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ARGUS ADVISOR

News for Argus Control System Owners

As we begin another season it's a good time to review the performance of your control system and your controlled equipment. In support of this, we've included items on equipment cycling and sensor calibration in this edition of the Argus Advisor – topics we are often asked about.

The past year has been a very busy one at Argus. We successfully introduced our new Titan system into mainstream production, and it has been generally well received in the field. Notwithstanding the usual startup issues associated with the introduction any new product, we have been very pleased by the performance of our new systems and we are steadily making improvements and adding new hardware and applications as the system matures.

We've recently added a complete evapotranspiration model for outdoor irrigation and enhanced capabilities for data exchange with other applications and systems (see the item on the new Supervisory Control Guardian).

2007 was a very strong year for sales at Argus and we added many new customers. We'd like to take this opportunity to welcome you all to the Argus family and to also wish our long time customers all the best for another productive new year!

Alec Mackenzie

Excessive Equipment Cycling



Argus systems are used to control many different equipment types used in a wide range of configurations and applications. The system translates your climate objectives into equipment control responses. However, if these responses are not carefully matched to the capabilities of your equipment, poor control and excessive equipment cycling could result. This can cost you a lot of money in equipment wear and tear, premature equipment failures, and losses resulting from not achieving your control targets.

The control system must serve two masters - your equipment must be operated within its limitations, while still achieving your final control objectives. This can require significant attention to sensor selection and location, equipment selection and sizing, and tuning of the control response to achieve the best compromise between equipment operating costs and good control.

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Take Control With Argus

Excessive on/off cycles or constant position changes can cause premature equipment wear without any practical increase in control effectiveness. Some possible causes include:

- **Poor location of feedback control sensors** (sensors cannot 'see' the immediate results of the control effect).
- **Inadequate time integration** (averaging) of sensor readings. Short term 'process noise' (small, often random fluctuations in process measurements) can cause unnecessary equipment response if not filtered out using time integration.
- **Competing setpoints** that are set too close together. For example, narrow dead bands between heating and cooling targets can force the control response to 'bounce' between heating and cooling modes.
- **Incorrect tuning settings.** The control system may be incorrectly 'tuned', causing inappropriate equipment responses. This in turn can cause a never ending series of adjustments and counter adjustments as the control system attempts to achieve the correct response.

Detecting Equipment Cycling Problems

- 1 **Watch the process directly.** You can detect some equipment cycling problems by simply standing in the greenhouse. For example, if roof vents seem to be constantly adjusting, there could be a tuning problem (keep in mind that rapidly changing weather conditions may cause a lot of legitimate vent movements).
- 2 **Let Argus do the watching.** Use data recording to examine the operational history. This is the most comprehensive way to detect equipment cycling problems. By recording the output positions of all equipment you can quickly review their movements over time in graph reports. Overlaying other related items such as the climate temperatures and weather conditions can help you to judge whether the amount of equipment operations was necessary.

Keep in mind that data recording averaging may 'hide' some short term fluctuations, so you may have to read between the lines a little. With event recording you can also count the daily on/off cycles of equipment systems and set maximum

threshold alarms to alert you of potential problems.

Preventing Excessive Cycling

Set reasonable control targets and use slow setpoint change rates. Don't 'slam' your control system by making sudden drastic target changes. Changes to the greenhouse environment should be made as slowly and smoothly as possible, like driving a car with an egg on the dashboard, not like you are trying to win a NASCAR race. The same strategy applies to shared common equipment such as boiler systems. For example, you cannot avoid the simultaneous increase in heat demand across all heating zones as the sun sets on a cold winter day, but you can spread this load out by using different start times in each zone for ramping to the night targets. This will also reduce the risk of boiler shock. In this way, all your heating zones won't come looking for the maximum heat supply at the same time. This will make it easier on your equipment, and you'll avoid sudden sharp changes that often take several cycles to dampen down.

Set control targets that work *with* the natural inputs and time lags that are driving the controlled processes rather than fighting *against* them. For example, turn supplementary lights on a few minutes *after* a scheduled temperature setpoint ramp down rather than just before. This allows the heating pipes to cool down in anticipation of the additional heat produced by the lights. Conversely, turn the lights on a few minutes before a setpoint increase to allow the additional heat from the lights to 'help' the heating system warm the greenhouse. The same consideration should be given to thermal curtains and other interactive system components.

There are many tuning settings throughout your Argus system for managing process lags, sensor 'noise' or 'jitter', and the overall aggressiveness of control responses. Be careful when altering or adjusting any of these tuning values. Generally the default Factory values should be used as a starting point. Make sure you understand the consequences and keep a close eye on the number and frequency of equipment operations after you make any changes. If you do spot an equipment cycling problem, it is usually best to call Argus for assistance.

Sensor Calibration

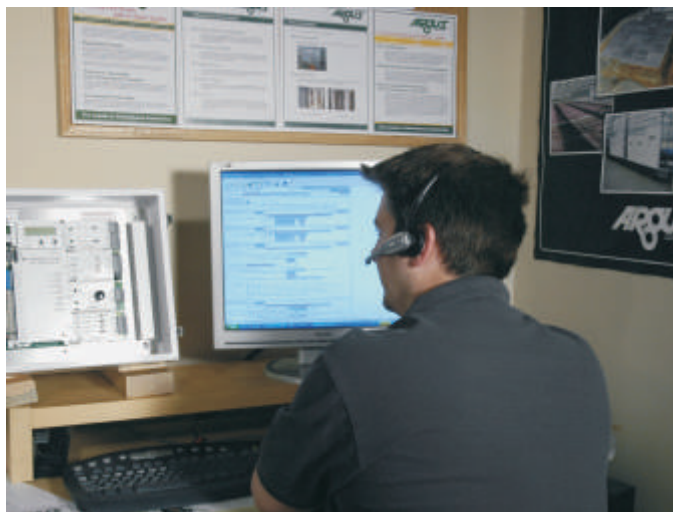
We are often asked about the need for calibrating sensors. The standard sensors supplied with your Argus system have been specifically selected so that they do not require routine calibration. Most will provide a long and stable service life without any need for calibration. Others, such as pH and RH sensors may require periodic calibration checks. However, with few exceptions, sensors should probably be replaced once they begin to drift.

Recalibration should be the *last* step in attempting to correct a sensor reading problem. Calibration is a process for mathematically correcting a reading error within the sensor. However, if the source of the error is something outside the sensor, such as corrosion at the connection terminals, recalibration will only mask the problem. Therefore, you should only resort to recalibration after all other possibilities have been exhausted.

Unless the reading error is very large, diagnosing and correcting sensor reading problems in the field can be a time consuming challenge. After eliminating other causes, sometimes the best alternative is to try replacing the suspect sensor with a known good sensor. For more information, Argus has prepared a short document called **Sensor Troubleshooting**. You can find it on our web site at <http://www.arguscontrols.com> or contact us and we'll send you a copy.



Remote Service Access



For most service issues, Argus uses the built-in client/server utility of the Argus Operator program for remote access to your system. This is the same utility you can use for accessing your system over a LAN, phone modem link, or the Internet. Occasionally we are asked by customers to use remote desktop applications instead. These can include VPN, PCAnywhere, and various Windows Remote Desktop access utilities. Unlike the native Argus client/server utility, these involve a third party or operating system utility for taking over full control of your Argus Server PC from a remote location. There are several reasons why we prefer not to do this:

- It is much slower than our Client/Server software
- It 'ties up' your Argus server PC
- Access issues, connection problems, and 'drop outs' are more common
- There are security and liability issues – we only need access to your Argus program, we don't want full control of your PC and access to all your files!
- There are too many versions of these programs for Argus to support.

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Our native Argus client/server utility has proved to be a very fast and secure method for remotely accessing your system. We highly recommend you use it instead of remote desktop applications. This will also help ensure you receive prompt, efficient service from our technical support staff.

data being received and it also sets safe threshold limits for any values that are being passed to it.

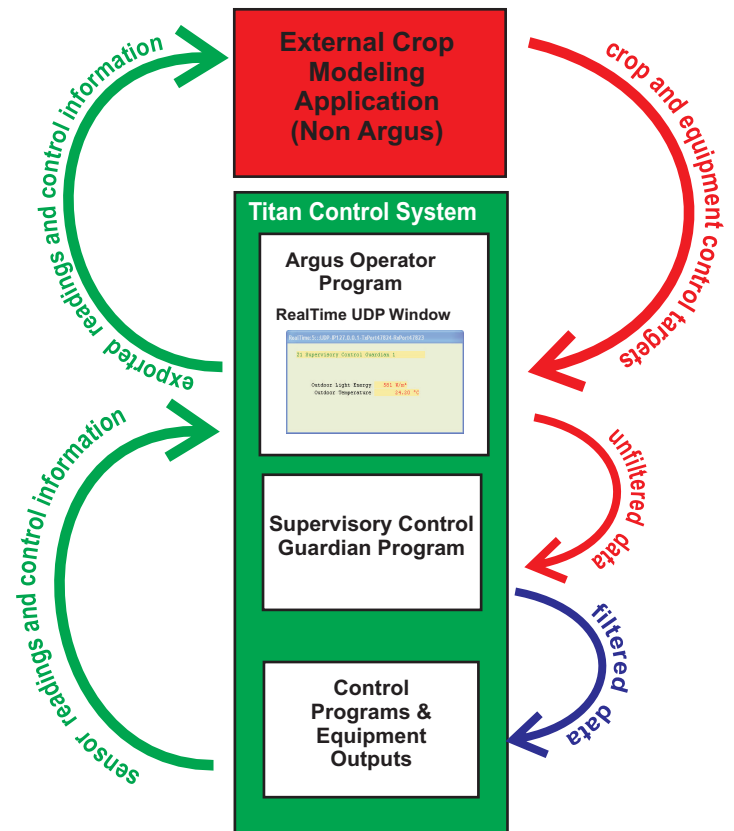
For more information please follow the link on our web site to the full article: **Crop Modeling and Automated Control Systems.**

New Supervisory Control Capabilities for Titan Systems

We are continuing to add to the list of capabilities for the new Titan system. The latest program developed is a Supervisory Control Guardian together with support for UDP (a communications protocol for transferring data between computers). This allows for the exchange of data and control instructions between the Argus system and other external programs.

This new program will be of interest to researchers and commercial growers who are working to develop or use crop models and other decision support applications. The usual goal of these applications is to use feedback data from the crop and climate along with collected data made from previous growth studies to make predictive control decisions needed to sustain optimum growth.

Researchers can now link their models directly to the Argus system to receive sensor readings and other control data. If their models also make decisions about any changes needed in the control setpoints, these instructions can be passed to the Argus system through the Supervisory Control Guardian program. The program helps to ensure the integrity of the



Control Questions?

Do you have a control question, topic, or comment that you'd like to see in our newsletter? Drop us a line or an e-mail and we'll try to answer it in an upcoming issue.