

# Instruction Manual

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## Digital Thermocouple Gauge Control Units Models DTC-531-115 & DTC-531-230 Models DTC-06M-115 & DTC-06M-230



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## I Technical Specifications

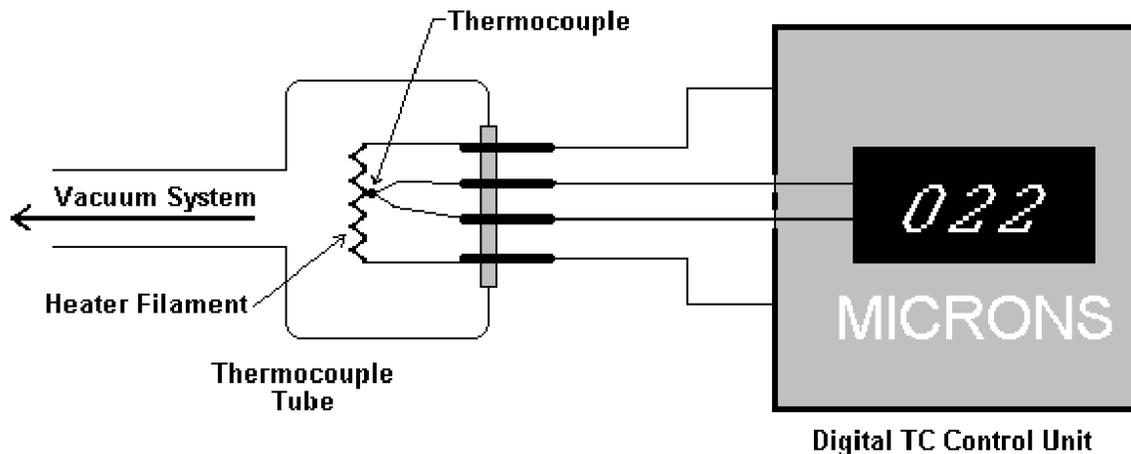
Input Voltage:	Model <b>DTC-531-115</b> : 88-140 VAC, 50/60 Hz Model <b>DTC-531-230</b> : 208-240 VAC, 50/60 Hz  Model <b>DTC-06M-115</b> : 88-140 VAC, 50/60 Hz Model <b>DTC-06M-230</b> : 208-240 VAC, 50/60 Hz
Display:	Four-digit red LED
Weight:	1 lb (0.5 kg)
Range:	1 mTorr to 1999 mTorr (1 micron to 1999 microns)
Environmental limits:	Temperature: 32 to 120°F (0 to 49°C) Relative Humidity: 10% to 90%, Non-Condensing Altitude: -1,000 ft to 10,000 ft (-333 m to 3333 m)
Dimensions (LxWxH) :	3.5 in x 4.1 in x 2 in (8.9 cm x 10.4 cm x 5.1 cm)
Power Cable Length:	6 ft (183 cm)
Thermocouple Cable Length:	10 ft (305 cm)

## II Principle of Operation

Thermocouple gauges belong to the class of vacuum gauges which rely on the thermal transport usalities 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 DTC-531 is a direct replacement for the Varian Model 801, and uses the Varian Type 531 tube, Duniway Stockroom Corp. Part Number **DST-531**.

The DTC-06M is a direct replacement for the Hastings Model VT-6, and uses the Hastings Type DV-6M tube, Duniway Stockroom Corp. Part Number **DST-06M**.

The display is a large (0.56 inch high) LED digital display, rugged and easy to read.

### III Installation

The basic thermocouple controller is a self-contained meter/control/cable package. The unit assembly consists of a display, power unit, 6 foot power cable and 10 foot thermocouple cable. It can be operated as a free-standing unit if mounted in the optional box, or can be panel mounted.

**CAUTION:**

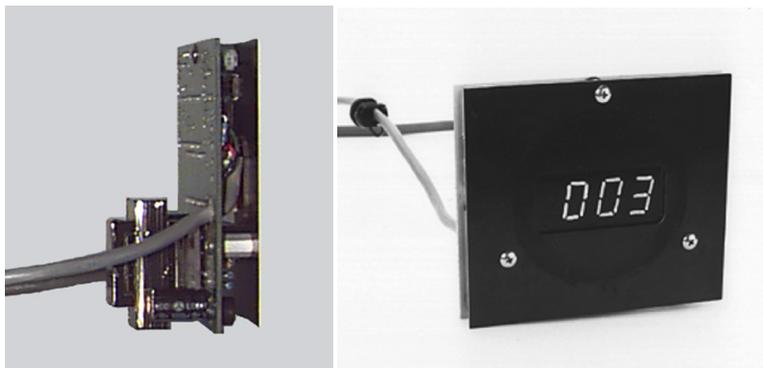
**If unmounted, line voltage is exposed on the transformer, which can be hazardous to personnel.**

**Installation involves**

1. Mounting of the unit, if required.
2. Attach the thermocouple cable to the thermocouple tube.
3. Plug in the power cable.
4. The DTC-531 or DTC-06M control unit and tube, which are shipped together, have been calibrated at the factory. See “Calibration” section below, if zero adjustment is necessary.

**CAUTION:**

**In some applications, such as neon sign production, grounding of the thermocouple tube is recommended. Especially on glass based vacuum systems with high voltage discharges involved, “flashback” can occur, causing the high voltage plasma to take a current path to ground through the thermocouple tube. This “flashback” can cause damage to the integrated circuit chips in the DTC-531 or DTC-06M.**



**Figure 2: Photograph of Control Unit - Side and Front**

## IV 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.

For operation with a recorder, consult with the customer support representative at Duniway Stockroom Corp.

### 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. Plug the line cord into a 115 VAC (or 230 VAC if appropriate) 50/60 Hz outlet.
5. Locate the zero adjustment potentiometer (small slotted screw head) on the front panel of the control unit. In some units it is above the display and in others it is below the display. Adjust it until the meter reads zero millitorr. CAUTION: Do not adjust any of the other potentiometers on the unit. They are factory set and adjustment will require return to factory for recalibration.
6. Allow the system to stabilize for approximately 15 minutes, and readjust the zero if necessary.



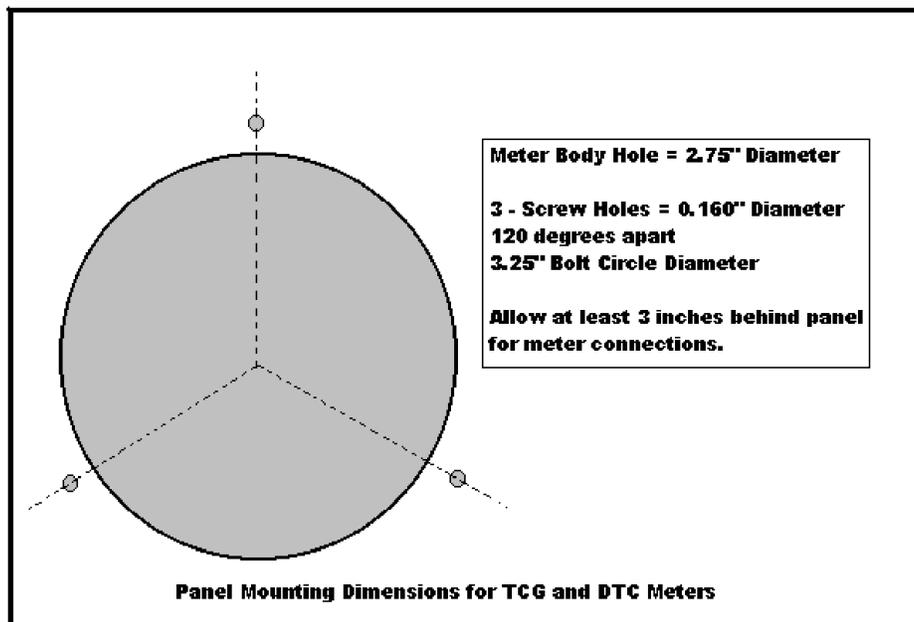
Figure 3: DTC-531-\_\_\_-BX: Unit Mounted in a Metal Box

## 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 DTC-531 or DTC-06M. If the unit is damaged or out of calibration, it should be returned to Duniway Stockroom Corp. for repair or recalibration.



**Figure 4: Panel Mounting Hole Dimensions**

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