

# ***TM0-2***

STAND ALONE / BENCH TOP  
AMPLIFIER / CONDITIONER MODULE

## OPERATORS MANUAL



Transducer  
Techniques®

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## DESCRIPTION

Model TM-2 is a complete differential amplifier/signal conditioner, powered by a standard 115 VAC line. The unit provides regulated excitation voltage, balance and gain controls and shunt calibration necessary to couple a bridge type transducer to an indicating instrument. Full scale output is specified at + or -10 volts. The TM-2 provides a floating shunt calibration circuit, which applies calibration at the transducer, thereby eliminating errors due to line losses. The TM-2 is supplied with a low pass filter, with the standard cut-off frequency set at 16 Hz (optional 160Hz or 1600Hz).

## FEATURES

### 1. INPUT TERMINAL BLOCK

TM-2 is wired for a standard 6 wire, single shunt transducer with shield. Positive and negative excitation voltage are fixed at approximately 4 volts with respect to ground or shield. Signal terminals are polarized to match transducer polarity. On a four wire transducer, the calibration terminals are floating and must be connected to the calibration circuit via jumpers (fig. 2).

### 2. OUTPUT TERMINAL BLOCK

Connects the TM-2 module to an indicating instrument (voltmeter). Terminals are coded V for voltage output, G for ground, and SH for shield.

### 3. BALANCE AND GAIN CONTROLS

Provide at least 10% balance adjustment and 67 to 737 times gain, via 10 turns potentiometers.

### 4. SHUNT CALIBRATION CIRCUIT

Connects the calibration resistor to the cal positions of the input terminal block, by depressing the calibration button.

### 5. POWER SWITCH

Allows turning on/off the main power supply. The Power lamp is lit when power is on.

## SET UP PROCEDURES

**CAUTION:** Before proceeding with the Set Up unplug the unit and make sure that output terminals V and G or SH are not shorted. Permanent damage to the unit can result when output is shorted to ground.

### METHOD 1: Shunt calibration with TTI transducers.

1. Connect transducer to input terminal block. For 6 wire transducer refer to fig.2 and for 4 wire transducer refer to fig.3. The following table can also be useful.

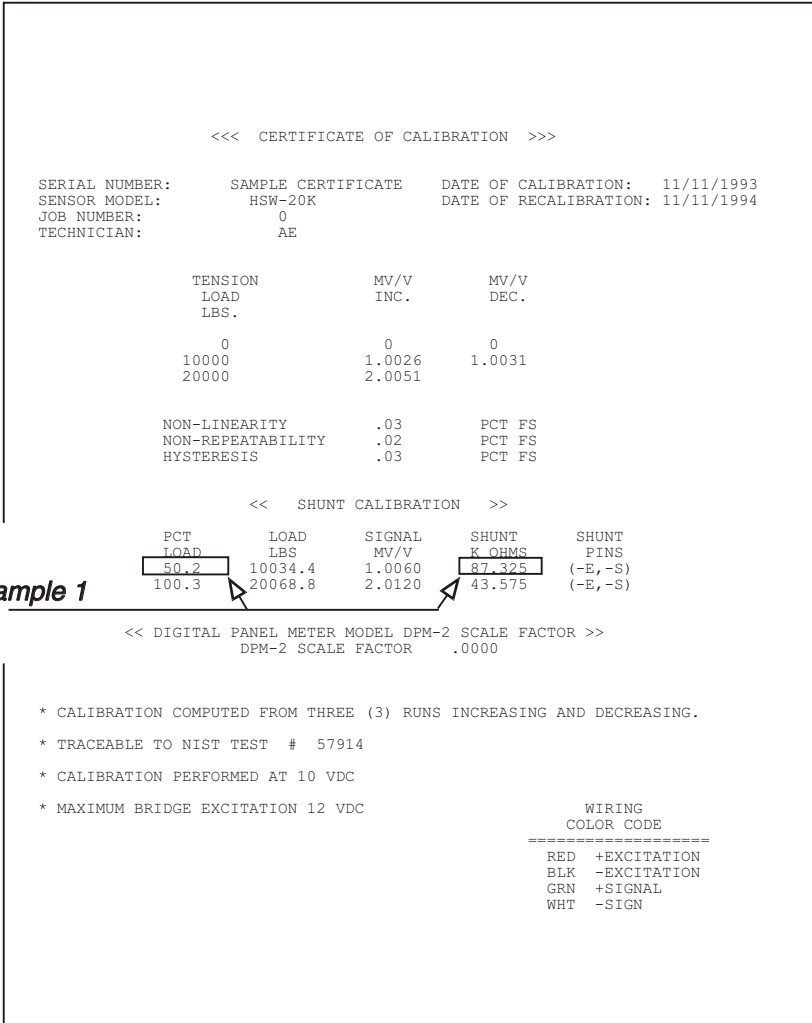
6 WIRE TRANSDUCER		TM-2	4 WIRE TRANSDUCER		TM-2
RED		EXC	RED		EXC
WHITE		-SIG	WHITE		-SIG
GREEN		SIG	GREEN		SIG
BLACK		-EXC	BLACK		-EXC
BLUE		CAL	SHIELD		SH
BROWN		CAL			
SHIELD		SH			

2. Connect a digital voltmeter to output terminals V and G, positive probe to V. (Set meter's range to 20 VDC or less, according to the number of counts needed for the application. For instance, if a load cell is used to weigh a 1000 pounds object, the most convenient range is 2.000 VDC for a 4.5 digit voltmeter, knowing that TM-2 module has a maximum 10 VDC output.)
3. Turn power switch off. Plug power cord to the unit and to a 115 VAC, 50 to 400 Hz power outlet. Turn power on and verify via power lamp. Allow 15 minute warm up.
4. Adjust balance potentiometer until the voltmeter displays zero (or close to zero for more than 4 digits).
5. Refer to the sample certificate of calibration, fig.1, example1 (typical to certificates of calibration supplied with TTI transducers). Multiply the percentage of load value (PCT LOAD) for a 87.325 kohm resistor by the desired full scale voltage output. Note that 10 VDC is the maximum output voltage for a 2 mV/V transducer.

Example: 10 VDC x 50.2 % = 5.02 VDC.

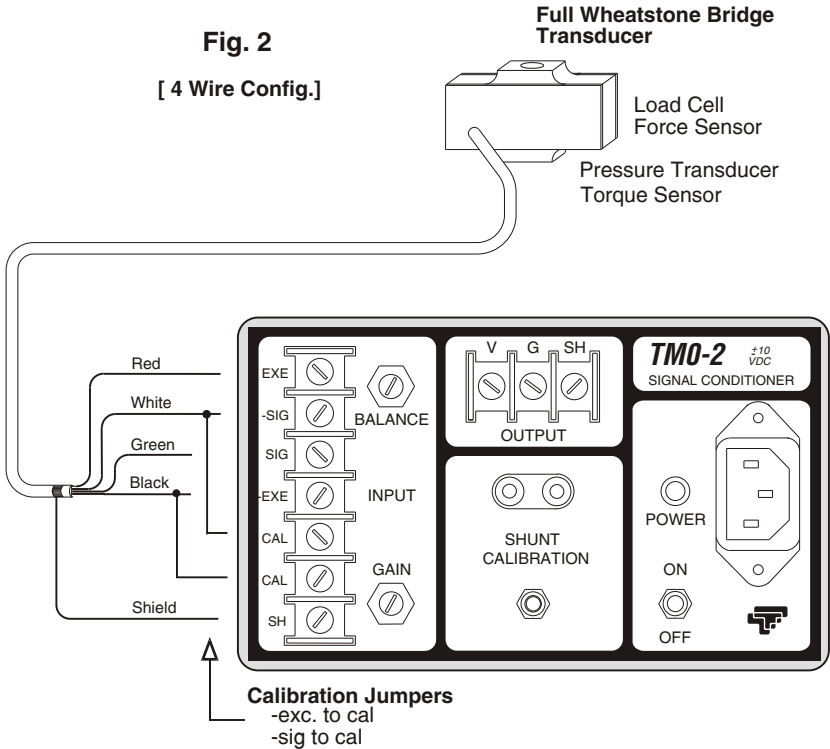
6. Activate the calibration circuit by depressing the calibration button. While holding the calibration button depressed, adjust the Gain potentiometer until the ampermeter displays the engineering units calculated in step 5. Example: 5.02 VDC. When complete, release calibration button.
7. Repeat step 4 if necessary.
8. Unit is calibrated, start application.

**Fig. 1**



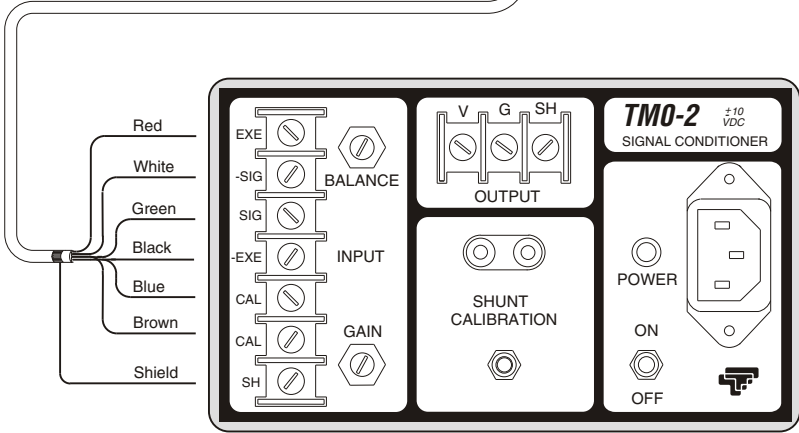
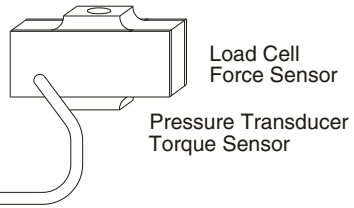
## Method 2: Using a Known load (Dead Weight Calibration).

1. Follow METHOD1, steps 1 through 4.
2. Apply a known load (Dead Weight) to the transducer.
3. Adjust the gain potentiometer to display engineering unit equivalent to known load (Dead Weight).
4. Remove known load (Dead Weight) and readjust balance potentiometer, if necessary.
5. The TM-2 is Calibrated and ready to be used.



**Fig. 3**  
[ 6 Wire Config.]

**Full Wheatstone Bridge Transducer**



## TROUBLESHOOTING

SYMPTOM/ PROBLEM	ACTION
The power lamp is not lit when the power switch is on	Check the fuse, which is located close to the transformer
The analog output is saturated (the output current is above 30mA or below 4mA)	Check the transducer's connections to the input terminal block, and/or check the integrity of the circuit for the transducer by disconnecting all wires from the input terminal block and measuring resistance between the red and the black wires (350 ohms), and between the green and the white wires (350 ohms)
No change in current output	Swap positions between the green (SIG) and the white (-SIG) wires of the transducer, at the input terminal block
Output noise higher than specified	<p>Verify that the transducer shield lead is connected to position SH at the input terminal block</p> <p>Keep unit and the transducer cable away from potential sources of electrical noise, such as transformers, power lines, running electric motors, a.s.o.</p> <p>Sometimes, a capacitor (1 to 100nF), connected between output and GND (mA and SH of the output terminal block), may reduce voltage spikes, which can lead to incorrect readings</p>

## SPECIFICATIONS

### SIGNAL CONDITIONER

Type:	Full external bridge
Bridge Resistance:	120 to 1000 ohms
Balance Range:	3% of bridge balance
Shunt Calibration:	Single point momentary
Calibration Value:	87.325 kohm - provided

### BRIDGE AMPLIFIER

Type:	Bipolar differential
Gain Range:	67 to 737
Input Sensitivity:	1 mV/V to 10 mV/V
Input Impedance:	10 Meg ohm min.
Output Voltage:	+10 VDC
Output Current:	+10 mA
Output Impedance:	75 ohm
CMR:	110 dB min., DC to 60 Hz
Noise and Ripple:	Less than 3 mVP-P
Nonlinearity:	.01% max.
Compliance:	.15% plus FS vs. minus
Filter:	Low pass, 6 dB / octave
Cut Frequency:	16 Hz standard 160 Hz, 1600 Hz optional

### EXCITATION SUPPLY

Type:	Constant voltage
Output:	8 VDC+25%
Output Current:	0 to 120 mA
Current Limit:	Factory set at 65 mA
Load Regulation:	1% max. for 100% load change

### GENERAL

Balance Stability:	.2% for 8 hours
Gain Stability:	.01% for 8 hours
Tempco:	.02% full scale/degree C
Isolation:	1000 Meg ohm, output to AC
Operating Temp:	0 to 50 degree C
Size:	3 x 3.75 x 6.25 inches
Weight:	Less than 2 pounds
Power:	115 VAC+10% / 3W ( 50 to 400 Hz )



# WARRANTY/REPAIR POLICY

## Limited Warranty on Products

Any of our products which, under normal operating conditions, proves defective in material or in workmanship within one (1) year from the date of shipment by Transducer Techniques, will be repaired or replaced free of charge provided that you obtain a return material authorization from Transducer Techniques and send the defective product, transportation charges prepaid with notice of the defect, and establish that the product has been properly installed, maintained, and operated within the limits of rated and normal usage. Replacement product will be shipped F.O.B. our plant. The terms of this warranty do not extend to any product or part thereof which, under normal usage, has an inherently shorter useful life than one year. The replacement warranty detailed here is the Buyer's exclusive remedy, and will satisfy all obligations of Transducer Techniques, whether based on contract, negligence, or otherwise. Transducer Techniques is not responsible for any incidental or consequential loss or damage which might result from a failure of any Transducer Techniques' product. This express warranty is made in lieu of any and all other warranties, express or implied, including implied warranty of merchantability or fitness for particular purpose. Any unauthorized disassembly or attempt to repair voids this warranty.

## Obtaining Service Under Warranty

Advance authorization is required prior to the return to Transducer Techniques. Before returning the items either write to the Repair Department c/o Transducer Techniques, 42480 Rio Nedo, Temecula, CA 92590, or call (909) 719-3965 with: 1) a part number; 2) a serial number for the defective product; 3) a technical description of the defect; 4) a no-charge purchase order number (so products can be returned to you correctly); and, 5) ship to and bill to addresses. Shipment to Transducer Techniques shall be at Buyer's expense and repaired, or replacement items will be shipped F.O.B. our plant in Temecula, CA. Non-verified problems or defects may be subject to a \$75 evaluation charge. Please return the original calibration data with the unit.

## Obtaining Non-Warranty Service

Advance authorization is required prior to the return to Transducer Techniques. Before returning the items, either write to the Repair Department c/o Transducer Techniques, 42480 Rio Nedo, Temecula, CA 92590, or call (909) 719-3965 with: 1) a model number; 2) a serial number for the defective product; 3) a technical description of the malfunction; 4) a purchase order number to cover Transducer Techniques' repair cost; and, 5) ship to and bill to addresses. After the product is evaluated by Transducer Techniques, we will contact you to provide the estimated repair costs before proceeding. The minimum evaluation charge is \$75. Shipment to Transducer Techniques shall be at Buyer's expense and repaired items will be shipped to you F.O.B. our plant in Temecula, CA. Please return the original calibration data with the unit.

## Repair Warranty

All repairs of Transducer Techniques' products are warranted for a period of 90 days from the date of shipment. This warranty applies only to those items which were found defective and repaired; it does not apply to products in which no defect was found and returned as is, or were recalibrated. Out of warranty products may not be capable of being returned to the exact original specifications or dimensions.

**TECHNICAL SUPPORT**  
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