SERIES 637 ADJUSTABLE RANGE PRESSURE TRANSMITTER

Specifications – Installation and Operating Instructions

The Series 637 all stainless steel pressure transmitters feature zero and span adjustments, 5:1 pressure range turndown, 4-20 mA output and ±0.25% of full span accuracy. They are Factory Mutual approved for intrinsically safe apparatus and explosion-proof service in hazardous locations. They also meet NACE standards for offshore applications.

The small size and light weight eliminate the need for bulky mounting hardware and mechanical supports. A lightweight mounting bracket may be all that is required for installation. The integral junction box permits simple field wiring without the need for additional hardware, adding to the speed and ease of installation.

A 4-20 mA output signal is standard with a 12-40 VDC power supply. With all 316 stainless steel welded construction, the Series 637 Transmitters are compatible with corrosive media and hazardous environments.

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>STOCK RANGE, PSI</th>
<th>MINIMUM RANGE, PSI</th>
<th>STOCK RANGE, BAR</th>
<th>MINIMUM RANGE, BAR</th>
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<tbody>
<tr>
<td>637-0</td>
<td>0-15</td>
<td>0-3</td>
<td>0-1</td>
<td>0-0.2</td>
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<td>637-1</td>
<td>0-30</td>
<td>0-6</td>
<td>0-2</td>
<td>0-0.4</td>
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<td>637-2</td>
<td>0-100</td>
<td>0-20</td>
<td>0-7</td>
<td>0-1.4</td>
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<td>637-3</td>
<td>0-300</td>
<td>0-60</td>
<td>0-20</td>
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</table>

FACTORY MUTUAL APPROVALS

FM approved as intrinsically safe for Class I, II & III, Division 1, Groups A, B, C, D, E, F & G for Hazardous Locations per Fig. F.

FM approved as explosion-proof for Class I, Div. 1, Groups B, C & D. Dust-ignition proof for Class II, Div. 1, Groups E & G and suitable for Class III, Div. 1; Hazardous Locations, NEMA 4 enclosure. Conduit seal must be within 18 inches (45 cm) of transmitter.

SPECIFICATIONS

Service: Liquid, gas or vapors
Range Limits: See chart
Output: 4-20 mA DC, limited to 30 mA DC
Power Supply: 12-40 VDC with reverse polarity protection
Loop Resistance: 1400 ohms maximum @ 40 volts DC
Zero Adjust: ±10%
Span Adjust: ±10%
Turndown: 5:1
Temperature Limits:
Electronics (ambient): −40 to 140°F (−40 to 60°C)
Process interface: −40 to 212°F (−40 to 100°C)
Storage: −40 to 212°F (−40 to 100°C)
Overrange: 300% upper range limit
Humidity Limits: 0-100% RH
Accuracy: ±0.25% of calibrated span including linearity, hysteresis and repeatability (BFSL)
Response Time: Time constant of 20 milliseconds
Stability: ±0.5% for six months
Temperature Effect (Includes zero and span)
Compensated: −20 to 180°F (-29 to 82°C)
Between 30 and 130°F (-1 to 54°C): ±1% of URL per 50°F (28°C)
Between −20 and 180°F (-29 to 82°C): ±1.5% of URL per 50°F (28°C)
Power Supply Effect: ±0.005% of full span per volt
Surge Protection: Standard
Vibration Effect: ±0.1% of URL for 3g to 200 Hz
Position Effect: 0.05%/90° tilt
Overrange Effect: ±0.15% FS per 300% of maximum range
Materials of Construction:
Process wetted parts: 316L stainless steel
Non-wetted parts: 316 stainless steel
Cast head: CF-8M (316 cast stainless steel)
“O” ring: Buna-N
Fill fluid: Dow Corning 200 silicone, standard
Process Connection: 1/2” NPT female
Electrical Connection: 1/2” NPT female
Weight: 1.67 lbs. (.76 kg.)

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PIPING
Transmitter mounting is shown in Figs. B-1 and B-2 of Fig. B. Conduit drain should be provided to prevent moisture buildup in the conduit compartment.

- Fig. B-3 shows a tee which can be used for calibration.
- Fig. B-4 shows a transmitter mounting with an elbow used to prevent sediment in the process from clogging the line.
- Fig. B-5 shows a transmitter mounting with an elbow used to eliminate trapped vapor.
- Fig. C shows steam piping diagrams.

WIRING
CAUTION: Power must be off while connections are made to the field terminals.

There are two field terminals, + signal and - signal, located on the terminal board in the field terminal compartment. The circuit is protected from reversed polarity.

To wire the transmitter to receiver and power supply:
1. Install wire between the negative terminal of the transmitter and the negative terminal of the power supply. See Fig. D.
2. Install wire between the positive terminal of the transmitter and the negative terminal of the receiver. See Fig. D.
3. Install wire between the positive terminals of the power supply and receiver. See Fig. D.
4. The field terminals will accept stripped wire leads from No. 14-22 AWG.
5. The transmitter is normally grounded. If the signal circuit must be grounded, use the ground position on terminal provided for this purpose. See Fig. D.

NOTE: In order to avoid "Ground Loop" conditions, there should be only one earth ground in a loop.

6. Seal wires entering the housing with sealing compound to prevent water from entering the field wiring compartment.

There are two test terminals (TP+ and TP-) located on the terminal board in the field wiring compartment. The terminals have the same output signal, (4-20 mA DC) as the signal terminals and are provided as an in-circuit monitor. See Fig. D.

NOTE: The cover must be closed tightly to ensure explosion-proof design and integrity.
**BARRIER REMARKS**

A. Installation of barrier shall be in accordance with the manufacturers instructions per Fig. F.

B. Barrier output terminals shall not be exposed without de-energizing all system electrical power.

C. Resistance from barrier to ground shall not exceed one ohm and non-hazardous location equipment associated with this system shall not employ or generate in excess of 250 V rms (360 volts peak).

D. Barrier Entity requirements are: $V_{max} = 36$ VDC, $I_{max} = 225$ mA, $C_l = 0.0126 \mu F$, $L_l = 0$.

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**Notes:**

1. Dwyer transmitter model numbers, approved classes, divisions and groups and manufacturers publication numbers cannot be added or deleted without approval by Factory Mutual.

2. To assure an intrinsically safe system, the Model 637 must be wired in accordance with the barrier manufacturers field wiring instructions.

3. Model 637 transmitters have been tested under the entity concept for selecting the barriers in an intrinsically safe system. Entity is a means by which any barrier approved by Factory Mutual for entity may be used with any transmitter approved for entity. The entity barrier/transmitter may be connected together and still maintain an intrinsically safe system as long as all the input and output parameters for each device are met.

**Transmitter Parameters (Single Barrier)**

- Maximum open circuit voltage ($V_{max}$) = 36 VDC, $V_{max} \geq V_{oc}$
- Maximum short circuit current ($I_{max}$) = 225 mA, $I_{max} \geq I_{sc}$
- Maximum unprotected inductance ($L_l$) = 0 mH
- Maximum unprotected capacitance ($C_l$) = 0.126 $\mu F$

**Transmitter Parameters (Dual Channel or 2 Single Channel Barriers)**

- $V_{max} = 36$ VDC, $V_{max} \geq V_t$
- $I_{max} = 225$ mA, $I_{max} \geq$ maximum I sc of barriers
- $L_l = 0$ mH, $L_l + L_{cable} \leq L_a$
- $C_l = 0.126 \mu F$, $C_l + C_{cable} \leq C_a$

4. Compliance with above notes is required to maintain FM approval.
ADJUSTMENTS
There are three adjustment potentiometers located in the Field Terminal compartment; zero, span and turndown.

Zero Adjustment (Z) Offsets due to elevation or suppression of approximately 10% of full span can be adjusted using the zero adjustment terminal (potentiometer).

Span Adjustment (S) Span can be adjusted approximately 10% of full span using the span adjustment terminal (potentiometer). The span adjustment is used as a fine span adjustment.

5:1 Turndown Adjustment (T) Range turndown of approximately 80% of full span can be achieved using the turndown (T) adjustment terminal. For example, a transmitter with a full span pressure range of 100 psi can be "turned down" to 20 psi and still produce a 4-20 mA output. The turndown adjustment is used as a coarse span adjustment.

CALIBRATION
Series 637 Transmitters are factory calibrated at maximum range and ambient temperatures unless otherwise indicated.

CAUTION – Power must be off while connections are made to field terminals.

Transmitter can be calibrated as shown in Fig. G which shows an in-system piping arrangement which includes a tee for calibration. The bleeder valve should be used to block the process.

CALIBRATION INSTRUMENT
NOTE: Calibration instrumentation should be five times the accuracy of the transmitter being calibrated.

The Series 637 Transmitter can be calibrated using an ammeter or voltmeter as shown in Fig. G. Use an ammeter with internal shunt impedance less than 10 ohms. An impedance greater than 10 ohms will produce erroneous readings. Use a voltmeter with a 10 ohm precision resistor connected as shown in Fig. G.

CALIBRATION PROCEDURE
The transmitter can be calibrated using the test terminals or field terminals. Outputs using an ammeter are in mA with a resolution of 0.01 mA. Outputs using a voltmeter and a 10 ohm resistor are in mV with a resolution of 0.1 mV.

With the system set up as shown in Fig. G, proceed with calibration as follows:
1. Apply 0 psi pressure to input.
2. Adjust zero (Z) pot to obtain 4 mA (40 mV) * output.
3. Apply full span pressure to input.
4. Adjust span (S) pot to obtain 20 mA (200 mV) * output.
5. Repeat steps 1 through 4 until output values of 4-20 mA or 40-200 mV are consistently produced.
6. If span being set differs from previous span by more than 10%, adjust turndown (T) pot prior to span pot and proceed to step 4.

*Using 10 ohm resistor as shown in Fig. G.

TROUBLESHOOTING
The Series 637 Pressure Transmitter is an all welded unit. There is no access to the electronic circuitry. The zero, span and turndown potentiometers are connected to shafts which are sealed by "O" rings. If turning shafts in either direction does not change output, proceed as follows:

With a small screwdriver under the head of the shaft, pry it upward slightly. Turn shaft with a slight downward pressure to re-engage it into potentiometer. If no output, check wires in terminal strip.

MAINTENANCE
Following final installation of the Series 637 Transmitter and its companion receiver, no routine maintenance is required. A periodic check of zero and span following the procedure under Calibration is recommended. If unit needs repair, return it to the factory, freight prepaid. Be sure to include a clear description of the problem plus any application information available.