of Material item numbers.

## Parts List

Item	Description
1	Transducer housing cover
2	Housing cover O-ring
3	Circuit board mounting screws
4	Circuit board
5	Stickers
6	Modulator set screw
7	Modulator screws
8	Pressure modulator cover
9	Spring diaphragm assembly
10	Pressure modulator cover
11	Coil assembly
12	Pressure modulator body
13	Pressure modulator nozzle
14	Foam filter
15	Coil O-ring
16	Ground screw
17	Flame arrestor
18	I/P to positioner housing air connection O-rings
19	Vent cover screws
20	Vent cover
21	Vent element
22	Filter
23	O-ring
24	Filter cover

Item	Description
25	Lock screw for ATEX I/P
26	I/P to positioner attachment screws
27	Poppet spring
28	Regulator poppet
29	Poppet guide O-ring
30	Regulator poppet guide screw
31	Poppet seat
32	Orifice retainer
33	Regulator diaphragm
34	Spring guide
35	Diaphragm retainer
36	Regulator spring
37	Regulator spring button
38	Regulator cover
39	Regulator screws
40	Regulator setscrew
41	Pressure gauge (0-30 psi)
42	Orifice O-ring
43	Orifice screw O-ring
44	Orifice screw
45	Transducer housing
46	Sensor O-ring
47	O-ring retainer

## Spare Part Kits

*Kit 1 – Regulator Assembly*  
PN 138727.999.000

Item	Description	Quantity
27	Poppet Spring	1
28	Regulator Poppet	1
29	Poppet Guide O-ring	1
30	Regulator Poppet Guide	1
31, 32, 33, 34	Diaphragm Assembly	1
36	Regulator Spring	1
37	Regulator Spring Button	1
38	Regulator Cover	1
39	Regulator Screw	2
40	Regulator Set Screw	1

*Kit 2 – Orifice*  
PN 098333.999.000

Item	Description	Quantity
42	Orifice O-ring	1
43	Orifice Screw O-ring	1
44	Orifice Screw	1

*Kit 3 – Filter Element*  
PN 098334.999.000

Item	Description	Quantity
23	Filter Cover O-ring	1
22	Coalescing Filter Element	1

*Kit 4 – Vent Element*  
PN 098335.999.000

Item	Description	Quantity
19	Vent Cover Screws	2
20	Vent Cover	1
21	Vent Element	1

*Kit 5 – Soft Goods*  
PN 171270.999.000 – Buna N  
PN 188562.999.000 – Fluorosilicon  
PN 188563.999.000 – Viton

Item	Description	Quantity
2	Housing Cover O-ring	1
15	Modulator O-ring	1
23	Filter Cover O-ring	1
29	Poppet Guide O-ring	1
31	Poppet Seat	1
33	Regulator Diaphragm	1
42	Orifice O-ring	1
43	Orifice Screw O-ring	1
46	Sensor O-ring	1
	Regulator Cover Gasket (for vented models only)	1

*Kit 6 – Electronics and Maintenance Kit*  
PN 217591.999.000

Item	Description	Quantity
3	Circuit Board Mounting Screws	3
4	Circuit Board	1
16	Grounding Screw	1

# Standard Explosion Proof EMI / RFI Wiring Installation Procedures (using conduit)

The NT 3000 transducer has been tested by an independent testing laboratory to comply with the following industry standards:

**EN 61000-4-2** Electromagnetic Compatibility (EMC) Part 4: Testing and measurement techniques, Section 2 Electrostatic Discharge immunity test, 1995.

**EN 61000-4-3** Electromagnetic Compatibility (EMC) Part 4: Testing and measurement techniques, Section 3 Radiated, radio frequency, electromagnetic field immunity test, 2006.

**EN 61000-4-4** Electromagnetic Compatibility (EMC) Part 4: Testing and measurement techniques, Section 4 Electrical fast transient/burst immunity test, 1995.

**EN 61000-4-5** Electromagnetic Compatibility (EMC) Part 4: Testing and measurement techniques, Section 5 Surge immunity test, 2005.

**EN 61000-4-6** Electromagnetic Compatibility (EMC) Part 4: Testing and measurement techniques, Section 6 Immunity to conducted disturbances, induced by radio frequency fields immunity test.

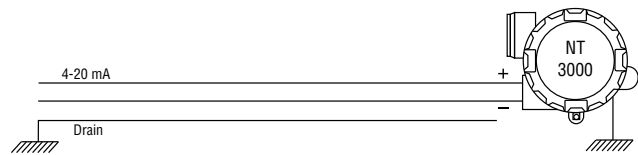
The NT 3000 transducer complies with these standards when installed following the minimum wiring procedures.

The housing must be grounded. Normally the housing is grounded through the valve to the local superstructure. When the positioner is grounded, the on-board filtering will be effective. Therefore, a green internal ground screw is provided. The ground wire should be as short as possible.

Proper NT 3000 field wiring includes three elements: conductive conduit (armor), drain wire and shielded wire.

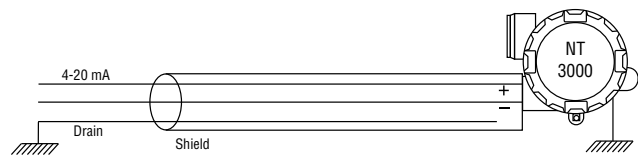
**Conductive Conduit** The conduit can be rigid or flexible and must be conductive. The conduit provides additional protection in the event the shield contains an opening and is required to be within six feet of the NT 3000 transducer and within six feet of any radios or microwave sources. The conduit system includes an aluminum fitting at the NT 3000 transducer.

Figure 9 – NT 3000 Transducer, Drain Wire



**Drain wire** The drain looks like a bare ground wire and is not a shield. The drain wire is provided by the cable manufacturer and provides a path to ground for any noise, or can be a path for ground loops. Therefore, the drain should be terminated only at one end of the loop (normally the source). The drain extends from the source to the NT 3000.

Figure 10 – NT 3000 Transducer, Shielded Wire



**Shielded Wire** This is standard insulated instrumentation wire with a conductive aluminum foil wrapped around the conductors. The shield provides a protective metal barrier to keep out electrical noise. Shield weak points are found at the beginning, end and other openings. Sometimes the foil wrap is outside of the cable manufacturer’s specification for overlap. Any openings in the shield (i.e. bends with under tolerance overlap) provide a path for electrical noise to infect the current signal. The shield extends from the source to the NT 3000 transducer. Grounding of the shield should be at one end only (the same end as the drain wire).

**NOTE:** Cable tray or ladder will not provide protection from electrical noise.

This procedure will protect against noise generated close to the NT 3000 transducer. However, generating electrical noise at the source power supply (DCS, etc.) is possible and can be due to ground loops in the source power supply or other contamination. Any noise generated at the source can affect the NT 3000 transducer.

## Troubleshooting

Failure	Probable Cause	Corrective Action
Transducer output is less than 1.5 psig with no input signal (output pressure should be 2.0 psig $\pm$ 0.5 psig)	1. Supply pressure is low or not connected properly	1. Set supply pressure to recommended value
	2. Pressure gauge is faulty	2. Replace gauge
	3. Orifice is plugged	3. Replace orifice
	4. Transducer filter needs servicing	4. Service filter
	5. Transducer pressure regulator adjusted improperly	5. Adjust pressure regulator
	6. Transducer pressure modulator adjusted improperly	6. Adjust pressure modulator
Transducer output pressure is greater than 3.0 psig with no input signal	1. Transducer pressure modulator adjusted improperly	1. Adjust Transducer pressure modulator
	2. Transducer pressure regulator adjusted improperly	2. Adjust pressure regulator
	3. Pressure gauge is faulty	3. Replace gauge
Low pressure output with a signal above minimum input signal	1. Zero and span out of calibration	1. Recalibrate zero and span settings
	2. MPC is enabled (Old style NT 3000 models only)	2. Disable MPC
Transducer output is 2.0 psig $\pm$ 0.5 psig, regardless of input signal	1. Input signal not connected properly	1. Connect input signal to circuit board
	2. Pressure modulator assembly not connected to circuit board	2. Connect pressure modulator to circuit board
	3. Circuit board is defective	3. Replace circuit board
Output will not reach 15.0 psig with maximum input signal	1. Supply pressure is low or not connected properly	1. Set supply pressure to recommended value
	2. Zero and span out of calibration	2. Recalibrate zero and span settings
	3. Pressure gauge is faulty	3. Replace gauge
	4. Orifice is plugged	4. Replace orifice
	5. Transducer filter needs servicing	5. Service filter
	6. Transducer pressure regulator adjusted improperly	6. Adjust pressure regulator
	7. Transducer pressure modulator adjusted improperly	7. Adjust pressure modulator
Excessive air consumption	1. Air leakage from input port	1. Tighten port mounting screws. Be certain correct O-rings are in place.
	2. Air leakage from filter cover	2. Service filter
	3. Air leakage from pressure gauge	3. Remove gauge, clean threads, apply hydraulic sealant to threads and replace
	4. Air leakage from orifice	4. Replace orifice
Erratic operation	1. Circuit board leads are loose	1. Tighten circuit board leads
	2. Orifice is plugged	2. Replace orifice
	3. Pressure modulator adjusted improperly	3. Adjust pressure modulator
	4. Circuit board is defective	4. Replace circuit board



## NT 3000 Model Numbers

Selection	Option	Code	Example
			NT
<b>Series/Prefix</b>	3000 Series	3	<b>3</b>
<b>Communications</b>	4-20 mA	0	<b>0</b>
<b>Diagnostics</b>	None	0	<b>0</b>
<b>Material</b>	Aluminum	0	<b>0</b>
	Stainless Steel	1	
<b>Certification</b>	Intrinsically Safe ATEX II 1 G D, Ex ia, Ex iaD, IP66	04	<b>04</b>
	I/P 4-20 mA ANZEx Exd IIB+H2 T6, Ex ia IIC T4/T5, Ex n IIC T6	05	
	Flameproof, ATEX II 2 G D, Ex d, Ex tD, IP 66	07	
	I/P 4-20 mA Exp proof/intrinsically safe FM/GSA	10	
	I/P 4-20 mA General purpose	14	
	Intrinsically Safe ATEX II 1 G D, Ex ia, Ex iaD, IP66 Flameproof, ATEX II 2 G D, Ex d, Ex tD, IP 66	28	
<b>Gauges (qty / material / units of measure)</b>	(1) / Stainless steel gauges with brass fittings / psi bar kPa	2	<b>2</b>
	(1) / Stainless steel gauges with Stainless steel fittings / psi bar kPa	4	
	(1) / Stainless steel gauges with brass fittings / kg cm <sup>2</sup> psi	6	
	(1) / Stainless steel gauges with Stainless steel fittings / kg cm <sup>2</sup> psi	8	
	No gauges (Stainless steel plugs)	9	
<b>Soft Goods / Temperature</b>	(Standard) Buna-N, Fluorosilicone / -40° to +185°F (-40° to +85°C)	S	<b>S</b>
	Viton / -20° to +185°F (-29° to +85°C)	V	
	EPDM / -40° to +185°F (-40° to +85°C)	E	
<b>Conduit Connection</b>	½" NPT	N	<b>N</b>
	M20	M	
<b>Vent</b>	Non-Vented	1	<b>1</b>
	Vented	2	
<b>Paint</b>	White	W	<b>W</b>
	Black	B	
	Food Grade	F	
	No paint (Stainless steel)	S	

## Adjusting the Minimum Pressure Cutoff Feature on Old Transducers

Older models of the NT 3000 Transducer have a “Minimum Pressure Cutoff” feature. This allows the user to set a trip-point to activate when the input signal falls below a certain point. This results in the pressure output falling rapidly to approximately 2.0 psi, causing the valve to close on an air-to-open valve. This feature is generally used when the service requires a tight shutoff or to prevent throttling near the valve seat. To adjust this feature, refer to Figure 12 and perform the following steps:

**NOTE:** The zero and span settings of both the positioner and NT 3000 transducer should be verified to be accurate before the minimum pressure cutoff feature is enabled and adjusted. Instructions for setting the zero and span settings are described in the calibration section on Page 4.

**NOTE:** Complete the following steps only when using the minimum pressure cutoff feature.

1. Connect the NT 3000 transducer to the 30 to 150 psi air supply pressure.
2. Remove the NT 3000 transducer housing cover.
  - o **WARNING: Disconnect I/P module power before removing housing cover in explosive atmospheres; otherwise personal injury may occur.**
3. Connect an adjustable current source to the terminal block on the circuit board. Apply the desired input signal to the positioner at which the output pressure is to fall to approximately 2.0 psi.

This signal can range from the factory setting of 3.7 to 8 mA. See Figure 11.

4. Turn the minimum pressure cutoff pot clockwise until the output pressure drops off.
5. Fine-tune the pressure drop-off point by increasing the input signal and then decreasing it through the desired shut off signal. Observe the signal value at which the pressure drops off. If the pressure drops off at a lower mA signal than desired, turn the MPC pot slightly clockwise. If the pressure drops off at a higher signal than desired, turn the MPC pot slightly counterclockwise.
6. Repeat step 5 until the pressure drops off at the desired input signal.
7. To disable the MPC feature turn the minimum pressure cutoff pot (marked “MPC”) 20 turns counterclockwise or until it makes a clicking noise.

Figure 11 – I/P Minimum Pressure Cutoff Adjustment Range

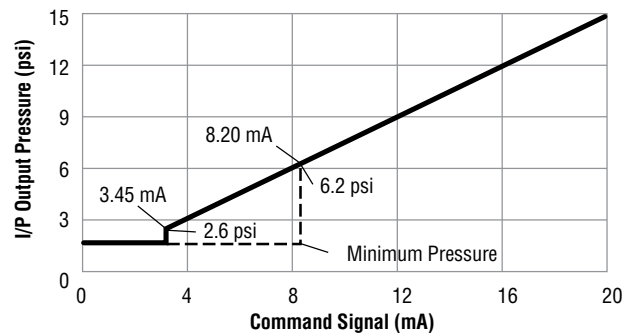
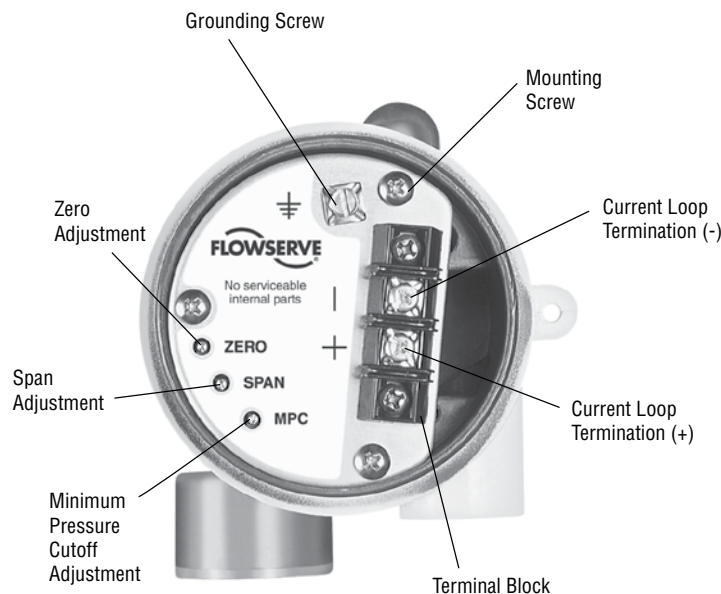


Figure 12 – Old Style NT 3000 Transducer Circuit Board (housing cover removed)





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