



WORLD
PRECISION
INSTRUMENTS

INSTRUCTION MANUAL

Transbridge TBM4M

Transducer Amplifier Manifold

Serial No. _____

www.wpiinc.com

111723

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ABOUT THIS MANUAL

The following symbols are used in this guide:



This symbol indicates a CAUTION. Cautions warn against actions that can cause damage to equipment. Please read these carefully.



This symbol indicates a WARNING. Warnings alert you to actions that can cause personal injury or pose a physical threat. Please read these carefully.

NOTES and TIPS contain helpful information.



Fig. 1—The TBM4M Transbridge amplifies the output voltage signal from transducers.

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 V (+ 5 and - 5 V 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.

Unpacking

Upon receipt of this instrument, make a thorough inspection of the contents and check for possible damage. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed damage should be reported at once to the carrier and an inspection requested. Please read the section entitled "Claims and Returns" on page 7 of this manual. Please contact WPI Customer Service if any parts are missing at 941.371.1003 or customerservice@wpiinc.com.

Returns: Do not return any goods to WPI without obtaining prior approval (RMA # required) and instructions from WPI's Returns Department. Goods returned (unauthorized) by collect freight may be refused. If a return shipment is necessary, use the original container, if possible. If the original container is not available, use a suitable substitute that is rigid and of adequate size. Wrap the instrument in paper or plastic surrounded with at least 100mm (four inches) of shock absorbing material. For further details, please read the section entitled "Claims and Returns" on page 7 of this manual.

OPERATING INSTRUCTIONS

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. 2).

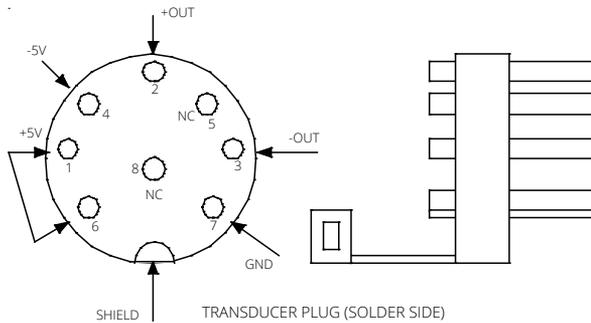


Fig. 2—Transducer input plug terminal configuration.

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 Fig. 3. When the Bridge switch is in the Diff position, both inputs of the differential amplifier, inverting and non-

inverting, 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.

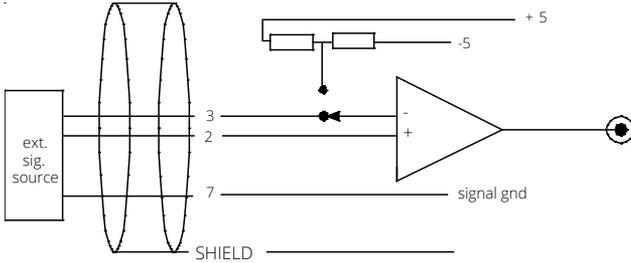


Fig. 3—Wheatstone bridges

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 V 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 μV out per V 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 x100 Amplification, the Output per mm Hg would be 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.)

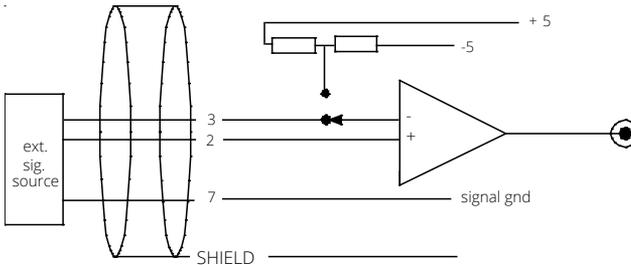


Fig. 4—Transbridge connected to an external signal source

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.

MAINTENANCE

Fuses

The correct replacement fuse for 110 V operation is 1/8 A, slow blow. Use a 1/16 A, slow blow fuse for 230 V operation.



WARNING: BEFORE ATTEMPTING FUSE REPLACEMENT, DISCONNECT THE INSTRUMENT FROM THE AC POWER SOURCE.

The instrument contains one fuse, located in the fuse holder on the back panel. If necessary, replace the fuse with the type and rating specified on the back panel. Verify that the fuse contained in the fuse holder matches the desired line voltage. A (Fig. 5).

1. Turn the main power switch off (I).
2. Unplug the power cord from the power cord socket on the back of the unit (Fig. 5).

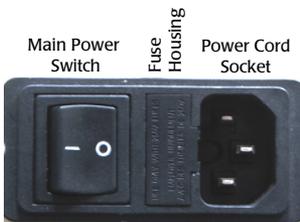


Fig. 5—Unplug the power cord to access the fuse housing release.

3. Insert a small flat blade screwdriver under the lip on the right side of the fuse housing cover (Fig. 6).



Fig. 6—Insert the screw driver under the fuse housing lip and pry the housing open.

4. Pull the fuse housing out as far as it will go and rotate it to the right. There is a catch to keep the housing from coming completely out (Fig. 7).



Fig. 7—Open the fuse housing and rotate it right to remove the fuse.

5. Remove the bad fuse. It is the one on the top. A spare fuse is stored in the bottom slot of the fuse housing.
6. Use the spare fuse provided to replace the bad fuse. Slide it into the top slot of the fuse housing.
7. Rotate the fuse housing and slide it back into position.
8. Reinstall the power cord.
9. Turn the power switch on to verify that the unit has power again.

Spare Plugs

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.

SPECIFICATIONS

This unit conforms to the following specifications for Channels 1, 2, 3 and 4:

| | |
|-----------------------------|---|
| Voltage Amplification | ×1, ×10, ×100, ×1000 |
| Voltage Offset Adjustment | ±150 mV |
| Output Voltage Swing | ±10 V |
| Maximum Transducer Current | 0.2 A |
| Input Impedance, each input | 100 kW/0.01 mF |
| Transducer Applied Volts | 10 V DC (± 5 V) approximately |
| Bandwidth, small signal | 1 MHz (×1), 80 kHz (×10), 10 kHz (×100), 1 kHz (×1000) |
| Fuse (Older models) | 120 V: 0.125 A, slow, 0.25 x 1.25" USA 230 V: 0.0625 A, slow, 0.25 x 1.25" USA |
| Fuse (2019 models) | 120 V: 0.125 A, slow, 5 x 20 mm metric 230 V: 0.0625 A, slow 5 x 20 mm metric |

DECLARATION OF CONFORMITY



WORLD PRECISION INSTRUMENTS, LLC.
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DECLARATION OF CONFORMITY CE

We: World Precision Instruments, Inc.
175 Sarasota Center Boulevard
Sarasota, FL 34240-9258, USA

as the manufacturer/distributor of the apparatus listed, declare under sole responsibility that the product(s):

TBM-4M

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

Low Voltage Directive (Safety) 2014/35/EU:

- EN 61010-1:2010+A1:2019

EMC Directive 2014/30/EU:

- EN IEC 61326-1:2021
- EN IEC 61326-2-3:2021
- EN IEC 61000-3-2:2019+A1:2021
- EN IEC 61000-3-3:2013+A2:2021

Issued On: December 13, 2022


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F-QC-006 Rev D

WARRANTY

WPI (World Precision Instruments) 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 ten (10) days after receipt of shipment. Claims for lost shipments must be made within thirty (30) days of receipt of invoice or other notification of shipment. Please save damaged or pilfered cartons until claim is settled. 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.

Do not return any goods to us without obtaining prior approval and instructions from our Returns Department. Goods returned (unauthorized) by collect freight may be refused. Goods accepted for restocking will be exchanged or credited to your WPI account. Goods returned which were ordered by customers in error are subject to a 25% restocking charge. Equipment which was built as a special order cannot be returned.

Repairs

Contact our Customer Service Department for assistance in the repair of apparatus. Do not return goods until instructions have been received. Returned items must be securely packed to prevent further damage in transit. The Customer is responsible for paying shipping expenses, including adequate insurance on all items returned for repairs. Identification of the item(s) by model number, name, as well as complete description of the difficulties experienced should be written on the repair purchase order and on a tag attached to the item.

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

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