

Temperature and Humidity Monitoring in a Greenhouse

Escort iLog Temperature and Humidity Datalogger

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CAS DataLoggers recently provided the data logging solution for a large greenhouse currently cultivating several species of popular flowers, an extremely temperature- and humidity-sensitive process. The temperature and humidity requirements varied from flower to flower, with ideal temperature limits usually being between 57°F and 82°F (14°C to 28°C) with a humidity of 70%-100%. Temperature and humidity were both measured at the head of the plants for the most meaningful results, and were the largest factors in making up the greenhouse's delicate



microclimate, so to obtain maximum growth efficiency it was essential that the correct temperature and humidity conditions be maintained throughout the growth of the crops. Temperature and humidity were also the primary indicators used to collect disease prediction data –the earliest warning of disease and mold before they could overwhelm whole species. All problems had to be addressed promptly to minimize mass infection since plant population density was very high and closely confined by the greenhouse walls so that diseases could rapidly become severe. Gray mold was the most common threat to the greenhouse's floral crops, producing spores that quickly spread on air currents throughout the structure. Thriving at a relative humidity at or above 85%, gray mold spores would land on the plants, germinate, and begin infection. Diseases such as this proved very expensive for the growers, who needed to constantly monitor every plant in the structure in an attempt to keep foliage dry and control the disease. Early on, the growers had been relying on inexpensive glass and electric thermometers for temperature measurement, but these proved to be too time-intensive and inaccurate. Staff needed to quickly compare current measurements with previously-recorded data to get an idea of how to conduct temperature profiling for their disease prevention processes. Soon the greenhouse was equipped with a climate control system to automatically control temperature and humidity, but staff realized that the system's drawback was that the climate control was limited to fixed places. What the owner and growers needed was a temperature and humidity monitoring solution powerful yet affordable enough for all greenhouse operations; a flexible solution to mapping humidity distribution as well as hot and cold spots and the effectiveness of ventilation, heating, and irrigation. Additionally, all current conditions of the measurement cycle would have to be available at a glance for quick correction.

The greenhouse installed four **ESCORT iLog Humidity Data Loggers** in major areas not covered by the existing climate control system. Each iLog data logger monitored temperatures across a -40°F to 158°F (-40°C to +70°C) range with an internal temperature sensor as well as recording humidity using the external sensor's range of 0 to 100% RH. The iLog's 0.1°C resolution provided highly-accurate readings which were clearly displayed on each logger's large LCD display, featuring active and alarm LEDs and multi-function viewing to show climate data in real-time. Each iLog's memory stored up to 32,000

samples (at 16,000 per sensor) with a user-set sampling frequency anywhere from every second to every 10 days. Customized alarm settings notified growers whenever temperatures suddenly went out of specification, and for additional convenience, the dataloggers could be started using their programmable auto start feature or bookmarked with a quick magnetic swipe to identify important moments in time. Each logger was rated at IP 65 with dust filter attached for durability against humidity, dirt, and other harmful conditions.

Personnel were able to quickly install the iLogs and retrieve them whenever needed. The dataloggers monitored the microclimate in tandem with the climate control system, covering the 'blind spots' in its fixed sensors. Functioning like portable weather stations for monitoring the greenhouse in detail, the humidity loggers gave key information on the microclimate, such as temperature drops or changes in the diurnal range, by linking the temperature to the humidity info. This combination of historic and current data was invaluable when growers collected comprehensive meteorological information to reduce risk to the crop by taking measures to limit the negative effects of uncontrollable environmental conditions. This allowed them to achieve optimum plant growth while minimizing disease risk. As opposed to walking up to a thermometer to read the temperature and recording it manually, all this climate information was stored on the data logger. The logger also aided in disease prediction from gray mold, powdery mildew, and other diseases which depended on temperature and humidity conditions, so the growers knew when to spray and when to remove infected vines.

Free Escort Console software was included with each iLog unit, expressly designed for ease of programming and downloading. The user-friendly, multi-language interface guided users quickly through data downloads and reconfiguring the datalogger, and also allowed growers to combine the readings of multiple iLogs into a single graph or list. The Escort software was also able to show dew point information for recorded measurements and automatically calculated predefined and/or user-defined formulae.

The greenhouse benefited in several short- and long-term ways from installing the iLog temperature data loggers. Most importantly, the iLogs provided constant temperature and humidity monitoring at high accuracy with customizable alarm settings. The iLog Temperature and Humidity Loggers made for an economic greenhouse fixture, as they were easily installed and retrieved by staff so that growers were able to get a comprehensive temperature and humidity profile of the environment and adjust conditions to obtain maximum healthy plant growth. Their programmable alarm feature was especially convenient when profiling the microclimate for disease prevention. The dataloggers worked easily in conjunction with the climate control system to verify its accuracy and measure the areas not covered by its fixed sensor. From transplantation to disease prevention, the entire growing process was modernized and correlated to further protect the crop, with all electronic recordings automatically stored for later evaluation with Escort Console software. The iLogs also provided the technology to improve the growers' documentation and understanding of the different temperature and humidity-sensitive processes at work, resulting in real cost benefits to the growers and a safeguarded, high-quality crop.

As an additional precautionary option, the iLogs could be interfaced to an **Escort Alarm Link**, connected in turn to an alarm system to alert the growers that temperature and humidity conditions had gone out of specification and corrections needed to be made immediately. This link activated an alarm device when detecting an alarm status by the actuation of an internal changeover contact.

For further information on the iLog Humidity Data Logger, the Escort Alarm Link, other ESCORT temperature dataloggers, or to find the ideal solution for your application-specific needs, contact a CAS Data Logger Applications Analyst at (800) 956-4437 or visit the website at www.DataLoggerInc.com.

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