

W inter 2004

There's always something to worry about when you operate a greenhouse. As winter approaches in the northern parts of the world, it's time to shift from worrying about cooling to worrying about heating. Will your heating equipment get you through another season? (If you're reading this in the Southern Hemisphere, this is your winter issue six months early!)

We are always delighted when customers tell us how the monitoring and alarm features on their Argus systems saved them from a major catastrophe. Likewise, we are just as saddened when we hear of a disaster that might have been averted had the customer used an appropriate alarm.

Accordingly, we've decided to devote this entire edition to making the most of the monitoring and alarms features of your system, particularly for managing critical failures.

As we've said many times, every Argus system is really three systems in one:

- **A real-time control system**
- **A monitoring and alarm system**
- **A tool for data collection and graphical analysis**

By making good use of all these features you'll get the maximum benefit and peace of mind from your Argus system. From all of us at Argus, best wishes for a successful season.

Sincerely,



Alec Mackenzie



ARGUS ADVISOR

News for Argus Control System Owners

Managing Critical Failures

"The most dangerous system is the one that 'cannot fail'"



Frost Damaged Chysanthemum

Everything we do involves some risk. We can never know with certainty what will happen in the future. Producing crops in greenhouses has certainly reduced many of the traditional farming risks that are related to weather. However, it has also added a host of new risks that result from growing plants with complex equipment systems and structures. There are a lot more ways to kill a crop with a greenhouse!

As a grower, you contend with all sorts of risks. These include production, marketing, financial, legal, and environmental risks. Your Argus system can't protect you from all of these, but it can play a key role in managing production risks caused by equipment failure and human error. Devising ways



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to prevent trouble in the first place is paramount, but you still need a backup plan to contend with the things that you can't prevent. That's where your Argus system can be a real life-saver. You can use it to keep an eye on all of your other equipment systems. The sooner you discover a problem, the better your chances are of heading off a catastrophe.

You can prevent most production disasters by anticipating the potential sources of failures and developing contingencies in advance for dealing with them. This involves:

- ✓ **Identifying the Risks**
- ✓ **Prevention Strategies**
- ✓ **Intelligent Monitoring and Alarms**
- ✓ **Preparing for Emergencies**

Identifying the Risks

To guard against disasters and prepare for them should they occur, you need to assume the worst. Take a walk around your operation and ask "what would happen if...?"

Look for vulnerabilities in every equipment system, and imagine the consequences if a motor dies, a pump fails, or a transformer blows. This will help you to identify critical failure points.

Prevention

Obviously, the best way to avoid a catastrophe is to prevent the events that lead to it in the first place. Try to design as much safety and redundancy as you can into your equipment systems. Some common examples include:

- ✓ **Use more than one piece of equipment to accomplish the job. For example, use dual heat transport pumps and multiple ventilation fans.**
- ✓ **Use backup systems such as spare boilers or CO₂ burners as emergency heat sources.**
- ✓ **Use 'day tanks' on nutrient systems to minimize overdosing risks by limiting the amount of fertilizer that can be administered.**
- ✓ **Install manual or emergency cranking**

- ✓ **mechanisms on roof vents.**
- ✓ **Use a water storage reservoir to avoid supply interruptions.**

If you can't reduce your sole dependence on a critical component, make sure you have a fast, reliable way of detecting a failure, and keep a stock of essential replacement parts for quick repairs.

The Human Factor



No matter how diligent you are, you can't prevent all human errors. Anyone can make a mistake such as entering a wrong control setting or forgetting to switch on a circuit breaker. Proper training, warning signs, and checklists can help, but you need to expect that some mistakes are going to happen anyway and try to be ready for them. Comprehensive monitoring is often your best defense.

Monitoring



Unfortunately, you can't avoid every problem through prevention alone. Backup systems can fail, and hidden flaws seem to appear at the

worst of times. For this, your best option is monitoring. It can be indispensable for all types of failures, whether or not they produce catastrophic effects.

Your Argus system is loaded with alarm monitoring features. Like a canary in a coal mine, you can use your system as an early warning device.

- ✓ **All sensors have failure detection settings.**
- ✓ **Many control programs have built-in features for alarms and safety overrides.**
- ✓ **You can configure event records and individual alarms to monitor almost any condition.**
- ✓ **Alarm priority and annunciation control settings let you define when and how you will be alerted.**
- ✓ **You can define some alarms as critical and others as less important management-related alarms.**

Unfortunately, many Argus customers tend to under-use the monitoring and alarm capabilities of their systems. Too often, we've seen where a simple alarm, had it been enabled, could have detected a mistaken setpoint entry, or a stuck valve long before damage occurred.

As a minimum, you should use the alarm features of your system to monitor as many of the 'crop-killer' conditions as you can. This includes high temperatures, low temperatures, humidity, irrigation events, moisture status, nutrient strength, and pH.

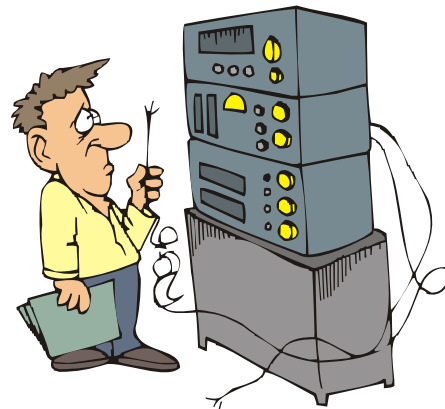
Comprehensive monitoring is also the key to a successful "management by exception" or "run it till it breaks" strategy. This is not as irresponsible as it sounds. You can use your control system to watch for the early effects of a wide range of failures. What's more, monitoring is often free, since you can use the same sensors for alarm monitoring that you use for equipment and climate control.

For example, a low temperature alarm in a climate will alert you to a heating problem, regardless of the cause. Since the temperature sensor 'sees' the common effect of a wide range of equipment failures, it is a highly effective way of protecting your crop.

Where practical, you can also install a few specialized equipment sensors to provide early warnings of specific problems and keep an eye on equipment performance.

For example, by mounting an inexpensive temperature sensor in the outlet air stream of a unit heater, you'll be alerted to a heating failure as soon as it occurs, saving valuable minutes before the climate temperature sensor detects the problem.

Monitoring Systems Can Fail Too



Though they have generally proved to be considerably more reliable than the equipment they control, Argus systems are machines, and all machines can fail. By far, most 'system failures' result from mishaps like cut wires, power failures, wrong settings, sensors in the wrong place, or manual overrides left in the wrong position.

Fortunately, your Argus system has many built-in features designed to minimize the chance of a problem in the first place, and to let you know as soon as one occurs. Provided the failure is attended to promptly, you can generally recover by simply operating the manual equipment overrides until automatic control is restored.

Avoiding Complacency

Automatic monitoring is never a substitute for diligence. Alarms are not something you can just 'set and forget'.

Make sure your alarm annunciation strategies are complete and thoroughly tested. You should regularly review the alarms and event records on your system to make sure they are enabled, properly configured, and appropriate for the situation.

Your monitoring needs may change with the seasons. Try to take time to regularly review critical settings. In particular, examine any equipment that is set to manual and any alarms that are disabled. Should they be this way?

Emergency Response

Having identified the things that could go wrong, and the ways to best prevent and detect them, it's important to make plans for responding to emergencies when they do occur.

Is the phone dialer turned on and connected?

What if the phone lines go down?

What if no one is home to receive an alarm call?

When was the last time you performed a complete alarm system test?

Have you stocked the essential spare parts?

Have you made arrangements for emergency electrical repairs?

Does everyone know what to do in an emergency?

Obviously, not all disasters are avoidable. Forces of nature pose a constant risk that we must all live with. Nevertheless, to be successful, we need to take reasonable precautions against those things that we can control. With your Argus system, chances are you already have the tools you need to make this a catastrophe-free season.

Monitoring Ideas

Tank Levels

There are many ways to measure liquid volumes. You can use simple float switches for high and low level alarms. If you need full-scale volume measurement, you can also use submerged pressure sensors, ultrasonic depth sensors, or load cells to measure the tank weight.

Pump Failure

Strap an inexpensive temperature sensor to the outlet connection on an irrigation pump. If the pump runs dry or deadheads, the sensor will detect the resulting heat buildup, indicating a problem.

Heat Stress

An infra-red sensor can monitor a section of your crop for signs of heat or moisture stress. On sunny days, any significant rise in leaf temperature above the ambient air temperature can be a sign of stress.

Lights

A temperature sensor mounted on the lamp reflector can be used to confirm lamp operation. Inexpensive light sensors similar to the ones used in motion detectors can also be used.

Vent Operation

Some vent motors are equipped with position sensors. You can also use sensors that detect vent opening, or sensors that measure drive shaft rotation.



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