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Sidebars: Are used to explain typical uses for feed and control functions. Sidebars are at the bottom of the page detailing the function. New users & users new to water treatment will find these explanations helpful.

Aegis_Browser is included as Appendix 'C' in the **Aegis_user** manual when the controller includes the 'LB', LAN Browser option.

Aegis_Browser & Aegis_user are available as a .pdf downloads from www.Aquatrac.com.

1.0 Day-to-Day Browsing

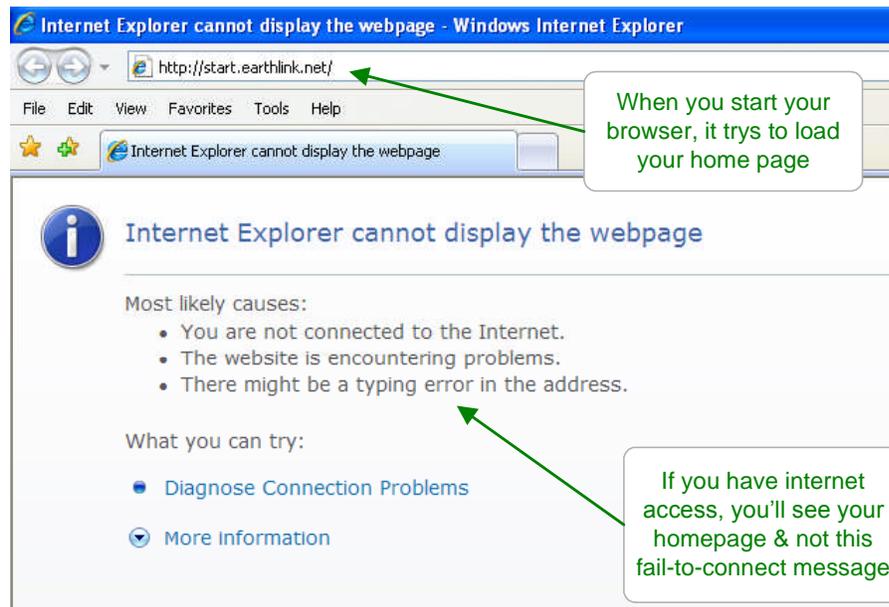
1.1 Connect

On-Site using a Notebook PC

- A. You'll need an Ethernet cross-over cable available from office supply & electronics stores;
Example: **Staples Item 437225**, 12 ft. long, Belkin Model A3X126-14-YLW-M, \$15.98.
- B. You'll need to set up a new connection in your notebook. Refer to Section 11 of this appendix.

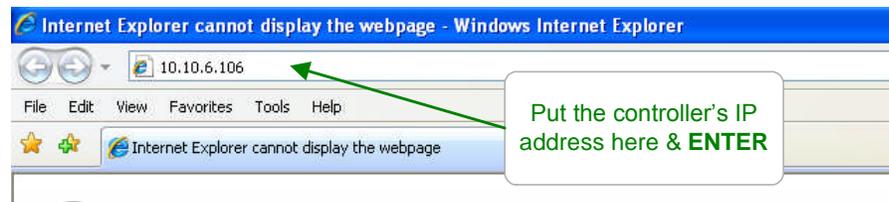
Open the controller enclosure door and jack into the controller Ethernet jack located on the center of the upper controller circuit board.

If you need command & control only, start **Internet Explorer 7** or **Mozilla's Firefox**.
If you also require reporting, start Aquatrac's **Trackster3** application.



Notebook PC & Over the Site LAN

Key the controller IP address into the PC's browser address.
You can find the controller's IP address using the controller keypad.
Refer to Section 11.7 of the **AEGIS_user** manual.



1.1 Connect continued

Remotely using a VPN

If the site has provided you with VPN (Virtual Private Network) access to the site LAN, you'll need to start the VPN application on your PC to gain access to the site's LAN. Once connected to the site LAN, follow the previous, 'Over the Site LAN' procedure.

Remotely using a Modem

If your controller includes the RM option and you have a site telephone line, that can receive incoming calls, connected to the modem, you can browse the controller from any modem equipped PC.

The screenshot shows a web browser window at the URL `http://10.10.6.106/`. The main content area displays a real-time monitoring interface for a cooling tower system. On the left, there is a schematic diagram of the system with various components and their status:

- Oxidant:** 65sec, ON (green circle)
- Dispersant:** No Event, OFF (blue diamond)
- Acid Pump:** Setpoints, OFF (blue diamond)
- Inhibitor:** Owes 16.4min, ON (green circle)
- Bleed Meter:** 2300 G, OK (green circle)
- Bleed Valve:** ON: 10.8min, OK (green circle)
- Flowswitch:** 3.35hrs, ON (green circle)
- ORP:** 312.4 mV, OK (green circle)
- Temperature:** 71.3 F, OK (green circle)
- Conductivity:** 2071.7 uS, OK (green circle)
- Make-up:** 7200 G, OK (green circle)
- System:** 16/11/07, S/N: A000X0005, Status: Waiting for Login, Select User: Public, Password: [masked], New View: Diagnostic, Alarms: none

Annotations on the screenshot include:

- A callout box pointing to the main interface: "Real time view updates every 2 seconds"
- A callout box pointing to the system information panel: "Requires password for command & control"
- A text box titled "System View" explaining the current view and how to switch views.

System View
 Current values of sensors, water meters and flowswitches and the status of pumps, valves & solenoids are displayed in the System view.
 You can select both the System view and which inputs and outputs are displayed in the System view.
 All controller inputs and outputs are displayed in the Diagnostic view.

Note: System & Diagnostic views are optimized for notebook PCs at 1024 x 768 pixels.

1.2 Log-in

Pull down the **Select User** list and select a user id.
 Key in the **Password** for the selected user ID & press **SUBMIT**.
Status updates you on an incorrect password.
 Once you've logged in you can change your user ID & password.

Login

Login view displays on connection

Select Diagnostic view without Login

Select User

Select your user name

Enter the password for the selected User and press **SUBMIT**

Once you've logged in, the controller's home page changes to show your user ID, **Current User**.
 Press the link at any sensor, meter, pump, solenoid or valve to view or modify.
 If the controller parameter is not visible on the System view, select **Diagnostic** view & **SUBMIT**.

Logged In

System menu now available

You're logged on as user **Configure6**

Ends priming & biofeed events. Zeroes owed time & volume.

Default Passwords:

The factory default passwords are:
 Operator1 = 1 Operator2 = 2 Operator3 = 3 Operator4 = 4.
 Configure5 = 5 Configure6 = 6 Configure7 = 7 Administrator = AAAA
 There are 3 password levels, Operator, Configure and Administrator.
 The User IDs are used in the controller's keypress log.

5 incorrect passwords, block logon until 7:00AM or until a power OFF/ON.

1.3 Checking & Clearing Alarms

Alarms display as **RED Alarm** hexagons.

Any alarm also sets the System alarm which displays on both the System & Diagnostic views beside the Day-Time display. If an alarm occurs on an input-output that is not displayed in the view, the System alarm alerts you that the alarm has occurred.

The screenshot shows a web browser window displaying a process control interface. The interface includes a central diagram with components like 'Cooling Tower' and 'Exchanger'. Various sensors and actuators are shown with status indicators: 'Runtime Limit Oxidant' (red hexagon with 'Alarm'), 'No Event Dispersant' (blue diamond with 'OFF'), 'Setpoints Acid Pump' (blue diamond with 'OFF'), 'Owes 18.4min Inhibitor' (green circle with 'ON'), '2300 G Bleed Meter' (green circle with 'OK'), 'ON: 8.8min PowerRelay_2' (green circle with 'ON'), '7200 G Make-up' (green circle with 'OK'), '3.32hrs Flowswitch' (green circle with 'ON'), '312.4 mV ORP' (green circle with 'OK'), '71.1 F Temperature' (green circle with 'OK'), and '2072.4 uS Conductivity' (green circle with 'OK').

Callouts provide additional information:

- 'This example shows a feed limited oxidant pump in Alarm' points to the 'Runtime Limit Oxidant' alarm.
- 'Any active Alarm sets this Alarm so even if the cause is not displayed in the System view, you'll see the Alarm' points to the 'Polar Fibers Tower 4B' alarm.
- 'Select Reset All & press SUBMIT to reset feed limits.' points to the 'RESET' and 'SUBMIT' buttons.
- 'Here's what kind of Alarms occurred & when they occurred' points to the 'Alarms' list on the right.

The 'Alarms' list on the right shows:

- System: Home
- 16/11/07 S/N: A000X0005
- Status: Logged in
- Current User: Configure6
- Logout: Yes
- New View: Diagnostic
- Alarms, Events and Timers: Reset All
- Alarms**
- Oxidant , Limit,Time/Day at 15:11:25 16/11/07, Relay 4

Sidebar:

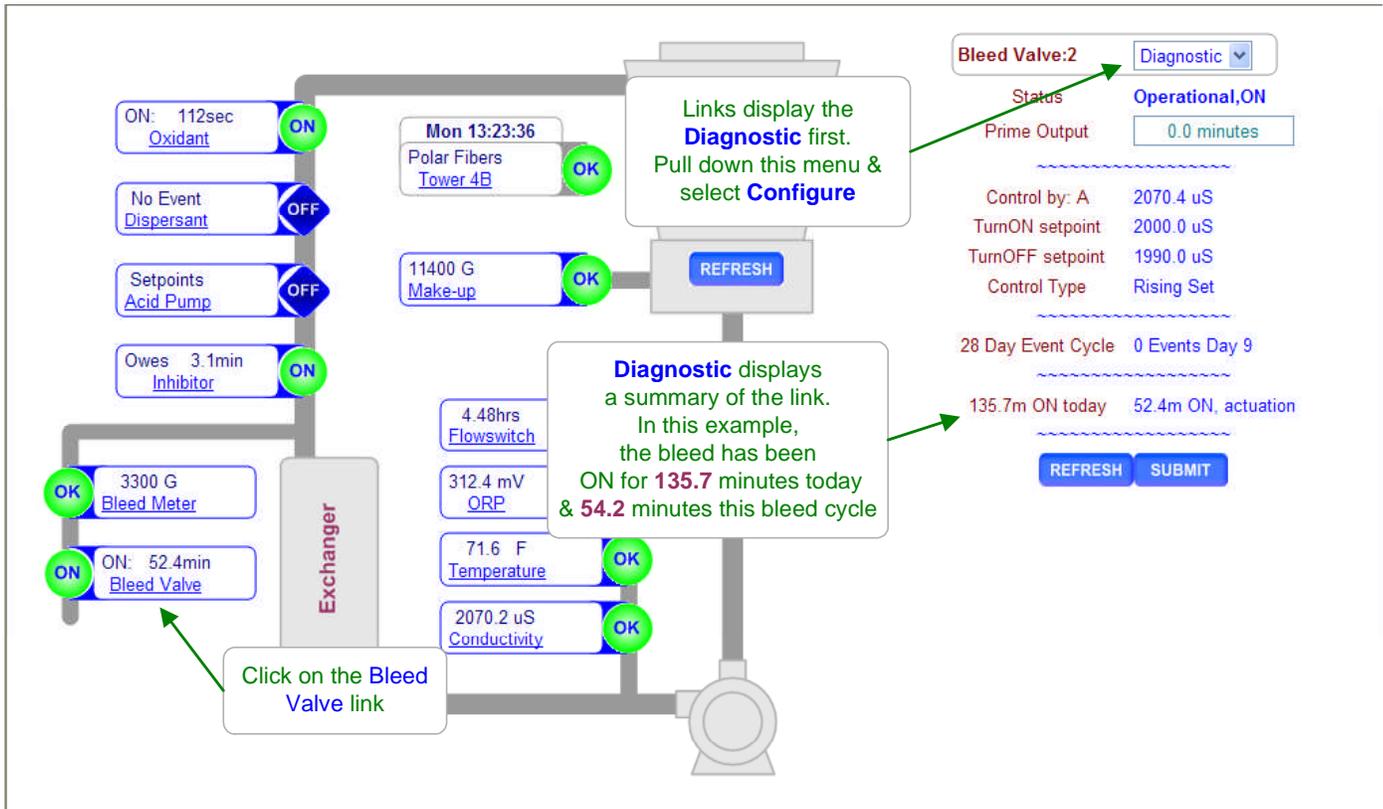
Feed limit and water meter alarms will immediately re-trip unless you adjust the alarm limits. Sensor alarms will re-trip after the user set 'Delay' unless the fault is corrected.

Individual input-output alarms may be cleared by selecting the input or output link and then selecting **Alarms** from the pull down menu at the top of the left side of the screen.

Internet Explorer users can e-mail this or any page by selecting **File /Send/ Page by E-mail** on the IE7 tool bar. If you are not on-site, show on-site staff how to e-mail you on alarm.

1.4 View & Adjust Setpoints

Setpoint values vary with the use of the pump, valve or solenoid.
 The following, typical example changes the tower bleed setpoints.



Sidebar:

Relays controlled by sensors power Pumps and Solenoids ON and OFF.

(Relays are outputs 1 to 5)

Frequency controlled Pumps feed chemicals at varying rates.

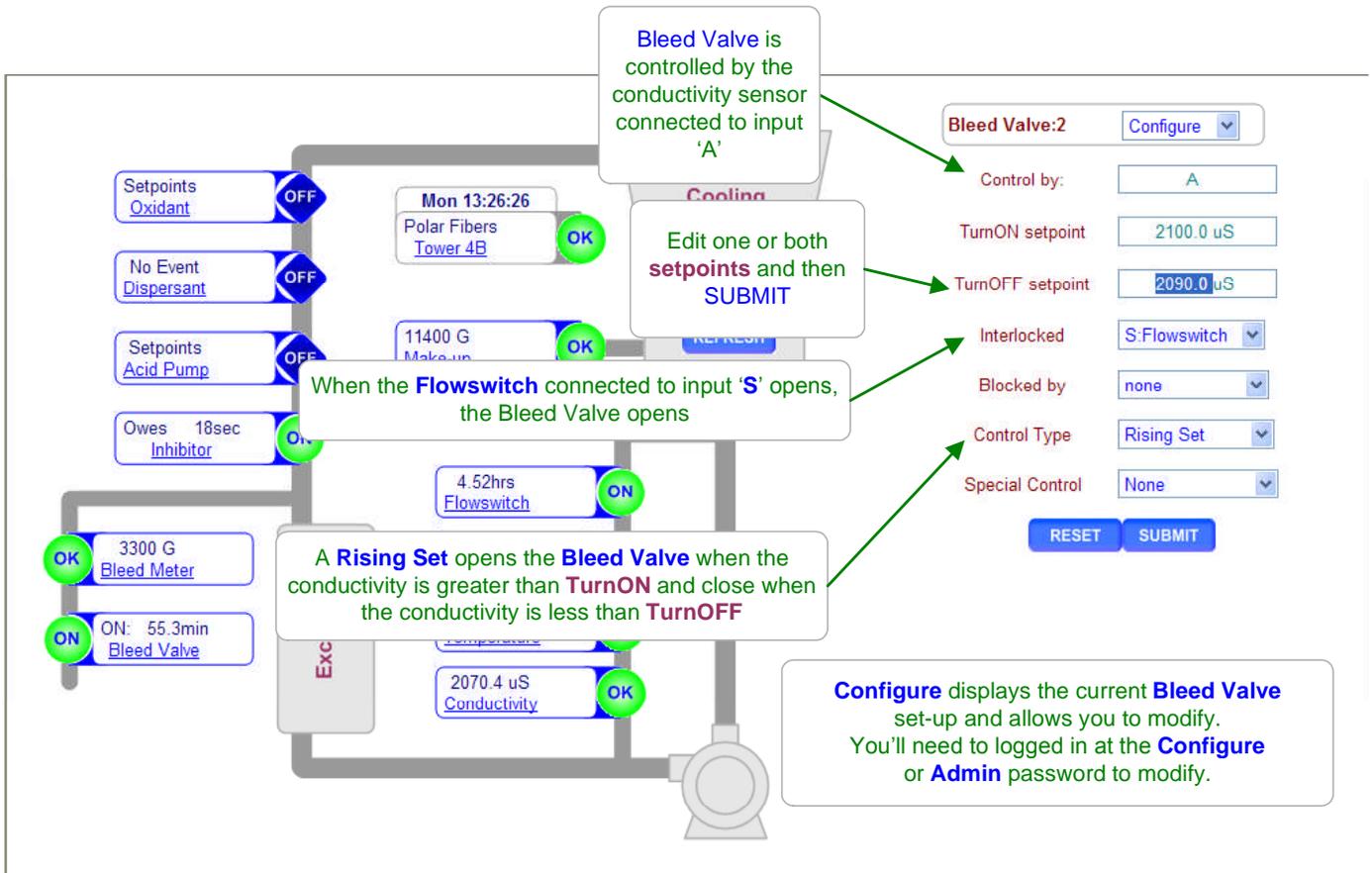
(Frequency controlled pumps are outputs 6 to 9)

Tower Bleed solenoids use Setpoints 5uS to 20uS apart so that short bleeds are followed by short feeds. The resulting control has minimum variation in Inhibitor ppm and operates as close as possible to the target cycles of concentration.

ON-OFF Acid pumps use setpoints 0.05 pH apart so that the delay between feeding acid and measuring it's pH does not cause wide pH swings.

1.4 View & Adjust Setpoints continued

'Interlocked', 'Blocked by', 'Control Type' and 'Special Control' are all detailed in the following sections of this Appendix and in the AEGIS_User manual.



Sidebar:

Pay attention to the number :1 to :9 that follows the pump, valve or solenoid name. It's the physical location on the lower controller circuit board that connects to the pump, valve or solenoid.

You may modify the name of the pump, valve or solenoid but you'll need to know which output is controlling so you can check that the 1 to 9 GREEN indicating light is ON when the pump, valve or solenoid is ON.

1.5 Priming-Testing Pumps & Solenoids

ON-OFF pumps, valves & solenoids controlled by relays 1 to 5, are primed in minutes.
 Frequency controlled pumps 6 to 9 are primed in mL of volume.
 Use Clear Alarms to end priming.
 The following example primes the Dispersant pump connected to Relay 5.

The screenshot displays a process control interface. On the left, a schematic diagram shows a piping system with components including a Cooling Tower, an Exchanger, and a pump. Various sensors and control points are indicated with status indicators (ON/OFF) and values (e.g., 2300 G Bleed Meter, 3.41hrs Flowswitch, 312.4 mV ORP, 71.4 F Temperature, 2072.6 uS Conductivity). A 'No Event Dispersant' indicator is also shown as OFF. A callout box points to the 'Dispersant' link in the diagram, stating 'Click on the Disperant link'. On the right, a diagnostic panel for 'Dispersant:5' shows a dropdown menu set to 'Diagnostic', a status of 'Operational, OFF', and a 'Prime Output' field with the value '15'. Below this, it shows '28 Day Event Cycle 5 Events Day 6' and '0.0m ON today 0.0m ON, actuation'. There are 'REFRESH' and 'SUBMIT' buttons. A callout box points to the 'SUBMIT' button, stating: 'Then, key in the time in minutes that you wish to Prime or test the pump or solenoid and SUBMIT'. Another callout box at the bottom right states: 'Prime time is added to owed time for the pump or solenoid. It's an easy way to get a one-time feed to charge a system'.

Sidebar:

Priming may also be used to slug feed on system start-up in addition to testing pumps, valves or solenoids.

Ending Prime-Test:

Clear Alarms, Section 1.2 ends all owed time & volume for all pumps and solenoids.

Fail to Prime:

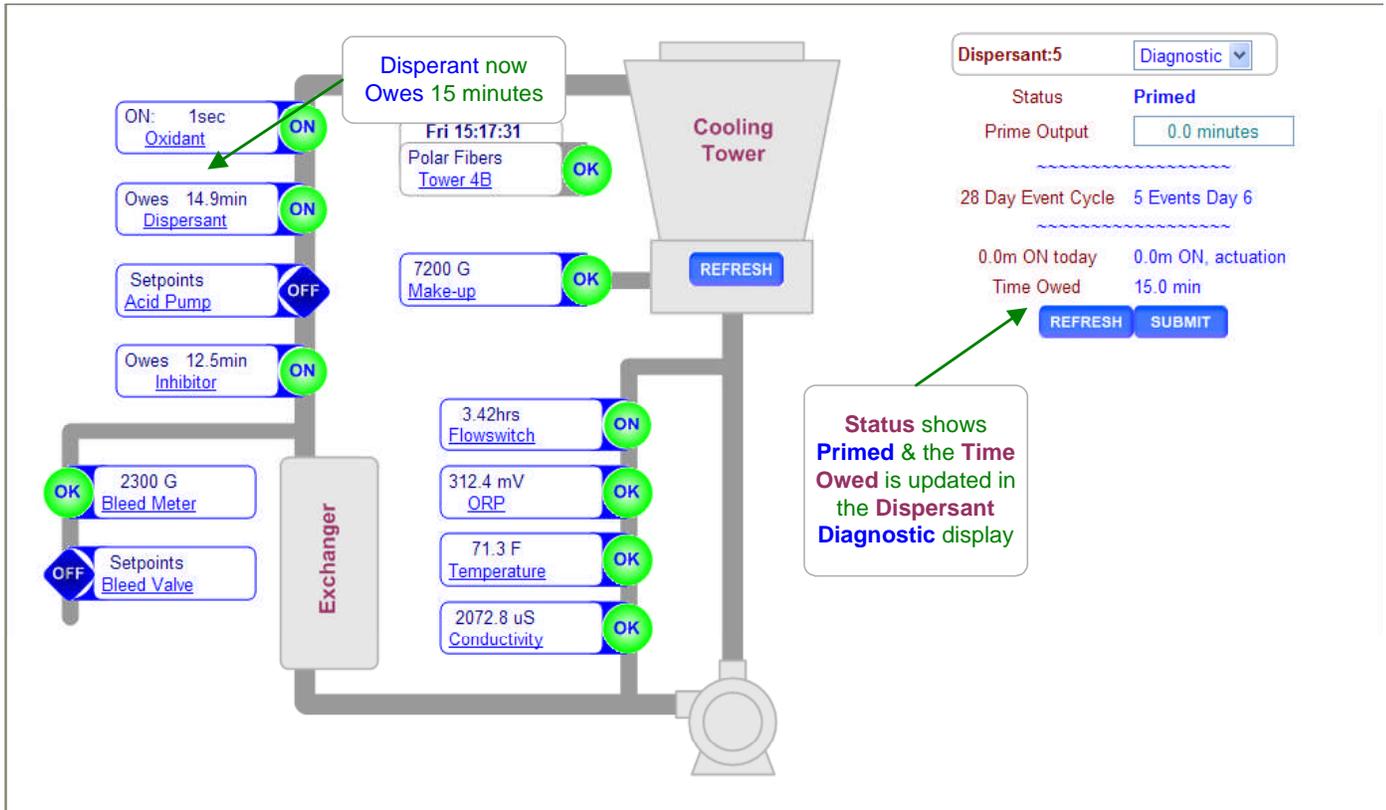
A pump or solenoid that is Interlocked, Blocked or OFF on alarm will not Prime.
 The time or volume owed will be fed when the reason for no feed is removed.
 The **Diagnostic** display for the target pump or solenoid will display the reason for fail to prime

If the green LED on the lower controller circuit board is ON, the pump or valve connected to that output **1** to **9** should also be ON

1.5 Priming-Testing Pumps & Solenoids continued

ON-OFF pumps, valves & solenoids controlled by relay 1 to 5, are primed in minutes. Frequency controller pumps 6 to 9 are primed in volume. Use Clear Alarms to end priming.

The following example changes the tower bleed setpoints.



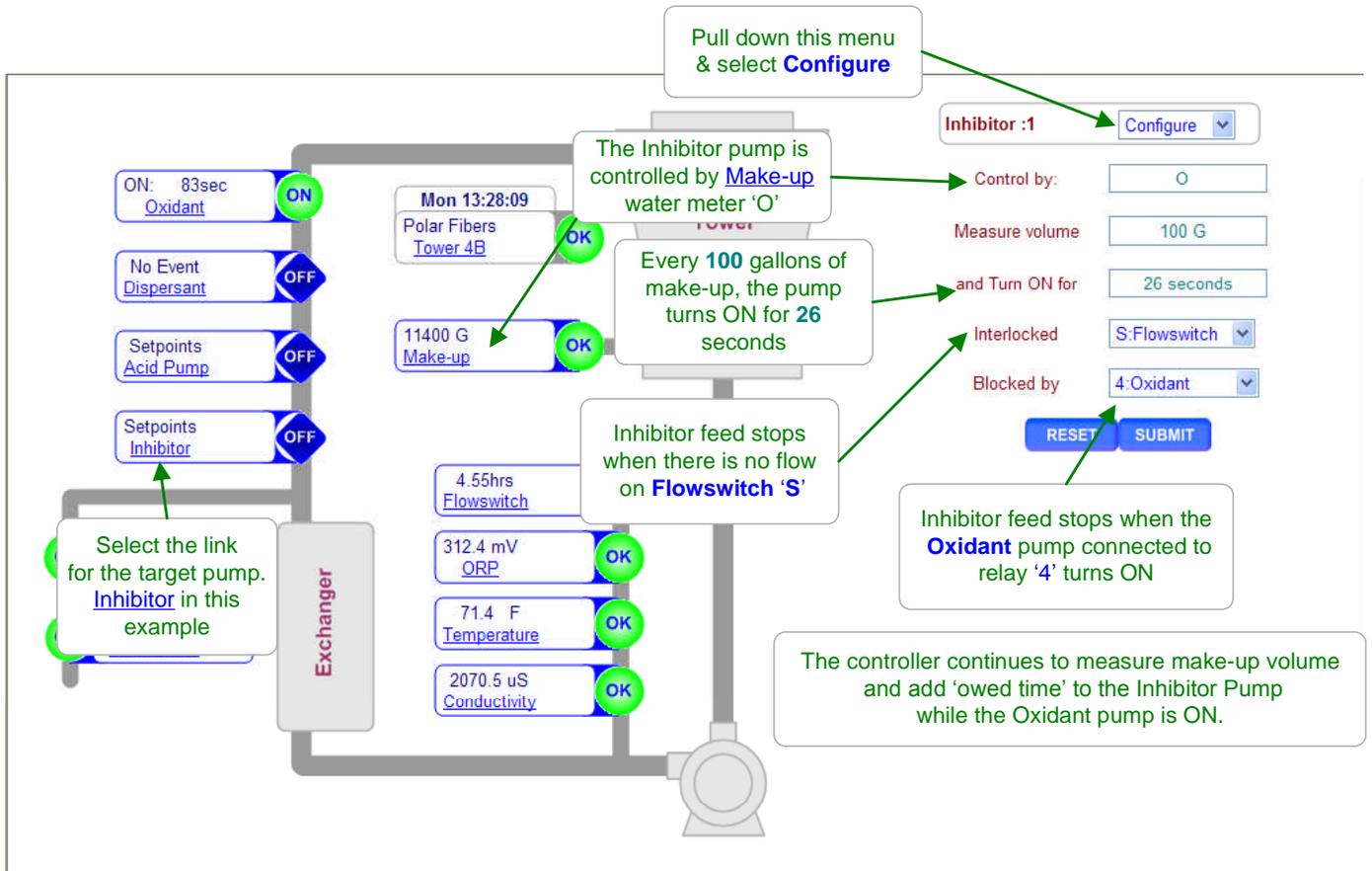
Sidebar:

Priming may also be used to slug feed on system start-up in addition to testing pumps, valves or solenoids.

Verify that the slug feed time does not exceed either of the **Minutes/Day** or **Mins/Actuation** Alarm times for the pump or solenoid. Frequency controlled pumps use **Volume/Day** and **volume at MAX spm** as feed limit Alarms.

2. Chemical Feed Controls: Inhibitor, Acid, Bleach, Amine...

2.1 Water Meter Feed



Sidebar:

Water meter and Feedwater Meter based controls feed proportional to load to maintain a target ppm of the fed chemical. Inhibitors, Boiler Treatment and Amines are usually fed to achieve a target ppm and therefore frequently meter controlled.

Meter based feeds are among the most reliable, accurate and simplest ways to feed. The cost of installing a water meter is offset by the resulting reliability.

Summing Meters:

Up to 4 meters may be summed to control a pump. Use when towers have more than 1 make-up.

Sequencing Meters:

Refer to **Aegis_User** manual **5.3 Feed Verification & 5.4 Cycle Controls**.

Oxidizing chemicals like bleach are almost never fed using a water meter since the demand is not proportional to the make-up volume.

pH correction, feeding acid based on make-up volume, only works if make-up water chemistry is constant. Even then, a monitoring pH sensor is required.

2.2 Bleed Based Feed

Select the link on the target inhibitor feed pump and pull down the top, right menu, selecting **Configure**.

When **Control by = 'No control'**, both **Bleed then Feed** and **Bleed & Feed Special Special Control** may be selected.

Select a bleed valve or solenoid relay and set the target % of bleed ON time.

Bleed & Feed is usually only used when the tower is 'bleed limited', with the bleed undersized and ON for more than 50% of the time.

Sidebar:

Bleed then Feed is used to feed cooling tower inhibitor when a make-up meter is not available and the bleed is ON for less than 50% of the time that the tower is on-line.

If the tower Bleeds for **X** Minutes, the Inhibitor is fed for a user set % of **X** minutes AFTER the bleed ends. It's a better way to feed inhibitor for small cooling towers than Bleed & Feed since less inhibitor is lost down the drain.

Inhibitor savings averaging more than 20% were measured on a mix of small towers in California simply by switching from Bleed & Feed to Bleed then Feed.

Reliability:

Bleed then Feed & Bleed & Feed are only as reliable as the tower bleed solenoid and conductivity sensor. Refer to **Aegis_user 2.5 Limiting Feed & Alarms** for guidelines on preventing overfeed and recovering from bleed fault.

2.3 Sensor Controlled ON/OFF Feeds

Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Configure**.

Set **Control by** to the sensor input 'A' to 'N'.

Setpoints display the units of the controlling sensor.

ON-OFF Pumps controlled by sensors may also use **Timed Cycling** or **Holding Time Special Control**. Refer to the Section 2.4 of **Aegis_User** manual for configuration and operational detail.

Sidebar:

Pumps powered by the controller Relays 1 to 5 are switched ON and OFF based on the value of the controlling sensor or sensors.

Control Type

Each sensor uses a control type based on the water treatment system's effect on the sensor. For example, a cooling tower conductivity and pH **rise** as the tower operates & both these sensor use a **Rising Setpoint**. The ORP of a tower **falls** as the tower operate & ORP uses a **Falling Setpoint**. Refer to the following page.

Sensor Math

Most feeds are controlled by a single sensor. If the control combines more than one sensor with different units the control setpoints must reflect the result. Example: If the sum of temperature and make-up rate in GPM control a pump, the ON/OFF setpoints are in degrees + rate.

Interlocking & Blocking:

Interlocking prevents a chemical from feeding when the tower or boiler is off line.

Refer to **Section 2.7. No Feed on No Flow**.

Blocking prevents one chemical from feeding while another is feeding.

Refer to **Section 2.8. Blocking a Feed**.

Reliability

Setpoints may be set incorrectly. Sensors eventually fail. Solenoids & Pumps fault.

Refer to **Section 2.6 Limiting Feed & Alarms** to control a fault response.

2.3 Sensor Controlled ON/OFF Feeds continued

Control type:

Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Configure**.

Each sensor pump control uses a **Control type** based on the water treatment system's effect on the sensor.

For example:

A cooling tower's conductivity and pH **rise** as the tower operates & both these sensors use a **Rising Set**. The ORP of a tower **falls** as the tower operates & ORP uses a **Falling Set**.

Sidebar:

Control Type is not applicable or displayed for water meter based feeds.
Control Type for frequency controlled pumps 6 to 9 are **Always & During Events**

Between Sets turns ON a pump or solenoid whenever the controlling sensor value is between the TurnON & TurnOFF setpoints. This type finds use in blocking and sequential PLC types controls.

The **Event: Control Type** controls the chemical pump only during a timed event. During the timed event interval the control works normally, turning the pump ON & OFF as the controlling sensor value changes. When the timed event ends, the pump turns OFF.

Example:

Event: Falling Control Type is used to slug bleach during a biocide feed event to hold a target ORP during the event period.

Setpoint Order:

The controller will automatically switch the setpoints to fit the selected **Control Type**, inserting a **Setpoints Switched** message into the **Status** line of the left hand side of the page.

2.3 Sensor Controlled ON/OFF Feeds continued

Special Control: Timed Cycling

Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Configure**.

Timed Cycling allows time for the controlling sensor to measure the effect of chemical before feeding more chemical.

This **Special Control** is used where a chemical is fed occasionally into a system with a large volume.

It may be several minutes before the chemical travels from the injection point through the piping and sump and then back to the controlling sensor location at the recirculating pump.

The screenshot shows the configuration page for 'CIO2 Feed :5'. The 'Special Control' dropdown is set to 'Timed Cycling'. The 'ON Time' is set to 2.0 minutes and the 'Period' is set to 15.0 minutes. Callouts explain that during the ON Time, the pump is controlled by the sensor value, and for the remaining 13 minutes of the 15-minute period, the pump is OFF.

Sidebar:

Often there is a long time delay between adding a chemical and measuring its effect at a sensor which causes setpoint overshoot and poor control.

Examples: Pumping citric acid into a large swimming pool or adding bleach to a cooling system with a large sump volume.

The **Timed Cycling Special Control** feeds for a user defined **ON Time** than waits for a user defined time before feeding again allowing the system to respond to the fed chemical. During the **ON Time** ON-OFF pumps and frequency controlled pumps feed on setpoint control.

The 'CIO2 Feed Diagnostic display counts down the time in the **ON Time** and **OFF Period**.

Selecting a **Special Control** automatically sets typical default times or sensor values. Adjust the default values for your site's application.

2.4 Proportional Feed

Special Control: Time Modulate for ON-OFF Pumps

Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Configure**.

Time Modulate allows an ON/OFF pump to operate like a frequency or 4-20mA controlled pump.

This **Special Control** is used feed proportionally to a sensor value.

ON-OFF pumps are typically set to maximum stroke and rate when **Time Modulate** is selected.

Time Modulate Special Control typically widens the difference between setpoints

Select the **Time Modulate Special Control**

Pump ON time varies from 0 to 120 sec. in every 120 seconds

Sidebar:

Frequency controlled pumps connected to controller outputs '6' to '9' are proportionally controlled as the controlling sensor varies the pump frequency.

Often there is a need to proportionally control an ON/OFF pump connected to one of the controller power relays '1' to '5'.

Examples: The pump may be oversized for the application or turning down the pump stroke or frequency may cause loss of prime or feed line blocking.

The **Time Modulate Special Control:**

Turns OFF below the **TurnOFF** setpoint and is always ON above the **Turn ON** setpoint.

Between setpoints, linearly increases the ON time from zero @ the **TurnOFF** to always ON at the **Turn ON** setpoint.

Example: Period=120 seconds, pH **Turn ON** = 7, pH **TurnOFF** = 8, current pH = 7.4.

ON time = 48 seconds in every 120 seconds, OFF time = 72 seconds in every 120 seconds.

Time Modulate Special Control works for both rising & falling setpoints.

2.4 Proportional Feed

Frequency Controlled Pumps

Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Configure**.

Frequency controlled pumps modify the feed rate as the value of the controlling sensor changes.

In this example, the pump frequency increases as the ORP falls towards 300mV. At 300mV the bleach is fed at the maximum rate, decreasing as the ORP increases.

If this example was an anti-chlor pump, the **100%ON Setpoint** would be greater than the **TurnOFF setpoint**. As anti-chlor feeds, the ORP decreases.

Frequency controlled pumps are :6 to :9

At **300mV** and less, the pump feeds at Maximum SPM

Above **350mV** the pump is OFF

Control Type is either **Always** or **During Events**

Diagnostic displays when you select **Oxidant Pump**

Controlling sensor location, **G** & its present value

Volume pumped from midnight

Feeding @ **75.2%** of the pump's rated maximum SPM.
 $0.752 = 1 - (312-300) / (350 -300)$

Sidebar:

In this example the pump is rated @ 180 SPM, Strokes per Minute, and pumps 0.1mL stroke so we're pumping (180 x 0.1 x 0.752) 13.54 ml/minute or 0.215 Gallons/hour

2.5 Base Feed

Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Configure**.

ON-OFF Pumps: Setting the **% ON Time** greater than 100%, sets the % to 100. **5% ON time** is 15 seconds ON in every 5 minutes (0.05 x 300 seconds).

Frequency Controlled Pumps: If you set a **Feed** rate greater than the pump rating, the controller will set the feed rate to pump maximum SPM. If the pump is rated 180 strokes/minute & 0.1mL stroke, the rate will be set to **18mL/min**.

Sidebar:

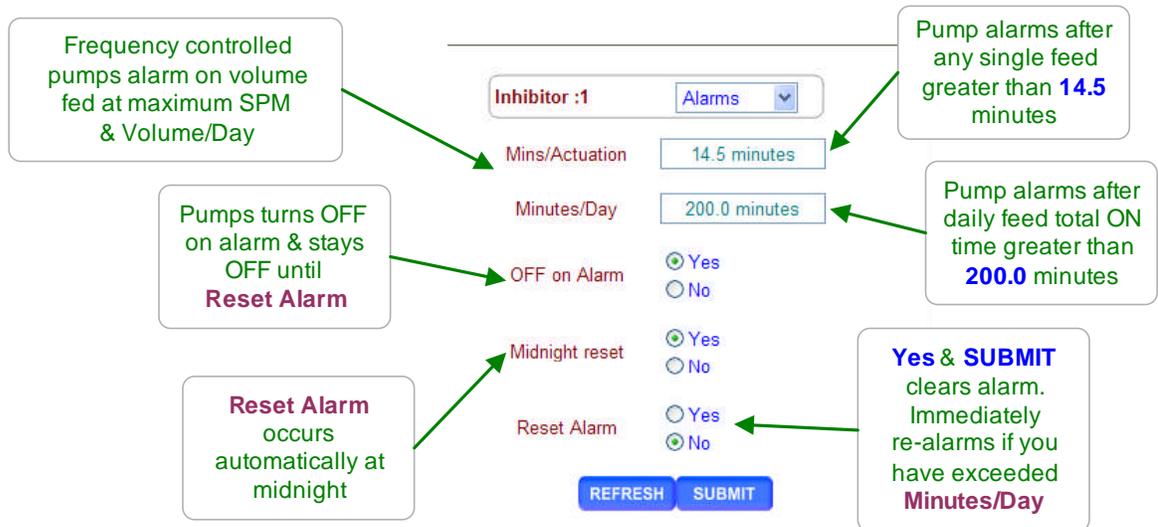
Base Feeds are used to continuously feed a chemical. In some cases, as a temporary measure while a sensor is replaced or a water meter repaired or to pre-treat a system on start-up

Boiler chemicals are frequently base fed as long as the boiler's on-line contact set is closed.

Concentration is modified by changing the frequency controlled pump (**6 to 9**) feed rate or relay (**1 to 5**) **% ON Time**.

2.6 Limiting Feed & Alarms

Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Alarms**.



Sidebar:

Feed Limits are times for pumps & solenoids controlled by relays **1 to 5** and volumes for frequency controlled outputs **6 to 9**.

Set the limits so that worst case operation on the hottest day or highest boiler load will not trip the limit, avoiding nuisance alarms. In more critical applications, run the limit close to actual operating volume or time & use the limit alarms to flag atypical system operation.

Chemical feeds are usually all set to **OFF on alarm** since an overfeed indicates an operating problem which requires correction and continuing to feed may cause damage or incur product cost. Bleeds & Blowdowns are not set to **OFF on Alarm**.

Typically you are only concerned with either the **Actuation** or **Day** limit.

Examples:

Inhibitors usually use the **Day** limit for both cost & ppm objectives, setting the **Actuation** limit so it never trips.

Oxidant feeds usually use the **Actuation** limit to prevent overfeeds & to detect loss of feed, setting the **Day** limit so it never trips.

Acid feeds would use both **Actuation** and **Day** limits since different fault types trip each limit alarm.

2.7 No Feed on No Flow

Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Configure**.

The screenshot shows the configuration interface for 'Acid Feed :4'. The 'Interlocked' dropdown menu is set to 'S.Flowswitch'. Callouts provide the following information:

- Top right callout:** Each Pump, Valve & Solenoid views & selects its Interlock on the **Configure** page.
- Left callout:** Pull down this selector to view all possible Interlocks and 'none'. Select & **SUBMIT** to change **Interlocked**.
- Right callout:** The **Acid Feed** pump connected to Relay '4' is **Interlocked** to the **Flowswitch** connected to input **S**.
- Bottom callout:** In this example, whenever the **Flowswitch 'S'** is OFF, the **Acid Feed** pump is OFF.

The configuration page includes the following fields:

- Control by: C
- TurnON setpoint: 8.00 pH
- TurnOFF setpoint: 7.00 pH
- Interlocked: S.Flowswitch
- Blocked by: none
- Control Type: Rising Set
- Special Control: Time Modulate
- Period: 120 seconds

Buttons for RESET and SUBMIT are located at the bottom of the form.

Sidebar:

Interlocks are contact sets that must be closed for a Pump to feed, a Solenoid to open or a boiler Blowdown Valve to operate.

Cooling towers use a flowswitch installed in the sensor piping to detect that the cooling tower is operating & it's OK to feed chemicals & bleed the tower. Boilers use dry contact sets from the boiler firing control or site automation to tell the controller that the boiler or boilers are on-line & it's OK to blowdown.

One or more closed contact sets may be required to **Interlock** a pump.

Examples:

If any of three boilers is on-line, feed sulfite. Each boiler has its own on-line contact set connected to controller inputs 'T', 'U' & 'V'. The sulfite pump **Interlocked = T/U/V**

If there is flow in the feed line(Input 'S') and the tank level switch (Input 'T') shows chemical available, feed chemical. The chemical pump **Interlocked = S+T**

Notice that Interlocks may be **ORed** using the '/' symbol or **ANDed** using the '+' symbol. The controller prevents a mix of **ORs** and **ANDs** in any one **Interlock**.

2.8 Blocking a Feed

Select the link on the chemical feed pump that you wish to block and pull down the top, right menu, selecting **Configure**.

Pull down the **Blocked by** selector to view all other pumps, valves & solenoids.

In this example, the **Inhibitor** pump will turn OFF whenever the **Oxidant** pump turns ON

In this example, select the pump you wish to block the **Inhibitor** pump & **SUBMIT**

Sidebar:

Blocking prevents one or more chemicals from feeding at the same time. If you are owed time or volume on the blocked pump, the controller remembers and feeds when the block clears.

A pump may be **Blocked** by one or more other pumps, solenoids or valves.

Examples:

- Some products jell or react in the feed line when fed at the same time. Block ChemicalA pump connected to Relay '4' with the ChemicalB connected to Frequency '7'. ChemicalA **Blocked by** = '7'.
- Some inhibitors are degraded by high levels of oxidant. The Inhibitor pump is connected to Relay '1' & the Oxidant pump connected to frequency control '7'. Inhibitor **Blocked by** = '7'
- Three chemical pumps connected to Frequencies '6', '7' & '8' share a common feed line. Only one can be fed at a time. Frequency6 **Blocked by** = 'none', Frequency7 **Blocked by** = '6+8' and Frequency8 **Blocked by** = '6+7'.
'6' can always feed, '7' feeds if '6' & '8' are OFF, '8' feeds if '6' & '7' are OFF

Caution: Be careful **Blocking** with frequency outputs '6' to '9' that are controlled by a sensor to ensure that they occasionally turn OFF to allow the blocked pump to feed.

2.9 Feed Diagnostics

Select the link on the target chemical feed pump. The pump **Diagnostic** displays on the right.

View displays feed rate of 75.2%

The Oxidant Pump is controlled by 6 frequency output

Present value of the ORP sensor connected to input 'G' and controlling Oxidant Pump

The Oxidant Pump has pumped 0.410 Gallons from midnight.

The Oxidant Pump controlling sensor is 312.4mV which is 75.2% of the difference between setpoints. A pump rated @ 180 SPM & 0.1ml/stroke would be pumping 13.5mL/minute

Calculation:
 $75.2\% = (350 - 312.4) / (350 - 300) \times 100\%$
 $13.5 \text{ mL/min} = 180 \text{ SPM} \times 0.742 \times 0.1 \text{ mL}$

Sidebar:
Diagnostics vary with the output type and control.
 Relays '1' to '5' use ON time instead of the volumes of Frequency controls '6' to '9'.
 The main menu displays **Blocked** & the blocking output OR **Lockout** & the **Interlock** input OR **Alarmed** if a pump cannot feed.

2.9 Feed Diagnostics

Select the link on the target chemical feed pump. The pump **Diagnostic** displays on the right.

Acid Feed :4 Diagnostic

Status: Special Control, ON

Prime Output: 0.0 minutes

Control by: C 7.85 pH

TurnON setpoint: 8.00 pH

TurnOFF setpoint: 7.00 pH

Control Type: Rising Set

28 Day Event Cycle: 0 Events Day 10

198.4m ON today 0.0m ON, actuation

Time Modulate ON Countdown: 102 seconds
Period: 120

The **Time Modulate** Special Control is ON has **102** seconds **ON** time remaining in its **120** second period. The pump will be ON for a maximum of 120 seconds in every 120.
 $102 = 120 \times (8-7.85)/(8-7)$

Inhibitor :1 Diagnostic

Status: Operational, OFF

Prime Output: 0.0 minutes

Control by: O 11400 G

Measure volume: 100 G

and Turn ON for: 26 seconds

Last fed at: 11400 G

28 Day Event Cycle: 0 Events Day 9

49.4m ON today 0.0m ON, actuation

The **Inhibitor** pump connected to relay **1**, last fed when the water meter connected to 'O' measured **11400** Gallons. Next feed occurs @ 11500 gallons. Today, the pump has been ON for **49.4** minutes

Biocide :3 Diagnostic

Status: Operational, OFF

Prime Output: 0.0 minutes

28 Day Event Cycle: 4 Events Day 9

0.0m ON today 0.0m ON, actuation

Prebleed-Lock on 2

The bleed solenoid connected to relay **2**, prebleeds and then locks out whenever the **Biocide** pump connected to relay **3** pumps biocide

Sidebar:

AEGIS controllers are **Diagnostic** intensive.

Each sensor, water meter, contact set, relay-frequency output and the controller itself has a **Diagnostic** display sequence.

Diagnostic tells you a lot about the operation of the treatment system and is invaluable if you have a configuration problem or feed fault.

Even if you have **Passwords** turned ON, any user can still view the **Diagnostics**.

An unformed user reading you the **Diagnostic** screen sequence may save you a site trip.

Browser access available locally or remotely via a VPN or modem connection displays all controller **Diagnostics**.

3.0 Biocides: Feeding by Time & Date

3.1 Setting & Viewing Events

Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Setup** for the left page or **Events** for the right page.

Setup Page:

- Biocide :3** Setup
- Description: Biocide
- Log Period: 60 minutes
- Event Cycle: 28 Days
- Disable output: No
- Buttons: RESET, SUBMIT

Events Page:

- Biocide :3** Events
- Status: Events Added
- Select Activity: Add an Event, Edit an Event, Delete an Event, Delete all Events
- Select for Edit & Delete: Day 3 @ 06:30 for 35 minutes
- Values for Add & Edit:
 - Start Day: 3 1-28
 - Start Time: 6:30 HH:MM
 - ON Time: 35 minutes
- Event frequency: Once, Alternate Weeks, Weekly
- Buttons: RESET, SUBMIT

Annotations:

- Description may be any combination of 14 letters & numbers
- The Biocide pump repeats its feed events every 28 days.
- Each pump, valve and solenoid has its own Event Cycle and can set events which operate in parallel with user selected controls
- To add a new feed event, select **Add an Event**
- Pull down selector to view existing events
- Then edit **Start Day**, **Start Time**, **ON Time**
- Then select how often you wish to feed and **SUBMIT**
- Event Frequency selections vary with Event Cycle setting

Sidebar:

Event Day can be set from **1** to **28** for Pumps set on a 28 day **Event Cycle** and from **1** to **7** for controllers set on a 7 day **Event Cycle** or always 1 on a 1 day **Event Cycle**.

Events repeat every **1,7** or **28** days.

Relays '1' to '5' feed time in minutes. Frequency controlled outputs '6' to '9' feed volume in mL.

If you set a **Start Day**, **Start Time** or **ON Time** out of range, the controller will correct, set to a default value or to the maximum allowed & display the result. You can then either modify the revised event, **Edit an Event** or delete it, **Delete an Event**.

If you are feeding two organic biocides, alternating every week, you should use the default **28 Day Event Cycle**.

If you are feeding bleach or another oxidant, you are likely dosing 2 to 3 times week & never on Saturday or Sunday. You should use the **7 Day Event Cycle**

If you are using the Biofeed timer for a process type task like automating sensor cleaning or backwashing a filter, the **24 Hour Event Cycle** may fit your application.

3.1 Setting & Viewing Events

Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Events**.

Biocide :3 Events

Status **Events Added**

Select Activity

- Add an Event
- Edit an Event
- Delete an Event
- Delete all Events

Select for Edit & Delete

- Day 3 @ 06:30 for 35 minutes
- Day 3 @ 06:30 for 35 minutes
- Day 10 @ 06:30 for 35 minutes
- Day 17 @ 06:30 for 35 minutes
- Day 24 @ 06:30 for 35 minutes

Start Time 6:30 HH:MM

ON Time 35 minutes

Event frequency

- Once
- Alternate Weeks
- Weekly

RESET SUBMIT

Biocide :3 Diagnostic

Status **Operational, OFF**

Prime Output 0.0 minutes

28 Day Event Cycle 4 Events Day 9

0.0m ON today 0.0m ON actuation

Prebleed-Lock on 2

REFRESH SUBMIT

Frequency controls 6 to 9 feed events are in mL of volume and not the ON Time used for relays 1 to 5.

The pump's Diagnostic page display the Event Cycle days, how many events are set & the current day. Day 9 is Monday of week 2 & there are 4 events set for this pump, likely one for each week.

Sidebar:

Events with zero minutes ON time or zero volume are deleted.

Each Relay '1' to '5' and Frequency control '6' to '9' may have up to 28 Events. Each Relay and Frequency control may have its own **Event Cycle** of 1,7 or 28 days.

Selecting **BioVolume Feed & Delete Events**, removes ALL events. Selecting **BioFeed Event & Delete Events**, removes ALL events.

BioVolume: Maximum volume per event is 25000mL, 25L

BioFeed: Maximum feed per event is 1440 minutes, 24 hours.

PotFeeders : Oxidizing biocides for smaller towers frequently use bleach tablets or pucks in pot feeders. A solenoid connected to Relay '1' to '5' is turned ON directing flow through the feeder. Verify that both isolation valves are open after filling the feeder.

3.2 Prebleed-Lockout

Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Configure**.

Lock-out Time is the time the bleed will be OFF after the biocide feed event. Set to zero for no **Lock-out**.

Prebleed Time is the time the bleed will be ON before the biocide feed event starts. Set to zero for no **Prebleed**.

Prebleed sensor and **Prebleed value** are optional. Set **Prebleed Sensor** to 'none' to Prebleed on time only.

Prebleed value is the conductivity that ends Prebleed.

Pull down the **Special Control** selector & select **Prebleed-Lock**. Select 'none' to remove.

Pull down the **Bleed Output** selector & select bleed solenoid or valve.

Pull down the **Prebleed sensor** selector & select conductivity sensor controlling the **Bleed Output**.

Sidebar:

Prebleed lowers tower conductivity before feeding biocide so make-up does not dilute the biocide. Biocides are preferably fed when tower thermal load is low & make-up is therefore limited.

Lock-out prevents tower bleed during the time required for a biocide to act. It may not be necessary to **Lock-Out** lightly loaded towers. Do not **Lock-out** heavily thermally loaded towers for extended periods.

Lock-out time starts when **Prebleed time** ends and the feed event starts. If you require 90 minutes of residence time for a biocide to be effective then **Lock-out time** = Feed time + 90 minutes.

Biocide Pumps powered by Relay '1' to '5' should be set to MAX stroke & frequency to slug feed.

Biocide Feed on frequency controls '6' to '9' will feed at MAX frequency. In either case, the feed objective is to get to the target kill concentration quickly.

4.0 Sensors: Conductivity, pH, ORP, Corrosion, 4-20mA...

4.1 Sensor Calibration

Select the link on the target sensor and pull down the top, right menu, selecting **Calibrate**.

Conductivity :A Calibrate

Enter value

Factory Reset Yes No

RESET SUBMIT

Put the grab sample value of the sensor here & **SUBMIT**

Factory Reset returns the sensor back to it's default value. It's useful when you are trying to identify a faulted sensor or correct an incorrect calibration.

Conductivity :A Diagnostic

Status **Sensor Calibrated**

Sensor type Conductivity

Period Maximum 2047.8 uS

Period Minimum 2005.0 uS

Period Average 2035.0 uS

Sample size 494

Current Period 15 minutes

Log Period 60 minutes

Compensation Thermal Comp

Measured Level 365.2 mV

Gain Multiply 5.8347

Default Gain 5.6000

Offset Adjust -35.0000

Default Offset -35.0000

Input card ID 75 mV

REFRESH

After **SUBMIT** The controller displays the **Diagnostic** page & **Sensor Calibrated Status**

Sensors are measured in millivolts and then **Gain & Offset** are applied to convert to user units, **uS** in this example

Calibration modifies either **Gain** or **Offset**. If either gets too far from **Default** values, the sensor will fail to calibrate

Sidebar:

Single Point Calibration: All sensors but some 4-20mA inputs can be single point calibrated. Aquatrac recommends that you measure a sample from the sensor installation line and calibrate the sensor based on the grab sample. It's the simplest, most repeatable method.

Corrosion rate sensors are not calibrated.

Water treatment systems setpoint control so that the conductivity, pH or ORP is controlled within a narrow range allowing simple single point calibration.

Process control and monitoring only sites which may operate over a wide sensor range benefit from 2 point calibration. For these users, the controller supports direct set of sensor OFFSET & GAIN.

Calibration Faults: Refer to the next page for options on fault.

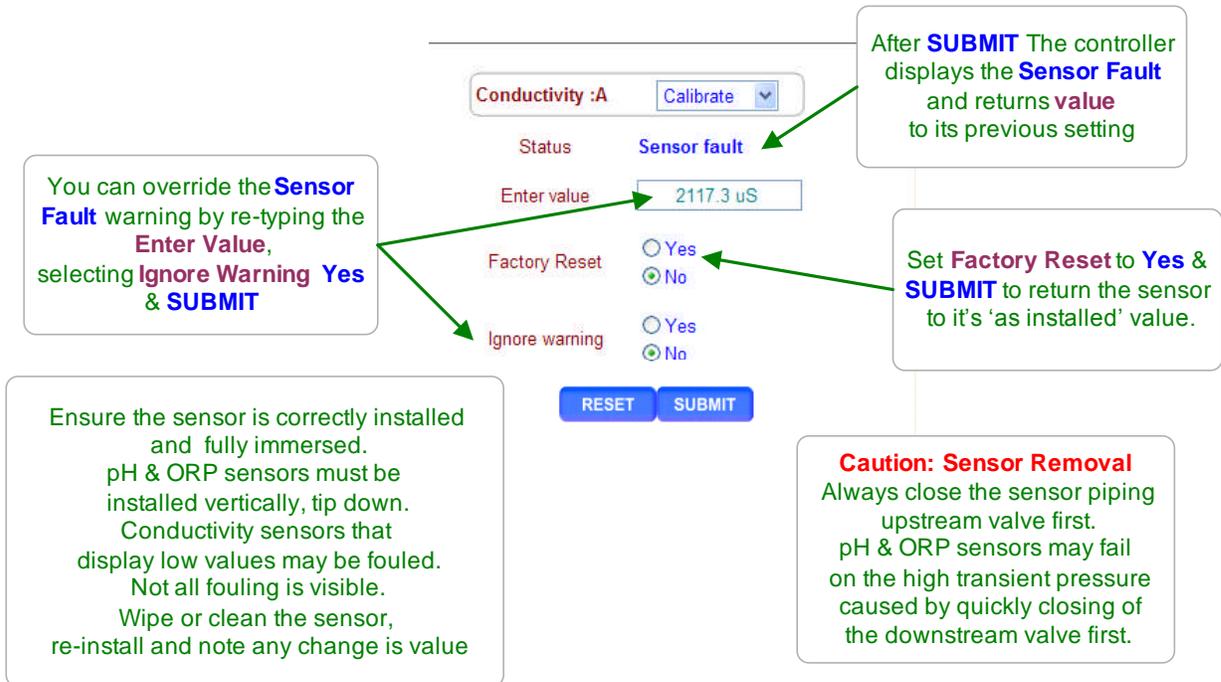
Inventory and Manual Input sensors

Use **Calibrate** when you fill a tank to correct the **Inventory** level.

Use **Calibrate** after you measure a drop count to update a **Manual Input**.

4.1 Sensor Calibration

This page displays on a failure to calibrate. Although, you may elect to ignore and bypass this warning it's usually telling you there's a problem. You may have forced to sensor to read a value, but it may not track changes in conductivity, pH, ORP, temperature, GPM...



Sidebar:

Sensor Fault: The controller verifies that sensor OFFSET or GAIN required to make the sensor read it's new value are within the range of typical sensor operation. If out of range, **Sensor Fault** displays.

Fault Cause varies with sensor type.

Conductivity: Fouling lowers the measured value. Remove and inspect. Whitish deposits indicate overcycling & may require HCl cleaning to remove. If no visible fouling clean, with alcohol or solvent then **Factory Reset**. Refer to Section 7. for boiler sensors.

ORP: Verify sensor cable not shortened & firmly connected. Verify not visibly fouled. If stream contains organics, clean with alcohol or solvent. If stream high in iron or copper restore platinum surface with Aqua Regia or equal.

pH: Verify solution ground connected & excess sensor cable coiled at sensor, not in enclosure. Verify sensor cable not shortened & firmly connected. Then replace if no recovery after **Factory Reset**. pH sensor life decreases with handling and temperature extremes.

Temperature: Verify color coding correct and sensor wires firmly connected. Inspect sensor for damage or leaking.

4.2 Sensor Alarms

Select the link on the target sensor and pull down the top, right menu, selecting **Alarms**.

The screenshot shows two sensor configuration panels. The left panel is for 'Conductivity A:A' and the right is for 'WaterMeter_O:O'. Both have a dropdown menu set to 'Alarms'. The 'Conductivity A:A' panel has a High Alarm of 2400.0 uS, a Low Alarm of 1800.0 uS, and a Delay on Alarm of 5.0 minutes. The 'WaterMeter_O:O' panel has a High Alarm of 75000 G and a Low Alarm of 48000 G. Both panels have 'RESET' and 'SUBMIT' buttons. Callout boxes include: 'Edit the High & Low Alarm trips and SUBMIT' pointing to the alarm value fields; 'Alarm will display and log 5 minutes after trip' pointing to the delay field; 'Maximum measured volume in any one day' pointing to the High Alarm value of 75000 G; 'Low Alarm volume is only checked at midnight' pointing to the Low Alarm value of 48000 G; and 'Alarmed sensors display a Clear Alarms check box with the type of alarm and the date-time stamp' pointing to the bottom of the panels.

Sidebar:

Sensor Alarms: Nuisance alarms tend to be ignored. Select alarm limits that represent control fault or sensor failure.

Example:

If the tower make-up is 450uS and you are controlling at 2.5 cycles or 1125uS...

Set the **Low Alarm** at 900uS because if you ever get to 900uS you have a leak or water loss causing undercycling. If your biocide feed **Prebleed** lowers the conductivity below 900uS, then set the **Low Alarm** lower.

Set the **High Alarm** at 1300uS because if you ever get to 1300uS, bleed control has failed. The bleed solenoid has faulted. The bleed line is blocked or valved off. The controller relay fuse has opened. You're being punished for a misspent youth. If your biocide feed **Lockout** period results in a higher conductivity, increase the **High Alarm**. If your treatment program scales at a conductivity higher than 1250uS without scaling, reduce the **High Alarm**.

If the feed program has a tight temperature limit set the Temperature alarm to alert you.

Clear Alarms: Resets the **Delay on Alarm** time

If the **Delay on Alarm** is set to zero minutes and the sensor is above the **High Alarm** or below the **Low Alarm**, the sensor alarm will immediately re-trip.

Alarms when Tower OFF Line:

If the sensor installation piping drains or siphons when the tower turns OFF and a sensor alarm results, install a check valve on the sensor line.

A check valve will prevent alarms but more importantly will prevent wet-dry cycles from depositing on sensing surfaces, causing calibration problems and shortening sensor life.

4.3 Sensor Configure

Select the link on the target sensor and pull down the top, right menu, selecting **Configure**.

The screenshot shows the configuration page for a sensor labeled 'Conductivity :A'. The interface includes the following fields and callouts:

- Configure** (dropdown menu)
- Description**: Conductivity. Callout: Edit **Description** for up to 14 letters & numbers. Changes the View on **SUBMIT**.
- Gain Multiply**: 5.6000. Callout: **Gain** or **Offset** are modified by the controller when you Calibrate the sensor.
- Offset Adjust**: -35.0000 uS. Callout: **Gain** or **Offset** are modified by the controller when you Calibrate the sensor.
- Display units**: uS. Callout: **Display Units** may be set to any three characters.
- Decimal digits**: 1. Callout: **Decimal digits** sets the number of digits displayed after the decimal point.
- Compensation**: Thermal Comp. (dropdown). Callout: Pull down and select the **Thermal Sensor** built into the conductivity sensor or installed in the same stream.
- Thermal Sensor**: B:Temperature (dropdown). Callout: Pull down and select the **Thermal Sensor** built into the conductivity sensor or installed in the same stream.
- Compensation**: 0.970 %/deg.
- Disable Input**: Yes, No. Callout: The controller won't let you **Disable** a sensor used for control or compensation.
- Log Period**: 60 minutes. Callout: **Log Period** may be set to any value between 5 & 1440. **60 Minutes** if the default.

Buttons at the bottom: **REFRESH** and **SUBMIT**.

Sidebar:

Description: Text is rejected if it contains HTML delimiters like < >.

Avoid assigning duplicate or similar names for sensors, requiring the user to identify using only the identifying letter 'A' to 'N'.

Each sensor has only one name. It's the same for both Keypad-LCD and Browser users and is included in the controller data logs.

Resolution: When you select the number of digits displayed after the decimal:

1. Keep the number to a minimum to unclutter the display, making sensor values easier to read & remember.
2. Conductivity is usually not measured with more than 1uS resolution & is never controlled within 1uS so it's not necessary to display fractional uS.
3. Small changes in calculated ppm may indicate a large change in chemical usage so three digits after the decimal is useful.

The displayed resolution of a sensor does not alter the data log resolution or the resolution used for control or the accuracy of sensor calculations.

Disabling a sensor removes it from the display and all selection menus used for control and compensation. Data logging stops for disabled sensors.

Refer to **11.4 Enabling Inputs & Outputs** if you need to re-enable a disabled sensor.

Use **Disable Input** to unclutter the LCD & browser display, reducing scrolling key presses.

4.3 Sensor Compensation

Select the link on the target sensor and pull down the top, right menu, selecting **Alarms**.

The screenshot shows the configuration interface for a Conductivity sensor. The 'Compensation' dropdown is set to 'Thermal Comp.' and the 'Thermal Sensor' dropdown is set to 'B:Temperature'. The 'Compensation' value is 0.970 %/deg. Callout boxes provide context: one points to the 'Compensation' dropdown stating it's the selector for each sensor type; another points to the 'Thermal Sensor' dropdown stating it should be the sensor in the stream; a third points to the 'Compensation' value stating it's a default of 1.8% for metric units; and a fourth states that conductivity sensors are usually temperature compensated.

Sidebar:

Conductivity Temperature Compensation:

Cooling tower applications use conductivity as a measure of total dissolved solids (TDS). If we didn't temperature compensate then we'd have an error of roughly 1%/F in the TDS. A typical cooling tower 15 degree F temperature rise would cause about a 15% error in TDS because water is more conductive as temperature increases even though the TDS hasn't significantly changed.

We temperature compensate conductivity so it tracks TDS, the variable we want to control.

pH Temperature Compensation:

If your site switches to free cooling and water temperature spans 40-60F in a day then temperature compensating pH is worth the slight decrease in overall reliability.

Otherwise you won't see any measurable benefit in temperature compensating pH.

4.3 Sensor Compensation

Select the link on the target corrosion rate sensor and pull down the top, right menu, selecting **Configure**.

Corrosion rate sensors installed as an on-site upgrade auto-configure for carbon steel.

If you order the controller with a Cupro-Nickel, Copper, Admiralty or Zinc (Galvanizing) corrosion rate included, it will ship correctly configured.

The screenshot shows the configuration page for a 'Steel Sensor :D'. At the top right is a 'Configure' dropdown menu. The form contains the following fields:

- Description:** Steel Sensor
- Gain Multiply:** 1.0000
- Offset Adjust:** 0.0000 mpy
- Display units:** mpy
- Decimal digits:** 2
- Compensation:** Corrosion
- Alloy Number:** 1.000
- Conduct. Sensor:** A.Conductivity
- Disable Input:** Radio buttons for Yes and No (No is selected)
- Log Period:** 5 minutes

At the bottom are 'REFRESH' and 'SUBMIT' buttons. Four callout boxes provide additional information:

- Top Left:** 'If you have more than one corrosion sensor, modify **Description**' (points to the Description field).
- Middle Left:** 'Steel is **Alloy Number = 1**, **Copper = 2**' (points to the Alloy Number field).
- Top Right:** '**Compensation** sets automatically when the sensor driver card is installed' (points to the Compensation dropdown).
- Bottom Right:** 'If a conductivity sensor is installed in the same header, pull down the selector, select the conductivity sensor & **SUBMIT**' (points to the Conduct. Sensor dropdown).

Sidebar:

Corrosion Rate Measurements:

Weight loss coupons are commonly used to measure average corrosion rate over the coupon immersion period. The AEGIS' corrosion rate measurement uses **LPR** (Linear Polarization Resistance) for a corrosion rate that's updated every 2 minutes.

Although LPR is not as accurate as weight loss, LPR responds immediately to changes in corrosivity & is sensitive enough to detect when you are feeding oxidant, which marginally increases corrosion rate. Sensor life in treated cooling waters is many years.

Corrosion rates are measured in mils/year, MPY where 1mil = 0.001”.

LPR is a proven technique for real time measurement of general corrosion rates for all of the metals and alloys in typical cooling water systems. It is not useable for aluminum or stainless steels, which pit rather than corrode uniformly.

4.3 Sensor Compensation

Select the link on the input 'H' to 'N', used for ppm calculation and pull down the top, right menu, selecting **Configure**.

The screenshot shows the configuration interface for 'Inhibitor2 :J'. The settings are as follows:

- Description:** Inhibitor2
- Gain Multiply:** 1.0000
- Offset Adjust:** 0.0000 ppm
- Display units:** ppm
- Decimal digits:** 2
- Compensation:** Calculate ppm
- Chemical Volume:** R:Feed Meter
- Make-up Volume:** O:Make-up
- Cycles method:** Fixed Cycles
- Cycles:** 2.500
- Disable Input:** No (selected)
- Log Period:** 60 minutes

Callouts provide the following instructions:

- Set Display units to ppm .** (Points to 'Display units')
- Set Compensation to Calculate ppm.** (Points to 'Compensation')
- Set Make-up Volume to the tower make-up water meter or meters .** (Points to 'Make-up Volume')
- Select Meter Cycles if a bleed meter exists, SUBMIT & then select the bleed meter location.** (Points to 'Cycles method')
- Decimal digits sets the number of digits displayed after the decimal point.** (Points to 'Decimal digits')
- Set Chemical Volume to the meter or pump measuring fed volume.** (Points to 'Chemical Volume')
- Set Cycles Method to Fixed Cycles, SUBMIT & then set Cycles to the ratio of Tower-to-Make-up conductivities & SUBMIT.** (Points to 'Cycles method' and 'Cycles')

Buttons at the bottom: REFRESH, SUBMIT

Sidebar:

Calculate ppm:

If the controller knows the volume of chemical fed, the make-up volume and cycles of concentration, then the ppm of the fed chemical can be calculated.

The 1mL/pulse Tacmina positive displacement feed meters installed on the pump outlet or the inlet of fractional HP boiler feed pumps are an accurate way to measure volume fed. In this example, the feed meter is connected to controller input 'R'.

Phantom Inputs 'H' to 'N'

In this example we've enabled phantom input 'J' for use as a ppm sensor. 'H' to 'N' may also be used as **Inventory** or **Manual Input** sensors.

Phantom inputs are logged, used for controls and alarming just like inputs 'A' to 'G' which do physically exist and have connection terminal blocks.

4.4 Sensor Diagnostics

Select the link on any sensor to view the **Diagnostic** page for the sensor.

Conductivity A:A Diagnostic

Status: **Sensor Calibrated**
Sensor type: Conductivity

Period Maximum: 2068.2 uS
Period Minimum: 2066.8 uS
Period Average: 2067.3 uS

Sample size: 173
Current Period: 5 minutes
Log Period: 5 minutes

Compensation: None

Measured Level: 375.4 mV
Gain Multiply: 5.3675
Default Gain: 5.6000
Offset Adjust: -35.0000
Default Offset: -35.0000

Input card ID: 75 mV

REFRESH

Inhibitor2 :J Diagnostic

Status: **Operational**
Sensor type: Calculated

Period Maximum: 330.25 ppm
Period Minimum: 0.00 ppm
Period Average: 21.46 ppm

Sample size: 320
Current Period: 10 minutes
Log Period: 60 minutes

Compensation: Calculate ppm
Gain Multiply: 1.0000
Offset Adjust: 0.0000

REFRESH

Status displays Alarmed if tripped.

If you are controlling conductivity, you'd only expect variation when the bleed opens.

Here's a possible problem... Conductivities are usually have temperature **Compensation**

When you calibrate a conductivity, the controller adjusts the **Gain** to modify the displayed value.

Input card ID is checked on each power ON, reconfiguring the controller as sensor cards are added or removed.

Sensor inputs 'H' to 'N' may be used for ppm, manual entry & inventory.

Phantom input 'J' is used to **Calculate ppm** using the values of other volume meters and sensors.

Sidebar:

Diagnostic displays how the sensor is configured, compensated and calibrated.

Gain & Default Gain

When you calibrate a conductivity, the controller adjusts the GAIN to make your measured value match the displayed value.

Offset & Default Offset

When you calibrate a pH, ORP, temperature or corrosion rate, the controller adjusts the OFFSET to make your measured value match the displayed value.

When you two point calibrate a 4-20mA input, the controller adjusts both OFFSET and GAIN.

Inventory, ppm and Manual Sensors:

These sensor types use only the OFFSET to set the displayed value.

The controller ignores GAIN for these sensor types.

For example when you fill a tank and **Calibrate** an Inventory sensor to display 48.5 Gallons, **Offset Adjust** will display 48.5.

Measured Level:

pH sensors have a well defined mV to pH relationship.

Example pH7 = 0mV, pH10=176 mV and pH4 = -176 mV.

Displayed sensor value = **(GAIN x Measured Level) + OFFSET.**

Using this simple equation, you can directly modify the OFFSET & GAIN to get a desired display.

This is seldom done, but it's convenient for some unusual sensor types.

4.4 Sensor Diagnostics

Select the link on any sensor to view the **Diagnostic** page for the sensor.

The screenshot shows the diagnostic page for a 'Steel Sensor :D'. At the top, there is a dropdown menu set to 'Diagnostic'. Below it, the status is 'Operational' and the sensor type is 'Corrosion'. A callout box explains that the corrosion rate sensor is connected to input 'D' terminals. The page lists several parameters: Period Maximum, Minimum, and Average (all 2.43 mpy), with a callout stating that corrosion rates vary with temperature and chemicals. Sample size is 1, Current Period is 4 minutes, and Log Period is 5 minutes, with a callout explaining that a 60-minute log period captures 30 measurements. Compensation is set to Corrosion. Anodic Level is 245.3 mV, Cathodic Level is -286.5 mV, and Pitting Level is 18.9 mV. A callout notes that these levels are updated every 2 minutes. Measured Level is 1192.4 mV, with a callout stating it changes after each refresh. Gain and Offset parameters are all 1.0000 or 0.0000. Input card ID is 1604 mV and Drive Level is 1211.1 mV. A 'REFRESH' button is at the bottom.

Status	Operational
Sensor type	Corrosion
Period Maximum	2.43 mpy
Period Minimum	2.43 mpy
Period Average	2.43 mpy
Sample size	1
Current Period	4 minutes
Log Period	5 minutes
Compensation	Corrosion
Anodic Level	245.3 mV
Cathodic Level	-286.5 mV
Pitting Level	18.9 mV
Measured Level	1192.4 mV
Gain Multiply	1.0000
Default Gain	1.0000
Offset Adjust	0.0000
Default Offset	0.0000
Input card ID	1604 mV
Drive Level	1211.1 mV

Sidebar:

Corrosion Rate has a unique set of diagnostics.

Anodic and **Cathodic** levels should be opposite in sign and nominally the same magnitude. If not, the sensor tips may be fouled, debris blocked or pitting.

Pitting Level

Linear Polarization corrosion rate sensors work correctly unless pitted. Pitting usually only occurs under deposits in cooling water systems since water treatment prevents pitting on exposed surfaces.

Alarms:

If the magnitude of **Pitting Level** exceeds the **Anodic** or **Cathodic** level, the controller sets the 'Sensor Pitted' alarm at corrosion rates > 2 mpy.

If a conductivity sensor is selected and more than 50% of the measurement voltage is used to overcome the water resistance, the controller sets the 'Low Conductivity' alarm.

These alarms alert you to error in the displayed corrosion rate.

5.0 Measuring Volume: WaterMeters, Inventory, Verify Feed

5.1 Configuring a New Meter

Select the link on the meter and pull down the top, right menu, selecting **Configure**.

The screenshot shows the configuration interface for a water meter. At the top, a dropdown menu is open, showing 'Make-up :0' and a 'Configure' button. A callout box points to this menu, stating: 'The water meter is connected to input 'O''. Below the menu, the configuration form includes the following fields:

- Digital Type:** Volume Meter
- Description:** Make-up
- Volume/contact:** 100.0 G
- Meter Type:** Contact Meter
- Display units:** G
- Decimal digits:** 0
- Copy Volume to:** none
- Compensation:** None
- Disable Input:** No (selected)
- Log Period:** 60 minutes

At the bottom of the form are 'REFRESH' and 'SUBMIT' buttons. Several callout boxes provide additional instructions:

- 'Modify the **Description** to match the site name' points to the 'Description' field.
- 'If you are using a turbine or paddlwheel meter, set **Meter Type** to **Turbine Meter** & **SUBMIT** then adjust '**K**' Factor & **SUBMIT**' points to the 'Meter Type' field.
- 'Set **Volume/contact** to the value measured every time the meter contacts close' points to the 'Volume/contact' field.
- 'If you have set the controller to **U.S. Units**, **Display Units** are '**G**'allons. Metric units display '**L**'iters' points to the 'Display units' field.

Sidebar:

Contact Head Meters

Meters may often be user configured for many Gallon/Contact or Liter/Contact settings. Make sure you get the volume/contact correct or feed concentration errors will occur.

Turbine-Paddlewheel Meters

Nominal '**K**' Factors or Pulses-per-Gallon are listed for each pipe size on the manufacturer's web site or on the installation manual supplied with the meter. When meter are supplied with entry fittings, the actual 'K' factor is frequently labeled on the body of the meter.

Common Meter Wiring Errors:

1. Switching wire colors when extending 3 wire meter cables.
2. Routing meter wiring in the same conduit as AC power.
Meter cables are low voltage. If site practice allows, tie wrap meter cabling to the outside of conduit rather than share a conduit with AC power.

5.1 Configuring a New Meter

Unused controller digital inputs can be enabled and used for either contact set-flowswitch inputs or to measure volume as water meters or chemical feed meters. Select the **Diagnostic** page from the **System Home** page.

To enable an unused water meter input, select a grayed out link from 'O' to 'V' in the Diagnostic view. Click on **Yes** & **SUBMIT**

If you've enabled a contact set & want a water meter, set **Digital Type** to **Volume Meter** and **SUBMIT**.

We've converted controller input 'U' from a **Contact Set** to a **Volume Meter**. Edit the **Description** to reflect the new use.

Sidebar:
Digital Type
 The eight controller inputs 'O' to 'V' may be configured to any combination of meter and contact set inputs. Meter inputs measure volume and contact sets measure state, ON or OFF.

Contact Set Debouncing:
 Mechanical water meter contact sets bounce when closing or opening. The controller software debounces so that you don't measure extra counts when you select **Contact Meter**.

Maximum Turbine Pulse Rate:
Turbine pulse streams are not debounced and will measure up to 400 pulses/sec. or Hertz. 400 Hz. is faster than the pulse stream from the Seametrics type meter at maximum **'K' Factor**.

5.2 Feed Verification & Inventory

Select the link on the target sensor and pull down the top, right menu, selecting **Configure**.

The screenshot shows a configuration form for 'Feed Verify :Q'. The form includes the following fields and callouts:

- Feed Verify :Q** (Header) with a **Configure** dropdown menu. Callout: "The meter installed on the pump outlet or inlet is connected to the 'Q' terminals."
- Digital Type**: Volume Meter
- Description**: Feed Verify
- Volume/contact**: 1.0 mL. Callout: "Set **Volume/contact** for your verify meter type in mL. **1.0 ml** is the Tacmina default"
- Meter Type**: Contact Meter
- Display units**: mL
- Decimal digits**: 0
- Copy Volume to**: none
- Compensation**: Feed Verify. Callout: "Select **Compensation** to **Feed Verify**."
- Inventory input**: K:Tank Level. Callout: "Select an optional **Inventory Input** for tracking chemical pumped and calculating ppm"
- Verify Output**: 1:Inhibitor. Callout: "Select the pump where the verify meter is installed. In this example, it's the **Inhibitor** pump connected to relay **1**."
- Wait-to-Verify**: 30 seconds. Callout: "Set the time between the pump turning ON and the first pulse from the verify meter. **30 seconds** is the default."
- Disable Input**: Yes, No
- Log Period**: 60 minutes

Buttons: REFRESH, SUBMIT

Sidebar:

Feed Verify uses a feed meter on the pump to ensure chemical is pumped when the pump is turns **ON**. Any water meter input '**O**' to '**Z**' can be used for a **Verify Meter**. **Feed Verify** can be used to check any control or feed with a downstream water meter. Relays '**1**' to '**5**' and frequency controlled Pumps '**6**' to '**9**' can be alarmed on fail to feed with the **Feed Verify Compensation**.

Once you've set up the **Verify Meter**, you'll need to tell it which Pump to verify and if you wish keep track of the chemical pumped, which input to use for **Inventory**.

More than one **Verify Meter** can use the same **Inventory input** since more than one pump may use the same tank or tote.

Feed meters may be built into the pump, installed on the pump feed tubing or on the pump suction tubing for fractional HP boiler feed pumps.

Many pumps can be purchased with a low cost option that provides a contact closure whenever the pump feeds, typically every stroke.

These contact sets can **Feed Verify** that the pump has not lost prime, become unplugged or run out of chemical in applications where the accuracy of a higher cost 1mL/pulse meter is not required.

5.3 Cycle Controls

Select the link on the target bleed control and pull down the top, right menu, selecting **Configure**. The **Diagnostic** page is displayed when you select the target bleed control.

Make-up meter 'O' and Bleed meter 'P' are used for control. The ':' measures 'O' then 'P'

Any combination of volumes may be used as setpoints to get the target control ratio.

In this example we're controlling the **Bleed Valve** connected to ON/OFF relay 2.

The **Diagnostic** page shows where you are in the sequence of measuring make-up and bleeding

Sidebar:

Cycles of concentration are usually set by the conductivity control that operates the bleed solenoid. If the make-up conductivity & chemistry is constant, two water meters can be used for cycles of concentration control.

For every 200 Gallons of Make-up, the controller opens the bleed solenoid until it measures 50 Gallons. The result is 4 cycles of concentration. In this example, the conductivity sensor is used only to monitor the tower and not to operate the bleed solenoid. Volume setpoints can be adjusted for any Cycles target.

Don't worry about the math and each meter's volume/contact rating or 'K' factor. The controller takes care of these details.

Applications:

Any two volume meter inputs can be used to feed a ratio of chemicals. You could use the make-up meter and a 1mL/pulse feed volume meter to feed at a fixed ppm.

Example:

You Rate-to-Volume compensate a 4-20mA input which represents process line speed to volume meter input 'R' and measure cleaner feed volume on meter input 'Q'. The Cleaner pump controlled using 'Control by' = **R:Q** to feed cleaner proportional to process line speed.

5.4 Copying Meters

Select the link on the target sensor and pull down the top, right menu, selecting **Alarms**.

In this example, the **Make-up** meter connected to input 'O' is copied to the phantom **Site Total** meter @ input 'Y'

Copying can sum **Contact Meters** and **Turbine Meters**.

Pull this selector down to view all enabled water meters. Select & **SUBMIT** to **Copy**.

You can **Copy** to both real meters connected to inputs 'O' to 'V' and/or to phantom meters connected to 'W' to 'Z'

Sidebar:

The volume measured by one water meter can be copied to another water meter.

There are several uses for copying meters:

1. More than one meter can be summed for each meter in an O:P type Cycle Control.
2. Several tower's make-ups or boiler's feedwater volumes may be summed to a single meter for logging or alarming purposes. If you enabled a phantom input, 'W' to 'Z' you don't need to give up a physical controller input to sum volumes.

Meter Control Equations:

Up to 4 Meters can be summed or differenced to control a pump without using **Copy Volume to**.

Copy Volume to adds flexibility to configuring volume feed controls

Operation:

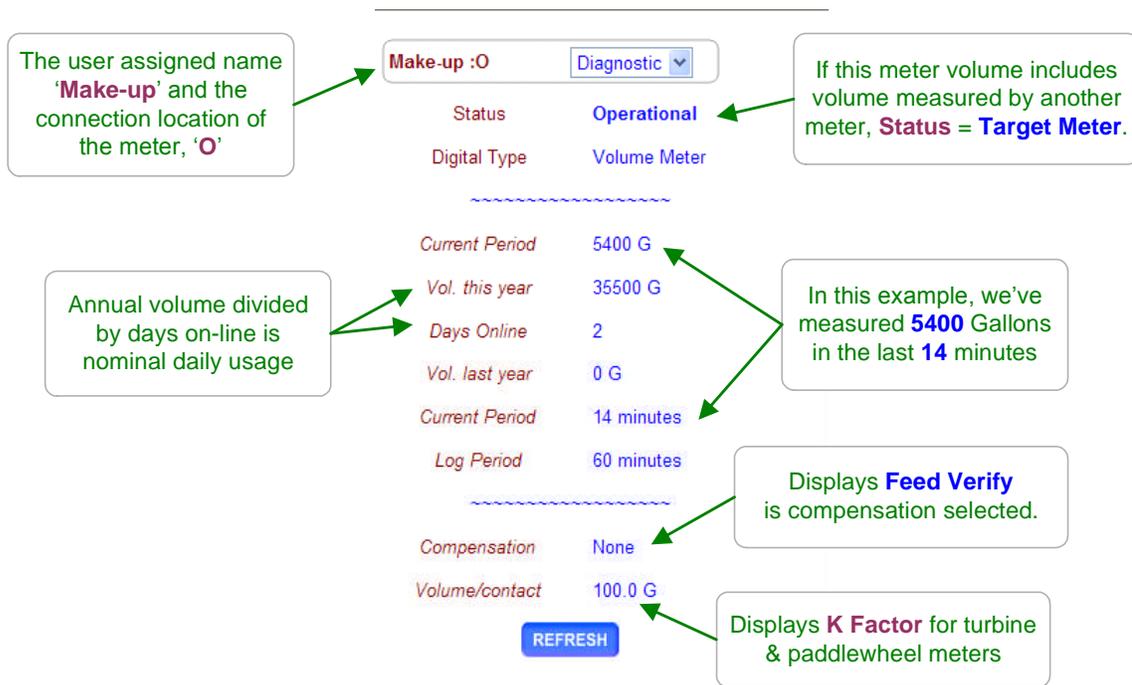
Only the incremental volume measured is copied, not the meter daily total. Copying starts when you set **Copy Volume to**.

Constraint:

The target meter of a **Copy Volume to** cannot be copied to prevent a run-away circular copy. In this example if you copied meter 'O' to Meter 'Q' and then copied 'Q' to 'O', you'd quickly get an infinite volume. The controller blocks this type of circular reference.

5.5 Meter Diagnostics

Select the link on the target volume meter to display the **Diagnostic** page.



Sidebar:

If **Days Online** = 286 and **Vol. this year** = 1642900 & the tower or boiler operates 24/7 then we're averaging 5750 Gallons/day
 Is this the expected volume for the target cycles of concentration and thermal load?
 If we've been averaging 5750 and today at noon we've measured **Volume today** = 9860 Gallons, why the increase?

Meter Alarms: Low Alarm

The **Low Alarm** for water meters only trips at midnight if the meter has not exceeded to **Low Alarm** volume. Set **Low Alarms** = 0 to prevent alarms @ midnight.

Use **Low Alarm** to flag towers or boilers that have not made-up, towers that have had no blowdown or chemicals that have not fed.

Meter Alarms: High Alarm

The **High Alarm** for water meters trips when the meter exceeds the **High Alarm** volume.

Set **High Alarms** higher than the volume expected @ highest thermal load to prevent nuisance alarms OR close to actual usage to flag you on increased load..

Set **High Alarms** on feed verify meters to flag you on increased usage.

Note; clearing a water meter **High Alarm** without adjusting the **High Alarm** level will immediately trip another alarm on the meter.

6.0 Cooling Tower Bleed

6.1 Bleed Alarms

Select the link on the target bleed valve or solenoid and pull down the top, right menu, selecting **Alarms**.

Sidebar:

Alarms: Because bleed ON time alarms are usually not set to turn OFF the bleed, they are typically set tighter to actual operating times for a tower under maximum thermal load.

These alarms can be used to flag you on maintenance problems with the bleed or changes in the thermal loading of the tower. An increase in make-up conductivity or an error in adjusting bleed setpoints could also increase bleed time & trip the alarm.

The **Minutes/Actuation** alarm starts timing when the bleed turns ON and returns to zero when the bleed turns OFF. This alarm does not reset it's timing at midnight since an actuation period or bleed cycle may bridge two days.

6.2 Variable Cycles

Select the link on the target bleed valve or solenoid and pull down the top, right menu, selecting **Configure**.

Sidebar:

Varying Cycles: Controls tower bleed on the ratio of the Tower-to-Makeup conductivity.

The user selects the cycles of concentration for three ranges of make-up conductivity and a maximum tower sump conductivity.

The controller measures the make-up conductivity and controls bleed @ one of the three cycles of concentration. If the tower sump exceeds the maximum conductivity, the tower conductivity is used to control the bleed & to reduce the sump conductivity.

Where Used:

If your make-up changes seasonally or periodically and you have a 2nd conductivity sensor installed in the tower make-up line you can control using Varying Cycles.

Where Not Used:

1. If the holding time or turnover time of the tower is 'long' then the bulk of the tower water has not changed when the make-up conductivity changes & you may scale if hardness limited.

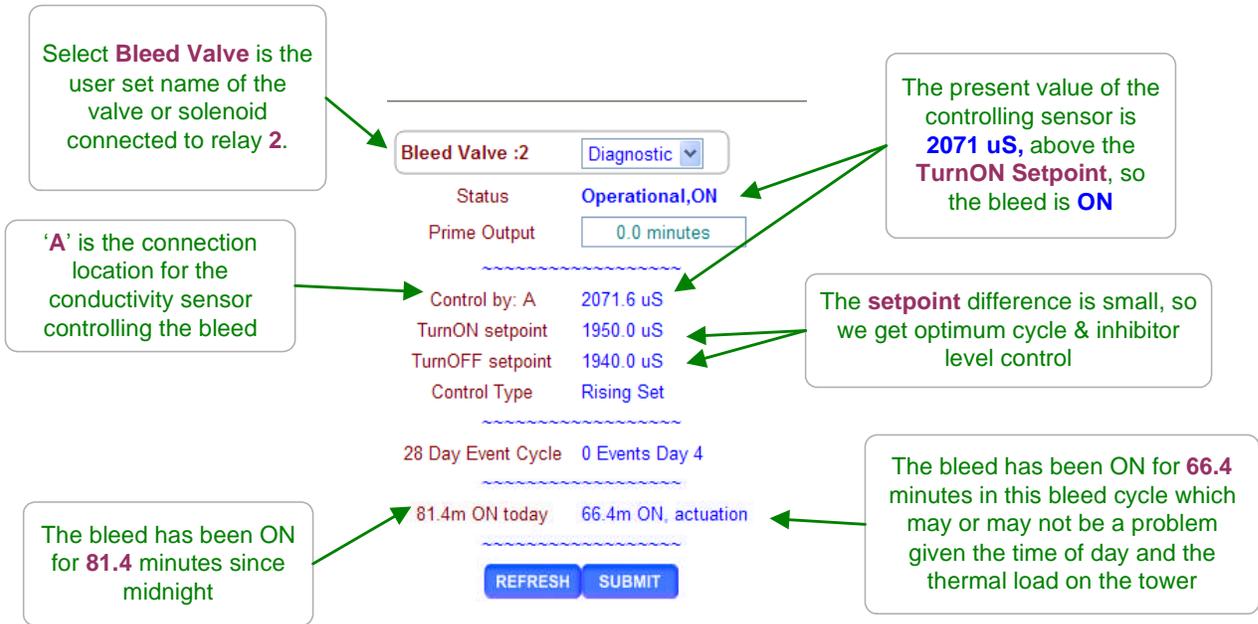
'Long' is site specific and a function of temperature, water chemistry and treatment program.

2. If the make-up conductivity does not track the component that limits the maximum cycles.

For example, hardness may increase with conductivity but silica may not & you may be silica limited.

6.3 Diagnostics

Select the link on the target bleed valve or solenoid and the **Diagnostic** page will display.



Sidebar:

ON Today: If the tower has been operating for 10 hours today, then its bleeding for about 36% of the time; typical for a tower under load.

If the tower has been operating for 4 hours today, then its bleeding for about 90% of the time indicating that the bleed may be undersized or partially blocked or bleed setpoints may be set incorrectly, or that make-up conductivity has changed..
 An increase in tower thermal load could cause the conductivity to rise beyond the **Turn ON** setpoint because the bleed can't keep up.

Special Control: Varying Cycles

Displays **'Offline'** if not controlled by a ratio of conductivities. Correct **Control by:**

Displays **'Low Range'**, **'Med. Range'** or **'High Range'** depending on the make-up conductivity and controls the bleed to maintain the cycles of concentration setpoint for the displayed range.

Displays **'Max Conduct.'** if sump conductivity exceeds maximum setpoint.
 The controller sets the **TurnOFF** setpoint 1% below the **'Max. Conduct'** setpoint.
 For example, if **Max. Conduct** = 3000 uS, **TurnOFF** would be 2970 uS.

7.0 Boiler Blowdown

7.1 Adjusting Boiler Blowdown Timing

Select the link on the blowdown valve and pull down the top, right menu, selecting **Configure**.

The image shows two side-by-side screenshots of the AEGIS Browser interface for 'Boiler 2:2'. The left screenshot is the 'Configure' page, and the right is the 'Diagnostic' page. Green callout boxes explain various features:

- Configure Page:**
 - Special Control:** A dropdown menu set to 'Capture Sample'. Callout: 'Select **Special Control** to **Capture Sample**'.
 - Sampling:** A callout explains 'Sampling opens the valve to replace the water at the sensor.'
 - Measure:** A callout explains 'Measure closes the valve; cooling occurs'.
 - Blowdown:** A callout explains 'Blowdown occurs if conductivity > TurnON at the end of Measure.'
 - Re-Sample:** A callout explains 'Re-Sample occurs if conductivity < TurnOFF at the end of Measure.'
 - Fail-to-Sample:** A dropdown menu set to 'U:F.TS Switch'. Callout: 'Selects location of optional Fail-to-Sample thermal switch'.
- Diagnostic Page:**
 - Status:** 'Special Control, ON'.
 - Prime Output:** '0.0 minutes'.
 - Control by:** 'E'.
 - TurnON setpoint:** '5911 uS'. Callout: 'Displays conductivity. Updated *only* at the end of every **Measure** period'.
 - TurnOFF setpoint:** '5890 uS'.
 - Control Type:** 'Rising Set'.
 - 28 Day Event Cycle:** '0 Events Day 20'.
 - 33.2m ON today:** '0.7m ON, actuation'.
 - Capture Sample: Blowdown:** 'Countdown: 78, seconds'. Callout: 'Displays which of the 4 steps controls and counts down the time. In this example, there are **78** seconds remaining in the **Blowdown** time'.
 - Sensor Watch:** '5911 uS'.
 - Fail-to-Sample U:** 'ON'. Callout: 'Sensor Watch updates conductivity on every **REFRESH**. Use to verify sampling is occurring & not flashing'.
 - Buttons:** 'RESET', 'SUBMIT', 'REFRESH', 'SUBMIT'.
 - Callout:** 'Displays location of thermal switch and **ON** or **OFF**. **ON** = hot & sampling or blowing down.'

Sidebar:

Re-sample Time: Varies with boiler load type. Process boilers check conductivity frequently. Lightly loaded or constant load boilers check every few hours

Measure Time, Blowdown Time and Re-sample wait are viewed and modified in the same way as **Sample Time**.

Whenever you modify **Captured Sample** timing a new **Sample** time starts immediately.

Setting a Re-sample Wait Time:

Energy, softened make-up and treatment chemicals are lost during each **Sample** so its appealing to set a long **Re-sample Wait** time.

Set the **Re-sample Wait** time to reflect the time it takes the boiler to increase conductivity under the worst case, heaviest load and lowest percentage of condensate return.

A high percentage of condensate return usually means that it takes longer to increase boiler water conductivity.

7.2 Fail-to-Sample

Select the link on the blowdown valve and pull down the top, right menu, selecting **Configure**.

In this example, the contact set connected to input 'V' must be closed for the blowdown valve to turn ON

To configure an installed **Fail-to-Sample** switch, pull down the selector, select & **SUBMIT**

The **Fail-to-Sample** switch is set on relay '3' and alarms on 'T' when the temperature at the end of **Sample** is low, indicating no sample & therefore no blowdown control

Sidebar:

Fail-to-Sample: At the end of a **Sample** period when the piping at and upstream of the conductivity sensor is hottest, the controller checks the **Fail-to-Sample** switch. If the switch is hotter than 190F to 200F (88C to 93C), its contact set is closed. An open contact set indicates a **Fail-to-Sample** and the controller sets an alarm.

If the surface blowdown line is accidentally valved OFF upstream or downstream of the **Fail-to-Sample** switch or the blowdown valve does not open, the piping never heats, the switch contacts never close & the controller alarms.

Surface blowdown piping cools to ambient during the **Re-sample Wait** time and the **Fail-to-Sample** contact set opens.

Flashing: Flashing at the conductivity sensor causes poor control because the sensor is measuring a varying mix of water and steam. Frequently flashing deposits solids on the sensor, fouling it and causing a low conductivity measurement. In some cases you can limit flashing by reducing the flow at the throttling or needle valve.

Effective Blowdown Control:

Accurate, non-drifting blowdown control requires a non-flashed sample at the conductivity sensor, fixed **Measure** time and fixed throttling valve setting. Any change in timing or plumbing which effects the temperature at the start or end of the **Measure** time requires a conductivity sensor calibration.

8.0 Flowswitches & Contact Sets

8.1 Switching Meters & Contact Sets

Select the link on the target water meter or contact and pull down the top, right menu, selecting **Configure**.

Flowswitch :S Configure

Digital Type Contact Set

Description Flowswitch

Invert sense Yes No

Compensation None

Disable Input Yes No

Log Period 60 minutes

REFRESH SUBMIT

If you need another contact set, flowswitch or meter, enable an unused input.

If you are going to connect a meter or contact set, use an input 'O' through 'V'. If you are going to use for mirroring or volume summing, use a phantom input 'W' through 'Z'

Pull down this selector to change from the present **Contact Set** to a **Volume Meter**. and **SUBMIT**

Contact sets used for Interlocking or control cannot be switched. Meters used for control or volume tracking volume cannot be switched.

Sidebar:

Volume & Contact Set Inputs:

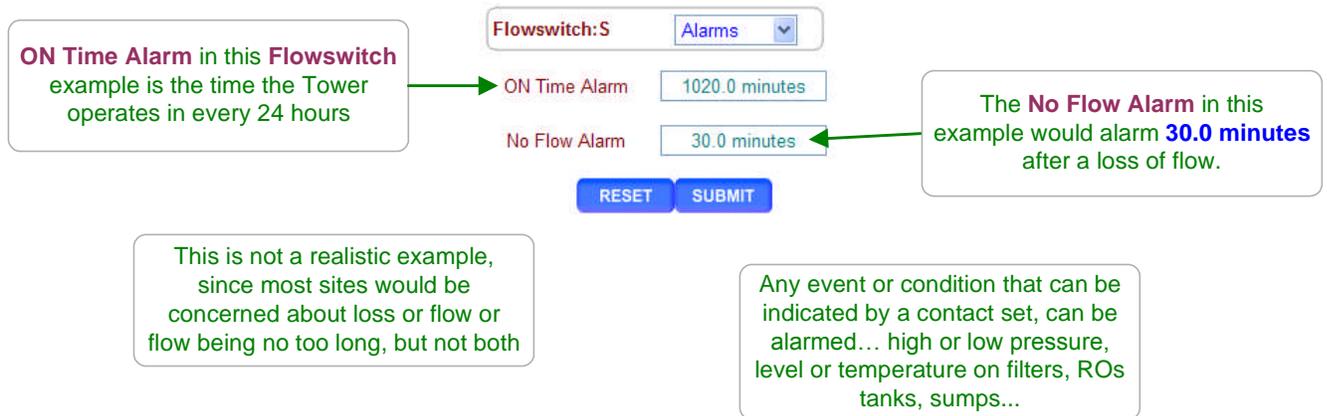
Controller inputs 'O' through 'V' may be set individually to be a water meter or a contact set. The controller is defaulted to meters at inputs 'O' to 'R' and contact sets at inputs 'S' to 'V'.

Phantom Inputs:

Controller inputs 'W' through 'Z' do not have physical terminals but may be enabled individually as either water-volume meters or contact sets. Phantom meters are used as 'Rate-to-volume' or 'Copy Volume to' targets. Phantom contact sets are used to 'Mirror' controller outputs and then to sequence or block other controller outputs

8.2 Contact Set Alarms

Select the link on the target sensor and pull down the top, right menu, selecting **Alarms**.



Sidebar:

Default alarm times are set so that contact sets won't alarm unless user configured. It's unlikely that you would set both alarms on any one contact set but the ability to alarm both ON & OFF states gives you a lot of application flexibility.

ON Time Alarm:

If the pressure switch on your RO or sidestream filter shows high pressure for more than 30 minutes, you'd like to log an alarm.

If the flowswitch on a comfort cooling tower which typically is ON between 6:00AM & 6:00PM is ON for more than 13 hours, either the flowswitch has faulted OR tower operation has changed.

No Flow Alarm:

If you had a treatment system that runs 24/7 you'd want to alarm on a flowswitch that has no flow since it indicates that the sensor or injection line is blocked or inadvertently valved OFF.

If you expected a bottom blow thermal switch to trip daily when the bottom blow valve is manually opened, you want an alarm if this bottom blowdown did not occur.

8.3 Mirroring Outputs

Select the link on the contact set that you wish to use for mirroring and pull down the top, right menu, selecting **Configure**.

ContactSet_T :T Configure

Digital Type: Contact Set

Description: ContactSet_T

Invert sense: Yes No

Compensation: Mirror output

Target Output: 3:Biocide

Disable Input: Yes No

Log Period: 5 minutes

REFRESH SUBMIT

Pull down the **Compensation** selector. Select **Mirror output** and **SUBMIT**

Pull down the **Target Output** selector. Select the pump, valve or solenoid you wish to **Mirror** and **SUBMIT**

Both ON/OFF relays '1' to '5' and frequency controlled pumps '6' to '9' can be **mirrored**.

In this example, when the **Biocide** pump connected to relay 3, turns ON, contact **ContactSet_T** will also dialy ON, **mirroring 3**

Sidebar:

Mirroring, Inverting & Contact Set Controls support varied and complex PLC type applications.

Many sites won't use these extra contact set functions, however for those sites which have applications these controls, they are built into each controller.

Example:

Every time I feed oxidizing biocide using the **Biocide** pump powered by relay 3, I want to feed extra corrosion inhibitor after the biocde feed ends.
I'll configure **ContactSet_T** to mirror the **Biocide** & then use **ContactSet_T** to control the Inhibitor Pump to turn ON for 15 seconds.

To make this work, I'll need to invert **ContactSet_T** and then configure a contact set control. These methods are detailed in the foll0wing two sections of this appendix.

8.4 Inverting Contact Sets

Select the link on the contact set you wish to invert and pull down the top, right menu, selecting **Configure**.

The screenshot shows the configuration interface for a contact set. At the top, there is a dropdown menu for 'ContactSet_T:T' with a 'Configure' button next to it. Below this are several configuration options:

- Digital Type:** A dropdown menu set to 'Contact Set'.
- Description:** A text input field containing 'ContactSet_T'.
- Invert sense:** Two radio buttons, 'Yes' (which is selected) and 'No'.
- Compensation:** A dropdown menu set to 'Mirror output'.
- Target Output:** A dropdown menu set to '3:Biocide'.
- Disable Input:** Two radio buttons, 'Yes' and 'No' (which is selected).
- Log Period:** A text input field containing '5 minutes'.

At the bottom of the form are two buttons: 'REFRESH' and 'SUBMIT'. Three callout boxes are present:

- On the left: 'The default for all contact sets and flowswitches is **Invert sense = NO**. When a default contact set closes, the controller displays ON'.
- On the right, pointing to the 'Yes' radio button: 'Select **YES** and **SUBMIT** to invert the sense of **ContactSet_T**'.
- At the bottom right: 'The controller's **Diagnostic** page for a contact set will tell you if a contact set is Open or Closed.'

Sidebar:

Inverting Sense:

Contact sets interlock and control when they are **ON**.
 For non-inverted contact sets, **ON** is when the contact set is closed.

If you wish to Interlock or control when the contact set is open, set Invert sense to YES.

If your contact sets are open when they are measuring the state you wish to alarm, control using or log, set Invert sense to YES.

RUN/STOP an 'Invert sense' Example:

Contact set 'U' is used for a RUN/STOP switch.
 The switch contacts are OPEN when the switch is set to RUN.
Invert sense is set for 'U' so that RUN displays on the controller as **ON**
 and so that 'U' can be used as a flowswitch for pumps and solenoids.

1 Contact Set, 2 Jobs Example:

I want to control a solenoid when the contact set is open & control a pump when the contact set is closed.
 Wire the contact set to input 'U' and jumper the U+ terminal to the V+ terminal.
 Use input 'U' for the pump. Invert the 'V' input & use it for the solenoid.

8.5 Contact Set Controls

Select the pump, valve or solenoid you wish to control using a contact set or flowswitch and pull down the top, right menu, selecting **Configure**.

Frequency_8:8 Configure

Control by:

TurnON setpoint:

then Feed:

Copy Volume to:

Interlocked:

Blocked by:

RESET SUBMIT

Controlling using a contact set allows more flexibility than using a contact set or flowswitch to Interlock

In this example, we're using 2 contact sets, 'T' for control & 'S' for interlocking

Set **Control by:** to the contact set input used to turn ON the pump, valve or solenoid and **SUBMIT**

Set the delay from contacts closing & then the volume fed. In this example, we'll feed **50 mL** after **ContactSet_T** has been closed for **60 seconds**

This example uses a frequency controlled pump connected to controller output '8'. ON/OFF relays '1' to '5', use a TurnON setpoint and an OFF setpoint in seconds for a control based on timing, not volume fed.

Sidebar:

Contact Set Control Example:

A pressure switch connected to controller input 'V' turns **ON** when the pressure drop across a sidestream filter indicates a need for a backwash sequence. The **TurnON Setpoint** is set to 30 seconds to prevent transient states from triggering a backwash. The **OFF Setpoint** is set to 900 seconds, 15 minutes, the time required to backwash the filter.

Set the **ON Time alarm** on **Pressure 'V'** to 20 minutes, because if 'V' hasn't turned **OFF** in 20 minutes, then backwashing failed and filter pressure is still high.

Owed Time or Volume:

Contact set controls work by adding time or volume to the controlled output. Reset alarms zeroes time (Relays 1 to 6) or volume (Pumps 6 to 9) owed. Time or volume owed adds to any existing owed so every time a controlling contact set turns **OFF** and then **ON** for more than **TurnON Setpoint**, the owed time or volume increases. Contact set controls work in parallel with **Prime-Test** and **Biofeed** event time or volume owed.

9.0 Frequency Controlled Pumps

9.1 Selecting a Pump

Select the link on the target pump and pull down the top, right menu, selecting **Setup**.

The image shows two side-by-side screenshots of a web-based pump configuration interface. Both screens are for 'Oxidant:7' and have a 'Setup' dropdown menu. The left screen shows the 'ProMinent 1001' pump selected. Callouts indicate that the controller automatically sets the 'Rated SPM' (180) and 'mL/stroke' (0.10) for a 40 psi injection head. The right screen shows the 'Other' pump type selected. Callouts indicate that the user must manually set the 'mL/stroke' (0.20) and 'Rated SPM' (100) and then click the 'SUBMIT' button. Both screens include fields for 'Description', 'Log Period', 'Event Cycle', 'Disable output', and 'Pump Type', along with 'RESET' and 'SUBMIT' buttons.

Built-in Pump types

Pump Type	ml/stroke	Liters/hr	Gallons/hr
1601	0.13	1.404	0.371
1602	0.24	2.592	0.685
1001	0.10	1.080	0.285
1002	0.24	2.592	0.685
0704	0.42	4.536	1.198
0705	0.50	5.400	1.427

Sidebar:

Pump Type:

If you select one of the 6 built-in ProMinent pumps, the feed volume mL/stroke and maximum frequency are set correctly and automatically assuming a nominal 40 psi feed line pressure. If you select 'Other' as a pump type, you'll need to provide both the nominal mL/stroke and maximum stroke rate. Pumps with maximum stroke rates from 50 SPM to 400 SPM are supported by the controller.

Relay Controls:

Frequency controlled pumps may be switched ON/OFF by one of the controller's relays '1' to '5'. Disconnect and remove the frequency control cable and plug the pump power cord into the controller.

This is not the best use for a frequency controlled pump but if you need more than the controller's four frequency controls, its an option.

9.2 Copying a Pump Volume

Select the link on the target sensor and pull down the top, right menu, selecting **Alarms**.

In this example we're copying the pumped volume to a phantom water meter. Pumped volume is **added** to **Y:Tot.Inhib.**

Pull down the **Copy Volume to** selector to display all possible copy targets. Select & **SUBMIT**.

In this example, we're copying the pumped volume to tank level. Pumped volume is **subtracted** from the **K:Tank Level**

Sidebar:

Copying Volumes:

Pumped volumes are summed to volume meter inputs 'O' to 'Z' and subtracted from sensor inventory inputs 'H' to 'N'.

Inventory Applications: Summing to Sensor

If more than one frequency controlled pump is feeding from the same tank, both pumps can be set to Copy Volume to the same tank to display and alarm on a calculated tank volume. A Feed Verify meter can also share the same calculated volume.

Proportional Feed Application: Summing to Meter

If you wish to feed 100mL of dispersant after every 1000mL of inhibitor, copy the inhibitor pump volume to a water meter. Then use the water meter to feed 100ml of dispersant every time it measures 1000mL. The meter doesn't need to physically exist, so you could enable and use one of the phantom inputs 'W' to 'Z' to avoid using one of the meter-contact set inputs 'O' to 'V' which have physical terminal blocks.

9.3 Adjusting mL/stroke

Select the link on the target frequency controlled pump and pull down the top, right menu, selecting **Setup**.

Sidebar:

Product Concentration Error Sources

ppm level errors can be caused by: Product formulation inaccuracy, loss of active product due to extended storage, settling-separation or temperature, reaction of the product with other fed chemicals, errors in the ppm test method or its reagent, inaccuracy or incorrect scaling of the make-up or feedwater meter **and** errors in the mL/stroke setting of the feed pump.

Calibrating Stroke Volume:

When your chemical ppm tests don't match the feed ppm setpoints or the calculated inventory doesn't match the actual tank volume, then consider calibrating the pump ml/stroke. If you find you're correcting the mL/stroke value frequently, then its very likely that the error source is not the mL/stroke setting since the feed head hasn't changed.

Calculated Adjust:

If you test 5% higher than the ppm feed setpoint, then adjust the mL/stroke x 1.05.

This method is minimum effort but it may mask other contributors to concentration error.

Pump from a Graduated Cylinder:

Pump 100 to 250mL from a graduated cylinder and note the change in inventory or fed volume. Correct the mL/stroke accordingly.

Calibration Limits:

The controller limits the range of **mL/stroke** calibration for the built-in ProMinent pumps.

9.4 Setting the SPM Rating

Select the link on the target frequency controlled pump and pull down the top, right menu, selecting **Setup**.

InhibitorB :7 Setup

Status: **Feed @ MIN!**

Description: InhibitorB

Log Period: 5 minutes

Event Cycle: 24 Hours, 7 Days, 28 Days

Disable output: Yes, No

Pump Type: Other

ml/stroke: 0.20

Rated SPM: 100

RESET SUBMIT

The controller checks the user set feed rate & mode to verify that the pump can deliver. If you exceed the pump's capacity, the controller will provide a message and set the pump to its MAX feed rate.

Other Pump Types can set the Rated SPM. Adjust & **SUBMIT**.

Sidebar:

Strokes per Minute:

Only **Other** type pumps can adjust the Rated SPM from 50 to 400 strokes per minute. The built-in ProMinent pumps have preset SPM ratings.

The controller uses the **Rated SPM** and **mL/stroke** to verify that feed **mL/minute** setpoints can be delivered.

Warning:

Don't set the **Rated SPM** for the pump higher than its nameplate rating since the action of the pump on overspeed may not be defined and in the worst case the pump may stall. This potential operating fault is not an issue for the built-in ProMinent pumps.

10.0 4-20mA Outputs

10.1 4-20mA Output Setpoints

Select the link on the 4-20mA output and pull down the top, right menu, selecting **Configure**.

The image shows two side-by-side web interface panels for a 4-20mA output labeled '4-20mAOutput E:E'.

Left Panel (Configure):

- Top right: '4-20mAOutput E:E' with a 'Configure' dropdown menu.
- Description: '4-20mAOutput E'
- Adjust Setpoint: '25.0 %'
- Return to Auto: Radio buttons for 'Yes' and 'No' (selected).
- Interlocked: Dropdown menu showing 'S:Flowswitch'.
- Log Period: '5 minutes'
- Buttons: 'REFRESH' and 'SUBMIT'.

Right Panel (Alarms):

- Top right: '4-20mAOutput E:E' with an 'Alarms' dropdown menu.
- Status: 'Alarmed'
- High Alarm: '100.000.0 %'
- Low Alarm: '0.0 %'
- Delay on Alarm: '5.0 minutes'
- Clear Alarms: Yes
- 4-20 loop open: '06:43:40 13/12/07'
- Buttons: 'RESET' and 'SUBMIT'.

Callout Boxes:

- Top left: 'In **Manual** mode the user sets a fixed current level 0-100% = 4 to 20mA'. Arrows point to 'Adjust Setpoint' and 'Return to Auto'.
- Middle left: 'Both **Auto & Manual** modes can be **Interlocked**. Current = 4mA when Flowswitch OFF'. Arrow points to 'Interlocked'.
- Bottom center: 'The current loop level, 0 to 100% is logged. In this example the current log is available at input **'E'**'. Arrow points to 'Log Period'.
- Bottom right: 'The controller alarms when the current loop is open. Select **Clear Alarms & SUBMIT** to reset.'. Arrows point to 'Clear Alarms' and 'SUBMIT'.

Sidebar:

Manual Mode:

Use **Manual mode** to verify the 100% ON=20mA, OFF=4mA & that modulated operation of the proportional pump or valve is operating correctly.
 Use **Manual mode** to verify the monitoring input that is using the current loop value to represent a controller conductivity, pH, ORP or corrosion rate sensor or ppm calculation.

Load Powered 4-20mA Loop:

4-20mA current outputs are powered by the loop load or by the controller 15VDC power supply. Building automation system typically supply 24VDC to power current loops. Current loop controlled pumps and valves usually use the controller 15VDC supply to power the loop.

Open Loop Alarm:

The DC isolated 4-20mA output alarms on an open loop or a loss of loop power.

10.1 4-20mA Output Setpoints

Select the link on the 4-20mA output and pull down the top, right menu, selecting **Configure**.

Setpoints may be reversed to change feed mode. Adjust & **SUBMIT**.

Return to Manual by selecting **Yes** & **SUBMIT**.

Pull down the **Control Sensor** selector to view available sensors. In this example, the 4-20mA current is controlled by **Conductivity**.

Diagnostic displays the **Auto - Manual - Alarmed Status** & variation is loop current within the log period

Span & Zero may be adjusted by keypad users to calibrate the current loop

Sidebar:

Setpoints: Setpoints may be positive or negative numbers. The 4mA Setpoint may be greater or less than the 20mA setpoint so that the loop current may either increase or decrease as the controlling sensor increases. A pH sensor can control an acid pump on one 4-20mA output and a caustic pump on another 4-20mA output.

Calculating Loop Current:

$$4\text{-}20\text{mA Output current (mA)} = 4 + 16 \times \left(\frac{\text{Sensor Value} - 4\text{mA Setpoint}}{20\text{mA Setpoint} - 4\text{mA Setpoint}} \right)$$

Use the absolute value of the setpoint difference for **20mA Setpoint < 4mA Setpoint**.

For this page's example, if the conductivity connected to input 'A' is 1500uS:

$$8.0\text{mA} = 4 + 16 \times \left(\frac{1500\text{uS} - 1000\text{uS}}{3000\text{uS} - 1000\text{uS}} \right)$$

Manual-Auto Switching:

Setpoints are retained when you switch between Auto & Manual. You can use one mode to verify the other if you are checking the level at a monitoring DCS or the operation of a proportional pump or valve.

10.2 4-20mA Configuration

Select the link on the 4-20mA output and pull down the top, right menu, selecting **Configure**.

In **Manual** mode the user sets a fixed current level 0-100% = 4 to 20mA

Both **Auto & Manual** modes can be **Interlocked**. Current = 4mA when Flowswitch OFF

The current loop level, 0 to 100% is logged. In this example the current log is available at input 'E'

The controller alarms when the current loop is open. Select **Clear Alarms & SUBMIT** to reset.

Sidebar:

Control by: Any enabled sensor of any type, 'A' to 'N' may be used to control the 4-20mA loop current.

Once you've selected a controlling sensor, adjust the **4mA Setpoint** and **20mA Setpoint** to reflect the range for either control of a pump or valve or for a remote DCS monitoring input.

Example: You are controlling the 4-20mA output current using a pH sensor.

If the 4-20mA current is controlling a pump feeding acid you could set 4mA= 7.0pH and 20mA = 8.0pH.

The pump would be OFF at 7.0pH and at 100% at 8.0pH.

If the 4-20mA current is monitored by a building automation system or distributed control system, you could set 4mA= 6.0pH and 20mA = 10.0pH. since this span represents the likely range of measured pH.

Auto Mode: The **Control Sensor** option only appears in **Auto** mode.

Open Loop Alarms: Both disconnected wiring and loss of loop power cause an open loop alarm. In either case, the current loop cannot control a pump or valve.

11.0 System Settings

11.1 Passwords

Select the system or home link. Pull down the top, right menu, selecting **Passwords**.

The screenshot shows two side-by-side configuration forms for 'System: Passwords'. The left form is for 'Login @ configure' and the right for 'Login @ Admin'. Both forms have fields for 'User ID', 'New Password', and 'Confirm Password', along with 'RESET' and 'SUBMIT' buttons. A 'Select User' dropdown is present in the right form, and an 'Access Level' dropdown is at the bottom of both. Callouts provide instructions: 'Displays your access level, configure, operate or Admin' points to the 'System' dropdown; 'Modify your User ID & SUBMIT' points to the 'User ID' field; 'Modify both New & Confirm Passwords & SUBMIT' points to the password fields; 'You can only view & modify the User ID & Password of the present current login.' points to the 'User ID' field; 'The Admin login user can set the access level for other usierids' points to the 'Access Level' dropdown; and 'Select the User ID, select the Access Level and then SUBMIT to change a user's access.' points to the 'Select User' and 'Access Level' dropdowns.

Default Passwords:

Operator1 = 1 Operator2 = 2 Operator3 = 3 Operator4 = 4.
 Configure5 = 5 Configure6 = 6 Configure7 = 7 Administrator = AAAA
 There are 3 password access levels, Operate, Configure and Administrator.

The eight User IDs are used in the controller's keypress log.

Login Page: Operators can view all controller pages.

When you modify a page & **SUBMIT** the Status message will display **Login @ configure** OR **Login @ Admin** is a higher access level is required.

Go to the home page or select the system link and **Logout & SUBMIT**, then login at the required access level.

Modify Passwords:

If the controller is accessible on the site LAN, you should modify all 8 passwords. Passwords are limited to 8 letters and numbers. Keypad passwords are capitals only. Any space in a password ends the password on both editing and **Login** password entry

Two users cannot share the same password because only the password is used to identify keypad users. The controller displays **Password Fail** on a duplicate password.

Reset Passwords: If you forget your password, a **Reset Password**, available from Aquatrac & specific to your controller's serial number, setting all passwords to default.

11.2 Time & Date

Select the system or home link. Pull down the top, right menu, selecting **Time & Date**.

System: Time & Date

Date DD/MM/YY 12/12/07

Time HH:MM:SS 19:52:01

RESET SUBMIT

Modify the date and/or time & **SUBMIT**

The controller uses a 24 hour clock.
19:52:01 is 7:52 P.M.

Sidebar:

Time & Date:

The controller uses a 24 hour clock where 14:30 is 2:30 PM.

When you set the Date, the controller automatically sets the correct day of the week.

Controller Response to a new Time&Date:

When you change the time & date, the controller:

1. Turns all outputs OFF, resets all control timing and restarts the logging period on each I/O
2. Ends prebleeds, lock-outs and zeroes time and volume owed which ends all BioFeed events.
3. Does a midnight reset which will may set volume-meter Low Alarms and will reset any output alarms set to reset @ midnight.
4. Sets the biocide Day 1 to the most recent Sunday.

Example: If you are at Day 19, Thursday of week 3, on a 28 day biocide cycle.

After a **Time&Date** change you are now at, Day 5, Thursday of week 1

11.3 Keypress-Alarm Log

Select the system or home link. Pull down the top, right menu, selecting **Activity Log**.

The screenshot shows the 'Activity Log' interface. At the top, there is a 'System:' dropdown menu set to 'Activity Log'. Below this is a list of log entries. Each entry consists of two lines: the first line shows the system name and the activity description, and the second line shows the user ID, time, and date. Callouts provide the following information:

- The last 25 user activities, 2 lines for each activity
- 1st line displays the name of the sensor, meter, pump or valve and the activity
- 2nd line displays the user id and the time and date of activity
- These activity log entries flag a **Inhibitor** pump feed adjustment by the **admin** user

System	Activity	User ID	Time	Date
System	Alarms cleared	admin	09:53:14	06/11/07
Biocide	Edit Biotiming	admin	09:40:17	06/11/07
Biocide	Reconfigured	admin	09:40:10	06/11/07
Biocide	Interlock modify	admin	09:40:10	06/11/07
Biocide	Control changed	admin	09:40:10	06/11/07
Inhibitor	Reconfigured	admin	09:39:31	06/11/07
Inhibitor	Interlock modify	admin	09:39:31	06/11/07
Tower Bleed	Reconfigured	admin	09:38:44	06/11/07
Tower Bleed	Interlock modify	admin	09:38:44	06/11/07

Sidebar:

Keypress-Alarm Log:

The log contains the last 25 activities that effect the operation of the controller. Most recent activities first. Both keypad and browser user activities are logged.

User IDs:

Keypad Password ON: Logs the User IDs listed in **Section 11.1 Default Passwords**.
Keypad Password OFF: Logs all User IDs as **Keypad**.

Browser user IDs are always logged because login is required to browse.

Actions taken by the controller, like configuring a new driver card on power ON, use the **System** user ID.

11.4 Enabling Inputs & Outputs

Select the link on the target 'unused' input or output in either the **Diagnostic** or **Site** views.

Disabling I/O:

Select Input link and then the **Configure** top menu option, then **Disable & SUBMIT**.
 Select Output link then the **Setup** top menu option, then **Disable & SUBMIT**.
 I/O in use by the controller for control or sensor compensation cannot be disabled.
 Disabled I/O is grayed out, displaying the 'unused' gray disc icon.
 Disabled I/O is not logged and does not appear in the selections used to compensate and configure other enabled I/O

Enabling Inputs:

Sensor inputs **A**:Conductivity, **B**:Temperature and **G**:4-20mA Input are fixed.
A,B & G may be enabled or disabled but their function is fixed.
 The function of Sensor inputs **C-D** and **E-F** is set by the installed sensor-driver card to be another conductivity or a pH, ORP, corrosion rate...
 Phantom Sensor inputs **H** to **N** are enabled as needed to for tank inventory and ppm calculations and to log manually entered drop counts.

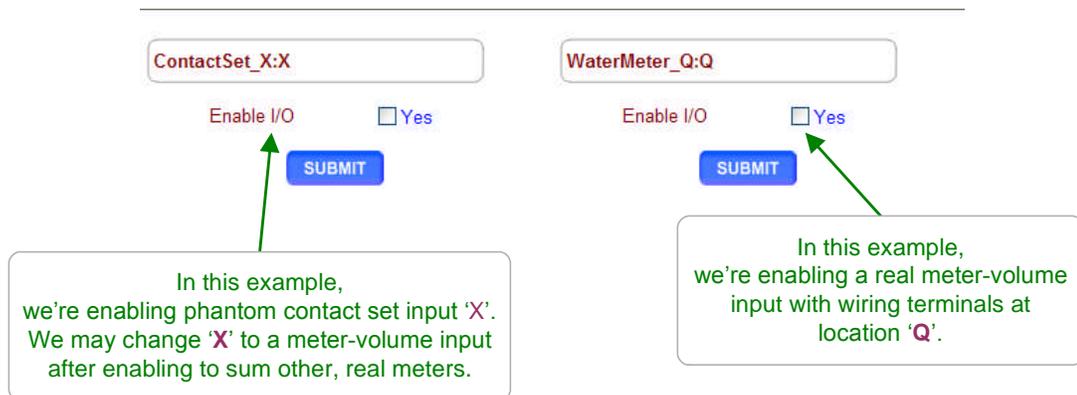
Meter-Volume and Contact Set Inputs **O** to **V** are enabled and configured for either water-volume meters OR flowswitches, boiler ON line contact sets, level-pressure switches ...
 Phantom Meter-Volume or Contact Set inputs **W** to **Z** are enabled as needed as **'Rate-to-Volume'** and **'Copy Volume to'** target or as **'Mirror Output'** targets.

Enabling Outputs:

Outputs **1** to **5** are AC power switching relays that are enabled to power pumps, solenoids or motorized valves.
 Outputs **6** to **9** are frequency controlled outputs that are enable to proportionally control pumps.

11.4 Enabling Inputs & Outputs

Select the link on the target **'unused'** input or output in either the **Diagnostic** or **Site** views.



Sidebar:

Enabling Inputs:

In each controller there are 26 inputs; 14 Sensors 'A' to 'N' and 12 Meter-Volume or Contact Sets 'O' to 'Z'.

Of the 14 sensors, 7, **A-G**, have terminal blocks where you can connect actual sensors and 7, **H-N**, are 'Phantom' and are used for manual and calculated values.

Of the 12 Meter-Volume or Contact Sets, 8, **O-V** have terminal blocks where you can connect actual meters or contact sets and 4, **W-Z** are 'Phantom' and are used for copy targets and mirroring.

Enabling Outputs:

Outputs are enabled in the same way as inputs. Each controller has 9 outputs.

Outputs **1-5** are relays which switch controller AC power to turn ON and OFF pumps, valves and solenoids.

Outputs **6-9** are frequency controls which are connected to frequency controlled pumps by a 2 wire control cable. The pumps are plugged into the AC power and the controller modifies the feed rate by changing the pump stroke frequency.

11.5 Metric & U.S. Units

Select the system or home link. Pull down the top, right menu, selecting **SYS Configure**.

The screenshot shows the 'SYS Configure' web interface. At the top, there is a 'System:' dropdown menu set to 'SYS Configure'. Below this are several configuration options:

- Status:** Login @ Admin
- Site name:** Polar Fibers
- Controller name:** Tower 4B
- This Sunday Day 1:** Radio buttons for Yes and No (No is selected).
- Metric Units:** Radio buttons for Yes and No (No is selected).
- Keypad Password:** Radio buttons for Yes and No (No is selected).
- Load config.:** Radio buttons for Yes and No (No is selected).
- Save config.:** Radio buttons for Yes and No (No is selected).
- A&B Sensor:** Dropdown menu set to 'Conductivity'.
- System restart:** Radio buttons for Yes and No (No is selected).

At the bottom are 'RESET' and 'SUBMIT' buttons. Four callout boxes provide additional information:

- Box 1 (left):** 'While any user may view the present settings, you'll need to be logged in as **'admin'** to modify' (points to the Status field).
- Box 2 (top right):** 'Modify to reflect your site & equipment names & **SUBMIT**' (points to Site name and Controller name).
- Box 3 (middle right):** 'Select **Yes** & **SUBMIT** to measure volumes in Liters & Temperatures in 'C'' (points to the Metric Units radio buttons).
- Box 4 (bottom right):** 'Selecting **Yes** & **SUBMIT** is the same as powering OFF then ON' (points to the System restart radio buttons).

Sidebar:

Commissioning:

Select U.S. or Metric Units when you commission or install the controller.

Data logging uses the Units setting for the units on logged volumes and temperatures. Changing units does not change data already logged.

Metric Inputs:

Non 4-20mA temperature inputs are converted to Centigrade using the default offset and gain for each of the thermal input type.

If you switch back to U.S. units, temperatures are converted to Fahrenheit using the default offset & gain, removing the effect of any user calibration.

Inventory volumes are calculated in Liters but units are not changed.

ppm calculations now assume metered volumes in Liters and not gallons.

Metric Outputs:

Pumped volumes are reported in mL & Liters.

Biofeed event volumes are in Liters and not Gallons.

The controller uses the units of the controlling sensor for setpoints.

If a water meter was set to measure Gallons prior to switching the **Metric Units**, it will still display Gallons on the meter and wherever it's used for control.

11.6 Configurations

Select the system or home link. Pull down the top, right menu, selecting **SYS Configure** or select **View-Config**. **View-Config** selection is only available when the Diagnostic View displays.

The screenshot shows the 'SYS Configure' interface with the following fields and callouts:

- System:** SYS Configure (dropdown)
- Status:** Login @ Admin
- Site name:** Polar Fibers
- Controller name:** Tower 4B
- This Sunday Day 1:** Radio buttons for Yes and No (No is selected).
- Metric Units:** Radio buttons for Yes and No (No is selected).
- Keypad Password:** Radio buttons for Yes and No (No is selected).
- Load config.:** Radio buttons for Yes and No (No is selected).
- Save config.:** Radio buttons for Yes and No (No is selected).
- A&B Sensor:** Conductivity (dropdown)
- System restart:** Radio buttons for Yes and No (No is selected).
- Buttons:** RESET and SUBMIT

Callouts and instructions:

- Top right:** While any user may view the present settings, you'll need to be logged in as 'admin' to modify.
- Left (top):** Select Yes & **SUBMIT** to set all 28 day biocide feed timing Day 1 to the most recent Sunday.
- Left (middle):** After you modify the current **View-Config** you can **Save** it. Use **Load config.** to recover your modified **View-Config**.
- Right (middle):** **Warning: Load Config.** takes the controller OFF line and may reconfigure, enable-disable all sensors, meters, flowswitches, pumps, valves & solenoids.
- Right (bottom):** Sensor inputs **A & B** may be used for different sensor types. Displays current sensor type. Pull down select & **SUBMIT** to change sensor type.

The bottom section shows the 'View-Config' interface:

- System:** View-Config (dropdown)
- 6 View-Config:** TB_demo_dual
- View-Config:** List box containing B1T3, T2CO21, OX2, TPCPT2CX, TBR3F3, B1T3BC.
- Load config.:** Radio buttons for Yes and No (No is selected).
- Buttons:** RESET and SUBMIT

Callouts for the bottom section:

- Left (top):** In this example, the controller has 6 possible **View-Configs**.
- Left (bottom):** Select **Yes & SUBMIT** to load the selected, new **View-Config**.
- Right (top):** Displays the name of the **View-Config** set. In this example, the set is used for training.
- Right (bottom):** Displays the currently selected and loaded **View-Config**. Scroll to view all possible **View-Configs**.

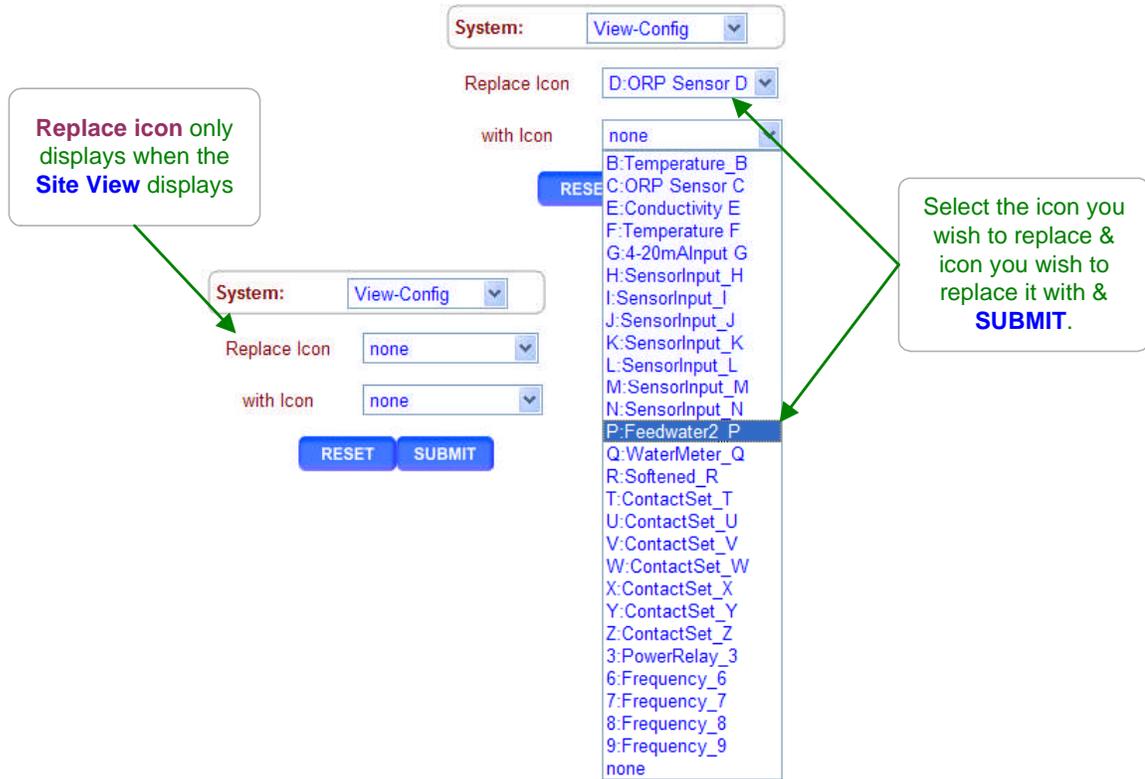
System: View-Config

Up to 15 configurations may be included with the controller. The configurations shipped with the controller may make it easy to add a 2nd boiler blowdown, a make-up conductivity or an ORP controlled bleach feed. They may also include complete preset feed programs complete with setpoints, pump type selection and biofeed timing.

The views associated with the configurations may display boilers or towers or specialized process equipment and maintenance-service pages.

11.6 Configurations

Display the **Site View** then select the system or home link.
Pull down the top, right menu, selecting **View-Config**.



Sidebar:

Replace icon allows you to modify the **Site View** to match your installed sensor-meter-pump-solenoid set.

Any icon can be replaced with any other icon.

A water meter can be replaced with a frequency-controlled pump.

A biocide pump can be replaced with a pH sensor or a calculated tank level.

All enabled and disabled inputs display in both icon selectors

Note: Replacing & switching icons has no effect on the operation of any controls, alarms or data logging. It's a visual change only.

When you remove an icon from the **Site View**, you can still see and access the icon in the **Diagnostic** view.

11.7 Communications

Select the system or home link. Pull down the top, right menu, selecting **COM Configure**.

The screenshot shows the 'COM Configure' web interface with the following fields and callouts:

- System:** A dropdown menu set to 'COM Configure'. Callout: 'While any user may view the present settings, you'll need to be logged in as **Admin** to modify'.
- Status:** A button labeled 'Login @ Admin'. Callout: 'If connected to the site LAN, modify the **IP Address** & **SUBMIT**.'
- IP Address:** A text input field containing '10.10.6.106'. Callout: 'If connected to the site LAN, modify the **IP Address** & **SUBMIT**.'
- Netmask:** A text input field containing '255.255.255.0'.
- GatewayOFF:** A text input field containing '10.10.6.19'. Callout: 'The controller does not require a valid **Gateway** to operate or to support browsing. OK to leave @ default.'
- Timezone:** A text input field containing '-8'. Callout: '**Timezone** is the offset from Greenwich. **-8** is California's PST. Sets the time correctly in the browser header. Doesn't cause problems if set incorrectly'.
- HTML Port:** A text input field containing '80'. Callout: 'Some site LANs do not allow you to use **Port 80**. Otherwise, leave at the default **80**.'
- MAC Address:** A text input field containing '0090:c200:0000'. Callout: 'Some sites will require to **MAC Address** to register the controller on the site LAN'.

At the bottom of the form are two buttons: 'RESET' and 'SUBMIT'.

Sidebar:

Warning: Do not connect the controller Ethernet connection into a site LAN until the site IT staff have assigned a valid IP Address.

Not Connected to the Site LAN:

Leave the IP Address at 10.10.6.106.

Connect a crossover cable from your notebook PC to the controller and browse 10.10.6.106.

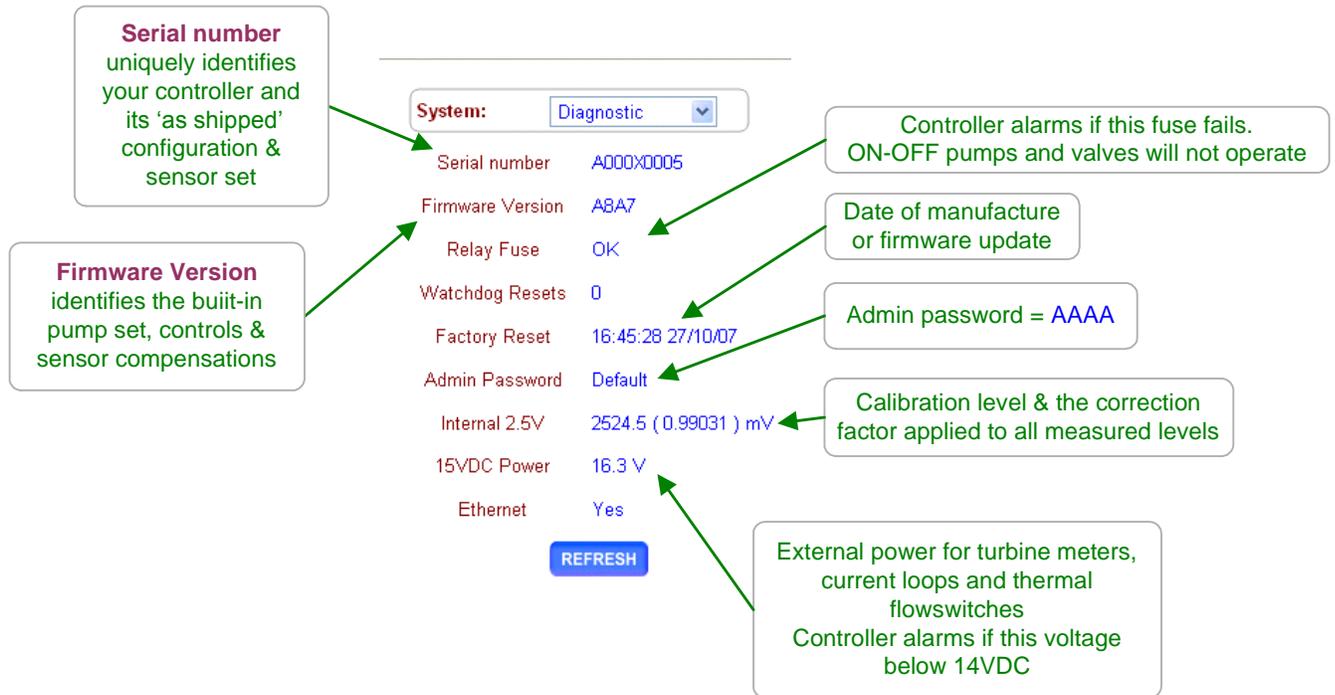
Browser passwords are the same as the default keypad passwords listed in the manual & appendix Section 11.1 **Passwords**.

You'll need to configure your notebook to connect.

Refer to Section 12 of this Appendix for XP & Vista Ethernet TCP-IP setup.

11.8 System Diagnostic

Select the link below the view Day & Date to get to the log in page then select **Diagnostic** at the top on the right side page.



Sidebar:

If the **System Diagnostic** Admin Password is not Default, then you will not be able to use the default 'AAAA' administrator password to log onto the controller.

Watchdog Resets should always be zero.

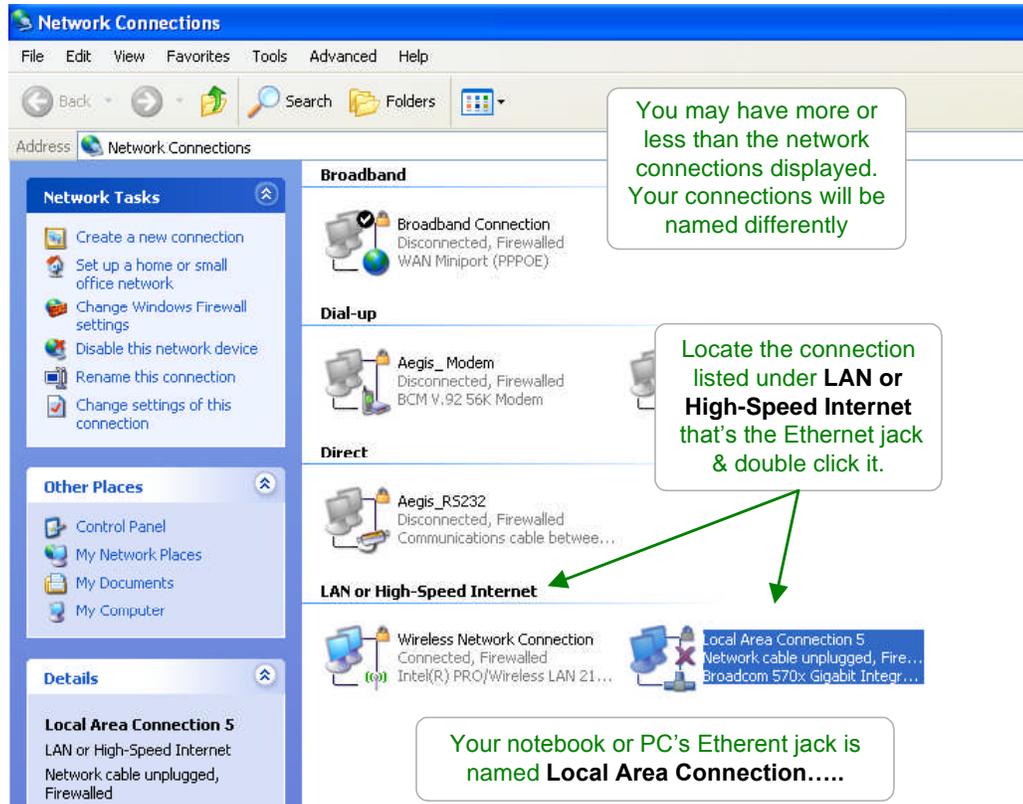
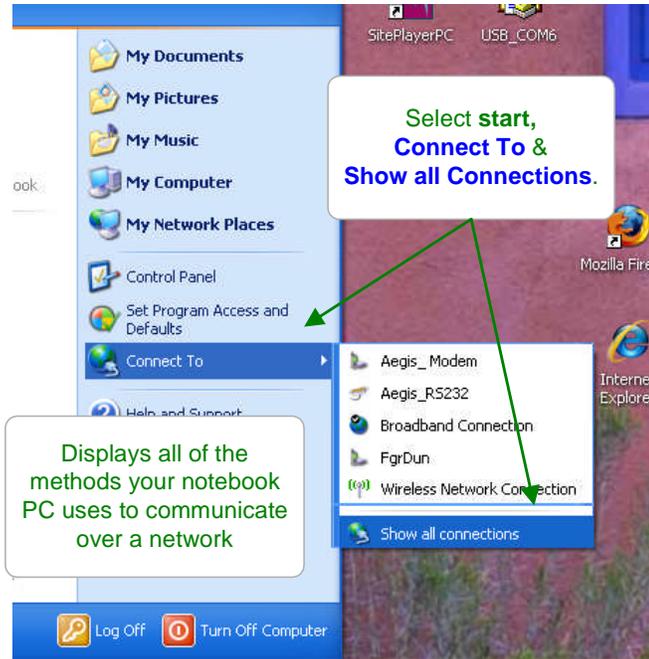
If you have discharged static onto one of the controller circuit boards or one of the meter, sensor or contact set cables is in the same conduit as AC power switching transients, you may see the Watchdog Resets count up as the controller tries to recover.

Touch the grounded controller internal aluminum frame before handling controller sensor cards or re-wiring controller terminals. Static discharge is not typically a problem on-site since few controllers are installed in carpeted areas.

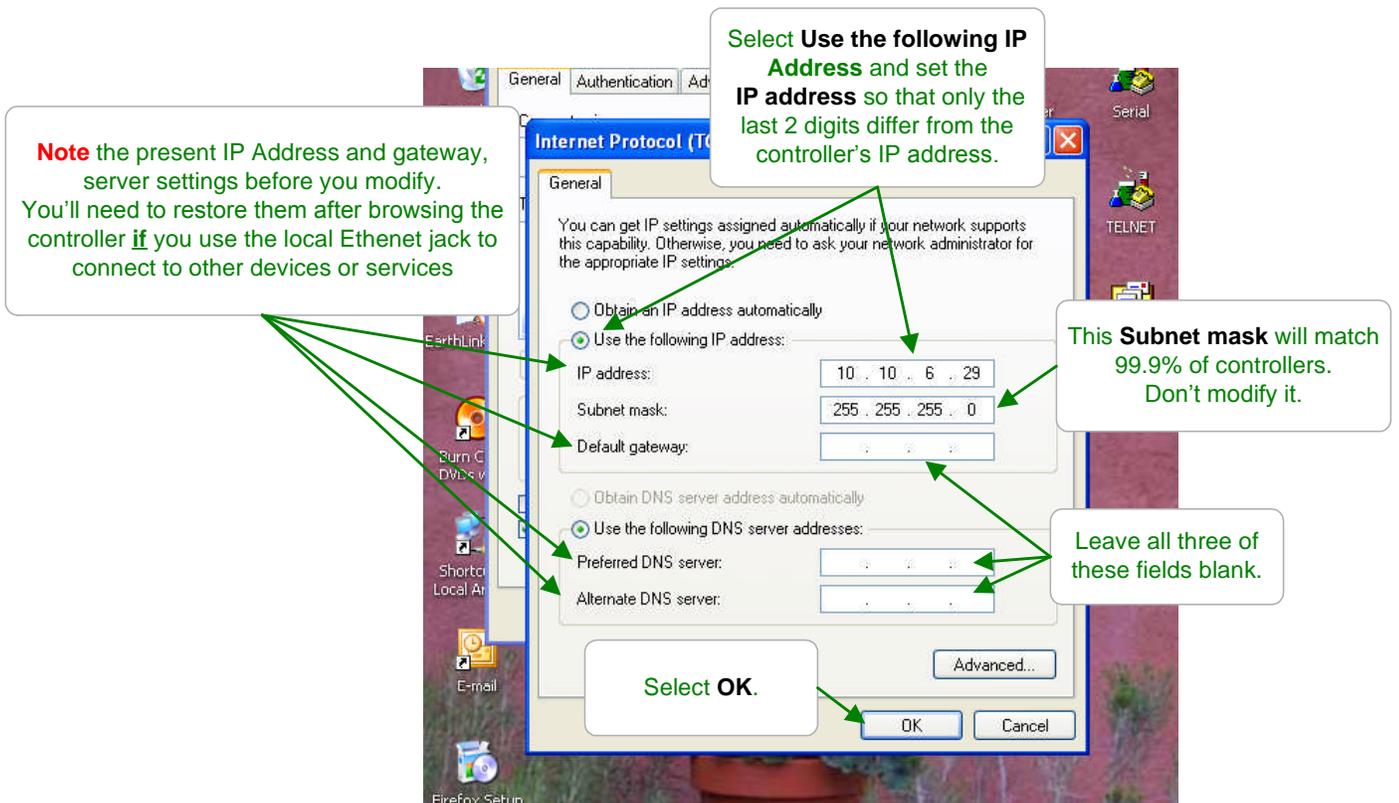
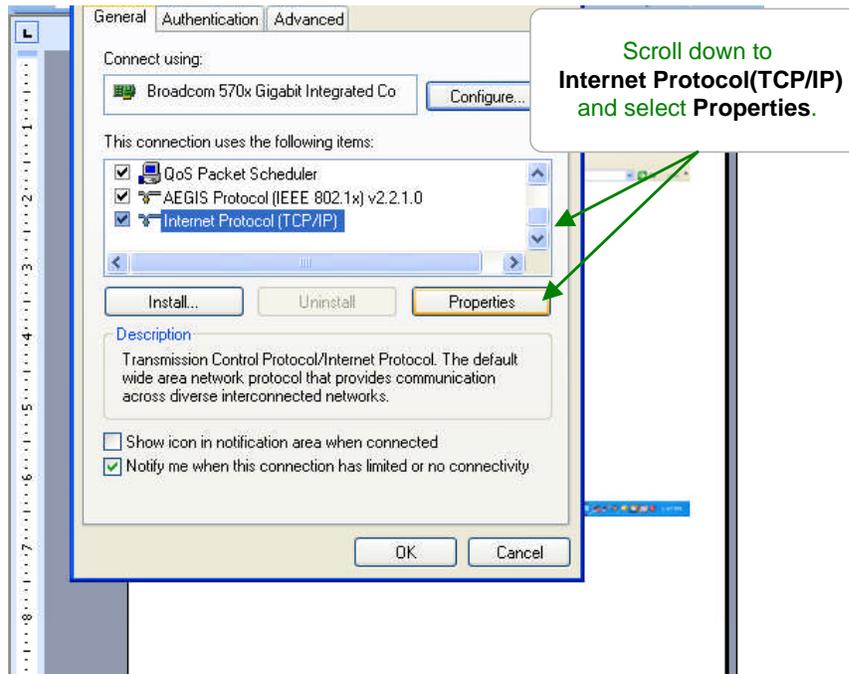
Correct wiring to remove instrument cabling from AC power conduits.

12.0 Notebook & PC Ethernet Set-up

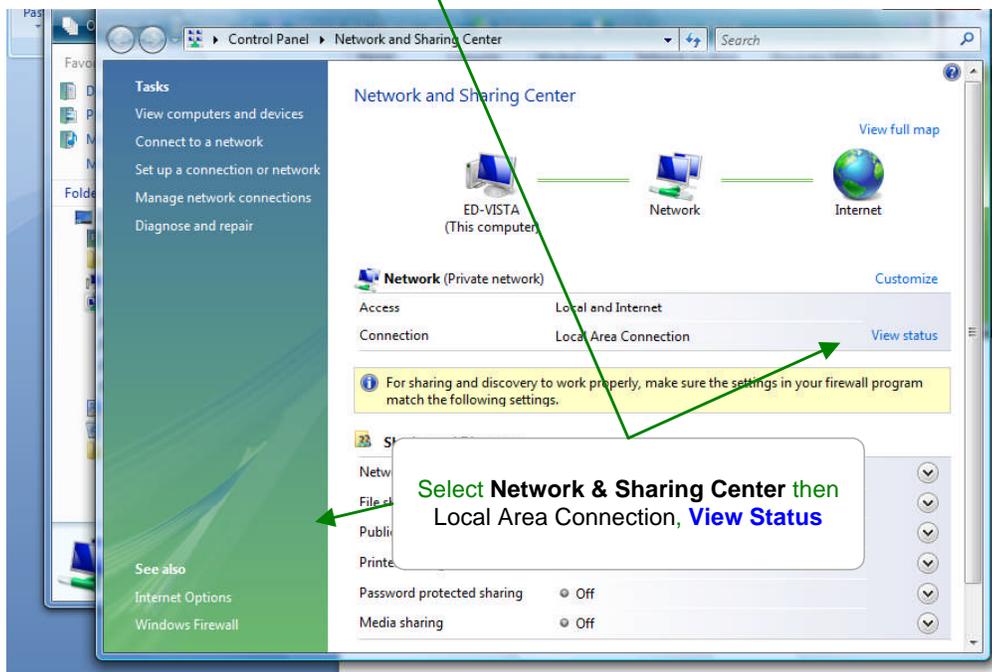
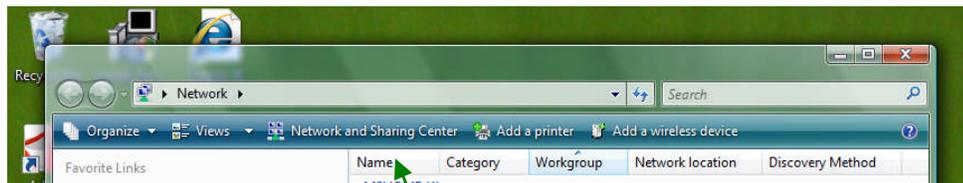
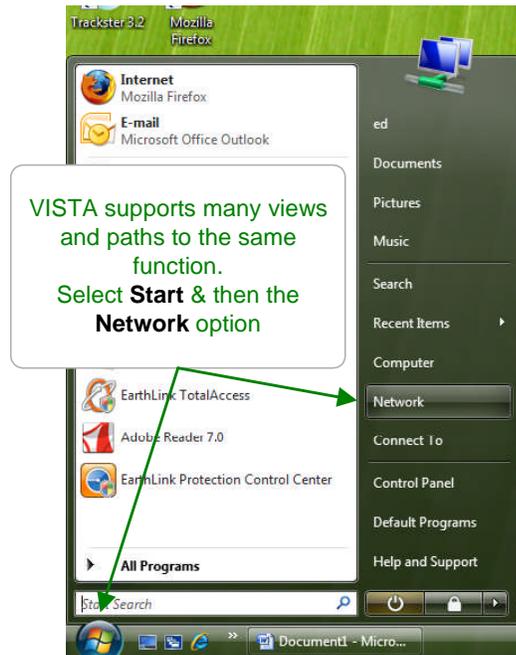
12.1 Windows XP Browser Set-up



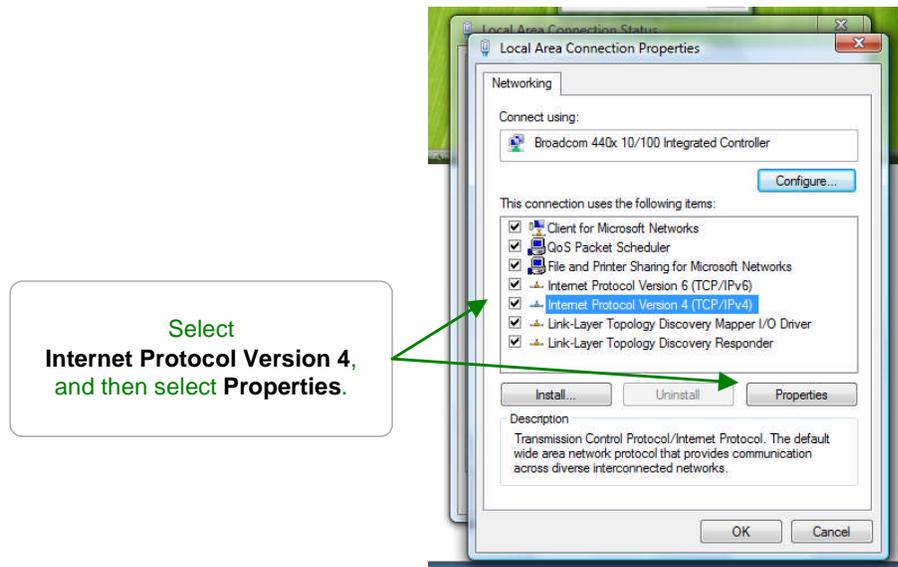
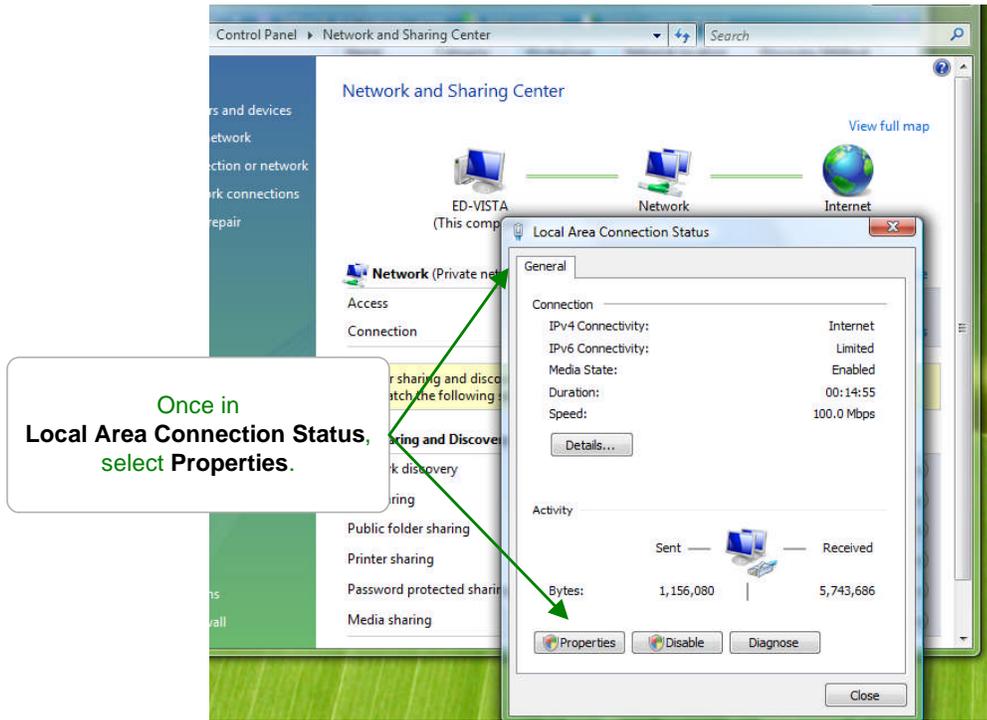
12.1 Windows XP Browser Set-up cont.



12.2 Windows VISTA Browser Set-up



12.2 Windows VISTA Browser Set-up cont.



12.2 Windows VISTA Browser Set-up cont.

The image shows a screenshot of the Windows Vista Network Setup Wizard, specifically the 'Internet Protocol Version 4 (TCP/IPv4) Properties' dialog box. The 'Alternate Configuration' tab is selected. The 'User configured' radio button is chosen. The IP address is set to 10.10.6.29 and the Subnet mask is 255.255.255.0. The other fields (Default gateway, DNS servers, WINS servers) are blank. Several callout boxes provide instructions: 'Select Alternate Configuration and User Configured.' points to the 'Alternate Configuration' tab and the 'User configured' radio button. 'Set the IP address so that only the last 2 digits differ from the controller's IP address.' points to the IP address field. 'This Subnet mask will match 99.9% of controllers. Don't modify it.' points to the Subnet mask field. 'Leave all four of these fields blank.' points to the Default gateway, Preferred DNS server, Alternate DNS server, and Preferred WINS server fields. 'Select OK.' points to the OK button. A larger callout box at the bottom right states: 'If Alternate Configuration is not an option, note the present IP Address and gateway, server settings before you modify. You'll need to restore them after browsing the controller if you use the local Ethernet jack to connect to other devices or services'.

Select Alternate Configuration and User Configured.

Select the IP address so that only the last 2 digits differ from the controller's IP address.

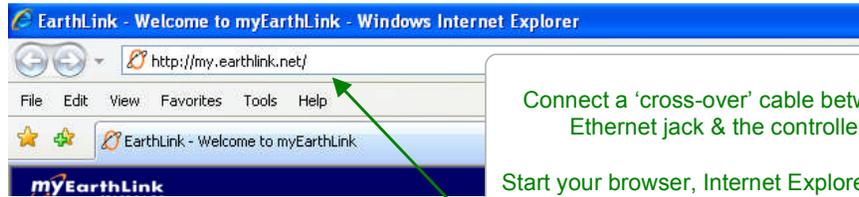
This Subnet mask will match 99.9% of controllers. Don't modify it.

Leave all four of these fields blank.

Select OK.

If Alternate Configuration is not an option, note the present IP Address and gateway, server settings before you modify. You'll need to restore them after browsing the controller if you use the local Ethernet jack to connect to other devices or services

12.2 Windows Browser Connect



Connect a 'cross-over' cable between your notebook's Ethernet jack & the controller's Ethernet jack.

Start your browser, Internet Explorer 7 or Mozilla's Firefox. If you have wireless internet access, you'll connect to your ISP, Earthlink in this example. If no wireless access, you'll get the the not found page.

Then key the controller's IP address into the browser's address line, **10.10.6.106** in this example & **ENTER**. Your browser will convert to **http://10.10.6.106/**

System:

20/12/07 S/N: U000X0005

Status: **Waiting for Login**

Select User: Public

Password: [Masked]

New View: Diagnostic

Alarms: none

RESET **SUBMIT**

REFRESH

Thu 13:59:04
Location Name: System Name **OK**

0 G WaterMeter_Q **OK**

37sec ContactSet_S **ON**

1163.6 --- 4-20mAInput_G **OK**

72.1 F Temperature B **OK**

2069.0 uS Conductivity A **OK**

No control PowerRelay_4 **OFF**

No control PowerRelay_5 **OFF**

No control PowerRelay_3 **OFF**

Setpoints PowerRelay_1 **OFF**

0 G WaterMeter_P **OK**

No control PowerRelay_2 **OFF**

You'll see a real time view of your controller, updated automatically every 2 seconds.

You can select **Diagnostic** & **SUBMIT** to view all of the controller's inputs & outputs.

To do anything else, you'll have to **Login** to the controller

12.2 Find the Controller's IP Address

The following is copied from Section 11.7 of the Aegis_User manual.

To view or adjust the controller Ethernet setting press **ENTER** and **DOWN** to **Communicate** at the power up or day-time display.

Key **ENTER** @ **Communicate**

Displays the current LAN **IP address**. In this example, it's the factory default. If you are connecting into the site LAN, **IP address** is assigned by the site IT staff. Key **ENTER** to modify.

Netmask is usually this value for most sites. Key **ENTER** to modify.

This is the default **HTML Port** for browsing. It can be modified only via the browser.

The site IT staff may require the controller **MAC Address** to register-allow the controller on the site network. The **MAC address** is six 2 digit hexadecimal numbers, separated by colons into 3 groups of 4 to fit the LCD screen. In this example, the **MAC address** is **00 90 C2 00 00 00**

Communicate

Thu 16:54:10 ←↕↕
S/N: A076X486

←↵ then ↓

Communicate ←↵
Configure ↓

←↵

IP Address ←↵
10.10.6.106 ↕↕

↓ ↕ ↕ or ←↵

Netmask ←↵
255.255.255.0 ↕↕

↓ ↕ ↕ or ←↵

HTML Port
80 ↕↕

↓ ↕

MAC Address
0090:c200:0000 ↕↕

↓ ↕

IP Address ←↵
10.10.6.106 ↕↕