

INSTALLATION, OPERATION AND MAINTENANCE
INSTRUCTIONS FOR THE AMI
MODEL 150A
LIQUID HELIUM LEVEL METER

I. INTRODUCTION

The American Magnetics, Inc. (AMI) Model 150A is a compact, fully portable Liquid Helium Level Meter providing simple and easy operation. The instrument is battery operated and when used in conjunction with an AMI LHe Level Sensor, provides a truly portable means of measuring liquid helium levels at any location. The sensor connects to the instrument via a standard DB9 connector. The instrument displays 0-100% of sensor maximum active length immersed in LHe. The instrument can be used with AMI sensors with active lengths of up to 60 inches. The instrument is powered by sealed lead-acid batteries. A standard AC-DC adapter (either 120VAC or 230VAC) is supplied with the unit for charging the batteries. Since battery energy consumption is strongly dependent on the LHe level being measured, AMI has developed a special "battery saver" circuit which reduces the power drain from the batteries as more of the sensor becomes superconducting. Power requirements decrease as LHe level increases. A front panel POWER LED is provided to indicate sufficient battery power exists to make an accurate level reading.

II. SPECIFICATIONS (at 25 °C unless stated otherwise)

Input Power (instrument)	Sealed lead-acid battery (6VDC)
Input Power (AC adapter)	90VAC to 132VAC 50/60 Hz, or 180VAC to 264VAC 50/60 Hz (depending on specified AC adapter model)
Operating temperature (instrument)	0 to 50 °C non-condensing
Operating temperature (AC adapter)	0 to 40 °C non-condensing
Sensor active length range	1 inch to 60 inches
Linearity	0.5% of full scale
Absolute Calibration	0.5% of full scale 2% of full scale (from 0 to 50 °C)
Probe Current	75 mA nominal
Battery Life	Typically 1,000 readings with a 60" sensor.

III. INSTALLATION

- A. Carefully remove the instrument from the shipping carton and remove all the packing material. Inspect the equipment for any physical damage that may have occurred during shipment.

NOTE: If there is any shipping damage save all packing material and contact the shipping representative to file a damage claim. Do not return the instrument to AMI unless prior authorization has been received. (See Section IX)

- B. Install the liquid helium sensor as per the AMI document "Installation, Operation And Maintenance Instructions for the AMI Liquid Helium Level Sensor."
- C. To facilitate mobility, the Model 150A is equipped with a single standard DB9 connector which connects the instrument to a sensor. Connect the LHe sensor wires to the DB9 connector terminals as follows:

Wire Color	DB9 Pin Number	Signal Name
Red	1	I+
Yellow	6	V-
Black	7	I-
Blue	8	V+

IV. OPERATION

- A. Connect the instrument to the sensor via the sensor (DB9) connector. Refer to Figure 1.
- B. Depress the READ push-button switch on the front panel to read the LHe level. The button should be held for sufficient time to allow the meter reading to stabilize.

NOTE: The front panel LED should light to indicate sufficient sensor current exists to make an accurate reading. The instrument is calibrated to read the helium level directly on the panel meter. If the LED does not light during the level measurement, recharge the batteries. When the READ button is released, the unit is automatically deenergized.

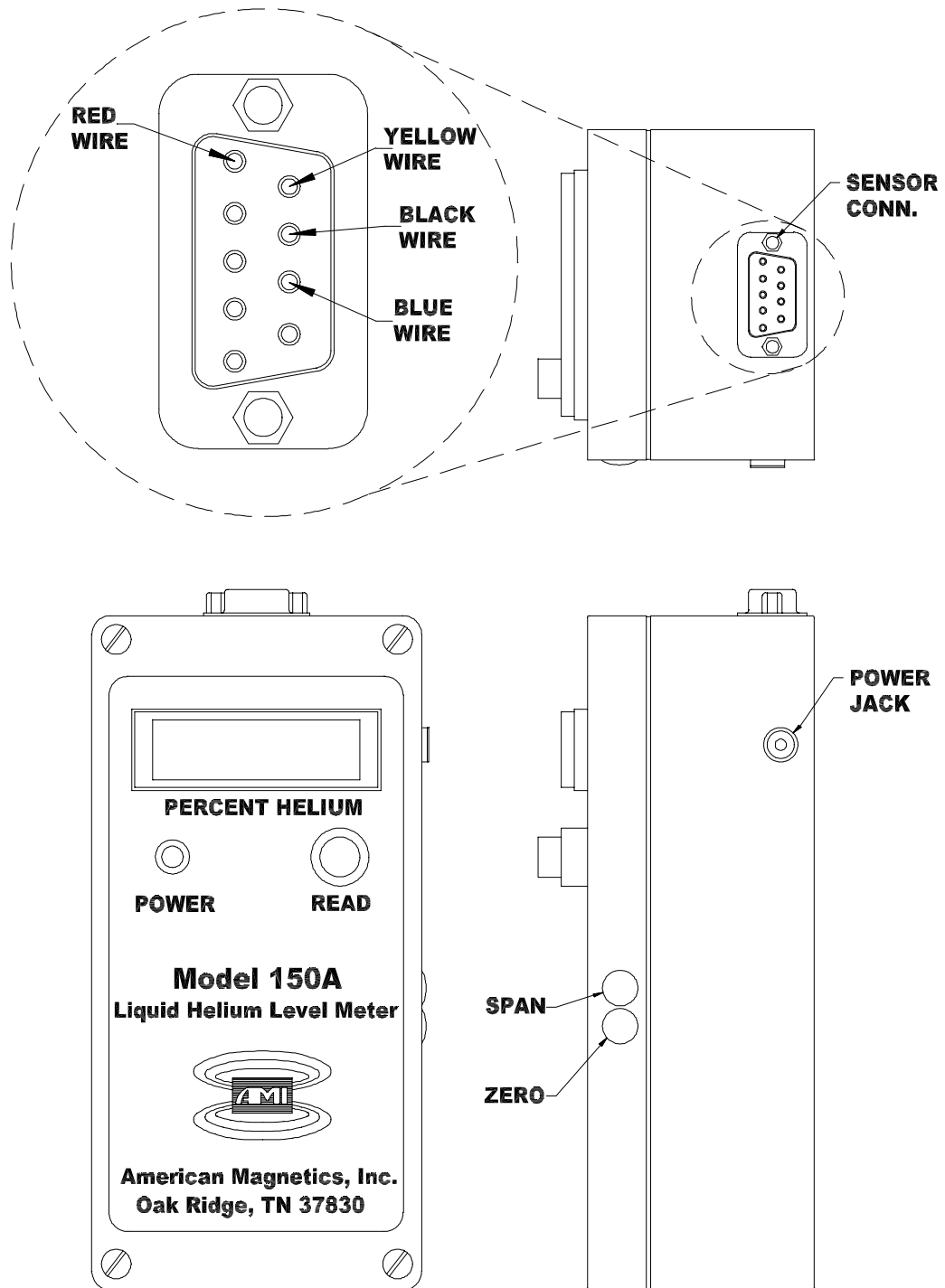


Fig. 1. Model 150A

V. MAINTENANCE

- A. The instrument was shipped with a full charge on the batteries. Operating under a maximum power consumption of measuring a 60" sensor in a near empty dewar, the unit is capable of making approximately 1,000 level measurements before battery recharging is required.
- B. The failure of the front panel LED to light when a measurement is being made indicates low battery power. If the front panel LED fails to stay lit during a measurement, the batteries should be recharged. The supplied AC-DC adapter plugs into a 90VAC to 132VAC 50/60Hz (or optional 180VAC to 264VAC 50/60Hz for the European model) source and into the jack provided on the side of the instrument. The batteries should be charged for a minimum of 1 hour before taking more readings; subsequently, as soon as it is feasible, batteries should be charged for at least 72 hours to fully charge the battery.

NOTE: Best battery performance will be realized by charging the Model 150A continuously whenever it is not being used.

VI. CALIBRATION

- A. The instrument is calibrated for a specific sensor length before shipping and should never need adjustment. However, the calibration procedure is included for your information. All AMI sensors have a resistance of 4.56 ohms/cm (active length) when in the normal state and maintained just above the transition temperature of 10K. Thus, if you are using a 50 cm sensor, you will need a $50 \times 4.56 = 228.0$ ohm resistor for calibration purposes (ensure that the resistor power rating is sufficient and that its temperature coefficient is adequately low such that self-heating due to the 75 mA excitation current does not cause excessive shift in the resistor's resistance).

NOTE: The active length of a sensor is usually 1" less than its overall length.

NOTE: Disconnect the helium level sensor from the instrument.

- B. CHANGING SENSOR ACTIVE LENGTH RANGE

NOTE: PERFORM THIS STEP ONLY IF NEEDED. There are two sensor active length ranges — 1"-7.99" and 8"-60". If the instrument is currently calibrated for a sensor in a particular range and the new sensor is in the same range, then this step does not need to be taken—the range-setting jumpers are already in the correct position. For example, if the instrument is currently calibrated to an 18" sensor active length, and is being re-calibrated to a 12" sensor active length, then the jumpers are already both in the 8"-60" position; there is no need to open up the unit. All needed adjustments can be made through the side access holes in the lid.

1. ONLY IF NEEDED (see above note), remove the electronics from the enclosure to allow access to the printed circuit board, by following the steps in this section.

NOTE: The electronics inside the instrument are STATIC ELECTRICITY sensitive. Extreme care should be used when handling by following static sensitive handling procedures.

2. Open the Model 150A enclosure by loosening the four captive lid screws.
3. Record the position of the three internal cable connectors (including their orientation) attached to the printed circuit board; then disconnect them from the printed circuit board.
4. Remove the READ switch cap and guard (cap is pulled off and guard is unscrewed).
5. Apply slight pressure to the POWER LED and READ switch from the front of the Model 150A and gently remove the printed circuit board from the back.

NOTE: Gently removing the printed circuit board will ensure that the POWER LED disengages from its mounting socket in the front panel and the LCD display disengages from its socket on the board with no damage to either.

6. When recalibrating for a different sensor-length range, two jumpers (at J6 and J7) on the circuit board must be changed. Set both jumpers to either 1"-7.99" or 8"-60" as appropriate for the active length of the sensor to which the instrument will be calibrated.

NOTE: The ends of J6 and J7 nearest the asterisks ("") are where the jumpers should be set for the 8"-60" range. Set the jumpers to the ends of J6 and J7 farthest from the asterisks for the 1"-7.99" range.*

7. Carefully reinstall the printed circuit board into the front panel lid, aligning the LCD display pins with the connector in the printed circuit board, aligning the POWER LED with its socket in the lid, and aligning the READ switch with its opening in the lid.
8. Reinstall the READ switch cap and guard.
9. Reconnect all the internal cable connectors to the printed circuit board with the same orientation and position as recorded in Step 3.
10. Close up the Model 150A enclosure by retightening the four hold-down screws in the front panel lid, attaching the lid to the base.

B. ACTIVE LENGTH CALIBRATION

1. Jumper the I+ and V+ contacts (pins 1 and 8) on the SENSOR connector together and connect to one side of the *calibration resistor*. Jumper the I- and V- contacts (pins 6 and 7) on the sensor connector together and connect to the other side of the *calibration resistor*. The value of the *calibration resistor* should be $(4.56 \text{ ohms}) \times (\text{the active length of the sensor in cm})$; remember that the active length of AMI standard sensors is 1 inch less than the overall length.
2. Temporarily install a short circuit (using a clip lead or other means) across the *calibration resistor*.
3. Depress the READ switch.
4. Adjust the SPAN potentiometer located on the circuit board through the side access hole in the lid until the display LCD reads 100.0. Refer to Figure 1.
5. Release the READ switch.
6. Remove the short from the *calibration resistor*.
7. Depress the READ switch.
8. Adjust the ZERO potentiometer located on the circuit board through the side access hole in the lid until the display LCD reads 0.0. Refer to Figure 1.
9. Release the READ switch.
10. Repeat steps 2 through 9 until neither potentiometer needs adjusting.
11. Remove the jumper wires and *calibration resistor*.
12. The calibration procedure is complete.
13. Reconnect the sensor to the instrument.

IV. TROUBLESHOOTING

- A. No LED power indication when the READ switch is depressed
 1. Verify the sensor is properly connected to the SENSOR connector. The POWER LED indicates proper *sensor current*; consequently, the POWER LED will not light if the sensor is not connected properly even though batteries are fully charged.
 2. Recharge the batteries.
 3. Check the condition of the internal batteries. Verify no corrosion exists.

- B. Meter reads 100.0 when the READ switch is depressed.
 - 1. Verify that a sensor is properly connected to the instrument.
 - 2. Ensure the helium level is not actually at the top of the sensor.
- C. Other erroneous level indications.

Most inoperative instruments are traced to improper wiring between the sensor and the instrument. Verify the sensor is connected in accordance with the color code outlined in the installation section (see table in installation section and Figure 1).

If the cause of the problem cannot be located, please call an AMI Technical Support representative at (865) 482-1056. Our standard business hours are Monday through Friday, 8:00 a.m. to 4:30 p.m. Eastern time.

V. WARRANTY

All products manufactured by AMI are warranted to be free of defects in materials and workmanship and to perform as specified for a period of one year from date of shipment. In the event of failure occurring during normal use, AMI, at its option, will repair or replace all products or components that fail under warranty, and such repair or replacement shall constitute a fulfillment of all AMI liabilities with respect to its products. Since, however, AMI does not have control over the installation conditions or the use to which its products are put, no warranty can be made of fitness for a particular purpose, and AMI cannot be liable for special or consequential damages. All warranty repairs are F.O.B. Oak Ridge, Tennessee, USA.

VI. RETURN AUTHORIZATION

Items to be returned to AMI for repair (warranty or otherwise) require a return authorization number to ensure your order will receive proper attention. Please call an AMI representative at (865) 482-1056 for a return authorization before shipping any item back to us.