

HELPFUL HINTS

ENVIRONMENTAL CONTROL COMPUTERS



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How do environmental control computers benefit horticulture?

The greenhouse environment must be accurately controlled to produce optimal conditions for crop production. In addition to controlling the humidity and temperature, environmental control computers can manage shade systems and supplemental lighting, control carbon dioxide concentration, schedule and sequence irrigation valves, and control the pH, EC, and temperature of the irrigation water. Because they integrate these functions into a single control system, environmental computers can manage the complex interactions between these elements providing the grower with a tool to optimize production.

Do they respond to both the greenhouse and outdoor environment?

Yes, greenhouses are very dynamic climates that are rapidly influenced by changes in outdoor conditions. Many environmental control systems use wind-speed, outdoor temperatures, and light levels to anticipate heating and cooling demands and to control the operation of heating and ventilation systems. This type of anticipatory control enables greenhouse control systems to manage set-points within narrow tolerances despite large fluctuations in external conditions. They also monitor windspeed and wind direction to protect vents from damage.

How can they minimize energy costs?

Computerized environmental controls help minimize energy costs by closely controlling the environment and by integrating and coordinating the use of all of the climate control equipment in the greenhouse. Better temperature and humidity measurement and integrated equipment control means that energy inputs can be delivered with more precision and less waste. For example, lighting systems can be operated when light levels fall below a certain threshold, saving money on electrical costs. The computer system can manage this intelligently, by measuring light levels and operating the lights in an efficient manner while protecting against equipment wear. Likewise, by considering outdoor conditions, the control system can help avoid using costly fuel for heating if it anticipates that outdoor conditions will soon cause a natural rise in the climate temperature.

Can they reduce chemical use?

Yes, by using the environmental control computer to closely manage humidity levels and temperatures, the incidence of diseases can be reduced along with the need for fungicide treatments. Internal air circulation equipment such as horizontal airflow fans can also be managed by the environmental control system. This helps create more uniform conditions and prevents the 'dead air' pockets where diseases can gain a foothold.

Can labor be reduced through an environmental control system?

Yes, environmental control computers can dramatically reduce the manual intervention needed from the grower to maintain the desired conditions. They do this by automatically operating equipment to achieve the desired setpoints over a range of external conditions. This not only reduces climate management time, but can result in better crop quality and crop uniformity, as well as reduced spacing, moving, and grading costs.

Can environmental control computers change crop quality?

Yes, because they constantly monitor and control the temperature, humidity, and light intensity, environmental control computers create the most uniform conditions possible. This increases uniformity in the crop, increasing the yields of salable product while reducing the cost of grading and space management.

Does the computer keep records and how can they be used?

Environmental control computers keep records of their sensor readings and equipment usage. This allows the grower to monitor past conditions and events that occur on nights and weekends. This data can be carried over from crop to crop and used as a

tool in crop timing and quality control. Equipment usage records can also help in planning maintenance schedules.

Can the computer help in plant modeling?

The data for most environmental control computers can be fed directly into manual or computerized graphical tracking programs. In many cases, the data can be passed electronically to computerized tracking systems without the need for re-keying.

Does the computer generate alarms?

An environmental control computer can generate alarms when it detects conditions that threaten the crop or equipment safety. Examples of alarm conditions include high and low temperatures, power failure, equipment failure, and any failure of the computer system to operate properly.

How will the computer respond during a power failure?

Environmental control computers retain all your settings during power failures. It is not essential for the computer itself to continue operating through a power outage since the equipment it controls cannot respond. If your standby generator doesn't have enough capacity to operate all the equipment, consider a computer

that can selectively shed loads while on standby. When power returns, the computer system can gradually turn on the equipment to protect against startup overloads. If you have equipment that operates on three-phase power, consider a computer that can detect phase failures, shutdown 3 phase equipment, and generate an alarm to protect your equipment.

How does the computer control the equipment?

The environmental control system uses programs specially developed for each equipment system. These programs are connected to computer controlled output relays which in turn engage or disengage each type of equipment according to the specific way it is operated. For example, the control system will operate your roof vents by turning on or off the drive motor(s) for each vent group to achieve the desired vent opening position. The control system will often use low voltage relays for switching the line voltage loads at relay control interface panels. Low voltage loads such as 24 VAC irrigation solenoid valves can often be operated directly using the low voltage relays supplied with the control system.

What kinds of sensors are available?

A broad range of sensors can be used with an environmental control system. Climate temperature and humidity sensors are usual-

ly supplied in aspirated chambers to provide the most accurate readings possible. Depending upon your needs, humidity sensors can be either electronic or wet bulb/dry bulb types. Electronic temperature sensors provide reliable, accurate temperature readings over the span of greenhouse conditions. Other sensors include pH, EC, water flow, equipment position, CO₂, light, wind direction, wind speed, rain detection, rain accumulation, and many other specialized sensors for each type of controlled application. Your environmental control system vendor can typically supply many of these sensors, and can provide interfacing to many other types of specialized sensors.

How can I learn to use my environmental control computer?

Environmental control computers now include so many features and options that most users need some help in learning to use them. You can learn more about environmental controls by contacting your NGMA greenhouse or environmental control manufacturers. Training and ongoing system support is an important part of your environmental control system.

What features should I look for in an environmental control system?

Greenhouse environmental control systems are available in a wide variety of formats, from very simple to full featured. In addition to the general features described above,

many systems have special capabilities that may be of interest to you. These include remote management, irrigation, nutrient control, boiler limiting, CO₂ extraction, heat recovery and storage, soil cooling, standby power, evaporative cooling, supplementary and photoperiod lighting, shading and thermal curtains etc.

Where can I get more information about environmental controls?

Contact the NGMA office for a free copy of the Environmental Control Guidelines or download it off the Web: www.NGMA.com. You can also contact your NGMA environmental control system vendors directly.



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