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Greenhouse controls made simple

7 tips to help you navigate the world of greenhouse controls.

By Patricia Dean

Clesen brothers, Tom (left), president, and Tim, chief executive officer, of Clesen Wholesale Flowers in Evanston, Ill., use the Internet to monitor environmental controls at a greenhouse range that is about 45 miles from their main location.

"Simple" and "controls" are two words many growers would not use in the same sentence. Wires and electricity stray far a field from the world of green and growing plants. But if you start with the knowledge that all things electrical in your greenhouse can be controlled, you're on your way.

Here are seven tips to help you navigate the world of greenhouse controls.

1. Make a map.

Draw a sketch of your greenhouse. Add an arrow pointing north. If your facility includes two or more gutter-connected houses, do you maintain the same conditions in all the houses, or do you divide them into different climate zones for at least part of the year? If you divide the houses, draw lines on your map to show the zones.

2. Take stock.

Now that you've mapped the houses, mark them with the names and locations of the equipment that heats and cools them. You needn't be a draftsman. Boxes with initials usually serve the purpose. A square with the letters "UH" for a unit heater, or a rectangle marked "EF2sp" for a two-speed exhaust fan will do.

3. Build an equipment table.

Before you can control the climate in a greenhouse, you need a list of the equipment you have to work with. The map you've made and the equipment stock you've marked on it are the raw materials for a table that collects useful facts about the equipment. Below is an example table, filled out for a simple hoop house.

Equipment, quantity, brand and model are all self-explanatory, but what about horsepower, volts, amps and phase? Fortunately, somewhere on each piece of equipment, there's a metal plate with this information stamped on it.

Horsepower and amps are closely related. For this reason, your equipment may be marked with one or the other, but not both. Make a note of the available information. The nameplates will probably show phase as either 1 or 3. These are the two ways the utility company can furnish electrical power to your greenhouse. If the equipment isn't marked, you can safely assume 1 is the correct value.

The value of volts can be confusing. Many motors are made to work with more than one voltage. You may see markings like 115/230 or 208/230/460. Record the information provided by the nameplate. Once you've filled in your table, you have the reference information you need to match a controller to your needs.

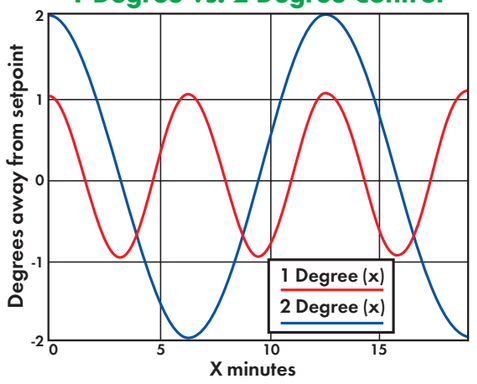
4. Think dollars and sense.

Consider your goals and how they fit your budget. Are you making the transition from no controls to thermostats or upgrading to analog or computerized controls? Though it seems obvious that thermostats are your lowest-cost alternative, that may not be true. Thermostats are far better than no controls at all, but they don't conserve energy as well as more sophisticated controls.

With the price of oil at nearly $70 a barrel and driving up the price of other energy sources with it, an important part of the cost of controls is the energy they use, or save. The chart below shows an estimate of the way temperature changes with controllers that can hold a greenhouse within 1 or 2 degrees of its set temperature.

Equipment	Quantity	Brand	Model	Horsepower	Volts	Amps	Phase
Gas unit heater	2	Modine	PSH150	⅛	115	?	1
Exhaust fan	3	Acme	DC36G	½	115	?	1
Gable vent	1	Wadsworth	VC-100A	1/20	115	?	1
Pad pump	1	Acme	#159	¼	115	?	1

1 Degree vs. 2 Degree Control



If your intuition tells you it takes more energy to follow the blue 2-degree curve than it does to follow the red 1-degree curve, you're right. The heat runs twice as long for the blue curve as it does for the red one. Thermostats typically react to 2°F to 2½°F temperature changes. Computerized controllers easily track 1°F changes. That means a computer control can save half your energy bill in spring and fall when heat cycles on and off.

You can purchase a greenhouse computer control for as little as $1,000. Heavy-duty thermostats that do the same job cost $600-$800. Consider your climate and your energy bill. Chances are good that you can recoup that $200 difference in as little as a year.

5. Pick a partner.

Though greenhouse operators must wear many hats, there's no need to try to be a complete expert on everything. Many areas seem to have growers who are innovators and leaders in some aspect of the business. Find out what leading growers in your area are doing, but use common sense. Even the leading growers can make mistakes.

Make use of sales representatives who call on you regularly, as well as some who don't. No one builds a new structure every year, but the salespeople who handle structures are often great resources for the equipment and controls that go into them.

Take advantage of toll-free numbers and Web sites of control companies. Collect the information and trust your common sense. The person who's listening and responding to your situation will want to study your map and your list of equipment.

Make sure the companies you are considering specialize in greenhouse controls and have experts to assist you. Think longevity. Your rela-

tionship with a control company will span over a decade, so choose a reputable one with solid tech support.

6. Find out the full price.

The control picture you see in a company's product catalog, and the price that goes with it, don't tell the whole story. You'll almost always need to add items shown as options or accessories before the controller works. The controller will need a temperature sensor and cable to operate properly.

Few controllers connect directly to equipment like fans and pad pumps. You'll need an additional piece of equipment, called a contactor panel, to complete installation.

Finally, think about the lifetime cost of the equipment. Will the vendor you are interested in doing business with be available for service and support in five, 10 or even 20 years? Or will you have to discard the controller and replace it even if it only has a minor problem?

7. Take back your time.

Even the most basic controls automate tasks that you otherwise have to do yourself. A motorized vent with a thermostat opens and closes as needed, even on the weekend, and allows you to spend time away from the greenhouse.

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Making a greenhouse map and listing the heating and cooling equipment you have will help you determine what is the most economical and efficient way to control the growing environment.

CURTAINS CAN CUT COSTS

If you use your greenhouse year-around, but don't have an energy curtain, your heating dollars are escaping through the roof. Modern systems can reduce winter heating costs by 30 percent or more and reduce your summer cooling needs. Depending on the size of your greenhouse, motorized energy curtains cost about $2 per square foot, less for larger houses.

Talk to growers who have curtains. Many report that their systems paid for themselves in two years. As an added incentive, government and utility companies offer tax relief or subsidies for businesses that invest in proven energy conservation technologies like curtain systems.

A good place to start your research is the Association for Better Insulation's Web site (www.betterinsulation.org/energy/index.html). This site will let you find out if energy rebates are available in your area.

◆ ***For more:*** *Association for Better Insulation, 5350 Louisville Road, Suite 93, Bowling Green, KY 42101; (800) 664-0063; www.betterinsulation.org.*

Thermostats (shown) typically react to 2°F-2½°F temperature changes while computerized controllers easily track 1°F changes. The difference in accuracy can save half your energy bill in the spring and fall when heat cycles on and off.