

Letters to the Editor

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A DEW POINT RECORDER FOR USE AT AIRPORTS

An instrument to measure and record directly at a distance dew point temperatures, has been constructed, using as sensor a dewcel, which makes use of the hygroscopic properties of lithium chloride to determine the partial pressure of the ambient water-vapour in terms of the LiCl dew point. The principle of operation of the dewcel devised by Hickes (1947) is well known.

The instrument consists of the dewcel with its power supply, a thermistor used in bridge circuit for sensing the equilibrium temperature, a constant gain d.c. amplifier which with the bridge readings, and a remote indicator and recorder for continuously indicating and recording the dew point (Fig. 1).

The dewcel consists of a thin-walled cylindrical metal tube, closed at one end, on which is wound a woven glass tape impregnated with saturated lithium chloride solution and over which is wound a pair of silver wires which serve as heater elements. The dewcel is powered with a 24 volt a.c. supply. A perforated protective metal guard is provided and a bead-in-glass thermistor fitted inside the tube. The thermistor is shunted by a resistor to obtain a linear scale for the LiCl equilibrium temperature in the range 20° to 90°C. The output of the bridge is fed to a constant gain d.c. amplifier. The amplifier circuit is similar to that used in the telethermometer designed by the authors (1966). The bridge values and the amplifier gain are so adjusted that the recorder and indicator give directly the dew point.

The errors of the dewcel have been discussed by Tanner and Suomi (1956). The disadvantages are that since the LiCl cell cannot cool to temperatures below the air temperature, dew points at extremely low relative humidities cannot be measured. And since differences between the dewcel temperature and that of the ambient air affect the convection and radiation heat losses, ambient air temperature also influences the equilibrium temperature of the dewcel. Because of the complex nature of the dewcel heating and equilibrium mechanism, it is also not very accurate in its absolute readings, especially when used with thermistors which may sample hot or cold spots in the

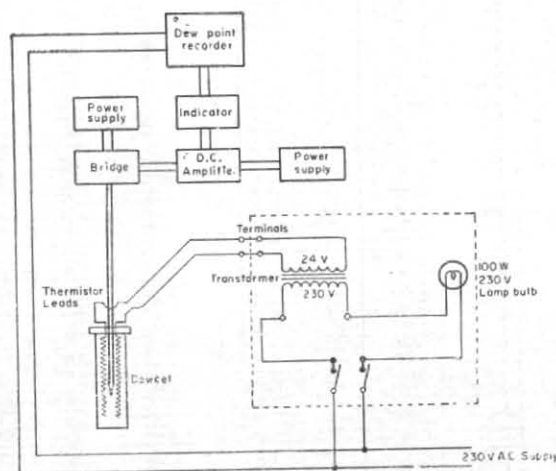


Fig. 1. Schematic wiring of Dewcel with power unit

dewcel bulb. The dewcel must, therefore, be calibrated under conditions in which it will operate. It should also be operated 10°–15°C above ambient to read close to the LiCl dew point.

The main advantages of the dewcel are its operational simplicity and the fact that the dewcel data are directly and conveniently reduced to dew point and vapour pressure data. The relative error of measurement is the same for all values of dew point and it is accurate within $\pm 1^\circ\text{C}$ under stable conditions. The instrument neither adds nor removes water from the atmosphere and can function even with quite low air ventilation values. The time lag of the order of 2–4 minutes is advantageous, when representative readings for synoptic reports are required. The instrument needs no attention except the dewcel, which must be reconditioned every three months.

The dewpoint recorder designed for use at airports, has been in regular operation at Poona since 1965 and has given consistent, reliable records for over a year.

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