

TELEVAC TELEVAC TELEVAC TELEVAC

INSTRUCTION MANUAL

B2A -1-BAT

PORTABLE THERMOCOUPLE INSTRUMENT



TELEVAC BATTERY OPERATED THERMOCOUPLE INSTRUMENT

I – DESCRIPTION:

The TELEVAC Battery model is an analog display thermocouple type instrument that will monitor pressures between 1 micron and 1,000 microns. The unit receives a signal from a model 2A thermocouple gauge tube and displays the information on a meter calibrated in microns. (See Figures 1 and 2)

The vacuum measuring systems consists of a thermocouple gauge tube which senses the vacuum, a portable instrument and an interconnecting cable. The B2A-BAT normally has a single “C-size” nickel/cadmium (NiCd) rechargeable battery (for the T/C heater), and a charging circuit all mounted on the printed circuit board. A second “C-size” battery is optional for special, non-standard applications. The self-contained power supply enables the unit to be used away from an AC line power source.

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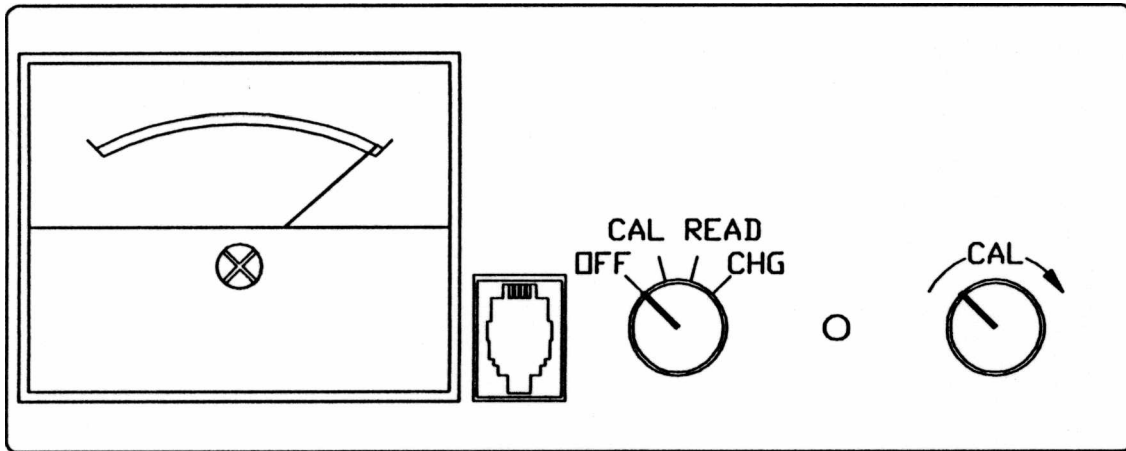


FIGURE 1 – FRONT PANEL

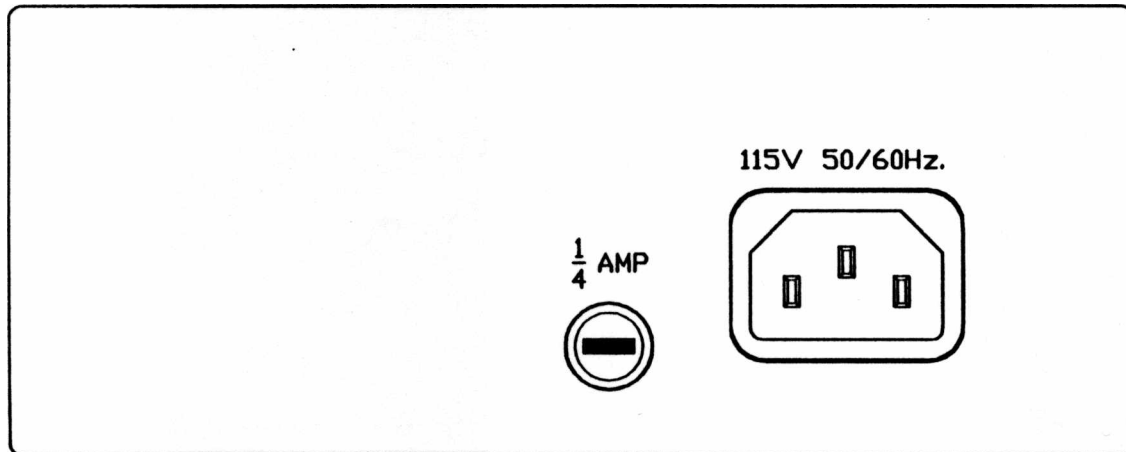


FIGURE 2 – REAR PANEL

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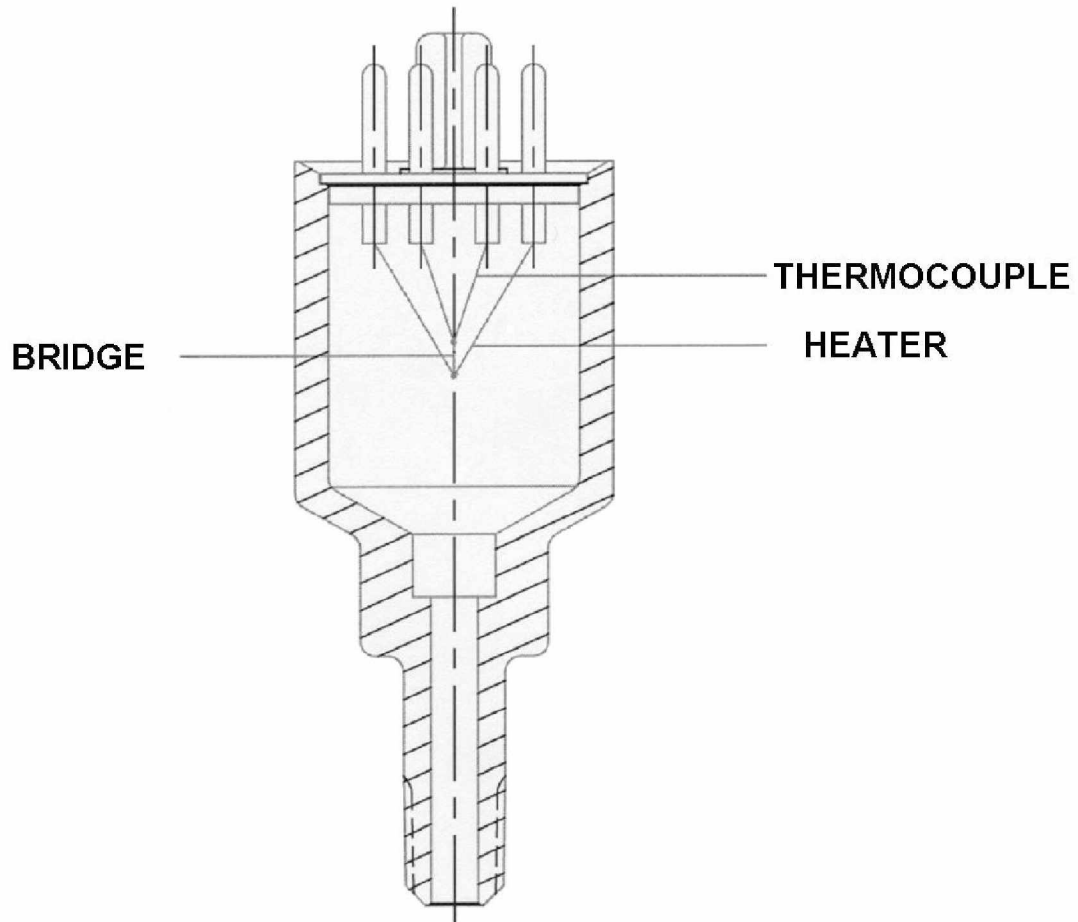
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Thermocouple Sensors

The thermocouple gauge is an indirect reading thermal conductivity sensor. This is a relatively inexpensive device with proven reliability for a wide range of applications. The thermocouple (T/C) gauge-sensing element consists of a filament heated by the passage of a constant current. A thermocouple is welded to the Conduction Bridge at the center of the heated element, thereby providing a means of directly measuring the bridge temperature. With a constant current through the heater, the bridge temperature increases when there is less air (gas) to cool the filament. This temperature change will in turn change the electrical output of the T/C. This electrical signal is proportional to the vacuum (pressure). These class of gauges are typically accurate up to 1 Torr (1000 microns) and provide vacuum measurement up to 20 Torr (20,000 microns).

The TELEVAC T/C vacuum gauges are pre oxidized to a precise level that ensures interchangeability with minimal adjustments. This also provides a higher stability and minimizes the effects of contamination.

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TELEVAC THERMOCOUPLE SENSOR

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III – THERMOCOUPLE VACUUM SENSOR:

All thermocouple elements are pre-oxidized under controlled conditions to provide interchangeability of tubes without recalibration. This process also provides high stability and minimizes the effect of contamination. The nonlinear analog thermocouple signal is amplified and displayed on a meter scale calibrated directly in microns. The meter scale provides the highest resolution at the lower end of the pressure range.

IV – HEATER POWER:

The heater current to the gauge tube is supplied by a permanently installed NiCd rechargeable battery. The battery will provide over 12 hours of continuous operation before recharging. The rated heater current of 95mA is set by a potentiometer in series with the heater element. The small red pilot LED on the front panel begins to blink when 2 hours of operating time remains.

A fifteen hour recharging time is recommended for full charge.

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V – OPERATION

The battery operated unit is connected to a gauge tube sensor, which is in turn connected to the vacuum system. Typically, a 1/8" N.P.T. fitting is used, others are available.

The typical sensor for the model 2A gauge has a blue label and is identified with the 2A part number (2100-10 is most often used). Alternately, the miniature stainless steel gauge tube, P/N 2100-31, is often used for cryogenic piping applications; however, it requires a special cable.

Cable length may affect calibration of the vacuum measurement if lengths are extended over 50 feet. The standard instrument is factory calibrated to a five foot coiled cable. Proper operation requires the use of TELEVAC manufactured cables.

Contamination of the gauge tube caused by the process occurring in the vacuum vessel is a critical factor in measurement of high vacuum. Depending upon the degree of contamination and accuracy required, it is recommended that new gauge tubes be installed periodically and that contamination filters, P/N 2100-50, be used to protect these gauge tubes.

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VI – MOUNTING:

Gauge tubes should be mounted in a vertical position, open end extending downward, and the threaded joint should be thoroughly coated with a vacuum sealant such as Glyptal, or mounted using Teflon tape.

The instrument may be used in any convenient location where it is not subjected to excessive vibration and can be operated in any position. The normal care associated with analog meter type equipment should be taken into consideration.

To set up for operation, connect the thermocouple cable between the gauge tube and the front panel input connector. Once the cable is connected between the front panel and the sensor, the power can be turned on. Only one adjustment is necessary in the operation of the instrument, see paragraph VII.

The unit may be turned on at any time, since atmospheric pressure will not harm the gauge elements or cause overdrive on the metering circuit.

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VII – FRONT PANEL CONTROLS:

Set “FUNCTION” switch in the “CAL” position. Adjust the “CAL” potentiometer knob until the meter reads red line, (located below the 1 micron point). This adjusts the gauge tube heater current to its proper value, and is the only necessary adjustment for the “CAL” position. Turn the “FUNCTION” switch to the “READ” position and the indicating meter will measure the system pressure between 1 and 1,000 microns.

When using this rechargeable battery instrument, charging of the battery takes place only in the “CHG” position on the selector switch. Fifteen hours (minimum) is required to recharge the instrument. When the unit is not being used, the “FUNCTION” switch should be placed in the “OFF” position. This disconnects the battery voltage, thus avoiding depletion of battery power.

The red LED pilot lights when the instrument is on to indicate that the battery is charged. It will blink if less than two operating hours remain.

The pilot will also light during the recharging of the battery , however the instrument can only be read with the front panel switch in the CAL or READ positions.

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VIII – MAINTENANCE OF THE INSTRUMENT IN SERVICE:

TELEVAC gauges, if used properly, require very little maintenance under normal operating conditions. If the unit should cease to operate, the following checks should be made:

Check input to gauge by removing connecting cable from meter case and measuring between pins 1 and 4 of connector on front panel. Voltage reading should be between 1.1 and 1.3 VDC. Pins 1 and 4 are the two outermost contacts on the connector.

If instrument voltages are correct, and the instrument fails to work, the gauge tube should be checked for continuity by using an ohmmeter across the gauge tube terminals 1, 2, 7 and 8. An open circuit between any two terminals indicates a broken element. A new tube should be substituted to restore the instrument to operation.

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IX – CALIBRATION:

All TELEVAC instrumentation is calibrated at the factory. No further calibration at the customer's facility should be required. For a reliable calibration certification, it is necessary to have a reference standard vacuum system whose pressure is known to be accurate. For such a calibration, the instrument, sensor tube and cable should be returned to TELEVAC for recertification. However, if the vacuum calibration verification is to be done at the customer's facility, equipment of certifiable accuracy should be operated by a knowledgeable vacuum technician.

X – CALIBRATION VERIFICATION:

1. Connect sensor to the known vacuum source.
2. Make a comparison table of indicated pressure for the instrument to that of the reference vacuum standard. The comparisons should be made typically at 0 (red line), 10, 100, and 400 microns.

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XI – TROUBLESHOOTING:

Troubleshooting of the circuit or components is similar to any industrial electrical equipment, i.e., checking for circuit continuity, shorts, grounds, resistor values, etc.

Generally, those familiar with electrical equipment should have no difficulty locating faults in either gauge or meter unit by systematically proceeding through the circuit. The enclosed diagram should facilitate maintaining the instrument. To troubleshoot the unit, your tube and cable must be in working condition and plugged into the unit. If it does not read:

- a. Try readjusting for red line in “CAL” position.
If red line cannot be set, check the NiCd battery;
If below 1.1V, recharge.
- b. If the red LED pilot is blinking recharge the unit
- c. Check T/C tube pins 1,2,7 & 8 with an ohmmeter by connecting one lead to pin 1 and switching the other lead from pin to pin (2,7 & 8). If the reading falls outside the range of 5 to 8 ohms. Replace the tube.

If it is not possible to adjust for red line with the “CAL” knob:

- a. Check that the red pilot light is on and not blinking
- b. If the pilot does not light or is blinking, recharge the unit overnight.

If the unit cannot be recharged:

- a. Check the fuse
- b. Is AC getting to the unit? Is pilot light on?
- c. Check voltage across the NiCd battery, it should be approximately 1.2V.

These are some troubleshooting hints. If the unit is still inoperative after doing all of the above, return it to the factory for repair.

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XII – SPECIFICATIONS:

Range	1-20,000 millitorrr (microns) (2A)
Calibration medium	Dry air
Oper. Temp. (tube)	-1 degree to +65 degrees Celsius
Power (Recharging)	95 to 140VAC
Frequency	50/60 Hz
Battery Life (approx.)	12 hours of intermittent or continuous use between charges
Fuse	3/8 Amp slow-blow
Display	1 mA Pivot & Jewel Meter
Weight (instrument)	2 ½ pounds

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XIII – UNPACKING AND INSPECTION:

Before each unit is installed or operated, a quick inspection should be performed and the following noted:

- a. Damage to the case or front panel (scratches, nicks, dents, cracks, etc.)
- b. Missing: screws, switches or switch hardware
- c. Broken or loose components within instrument

Should any of the above problems be encountered, contact the factory immediately. Any unauthorized repairs will void the warranty.

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XIV – WARRANTY INFORMATION:

The Fredericks Company warrants all instruments and components to be free of defects in materials and workmanship. Our obligation under this warranty is limited to servicing or adjusting any instrument returned to us and replacing any part, except those specifically exempt from this warranty, which shall, within one year after delivery to the original purchaser, be returned to us with transportation charges prepaid, and which our examination should disclose to our satisfaction to have been defective. Those portions specifically exempt from this warranty are gauge tubes and batteries as well as meters which have been disassembled or physically damaged. The factory does not assume any other obligation than that stated in this warranty nor does it authorize any person to assume for them any other liability in connection with the sale, service or use of these instruments.

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