

Type 2000 Transducer Product Instructions

The Type 2000 is an electro-pneumatic device that regulates an unregulated supply pressure down to an electronically-controlled output pressure. There are two models of the Type 2000. The S is the standard model. The E is the Explosion Proof model. The S Model has one of the following electrical connections: Conduit, Hirschmann, or Terminal Block; while the E Model has conduit only. Both models can have pneumatic ports (supply and output) which are either through-ported (the standard) or bottom-ported (Manifold-Mount versions only).

MOUNTING INSTRUCTIONS

DIRECT MOUNTING

PIPE: The Type 2000 may be supported by its own plumbing (air supply and output). Transducers with 1/2" or 20mm electrical conduit connector may be supported with conduit.

PANEL: The Type 2000 may be mounted to a panel with two No. 10-32 screws using threaded holes in the back of a transducer, or with two to four No. 8-32 screws using threaded holes in the bottom of the transducer.

MOUNTING KITS

PANEL MOUNTING KIT, Part No. 010-135-000

This kit is supplied with every S-Model Type 2000. A bracket (supplied) attaches to the transducer with two No. 10-32 screws (supplied) using threaded holes in the back of the transducer, or with two to four No. 8-32 screws (supplied) using threaded holes in the bottom of the transducer. The four attachment clearance holes in the bracket are offset to one side of the bracket. In the case of back mounting, this allows for four different offset positions of the bracket relative to the transducer with a 1.00 inch range. In the case of bottom mounting, this allows for six different offset positions of the bracket relative to the transducer with a 1.75 inches range. The bracket has four mounting clearance holes for No. 10 screws.

VALVE MOUNTING KIT, Part No. 010-134-000

This kit can be used to mount transducers to a valve or to a panel. It is supplied with every E-Model Type 2000, and is an accessory for the S-Model. The bracket (supplied) attaches to an E-Model Type 2000 with two No. 10-32 screws (supplied) using threaded holes in the back of the transducer. The bracket has four attachment clearance holes so that the bracket can have four different orientations, in 90 degree increments. Two slotted holes in the bracket for 5/16" (maximum) bolts are for mounting to valve or panel. The bracket can also be used to mount the S-model Type 2000 with two No. 10-32 screws (supplied) using threaded holes in the back of a transducer or with two No. 8-32 screws (supplied) using threaded holes in the bottom of the transducer. The bracket has four attachment clearance holes. In case of back mounting, this allows for four different orientations of the bracket relative to the transducer, in 90 degree increments. In case of bottom mounting, this allows for two patterns of four different orientations of the bracket relative to the transducer, in 90 degree increments within each pattern and .75 inch offset between the two patterns. Two slotted holes in the bracket for 5/16" (maximum) bolts are for mounting to valve or panel. A spacer (supplied) should be used between the bracket and the transducer if the transducer will be mounted to a pipe using a 2.0" PIPE MOUNTING KIT.

2" PIPE MOUNTING KIT, Part No. 010-143-000

NOTE: Pipe of 2 inches nominal size has O.D. of 2.375 inches.

The Type 2000 MUST have a valve mounting bracket (with a spacer) attached to it prior to mounting to a pipe. A pipe is clamped between the pipe clamp (supplied) and the clamp saddle (supplied) using one 5/16-18 nut (supplied) on each end of the pipe clamp. The slotted mounting holes of the valve mounting bracket are placed over the threaded ends of the pipe clamp, followed by a washer (supplied) and a lock washer (supplied) on each end, and secured to it with the other two 5/16-18 nuts (supplied).

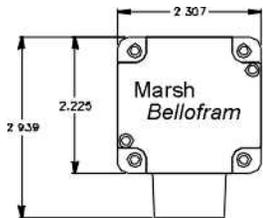
Warranties of Sale, disclaimer thereof and limitations of liability are covered exclusively by Marsh Bellofram's printed warranty statement for the Type 2000 transducer. These instructions do not expand, reduce, modify or alter Marsh Bellofram's warranty statement and no warranty or remedy in favor of a customer or any other person arises out of these instructions.

DIN RAIL MOUNTING KIT, Part No. 010-115-000

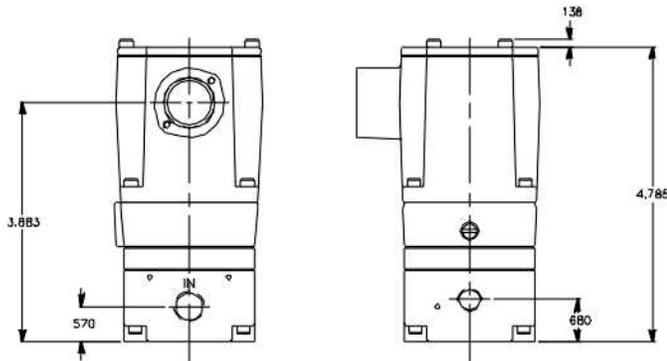
A rail guide (supplied) is attached to the bottom of a transducer with four No. 8-32 screws (supplied) using threaded holes in the bottom of a transducer.

The rail guide is designed for mounting to NS32 rails in accordance with DIN EN50035 and NS35/15 rails in accordance with DIN EN50022.

Mounting Options		
Mounting Method	Intrinsically-Safe (S) Model	Explosion-Proof (E) Model
In-Line	Yes	Yes
Direct Mounting	Side or Bottom Holes	Side or Bottom Holes
Bracket Mounting		
Panel	Supplied	Accessory
Valve	Accessory	Supplied
Pipe	Accessory (Valve Kit Required)	Accessory (Valve Kit Required)
DIN-rail	Accessory	Accessory
Manifold Mounting	Accessory (bottom-ported units only)	Accessory (bottom-ported units only)



S Model with Conduit Connector



Other Dimensional Drawings

(To be included at a later date)

Type 2000 S Model with Terminal Block connection

Type 2000 S Model with Hirschmann connection

Type 2000 E Model

Type 2000 Side Mounting Holes

Type 2000 Bottom Mounting Holes

Type 2000 Manifold-Mount (Bottom-View)

Panel Bracket

Pipe Bracket

Valve Bracket

DIN-rail bracket

Manifold Kit

PNEUMATIC INSTALLATION

Warning

In order to get optimal service from this transducer the following is recommended. The supply air quality to this instrument should be instrument quality air as defined by ISA Standard 57.0.01-1996.

1. Dew point not higher than 35°F.
2. No particulates larger than 3 microns in size.
3. Maximum oil content of 1 ppm.

AIR CONNECTIONS

SUPPLY: Connect air supply to the port marked "IN". The Supply pressure must be **at least 5 PSI** above maximum output up to 140 PSI. Low pressure models, with an output pressure less than 15 PSI have a 20 PSI minimum supply pressure.

OUTPUT: Connect output to the port marked "OUT".

GAUGE: The plugged 1/8" NPT port in the base of the transducer is internally connected with the "OUT" port. A pressure gauge can be attached to this port to monitor the output pressure.

Electrical Installation

WARNING: In explosive atmospheres, electrical power must be removed from the transducer before attempting to remove the cover and until the cover is fully reinstalled. Failure to do so may result in electrical spark and/or explosion. Never install or remove electrical lines when electrical power is present.

Caution: User calibration of the Type 2000 is limited to adjustment of onboard potentiometers, jumpers, and switches.

Note: The E/P (voltage input) version of the Type 2000 requires a source of power between 5 and 24 VDC in addition to the electrical command signal. The I/P (current input) version is completely powered by the electrical command signal.

Conduit Connector (1/2"NPT or 20mm): Remove the cover (see WARNING above). Bring wiring to the terminal block, located on the circuit board, through the electrical port. (See Table 1 Internal Wiring Connections), 18 A.W.G. is recommended. Reinstall the cover tightly using all screws, gaskets, and o-rings to insure compliance with Agency Approvals. Connect the Type 2000 to the electrical conduit.

Table 1 Internal Wiring Connections

INTERNAL TERMINAL BLOCK*	I / P MODE	E / P MODE
(S)	NOT USED	(+) SIGNAL
(+)	(+) SIGNAL	(+) SUPPLY (5 to 24) VDC
(-)	(-) SIGNAL	GROUND FOR SIGNAL & SUPPLY
INTERNAL GREEN EARTH GROUND SCREW	CONNECT TO EARTH GROUND	CONNECT TO EARTH GROUND

*The S, +, and – terminals are clearly identified on the circuit board next to the internal terminal block.

Hirschmann Connector: The Hirschmann male connector comes attached to the Transducer, and is completely wired. The female portion must be wired so the pins correspond to the numbers on the male. The earth grounding connection is provided on all units for use in increasing operator safety and immunity to electrostatic discharge. The ground pin is distinct with it's flat blade. Connect input power cable wires to the female connector pins so that pin locations will match the male locations as outlined in Table 2. Place the rubber gasket between the two connectors before plugging together. Tighten the center screw that holds the two connectors together. This completes the assembly.

Table 2 Hirshmann Connection

Hirschmann Pin Location	I/P MODE	E/P MODE
1	NOT USED	(+) SIGNAL
2	(+) SIGNAL	(+) SUPPLY (5 to 24) VDC
3	(-) SIGNAL	COMMON GROUND SIGNAL & SUPPLY
GND.	EARTH GND.	EARTH GND

Terminal Block Connector: The Terminal Block Connector comes attached to the Transducer, and is completely wired. Connect input wiring to the terminal block as shown in Table 3. 18 A.W.G. is recommended; The earth grounding connection is provided on all units for use in increasing operator safety and immunity to electrostatic discharge.

Table 3 External Wiring Connections

EXTERNAL TERMINAL BLOCK	I / P MODE	E / P MODE
(S)	NOT USED	(+) SIGNAL
(+)	(+) SIGNAL	(+) SUPPLY
(-)	(-) SIGNAL	GROUND FOR SIGNAL & SUPPLY
GND.	EARTH GND.	EARTH GND

PRECAUTIONS TO BE OBSERVED DURING INSTALLATION



The Type 2000 was tested in the EMC Lab at Marsh Bellofram, Newell, WV 26050 to the Electromagnetic Compatibility Directive effective January 1, 1996. The relevant EMC specifications tested were the following: EN 50081-1 (1992) and EN 50082-2 (1992). A Technical Construction File, Serial #109 was written and a Declaration of Conformity provided by Marsh Bellofram.

EN 50081-1 (1992): Test results confirmed that no precautions need to be observed during installation regarding electromagnetic emissions from the Type 2000 Transducers.

EN 50082-2 (1992): The following precautions should be taken during installation to maintain the advertised accuracy specifications for the T-2000 Transducers. The input wiring to the transducer should be isolated from other high voltage transient wiring. The momentary switching on and off of nearby relays, motors, or other high capacitive or inductive loads can have a minor effect on the accuracy specification (0.25% of Span) for the T-2000. Any change in output pressure is minimal and momentarily, and is considered to be within the performance capabilities of the T-2000. Use of a wiring conduit is required to achieve +/- 1% accuracy at all frequencies.

CALIBRATION ADJUSTMENTS

Remove the cover to gain access to the four potentiometers. **NOTE:** The "COURSE" zero potentiometer is for major adjustment of the unit's zero setting. This becomes necessary when the output pressure range is changed from the factory calibration.

For minor adjustments in the output pressure, "SPAN", and "FINE" (fine zero), are used. Set electrical input signal to 0% (e.g. 4 mA or 0 VDC).

FORWARD ACTING UNITS: Using the "FINE" potentiometer, adjust output pressure to 0% output (e.g. 3 PSI).

FORWARD ACTING UNITS: Using the "SPAN" potentiometer, adjust output pressure to 100% output (e.g. 15 PSI).

REVERSE ACTING UNITS: Using the "FINE" potentiometer, adjust output pressure to 100% output (e.g. 15 PSI).
Set electrical input signal to 100% (e.g. 20 mA or 10 VDC).

REVERSE ACTING UNITS: Using the "SPAN" potentiometer, adjust output pressure to 0% output (e.g. 3 PSI).

Repeat the 0% and 100% input steps until output pressures are properly set. Reinstall cover using original screws, gaskets, and o-rings.

NOTE: Under certain circumstances, output pressure may exhibit cycling action. To eliminate this condition, use the "GAIN" potentiometer. Turn the "GAIN" potentiometer clockwise to eliminate cycling and counter-clockwise to improve response time.

ELECTRICAL MAINTENANCE

A skilled technician must isolate an electrical problem. The electrical signal (and power if an E/P unit) should be verified first. Circuit board failures are very rare, and can be confirmed by the following method. Remove the Type 2000 to a non-hazardous area. Unscrew the dark gray enclosure from the light gray housing, pulling them apart just enough to disconnect the piezo actuator from the 3-pin header on the bottom of the enclosure. The enclosure and housing can be fully separated. Apply a typical electrical signal (and power for E/P units) to the transducer, and measure the voltage across the outer pins on the 3-pin header. This voltage should be approximately 200VDC. If it is not, contact Marsh Bellofram for a Return Authorization #.

INPUT AND OUTPUT DIP SWITCH SETTINGS

On	0-5 psi 0-15 psi 3-15 psi 1-17 psi 0-30 psi 3-27 psi 6-30 psi 0-100 psi	1-5 VDC 0-5 VDC	Split low	E/P Voltage Input (E/P)	Full Split Low	0-5 psi 0-15 psi 1-17 psi 0-30 psi 0-60 psi 0-100 psi 0-120 psi	Reverse Acting	Full	I/P
Switch	1*	2	3	4	5	6	7	8	9
Off	0-60 psi 0-120 psi	1-9 VDC 1-10 VDC 0-10 VDC 4-20mA	Full Split High	I/P Current Input (I/P)	Split High	3-15 psi 3-27 psi 6-30 psi	Direct Acting	Split Low Split High	E/P

IMPORTANT:* The Type 2000's output pressure can only be switched to other settings within the range of the onboard sensor. The 0-5 PSI unit has a 5 PSI sensor; the 0-15, 3-15, and 1-17 PSI units have a 15 PSI sensor; the 0-30, 3-27, and 6-30 PSI units have a 30 PSI sensor; the 0-60psi unit has a 50 PSI sensor; and the 0-100 and 0-120 PSI units have a 100 PSI sensor.

PNEUMATIC MAINTENANCE

All Type 2000 transducers also have an internal orifice filter, but if contaminants do invade the transducer, they can clog the internal orifice, or jam open the internal supply valve. The problem can be corrected through replacement of the orifice, by cleaning the internal supply valve, or both.

REPLACING ORIFICE

This can be accomplished without removing the unit from its mounting or plumbing. Turn off supply pressure and unscrew the brass orifice assembly located on the side of the housing with the gauge port. The small sealing o-ring may remain inside of the housing. If it does, remove it with a paper clip or other small probe. The replacement assembly will contain this o-ring. Install the new orifice assembly making sure the o-ring is seated on the end of the screw.

CLEANING INTERNAL SUPPLY VALVE

1. Turn off the supply pressure.
2. Use a 9/16" socket or wrench to unscrew the brass plug in the bottom of the transducer.
3. Take care not to lose the supply valve spring which is retained by the bottom plug.
4. Clean out any dirt or debris and reassemble, making sure the stem of the supply valve is nested in the supply valve spring.

Hazardous Area & Usage Classification

NEMA 4X: Approved per Factory Mutual (water tight, dust tight, and corrosion resistant).

IP66: Approved per BASEEFA. (NEMA 4X & IP66 not available on terminal block models)

EXPLOSION PROOF (E MODEL ONLY): Pending approval for: Class I, Div. I & 2, Groups A thru D; Class II, Div. I & 2, Groups E thru G; and Class III.

INTRINSIC SAFETY: CONDUIT AND DIN 43650 MODELS Factory Mutual for Class I, II, III, Div. I, Groups A thru G when installed per control dwg 990-438-000 Nonincendive: Class I, Div. 2, Groups A thru D. Suitable For Class II, and III, Div. 2, Groups F & G indoor & outdoor Type 4X hazardous (classified) locations. Temp. code T4; max ambient 60°C. Max nonincendive operating parameters: 25 vdc and 50 mA

TERMINAL BLOCK MODEL: Factory Mutual for Class I, Div. I, Groups A thru D when installed per drawing 990-438-000. Nonincendive: Class I, Div. II, Groups A thru D. Hazardous (classified) locations Temp. code T4; Max ambient 60°C. Max nonincendive operating parameters: 25 vdc and 50 mA

INTRINSIC SAFETY: ALL MODELS BASEEFA to the ATEX Directive per the following:

 (Conduit connector only): EN 50081-1 Residential, commercial & light industry; EN-50082-2 Heavy Industrial

  
 EEx ia IIC T4
 (-20°C<Ta<+60°C)
 Ui=30V Ii=200mA Pi=1W


 APPROVED