

S
HASTINGS

**INSTRUCTION
MANUAL**

**HASTINGS VACUUM
GAUGES
MODEL 760 (TORR)
MODEL 1100 (millibar)**



Accredited by the Dutch
Council for Accreditation (RvA)

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Accreditation Board (RAB)

Manual Print History

The print history shown below lists the printing dates of all revisions and addenda created for this manual. The revision level letter increases alphabetically as the manual undergoes subsequent updates. Addenda, which are released between revisions, contain important change information that the user should incorporate immediately into the manual. Addenda are numbered sequentially. When a new revision is created, all addenda associated with the previous revision of the manual are incorporated into the new revision of the manual. Each new revision includes a revised copy of this print history page.

Revision B (Document Number 108-032001) March 2001



Refer to accompanying documents



If equipment is not used in the manner specified by this manual, protection provided by the equipment may be impaired

Hastings Instruments reserves the right to change or modify the design of its equipment without any obligation to provide notification of change or intent to change.

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1.0 GENERAL INFORMATION

This manual contains technical and general information concerning the installation, operation and calibration of the Hastings Model 760 and Model 1100 Vacuum Gauges and associated components.

For proper operation, the Model 760 or Model 1100 must be suitably connected to a matching Gauge Tube. Attempting to use the Model 760 or Model 1100 Vacuum Gauge with any other transducer may damage both the instrument and the other transducer.

1.1 Description:

The Hastings Model 760 Vacuum Gauge, combined with its companion Gauge Tube and Gauge Tube Cable, is a versatile, accurate and stable vacuum measuring and monitoring instrument with a range of 0 to 800 Torr. The Model 1100 provides identical operations in the range of 0-1100 millibar.

Features of Models 760 and 1100 include a large, 3-1/2 digit LED display, two control relays with independent set points, an analog output (0-8 VDC), a compact and durable case, and a simple calibration procedure performed at known atmospheric pressure and ambient temperature.

1.2 Specifications:

- Range, DV-760 0-800 Torr
- Range, DV-1100 0-1100 millibar
- Accuracy $\pm 1\%$ Full Scale
- Display Resolution 1 Torr or 1 mbar
- Analog Output Model 760, 0-8 VDC min 1K ohm load
..... Model 1100, 0-8 VDC min 1K ohm load
- Power 90-135 VAC 50/60 Hz.
..... Optional : 205-255 VAC 50/60 Hz.
- Weight (approx) 1.8 lbs.
- Relays 2 ea. SPDT
- Relay Contacts 5 A @ 115 VAC
..... 2 A @ 230 VAC

1.3 Warranty:

Hastings Instruments warrants this product, for a period of one year from the date of shipment, to be free from defects in material and workmanship.

This warranty does not apply to defects or failure resulting from unauthorized modification, misuse or mishandling of the product. This warranty does not apply to fuses, filters, batteries, or other expendable parts, nor to damage caused by leaking batteries, clogged filters, or similar occurrences.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty as to fitness for a particular use. Hastings Instruments shall not be liable for any indirect or consequential damages. Refer to Section 6.0 for warranty or other service for this product.

2.0 GAUGE TUBE AND CABLE

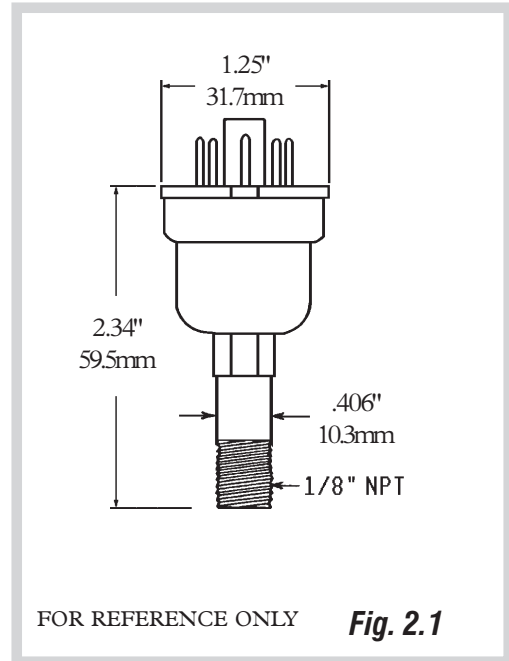
The pressure transducer used with the Model 760 is the Hastings DV-760 Gauge Tube. The Model 1100 requires the DV-1100 pressure transducer. The recommended Gauge Tube Cable is one of the Hastings LUG-N-VS series of cables (where N specifies the length in feet).

2.1 DV-760 and DV-1100 Gauge Tubes:

DV-760 and DV-1100 Gauge Tubes consist of piezoresistive sensors mounted in standard Hastings Gauge Tube shells. Figure 2.1 is a drawing of the gauge tube (Models DV-760 and DV-1100 are identical structurally) showing the dimensions in millimeters and inches. These Gauge Tubes are mechanically rugged; provide excellent linearity, accuracy, and fast response time; and are unaffected by gas composition.

The label on each DV-760 or DV-1100 includes a calibration number (abbreviated CAL NO.) for that gauge tube. The CAL NO. is used in the calibration procedure as described in Section 5.0.

The DV-760 or DV-1100 may be operated in any position. However, when possible, they should be mounted vertically, with the base up, in order to provide drainage of condensed vapor.

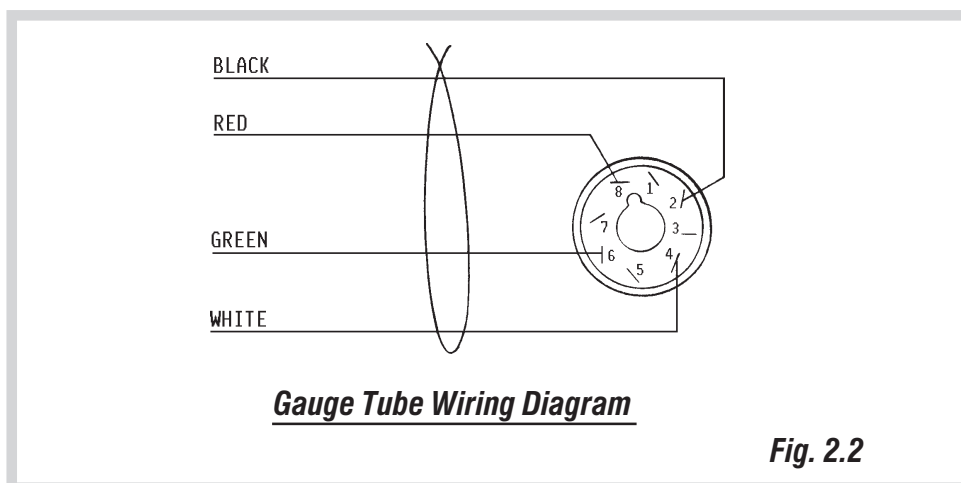


2.2 Gauge Tube Cable:

The Hastings LUG-N-VS Series of flexible, four wire, gauge tube cables are available in 8, 25, 50 and 100 foot lengths. The four color coded wires are terminated in spade lugs at one end of the cable and in a keyed octal socket at the other end. The spade lugs facilitate connection to the terminal block at the rear of the Model 760 or Model 1100, while the octal socket assures a properly polarized connection to either gauge tube.

With the gauge tube installed, the minimum clearance required to install the LUG-N-VS cable is 2.5 inches measured from the end of the keyed post on the base of the tube.

Users may wish to provide their own gauge tube cable, in which case the cable must be constructed in accordance with the drawing shown in Figure 2.2 using no smaller than 22 gauge, stranded conductors.



3.0 INSTALLATION

Operation of the Model 760 or Model 1100 requires an AC power source, a companion gauge tube, and a gauge tube cable. The AC power cord is internally connected. All other connections to the Model 760 and Model 1100 are made through terminal blocks at the rear of the unit.

3.1 AC Power:

The standard Model 760 (Stock No. 67-111) and the Model 1100 (Stock No. 67-134) come with 3-wire power cords and plugs. If the optional version is ordered the unit is shipped without a plug on the power cord. However, the Model 760 features an AC voltage selector which allows the user to switch between the standard and the optional AC voltage versions, if required.

The voltage selector switch is accessible through a hole in the top of each case. A decal adjacent to the access hole uses arrows, labeled with the nominal operating voltage, to indicate the correct switch position. The initial position of the voltage selector switch is set at the factory in accordance with the stock number ordered.

With the voltage selector switch in the 110 VAC position, the unit will operate with supply voltages in the range of 90 - 135 VAC, 50/60 Hz. With the switch in the 220 VAC position, the unit will operate with supply voltages in the range of 205 - 255 VAC, 50/60 Hz.

3.2 Rear Panel Terminals:

Figure 3.1 shows the rear view detail of the Model 760 (the Model 1100 is identical). Looking at the rear view, the terminals on the right side terminal block are numbered 1 through 8 while those on the left side terminal block are lettered A through H.

3.2.1 Gauge Tube Cable

The gauge tube cable is connected to the instrument by means of terminals 5-8 on the terminal block on the right in Figure 3.1. Each terminal is labeled with the color corresponding to the color of the LUG-N-VS conductor to be connected to it (5-Red, 6-White, 7-Green, 8-Black).

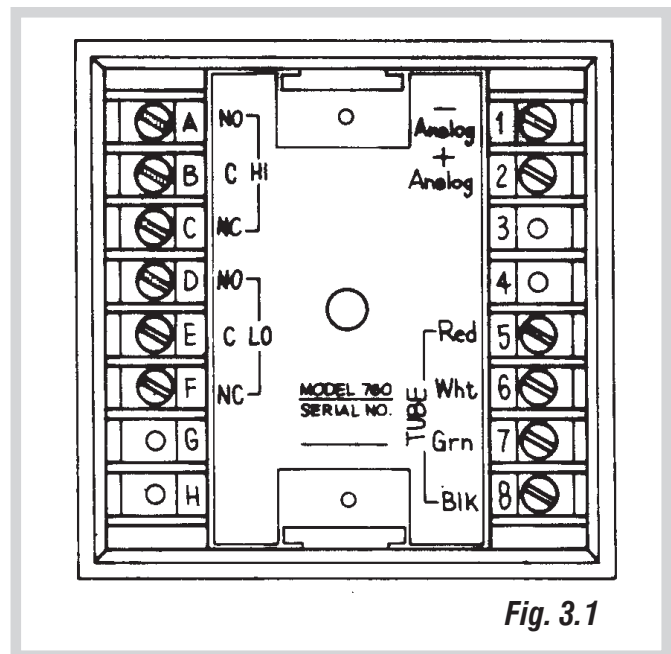
3.2.2 Relays

Referring to Figure 3.1, set point relay contacts are connected to terminals A through F in the left side terminal block. Each of the two relays has a Normally Open (NO), Normally Closed (NC), and Common (C) contact. The HI relay contact connections are A-(NO), B-(C) and C-(NC).

The LO relay contact connections are D-(NO), E-(C) and F-(NC). These connections are clearly marked on the rear decal.

3.2.3 Analog Output

The analog signal is available at terminals 1 and 2 of the right terminal block shown in Figure 3.1. Terminals 1 and 2 are labeled - Analog and + Analog respectively and in accordance with the polarity of the DC output voltage.



3.3 Panel Mounting:

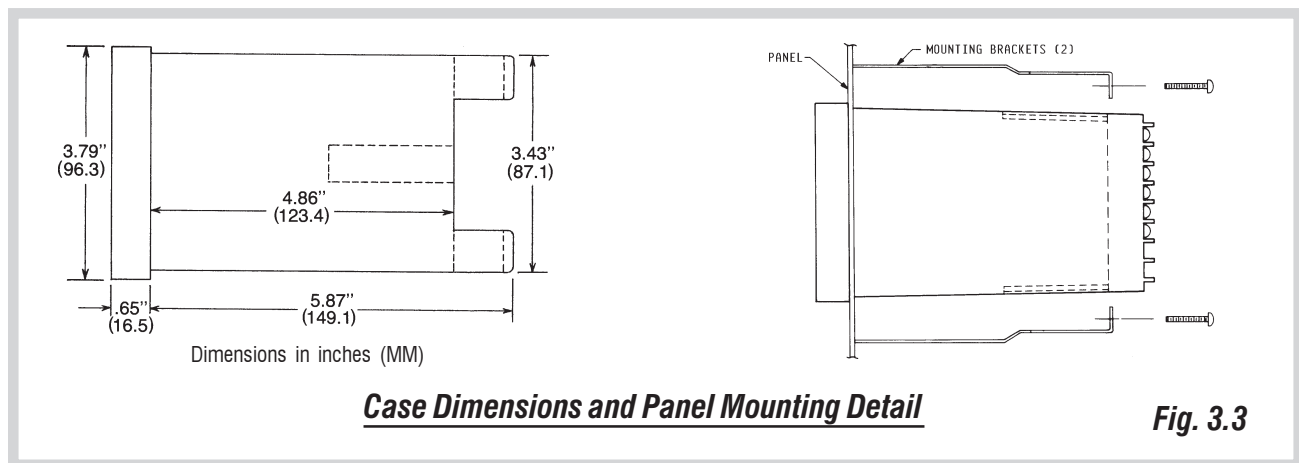
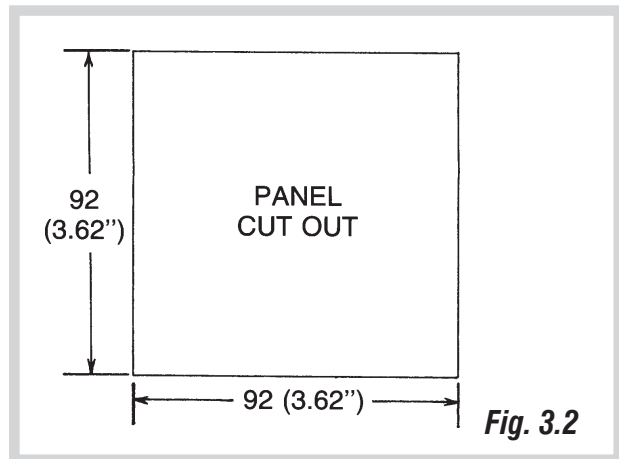
The Model 760 and Model 1100 come with all the hardware required to mount each unit in a panel. Figure 3.2 shows the panel cutout dimensions (1/4 DIN) in millimeters and inches.

The overall dimensions of the cases and method of mounting are illustrated in Figure 3.3. Dimensions are for reference only.

With the unit in the cutout, the mounting brackets are slipped, from the rear, into the channels on the top and bottom of the case (shown dashed in Figure 3.3) such that the hole in the wide end of the bracket is aligned with the corresponding hole in the case.

Insert the 1" self-tapping screws through the bracket and into the hole in the back of the case. Tighten the screws until the unit is held firmly in place.

DO NOT OVERTIGHTEN.



4.0 OPERATION

4.1 Power Up:

Power to the unit is controlled by the ON-OFF switch on the front panel. The unit may be switched on without a tube connected. However, it is recommended that the unit be switched off during the connection or removal of the gauge tube. Accuracy and repeatability specifications are based on a 15 minute warm-up prior to reading the pressure.

4.2 Relay Set Points:

The Model 760 and Model 1100 feature two user-selectable set points. For purposes of identification the set points are labeled HI and LO but both can be set anywhere within the operating range of the instruments. When not required, either or both relays can be effectively disabled by adjusting their set point pressure to 0.

4.2.1 Relay Operation

The HI (LO) set point pressure is displayed when the rotary switch on the front panel is set to the HI (LO) position. Two LEDs (labeled HI and LO) on the front panel provide an indication that the corresponding relay has been energized. The relay will be energized, and the appropriate LED will light, when the indicated pressure falls below the set point value. In order to prevent relay chatter, the set point circuits include a hysteresis of approximately 2 Torr (3 mbar).

4.2.2 Changing the Set Points

Loosen the thumbscrew at the bottom of the front panel and raise the protective cover. The set point adjusting potentiometers are located to the left of the thumbscrew and are labeled HI and LO. Rotate the front panel switch to the desired set point indicator (HI or LO) and turn the corresponding potentiometer (clockwise to increase set point) until the desired set point pressure is displayed.

4.3 Analog Output:

The DV-760 analog output signal is linearly proportional to the measured pressure (10 mV/Torr) over the range of 0 to 800 Torr. The DV-1100 analog output signal is 5mV/mB. The DC input impedance of any device connected to the analog output terminals must be at least 1000 ohms.

5.0 CALIBRATION

Calibration is required in order to match the Model 760 Vacuum Gauge to a particular DV-760 gauge tube (or the Model 1100 and a particular DV-1100 gauge tube) and length of gauge tube cable being used. Recalibration is necessary only when the gauge tube is replaced or the cable length is increased or decreased by a factor of three or more.

5.1 Temperature Correction:

Each DV-760 and DV-1100 is calibrated at the factory for operation at 25°C and the calibration number at 25°C is written on the tube's label. If the tube temperature at the time of calibration is different from 25°C, the Calibration Number must be corrected. The correction is an algebraically added constant which may be read from the calibration curve shown in Figure 5.1 or calculated using the formulas given below.

For example, suppose the CAL NO. on a given DV-760 is -212 and the temperature at the time of calibration is 30°C (86°F). From Figure 5.1, the correction constant is -3.8, and the corrected CAL NO. is:

$$\text{CAL NO. (corrected)} = (-212) + (-3.8) = -215.8 \text{ or } -216.$$

The corrected CAL NO. may be calculated using one of the following formulas:

For the temperature T, in degrees Centigrade, $\text{CAL NO. (corrected)} = \text{CAL NO. (on tube)} + 0.756 \times (25 - T)$.

For the temperature T, in degrees Fahrenheit, $\text{CAL NO. (corrected)} = \text{CAL NO. (on tube)} + 0.420 \times (77 - T)$.

The calibration curve is a straight line and these formulas are derived from the equations of this line.

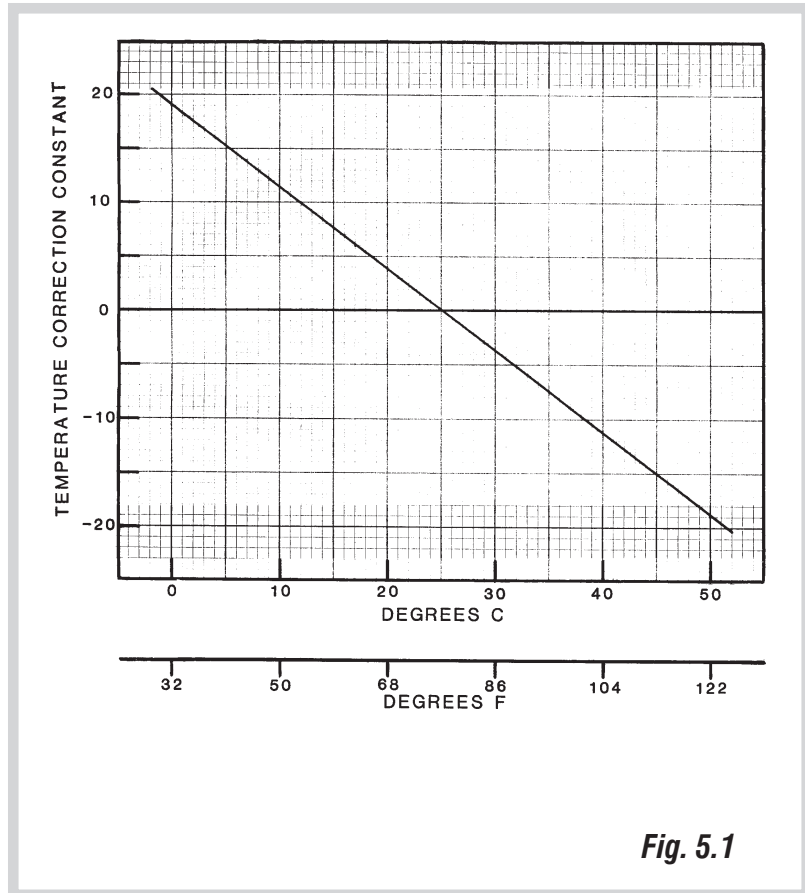


Fig. 5.1

5.2 Procedure:

The Model 760 or Model 1100 should be allowed to warm up for a period of not less than 15 minutes prior to calibration. The particular DV-760 or DV-1100 intended to be used with the vacuum gauge must be connected to its companion instrument.

Loosen the thumbscrew at the bottom of the front panel and raise the protective cover. Locate the two adjusting screws to the right of the thumbscrew, one labeled ATM and the other labeled CAL. Perform the steps in the order shown on the following page.

1. Set the rotary switch on the front panel to the CAL position.
2. Adjust the CAL pot until the display reads the temperature corrected CAL NO. (See Section 5.1).
3. Set the rotary switch to the READ position.
4. Adjust the ATM pot until the display reads the local barometric pressure.
5. Set the rotary switch to the CAL position. If the CAL NO. has not changed, proceed to Step 6. If the CAL NO. has changed, repeat Steps 2 through 5.
6. Set the rotary switch to the READ position. The unit is now ready for use.

No other calibration or temperature correction is necessary.

6.0 SERVICE INFORMATION

6.1 Warranty Policy

Hastings Instruments warrants this product for a period of one year from the date of shipment to be free from defects in material and workmanship. This warranty does not apply to defects or failures resulting from unauthorized modification, misuse or mishandling of the product. This warranty does not apply to batteries or other expendable parts, nor to damage caused by leaking batteries or any similar occurrence. This warranty does not apply to any instrument which has had a tamper seal removed or broken.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty as to fitness for a particular use. Hastings Instruments shall not be liable for any indirect or consequential damages. Hastings Instruments will, at its option, repair, replace or refund the selling price of the product if Hastings Instruments determines, in good faith, that it is defective in materials or workmanship during the warranty period. Defective instruments should be returned to Hastings Instruments together with a written statement of the problem and a Return Material Authorization (RMA) number. Please consult the factory for your RMA number before returning any product for repair.

6.2 Non-Warranty Repair Policy

Any product returned for a non-warranty repair must be accompanied by a purchase order, RMA form and a written description of the problem with the instrument. If the repair cost is higher, you will be contacted for authorization before we proceed with any repairs. If you then choose not to have the product repaired, a minimum will be charged to cover the processing and inspection. Please consult the factory for your RMA number before returning any product for repair.

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INTERNET ADDRESS <http://www.hastings-inst.com>

Repair Forms may be obtained from the "Information Request" section of the Hastings Instruments web site.

