

Instruction Manual
Digital Thermocouple Gauge
Battery Operated Control Unit
Model BOB-531



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I Principle of Operation

A Overview

Thermocouple gauges belong to the class of vacuum gauges which rely on the thermal transport qualities of gases. The thermocouple gauge uses the thermal conductivity property of gases, by incorporating a wire filament which is heated by a constant source of power. Attached to this filament is a thermocouple, which measures the temperature of the wire. At high pressures, the large number of gas molecules striking the heated wire carries energy away and cools the wire. At low pressures, the smaller number of gas molecules striking the wire causes less cooling, and thus a higher temperature. The thermocouple output voltage responds to these temperature changes to give an indication of pressure: low gas pressure gives high filament temperature which gives high thermocouple output voltage; high gas pressure gives low filament temperature which gives low thermocouple output voltage. The meter measuring the thermocouple voltage is calibrated in pressure units to give a direct indication of pressure.

At pressures below about 10^{-3} torr, the heat loss from the filament is primarily through radiation since the density of gas molecules is so low. Since the heat loss due to radiation is constant, the resulting temperature corresponds to the “zero” reading on the meter.

The thermocouple gauge is a simple, rugged device which is very useful at rough vacuum pressures. The display covers the pressure range of 1 to 1999 millitorr.

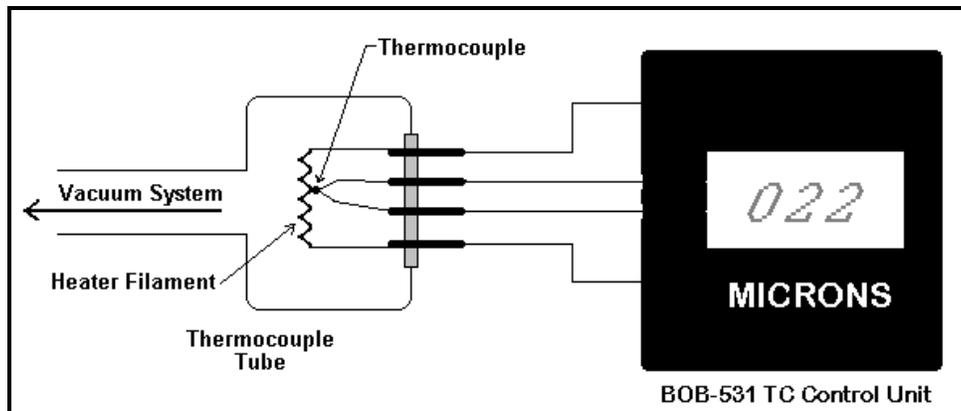


Figure 1: Diagram of Thermocouple Tube and Control Unit

The BOB-531 is a functional replacement for the Varian Model 801, and uses the Varian Type 531 tube or equivalent (Duniway P/N: DST-531).

The display is a large (0.7 inch high), rugged, easy to read LCD.

II Installation

The basic thermocouple controller is a self-contained meter/control/cable package. The unit assembly consists of a display, battery power unit, and 8 foot thermocouple cable. It can be operated as a free-standing unit.

Installation:

1. Install one D-cell alkaline battery (regular or rechargeable), positive terminal out.
2. Attach the thermocouple cable to the thermocouple tube.
3. If the BOB-531 control unit and tube have been shipped together, they have been calibrated at the factory. See “Calibration” section below if zero adjustment is necessary.



Figure 2: Photograph of Control Unit - Side and Front

III Operation/Calibration

A Operation

Operation of the thermocouple gauge and control is generally very simple and trouble free. Occasional zero adjustment and calibration may be required. See “Maintenance” for additional information.

B Calibration

Initial matching of a tube to a control unit and long term changes to the sensing elements require the performance of the calibration steps described below.

1. Connect the thermocouple tube, matched to the control unit, to a vacuum system capable of reaching and maintaining a pressure of less than 1.0 micron (1 millitorr).
2. Pump down the system until the pressure is below 1.0 micron (1 millitorr).
3. Connect the thermocouple cable of the Duniway Stockroom Corp. control unit to the thermocouple gauge tube.

4. Turn the power switch to the "ON" position (see Figure 3, below)
5. Locate the zero adjustment potentiometer, located behind a small hole on the top of the control unit (see drawing below for location) and adjust it until the meter reads zero millitorr.
6. Allow the system to stabilize for approximately 15 minutes, and readjust the zero if necessary.
7. The "Span Adjust" potentiometer is factory set and adjustment in the field should not be necessary.

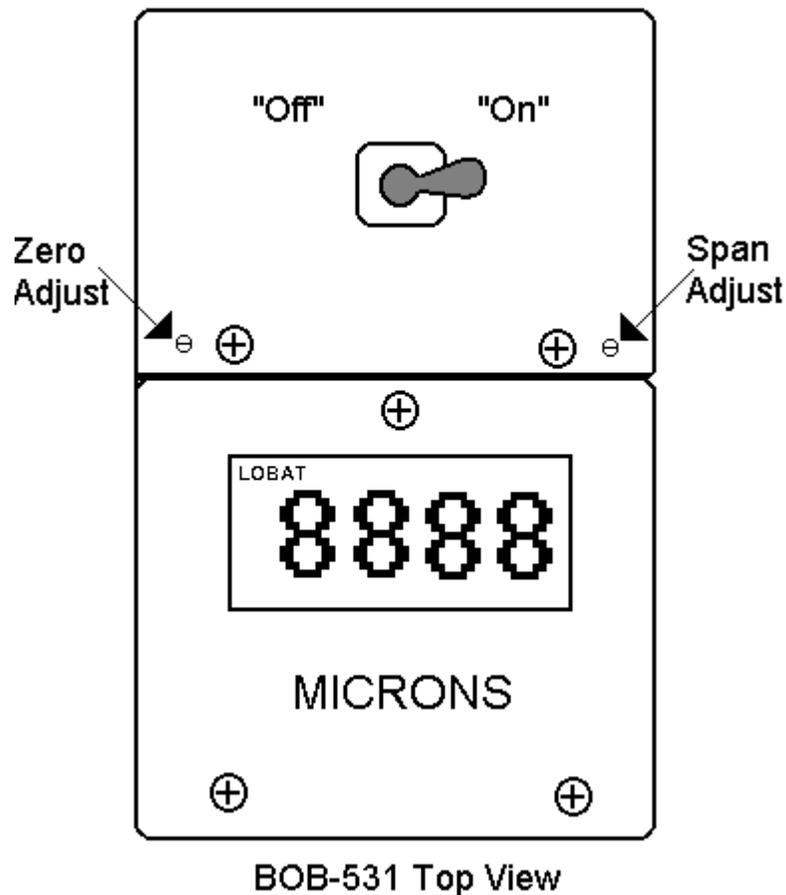


Figure 3: Top View Showing Adjustments, Low Battery Indicator and Power Switch

IV Technical Specifications

Input Voltage:	One each, D-Cell Alkaline Battery, Regular or Rechargeable For Example: “Ray-O-Vac Renewable” Rechargeable Alkaline Battery Ray-O-Vac Part Number 713 with PS2 Recharger.
Battery Life:	80 hours typical with Power Switch “ON” “Low Battery” (LOBAT) indicator on upper left side of display.
Weight:	1 lb (0.5 kg)
Range:	1 millitorr to 1999 millitorr
Environmental Limits:	32-120°F (0-49°C) 10%-90% Relative Humidity, Non-Condensing -1000 feet (-305 meters) to +10,000 feet (+3,046 meters) altitude
Dimensions:	4.0 in. high (10 cm) by 3.8 in. wide (9.7 cm) by 4.5 in. deep (11.4 cm)
Thermocouple Cable Length:	8 feet (244 cm)

V Maintenance

Aging and/or contamination can change the calibration of the thermocouple gauge, thus recalibration may be necessary from time to time.

The sensitivity of thermocouple gauges varies significantly from one gas species to another and with pressure for a specific gas. For example, the sensitivity of a thermocouple gauge for helium is higher than for air at intermediate pressures, but lower at high pressures.

There are no user replaceable parts in the BOB-531, except for the battery. The battery life is 80 hours typical with Power Switch “ON”. There is a “Low Battery” (LOBAT) indicator on the upper left side of the display. See Figure 3.

If the unit is damaged or out of calibration, please contact Duniway Stockroom Corp. for repair or recalibration.

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