CONTENTS

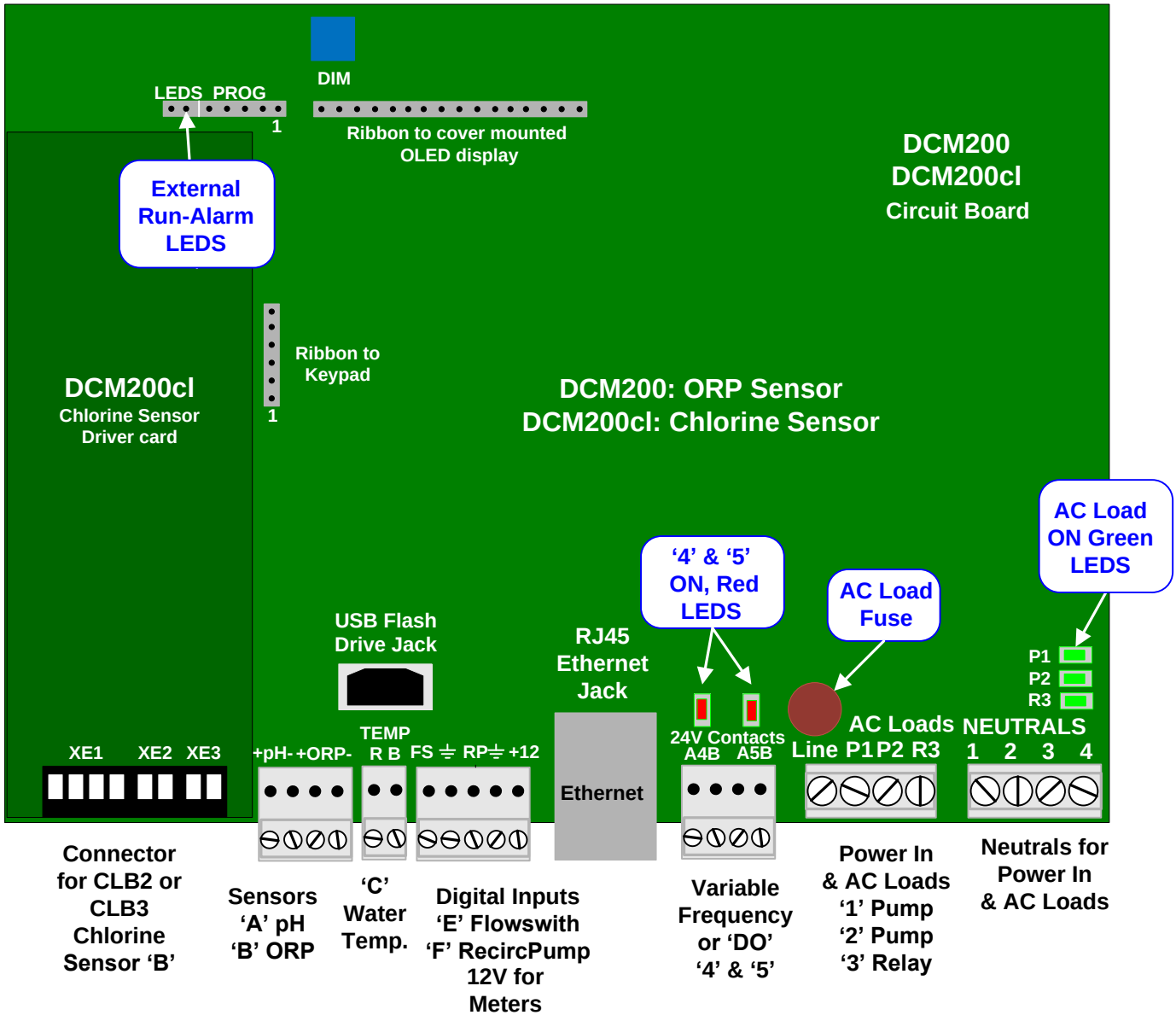
Sidebars:
Are used to explain typical uses for feed and control functions.
Sidebars are at the bottom of the page detailing the function.
New users & users new to automated controls will find these explanations helpful.

DCM200 series controllers are shipped preconfigured.
This manual supports re-configuration required as you add and modify the way you feed chemicals and manage filters, heaters and sensors

Users may re-name controller inputs & outputs @ each site.

DCM200 DCM200cl Browser

DCM200 & DCM200cl Input-Output Namespace



Sidebar:
The physical connection points for inputs & outputs are designated by letters (**A-F**) for inputs & numbers (**1-5**) for outputs.
Inputs: Sensors: **A to C** Input '**D**' is the LSI-Ryznar calculation
Flowswitches, Contact sets & Water Meter: **E & F**
Outputs: 120VAC Relay Outputs: **1 to 3**.
Dry Contact or Frequency Outputs: **4 & 5** (Rated 24VDC & 250mA max)
Using letters & numbers provides a compact, generic way of defining a control;
Example: The sensor connected to input '**B**' controls the pump connected to relay '**2**' when the flowswitch connected to input '**E**' is closed. Users label **B**,**2** & **E** with site specific names.
Complex controls can be defined by letters (sensors) & numbers (pumps & solenoids).
Inputs & outputs don't need to have fixed functions & a more flexible controller results.

DCM200 DCM200cl Browser
1.0 Day-to-Day Browsing

1.1 Connect

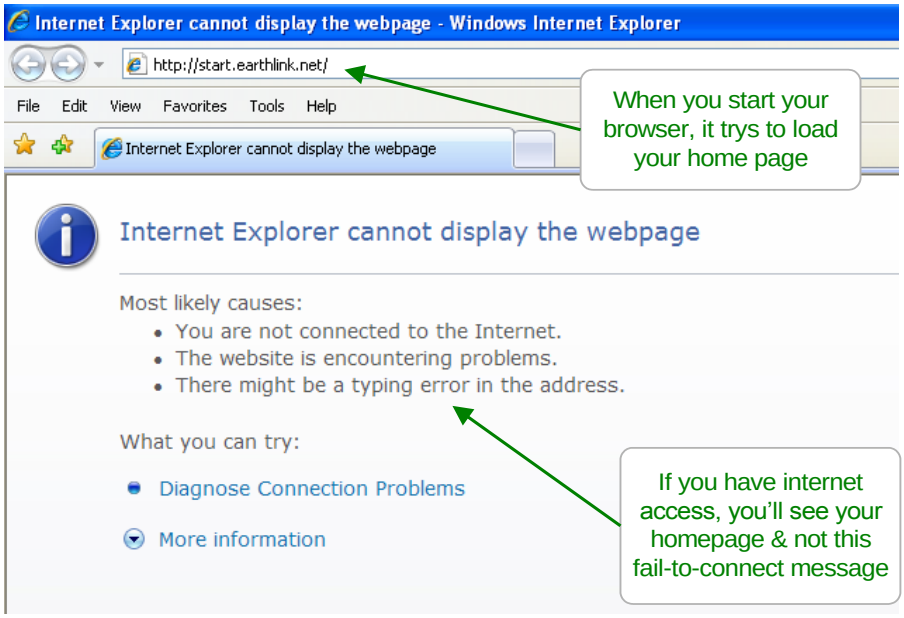
On-Site using a Notebook PC to a DCM200 not on the Site LAN

A. You'll need an Ethernet crossover cable available from office supply & electronics stores;
Example: Office Depot # **393427,** Belkin Cat5e Crossover Cable, 7 ft. long, $5.95.

B. You'll need to set up a new connection in your notebook or PC.
Refer to Section 9.

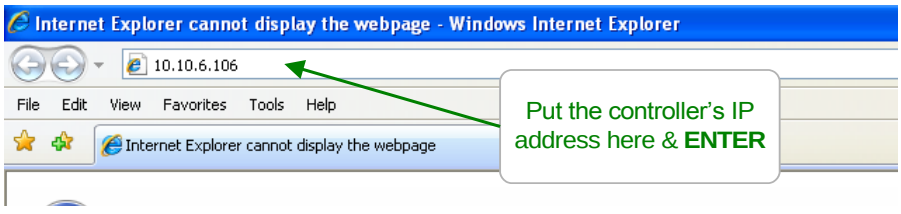
Open the controller enclosure door and jack into the controller Ethernet jack located on the lower center of the controller circuit board.

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



Notebook PC & Over the Site LAN

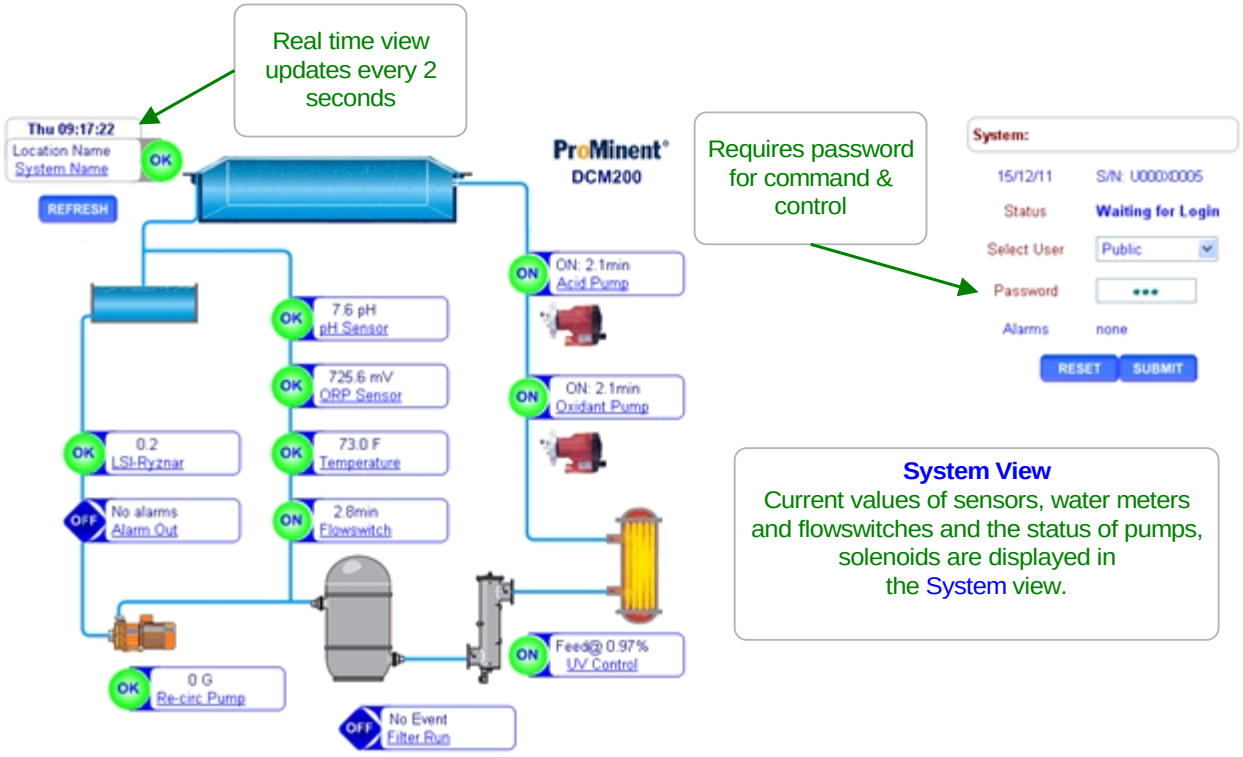
Key the controller IP address into the PC's browser address.
You can find the controller's IP address using the controller keypad (default = **10.10.6.106**).
Refer to Section 9.



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.

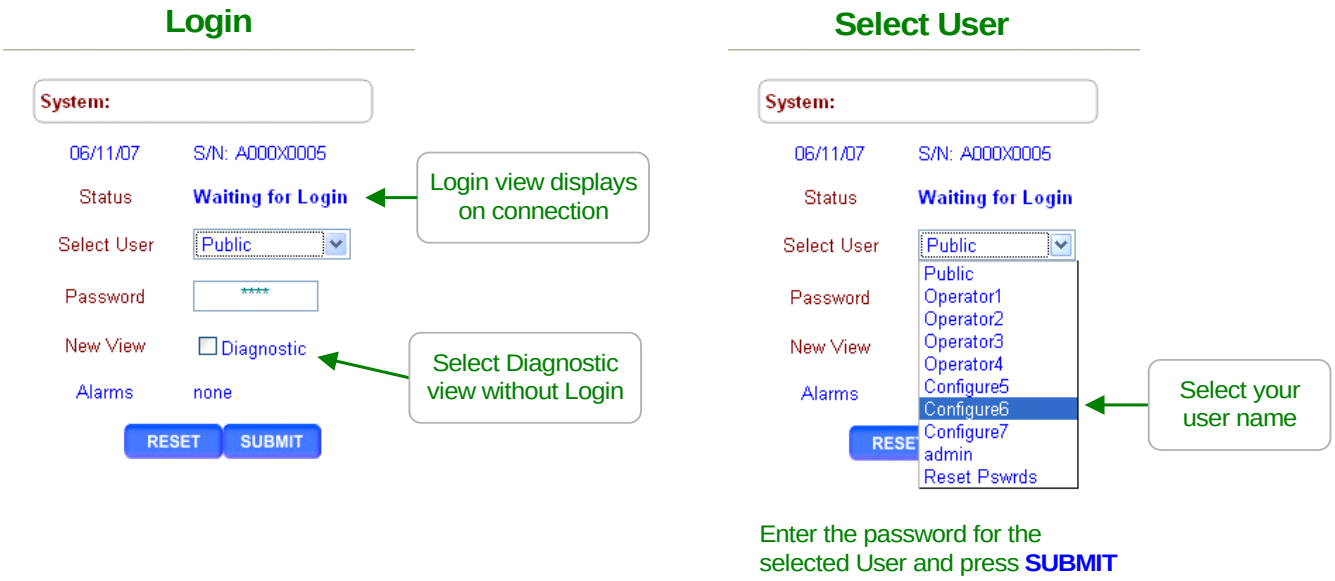
Here's what you'll see in your browser on first connect.



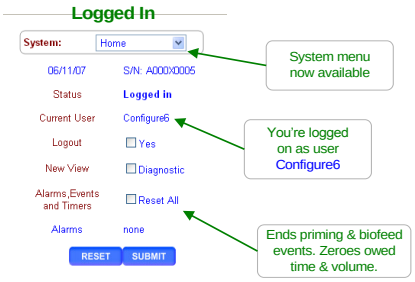
Note: Views are optimized for limited resolution displays, notebooks & PCs at 1024 x 768 pixels.

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.



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.

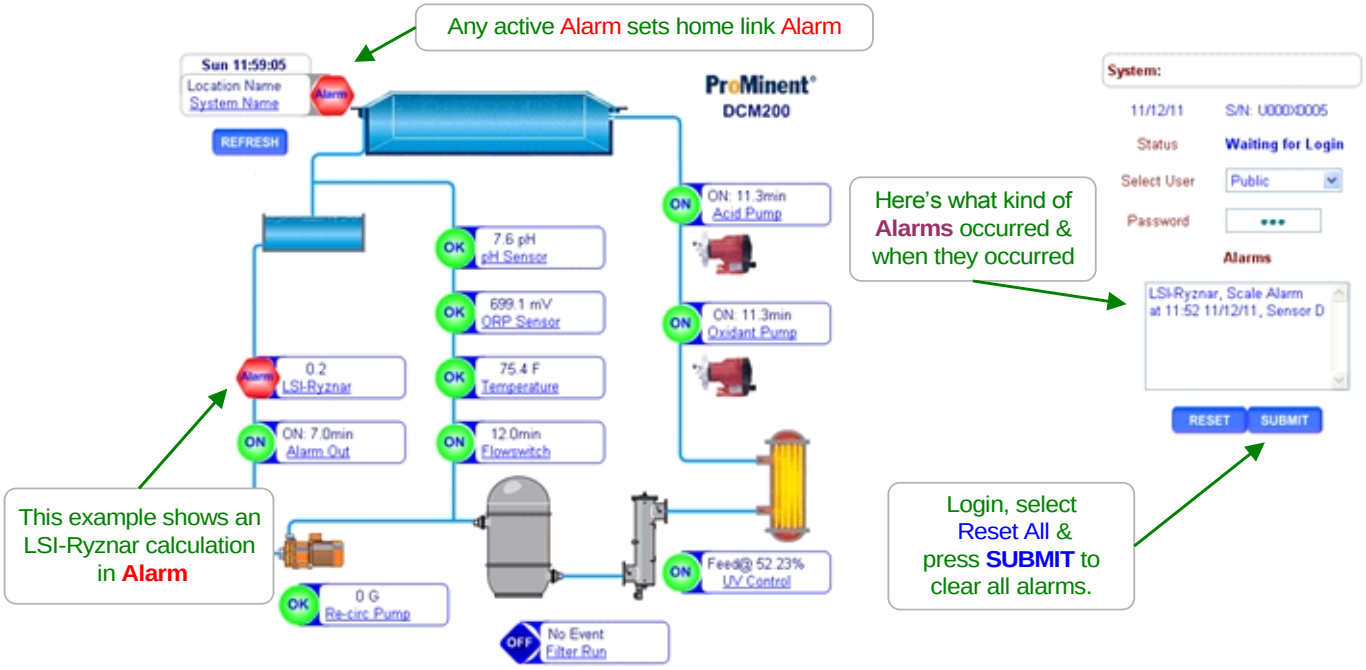


Default Passwords:
The factory default passwords are**:**
Operator1 = **1** Operator2 = **2** Operator3 = **3** Operator4 = **4**.
Configure5 = **5** Configure6 = **6** Configure7 = **7** Administrator = **AAAA**
There are 3 password levels, Operator, Configure and Administrator.
The User IDs are used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

WARNING: 5 incorrect passwords, blocks 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 beside the Day-Time display.



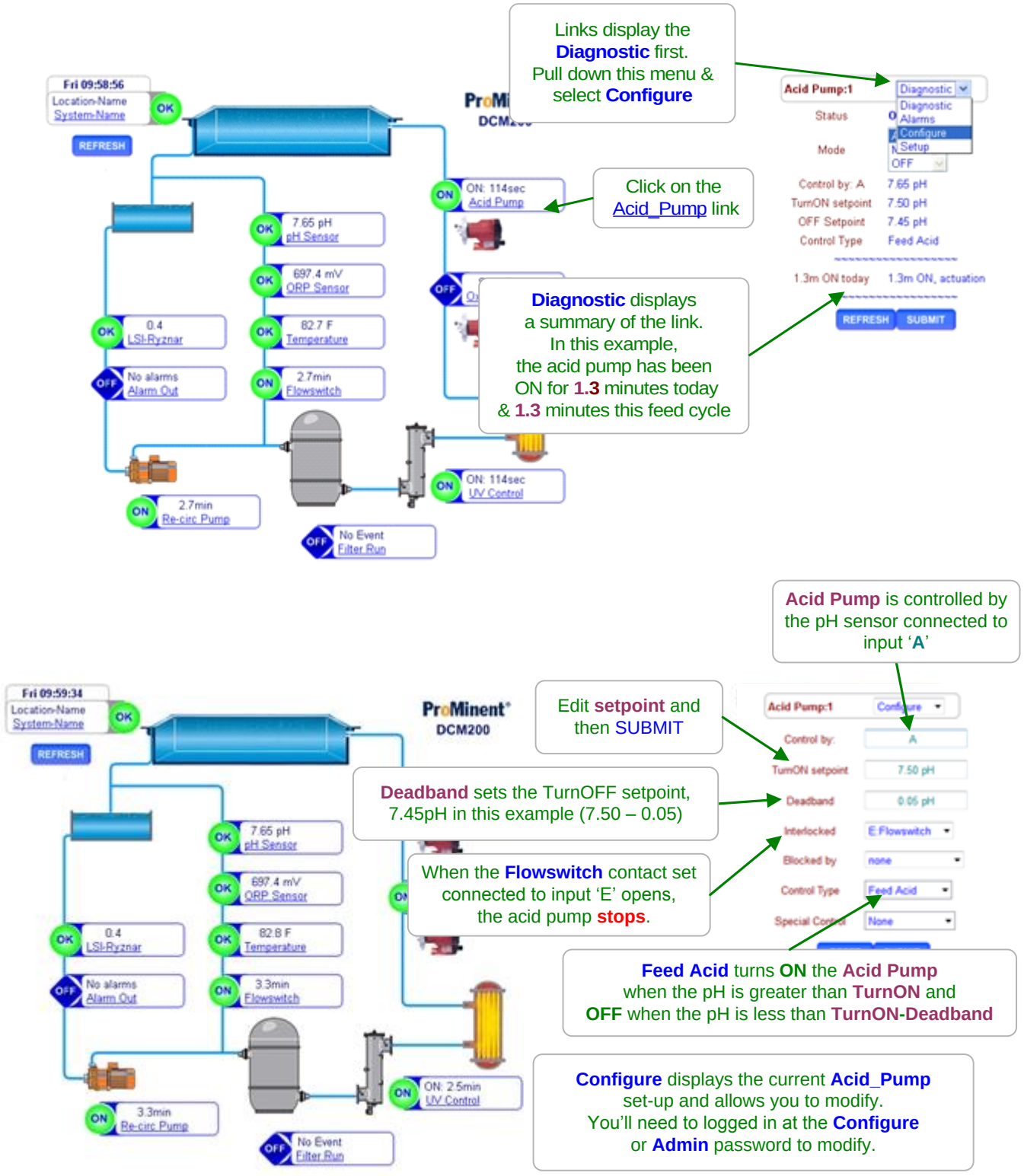
Sidebar:
Sensor alarms will re-trip after the user set 'Delay' unless the fault is corrected.
Relay controlled pumps will alarm on ON time. Frequency controlled pumps alarm on volume.

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.

LAN connected controllers may be set to E-mail out on alarm in addition to
E-mails sent at a user selected interval.

1.4 View & Adjust Setpoints

Setpoint values vary with the use of the pump, digital out or solenoid.
The following, typical example changes the pH controlled, acid pump setpoints.



1.4 View & Adjust Setpoints continued

Pumps controlled by Chlorine, ORP, pH or temperature have a setpoint limited by each sensors High and Low Alarm setpoints. If you attempt to adjust a control setpoint outside of the alarm limits, you'll get an **Alarms-Limits Status** message.

'**Interlocked**', '**Blocked by**', '**Control Type**' and '**Special Control**' are detailed in following sections of this manual.

Interlocked turns off pumps & solenoids when flowswitch contact set turns OFF.

Blocked by prevents a pump from turning ON when another pump or solenoid is ON.

Control Type selects the setpoint order. For example, when you feed **Feed Caustic**,
TurnON is less than **TurnOFF**. **Feed Acid**, reverses the setpoint order.
TurnOFF is calculating by adding or subtracting **Deadband** from **TurnON**

Special Control selections vary with sensor and output type.
For example,
Oxidant feeds may select PID control.
Outputs without a controlling sensor may be used switch the filter regenerate.

Sidebar:
Relays controlled by sensors power Pumps and Solenoids ON and OFF.
(Relays are outputs **1** to **3**)

Frequency controlled Pumps feed chemicals at varying rates.
(Frequency controlled pumps are outputs **4** & **5**)

Digital Outputs are dry contacts rated 24VDC & 250mA and are either ON/closed or OFF/open
(Digital Outputs, DO are outputs **4** & **5.** Outputs **4** & **5** are user configurable as frequency or DO)

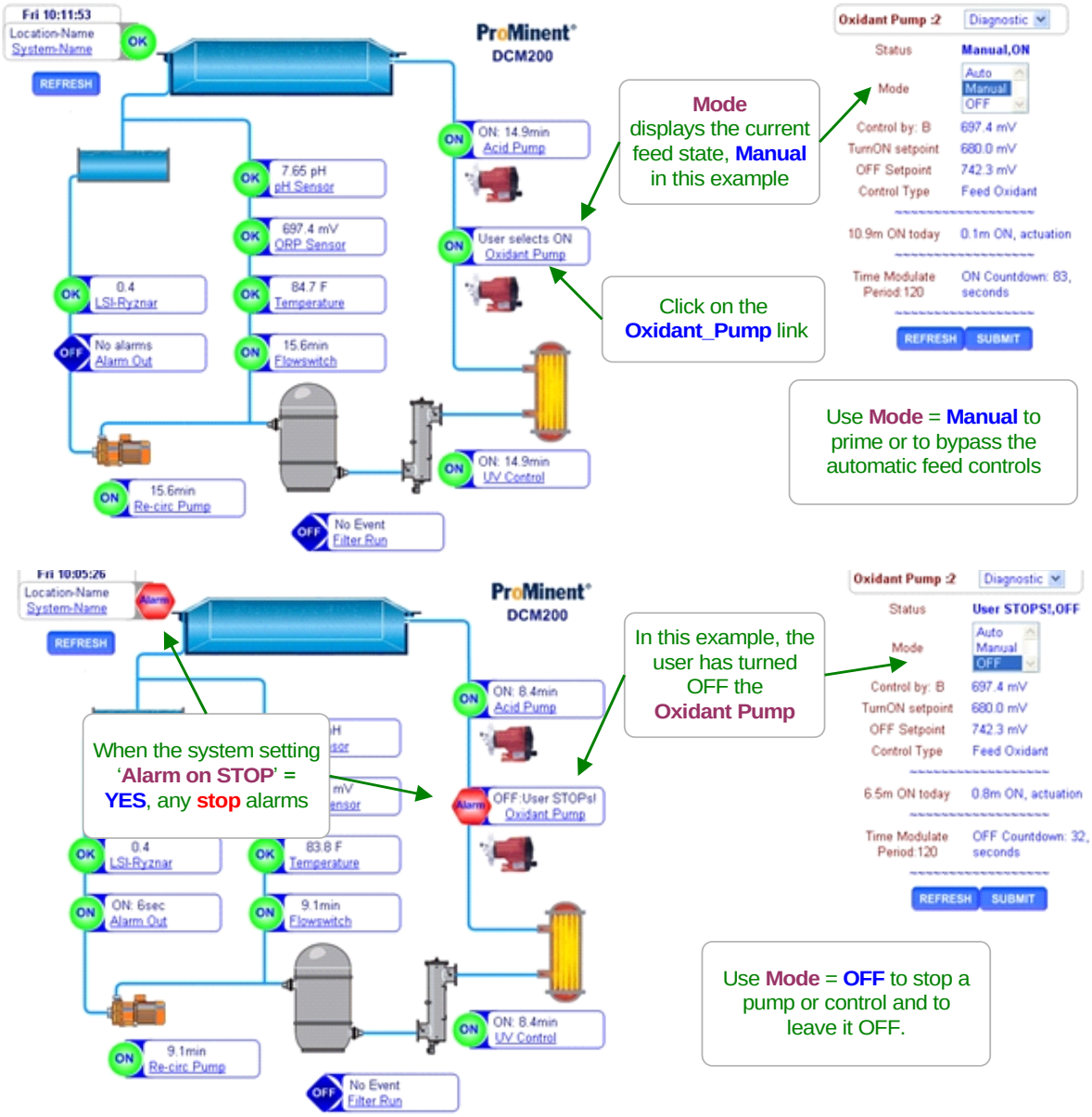
ON-OFF Acid pumps typically use setpoints 0.05 pH apart so that the delay between feeding acid and measuring its pH does not cause wide pH swings.

Pay attention to the number **:1** to **:5** that follows the pump or solenoid name.
It's the physical location on the controller circuit board that connects to the pump, valve or solenoid.

You may modify the name of the pump, DO or solenoid but you'll need to know which output is controlling so you can check that the **1** to **3 GREEN** or **4** & **5 RED** indicating light is ON when the pump, contact set or solenoid is ON.

1.5 HOA: Manual-OFF-Auto

Controlled outputs default to '**Auto**' allowing the DCM200 to control the pump, solenoid or DO.
'**Manual**' overrides controls and turns ON the output for priming & testing of pumps & solenoids.
'**OFF**' turns OFF the pump or solenoid and opens digital outputs (DO).
Cycling controller power has no effect on an '**OFF**' pump or solenoid.

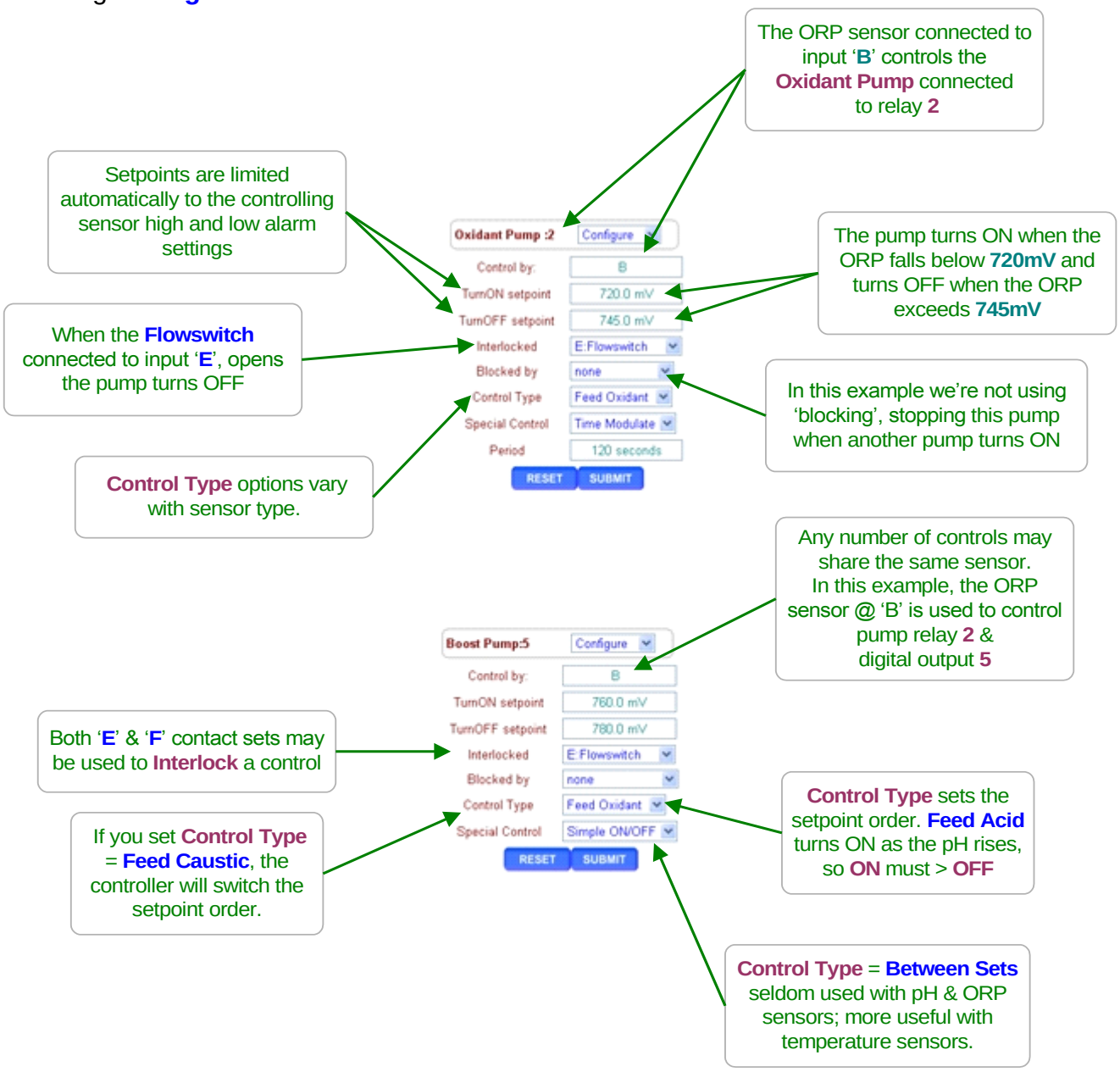


Sidebar:
Manual may also be used to slug feed on system start-up in addition to testing pumps, dry contact outputs or solenoids.
Safeguards: A pump or solenoid that is Interlocked, Blocked or OFF on alarm will not turn ON when **Manual** is selected. This safeguard blocks feeding acid into a non-flowing line. Feed Limiting will turn OFF **Manual** on time or volume limit if configured for **OFF on Alarm**.

DCM200 DCM200cl Browser
2.0 Chemical Feed Controls

2.1 Sensor Controlled ON/OFF Feed

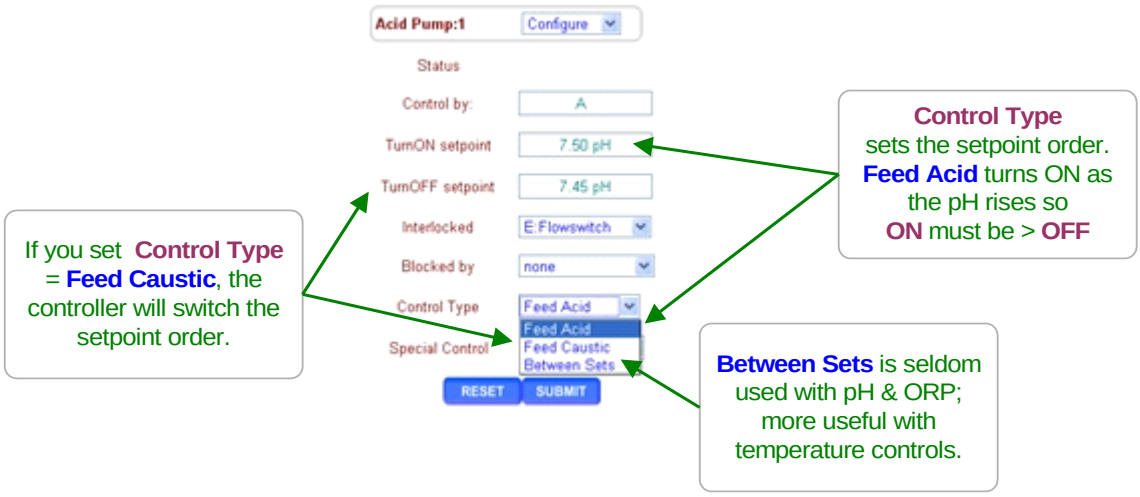
Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Configure.**



Sidebar
Setpoints may be set incorrectly. Sensors eventually fail. Solenoids & Pumps fault.
Refer to **Section 2.5 Limiting Feed & Alarms** to control a fault response.

2.1 Sensor Controlled ON/OFF Feed 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** set by the chemical fed.
ORP, pH and temperature sensors have **Control types** specific to the sensor.

For example, when select a temperature sensor, the **Control Type** options are **Lower Temp** & **Increase Temp**.

Sidebar:
Control Type is not applicable or displayed for water meter based feeds.

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

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.

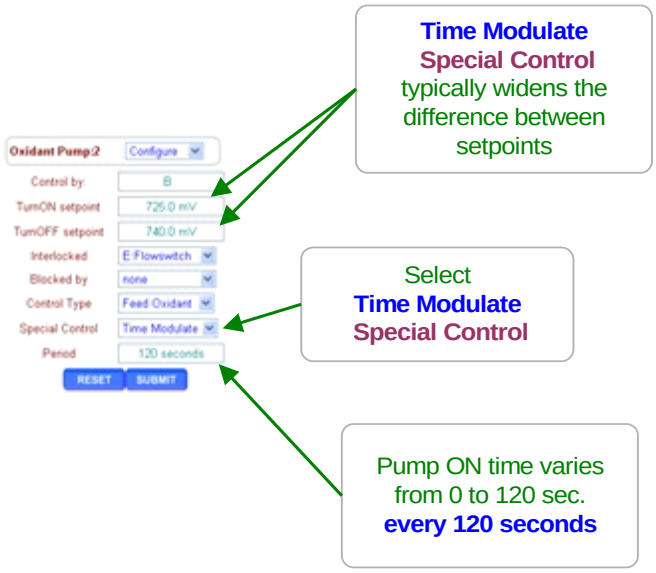
2.2 Proportional Feed

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.



Sidebar:
Frequency controlled pumps connected to controller outputs '**4**' & '**5**' 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 '**3**'.
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 acid & caustic, chlorine, oxidant & de-chlor, setpoints.

2.2 Proportional Feed

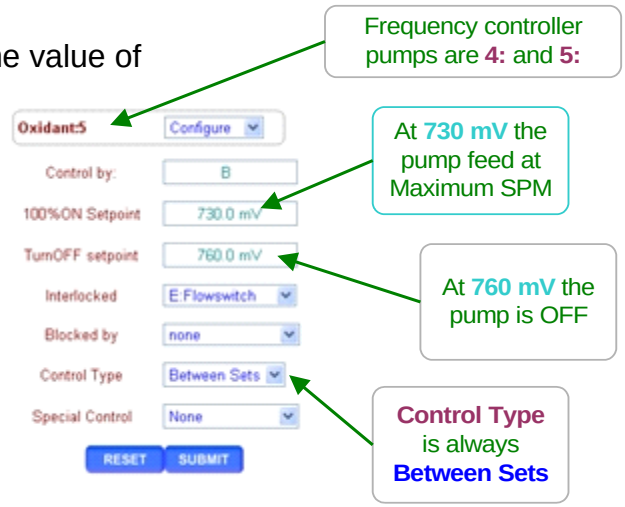
Frequency Controlled Pumps

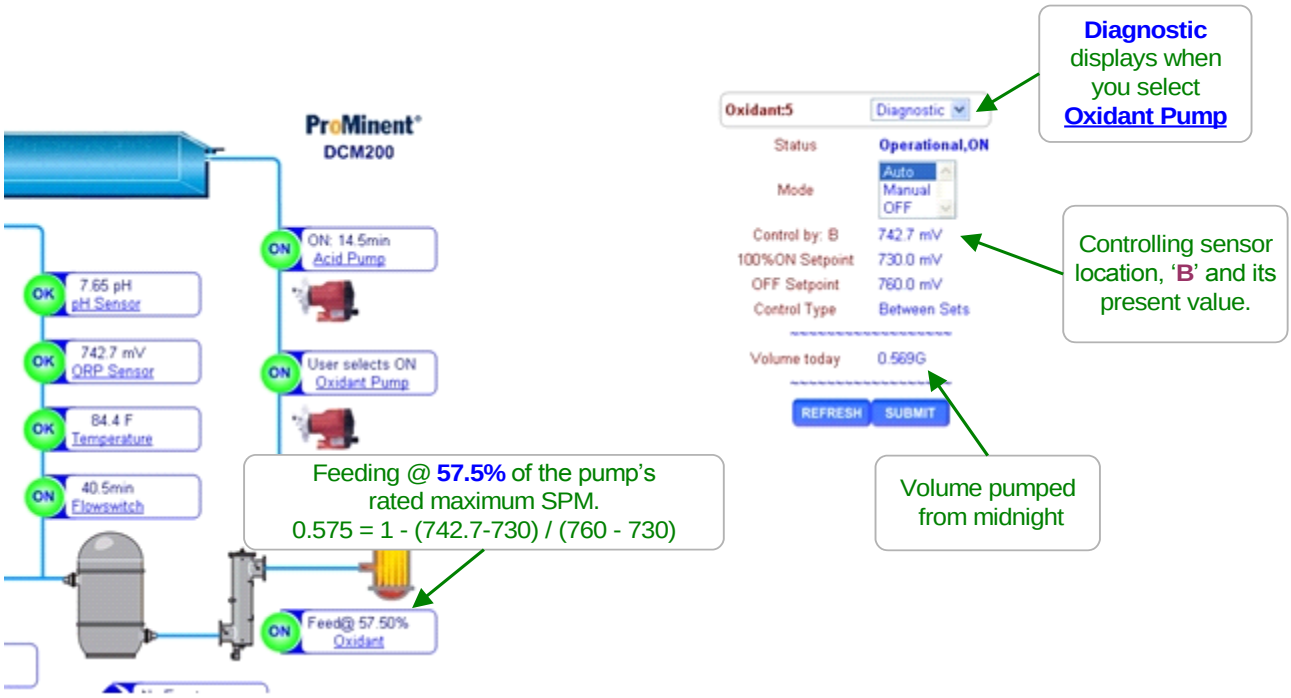
Select the link on the target chemical feed pump and pull down the top, right menu, selecting **Configure.**

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 oxidant 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.

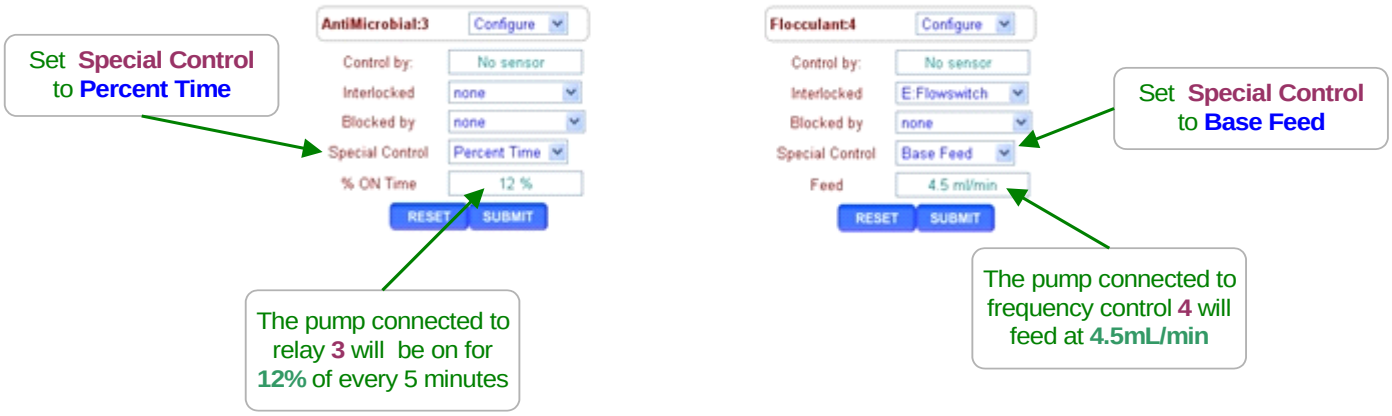




Sidebar:
In this example the pump is rated @ 180 SPM, Strokes per Minute, and pumps 0.1mL stroke so we're pumping (180 x 0.1 x 0.575) 10.35 ml/minute or 0.166 Gallons/hour

2.3 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.
12% ON time is 36 seconds ON in every 5 minutes (0.12 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 to pre-treat a system on start-up

Concentration is modified by changing the frequency controlled pump (**4** & **5**) feed rate or relay (**1** to **3**)**% ON Time**.

2.4 PID Controls

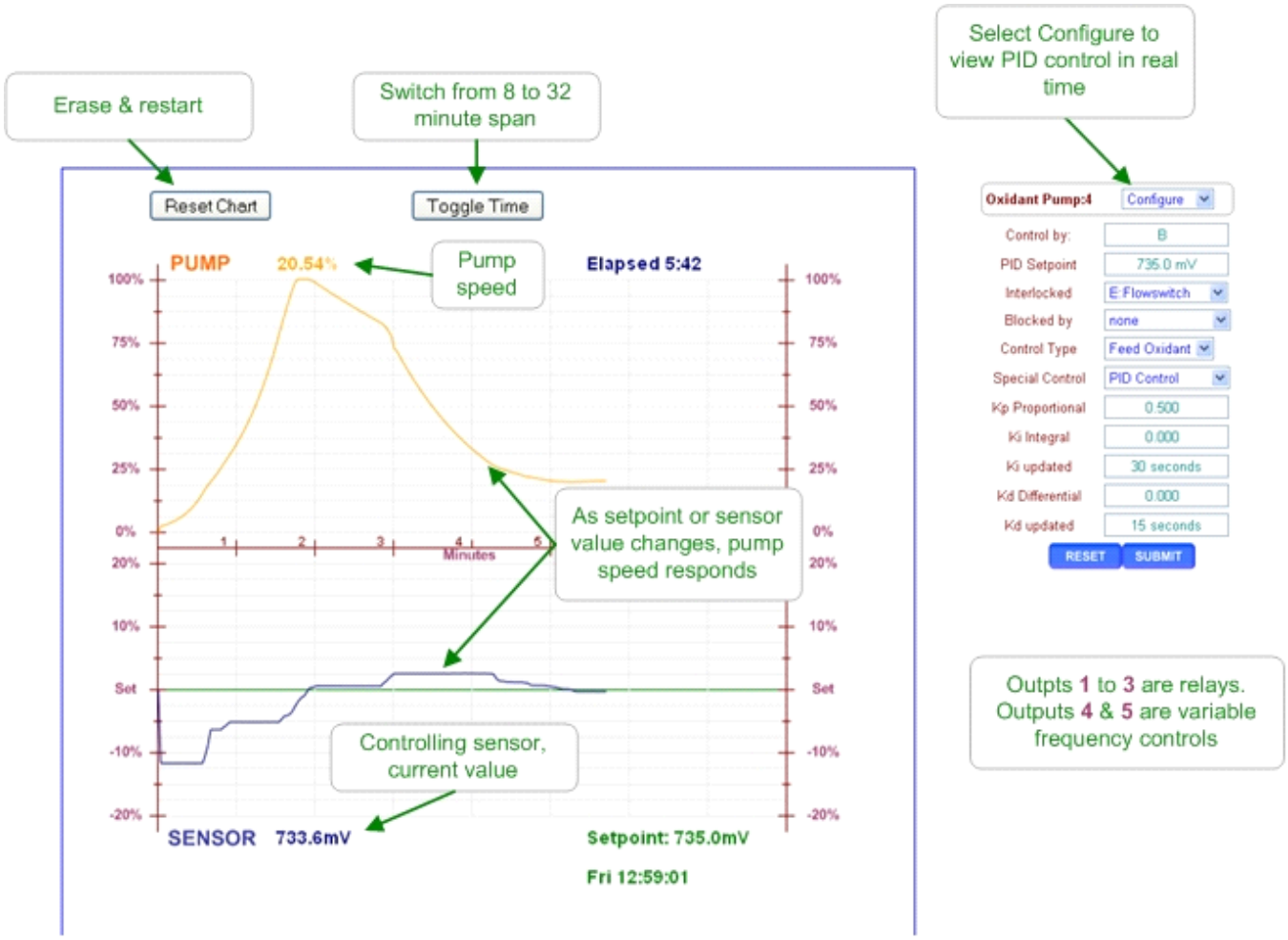
Each of the frequency-controlled pumps, outputs 4 & 5, can be configured for PID (Proportional-Integral-Derivative) control.

Relay outputs 1 to 3 may also be configured for PID control, implemented by continuously modifying the pump-powering relay ON & OFF times.

Users of the Firefox Mozilla browser can view a real time 'chart' of pump rate versus setpoint as they adjust Kp, Ki & Kd to tune the PID loop response
The 'chart' HTML tag is not supported by Internet Explorer prior to Version 9.

Chart time spans of 8/16 minutes and 32/64 minutes are supported.

Set a pump **Special Control** = **PID Control** & charting will start on the next **SUBMIT** & re-start every time you select **Configure** on the pump.



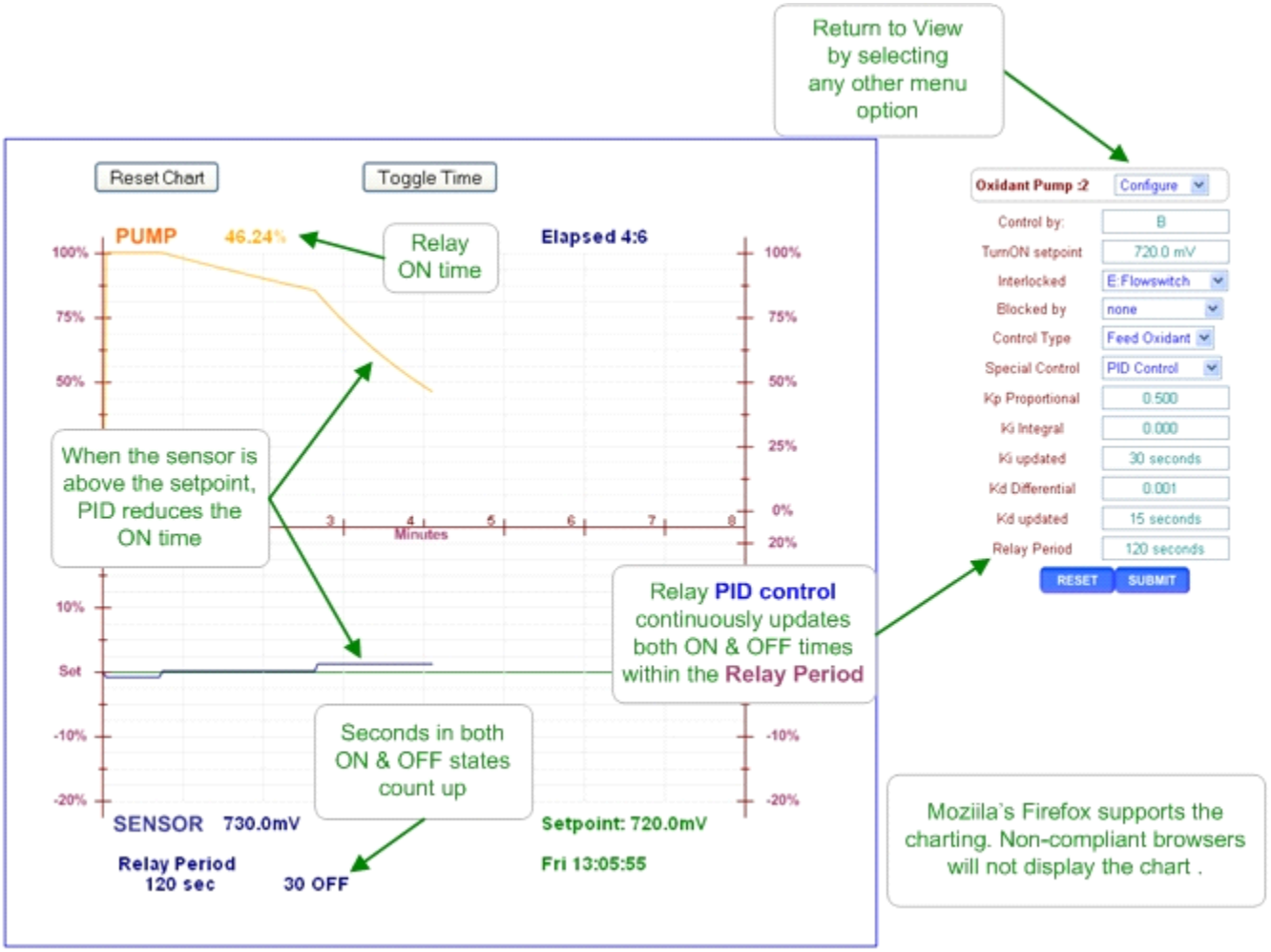
2.4 PID Controls

Most aquatics systems have a delay between feeding the chemical and the controlling sensor measuring the effect of the fed chemical.

This delay effectively adds to the **Kp** value to make PID feed systems oscillate & means that few aquatics chemical feed systems will need **Ki**.
The default **Ki** & **Kd** settings (0.001) disable the Integral & Derivative control.

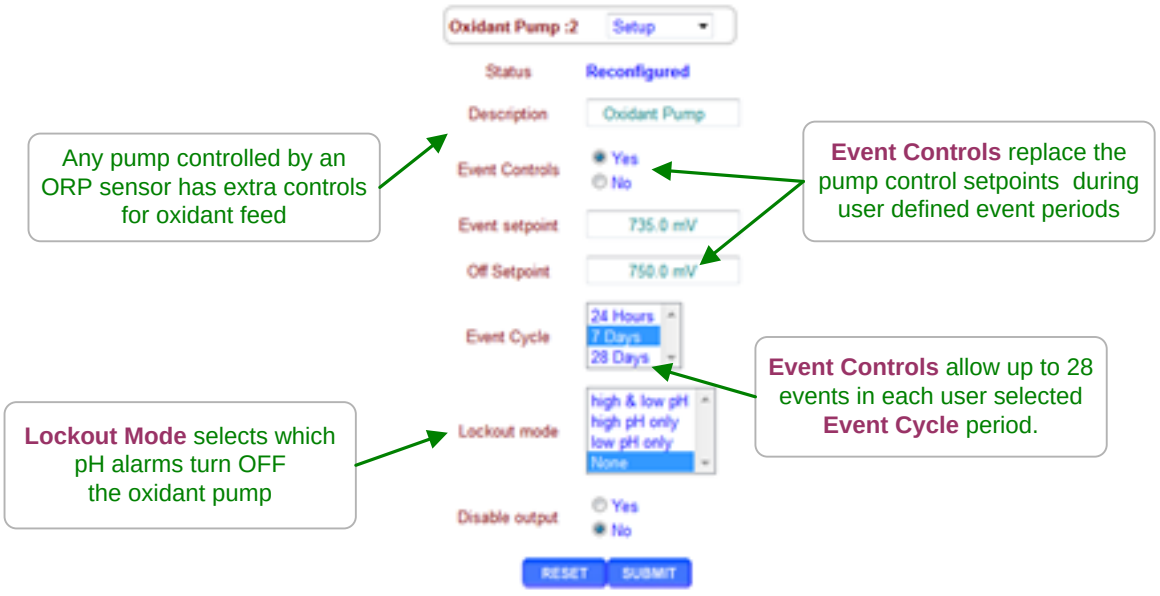
Most feed systems and slow responding systems in particular will benefit from frequent (**Kd Updated** = **1**)., differential control (**Kd** > **1.0**).

ON/OFF pump PID controls include the **Relay Period** field and the real time chart includes a display of the ON & OFF times within each **Relay Period**.



2.5 Oxidant Feed Controls

Pumps and solenoids controlled by ORP & Chlorine sensors have additional, optional controls.



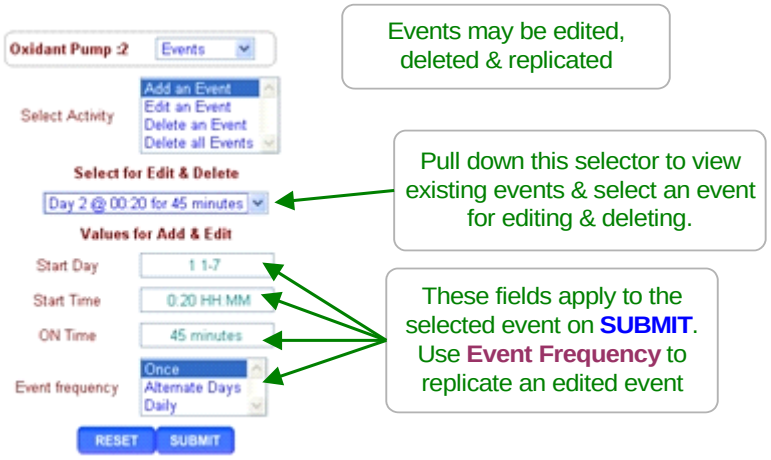
Sidebar:

Event Controls are used to implement periods of high oxidant or low ppm typically when the water feature or pool if unused or offline.

If **Event Controls** = **No**, the **Events** pull-down option and Event sub-fields on the **Setup** page do not display.

2.5 Oxidant Feed Controls

If **Setup Event Controls** = **Yes**, pull down & select **Events** on the oxidant pump or solenoid pull down to view and/or set events.



2.6 'Simple' ON/OFF Controls

Frequency controlled outputs **4** & **5** may be re-configured as dry contact ON/OFF outputs by selecting the **Simple ON/OFF Special Control**.

The **Simple ON/OFF** option is available for outputs controlled by sensors connected to inputs '**A**' to '**C**'.

Special Control = **Simple ON/OFF** is used to control devices, filters, UV's… that require a dry contact set to operate

Relay outputs **1** to **3** are powered at AC line voltage & would require an interposing relay to convert control to a dry contact set.

Select **Simple ON/OFF** to make a variable frequency output, a dry contact ON/OFF output

Simple ON/OFF controls report and log ON time, not volume pumped.

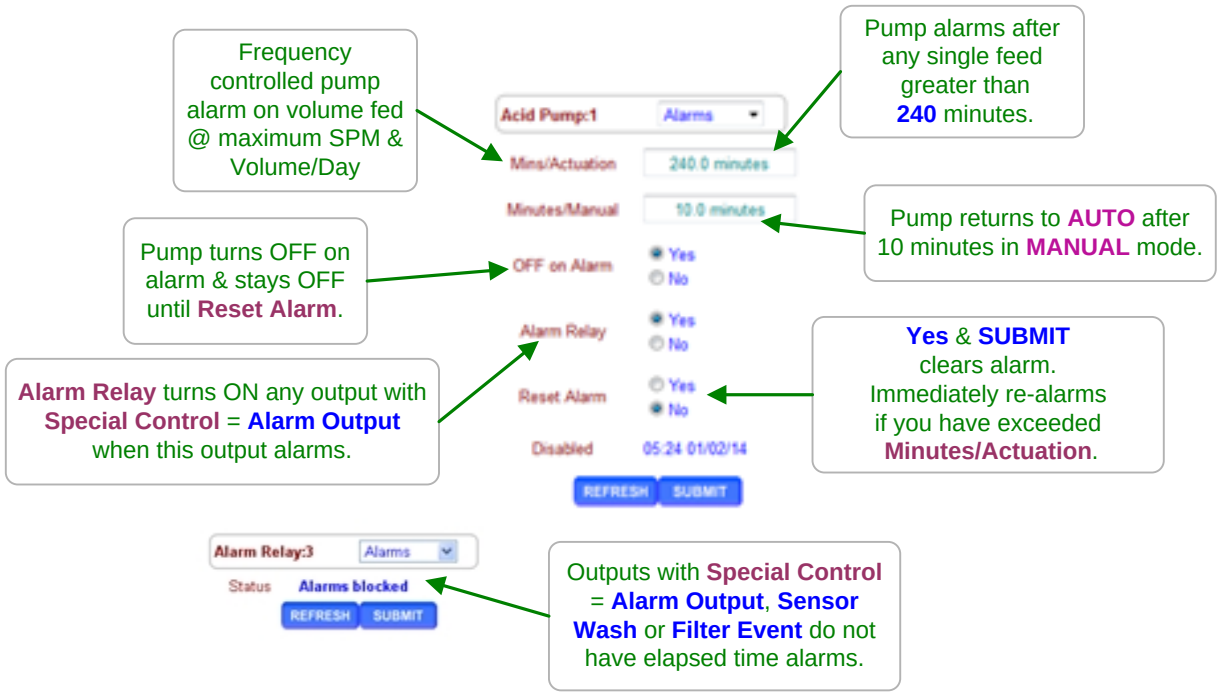
Simple ON/OFF controls by pH, chlorine ORP and temperature sensors do not require pump type selection and do not have added control options in the **Setup** page.

Sidebar:
Digital outputs **4** & **5** are DC isolated, floating, non-polarized, electronic contact sets.
thermally fused @ 250mA & 30VDC.
Do not switch AC line voltages with these contact sets.

Thermal fusing prevents damage to the contact set due to wiring errors, recovering automatically when the wiring fault is corrected.

2.7 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 ON times for pumps & solenoids controlled by relays **1** to **3** and volumes for frequency controlled outputs **4** & **5**.

Set the limit so that worst case operation on the hottest day or highest 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.

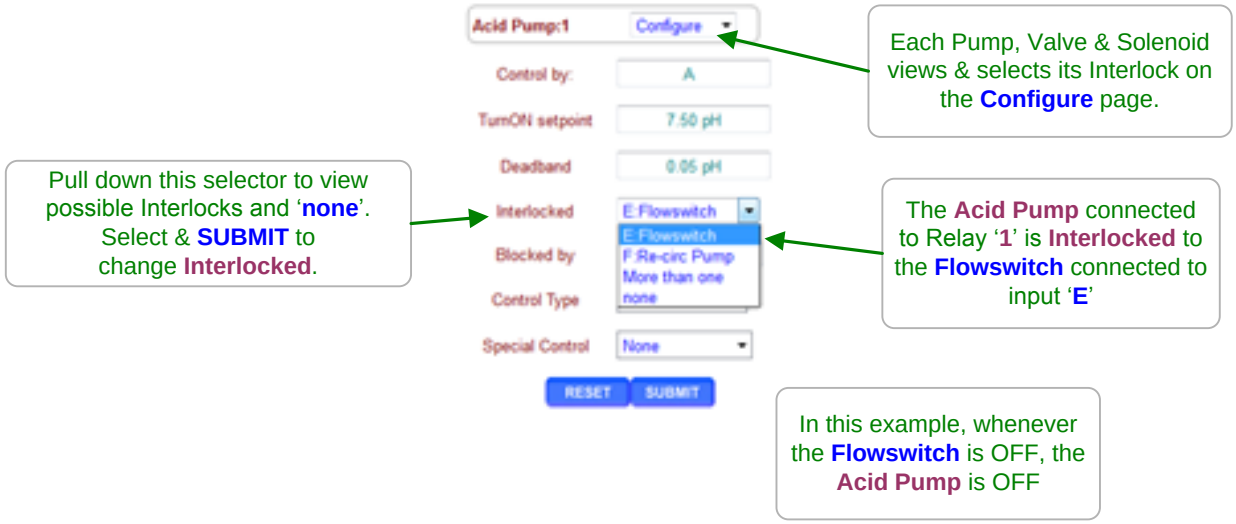
Chemical feeds other than Chlorine, Oxidant & Acid feeds are usually all set to **OFF on alarm** since an overfeed indicates an operating problem which requires correction whereas continuing to feed Chlorine, Oxidant or Acid may put users at risk.

The Minutes/Manual limit automatically returns to control for users that inadvertently leave a controller in Manual mode.

Note: The Minutes/Actuation alarm does not reset @ midnight so that feed events that start prior to midnight alarm correctly.

2.8 No Feed on No Flow

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



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

Aquatics sites use a flowswitch installed in the sensor header to detect that the pool/spa/water feature is operating & it's OK to feed chemicals, backwash filters, run electrolyzers…

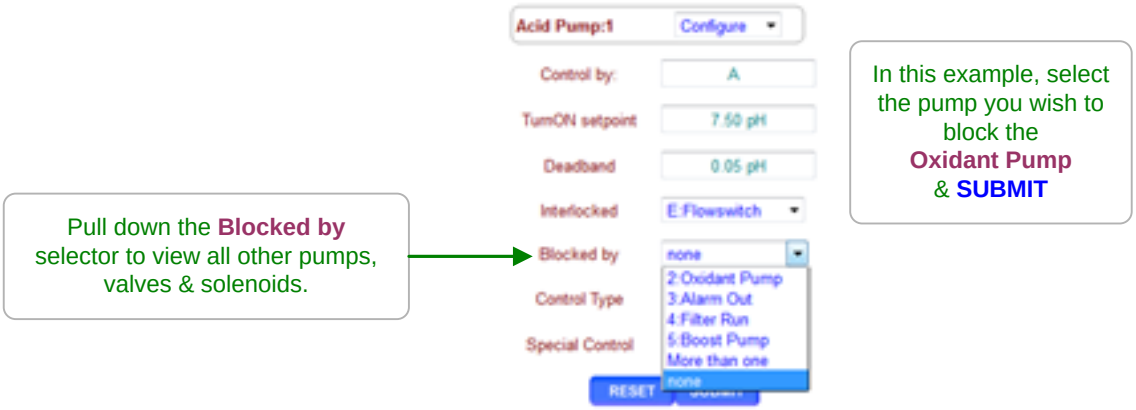
One or more closed contact sets may be required to **Interlock** a pump.
Examples:
If both the sensor sample flow (Input '**E**') and the recirculation pump are ON(Input '**F**') enable the oxidant pump. The oxidant pump **Interlocked** = **E+F**

If there is flow in the recirculating line (Input '**E**') and the tank level switch (Input '**F**') shows chemical available, feed chemical. The chemical pump **Interlocked** = **E+F**

Interlocks may be **OR**ed using the '**/**' symbol or **AND**ed using the'**+**' symbol.

2.9 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.**



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.

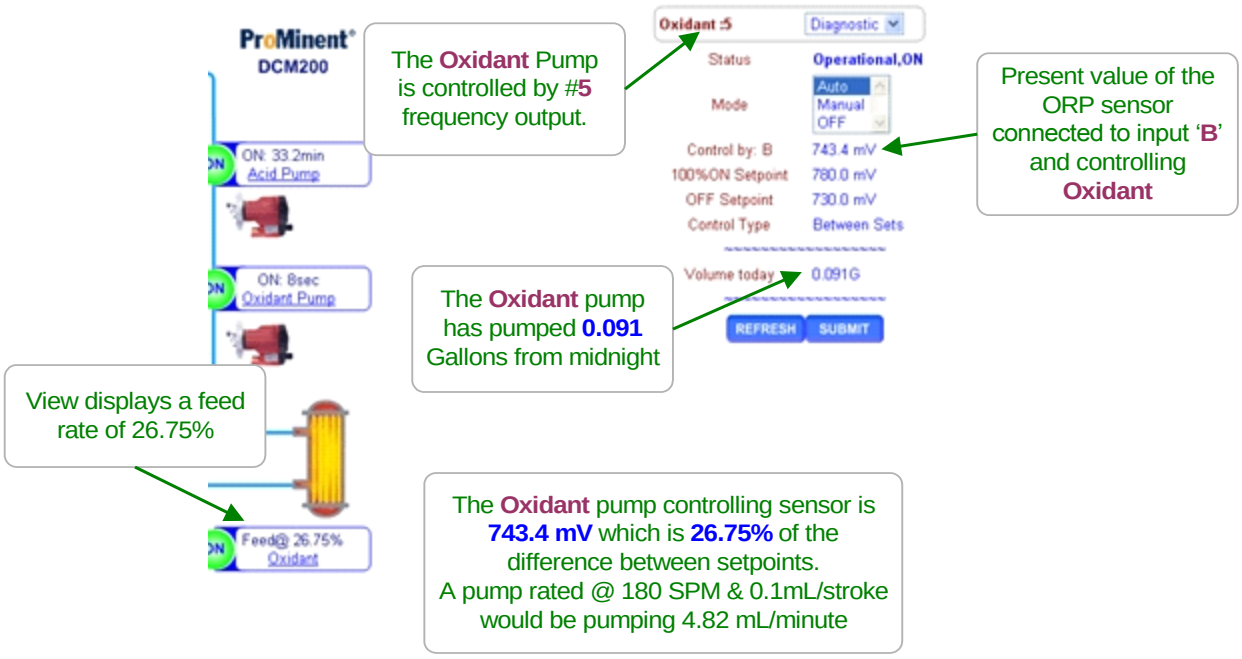
Examples:
1. You may wish to prevent oxidant and acid feeds during a filter backwash.
Blocking the Acid pump connected to Relay '**1**' and Oxidant pump connected to Relay '**2**' with the connected filter backwash run connected to digital output '**5**'.
Acid & Oxidant Pumps **Blocked by = '5'.**

2. Some chemicals are degraded by high levels of oxidant. The Flocculant pump is connected to Relay '**3**' & the Oxidant pump connected to frequency control '**2**'. Flocculant **Blocked by** = '**2**'

Caution: Be careful **Blocking** with frequency outputs '**4**' & '**5**' that are controlled by a sensor to ensure that they occasionally turn OFF to allow the blocked pump to feed.

2.10 Feed Diagnostics

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



Sidebar:
Diagnostics vary with the output type and control.
Relays '**1**' to '**3**' use ON time instead of the volumes of Frequency controls '**4**' & '**5**'.

The main menu displays **Blocked** & the blocking output OR **Lockout** & the **Interlock** input OR **Alarmed** if a pump cannot feed.

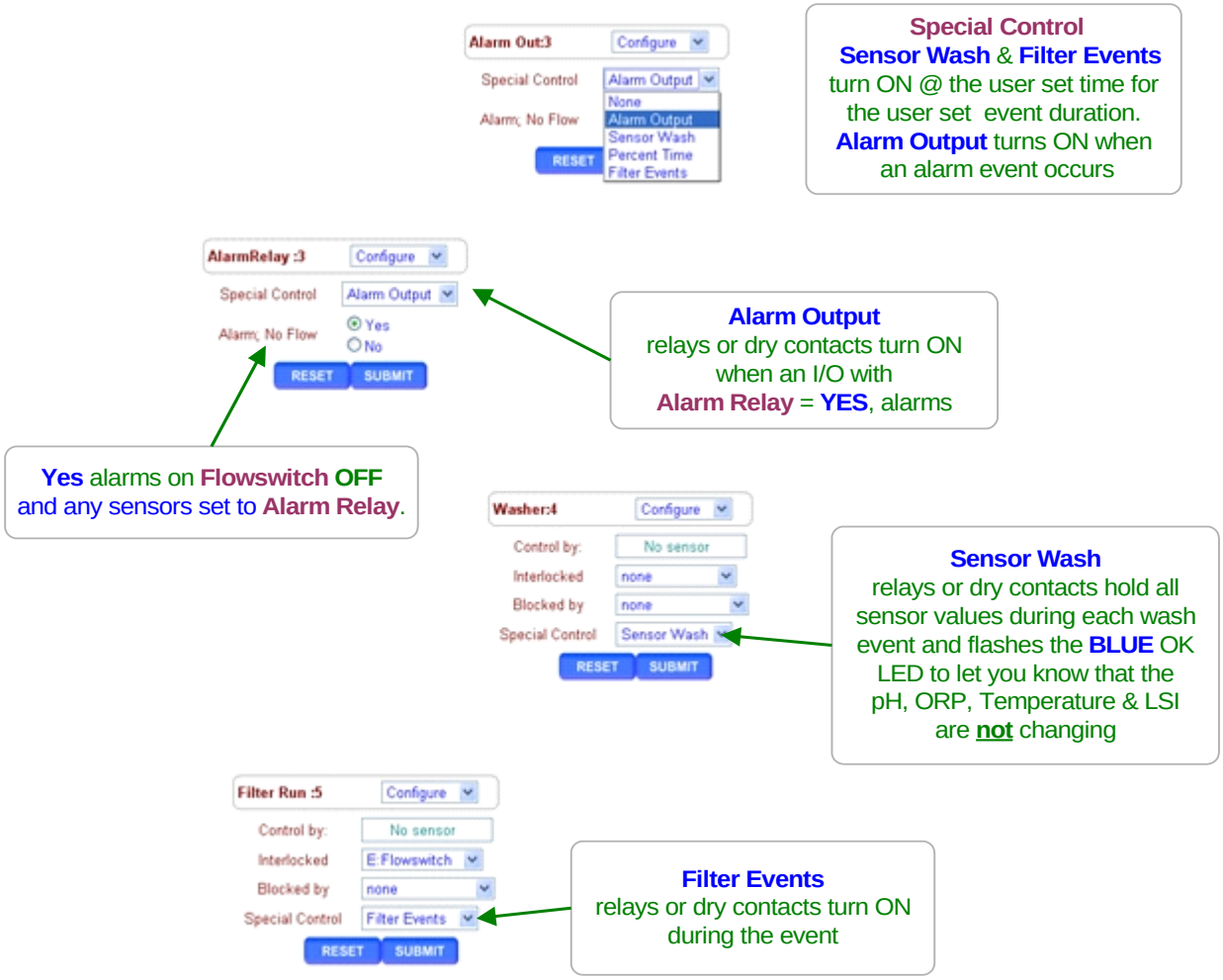
Diagnostic tells you a lot about the operation of the aquatics system and is invaluable if you have a configuration problem or feed fault.

Even if you have LCD **Passwords** turned ON, any Keypad-LCD user can still view the **Diagnostics**. An uniformed user reading you the **Diagnostic** screen sequence may save you a site trip.

3.0 Event Controls

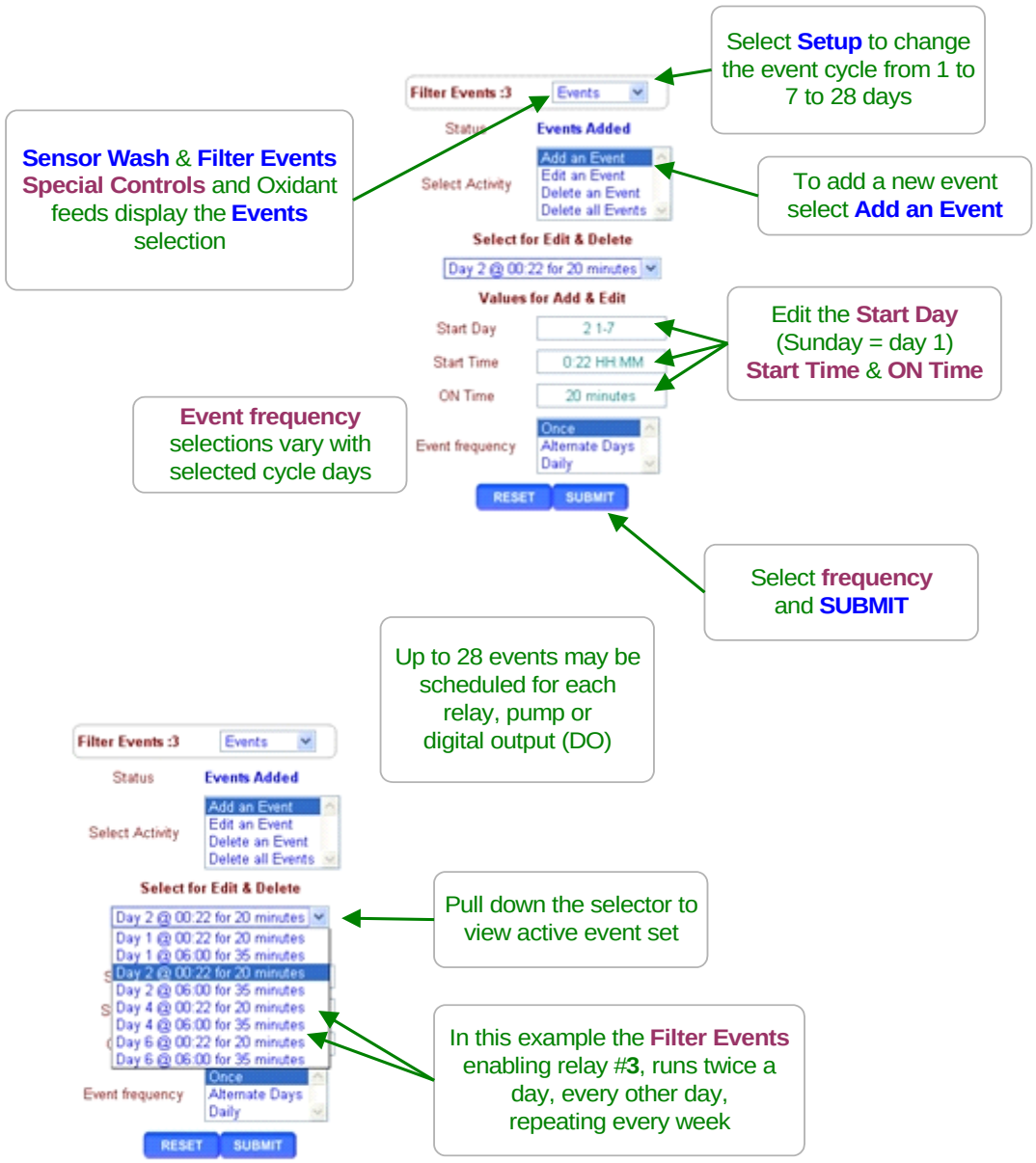
3.1 Four Types of Events

Alarm : **Sensor Wash** : **Filter** : **Oxidant-Chlorine Controlled** (refer to Section 2.5)
Events turn on a pump, solenoid or valve for user set time (Relay & Digital Outputs) or volume (Frequency controlled pumps) at a user set day & time or on alarm.
Non-Alarm events are repeated every Day, Week or Four Week cycle.



3.2 Setting & Viewing Events

Select the link on the target output, pump or solenoid and pull down the top, right menu, selecting **Setup** to modify the event cycle or **Events** to view, add or modify events.

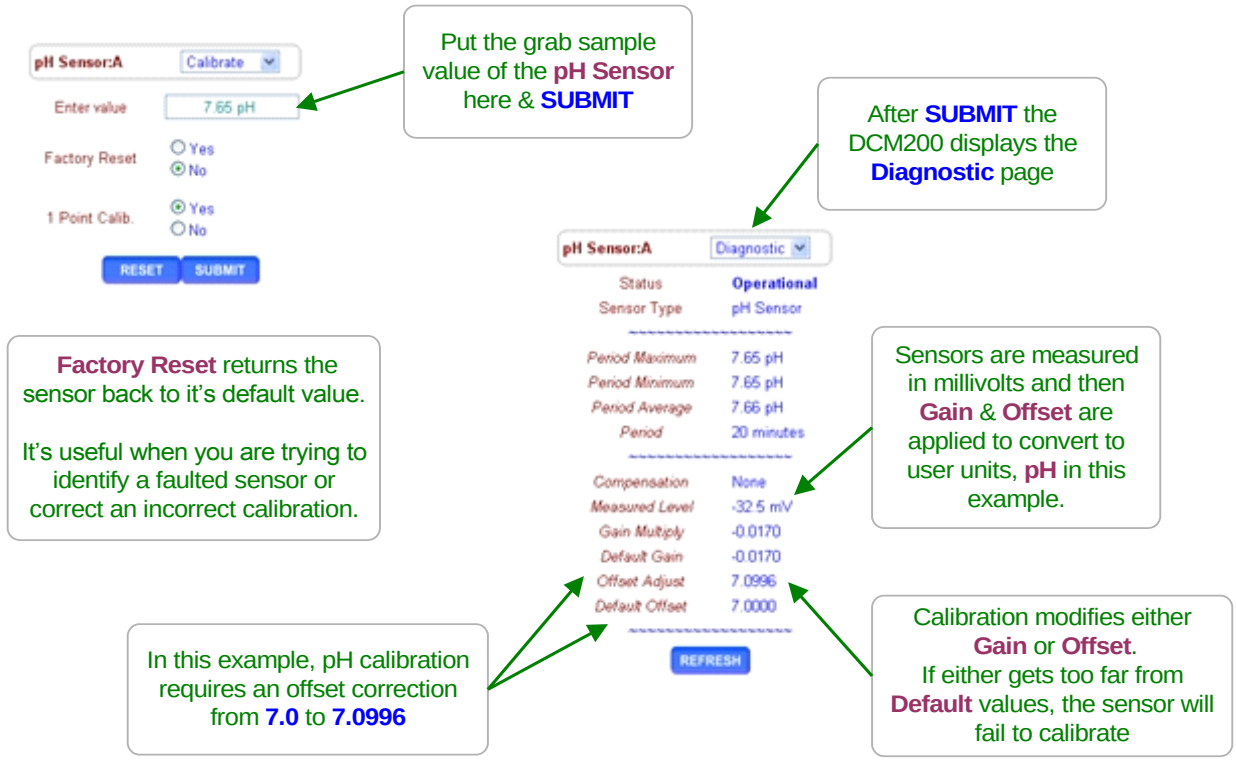


Sidebar:
Event Day can be set from **1** to **28** for Pumps set on a 28 day **Event Cycle** and from **1** to **7** for controllers set on a 7 day **Event Cycle** or always 1 on a 1 day **Event Cycle.**
Events repeat every **1**,**7** or **28** days.
Relays '**1**' to '**3**' & Digital Outputs feed time in minutes.
Frequency controlled outputs '**4**' & '**5**' feed volume in mL. @ maximum pump SPM.

4.0 Sensors

4.1 Sensor Calibration

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



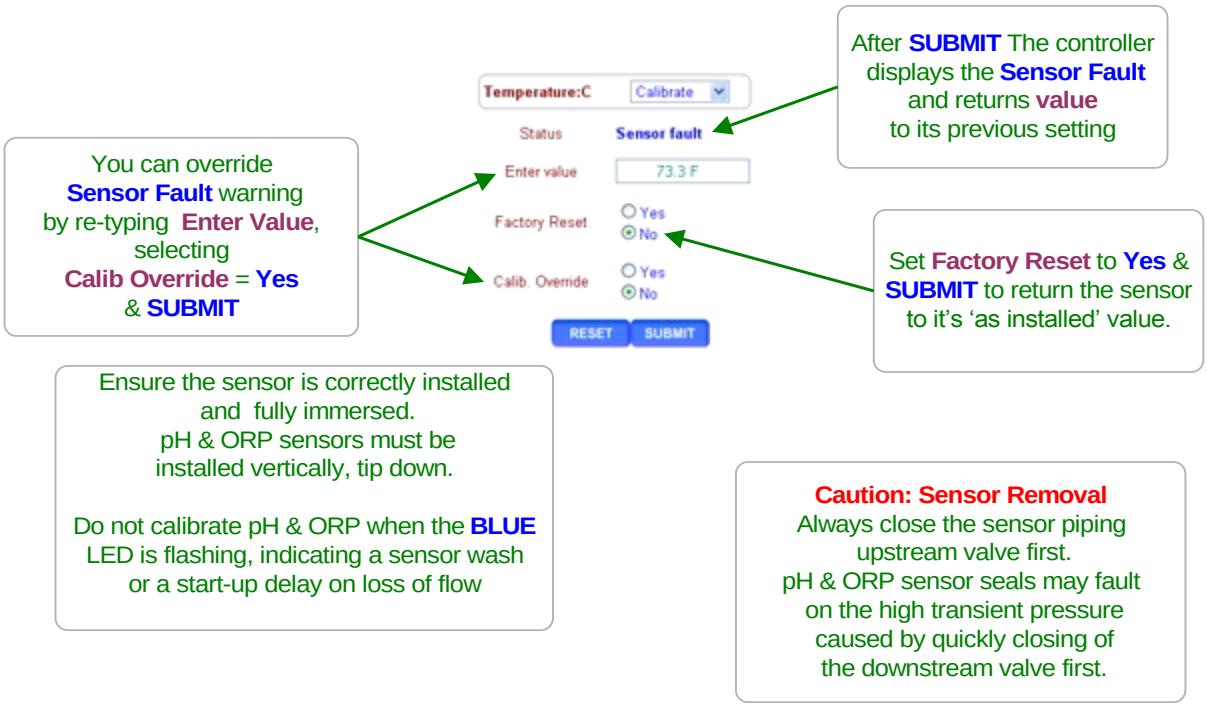
Sidebar:
Single Point Calibration: All sensors can be single point calibrated. Measure a grab sample from the sensor installation line and calibrate the sensor based on the grab sample. It's the simplest, most repeatable method.

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 and 2 point calibration of pH.

Calibration Faults: Refer to the next page for options on fault.
LSI-Ryznar sensors
Use **Calibrate** after you measure conductivity, alkalinity or hardness to update **LSI_Ryznar**

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 force to sensor to read a value, but it may not track changes in pH, ORP or temperature.



Sidebar:
Sensor Fault: The DCM200 verifies that sensor OFFSET or GAIN required to make the sensor read its new value are within the range of typical sensor operation.
If out of range, **Sensor Fault** displays.

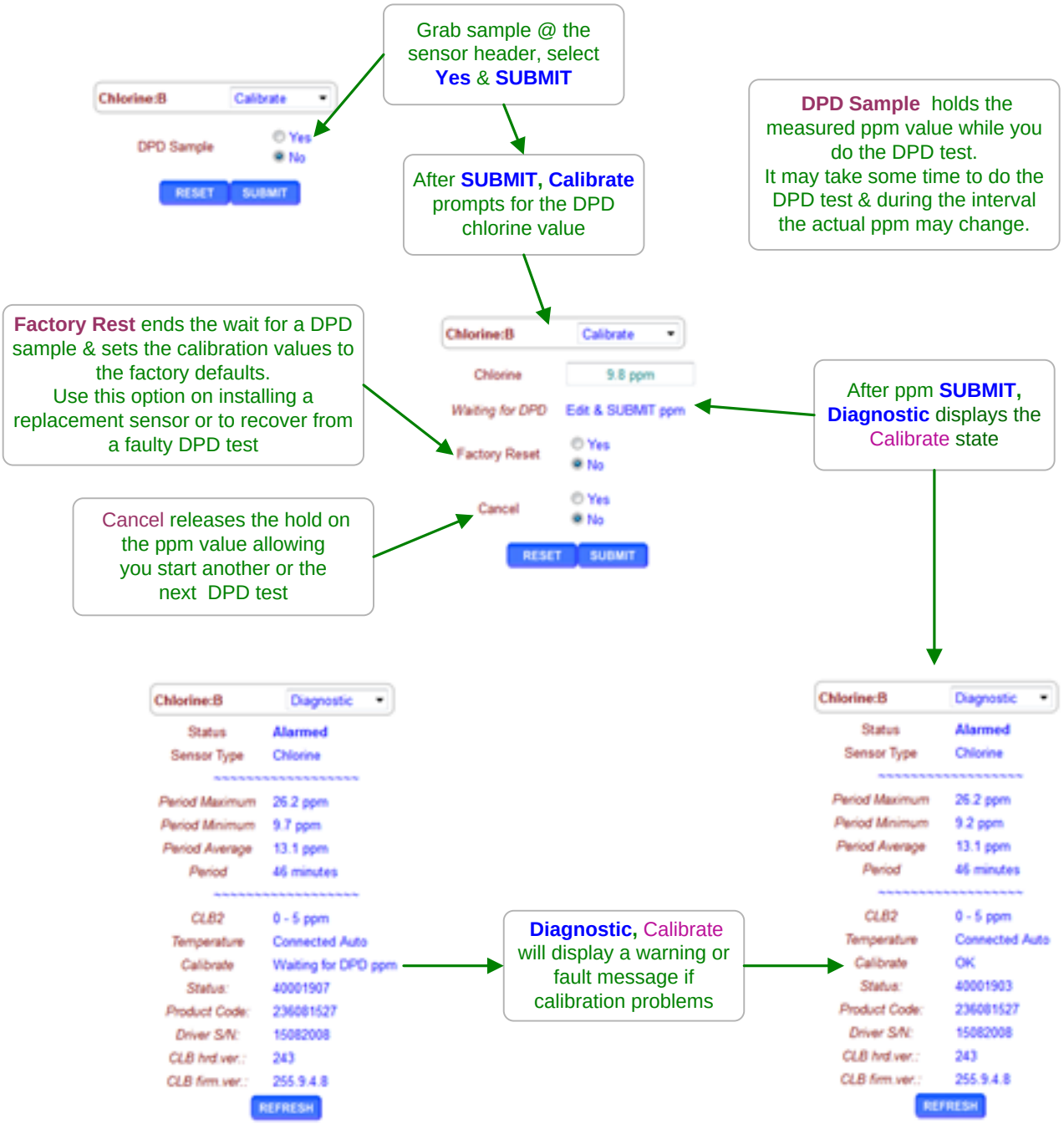
Fault Cause varies with sensor type**.**
ORP: Verify sensor cable not shortened & firmly connected. Verify not visibly fouled. If stream contains organics, clean with alcohol or solvent. If stream high in iron or copper, restore platinum surface with Aqua Regia or equal.

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.

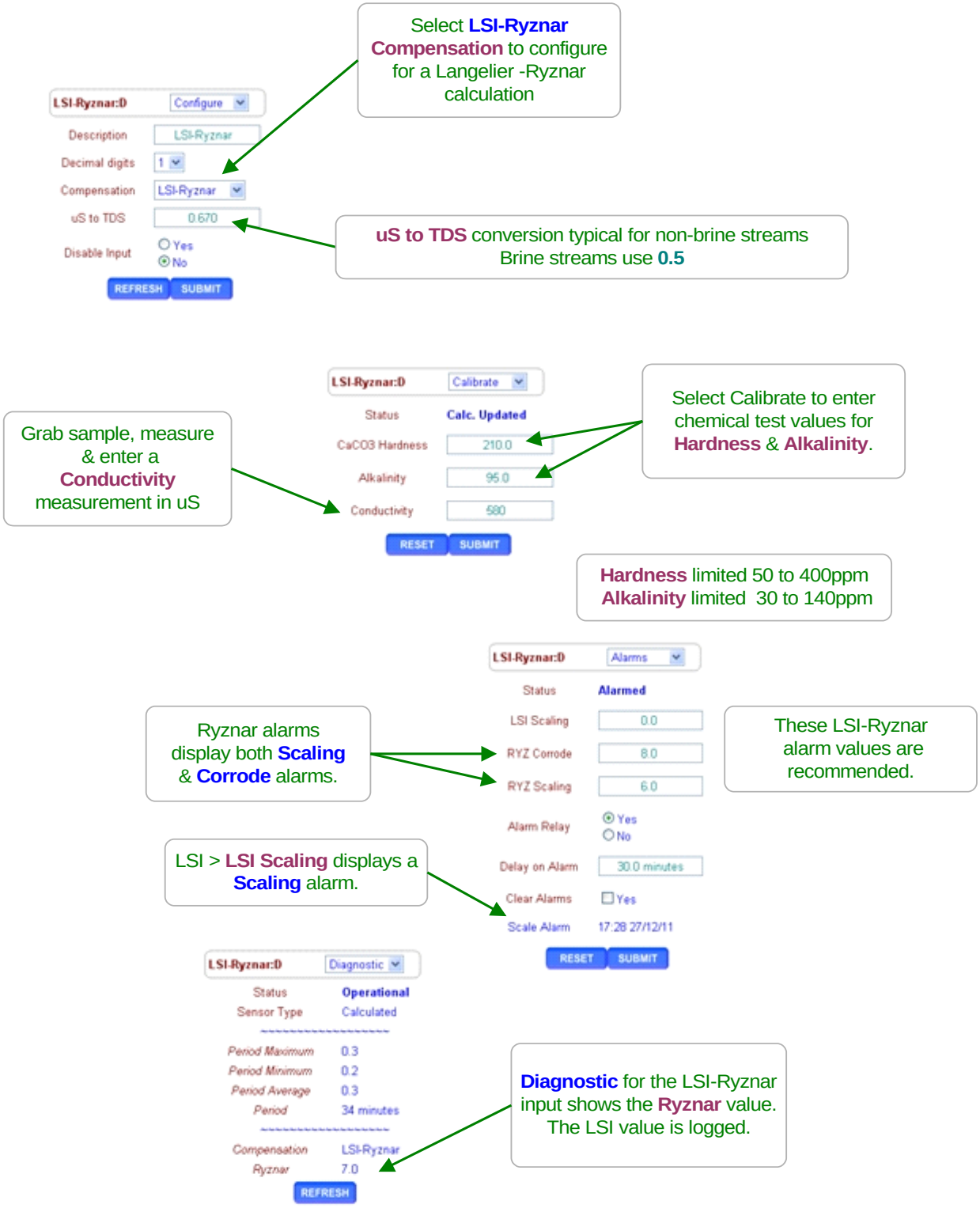
4.2 Chlorine Calibration

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



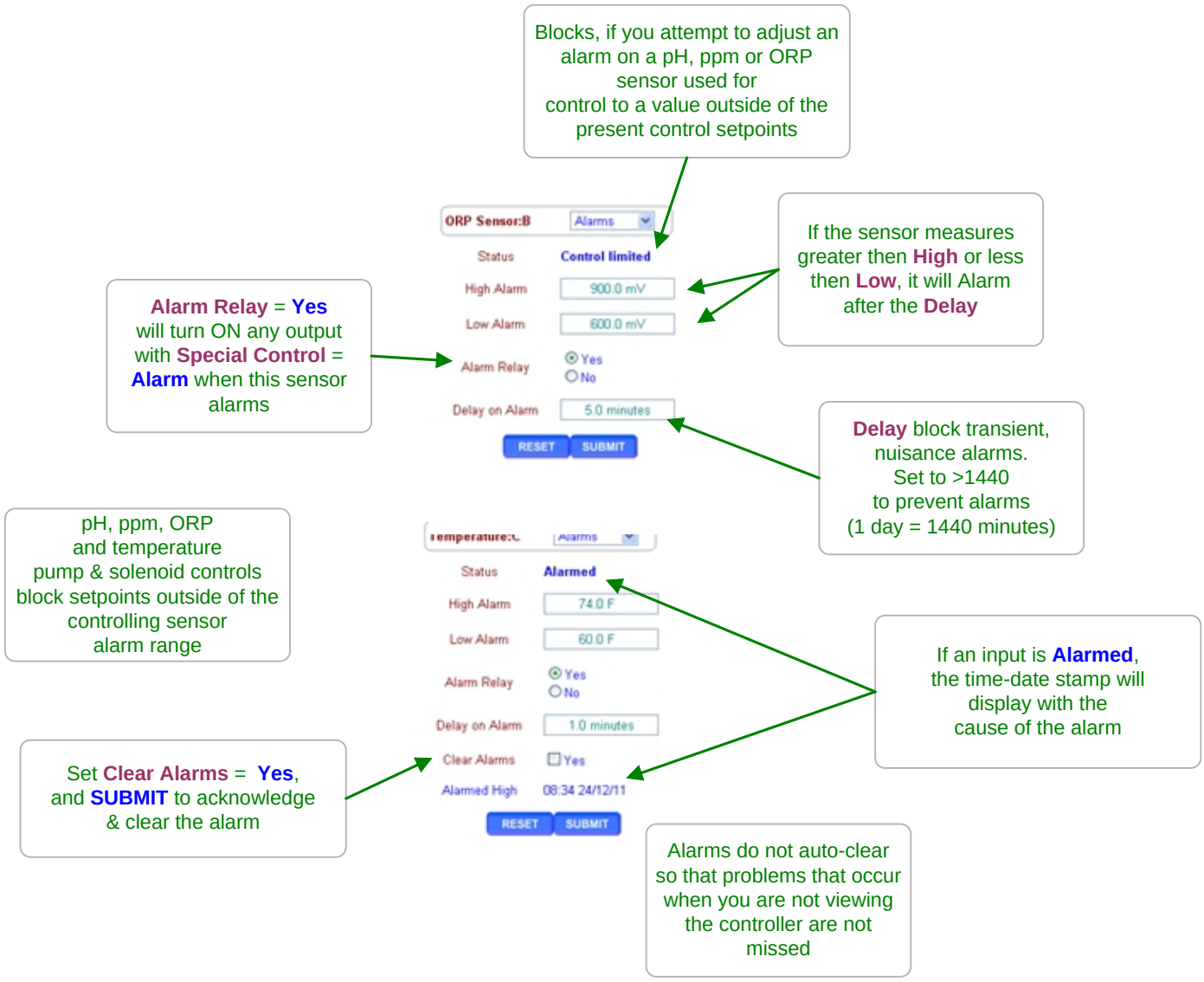
4.3 LSI-Ryznar Calculation

LSI-Ryznar calculations use a combination of measured sensor & manual test values.



4.4 Sensor Alarms

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

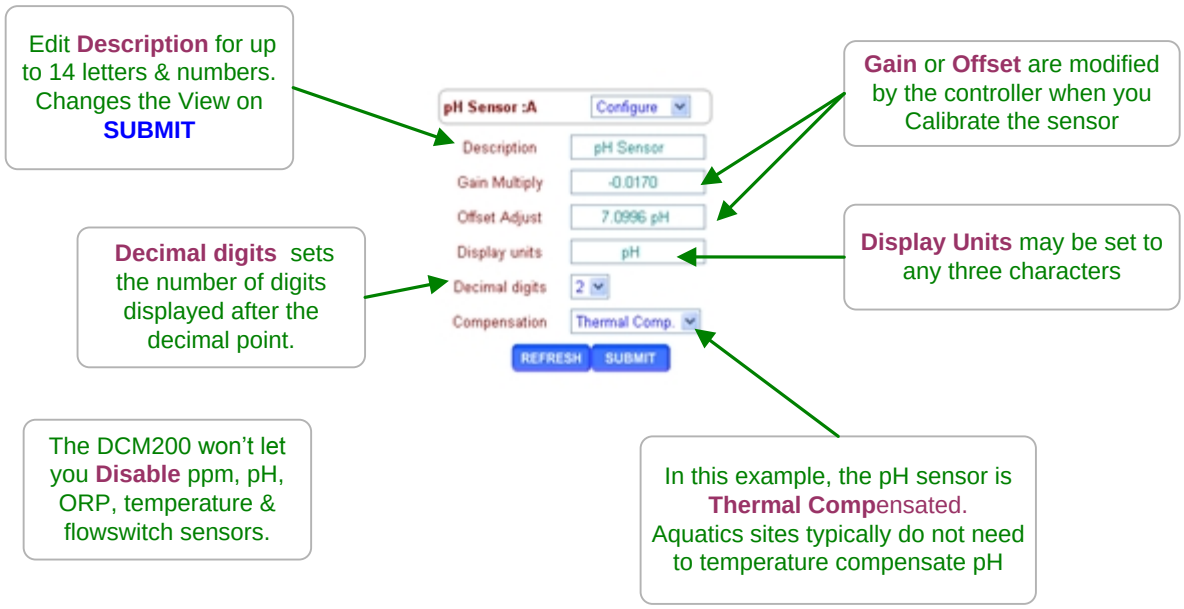


Sidebar:
Clear Alarms: Resets the **Delay on Alarm** time
If the **Delay on Alarm** is set to zero minutes and the sensor is above the **High Alarm** or below the **Low Alarm**, the sensor alarm will immediately re-trip.

Water meters & Contact sets also have alarms & these are defaulted to not trip the **Alarm Relay**.

4.5 Sensor Configure

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



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 '**F**'.
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. pH is typically displayed with 2 digits of resolution & ORP with 0 or 1 digits after the decimal point

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.

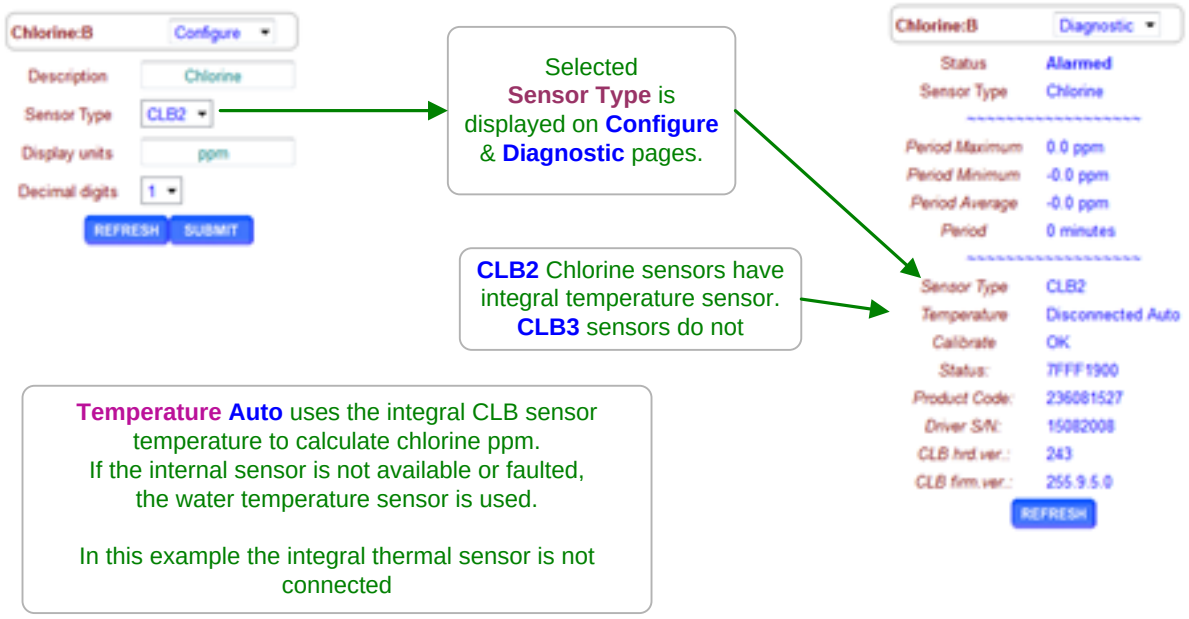
Disabling a sensor removes it from the display and all selection menus used for control and compensation. Data logging stops for disabled sensors.

DCM200 DCM200cl Browser

4.5 Sensor Configure cont.

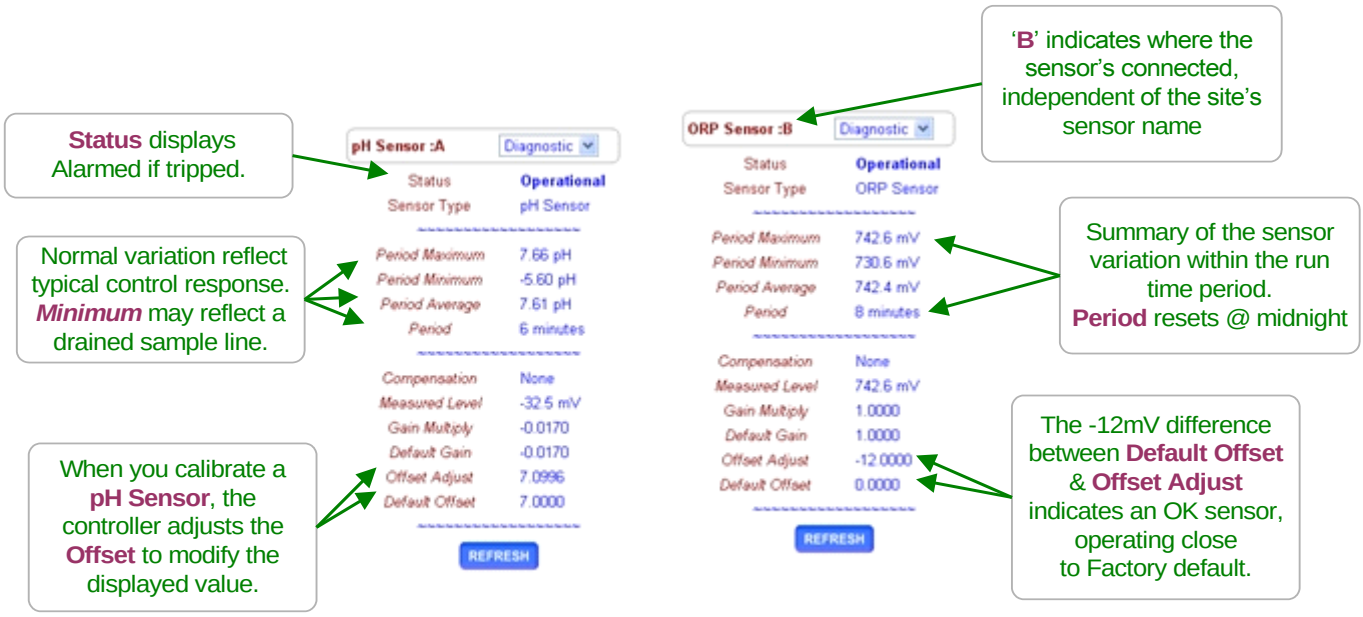
DCM200cl controllers include a CLB sensor driver card, mounted of the left side of the controller circuit board & either a CLB2 or CLB3 chlorine sensor installed in the sensor header.

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



4.6 Sensor Diagnostics

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



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

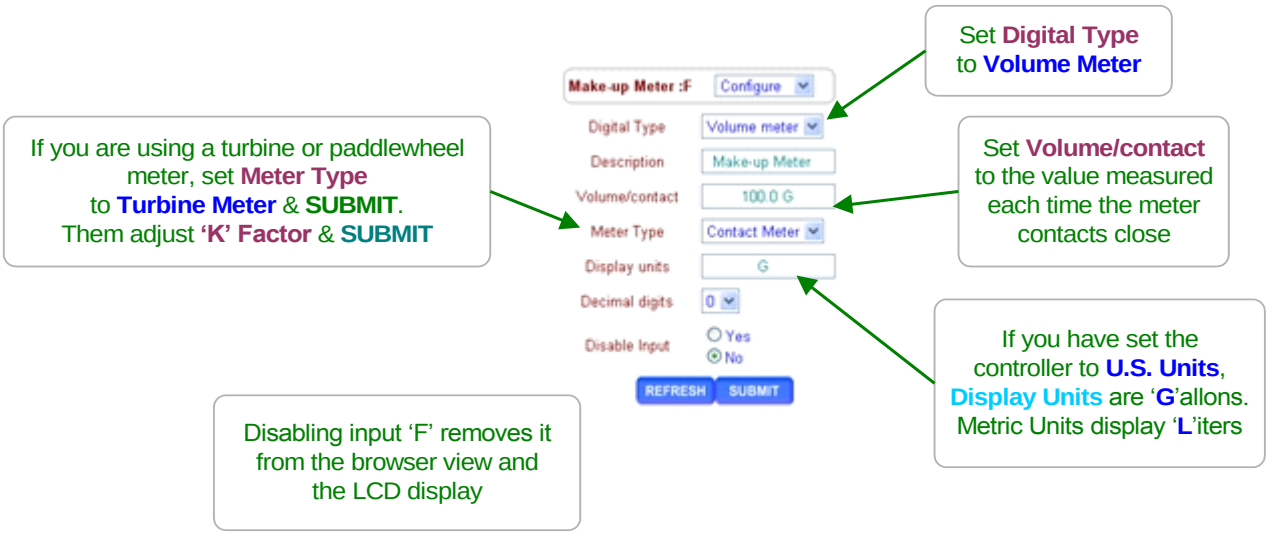
Offset & Default Offset
When you calibrate a pH, ORP or temperature, the DCM200 adjusts the OFFSET to make your measured value match the displayed value.

Manual Sensors:
These sensor types use only the OFFSET to set the displayed value.
The controller ignores GAIN for these sensor types.

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 atypical sensor types.

4.7 Water Meters: Volume & Rate

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



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.

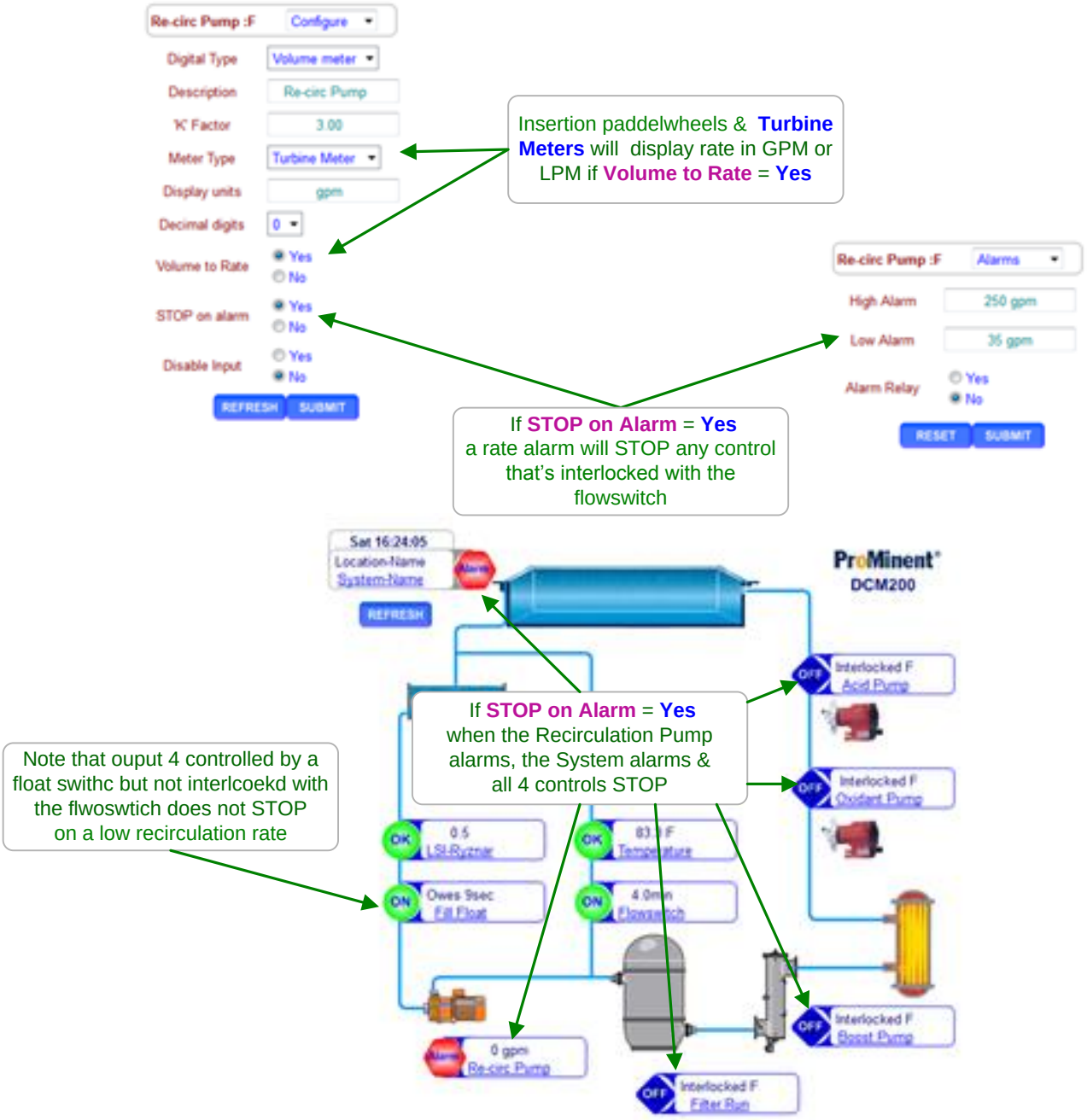
Contact Set Debouncing:

Mechanical water meter contact sets bounce when closing or opening. The DCM200 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**.

4.7 Water Meters: Volume & Rate cont.



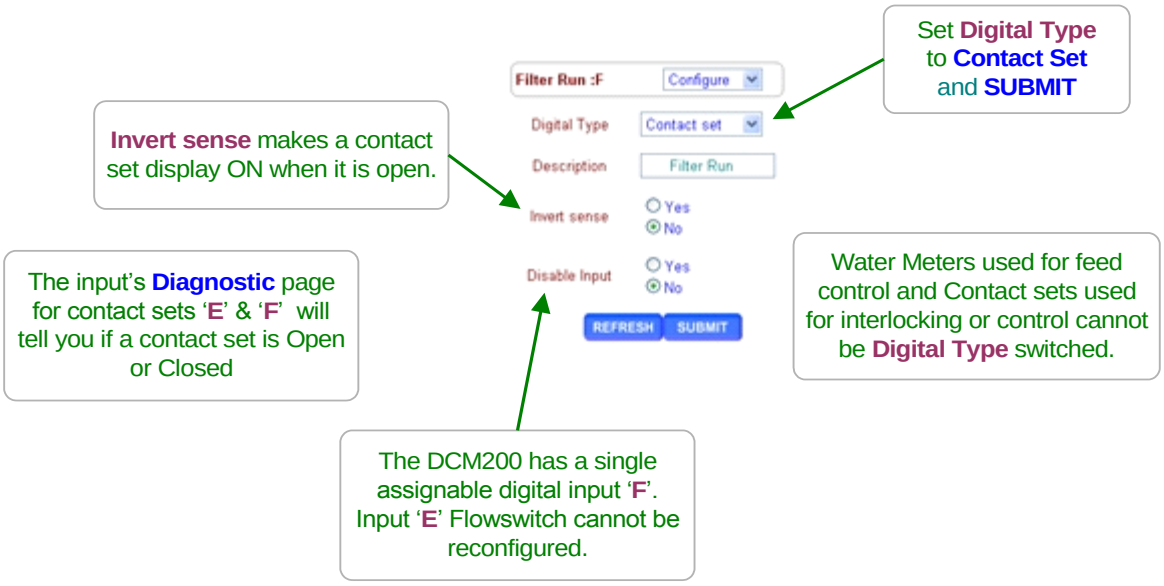
Sidebar:

1. The alarm on Volume-to-Rate is non-latching so that when flow recovers, feed & control restart automatically.
2. When a low rate alarm occurs, the System Alarm is set so the RED LED on the enclosure door turns ON.
3. Control & feed will not restart until the cause of rate alarm is corrected, the alarm setpoints are changed or **STOP on Alarm** = **NO**

5.0 Flowswitches & Contact Sets

5.1 Switching Meters & Contact Sets

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



Sidebar:
Volume & Contact Set Input:
Controller input '**F**' may be set to be a water meter or a contact set.
The DCM200 is defaulted to contact at input '**F**'.

5.2 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 water pad which typically is ON between 6:00AM & 8:00PM Is ON for more than 15 hours, either the flowswitch has faulted OR pad operation has changed.

No Flow Alarm:
If you had an aquatics 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.

5.3 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** and set **Control by** to either contact set '**E**' or '**F**'.

When the controlling contact set is **ON**, the relay is **ON** .

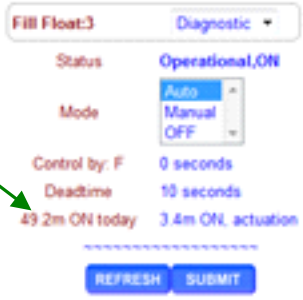
In this example when input '**F**' is **ON**, relay **3** is **ON** after the **Deadtime** has elapsed.

If the contact set is controlling a variable frequency pump output, **4** or **5**, the pump feeds at 100% when the contact set is ON.

Set **Control by** to a contact set input.
In this example we've selected input '**F**' to control relay **3**

Deadtime in this example is used to remove bounce from a float switch

The **Diagnostic** display shows the total time the output has been **ON** today & **ON** time of the controlling contact set this **actuation** .



If **Invert sense** is set to **Yes**, the controlling contact set in this example will be **ON** when the contact set is **OPEN**.

This setting allows you to turn the relay or pump **ON** when the contact set is **OPEN** or **CLOSED**.

Contact set controls are simple. There are no setpoints or special controls

6.0 Frequency Controlled Pumps

6.1 Selecting a Pump

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

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:

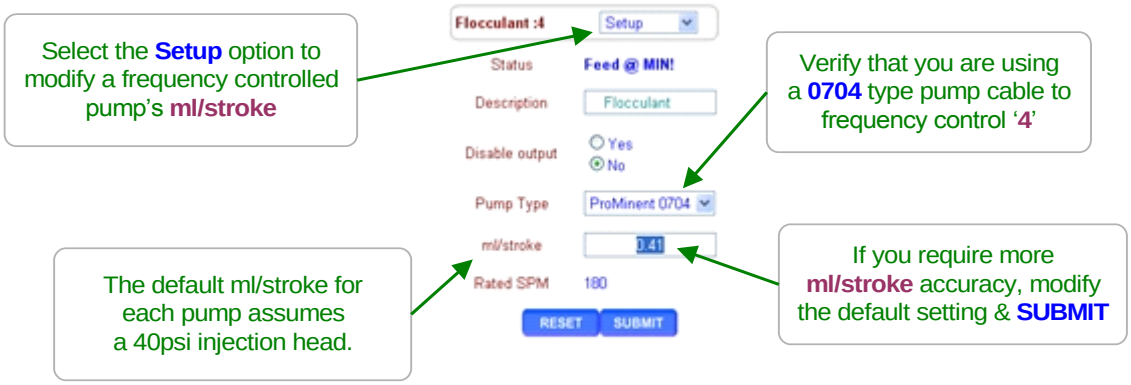
If you select one of the 6 built-in ProMinent pumps, the feed volume mL/stroke and maximum frequency are set correctly and automatically assuming a nominal 40 psi feed line pressure.
If you select '**Other**' as a pump type, you'll need to provide both the nominal mL/stroke and maximum stroke rate. Pumps 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 '**3**'. 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 two frequency controls, it's an option.

6.2 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 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.

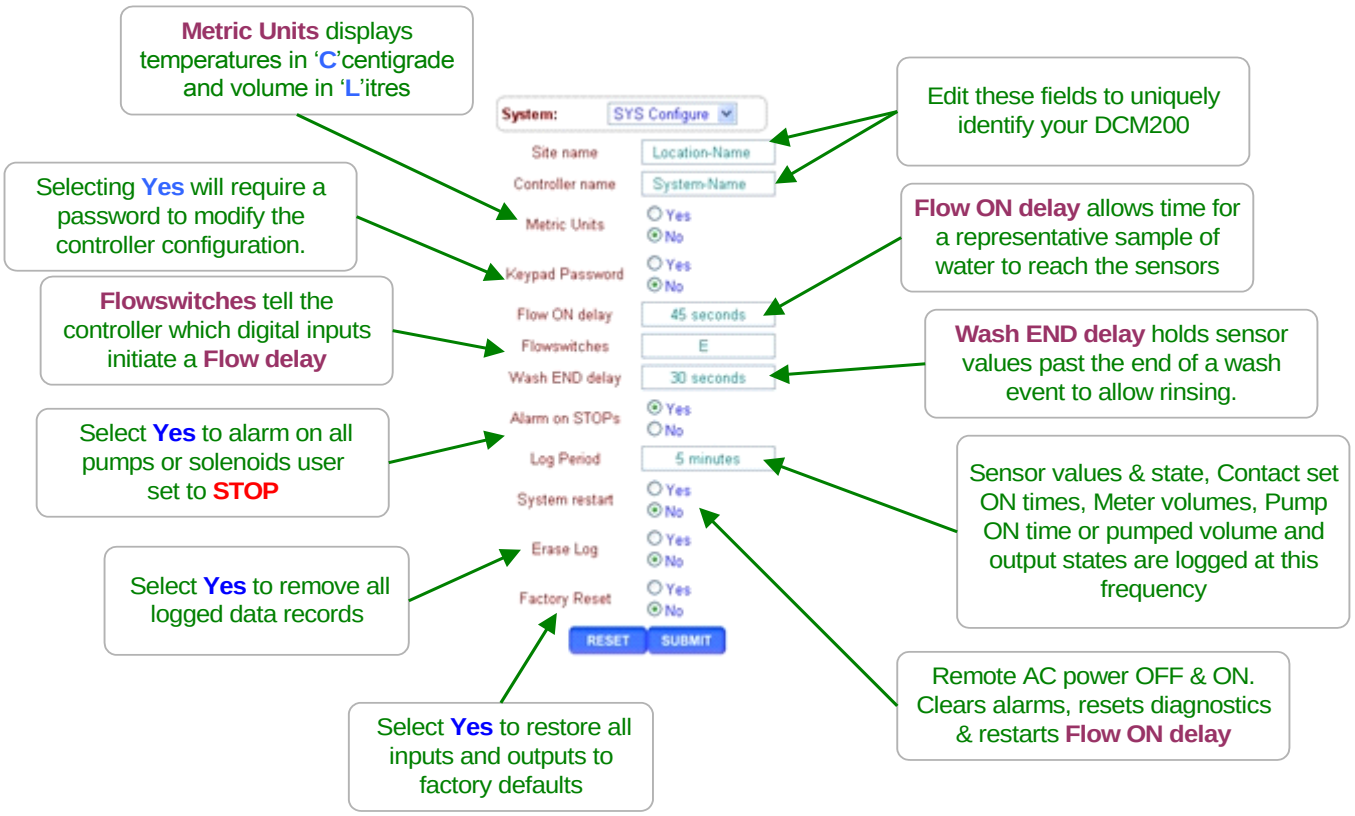
Calibration Limits:

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

7.0 System Settings

7.1 Site Configuration

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



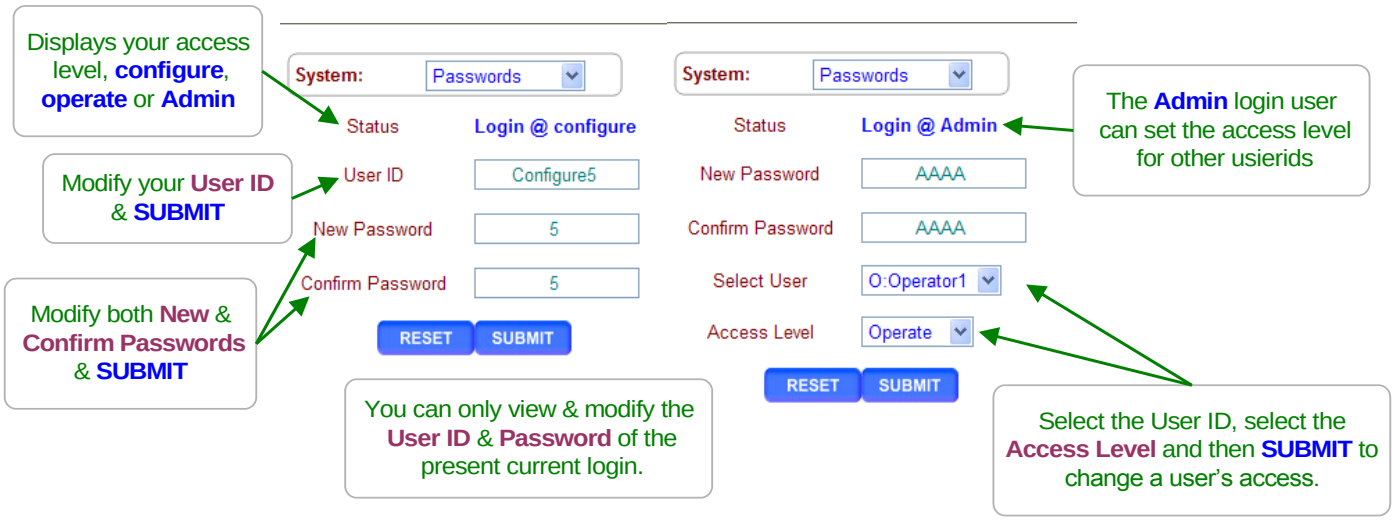
Sidebar:
Commissioning: *Select U.S. or Metric Units when you commission or install.*
Data logging uses the Units setting for the units on logged volumes and temperatures.
Changing units does not change data already logged.

Metric Inputs:
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.

Metric Outputs:
Pumped volumes are reported in mL & Liters.
Event feed 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.

7.2 Passwords

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



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.

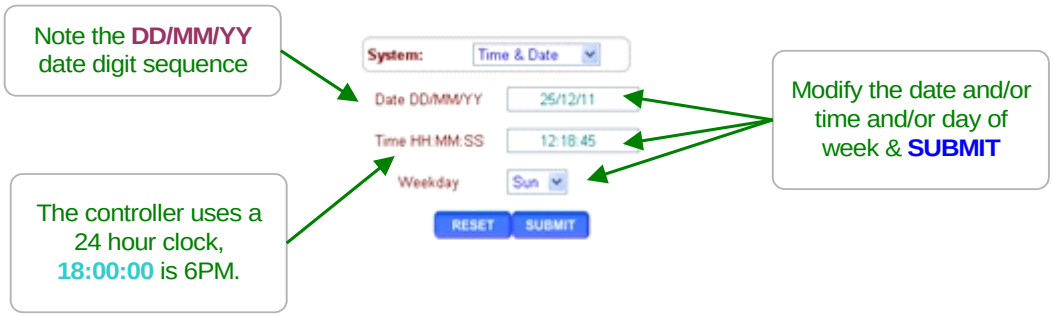
Modify Passwords:
If the controller is accessible on the site LAN, you should modify all 8 passwords.
Passwords are limited to 8 letters and numbers. Keypad passwords are numbers only.
Any space in a password ends the password on both editing and **Login** password entry

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 ProMinent & specific to your controller's serial number, setting all passwords to default.

7.3 Time & Date

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



Sidebar:
Time & Date:
The controller uses a 24 hour clock where 14:30 is 2:30 PM.

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. Zeroes time and volume owed which ends all timed & volume events.

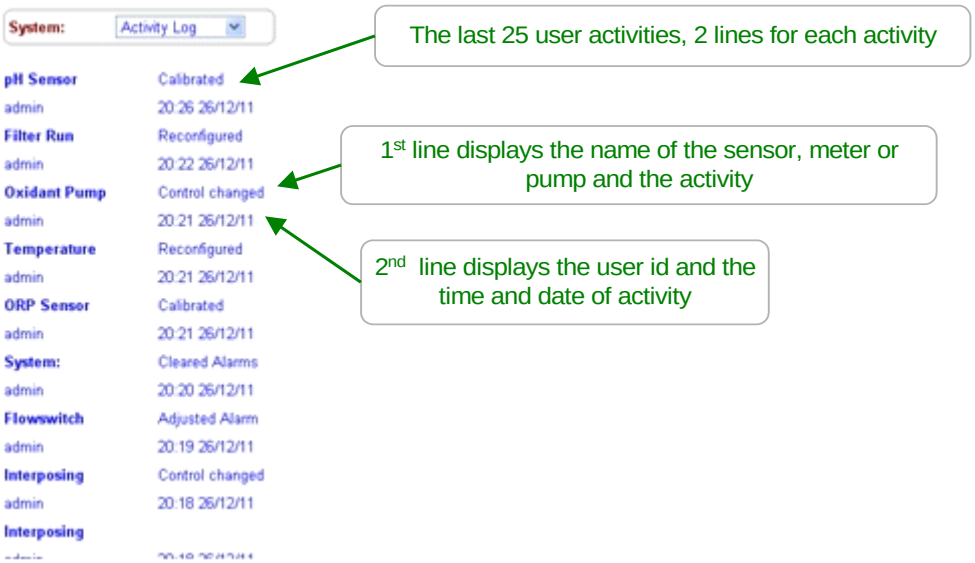
3. Does a midnight reset which will may set volume-meter Low Alarms.

4. Sets the events Day 1 to the most recent Sunday.

Example: If you are at Day 19, Thursday of week 3, on a 28 day event cycle.
After a **Time&Date** change you are now at, Day 5,Thursday of week 1

7.4 Keypress-Alarm Log

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



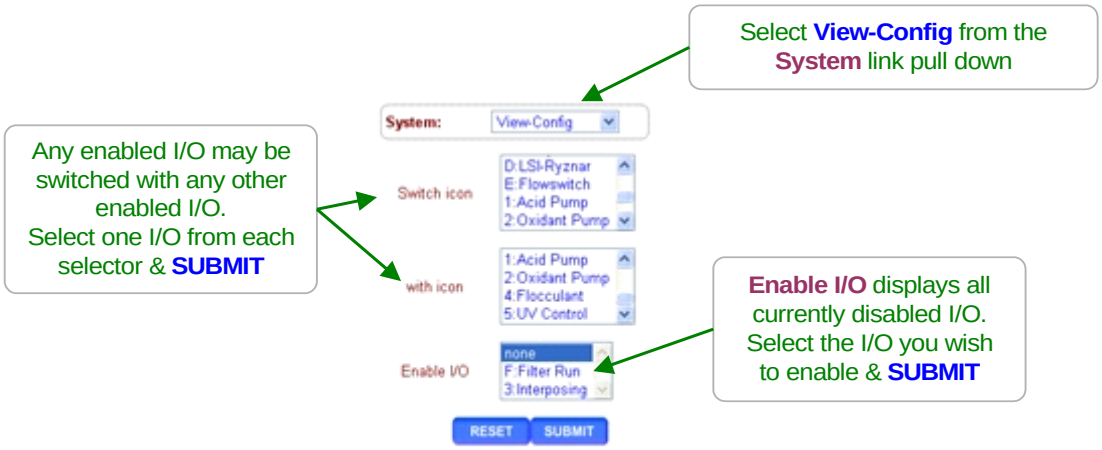
Sidebar:
Keypress-Alarm Log:
The log contains the last 25 activities that effect the operation of the controller.
Most recent activities first. Both keypad and browser user activities are logged.

User IDs:
Keypad Password ON: Logs the User IDs listed in **Section 7.1 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 Power OFF/ON, use the **System** user ID.

7.5 Enabling I/O, Switching Icons



Disabling I/O:
Select Input link and then the **Configure** top menu option, then **Disable** & **SUBMIT**.
Inputs **A**:pH, **B**:ORP or Chlorine, **C**:Temperature & **E**:Flowswitch cannot be disabled.
Sensor inputs **D** and **F** may be disabled if not used for control.

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 removed from the view.
Disabled I/O is not logged and does not appear in the selections used
to compensate and configure other enabled I/O

Enabling Inputs:
Meter-Volume and Contact Set Input '**F**' is enabled and configured as either a water-volume meter OR flowswitch, contact sets, level-pressure switches …

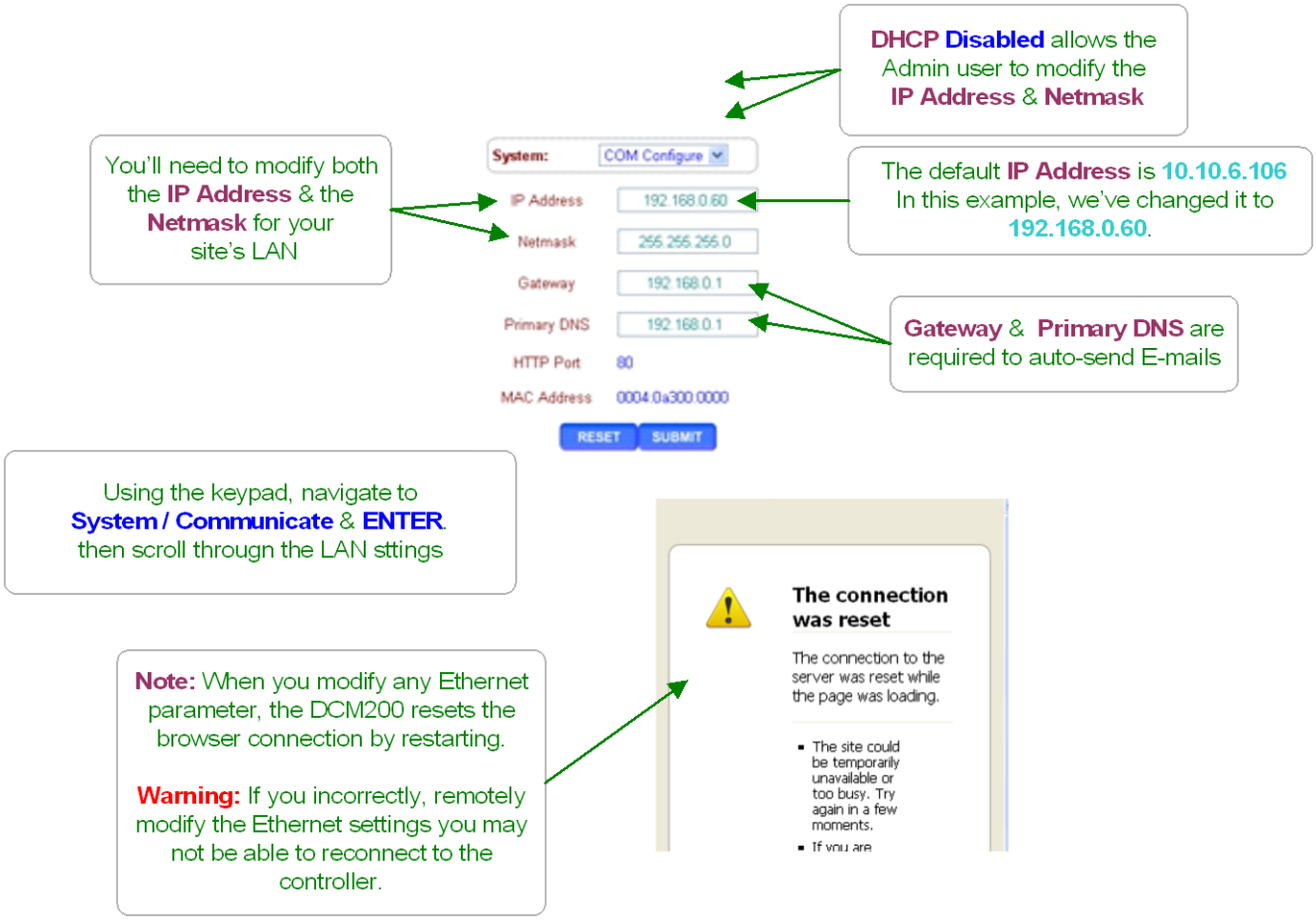
Enabling Outputs:
Outputs **1** to **3** are AC line powered switching relays that are enabled to power pumps, solenoids or motorized valves.

Outputs **4** & **5** are frequency controlled outputs or dry contact digital outputs (DO) that are enabled to proportionally control pumps or enable external equipment, send alarms ….

7.6 Communications

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

.



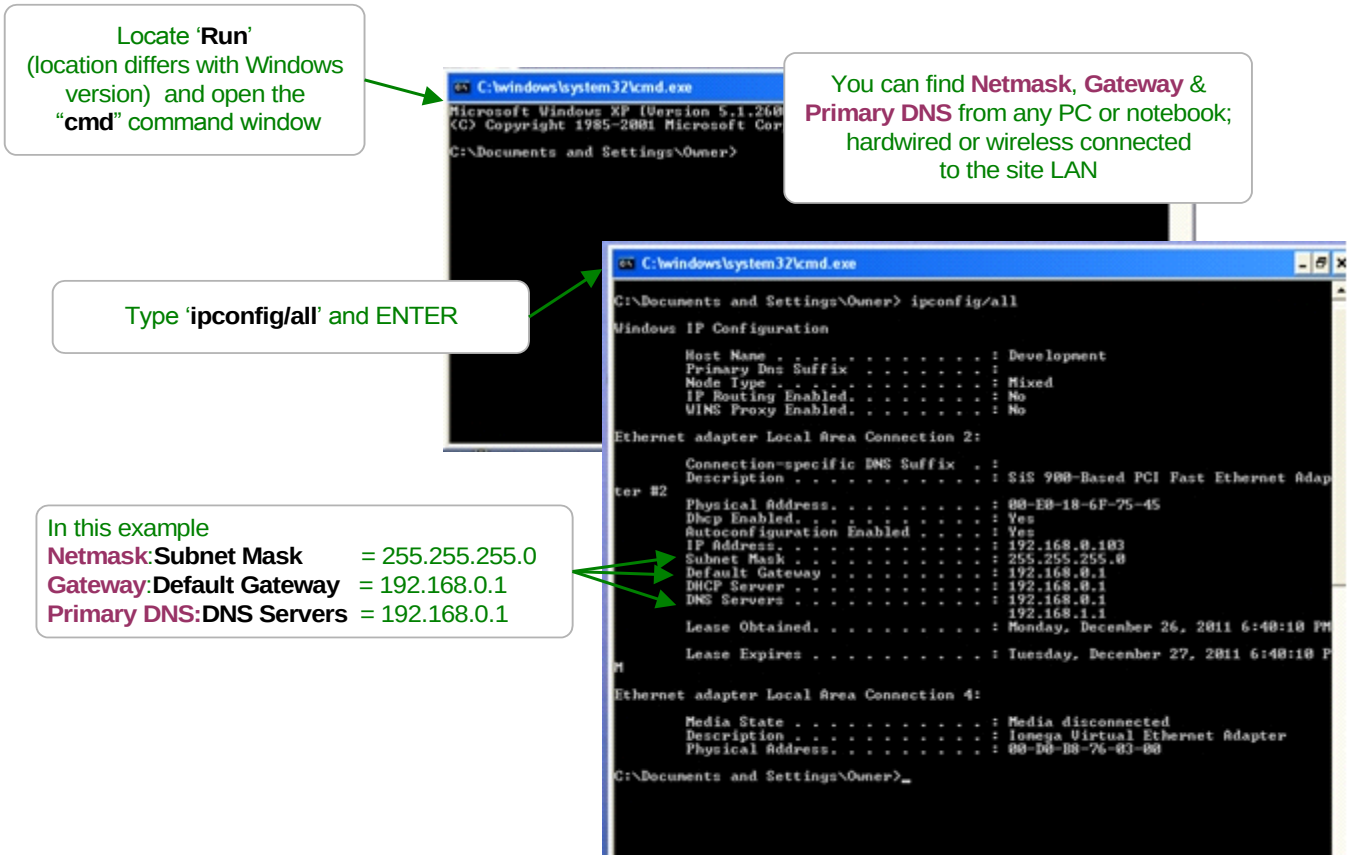
Sidebar:
Warning: Do not connect the DCM200 Ethernet connection into a site LAN without approval from site IT staff .
Browser passwords are the same as the default keypad passwords listed in the manual Section **7.2 Passwords**.

You'll need to configure your notebook to connect.

Refer to Section 9 for Ethernet TCP-IP setup and the following page to get your site's LAN settings.

7.6 Communications cont.

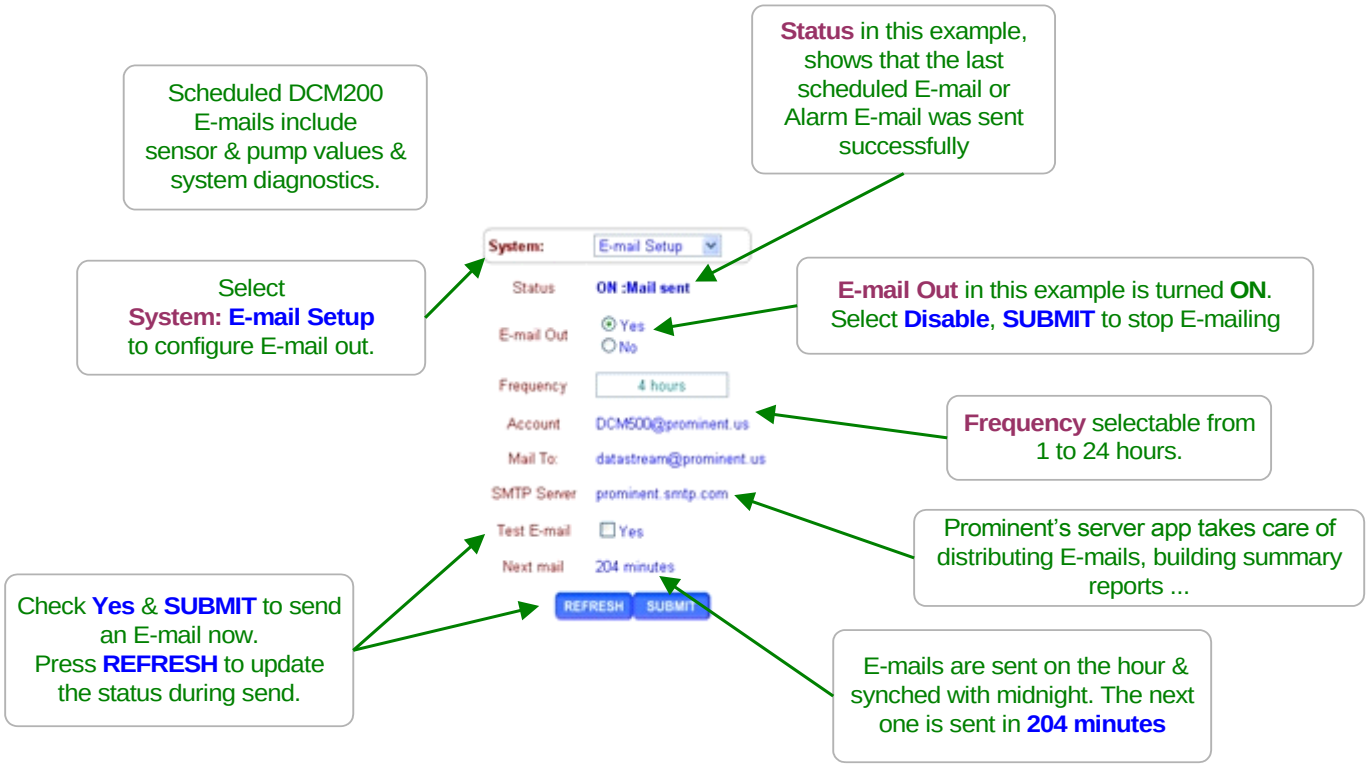
Windows operating systems have a simple way to find the Ethernet setup parameters:



You can use either the Keypad-LCD interface or the browser to setup the controller's IP Address, Netmask, Gateway & Primary DNS.

7.7 E-Mail Out

DCM200's connected to the site LAN can E-mail alarms & system operating parameters thru Prominent's app which redistributes and re-packages for end users.



Status: messages

OFF: = E-mail out Disabled by user
ON : = E-mails out Enabled by user
Testing: = User selects Test E-mail

:Mail Sent = last test, alarm or scheduled E-mail successfully sent.

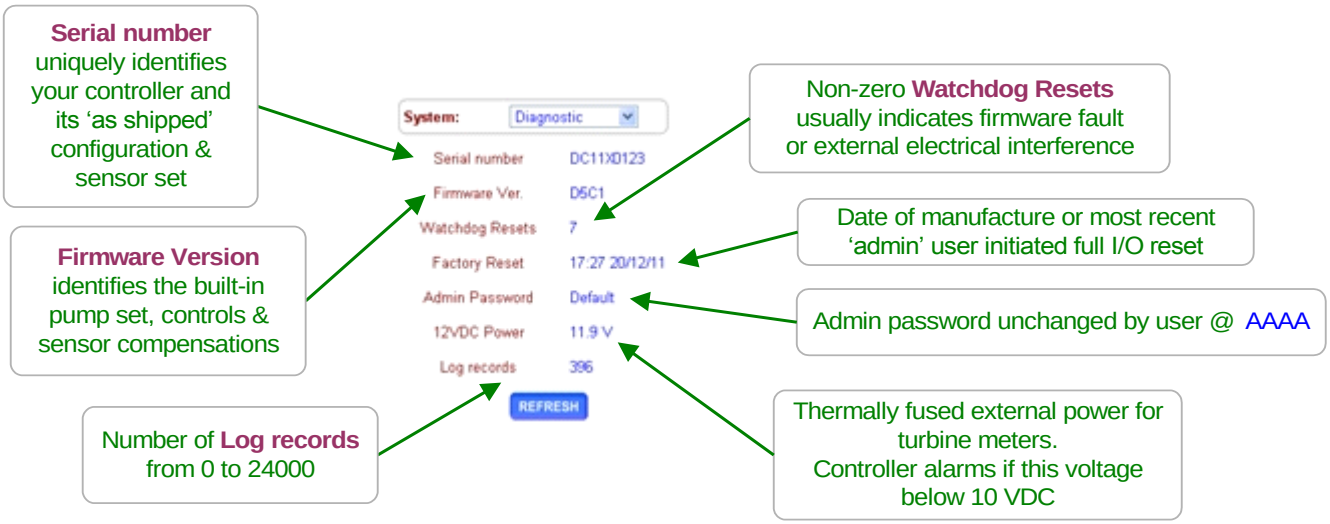
:Busy, wait! = file server temporarily unavailable. In use by LAN or USB log uploader.

:none sent = Power-on state, prior to 1st E-mail.

DCM200 Mail Server Messages
:Can't Send = E-mails blocked external to the DCM200
:fails, no DNS = cannot connect to SMTP server, check Primary DNS & Gateway settings
:authorize fails = password or user name incorrect, report fault to ProMinent

7.8 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 times-out & recovers.

Touch the grounded controller internal aluminum frame before handling 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.

8.0 Notebook & PC Ethernet Set-up

8.1 Ethernet Overview

If you are going to occasionally browse the DCM200 using an Ethernet crossover cable, leave the controller IP address @ the default 10.10.6.106 & setup a connection to this IP in your notebook.

8.2 View-Modify the DCM200 IP Address

If you the DCM200 is on the site LAN, you can use the keypad to view/modify the DCM200 IP parameters.

To view or adjust the controller Ethernet setting press **ENTER** and **DOWN** to **Communicate** at the power up or top of menu display.

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

Displays the current LAN **IP address**. In this example, it's the factory default.

Key **ENTER** to modify.

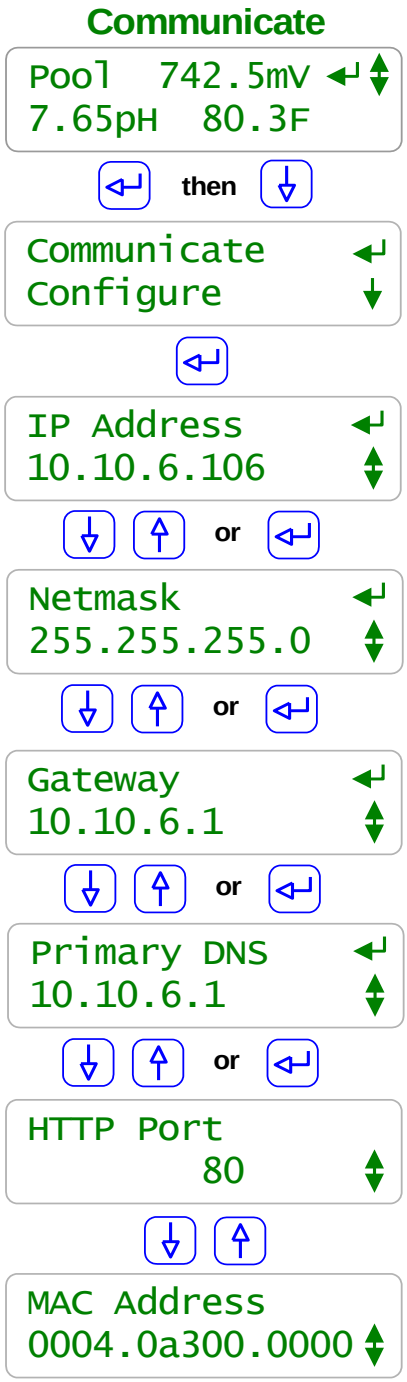
Netmask is usually this value for most sites.
Key **ENTER** to modify.

Gateway is frequently the '1' address on the subnet
Key **ENTER** to modify.

Primary DNS is frequently provided @ the same address as the **Gateway**
Key **ENTER** to modify.

The DCM200 HTTP sever is fixed at Port 80.

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**



8.3 Browser Connect

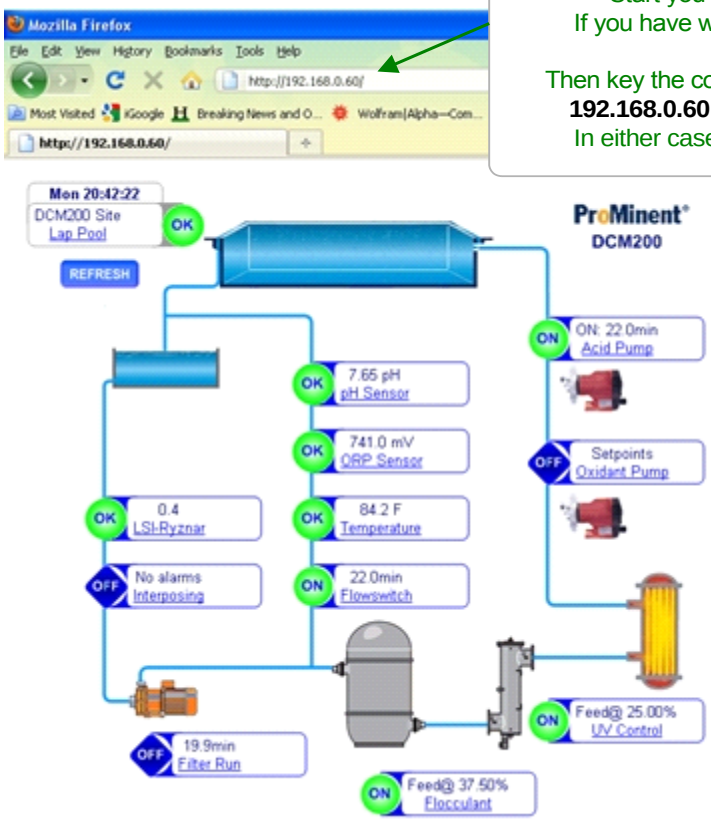
If the DCM200 is on the site's LAN, you're ready to Ethernet connect & browse.

If you are not on the site LAN & are going to use a Crossover cable, see one of the following sections for your operating system (Windows 7, Vista, or XP) TCP-IP connection set-up.

Connect a 'cross-over' cable between you notebook's Ethernet jack & the controllers Ethernet jack.

Start you browser, Internet Explorer or Mozilla's Firefox.
If you have wireless internet access you'll connect to your ISP.

Then key the controller's IP address into the browser's address line.
192.168.0.60 in this example. Factory default IP is **10.10.6.106**.
In either case, your browser will convert to **http://[IP Address]**

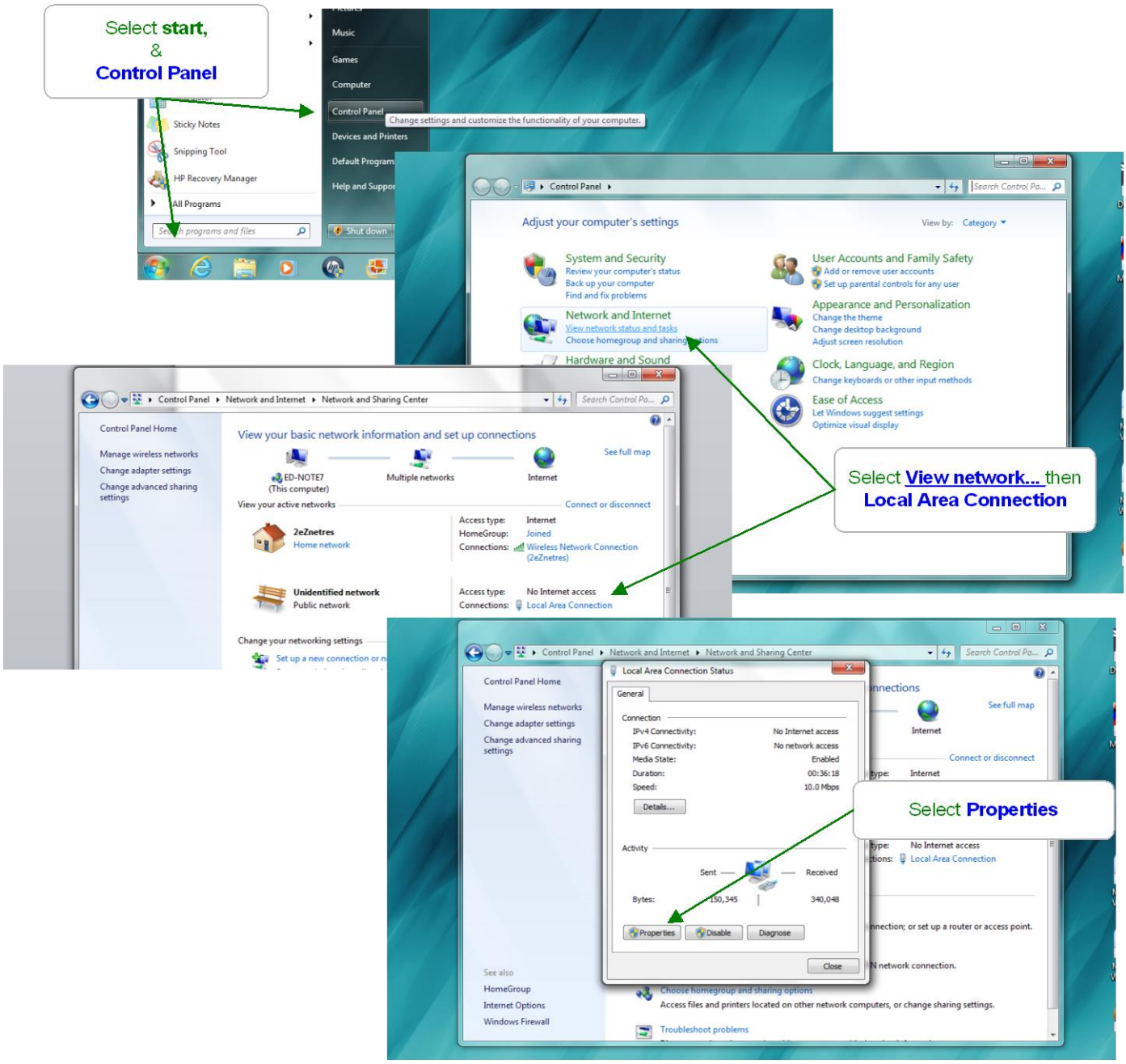


You'll see a real time view of your DCM200 updated automatically every 2 seconds.

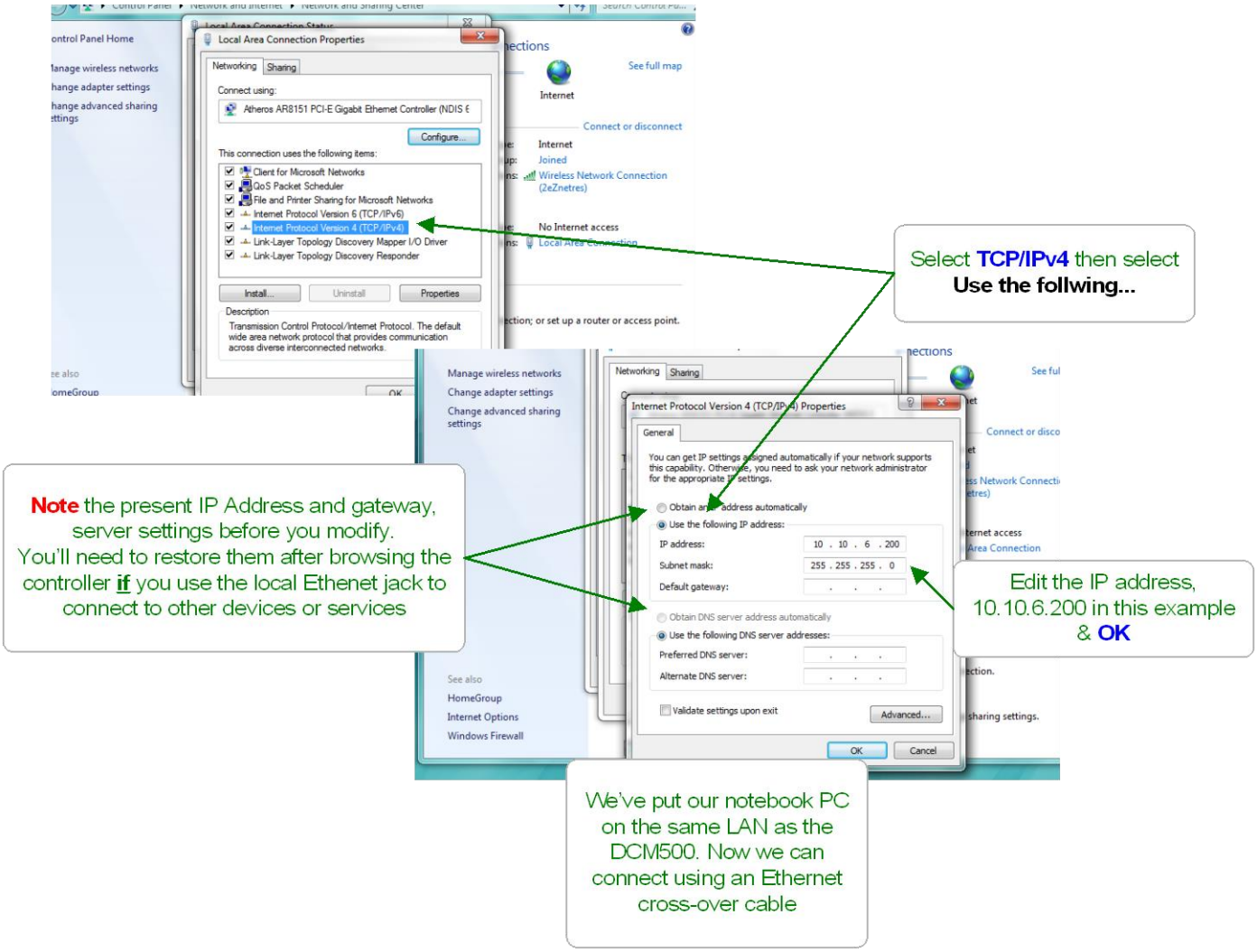
To do anything else, you'll have to **Login** to the controller.

Five incorrect **Login** attempts will lock all users out until a power OFF/ON or 7:00 AM the following morning

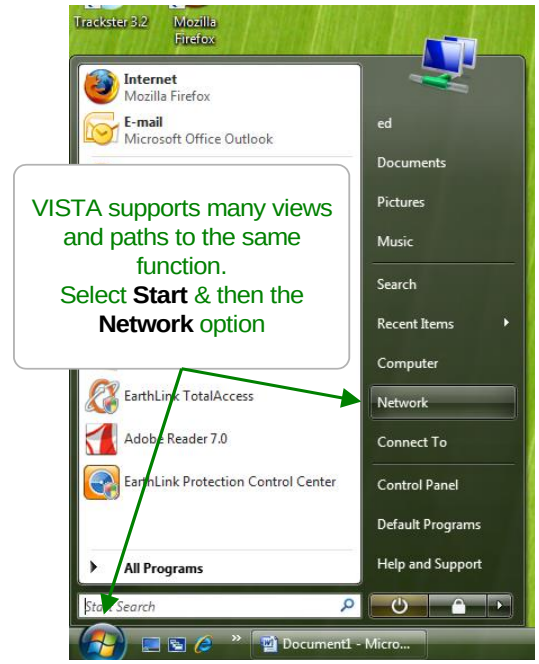
8.4 Windows 7 Cross-Over Set-up

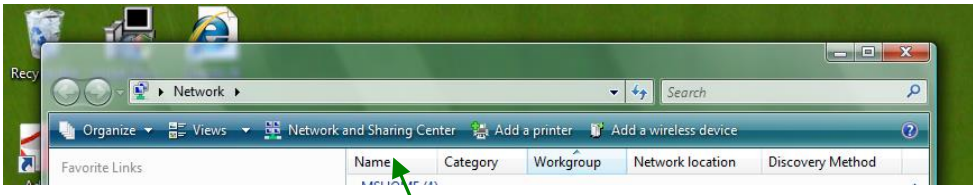


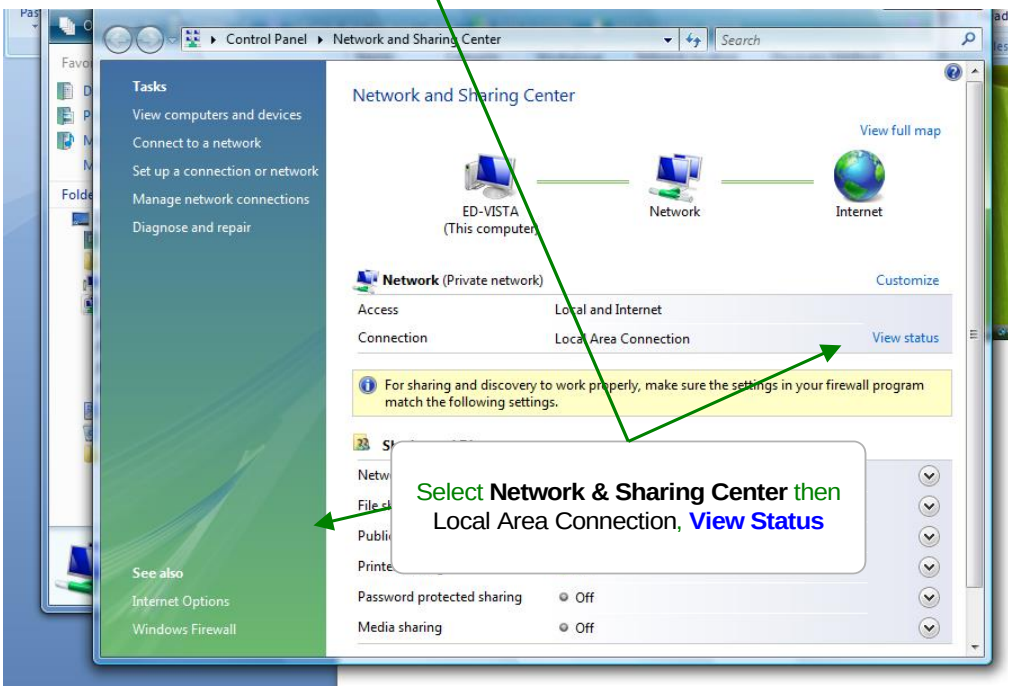
8.4 Windows 7 Cross-Over Set-up cont.



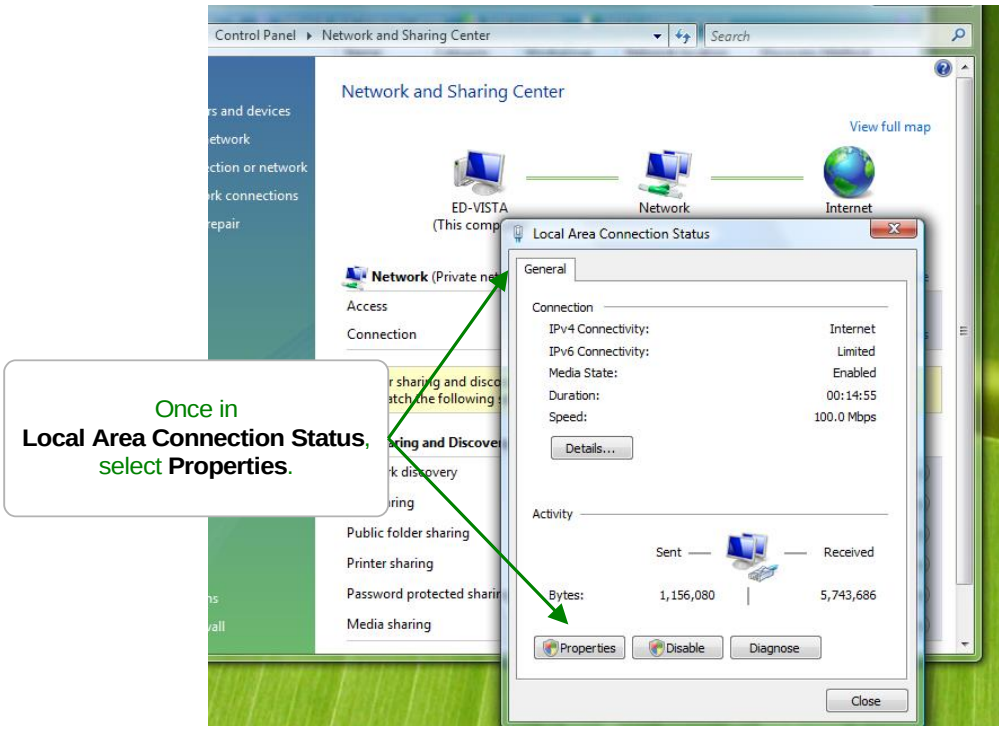
8.5 Windows VISTA Cross-Over Set-up

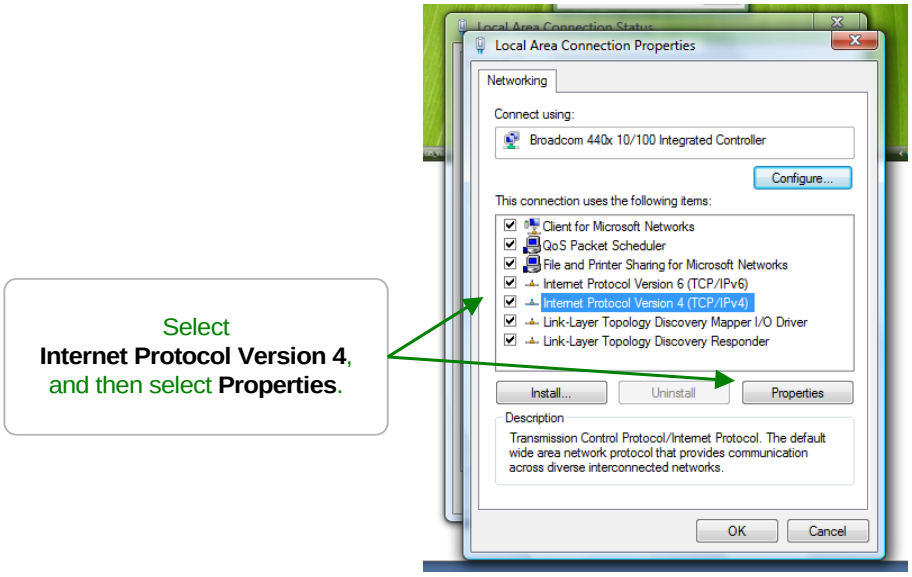




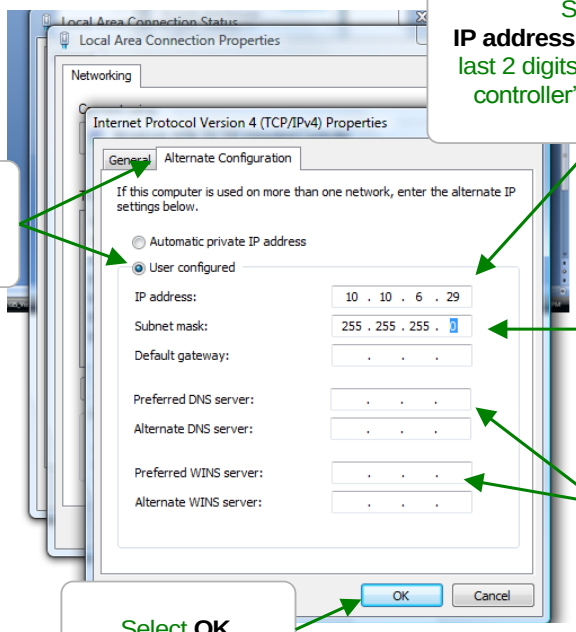


8.5 Windows VISTA Cross-Over Set-up cont.





8.5 Windows VISTA Cross-Over Set-up cont.



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

Select **Alternate Configuration** and User Configured.

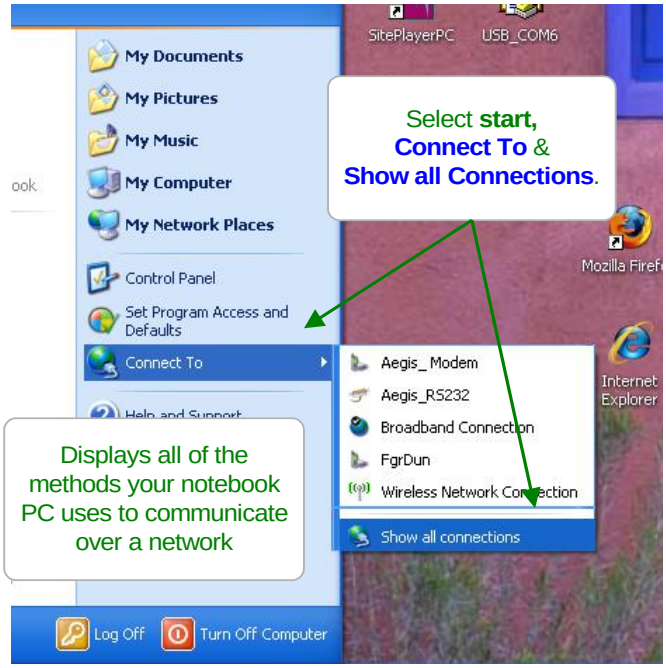
This **Subnet mask** will match 99.9% of controllers. Don't modify it.

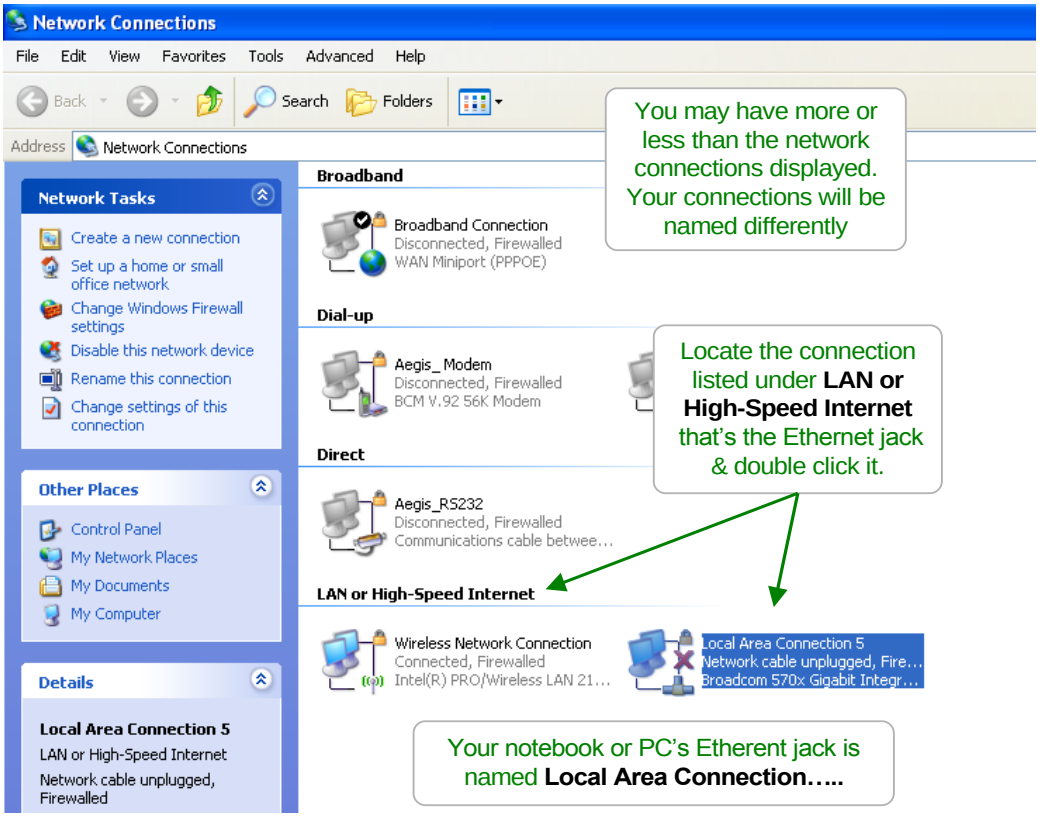
Leave all four of these fields blank.

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 Ethenet jack to connect to other devices or services

8.6 Windows XP Cross-Over Set-up





8.6 Windows XP Cross-Over Set-up cont.