BECSys7

Operation and Maintenance Manual

Certified to NSF/ANSI Standard 50

BECS TECHNOLOGY

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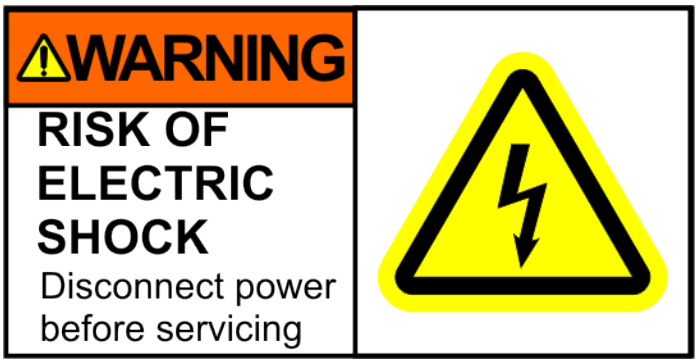
Warnings

Pay particular attention to the following warnings encountered while utilizing your BECSys7 Water Chemistry Controller:



Warning: Various other warning boxes may be found throughout the manual text.

Caution: Various caution boxes may be found throughout the manual text.

General Guidelines

Proper installation and use of the BECSys controller depends on the specific needs of the application. Read the manual completely before starting the installation and ensure all guidelines and recommendations are followed. All components should be mounted and the flow cell plumbing installed and pressure tested before wiring the controller. Ensure compliance with all applicable plumbing and electrical codes during the installation as well.

Caution: The BECSys controller should not be installed where it is accessible to the public.

Firmware Version

This manual was written for firmware v2.20. If you received newer firmware but did not receive a copy of the manual covering that version of firmware, please contact your distributor.

Environmental Conditions

The BECSys7 is housed in a NEMA 4X (IP65) enclosure. It should not be used in explosive environments. The BECSys7 should be mounted so that adequate ventilation is provided around the enclosure, preventing general environmental specifications from being exceeded (see table below).

Environmental Specifications	
Specification	**Rating**
Storage Temperature	-40 to 85 Deg C
Ambient Operating Temperature	-18 to 50 Deg C
Ambient Humidity	95% non condensing maximum humidity

Caution: After installation the enclosure must be completely sealed to preserve the NEMA rating, including sealing unused watertight cable glands. Failure to do so may result in a voided warranty.

Electrical Specifications

The BECSys7 may be ordered in either a 115VAC model or a 230VAC model. Following are the electrical specifications for each model:

Controller Ratings		
	115VAC Model	**230VAC Model**
Voltage:	115VAC 60Hz	230VAC 50Hz
Phase:	Single	Single
Current:	32.5 Amps Full Load	32.25 Amps Full Load
	(½ Amp – Controller)	(¼ Amp – Controller)
	(32 Amps – Relay Outputs: 3A X 8, 8A X 1)	(32 Amps – Relay Outputs: 3A X 8, 8A X 1)

Relay Output Ratings		
	115VAC Model	**230VAC Model**
Relay 1 (K1)	250VAC (max) – 3 Amps	250VAC (max) – 3 Amps
Relay 2 (K2)	250VAC (max) – 3 Amps	250VAC (max) – 3 Amps
Relay 3 (K3)	250VAC (max) – 3 Amps	250VAC (max) – 3 Amps
Relay 4 (K4)	250VAC (max) – 3 Amps	250VAC (max) – 3 Amps
Relay 5 (K5)	250VAC/30VDC (max) – 8 Amps	250VAC/30VDC (max) – 8 Amps
Relay 6 (K6)	250VAC/30VDC (max) – 3 Amps	250VAC/30VDC (max) – 3 Amps
Relay 7 (K7)	250VAC/30VDC (max) – 3 Amps	250VAC/30VDC (max) – 3 Amps
Relay 8 (K8)	250VAC/30VDC (max) – 3 Amps	250VAC/30VDC (max) – 3 Amps
Relay 9 (K9)	250VAC/30VDC (max) – 3 Amps	250VAC/30VDC (max) – 3 Amps

NSF Suggested Operation Ranges

ORP	650mV to 850mV
pH	6.8 to 8.2
Free Available Chlorine	0 to 10 ppm

Applicable Sensor Operating Ranges

Standard Sensors	
pH	0.0 pH to 14.0 pH
ORP	-1000mV to 1000mV
Temperature	32°F to 212°F (0°C to 100°C)
Reed Flow Switch	Switch Point (On): 2.0 gpm
Rotary Flow Switch	Switch Point (On): 1.5 gpm
Optional Sensors	
Amperometric ppm	0 ppm to 20 ppm
Total Chlorine	0 ppm to 20 ppm
Pressure Transducer	0 to 100 PSI
Vacuum Transducer	-14.7 to 85 PSI
Vacuum Swichgage	0 – 30 in. HG
Pressure Swichgage	0 – 50 PSI
Differential Swichgage	0 – 50 PSI
Conductivity Sensor	0 – 20,000 micromho
Turbidimeter	0 – 20.0 NTU
Flowmeter	0 – 655.35 Kgpm

Section A: Programming the Controller

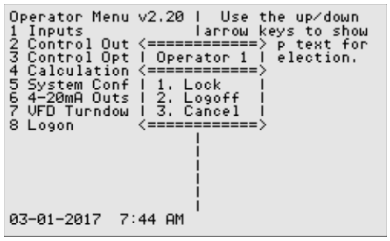
A – 1: Adjusting the Display Contrast

You can adjust the display contrast by holding down either the up or down arrow keys for two seconds, then after the controller beeps three times, use the up and down keys to adjust the contrast.

A – 2: Security Settings

A – 2.1: Access Codes and levels

To view what access level you were given, press the lock screen button while in any menu.



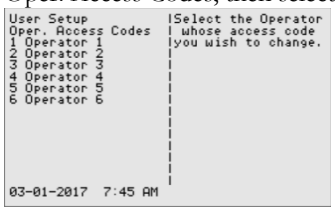
The Main Menu will also display who is logged on along with the version of firmware.

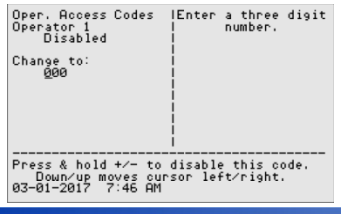
You do not need to set all the access codes for each level if you do not wish to. Also, a disabled access code is not equivalent to 000, so entering 000 when it prompts for an access code will only work if you have specifically assigned an access code to be 000.

A – 2.2: Setting Access Codes

To set an access code, press the menu button, then:

- Select System Config
- Choose User Setup
- Then select the access level you want to set an access code for.
  To set Operator 1's access code, you would select Oper. Access Codes, then select Operator 1.





Pressing and holding the +/- button disables the access code, while pressing enter will enable and set the access code to the value on the screen.

Operators may only change their own access code. Managers may change their access code and any of the Operators.

A – 2.3: Controller Options

Depending on how a particular controller is configured, not all of the options listed in this manual may be available.

A – 3: Navigating the menus

The controller's menus incorporate built in help text to aid in understanding the function of each parameter, item, and option.

A – 3.1: Common status messages

The very bottom line of the display contains the time and date on the left while the right is reserved for a number of status messages; the most common are as follows:

- "Busy..." - Indicates the controller is busy doing something critical and it cannot stop until it finishes. Until this message disappears, the controller will not respond to your key presses (although it does record them any will process them when done). Normally this message is only seen briefly after changing a setting, but it is also used for lengthier operations such as factory defaults and in the extremely rare case where the internal diagnostics detect a memory problem and attempts to correct it.

⚠ Warning: Interrupting the controller by turning the power off while it displays the busy message could result in the complete loss of all of its settings.

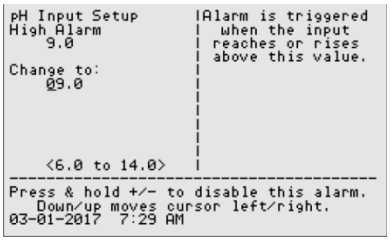
- "(1 of 2) (More →)" - and the like indicate there are more options for you to choose from than the controller could show at one time. Press the right arrow key (Next) to view them. The left number indicates the current page, while the right number indicates the total number of pages.
- "Bad Value, Retry..." - Accompanied by an error beep, this indicates the value you just entered was not within the allowable range of values and was not stored.

A – 3.2: The Menu Screens

Most of the features of the controller are configured via the Menu button's menus. The menu screens can be broken up into two types: entry screens and lists.

A – 3.2.1: Entry Screens

An entry screen is used to enter a value using the keypad.



The current value is usually displayed at the top while the cursor will be positioned under the current digit or character of the value you are entering in. The up and down arrows allow you to move the cursor right or left so you do not have to retype the existing digits if you only wish to change one.

Most numerical values will display the minimum and maximum values you can enter in at the bottom of the display in the format "< ### to ###>". These ranges many times will be dependant on other values you have set, such as alarm points or set points, while others are simply fixed to stay within a reasonable range.

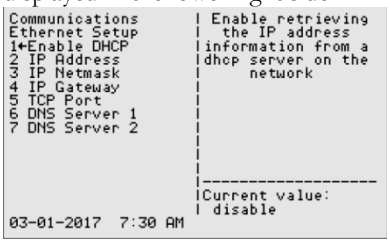
Entering a value that is not within the acceptable range will result in an error beep and the message "Bad Value, Retry..." being displayed in the status area.

For some values, certain keys may take on special functions that are explained in the lower lines of the screen. The Down/up message in the example above is one of them.

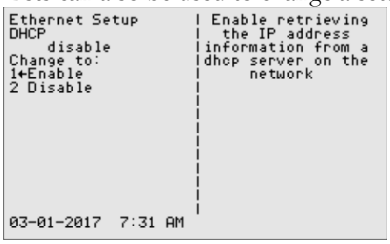
A – 3.2.2: List Screens

The list screens are mainly composed of lists of menu items that you can choose from by either pressing an item's number or by using the up and down arrow keys to select it (indicated by the arrow) and then pressing enter to choose it.

Using the up and down arrow keys also allows you to view each item's help text. And if the item leads to an entry screen or a list screen that sets a setting (see below), the current value is displayed in the lower right side.



Lists can also be used to change a setting:



When a list is used this way, it will display the current setting followed by the words "Change to:". Because it is a list, you can select an item with the up/down buttons to see help information about that particular selection.

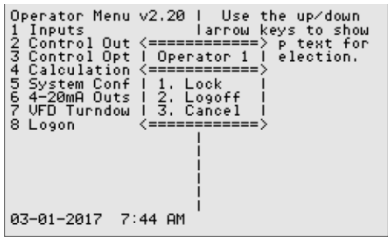
There are a few list screens that use the entire width of the display for displaying values associated with each item and therefore do not have help. See Section C: Using the Quick Set Face Panel Keys for examples of these types of screens.

A – 3.3: The Lock Screen Key

When not in a menu (i.e. viewing the normal display), pressing the lock screen key will prevent the controller from paging the screen to show more inputs, alarms, and other status information. See Section B: The Normal Display for more info about using the lock screen key in the normal display.

While within any menu, if the user does not press a key within sixty seconds of the last key press, the current user is logged out and the screen is returned to the normal display. To prevent the controller from timing out, you may lock the screen.

While within a menu, pressing the Lock Screen key will bring up a popup menu:



The first option on the popup will be either to lock or unlock the screen depending on the current lock state. While the screen is locked, key presses normally are ignored. However, in some instances certain keys are given special functions while the screen is locked, such as using the up and down arrows to scroll the help text if all of the help text cannot be displayed at once.

You can also lock/unlock the screen without bringing up the popup menu by holding down the lock button for one second. The controller will acknowledge this action with a triple beep and the yellow Lock Screen light will turn on.

The Lock button popup menu also identifies who is currently logged on, and provides an option for the user to log off. You can also select cancel if you pressed the lock button in error.

A – 4: Inputs

To enter the program menu, press the Menu button on the front face panel of your controller. This will allow the viewing of the Main Menu where the programming options are displayed.

The Cl inputs, Cl Inventory Input, Chlorine Control, and Chlorine booster control are all displayed as either Chlorine and Cl or Bromine and Br depending on the chemical selected in the Cl feed menu. This manual is written using the Chlorine setting. If you select Bromine as the sanitizing chemical, the controller will display Bromine and Br instead of Chlorine and Cl, but the menus and functions are otherwise exactly the same as shown.

A – 4.1: pH Setup

If your controller is configured to monitor pH, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the pH reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the pH reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the pH reading has to rise above the high alarm or fall below the low alarm before the alarm will shut off.

A – 4.2: ORP Setup

If your controller is configured to monitor ORP, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the ORP reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the ORP reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.

Alarm Hysteresis (Mgr): This value sets the amount that the ORP reading has to rise above the high alarm or fall below the low alarm before the alarm will shut off.

A – 4.3: Cl Inputs Setup

A – 4.3.1: Free Cl Setup

If your controller is configured to monitor Free Cl, it may be either calculated or a sensor may be attached. There are two versions of the free chlorine sensor, the CCS-140 and the CP-1.

⚠ Caution: Free chlorine sensors require the use of a temperature sensor and a properly calibrated pH sensor.

A – 4.3.1.1: Input Source: Calculated

- **High Alarm (Op):** The high alarm will activate when the free Cl reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the free Cl reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the Cl input readings have to rise above their high alarm or fall below their low alarm before the alarm will shut off.

A – 4.3.1.2: Input Source: CCS140 Probe

- **High Alarm (Op):** The high alarm will activate when the free Cl reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the free Cl reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the Cl input readings have to rise above their high alarm or fall below their low alarm before the alarm will shut off. Note this value is used for free, total, and combined Cl alarms.
- **Calibrate (Op):** This selection allows you to do a single point calibration of free Cl. Enter the reading from your test kit and press enter. The value entered must be 1.0 ppm or greater.
- **Diagnostics (Op):** This option displays input diagnostic values.
- **Reset Calibration (Op):** Resets the calibration to the original factory setting.

A – 4.3.1.3: Input Source: CP-1

- **High Alarm (Op):** The high alarm will activate when the free Cl reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the free Cl reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the Cl input readings have to rise above their high alarm or fall below their low alarm before the alarm will shut off. Note this value is used for free, total, and combined Cl alarms.
- **Calibrate (Op):** This selection allows you to do a single point calibration of free Cl. Enter the reading from your test kit and press enter. The value entered must be 0.50 ppm or greater for the CP-1 sensor.
- **Reset Calibration (Op):** Resets the calibration to the original factory setting.

A – 4.3: Cl Inputs Setup (continued)

A – 4.3.2: Total Cl Setup

If your controller is configured to monitor Total Cl, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the total Cl reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the total Cl reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the Cl input readings have to rise above their high alarm or fall below their low alarm before the alarm will shut off. Note this value is used for free, total, and combined Cl alarms.

A – 4.3.3: Combined Cl

If your controller is configured to monitor Combined Cl, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the combined Cl reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the Cl input readings have to rise above their high alarm or fall below their low alarm before the alarm will shut off. Note this value is used for free, total, and combined Cl alarms.

A – 4.4: Temperature Setup

If your controller is configured to monitor temperature, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the temperature reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the temperature reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the temperature reading has to rise above the high alarm or fall below the low alarm before the alarm will shut off.

A – 4.5: Conductivity/TDS Setup

If your controller is configured to monitor Conductivity/TDS, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the input reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the input reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the Conductivity/TDS reading has to rise above the high alarm or fall below the low alarm before the alarm will shut off.

A – 4.6: Flow Rate Setup

If your controller is configured to monitor Flow Rate, you will have the following options:

- **Label (Op):** Allows you to rename this input.
- **Low Alarm (Op):** The low alarm will activate when the flow rate reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the reading that the flow rate must rise above the low alarm before the alarm will shut off.

A – 4.7: Combined Flow Rate

If your controller is configured to monitor multiple Flow Rates, you will have the following options:

- **Label (Op):** Allows you to rename this input.
- **Low Alarm (Op):** The low alarm will activate when the flow rate reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.

Alarm Hysteresis (Mgr): This value sets the reading that the flow rate must rise above the low alarm before the alarm will shut off.

A – 4.8: pH & Chlorine Inventory Setups

If your controller is configured to monitor chemical inventories, a level sensor may be used or a contact switch. If a level sensor is used, you will have the following options:

- **Low Alarm (Op):** This value sets at what level or weight the inventory low alarm will be activated. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets at what level the inventory level or weight has to rise above the low level or weight alarm setting before the alarm will shut off.

A – 4.9: Turbidity

If your controller is configured to monitor Turbidity, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the input reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the level that the turbidity reading has to rise above the high alarm setting before the alarm will shut off.

A – 4.10: Surge Pit Level

If your controller is configured to monitor the Surge Pit Level, a sensor may be used or a contact switch. If a sensor is used, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the input reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the input reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the surge pit level has to rise above the high alarm or fall below the low alarm before the alarm will shut off.
- **Hi Emergency Off (Op):** Enable or Disable triggering an Emergency Off on a high surge pit alarm or high surge safety alarm.

A – 4.11: Pressure & Vacuum Setup

A – 4.11.1: Filter Influent Pressure

If your controller is configured to monitor the Filter Influent Pressure, either a PSI transducer, Vacuum transducer, or a gauge may be used. If a transducer is used, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the pressure reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the pressure falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis: (Mgr)** This value sets the amount that the pressure reading has to rise above the high alarm or fall below the low alarm before the alarm will shut off.
- **Display Input (Op):** This option enables/disables displaying the influent pressure on the normal display.

A – 4.11.2: Filter Effluent Pressure

If your controller is configured to monitor the Filter Effluent Pressure, either a PSI transducer, or a pressure gauge may be used. If a transducer is used, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the pressure reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the pressure reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the pressure reading has to rise above the high alarm or fall below the low alarm before the alarm will shut off.
- **Display Input (Op):** This option enables/disables displaying the Filter Effluent pressure on the normal display.

A – 4.11.3: Filter Differential Pressure

- **High Alarm (Op):** The high alarm will activate when the pressure reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the pressure reading has to rise above the high alarm before the alarm will shut off.

A – 4.11.4: Pump Effluent Pressure

If your controller is configured to monitor the Pump Effluent Pressure, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the pressure reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the pressure reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the pressure reading has to rise above the high alarm or fall below the low alarm before the alarm will shut off.
- **Display Input (Op):** This option enables/disables displaying the Pump Effluent pressure on the normal display.

A – 4.11: Pressure & Vacuum Setup (continued)

A – 4.11.5: Strainer Vacuum

If your controller is configured to monitor the Strainer Vacuum, either a transducer or a gauge may be used. If a transducer is used, you will have the following options:

- **High Vac Alarm (Op):** The high vacuum alarm will activate when the pressure reaches or falls below this setting. This is actually a low pressure alarm that operates in the negative pressure range, which is a vacuum. You may disable this alarm by holding down the +/- key for 1 second.

  If the recirc pump is assigned a relay, the high strainer vacuum alarm will trigger an **emergency off** of the system.

  If the recirc pump is assigned a relay and the High Vac Alarm is disabled, this will defeat the emergency off.

- **High Vac Warning (Op):** The high vacuum warning will activate when the pressure reaches or falls below this setting. This is actually a low pressure alarm that operates in the negative pressure range, which is a vacuum. You may disable this alarm by holding down the +/- key for 1 second.

  The high strainer vacuum warning is generally used to indicate to the operators that the strainer needs cleaned. While this warning does flash the alarm LED, it does not shut down any pumps or feeds.

- **Alarm Hysteresis (Mgr):** This value sets the level that the pressure reading must rise above the alarm settings before the alarm will shut off.

A – 4.11.6: Total Dynamic Head

If your controller is configured to monitor the Total Dynamic Head, you will have the following options:

- **Display TDH (Op):** Enables displaying total dynamic head on the normal display.
- **High Alarm (Op):** The high alarm will activate when the total dynamic head across the pump reaches or rises above this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Low Alarm (Op):** The low alarm will activate when the total dynamic head across the pump reaches or falls below this setting. You may disable this alarm by holding down the +/- key for 1 second.
- **Alarm Hysteresis (Mgr):** This value sets the amount that the total dynamic head has to rise above the high alarm or fall below the low alarm before the alarm will shut off.

A – 4.12: Backwash Pit Level

If your controller is configured to monitor the backwash pit level, either a level sensor or a pair of floats may be used. If a level sensor is used, you will have the following options:

- **High Alarm (Op):** The high alarm will activate when the input rises above this setting. Backwash of the current filter will be paused until the level falls to or below the low point.
- **Low Point (Op):** Level to resume backwash after a high backwash pit alarm.

A – 5: Control Outputs

Press the Menu button on the front of the Controller and select Control Outputs. Depending on the controller configuration, some control outputs may or may not be installed.

A – 5.1: pH Control

If your controller is configured to control pH, you will have the following options:

- **Control Type (Op):** Choose from On/Off or Time Base Proportional control.
  - In general, if you are using a motor driven chemical feeder then you should choose the On/Off option. If you are using a solenoid driven or pulsed diaphragm chemical feeder (such as Pulsatron, most LMI models or most Prominent Models), you should choose the TBP option. This feature helps to hold a set point and to minimize over-shoot by making a standard feeder mimic the action of more sophisticated modulating feeders.
  - If you choose the On/Off option and are feeding up, then the controller will activate the chemical feeder whenever the pH falls below the set point and continue to feed until the pH rises above the set point plus hysteresis at which point it will stop.
  - If you choose the TBP option and are feeding up then the controller will activate the chemical feeder whenever the pH falls below the set point and will feed for a percentage of the Time Base (default one minute) proportional to the offset from set point. For the remainder of the Time Base the feeder will be paused. The feeder will continue this feed and pause cycle until the controller achieves the set point plus hysteresis. The closer to set point, the less time the feeder is ON.
- **Set Point (Op):** This value sets the desired level to maintain the pH at. Input the desired pH set point.
- **Span/Prop. Bnd (Op):** *This option is only shown if the Control Type is Time Base Proportional.* This value sets the distance (or span) from the set point that the output will be proportionally controlled.

Warning: Increasing or decreasing the *Span/Prop. band* or *Time Base* may cause the feed to severely overshoot or never achieve set point. Adjust this option only when recommended to do so by a factory representative.

- **Time Base (Op):** *This option is only shown if the Control Type is Time Base Proportional.* This sets the total time that control is based on. During this time, the feeder will turn on for a percentage of the Time Base and turn off for the remainder.
- **Failsafe Timer (Op):** This value sets the time that the relay is allowed to stay continuously on.
  - The most common failures of automated chemical feed systems are depletion of the chemical supply and/or chemical feeder failure. Both problems result in the controller being unable to reach set point in a reasonable period of time. The failsafe timer sets the maximum length of time the feeder can run. If the feeder has been trying to achieve set point without success for the selected time, the controller will cut power to the feeder, flash the Reset Fail/Safe LED on the face panel and display a message to alert the operator. If in TBP Pause mode, the controller will reset the timer.
  - An operator must reset the failsafe through the Reset Fail/Safe button to re-enable normal control.

Warning: Disabling the failsafe timers is highly discouraged. They are an important safety feature to protect against dangerous chemical overfeeds and will protect the equipment from running continuously if it runs out of chemical.

- **Dead Band (Mgr):** *This option is only shown under dual pH control.* This value sets the amount the input must exceed the set point by before the feed of the opposite direction will trigger. (The range is from twice the feeds' hysteresis to 2.8 pH)

A – 5.2: Chlorine Control

If your controller is configured to control Chlorine, you will have the following options:

- **Sanitizer Chemical (Op):** Sets the sanitizer chemical name (Chlorine or Bromine).
  - This option controls what chemical name the controller displays for the ppm Input and the primary sanitization/oxidizing chemical.
- **Control Input Src (Op):** *This option is only available if the controller is configured for ppm.* Choose between ORP and ppm to use as the primary control input for the sanitizer feed.
  - If the ppm Input is selected and the ppm Input source is set to probe, chlorine control is disabled while the ppm interlock timer is running.
  - If the ppm Input is selected and the ppm Input source is set to calculated, the controller still controls off of ORP, but the ORP set point is calculated by the controller based on the ppm set point, the pH set point, and the ppm calibration. Modification of any one of those three values will result in a new ORP set point.
- **Control Type (Op):** Choose from On/Off or Time Base Proportional control.
  - In general, if you are using a motor driven chemical feeder then you should choose the On/Off option. If you are using a solenoid driven or pulsed diaphragm chemical feeder (such as Pulsatron, most LMI models or most Prominent Models), you should choose the TBP option. This feature helps to hold a set point and to minimize over-shoot by making a standard feeder mimic the action of more sophisticated modulating feeders.
  - If you choose the On/Off option, then the controller will activate the chemical feeder whenever the ORP falls below the set point and continue to feed until the ORP rises above the set point plus hysteresis at which point it will stop.
  - If you choose the TBP option, then the controller will activate the chemical feeder whenever the ORP falls below the set point and will feed for a percentage of the Time Base (default one minute) proportional to the offset from set point. For the remainder of the Time Base the feeder will be paused. The feeder will continue this feed and pause cycle until the controller achieves the set point plus hysteresis. The closer to set point, the less time the feeder is ON.
- **ORP Set Point (Op):** *This option is NOT available if using calculated ppm control.* This value sets the desired level to maintain the ORP at.
- **ORP Span/Prop. Bnd (Op):** *This option is only shown if the Control Type is Time Base Proportional and the ORP Set Point is shown above.* This value sets the distance (or span) from the set point that the output will be proportionally controlled.

Warning: Increasing or decreasing the proportional band may cause the feed to severely overshoot or never achieve set point. Adjust this option only when recommended to do so by a factory representative.

- **Free Cl Set Point (Op):** *This option is only shown if the Control Source is set to ppm.* This value sets the desired level to maintain the ppm at.
- **Free Cl Span/Prop Bnd (Op)** *This option is only shown if the Control Type is Time Base Proportional, the Control Source is set to ppm, and a ppm probe is installed.* This value sets the distance (or span) from the set point that the output will be proportionally controlled.

Warning: Increasing or decreasing the proportional band may cause the feed to severely overshoot or never achieve set point. Adjust this option only when recommended to do so by a factory representative.

- **Time Base (Op):** *This option is only shown if the Control Type is Time Base Proportional.* This sets the total time that control is based on. During this time, the feeder will turn on for a percentage of the Time Base and turn off for the remainder.

Warning: Increasing or decreasing the time base may cause the feed to severely overshoot or never achieve set point. Adjust this option only when recommended to do so by a factory representative.

- **Failsafe Timer (Op):** This value sets the time that the relay is allowed to stay continuously on.
  - The most common failures of automated chemical feed systems are depletion of the chemical supply and/or chemical feeder failure. Both problems result in the controller being unable to reach set point in a reasonable period of time. The failsafe timer sets the maximum length of time the feeder can run. If the feeder has been trying to achieve set point without success for the selected time, the controller will cut power to the feeder, flash the Reset Fail/Safe LED on the face panel and display a message to alert the operator. If in TBP Pause mode, the controller will reset the timer.

An operator must reset the failsafe through the Reset Fail/safe button to re-enable normal control.

Warning: Disabling the failsafe timers is highly discouraged. They are an important safety feature to protect against dangerous chemical overfeeds and will protect the equipment from running continuously if it runs out of chemical.

- **Alt Set Point:** The 4 Event 28 Day Timer allows you to program a schedule to define when to use alternate set point.
  - **Alt Set Point 4 Event 28 Day Timer (Op):** To program the 4 Event 28 Day Timer, perform the following:
    - Select the Alt. Set point from the Cl (Br) Control menu.
    - Now select the 4Event 28Day Timer from the Alt. Set Point menu.
    - Selecting Event1 will allow you to select the weekly interval to use the alternate set point.

      If the 1st, 2nd, 3rd, or 4th week is selected, the timer will only trigger on that week in the four-week cycle. The Odd Weeks selection will trigger on the 1st and 3rd weeks, the Even Weeks selection will trigger on the 2nd and 4th weeks, and the Every Week selection triggers every week.

      The week number and day of week for the current date is displayed on the bottom right side of these screens.

      The first week is fixed to be the week of Sunday, January 2nd, 2000 and every four weeks afterwards.
      The next set of screens will allow you to choose the actual day(s).
    - Select what day of the week, or every day, the alternate set point should be used.
    - Once you make your selection you will be returned to the 4Event 28Day Timer menu where you will have a new menu item: Event 1 Times.
    - Select the Event1 Times from the 4Event 28Day Timer menu.

      This screen allows you to set both the start time and the end time for the event's programmed weeks/days. To toggle AM/PM, press the +/- key while the cursor is on the time you wish to change.

      If your start time is before midnight (12:00 AM) and the end time is after midnight, the alternate set point will continue to be used the following day up to the end time even if that day did not fall within the week/day selection for that event.

      Example:

Event1 Week/Day:	Odd weeks/ Tuesday
Event1 Times:	11:00 PM to 3:00 AM
Event2 Week/Day:	Even weeks/ Monday
Event2 Times:	11:00 PM to 6:00 AM
Current Week/Day:	2nd/Tuesday
Current Time:	4:00 PM

      The alternate set point last ran from 11:00 PM last night to 6:00AM this morning.

      The next time the alternate set point will run will be from 11:00 PM next Tuesday to 3:00AM next Wednesday.
  - **ORP Set Point (Op):** This value sets the desired level to maintain the ORP at during any of the programmed alternate set point events.
  - **ppm Set Point (Op):** *Shown only with ppm probe and ppm Control Source.* This value sets the desired level to maintain the ppm at during any of the programmed alternate set point events.
- **Bracketed ppm (Op):** *Shown only with ppm probe and ORP Control Source.* If enabled, the controller will override the ORP control so that the ppm will not drop out of a programmed range.
- **Bracketed ORP (Op):** *Shown only with ppm probe and ppm Control Source.* If enabled, the controller will override the ppm control so that the ORP will not drop out of a programmed range.

A – 5.3: Chlorine Booster Control

If your controller is configured to control a Chlorine Booster pump, you will have the following options:

- **Control Input (Op):** *This option is only available if the ppm Input is enabled.* Choose between ORP, ppm or, if the ppm probe is used, both to control the chlorine booster.
- **ORP Trigger Point (Op):** *This option is only shown if the Control Input is ORP or Both.* This value sets the ORP level that the input must drop below to activate the chlorine booster control. (the range is -1000 mV to the Cl Booster's ORP Set Point)
- **ppm Trigger Point (Op):** *This option is only shown if the Control Input is ppm or Both.* This value sets the ppm level that the input must drop below to activate the chlorine booster control. (the range is from 0.0 ppm to the Cl Booster's ppm Set Point)
- **ORP Set Point (Op):** *This option is only shown if the Control Input is ORP or Both.* This value sets the ORP level that once it is reached the chlorine booster control will shut off. (the range is from Cl Booster's ORP Trigger Point to the ORP high alarm point)
- **ppm Set Point (Op):** *This option is only shown if the Control Input is ppm or Both.* This value sets the ppm level that once it is reached the chlorine booster control will shut off. (the range is from the Cl Booster's ppm Trigger Point to the ppm high alarm point)
- **ORP Hysteresis (Op):** *This option is only shown if the Control Input is ORP, Both, or, if ppm Input source is set to calculated, ppm.* This value sets the level that the input must rise above the set point before the chlorine booster control will turn off.
- **ppm Hysteresis (Op):** *This option is only shown if the ppm probe is used and the Control Input is ppm or Both.* This value sets the level that the input must rise above the set point before the chlorine booster control will turn off.

Warning: Disabling the failsafe timers is highly discouraged. They are an important safety feature to protect against dangerous chemical overfeeds and will protect the equipment from running continuously if it runs out of chemical.

- **Failsafe Timer (Op):** This value sets the time that the relay is allowed to stay continuously on. (the range is 0:00 to 18:00 hours)

  The most common failures of automated chemical feed systems are depletion of the chemical supply and/or chemical feeder failure. Both problems result in the controller being unable to reach set point in a reasonable period of time. The failsafe timer sets the maximum length of time the feeder can run. If the feeder has been trying to achieve set point without success for the selected time, the controller will cut power to the feeder, flash the Reset Fail/Safe LED on the face panel and display a message to alert the operator. If in TBP Pause mode, the controller will reset the timer.

  An operator must reset the failsafe through the Reset Fail/Safe button to re-enable normal control.

A – 5.4: Super Chlorination

If your controller is configured for Super Chlorination, you will have the following options:

- **Control Input (Op):** *This option is only available if the ppm probe is installed.* Choose between ppm and ORP to use to control the Super Chlorination feed.
- **4 Event 28 Day Timer (Op):** To program when the super chlorination should trigger, select 4Event 28Day Timer from the Super Chlorination menu:
  - Selecting Event1 will allow you to select the weekly interval to trigger the Super Chlorination. If the 1st, 2nd, 3rd, or 4th week is selected, the timer will only trigger on that week in the four-week cycle. The Odd Weeks selection will trigger on the 1st and 3rd weeks, the Even Weeks selection will trigger on the 2nd and 4th weeks, and the Every Week selection triggers every week.

    The week number and day of week for the current date is displayed on the bottom right side of these screens.

    The first week is fixed to be the week of Sunday, January 2nd, 2000 and every four weeks afterwards.

  - Next you can select the day of the week (or every day) the event should be triggered on.

Once you make your selection, you will be returned to the 4Event 28Day Timer menu where you will have a new menu item: Event 1 Start Time.

- Select the Event1 Start Time from the 4Event 28Day Timer menu.

This screen allows you to set the time to trigger the event on the programmed weeks/days. The event will trigger at the start time if the controller is running at that time. To toggle AM/PM, press the +/- key. Enter the desired time and press enter.

After setting the time, press the left arrow to return to Super Chlorination's main menu. Here you will notice the next scheduled super chlorination is displayed for you. The controller will also list the last super chlorination here once one has been completed.

- **Maximum Time On (Op):** This value sets the maximum time you want the Super Chlorination on to reach the set point. If the time expires before set point is reached, the controller will trigger the SuperChlor failsafe alarm and end the SuperChlor feeds. (the range is from 0:00 to 18:00 hours)

  An operator can reset the failsafe through the Reset Fail/Safe button; however the failsafe alarm will automatically clear itself when the regular Cl feed begins feeding.
- **ORP Set Point (Op):** *This option is only shown if the Control Input is set to ORP.* This value sets the desired ORP level to shock the pool.
- **ppm Set Point (Op):** *This option is only shown if the Control Input is set to ppm.* This value sets the desired ppm level to shock the pool.

A – 5.5: Dechlorination

If your controller is configured for Dechlorination, you will have the following options:

- **Control Input (Op):** *This option is only available if the ppm probe is installed.* Choose between ppm and ORP to use to control the dechlor feed.
- **Follow Super Chlorination (Op):** Choose whether or not you want your dechlorination to automatically follow your super chlorination.
- **4 Event 28 Day Timer (Op):** The 4 Event 28 Day Timer allows you to program the dechlorination on a schedule. See the section on Super Chlorination's 4 Event 28 Day Timer for details on how to set this.
- **Maximum Time On (Op):** This value sets the maximum time you want the dechlorination on to reach the set point. (the range is from 0:00 to 18:00 hours)
- **ORP Set Point (Op):** *This option is only shown if the Control Input is set to ORP.* This value sets the desired final ORP level.
- **ppm Set Point (Op):** *This option is only shown if the Control Input is set to ppm.* This value sets the desired final ppm level.

A – 5.6: Ozone Control

If your controller is configured for Ozone Control, you will have the following options:

- **Control Input (Op):** *This option is only available if the ppm probe is installed.* Choose between ppm, ORP, or both to use to control the Ozone feed.
- **ORP Set Point (Op):** *This option is only shown if the Control Input is ORP or Both.* This value sets the ORP level that the input must drop below to activate the Ozone.
- **ppm Set Point (Op):** *This option is only shown if the Control Input is ppm or Both.* This value sets the ppm level that the input must drop below to activate the Ozone.
- **ORP Hysteresis (Op):** *This option is only shown if the Control Input is ORP or Both.* This value sets the level that the input must rise above the set point before the Ozone control will turn off the relay.
- **ppm Hysteresis (Op):** *This option is only shown if the Control Input is ppm or Both.* This value sets the level that the input must rise above the set point before the Ozone control will turn off the relay.
- **Fireman Switch (Op):** *This option is only shown if a relay is assigned to the recirculation pump or backwash.* This value sets the minimum amount of time to leave the recirculation pump on or delay the start of backwash after the Ozone relay shuts off.
- **Failsafe Timer (Op):** This value sets the time that the relay is allowed to stay continuously on.

A – 5.7: Heater

If your controller is configured for Heater Control, you will have the following options:

- **Temp. Ctrl Enable (Op):** Enables or disables controlling the Heater using the Temperature Input.
- **Set Point (Op):** *Only shown if Temp. Ctrl is enabled.* This value sets the desired temperature. (the range is from the temperature low alarm to the temperature high alarm)
- **Failsafe Timer (Op):** *Only shown if Temp. Ctrl is enabled.* This value sets the time that the relay is allowed to stay on without reaching set point before the relay is locked out. If the heater has been trying to achieve set point without success for the selected time, the controller will cut power to the heater, flash the Reset Fail/Safe LED on the face panel and display a message to alert the operator.

  An operator must reset the failsafe through the Reset Fail/safe button to re-enable normal control.
- **Fireman Switch (Op):** *This option is only shown if a relay is assigned to the recirculation pump or backwash.* This value sets the minimum amount of time to leave the recirculation pump on or delay the start of backwash after the heater relay shuts off.
- **Hysteresis (Op):** *Only shown if Temp. Ctrl is enabled.* This value sets the level that the input must rise above the set point before the heater control will turn off.
- **Alternate Temperature (Op):** *Only shown if Temp. Ctrl is enabled.* The 4 Event 28 Day Timer allows you to program an alternate set point on a schedule. See the Chlorine (Bromine) Control's Alt Set Point for details on how to set this.

  After the schedule is set, you may choose the alternate temperature set point option and enter the desired setting.

A – 5.8: Chiller

After entering the Control Outputs option, select Chiller Control from the menu. This will allow the programming of the following:

- **Priority Mode (Op):** *Only shown if the heater relay is assigned and temperature control is enabled.* Select how the heater and chiller should operate together.
  - **Mixed Mode:** Operates the heater and chiller like a home thermostat. The chiller's active set point must be above the heater's or the chiller will be disabled.
  - **Heater Primary:** Operate the heater only during regular hours and the chiller only during alternate set point hours. Set the Chiller's set point via the alternate set point.
  - **Chiller Primary:** Operate the chiller only during regular hours and the heater only during alternate set point hours. Set the Chiller's set point via the standard Chiller set point.
- **Set Point (Op):** *only shown if no heater or Priority Mode is set to Mixed Mode or Chiller Primary.* This value sets the desired temperature. (the range is from the temperature low alarm or heater set point to the temperature high alarm)
- **Failsafe Timer (Op):** This value sets the time that the relay is allowed to stay on without reaching set point before the relay is locked out. If the chiller has been trying to achieve set point without success for the selected time, the controller will cut power to the heater, flash the Reset Fail/Safe LED on the face panel and display a message to alert the operator.

  An operator must reset the failsafe through the Reset Fail/safe button to re-enable normal control.
- **Alternate Temperature (Op):** Shared with the heater control, the 4 Event 28 Day Timer allows you to program an alternate set point on a schedule. See the Chlorine (Bromine) Control's Alt Set Point for details on how to set this.

  After the schedule is set, you may choose the alternate temperature set point option and enter the desired setting

  .

A – 5.9: Autofill

If your controller is set up to control an Autofill valve, it can be triggered by the Surge Pit Level (if monitored) or a proximity switch.

- **Set Point (Op):** *Only shown if Autofill sensor type is set to Surge Pit Level.* This value sets the surge pit level that the controller will fill to.
- **Alternate Set Point (Op):** *Only shown if Autofill sensor type is set to Surge Pit Level.* To program when to use the alternate set point, see the section on Chlorine (Bromine) Control's Alternate Set point Timer Settings. After the schedule is set, you may choose the alternate set point option and enter the desired setting.
- **Start Delay (Op):** Sets the time required for the water level to stay below the trigger point before fill begins.
- **End Delay (Op):** Sets the time required for the water level to remain above shutoff point before ending the fill.

- **Failsafe Timer (Op):** This value sets the time that the relay is allowed to stay on without reaching set point before the relay is locked out. If Autofill has been trying to achieve set point without success for the selected time, the controller will cut power to the relay, flash the Reset Fail/Safe LED on the face panel and display a message to alert the operator.

  An operator must reset the failsafe through the Reset Fail/safe button to re-enable normal control.

A – 5.10: Bleed Valve

- **Hi Surge Pit Bleed (Op):** *Only shown if the Surge Pit 4-20mA sensor or the Surge Pit safety input is installed.* Enable or disable opening the bleed valve on high surge alarm and/or high surge safety alarm
- **TDS Control En (Op):** *Only shown if the conductivity sensor is installed.* Enable or disable using TDS to control the bleed valve..
- **Makeup water TDS (Op):** *Only shown if TDS Control is enabled.* Enter the test kit TDS reading for the water controlled by your Autofill. This is used to determine the appropriate TDS set point.
- **Pool TDS cycle (Op):** *Only shown if TDS Control is enabled.* Enter the pools' cycle multiplier of the incoming makeup water. The resulting TDS set point is the incoming makeup water's TDS times this value.
- **Failsafe Timer (Op):** *Only shown if TDS Control is enabled.* This value sets the time that the relay is allowed to stay on without reaching set point before the relay is locked out. If the TDS control has been trying to achieve set point without success for the selected time, the controller will cut power to the relay, flash the Reset Fail/Safe LED on the face panel and display a message to alert the operator.

  An operator must reset the failsafe through the Reset Fail/safe button to re-enable normal control.

A – 5.11: Filter Backwash

If your controller is configured for filter control, you will have the following options:

A – 5.11.1: Triggers

A – 5.11.1.1: Timer Setting:

- **Enable Timer (Op):** Enables or disables triggering backwash from the 4 Event 28 Day Timer.
- **4 Event 28 Day Timer (Op):** *Only shown if the timer is enabled.* The 4 Event 28 Day Timer allows you to program a backwash based on a schedule.

Selecting Event 1 will allow you to select the weekly interval to trigger the backwash.

If the 1st, 2nd, 3rd, or 4th week is selected, the timer will only trigger on that week in the four-week cycle. The Odd Weeks selection will trigger on the 1st and 3rd weeks, the Even Weeks selection will trigger on the 2nd and 4th weeks, and the Every Week selection triggers every week.

The week number and day of week for the current date is displayed on the bottom right side of these screens.

The first week is fixed to be the week of Sunday, January 2nd, 2000 and every four weeks afterward.

After making your selection, you can select the day of the week (or every day) the backwash should be triggered on.

Once you make your selection, you will be returned to the 4 Event 28 Day Timer menu where you will have a new menu item: Event 1 Start Time.

Select the Event 1 Start Time from the 4 Event 28 Day Timer menu. This screen will allow you to set the time to trigger the event on the programmed week/days. The event will trigger at the start time if the controller is running at that time. To toggle AM/PM, press the +/- Key. Enter the desired time and press enter.

A – 5.11.1.2: Pressure Settings:

- **Start BW Enable (Op):** Enables or disables triggering backwash from a high differential pressure. If enabled and the filter pressure type is set to transducer, the controller allows you to set the triggering differential set point. If the filter pressure sensor type is set to contact switch, then the controller will trigger a backwash when it sees a contact closure on the input assigned to be BW Diff. Pres Trig.
- **Set Point (Op):** *Only shown if the Start BW Enable is enabled and the filter pressure sensor types are set to transducer.* When the differential pressure rises above this value for the BW Start Delay, the controller will trigger a backwash.
- **BW Start Delay (Op):** *Only shown if the Start BW Enable is enabled.* This is the amount of time the differential pressure must remain above the Set Point before it triggers a backwash.

A – 5.11: Filter Backwash (continued)

A – 5.11.1: Triggers (continued)

A – 5.11.1.3: Flow Rate Settings:

- **Start BW Enable (Op):** Enables or disables triggering a backwash from a low flow rate.
- **Set Point (Op):** *Only shown if the Start BW Enable is enabled.* When the Flow Rate falls below this value for the BW Start Delay, the controller will trigger a backwash.
- **BW Start Delay (Op):** *Only shown if the Start BW Enable is enabled.* This is the amount of time the flow rate must remain below the Set Point before it triggers a backwash.

A – 5.11.1.4: Flow Volume Settings:

- **Start BW Enable (Op):** Enables or disables triggering a backwash from a flow volume.
- **Flow Vol Increment (Op):** *Only shown if the Start BW Enable is enabled.* Enter the value the volume must increment by to trigger a backwash.

A – 5.11.1.5: Turbidity Settings:

- **Start BW Enable (Op):** Enables or disables triggering a backwash from a high turbidity set point.
- **BW Start Set Point (Op):** *Only shown if Start BW Enable is enabled.* When the turbidity reading reaches or rises above this value for the BW Start Delay time, the controller will trigger a backwash.
- **BW Start Delay (Op):** This value sets how long the turbidity reading must remain at or above the Start BW Set Point before triggering a backwash.
- **End BW Enable (Op):** Enables or disables ending the backwash of a filter early from a low turbidity set point.
- **BW End Set Point (Op):** *Only shown if End BW Enable is enabled.* When the turbidity reading reaches or falls below this value for the BW End Delay time, the controller will end the current filter's backwash.
- **BW End Delay (Op):** *Only shown if End BW Enable is enabled.* This value sets how long the turbidity reading must remain at or below the End BW Set Point before ending the current filter's backwash.

A – 5.11.2: Other features

- **BFFS Duration: (Op):** Prevents a trigger (except manual start) from starting a backwash if triggered within this time period from the end of the previous backwash. Set to zero to disable.
- **Inhibit BW Start (Op):**
  - **Enable/Disable (Op):** Enables or disables locking out backwashes between the Start Time and End Time.
  - **Start Time (Op):** *Only shown if Enable/Disable is enabled.* Prevents a backwash from being triggered between this time and the End Time.
  - **End Time (Op):** *Only shown if Enable/Disable is enabled.* Prevents a backwash from being triggered between this time and the Start Time.
- **Hi BW Pit Options (Op)**: Only shown if the BW Pit Input has been enabled.
  - **Hi BW Pit Action (Op)**: Choose what action you want the controller to take when a backwash pit high alarm occurs while backwashing. While the pit/tank drains, you may either switch the filter back to filter (the default setting), shut down the Recirculation Pump (if the Recirculation Pump has been assigned a relay), or isolate the filter from the system (if the valve type is set to Enhanced Pilot Valve) which prevents re-compacting the filter media.
  - **Hi BW Timeout (Op)**: This value sets the maximum time you wish the controller to hold a backwash while waiting for the backwash pit to drain. If the timeout is reached, the backwash will be canceled and the BW Duration Failsafe alarm will trigger.

A – 5.12: Sensor Wash

If your controller is set up to do a Sensor Wash you will have the following options:

- **4 Event 28 Day Timer (Op):** Once you have entered Sensor Wash, select 4Event 28Day Timer from the menu. The 4 Event 28 Day Timer allows you to program the sensor wash on a schedule. See the section on Super Chlorination's 4 Event 28 Day Timer for details on how to set this.
  - **Start/End Time (Op):** Allows you to set what times the feed may be triggered during a day.
  - **# Of Cycles (Op):** *Only shown if Duration is not zero.* Sets how many times the relay will trigger between the Start and End times.
- **Duration (Op):** Sets how long the feed will run for each cycle. If set to zero, there are no cycles and the relay will simply be on when current time is between the active event's start and end times.

A – 5.13: Enzyme

If your controller is configured to control an Enzyme feed, you will have the following options:

- **Start/End Time (Op):** Allows you to set what times the feed may be triggered during a day.
- **# Of Cycles (Op):** *Only shown if Duration is not zero.* Sets how many times the relay will trigger between the Start and End times.
- **Duration (Op):** Sets how long the feed will run for each cycle. If set to zero, there are no cycles and the relay will simply be on when current time is between the start and end times.

A – 5.14: Polymer

If your controller is configured to control a Polymer feed, you will have the following options:

- **High Set Point (Op):** *Only shown if control type is set to Turbidity Control.* When the turbidity reading rises above this value for the Trigger Delay Time, the controller will trigger the polymer control cycle.
- **Low Set Point (Op):** *Only shown if control type is set to Turbidity Control.* At the end of each control cycle, the controller checks to see if the turbidity reading is below this value. If it is, the control cycle ends, otherwise the controller starts a new control cycle.
- **Cycle Time (Op):** *Only shown if control type is set to Turbidity Control.* This value sets the control cycle duration. At the beginning of each cycle, the relay turns on, stays on for the programmed On Time, then shuts off for the remainder of the cycle time.
- **On Time (Op):** *Only shown if control type is set to Turbidity Control.* This value sets how long the controller will feed polymer during each control cycle.
- **Trigger Delay Time (Op):** *Only shown if control type is set to Turbidity Control.* This value sets how long the turbidity reading must remain above the high set point before triggering the polymer control cycle.
- **Start/End Time (Op):** *Only shown if control type is set to Cycle Timer.* Allows you to set what times the feed may be triggered during a day.
- **# Of Cycles (Op):** *Only shown if control type is set to Cycle Timer.* Sets how many times the feed will be triggered between the Start and End times.
- **Duration (Op):** *Only shown if control type is set to Cycle Timer.* Sets how long the feed will run for each cycle.

A – 5.15: UV Turndown

If your controller is configured to control a UV unit, you will have the following options:

- **Combined Cl Set Point (Op):** *This option is only shown if both the free Cl and total Cl probes are installed.* This value sets the Combined Cl level that the input must be equal to or drop below to activate the turndown.
- **Start Delay (Op):** *This option is only shown if both the free Cl and total Cl probes are installed.* Time the combined ppm must remain at or below set point before activating turndown.
- **Fireman Switch (Op):** *This option is only shown if a relay is assigned to the recirculation pump or backwash.* This value sets the minimum amount of time to leave the recirculation pump on or delay the start of backwash after the UV turndown relay turns on.

A – 5.16: Recirculation Pump

If your controller is configured to control the Recirculation Pump, you will have the following options:

- **Pres. Alarm Delay (Op):** Delay pressure and vacuum alarms from triggering for this amount of time whenever the recirc pump starts up.
- **Heater Fireman Switch (Op):** *This option is only shown if a relay is assigned to the Heater control.* This value sets the minimum amount of time to leave the recirculation pump on or delay the start of backwash after the heater shuts off.
- **Ozone Fireman Switch (Op):** *This option is only shown if a relay is assigned to the Ozone control.* This value sets the minimum amount of time to leave the recirculation pump on or delay the start of backwash after the Ozone relay shuts off.
- **UV Turndown Fireman Switch (Op):** *This option is only shown if a relay is assigned to the UV Turndown.* This value sets the minimum amount of time to leave the recirculation pump on or delay the start of backwash after the UV turndown relay turns on.

A – 5.16.1: VFD Control

If your controller is configured to operate a VFD, this menu allows you to configure the VFD control settings for the Recirculation Pump. Once you have selected VFD Control you will have the following items to choose from:

- **OOR alarm delay (Op):** *This option is only shown if the Control Input is set to Flow Meter.* If the output required to meet the set point exceeds 100%, the triggering of the Out Of Range (OOR) alarm will be delayed by this amount of time. Set to 0 to disable the alarm.

A – 5.16: Recirculation Pump (continued)

A – 5.16.1: VFD Control (continued)

- **Set Point (Op):** Allows you to set the value to control to. (in % or flow rate depending on what the control input is set to).
- **Dead Band (View Only):** *This option is only shown if the Control Input is set to Flow Rate.* The VFD output will not change until the input is this far away from the set point.
- **Backwash Output (View Only):** *This option is only shown if the backwash control is configured.* Sets the VFD percent output to use when backwashing.
- **Minimum Output (View Only):** The controller will always keep the VFD output above this % except when the relay is off.

A – 5.16.1.1: Scheduled Turndowns

Scheduled turndowns will override the regular set point at their scheduled times.

If two scheduled turndowns overlap, turndown 1 has the highest priority; turndown 2 has the second highest priority, and so on. Once the highest priority turndown's scheduled time ends, the next highest active turndown's set point will be used until its time ends or a higher turndown becomes active.

- **Cancel on alarm (Mgr):** If a high or low alarm for pH, ORP, Cl, temperature trigger, or a high turbidity alarm triggers, a turndown failsafe is triggered and all scheduled turndowns are canceled until the failsafe is cleared.
- **Heater/Ozone/UV turndown modes (Mgr):**

Each control has two modes available:

- **Minimum Flow Rate** – scheduled turndowns will adjust their targeted flow rate to ensure the flow rate is above the equipment's minimum flow rate before the equipment is allowed to run.

  If an input wants to activate the control during the turndown, the input must remain above/below the set point for five minutes before that feed is enabled. Then if the flow rate is below the equipment's minimum flow rate, the flow rate is slowly raised to a rate just above the minimum flow rate. Only once the flow rate is above the minimum flow rate for that equipment will that control be allowed to run.

  If the control is already active when the turndown starts and the turndown's set point is lower than the equipment's minimum flow rate, the controller will slowly decrease the flow rate to a point just above the equipment's minimum flow rate instead of the turndown's programed flow rate.

- **Normal Operation** – the feed will shut off if the flow rate drops below the programed minimum flow rate.

A – 5.16.1.2: Manual Turndowns

Manual turndowns are configured here but are triggered from the main menu.

Manual turndowns override the normal and scheduled set points.

There are four manual turndowns available. Each manual turndown has the following settings:

- **Duration (Op):** Sets how long the manual turndown will run. Must be set to non-zero for the turndown to show up on the main menu.
- **Set Point (Op):** Sets the type of set point (% out or flow rate) and the value to control to for the manual turndown.
- **Label (Op):** Allows you to change the name of this manual turndown. There is a 12 character maximum.

A – 6: Control Options

A – 6.1: Flow Restored Feed Delay

- **Enable / Disable (Op):** Once you have entered the Flow Restored Feed Delay option, select Enable / Disable from the menu. Here you will be able to select whether you want to delay the chemical feeders after flow is restored to the system.
- **Delay Duration (Op):** *This option is only available if flow restored feed delay is enabled.* Enter the desired time that the chemical feeders must wait to operate after flow is restored.

A – 6.2: Power Saver

Power Saver is a timer triggered function that saves energy by shutting down the recirculation pump for programmable periods of time while the pool is not in use.

When active, power saver has the following states:

- CONTROLLING: At least one control function is currently feeding. Once all feeds have finished, the system will enter the GOING TO SLEEP state.
- GOING TO SLEEP: All control functions must be satisfied (they don't turn their feeds on) for the Enter Sleep Delay duration before allowing system to enter the SLEEPING state.
- SLEEPING: Timed period (Sleep Duration) where the shutdown of recirculation pump is triggered and all feeds are disabled. After entering SLEEPING state, the recirculation pump will continue to run until the heater and ozone fireman switch timers run out. The sleep timer starts when all conditions have been met, not when controller shuts down the recirculation pump. Only a timer triggered backwash, the sleep timer expiring, or the Power Saver timer expiring will put the system into the WAKING UP state. No feeds or input alarms will operate while the system is asleep or waking up.
- WAKING UP: Timed period (Exit Sleep Delay) where the recirculation pump is ran before allowing feeds to operate. Once the wake up time expires, if the Power Saver timer expired, the system will remain awake even if all feeds are satisfied. Otherwise the system enters the CONTROLLING state, performing a backwash if triggered, and will reenter GOING TO SLEEP again once all feeds have been satisfied again.

While Power Saver is active, the system automatically uses the Alternate Temperature set point for the Heater and the Alternate ORP and/or Alternate ppm set points for the Cl feed.

- **Enable (Op):** Enable or disable the Power Saver feature.
- **4 Event 28 Day Timer (Op):** The 4 Event 28 Day Timer allows you to program power saver's schedule. See the section on the Chlorine (Bromine) Control's Alt Set Point for details on how to set this.
- **Sleep Duration (Op):** Sets how long the controller will sleep.
- **Enter Sleep Delay (Op):** Sets how long to wait after all of the feeds have been satisfied before entering SLEEP (i.e. the GOING TO SLEEP duration). If any feed starts feeding during this time, the controller goes back to the CONTROLLING state.
- **Exit Sleep Delay (Op):** Sets how long to wait after coming out of sleep before allowing any feeds to run. (i.e. the WAKING UP duration).
- **Alternate ORP (Op):** Sets the alternate ORP value used during power saver and the Cl feed's alternate set point event timer.
- **Alternate ppm (Op):** Sets the alternate ppm value used during power saver and the Cl feed's alternate set point event timer.
- **Alternate temp (Op):** Sets the alternate temperature value used during power saver and the heater's alternate set point event timer.

A – 6.3: pH Lockout

pH lockout (Mgr) disables the sanitizer feed when a pH high and/or low alarm is activated:

Full lockout:	The Cl (Br) feed is disabled when either a pH high or low alarm occurs.
Feed direction:	For pH feed up, the Cl (Br) feed is disabled on a pH low alarm. For pH feed down, the Cl (Br) feed is disabled on a pH high alarm.
Disable:	pH alarms do not disable the Cl (Br) feed. (**Not Recommended**)

⚠Warning: Disabling the pH lockout will allow for chemical overfeeds which may damage equipment or harm patrons.

A – 7: Calculations

A – 7.1: Enter Parameters

By selecting this, the controller will step you through entering the values for Pool Volume, whether it should use TDS for calculations, Calcium Hardness, and Alkalinity. Once the values have been entered, the calculated LSI & Ryzner reading will appear in the menu and on the display.

A – 7.2: LSI Setup

- **Use TDS?:** Selects if the controller should use TDS for the LSI/RSI calculations.
- **Pool Volume:** Allows you to enter the volume of the pool.
- **Display RSI/LSI:** Allows you to select if the RSI/LSI information is displayed on the routine display.

A – 8: System Configuration

Press Menu on the controller's face panel and select System Configuration from the menu. This will allow you to configure the following for the system:

A – 8.1: System Info

This information menu displays the controller's system type, serial number, and firmware version information. From this menu you can also view the current Ethernet network status, Modem status, and EZConnect status. The Ethernet network status menus display the Ethernet card's version information, current network configuration, and link status.

A – 8.2: Communication

Once you have entered System Configuration, select Communication from the menu. Under communication, you can select from the following.

A – 8.2.1: EZConnect

(Mgr) If the current user's access code is set, this menu allows you to view, create and disable EZConnect authentication codes. If the current user's access code is not set, this menu will only display a notice explaining this.

A – 8.2.2: Ethernet Setup

These parameters should be set to values provided by the network's administrators.

- **Enable DHCP (Op):** Enables/disables using DHCP. If DHCP is enabled, the controller will retrieve its IP address information from a DHCP server on the network. If DHCP is disabled, the IP address information must be set manually via the remaining items listed here.
- **IP Address (Op):** *This option is only shown if DHCP is disabled.* Sets the controllers IP address.
- **IP Netmask (Op):** *This option is only shown if DHCP is disabled.* Sets the controllers IP netmask.
- **IP Default Route (Op):** *This option is only shown if DHCP is disabled.* Sets the controllers IP default route/gateway.
- **TCP Port (Op):** Sets the TCP port to listen for connections on. Acceptable values are 1024-1089 and 1091-65535.
- **DNS Server 1 (Op):** Sets the IP address for the primary DNS server. Required for email call outs.
- **DNS Server 2 (Op):** (Optional) Sets the IP address for the secondary DNS server which is only used if DNS server 1 cannot be contacted.

A – 8.2.3: SMTP Setup

- **EZMail Enable (Op):** *Only shown if EZConnect is enabled.* Enable or disable using EZConnect to send email and text message based callouts.
- **SMTP Server Addr (Op):** *Only shown if EZConnect or EZMail is disabled.* Sets the email SMTP server address used by alarm call out to send email and text messages.
- **SMTP Server Port (Op):** *Only shown if EZConnect or EZMail is disabled.* Sets the email SMTP TCP port. This value should be set to 25 unless otherwise instructed by a network administrator.
- **Sender Email (Op):** *Only shown if EZConnect or EZMail is disabled.* Set the email address to use for the From field in email callouts. If left blank, an email address based off this unit's serial number will be used.
- **Authentication (Op):** *Only shown if EZConnect or EZMail is disabled.* Enable/Disable SMTP authentication. Many SMTP servers require users to authenticate with a user name and password before sending email through them. Usually used with SSL or TLS encryption.
- **Auth User Name (Op):** *(Only shown if Authentication is enabled)* Logon user name to use for Authorization.
- **Auth Password (Op):** *(Only shown if Authentication is enabled)* Password to use for Authorization.
- **Encryption Type (Op):** *Only shown if EZConnect or EZMail is disabled.* Select the type of encryption to use with the SMTP server (SSL, TLS, or none). SSL and TLS are usually used in combination with Authentication.

A – 8.2.4: Call Out Setup

Here you can set the parameters for the alarm call out functions.

- **Call Out Enable (Op):** Choose to enable or disable call outs.
- **Call Start Time (Op):** Sets the time the controller will start allowing call outs.
- **Call End Time (Op):** Set the time the controller will stop allowing call outs. Set this and Call Start Time to same value for 24 hour callouts.
- **Pre-Delay (Op):** Sets the amount of time the controller will delay to allow for alarm to reset before calling out.
- **Recipients Setup (Op):** Allows configuration of eight recipients which can individually be configured for fax, pager, email, or text message call-out.
  - **Call-Out Type:**
    - **Email:** Sends a plain text email to the recipient's email address containing all active alarms, the times they were triggered, and a summary of inputs and set points.
    - **HTML Email:** Sends an html formatted email to the recipient's email address containing all active alarms, the times they were triggered, and a summary of inputs and set points.
    - **Text Message:** Sends a text message with a list of active alarms to a text pager or cell phone using email.
    - **Disabled:** Disables the call-out recipient.
  - **Email address (Email):** *This option is only shown if the call-out type is set to email.* Enter the recipients email address. Enter the local part of the email address (the part before the @) into the first screen, then enter the domain part of the email address (the part after the @) into the second screen.
  - **Email address (text message):** *This option is only shown if the call-out type is set to text message.* The recipients email address for text messaging is usually in the form of the pager's or cell's ten-digit-number@domain.com or the like. (2223334444@txt.att.net). Enter the phone number into the first screen, then enter the domain part of the email address (the part after the @) into the second screen. Check with the recipient's wireless carrier for the correct email address to use.
  - **Test:** Triggers a test call-out of the current recipient only. You may only test one recipient at a time. **NOTE: if the callout type is Text Message, an alarm must be active for the test message to be sent.**
  - **Current State:** Shows the current state of the recipient's call-out when a call-out is in progress.
  - **Last Status:** Shows the status of the previous call-out for the selected recipient. This is only updated when a call-out has been completed. Some of the possible results are: success, no dial tone, busy, no answer, and no carrier.

Common North American text message email domains	
AT&T	@txt.att.net
Rogers	@pcs.rogers.com
Sprint PCS	@messaging.sprintpcs.com
T-Mobile	@tmomail.net
US Cellular	@email.uscc.net
Verizon PCS	@vtext.com

A – 8.3: Date, Time & Units

Once you have entered System Configuration, select Date, Time & Units from the menu. Here you can enter the values for the following:

- **Units (Op):** Here you can choose from U.S. or Metric measurements.
- **Date Format (Op):** Here you can choose the format for the date.
- **Current Date (Op):** Here you can set the current date.
- **Current Time (Op):** Here you can set the current time. Use the + / - key to toggle between AM and PM.

A – 8.4: User Setup

Once you have entered System Configuration, select User Setup from the menu. Here you can enter the access codes for Operators and Managers. You can enter 6 codes for Operators and 2 codes for Managers.

See the section on Access Codes for more information.

A – 8.5: Display Options

Once you have entered System Configuration, select Display Options from the menu.

- **Page Delay (Op):** Here you can set the delay for scrolling to the next page in the normal display. These screens will only scroll when not in a menu screen.
- **Backlight Delay (Op):** *Only shown if the LCD display with the white backlight display is installed and one of the two-state backlight modes is used.* When a key is pressed, delay this amount of time before dimming or shutting off the backlight.
- **Toggle LCD Mode (Op):** Toggles the LCD display between negative and positive modes.

A – 9: VFD Turndowns

VFD Turndowns allow you to trigger or cancel manual turndowns (must have a manual turndown enabled for this menu to appear). This will also display the next scheduled turndown.

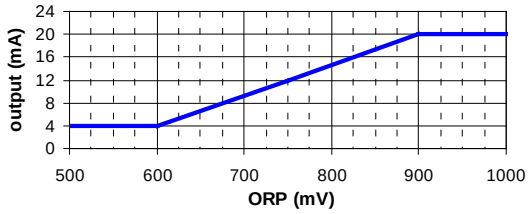
A – 10: 4-20mA Outs

The 4-20mA output board allows you to connect to either a building management system or to control a VFD.

If you have a 4-20 mA board installed in your system you may choose 4-20mA outputs from the main menu. By selecting one of the 4-20mA output channels you will be able to select the following:

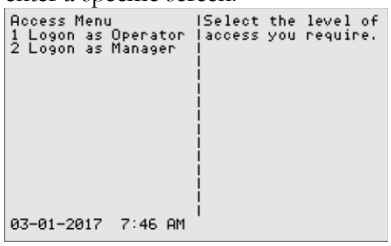
- **Usage (Mgr):** Selects what to use the selected 4-20mA output channel for.
  - **Recorder Out:** Output a 4-20mA signal based on one of the controller's inputs, feed set points, or alarm set points. Once you have selected Recorder Out, you will need to then select the Source (see below).
  - **VFD Control Out:** Use this channel to control a VFD unit connected to the recirculation pump.
  - **Disable:** Disables the 4-20mA output.
- **Source (Mgr):** *Only shown if the usage is set to Recorder Out.* Configures the recorder out's signal source. This is broken up into four different categories to make selection of the source easier. Select the Recorder Out's source from one of the following lists:
  - **Inputs:** Lists all enabled inputs compatible for outputting on the selected 4-20mA output channel.
  - **Feed Set Points:** Lists all enabled controls using feed set points. Note that some feeds have more than one set point to control to. If a control's feed point is selected, the output signal will be whatever value that feed is controlling to.
  - **High Alarm Set Points:** Lists all available high alarm set points for use as the source.
  - **Low Alarm Setpoints:** Lists all available low alarm set points for use as the source.
  - **Disable:** Disables the recorder out.
- **20 ma value (Mgr):** *Only shown if usage is set to Recorder Out.* Enter the value which the recorder will output 20 mA for.
- **4 ma value (Mgr):** *Only shown if usage is set to Recorder Out.* Enter the value which the recorder will output 4 mA for.

Example: Source: ORP input, 4 mA value = 600 mV, 20 mA value = 900 mV. ORP values between 600 and 900 mV are lineally scaled between 4 and 20 mA as shown below.



A – 11: Access Menu

The controller will require users to enter their access code before allowing them to enter the menus or set any values under the quick set keys. The controller automatically displays the access screen whenever a user does not have a high enough access level to enter a specific screen.



To enter an Operator access code, press 1.
To enter a Manager access code, press 2.
If at any time you wish to logon as another access level, you may do so by pressing the Menu key and selecting Logon from the main menu.

Section B: The Normal Display

The normal display refers to the screens that display all of your inputs, current alarms, and status messages. These are read only and do not offer any selections to chose from.

B – 1: Inputs and Feeds

When no alarms or status messages are present, the entire screen will be used to display all of the enabled inputs. If a particular input is used by a control output and the control output is feeding based off of that input, the controller will display a message next to that input indicating so.

Other information such as LSI/RSI calculated values and Customer/Location/Rep information may also be displayed.

If there are more items to show than there is room for, the controller the controller will page through them until they all have been displayed, then start over.

- Pressing the right arrow key (Next) will display the next page.
- Pressing the Lock Screen button will prevent the controller from paging the screen to show more inputs, alarms, and other status information.
- You can adjust the rate at which the controller pages by pressing the up and/or down arrow keys.

B – 2: Alarms & Status messages

When one or more alarms are active, the bottom three lines are used to list them. If more than three alarms are active, the controller will page through them three at a time until they all have been displayed, then start over.

Super chlorination, dechlorination, sensor wash, backwash, and power saver all display status information in this area as well. If there are any active alarms while one or more of these control functions' are active, the alarms will be shown every other page while the control functions will alternate with each other.

```
pH Level              6.8     Feeding Up
ORP Level             702 mV
Chlorine              1.9 ppm Feeding Up
Conductivity          1000 µmho
Temperature           68 °F  Heating

Turbidity            5.00 NTU
pH Inventory          0.5 ft
Chlorine Inventory    0.5 ft

Filter Differential    10 psi
-----------------------------------------
pH Inventory Low
Chlorine Inventory Low
pH Low ALARM!
03-01-2017  8:30 AM
```

```
Surge Tank Level     1.00 ft
BW Pit Level         1.00 ft

Filter Flow                  500.0 gpm

Last Backwash 02-27-2017 at 10:45 AM
Backwash started by: Manual
Backwash ended by: Timer Cycle



-----------------------------------------
ORP Low ALARM!
ppm Low ALARM!
Conductivity Low ALARM!
03-01-2017  8:30 AM
```

```
pH Level              6.8     Feeding Up
ORP Level             702 mV
Chlorine              1.9 ppm Feeding Up
Conductivity          1000 µmho
Temperature           68 °F

Turbidity            5.00 NTU
pH Inventory          0.5 ft
Chlorine Inventory    0.5 ft

Filter Differential    10 psi
-----------------------------------------
Temperature Low ALARM!


03-01-2017  8:30 AM
```

```
Surge Tank Level     1.00 ft
BW Pit Level         1.00 ft

Filter Flow                  500.0 gpm

Last Backwash 02-27-2017 at 10:45 AM
Backwash started by: Manual
Backwash ended by: Timer Cycle



-----------------------------------------
pH Inventory Low
Chlorine Inventory Low
pH Low ALARM!
03-01-2017  8:31 AM
```

Section C: Using the Face Panel Quick Keys

C – 1: The Set Points Key

The Set Points Key on the front face panel, when pressed, allows you to quickly change desired feed set points for the various control outputs that are enabled.

```
<========== Feed Set Points ==========>
Press Set Point button again for alarms
1 pH                          7.5
2 ORP                         750 mV
3 Alternate ORP               720 mV
4 Alternate ppm               0.5 ppm
5 Heater Temp                 80 °F
6 Alt Heater Temp             75 °F
7 Polymer High                5.00 NTU
8 Polymer Low                 2.00 NTU
9 SuperChlor                  800 mV

>>   Press next for more selections.  <<

03-01-2017  8:48 AM  (1 of 2) (More+)
```

To change the existing feed set point, first select the desired option, input the new value, and then press enter.

Pressing the Set Points key a second time will display the alarm set points for all of the enabled inputs.

```
<========== Alarm Set Points ==========>
Press Set Point button again for feeds
1 pH High Alarm               9.0
2 pH Low Alarm                6.0
3 ORP High Alarm              800 mV
4 ORP Low Alarm               700 mV
5 Free Cl High Alarm          5.0 ppm
6 Free Cl Low Alarm           0.5 ppm
7 Cond. High Alarm            3500 µmho
8 Cond. Low Alarm             500 µmho
9 Temp High Alarm             90 °F

>>   Press next for more selections.  <<

03-01-2017  8:49 PM  (1 of 2) (More+)
```

To change the existing alarm set point, first select the desired option, input the new value, and then press enter.

C – 2: The Relay Mode Key

What you see when you press the Relay Mode key on the front face panel the first time depends if the recirculation pump is assigned a relay or not. If it is, the recirculation pump menu is shown allowing you to start and stop it, and if controlling a VFD, manually override the speed.

```
<========= Recirculation Pump =========>
Press button again for Relay Modes
  Status: On      @          90.3 %
  Current Flow Rate:        899.3 gpm
  Current VFD set point:    900.0 gpm

1 Shutdown
2 Manual override speed




03-01-2017  10:51 AM
```

Manual override speed has two options:

- Manual % Out sets the VFD output at a specified value.
- Manual Flow Rate changes the VFD output to maintain a specified flow rate.

Pressing the relay mode button again takes you to the same screen controllers without recirculation pump control see first, the list of local relays.

```
<============ Local relays ============>
Press button again for more outputs
1 r1 pH feed down   AUTO        Off
2 r2 Cl Feed        AUTO        Off
3 r3 Recirc Pump    AUTO        On
4 r4 Sensor Wash    AUTO        Off
5 r5 BW Filter 1    AUTO        Filter
6 r6 BW Filter 2    AUTO        Filter
7 r7 BW Filter 3    AUTO        Filter
  r8 Unused                     Off
8 r9 BW Pri Valve   AUTO        Open



03-01-2017  10:50 AM
```

The local relays screen shows you which options have been assigned relays, and each of the relays' current mode (AUTO/MANUAL OFF/MANUAL ON) and its state (Off or On).

Pressing the Relay Mode key again will cycle through the relay expansion modules connected to the controller (if any), showing what is assigned to those relays and their current state.

```
<========= Expansion Relays 1 =========>
Press button again for more outputs
1 x1r1 Autofill     AUTO        On
2 x1r2 Ozone        AUTO        On
3 x1r3 Heater       AUTO        Off
4 x1r4 Polymer      AUTO        Off
5 x1r5 Bleed Valve  AUTO        Off




03-01-2017  8:50 AM
```

By selecting one of the assigned relays, you are allowed to choose between automatic, manual on or manual off. Unused relays and the alarm relay cannot be manually overridden, but their current state is always displayed.

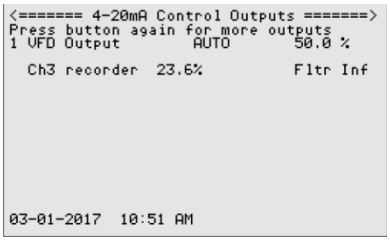
If Manual On is selected, you may be prompted to enter how long the relay can stay in Manual On before returning to Auto (the maximum on time is 30 minutes).

To test a relay or to prime a pump (on the local relay screen), lock the screen while in the main local relays menu, then press the relay's numeric key (i.e., for relay 3, press the 3 key). This will turn the relay on for as long as you are pressing that key. If the relay is already on, this will have no effect.

The Relay Expansion modules have a button to test the relays.

If you have the controller set up to control a VFD or if any 4-20mA recorder outs have been assigned,

pressing the Relay Mode Key again will display the 4-20mA Control Outputs.



From here you can also switch the VFD between auto and manual on. The manual on is the same as Manual override speed in the recirculation pump screen.

C – 3: The Cal Key (calibration)

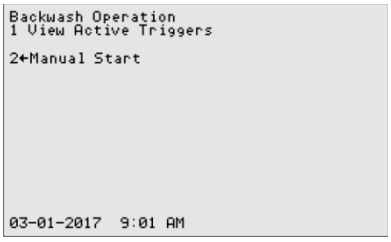
The Cal (calibration) key on the front face panel, when pressed shows you the inputs you can perform a single point calibration. The standard inputs that can be calibrated are pH and ORP. Any other inputs you have enabled can also be calibrated from this Menu screen. Select the input you wish to calibrate and enter the proper value.

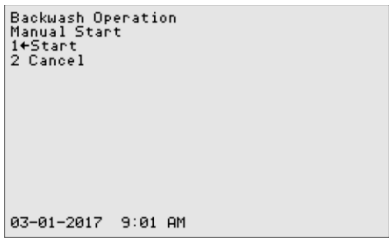
Perform a single point calibration if the reading is off by a consistent amount throughout the input range.

If the readings are accurate at one reading, but are off by an increasing amount the farther away you go from that reading, contact your distributor.

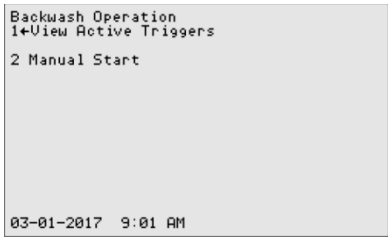
C – 4: The Backwash Key

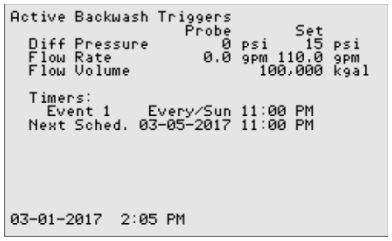
When all of the necessary components needed for backwash have been assigned and configured, and if there are no conditions preventing a backwash, the Backwash Key allows you to start a manual backwash.



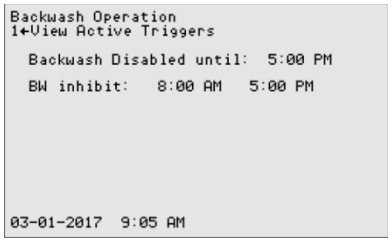


If any automated backwash triggers have been enabled, you may also view them along with their associated input if applicable by selecting the View Active Triggers.

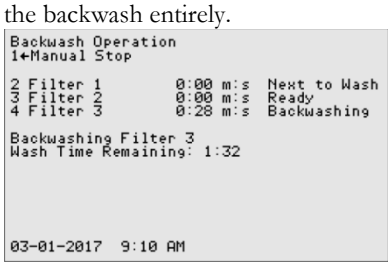


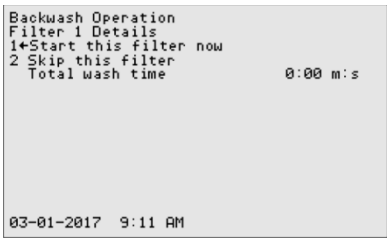


The Backwash Key's main screen will also list anything preventing a backwash from occurring such as an Emergency Off, configuration problems, and the Backwash Inhibit Timer.

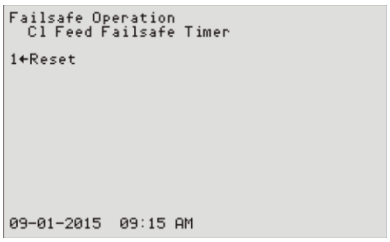


During a backwash, the Backwash Key displays the progress of each filter and allows you to restart, switch to, or cancel a particular filter as well as cancel the backwash entirely.





C – 5: The Reset Fail / Safe Key



The Reset Fail / Safe key on the front face panel, when pressed, provides the following information and options:

- Lists any active failsafe alarms and provides the option to reset them. A failsafe alarm is generally triggered when one of the relays has remained on past the set time the function has been given to reach its set point. By choosing to reset the failsafe, the control that triggered the failsafe will be able to resume operating normally once again.

⚠ Warning: Before resetting any failsafe alarms, ensure that all functions of the controller are working properly.

- Displays the remaining time a relay may remain on before a failsafe will occur for each active feed with a failsafe time set.
- Provides the option to abort the Flow Restored Feed Delay whenever the flow restored feed delay is enabled and is currently delaying feeds.

C – 6: The Emergency Off Key

When the Emergency Off button is pressed, all relays are automatically shut off except for the alarm relay which will turn on. All the other relays will remain off until the emergency off button is press again.

Section D: BECSys for Windows

To ensure you receive the latest version of BECSys for Windows, please download the software by entering the following web address in a web browser:

http://dnld.becsys.com

D – 1: System Requirements

Windows XP
Windows Vista
Windows 7
Windows 8
Windows 10

D – 2: Installation

You MUST be an Administrator to install BECSys for Windows.

1) Enter the following web address in a web browser: http://dnld.becsys.com
2) Under the "Downloads" section, click on the link listed below "BECSys for Windows" and save it to your local drive in a location you can find later.
3) After downloading the file, locate the file on your local drive.
4) Double click on the file.
5) Follow the prompts to install BECSys for Windows.
6) Once it is finished installing **you must reboot the computer before using the program.**

After installing BECSys for Windows, a shortcut to the manual is located in the start menu under the All Programs→BECSys for Windows group. This will walk you through the steps to create a site.

The BECSys controller requires no maintenance other than a periodic calibration check and sensor cleaning.

E – 1: Potentiometric Sensors (pH and ORP)

E – 1.1: Electrode Cleaning

Slow response time and large offsets may indicate the electrode has become coated. The nature of the coating will dictate the type of cleaning technique that should be used.

⚠ Warning: You may lightly blot the water on a pH sensor tip on a paper towel, but never vigorously rub or wipe the pH bulb because this may scratch the delicate outer layer on the pH glass impairing its response.

- Soft coatings, like bacterial films, are best removed using a squirt bottle or the water jet from a faucet. If this is not successful, then gently wipe with a soft wet cloth.
- For a more severe coating, first try a strong detergent (something similar to Dawn liquid detergent) and warm water, using a soft brush (like a toothbrush). Isopropyl alcohol on a Q-tip is another good choice. Rinse the measuring end in distilled water before reinstallation.
- Greasy and oily coatings are best removed with a detergent solution or a solvent that will not attack the sensor body. Methanol and isopropyl alcohol are good choices for solvents. Acetone, MEK, THF, or trichloroethane will irreparably harm the electrode.
- Hard coatings, like calcium or lime scale, are best removed with a solvent appropriate for the particular coating. A 5% solution of hydrochloric acid (HCl) would be a good choice for calcium scale. If unsure of the proper solvent to remove a hard mineral coating, then alternate between a 5% hydrochloric acid and a 4% sodium hydroxide (NaOH) for 10 minutes each. After treating the electrode with these strong acids or bases, rinse the electrode with water and soak it in a pH 4 buffer for at least 1/2 hour.
- The platinum tip of an ORP sensor can be cleaned with an abrasive as a last resort. Gently scour the platinum with a 600 grit wet emery cloth, or preferably, a 1-3 micron alumina polishing powder.

E – 1.2: Long-Term Storage

Save the wetting cap that came with the sensor for long-term storage. After removing the sensor from the flow cell, clean it as in routine maintenance, then store it in the wetting cap using a pH 4 buffer saturated with potassium chloride (KCl). The potassium chloride will prevent electrolyte from leaching out of the sensors reference cell. The wetting cap only needs to be half full. If a number of sites are going to be serviced, for example, at the end of a season, then it might be a good idea to carry a pint of 4.0/KCl storage solution.

E – 2: Free Chlorine Sensor (membrane)

Check the sensor measurement at regular intervals (at least once a month), and perform a recalibration if necessary.

As a rule of thumb, refill the measuring cell with electrolyte once per season (or every 12 months).

E – 2.1: Cleaning

- If the sensor membrane is visibly soiled, then remove the sensor from the flow cell and clean the membrane with a gentle water jet, or soak the membrane for a few minutes in a 1% to 10% hydrochloric acid (HCl) solution. Avoid chemical additives as they may damage the membrane.
- Replace a heavily soiled or damaged membrane.

E – 2.2: Long-Term Storage

Save the yellow protective cap that came with the sensor for long-term storage. After removing the sensor from the flow cell, empty the measuring cell of electrolyte (particularly if dehydration of the membrane is possible). Rinse the measuring chamber and electrode shaft with cold water and let them dry. Then screw the measuring cell down loosely and not to the stop, so that the membrane remains unstressed. When the sensor is put back into service, it will have to be refilled with electrolyte and run through an initial polarization before calibration.

E – 2.3: Filling electrolyte

- Unscrew the measuring chamber from the shaft.
- Hold the measuring chamber at an angle and fill in approximately 7 to 8 ml electrolyte, up to approximately 1 cm under the top edge.
- Tap the filled chamber several times on a flat surface to release any air bubbles.
- Screw the electrode shaft into the measuring chamber vertically from above, displacing all air from inside. Tighten slowly to the stop.

E – 3: Free Chlorine Sensor (CP-1)

E – 3.1: Long Term Storage

Drain the CP-1 cell completely, remove the acrylic cover from the CP-1 cell, discard the glass beads, and allow all to dry. The copper and platinum won't degrade if kept dry. Never allow the sensor to remain stored in the cell with wet glass beads forming a path between the platinum and copper electrodes; the copper will continue to act as a sacrificial electrode and a large section of the copper disc will corrode away over time, dramatically reducing the useful lifetime of the sensor. Add a new set of replacement glass beads when the sensor is put back into service (BECS part number 2210444).

E – 3: Total Chlorine Sensor

Check the sensor measurement at regular intervals (at least once a month), and perform a recalibration if necessary.

As a rule of thumb, refill the measuring cell with electrolyte every 3 to 6 months. The membrane should be replaced once a year.

E – 3.1: Long Term Storage

After removing the sensor from the flow cell, empty the measuring cell of electrolyte (particularly if dehydration of the membrane is possible). Rinse the measuring chamber and electrode shaft with cold water and let them dry. Then loosely screw the measuring cell down. The membrane must not rest against the measuring electrode.

When the sensor is put back into service, the electrode tip must be cleaned with the special abrasive paper and a new membrane cap must be used.

E – 3.2: Cleaning The Electrode Tip

To clean the electrode tip, first remove the membrane cap. Be sure to expose the vent when removing the membrane cap to prevent damage to the membrane. Clean the electrode finger using a clean, dry paper towel. The special abrasive paper is used on just the electrode tip. Place the special abrasive paper on a paper towel and hold it at one corner. Hold the probe perpendicular to the paper towel and abrasive paper and rub the electrode tip two or three times across the abrasive paper. Once the tip has been cleaned, replace the electrolyte.

E – 3.3: Filling Electrolyte

The lower portion (below the upper band) unscrews. Be sure to lift the hose ring that covers the vent while removing the membrane cap.

⚠ Warning: The membrane may be damaged if the vent is not opened while removing the membrane cap.

⚠ Warning: Never touch the electrode finger.

Fill the membrane cap to the edge with the electrolyte. Make sure there are no bubbles.

Insert the sensor into the membrane cap. Slowly screw the membrane cap onto the sensor. Excess electrolyte will escape through a valve in the membrane cap – do not block this valve. Rinse excess electrolyte off with water.

To re-install the sensor in the flow cell:

The Probe Ring is installed first.

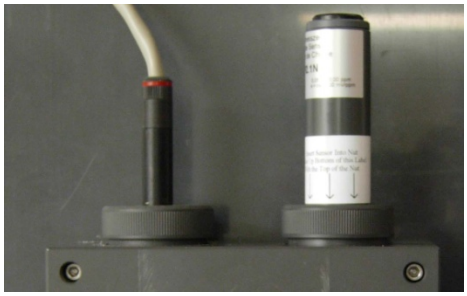
E – 3.3: Filling Electrolyte (continued)

Slide the smaller diameter O-Ring up the sensor body until it rests against the Probe Ring.

Insert the larger diameter O-Ring into the O-Ring retainer.

Slide the O-Ring retainer (O-Ring side towards membrane) up against the O-Ring just installed.

Insert the complete assembly into the Flow Cell. Check the Teflon Tape around the Probe Nut and re-wrap if necessary. Use the Probe Nut to secure the sensor inside the Flow Cell. The top of the Probe Nut should be at the bottom of the label.



The voltage applied by the controller to the Free Chlorine Sensor polarizes the surface of the gold cathode. The polarization period (one hour) must elapse before calibration is performed based on the results acquired through the use of a DPD test kit.

E – 4: Conductivity Sensor

E – 4.1: Cleaning

- The sensor should be kept as clean as possible for optimum measurement accuracy. The frequency of cleaning will depend upon the application.

⚠ Warning: Residue from cleaning solutions, or even skin contact, can leave trace elements on the sensor that may affect the reading,

- When necessary, wash with strong detergent (something similar to Dawn liquid detergent) and warm water, using a pipe cleaner or small soft brush for most fouling. Rinse with tap water to completely remove the detergent, and then perform a final rinse with distilled or de-ionized water.
- For hard scale, try a mild acid solution. Vinegar will often do it, 5% hydrochloric acid if the vinegar doesn't work. You can use acetone or something similar on this sensor.

⚠ Warning: Do not soak the sensor in a strong solvent as the O-rings may be attacked after time.

Section F: Feed Charts

Use the charts on the following pages to determine the correct amount of chemical to add to spa or pool water to achieve desired conditions. Choose which chart to use by the chemical indicated and the number of gallons to be treated.

F – 1: Spa Feed Charts

Quantity of Muriatic Acid Needed to Lower Total Alkalinity

Desired Decrease In ppm	Gallons in Spa					
	100	150	250	500	750	1000
10	1.25 ts	2.00 ts	1.00 tb	2.00 tb	3.00 tp	0.25 cp
20	2.50 ts	4.00 ts	2.00 tb	0.25 cp	0.33 cp	0.50 cp
30	1.25 tb	2.00 tb	3.00 tb	0.33 cp	0.67 cp	0.75 cp
40	5.00 ts	2.50 tb	0.25 cp	0.50 cp	0.75 cp	1.00 cp
50	2.00 tb	3.00 tb	5.00 tb	0.67 cp	1.00 cp	1.33 cp
60	2.50 tb	0.25 cp	0.33 cp	0.75 cp	1.00 cp	1.50 cp
70	3.00 tb	0.25 cp	0.50 cp	1.00 cp	1.33 cp	1.75 cp
80	3.50 tb	0.33 cp	0.50 cp	1.00 cp	1.50 cp	2.00 cp
90	0.25 cp	0.33 cp	0.67 cp	1.00 cp	1.67 cp	2.33 cp
100	0.25 cp	0.50 cp	0.67 cp	1.33 cp	2.00 cp	2.50 cp

ts = teaspoon tb = tablespoon cp = one cup (8 fl oz)

Quantity of Sodium Bisulfate Needed to Lower Total Alkalinity

Desired Decrease In ppm	Gallons in Spa					
	100	150	250	500	750	1000
10	1.50 ts	2.50 ts	1.00 tb	2.50 tb	0.25 cp	0.33 cp
20	1.00 tb	1.50 tb	2.50 tb	0.33 cp	0.50 cp	0.67 cp
30	1.50 tb	2.50 tb	0.25 cp	0.50 cp	0.75 cp	1.00 cp
40	2.00 tb	3.00 tb	0.33 cp	0.67 cp	1.00 cp	1.25 cp
50	2.50 tb	0.25 cp	0.50 cp	0.75 cp	1.25 cp	1.50 cp
60	3.00 tb	4.50 tb	0.50 cp	1.00 cp	1.50 cp	2.00 cp
70	0.25 cp	0.33 cp	0.50 cp	1.00 cp	1.67 cp	2.25 cp
80	0.25 cp	0.33 cp	0.67 cp	1.25 cp	2.00 cp	2.50 cp
90	0.33 cp	0.50 cp	0.75 cp	1.50 cp	2.25 cp	3.00 cp
100	0.33 cp	0.50 cp	0.75 cp	1.67 cp	2.50 cp	3.25 cp

ts = teaspoon tb = tablespoon cp = one cup (8 fl oz)

Quantity of Bicarbonate of Soda Needed to Raise Total Alkalinity

Desired Increase In ppm	Gallons in Spa					
	100	150	250	500	750	1000
10	1.25 ts	2.00 ts	4.00 ts	2.50 tb	0.25 cp	0.33 cp
20	1.00 tb	1.50 tb	2.50 tb	5.00 tb	0.50 cp	0.50 cp
30	1.50 tb	2.00 tb	3.50 tb	0.50 cp	0.67 cp	1.00 cp
40	2.00 tb	3.00 tb	0.33 cp	0.50 cp	1.00 cp	1.00 cp
50	2.50 tb	3.50 tb	6.00 tb	0.75 cp	1.00 cp	1.50 cp
60	3.00 tb	0.25 tb	0.50 cp	1.00 cp	1.33 cp	1.75 cp
70	3.50 tp	0.35 cp	0.50 cp	1.00 cp	1.50 cp	2.00 cp
80	0.25 cp	0.33 cp	0.50 cp	1.25 cp	1.75 cp	2.50 cp
90	0.33 cp	0.50 cp	0.67 cp	1.33 cp	2.05 cp	2.75 cp
100	0.33 cp	0.50 cp	0.75 cp	1.50 cp	2.25 cp	3.00 cp

ts = teaspoon tb = tablespoon cp = one cup (8 fl oz)

Quantity of Calcium Chloride Needed to Increase Calcium Hardness

Desired Increase In ppm	Gallons in Spa					
	100	150	250	500	750	1000
10	1.25 ts	2.00 ts	1.00 tb	2.00 tb	3.00 tb	0.25 cp
20	2.50 ts	4.00 ts	2.00 tb	0.25 cp	0.33 cp	0.50 cp
30	1.25 tb	2.00 tb	3.00 tb	0.33 cp	0.67 cp	0.75 cp
40	4.00 ts	2.50 tb	0.25 cp	0.50 cp	0.75 cp	1.00 cp
50	2.00 tb	3.00 tb	5.00 tb	0.67 cp	1.00 cp	1.33 cp
60	2.50 tb	0.25 cp	0.33 cp	0.75 cp	1.00 cp	1.50 cp
70	3.00 tp	0.25 cp	0.50 cp	1.00 cp	1.33 cp	1.75 cp
80	3.50 tp	0.25 cp	0.50 cp	1.00 cp	1.50 cp	2.00 cp
90	0.25 cp	0.33 cp	0.33 cp	1.00 cp	1.67 cp	2.33 cp
100	0.25 cp	0.50 cp	0.67 cp	1.33 cp	2.00 cp	2.50 cp

ts = teaspoon tb = tablespoon cp = one cup (8 fl oz)

Quantity of Chlorine Compound Needed to Increase 1 ppm

Percent Chlorine In Product	Gallons in Spa					
	100	150	250	500	750	1000
5	0.50 tb	2.00 ts	1.25 tb	2.50 tb	0.25 cp	0.33 cp
10	0.25 tb	1.00 ts	2.00 ts	1.25 tb	2.00 tb	2.50 tb
12	0.25 tb	1.00 ts	0.50 tb	1.00 tb	1.50 tb	2.00 tb
30	0.25 tb	0.33 ts	0.75 ts	1.25 ts	2.00 ts	2.50 ts
40	0.167 ts	0.25 ts	0.500 ts	1.00 ts	1.50 ts	2.00 ts
50	0.167 ts	0.25 ts	0.375 ts	0.75 ts	1.25 ts	1.50 ts
60	0.167 tb	0.200 ts	0.375 ts	0.50 ts	1.00 ts	1.25 ts
65	0.100 ts	0.167 ts	0.250 ts	0.50 ts	0.75 ts	1.00 ts

ts = teaspoon tb = tablespoon cp = one cup (8 fl oz)

F – 2: Pool Feed Charts

Quantity of Muriatic Acid Needed to Lower Total Alkalinity									
Desired Decrease In ppm	Gallons in Pool								
	10,000	25,000	50,000	75,000	100,000	200,000	500,000	750,000	1,000,000
10	1.30 pt	1.62 qt	3.25 qt	1.22 gl	1.62 gl	3.25 gl	8.13 gl	12.20 gl	16.25 gl
20	1.30 pt	3.25 qt	1.62 gl	2.43 gl	3.25 gl	7.50 gl	16.20 gl	24.30 gl	32.50 gl
30	1.95 qt	1.22 gl	2.44 gl	3.86 gl	4.98 gl	9.76 gl	24.40 gl	36.60 gl	48.80 gl
40	2.80 qt	1.63 gl	3.25 gl	4.87 gl	6.50 gl	13.00 gl	32.50 gl	48.80 gl	65.00 gl
50	3.25 qt	2.03 gl	4.07 gl	6.10 gl	8.14 gl	16.28 gl	40.70 gl	61.00 gl	81.40 gl
60	3.90 qt	2.44 gl	4.88 gl	7.32 gl	9.76 gl	19.52 gl	48.80 gl	73.20 gl	97.80 gl
70	1.14 gl	2.84 gl	5.69 gl	8.54 gl	11.38 gl	22.76 gl	56.90 gl	85.45 gl	113.80 gl
80	1.30 gl	3.25 gl	6.50 gl	9.75 gl	13.00 gl	26.00 gl	65.00 gl	97.50 gl	138.00 gl
90	1.48 gl	3.66 gl	7.31 gl	10.96 gl	14.82 gl	29.24 gl	73.10 gl	109.60 gl	146.20 gl
100	1.63 gl	4.06 gl	8.12 gl	12.18 gl	16.24 gl	32.48 gl	81.20 gl	121.80 gl	162.40 gl
120	1.96 gl	4.88 gl	9.76 gl	14.64 gl	19.52 gl	39.00 gl	97.80 gl	148.40 gl	196.20 gl
150	2.44 gl	6.09 gl	12.18 gl	18.27 gl	24.40 gl	48.80 gl	121.80 gl	182.70 gl	244.00 gl
200	3.25 gl	8.12 gl	18.24 gl	24.36 gl	32.50 gl	65.00 gl	162.40 gl	243.80 gl	325.00 gl

pt = one pt (16 fl oz) qt = one quart (32 fl oz) gl = one gallon (128 fl oz)

Quantity of Bicarbonate of Soda Needed to Raise Total Alkalinity									
Desired Increase In ppm	Gallons in Pool								
	10,000	25,000	50,000	75,000	100,000	200,000	500,000	750,000	1,000,000
10	1.50 lb	3.75 lb	7.50 lb	11.25 lb	15.00 lb	30.00 lb	75.00 lb	112.50 lb	150.00 lb
20	3.00 lb	7.50 lb	15.00 lb	22.50 lb	30.00 lb	60.00 lb	150.00 lb	225.00 lb	300.00 lb
30	4.50 lb	11.25 lb	22.50 lb	33.75 lb	45.00 lb	90.00 lb	225.00 lb	337.50 lb	450.00 lb
40	6.00 lb	15.00 lb	30.00 lb	45.00 lb	60.00 lb	120.00 lb	300.00 lb	450.00 lb	600.00 lb
50	7.50 lb	18.75 lb	37.50 lb	56.25 lb	75.00 lb	150.00 lb	375.00 lb	562.50 lb	750.00 lb
60	9.00 lb	22.50 lb	45.00 lb	67.50 lb	90.00 lb	180.00 lb	450.00 lb	675.00 lb	900.00 lb
70	10.50 lb	26.25 lb	52.50 lb	78.75 lb	105.00 lb	210.00 lb	525.00 lb	787.50 lb	1050.00 lb
80	12.00 lb	30.00 lb	60.00 lb	90.00 lb	120.00 lb	240.00 lb	600.00 lb	900.00 lb	1200.00 lb
90	13.50 lb	33.75 lb	67.50 lb	101.25 lb	135.00 lb	270.00 lb	675.00 lb	1012.50 lb	1350.00 lb
100	15.00 lb	37.50 lb	75.00 lb	112.50 lb	150.00 lb	300.00 lb	750.00 lb	1125.00 lb	1500.00 lb

lb =pounds of dry chemical

Quantity of Calcium Chloride Needed to Increase Calcium Hardness									
Desired Increase In ppm	Gallons in Pool								
	10,000	25,000	50,000	75,000	100,000	200,000	500,000	750,000	1,000,000
	lb oz	lb oz	lb oz	lb oz	lb oz	lb	lb oz	lb oz	lb
10	1 4	3 2	6 4	9 6	12 8	25	62 8	93 12	125
20	2 8	6 4	12 8	18 12	25 0	50	125 0	197 8	250
30	3 12	9 6	18 12	28 2	37 8	75	187 8	281 4	375
40	5 0	12 8	25 0	37 8	50 0	100	250 0	375 0	500
50	6 4	15 10	31 4	46 14	62 8	125	312 8	468 12	625
60	7 8	18 12	37 8	56 4	75 0	150	375 0	562 8	750
70	8 12	21 14	43 12	65 10	87 8	175	437 8	658 4	875
80	10 0	25 0	50 0	75 0	100 0	200	500 0	750 0	1,000
90	11 4	28 2	56 4	84 6	112 8	225	562 8	843 12	1,125
100	12 8	31 4	62 8	93 12	125 0	250	625 0	937 8	1,250
150	18 12	46 14	93 12	104 10	187 8	375	937 8	1,406 4	1,875
200	25 0	62 8	125 0	187 8	250 0	500	1,250 0	1,875 0	2,500

Quantity of Chlorine Compound Needed to Increase 1 ppm									
Percent Chlorine In Product	Gallons in Pool								
	10,000	25,000	50,000	75,000	100,000	200,000	500,000	750,000	1,000,000
5	3.2 cp	2 qt	1 gl	1.5 gl	2 gl	4 gl	10 gl	15 gl	20 gl
10	1.6 cp	1 qt	2 qt	3 qt	1 gl	2 gl	5 gl	7.5 gl	10 gl
12	1.33 cp	1.67 pt	1.517 qt	2.276 pt	3.33 qt	1.665 gl	4.163 gl	6.245 gl	8.326 gl
30	0.278 lb	0.665 lb	1.390 lb	2.085 lb	2.780 lb	5.580 lb	13.900 lb	20.850 lb	27.800 lb
40	0.209 lb	0.521 lb	1.043 lb	1.565 lb	2.086 lb	4.172lb	10.430 lb	15.645 lb	20.860 lb
50	0.167 lb	0.417 lb	0.834 lb	1.251 lb	1.668 lb	3.336lb	8.340lb	12.511 lb	16.680 lb
60	0.139 lb	0.348 lb	0.695 lb	1.043 lb	1.390 lb	2.780lb	6.950 lb	10.425 lb	13.900 lb
65	0.128 lb	0.321 lb	0.642 lb	0.963 lb	1.284 lb	2.568lb	6.420 lb	9.630lb	12.840 lb
70	0.119 lb	0.298 lb	0.596 lb	0.894 lb	1.192 lb	2.384lb	5.960lb	8.940 lb	11.920 lb
75	0.111 lb	0.278 lb	0.556 lb	0.834 lb	1.112 lb	2.224 lb	5.560 lb	8.340 lb	11.120 lb
80	0.104 lb	0.261 lb	0.521 lb	0.782 lb	1.042 lb	2.064 lb	5.210 lb	7.815 lb	10.420 lb
85	0.096 lb	0.417 lb	0.491 lb	0.737 lb	0.982 lb	1.964 lb	4.910 lb	7.365 lb	9.829 lb
90	0.093 lb	0.232 lb	0.463 lb	0.695 lb	0.926 lb	1.852 lb	4.630 lb	6.945 lb	9.260 lb
100	0.083 lb	0.209 lb	0.417 lb	0.626 lb	0.634 lb	1..668 lb	4.170 lb	6.225lb	8.340 lb

cp = one cup (8 fl oz) pt = one pt (16 fl oz) qt = one quart (32 fl oz)
gl = one gallon (128 fl oz) lb =pounds of dry chemical

Section G: Replacement / Maintenance Parts

Fuses		
Standard Fuses		
8140095	**115V Unit** Main Fuse	Time Lag 500mA 250V
8140086	**230V Unit** Main Fuse	Time Lag 250mA 250V
8140088	Relays 1-4 & 6-9 Fuse	Time Lag 3A 250V
8140092	Relay 5 Fuse	Time Lag 8A 250V

Boards	
CPU / Interface Boards	
2200421	BECSys7 CPU/Relay PCB
1200424	BECSys7 UI PCB
Communications Boards	
2200712	BECSys Gigabit Card
Option Boards	
1200494	BECSys Loop Power Board (4 power supplies for 4-20mA inputs)
1200453	BECSys 4-20mA output board (4 channel, 440 ohm) with 4 power supplies for 4-20mA inputs

Misc	
Enclosure Parts	
8060627	Enclosure Plug 0.875”
8060628	Enclosure Plug 1.125”
8520173	Single BNC cable assembly
8060736	Small watertight cord grip PG-7
M000070	BECSys7 Lid Assembly (No PCB)

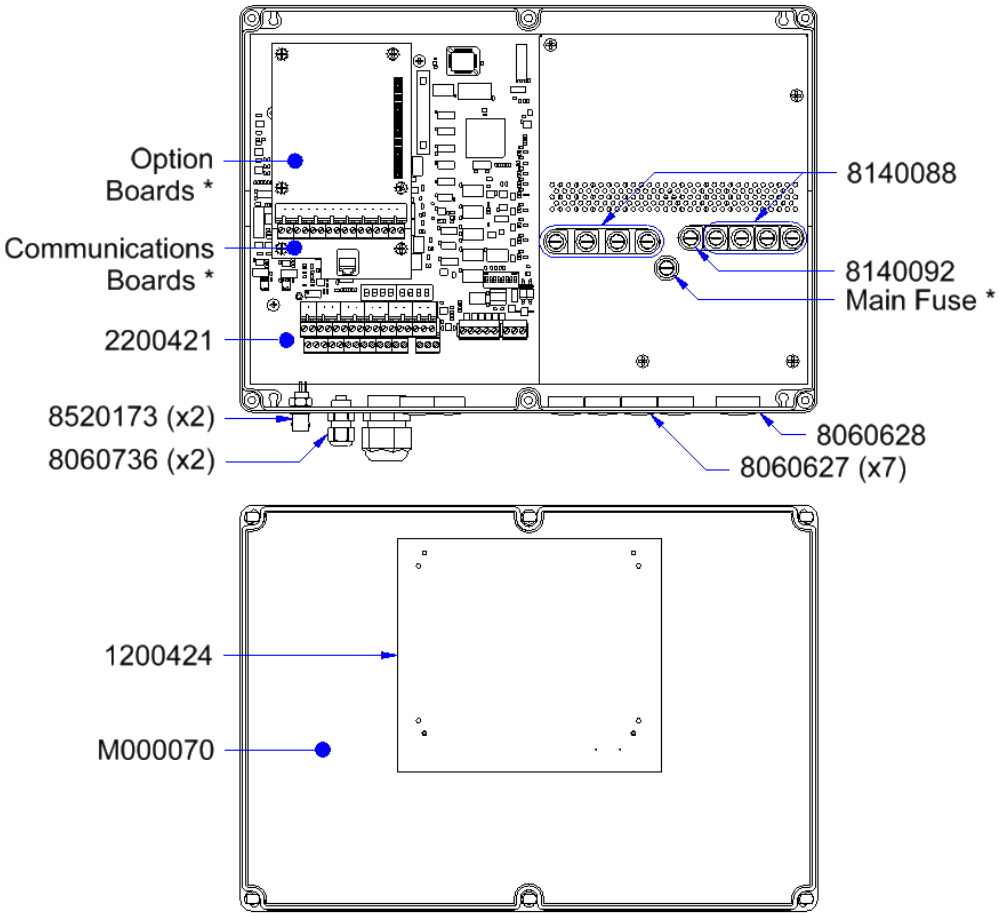
Flow Cell	
Round Flow Cell	
1210147	Round Flow Cell
Rectangular Flow Cell	
1210137	2-Sensor Rectangular Flow Cell
1210136	3-Sensor Rectangular Flow Cell
Lighted Flow Cell	
2210452	Lighted Flow Cell with CP-1 Module
2210456	Lighted Flow Cell without CP-1 Module

Standard Sensors	
pH Sensors	
9660013	BECSys pH Sensor (30” cable) [range: 0 to 14.0 pH]
9660010	BECSys pH Sensor (10’ cable) [range: 0 to 14.0 pH]
ORP Sensors	
9660022	BECSys ORP Sensor Platinum Band (30” cable) [range: 0 to 1000mV]
9660023	BECSys ORP Sensor Platinum Band (10’ cable) [range: 0 to 1000mV]
9660038	BECSys ORP Sensor Solid Gold Band (30” cable) [range: 0 to 1000mV]
9660040	BECSys ORP Sensor Solid Gold Band (10’ cable) [range: 0 to 1000mV]
Temperature Sensors	
8660016	Temperature Sensor (30” cable) [range: 32°F to 212°F (0°C to 100°C)]
9660003	Temperature Sensor (10’ cable) [range: 32°F to 212°F (0°C to 100°C)]
pH/ORP Sensor Maintenance Items	
8500061	4/KCl solution (pint); for long-term storage of sensors
8680015	½” Wetting Cap for pH and ORP sensors

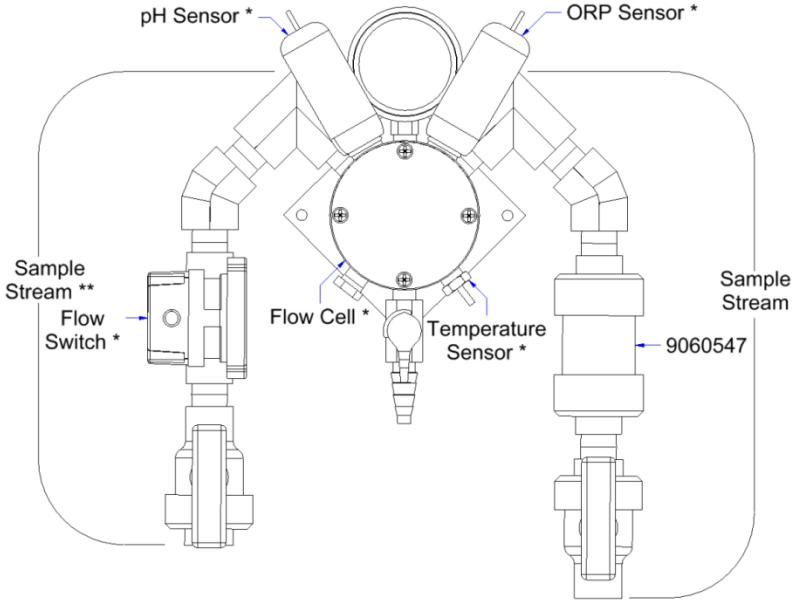
Sample Stream	
Flow Switches	
9660006	Reed flow switch [Switch Point (On): 2.0 gpm]
9660007	Rotary flow switch [Switch Point (On): 1.5 gpm]
9060547	Spring Check Valve
Round Flow Cell	
1210148	Sample stream for round flow cell with reed flow switch
1210149	Sample stream for round flow cell with rotary flow switch
Rectangular Flow Cell	
1210142	Sample stream for rectangular flow cell with reed flow switch
1210143	Sample stream for rectangular flow cell with rotary flow switch
Lighted Flow Cell	
2210529	Sample Stream for lighted flow cell

Optional Sensors - Not shown in diagrams since these sensors are not installed in the controller sample stream.	
Optional OCS140 Free Chlorine Sensor	
9660005	Amperometric Sensor only, no flow cell [range: 0 to 20 ppm]
8680016	Replacement Membranes (2 pieces) for Chlorine Sensor 9660005
8680017	Electrolyte (50 ml) for Chlorine Sensor 9660005
2220363	Amperometric ppm Probe Nut
Optional CP-1 Free Chlorine Sensor	
2210422	Replacement CP-1 Sensor (includes glass beads and O-rings) [range: 0 to 10 ppm]
Optional Total Chlorine	
8660044	Total Chlorine Sensor only, no flow cell [range: 0 to 20 ppm]
2220359	Probe Ring
2220360	Total Chlorine Probe Nut
2220361	O-Ring Retainer
8060808	O-Ring 3/32x0.987 ID
8060809	O-Ring 3/32x1.174 ID
Optional Pressure and Vacuum	
8520189	50ft Cable Pressure or Vacuum Transducer
8520190	100ft Cable Pressure or Vacuum Transducer
8660029	Pressure transducer only, no cable [range: 0 to 100 PSI]
8660033	Vacuum transducer only, no cable [range: -14.7 to 85 PSI]
8660064	Pressure transducer only, no cable [range: 0 to 100 PSI]
8660065	Vacuum transducer only, no cable [range: -14.7 to 85 PSI]
9660019	Vacuum Swichgage [range: 0 to 30 in. HG]
9660020	Pressure Swichgage [range: 0 – 50 PSI]
8660021	Differential Swichgage [range: 0 – 50 PSI]
Optional Conductivity/TDS	
9660012	BECSys Conductivity Sensor [range: 0 to 20,000 micromho]
Optional Turbidimeter	
1210261	BECSys Turbidimeter [range: 0 to 20.00 NTU]
9680024	Dessicant Tray – Refill
Optional Flowmeters	
8660008	Flowmeter (1/2” to 4”) [range: 0 to 655.35 Kgpm]
9660009	Flowmeter (5” to 8”) [range: 0 to 655.35 Kgpm]
9660004	Flowmeter (10” to 36”) [range: 0 to 655.35 Kgpm]

Documentation	
8620108	BECSys7 Operation and Maintenance Manual
8620111	BECSys7 Installation and Technical Manual
8620038	BECSys7 Laminated Quick Reference Sheet



* Specific part dependant upon configuration ordered. See table for valid part number.



* Specific part dependant upon configuration ordered. See table for valid part number.
** Flow switch is included with the sample stream.

LIMITED WARRANTY

BECS warrants the controller electronics and flow cell against any defect in workmanship or materials for a period of five years from the date of shipment. BECS warrants the pH and ORP sensors against any defect in workmanship or materials for a period of two years from the date of shipment. BECS warrants all other components against any defect in workmanship or materials for a period of one year from the date of shipment. In the event of a component failure due to any defect in workmanship or materials, BECS will repair, or if repair is not possible, replace the defective part or parts of the BECSys controller.

BECS will have the sole right to determine whether to repair or replace a product. BECS will not be responsible for any expense associated with installation of repaired or replacement parts.

LIMITATIONS AND EXCLUSIONS

This is a LIMITED WARRANTY. BECS makes NO WARRANTIES other than those contained herein. The LIMITED WARRANTY replaces and is in lieu of any WARRANTIES of MERCHANTABILITY or of FITNESS FOR A PARTICULAR PURPOSE which are expressly DISCLAIMED. All GENERAL, SPECIAL, INDIRECT, INCIDENTAL AND/OR CONSEQUENTIAL DAMAGES ARE EXCLUDED AND DISCLAIMED.

This Limited Warranty is governed by Missouri Law and all disputes related to or arising from this transaction or Limited Warranty shall be resolved in Circuit Court of St. Louis County, Missouri.

Any claims under this Limited Warranty must be brought within ONE YEAR after the cause of action occurred.

BECS TECHNOLOGY has been designing and manufacturing the industry's most reliable water chemistry controller for over 20 years. Our 24,000 ft^2 facility in Saint Louis, Missouri is home to an exceptional design team, and all manufacturing is performed onsite at this facility where we can personally assure the quality of our products. The BECS commitment to excellence drives the most innovative new products and unparalleled customer service.

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