W600 & W900 RELAY OPTIONS AND UNDERSTANDING THEM

INDEX

COMMON OPTIONS ON MOST RELAYS

A) ***Hand Time Limit*** *– this is the amount of time a relay will stay on once the hand mode has been selected on the relay.*

B) ***On Delay Time*** *– enter the amount of time the relay will wait before it turns on.*

C) ***Off Delay Time*** *– enter the amount of delay time the relay will stay on after it was supposed to shut off.*

D) ***Output Time Limit*** *– this is the maximum amount of time the relay can stay on before it goes into an alarm state.*

E) ***Duty Cycle Period*** - Using a duty cycle helps to prevent overshooting the set point in applications where the response of the sensor to chemical additions is slow. The user will have to specify the amount of time for the cycle, and the percentage of that cycle time that the relay will be active. The relay will be off for the rest of the cycle, even if the set point has not been satisfied. Enter the length of the duty cycle in minutes.

F) ***Duty Cycle %*** *- Enter the percentage of the cycle period that the relay will be active. Set the percentage to 100 if use of a duty cycle is not required.*

G) ***Min Relay Cycle*** - Enter the number of seconds that will be minimum amount of time that the relay will be in the active or inactive state. Normally this will be set to 0, but if using a motorized ball valve that takes time to open and close, set this high enough that the valve has time to complete its movement.

H) ***Add Last Missed*** *– (Biocide Menu Only)* – Select Enabled if the controller should delay start of the most recent Biocide cycle until immediately after an Interlock clears **OR** Disabled if all Biocide feed should be skipped if there is an Interlock condition at the time the add was due to start.

I) ***Activate –*** select the relays and digital inputs that will activate this relay.

J) ***Interlock*** *– select the relays and digital inputs that will interlock this relay.*

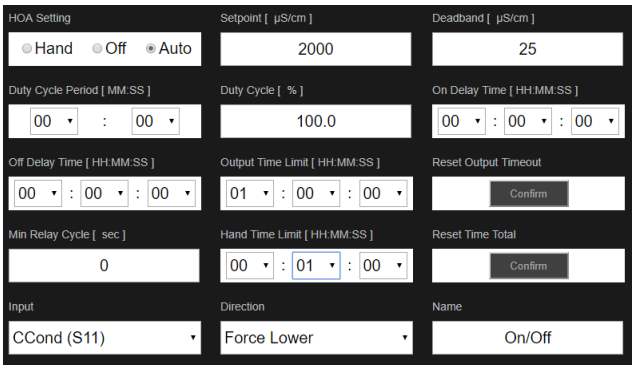
K) ***Reset Time Total*** – this will reset the total accumulated on-time stored for the output back to 0.

L) ***Reset Output Time*** - Enter this menu to clear an Output Timeout alarm and allow the relay to control the process again.

RELAY ALGORITHMS IN DETAIL

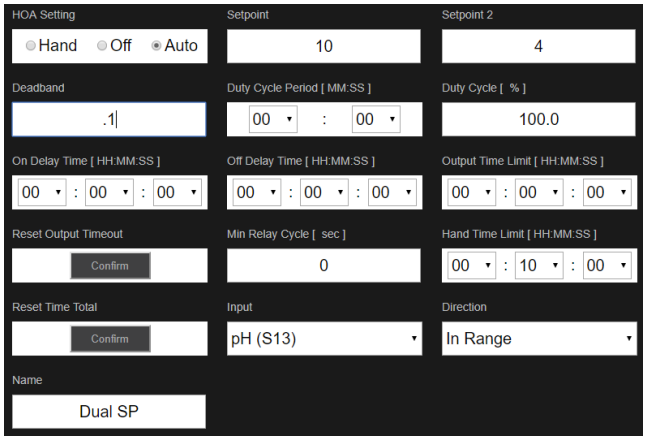
1) ***ON/OFF:*** Turns the relay on and off based on a set point and a dead band, this ON/OFF setting can be turned on by a Walchem sensor or any analog device. Be aware that when you change the output control mode or the input assigned to an output the relay reverts back to the OFF Mode.

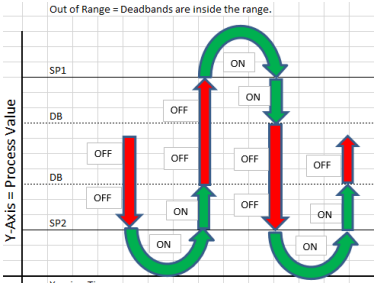
   Example: Relay will activate at 2000 uS and open the solenoid on the tower bleed line. It will bleed until the sensor reads 2000 uS minus the dead band 25 uS or 1975 uS. The bleed will never come on for more than an hour based on the Output Time Limit selected one hour.

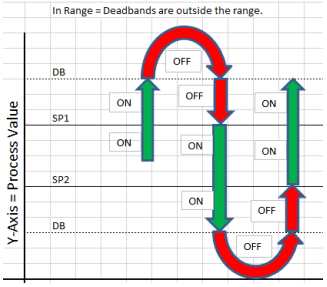


2) ***DUAL SET POINT:*** Two types in range and out of range typically used with Ph but can be used with any of the Walchem sensors, analog input, or virtual input. In Range the controller stays on in-between the set points + the Dead band. Out of Range – the controller stays on when above the set point until the value goes below the set point minus the Dead band.

   Example: In range example down below - the relay will work whenever the pH is lower than 10.1 and higher than 3.9 The relay actually shuts off at a pH of 10.1 and 3.9 based on the .1 dead band. See graph down below green areas relays is on.

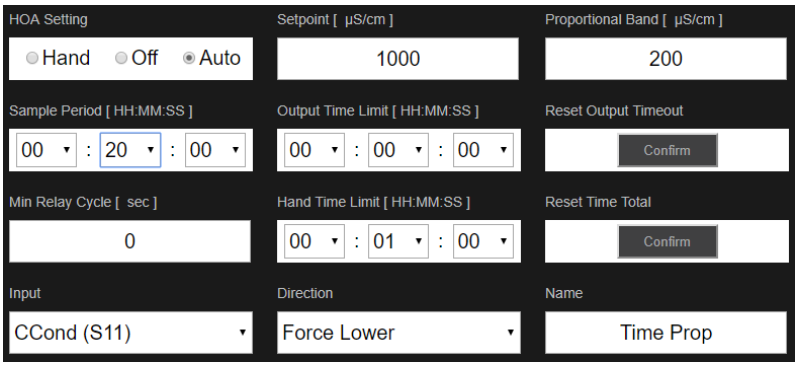






3) ***TIME PROPORTIONAL:*** Based on a set point, dead band, and time selected. The relay will come on for a specific amount of time based on how far away the value is from the set point. ***The pattern is cyclical***. Like a percent timer with a set point and a dead band. This relay will work with our sensors, analog signal, or a virtual input.

Example: The Relay comes on when the conductivity is greater than 1000 uS. The controller will sample based on the time you entered into the program - if you select a 20-minute sample period every 20 minutes the controller determines if you are above the set point. If you are below the set point nothing happens if you're above the set point the relay comes on for a proportional amount of time depending on how far you are away from the set point. In the example down below if you were at 1100uS the relay would turn on for 10 minutes, then off for ten minutes, then check the conductivity again. If the conductivity was 1050 uS it would come on for 5 minutes and off for 15 minutes.



4) ***INT SAMPLING Trapped Sampling – enabled):*** (Timed) HVAC ENABLED

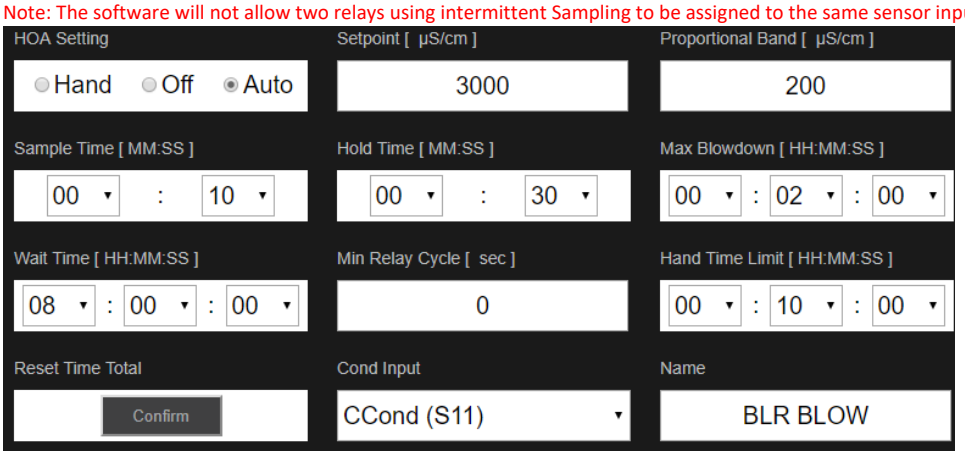
Traps a sample and blows down for a desired amount of time based on how far the user is away from the set point. A max blow down time and proportional band are set in this mode.

Example: This program will sample every 8 hours, if the conductivity is above 3000 the blow down value will open, blow the line for 10 seconds, hold a sample for 30 seconds, and then blow the boiler down for a set amount of time proportional to the distance it is about the set point – max blow down time in set for 2 minutes.

Things to remember: when the boiler relay is in the auto mode:

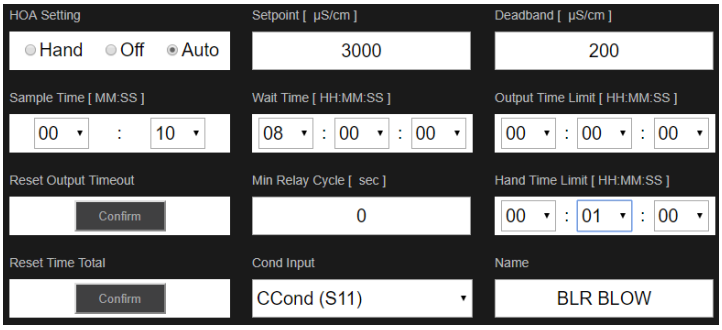
1) The only time you will see the actual boiler value is after the boiler sample time.
2) If you want to see the current conductivity value in the boiler put the boiler in Hand.

Note: The software will not allow two relays using intermittent Sampling to be assigned to the same sensor input.



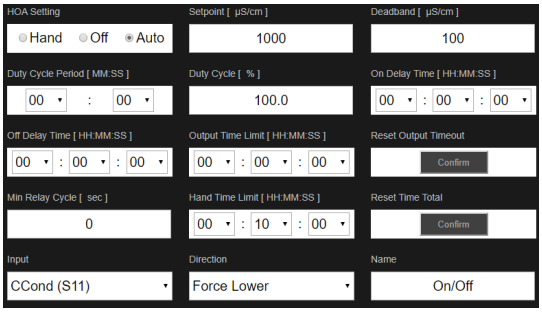
(Trapped Sampling – Disabled): (NOT Timed based on conductivity) HVAC ENABLED

Hold time and Blowdown time are not used in this algorithm. The controller does not work on time it blows down by the boiler conductivity value. The relay will sample every 8 hours and then open the blow down line for 10 seconds read the sensor conductivity value and blow down until the set point minus the dead band is reached (2800 uS).

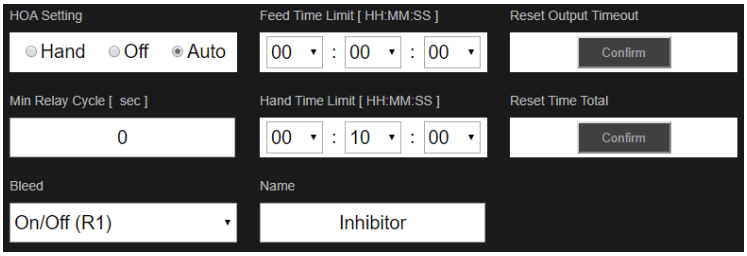


5) ***BLEED & FEED:*** Typically for cooling tower control the bleed and feed relays come on at the same time. Can also be used whenever it is desired to have 2 relays come on at the same time for any process. This algo is based on the bleed relay. When the bleed (R2) comes on based on bleed the feed relay (R1) is also activated. Both relays will shut off at the same time. You could achieve the same results by ACTIVATING relay 2 by relay 1. Relay one would be controlled by the tower conductivity (bleed). Relay two would be turned on at the same time relay one kicked on and it would add the tower inhibitor. If the conductivity should fall below the Dead band right away the inhibitor will still feed for the entire duration.

RELAY 1 - Bleed Relay



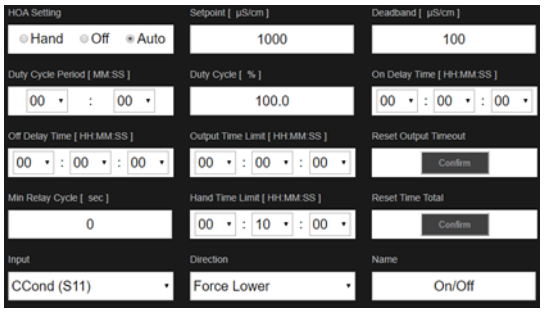
RELAY 2 – Inhibitor Relay



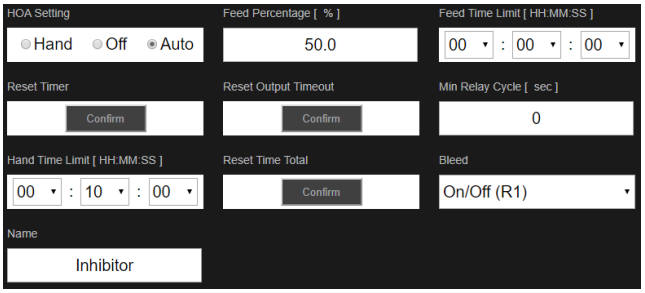
6) ***BLEED THEN FEED:*** The tower will bleed (R1) and then feed (R2). Relay (R1) will come on for a (**Percentage**) of the bleed time. This relay algo can be used to activate one relay after another relay has turned on.

Example: In the example down below if the bleed (R1) was on 4 minutes then the inhibitor (R2) would come on for 2 minutes since the Feed Percentage is set at 50%.

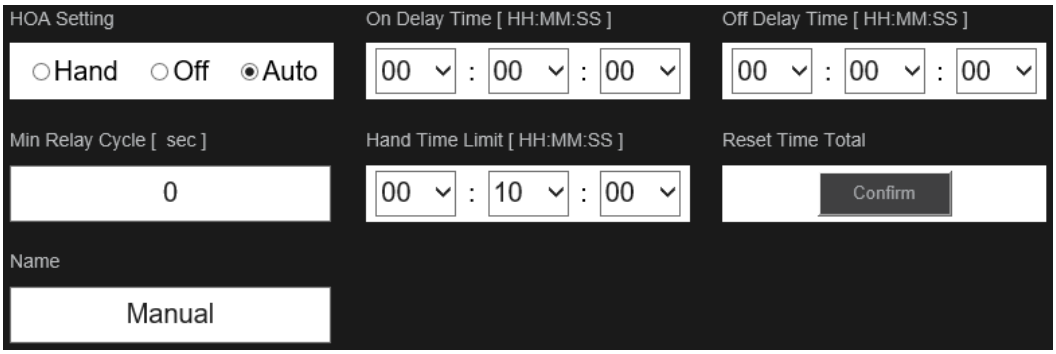
RELAY 1 – Bleed Relay



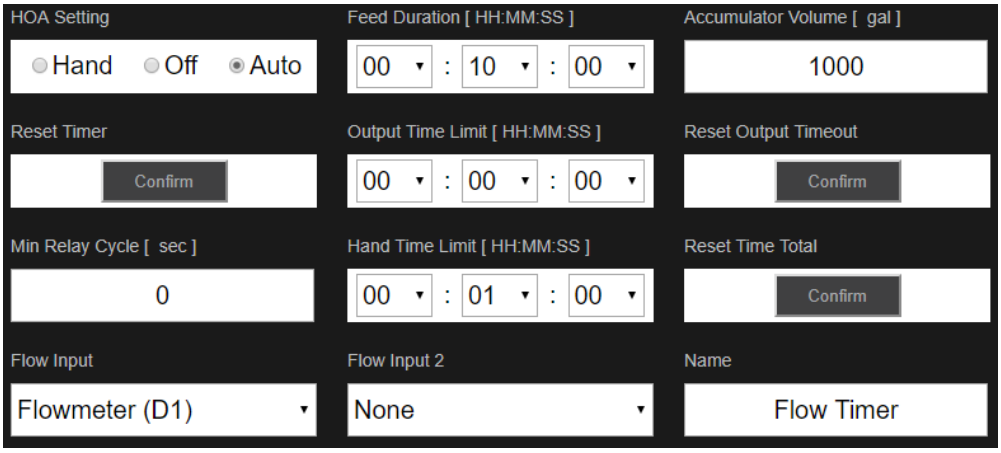
RELAY 2 – Inhibitor Relay



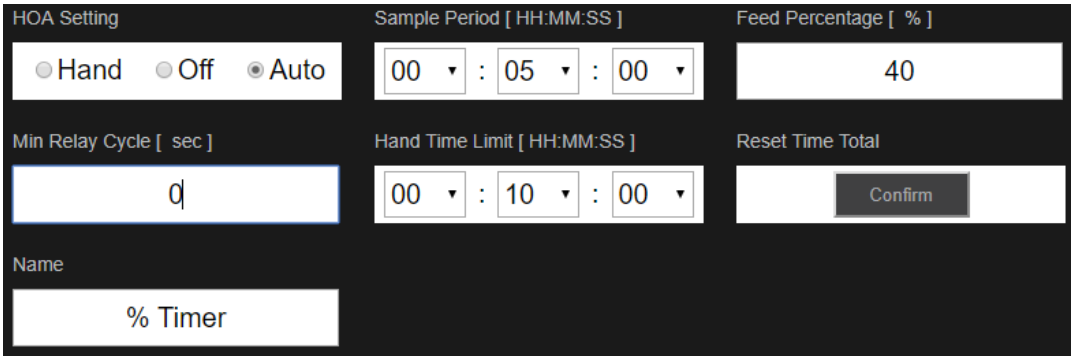
7) ***MANUAL MODE***: If you desire to activate or interlock a relay with another relay or digital input put the relay in manual mode. Manual mode must be set to AUTO



8) ***FLOW TIMER:*** Turns the relay on for a specific amount of time determined by one or two flow meter totals. If two water meters are used the volume used will be the sum of both water meters. This relay will turn on for 10 minutes after 1000 gals has accumulated on the water meter. Reset timer will reset the flow accumulator and reset the relay immediately.



9) ***PERCENT TIMER:*** (Cyclical) You will need to put in a Sample Period time and a Feed Percentage time for this relay to work. The sample period is the total time. The feed percentage is the % of the total time the relay will be on.



10) ***ALARM:*** Dry Contact, Powered, or Pulse Relay: Any relay can be selected as an alarm relay. The user will select which alarms he wants to activate the local alarm relay on the relay page. You cannot delay local relay alarms and you can only suppress analog, sensor, and PID inputs – option found on the sensor input page. *You can delay the alarm if it's being set via email*, txt (Email settings) This is done if the Email Setting Page. You can also delay alarms on controller power up – look at global settings page.

a. **POWERUP ALARM DELAY** – Under Global settings – enter in how much time to wait after powering up the controller before alarm conditions are considered valid.
b. A pulse proportional relay can also be used as an alarm it is basically a switch that closes – only takes 40 VDC Max.

A pulse relay being used as an alarm – the LED on the front of the controller will pulse on and off but the relay contact is shut all the time when the LED is blinking. If there no relay the LED is off and the relay is open.

Dry contact mechanical relays (0 to 8 depending on model code):	6 A (resistive), 1/8 HP (93 W) Dry contact relays are not fuse protected
Pulse Outputs (0, 2 or4 depending on model code):	Opto-isolated, Solid State Relay 200mA, 40 VDC Max. VLOWMAX = 0.05V @ 18 mA

11) ***TIMER:*** HVAC MODES DISABLED

- Up to 10 timed events per day.
- Overlapping Timer Events: If a 2nd timer starts up while the 1st one is active, the second event will be ignored.
- Interlocks and Activate: selections will override the relay control but will not affect the timer from starting up and running through its cycle. An event skipped alarm is reset on its next activation.
- Alarm: An Event Skipped alarm is set when a second timer event occurs while one event is still running.
- An Event Skipped alarm is also set when the timer relay never turns on during an event because of an interlock condition. The alarm is cleared when the relay is next activated for any reason
- Events Per Day – only appear if repetition is hourly.

12) ***PROBE WASH:*** The timer event triggers the relay to come on for the programmed time so the sensor can be cleaned. The output of the selected sensors will either be held or disabled during the cleaning cycle, and for a programmable hold time after the cleaning cycle.

- Up to 10 timed events per day.
- Overlapping Timer Events: If a 2nd timer starts up while the 1st one is active, the second event will be ignored.
- Interlocks and Activate: selections will override the relay control but will not affect the timer from starting up and running through its cycle. An event skipped alarm is reset on its next activation.
- Alarm: An Event Skipped alarm is set when a second timer event occurs while one event is still running.
- An Event Skipped alarm is also set when the timer relay never turns on during an event because of an interlock condition. The alarm is cleared when the relay is next activated for any reason
- Events Per Day – only appear if repetition is hourly.

Sensor Mode	Select the effect that the probe wash event will have on any control outputs that use the sensor(s) being washed. The options are to either Disable the sensor readings (turn the control output off) or Hold the sensor reading at the last valid sensor reading prior to the start of the probe wash event.
Hold Time	Enter the amount of time needed to hold the sensor reading after the event has finished, in order for the wash solution to be replaced by process solution.

13) BIOCIDE TIMER: - ENABLE HVAC MODE

- Up to 10 timed events per day.
- Overlapping Timer Events: If a 2nd timer starts up while the 1st one is active, the second event will be ignored.
- Interlocks and Activate: selections will override the relay control but will not affect the timer from starting up and running through its cycle. An event skipped alarm is reset on its next activation.
- Alarm: An Event Skipped alarm is set when a second timer event occurs while one event is still running.
- An Event Skipped alarm is also set when the timer relay never turns on during an event because of an interlock condition. The alarm is cleared when the relay is next activated for any reason
- Events Per Day – only appear if repetition is hourly.

i. Bleed Lock out: Time to lockout bleed after the biocide feed is complete.
ii. Prebleed: If both a time limit and a conductivity limit are set; the time limit takes precedence. The bleed relay will turn off once the time limit is reached or when the prebleed conductivity limit is reached (whichever occurs first). If the prebleed has a conductivity limit set, then the time limit can't be set to zero, as this would allow the prebleed to last forever if the conductivity limit is never reached.
iii. Prebleed To: Lower the conductivity prior to feeding biocide by Conductivity.
iv. Prebleed Time: Lowering the conductivity prior to feeding biocide using a fixed amount of time.

New function:

Add Last Missed	Select Enabled if the controller should delay start the most recent Biocide cycle until immediately after an Interlock clears, or Disabled if all Biocide feed should be skipped if there is an Interlock condition at the time the add was due to start.

Event 1 (through 10)	Enter these menus to program timer events via the menus below:
Repetition	Select the time cycle to repeat the event: Daily, 1 Week, 2 Week, 4 Week, or None. An event means that the output is turned on at the same time of day, for the same amount of time, and except for the Daily cycle, on the same day of the week.
Week	Only appears if Repetition is longer than 1 Week. Select the week during which the event will occur.
Day	Only appears if Repetition is longer than Daily. Select the day of the week during which the event will occur.
Start Time	Enter the time of day to start the event.
Duration	Enter the amount of time that the relay will be on.
Bleed	Select the relay to be used for Bleed/Blowdown
Prebleed Time	If lowering the conductivity prior to feeding biocide is desired using a fixed time instead of a specific conductivity setting, enter the amount of time for the pre-bleed. Also may be used to apply a time limit on a conductivity based prebleed.
Prebleed To	If lowering the conductivity prior to feeding biocide is desired, enter the conductivity value. If no prebleed is required, or if a time-based prebleed is preferred, set the conductivity value to 0.
Cond Input	Select the sensor to be used to control the prebleed relay selected above.
Bleed Lockout	Enter the amount of time to lockout bleed after the biocide feed is complete.
Add Last Missed	Select Enabled if the controller should delay start the most recent Biocide cycle until immediately after an Interlock clears, or Disabled if all Biocide feed should be skipped if there is an Interlock condition at the time the add was due to start.

14) ***SPIKE TYPE:***

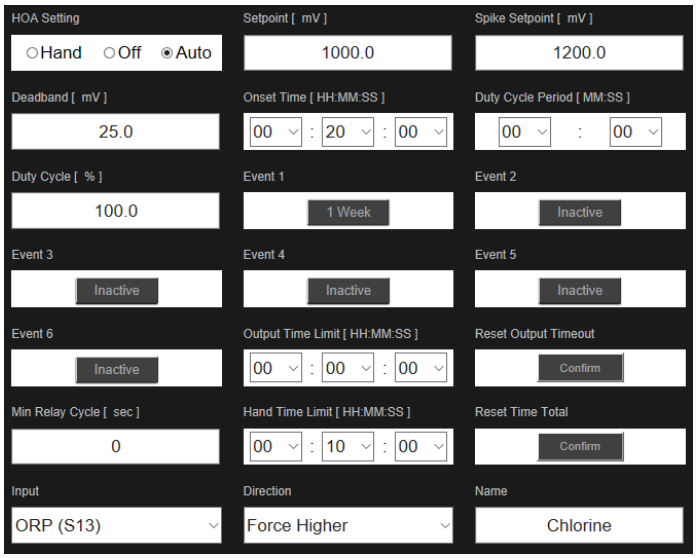
This algorithm is typically used to provide a baseline amount of chlorine for disinfection, and periodically shocking the system with a larger dose. During normal operation, the relay will be reacting to the sensor to maintain a set point within a programmable Deadband, as described in On/Off Control Mode above. When a Spike event triggers, the algorithm will change from the normal set point to the Spike Set Point, for the programmed time. The Onset Time setting allows the user to decide if the programmed spike duration time starts counting down immediately, or if the controller will wait until the higher set point is achieved or the onset time expires, whichever comes first, before starting the spike Duration timer.

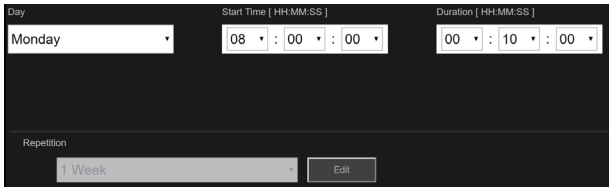
Onset Time	The onset time determines when the duration timer starts. If set to zero, the duration time starts immediately. If set higher than that, the controller will not start the duration timer until the spike set point is achieved, or until the onset time is over, whichever comes first.

Basically, this relay acts like a continual ON/OFF relay adding biocide based on set point and deadband. Based on the Event Scheduled it will SPIKE the process with Biocide. The Biocide will be added according to the Duration Count Down Timer scheduled in the Event programmed. If the user wants, he can add an ONSET TIME which will turn on the relay immediately and add biocide. When the Spike Setpoint is reached the countdown duration timer starts. If the Spike set point is not reached within the ONSET TIME the relays total time on will be that of the duration count down timer set in the event programmed.

Example: Spike SP 1200, Normal SP 1000, DB 25, Event 1 – Daily, Time 3:00 pm, Duration, 30 min, Off set 20 min

Down below the spike biocide addition will happen every Monday at 8am and will last for 10 minutes. If the onset time is set to 0 the duration starts immediately. If an ONSET TIME is given the duration time will not start until the spike set point is achieved, or until the onset time is over – whichever comes first. In the example down below the duration time will not start until the spike setpoint of 1200 is reached or until the onset time is over.





15) ***COUNTER TIMER:*** HVAC is disabled - A timer is activated after a set number of pulses are sent to the controller. Once the number of pulses has been achieved the timer runs for the amount of time entered in and then shuts off. (Not on the W600 yet)

16) ***PULSE PROPORTIONAL CONTROL MODE:*** (OPTO RELAY NEEDED)

Controls with a set point and a proportional band from a sensor, analog input, or virtual input. The output display will show the value in %. *The pump or device connected to the relay will always run at the slowest value or at the Min Output % at the SET POINT value. The MIN OUTPUT should not be set to 100% it must be set lower than 100%.*

Force Higher - (adding caustic to increase the pH set point 10 – dead band 6)

The pump will run at 100% at any value below pH 4 and will slow down as the pH gets closer to 10. At 10 the pump will not run. Your minimum output value can be higher than 0%. If you do that the pump will run at that value when the pH is above the set point. For example, if you set the minimum value at 20% the pump will run at 20% when the pH is above 10.

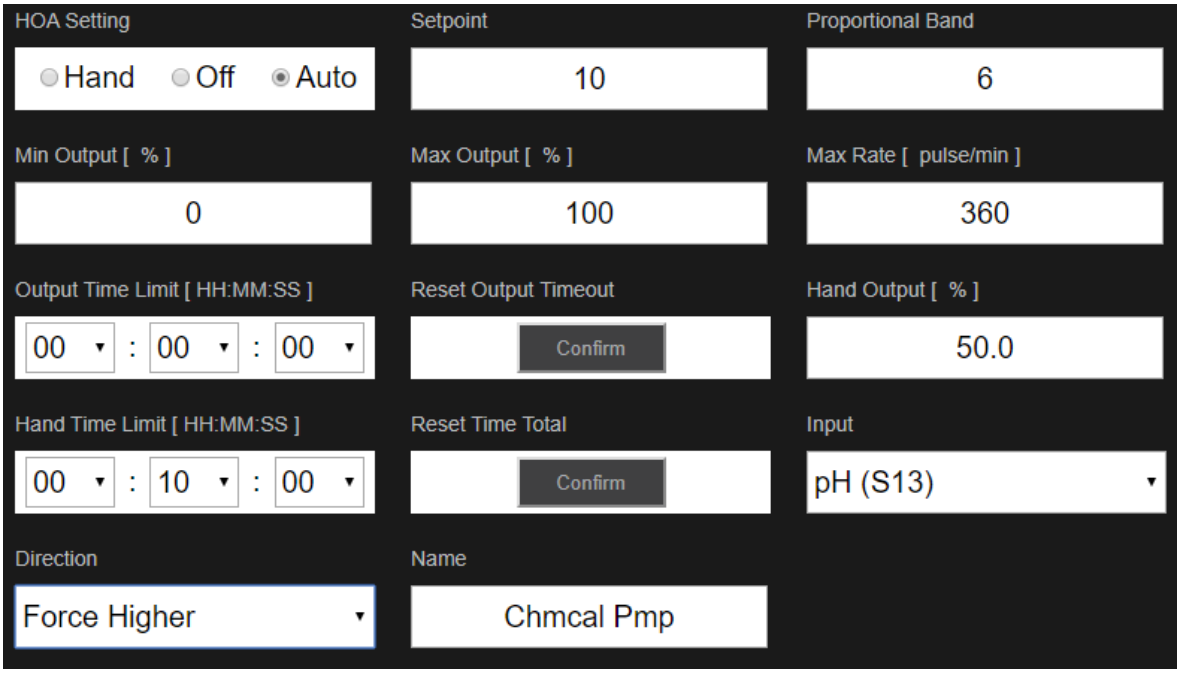
Force Lower - (adding acid to lower pH set point 7 – dead band 4)

The pump will run at 100% at any value above pH 11 and will slow down as we get closer to 7. At 7 the pump will shut off. Your minimum output value can be higher than 0%. If you do that the pump will run at that value when the pH is below that set point. For example, if you set the minimum value at 20% the pump will run at 20% when the pH is below 7.

Set point	Enter the sensor process value at which the output will pulse at the Minimum Output % set below.
Proportional Band	Enter the distance that the sensor process value is away from the set point beyond which the output will be pulsing at the Maximum Output % set below.
Minimum Output	Enter the lowest possible pulse rate as a percentage of the Maximum Stroke Rate set below (normally 0%).
Maximum Output	Enter the highest possible pulse rate as a percentage of the Maximum Stroke Rate set below.
Maximum Rate	Enter the maximum pulse rate that the metering pump is designed to accept (10 - 360 pulse/minute range).
Input	Select the sensor to be used by this relay.
Direction	Set the control direction.

Example: Set Point is 10, proportional Band is 6, and we are forcing the system Higher. So, this is what will happen. We will be adding caustic to increase the pH within the system. At a pH of 10 the pump will stop pumping caustic and at a pH of 4 the pumps will be pumping at the Maximum Output 100%. In the hand mode the pump will pump at 50%.

KEY THE SET POINT IS WHERE THE PUMP RUNS THE SLOWEST



17) ***RELAY – PID CONTROL MODE****: (OPTO RELAY & ANALOG OUPUT CARD)* HVAC mode is disabled for OPTO option – there are two types of PID loops on the controller one where you use a Pulse relay and the other you use and analog output. If using the first option your controller will need an OPTO relay for this to work. If using the second option your controller will need an analog output card. Look at option 24 for more detail.

The PID algorithm controls a solid state relay using standard Proportional-Integral-Derivative control logic. The algorithm provides feedback control based on an error value continuously calculated as the difference between a measured process variable and a desired set point. Tuning settings specify the response for proportional (the size of the error), integral (the time that the error has been present), and derivative (the rate of change for the error) parameters. With proper tuning, the PID control algorithm can hold the process value close the set point while minimizing overshoot and undershoot.

PPM MODES ON THE CONTROLLER

18) ***RELAY – TARGET CONTROL MODE (PPM): (RELAY FUNCTION – VOLUME/TIME)*** Use with a **POWERED OR DRY RELAY** Only available if HVAC mode is enabled.

a. W900 monitors the total volume through up to two (2) analog or digital flow meters. Once a set volume has been accumulated the relay *activates for a calculated time* to achieve a target PPM level of chemical. As flow accumulates, controller updates the "Accumulator Total" field. When value exceeds or is equal to the pre-programmed "Accumulator Volume", the relay activates for the calculated number of seconds to activate the pump. The accumulated total is reduced by the accumulator volume amount.
b. The Data necessary to calculate the pump on time is the following:

   i. Target PPM of the product
   ii. Pump capacity – maximum flow rate for metering pump
   iii. Pump settings – stroke length setting for metering pump – in percent (%)
   iv. Specific gravity – of the product being added
   v. Accumulator volume – the total volume of water passing through the flow meters to trigger chemical feed, i.e. energize the relay
   vi. Flow input – flow meter to be used for this control relay
   vii. Flow input 2 – second flow meter, if used
   viii. Cycles input – here you select a virtual input as a ratio calculation of the systems cycles of concentration or select "None"
   ix. Low cycles limit – lower limit for cycles of concentration, if used. The calculated on-time is limited to the maximum value if the cycles of concentration gets too low

c. If trigger volume is achieved again before the activation time has expired, the newly calculated feed monitor pulses per unit volume is added to the remaining number.

d. If relay state is continuously one for longer than the Output Time Limit, the relay will deactivate.

19) ***ANALOG OUTPUT – FLOW PROPORTIONAL MODE: (PPM):*** **(ANALOG CARD – VOLUME/AO)** Only works if the controller has an AO card output.

a. Analog proportional feed control to achieve a target PPM of product in a system based on flow from either an analog or digital flow meter. Controller monitors flow via an analog or digital flow meter and continually adjusts the analog (4 to 20 mA) output band to achieve a target PPM level in the system. If the output is continuously on for longer the Output Time Limit, the output will deactivate.

a. Information required:

- Target PPM of the product
- Pump capacity – maximum flow rate for metering pump
- Pump settings – stroke length setting for metering pump – in percent (%)
- Specific gravity – of the product being added
- Flow input – select the flow meter used for this relay control
- Cycles input – here you select a virtual input as a ratio calculation of the systems cycles of concentration or select "None"
- Hand output – desired % output when placed in "HOA-Hand" mode
  - *Acceptable range: 0-100%*
- Off mode output – output mA desired when the output is in "HOA-OFF" mode or being interlocked or during calibration of sensor used as an input.
  - *Acceptable range: 0 to 21 mA*
- Error output – output mA desired when the sensor is not giving the controller a valid signal
  - *Acceptable range: 0 to 21 mA*

i. Low cycles limit – lower limit for cycles of concentration, if used. The calculated on-time is limited to the maximum value if the cycles of concentration gets too.

20) ***RELAY – VOLUME CONTROL MODE (PPM):*** **(VOLUME/POSI-FLOW) POWERED OR DRY RELAY** – Same as TARGET PPM except done with a PosiFlow. Only available if HVAC mode is enabled.

a. This must be programmed on the appropriate DI screen feed Monitor. The W900 monitors the total volume of flow through up to (2) analog or digital flow meters. Once a set volume has been accumulated, the relay activates until the calculated number of pulses from a flow monitoring device to achieve the target PPM level are received. The user must enter Target PPM, Volume of water to trigger the chemical feed, Data necessary to calculate the numbers of strokes for the pump to run in order to maintain the PPM in that volume of water.

b. Required Information:

Target	Enter the desired PPM set point for the product.
Specific Gravity	Enter the specific gravity of the product to be added.
Accumulator Volume	Enter the volume of water passing through the water meter to trigger the chemical feed.
Flow Input	Select the flow meter to be used as an input for this control relay.
Flow Input 2	Select the second flow meter, if any, to be used as an input for this control relay.
Cycles Input	Select the virtual input that is programmed as a Ratio calculation of the system conductivity/makeup conductivity, or select None.
Low Cycles Limit	Enter the lower limit for cycles of concentration, if used. The calculated on-time is limited to a maximum value if the cycles of concentration gets too low.

c. If trigger volume is achieved again before the activation time has expired, the newly calculated feed monitor pulses per unit volume is added to the remaining number.

d. If relay state is continuously one for longer than the Output Time Limit, the relay will deactivate.

21) ***RELAY – FLOW PROPORTIONAL MODE (PPM):*** **(OPTO RELAY – VOLUME/OPTO)** Same as FLOW PROP MODE except ramped up and down **continuously by the OPTO RELAY** and not by an analog signal.

In Flow Proportional control mode, the controller monitors the rate of flow through an analog or digital flow meter, and continuously adjusts the the pulse proportional output band to achieve a target PPM level. The user enters the target PPM and the data necessary to calculate the proportional band (the water flow rate at which the maximum pulse rate will occur) required to maintain the target PPM with that flow rate of water.

Target	Enter the desired PPM set point for the product.
Pump Capacity	Enter the maximum flow rate for the metering pump.
Pump Setting	Enter the stroke length setting for the metering pump, in percent.
Specific Gravity	Enter the specific gravity of the product to be added.
Hand Output	Enter the output % desired when the output is in Hand mode.
Flow Input	Select the flow meter to be used as an input for this control relay.
Cycles Input	Select the virtual input that is programmed as a Ratio calculation of the system conductivity/makeup conductivity, or select None.
Low Cycles Limit	Enter the lower limit for cycles of concentration, if used. The calculated on-time is limited to a maximum value if the cycles of concentration gets too low.

ANALOG OUTPUTS

22) ***RETRANSMIT ANALOG:*** Retransmits a 4 to 20 mA signal coming into the controller and displays it in % analog. You can also send out a sensor value as a 4 to 20 signal by retransmitting it. 0% is the 4mA signal and 100% is usually 20 mA.

23) ***ANALOG OUTPUT – MANUAL MODE:*** In manual mode the analog output will activate if the HOA mode is in Hand, or if it is activated with another channel. There are no additional programmable parameters. Put in AUTO if you desire another output (relay or digital signal) to activate the analog output.

24) ***ANALOG OUTPUT, PID CONTROL MODE:*** Analog Output Card Needed - HVAC mode DISABLED.

The PID algorithm controls an analog (4-20 mA) output using standard Proportional-Integral-Derivative control logic. The algorithm provides feedback control based on an error value continuously calculated as the difference between a measured process variable and a desired set point. Tuning settings specify the response for proportional (the size of the error), integral (the time that the error has been present), and derivative (the rate of change for the error) parameters. With proper tuning, the PID control algorithm can hold the process value close to the set point while minimizing over shooting and undershooting.

a. The PID algorithm controls an analog output to drive the Integral and Derivative Control Logic. Proportional (the size of the error) Integral (the time that the error has been present) Derivative (the rate of change for the error)

b. **Standard Form**: the standard form is more commonly used in industry because its time based settings for the integral and derivative coefficients are more meaningful.

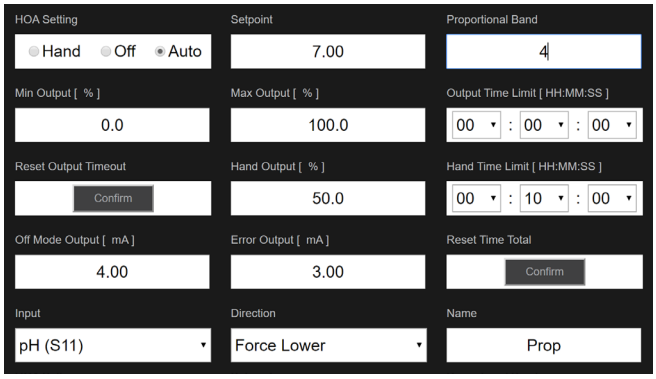
c. **Parallel Form**: The parallel form allows the user to enter all parameters as Gains. In all cases, larger gains vales result in faster output response.

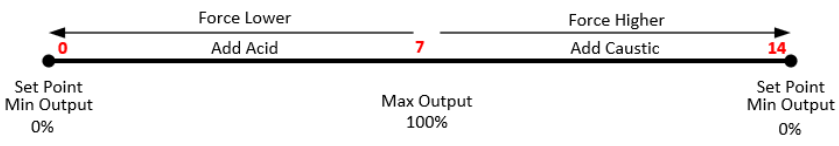
25) ***ANALOG OUT - PROPORTIONAL CONTROL MODE:*** Controls with a set point and a proportional band from a sensor, analog input, or virtual input. The output display will show the value in %. *The pump or device connected to the relay will always run the slowest or at the Min Output % at the SET POINT value. The MIN OUTPUT should not be set lower than 100%.*

Force Higher - (adding caustic to increase the pH set point 10 – dead band 6)
The pump will run at 100% at any value below pH 4 and will slow down as the pH gets closer to 10. At 10 the pump will not run. Your minimum output value can be higher than 0%. If you do that the pump will run at that value when the pH is above the set point. For example, if you set the minimum value at 20% the pump will run at 20% when the pH is above 10.

Force Lower - (adding acid to lower pH set point 7 – dead band 4)
The pump will run at 100% at any value above pH 11 and will slow down as we get closer to 7. At 7 the pump will not run. Your minimum output value can be higher than 0%. If you do that the pump will run at that value when the pH is below the set point. For example, if you set the minimum value at 20% the pump will run at 20% when the pH is below 7.

EXAMPLE: adding acid

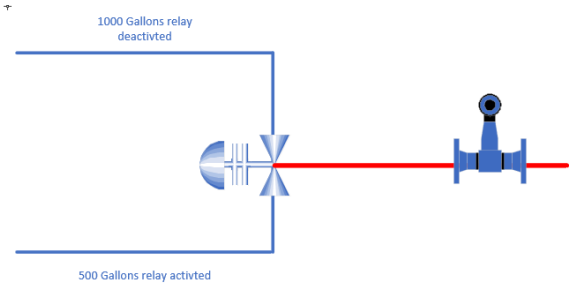




26) Relay Output, Volumetric Blending Control Mode

Volumetric Blending is used to mix two liquid streams together at a fixed ratio. The relay controls a diverter valve that alternates between two sources, metering in a programmable accumulator volume when the relay is deactivated, and then switches to a programmable blend volume when the relay is activated. This control mode includes an optional disturbance input that is multiplied by the user-entered blend volume. A common example is to mix two cooling tower makeup water sources, and then to use the makeup conductivity as a disturbance input to adjust the ratio. *This uses one flow meter and controls a diverter valve to alternate between the two water sources.*

Output Details
The details for this type of output include the relay on/off state, HOA mode or Interlock status, accumulated on time, alarms related to this output, relay type, and the current control mode setting.
Settings
Touch the Settings icon to view or change the settings related to the relay.
Accumulator Volume
Enter the volume through the flow meter with the relay deactivated.
Blend Volume
Enter the volume through the flow meter with the relay activated.
Flow Input
Select the flowmeter input to be used to control this output.
Disturbance Input
Select the virtual input or analog output to be used to multiplied by the control setpoint (Blend Volume).



27) 5.3.26 Relay Output, Flow Meter Ratio Control Mode (USING CYCLES)

Flow Meter Ratio Control Mode is typically used in cooling water applications to control the conductivity of the water using volumetric cycles of concentration. The controller measures the volume of makeup water going through one or two water meters, and after a programmable amount, activates the relay to control a programmable volume out through one or two bleed water meters. *This program uses two water meters. For every X gallons of water through the first meter, it opens a valve to let Y gallons of water through the 2nd meter.*

- First assign the two water meters or conductivity sensors.
- Set up the virtual input
- Set up the relay page using the V1 as the input.

Output Details
The details for this type of output include the relay on/off state, HOA mode or Interlock status, Accumulated makeup water total, bleed cycle volume, remaining volume, relay on-time for this cycle, accumulated on-time, alarms related to this output, relay type, and the current control mode setting.
Settings
Touch the Settings icon to view or change the settings related to the relay.
Accumulator Volume
Enter the volume through the makeup water meters that will activate the relay.
Bleed Volume
Enter the volume through the bleed water meters that will deactivate the relay.
Makeup Meter
Select the makeup water meter from the pulldown list.
Makeup Meter
2 Select the makeup water meter from the pulldown list, if applicable, or leave at None.
Bleed Meter
Select the bleed water meter from the pulldown list.
Bleed Meter 2 Select the bleed water meter from the pulldown list, if applicable, or leave at None.

VITURAL INPUTS

NOTE: Only available for 4-20 mA and pulse relay output channels. These control modes generate an output by combining contributions from a Primary control output, a Disturbance Input, and a Trigger Input in a variety of ways. When the disturbance trigger discrete input is active, the disturbance input is multiplied by the primary output to determine the control percent output. An alternate calculation trigger mode selection (Use Disturbance) is available to simply switch to the disturbance output when the trigger is active (rather than combine the two values). As a future enhancement, the Primary Output and any outputs that are used as alternate control outputs will be Virtual Outputs. For now, these will require a physical output that are not connected to any controlled devices.

28) Virtual Input Calculation:

A Calculation type Virtual Input is not a physical sensor; it is a value that is calculated from two physical sensor inputs. The analog values that can be used for each type of calculation are selected from a List of all defined sensor inputs, analog inputs, flowmeter rates, the other virtual input, solid state relay %, and analog output %.
Calculation modes are:

- **Difference** (Input - Input 2)
- **Ratio** (Input / Input 2)
- This selection could be used to calculate Cycles of Concentration in HVAC applications, for example
- **Total** (Input + Input 2)
- **% Difference** [(Input - Input 2) / Input]
- This selection could be used to calculate % Rejection in RO applications.

LOW RANGE: Set the low end of the normal range for the calculated value. A value below this will trigger a Range Alarm and deactivate any control output using the virtual input.

HIGH RANGE: Set the high end of the normal range for the calculated value. A value above this will trigger a Range Alarm and deactivate any control output using the virtual input.

29) Virtual Input – Redundant Sensor:

A Redundant type Virtual Input is not a physical sensor; it is a value that is calculated from two physical sensor inputs. The redundant sensor algorithm compares the readings from two sensors and chooses which sensor to use. The value of the virtual input is the value of the sensor chosen by this comparison.

If the difference between the two exceeds a programmable amount, a deviation alarm is set, but control continues. If one of the sensors goes into a range error or a fault alarm, the other sensor will take over. If both sensors give invalid readings, an input alarm is set and any outputs using the virtual input for control are disabled.

There are three modes:

- Primary/Backup – When the deviation between the two sensors is greater than the deviation alarm set up on the virtual Input page: the Alarm Relay will be activated.
- **Min & Max Mode**: First you set up virtual input Mode select Min or Max. **Example**: First set up your two sensors. Next set up the virtual input by selecting a Deviation Alarm Value say (500). Next set up your relay - in this example we will us an ON/OFF relay with a Set Point of 2000 and Dead Band of 100, and force lower. Lastly, we set up an alarm relay for the sensor inputs. The alarm relay will go off anytime the two sensor values differ more than 500. The ON/OFF relay will only activate the relay to go ON based on the sensor with the lowest value. So, if Senor 1 is 2300 and Sensor 2 is 1900 the relay will come on when sensor 2 goes about the set point 2000. This function on the virtual input will work similarly when you select the Maximum Mode as well.

Deviation Alarm: Enter the value for the difference between the two input readings above which the deviation alarm will trigger.
Deadband: This is the Alarm Deadband. For example, if the Deviation Alarm is 1.00, and the deadband is 0.1, the alarm will activate if the sensor readings are 1.01 units apart.

30) Virtual Input Raw Value:

A Raw Value type Virtual Input is not a physical input. The value of the virtual input comes from the unmanipulated signal from a real sensor.

We added a Raw Value virtual input type to do one of two things:

- Datalog the raw uncalibrated reading of a sensor for troubleshooting purposes
- Allows you to track the ration of imbalance to general corrosion

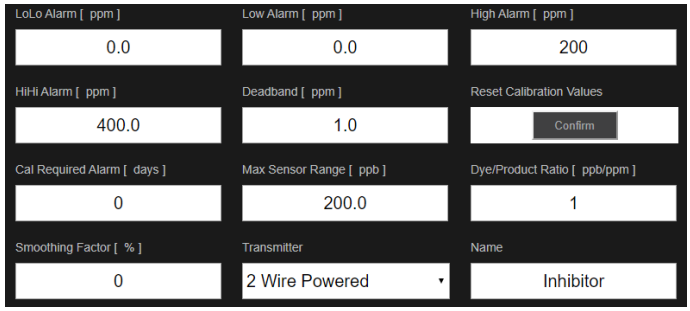
31) DISTURBANCE INPUT: (ON/OFF DISTURBANCE) (SET POINT CHANGES) (*POWERED RELAY*)

Example: On/Off control mode is enhanced to add a disturbance input that is multiplied by the user-entered setpoint. An example of this might be the control of a corrosion inhibitor containing PTSA based upon a fluorometer sensor input, with the setpoint modified based upon a corrosion sensor Disturbance Input, so a higher corrosion reading results in more corrosion inhibitor being fed.

How it works: on the virtual input menu put in your max /min disturbances. The Max and Min disturbances will be associated to the variable that changes the most – in this example the water flow. You will also set up a multiplier for each. *The multiplier will change the SET POINT and dead band will stay the same value*.

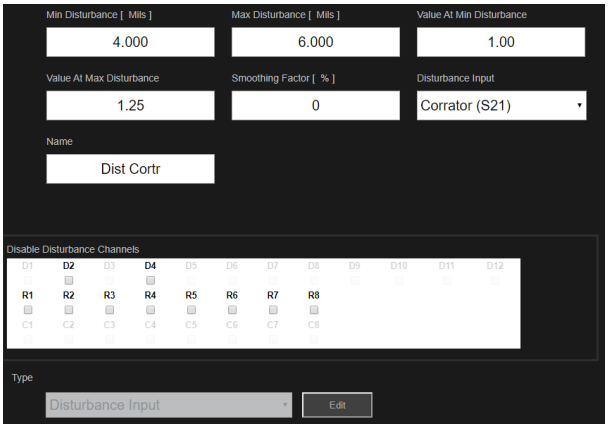
Example: If you put a value of 1 for the min disturbance value multiplier it will keep the set point the same at the Min Disturbance water meter value. In the example down below the min value is 100 so if the flow is below 100 the pH Relay operates as it normally would and comes on at 7 and shut off at 5. However, let's say the flow is at 400 GPM then the set point is going to be multiplies by 1.25 and will not come on until we hit a pH of 8.75 and shut off at 6.75 (Deadband stays the same) because we selected force Lower it will be the opposite if we selected force higher and it would come on at 5.75. The dead band stays the same even though the set point changes.

PTSA sensor Fluorometer (S22)

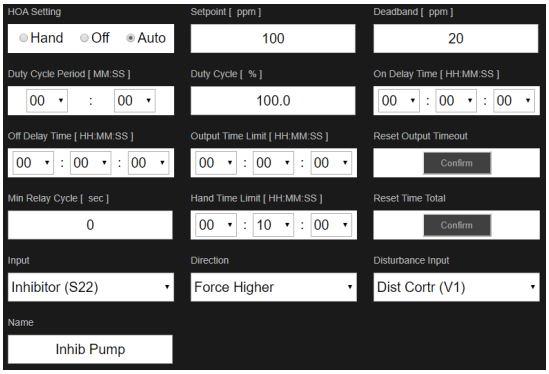


Analog Corrater from 0 To 10 Mils / Yr (S21)

Virtual Input 100 min and 700 max



pH Relay (R1) set point 7 dead band 2



FORCE LOWER: (does not really work with this algo you would want FORCE HIGHER.)

Below 4 Mils/YR nothing happens relay runs by PTSA Set Point and Dead Band – no multiplier. **(REMEMBER SAME DEAD BAND TO SHUT OFF 20)**

If you want the Disturbance Multiplier to go down as the Mils/YR goes up you must change the value on the virtual input page – Value at Max Disturbance to a lower value say .75 instead of 1.25. Now the set point drops as the Mils/YR goes up. AGAIN THIS REALLY DOES NOT WORK FOR THIS APPLICATION. BUT THIS EAMPLE DOES SHOW HOW TO DROP THE SET POINTS IF NEEDED.

4 Mils/YR	Disturbance Multiplier 1.00	Set Point is 100	Shut Off will be at 120
5 Mils/YR	Disturbance Multiplier 1.12	Set Point is 87	Shut Off will be at 107
6 Mils/YR	Disturbance Multiplier 1.25	Set Point is 75	Shut Off will be at 95

FORCE HIGHER:

Below 4 Mils/Yr the relay runs by PTSA Set Point and Dead Band – no multiplier **(REMEMBER SAME DEAD BAND TO SHUT OFF 20)**

Corrosion goes up and the Inhibitor set point goes up so the minimum level of additive is always greater and greater as the corrater values goes up.

4 Mils/YR	Disturbance Multiplier 1.00	Set Point is 100	Shut Off will be at 120
5 Mils/YR	Disturbance Multiplier 1.12	Set Point is 112	Shut Off will be at 132
6 Mils/YR	Disturbance Multiplier 1.25	Set Point is 125	Shut Off will be at 145

Note: on this relay algorithm you have the following:

1) You need to decide which variable is the disturbance.
2) The variable that changes the most will be the disturbance usually.
3) The disturbance criteria need to be inputted into the VIRTUAL INPUT page.
4) On the VIRTUAL INPUT page, the MIN & MAX disturbance determines when you start using a multiplier (MIN or Max) to the set point. The (Max Disturbance Value) is where the multiplier is at its greatest value or least value.
5) You will also input the multipliers on the VIRTUAL INPUT page.
6) The multipliers change the set point value and you will have a max and min value.
7) You will also set whether the relay will Force Higher or Force Lower based on the system.

32) DISTURBANCE - PULSE DISTURBANCE INPUT PROPOTIONAL OUTPUT - TRIGGER & NO-TRIGGER

OPTO RELAY needed or can use an AO OUTPUT CARD example shown down below – using an OPTO relay in the example down below.

In this example the pH of the water changes and the water flow changes. What we would like to do is increase the acid addition to the water stream when the water flow increases.

{Primary Output %}{Disturbance Input}{Max Pump Output%}{SPM 360 usually} = relay pulses

If pump Max Pump Output is 100% the equation is the following: (THESE VALUES CAN BE FOUND ON YOUR DISTURBANCE RELAY PAGE)

(Primary Output %)(Disturbance Input)(360 SPM usually) = relay pulses

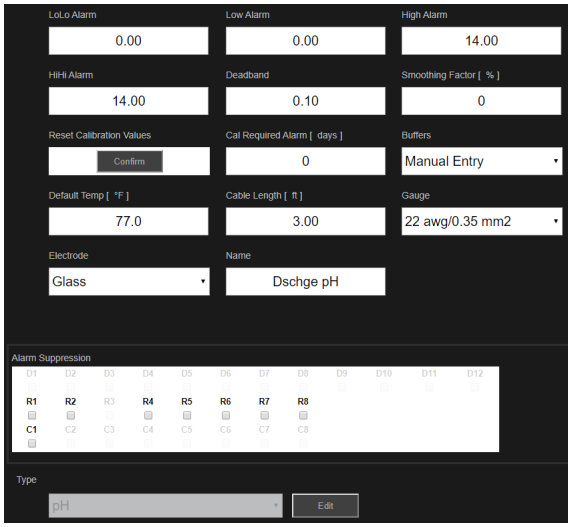
Note: once the primary sensor is above 7 pH the pump will start running when the water flow goes above 100 GPM the multiplier kicks in and multiplies. It increases the pump speed based on the equation up above.

Example down below

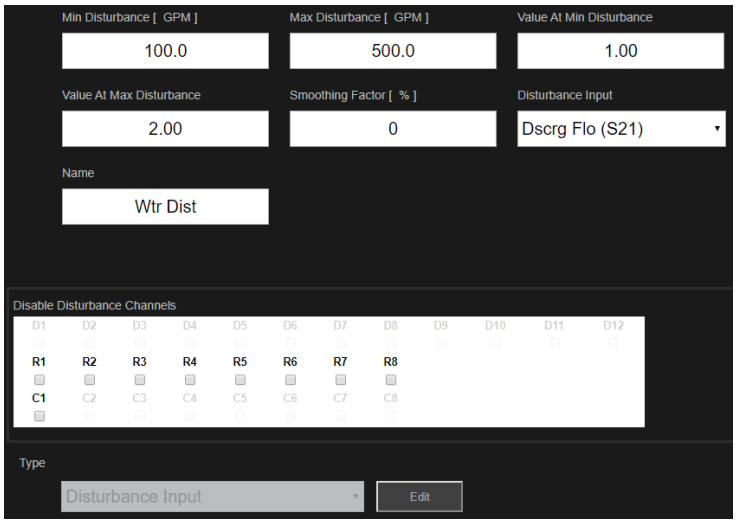
(NO TRIGGER): in a no trigger situation the relay will consider both the Primary Output and the Disturbance Input. If you are not above the min disturbance value it only takes into account the parameters set up as the primary output on your relay - pH in our case. We have a set point of 7 and a dead band 4, force lower, pump speed at 7 pH 0 SPM, pump speed at 11 pH 360 SPM. If you are above the min disturbance value (100 GPM) both the pH and water flow affect the pump speed and the controller will use the disturbance multipliers and multiply them by the primary output pump speed.

1) First thing enter in the data for the pH sensor and water meter on the controller menu pages.
2) Second enter data into the VIRTUAL INPUT page for the Disturbance Variable Water Flow and the multipliers you desire.
3) Set up the relay for the Primary Variable the pH sensor. You will want to use a Virtual Input to do this – you can also use a regular relay to do this if you so desire, however you then burn up a relay for nothing.
4) Set up the relay for the acid pump here you will put

pH of the discharge water (S13)



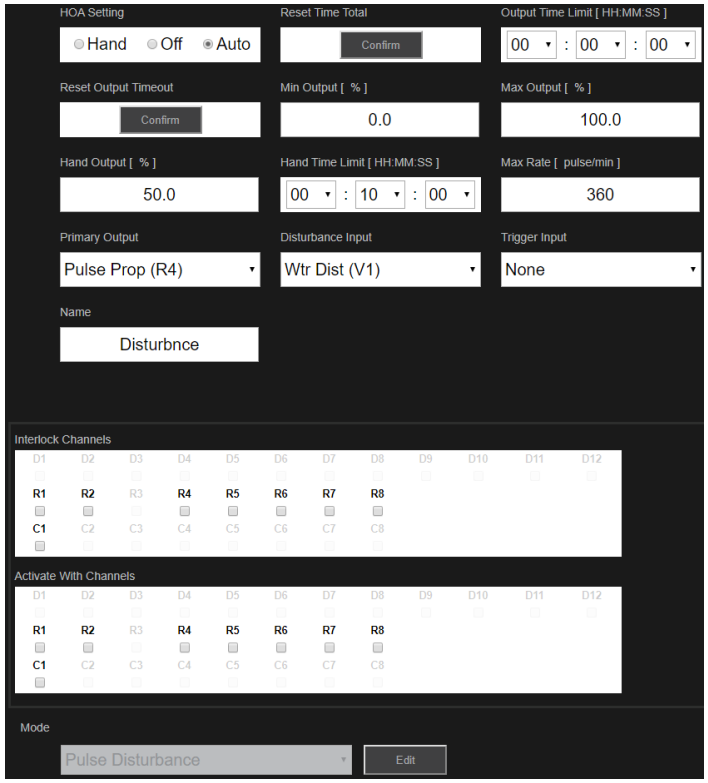
Disturbance of water flow (V1)



Disturbance OPTO Relay (R3) for Chemical Pump

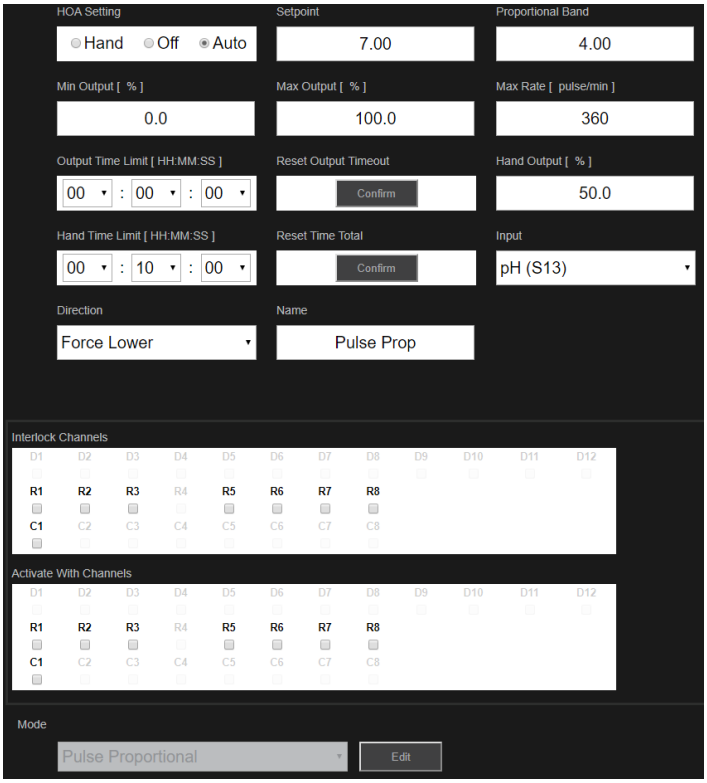
RELAY 3 ACID FEED PUMP

***** Primary Output on this relay can be Pulse Prop (R4) or (C1)**

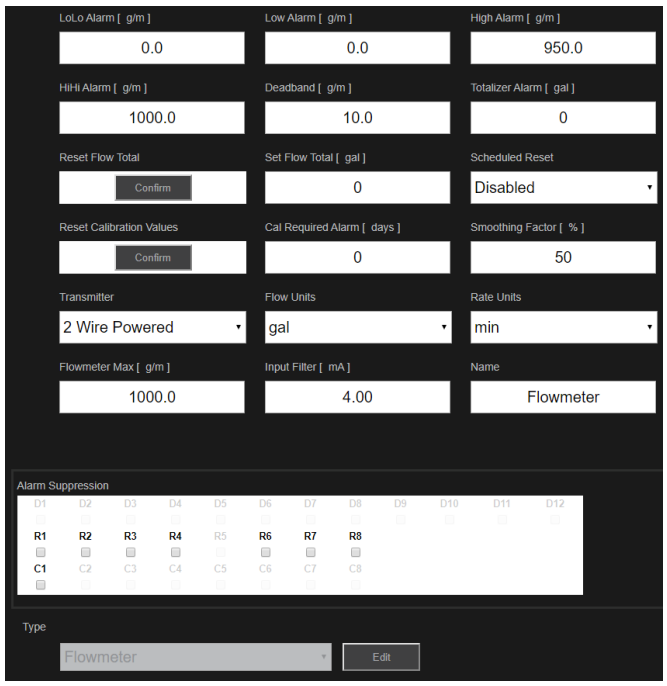


Primary Sensor output is R(4) or (C1) which ever you desire

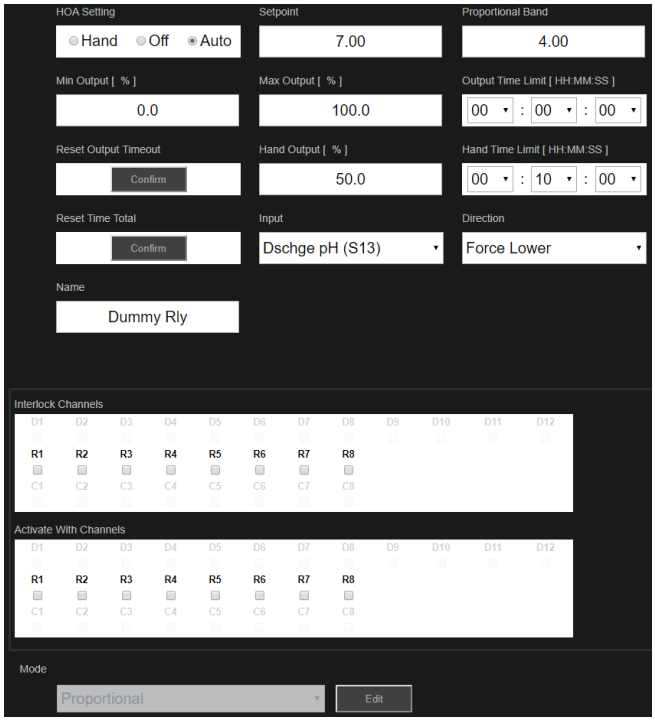
Relay Input (R4) for pH control



Analog Water Meter (S21)



Virtual Relay (C1) select proportional for MODE



Note: You don't have to use a real relay for the pH sensor use a VIRTUAL Relay (V1) for a Dummy pH relay. This way you don't waste a real relay. You can see the results down below.

Note: if you use (C1) for the Dummy relay it MUST BE selected as a PROPORTIONAL RELAY !!!!!!!!!!!!!!!!!!

Remember if the primary sensor (pH) is under a pH of 7 the pump relay will not turn on even if the flow is at 500 GPM.

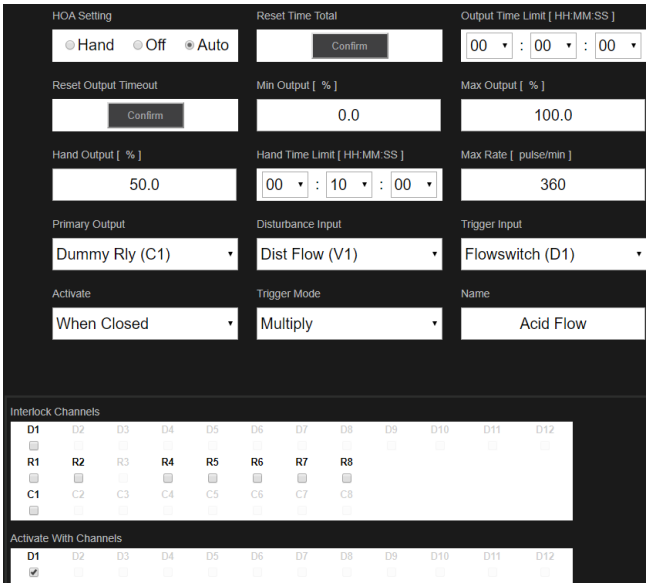
	X 1	X 1.5	X 2.0
	Flow under 100	**Flow at 300 GPM**	**Flow at 500 GPM** .
pH 7	0 SPM	0 SPM	0 SPM
pH 8	90 SPM	135 SPM	190 SPM
pH 9	180 SPM	270 SPM	360 SPM
pH 10	270 SPM	360 SPM	360 SPM
pH 11	360 SPM	360 SPM	360 SPM

Note: if you select a maximum output of 50% for relay 3 (Master) even though relay 4 says 0 to 100% or 360 SPM the max stroke rate on the pump for Relay 3 will be 180 SPM. If you set relay 4 at 50% output you can still achieve 360 SPM when you take into account the multipliers from the water meter flow.

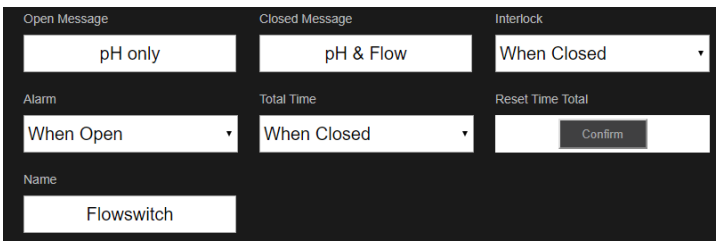
Trigger (Multiply): There are two trigger modes – (Multiply) will activate the Disturbance function on and off. In our example this would be the water meter.

The disturbance relay for the chemical pump (R3) will run the pump based on the pH sensor (Primary Output) algo until the digital switch is engaged. This switch closure will initiate the flow algo. The trigger can be a digital input or a relay. When the trigger is activated the relay will run based on ***flow and pH – just like when using no trigger***. When the switch or relay are shut off the relay will run again based on the pH algo (Primary Output) only.

Note: (R3) trigger activated by switch D1



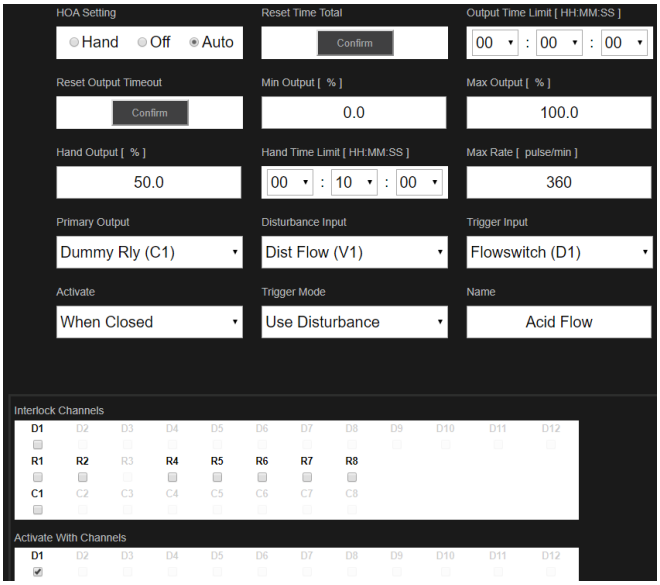
Digital Input Switch down below D1



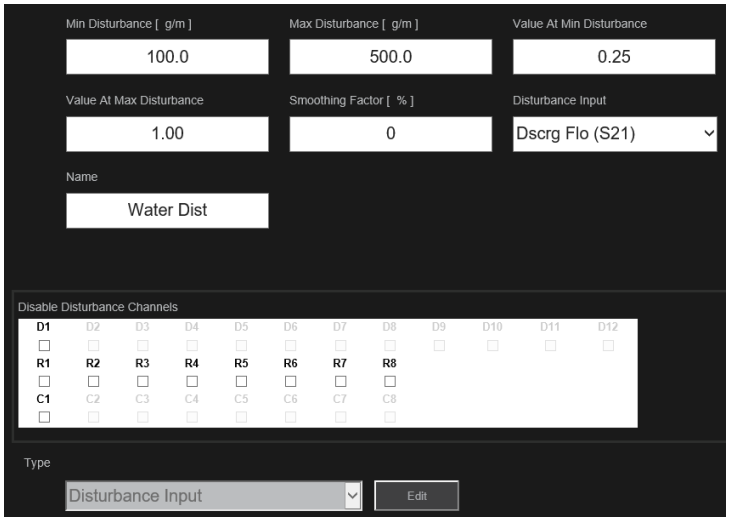
Trigger (Use Disturbance):

Now when the switch is **CLOSED** Only the flow will dictate the relay output when **OPEN** the pH will dictate the relay speed***. It's one or the other not both.*** I left everything the same except the trigger option and I changed it to the trigger disturbance input. I also changed the Max and Min Disturbance values. When we run the TRIGGER DIST function we have to change the multiplier on the water meter. Other wise the pump will run full blast all the time because the MIN multiplier is 1 or 100% and 2 would 200%. I changed the MIN multiplier to .25 and the MAX multiplier to 1.0.

RELAY 3 make sure and activate with D1



Virtual Input Page – Changes Made



Switch Off - pH is the **only** factor Switch ON – Flow is the only factor

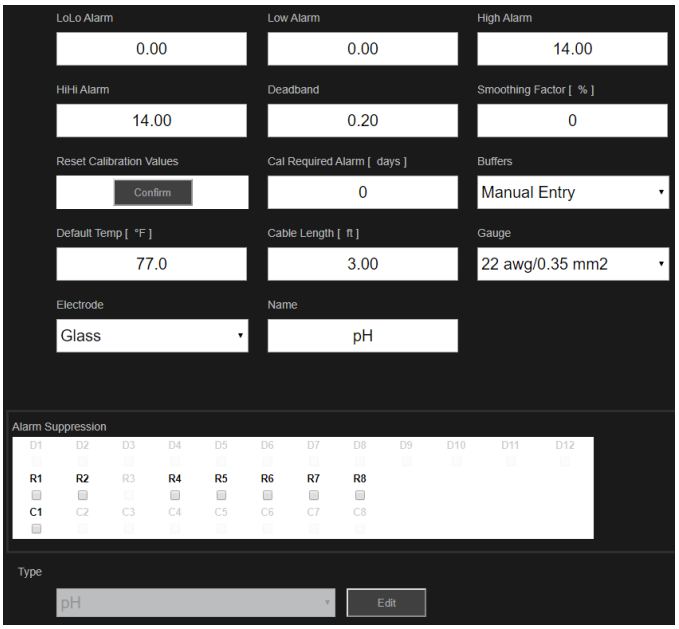
		SWITCH OPEN	SWITCH OPEN	SWITCH OPEN	SWITCH OPEN	SWITCH OPEN
GPM	Switch Closed	pH 7	pH 8	pH 9	pH 10	pH 11
100	0					
200	160 SPM	0 SPM	90 SPM	180 SPM	270 SPM	360 SPM
300	225 SPM	0 SPM	90 SPM	180 SPM	270 SPM	360 SPM
400	300 SPM	0 SPM	90 SPM	180 SPM	270 SPM	360 SPM
500	360 SPM	0 SPM	90 SPM	180 SPM	270 SPM	360 SPM

33) DISTURBANCE - PULSE DISTURBANCE INPUT PROPOTIONAL OUTPUT - TRIGGER & NO-TRIGGER

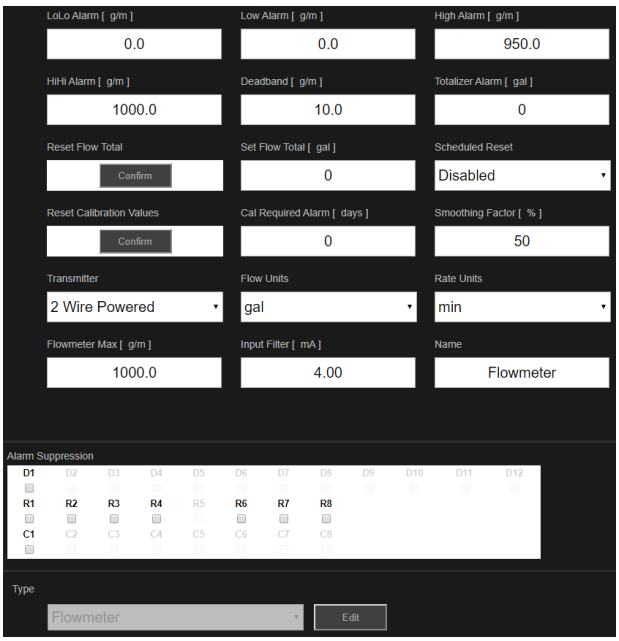
EXAMPLE: ANALOG OUTPUT – example shown down below – you can also use an OPTO relay example shown up above.

{**ANOTHER EXAMPLE**: in this example we are doing the same thing we created in the previous example up above however, we are using an analog output card to run the pump.

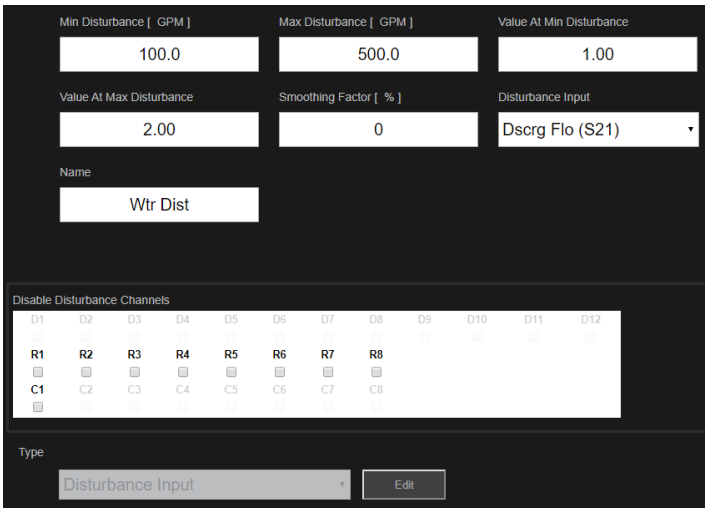
pH Sensor (S13)



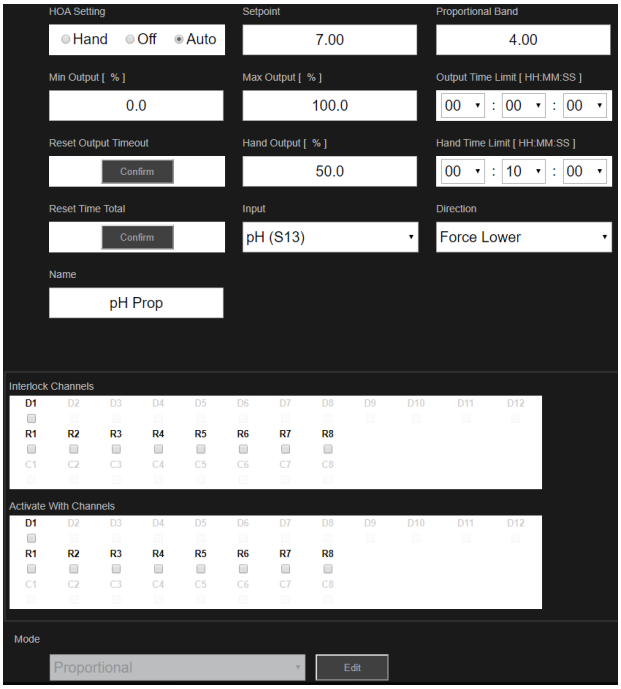
Water Meter Analog Menu (S21)



Water Meter Virtual Disturbance Input (V1)



Virtual Output for pH if you don't use a real relay (C1)



Analog Output for Acid Pump

Relay (R1) - Dummy Relay for the pH could be done if you did not want to use the virtual relay up above not shown.

Here is how the Acid pump should preform – notice since we used the same settings as the example up above **called PULSE DISTURBANCE INPUT PROPORTIONAL OUTPUT** . The chart values should look exactly the same. The only difference here is we are using an Analog output to run the pump not a pulse proportional (OPTO) relay to do this. The Trigger options will work exactly the same in this example as they did up above in the example already given.

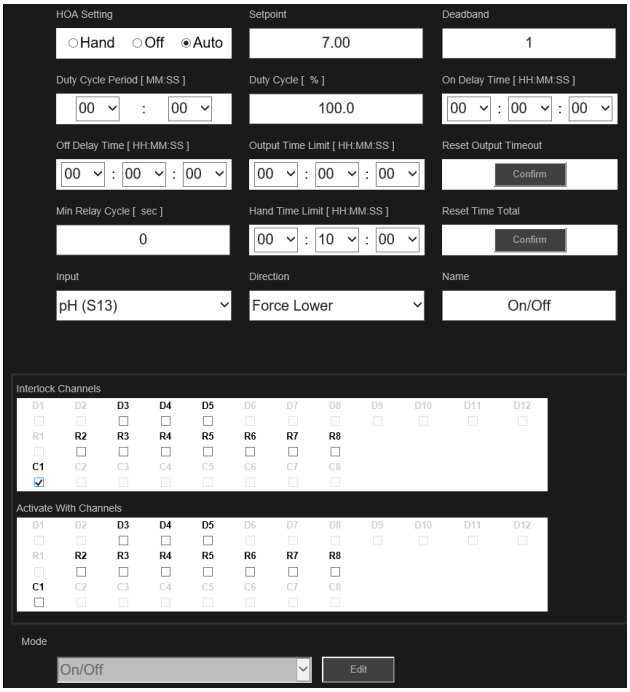
	X 1	X 1.5	X 2.0
	Flow under 100	**Flow at 300 GPM**	**Flow at 500 GPM .**
pH 7	0 SPM	0 SPM	0 SPM
pH 8	90 SPM	135 SPM	180 SPM
pH 9	180 SPM	270 SPM	360 SPM
pH 10	270 SPM	360 SPM	360 SPM
pH 11	360 SPM	360 SPM	360 SPM

VIRTUAL OUTPUTS

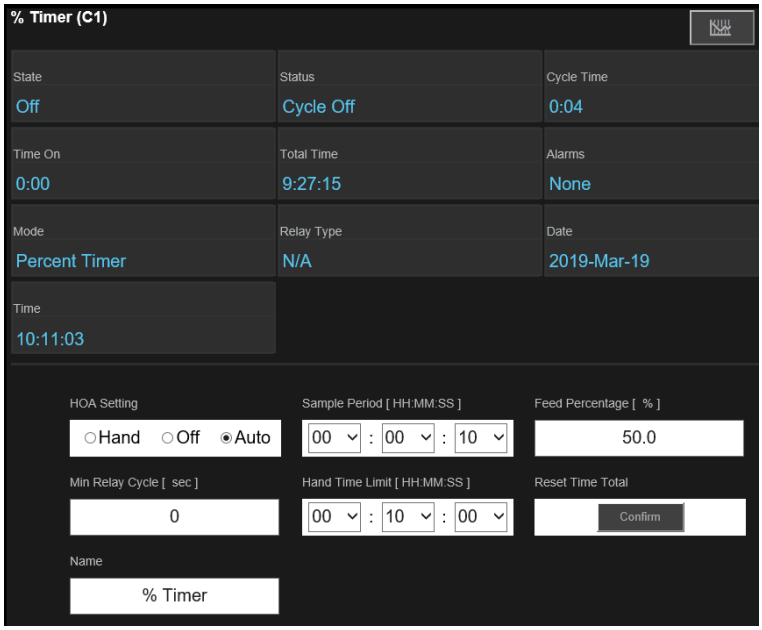
34) A Virtual Output helps the user save physical relays. The Virtual output usually works in conjunction with an existing relay. Say using an ON/OFF relay with a % Timer. This way the relay will come on and off on regular intervals. A customer could use a timer relay with and existing relay to turn a controller on during the weekends and off during the weekends. Virtual relays and usually set up as activates and interlocks. The virtual relay is not real so when we use them in a controller program they allow us not to use a real relay. Instead we use a make believe relay.

EXAMPLE: pH set up to turn on and off cyclically during operation.

Relay ON/OFF



Virtual Output (C1)



35) ***FEED MONITOR:*** The Feed Monitor Digital Input type performs the following functions:

- Monitors a pulse signal from a pump (Iwaki PosiFlow, Tacmina Flow Checker, LMI Digital Pulse, etc)
- Totalizes the chemical feed and calculates the current flow rate
- Activates a Total Alarm if the feed exceeds a specified limit
- Activates a Flow verify alarm if the control output is ON and the feed monitor does not record any pulses within a specified period of time.

WIRING: the Posi-Flow unit gets wired in following manor:

- White wire digital +
- Black wire digital –
- Red wire 9 Volt VDC

Totalizer Alarm: set a total volume for the amount of chemical that can be pumped before the alarm goes off.

Total Alarm Mode: select Maintain or Interlock – When a (Total Alarm) is set to Interlock it will shut off the relay when in the alarm goes off and Maintain will allow the relay to run even with an alarm.

Set Flow Total: This function works just like a water meter you can put in a value in where you want the volume to start at.

Flow Alarm Mode: you can DISABLE, MAINTAIN, or INTERLOCK this function is monitoring the posiflow unit and if it does not detect a pulse being sent back from the pump you can select one of the options just mentioned.

Disabled	*Flow Verify* alarms are not monitored, no change in output control.
Interlock	The output will be forced OFF while the alarm is active.(except during the reprime event)
Maintain	The alarm condition has no effect on output control. (except during the reprime event)

When you use the flow verify alarm you may also use these other functions with it.

- Flow alarm delay – put in a time, now the alarm will not go off until it has received pulses from the pump for this specific time period
- Flow alarm clear – is the number of pulses that must be registered to verify that pump operations is restored and clear the flow verify alarm.
- Reprime Time – the amount of time that that relay will stay on with an alarm condition

GENERAL NOTES:

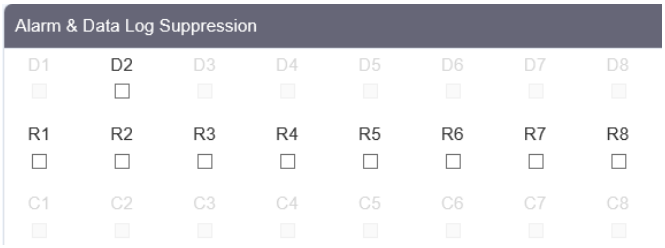
a) We now support generic sensors linear and logarithmic (ISE), and we are able to set the default slope in mV/Decade, the offset is calculated after the first calibration, until a calibration is preformed the reading will be stuck at 0 ppm.
b) The calibration will fail if the offset in more than 2mA or the gain in not between .5 and 2.0
c) In graphs in you select "SAVE FOR REPORT" that set of graphs will be sent as an attachment in every report.
d) Virtual Outputs may be used to Interlock or Activate actual controller outputs.
e) A dry or pulse relay can handle 40 VDC.
f) If the output mode is changed or input type changed, the controller relay will go to the OFF mode.

CONTROLLER PRESIDENCE ON ALGORITHMS

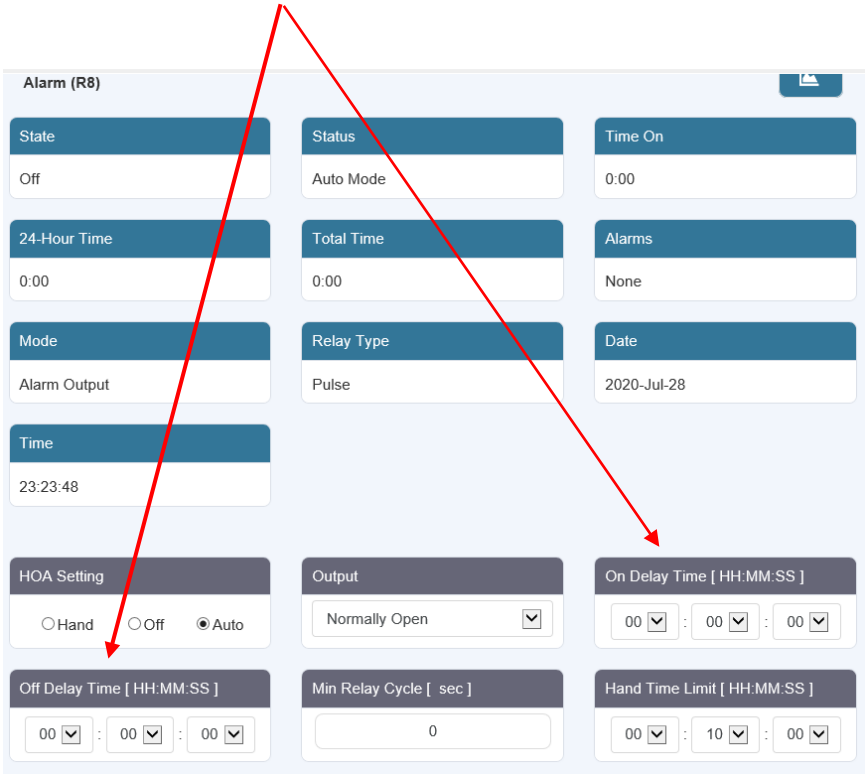
- Looking at the specs, it first checks HOA, and Hand or Off trumps everything else.
- If it's in Auto, the next check is any relay or DI interlock. Any off delays or minimum relay cycle time settings come into play if it shuts it off immediately or not.
- If there are no interlocks, then any activate with scenarios come into play, again using any on delays or relay cycle time settings to decide if the force on is immediate or not.
- If there's none of any of those, the algorithm can be used.
- We had two choices for what to do if there are conflicting instructions to force on or force off and we will always choose OFF as the safest decision. Same logic as we choose Off for the default HOA setting.

V3.33 UPGRADE & KEY FEATURES on ALL CONTROLLERS:

1) **DI Alarm Suppression:** you will find the DI Alarm Suppression on the input page for the sensors. This works just like any alarm suppressions. When the digital input is activated or deactivated the alarm for the sensor will be suppressed.



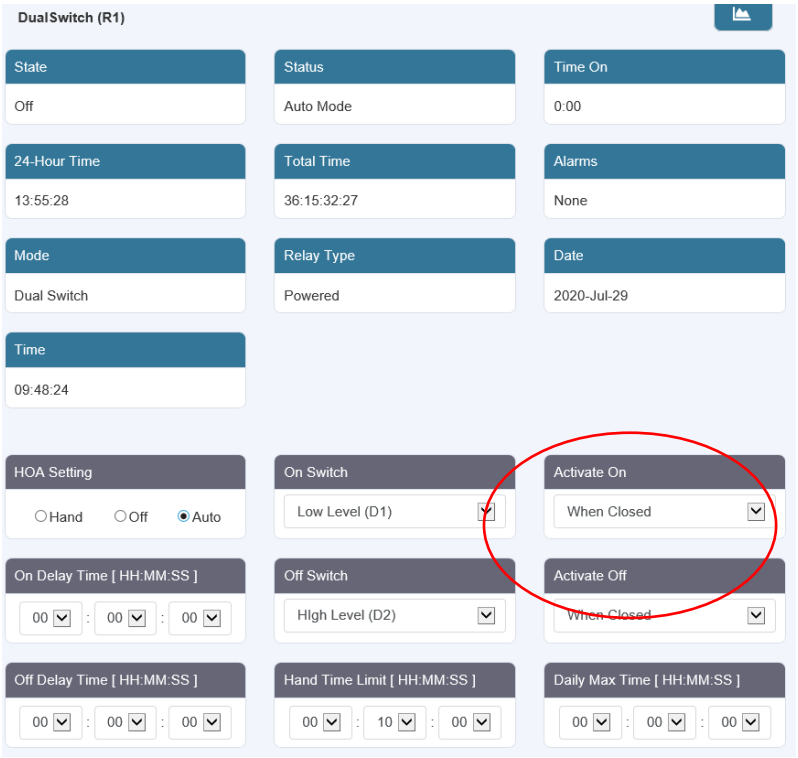
2) **ON & OFF Delays to Alarm Control:** Works exactly the same way as the existing delays for On/Off, On/Off Disturbance, or Dual Setpoint.



V3.33 UPGRADE & KEY FEATURES on W600 & W900:

1) **Dual Switch Control Mode:** A generic name for an algorithm that uses two switches to control a relay, this is typically used to fill or empty a tank. Assign the DI State Input, Relay Output, or Virtual Output (W900 only) to turn the relay on and another to turn the relay off. Example: D1 turns on the relay and D2 turns off the relay. Relay can be attached to a valve or a pump.

Note: Dual Switch output will only respond to relay state changes that occur when that relay is in Auto mode, not if manually set to Off or Hand



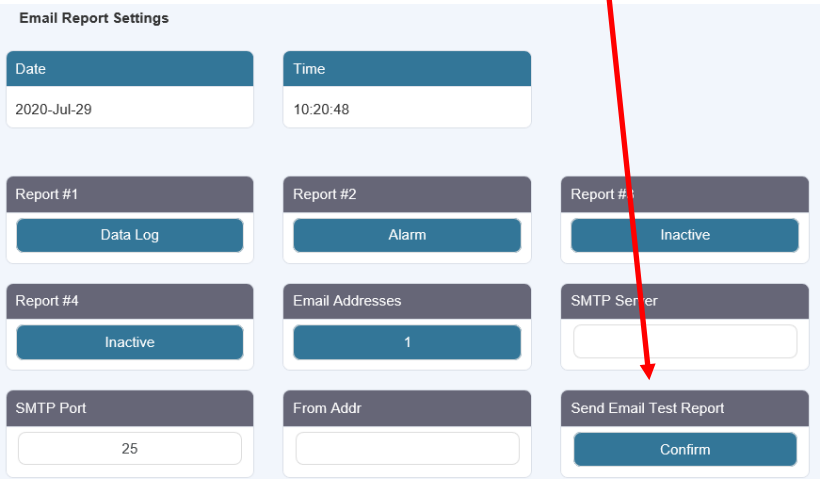
2) **NOTES PAGE:** Allows user to enter 10,240 bytes of notes, link in main menu list. You find the Note Pages after the graph option on the left hand side of the screen.

3) **FORCE PASSWORD CHANGE:** New regulation in state of CA, effective in 2020, bans default passwords. Each controller will ship with a unique web user interface password (the serial number). On first web login, the user will see username and password fields to modify with “Password Change Required”. If they do not change settings and move to a different page, they will see Confirm page change without password update? Clicking OK allows them to continue without changing, clicking Cancel returns them to the password modification page. They will get the prompt every time they login until the password is no longer the default.

4) **REMOTE CONFIG FILE INPORT/EXPORT:** For Importing the config file, the user is prompted to choose a file. If the file selected is valid, it is imported and the controller goes to the log in screen. To Export, the user selects a location and the file is saved there –file goes to downloads.

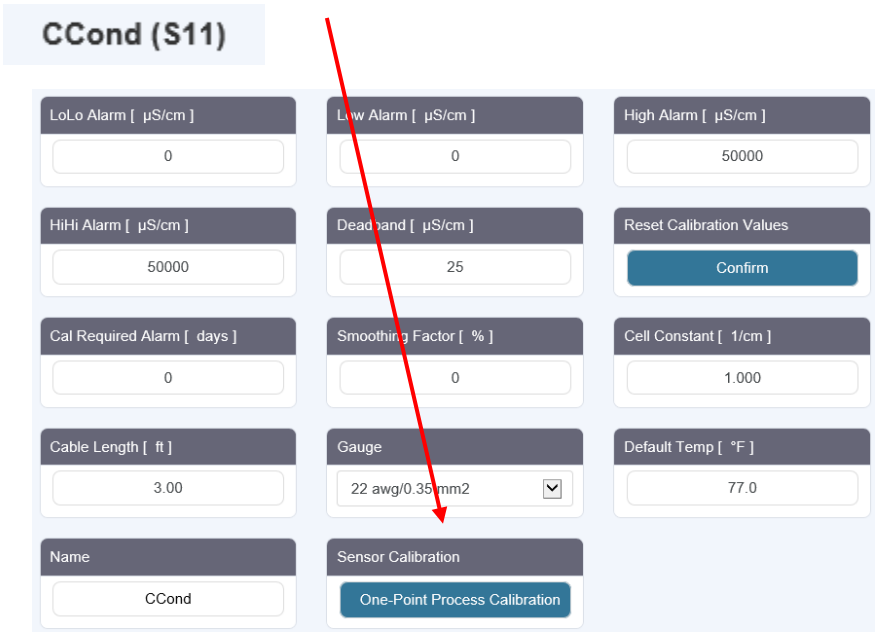
5) **ALARM EMAIL WITH SUMMARY ATTACHMENT:** A new menu has been added to the Alarm email page to Enable/Disable the Summary report (Home Page) attachment. Either select enable or disable on the alarm report page. First go to Email Report Settings, Then select the alarm report page and you will see this option appear.

6) **TEST EMAIL:** Added a button called Send Test Email Report which is shown in the Email Report Settings menu (webpages and local display). The Test Summary Report email is sent to each address checked in the Test Report Recipients field. If not received, look at the /network log for the detailed conversation between servers.



7) **REMOTE SOFTWARE UPGRADES:** Available for all v3.31 W900, but only for W600 with serial numbers > 180612xxxx. Controllers with compatible hardware and software with Internet access detect an upgrade is available on our server. If the user logged in has Admin privileges, the Software Upgrade link is displayed on the left below the Notepad link.
   a. Clicking the link brings up a new webpage
   b. States that an upgrade is available from version x to version y
   c. Upgrade Description button that goes to the Walchem website Learn More page
   d. Start Upgrade button
   e. Clicking Start Upgrade brings up the Status page which shows the steps and allows the user to Cancel Upgrade (and later Resume)
   f. The controller will return to the login page when the upgrade is successfully completed

8) **REMOTE PROCESS CALIBRATIONS:** this can be found on the sensor input page



9) **DATA SUPPRESSION:** If an input has Alarm Suppression based on a DI or relay activation, it will also have Datalog Suppression. The log will not show the actual value of the input if suppressed, just a blank cell.

10) **WEBPAGE COLOR:** Scheme: you can find this option on the Ethernet setting page. Select either light or dark.

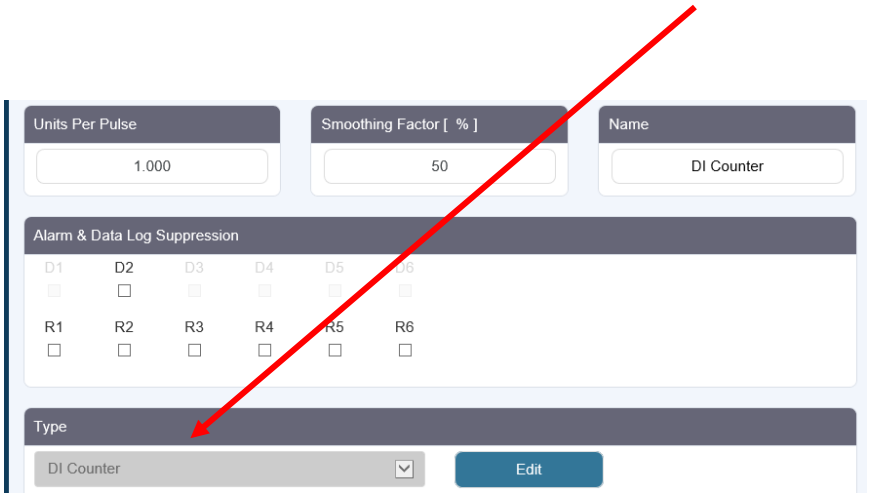
11) **RESPONSIVE WEBPAGE DESIGN:**
    a. Improved performance when using phones and tablets
    b. Menu links collapse and data stacks up on smaller screens

12) **LOG IP ADDRESS OF REMOTE CONNECTION:** Each attempted connection via Ethernet or Wi-Fi Infrastructure mode is logged in the system log. Now it will include the IP address of the device used to attempt to connect. Both successful and unsuccessful attempts will be documented

V3.33 UPGRADE & KEY FEATURES on W600 ONLY:

1) **PLATING CONTROLLERS – SET CURRENT # METAL TURNOVERS**:
    a. For WCU and WNI Controllers only
    b. Some customers rotate baths that have been used for some time between tanks with fixed controllers installed
    c. They want to be able to reset the MTO value to match that of the incoming bath
    d. New menu for Set Turnover Value added to the Total Mode menu for Plating Control mode relays

2) **DI COUNTER INPUT & COUNTER TIMER:** This digital input and output type already exists in W900 (HVAC mode disabled) and now is expanding the capability to W600
    a. Added ability for the user to set 1 pulse = fractional units, not just = one unit
    b. Added High/Low Alarms for the Rate
    c. This will can be found under the digital inputs – type selection at the bottom of the page

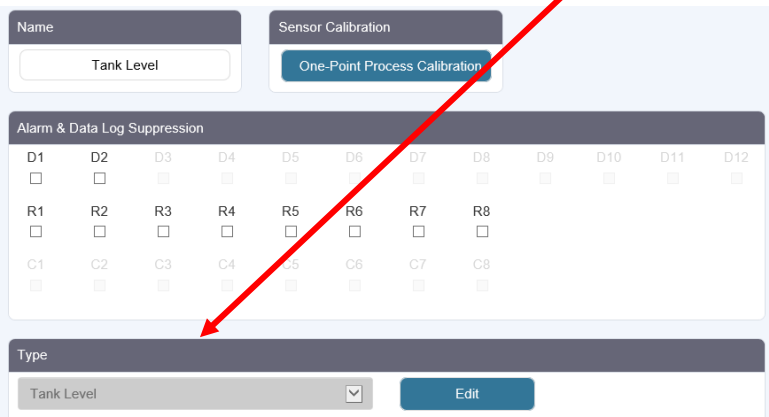


3) **ADDED TLS/SSL EMAIL SUPPORT:**
    a. This capability already exists in the W900
    b. Allows for emails to be sent using servers that require encryption, such as Gmail
    c. Expanding the feature to W600
    d. Requires the new network card in addition to the software upgrade

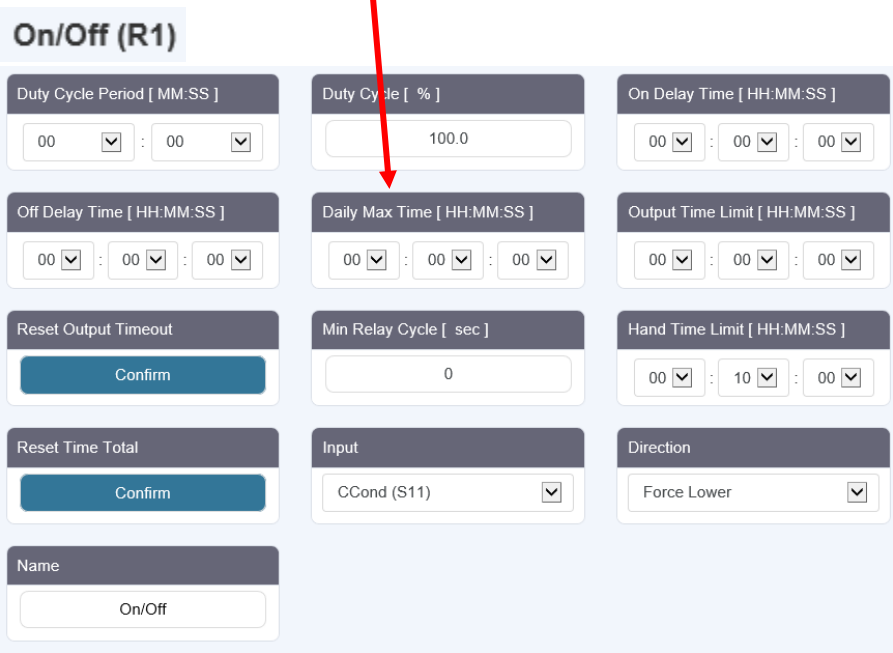
4) **ADD BACnet SUPPORT:** This capability already exists in the W900. Requires the new network card in addition to the software upgrade.

V3.33 UPGRADE & KEY FEATURES on W900 ONLY:

1) **TANK LEVEL TYPE ANALOG INPUT:** this is similar to inputting a flow transmitter. Now we have a selection for a level transmitters. You will find the option in the type selection on the bottom of the analog input page. This simplifies programming of level transmitters.

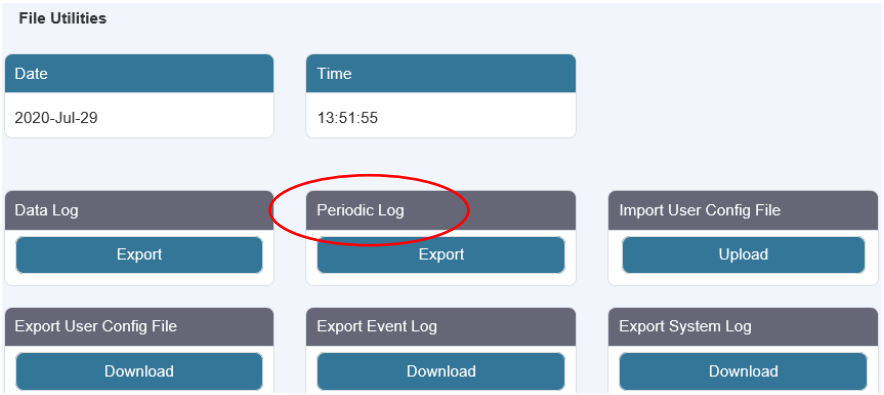


2) **DAILY MAX FEED TIME:** once we are tracking the on-time, we'll be able to set a daily maximum on-time for each output. This will be similar to the existing Output Time Limit except it automatically resets at midnight



3) **END TEMPORARY AD-HOC MODE BUTTON:**
   a. Currently if the user presses "Begin Temporary Ad-Hoc Mode" it can't be stopped - you must wait until it times out. In new software, the button changes to "End Temporary Ad-Hoc Mode" once the timer begins. Pressing the button again puts it back into Infrastructure mode

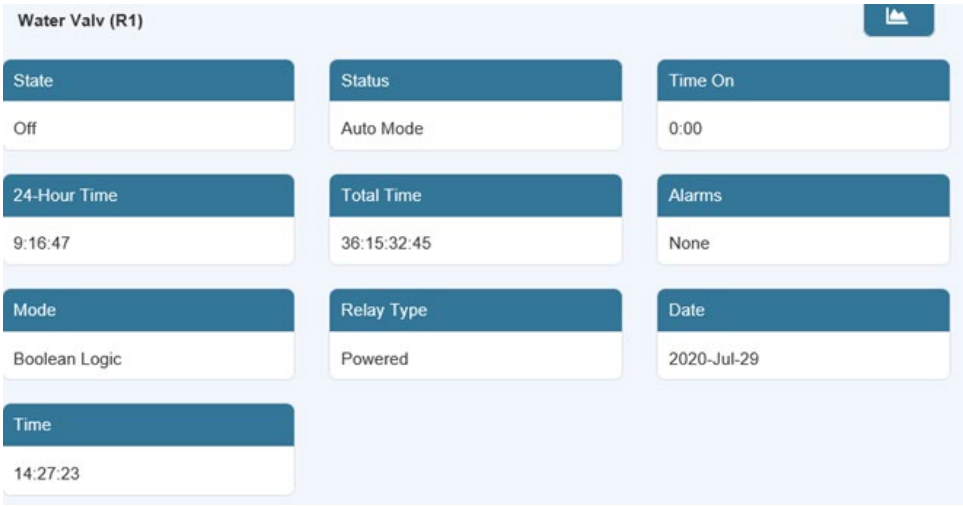
4) **PERIODIC LOG:** the periodic log can be found under the File Utilities section. You can export the log with either the Hourly data points, or with the hourly data added together and shown as one Daily data point.
    a. Min, Max, Average for each sensor and virtual sensor channel calculated hourly
    b. Total relay, virtual output and DI state on-time
    c. Average % output calculated hourly for analog outputs and virtual AO
    d. Flowmeter and flow monitor total volume

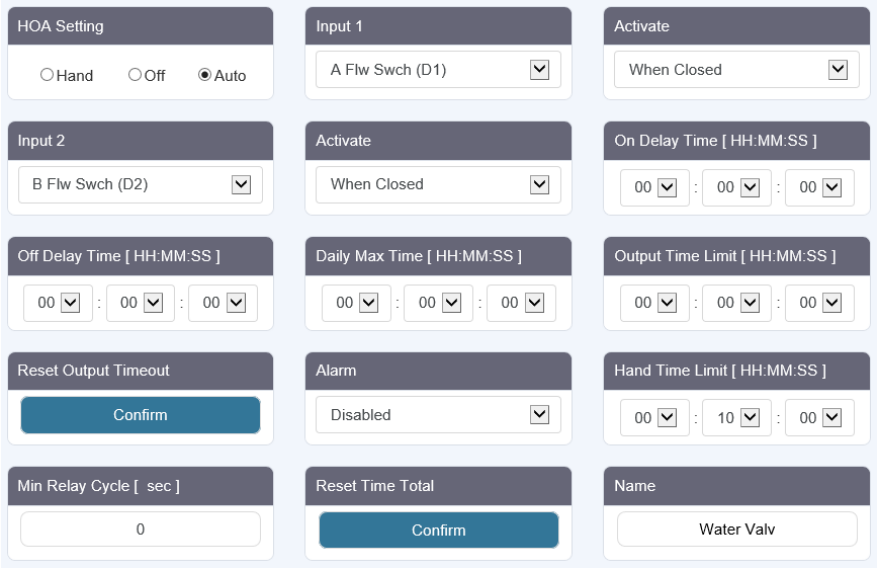


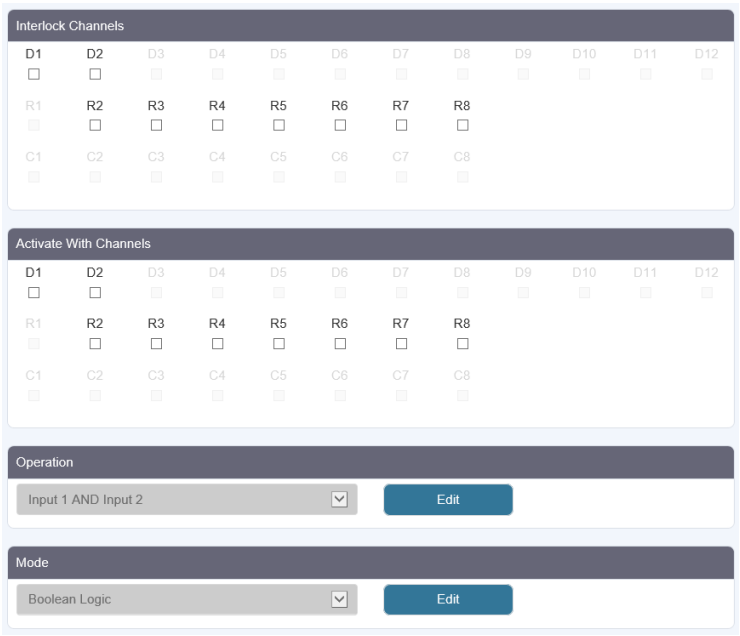
5) **BOOLEAN LOGIC CONTROL MODE:** new Boolean control mode for relays we have 3 options available currently. Input 1 AND Input 2, Input 1 OR Input 2, Inverse . If the Input is a DI State you may select its active state (open or closed). If the Input is a relay you may select its active state (on or off)

    a. Operation = Input 1 AND Input 2 - Both inputs must be in the active state for the relay to be active
    b. Operation = Input 1 OR Input 2 - If either input is in the active state, the relay is active
    c. Operation = Inverse Input 1 - If input 1 is in the non-active state, the relay is active

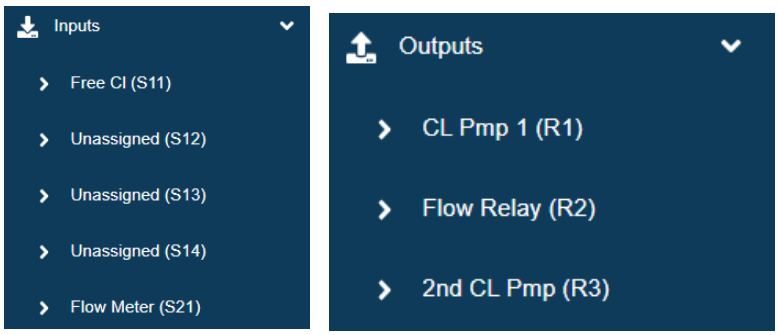
EXAMPLE: (MENU ON NEXT PAGE)We are adding two chemicals to a tank. Chemical A and B both have flow switches. If the chemicals are being dumped the flow switches are working, we want to make sure and add water to the tank when the chemicals are being added. The water is controlled by a solenoid valve on Relay 1. So, the only way that water will be added is when the chemicals are being added to the tank.



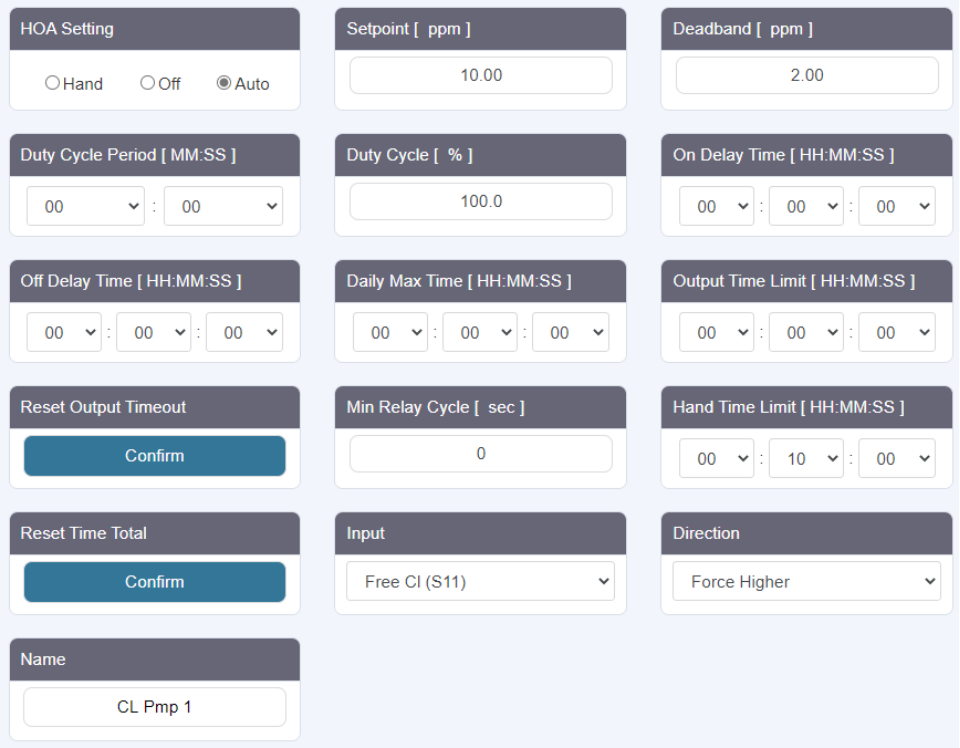




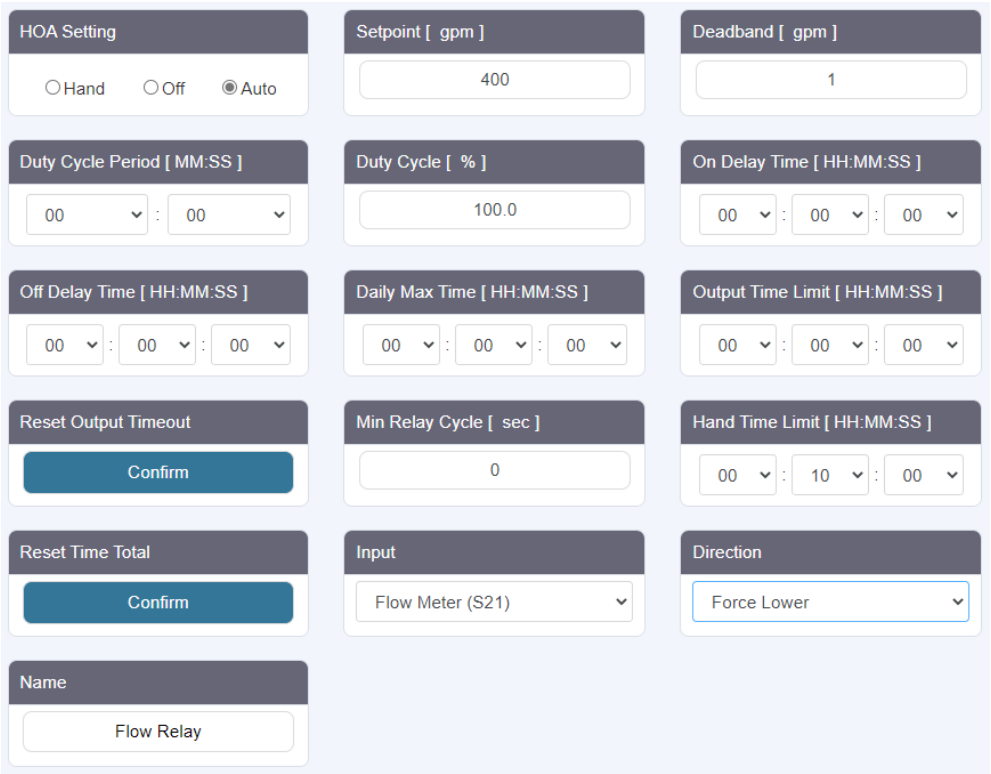
2ND EXAMPLE: this example will be using relays instead of digital inputs. In this example we have a plant that is adding Chlorine to a water supply. The 1st chlorine pump is being run by an ON/OFF relay by a chlorine sensor using a set point and dead band on Relay 1. If the flow of the water gets over 300 GPM. We want a second pump to activate. The flow will be measured by a flow transmitter.



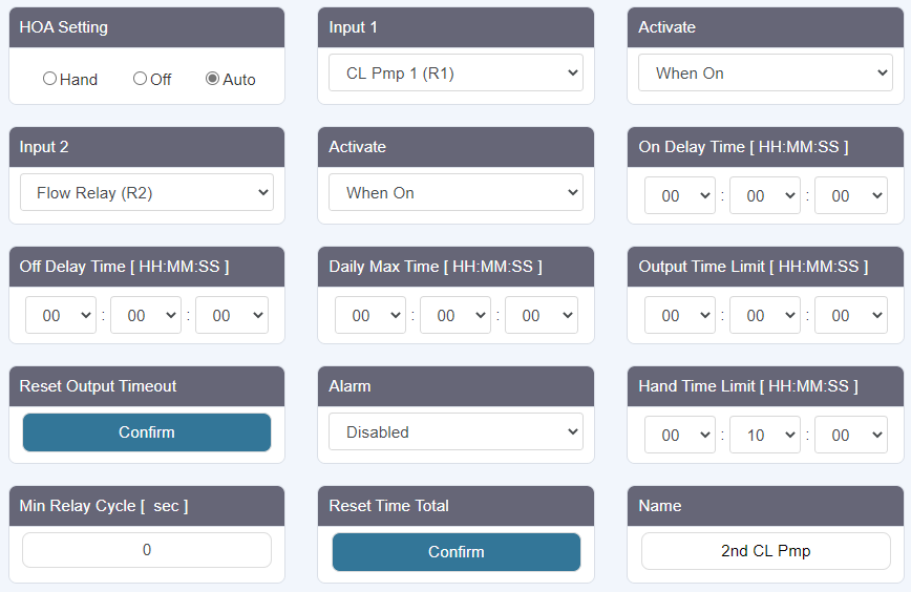
Relay 1 ON/OFF – is run by the chlorine sensor

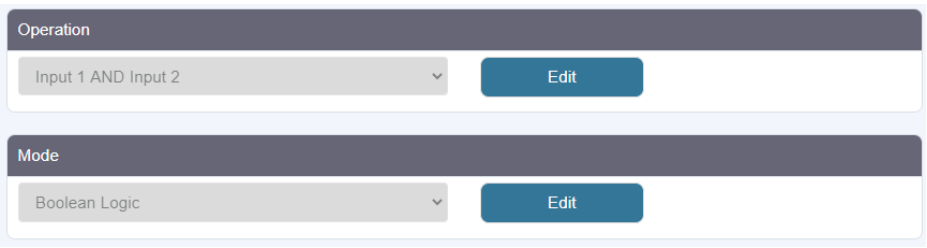


Relay 2 Flow transmitter turns on when flow goes above 400 GPM.



Relay 3 using Boolean Logic when Relay 1 and Relay 2 are on the 2nd spare put turns on.





Note: *if you change the Boolean logic on the relay from 1 AND 2 to 1 OR 2. Relay will come on if either relay 1 or 2 turns on.*