The Varian 801 thermocouple gauge control is a compact, self-contained instrument, designed primarily for panel mounting. It is supplied with a 6 ft. line cord and a 10 ft. thermocouple gauge cable. The instrument is line voltage regulated, and a temperature sensitive element to compensate for temperature drift in thermocouple gauges is built into the thermocouple cable socket. The indicator dial, which covers the pressure range from 1 to 2000 millitorr (1 millitorr is 1/1000 of 1 mm of mercury, or 1/1000 of 1 torr), is calibrated for a Varian 531 thermocouple gauge in dry air. The mechanical zero adjust is located on the front of the instrument. The pressure calibration can be reached through a hole in the rear cover (Fig. 1a and 1d). The meter voltage (0 - 11 mv) is available at two solder terminals at the rear for operating remote indicators whose input resistance should be 200 ohms or more.

Installation

A panel cutout, as shown in Fig. 1a, is required for the installation of the Varian 801 thermocouple gauge control. The instrument is mounted from the front and fastened with three nuts supplied (Fig. 1b, 1c).

Calibration

1. With the line power disconnected, adjust the mechanical meter zero until the needle reads OFF.
2. Connect a Varian 531 thermocouple gauge to a vacuum system capable of maintaining a pressure of less than 1.0 micron.
3. Pump down the system to less than 1.0 micron.
4. Connect the thermocouple cable of the Varian 801 control to the Varian 531 thermocouple gauge.
5. Plug the line cord into a 115V 50/60 cycle outlet.
6. Turn the calibration control in the rear of the instrument until the meter registers Zero millitorr.
7. Allow the system to stabilize for approximately 15 minutes, and readjust the zero if necessary.

NOTE: If so desired, the gauge can be calibrated against a McLeod gauge.
Maintenance

Due to aging and/or contamination of the thermocouple gauge, recalibration may be necessary from time to time. The above procedure should then be followed. As the temperature compensation for the TC gauge is built into the TC cord socket, it is not advisable to cut the plug off the TC cord. If the cable is too long, it should be coiled.

Disassembly of Control

The 801 should give years of trouble-free service, but if repairs are necessary, the following procedure of dismantling should be followed.

1. Unplug line cord.
2. Remove the two screws that hold the rear cover and terminals.
3. Remove the plastic cover.
4. Remove printed circuit card from meter.

NOTE: If, after assembly, the meter reads backwards, turn printed circuit card one-half turn.

Description

Transformer, T1
Thermistor
Meter
T.C. Board
T.C. Gauge Tube

Part Number

0881-6581-00-125
0881-6542-08-005
0881-6522-08-275
0881-F2737-301
053-F0472-301
INSPECTION & OPERATING INSTRUCTIONS
for
MODEL 501 THERMOCOUPLE GAUGE

Type and Length of Leads

The lead wires must be soldered to an octal tube socket following the appropriate connections shown on drawing M-1895. The user must take care to make good solder joints since all circuits used with the gauge are both low in voltage and resistance.

The length of leads is not critical provided the total lead resistance in either the heater or the thermocouple circuit does not exceed one-half ohm. The thermocouple leads should be kept close together to minimize the effect of external temperature variations in producing stray electromotive forces.

The use of conduit is recommended where long leads are used.

Installation

A suitable 1/8" IPS coupling must be provided in the system for installation of the gauge. Direct drilling and tapping is recommended only if the chamber wall is more than 1/4" thick.

Both male and female threads should be cleaned of all dirt or grease by rinsing with acetone or ether and allowing the threads to dry. Do not touch threads with fingers after cleaning.

Apply a thin coating of glyptal lacquer to the male thread so that the first one or two threads remain dry, insert and make up to about the same tightness as required for a standard water pipe connection. On completion of the joint, retouch lightly with more glyptal.

Calibration

A calibration curve for dry air is shown on drawing MG-8044. Since the calibration of the gauge depends on the type of gas, special calibrations are required when the gauge is used with gases other than dry air. The gauge will, however, indicate relative pressure changes.

Each gauge has a number stamped on the short hexagonal tube which connects the gauge envelope to the vacuum system. This number represents hundredths of an ampere. The required heater input current is obtained by adding 0.6 to the number stamped on the gauge considered as hundredths. Thus, if the number stamped is 3 this represents 0.03 amperes, and the heater input current thus becomes 0.63 amperes.
PHYSICAL SPECIFICATIONS
and
OPERATING CHARACTERISTICS
for
MODEL 501 THERMOCOUPLE GAUGE

Physical Specifications

Dimensions: 6-1/16" long x 1-1/4" diameter envelope

Electrical Cable Connections: Standard octal 8-prong tube base.
Mating plug not furnished, may be had on special order as Part 5-0001.

Vacuum Connection: 1/8" IPS male pipe thread on 1/2" hexagonal nipple.

Weight: 6 ounces.

Shipping weight: 1 pound.

Operating Characteristics

Heater current: 0.6 amperes plus hundredths of an ampere, corresponding to calibration number stamped on hexagonal nipple of gauge.

Maximum Heater Current: 1.0 amperes.

Heater resistance: 0.2 ohms (approximate).

Thermocouple output: 0 to 14 millivolts.

Range: 1 - 1000 microns mercury absolute in dry air, scale non-linear.

NATIONAL RESEARCH CORPORATION
Cambridge 42, Massachusetts

KMB: mw, mrq, pb
1 June, 1950

Issue No. 3, supersedes all issues prior to 1 June, 1950
Leak Hunting

For leak hunting use an acetone or ether spray. Increase the input current to about 1.0 ampere for greater sensitivity. When a leak is hit, the thermocouple output will drop, due to the change in vapor in the gauge.

Precaution

The gauge should be protected against vibration, shock and excessive heating and cooling from outside sources. The gauge can be operated at atmospheric pressure, without damaging the filament.

NATIONAL RESEARCH CORPORATION
Cambridge 42, Massachusetts

KMB:pb

Issue No. 3, supersedes all issues prior to 1 June, 1950
BOTTOM VIEW
PRONG ARRANGEMENT

PRONGS 1 & 5 - HEATER INPUT
PRONGS 3 & 7 - THERMOCOUPLE
OUTPUT

SECTIONAL VIEW
MODEL 501 THERMOCOUPLE GAUGE
TYPE 05-0100

SCALE: FULL
MO-1895
CALIBRATION CURVE - DRY AIR
MODEL 501 THERMOCOUPLE GAUGE
70 OHM IMPEDANCE METER CIRCUIT

PRESSURE IN MICRONS OF MERCURY

MICROAMPERES

5-8-50 MG-8044