

LI-610 Portable Dew Point Generator



*A Precision
Water Vapor Source
For Field or Laboratory Use*

LI-COR[®]

Biosciences

FEATURES

- Generates stable dew points from 0 to 50°C.
- Accuracy of $\pm 0.2^\circ\text{C}$ dew point.
- Completely portable and self-contained (battery or AC operated).
- No need for gas tanks and mixing systems.
- Millivolt output of dew point temperature for data acquisition.
- External control by a 0-5V input signal.

The LI-610 Portable Dew Point Generator is a rugged, portable instrument that provides a stream of gas with a precisely controlled dew point. High accuracy and stability make the LI-610 an ideal water vapor source for field or laboratory use.

Applications

- Calibrating $\text{CO}_2/\text{H}_2\text{O}$ analyzers.
- Calibrating solid state relative humidity sensors.
- Verifying calibration of dew point hygrometers.
- Precise control of the water vapor mole fraction in environmentally regulated chambers.

Water vapor is commonly measured in industrial processes by humidity sensing instruments. Often, on-line sensors directly affect process control, efficiency, and product quality. The LI-610 provides the capability to calibrate these sensors to ensure measurements with high accuracy and repeatability.

LCD Display

The LI-610 has an easy-to-read 4 1/2-digit display with 0.01°C display resolution. Coarse and fine adjustment knobs allow dew point temperature to be set precisely. Actual dew point temperature and battery voltage can also be displayed.

Easy Flow Adjustments

A valve on the front panel adjusts the flow rate through two gas exit ports (typically, combined total of 2.0 liters per minute). Rotameters monitor, adjust, or equalize the flow through each exit port.

Voltage Output

A linear analog output allows a data acquisition system to measure dew point temperature. The LI-610's 0 to 50°C dew point range is scaled over a 0 to 5-volt output range ($100\text{ mV}/^\circ\text{C}$).

External Control

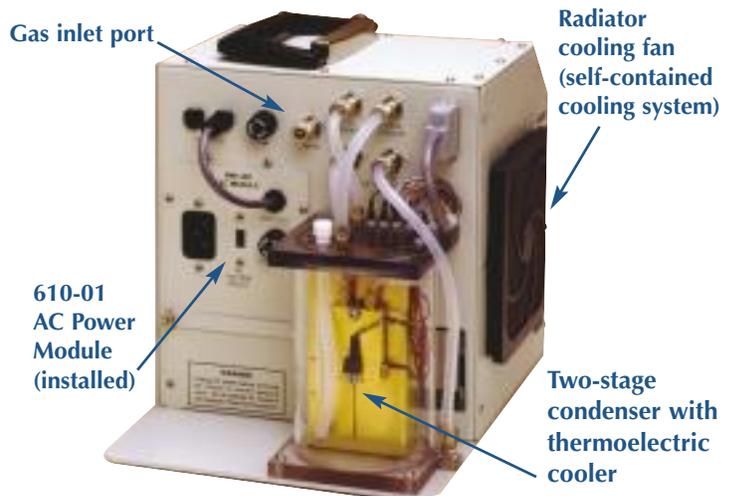
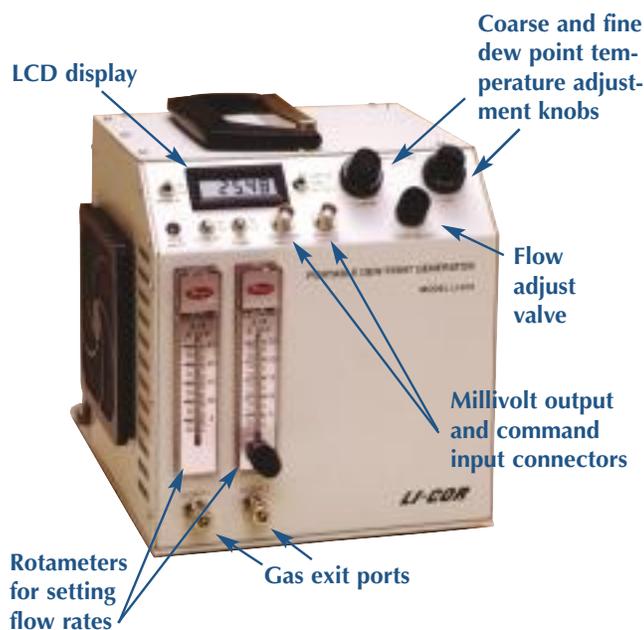
In addition to front panel controls, dew point temperature can be set by connecting a linear 0 to 5-volt signal to the Command Input connector on the front panel. By using an input signal to control the LI-610, an automated calibration system can cycle through a range of dew points while calibrating humidity measurement instruments. The LI-610 measures the input voltage and sets the dew point accordingly ($100\text{ mV}/^\circ\text{C}$).

Low Maintenance

Routine maintenance consists only of changing the water in the condenser block (weekly under normal operating conditions).

Portability

The LI-610 is completely portable with the 6200B Rechargeable Battery (optional), or any 12V battery. For laboratory use, it is powered by line voltage using the 610-01 AC Module (standard).

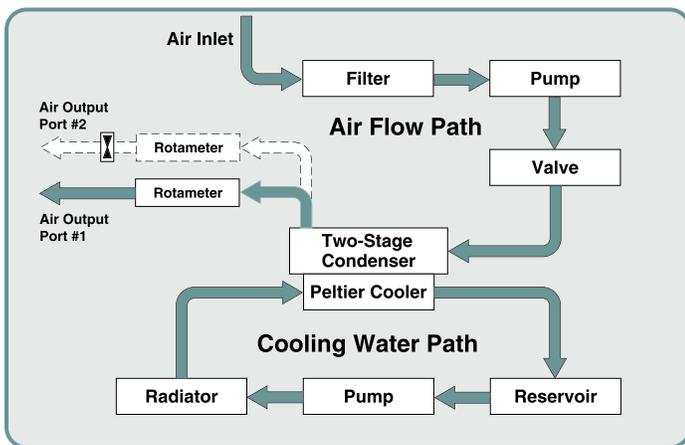




OPERATION

Air is bubbled through water reservoirs in two nickel-plated condensers to completely saturate the air stream with water vapor. The temperature of each condenser is precisely controlled to the dew point target by Peltier thermoelectric coolers. An internal radiator with a cooling fan dissipates heat from the coolers, providing a completely self-contained cooling system.

The water vapor stream exits the condensers via a port on the front panel (designed for 1/8" or 4 mm ID tubing) or can be split to a second port. An internal pump provides typical flow rates of 0 to 2.0 liters per minute.



LI-610 Operational Schematic

Instrument Calibrations

The high accuracy and stability of the LI-610 make it an excellent instrument to calibrate relative humidity sensors and to check the calibration of dew point hygrometers. An equation is provided to convert dew point temperature to relative humidity, assuming that temperature is accurately measured. A chart is also provided for quick conversions in the field.

The LI-610 can be used to calibrate CO₂/H₂O analyzers. An air stream from the LI-610 is directed through a desiccant to set the analyzer's zero, and the second airstream is used to set the span.



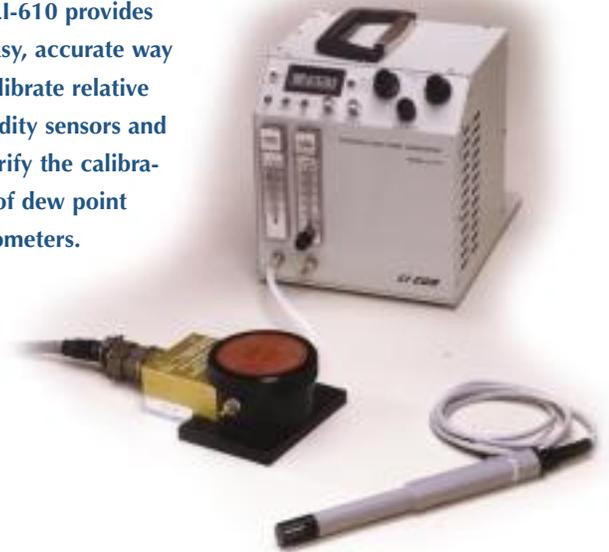
LI-610 with LI-6400 Sensor Head

Continuous Operation

The LI-610 can provide a continuous air stream of known dew point to photosynthesis and stomatal conductance measurement chambers, or for other applications where a known supply of water vapor is required.

Under typical operating conditions, the LI-610 can provide 4 to 8 hours of continuous operation before the condenser needs to be refilled.

The LI-610 provides an easy, accurate way to calibrate relative humidity sensors and to verify the calibration of dew point hygrometers.



Calibration

Condenser temperature is precisely measured by a Platinum Resistance Temperature Detector (RTD). Temperature calibration accuracy is assured through transfer calibrations using National Institute for Standards and Technology (NIST) recommended methods and NIST-traceable devices. The resulting dew point measurement accuracy is 0.2°C.

Power Requirements

The LI-610 is powered by line voltage (108-126 or 216-252 VAC) using the 610-01 AC Module.

The optional 6200B Rechargeable Battery provides approximately 4 hours of continuous battery powered operation at 25°C ambient air temperature and 10°C dew point. The 6200B requires the LI-6020 Battery Charger for recharging.*

* A 12V battery can also be used.



SPECIFICATIONS

Dew Point Range: 0 to 50°C (limited to 35°C below the cooling water temperature)

Accuracy: ± 0.2°C (0–50°C)

Stability: < 0.02°C per day at 25°C typical; < 0.04°C per day at 25°C maximum

Noise Level: 0.01°C peak-to-peak

Repeatability: ± 0.01°C

Response Time: Typically 15 seconds per °C when changing from ambient to a higher dew point; 30 seconds per °C for dew points lower than ambient

Temperature Sensor: Platinum resistance temperature detector (RTD)

Flow

Flow Rate: Adjustable; typically 2.0 liters per minute

Flow Meter Type: Dwyer series RMA. 2.5 liters min⁻¹ full scale

Flow Meter Accuracy: ± 4% of full scale reading

Flow Outputs: Two rapid connect hose fittings for 4 mm ID by 6 mm OD plastic tubing. Accepts 1/4" OD tubing with 1/8 to 3/16" ID

Maximum Input Flow: 2 liters min⁻¹. Contact LI-COR about using higher input flow rates

Analog Output: 0–5 Volts, 100 mV per °C

Command Input: 0–5 Volts, 100 mV per °C

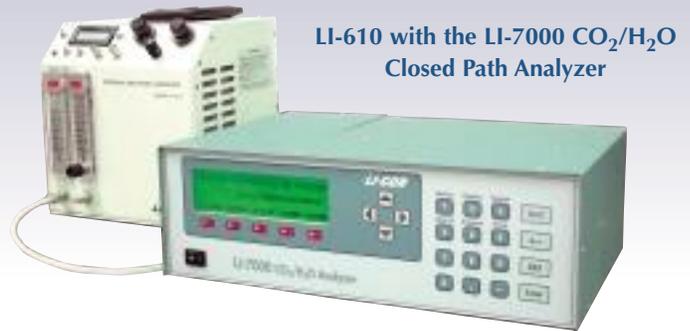
Display: 4 1/2 digit LCD for displaying dew point set temp (°C), actual dew point temp (°C), or battery voltage

Display Resolution: 0.01°C

Operating Range: 0 to 50°C, 0 to 100% RH

Weight: 7.86 kg (17.4 lb)

Size: 23.5H × 21W × 28.5D cm (9 × 8.1 × 11")



LI-610 with the LI-7000 CO₂/H₂O Closed Path Analyzer

Ordering Information

LI-610 Portable Dew Point Generator

Includes 610-01 AC Module and 610-04 BNC to mV Recorder Leads

Accessories

610-02 RH Calibration Accessory

For calibrating humidity sensors in the LI-6200 and LI-1600

610-04 BNC to mV Recorder Leads

For mV input or output. One included with the LI-610; for both millivolt input and output, order a second 610-04

6200B Rechargeable Battery

4 hour battery life at 25°C and 10°C dew point

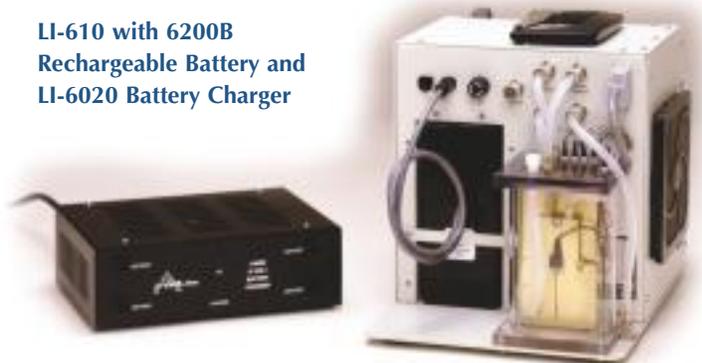
LI-6020 Battery Charger

92-138/184-276 VAC, 47-63 Hz
Charges up to four 6200B batteries



LI-610 with the LI-7500 CO₂/H₂O Open Path Analyzer

LI-610 with 6200B Rechargeable Battery and LI-6020 Battery Charger



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