XR3000 II Quick Guide
Cranberries

The XR3000 and XR3000 II system provides a unique set of scheduling logic that allows for many different agricultural applications to be applied using a single control system. However, given that this system can provide many varieties of specific use cases, from simple to complex sets of logic, it also requires developing a good knowledge of how to build schedules or control from remote telemetry radios to ensure proper applications are being done.

Starting with code levels 1.56 and 11.56, this has been simplified for specific applications to make programming easier for the user.

An overview of the system.

IAS XR3000™ and IAS XR3000 II™ Agent Model

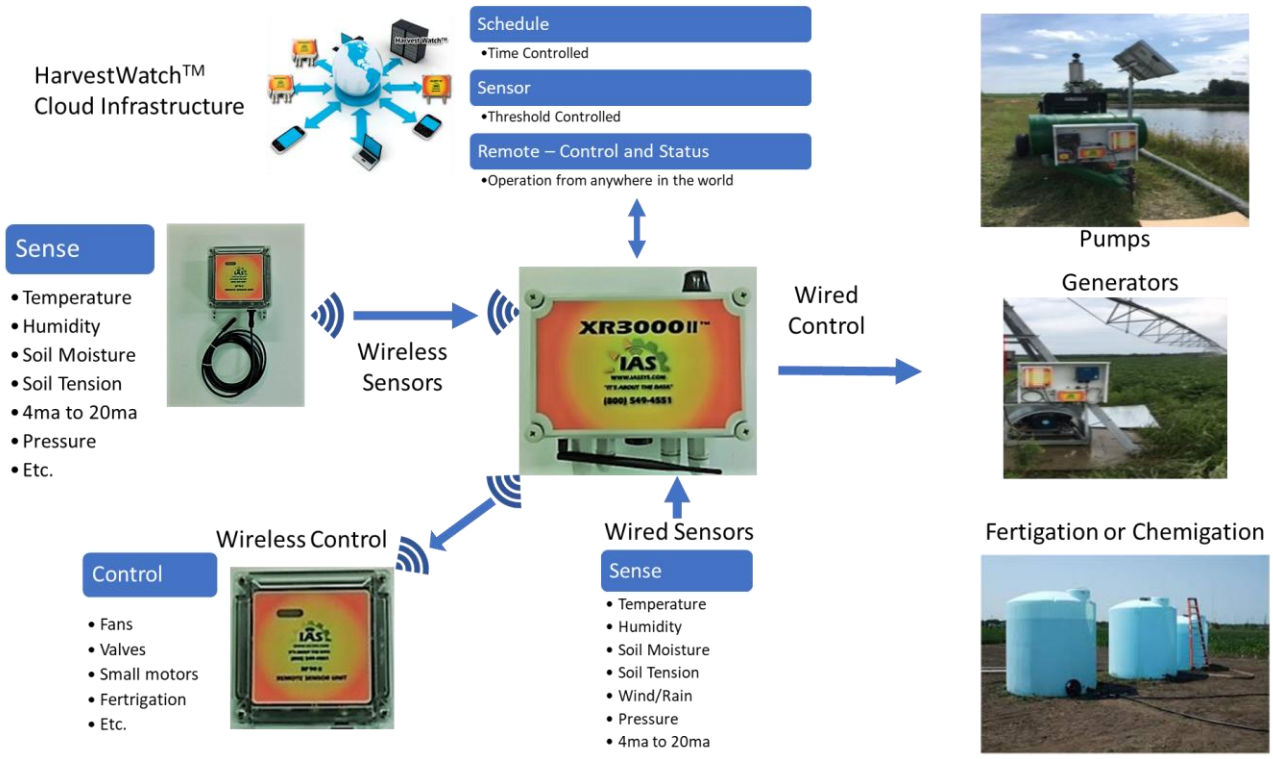
Is a cloud connected telemetry device with I/O. All sensors, outputs, and 8 channel Configurable Logic Controller (CLC) can act autonomously as an 'Agent' of the customer. Device access is through an internet accessible account under IAS Harvest Watch.

Inputs:

- 4 Ports for *IAS Intelligent Sensors™*
- 8 Wireless Radio Sensors

Outputs:

- 8 5A Programmable Outputs, Input thresholds can be set to control corresponding outputs
- Configurable for both remote and autonomous control.
- Automation configurable from intuitive, single page web interface
- RS485/Modbus interface - compatible with all major automation controllers and panels (IEM 2020, EMS Pro, MPC 20, etc.)
- Solar panel ready to maintain battery charge



Chapter 1 - Creating an Irrigation Process

Cranberries generally only utilize a single output function to either run an engine based irrigation pump or an electric motor based irrigation pump. The output configured to be used for either pump or engine is wired in the factory as output 1 in the XR3000 II. This output is wired to the Murphy engine controller in the case of engine systems or a contactor relay in the electric pump systems. ***See installation specific documentation.***

The control for this output can either be set by a time-based schedule, and/or by remote access to the XR3000 through Harvest Watch, and/or with automation from the Telemetry Radios known as an RF90 II. Your RF90 II will have been configured and tested in the factory for temperature measurement capability. There can be up to 8 RF90's configured to a single XR3000 for protection in multiple locations that may be under the purview of a single pump. Also available are RF90 Radios with Soil Moisture measurement capability.

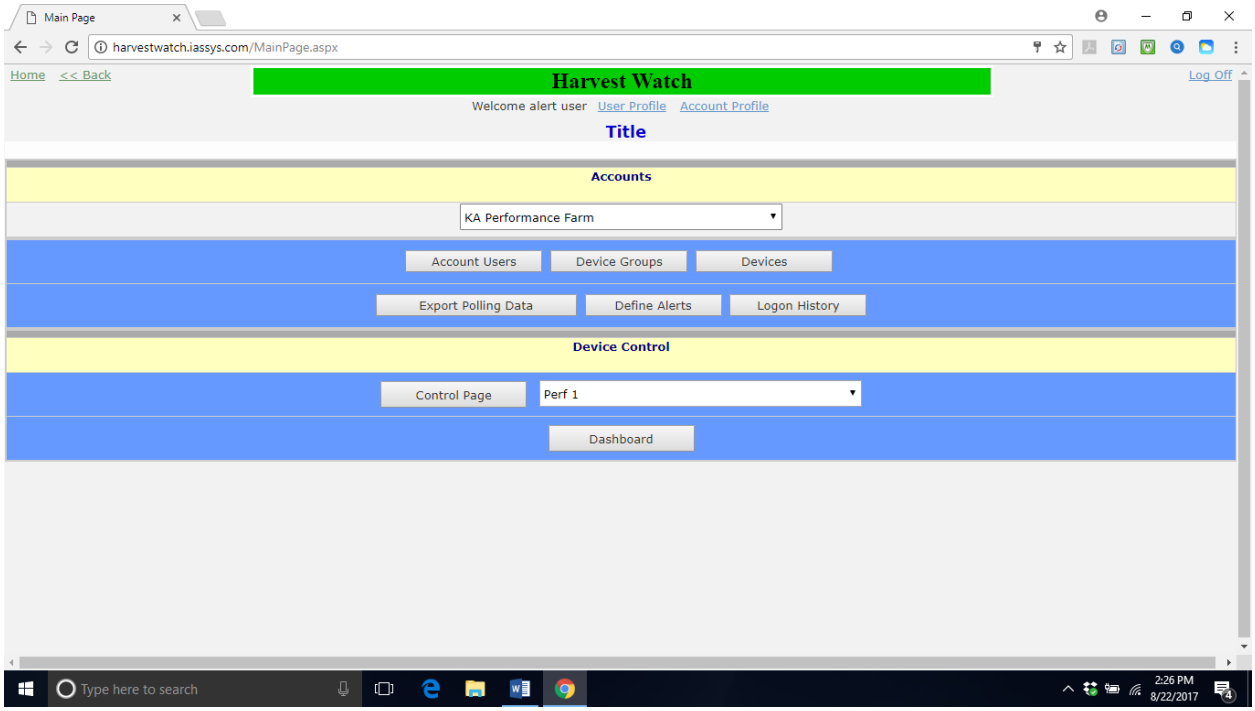
For engine based systems, reference the MPC Operations Manual:

https://support.enovationcontrols.com/hc/en-us/articles/115010637727

Setting up these parameters and alerts is done through Harvest Watch.

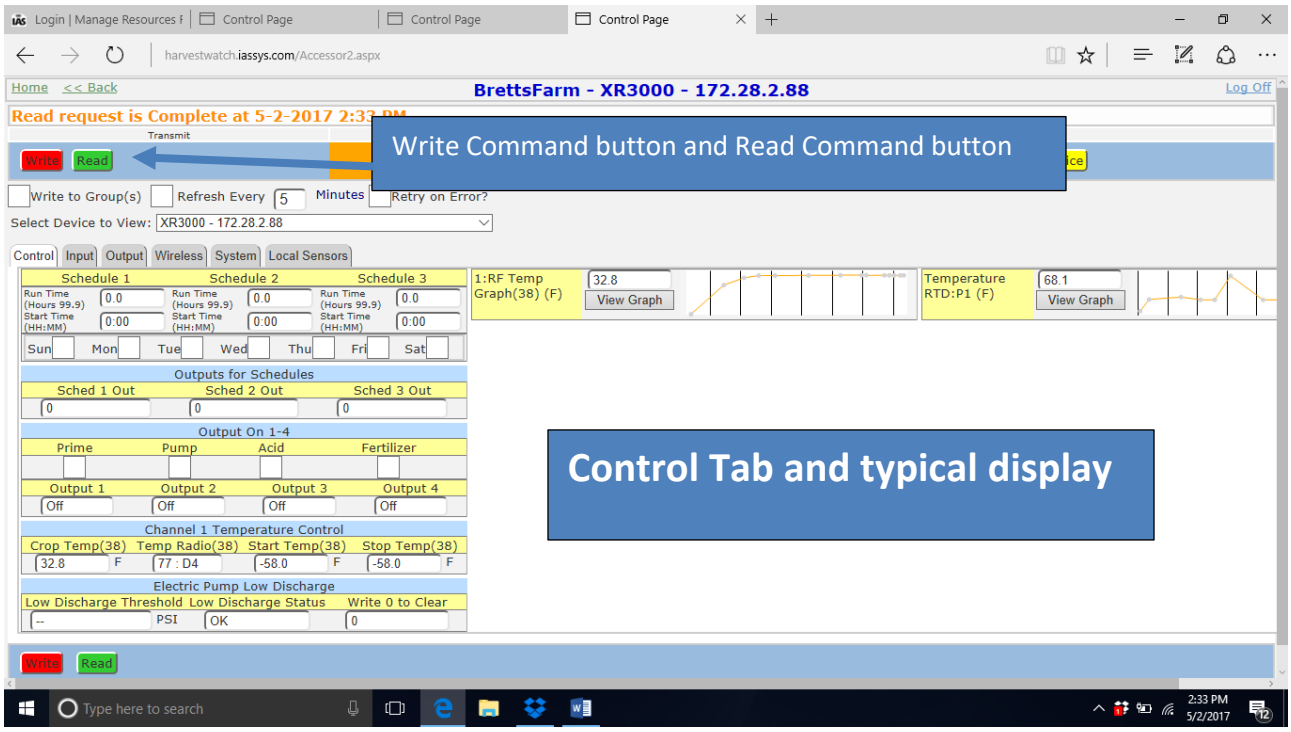
http://harvestwatch.iassys.com

Contact IAS for adding accounts and additional users.

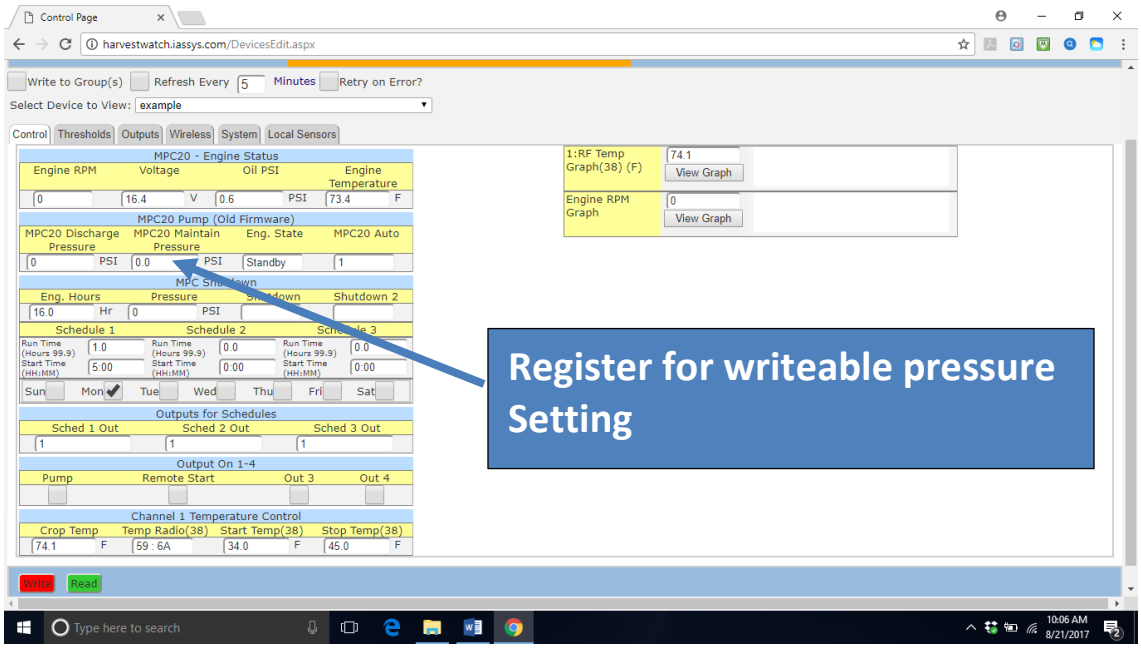


After login in to HW, on the main page for your specific system in Harvest Watch (HW) there are 6 tabs under the control page, some of these tabs are used for system configuration information, Wireless, System, Local Sensors. The other tabs are to be used for defining how to control the irrigation process. See display 1 for an Electric Pump operation and display 2 for a typical engine based operation.

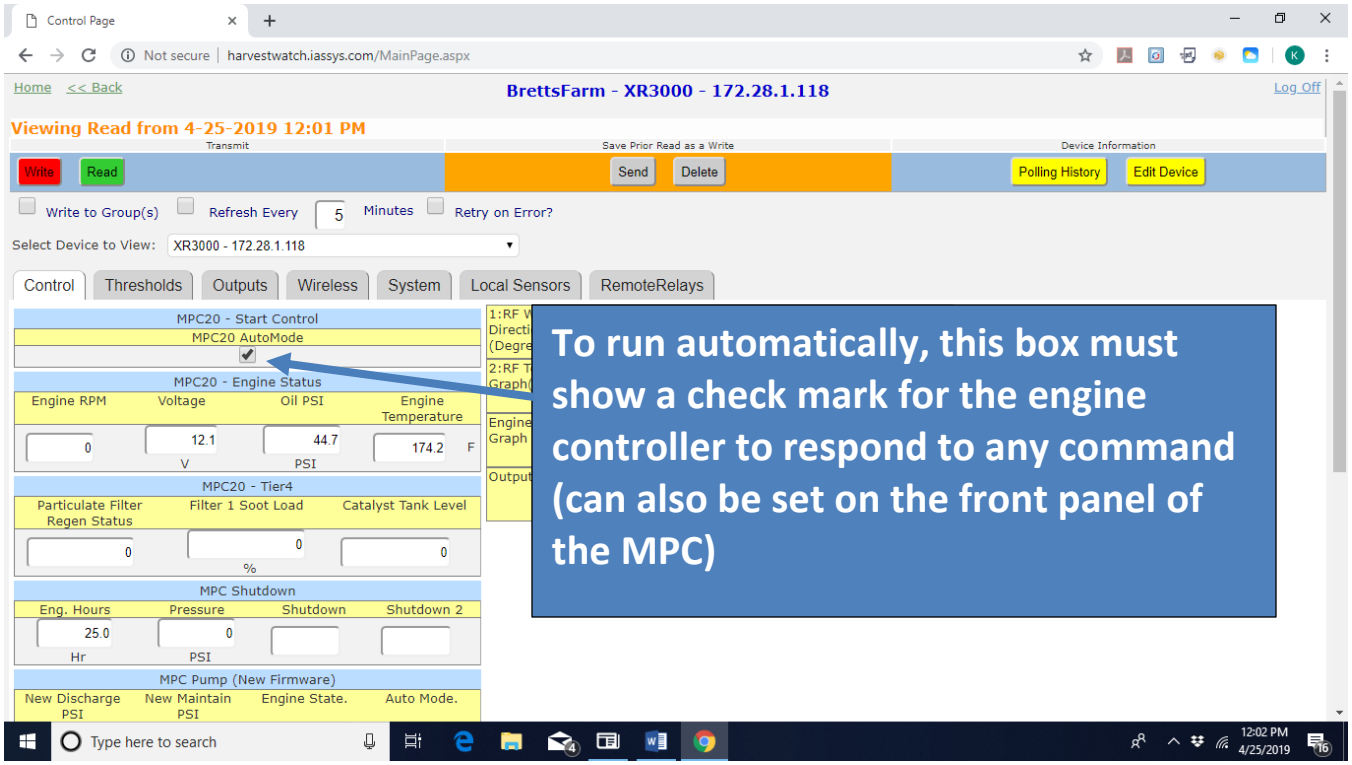
All changes require a "Write" to the device being programmed. ***Always perform a read after write to verify the change successfully transitioned over the cell network. Cell networks may drop packets normally just like when you hear spaces in your cell phone calls.***

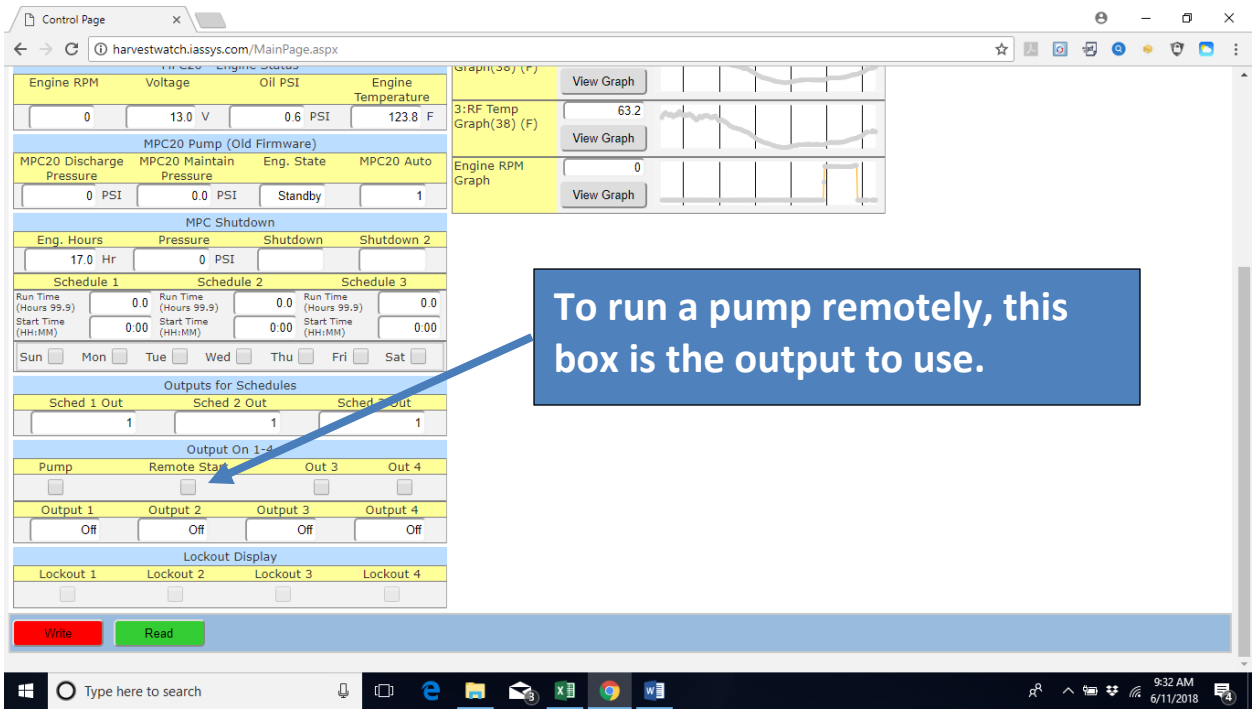


Display 1



Display 2





Prior to any control setup, you will want to verify that in the System Tab, on the bottom right, that the "Mode" has been configured. Each one is defined by entering a numerical value in the " xx" box.

Cranberry = 01

These modes predefine certain programming requirements to simplify setup and use. As an example, the user will not need to be concerned about “lockouts” since these will be automatically calculated based on time entry in the schedules for time based operations. Other elements such as assigning “Schedule Out” is also predefined, but also cannot be changed. With this in mind, we’ll concentrate on the inputs an operator must define.

Default is reserved for advanced programing and should not be used in general cases as improper irrigations cycles may result. If advanced programming is required, contact IAS for the manual and support.

For automated control of the pump based on a bog temperature, the input tab (Display 2 and 3) will need to be configured to enable this feature. If using multiple radios from more than 1 bog on a single pump, each radio’s threshold will need to be set in the threshold tab.

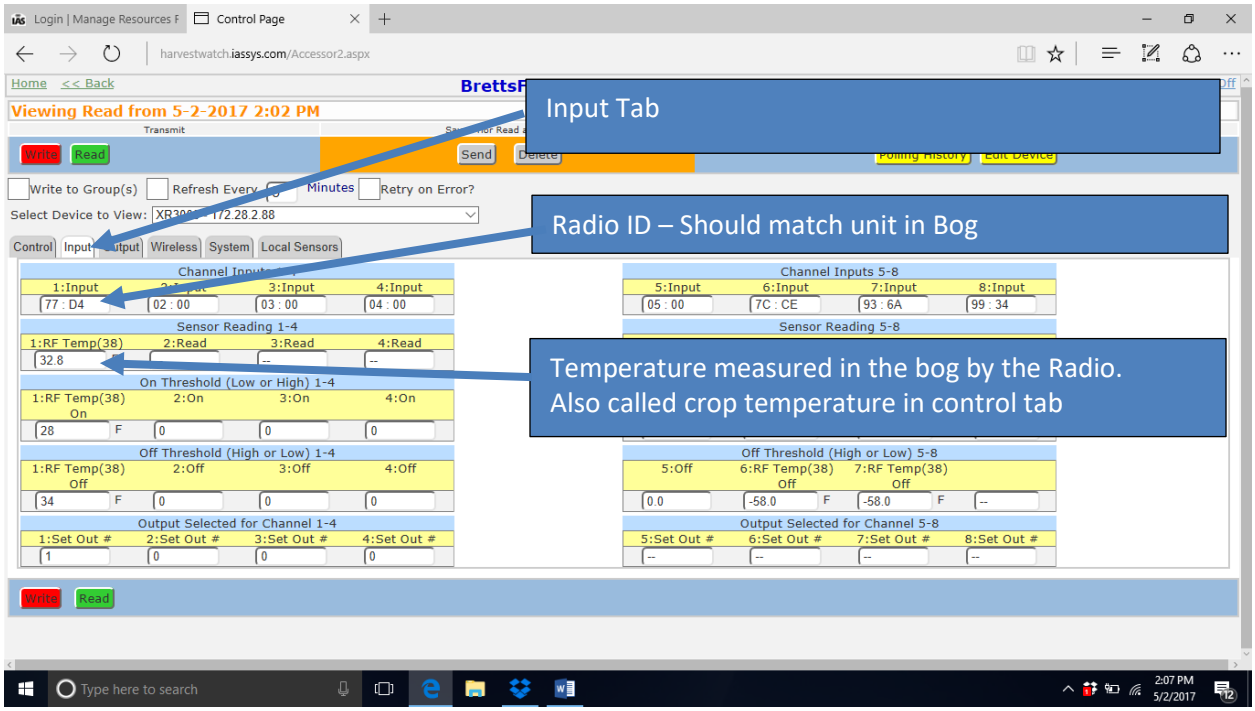
Cranberry mode also presets the mulitradio operation for threshold triggers to act in a specific way. When a triggering temperature is reached by any radio in the assignment, the pump will start. Later, when the off threshold is reached, ALL radios must meet the off threshold for the pump to shut down.

Go to the input tab, the Radio tab(s), it should match the same 4 character code of the unit placed in the bog being monitored, which has been labled on the side. If it does not match, you may need to reassign the radio.

The next box down now shows what the radio is reading for an external temperature by the probe placed in the plants, RF Temp. Display 3.

To control the pump on and off cycles by remote temperature monitoring, you will need to set these values in the next 2 boxes for channel one, see display 2. For cold temperature protection, you will want to set your “on” temperature at a point above your critical freeze temperature, give yourself room for variation, temperature can vary across the bog. Display 4.

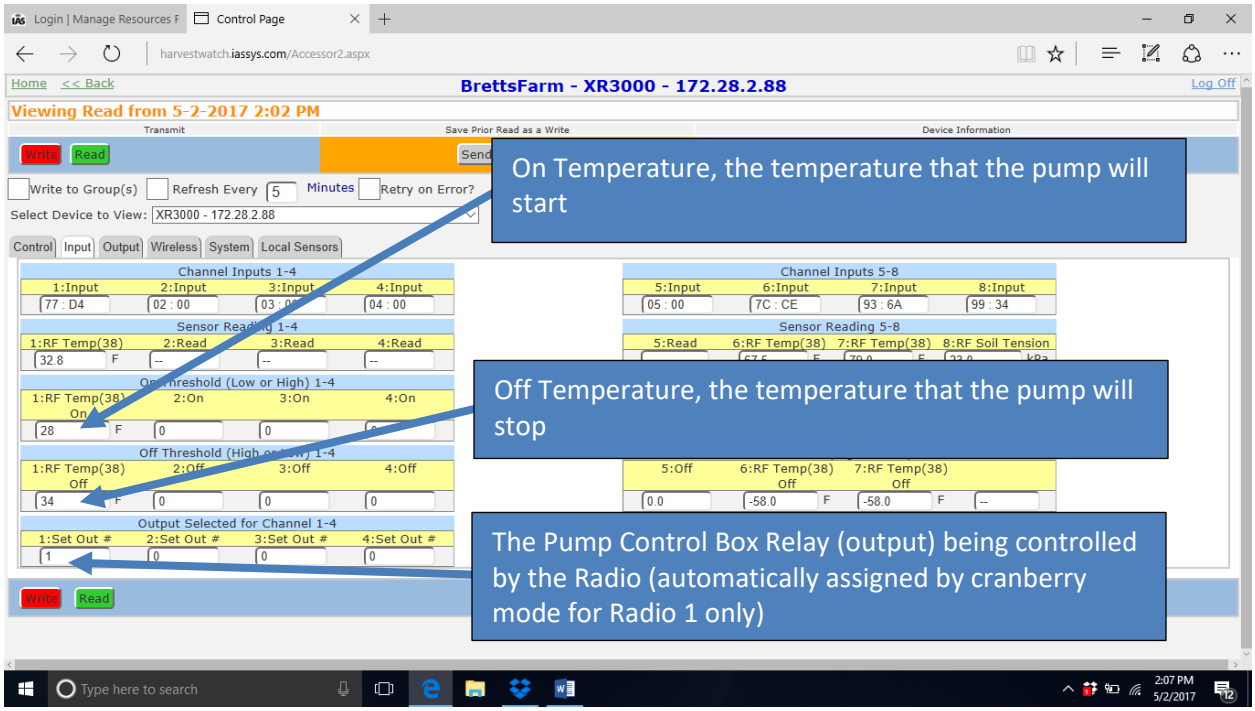
Next enter an off temperature setting so that the pump turns off when the temperature rises.



Display 3

If you are using more than 1 Radio for control you will need to set the “set out #” for each additional radio to control Channel 1 or other channels if desired. Mode only pre-defines this for the first radio as this is the most common case.

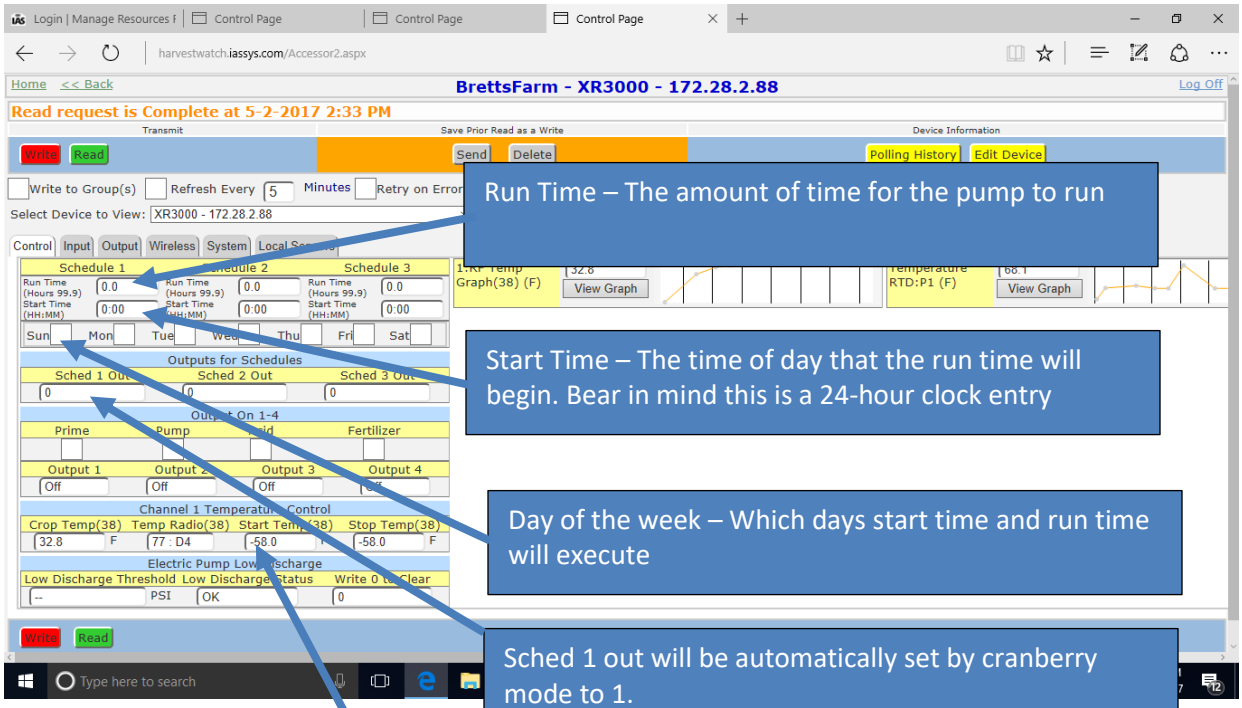
For single radio operations, there is a control block that enables a display in the control tab for setting on and off thresholds for Radio 1 ONLY. If you are using multi radio setups, you must set your thresholds on the remaining radios in the Thresholds Tab. (Display 5)



Display 4

For time based operations, we will now focus on the Control Tab. Display 5. Again since all cranberry operations have standardized on a single output for control, output #1, you will only need to worry about entering “Run Time”, “Start Time” and “Day of the Week”. Mode has automatically assigned these 3 values to run your schedule and there is no need to enter any “CH Trig”, “Delay”, or “On Time” in the output tab anymore. This is now reserved for advanced programming in specific cases, consult your IAS representative for such cases.

Simply enter “Run Time” in Hours X.X format, “Start Time” in 24 hour format and the “Day(s) of the week that these times should run.


Run Time – The amount of time for the pump to run
Start Time – The time of day that the run time will begin. Bear in mind this is a 24-hour clock entry
Day of the week – Which days start time and run time will execute
Sched 1 out will be automatically set by cranberry mode to 1.
Convenience display: Radio 1 Only Threshold settable in control tab with "Channel 1 Temperature Control"
Greater than 1 radio, thresholds must be set in thresholds tab.

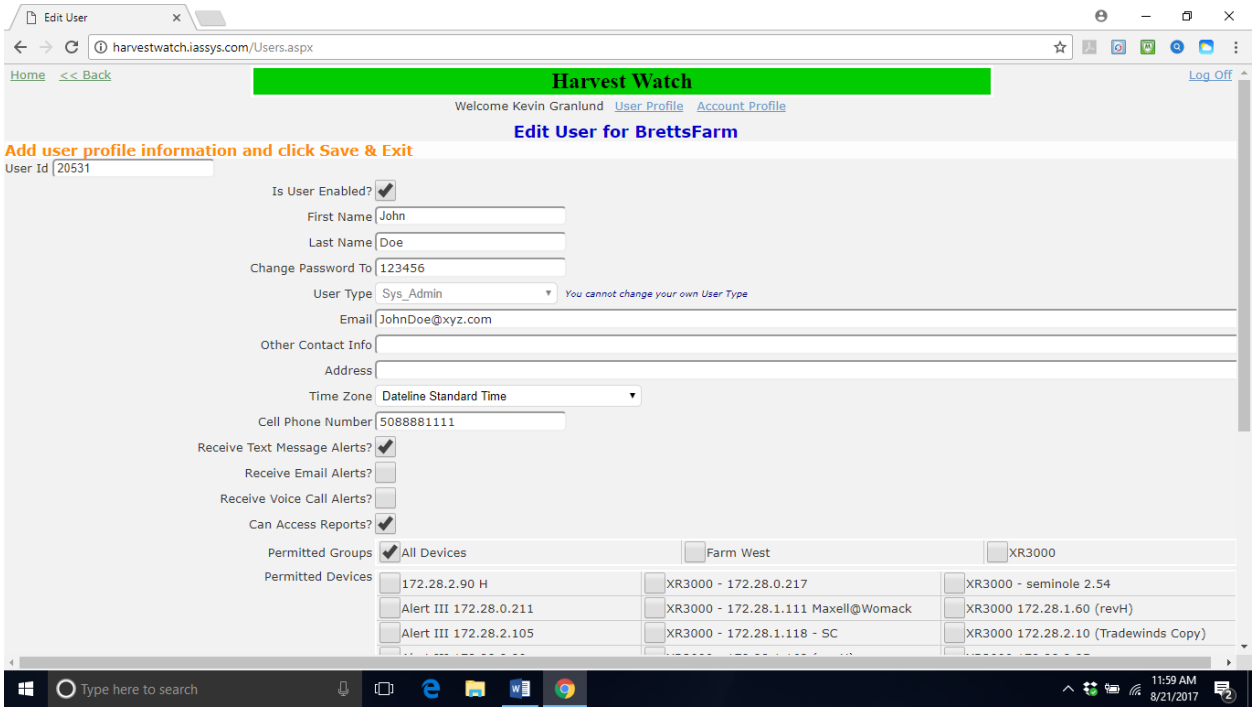
Display 5

Chapter 2 - Alerts

An advantage to the XR3000 familly of products is the ability to set up alerts to enable positive feedback on irrigation processes. Alerts can be created and sent by any combination of email, text and voice. All accounts are called Farms and within your Farm you can add or delete specific individuals that are required to receive these alerts.

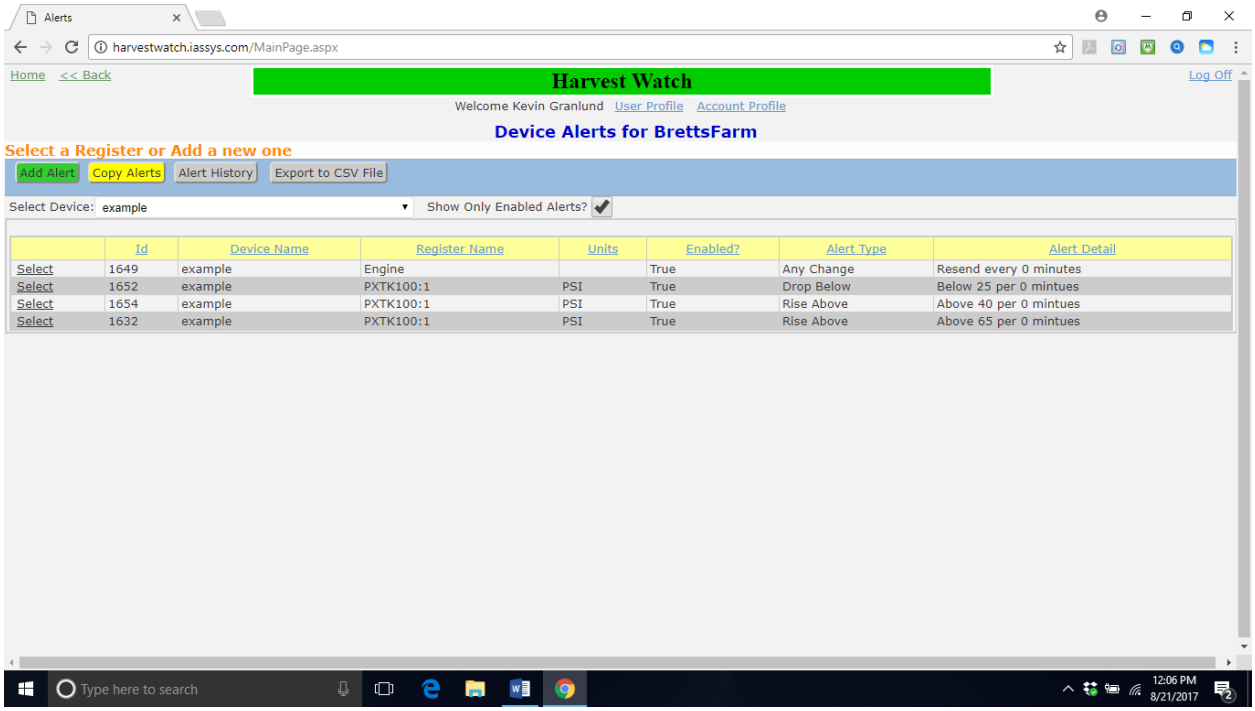
These alerts can be based on any register that has been defined in the irrigation process.

To enable alerts, first all user profiles for those who require access to the HW Farm (account) must be entered…… Display 6. This provides specific data such as phone numbers and email addresses for voice calls, text, and/or email alerts to go out. Once this is complete, then specific alerts can be tailored for everyone or specific individuals. This is where you also define the type of alert for everyone in your Farm. *Remember to check off which units you wish to be alerted for.*

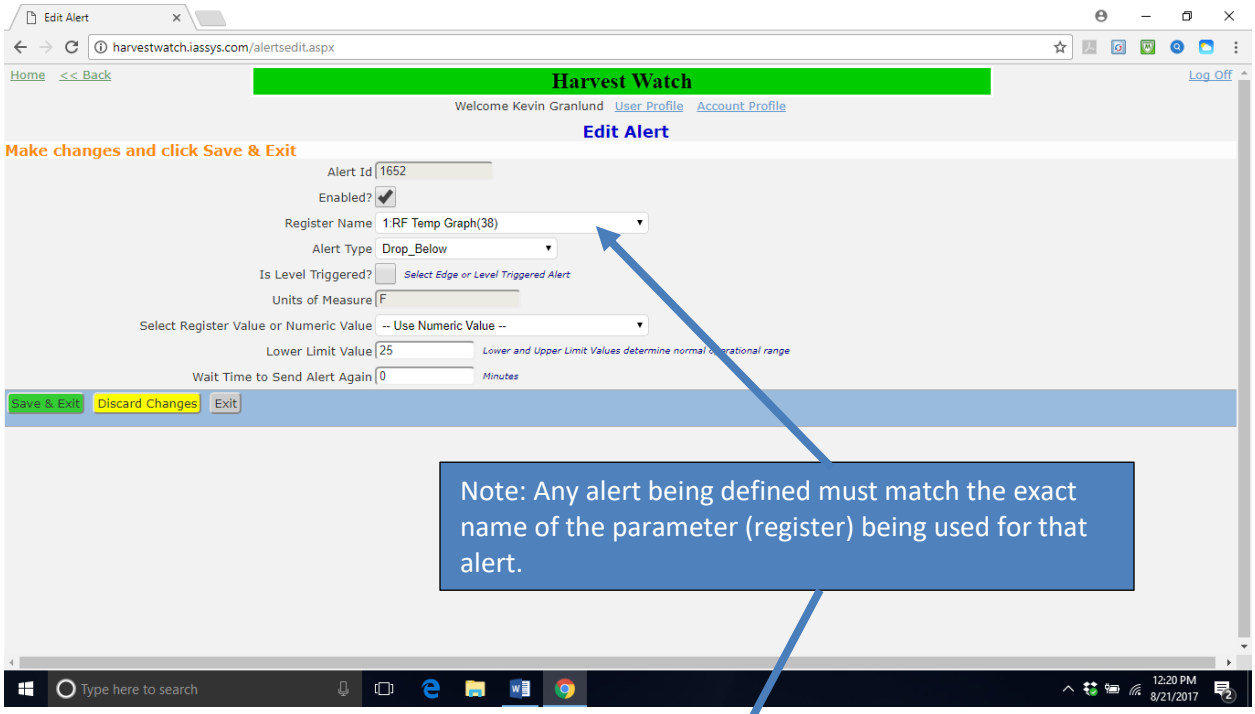


Display 6

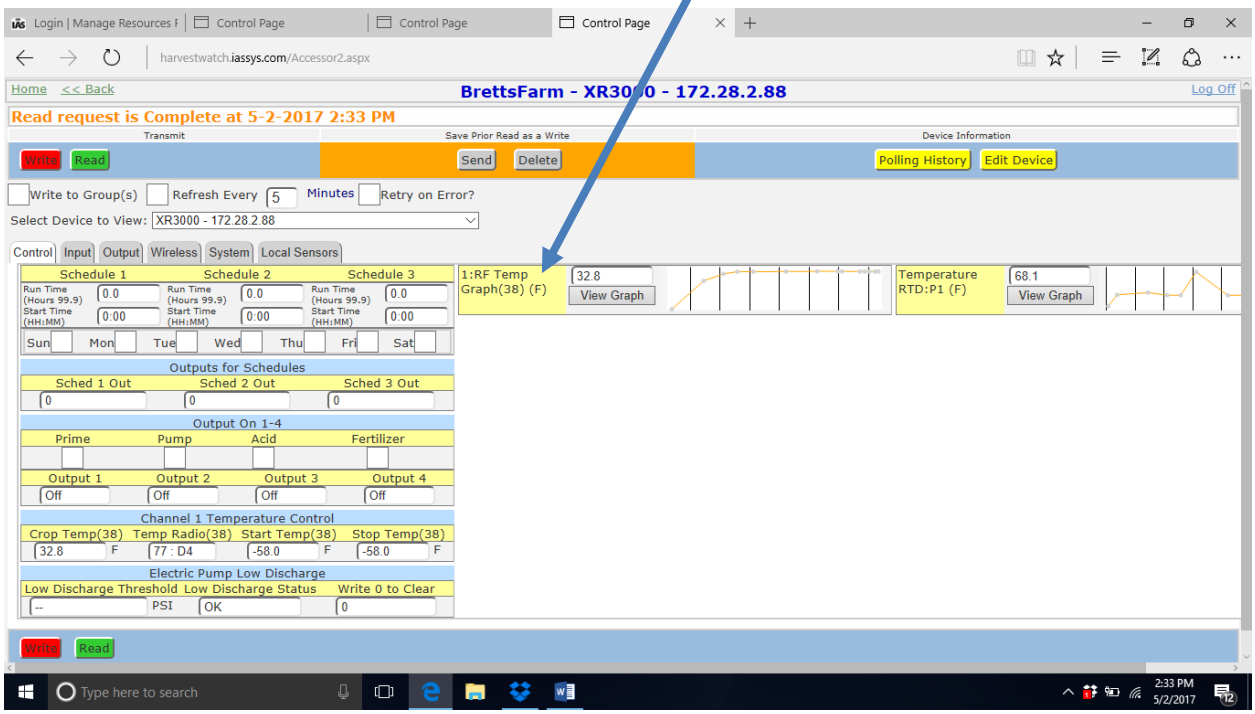
Now enter the “Define Alerts” tab on your screen. Display 7. This will open the Alert definitions and listings to review what alerts are created, enabled, or disabled. You can add alerts with the Add Tab or copy pre-existing alerts from another controller you may have already defined.



Display 7


Edit Alert
harvestwatch.iassys.com/alertsedit.aspx
Home << Back
Harvest Watch
Log Off
Welcome Kevin Granlund User Profile Account Profile
Edit Alert
Make changes and click Save & Exit
Alert Id 1652
Enabled?
Register Name 1:RF Temp Graph(38)
Alert Type Drop_Below
Is Level Triggered? Select Edge or Level Triggered Alert
Units of Measure F
Select Register Value or Numeric Value -- Use Numeric Value --
Lower Limit Value 25 Lower and Upper Limit Values determine normal operational range
Wait Time to Send Alert Again 0 Minutes
Save & Exit Discard Changes Exit
Note: Any alert being defined must match the exact name of the parameter (register) being used for that alert.
Type here to search
12:20 PM
8/21/2017

Display 8 + 9


Control Page
harvestwatch.iassys.com/Accessor2.aspx
Home << Back
BrettsFarm - XR3000 - 172.28.2.88
Log Off
Read request is Complete at 5-2-2017 2:33 PM
Transmit
Write Read
Save Prior Read as a Write
Send Delete
Device Information
Polling History Edit Device
Write to Group(s) Refresh Every 5 Minutes Retry on Error?
Select Device to View: XR3000 - 172.28.2.88
Control Input Output Wireless System Local Sensors
Schedule 1 Schedule 2 Schedule 3
Run Time (Hours 99.9) Start Time (HH:MM)
Sun Mon Tue Wed Thu Fri Sat
Outputs for Schedules
Sched 1 Out Sched 2 Out Sched 3 Out
Output On 1-4
Prime Pump Acid Fertilizer
Output 1 Output 2 Output 3 Output 4
Channel 1 Temperature Control
Crop Temp(38) Temp Radio(38) Start Temp(38) Stop Temp(38)
Electric Pump Low Discharge
Low Discharge Threshold Low Discharge Status Write 0 to Clear
1:RF Temp Graph(38) (F) 32.8 View Graph
Temperature RTD:P1 (F) 68.1 View Graph
Write Read
Type here to search
2:33 PM
5/2/2017

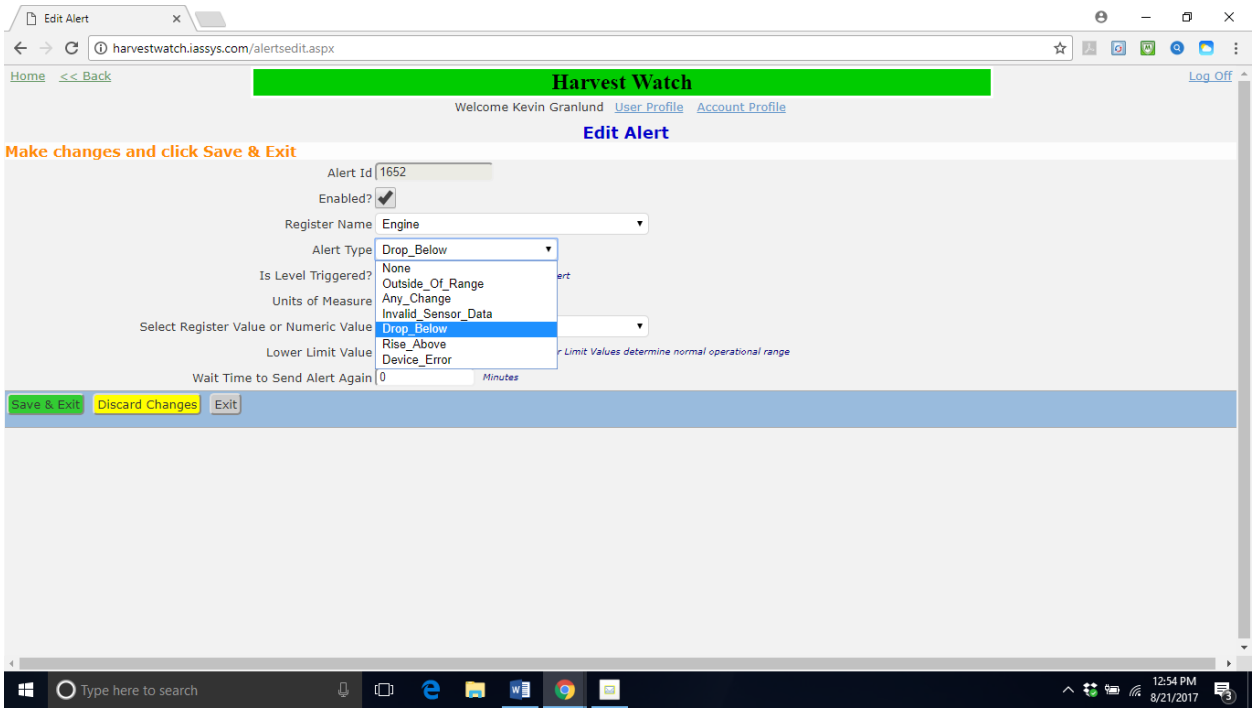
The edit alert has drop down menus to select the parameter (register) that will be used against the criteria listed in Display 10. So for example, in displays 8 + 9, the parameter being selected is “1: RF Temp Graph (38)”. Following further on in display 8, the alert is being defined as “drop below” and a numerical value of 25 has been entered.

What this has done is create a specific alert to be issued to whomever was selected in the farm user’s name list when ever Radio #1 has measured a temperature that is dropping and crossed over the 25F threshold defined in this example. This leads to no other action other than to define and generate alerts. Action by the controller to perform and run the pump as a result was defined earlier in the control setup. Also keep in mind, this is not real time, data is polled typically every 5 minutes plus transmission time over cell/internet communication. *Creating control and alerts to close to risk values is not good practice, give yourself some margin.*

This alert alone does not give a complete picture of the result of any action taken by the controller. Additional alerts may be required to get positive feedback that say a pump is running and providing frost protection as needed. So additional alerts built around pump output pressure sensing will then ensure you have knowledge of successful pumping going on. Also Engine change states may be of value.

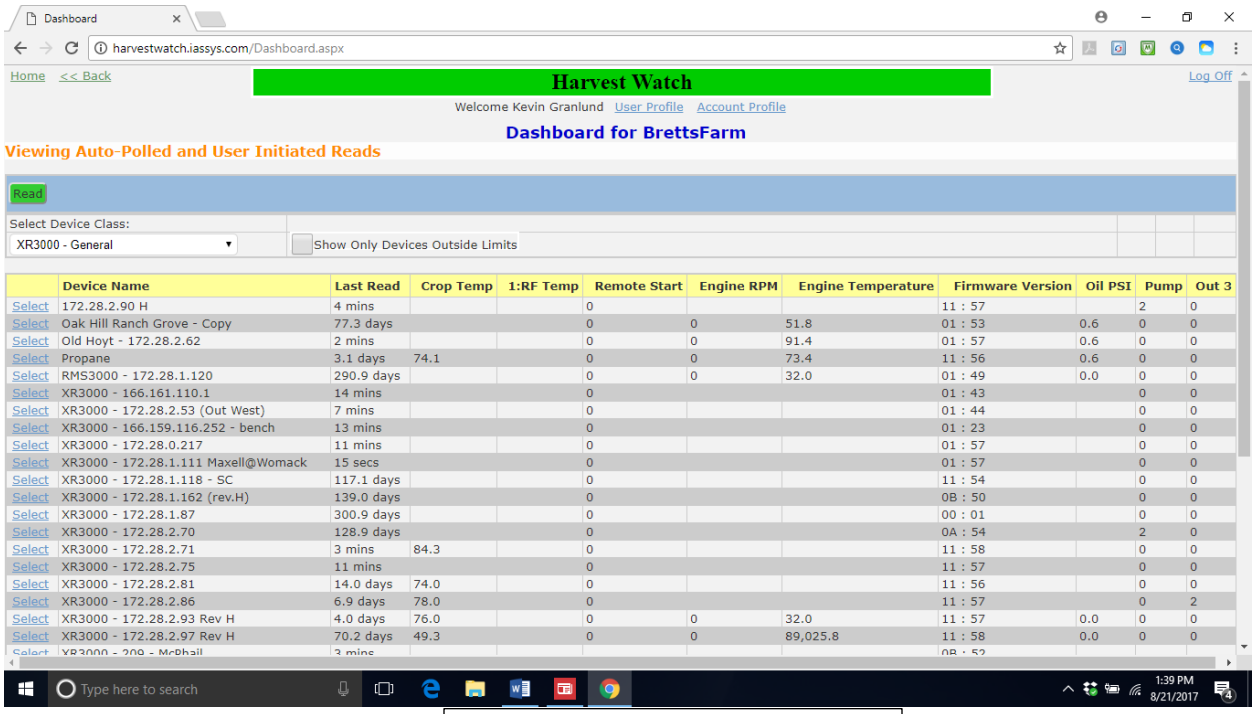
Setup pressure rise above and drop below to know when the pump is at pressure or lost pressure. Lost pressure may be that the pump completed either a schedule or when combined with a temperature rise above alert, know that frost danger has been averted and the pump should shut off. But say a pump looses prime and pressure drops ***before*** the temp rise above threshold is reached, you will know something is not working correctly at that pump and can take action.

This should aid in you developing your own set of alerts to match your needs, attempting to list all possibilities here is beyond the scope of this document.



Display 10

After creating your process and alerts, you can now create a dashboard for an overall multi system 1 page state review. Display 11.



	Device Name	Last Read	Crop Temp	1:RF Temp	Remote Start	Engine RPM	Engine Temperature	Firmware Version	Oil PSI	Pump	Out 3
Select	172.28.2.90 H	4 mins			0			11 : 57		2	0
Select	Oak Hill Ranch Grove - Copy	77.3 days			0	0	51.8	01 : 53	0.6	0	0
Select	Old Hoyt - 172.28.2.62	2 mins			0	0	91.4	01 : 57	0.6	0	0
Select	Propane	3.1 days	74.1		0	0	73.4	11 : 56	0.6	0	0
Select	RMS3000 - 172.28.1.120	290.9 days			0	0	32.0	01 : 49	0.0	0	0
Select	XR3000 - 166.161.110.1	14 mins			0			01 : 43		0	0
Select	XR3000 - 172.28.2.53 (Out West)	7 mins			0			01 : 44		0	0
Select	XR3000 - 166.159.116.252 - bench	13 mins			0			01 : 23		0	0
Select	XR3000 - 172.28.0.217	11 mins			0			01 : 57		0	0
Select	XR3000 - 172.28.1.111 Maxell@Womack	15 secs			0			01 : 57		0	0
Select	XR3000 - 172.28.1.118 - SC	117.1 days			0			11 : 54		0	0
Select	XR3000 - 172.28.1.162 (rev.H)	139.0 days			0			0B : 50		0	0
Select	XR3000 - 172.28.1.87	300.9 days			0			00 : 01		0	0
Select	XR3000 - 172.28.2.70	128.9 days			0			0A : 54		2	0
Select	XR3000 - 172.28.2.71	3 mins	84.3		0			11 : 58		0	0
Select	XR3000 - 172.28.2.75	11 mins			0			11 : 57		0	0
Select	XR3000 - 172.28.2.81	14.0 days	74.0		0			11 : 56		0	0
Select	XR3000 - 172.28.2.86	6.9 days	78.0		0			11 : 57		0	2
Select	XR3000 - 172.28.2.93 Rev H	4.0 days	76.0		0	0	32.0	11 : 57	0.0	0	0
Select	XR3000 - 172.28.2.97 Rev H	70.2 days	49.3		0	0	89,025.8	11 : 58	0.0	0	0

Display 11

Addendum – Binding and Clearing Radios

Normally you receive your system(s) with RF90's already bound to the specific control unit with an IP address as an ID for the controller. However, if you need to add or replace radio's, this sections describes the process for assignement. This Radio should already be assigned to "Radio 1"

Go to the "Wireless" tab of the specific XR3000 unit you are working with. See display 12 as an example. You can add as many as 8 radios ("Radio 1 – 8") to a single system and either use any combination of radios for control or for simply data collection of your crop in a larger area.

Radio's are logically bound to a specific controller so that other radio's in your area, even though it is visible to your controller cannot perform any action. No Radio can perform action, until it has been "bound" and "thresholds" set for action to that specific controller radio combination. Basestation information is only used by IAS personel for diagnosis, no user input here. Same with "Time 1" "Radio LQ", "Radio 1 Temp". "RF Batt X" is an aid to whether batteries need replacement.

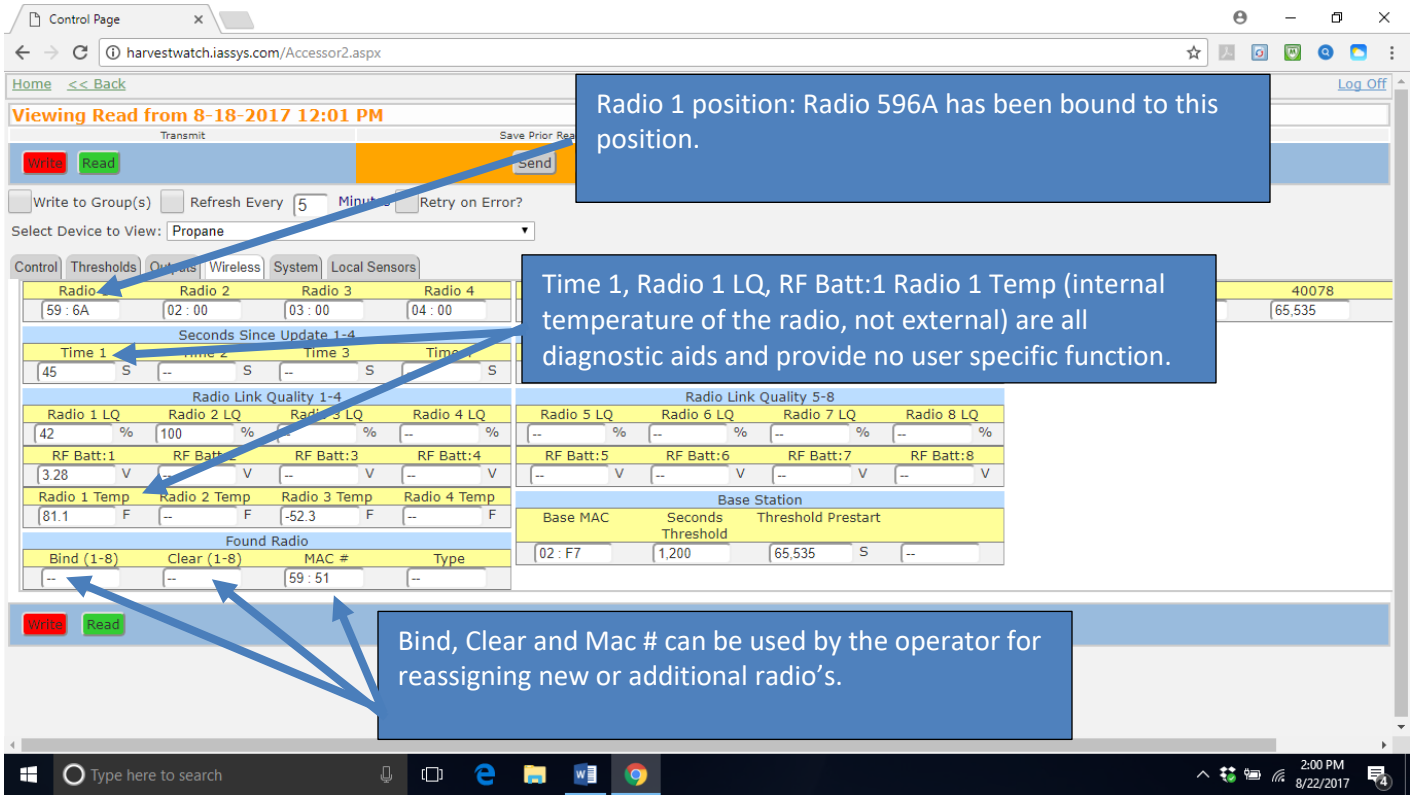
While these have been designed to last 2 years, this will depend on your environmental conditions. Batteries should be >2.8V, contact IAS if you suspect low battery power, however only suspect this if your Tempurature charts are not obtaining consistent reads, that is the true indicator of radio performance. If you are

seeing many blanks spaces in your temperature charts in the Control Panel, view the “Time x” window to determine when that last transmission was. Generally these will be every 2 minutes, but if it’s 1000’s of seconds since last transmission, contact IAS personel for evaluation.

Unbinding a radio from a controller requires a “clear” command. To do so, enter the “Radio X” posistion you want to clear in the “Clear 1-8” window and perform a write. Read verify it has cleared.

To bind a new radio into a radio position, first determine if the radio you want has appeared in the “Mac #” window. If that is the radio you need, then enter the radio # position you want to bind it to in the “Bind 1-8” window and perform a write, then read verify.

If it is not the radio desired, then bind it to an unused postion, say Radio 8 for example. Then wait a minute or so and perform a read to see what new radio has highlighted itself in the “Mac #” window. If it is bind it where you desire. If not repeat the binding process to another unwanted location. Keep performing this until your radio is displayed. After you have bound the proper radio to the proper position, then go back and clear unwanted radios. The Mac # is a first come first serve location.



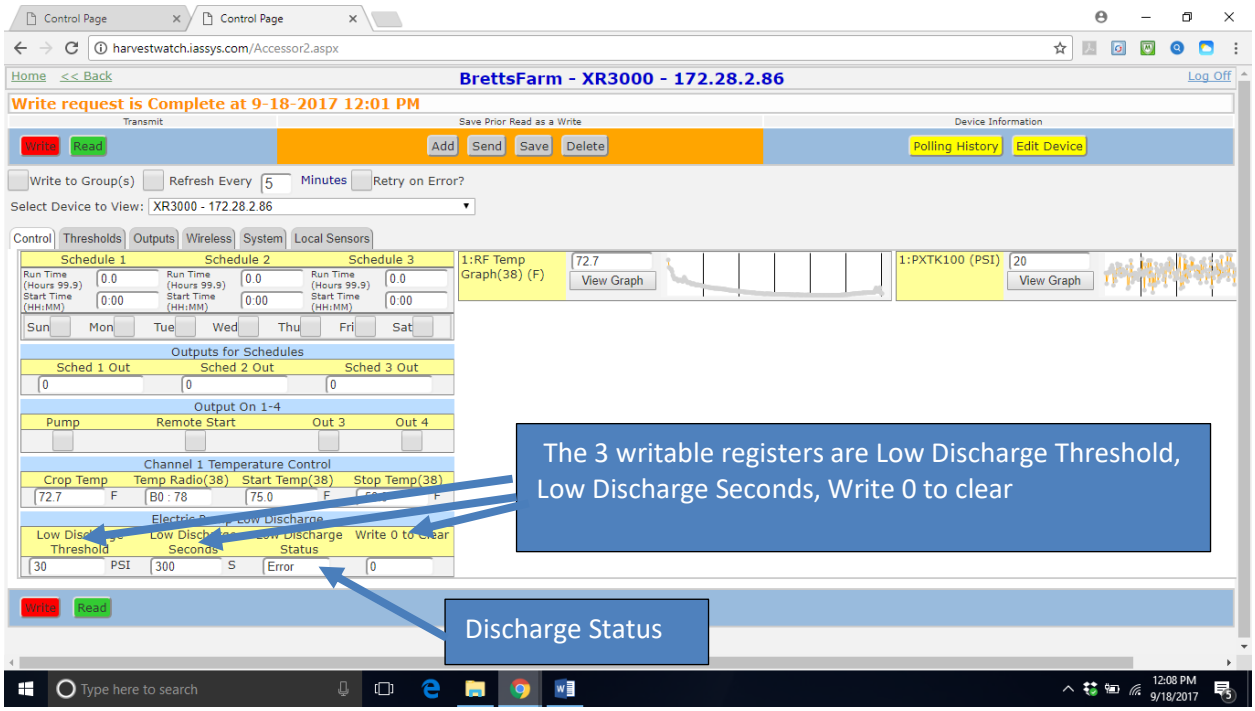
Display 12

Electric Pump Low Pressure Cutoff

Starting in code level 1.58 or 11.58, there is now a feature to shut down an electric pump in the case of not producing sufficient pressure within a certain time. Both Pressure and Time are programmable. See diplay 13.

Set the “Low Discharge Threshold” to the pressure setting below your optimimum operational pressuure. This is the point where you know if it has not gone over this pressure, you have insufficient prime and need to prevent pump damage. Next the timeout you want to enter, given in seconds, to allow the pump to reach pressure before shutting down, “Low Discharge Seconds”.

The “Low Discharge Status” window will state whether it is “ok” or “Error”. Error indicating that a valid timeout has occurred due to lack of pressure according to the values you set. Writing a 0 into “Write 0 to Clear” will clear the error and seconds which will need to be written with a value.



Display 13

ML1000/2000/Tec10 Operations Manaul

- Reference the Murphy Operators guide for details on specific settings.

http://www.murcal.com/pdf%20folder/15.murphy_mpc10_operations.pdf