

TM0-2A

STAND ALONE / BENCH TOP
AMPLIFIER / CONDITIONER MODULE

OPERATORS MANUAL



Transducer
Techniques®

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DESCRIPTION

Model TM-2A 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 4-20mA for a positive millivolt input only. The TM-2A provides a floating shunt calibration circuit, which applies calibration at the transducer, thereby eliminating errors due to line losses. The TM-2A comes with a low pass filter, the standard cut-off frequency set at 16 Hz (optional 160Hz or 1600Hz).

FEATURES

- 1. INPUT TERMINAL BLOCK** TM-2A is wired for a standard 6 wire, single shunt transducer with shield (fig.3). 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, calibration terminals are floating and must be connected to the calibration circuit via jumpers (fig.2).
- 2. OUTPUT TERMINAL BLOCK** - connects the TM-2A module to an indicating instrument (ampermeter). Terminals are coded mA for current 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.
- 6. VOLTAGE TO CURRENT CONVERSION** - 0 VDC = 4mA to 5 VDC = 20mA.

SET UP PROCEDURES

METHOD 1: Shunt calibration with TTI transducers.

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

NOTE: Full scale is specified at 4-20 mA for a positive millivolt input only. If you are using a universal load cell in compression where the millivolt output is negative, reverse your signal leads at the terminal input block. The result will be a positive input that can be scaled to a 4-20mA output.

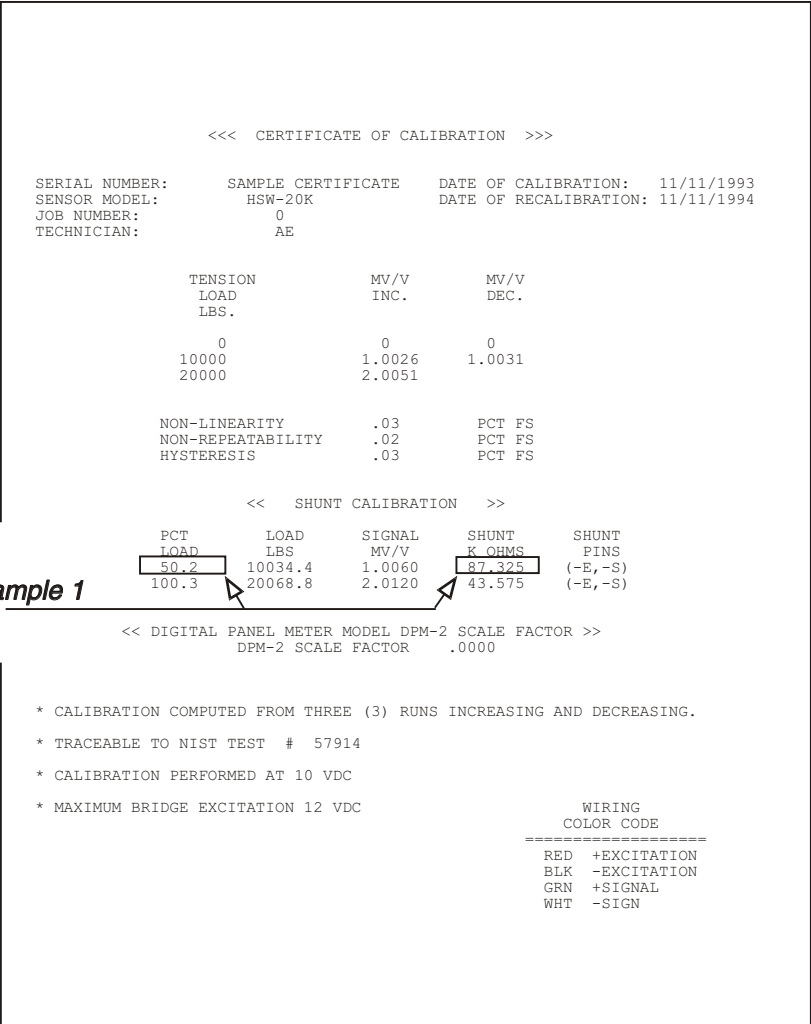
6 WIRE TRANSDUCER		TM-2	4 WIRE TRANSDUCER		TM-2
RED		EXC	RED		EXC
WHITE		-SIG	WHITE		-SIG
GREEN		SIG	GREEN		SIG
BLACK		-EXC	BLACK		-EXC
BLUE		CAL	SHIELD		SH
BROWN		CAL			
SHIELD		SH			

2. Connect a digital amperemeter to output terminals mA and G, positive probe to mA. Set meter's range to 20mA or more, according to the desired resolution needed for the application.
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 meter displays 4mA.
5. Refer to the sample certificate of calibration, fig.1, example1 (typical to certificate 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 current output from which you subtracted 4mA, then add 4mA ($I_{out} = PCT\ LOAD \times (Full\ Scale - 4mA) + 4mA$). Note that 20mA is not the maximum output current of the TM-2A, and this value can be exceeded by 50% when necessary.

Example: $50.2\% \times (20mA - 4mA) + 4mA = 12.032mA$

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: 12.032mA. When complete, release calibration button.
7. Repeat step 4 if necessary.

Fig. 1



METHOD 2: Using a known load (Dead Weight calibration).

1. Follow METHOD 1, 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-2A is calibrated and ready to be used.

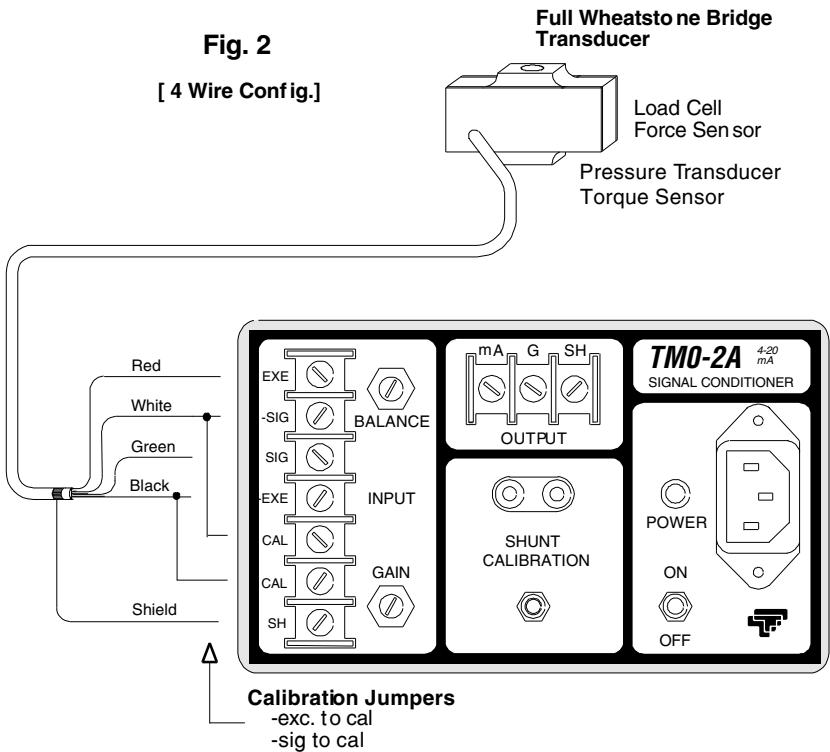
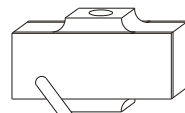


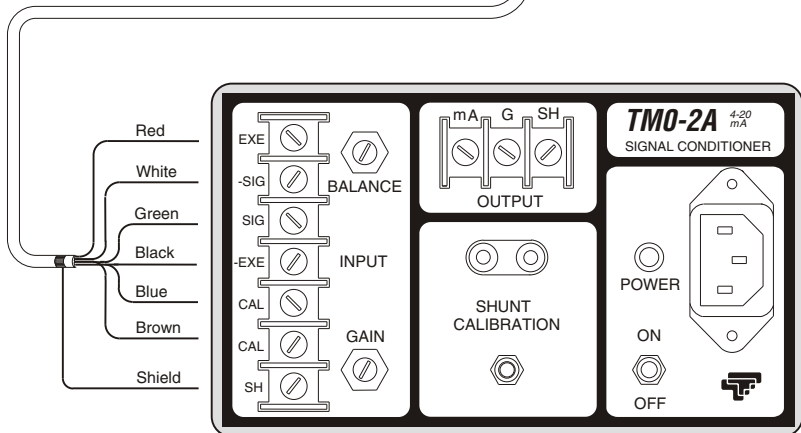
Fig. 3
[6 Wire Config.]

Full Wheatstone Bridge Transducer



Load Cell
Force Sensor

Pressure Transducer
Torque Sensor



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:	1mV/V to 10 mV/V
Input Impedance:	10 Mohm min.
Current Output:	4 - 20mA
Output Impedance:	75 ohm
CMR:	
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 Mohm, 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)

**Load Cells
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