



Transbridge TBM4M

Transducer Amplifier Manifold

www.wpiinc.com

INSTRUCTION MANUAL

Serial No. _____

100708



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DECLARATION OF CONFORMITY

We: World Precision Instruments, Inc.
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as the manufacturers of the apparatus listed, declare under sole responsibility that the product(s):

Title: TBM4M (containing 4 standard impedance channels)

to which this declaration relates is/are in conformity with the following standards or other normative documents:

Safety: EN 61010-1:1993 (IEC 1010-1:1990)

EMC: EN 50081-1:1992
EN 50082-1:1992

and therefore conform(s) with the protection requirements of Council Directive 89/336/EEC relating to electromagnetic compatibility and Council Directive 73/23/EEC relating to safety requirements.

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Warranty

WPI (World Precision Instruments, Inc.) warrants to the original purchaser that this equipment, including its components and parts, shall be free from defects in material and workmanship for a period of one year* from the date of receipt. WPI's obligation under this warranty shall be limited to repair or replacement, at WPI's option, of the equipment or defective components or parts upon receipt thereof f.o.b. WPI, Sarasota, Florida U.S.A. Return of a repaired instrument shall be f.o.b. Sarasota.

The above warranty is contingent upon normal usage and does not cover products which have been modified without WPI's approval or which have been subjected to unusual physical or electrical stress or on which the original identification marks have been removed or altered. The above warranty will not apply if adjustment, repair or parts replacement is required because of accident, neglect, misuse, failure of electric power, air conditioning, humidity control, or causes other than normal and ordinary usage.

To the extent that any of its equipment is furnished by a manufacturer other than WPI, the foregoing warranty shall be applicable only to the extent of the warranty furnished by such other manufacturer. This warranty will not apply to appearance terms, such as knobs, handles, dials or the like.

WPI makes no warranty of any kind, express or implied or statutory, including without limitation any warranties of merchantability and/or fitness for a particular purpose. WPI shall not be liable for any damages, whether direct, indirect, special or consequential arising from a failure of this product to operate in the manner desired by the user. WPI shall not be liable for any damage to data or property that may be caused directly or indirectly by use of this product.

Claims and Returns

- Inspect all shipments upon receipt. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed loss or damage should be reported at once to the carrier and an inspection requested. All claims for shortage or damage must be made within 10 days after receipt of shipment. Claims for lost shipments must be made within 30 days of invoice or other notification of shipment. Please save damaged or pilfered cartons until claim settles. In some instances, photographic documentation may be required. Some items are time sensitive; WPI assumes no extended warranty or any liability for use beyond the date specified on the container.
- WPI cannot be held responsible for items damaged in shipment en route to us. Please enclose merchandise in its original shipping container to avoid damage from handling. We recommend that you insure merchandise when shipping. The customer is responsible for paying shipping expenses including adequate insurance on all items returned.
- Do not return any goods to WPI without obtaining prior approval and instructions (RMA#) from our returns department. Goods returned unauthorized or by collect freight may be refused. The RMA# must be clearly displayed on the outside of the box, or the package will not be accepted. Please contact the RMA department for a request form.
- Goods returned for repair must be reasonably clean and free of hazardous materials.
- A handling fee is charged for goods returned for exchange or credit. This fee may add up to 25% of the sale price depending on the condition of the item. Goods ordered in error are also subject to the handling fee.
- Equipment which was built as a special order cannot be returned.
- Always refer to the RMA# when contacting WPI to obtain a status of your returned item.
- For any other issues regarding a claim or return, please contact the RMA department.

Warning: This equipment is not designed or intended for use on humans.

** Electrodes, batteries and other consumable parts are warranted for 30 days only from the date on which the customer receives these items.*

approximately 5 mV per mm Hg. Since the nominal rating of 5 mV per volt is usually not exact, the user must, in the end, calibrate the transducer with a known hydrostatic pressure to obtain an accurate conversion factor. (WPI's model **PM015** Pressure Monitor/ Calibrator is a suitable hydrostatic pressure calibration device.)

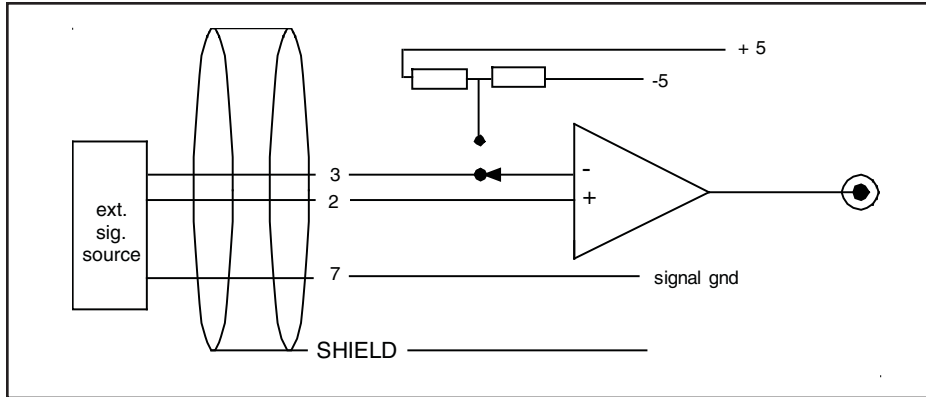


Figure 3 – Transbridge connected to an external signal source

General Amplification

For transducer types other than resistive bridges, such as active transistor circuits, magnetic, photocell or piezoelectric devices, the instrument's differential amplifiers may still be used for signal amplification in differential and single ended modes. Note particularly when using Transbridge's amplifiers that pin 7, instrument ground, must be connected to the circuit ground of the input source to achieve effective amplification. Note that careful shielding of signal generating devices will result in lower noise "pick-up" by the signal input wiring.

Notes

Fuses: Safety fuses (including one spare fuse) are installed in the rear power connector assembly. The correct replacement fuse for 110-volt operation is 1/8-ampere, fast blow; use a 1/16-ampere fuse for 220-volt operation.

Four spare 8-pin DIN transducer plugs are provided with each Transbridge to allow the user to rewire transducers other than those manufactured by WPI to access the front panel receptacles.

Introduction

Transbridge, a four-channel analog transducer manifold, is specifically designed to amplify the output voltage signal from transducers of pressure, force, displacement, temperature and a wide variety of other signal sources. Analog output signals available from each channel can be recorded on magnetic tape, displayed on an oscilloscope or applied to the input of a multi-channel data acquirer for signal processing in a digital computer.

Each channel contains: a regulated DC power supply, 10 volts (+ 5 and - 5 volts with respect to signal ground) to provide DC power to transducers and a precision differential amplifier with selectable voltage amplification and variable position adjustment control.

Specifications

Channels 1, 2, 3, 4:

- Voltage Amplification..... $\times 1, \times 10, \times 100, \times 1000$
- Voltage Offset Adjustment..... ± 150 mV
- Output Voltage Swing ± 10 volts
- Maximum Transducer Current 0.2A
- Input Impedance, each input..... 100 kW // .01 mF
- Transducer Applied Volts..... 10 V DC (± 5 V) approx.
- Bandwidth, small signal..... 300 kHz ($\times 1$), 30 kHz ($\times 10$), 3 kHz ($\times 100$),
0.3 kHz ($\times 1000$)

Operation

Transducers can be connected to Transbridge via any of the 8-pin connectors on the front panel. Four spare 8-pin DIN plugs are provided with each instrument to allow the user to rewire the cables of commercially available transducers to connect them to model TBM4M (Fig. 1).

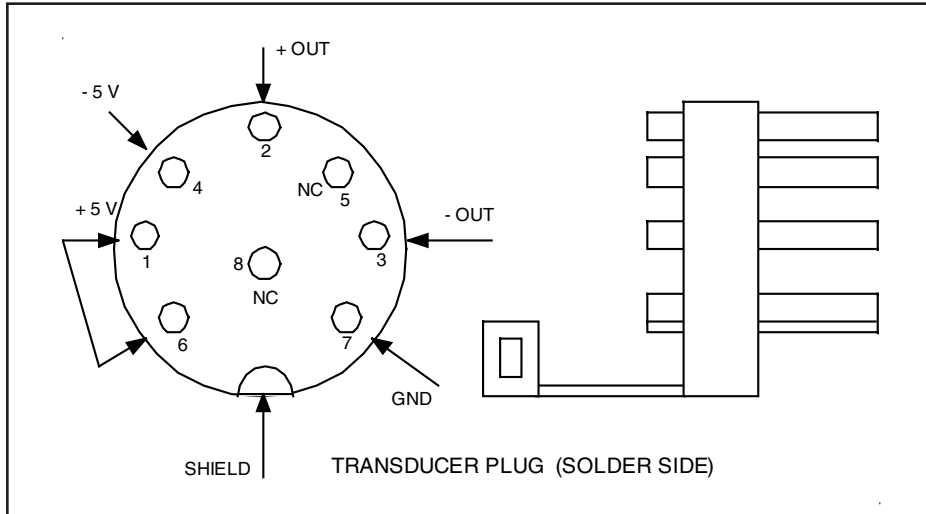


Figure 1 – Transducer input plug terminal configuration.

Positioning the Output to Zero

Insert the transducer plug into any of the four input connectors. Switch the gain for the channel being used to $\times 10$ and set the Bridge switch to Diff. Turn on the power switch located on the rear of the instrument cabinet. One or both of the two red Output Level indicator lamps above the transducer input connector will light if a transducer is plugged into the appropriate connector on the front panel. Output coaxial connectors for all channels are located on the rear panel of the instrument. If the “low” lamp is lit, the output voltage level is minus. If the “high” lamp is lit, the output voltage level is positive. To bring the output voltage level to nearly zero volts, adjust the Position Adjust knob above the Gain switch so that both lamps are lit together. A significant increase in the sharpness or resolution of the zero adjustment may be achieved by increasing the gain to $\times 100$. The position adjustment may be locked by a clockwise rotation of the concentric sleeve on the Pos Adj knob.

Bridge Switch

Many transducers configured as Wheatstone bridges with four resistive elements will directly access the differential amplifier, as represented in Figure 2. When the Bridge switch is in the Diff position, both inputs of the differential amplifier, inverting and noninverting, are connected to the signal terminals of the transducer bridge. In Single Ended operation, the inverting input of the differential amplifier is connected to a variable reference potential leaving the non inverting input available to the signal source. In the Gnd position both the inverting and the non inverting inputs are connected to ground.

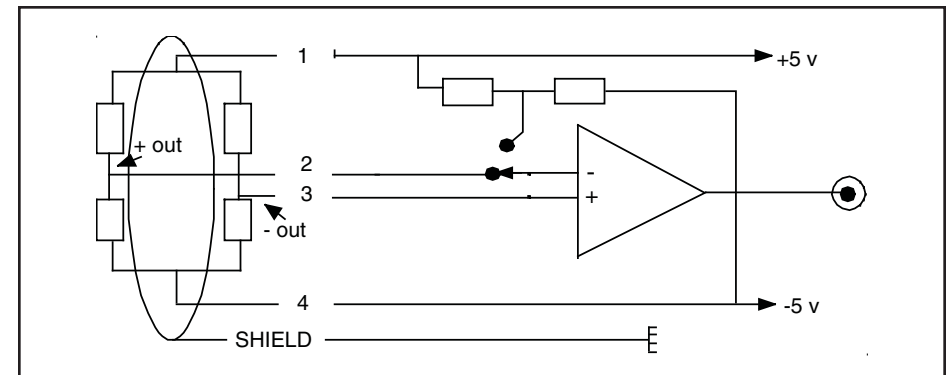


Figure 2

Transducer Calibration

Transbridge provides fixed and accurate decade amplification steps. Of most interest to the user, however, will be the conversion factor from the physical variable, for example grams, mm of Hg, mm of displacement, to output voltage of the channel. Since the transducer’s conversion factor is often not exactly known and varies with the voltage applied to the sensor (10 volts from Transbridge), it is therefore necessary for the user to calibrate the system using known forces, pressures or displacements to scale the output of Transbridge quantitatively with the original physical parameter being measured.

Example: A typical pressure transducer is nominally rated at 5 microvolts out per volt of excitation per mm of Hg. To compute the approximate output from Transbridge for this transducer . . .

$$5 \text{ mV/V} \cdot 10 \text{ V} \cdot \text{Amplification} = \text{Output mV per mm Hg}$$

Thus, if we had selected $\times 100$ Amplification, the Output per mm Hg would be