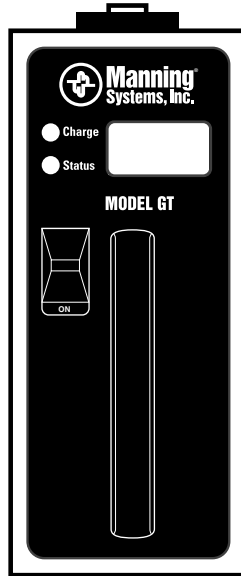


Instruction and
Maintenance Manual
Rev C

GT-R

Portable Refrigerant Sensor



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18427 GTR 03/2005 REVC

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Serial number:

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Introduction

This manual has been prepared to help in the operation and maintenance of the Manning Systems portable GT-R Refrigerant Sensor.

This manual must be carefully followed by all individuals who have or will have the responsibility for using or servicing the sensor. If in doubt about a procedure, please contact Manning Systems, Inc. before proceeding.

1 Sensor Description

The GT-R is a portable, battery operated instrument for the measurement of refrigerant-22 concentrations in ambient air. Figure 1 shows the operating controls and features of the GT-R.

Specifications

Electrical Power: Rechargeable NiCad battery – 4 hours of operation on a full charge

Charger: Standard 120 VAC

Display: Backlit LCD, two line by eight character alphanumeric

Pump: Miniature rotary vane type, 0.8L/minute nominal

Electronics: Designed to intrinsic safety standards

Alarms: Two concentration alarms, one pump out alarm, one low battery alarm

Standard Accessories: Carrying case, 30" telescoping wand, battery charger, and flow meter

Optional Accessories: Calibration Tee

Sensor Type: Refrigerant selective infrared

Range Available: 0–3,000 ppm standard

Accuracy: $\pm 3\%$ of full scale

Resolution: 10 ppm

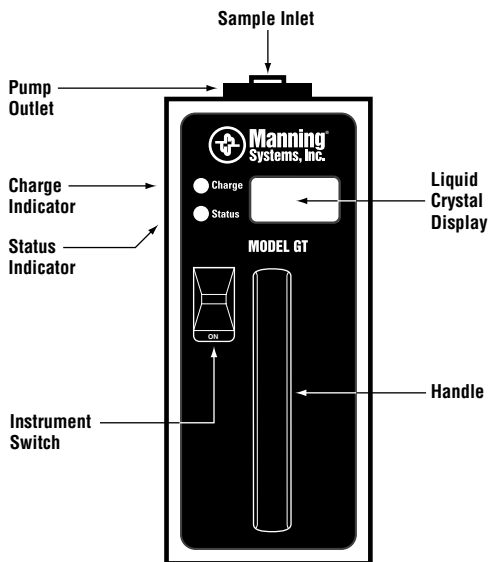
Operating Ambient Temperature Range: $+32^{\circ}\text{F}$ to $+120^{\circ}\text{F}$

Storage Temperature: $+32^{\circ}\text{F}$ to $+120^{\circ}\text{F}$, recommend cool environment ($50\text{--}75^{\circ}\text{F}$)

Weight: 6 lbs.

Dimensions: Approx. $8'' \times 6'' \times 3 \frac{1}{2}''$

Figure 1: Operating Controls and Features of the GT-R



2 Operation

A Operating the Sensor

The GT-R is shipped ready for use. When power is first applied, the LCD display will scroll through three screens:

- Range of the unit
- Current warning setpoint
- Current alarm setpoint

The unit displays a warm up value and “Warm UP” for one minute before readings are accurate. The Status Light flashes during warm up. After the warm-up period, the Status Light is continuously lit and the LCD display will indicate the current refrigerant value.

Note: Always keep the GT-R in an air conditioned office and plugged into the charger when not in use.

The “Charge” LED indicator to the left of the LCD display provides a visual confirmation that the unit is charging.

B Response Test

Prior to use, the unit should first be tested for proper response. This can be done simply by exposing the GT-R to a sample of R-22. The display should show increasing concentration. If not, do not use it for field measurements.

C Sample Inlet Port

The GT-R is shipped with a sample inlet fitting and can be used with or without the extension wand.

When using the extension wand, the internal walls of the tubing must be kept dry. Do not allow liquid to be pumped into the unit.

D Response and Recovery Time

Under normal conditions, the instrument will reach 90% of final value within one minute. In refrigerant-free air, the GT-R should return to zero within 10–20 seconds.

2 Operation continued

E Alarm Functions

The GT-R provides both visible and audible gas concentration alarms. Two levels are provided, with adjustable setpoints for each alarm.

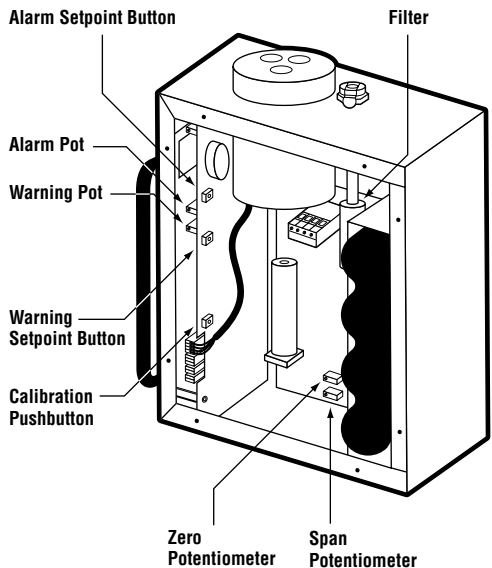
When the gas concentration exceeds the warning setpoint, the LCD display will flash “WARNING” and the audible beeper will sound intermittently. If the alarm setpoint is exceeded, the display will flash “ALARM” and the audible beeper will sound continuously.

Setpoint Adjustment:

The Warning and Alarm setpoints are adjusted using potentiometers inside the instrument. Remove the side panel to gain access. Figure 2 shows the location of these pots. The following steps detail the adjustment of setpoints:

- 1) With the unit running, push and hold the “Warning Setpoint Button” (see Figure 2). The display will show the current warning setpoint value. With a small screwdriver, turn the “Warning Pot” until the value in the display shows the desired setpoint. Then release the “Warning Setpoint Button.”
- 2) The “Alarm Setpoint” adjustment procedure is identical except the “Alarm Setpoint Button” and the “Alarm Pot” are used.

Figure 2: Warning and Alarm Setpoint Adjustment



2 Operation continued

Pump Out Alarm:

A pump continuously delivers an air sample to the gas sensor at approximately 0.8 LPM. Should the pump fail, the LCD will read *PUMP OUT* and the audible horn will sound intermittently.

A flowmeter is included to allow quick verification of proper flow. To check flow, turn the instrument on and connect the sampling wand. Place the tip of the wand into the tubing adapter attached to the flowmeter. Hold the flowmeter vertically and verify that the flow is above the red mark on the flowmeter. Proper flow should always be verified before use.

Low Battery Alarm:

The instrument is powered by a rechargeable NiCad battery. **The instrument should be charging at all times when not in use.**

Should the battery condition become weak during operation, the LCD display will indicate *LOW BATT* and the beeper will sound intermittently, leaving about 15 minutes of operation. After a low battery condition, place the unit on charge for 16 hours before using again.

F Calibration

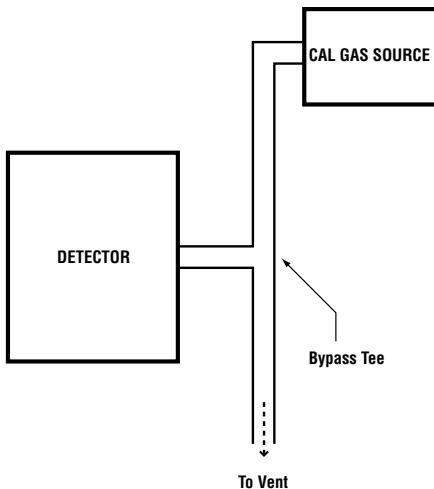
Calibration is recommended every six months in normal use.

The ZERO and SPAN potentiometers are used during calibration and is located on the board

beneath the side panel. The side panel is removed by taking out the eight screws in the side of the unit (see Figure 2).

The calibration procedure requires the use of a bypass tee to allow a calibration gas to be drawn into the unit at atmospheric pressure (see Figure 3). The calibration gas flow should be such that you can feel a slight amount of calibration gas flowing out of the open side of the tee. This insures that the unit is not drawing in ambient air which would dilute the calibration gas and result in an inaccurate calibration. **Do not feed calibration gas directly into the unit under pressure. The bypass tee must always be used during calibration.**

Figure 3: Calibration flow schematic



2 Operation continued

Zero Calibration:

Do not attempt to zero the instrument without certified calibration gas.

- With the side panel removed, push the *CALIBRATION PUSHBUTTON* to put the unit in calibration mode (see Figure 2).
- Using the bypass tee as shown in Figure 3, apply nitrogen or zero gas for two minutes.
- After two minutes, adjust the Zero Potentiometer (shown in Figure 2) until the unit display reads 0.00%.

Span Calibration:

Do not attempt to span the instrument without certified calibration gas.

- Always perform a zero calibration prior to the span calibration.
- Using the bypass tee as shown in Figure 3, apply span gas for two minutes.
- After two minutes, adjust the span potentiometer (shown in Figure 2) until the display reads the value of the span gas.

Push the *CALIBRATION PUSHBUTTON* to return the unit to normal operating mode.

Manning Systems provides a rapid turnaround factory calibration service.

Contact Manning Systems for details.

Manning Also provides Calibration Kits with appropriate calibration gas.

3 Maintenance

A Maintenance

It is essential that the test and calibration schedule be adhered to. Manning Systems recommends the following maintenance schedule:

- Response test prior to each use.
- Calibration should be performed with certified calibration gas every six months, and all tests must be logged.
- Check filter every six months. Replace if dirty or moist (see Figure 2).

Sensor Life: The infrared sensor is extremely reliable, but the following can shorten the sensor's life:

- exposure to liquid
- rough handling and vibration

Typical sensor life under normal use is five years or more. When the sensor will no longer calibrate properly, return to Manning Systems for repair.

B Troubleshooting

The detector does not start: If the battery is run down, charge the unit for 16 hours before use.

Detector does not respond to refrigerant: Verify the proper flowrate using the supplied flowmeter. Perform calibration. If sensor won't calibrate, the sensor may need to be replaced. Contact Manning Systems for service.

PUMP OUT alarm: This condition is usually caused by a motor failure. Plug the charger into the unit and see if the motor starts. If not, contact Manning Systems for service.

High reading, won't clear: Leave the unit running outside for 10 minutes to clear the sensor. If it won't clear, contact Manning Systems for service.

4 Limited Warranty

1. Limited Warranty.

Manning Systems, Inc. (“Manning”) warrants to the original purchaser and/or ultimate customer (“Purchaser”) of Manning’s Products (“Product”) that if any part thereof proves to be defective in material or workmanship within eighteen (18) months of the date of shipment by Manning or twelve (12) months from the date of first use by the purchaser, whichever comes first, such defective part will be repaired or replaced, free of charge, at Manning’s discretion if shipped prepaid to Manning at 11511 W. 83rd Terrace, Lenexa, Kansas 66214, in a package equal to or in the original container. The Product will be returned freight prepaid and repaired or replaced if it is determined by Manning that the part failed due to defective materials or workmanship. The repair or replacement of any such defective part shall be Manning’s sole and exclusive responsibility and liability under this limited warranty.

2. Exclusions.

- A. If gas sensors are part of the Product, the gas sensor is covered by a twelve (12) month limited warranty of the manufacturer.
- B. If gas sensors are covered by this limited warranty, the gas sensor is subject to inspection by Manning for extended exposure to excessive gas concentrations if a claim by the Purchaser is made under this limited warranty. Should such inspection indicate that the gas sensor has been expended rather than failed prematurely, this limited warranty shall not apply to the Product.
- C. This limited warranty does not cover consumable items, such as batteries, or items subject to wear or periodic replacement, including lamps, fuses, valves, vanes, sensor elements, cartridges, or filter elements.

3. Warranty Limitation and Exclusion.

Manning will have no further obligation under this limited warranty. All warranty obligations of Manning are extinguishable if the Product has been subject to abuse, misuse, negligence, or accident or if the Purchaser fails to perform any of the duties set forth in this limited warranty or if the Product has not been operated in accordance with instructions, or if the Product serial number has been removed or altered.

4. Disclaimer of Unstated Warranties.

THE WARRANTY PRINTED ABOVE IS THE ONLY WARRANTY APPLICABLE TO THIS PURCHASE. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

5. Limitation of Liability.

IT IS UNDERSTOOD AND AGREED THAT MANNING’S LIABILITY, WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY, IN NEGLIGENCE OR OTHERWISE SHALL NOT EXCEED THE AMOUNT OF THE PURCHASE PRICE PAID BY THE PURCHASER FOR THE PRODUCT AND UNDER NO CIRCUMSTANCES SHALL MANNING BE LIABLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES. THE PRICE STATED FOR THE PRODUCT IS A CONSIDERATION LIMITING MANNING’S LIABILITY. NO ACTION, REGARDLESS OF FORM, ARISING OUT OF THE TRANSACTIONS UNDER THIS WARRANTY MAY BE BROUGHT BY THE PURCHASER MORE THAN ONE YEAR AFTER THE CAUSE OF ACTION HAS OCCURRED.