Triton

Cooling Tower Water Treatment Controller

Proprietary Material Statement

Copyright

Table of Contents

(This page intentionally left blank.)

1 Theory of Operation

Overview

There is only one model of a Triton Cooling Tower controller; equipped with 8 high-capacity electro-mechanical relays, a sophisticated digital Conductivity and Temperature sensor, and 8 fully configurable Digital Inputs. Every Triton controller also comes with an Ethernet port, and two front-panel USB ports - one for data stick downloads and the other for easy local connection to a computer to use the Web Interface.

However, there are additional options if you need them; 4-20 mA Input and Output options, and a host of accessories from which to choose. When reading this Reference Manual, consider that there may be components and features discussed that are not present in the Triton controller you have purchased.

4-20 mA Input/Output Options: One example is the optional 4-20 mA Input and Output boards which can be installed in any Triton controller.

If the user needs analog 4-20 mA Inputs and/or 4-20 mA Outputs, the Triton has three locations on the main board available for these options. Either of these boards is available with two or four Inputs or Outputs, and these boards can be used in any combination, so from 2 to 12 of these 4-20 mA Inputs or Outputs can be installed.

Accessories: pH sensors, ORP sensors, Relay Expansion Modules, additional Conductivity/Temperature probes, Boiler Conductivty probes, PVC Manifolds to install the sensors into, fully Board Mounted systems, and more!

Fortunately, these options are all "Plug’n’Play" field installable, due to the sophisticated software and digital network used by the Triton controller. Simply plug the new sensors into the digital network, daisy-chained to other probes, and they will be automatically recognized, named, and placed into the appropriate menus, ready to use.

Be aware that selecting one of the "Ready to Use" (RtU) operation modes may temporarily 'hide' some of the Outputs, Inputs and Auto Control modes from the menus, as appropriate for the RtU mode chosen. Select one of the four “User Modes” to have every Output, Input and Auto Control mode available.

This Reference Manual explains all the possible components and features that are available with a Triton water treatment controller, so depending on a particular controller's configuration there may be a component or feature explained in this manual that is not available on that controller.

Triton Controller Special Features

A Triton controller has special features, not found on most other controllers, designed to offer a simpler, more flexible way to do water treatment. Some of the most useful special features are:

- Full Configuration File or Data Download using any standard USB "Data Stick".
- Open, Expandable Architecture, with Plug'n'Play Sensor or Relay Expansion.
- Digital network gives reliable measurements up to 1000 feet from the controller.
- Pre-programmed "Ready to Use" Operation Modes for simplified set-up and use.
- Large, Daylight-Readable, Backlit Graphic Display.
- Easy to read and navigate Menu System, using 4-way Navigator arrow-keys.
- "Direct Access" Relay and Alarm keys display their control menus in one step.
- Context-aware Help key gives immediate, useful help for any highlighted item.
- Control By Output. We think the way users think. With multiple sensor Set Points.
- Full Alphanumeric Keypad for simple, easy entry of numbers and characters.

One-Step Data Download with USB "Data Stick": Every Triton controller comes standard with a USB port on the front panel that allows the user to download the data logs from the controller in one easy step. Just plug in a standard USB "Data Stick" and the data is downloaded, ready to analyze and graph!

Open, Expandable Architecture with Digital Network: Need more Relays? Need more Sensors? Need them far away from the main controller? Rejoice, with Triton's digital expansion network, it is all "Plug'n'Play"!

Add a Relay Expansion Module to get four more high-capacity Relays and they will automatically be numbered appropriately and placed in the menus with the other Relays.

Add a new Modbus Sensor, like a second Conductivity probe, and the controller will automatically know what kind of sensor has been added and what its measurement range is, give it an appropriate name and add it to the menus next to any existing sensor(s) of the same kind.

In addition, because these devices are being connected over our digital network, they can be a hundred feet away from the main controller, without the worries of signal strength and electromagnetic interference that can make analog signals so problematic over long distances.

Digital Network: The sophisticated RS485 Digital Network using Modbus protocols means error-free transmission of measurements from your Conductivity, Temperature, pH and ORP sensors, even 1000 feet from the controller. This robust, packetized, redundant, checksum protected, network communications is completely immune the electro-magnetic interference that plagues analog probe communications in an industrial environment.

Pre-programmed Operation Modes: Every Triton controller has several simplified "Ready-to-Use" cooling tower water treatment programs pre-programmed, that may satisfy many user's water treatment needs.

For example, a user can select the simple "Conductivity controlled Bleed" Operation Mode (CndctvtBleed) and the controller will be automatically configured to perform that task. Relay 01 is designated to control a Bleed Valve using a Conductivity Set Point and so forth. Many of the Alarm Settings are even pre-configured, but the user can adjust any of the settings to meet their particular needs.

Or a user can select one of the four "user-defined" operation modes to control their Outputs, using control modes that combine the measurements of Sensors, Timers, Water Meters and other Inputs, with additional Pre-Bleed, Pre-Feed and Lockout settings.

Large Daylight-Readable Graphic Display: Every Triton controller uses a large daylight-readable LCD display (almost 6 inches diagonally), with an automatic backlight for dim conditions and adjustable contrast. It displays 20 rows of 40 characters, with a bold high-contrast font.

Easy to Read and Navigate Menus with 4-way Navigator arrow-pad: To go along with the big, beautiful display, is a simple menu system that displays the control options in an easy-to-navigate outline form.

This is explained in detail later, in the "Navigating the Menus" section of the "Description of Controls" chapter. The user sees a hierarchical list of features on the large display, and can move around the menu using a four arrow keys, Up, Down, Right, Left. When they have moved the highlight onto the option they want, they press Enter. It is very intuitive and easy to understand.

Front Panel "Direct Access" Keys: As easy as the menus are to navigate, why bother when direct access is available with a single key press? On the front panel of the controller are "Direct Access" keys to go immediately to the control menus for any Relay, to the Active Alarm menu, to the Menu Screen where the lists of features begin, or back to the Home screen for an overall look at the system. Instant access!

Context-aware "Help" Key: See the "Help" key on the front panel? Press that and get immediate help text about whatever the highlight is on. No more searching

If the user does not understand an abbreviation in the menus? They simply highlight the menu item and press "Help".

Control By Output: This is the heart (and brains) of the Triton controller system, and offers unique advantages.

In a Triton controller, the user can "control" their system via the Outputs (Relays). They start at the Output they wish to control, a water valve or chemical pump wired to one of the controller's Relays. Then they decide *how* they want to control that relay; manually, using a Timer, with a Sensor measurement, by the activation of some other relay and so forth.

One advantage of this system is that a single sensor can be used to control multiple outputs, each using their own Set Point measurement value.

Full Alphanumeric Keypad: It looks and works just like the keypad on an oversized cell phone! This allows fast, direct input, so the user is not pressing arrow keys to find the number or letter they want to enter. Simple and easy.

Relay Control

In a typical water treatment controller, there are several electro-mechanical relays. The relays are used to turn on and off chemical pumps and water valves.

The Triton controller is designed in the same way. The menus and controls emphasize "Control by Output", where the user can go to the Output Relay they want to control, and find all the settings to control that output. They can choose the "Relay Usage" they want, then an "Auto Control” mode and adjust the settings of that mode, to accomplish their goal.

There are manual controls as well as automatic control modes that use sensor values, timer control modes, control based on water meter volumes and even modes that use one relay to control another relay.

The user can access all of these options by going first to the Output they wish to program, and then going to submenus under that output to find the usages, auto control modes and settings.

High-Capacity Mechanical Relays (Bleed Valve, Relay 02...)
Every Triton controller is equipped with eight high-capacity electro-mechanical Relays, that can supply AC power to a device or be used unpowered as “dry contacts”. These Relays are typically used to activate a solenoid bleed valve or a chemical pump, but the user can choose to have other devices activated by any of the Relays, like a motorized ball valve or an external Alarm indicator such as a bell or strobe.

The factory default names for the Relays are of the form "Relay 02", "Relay 03" and so forth. Some of the Relays may have custom names assigned to them, depending on the Operation Mode that is currently selected.

4-20 mA Outputs

The Triton controller can be optionally equipped with up to three analog output boards that can have two or four 4-20 milliamp (mA) outputs on each board. These 4-20 mA outputs are normally used to report, or mirror, the status of some input to an external recorder or a building maintenance system.

Output Status Displays

The output relays display their status in various menus. The possible output relay status displays are:

"On: NNNN min"	Displays the total minutes of the relay's current activation.
"Relay is Off"	Indicates the relay is deactivated, normally.
"LkOut NN min"	Shows when a relay is locked-out by some other relay.
"AlarmLockOut"	This indicates a relay is locked out by an Alarm Setting.
"OvrTimeLimit"	The Limit Timer setting has been exceeded.
"Input Error"	Means the input that is controlling the relay is reporting an error.
"Not In Use"	A usage setting to hide the relay from most menus. (Details later)

Like the relay outputs, the 4-20 mA outputs display their status in various menus. The possible 4-20mA Output status displays are:

"NN.N mA Out"	Displays the current output value in milliamps.
"Input Error"	Means the input to the 4-20 mA output is reporting an error.

Sensor Inputs

Sensor Inputs are the signals from various devices that monitor the water's condition. The user can just view these measurements to monitor the water's condition or the user can employ the measurement values to control the outputs and/or set off alarms.

The sensor inputs considered essential for any cooling tower controller are Conductivity, Temperature and a Flow Switch. These sensor come standard with the Triton controller, a digital Conductivity and Temperature probe as well as a reliable mechanical Flow Switch.

Other Input sensors may be installed, besides the Conductivity / Temperature probe, and Flow Switch, such as:

- A pH sensor
- An Oxygen Reduction Potential (ORP) sensor
- A Boiler-rated Conductivity /Temperature probe.
- Water Meters, Drum Level sensors
- Any probe that has the option of 4-20mA output

Some systems may have more than one of a particular type of sensor installed, such as two Conductivity probes, or two pH sensors and so forth. This is especially easy with a Triton controller because it uses a "Plug'n'Play" expandable digital network for these additional inputs, and the new sensors are automatically named and added appropriately to the Input menus, even if they are plugged in long after the system has been installed and configured.

The measurements that these sensors are constantly providing can be compared by the controller logic to pre-set values, to activate relay outputs or generate alarms. Alarms can be programmed to flash the red Alarm lamp on the front panel, activate or Lockout relays and send alarm emails to appropriate personnel.

Other Inputs

Every Triton controller comes equipped with eight general-purpose digital inputs, whose function can be changed at any time. These are intended for volume-measuring Water Meters (either Reed Switch/Dry Contact or Hall Effect/Paddlewheel), Digital Counters, Flow Switches or general-purpose “two state” digital inputs like Drum Level sensors.

The Triton controller can also be equipped with optional 4-20mA Input Boards, that have two or four general-purpose 4-20 mA analog inputs. These support two or three wire devices, with internal 24V DC power available, have a 25 Ohm input resistance with an 800 Ohm maximum load capacity. In their Input Set-up menus, the user can have the current changes of these inputs “interpreted” into sensor measurements, to support various analog sensors, like corrosion probes, ozone sensors and so forth.

Input Status Displays

The various sensor Inputs have various status displays in various system menus.

Most Inputs (the measurement sensors) display one of these status messages:
"Normal" when the sensor is responding normally, and has not exceeded any setting.
"High Alarm" indicates the sensor measurement has exceeded its High Alarm setting.
"Low Alarm" indicates the sensor measurement is below its Low Alarm setting.

"Sensor Error" indicates a problem with the sensor, usually an out-of-range value.

A Flow Switch however would only display these two status messages:
"Normal" when the flow past the switch is sufficient.
"Flow Alarm" if the flow is insufficient, or there is no flow.

Any Dry Contact (Reed Switch) Water Meters installed would display either of:
"Normal" as long as the total volume measurement has not exceeded the preset limit.
"High Alarm" if the total volume measured exceeds the preset limit.

A Hall Effect (or Paddlewheel) Water Meter would display one of the following:
"Normal" as long as the volume or flow values have not exceeded their preset limits.
"High Alarm" if the volume measured total exceeds the preset volume limit.
"Hi FlowAlarm" if the flow rate exceeds the preset high flow rate limit.
"LowFlowAlarm" if the flow rate falls below a preset low flow rate limit.

The Counter usage for a Digital Input would display one of the following:
"Normal" as long as the total count and rate values do not exceed their preset limits.
"High Alarm" if the interpreted Total Count exceeds the preset limit.
"Hi RateAlarm" if the interpreted Count Rate exceeds the preset limit.
"LowRateAlarm" if the interpreted Count Rate falls below the preset limit.

A General Purpose Digital Input would use one of these two status displays:
"Normal" or "DigitalAlarm", based on settings the user makes in the menus for their control.

Inputs also have special "Not For Control" setting (NotForContrl), if the user does not want an input to appear in the Output Control menus. This setting allows the Input to be used to monitor the cooling system, have its measurements logged, and set off alarms as desired, but prevents it from being shown in the menus used to control an output relay

Starting with the Output they wish to control, the user will find relay usages and control modes that can use any of these Inputs, even in combination, to help them control their water treatment in a precise, convenient way.

Timers

Although using sensor measurements to activate outputs can have advantages in certain situations, the use of Timers is the most basic water treatment strategy.

The Triton controller gives the user many different ways to use Timers to implement their water treatment plan. They start a process at a certain time of day, and control the duration for which a process runs.

There are control modes allow the user to activate a relay at a certain time of day, and control the duration for which the output will stay activated. There are Timer control modes that activate at a certain time of day, but stop based on some Input value. There are Timer modes to force one relay's activation to wait a certain amount of time after some other relay has finished. Most of these Timers have a Daily cycle, a Weekly cycle and a 28-Day cycle available for the user's convenience.

There are even "proportional" Timer modes whose run time is self-adjusting, based on how long some other relay was activated, or how far away a current Input sensor value is from a pre-set value.

More detailed information about all these Timer control modes is in the "User-defined Operation Modes" section of the "Using the Triton Controller" chapter of this manual.

Expansion Modules

The Triton water treatment controller uses a digital network for easy "Plug'n'Play" system expansion. The user can simply plug a Relay Expansion Module or Modbus Sensor into one of the network ports and immediately begin using the addition as if it was installed at the factory.

The user can plug a Relay Expansion Module into the network and four more high-amperage Relay Outputs and four more Digital Inputs will appear in the controller's menus; configurable just like the ones in the main controller, and automatically numbered sequentially and listed after the original Relays.

The beauty of the digital expansion network is that when the user attaches either a Relay Expansion Module or a Modbus Sensor, the controller will automatically know what they have added and the new addition will automatically be given an appropriate name, numbered appropriately, and placed in the appropriate menu with the other Inputs or Outputs of the same kind

Moreover, because the device is connected over a sophisticated digital network, with robust redundancy and signal error detection, the Modbus sensors can be a thousand feet away from the main controller, without the worries of signal strength and electro-magnetic interference that make using analog sensors so problematic, especially over long distances.

All Modbus devices will have two digital communication ports, to allow the continuous connection, or “daisy-chaining”, of multiple devices. Therefore, you will not have to run another sensor cable all the way back to the controller and inside the enclosure!

2 Installation

Unpacking and Mounting

Unpack the Controller

Carefully open the shipping carton and inspect its contents. Notify the carrier immediately if there are any signs of damage to the controller or other parts. If any parts are missing, contact Hydro Systems.

The typical configuration would include the controller enclosure, a Conductivity / Temperature probe and a Flow Switch (each installed in their own clear plastic "T" manifold), and the Installation Guide. Any additional options (such as our digital network pH and ORP sensors) or accessories would be included as ordered. The comprehensive "Triton Reference Manual" you are reading is only available online at http://www.hydro-watertreatment.com/water-treatment-controllers/triton-controller.html.

Prepare to Mount the Enclosure

The Triton controller enclosure has four mounting holes, which are eight inches (8") apart horizontally, and twelve and seven-eighths inches (12-7/8") apart vertically. For your convenience, the top holes are "keyhole" shaped so you can hang the enclosure from a single attachment point, then level the enclosure and mark the remaining attachment locations. Please use all four attachment points to secure the controller.

We recommend the controller be mounted with the LCD at eye-level or higher, on a vibration-free surface, near a grounded 120V AC power supply (230V AC where applicable), within 1000 feet of the sample loop where the sensors will be installed, and close to the chemical delivery system and an Ethernet hub (if utilized). The following clearances are required for safe operation:

Top:	2 inches
Left Side:	4 inches
Right Side:	4 inches
Bottom:	8 inches

Do not install the controller near sources of electrical noise such as high voltage transformers, variable speed motors, radio transmitters and so forth. Environmental requirements are an ambient temperature of 0 to 49° C (32 to 120°F) with storage temperatures from -29 to 80°C (-20 to 176°F). Do not install the controller where it will be subjected to corrosive fumes, excessive moisture or humidity. The enclosure is NEMA 4X rated and suitable for outdoor installation as long as the operating limits are not exceeded.

Electrical Requirements

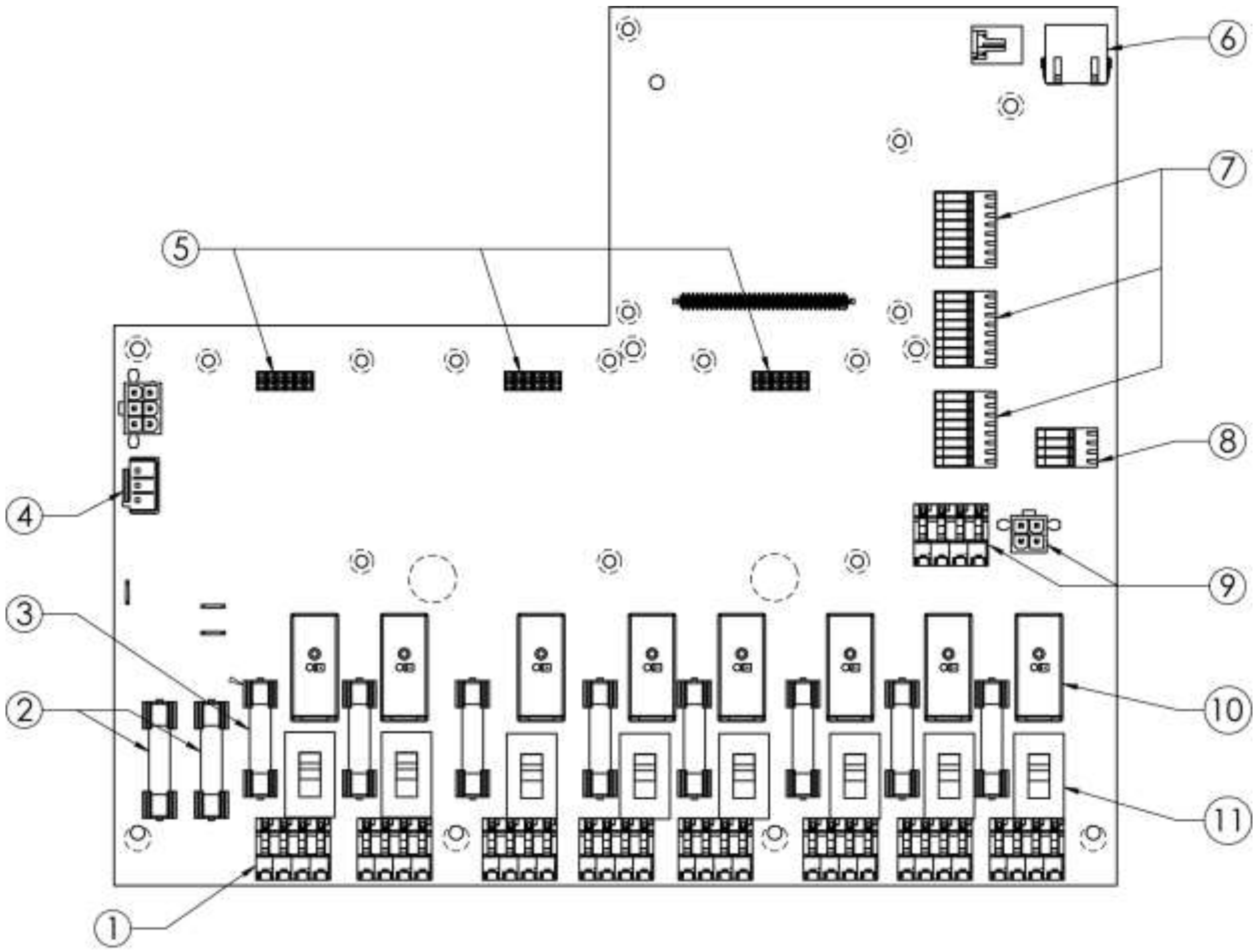
The controller requires an electrical supply of 110-120 VAC ±10 % (220-240 VAC where applicable) at 50-60 Hz, and up to 12 amperes of current. This circuit should be dedicated to the controller and protected with a 15 ampere fuse or circuit breaker, which should be nearby to facilitate safe maintenance practices.

All field wiring should be rated to 120 Volts or better (230 Volts or better where applicable), and to 75°C (167°F). For Cord Connected, Outdoor use, please use approved receptacle suitable for its intended use, and that the unit is to be installed according to CEC, NEC and/or local codes by qualified personnel. For Permanently connected units, please wire Line (L1) to the Black Wire, Neutral (N) to White Wire, and Earth Ground (GND) to the Green Wire.

CAUTION! There are live electrical circuits inside the enclosure, even when the front panel power switch is in the OFF position! The access door to the inside of the enclosure should never be opened until power to the controller is removed! The electrical installation must only be performed by trained professionals in conformance to all national, state and local codes!

As well as the controller enclosure, you will also need to install any sensors supplied and connect output devices to the electro-mechanical relays or the optional 4-20 mA outputs.

Triton Main Board Connection Diagram



1.	Relay Connection Block	(1 of 8)
2.	Main Power Fuses - 16 Amp	(2)
3.	Relay Fuse - 6.3 Amp	(1 of 8)
4.	DC Power Supply Connector	(1)
5.	4-20 mA Board Headers	(3)
6.	RJ45 Ethernet Connector	(1)
7.	Digital Input Connections	(3 x 8)
8.	Auxiliary 24VDC Power	(1 x 4)
9.	Modbus Network Connectors	(2)
10.	Electro-Mechanical Relay	(1 of 8)
11.	Wet / Dry Slide Switch	(1 of 8)

Input Connections

The Modbus digital Conductivity probe comes in a clear PVC “T” fitting with 1 inch NPT female fittings. Establish a “sample loop” on the discharge side of the cooling tower recirculating pump, to supply between 3 and 10 gallons per minute to the sensors. Install isolation valves on each side of the sample loop, so flow can be stopped for sensor inspection and maintenance. To prevent damage to the PVC pipe fittings, use no more than 3 layers of PTFE tape and screw the fittings together only “finger-tight”!

Modbus Digital Network Sensors

The digital network Modbus sensors connect to the controller, or to each other, using a ‘keyed’ four-pin, locking connector on the Modbus cables.

Push the plug cable connector, with the ‘key’ at the bottom, into the receptacle connector and turn the locking collar until you feel it secure the connection.

Make sure any unused receptacle device connection has its cover tightly secured, to avoid corrosion and debris from damaging the connector.

Each additional device is available with a 1, 4 or 10 foot plug-to-plug harness. (Longer cables are available separately.) Plug in a new device using installation procedure below. This can utilize the unused connector on an existing probe and allow for an open receptacle (with water resistant cover) on the new probe.

<u>Installing Multiple Modbus Devices:</u>

Currently there are four “families” of Modbus digital devices:

1) Conductivity Probes
2) pH Probes
3) ORP Probes
4) Relay Expansion Boxes

The controller automatically searches for any new devices when it powers up, and there is also an item in the "NetwrkConfig" menu that lets you search manually for new devices (SearchForNew).

If you have only one device from each family connected to the controller, just power up the controller, and they will automatically be found during the automatic search and put in the proper menus, ready for you to use.

If you are going to install more than one device in any of the families, leave the second one (or second and third, and so forth) un-connected during the initial power up and password entry. After you have checked that the first group of Modbus devices have been properly indentified, you can connect the second member of any family and go to the "Plug'n'Play" menu under the "NetwrkConfig" menu and use the manual search menu item "SearchForNew" to indentify the second device(s). After you see the second device(s) has been found, you can plug in the third member of any family you are connecting at this time. If you add a Modbus device in the future, it will be automatically detected during power up, and you will not need to use the manual search method.

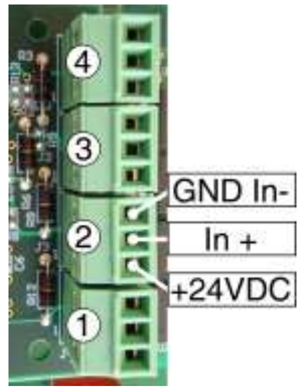
pH and ORP Sensors

These sensors must always have their measurement surfaces kept wet! If they are allowed to dry out, the semi-permeable membrane will occlude and the sensor will have to be replaced. Always install these probes so their sensor end is pointing down and use a "U-trap" in any manifold they are installed in, to ensure they will stay wetted if the normal flow is stopped. You must even keep the measurement surface wet when transporting these sensors, with a tightly fitting cap full of an appropriate solution (4 pH Buffer for pH, tap water for ORP). Do not store any pH or ORP electrode in DI water!

These sensors should be installed in a location where they will be measuring a representative concentration of treatment chemicals in the process water. We do not recommend injecting the treatment chemicals "upstream" of the sensor location in the sample loop, as the local high concentration will cause the system to "cycle" the injection on and off too frequently and may damage the sensors.

4-20 mA Inputs

The controller can be fitted with up to three optional 4-20 mA Input boards. These boards are available with two or four inputs on the board.

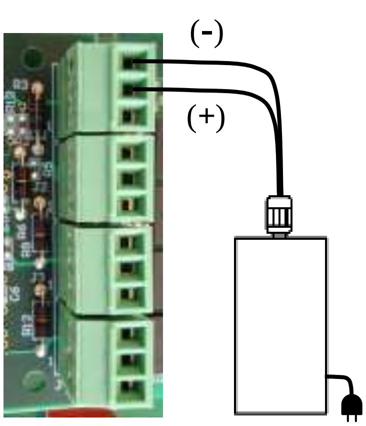


The wiring illustration shown uses a single four input board, installed in the leftmost position, as an example, with the ports numbered bottom to top, 1 through 4. Subsequent boards would use the same wiring scheme with the ports numbered 5 through 8 and 9 through 12 respectively.

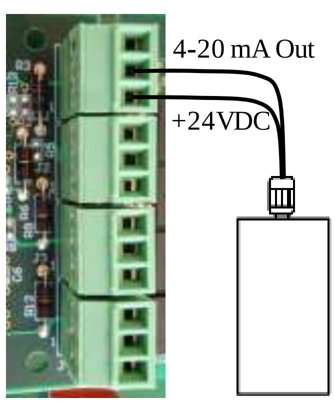
WARNING! There are live electrical circuits inside the enclosure even when the front panel power switch is in the OFF position. The power shall be removed from the controller before accessing the front door to the inside of the enclosure.

- Do not exceed 20 mA of current per input channel.
- 20-26 AWG wire is recommended for 4-20 mA connections.
- For extended runs, up to 325 feet (100 meters), use shielded, twisted pairs.
- Route signal wires in separate conduit, at least 6 inches from any AC voltage.

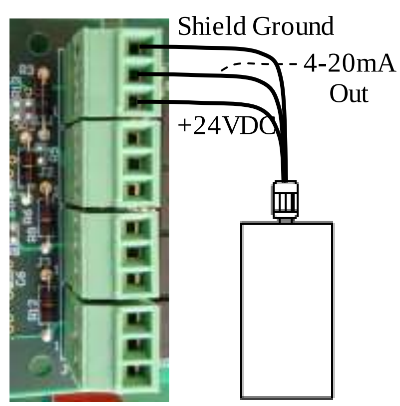
4-20 mA Input Wiring Examples



Powered 4-20 mA Source

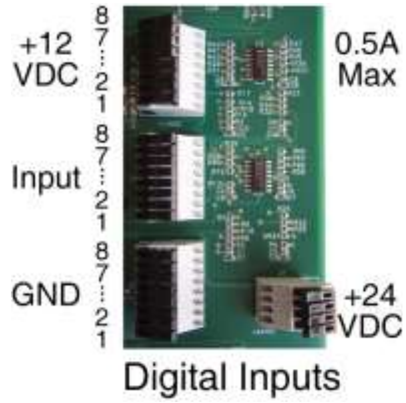


Unpowered 2-Wire



Unpowered 3-Wire

Digital Inputs



Every Triton controller comes with eight, fully configurable digital inputs. They can be used for simple “two-state” devices, like a float-style flow switch or drum level sensor, or for sophisticated “pulse generating” devices like a Hall Effect or Paddlewheel flow meter.

As shown in the wiring guide to the right, the digital inputs start with “1” at the bottom of the connectors and go upward to “8”. That corresponds with the menu items “Digital In 1” through “Digital In 8”.

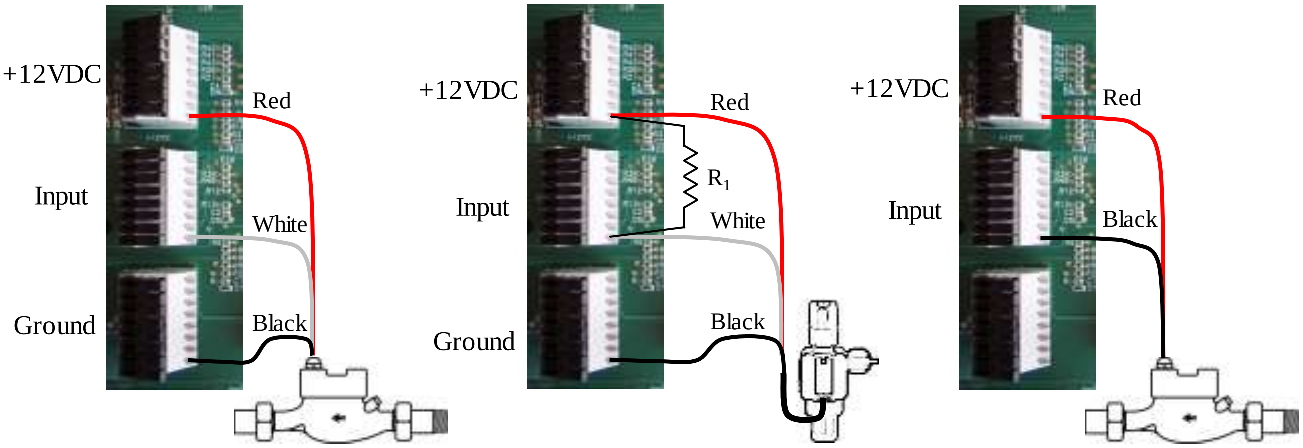
For the simpler digital inputs like a Reed Switch water meter and the “two-state” devices you would connect them to the middle (Input) and upper (+12 VDC) connectors. For Hall Effect water meters you may also need to connect to the lower ground (GND) connector. On the lower right four +24 VDC power supply connections are provided if needed for the device you are using.

WARNING! There are live electrical circuits inside the enclosure even when the front panel power switch is in the OFF position. The power shall be removed from the controller before accessing the front door to the inside of the enclosure.

- Do not exceed 0.5 A of current (as the sum of all contacts) on the 12 VDC supply.
- Do not exceed 0.5 A of current (as the sum of all contacts) on the 24 VDC supply.
- 20-26 AWG wire is recommended for Digital Input connections.
- Wire runs should not exceed 300 feet (100 meters). Twisted pair is optional.
- Route signal wires in separate conduit, at least 6 inches from any AC voltage.

After you have connected your digital devices to these digital inputs, you need to go to the software menu for each of them, and indicate their “Digital Usage”; whether you have connected a Flow Switch, Reed Switch water meter, Hall Effect water meter, Drum level sensor and so forth. The Triton digital inputs can reliably detect pulses as rapid as 1000 Hz when being used with a Hall Effect (Paddlewheel) water meter.

Digital Input Wiring Examples



Powered Digital Input
(Hall Effect-Paddlewheel)

Open Collector* Digital Input
R_1 = 10k - 47k Ω for 12VDC
R_1 = 47k - 120k Ω for 24VDC

Unpowered Digital Input
(Reed Switch, Drum Level)

(* Attach "pull up" resistor [R_1] between power and input.)

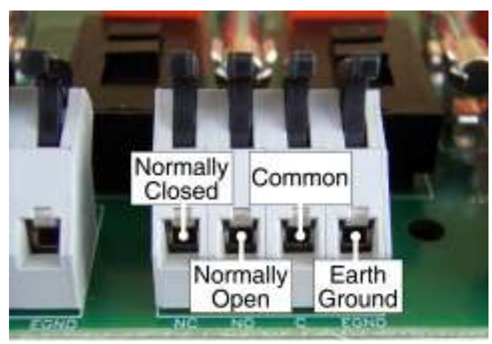
Output Connections

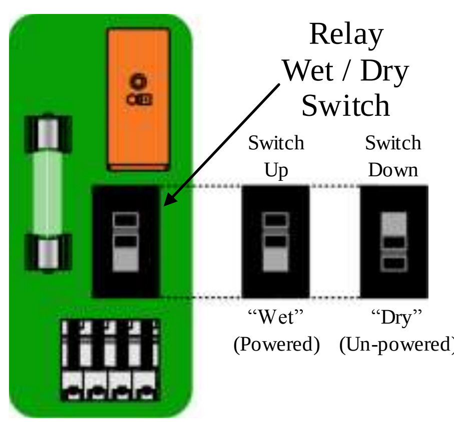
Relay Outputs

Every Triton controller comes with eight (8) high capacity electro-mechanical relays and can have additional relays added by connecting Relay Expansion Boxes to the digital network.

As shown in the wiring guide to the right, the relay connection blocks allow you to wire your output device using "normally open" or "normally closed" circuits. Triton controllers with pre-installed relay receptacles are wired normally open.

Also shown to the right, the black slide switches above the relay connection block in the picture, are the "Wet/Dry" switches



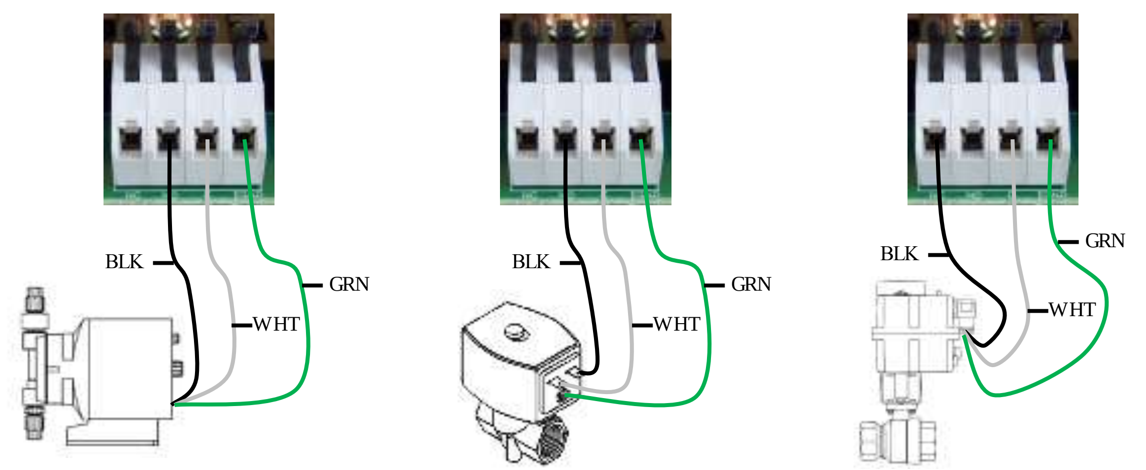


that control whether the relay provides power (Wet) or simply closes a set of unpowered contacts (Dry). When the switch is in the upper position the corresponding relay is powered (Wet), and when the switch is in the lower position the relay is unpowered (Dry).

WARNING! There are live electrical circuits inside the enclosure even when the front panel power switch is in the OFF position. The power shall be removed from the controller before accessing the front door to the inside of the enclosure.

- Do not exceed 5 amps current through a single relay; they are fused at 6.3 amps.
- Do not exceed 15 amps current as the sum of all relays; they are fused at 16 amps.
- 14-18AWG wire is recommended for relay connections.
- 0.25 inches of exposed conductor is recommended for relay block connections.
- Recommended longest wire run is 100 ft, to maintain 5 amps with 18AWG wire.
- Relays are rated for continuous activation, with control limit of 1440 minutes.

Relay Output Wiring Examples

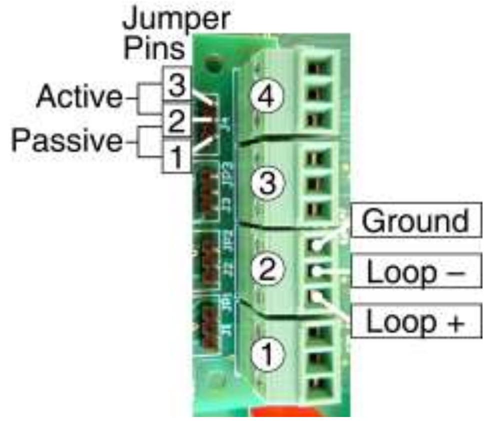


Metering Pump (as N.O.) Solenoid Valve (as N.O.) Motorized Ball Valve (as N.C.)

4-20 mA Outputs

The controller can be fitted with up to three optional 4-20 mA Output boards. These boards are available with two or four inputs on the board. They plug into the same three board headers that can be used for the 4-20 mA Inputs.

The wiring illustration shown uses a single four-output board, installed in the leftmost position, as an example, with the ports numbered bottom to top, 1 through 4. Subsequent boards would use the same wiring scheme with the ports numbered 5 through 8 and 9 through 12 respectively.

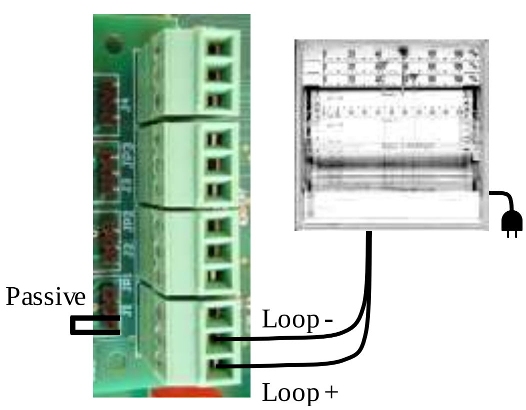


Each output channel has three jumper pins (1, 2 and 3, as shown) with a 2-pin jumper connecter installed. If the connector is on pins 1 and 2, the output channel will be in "Passive" mode, with only a signal current passing from "Loop +" to "Loop -". If the connector is on pins 2 and 3, the output channel will be in "Active" mode, delivering 24 Volts DC at the "Loop +" connection.

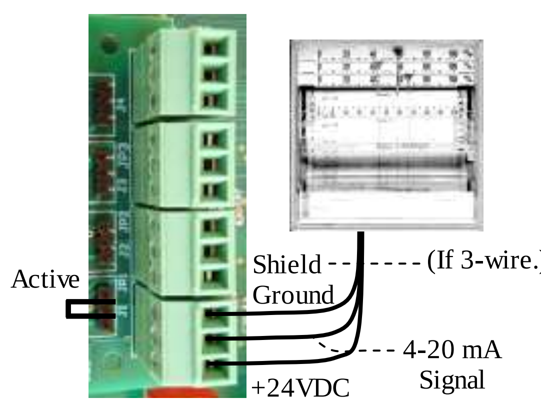
WARNING! There are live electrical circuits inside the enclosure even when the front panel power switch is in the OFF position. The power shall be removed from the controller before accessing the front door to the inside of the enclosure.

- Resistance Limit @ 24V (1.2k Ohms)
- Maximum current draw of 20 mA max @ 24VDC.
- 20-26 AWG wire is recommended for 4-20 mA connections.
- For long wire runs, not over 325 feet (100 meters), use shielded twisted pairs.
- Route signal wires in separate conduit, at least 6 inches from any AC voltage.

4-20 mA Output Wiring Examples



Powered 4-20 mA Receiver



Unpowered 2 or 3-Wire Receiver

Treatment Program Set-up

Default Passwords

Admin Level Default Password:	admin
User Level 1 Default Password:	user1
User Level 2 Default Password:	user2

Initial Set-up

Once you have connected the Input Sensors to the controller and the Relays to the devices they will control, you should perform the following steps, to set-up your water treatment program.

- Power up the Triton controller and log on using the default Administrator password.

- **CHANGE THE DEFAULT PASSWORDS!**
  Write down the new ones and store the info securely!

- Choose an Operation Mode, a pre-programmed "Ready to Use" (RtU) mode or an unrestricted "User Mode". By default the Triton will be set to use User Mode 1.

- Configure the Inputs or review Input Configuration if using RtU Operation Mode:
  1) Flow Switch (for a Flow Switch, you just need to 'activate' the alarms - see below.)
     a) For a Digital Input, select the appropriate Digital Input Usage (DigtlInUsage).
     b) Adjust settings:
        i) Set a Custom name?
        ii) Set alarm details (Set value to cause the alarm and set the AlarmActions)
        iii) Activate Alarms with "UseTheAlarms" menu item.
        iii) Calibrate, if necessary.

(Configure the other Inputs, Conductivty and so on. Digital Inputs may need a Usage adjustment.)

- Configure the Relays or review Relay Configuration if using RtU Operation Mode:
  1) Relay 01
     a) Select a Relay Usage, Bleed Valve is default for Relay 01.

(Bleed Valve, Pump Relay, Alarm Relay, Not In Use)

b) Pick a Control Mode. (Set Point, Timer, Water Meter...)

c) Adjust settings:

i) Custom relay name?

ii) Control details (Set Point or Timer settings, Alarm Settings and so forth.)

d) Activate the Control Mode: highlight "Use Mode Now" and press Enter.

2) Relay 02:

a) Select a Relay Usage, Pump Relay is default for Relays 02 through 07.
(Bleed Valve, Pump Relay, Alarm Relay, Not In Use)

b) Pick a Control Mode. (Manual, Set Point, Timer, Water Meter...)

c) Adjust settings:

i) Custom relay name?

ii) Control details (Set Point or Timer settings, Alarm Settings and so forth.)

d) Activate the Control Mode: highlight "Use Mode Now" and press Enter.

(Configure the rest of the Relays. Alarm Relays need no configuration.)

- Customize

a) Change the Home Screen to display the site info and summary info you want to see

b) Set the data logging interval, decide if you want the logs auto-downloaded.

c) Set email addresses, IP addresses, and text messages that you want sent on Alarm.

d) Check the Triton website for any firmware, menu system or help file updates:
http://www.hydro-watertreatment.com/water-treatment-controllers/triton-controller.html

3 Description of Controls

Overview

Every feature of the Triton Cooling Tower Water Treatment Controller can be easily accessed by using the 4-arrow key Navigator on the front panel of the controller.

Figure 3-1. A Triton Controller, with the front panel visible.

The LCD seen on the left side of the front panel in Figure 3-1 is showing the Home screen, an overall system status display. The user can press the Down arrow or the Menu key to access the Menu Screen. Once at the Menu Screen, the user can select a menu item by moving a reversed-color highlight over the menu item and pressing the Enter key.

To enter a value or change a name, the user must move past the menu item to an "Edit Value" or "Set New Name" prompt, press the Enter key, then enter the new value or name directly using the front panel keypad.

As the various menus are displayed, the user can simply press the Down arrow to move down the menu and the Up arrow to move up. If a highlighted menu item has options, they will automatically appear on the right, and the user can press the Right arrow to move to that submenu. A more detailed explanation of these operations is in the section called "Navigating the Menus".

Another key feature designed to make the controller easy to use, are the dedicated "Direct Access" front panel keys:

The Home key: Pressing this key will bring the user to the top-level display shown in Figure 3-1, from anywhere! The Home screen display is customizable too, so the user can change which six items are displayed, the name of the installation and how they want the date and time to be displayed. More details are provided in the section devoted to Home Screen Edit, later in this manual.

The Alarm key: Pressing this key will take the user directly to the Active Alarms display, for instant access. The Alarm light toward the top of the front panel is pre-programmed to light up when there is an Alarm, and then with one press of the Alarm key next to the light, the user can find out what's wrong.

The Menu key: Pressing this key will bring the user instantly to the top-level Menu Screen from anywhere in the menu system.

The Help key will cause helpful, context-sensitive text to appear when pressed. The helpful text will automatically be about the menu item that was highlighted when the user pressed the Help key.

The Back/Cancel key works two ways. When navigating the menus, it works just like the "Back" function in a web browser, taking the user back to the screen that was just previously displayed. When entering data, it works as a Cancel key, to revert the entry to its previous value.

The number pad works like the one on a cell phone and is used to enter numbers and alphabetic characters. The first press will input the number on the key; the second press will input the first letter, if available, and so forth. Notice that the “space” character is under the plus/minus (+/-) and the “shift” function is under the decimal point (.)

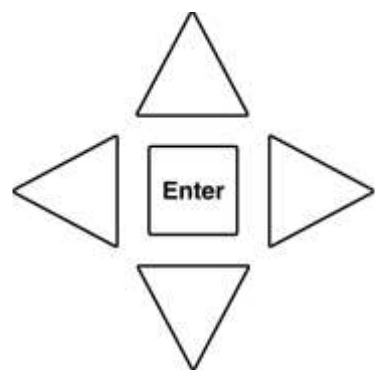
When entering information, the location where the entry will appear is shown by the insertion prompt, a blinking line at the bottom of the position in the entry field.

To delete a character just entered, press the Left arrow of the Navigator. On the other hand, if the user keeps pressing the Right arrow instead, the insertion prompt will "wrap around" to the front of the field, and the user can make a new entry over the previous entry.

Two "special function" keys are provided at the bottom corners of the number pad, for entering a capitalized letter or decimal point, and for entering a space or changing a number value back and forth from positive to negative. To enter a capitalized letter, press the Shift key, and then release it before pressing the key to enter the desired capital letter. Only the first letter entered after pressing the Shift key will be capitalized.

To abandon an entry in progress, just press the Back / Cancel key. The entry in progress will be discarded and the entry will revert to its previous value.

The Enter key: The user uses this key to show when they want to make a change, or when they are done making a change.



The Navigator: This array of four arrow keys can move the user through every one of the various controller screens and options. From the Home screen, the user simply presses the Down arrow once to access the Menu screen, where they press the Right, Down, Left, and Up arrows to navigate the menus.

Direct Relay Access: These keys are right below the Relay Activity lights, under the large display. The user can go directly to a relay's control menu, by simply pressing the corresponding access key! What could be easier?

The Home screen

This is the screen that first appears on the Triton controller and is the "top" of the menu of screens that the user can access. The user can go immediately to this screen, from anywhere in the menu structure, by pressing the Home key on the front panel.

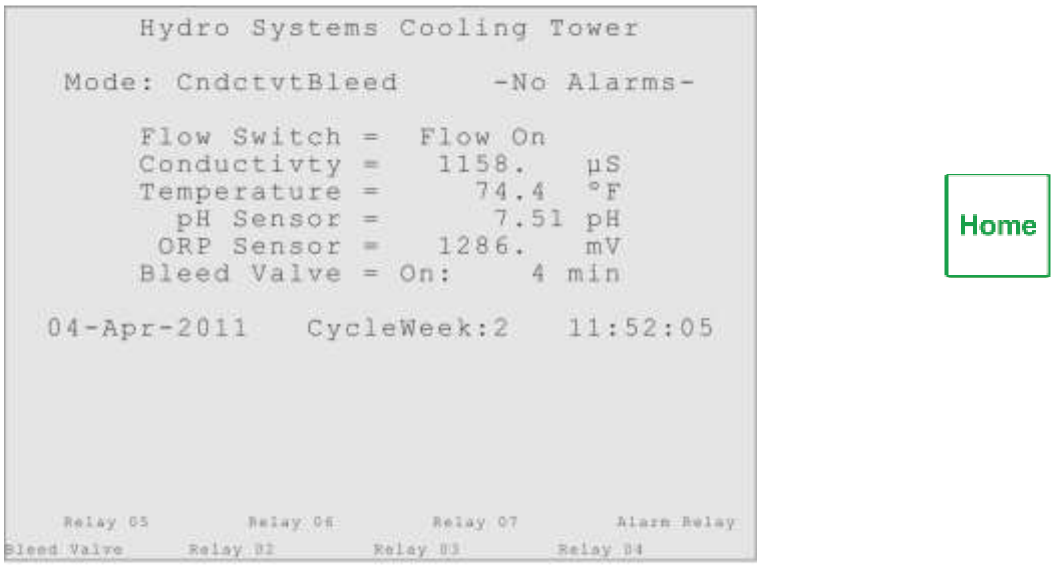


Figure 3-2. The Home Screen and Home key.

The first row of text on the Home screen is up to the user! In Figure 3-2 it is shown naming the installation site, but the user can enter any text they want, as described later in the section called "Home Screen Edit".

The second row of text shows the Operation mode the controller is running in, and the Alarm status. The Operation mode might be one of the "Ready to Use" pre-programmed modes as shown, or a User Mode the user has programmed the controller to use. The Alarm status will either display "-No Alarms-" or will display the number of alarms, for example, "* 2 Alarms *".

Next are the six status displays. The user can choose any six inputs or outputs to be displayed here, with the current measurement or status. The items displayed by default may vary based on the controller's installed options or a "Ready-to-Use" configuration, but normally the defaults will be the three standard sensors (Flow, Conductivity and Temperature), followed by the pH and ORP sensors, and then the Bleed Valve relay.

The fourth group of text on the Home screen shows the current date, an optional "Cycle Week" display, and the time. The user can choose the format of the date display. All these edits are done in the "Home Screen Edit" (HomeScrnEdit) menu, as explained later in this manual.

At the bottom of the display are "soft labels" for the Relay Activity lights, which reflect whatever "custom name" the user has given Relay 01 through Relay 08.

Entering a Password

When the user presses any key on the panel that moves the display away from the Home screen, they will see the Password request (Figure 3-3) asking them to enter a password.

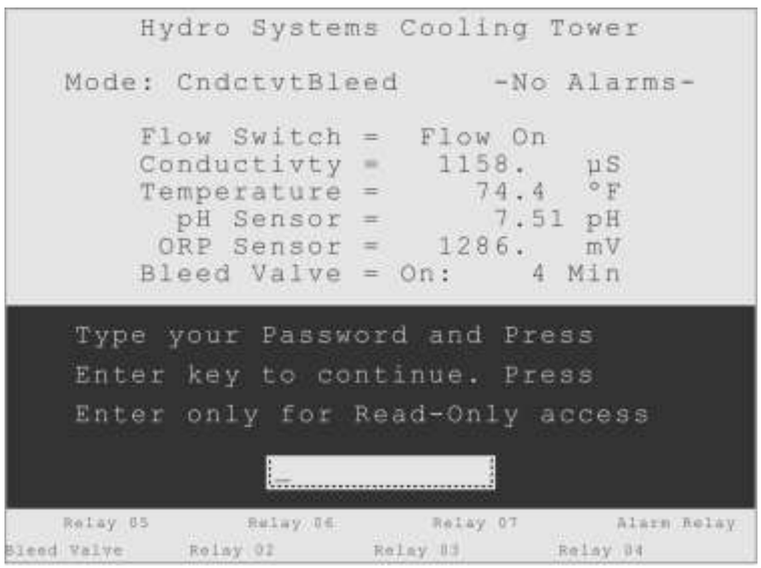


Figure 3-3. The Password Screen.

There are four levels of access, Administrator, User Level 1, User Level 2 and Read Only. The first three levels require the user to enter the appropriate password and press the Enter key to continue. If a user presses the Enter key only, they can navigate the menus in a read-only mode, although this can be disabled by the Administrator.

When the controller is first installed, the factory password for the Administrator access is "admin" and for the User Levels they are "user1" and "user2". One of the first things the Administrator for the system should do after installation is change these passwords, keeping track of the new ones in a secure location.

The examples in this manual will assume that the Administrator password was entered, so all changes are allowed.

To manually "log out" and reset the need to enter a password, return the controller display to the Home screen (pressing the Home key is an easy way) and allow one minute to pass. This will also happen automatically if there is no keypad activity for a pre-set amount of time. There is more detail about passwords, access control and the No Activity Timeout Limit in a later section of this chapter called "Passwords and Access Control".

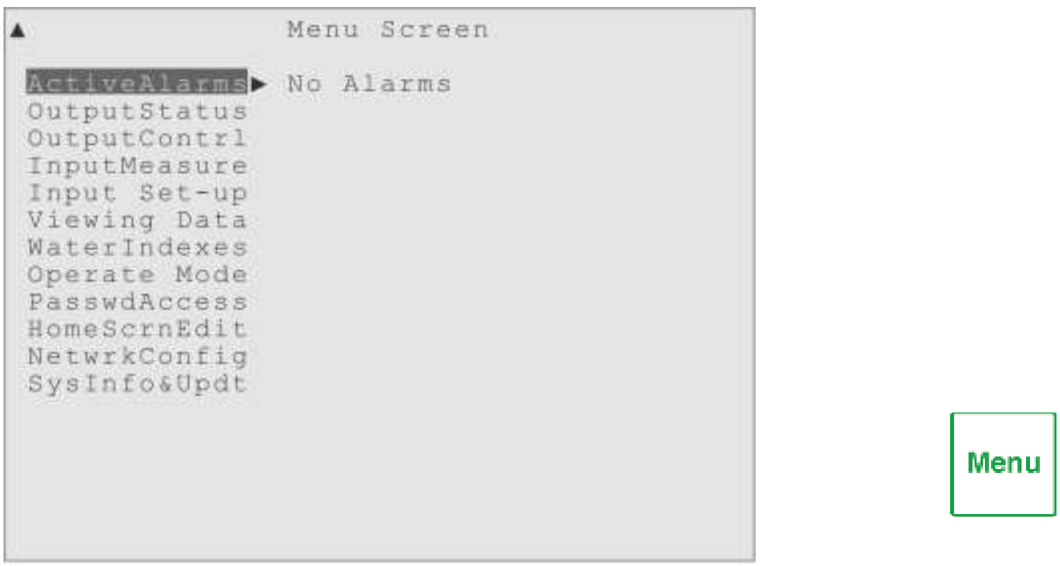


Figure 3-4. The Menu Screen and Menu key.

The Menu Screen

The user can go immediately to the Menu screen, from anywhere in the menu structure, by pressing the Menu key on the front panel. They can also get to the Menu screen from the Home screen with one press of the Down arrow on the Navigator.

The Menu screen will display, in a hierarchical list, all the features of the Triton controller. The user can "navigate" the list with the arrow keys, to see all the choices and settings, and press the Enter key to make changes.

The reversed color, or highlight, of the ActiveAlarms menu item, as seen in Figure 3-4, indicates this is the menu item in use. The user presses the arrow keys of the Navigator to move the highlight.

Notice there is a submenu for ActiveAlarms displayed to the right. If there were any Inputs or Outputs in alarm, they would be listed there, in place of the "No Alarms" message seen in Figure 3-4.

Navigating the Menus

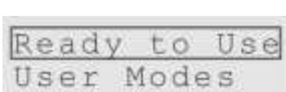
The menus are arranged in an outline form. The user can simply press the Down arrow to move down the menu and the Up arrow to move up. If there are options for a menu item, they will automatically appear in a submenu to the right and the user can press the Right arrow to move into the submenu. Then they can use the Up and Down arrows again to move in that submenu.

The Interface Elements

Looking at the example menu displays below, and in the upcoming section on Inputting Values, the following "interface elements" are used in the menus. The text below will explain what they mean, to help the user understand the displays and navigate the menu system.

The reversed color "highlight". This reversed color field is showing the user where the "focus" is, it is like a cursor that the user can move using the arrow keys of the Navigator. It tells the user "You are here." Selections are made in a list by moving the highlight onto the item the user wants to select and pressing the Enter key. Then the “Active Box” is drawn around the item to show it is active or selected.

The arrowheads and the colon. The arrowheads show the user where the highlight will move when they press the corresponding arrow key on the Navigator. They are also used to indicate where there are hidden menu items that can be accessed using the arrow keys. The colon is used when a value is displayed that cannot be edited, a "live" display of a measurement value or status code.



The "Active Box". This solid line drawn around a menu item indicates that the item has been selected or is active. In the example here, it shows that of the two choices in this menu, the "Ready to Use" item has been selected and is "active". Some menus allow more than one item to be selected; other menus only allow one item to be selected at a time.

The "input tray". This dotted line around the bottom and sides of a menu item indicates that it is a user setting, something the user can modify. It might be text, like the "custom name" for an Output, or numbers, like the Set Point value for a control mode. But it always indicates a field that can be modified by the user.

Navigating the Menus

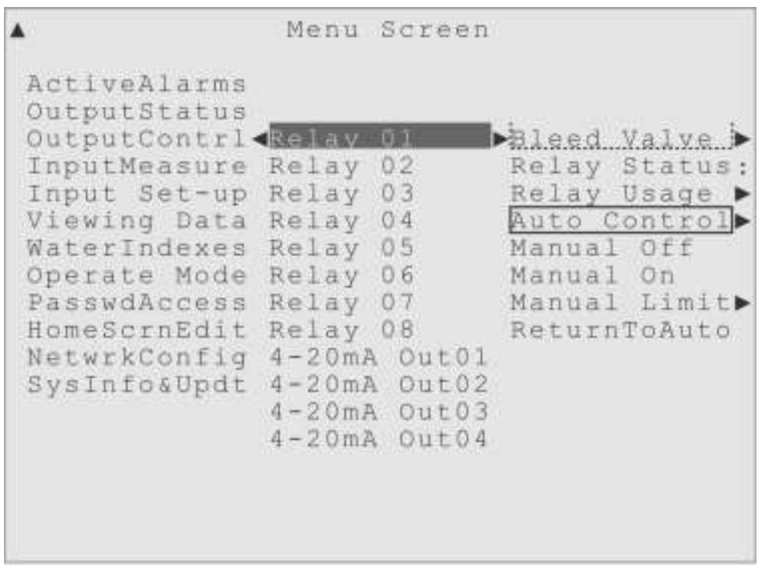


Figure 3-5. Highlight on Relay 01.

In Figure 3-5 the highlight is on the Output Control submenu item for Relay 01. The leftward pointing arrowhead (◄) to the left of Relay 01 shows the highlight is in the submenu of the Output Control (OutputContrl) menu, and that one press of the Left Arrow Navigator key on the front panel would move the highlight back to the Output Control menu item.

The rightward pointing arrowhead (►) to the right of Relay 01 indicates that this menu item (Relay 01) has a submenu, which is seen displayed to the right. It also shows where the highlight would move if the user presses the Right Arrow key on the front panel, onto the "custom name" menu item, which is showing the factory default custom name "Bleed Valve".

From where the highlight is shown in the picture, the Down Arrow on the front panel would move the highlight down the list, to Relay 02, Relay 03 and so forth. If the controller had enough Outputs installed that the list extended beyond the bottom of the display, the last row would have a downward pointing arrowhead (▼) to indicate there were more items out of sight.

From where the highlight is shown in the picture, the Up Arrow on the front panel would do nothing, since the highlight is at the top of the menu. But if the highlight were moved down, then the Up Arrow key would move it back up. Also, if the user scrolls to the bottom of a very long menu, so items go beyond the upper edge of the display, the top item is replaced with an upward pointing arrowhead (▲) to indicate there were more items out of sight.

Simply put, the arrowheads show the user where menus are available to view, and what arrow key to press to get there.

The upward pointing arrowhead (▲), in the upper left corner of the display, is a reminder that the Home Screen is 'above' the Menu Screen. If the highlight was on the Active Alarms menu item, a user could access the Home Screen with one press of the Up arrow, although it's easier to use the dedicated front panel Home key.

There are also rightward pointing arrowheads (►) and a colon (**:**) visible to right of the submenus items on the right side of the display. The arrowheads pointing right indicate another submenu is available, out of sight. The colon means there is a "display item" to the right, out of sight. A "display item" is an information display, with no submenu.

Figure 3-6 shows what the display would look like if the Right Arrow on the Navigator was pressed once to move into Relay 01's custom name submenu. One thing that happens is the whole menu moves, or scrolls, to the left so the user can see the next level of menus.

Also, notice that the text at the top of the screen has changed to help the user keep track of where they are in the menu system. When the menu name currently in use scrolls out of view to the left, it is then added to the top row of the display.

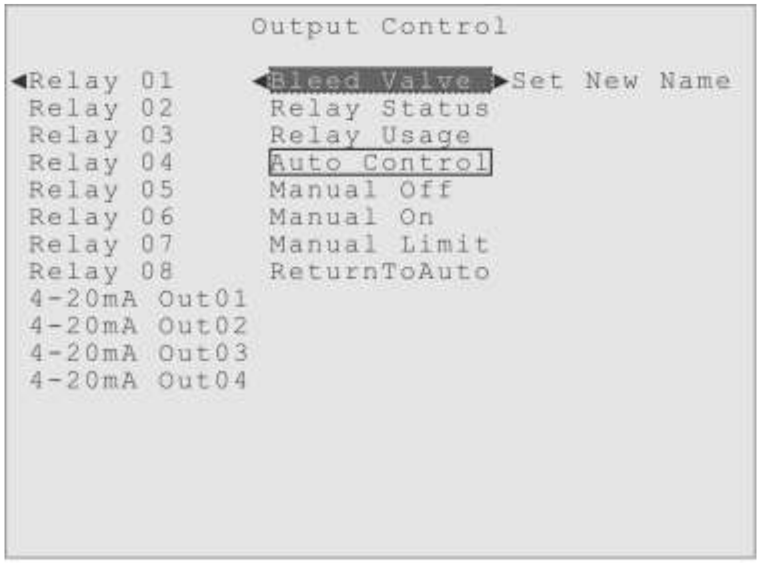


Figure 3-6. Relay 01 Custom Name.

Notice the only arrowheads in Figure 3-6 are the leftward pointing ones (◄) to the left of the Bleed Valve and Relay 01 menu items, and the rightward pointing one (►) to the right of the Bleed Valve menu item.

The leftward pointing arrowheads indicate that the user can press the Left Arrow to return to the list of Outputs, or again to return to the main menu item "OutputContrl", which is the screen shown in Figure 3-5.

The rightward pointing arrowhead indicates the user can press the Right Arrow key to move to the "Set New Name" item, and the lack of rightward arrowhead after the Set New Name items means there is no more information, or submenus, to the right. Later in this manual, in the Inputting chapter, an example will use the Set New Name item to change an Output's custom name.

These navigation techniques are used in identical ways for all the menus and submenus in the entire system. These simple highlight movements, using the Arrow keys, enable the user to navigate through the entire list of features built into the Triton controller. The next section explains the techniques for entering numerical values and alphabetic text.

Inputting Values and Text

For some features, the user will need to enter a numerical value or text, not just select an item from a menu. The Triton controller makes this very easy, as demonstrated in the examples below. This example will explain how to use the "custom name" menu item and how to change a Set Point. Specifically it will demonstrate:

1) How to give Relay 02 a custom name, to show it is controlling an Inhibitor pump.
2) How to edit the Conductivity Set Point for the Bleed valve Relay, to 1500 µS/cm.

1) Give Relay 02 a Custom Name:

First, the highlight would have to be moved to the OutputContrl menu, as in Figure 3-13. This is where all of the output control decisions are made and displayed; what the Relays are being used for, what control mode is in use and what settings are being used for that control mode.

The first submenu for OutputContrl is visible in Figure 3-7. In this hypothetical example, where Relay 02 is controlling an Inhibitor pump, the user would need to move the highlight into the Relay 02 control menu to make the name change, as explained below.

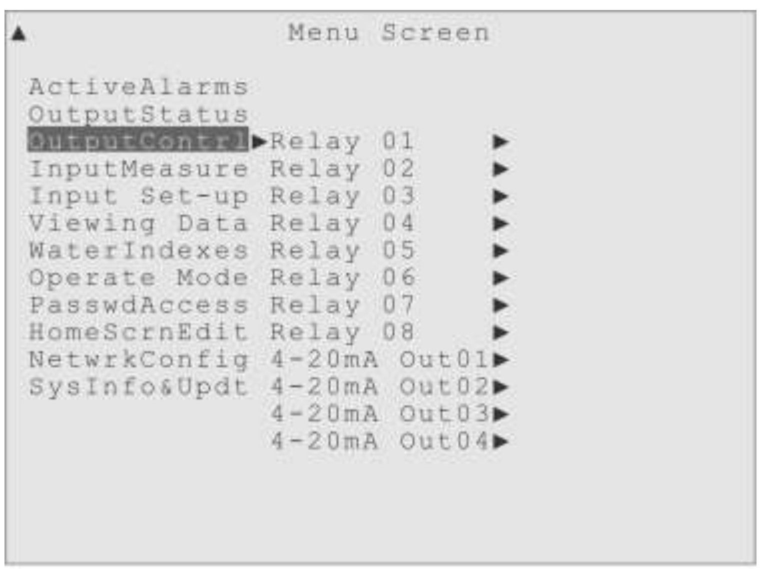


Figure 3-7. The Output Control Menu.

Pressing the Right arrow once and the Down arrow once on the Navigator keypad would move the highlight to the Relay 02 menu item, as seen in Figure 3-8.

The menu arrowheads show the user where the Navigator keys will move the highlight.

To enter a custom name for Relay 02, the user would first press the Right arrow to move to the custom name Input Tray as shown in Figure 3-9.

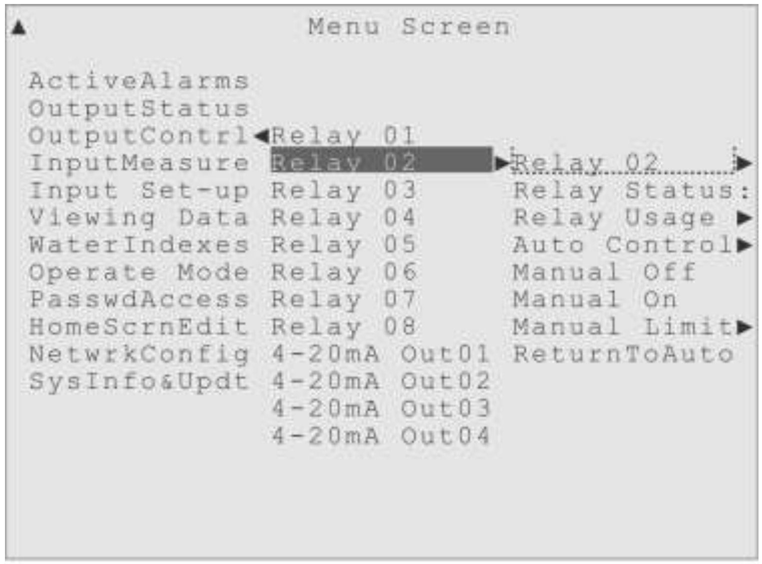


Figure 3-8. Output Control for Relay 02.

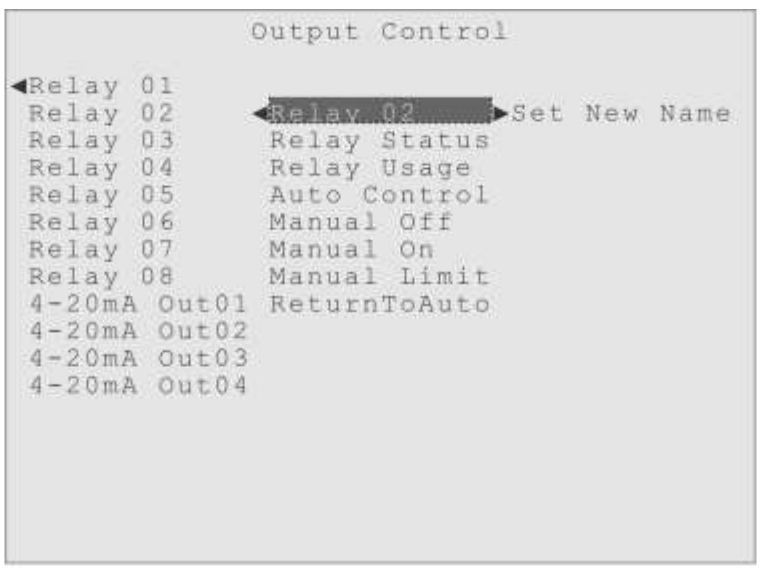


Figure 3-9. "Input Tray" for Relay 02 custom name.

Then the user would press the Right arrow again to highlight the "Set New Name" prompt as shown in Figure 3-10. These may seem like extra steps, but they help prevent accidental changes to the relay custom name.

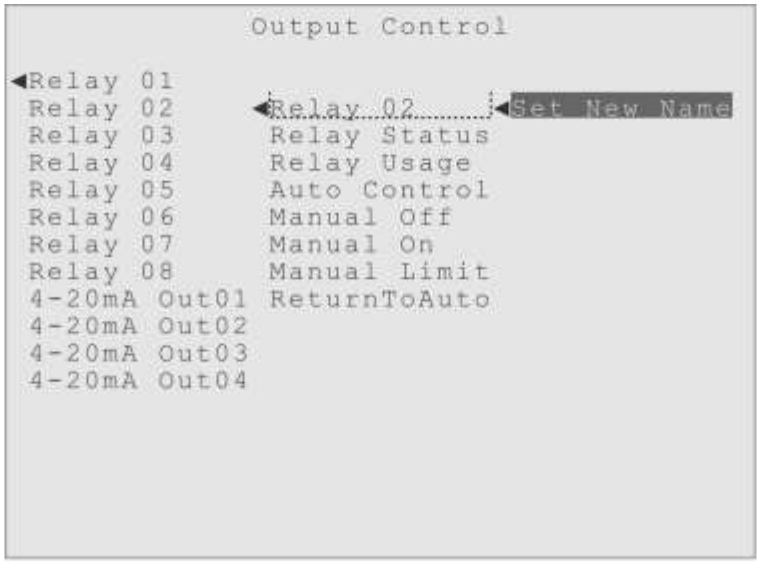


Figure 3-10. Highlight on Set New Name.

With Set New Name highlighted, the user can press Enter to edit the custom name.

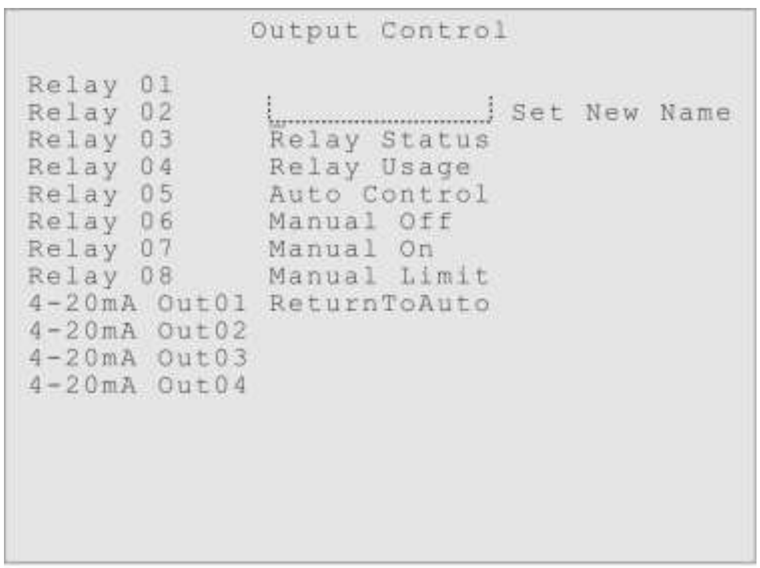


Figure 3-11. Input Prompt at first position of Input Tray.

The arrowheads will disappear and an insertion prompt, a blinking underline, will appear in the beginning of the custom name Input Tray, as shown in Figure 3-11. The arrowheads disappear because when entering a numerical value or text, the front panel arrow keys change their function.

Inside an Input Tray the Right arrow will now move the insertion prompt to the right, and the Left arrow will act as a Delete key. If the user wants to cancel the whole entry process, they can press the Back / Cancel key, and the custom name will revert to the value it had before they started to make changes.

In this hypothetical example, Relay 02 is activating an inhibitor pump, so the custom name "InhibitrPump" seems logical. In Figure 3-12 this new custom name for Relay 02 is showing, as it was entered, just before the Enter key is pressed.

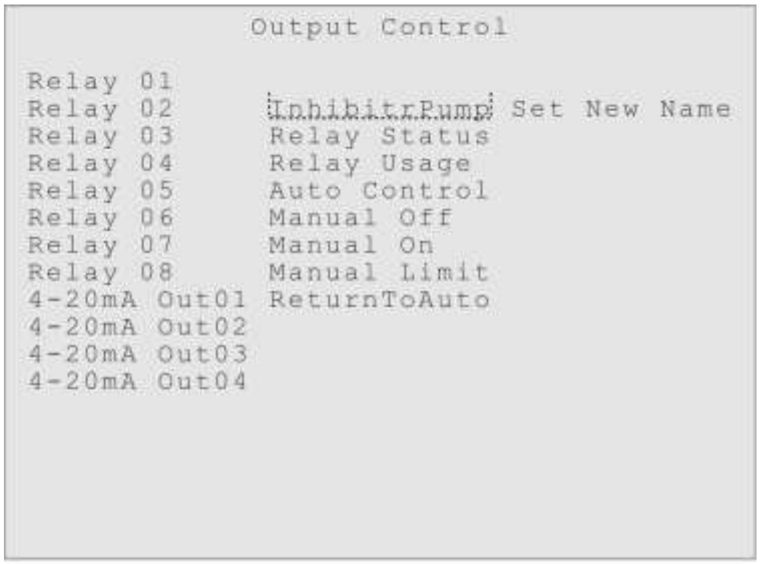


Figure 3-12. New Custom Name, before "Enter" key.

When the user is finished, they would press the Enter key to set the new name for Relay 02. Figure 3-13 shows the display after the Enter was pressed to accept the new name.

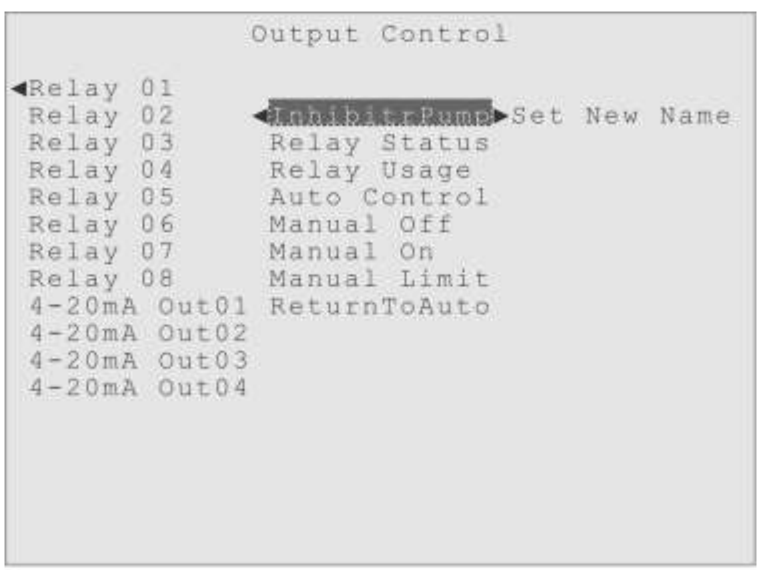


Figure 3-13. New Custom Name, after "Enter" key.

The new name will replace the previous name everywhere in the menu structure and on data logs and so forth. The only place that will always say "Relay 02 " is the first submenu of the Output Control menu, as seen above, which will always display the Relays in their numerical order and with their default numerical names.

The next goal of this explanation is to change the Set Point for the Conductivity sensor used to control the Bleed Valve, activated by Relay 01.

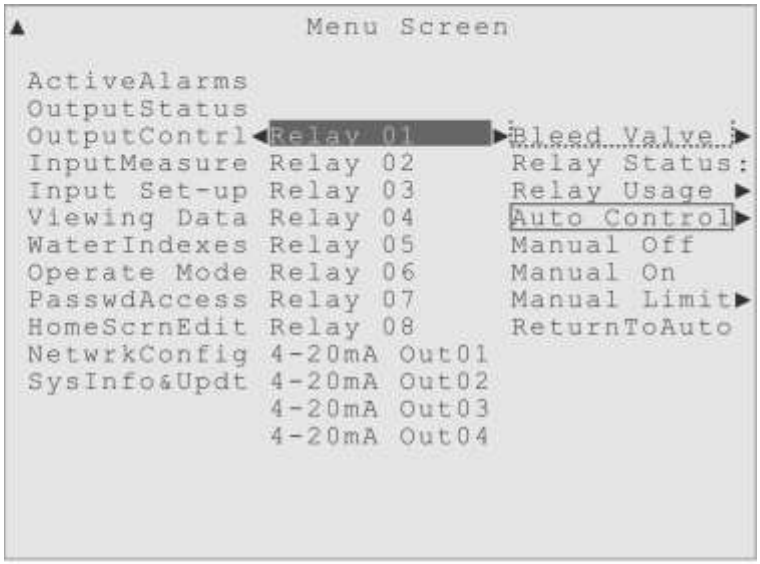


Figure 3-14. Output Control for Relay 01.

<u>2) Edit the Conductivity Set Point</u>

One press of the Left arrow will move the highlight back to the list of Outputs, then one press of the Up arrow will move the highlight up to the Output Control menu for Relay 01, and its submenu items would appear, a shown in Figure 3-14. Relay 01 typically has the custom name "Bleed Valve" assigned at the factory.

From the Relay 01 menu item, one press of the Right arrow would move the highlight into the custom name submenu for Relay 01, and then three Down arrow presses would highlight the Auto Control menu item, where the choices and settings for automatically controlling this Relay are found.

The submenu items displayed to the right of the Auto Control menu, shown in Figure 3-15, are the categories of "control modes", along with the Lockout and Alarm Settings submenus.

The Set Point Modes (**SetPnt Modes**) are the control modes that use a measurement value from an input sensor to decide when to activate a relay. The **Timer Modes** are the control modes that activate a relay at a certain time of day, and keep it activated for a user-defined duration. The Timer & Set Point Modes (**T&StPt Modes**) activate a relay at a certain time of day, but then use the measurement value of an input sensor to deactivate. The Water Meter Modes (**WtrMtr Modes**) activate a relay based on a volume measurement from a water meter. The Other Relay modes (**OthrRlyModes**) control the activation of this relay by the activation of some other relay.

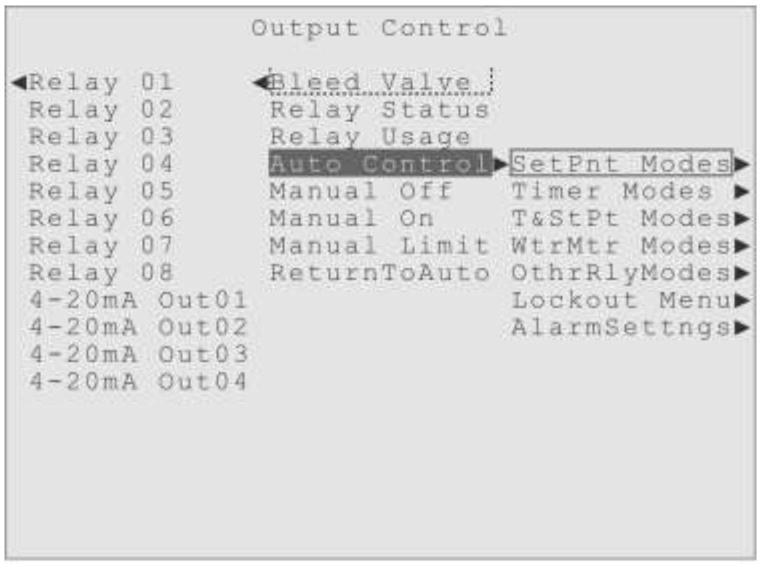


Figure 3-15. Relay 01 Auto Control Modes, Lockout and Alarm menus.

The "active box" drawn around the "SetPnt Modes" category indicates the currently selected control mode for this Relay is in that category, so that menu is where the user would go to change the Set Point.

A useful feature of the Triton controller is the user can use the same input sensor, but with a different Set Point, to control a different relay. That is part of the Triton "Control by Output" philosophy.

To access the individual Set Point control modes, the user would move the highlight to the right, to the Set Point Modes category. The text will scroll to the left and the individual Set Point control modes are displayed on the right, as shown in Figure 3-16.

The "active box" drawn around the submenu item, SetPnt-OnOff, indicates the Set Point On / Off control mode is currently the selected mode, and therefore that menu is where to change the Input sensor's Set Point for this relay. More details about the Set Point On / Off control method, as well as all the other control modes, are in the chapter "User-defined Operation Modes", further into this Reference Manual.

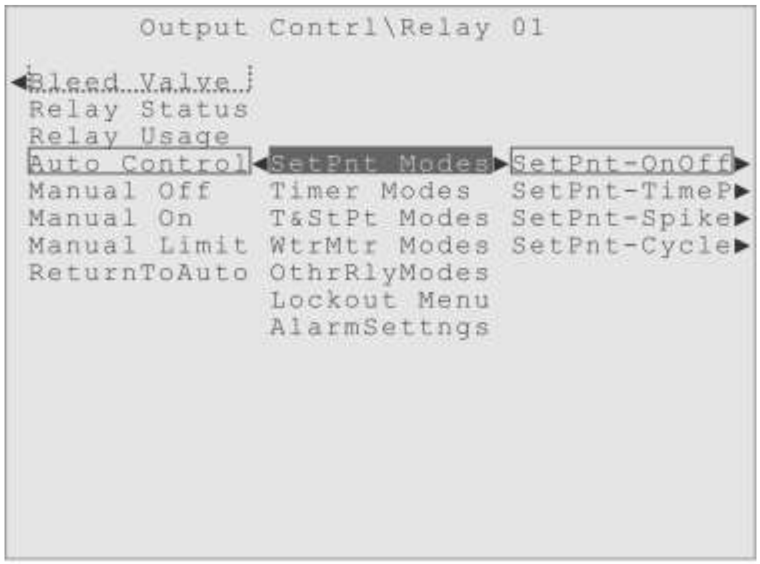


Figure 3-16. Set Point Control Modes.

The next step is to move the highlight to the right again, to the Set Point On / Off (SetPnt-OnOff) menu item. That will cause the display to scroll to the left again, to display the submenus of the Set Point On / Off mode to the right, as in Figure 3-17.

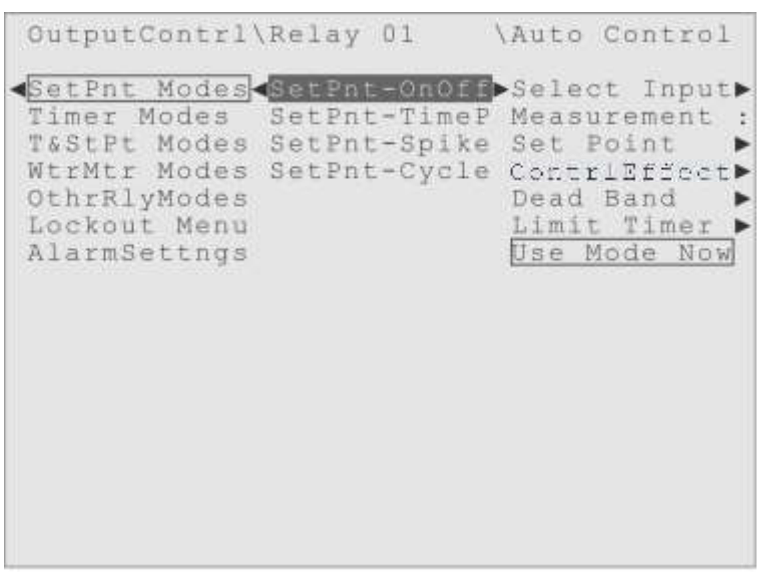


Figure 3-17. The Set Point On/Off menu items.

The **Select Input** menu is where user can select the Input to control the relay.

The **Measurement** menu displays the live measurement value the sensor is reporting.

The **Set Point** menu is where the Set Point value is entered, as explained below.

The **ContrlEffect** menu allows the user to choose if the relay activation will force the input measurement lower (Force Low) or force the measurement higher (Force High).

The **Dead Band** menu is for setting the dead band value to keep the relay from cycling on and off too often.

The **Limit Timer** menu is where the user can adjust the Activation Limit Timer for this relay, to take control of the relay if it fails to deactivate normally.

The **Use Mode Now** menu item is the "activator" for this control mode. After adjusting the control settings, a user must highlight "Use Mode Now" and press Enter, to use the control mode. The active box will be drawn around "Use Mode Now", the "SetPnt OnOff" menu item, "SetPnt Modes" category item and "Auto Control" menu item.

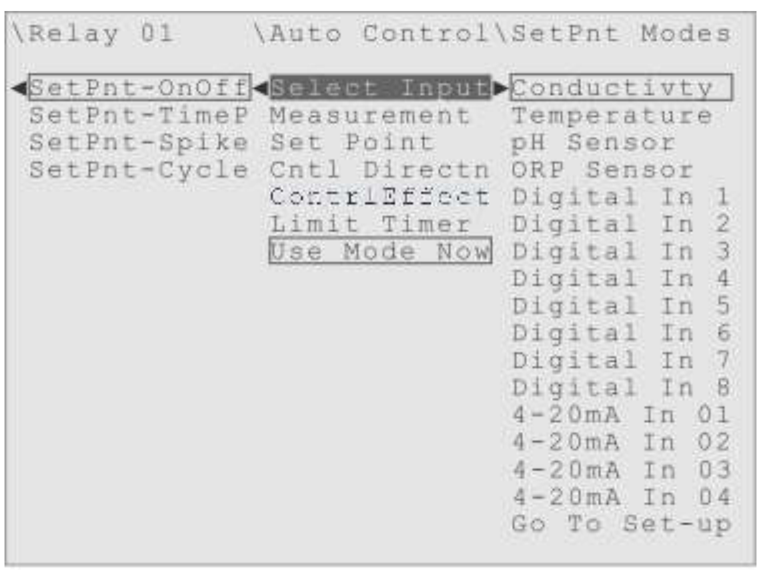


Figure 3-18. The Set Point On/Off, Select Input sub-menu.

To change the Set Point that activates the Bleed, the user would first move the highlight to the right, onto the Select Input menu item, as shown in Figure 3-18. The Conductivity sensor is shown as the selected Input for this Set Point control mode, controlling the Bleed Valve. You can tell because it has the active box around it. The “Go To Set-up” item at the bottom of the list is a shortcut to the Input Set-up menu for the active item. To change the Conductivity Set Point, the user would use the Down arrow, to move the highlight toward the Set Point menu item.

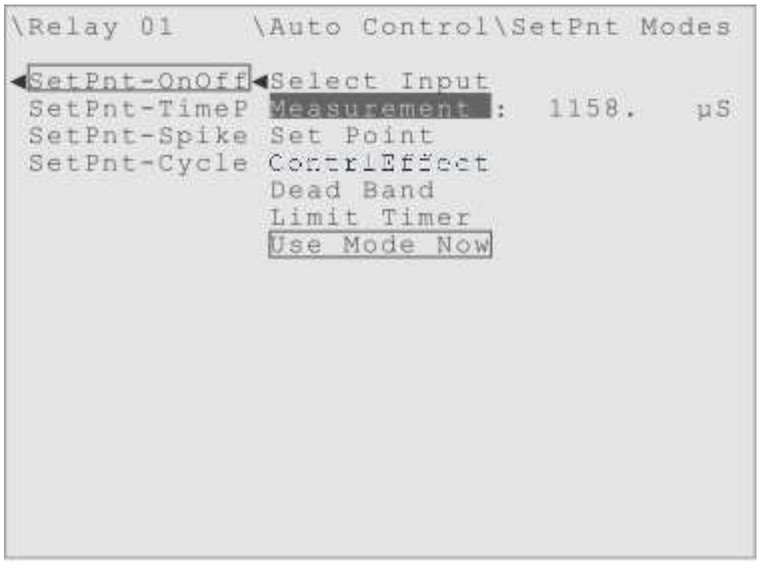


Figure 3-19. The Measurement Display.

The Measurement menu item, shown in Figure 3-19, simply displays the current "live" measurement value from the selected Input, for reference.

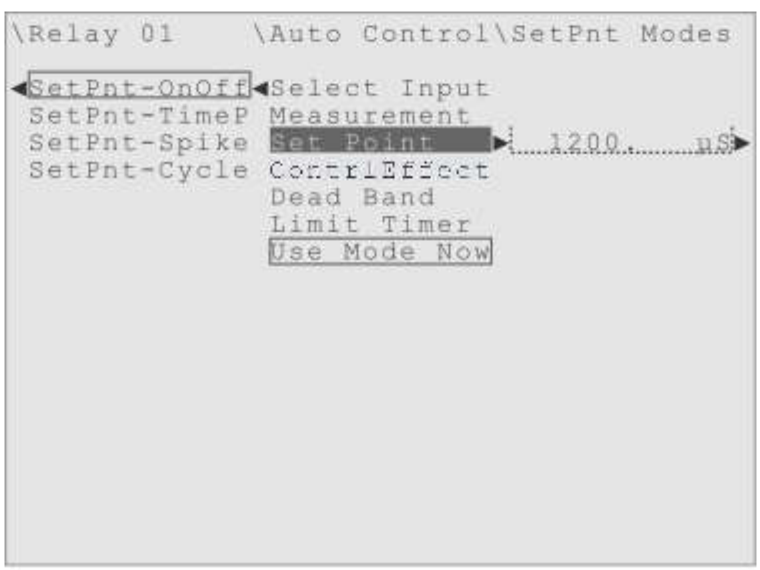


Figure 3-20. The Set Point menu and current value.

When the highlight is moved down to the "Set Point" menu item, the value that is currently in use is displayed to the right, as shown in Figure 3-20. The dotted "Input Tray" is a reminder that this is an editable value, and the user can expect to find an "Edit Value" submenu to the right. In our example, the Set Point is set to 1200 µS/cm. Moving the highlight to the right, onto to the current value, will expose the Edit Value prompt, as shown in Figure 3-21.

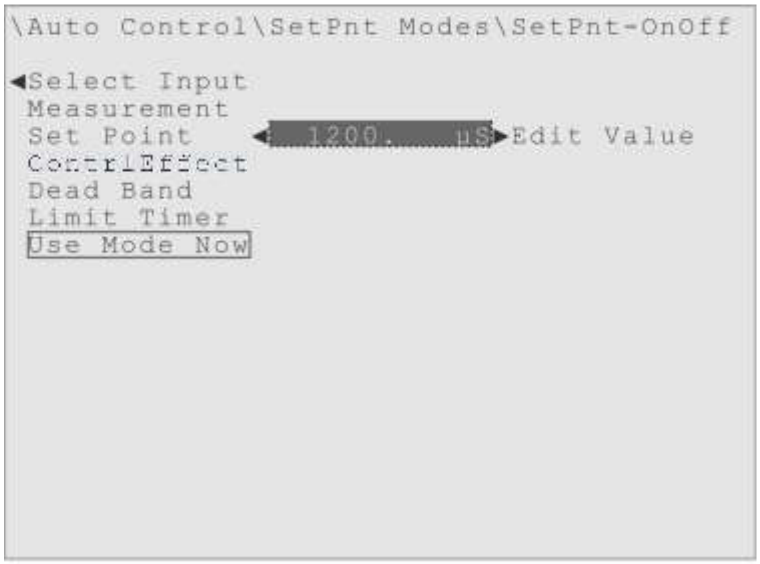


Figure 3-21. Exposing the Edit Value menu item.

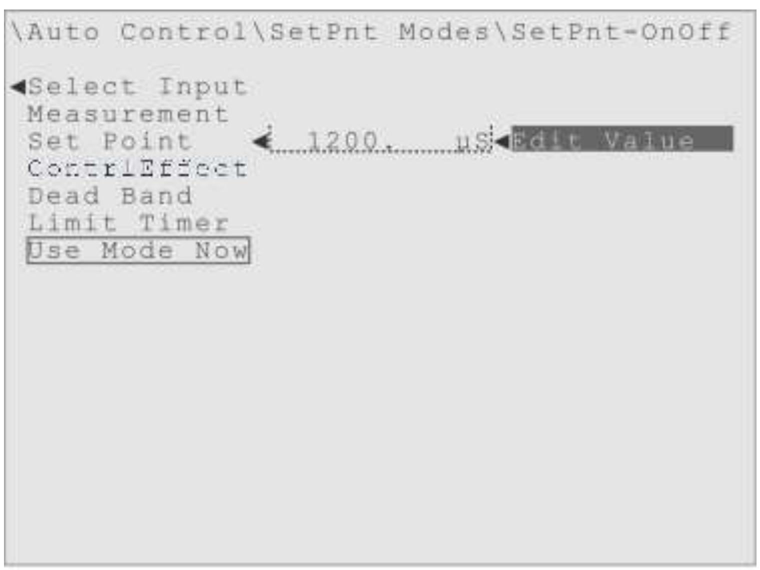


Figure 3-22. Highlight on Edit Value, ready to press Enter.

To help safeguard this important control value, the user has to move the highlight to the Edit Value prompt before they can change the value. When the highlight is on Edit

Value prompt, as shown in Figure 3-22, the user can press Enter to change the value. Another feature of the Triton is when entering a numerical value the user can enter the value directly using the keypad. No need to enter leading zeros or position the insertion pointer in the entry field, just enter the number directly with the front panel keypad. Figure 3-23 shows the new value "1500", before the Enter key is pressed.

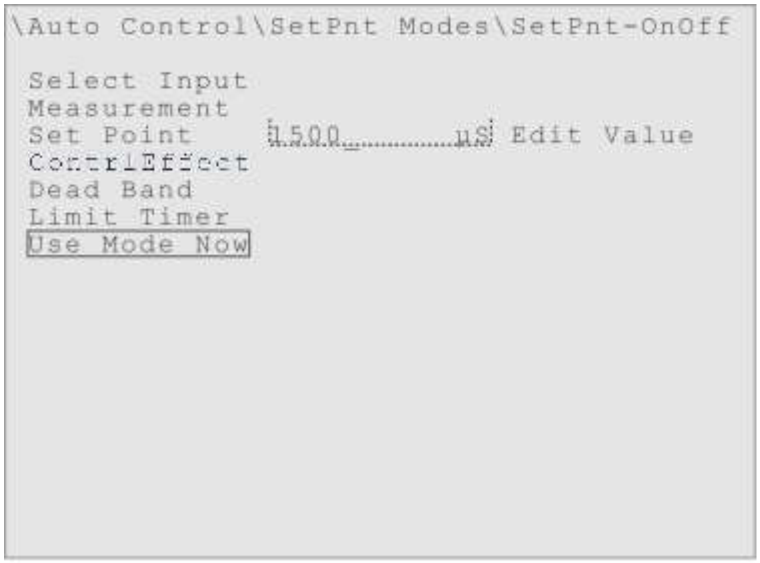


Figure 3-23. The new Set Point value, before Enter is pressed.

Figure 3-24 shows the new 1500 µS/cm Set Point value after Enter is pressed

Figure 3-24. The new Set Point value, after Enter is pressed.

To return to higher levels of the menu, the user would press the Left arrow a few times, or press the Menu or Home keys on the front panel to get back to the top level instantly.

. . .

The previous two sections of this Reference Manual have described how to navigate the menus of your Triton water treatment controller, how to change settings, and how to enter text and numerical values. The next section will explain the difference between the "Ready to Use" operation modes and the "User Modes".

"Ready to Use" and User-defined Operation Modes

Every Triton Water Treatment Controller comes with several convenient, pre-programmed, "Ready to Use" operation modes. Or the user can create their own water treatment program within one of the "User Modes". Both categories are found in the Operation Mode (Operate Mode) menu, as shown in Figure 3-25.

Figure 3-25. The Operation Mode menu.

"Ready to Use" Modes

The "Ready to Use" modes are pre-programmed with common water treatment strategies, simple modes like Conductivity controlled Bleed, or programs as complex as Conductivity controlled Bleed and Feed with an Oxidizing Biocide under ORP sensor control and pH control with a pH sensor.

More of these "Ready to Use" (RtU) modes may have become available since this manual was printed, check the Hydro Systems Triton controller website to see if an update with new operation modes is available:
http://www.hydro-watertreatment.com/water-treatment-controllers/triton-controller.html

Below are brief outlines of what the "Ready to Use" operation modes are designed to accomplish. There is much more detail about each of these modes and how they might be used, in the later sections of this Reference Manual named "Ready to Use Operation Modes" and "User-defined Operation Modes", found in the "Using the Triton Controller" chapter.

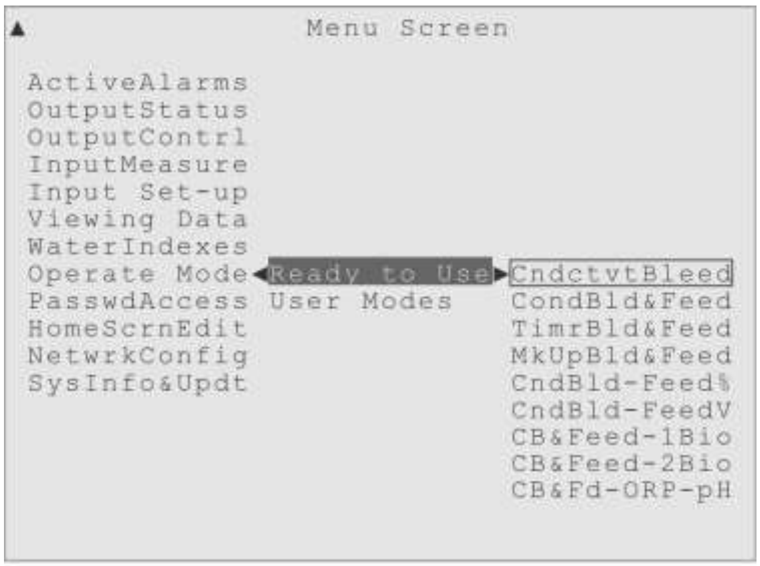


Figure 3-26. The "Ready to Use" (RtU) Operation Modes.

Conductivity controlled Bleed (CndctvtBleed)
A very simple operation mode that does nothing more than open and close the Bleed Valve based on a Conductivity sensor Set Point.

This mode will simply Bleed down the system water when the Conductivity sensor value rises past the Set Point value the user establishes, without any other control options (such as chemical additions and so forth).

Conductivity controlled Bleed & Feed Inhibitor (CondBld&Feed)
Much like the previous mode, but with the addition of an Inhibitor feed, controlled by Relay 02.

The Bleed valve is still controlled by the Conductivity Set Point, and the Inhibitor pump relay activation is controlled by the Bleed valve deactivation.

Timer controlled Bleed & Feed Inhibitor (TimrBld&Feed)
Similar to the previous "CondBld&Feed" mode, except the Bleed valve is controlled with a Timer, instead of the Conductivity Set Point. The Inhibitor pump activation is still controlled by the Bleed valve deactivation.

Make-up Volume controlled Bleed & Feed Inhibitor (MkUpBld&Feed)
Similar to the previous "Bleed and Feed" modes, except the Bleed valve is activated by a volume of water and then deactivated after a user-defined time duration. The Inhibitor pump activation is still controlled by the Bleed valve deactivation.

Conductivity controlled Bleed, Inhibitor as % of Time Cycle (CndBld-Feed%)
In this Control mode the Bleed valve is controlled by a Conductivity Set Point, but for the first time the Inhibitor is pumped *independent* of the Bleed valve. In this mode, the user defines a time cycle like 60 minutes, and a percentage of that cycle time for which they want the Inhibitor pumped. For example, the user could set the Inhibitor to feed for 50% of every 60 minutes.

Conductivity controlled Bleed, Timed Inhibitor by Water Volume (CndBld-FeedV)
Quite similar to the previous mode, with the Inhibitor pumped independently of the Bleed valve, but in this mode the Inhibitor relay is activated by a user-defined water volume measurement from a Water Meter, expected to be measuring the Make-up water.

Each time the user-defined Make-up Volume is reached, the Inhibitor is pumped for a user-defined, fixed amount of time. For example, the user could pump Inhibitor for 5 minutes after every 300 gallons of Make-up water has been measured.

The Bleed valve is still controlled by a Conductivity Set Point, as before.

Conductivity controlled Bleed & Feed Inhibitor with one Biocide (CB&Feed-1Bio)
The previous three modes dealt with various Inhibitor feed methods, now with this operation mode, the scheme goes back to the simple "Conductivity controlled Bleed & Feed Inhibitor" method and adds a Biocide feed, controlled by a Timer.

The Bleed valve is controlled by a Conductivity sensor Set Point, the Inhibitor relay is activated by the Bleed Valve deactivation and one Biocide is fed using a Timer mode (Time Percent, Daily, Weekly or 28-Day).

Conductivity controlled Bleed & Feed Inhibitor with dual Biocide (CB&Feed-2Bio)
Identical to the previous RtU mode, with the addition of a second Biocide feed, also controlled by a Timer mode.

The Bleed valve is again controlled by a Conductivity sensor Set Point, and the Inhibitor relay is activated by the Bleed valve deactivation. Both Biocide relays are controlled by a Timer mode (Time Percent, Daily, Weekly or 28-Day).

Conductivity Bleed & Feed Inhibitor w/ ORP & pH Control (CB&Fd-ORP-pH)
Similar to the previous mode, but the Biocide is now an Oxidizing Biocide controlled by an ORP sensor Set Point (or a Timer mode), and the second Biocide has been traded for pH control using an acid pump controlled by a pH sensor measurement.

The Bleed valve is still controlled by a Conductivity sensor Set Point, and the Inhibitor relay is still activated by the Bleed valve deactivation.

But now Relay 03 is expected to activate an Oxidizing Biocide pump, controlled by an ORP sensor Set Point (or a Timer), and Relay 04 is preset to activate an Acid Pump under the control of a pH sensor Set Point.

. . .

In every "Ready to Use" mode the last high-capacity relay installed in the controller (Relay 08, pre-named "Alarm Relay") is pre-set to activate an external alarm indicator (like a bell or strobe) if an Alarm condition occurs.

More detailed explanations of these RtU modes are in the chapter "Operation Modes".

. . .

The "User Modes"

The four User Modes (or User-defined Operation Modes) are where the user can take full advantage of the features of the Triton controller. Unlike the Ready to Use modes, nothing is hidden in the User Modes. The user can see, and select, every possible combination of Output, Input and Control Mode available on a Triton controller.

There are four of the user-defined operation modes, to which the user can give a custom name, and use to hold their water treatment settings for immediate use or later reference.

Perhaps the user will want to program operation modes for Spring, Summer, Fall and Winter. On the other hand, perhaps modes for Below 32F, Above 32F, Above 85F and Vacation will better meet their needs. In these modes, it's all up to the user.

Figure 3-27. The "User Mode" Operation Modes.

The user can even copy the settings from one of the RtU modes into a User Mode, or from one User Mode to another. For example, if the user wanted to experiment with some changes, they could copy the mode they are using now into an unused User Mode and experiment in that new mode without modifying their original program.

. . .

Output Control

"Control By Output" is the main design concept of the Triton water treatment controller. The user can simply go to the OutputContrl menu, then to the menu of a particular Relay, and find all the control settings in its submenus. Figure 3-28 shows the **OutputContrl** menu highlighted, with all the Outputs listed to the right.

The user can move the highlight to any Output, like Relay 01, shown in Figure 3-29, and find all the settings to control it. There are submenus for setting a custom name, displaying the current status, choosing the Relay Usage, and the Auto Control menu.

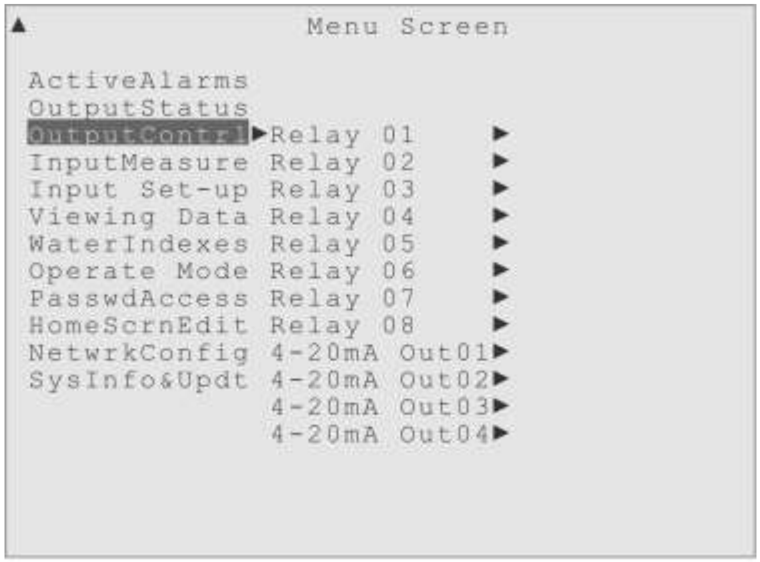


Figure 3-28. The Output Control menu.

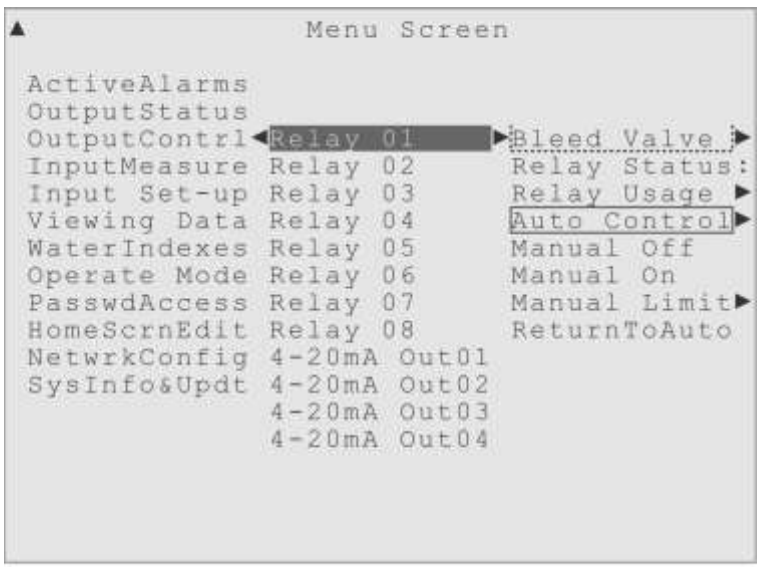


Figure 3-29. Output Control for Relay 01.

One of the first choices is to assign how this output will be used, in the Relay Usage menu. There are five relay usage assignments from which the user can select:

BleedValvUse	(Bleed Valve Usage):	To control a Bleed Valve. (Figure 3-30)
Blowdown Use	(Blowdown Valve Usage):	To control a Boiler Blowdown Valve.
PumpRelayUse	(Chemical Pump Usage):	To control a Chemical Pump.
AlarmRlayUse	(Alarm Relay Usage):	To control an external Alarm indicator.
Not In Use	(Relay Not In Use):	To remove the relay from most menus.

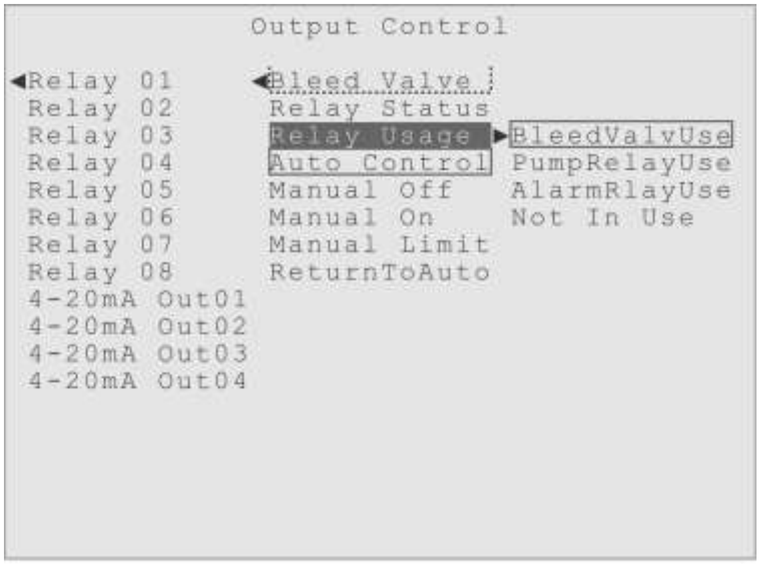


Figure 3-30. The Relay Usage menu.

When the user chooses the Relay Usage, the Auto Control menu is automatically adjusted to match that Usage. Figure 3-31 shows the Auto Control menu for Relay 01, controlling a Bleed Valve, as an example.

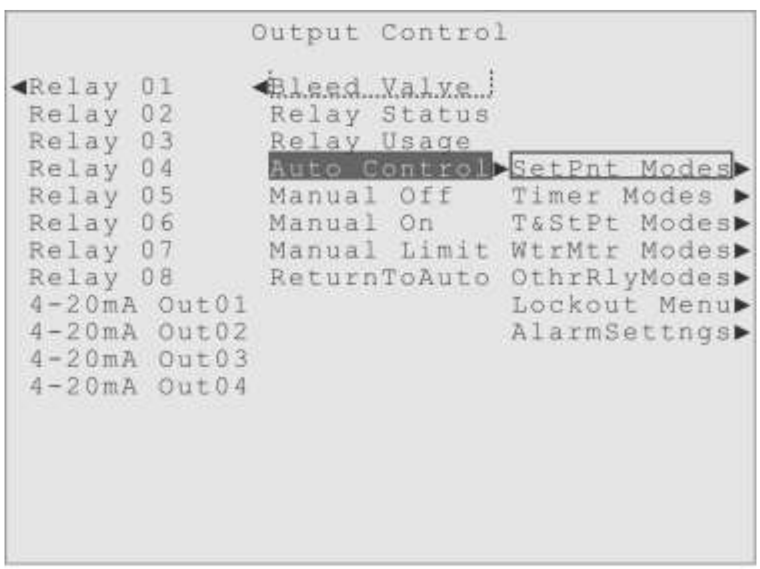


Figure 3-31. The Auto Control Menu for Bleed Valve Relay Usage.

Input Set-up and Calibration

These menus are dedicated to the controller's Inputs, the sensors that keep the user, and the controller, informed of the condition of the water in the cooling tower system.

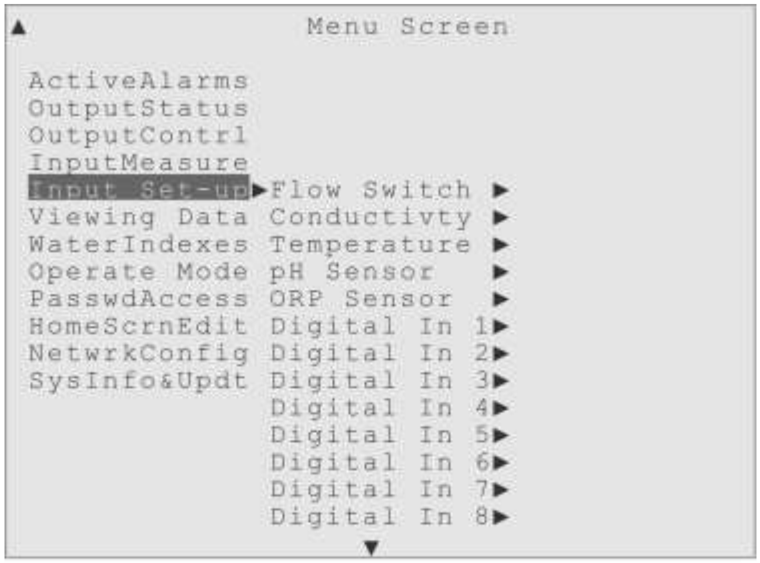


Figure 3-32. The Input Set-up and Calibration menu.

These sensors include such devices as the Flow Switch, the Conductivity / Temperature probe; pH and ORP probes; the digital inputs for Water Meters, Drum Level sensors; and the optional 4-20 mA Inputs.

The user would move the highlight to the Input Set-up and Calibration menu (**Input Set-up**) for three types of Input settings:

1) Initial set-up, like custom name and, where needed, Input Usage assignment.
2) The Alarm value settings and Alarm Actions.
3) Initial calibration, if desired, and periodic calibrations, as needed.

1) The Digital Inputs also have a Usage menu like the Outputs, so the user can easily define how the Digital Input will be used, as a Flow Switch, Water Meter, Drum Level sensor and so forth, and adjusts the Settings Menu to be appropriate for that usage.

The user may also want to assign custom names to the Inputs, especially the more generic inputs. A Drum Level sensor with a custom name like "Acid Level" will make more sense if an Alarm occurs than "Digital In 2", for example. The names shown in

Figure 3-32 are factory default names for some typical Inputs.

2) All the inputs that provide measurements can be checked or calibrated against known values in their respective menus. Sensors are often calibrated after the initial installation, and then periodically to maintain and verify their accuracy.

Most of the sensor calibration menus offer one-point and two-point calibration options for greater accuracy, and can be calibrated against reference solutions of a fixed value, or against a "field" measurement of the system water.

3) The Alarm settings for each Input are also found in their individual submenus. Each Input has its own set of Alarms, related to the kind of device it is, and how and what it measures. A typical Input sensor will have a High value alarm and a Low value alarm where you set the value or measurement that would cause the Alarm, and a Sensor error alarm.

Later it is explained how the user also can control what happens if an Alarm occurs, using the Alarm Actions menu. There are factory default settings for every Alarm, to activate the Alarm Relay, for example, but the user can change any of these settings. The Alarm Actions submenus include choices to:

• Have the red Alarm LED on the front panel flash.
• Activate any Relay, usually to control an external alarm indicator.
• Lockout any or all Output Relays.
• Have the controller send alarm emails.
• Do nothing!

Of course, any Alarm condition always appears in the Active Alarms menu, and in the System Activity Log for later reference, even if the user sets an Alarm to do nothing.

More information, for each Input, is in the "Input Set-up and Calibration" sections of the "Using the Triton Controller" chapter, later in this Reference Manual.

Active Alarms

This is the menu where any *active* alarms are displayed, and can be cleared. It is also the menu the Alarm key on the front panel would take a user to, in one easy step!

If there are any alarms listed, there will be a time saving menu item to clear all active alarms at once, and each Input or Output listed in alarm will have a handy submenu shortcut (Go To Set-up) to take you directly to their settings menu.

Figure 3-33. The Active Alarms menu, showing one alarm, and Alarm key.

Any time an Alarm condition occurs with a Triton controller, the situation that created the Alarm is logged to the System Activity Log, and the name of the Input or Output in alarm appears under this "ActiveAlarms" menu. The user has control over what else happens, whether the front panel Alarm LED is lit, whether Relays get a Lockout or are activated, whether emails are sent or phone calls made.

Detailed explanations of the Alarm settings and Alarm Actions are in the "Output Control" and "Input Set-up and Calibration" sections of the "Using the Triton Controller" chapter, later in this manual. Each Input and Output has Alarm submenus where the user can control when an Alarm should occur and what happens when it does.

Viewing Data

Although the Triton controller offers complete data downloads, right from the front panel or over a network connection, the user can also view the data on the front panel display or with the web interface.

The **Viewing Data** submenus allow the user to view the System Activity Log, or the Data Logs of the Input and Output values or status. The user can view the data right on the controller's front panel display, download the logs to a USB drive, or email the logs over an Ethernet network or the Internet.

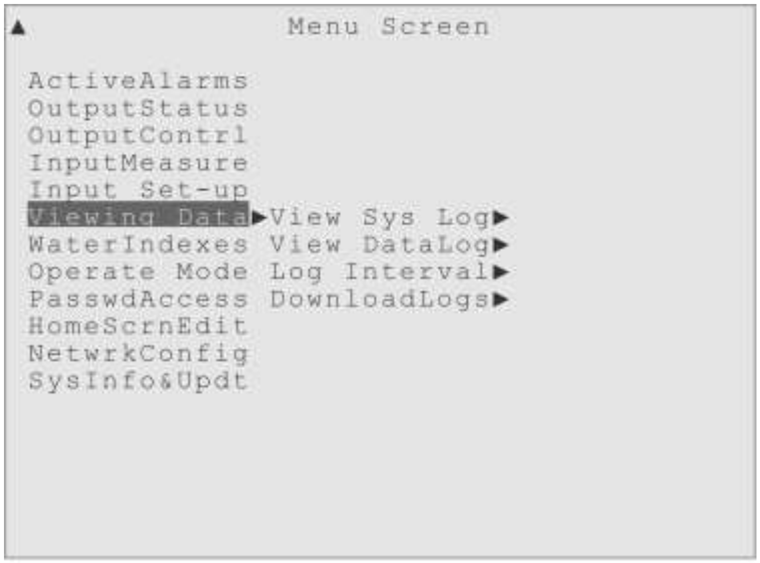


Figure 3-34. The Viewing Data menu.

Any changes made to the controller settings are recorded into the System Activity Log. The log will show the date and time of the change, most recent entries first, and the setting before and after the change. The Viewing Data menu allows the user to view the System Activity Log on the front panel display, over a LAN, via the Internet or choose to download the log to a USB drive.

A System Activity Log entry is made automatically when there is any system activity; a user log-on, setting change, alarm and so forth. The Data Log entries are made using a data logging interval, which can be set from one minute to once a day. The controller has enough memory locations reserved so that about 40 days worth of data can be logged for each Input and Output, using a 30-minute logging interval. Logging less often will allow even more days of data to be recorded.

When the log becomes full, new data is still logged, but the oldest data is deleted to make room.

The user can also view a Data Log of any Input or Output on the front panel display. In the View DataLog menu, all the Inputs and Outputs installed are listed, with a date entry field to the right, and a menu item to view the data for that date. When the "View Log

Now” item is selected, it is replaced with a list the times for the logged data, most recent entries first. Once the highlight is moved into the list of times, the individual log entries are shown, and the user can scroll up and down the data log with the Up and Down Arrow keys. They can use the date entry field to look at the data from a different date.

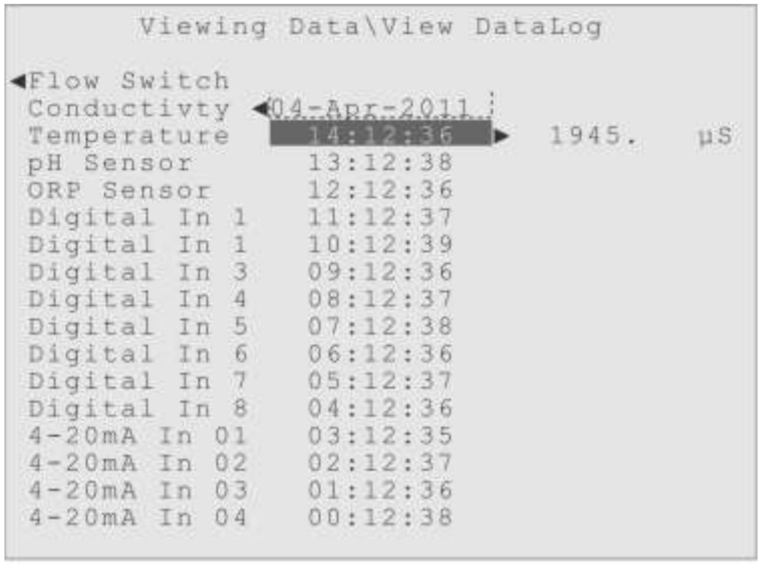


Figure 3-35. The Data Log for the Conductivity sensor on 04-Apr-2011.

The user may also download the data logs, for archival purposes or to import into a software trending or graphing program. The data can be downloaded in a “By Time” format is a single text file, with the first line being a listing of all the Inputs and Outputs, separated by commas (comma delimited). Subsequent lines contain the numerical data for each time interval, for each respective item, also separated by commas. This is the format most third-party database programs will expect.

Water Indexes and Wet Test Data

The Triton controller can display three popular water indexes:

Langelier Saturation Index (LSI)
Ryznar Stability Index (RSI)
Cycles of Concentration

LSI and RSI Indexes

These water indexes are popular indicators of the system water's condition. Be careful with the LSI and RSI Indexes, however! These indexes require manual "wet test" data on the system's water, and the data has to be entered regularly into the controller for the Indexes to be properly calculated.

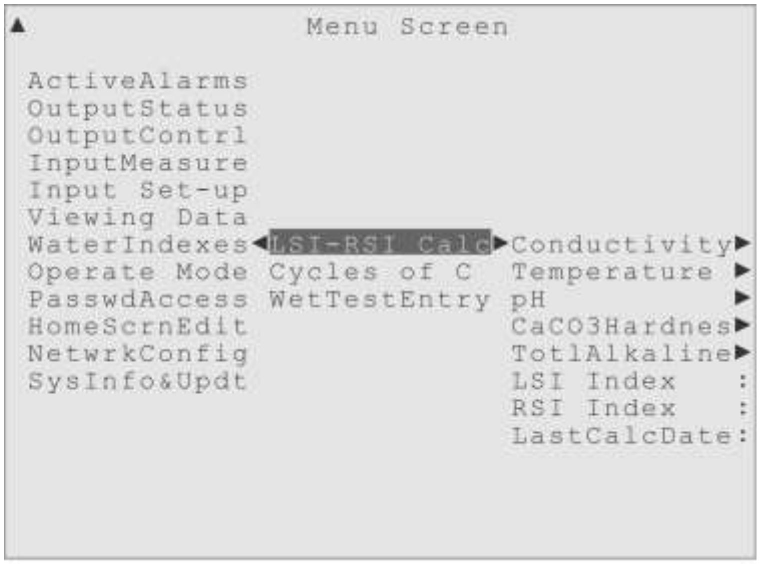


Figure 3-36. Water Indexes menu, highlight on the LSI-RSI Calc sub-menu.

As the water condition changes over time, the Index will no longer accurately reflect the water's quality. Therefore the LSI and RSI displays will change to show “* Expired *” two weeks after the required test data is entered. The controller also displays the date of the last wet test data entry, right below the index values, to help the user judge how useful the indexes are.

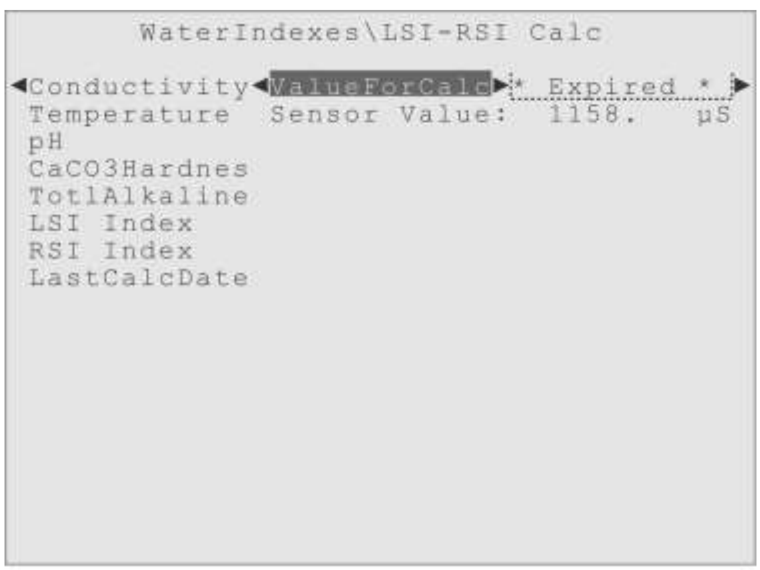


Figure 3-37. LSI-RSI Index, data entry menu for Conductivity.

For each of the five parameters needed to calculate an LSI and RSI Index, there is a menu for the user to enter the parameter value. Where possible, the controller will display its sensor measurement, but the user can enter a measurement value from any source they prefer. Figure 3-37 shows the Input Tray for the Conductivity data, with the usual Edit Value item to the right. The Triton sensor measurement is also shown.

There are similar data entry menus for each of the five required parameters. The indexes are calculated and displayed when all the data entered is less than two weeks old.

Cycles of Concentration

If the system has two Conductivity sensors, one for the system water and one for the make-up water, then a Cycles of Concentration (Cycles of C) value can also be displayed. This index is calculated constantly from the two conductivity measurements, and does not require a manual test to calculate its value. Therefore, its display does not expire like the LSI and RSI indexes. Figure 3-38 shows the "Cycles of C" menu.

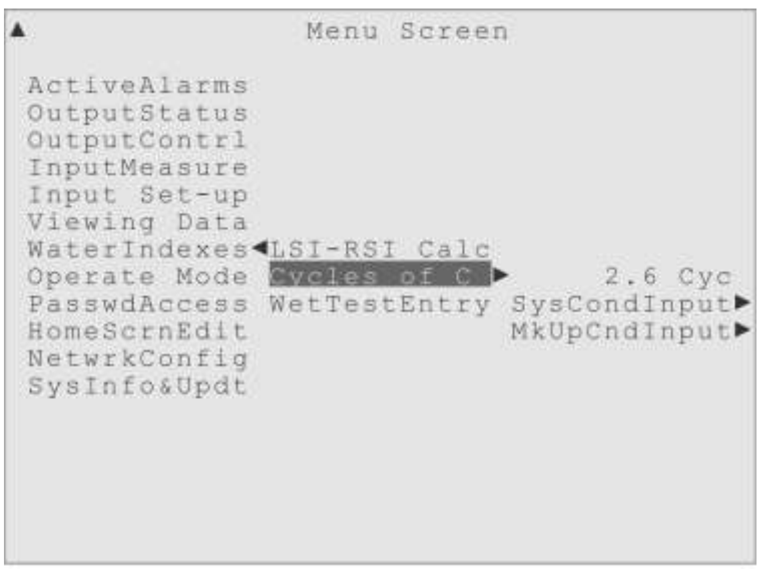


Figure 3-38. Water Indexes, Cycles of Concentration menu.

Wet Test Entry

The Water Indexes menu also has a submenu where the user can store their manually performed "wet test" data. The Triton controller does not use this data in any way, it just stores any values entered, so they can be downloaded along with the controller's own stored data, in the Data Log.

In each of the wet test data records, as shown in Figure 3-40, the user first selects the scale value for the data, either “ppm” (parts per million), “m/L” (milligrams per liter) or “g/g” (grains per gallon).

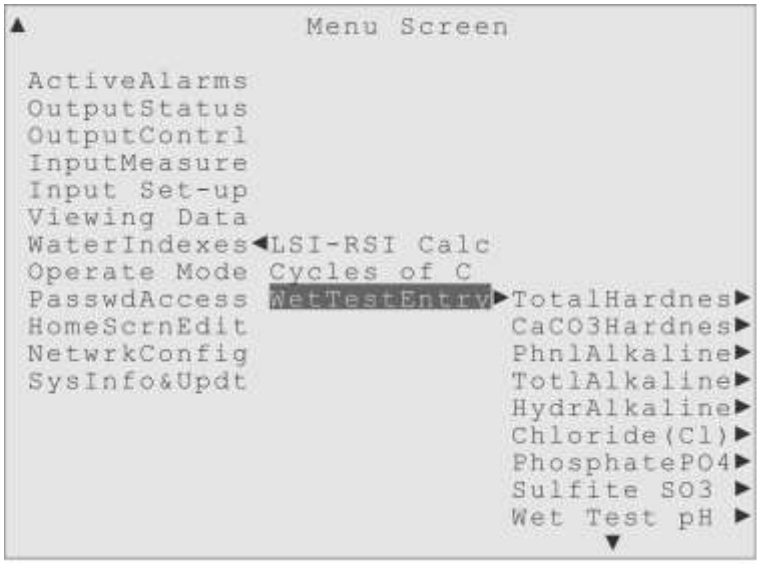


Figure 3-39. Water Indexes' Wet Test Entry menu.

In the Conductivity menu the scale choices are “µS” (micro-Siemens per centimeter), “µm” (micro-mhos per centimeter) and “ppm” (parts per million). The pH wet test entry always use “pH” as its scale. Then in the next submenu the user enters the data value they want stored. Once the value is entered, the date and time displays change automatically to the date and time of this entry.

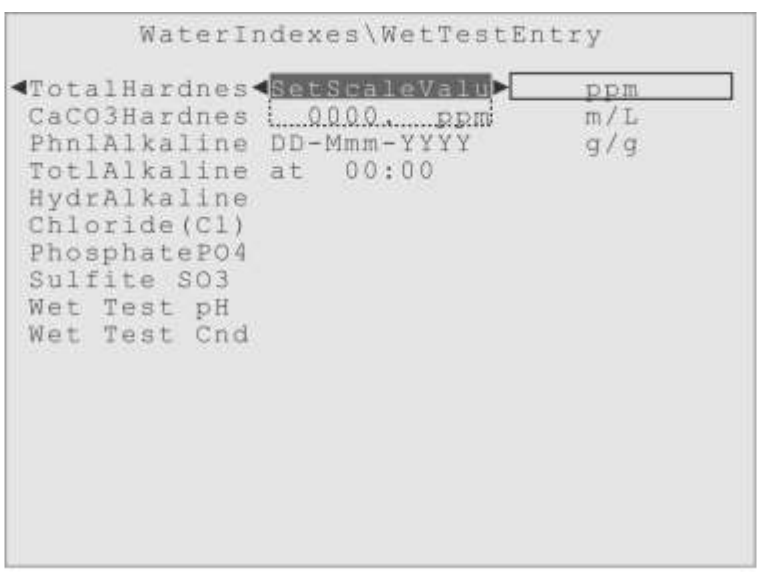


Figure 3-40. Wet Test Entry sub-menus for Total Hardness

The most recent data is stored, each time it is entered, into the Triton Data Log, along with all the data from the Triton Controller itself. This is just for the convenience of the user, so when they download the Triton data log, either locally or remotely, it includes their manually performed wet test data.

Password and Access Control

The Password and Access control menu (**PasswdAccess**) can be used to:

- Set the passwords for the Administrator, User Level 1 and User Level 2 users.
- Control the menus in which the User 1 and User 2 passwords will allow changes.
- To enable/disable Read-Only access when the Enter key is entered as a password.
- Change the No Activity Timeout Limit setting.

When a user first installs a new Triton controller, the factory password for the Administrator access is "admin" and for the User Level access, they are "user1" and "user2". One of the first things the administrator of the water treatment system should do is change these passwords, keeping track of the new ones in a secure location.

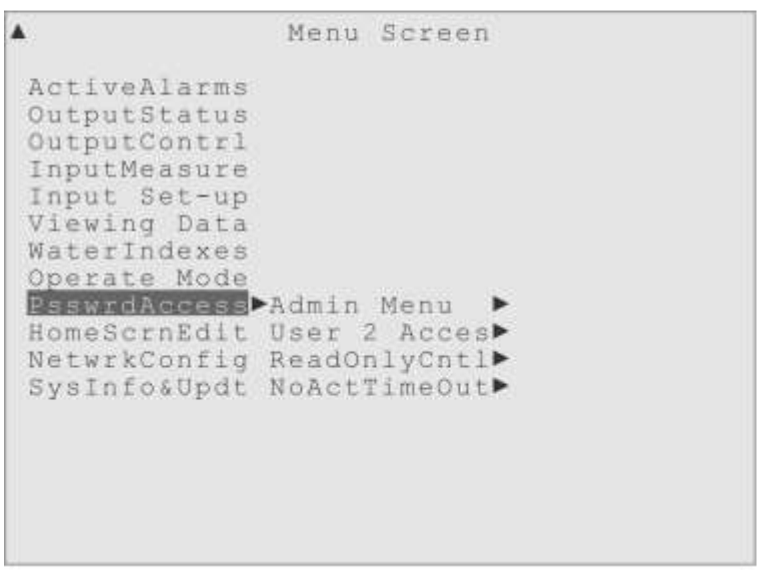


Figure 3-41. The Password and Access Control menu.

The Admin Level password gives unlimited access to the controller's functions and settings, including changing the passwords.

More details about these settings are in the "Passwords and Access Control" section of the "Using the Triton Controller" chapter of this Reference Manual. There are access control settings for each of the User Level passwords that allow fine-tuning of the User Level access to the controller's settings.

Just one example of how this can be used, is that an Admin Level user can disable the normal Read Only access (that requires no password), then remove all the User Level 2 ability to make changes, leaving User Level 2 with read only access. That would create a Read Only mode that requires a password to use.

Figure 3-42. The No Activity Timeout Limit menu.

The No Activity Timeout Limit (**NoActTimeOut**) will "log out" the current user, if no key presses are made on the front panel (or clicks in the Web Interface) for the time set. Any changes in progress are discarded and the setting reverts to the previous value. The display returns to the Home screen and a password entry will be required again.

The factory default for the No Activity Timeout Limit is 10 minutes.

To manually "log-out", so a password entry would be required again, the user would return the controller display to the Home screen and allow one minute to pass with no key presses.

Home Screen Edit

The Home Screen Edit (**HomeScrnEdit**) menu has a deceptively simple name. Although it is the menu where the user can modify the appearance of the Home screen, some of the choices affect all the displays in the entire menu system. A Home Screen display is shown in Figure 3-43. It can display 20 rows of 40 characters.

The user can edit the "top row text" to hold any text they would like; usually the site name or location is a good idea, since this text is included in the downloaded logs to identify the controller they came from. The Operation Mode currently in use is displayed on the next line of text, along with the Alarm status.

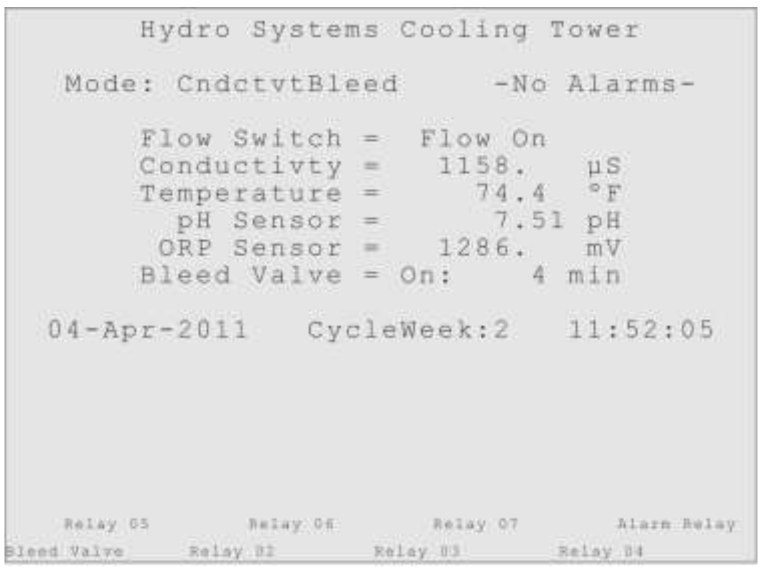


Figure 3-43. The Home Screen.

The next block of text displayed is the Status Display. The user can choose any six Inputs or Outputs to display their current measurement or status.

Next is a display of the current date, a reminder of what week of a 28-Day cycle the controller is in, and the current time.

Rows 12 through 18 are reserved for Password Requests, and on the bottom two rows are Relay identification displays, that will use whatever custom name the user assigns to the Relays. The Relay Names are staggered over their respective Relay Activity Lamps, using a smaller font.

Home Screen Edit Menu (HomeScrnEdit)

The Home Screen Edit menu is used to edit the items displayed on Home Screen.

Top Row Edit allows the use to change the text displayed on the first row of the Home Screen. This text is normally used to identify the controller or its installation site.
6 Row Status is where the user can choose which six Inputs or Outputs will have their current measurement value or status displayed on the Home Screen.
Temp Scale allows the user to choose either the Fahrenheit (ºF) or Centigrade (ºC) scale, for *all* the Controller's temperature displays, not just the Home Screen.

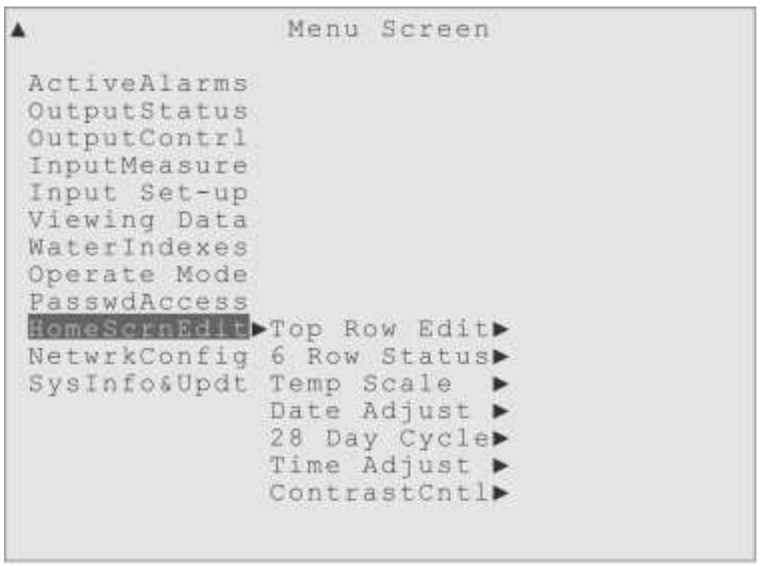


Figure 3-44. The Home Screen Edit menu.

Date Adjust is where the user can set or adjust the current date and its display format.
28-Day Cycle is a menu that allows the user to set the date when the first "cycle week" begins, and synchronizes any control modes using a 28-Day Cycle together. There is also a submenu item to remove the display of the "cycle week" from the Home Screen.
Time Adjust is where the user can set or adjust the current time.
ContrastCntl (Contrast Control) has a submenu where the user can adjust the LCD contrast, using an Adj Darker or Adj Lighter menu item. The user can also adjust the display contrast when the Home Screen itself is showing on the display, by pressing the Left Arrow key to decrease contrast and the Right Arrow key to increase contrast.

Network Configuration

The Network Configuration (**NetwrkConfig**) menu items, shown in Figure 3-45, are for defining the communications settings, and some digital network operations like manually searching for new devices on the network, and removing devices from the digital network.

The communication settings include the Alarm Notification email addresses, the text of the Alarm Notification messages, Data download email addresses and the IP settings for communication over an Ethernet network or the Internet.

The digital network operation controls allow the controller to manually search for a new device on the network (this also occurs automatically) and to remove a device.

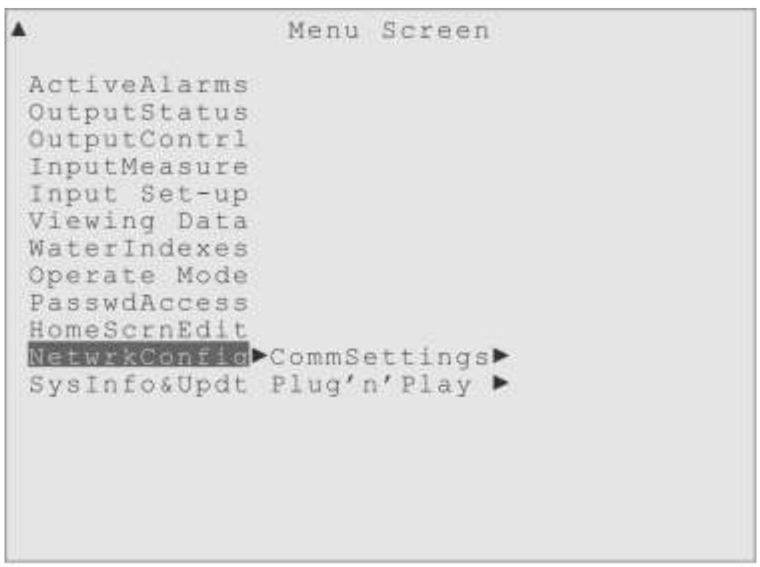


Figure 3-45. The Network Configuration menu.

System Information and Update

In the **SysInfo&Updt** menu the user can find manufacturer information about their Triton controller and controls for updating its software and firmware.

In the **View SysInfo** submenu the user can find controller specific information such as the model number, serial number and so forth.

The **View Version** submenu will display the installed versions of the controller's firmware and software.

The Configuration File submenu (**Config File**) allows for the downloading and uploading of the Configuration file, to a connected computer. The Configuration file holds all the settings and edits that are currently in use, throughout the entire controller.

Downloading this configuration file is a way to make a "back-up" of the settings. Another good use for this feature is to provide a painless, timesaving way to bring the settings of one Triton controller to another Triton controller.

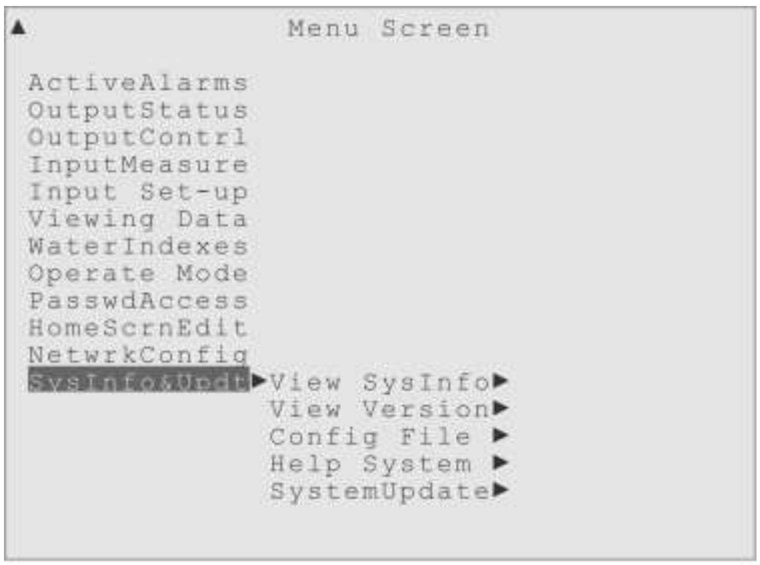


Figure 3-46. The System Information and Update menu.

The Triton controller has a very useful, context sensitive Help system, which can also be customized to fine tune the Help text to a user's particular needs.

If the display is on the Home Screen, the user will get help about the Home Screen. If the user has moved into the menus, so a menu item is highlighted, the help display will be about the menu item that is highlighted.

One special group of help screens is the entry-check help screens. These will appear automatically if the user tries to enter a value that is illegal or out of range, and provide help with the attempted entry. To get out of the Help system once it has been invoked, simply press Help again, the Back/Cancel key, or any non-Arrow key on the front panel to get back to the normal display.

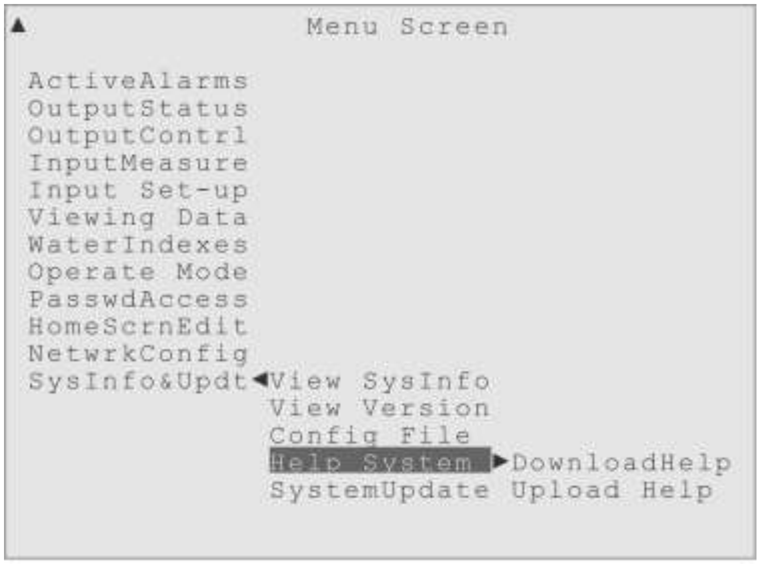


Figure 3-47. The Help System menu.

The **Help System** menu, however, has a different purpose. With the submenus of this menu item, the user can download the entire Help text file to USB flash drive, or upload a copy of the Help text file from a USB drive. The Help file is downloaded as a text file, with entries named after the menu items, along with the associated Help text. The user could then edit that text file as they see fit, customizing help instructions for their installation, adding contact phone numbers, perhaps even include a translation to another language! Then the modified Help file could be uploaded to the same controller, or brought to and uploaded to another Triton controller.

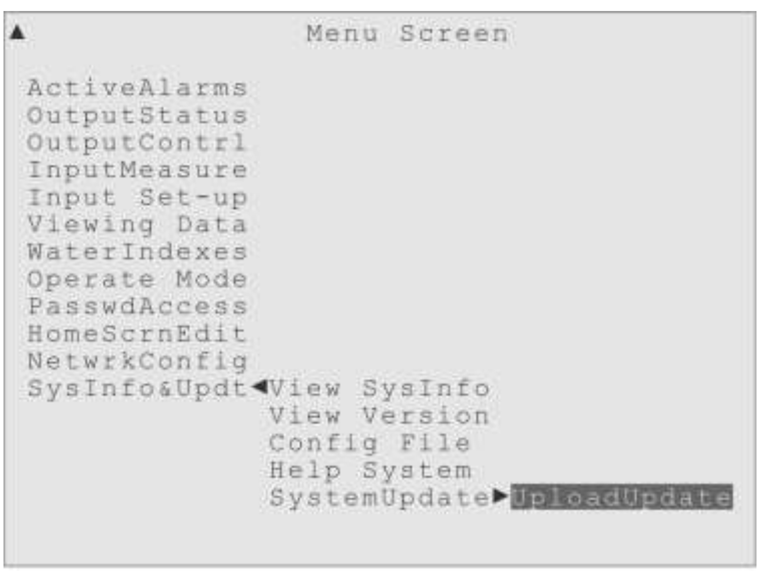


Figure 3-48. The SystemUpdate menu.

The System Update menu (**SystemUpdate**) shown in Figure 3-48 allows the user to upload a system update from a USB data stick plugged into the front panel of the controller. Check for system updates at:
http://www.hydro-watertreatment.com/water-treatment-controllers/triton-controller.html

4 Using the Triton Controller

Overview

Installation and Initial Set Up

The following chapters describe how to use the Triton controller most effectively. In this chapter are instructions for the initial installation and set up of a Triton controller, most importantly:

- Change the Default Passwords!
- Choose an Operation Mode.
- Name and configure the Outputs.
- Name the Inputs and configure their Alarms.

How to install and use the Triton water treatment controller:

- Physically install the Triton controller enclosure.
- Connect the Sensors to the controller and the Relays to the devices they will control.
- Supply power to the Triton controller.
- **CHANGE THE DEFAULT PASSWORDS!**
- Choose an Operation Mode. (Unless the controller was factory pre-programmed.)
  Choose a pre-programmed "Ready to Use" or a user-defined "User Mode".
- Configure the Relays:
  Relay 01
    a) Select a Relay Usage. (Bleed Valve, Chemical Pump, Alarm Relay...)
    b) Pick a Control Mode. (Manual, Set Point, Timer, Water Meter...)
    c) Adjust settings. (Custom name, Control details...)
  Relay 02
    (Configure the rest of the Relays...)
- Configure the Inputs:
  Flow Switch
    a) Select an Input Usage, if necessary.
    c) Adjust settings. (Custom name, Alarm details, Calibrate...)
  Conductivity
    (Configure the rest of the Inputs...)
- Customize!
  Change the Home Screen to display the appropriate site and summary info.

Set the data logging interval, to control how often data is logged.
Set up email accounts and text messages to send on an Alarm.

After the Triton controller enclosure has been mounted, the Input sensors installed and the relays have been connected to the devices they will control, it is time to actually use the controller's menus to implement a cooling tower water treatment plan.

Change the default Passwords! When a Triton controller is first installed, the administrator should immediately change the default passwords, keeping track of the new ones in a secure location.

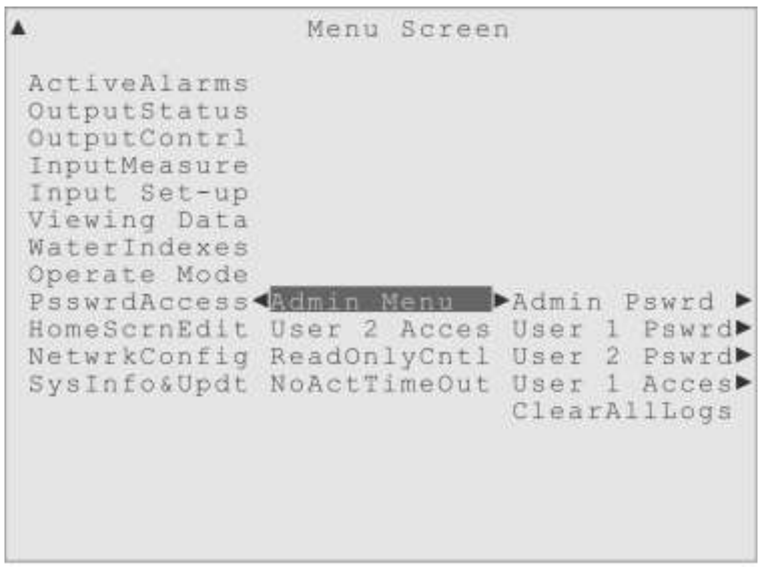


Figure 4-1. The Password and Access Control menu, Admin sub-menu.

Details on how to change the passwords are in the "Password and Access Control" section of this chapter.

Choose an Operation Mode: One consideration is whether a simplified "Ready to Use" Operation mode (RtU) will suffice for the water treatment needs of the particular installation, or whether a "User Mode" will be employed for a more customized treatment plan.

There is much more detail about the Operation modes, and what they offer, in the chapter after this one. The RtU modes are simplified operation modes that disable many of the options a user would normally have over the controller's settings, but allow faster start-up with less expertise required.

Name the Outputs... We recommend the user give custom names to the Relays controlling any Outputs, so the name matches the function of the Output.

Go to the OutputContrl menu item on the main Menu screen, and then press the Right arrow of the Navigator to move to the list of Relays. As the highlight is moved to a particular Relay in the list, the first submenu item for each Relay is the custom name "input tray". The custom name menu for Relay 02 is shown in Figure 4-2, as an example.

Press the Right arrow of the Navigator to move across any Relay's current custom name, to the "Set New Name" prompt, and press the Enter key to type in a new custom name.

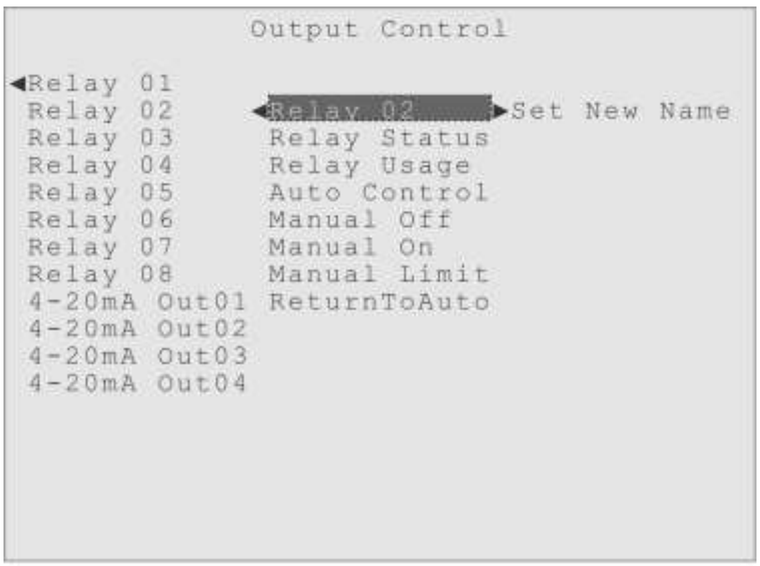


Figure 4-2. The custom name menu for Relay 02.

Menu Screen ▼

OutputContrl ►

Relay 01 ►

Bleed Valve (custom name) ►

Set New Name (press Enter here)

◄

▼

Relay 02 ►

Relay 02 (custom name) ►

Set New Name (press Enter here)

◀

▼

(...and so forth)

If one of the RtU modes was chosen as the Operation Mode, some of the Relays may already have custom names, such as "Bleed Valve" for Relay 01, "InhibitrPump" for Relay 02, "Alarm Relay" for Relay 08 and so forth. The user can decide whether to keep those names or change them. The Relay names may use up to 12 characters.

Name the Inputs. Custom Input names that match the function of the Input will also make using the menus more enjoyable. For example, a custom name like "Acid Level" will make more sense and be easier to remember than "Digital In 2", for a Drum Level sensor monitoring the acid supply level.

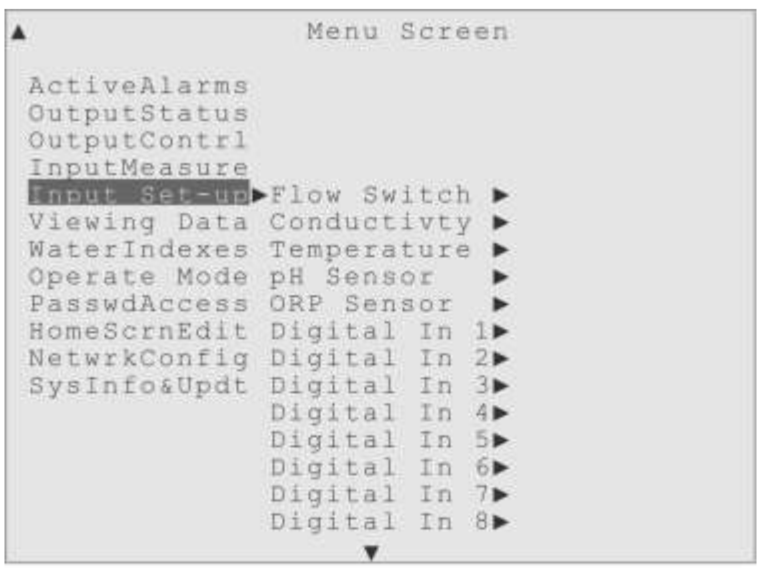


Figure 4-3. The Input Set-up and Calibration menu.

To set custom Input names, go to the "Input Set-up" menu item, as shown in Figure 4-3, and then press the Right arrow to move to the list of Inputs. As the highlight is moved onto a particular Input in the list, the first submenu item for each Input is the custom name field. Use the Right arrow of the Navigator to move across the current name to the "Set New Name" prompt and press the Enter key to type in a new custom name.

Menu Screen ▼

Input Set-up ►

Flow Switch ►

Flow Switch (custom name) ►

Set New Name (press Enter here)

◄

▼

Conductivty ►

Conductivty (custom name) ►

Set New Name (press Enter here)

◄

▼

(...and so forth)

This won't be as necessary for the Inputs connected to the Triton digital network, such as "Flow Switch", "Conductivty" and so forth, the user can decide whether to keep those names or change them. However, custom names will help a lot with the Inputs that have generic names, like the Digital and 4-20 mA inputs. The custom Input names may use up to 12 characters.

Customize control settings... The next menu to visit would be the Output Control menu (OutputContrl) where the specific control settings for the water treatment are found. The user would move the highlight onto the name of whichever Output they wish to adjust, and use the submenus to customize the control settings for their needs.

5 Operation Modes

Overview

The Triton controller comes with several pre-programmed "Ready to Use" operation modes that try to minimize the initial set-up work for the installer and user. But there are also four "User Modes" that allow the user to fully define how the controller operates.

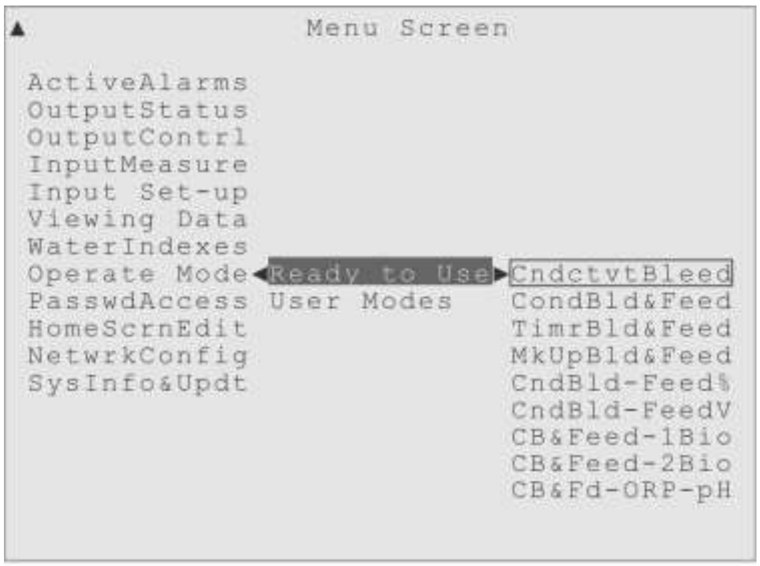


Figure 5-1. The "Ready to Use" Operation Modes menu.

"Ready to Use" Operation Modes

The Triton Controller comes with several operation modes pre-programmed for the user's convenience. The modes start simple, with the basic Conductivity controlled Bleed mode, then there are modes related to Bleed with an Inhibitor feed, followed by more complex modes that add Biocide feeds and pH control.

More "Ready to Use" (RtU) modes may have become available since this user manual was printed, visit the Hydro Systems Triton controller website to check:
http://www.hydro-watertreatment.com/water-treatment-controllers/triton-controller.html

As shown in Figure 5-1, the main menu item that gives access to these "Ready to Use" (RtU) modes is the "Operate Mode" menu. This is also where the User Mode selections are found, which will be explained after the RtU modes.

When the user highlights the Ready to Use menu item, the preprogrammed modes are listed to the right, as shown in Figure 5-1. If a mode is active, the Active Box will be drawn around its name.

Conductivity Controlled Bleed (CndctvtBleed)

This is a very basic RtU mode, which will simply activate the Bleed Valve when the Conductivity value rises past the user-defined Set Point. There are no other control options, such as chemical additions and so forth.

Outputs Available: Only Relay 01 (pre-named "Bleed Valve"), and Relay 08 (pre-named "Alarm Relay") will be visible, along with any 4-20 mA Outputs.

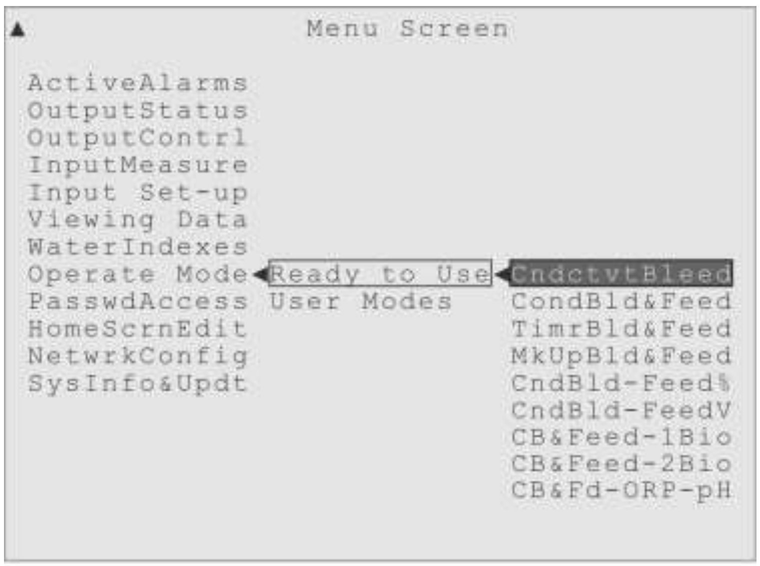


Figure 5-3. Highlight on Conductivity Controlled Bleed.

Auto Control Modes Available: Relay 01 will be designated as controlling a Bleed Valve, and the control mode will be set to the Set Point On/Off control mode, with the Set Point Time Proportional mode available as an optional control mode for this relay.

Relay 08 will be designated as an Alarm Relay, intended to activate an external Alarm indicator, like an exterior Bell or Strobe.

Default Settings: Relay 01 is pre-set to the Bleed Valve Usage and the Set Point On/Off control mode, using the Conductivity sensor as the controlling Input. The Control Effect will be pre-set to Force Low. The Activation Limit Timer setting will be 90 minutes by default.

Relay 08 will be pre-set to activate as the Alarm relay for the various alarm conditions possible for the Inputs and in the control modes available.

Inputs Available: Only Conductivity sensor Inputs will be available for control, with the Conductivity sensor pre-set to control Relay 01. The Alarm conditions described below have a default one minute Alarm delay, except the Flow Switch that by default has no delay set.

The Flow Switch will cause an Alarm condition if flow becomes insufficient.

The Conductivity sensor will have its High Alarm and Low Alarm available.

The Temperature sensor is available to allow for Conductivity calibration, but can also be used to trigger alarms.

4-20mA Out: The first of the optional 4-20 milliamp outputs will be set to follow the Conductivity sensor, for outside charting, monitoring or recording purposes. The rest these analog outputs would not have any default setting, but any existing relationships with the remaining outputs would be maintained when switching to this mode.

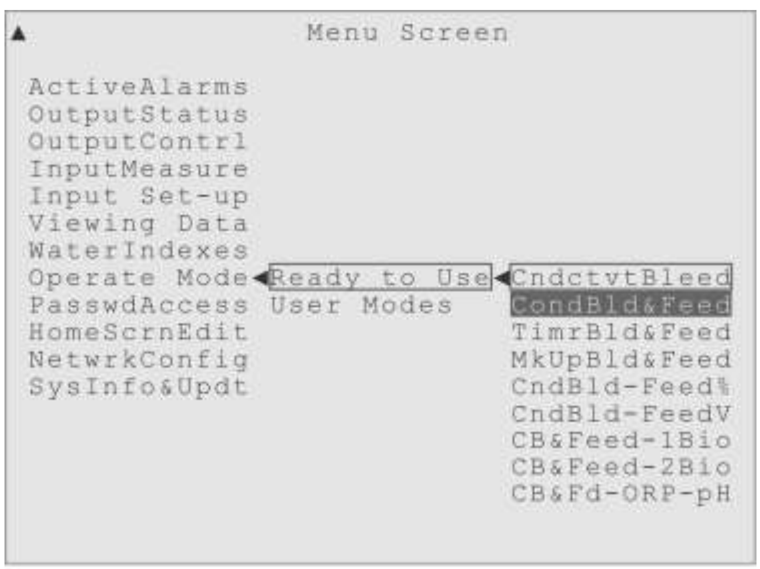


Figure 5-4. Highlight on Conductivity Controlled Bleed & Feed Inhibitor.

Conductivity controlled Bleed & Feed Inhibitor (CondBld&Feed)

This mode begins a series of Operation modes that are variations on a theme. The theme is “Bleed & Feed”, which is a Bleed (controlled by Conductivity, a Timer or a Water Volume), with an Inhibitor feed activated by the Bleed deactivation.

This operation mode, like the previous one, will activate the Bleed Valve when the Conductivity sensor value rises above the Set Point value, but with the addition of an Inhibitor feed that is activated by the Bleed Valve deactivation.

Outputs Available: Only Relay 01 (pre-named "Bleed Valve"), Relay 02 (pre-named "InhibitrPump"), and Relay 08 (pre-named "Alarm Relay") will be visible, along with any optional 4-20mA Outputs, if installed.

Auto Control Modes Available: Relay 01 will be designated as controlling a Bleed Valve, and the control mode will be set to the Set Point On/Off control mode, using the Conductivity sensor for the Input. That and the Set Point Time Proportional control mode will be the only control modes shown for Relay 01.

Relay 02 will be designated as controlling a Chemical Pump, but with only the “Other Relay” control modes available, pre-set to activate after Relay 01 deactivates. They will be the only control modes shown for Relay 02.

Relay 08 will be designated as an Alarm Relay, intended to activate an external Alarm indicator, like an exterior Bell or Strobe.

Default settings: Relay 01: Activates Bleed Valve; Set Point On/Off: Input is Conductivity sensor; Control Effect is pre-set to Force Low. The Activation Limit Timer setting will be 90 minutes by default.

Relay 02: Activates Inhibitor Pump; after Relay 01 deactivates, with a 0 minute Delay, with an Activation Limit Timer set to 90 minutes, all of which may be adjusted by the user.

Relay 08 will be pre-set to activate as the Alarm relay for the various alarm conditions possible in this Operation Mode.

Inputs Available: Only the Conductivity sensor Input will be available for control, with the Conductivity sensor pre-selected to control Relay 01. The Alarm conditions described below have a default one minute Alarm delay, except the Flow Switch that by default has no delay set.

The Flow Switch will cause an Alarm condition if flow becomes insufficient.

The Conductivity sensor will have its High Alarm and Low Alarm available.

The Temperature sensor is available for Conductivity calibration, and for alarms.

4-20mA Out: The first of the optional 4-20 milliamp outputs will be set to follow the Conductivity sensor, for outside charting, monitoring or recording purposes. The rest these analog outputs would not have any default setting, and could be set to reflect the status of any of the available Inputs or Outputs.

Timer controlled Bleed & Feed Inhibitor (TimrBld&Feed)

Much like the previous Operation mode, except that the opening of the Bleed valve is controlled by a Timer setting, instead of the Conductivity Set Point. The Inhibitor pump relay is still activated by the Bleed Valve deactivation.

Outputs Available: Only Relay 01 (pre-named "Bleed Valve"), Relay 02 (pre-named "InhibitrPump"), and Relay 08 (pre-named "Alarm Relay"), will be visible along with the 4-20 mA Outputs if installed.

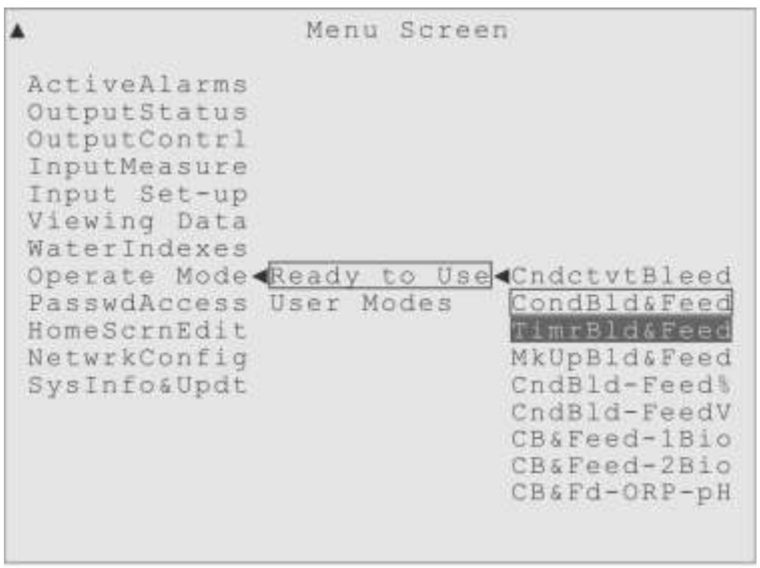


Figure 5-5. Highlight on Timer Controlled Bleed & Feed Inhibitor.

Auto Control Modes Available: Relay 01 will be designated as controlling a Bleed valve, and set to use the Timer Start & Stop control mode, with Daily, Weekly and 28-Day cycles available. Those will be the only Auto Control modes available for Relay 01.

Relay 02 will be designated as controlling a chemical pump, but with only the “Other Relay” control modes available, pre-set to activate after Relay 01 deactivates. Those will be the only Auto Control modes shown for Relay 02.

Relay 08 will be designated as an Alarm Relay, intended to activate an external

Alarm indicator, like an exterior Bell or Strobe.

Default settings: Relay 01: Activates Bleed Valve; Timer Start & Stop, Daily Cycle.

Relay 02: Activates Inhibitor Pump; after Relay 01 deactivates, with a 0 minute Delay, with an Activation Limit Timer set to 90 minutes, all of which may be adjusted by the user.

Relay 08 will be pre-set to activate as the Alarm relay for the various Alarm conditions possible in this Operation Mode.

Inputs Available: None of the sensor Inputs will be available in the Output Control menu, because none are used to control activation in this mode. However, all installed Inputs will be available in the Input Set-up menu for monitoring or setting off alarms. The Alarm conditions described below have a default one minute Alarm delay, except the Flow Switch that by default has no delay set.

The Flow Switch will cause an Alarm condition if flow becomes insufficient.

The Conductivity sensor will have its High Alarm and Low Alarm available.

The Temperature sensor is available to allow for Conductivity calibration, but can also be used to trigger alarms.

4-20mA Out: The first of the optional 4-20 milliamp outputs will be set to follow the Conductivity sensor, for outside charting, monitoring or recording purposes. The rest of these analog outputs would not have any default setting.

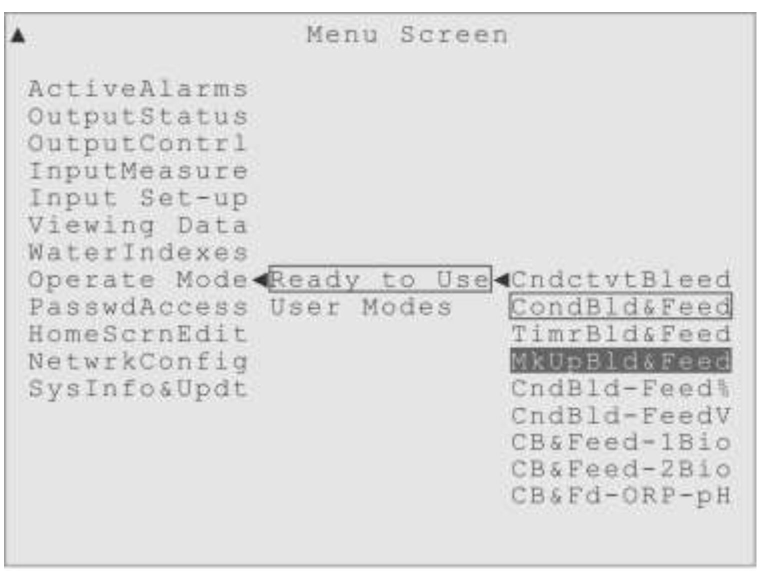


Figure 5-6. Highlight on Make-up Volume controlled Bleed & Feed.

Make-up Volume Controlled Bleed & Feed Inhibitor (MkUpBld&Feed)
Much like the previous Operation modes, except that the opening of the Bleed valve is now controlled by a Volume measurement of Make-up water. The Inhibitor pump relay is still activated by the Bleed Valve deactivation.

Outputs Available: Only Relay 01 (pre-named "Bleed Valve"), Relay 02 (pre-named "InhibitrPump"), and Relay 08 (pre-named "Alarm Relay"), will be visible along with the 4-20 mA Outputs if installed.

Auto Control Modes Available: Relay 01 will be designated as controlling a Bleed Valve and set to use the Bleed on Make-up control mode, using a Digital Input sensor, set to the Reed Switch Meter Usage, for the Water Meter Input. That will be the only Auto Control mode available for Relay 01.

Relay 02 will be designated as controlling a chemical pump, and only with the “Other Relay” control modes available, pre-set to activate after Relay 01 deactivates. Those will be the only Auto Control modes shown for Relay 02.

Relay 08 will be designated as an Alarm Relay, intended to activate an external Alarm indicator, like an exterior Bell or Strobe.

Default Settings: Relay 01: Activates the Bleed Valve; using the Bleed on Make-up control mode, with the Activation Limit Timer set to 90 minutes by default.

Relay 02: Activates Inhibitor Pump; after Relay 01 deactivates, with a 0 minute Delay, with an Activation Limit Timer set to 90 minutes, all of which may be adjusted by the user.

Relay 08 will be pre-set to activate as the Alarm relay for the various Alarm conditions possible in this Operation Mode.

Inputs Available: None of the sensor Inputs will be available in the Output Control menu, because none are used to control activation in this mode. However, all installed Inputs will be available in the Input Set-up menu for monitoring or setting off alarms. The Alarm conditions described below have a default one minute Alarm delay, except the Flow Switch that by default has no delay set.

The Flow Switch will cause an Alarm condition if flow becomes insufficient.

The Conductivity sensor will have its High Alarm and Low Alarm available.

The Temperature sensor is available to allow for Conductivity calibration, but can also be used to trigger alarms.

The Water Meter Digital Input will have its High Volume Alarm available.

4-20mA Out: The first of the optional 4-20 milliamp outputs will be set to follow the Conductivity sensor, for outside charting, monitoring or recording purposes. The remaining 4-20mA output would not have any default setting, and could be set to reflect the status of any of the available Inputs or Outputs.

Conductivity Bleed, Inhibitor Feed by Time Cycle % (CndBld-Feed%)

Similar to the previous mode, except for the first time the Inhibitor is pumped independent of the Bleed Valve. In this mode, the Inhibitor Relay is activated for a user-defined percentage of a user-defined Time Cycle, like 10% of every 60 minutes. The Bleed Valve is still activated by Relay 01, using the Conductivity Set Point.

Outputs Available: Only Relay 01 (pre-named "Bleed Valve"), Relay 02 (pre-named "InhibitrPump"), and Relay 08 (pre-named "Alarm Relay"), will be visible along with the 4-20 mA Outputs if installed.

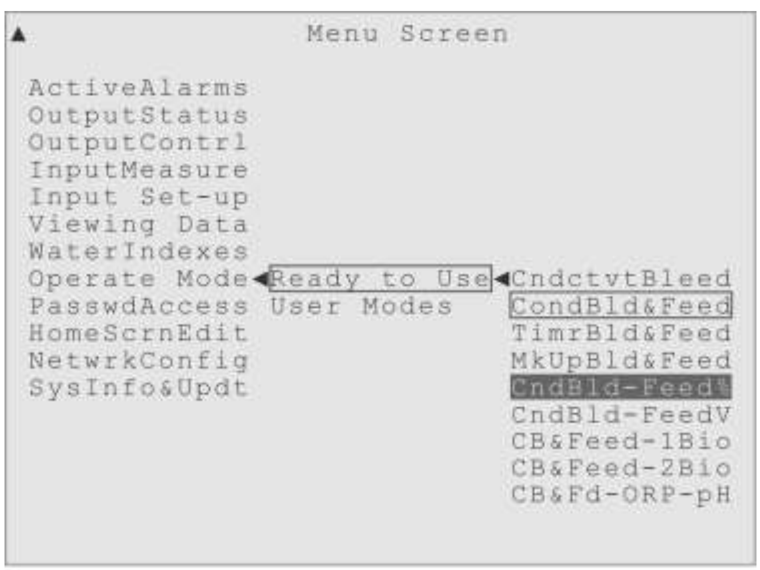


Figure 5-7. Highlight on Conductivity-Bleed, Feed as % of Time Cycle.

Auto Control Modes Available: Relay 01 will be designated as controlling a Bleed Valve and set to use the Set Point On/Off control mode, using the Conductivity sensor for the Input. That mode and the Set Point Time Proportional control mode will be the only Auto Control modes shown for Relay 01.

Relay 02 will be designated as controlling a chemical pump and set to use the Time Percentage control mode, set to activate Relay 02 for a user-defined percentage of a user-defined Time Cycle. It will be the only Auto Control mode available for Relay 02.

Relay 08 will be designated as an Alarm Relay, intended to activate an external Alarm indicator, like an exterior Bell or Strobe.

Default Settings: Relay 01: Activates Bleed Valve; Set Point On/Off: Input is Conductivity sensor; Control Effect is pre-set to Force Low. The Activation Limit Timer setting will be 90 minutes by default.

Relay 02: Activates Inhibitor Pump; using the Time Percent control mode, which may be adjusted by the user.

Relay 08 will be pre-set to activate as the Alarm relay for the various Alarm conditions possible in this Operation Mode.

Inputs Available: Only the Conductivity sensor Input will be available in the Output Control menu, with the Conductivity sensor used to control activation in this mode. The Alarm conditions described below have a default one minute Alarm delay, except the Flow Switch that by default has no delay set.

The Flow Switch will cause an Alarm condition if flow becomes insufficient.

The Conductivity sensor will have its High Alarm and Low Alarm available.

The Temperature sensor is available for Conductivity calibration, and for alarms.

4-20mA Out: The first of the optional 4-20 milliamp outputs will be set to follow the Conductivity sensor, for outside charting, monitoring or recording purposes. The remaining 4-20mA output would not have any default setting, and could be set to reflect the status of any of the available Inputs or Outputs.

Conductivity Bleed, Inhibitor Feed by Water Volume (CndBld-FeedV)

Similar to the previous mode, again with the Inhibitor being pumped independent of the Bleed Valve. Here the Inhibitor relay is activated by a user-defined Volume measurement from a Water Meter, expected to be measuring the Make-up water. Each time the user-defined Volume is reached, Relay 02 is activated for a user-defined, fixed time duration. For example, the user could pump Inhibitor for 5 minutes after every 300 gallons of Make-up water has been added.

The Bleed Valve is still being controlled by the Conductivity Set Point, in this mode.

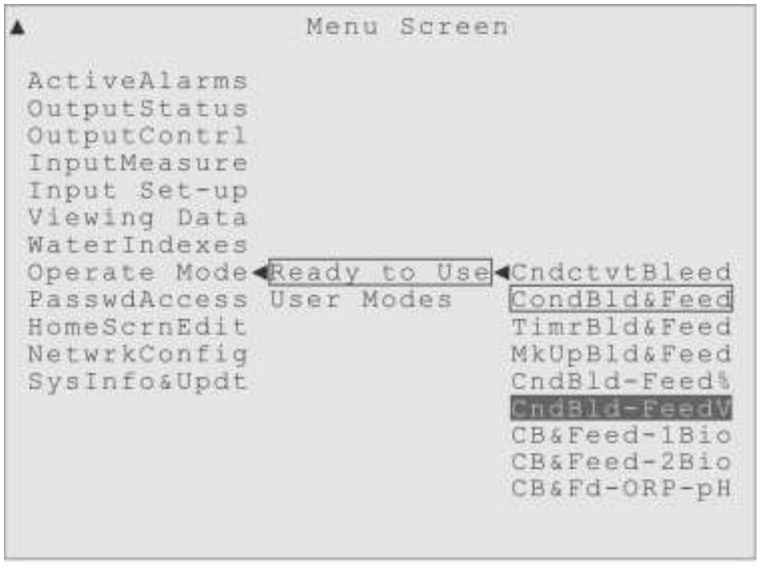


Figure 5-8. Highlight on Conductivity-Bleed, Feed by Water Volume.

Outputs Available: Only Relay 01 (pre-named "Bleed Valve"), Relay 02 (pre-named "InhibitrPump"), and Relay 08 (pre-named "Alarm Relay"), will be visible along with the 4-20 mA Outputs if installed.

Auto Control Modes Available: Relay 01 will be designated as controlling a Bleed Valve and pre-set to use the Set Point On/Off control mode, with the Conductivity sensor for the Input. That mode and the Set Point Time Proportional control mode will be the only Auto Control modes available for Relay 01.

Relay 02 will be designated as controlling a chemical pump and set to use the Water Meter and Timer control mode, set to activate Relay 02 after a user-defined volume of water has been measured, for a fixed time duration. It will be the only Auto Control mode available for Relay 02.

Relay 08 will be designated as an Alarm Relay, intended to activate an external Alarm indicator, like an exterior Bell or Strobe.

Default Settings: Relay 01: Activates Bleed Valve; Set Point On/Off: Input is Conductivity sensor; Control Effect is pre-set to Force Low, with the Activation Limit Timer setting set to 90 minutes by default.

Relay 02: Activates Inhibitor Pump; using a Digital Input as the Water Meter Input for the Water Meter and Timer control mode. The settings may be adjusted by the user.

Relay 08 will be pre-set to activate as the Alarm relay for the various Alarm conditions possible in this Operation Mode.

Inputs Available: Only the Conductivity and Digital Inputs will be available for output control. The Conductivity sensor will be pre-set to control the Bleed Valve relay and the Water Meter pre-set to control the Inhibitor pump relay. The Alarm conditions described below have a default one minute Alarm delay, except the Flow Switch that by default has no delay set.

The Flow Switch will cause an Alarm condition if flow becomes insufficient.

The Conductivity sensor will have its High Alarm and Low Alarm available.

The Temperature sensor is available to allow for Conductivity calibration, but can also be used to trigger alarms.

The Digital Input will have its High Volume Alarm available.

4-20mA Out: The first of the optional 4-20 milliamp outputs will be set to follow the Conductivity sensor, for outside charting, monitoring or recording purposes. The remaining 4-20mA output would not have any default setting, and could be set to reflect the status of any of the available Inputs or Outputs.

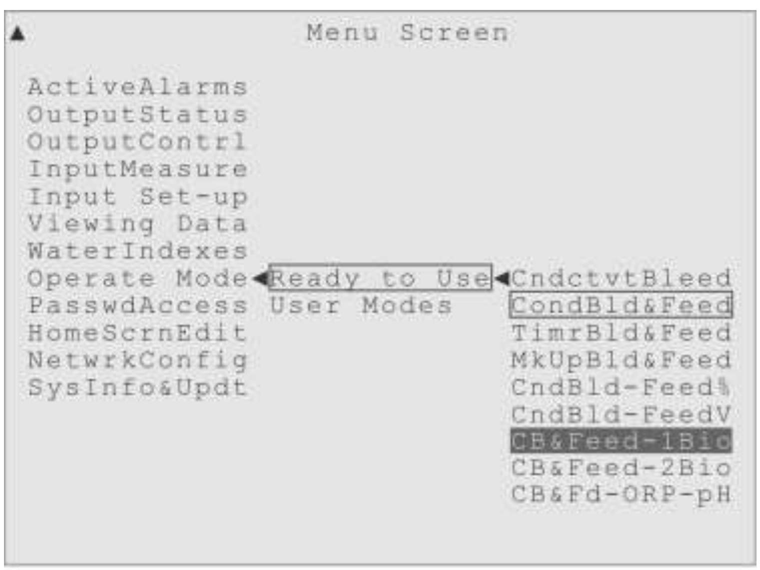


Figure 5-9. Highlight on Conductivity-Bleed & Feed, with one timed Biocide.

Conductivity Bleed & Feed Inhibitor with 1 Biocide (CB&Feed-1Bio)

Now that we have dealt with those Inhibitor Feed variations, we go back to the Conductivity controlled Bleed & Feed operation mode and simply add a Biocide, being controller by a Timer. The Bleed Valve activation is controlled by a Conductivity Set Point and the Inhibitor pump is activated by the Bleed Valve.

Outputs Available: Only Relay 01 (pre-named "Bleed Valve"), Relay 02 (pre-named "InhibitrPump"), Relay 03 (pre-named "Biocide1Pump") and Relay 08 (pre-named "Alarm Relay"), will be visible, along with the 4-20 mA Outputs if installed.

Auto Control Modes Available: Relay 01 will be designated as controlling a Bleed Valve and set to use the Set Point On/Off control mode, using the Conductivity sensor for the Input. That mode and the Set Point Time Proportional control mode will be the only Auto Control modes shown for Relay 01.

Relay 02 will be designated as controlling a chemical pump, and only have the With and After Other Relay control modes available, pre-set to activate after Relay 01 deactivates. They will be the only Auto Control modes shown for Relay 02.

Relay 03 will also be designated as controlling a chemical pump, but set to use the Timer Start & Stop control modes. They will be the only Auto Control modes shown for Relay 03.

Relay 08 will be designated as an Alarm Relay, intended to activate an external Alarm indicator, like an exterior Bell or Strobe.

Default Settings: Relay 01: Activates Bleed Valve; Set Point On/Off: Input is Conductivity sensor; Control Effect is Force Low, with the Activation Limit Timer set to 90 minutes by default.

Relay 02: Activates Inhibitor Pump; after Relay 01 deactivates, with a 0 minute Delay, with an Activation Limit Timer set to 90 minutes, all of which may be adjusted by the user.

Relay 03: Activates Biocide Pump, using a Timer. Which Timer, and its settings, can be changed as needed. Pre-Bleed and Pre-Feed controls will also be available.

Relay 08 will be pre-set to activate as the Alarm relay for the various Alarm conditions possible in this Operation Mode.

Inputs Available: Only the Conductivity sensor Input will be available for control, pre-set to control the Bleed Valve relay. The Alarms described below have a default one minute Alarm delay, except the Flow Switch that by default has no delay set.

The Flow Switch will cause an Alarm condition if flow becomes insufficient.

The Conductivity sensor will have its High Alarm and Low Alarm available.

The Temperature sensor is available to allow for Conductivity calibration, but can also be used to trigger alarms.

4-20mA Out: The first of the optional 4-20 milliamp outputs will be set to follow the Conductivity sensor, for outside charting, monitoring or recording purposes. The remaining 4-20mA output would not have any default setting, and could be set to reflect the status of any of the available Inputs or Outputs.

Conductivity Bleed & Feed Inhibitor with 2 Biocides (CB&Feed-2Bio)

The same as the previous mode, with the addition of a second, alternating, Biocide, also being controller by a Timer. The Bleed Valve is still controlled by a Conductivity Set Point and the Inhibitor pump relay is still activated by the Bleed Valve.

Outputs Available: Relay 01 (pre-named "Bleed Valve"), Relay 02 (pre-named "InhibitrPump"), Relay 03 (pre-named "Biocide1Pump"), Relay 04 (pre-named "Biocide2Pump") and Relay 08 (pre-named "Alarm Relay"), will be visible, along with the 4-20 mA Outputs if installed.

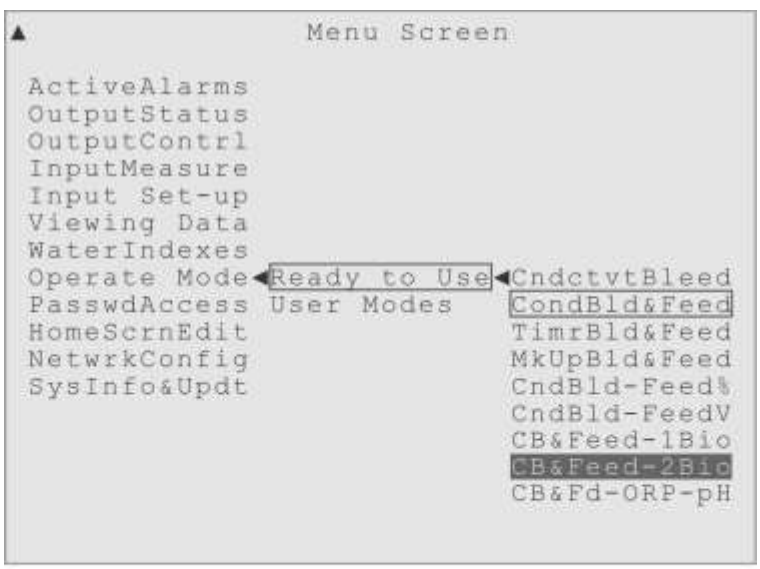


Figure 5-10. Highlight on Conductivity-Bleed & Feed, with two 28-Day Biocides.

Auto Control Modes Available: Relay 01 will be designated as controlling a Bleed Valve and set to use the Set Point On/Off control mode, using the Conductivity sensor for the Input. That mode and the Set Point Time Proportional control mode will be the only Auto Control modes shown for Relay 01.

Relay 02 will be designated as controlling a chemical pump, and only have the With and After Other Relay control modes available, pre-set to activate after Relay 01 deactivates. They will be the only Auto Control modes shown for Relay 02

Relays 03 and 04 will also be designated as controlling a chemical pump and set to use the Timer Start & Stop control modes. The Timer Start and Stop category will be the only Auto Control modes shown for Relays 03 and 04.

Relay 08 will be designated as an Alarm Relay, intended to activate an external Alarm indicator, like an exterior Bell or Strobe.

Default Settings: Relay 01: Activates Bleed Valve; Set Point On/Off: Input is Conductivity sensor; Control Effect is Force Low, with the Activation Limit Timer set to 90 minutes by default.

Relay 02: Activates Inhibitor Pump; after Relay 01 deactivates, with a 0 minute Delay, and the Activation Limit Timer set to 90 minutes, all of which may be adjusted by the user.

Relay 03: Activates Biocide1 Pump, using a Timer. Which Timer and its settings can be adjusted as needed. Pre-Bleed and Pre-Feed controls will also be available.

Relay 04: Activates Biocide2 Pump, using a Timer. Which Timer and its settings can be adjusted as needed. Pre-Bleed and Pre-Feed controls will also be available.

Relay 08 will be pre-set to activate as the Alarm relay for the various Alarm conditions possible in this Operational Mode.

Inputs Available: Only the Conductivity sensor Input will be visible for control, pre-set to control the Bleed Valve relay. The Alarm conditions described below have a default one minute Alarm delay, except the Flow Switch that by default has no delay set.

The Flow Switch will cause an Alarm condition if flow becomes insufficient.

The Conductivity sensor will have its High Alarm and Low Alarm available.

The Temperature sensor is available to allow for Conductivity calibration, but can also be used to trigger alarms.

4-20mA Out: The first of the optional 4-20 milliamp outputs will be set to follow the Conductivity sensor, for outside charting, monitoring or recording purposes. The remaining 4-20mA output would not have any default setting, and could be set to reflect the status of any of the available Inputs or Outputs.

Conductivity controlled Bleed & Feed with ORP and pH Control (CB&Fd-ORP-pH)

Similar to the previous mode, but the first Biocide is expected to be an Oxidizing Biocide, so its Auto Control mode is changed to use an ORP Sensor Set Point (or Timer), and the second Biocide has been traded for pH control using a pH sensor and Acid pump. The Bleed Valve is still controlled by a Conductivity Set Point and the Inhibitor pump relay still activates and deactivates together with the Bleed Valve.

Outputs Available: Relay 01 (pre-named "Bleed Valve"), Relay 02 (pre-named "InhibitrPump"), Relay 03 (pre-named "Oxy Biocide"), Relay 04 (pre-named "Acid Pump") and Relay 08 (pre-named "Alarm Relay"), will be visible, along with the 4-20 mA Outputs if installed.

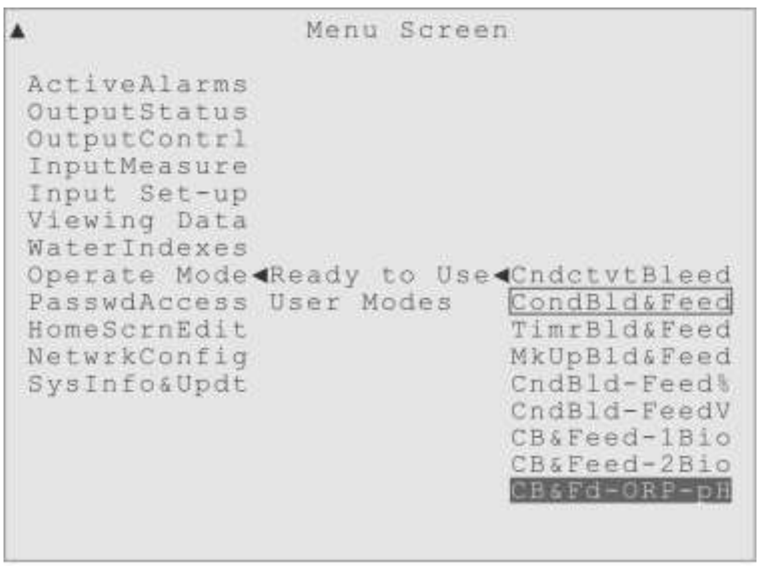


Figure 5-11. Conductivity-Bleed & Feed, w/ Oxidizing Biocide and pH control.

Auto Control Modes Available: Relay 01 will be designated as controlling a Bleed Valve and set to use the Set Point On/Off control mode, using the Conductivity sensor for the Input. That mode and the Set Point Time Proportional control mode will be the only Auto Control modes shown for Relay 01.

Relay 02 will be designated as controlling a chemical pump, and only have the With and After Other Relay control modes available, pre-set to activate with Relay 01. They will be the only Auto Control modes shown for Relay 02

Relay 03 will also be designated as controlling a chemical pump and set to use the Set

Point On/Off control mode, using the ORP sensor for the Input. That mode, the Set Point Time Proportional control mode, and the Timer Start and Stops modes will be the only Auto Control modes available for Relay 03.

Relay 04 will be designated as controlling a chemical pump and set to use the Set Point On/Off control mode, using the pH sensor for the Input. That mode and the Set Point Time Proportional control mode will be the only Auto Control modes shown for Relay 04.

Relay 08 will be designated as an Alarm Relay, intended to activate an external Alarm indicator, like an exterior Bell or Strobe.

Default Settings: Relay 01: Activates Bleed Valve; Set Point On/Off: Input is Conductivity sensor; Control Effect is Force Low, with the Activation Limit Timer set to 90 minutes by default.

Relay 02: Activates Inhibitor Pump; after Relay 01 deactivates, with a 0 minute Delay, with an Activation Limit Timer set to 90 minutes, all of which may be adjusted by the user.

Relay 03: Activates Oxidizing Biocide Pump, Set Point On/Off: Input is ORP sensor; Control Effect is Force High, with the Activation Limit Timer set to 30-minutes by default, all of which may be adjusted by the user.

Relay 04: Activates Acid Pump; Set Point On/Off: Input is pH sensor, Control Effect is Force Low, with the Activation Limit Timer set to 30-minutes by default.

Relay 08 will be pre-set to activate as the Alarm relay for the various Alarm conditions possible in the control modes available.

Inputs Available: Only the Conductivity, ORP and pH sensor Inputs will be available for control.

The Conductivity sensor will be pre-set to control the Bleed Valve, the ORP sensor pre-set to control the Oxidizing Biocide pump, and the pH sensor pre-set to control the Acid pump. The Alarm conditions described below have a default one minute Alarm delay, except the Flow Switch that by default has no delay set.

The Flow Switch will cause an Alarm condition if flow becomes insufficient.

The Conductivity sensor will have its High Alarm and Low Alarm available.

The Temperature sensor is available to allow for Conductivity calibration, but can also be used to trigger alarms.

The ORP sensor will have its High value Alarm and Low Alarm available.

The pH sensor input will have its High value Alarm and Low Alarm available.

Any of these inputs will also cause a "Sensor Error" Alarm if they report values outside of their established measurement range.

4-20mA Out: The first of the optional 4-20 milliamp outputs will be set to follow the Conductivity sensor, the second will be set to follow the ORP measurements and the third 4-20mA output will be set to track the pH sensor values. The 4-20mA Outputs are usually used for outside charting, monitoring or recording purposes. The remaining 4-20mA output would not have any default setting, and could be set to reflect the status of any of the available Inputs.

"User Modes" (User-defined Operation Modes)

The user can take full advantage of all the powerful programming options available with the Triton controller when they employ one of the User-defined Operation Modes, or "User Modes".

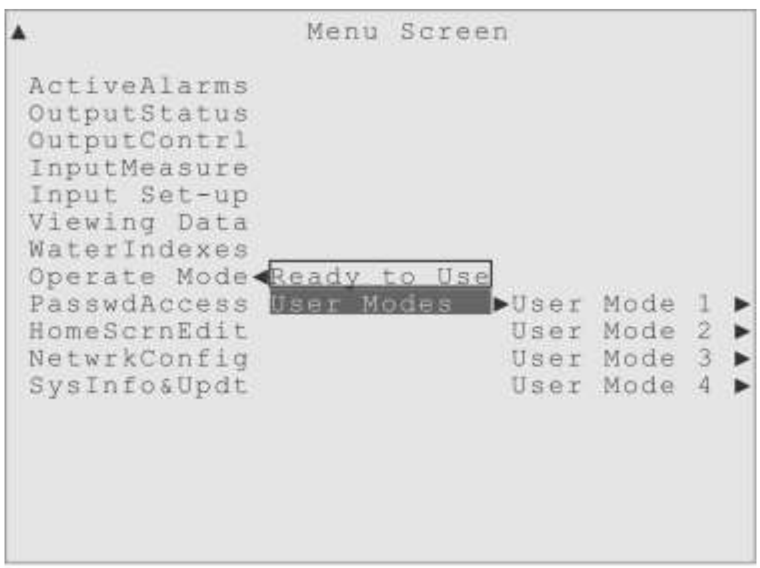


Figure 5-12. Highlight on the "User Modes" menu..

To take advantage of a user-defined operation mode, move the highlight on the Menu Screen to the "Operate Mode" item, then over and down to highlight the User Mode submenu item. A list of four User Modes will be displayed to the right (Figure 5-12).

The four User Modes are empty placeholders for customized water treatment. The control methods and settings are not defined or set-up from the factory, the user must go through and define all the control settings, or copy an existing operation mode (an RtU mode, or a previously defined User Mode) into the User Mode and modify it.

To select a User Mode, highlight its menu item and press the Enter key. The "active box" box will be drawn around the User Mode menu item to indicate that is now the operation mode in effect. Any changes made to the controller's settings will now be stored with this operation mode.

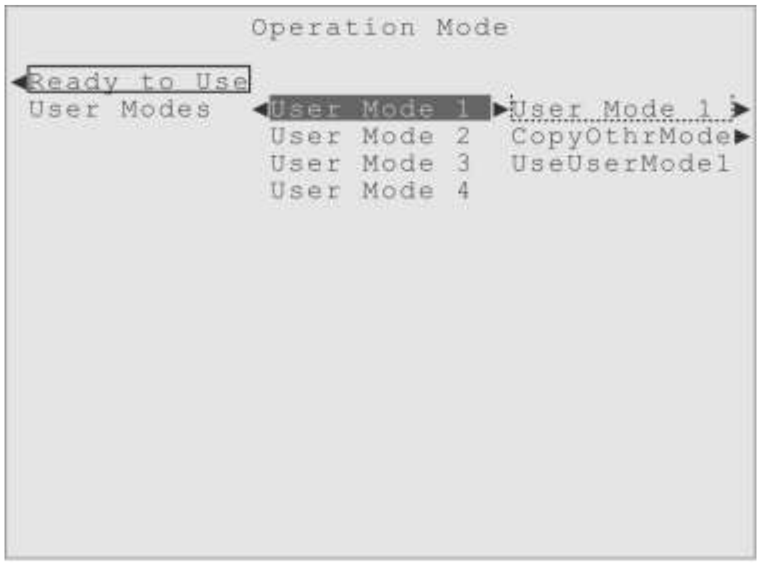


Figure 5-13. The "User Mode 1" menu, showing its sub-menu items.

The user can change the name of the User Mode using the usual Input Tray with the "Set New Name" submenu. Another great User Mode feature is the "CopyOthrMode" submenu to copy an existing operation mode, an RtU mode or another User Mode (Figure 5-13).

The CopyOthrMode feature is especially handy if the user wants to experiment with changes to an RtU or User Mode they had previously defined; just copy it into an undefined User Mode and make the changes to the copy.

The next menu to visit, to implement a customized water treatment plan, is the Output Control menu (OutputContrl). Start with the first Output, select a Usage, go to its Auto Control menu, pick a control mode and adjust the settings.

6 Output Control

Overview

This Output Control section is broken into three parts, presented in this order:

Relay Control
Output Alarm Settings
4-20mA Output Control

Relay Control

OutputContrl: To define how the Outputs in the water treatment system will be controlled, the user would move the highlight on the Menu Screen to the "Output Control" menu, then right, to the list of Outputs. Then the user would move the highlight down, until the output they wish to control is highlighted. This explanation will assume the highlight is on the first Relay, Relay 01, typically assigned to control a Bleed Valve.

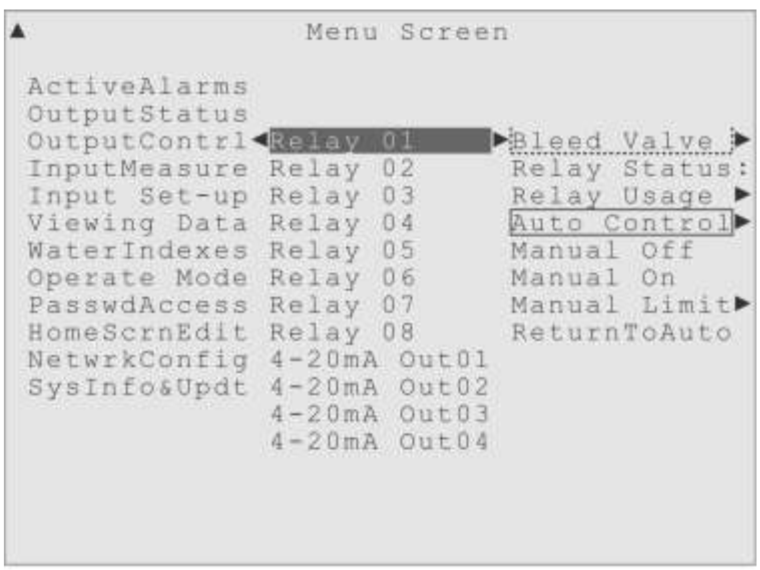


Figure 6-1. The Output Control menu for Relay 01, showing its sub-menus.

When a relay name is highlighted, the following submenus will show to the right:

(Custom Name)
Relay Status
Relay Usage

Auto Control
Manual Off
Manual On
Manual Limit
ReturnToAuto

(Custom Name): This menu does not have a "prompt" that says "Custom Name", but instead displays the current custom name for the relay, which for Relay 01 is typically "Bleed Valve" from the factory. The user may enter a new custom name using a submenu "Set New Name" to the right. A custom name takes the place of the "Relay 01" name everywhere *except* the first submenu of OutputContrl (Figure 6-1), which always lists the relays in their numerical order, with their numerical names, for easy reference.

Relay Status This menu item displays the current status for the output. All relays use the following status displays:

"**On: NNNN min**"	Displays the total minutes of the relay's current activation.
"**Relay is Off**"	Indicates the relay is deactivated, normally.
"**LkOut NN min**"	Shows the relay is currently locked-out by some other control.
"**OvrTimeLimit**"	When the Activation Limit Timer setting has been exceeded.
"**Input Error**"	Means the input controlling the relay has reported an error.
"**Not In Use**"	A usage setting that hides the relay from most menus.

Relay Usage This menu is where a user makes the first control decision: what this Relay will be used for, in their water treatment system. Any Relay can be designated as:

BleedValvUse	(Bleed Valve Usage):	To control a Bleed Valve.
Blowdown Use	(Blowdown Valve Usage):	To control a Boiler Blowdown Valve.
PumpRelayUse	(Chemical Pump Usage):	To control a Chemical Pump.
AlarmRlayUse	(Alarm Relay Usage):	To control an external Alarm indicator.
Not In Use	(Relay Not In Use):	To remove the relay from most menus.

Auto Control This menu is where the relay control settings can be found, once the Relay Usage has been defined. Most of this chapter is devoted to the Auto Control menu items. The first decision the user makes in this menu is what control mode to use.

There are Set Point control modes that use Input sensor values to control the relay, Timer-only control modes, modes that start at a certain Time but turn off based on a Set

Point, modes that use a Water Meter volume to activate, and even modes that allow some Other Relay to control this one.

The Auto Control menu is also where the Lockout and Alarm Settings are found.

But remember to designate the Relay Usage before going to the Auto Control menu, as the items under the Auto Control menu change based on the Relay Usage selected!

Relay Usage

The first choice to make when programming the Relay control is the Relay Usage. The user simply indicates how the Relay will be used in their water treatment system, by highlighted the appropriate Relay Usage item and pressing the Enter key.

In the example shown in Figure 6-2, the "active box" indicates Relay 01 has been designated as controlling a Bleed Valve.

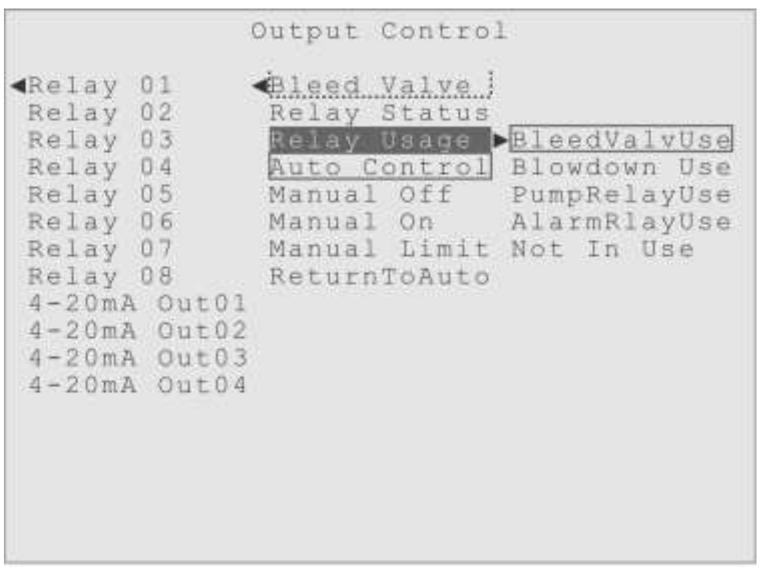


Figure 6-2. The Relay Usage menu for Relay 01.

BleedValvUse (Bleed Valve Usage) - Selecting the Bleed Valve Usage indicates that a Relay will be controlling a Cooling Tower Bleed Valve. This choice changes the control modes offered to the user and makes a changes in how the Relay reacts to Alarms. For example, the reaction of a Relay controlling a Bleed Valve to most Alarms is to keep the Bleed Valve activated (open), while the reaction of a Relay controlling a chemical pump is usually to deactivate.

Blowdown Use (Boiler Blowdown Valve Usage) - Selecting the Blowdown Valve

Usage indicates that a Relay will be controlling a Boiler Blowdown Valve. This choice changes the control modes offered to the user and makes a changes in how the Relay reacts to Alarms. For example, in the Auto Control menu a new category of control modes is revealed when the Blowdown Usage is selected, the Intermittent Sampling Set Point control modes (Sample Modes).

PumpRelayUse (Chemical Pump / General Purpose Usage) - Selecting the Chemical Pump / General Purpose Relay Usage indicates the Relay will be controlling a Chemical Pump, or is being used as a General Purpose Relay. This choice changes the control modes offered to the user and makes changes in how the Relay reacts to Alarms, compared to one controlling a Bleed Valve. For example, the Alarm Reaction of a Relay controlling a chemical pump is usually to deactivate, while the Alarm Reaction of a Relay controlling a Bleed Valve is to keep the Bleed Valve activated (open).

AlarmRlayUse (Alarm Relay Usage) - Selecting the Alarm Relay Usage indicates that this Relay will be controlling an external Alarm indicator, such as an exterior Alarm Bell or Strobe Light. This choice *removes* the control modes offered for normal relays and makes dramatic changes in how the Relay reacts to Alarms, compared to a relay controlling a Bleed Valve or a Chemical Pump.

Not In Use (Not In Use) - Selecting the" Not In Use" menu item indicates this Relay is not going to be used in the water treatment system, and all the usual control methods are removed from its Output Control menu. When this "usage" is selected, the relay will not appear in the other control and alarm menus in the system, to keep the menus as simple as possible and prevent accidental selection of relays that are not in use. This choice would also immediately deactivate the Relay when selected.

Auto Control

Once the Relay Usage has been defined, the next menu to visit is the Auto Control menu. When the highlight is on the Auto Control menu item, a list of control mode categories will appear to the right, as shown in Figure 6-3.

It is important to understand that the menu items listed to the right of the Auto Control menu are *categories* of control modes, not the individual control modes. The individual control modes will be shown to right of the categories, when highlighted.

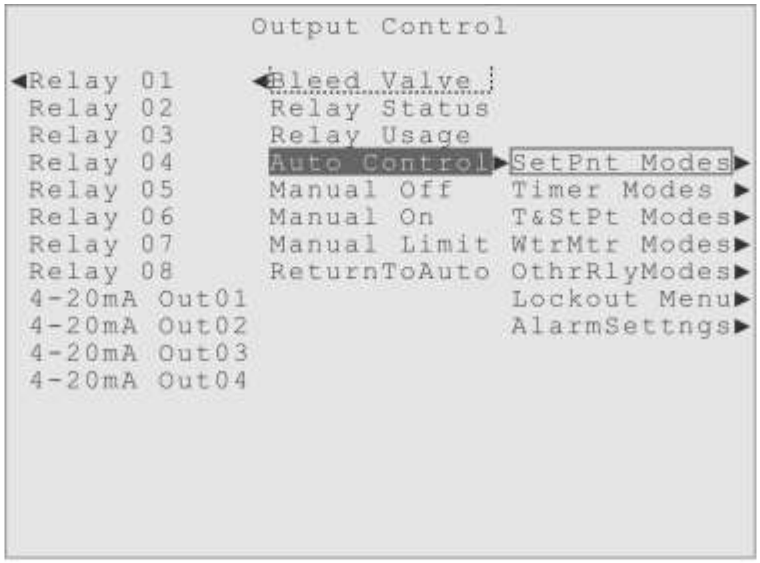


Figure 6-3. The Auto Control Menu for Relay 01, with the Bleed Valve Usage.

SetPnt Modes use an Input value (Set Point) to control the relay.
Timer Modes activate and deactivate the relay using only a timer.
T&StPt Modes activate at a certain time of day, but deactivate on an Input value.
WtrMtr Modes activate the relay using a volume measurement from a water meter.
OthrRlyModes allow another relay's activation or deactivation to control this relay.

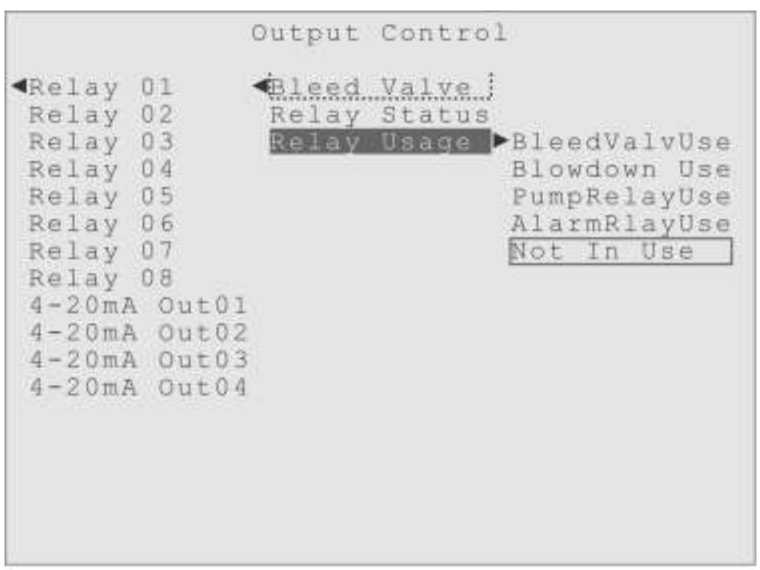


Figure 6-4. No Auto Control Menu for Relay 01, when set to Not In Use.

Different Relay Usages have Different Auto Control Menus!

This section will use Relay 01 as an example, designated to be controlling a Bleed

Valve. One reason for using Relay 01 is that the Bleed Valve Relay Usage fills the Auto Control menu with all the major control modes, to use as examples. But this is not the case with all Relay Usages! Look at the example in Figure 6-4, with Relay 01 temporarily designated as "Not In Use". There is no Auto Control menu, or manual control menu items at all!

So, before explaining a fully equipped Auto Control menu, the text below explains the more limited Auto Control menus associated with the Relay Usage designations for Alarm Control and Not In Use, and the manual control menu items.

Manual Control

When the Relay Usage is set to BleedValvUse or PumpRelayUse, below the Auto Control menu are the manual controls, shown in Figure 6-5. These do just what the menu items say; "Manual Off" turns the relay off, "Manual On" turns the relay on, and "ReturnToAuto" returns the relay control to whatever Auto Control mode was in use before the manual controls were selected. The "Manual Limit" menu allows the user to set a time limit on how long the relay stays activated when using manual control, as a "just in case" emergency shut off value or to control the relay's manual activation time.

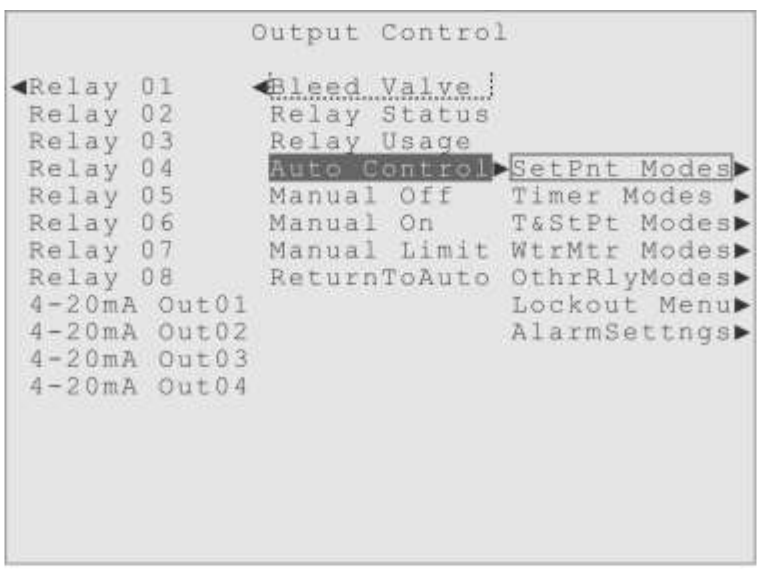


Figure 6-5. Relay 01, showing the manual controls, below the Auto Control menu.

Manual Off: If the user highlights the "Manual Off" menu item and presses Enter, the Relay will be immediately deactivated. The Active Box will be removed from the Auto Control or Manual On menu item and drawn around the Manual Off menu item, to indicate it has been selected.

Manual On: If user highlights the "Manual On" menu item and presses Enter, the Relay will immediately activate, and stay activated until the user highlights the "Manual Off" menu item and presses Enter, or the "Manual Limit" setting is reached. The Active Box will be removed from the Auto Control or Manual Off menu item and drawn around the Manual On menu item, to indicate it has been selected.

If the user highlights the ReturnToAuto menu item and presses the Enter key, control will return to whatever Auto Control mode was in use before the manual controls were selected, and the relay will deactivate or stay active based on the settings of that Auto Control mode.

Manual Limit: This item controls the maximum time for which the Relay will stay activated when under manual control. By default, this limit is set to 5 minutes, but the range of allowable values is from 1 to 1440 minutes (1440 minutes = 24 hours). The user can use this setting as a “just in case” emergency time limit - a backup setting to turn off the relay if they forget to turn it off manually, or they can use it as a precise control value, so when they select Manual On they are using the Manual Limit to control the activation time.

The Manual Limit value is preserved, even if control is returned to an Auto Control mode. Therefore, the next time the Manual On menu item is selected, the previous Manual Limit setting will still be in effect.

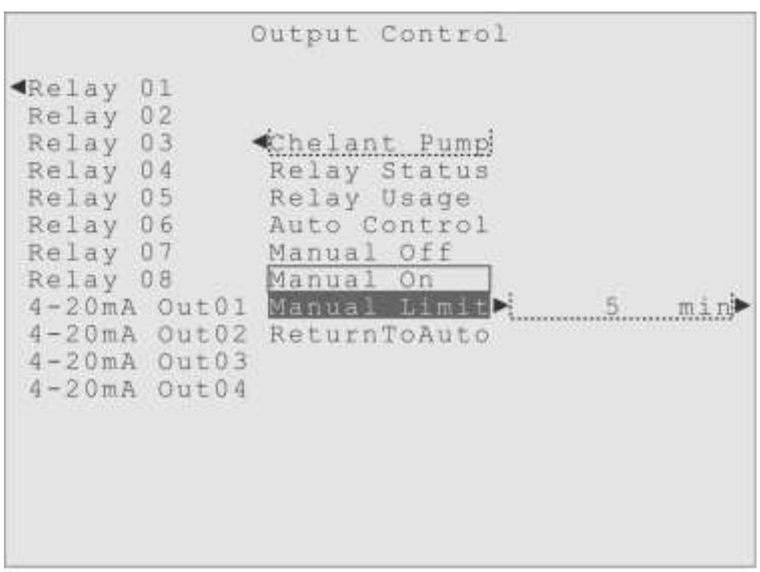


Figure 6-6. The Relay 01 Output Control menu, with Manual On active.

ReturnToAuto: This item is used to return control to whatever Auto Control mode was in use before the manual controls were selected. When the user highlights this menu item and presses the Enter key, the Active Box will be removed from either the Manual Off or the Manual On menu item and drawn around the Auto Control menu item. Whatever control mode was previously active for this relay will be re-activated.

If there was not an Auto Control mode active before the manual controls were used, the Active Box will simply be removed from the manual controls, and the user will have to use the regular "Use Mode Now" menu item to activate an Auto Control mode.

Alarm Relay Usage:

Figure 6-7 shows that the Output Control menu for a relay with a usage designation of Alarm Relay. The Auto Control menu has been removed, and there are only two relay control menu items, "Relay Off" and "Relay On".

A very useful feature of the Triton controller is that any relay can used as an Alarm Relay, and an Alarm Relay can be re-assigned to control a Bleed Valve or be a Pump Relay. The user is not forced to use a specific alarm relay, or give up the versatility of using an alarm relay for some other purpose. Even multiple relays may be designated with the Alarm Relay Usage if needed.

When a relay is designated as an Alarm Relay, it is expected to be energizing an external Alarm indicator, like an exterior Alarm Bell or Strobe Light. The last of the high-capacity relays, Relay 08, is typically pre-set at the factory as an Alarm Relay.

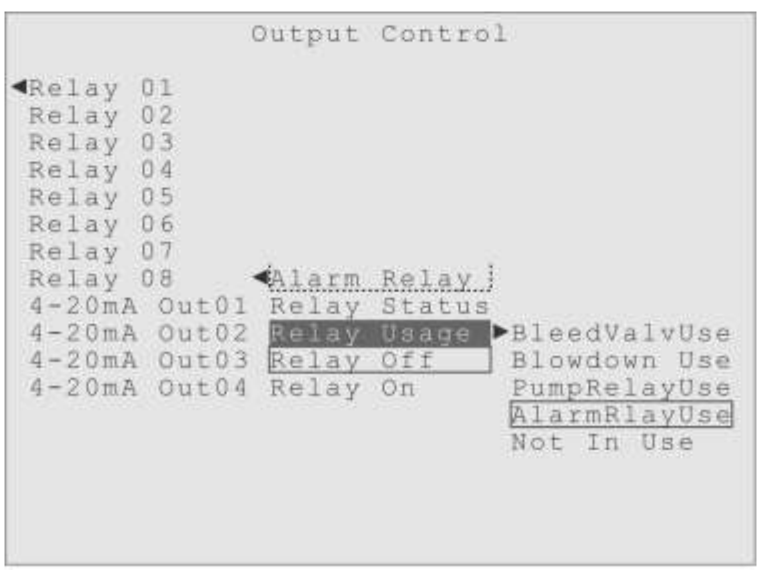


Figure 6-7. The Control Menu for Relay 08, as an Alarm Relay.

The Relay Off and Relay On menu items serve a dual function. Remember the main function of an Alarm Relay is the option of activating it, in some *other* relay's Alarm Settings menu, when an Alarm condition occurs to that other relay. So the primary function of these items is to display the current status of the relay, by having the Active Box around one of these two menu items.

But they also provide manual control over the relay, to allow the external alarm device to be turned off (Relay Off) if the alarm condition cannot be resolved quickly or to help test the alarm device connected to the relay (Relay On).

Relay Off: Highlighting this menu item and pressing the Enter key will turn off the relay and the Active Box will be drawn around this menu item to show it has been selected. This does not "clear" any alarm condition that may have turned on this Alarm Relay, but it will deactivate the external alarm device connected to this relay.

It is "safe" to manually deactivate an Alarm Relay, in that any subsequent alarm condition can turn the Alarm Relay back on again, which would remove the Active Box from this menu item and draw the Active Box around the "Relay On' menu item.

Relay On: Highlighting the Relay On menu item and pressing the Enter key will manually activate the relay and the Active Box will be drawn around this menu item to show it has been selected. This function is typically used to test the external alarm device connected to the Alarm Relay.

There are more details about the Alarm Relay, and how it is used, in the "Alarm Settings" section later in this chapter.

Not In Use:

When the Relay Usage of "Not In Use" is selected, not only does the Auto Control menu and manual controls disappear for that Relay, but all references to the Relay disappear from most of the Triton menu system! (It is still listed only in the Output Status menu; and in the Output Control menu so the Relay Usage can be changed in the future.) The idea is to simplify the menus, by hiding Outputs that are not in use. (There is a similar "NotForContrl" option for Inputs.) Hiding the relays that are not in use also prevents them from being selected by mistake, when the user is deep into the menu structure making control decisions.

Try to remember this feature, it is very useful to get a clean, simple menu display, with only the items being used visible. It is also a trouble-shooting hint, that if a Relay or Input seems to have disappeared from the menus, one thing to check is if it has been designated as "Not In Use" (or “NotForContrl” for Inputs). If that is not the reason for an Input disappearing, it may indicate the Input has been disconnected, or removed from Triton's digital network using the NetwrkConfig\Plug’n’Play menu.

. . .

One of the first things the user must check for is the proper Relay Usage settings, depending on the specifics of their water treatment strategy.

Now that the manual controls and the Relay Usages that eliminate the Auto Control menu have been examined, it is time to explain the options of a more fully equipped Relay Usage, like those used for Bleed Valve or Pump Relay control.

The differences between the Auto Control menus used with Bleed Valve control and Chemical Pump control are that Bleed Valve usage enables a special "Bleed based on Make-Up Volume" control mode not available using the Pump Relay usage, and the Pump Relay usage enables Pre-Feed and Pre-Bleed “add-on” modes that are not available in the Bleed Valve usage.

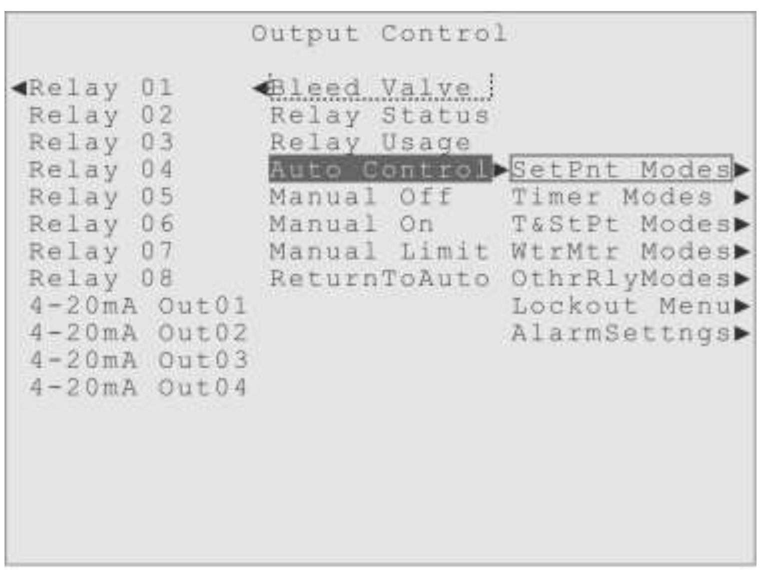


Figure 6-8. The Relay 01 Auto Control Menu, showing the control mode categories.

Bleed Valve Usage:

Below is the explanation for the various categories of Auto Control modes, and the individual control modes within those categories, using the Bleed Valve Usage (BleedValvUse) as an example.

Auto Control Modes (Category and Individual)

Going back to the example from the beginning of the chapter, Relay 01 with a Relay Usage of Bleed Valve control, the next menu to visit is the Auto Control menu. When the highlight is moved onto the Auto Control Menu item, a list of control mode categories will appear to the right, as shown in Figure 6-8.

The menu items listed to the right of the Auto Control menu are *categories* of control modes, not the individual control modes. The individual control modes will be listed to the right of each category when the highlight is moved onto a category menu item.

SetPnt Modes	These use an Input value (Set Point) to control the relay.
Timer Modes	These activate and deactivate the relay using only a timer.
T&StPt Modes	The relay activates at a certain time, but an Input value deactivates it.
WtrMtr Modes	The relay activates using a volume measurement from a water meter.
OthrRlyModes	These use another relay's activation/deactivation to control this relay.

When do the control mode settings take effect?

The individual control modes, found under the control mode categories described above, each have a menu item that is the "activator" for that individual control mode. Usually the "activator" is the last menu item in the control mode menus, and is named something like "Use Mode Now". The settings in that control mode take effect the moment the "activator" menu item name is highlighted and the Enter key is pressed. The "Active Box" is drawn around the "activator" menu item, the name of the individual control mode, the category name and the Auto Control item, to indicate an auto control mode is now active.

If the user is changing a setting in a control mode that is *already* active, the changes take effect as soon as they press Enter to complete the setting change.

The next sections look at the detailed settings in each individual control mode, within their control mode categories.

...

The Set Point Control Modes (SetPnt Modes)

Moving the highlight to the "SetPnt Modes" category will show four Set Point control modes, which use an Input measurement value to activate the relay.

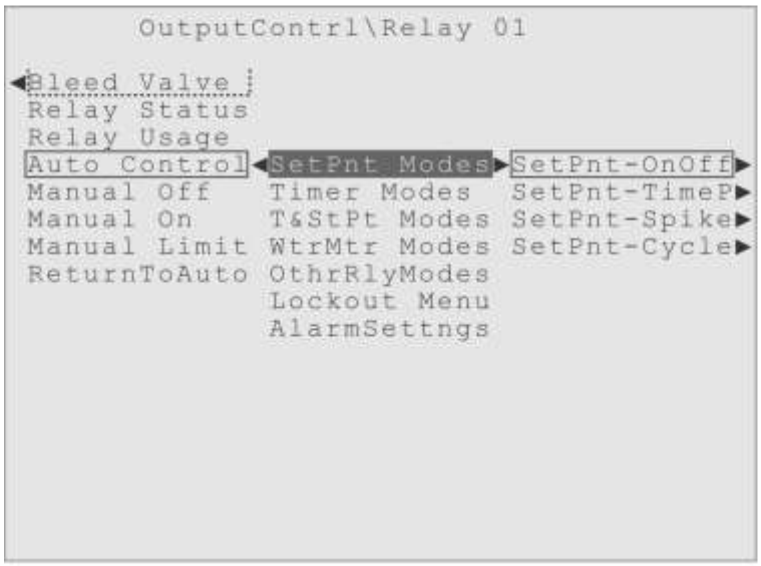


Figure 6-9. The Set Point Control Mode Category.

SetPnt-OnOff (Set Point - On / Off)

This mode activates the relay when the selected Input value passes the Set Point value, and then turns off the relay after the Set Point is passed going the other way (although a Dead Band setting may keep the relay active longer). The “active box" in Figure 6-9 indicates this is the control mode currently in use.

SetPnt-TimeP (Set Point - Time Proportional)

This mode checks the Input measurement value against the Set Point at the beginning of a user-defined time cycle, like every hour. If the Input value has passed the set point, the relay is activated for a portion of the pre-set time, proportional to how far the measurement was from the set point.

SetPnt-Spike (Set Point with Spike)

This mode activates and deactivates the relay much like the Set Point On / Off mode, but with an option to use a different "spike" Set Point on any particular day. Often used with Biocides, this allows the user to have one level of chemical in the water normally, with a higher level automatically added periodically.

SetPnt-Cycle (Set Point - Cycles of Concentration)

This mode is only useful if the controller has two Conductivity sensors available as Inputs, and appropriately installed. It allows control based on the ratio of the system water conductivity divided by the make-up water conductivity.

Set Point Control Modes: SetPnt-OnOff (Set Point - On / Off)

This control mode activates the relay when the selected Input's measurement passes a pre-set value, called the Set Point, either rising above or falling below the Set Point value. The relay is deactivated when the Set Point value is passed going the other way, with a programmable "dead band" to prevent rapid relay cycling. There is also an Activation Limit Timer setting, in case of a sensor failure or other problem.

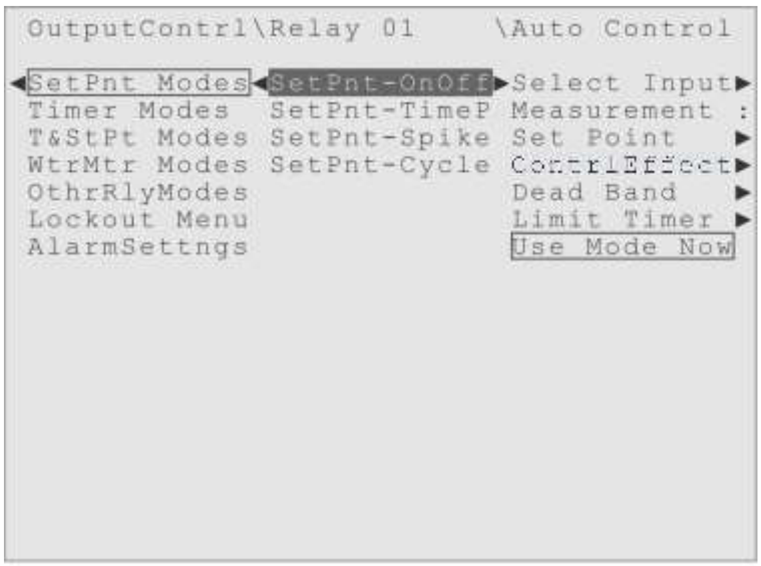


Figure 6-10. The Set Point - On / Off Control Mode.

The details for using this control mode are in the submenus:

Select Input is the first choice to make in the Set Point - On / Off mode. The user must decide which Input the method going to evaluate, or look at. The currently selected Input is displayed to the right of the Select Input submenu item and there is a list of all the Inputs to the right of that, if the user wants to change the Input choice. Chose the device or sensor to be used to control the relay. The first Input listed, usually the Conductivity sensor (Conductivity), is the default Input.

Measurement: This submenu item displays the current measurement value from the selected Input. This is for display and reference use, no editing is allowed in this submenu.

Set Point: This submenu is where the user can see and set the value that will cause the relay to activate. There is a submenu to the right of the displayed value with an Edit Value prompt that can be used to alter the Set Point value. The Set Point value for any input will probably require adjustment to be appropriate for a particular installation.

ContrlEffect (Control Effect): This submenu is where the user must set whether the relay activation is going to lower the input measurement (Force Low) or whether the relay activation is going to raise the input measurement (Force High). Force Low is the default.

Dead Band: This submenu is used to prevent the relay from cycling on and off too frequently. It is a value in the same units as the Set Point, but represents a magnitude only, not a particular value. Zero is the default value for the Dead Band.

For example, if the pH sensor was the selected Input, with 8.5 as the Set Point and Force Low as the control effect, the user might set the Dead Band to 2.0, which would keep the relay activated until the pH value dropped to 6.5.

The magnitude of the Dead Band setting required at a particular installation will depend on the physical locations of the input sensor, make-up water entry point, the pump making the chemical addition and so forth.

Limit Timer (Activation Limit Timer): This is a backup setting, to take control of the relay if the normal deactivation does not occur. If this activation time limit is exceeded, the "OvrTimeLimit" Alarm condition occurs, and the relay activates or deactivates depending on its RlayReaction setting in the Alarms Actions menu.

If this time limit is exceeded, the user can go to the "ActiveAlarms" menu (explained in detail in the Active Alarms chapter of this manual) and use the "Clear Alarm" to restore normal operation. The relay will not operate normally until the Alarm is cleared.

Don't set this activation time limit for too long a time, allowing adverse conditions to exist for a long time, but don't set it too short either, to the point where it affects the normal operations of the control method. The factory default setting is for 90 minutes.

Set Point Control Modes: SetPnt-TimeP (Set Point - Time Proportional) (Figure 6-11) Think of this mode as a "time cycle" that checks an Input measurement against the Set Point at the beginning of a recurring time period. If the measurement has passed the set point, the relay is activated for a portion of the time period, proportional to how far the measurement was from the set point. Look at the Adjustment Band (AdjustmtBand) section below for a specific example.

Select Input is first choice to make in all the Set Point modes. The currently selected Input is displayed to the right of the Input submenu item with a list of all the Inputs in use to the right of that. Select the device or sensor to be used to control the relay.

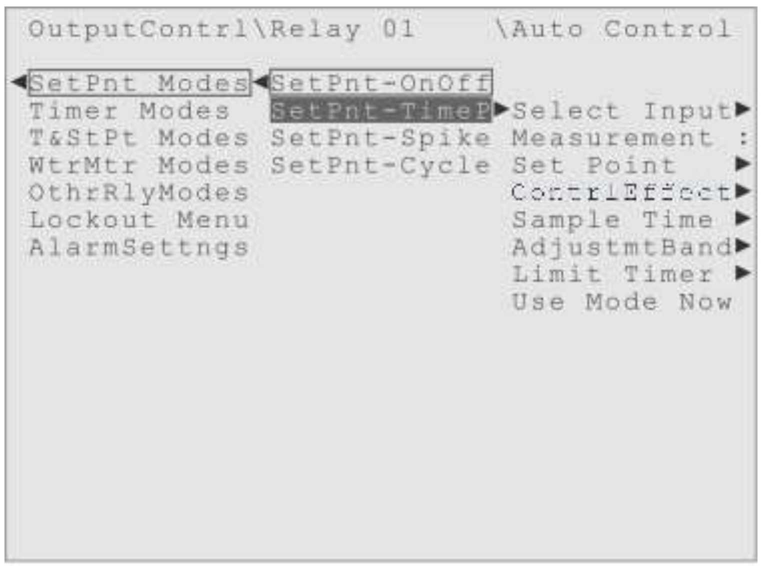


Figure 6-11. The Set Point - Time Proportional Control Mode.

Measurement: This submenu item shows the current measurement value from the selected Input. This is for display and reference use, no editing is allowed in this menu.

Set Point: This submenu is where the user can see and set the value that will cause the relay to activate. Use the Edit Value submenu to the right of the current value to alter the Set Point value.

ContrlEffect (Control Effect): This submenu is where the user must set whether the relay activation is going to lower the input measurement (Force Low) or whether the relay activation is going to raise the input measurement (Force High). Force Low is the default.

Sample Time: This submenu is for setting the time cycle at which the selected Input measurement is compared to the Set Point, which is also the longest amount of time for which the relay can be activated per cycle, based on the Adjustment band value.

AdjustmtBand (Adjustment Band): This setting is a magnitude value that is compared to the difference between the Input measurement and the Set Point at the beginning of each Sample Time. How close the difference is to the Adjustment Band value determines what portion of the Sample Time for which the relay will be activated.

Here is an example. Say the user is controlling the Bleed Valve relay with the Conductivity sensor, using this control mode. They have the Sample Time set for one hour, the Set Point at 3000 µS/cm and the Adjustment Band set for 200 µS/cm.

Suppose when the hour comes up the first time, the conductivity measurement is 3300 µS/cm. Then the difference between the measurement and the Set Point is 300 µS/cm, which is greater than the 200 µS/cm Adjustment Band, so the relay will be activated for the entire hour of the Sample Time setting.

At the end of that first one-hour cycle, suppose the conductivity measurement is now down to 3100 µS/cm. Then for the second cycle the difference between the measurement and the Set Point is 100 µS/cm. That is only 1/2 of the 200 µS/cm Adjustment band, so the relay would only be activated for the first 30-minutes of the one-hour Sample Time.

At the end of the second one-hour cycle, suppose the conductivity measurement is now down to 2975 µS/cm. Now the measurement is below the Set Point, and therefore the relay will not activate at all during the third one-hour Sample Time. And so forth.

Limit Timer (Activation Limit Timer): This is a setting to take control of the relay if the normal deactivation does not occur. If this time limit is exceeded, the "OvrTimeLimit" Alarm condition occurs, and the relay activates or deactivates depending on its RlayReaction setting in the Alarms Actions menu. When the cause of the problem is resolved, the user can go to the ActiveAlarms menu (explained in the Active Alarms chapter of this manual) and use the "Clear Alarm" to restore normal operation. The relay will not operate normally until the Alarm is cleared.

Don't set this time limit for too long, allowing adverse conditions to exist for a long time, but don't set it too short either, to the point where it affects normal operation of the control method. For example, in this mode, setting the Limit Timer to a time shorter than the Sample Time would be bad. The default setting is 90 minutes.

Set Point Control Modes: SetPnt-Spike (Set Point with Spike)

This control mode (Figure 6-12) is the same as the Set Point On / Off mode, with the additional feature of having a different Set Point used periodically. The user can set up a 7 day or 28-Day spike schedule. This is used to maintain one level of chemical addition "normally" (like on weekdays or during the day) with an automatic "spike" to a higher level of chemical addition periodically (like nightly, every weekend, every other weekend and so forth).

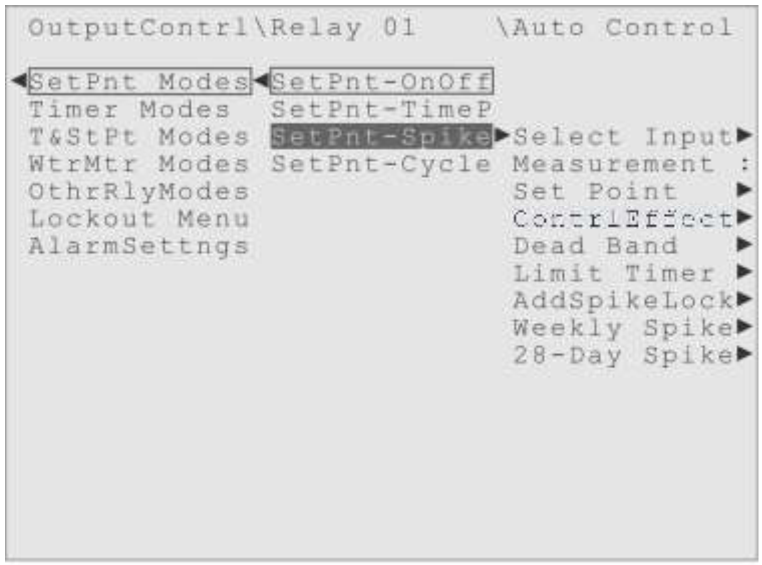


Figure 6-12. The Set Point with Spike Control Mode.

The submenus **Select Input**, **Measurement**, **NormalSetPnt**, **ContrlEffect**, **Dead Band** and **Limit Timer** menus are identical to the corresponding menus in the Set Point On / Off control mode. Refer to the descriptions in that section above for explanations of those menus.

AddSpikeLock allows the user to increase the Lockout time during the Spike Period. Each Relay has a separate Lockout menu, used to prevent other relays from activating while the relay is active. There is an option in that separate Lockout menu for “Additional Lockout Time” (AddLockTime) that will extend the Lockout beyond the deactivation of the relay. This AddSpikeLock menu allows the user to increase that additional lockout time during the Spike Period. Whatever value (in minutes) the user sets in this menu will be added to the normal AddLockTime setting, to define the additional lockout time during the Spike Period.

Spike Cycle: This menu is what makes this mode special. There are two versions:

Weekly Spike and

28-Day Spike, and they both have the same settings.

In the weekly cycle, the user defines the settings for Sunday through Saturday, and the settings are repeated weekly. In the 28-Day cycle, the user has the same settings but for Sunday-1 through Saturday-1, Sunday-2 through Saturday-2, Sunday-3 through Saturday-3, Sunday-4 through Saturday-4, and the settings are repeated every 28 days.

To select a day to have a Spike occur, simply set the time of day the Spike Period should start at, then set the Spike Period to a value other than zero and press the Enter key. The familiar "active box" will then be drawn around the day name to show that a Spike is scheduled for that day. Set the value back to zero to deactivate a day. Don't forget you also have to select "Use Mode Now" to start this control mode, after you have made all your settings.

The Spike submenu items for any particular day are the same, and include:

Spike Start@: Here is where the user sets the time, on that day, at which the Spike Set Point should take effect, and the Spike Period should start.

Spike Period: This menu item is for setting how long the user wants the Spike Set Point to be in effect. This period of time starts at the Spike Start time programmed above and the user can set this time duration from one minute to 1440 minutes (24 hours).

Spike SetPnt (Spike Set Point): This will be the new Set Point value that takes effect during the Spike Period. It follows the same Control Effect as the normal Set Point.

The user should employ the weekly (7 day) cycle settings if they want the spike to occur the same way every day, or every week.

The user should only bother with the 28-Day cycle settings if they need the spike to occur differently from week to week.

One use for the 28-Day cycle is to have two different biocides set to spike on alternate weeks. The user can set up one biocide to spike on the odd weeks (that start with Sunday-1 and Sunday-3) and set the second biocide to spike on the even weeks (that start with Sunday-2 and Sunday-4). By the way, another feature of the Triton controller is that all 28-Day Cycles are automatically synchronized. (See the "Start Cycle" menu explanation in the Home Screen Edit chapter of this manual.)

The last of these Set Point control modes is only useful if the Triton controller has two Conductivity sensors installed. This mode is designed to compare the TDS of the system water to the TDS of the make-up water, and control the output using the ratio of the two conductivity measurements, called the "Cycles" of the water.

Set Point Control Modes: SetPnt-Cycle (Set Point - Cycles of Concentration)
This is a simple Set Point On / Off style control mode, except it takes the ratio of two conductivity sensor measurements as its Input Measurement and compares that ratio to the user-defined Cycle Set Point (Figure 6-13). Other than using the ratio as the Input Measurement, its other settings are the same as a normal Set Point On / Off mode.

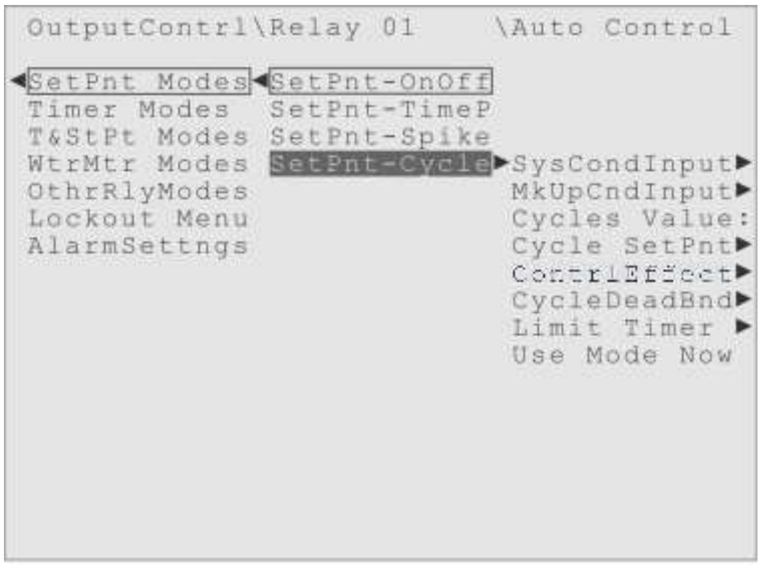


Figure 6-13. The Set Point - Cycles of Concentration Control Mode.

This mode needs two conductivity sensors, one measuring the system water and another measuring the make-up water. The system water conductivity is divided by the make-up water conductivity to get the ratio known as the "Cycles" or "Cycles of Concentration" of the water. For example, if the system water has twice the conductivity of the make-up water, the Cycles value would be 2.

SysCondInput (System Conductivity Input): This submenu allows the user to select which of the conductivity sensors is the system water conductivity sensor. It is set by default to the first sensor listed, which is normally the "Conductivty" sensor.

MkUpCndInput (Make Up Conductivity Input): This submenu allows the user to select which of the conductivity sensors is measuring the make-up water. If a second conductivity sensor is installed on the digital network, it will be selected by default. If the second sensor is connected to the 4-20 mA Inputs, it must be selected manually.

Cycles Value: This submenu item displays the current Cycles value to the right of the prompt, based on the two conductivity measurements defined above. It is simply the system conductivity divided by the make-up conductivity.

Cycle SetPnt (Cycle Set Point): This is the Cycle value that the user defines should activate the relay when exceeded. The Control Effect is pre-set to Force Low for this control mode, in which case the user is defining the Cycles value that must be *exceeded* by the current measurement, to activate the relay.

ContrlEffect (Control Effect): This submenu is where the user must set whether the relay activation is going to lower the Cycle value (Force Low) or whether the relay activation is going to raise the Cycle Value (Force High). Force Low is the default.

CycleDeadBand (Cycle Dead Band): The user's setting in this submenu works just like other Dead Band settings. The user enters a Cycle value intended to keep the relay from turning on and off too quickly. It delays the deactivation of the relay during the correction period by the Cycle magnitude value the user enters.

For example, if the user had defined 3.0 as the Cycle Set Point and they set the Cycle Dead Band to 1.0, once the relay was activated it would not deactivate until the Cycle value dropped to 2.0 instead of shutting off right at 3.0.

The magnitude of the Cycle Dead Band setting required at your installation will depend on the physical locations of the conductivity sensors, bleed valve, make-up water entry point, and so forth.

Limit Timer (Activation Limit Timer): This is a setting to take control of the relay if the normal deactivation does not occur. The factory default time limit is 90 minutes. If this activation time limit is exceeded, the "OvrTimeLimit" Alarm condition occurs, and the relay activates or deactivates depending on its RlayReaction setting in the Alarms Actions menu. When the cause of the problem is resolved, the user can go to the ActiveAlarms menu (explained in the Active Alarms chapter of this manual) and use the "Clear Alarm" to restore normal operation. The relay will not operate normally until the Alarm is cleared.

Timer Start & Stop Control Modes (Timer Modes)

The category of control modes after the Set Point category is the Timer Start & Stop group of control modes. These control modes activate the relay at a user-defined time of day, and then have the relay stay activated for a user-defined duration of time.

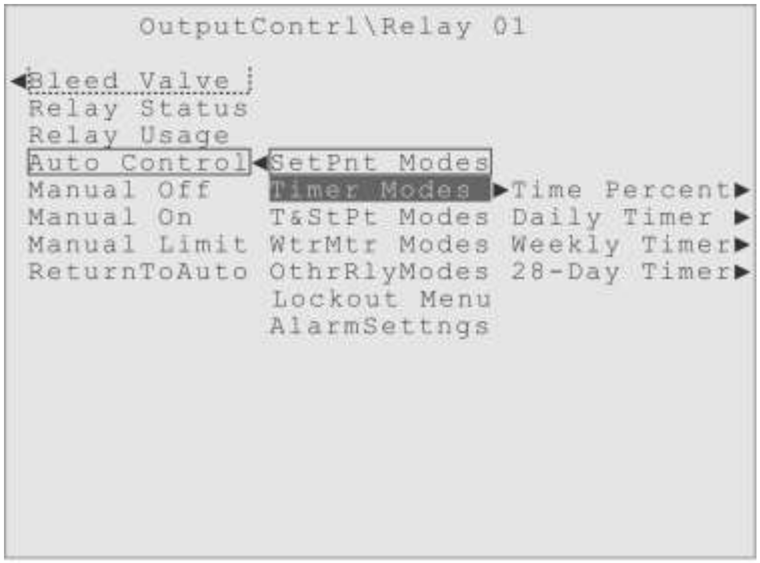


Figure 6-14. The Timer Start & Stop Control Mode Category.

Moving the highlight down to the "Timer Modes" menu prompt will show these control modes, which use a Timer to activate and deactivate the relay (Figure 6-14). The first four modes are full control modes, while the last two are "add-ons" to the main modes.

Time Percent (Time Percentage): This is a very simple Timer control mode. The user defines a time cycle, like one hour, and then they define what percent of that time the relay should be activated for, 50% for example. Those settings would result in 30-minutes of activation every hour. It is one way of activating a relay more often than the ten times a day available using the "Daily Cycle" mode.

Daily Timer (Daily Cycle): This mode can be programmed to activate the relay up to 10 different times a day, but every day will be the same. The user defines at what time of day the relay activates and for how long, for each of the ten “time slots”.

Weekly Timer (Weekly Cycle) This mode can be programmed to activate the relay once a day for each day of the week, and each day can be set differently but every week will be the same. The user defines what time of day the relay activates and for how long.

28-Day Timer (28-Day Cycle): This mode allows the user to activate a relay once a day on a 28-Day schedule, and each day can be set differently but every 28-day cycle will be the same. The user defines at what time the relay activates each day and for how long.

(Since Relay 01 is being used in this explanation, with the Bleed Valve control relay usage, the "Add PreBleed" and “Add Pre-Feed” control modes described below would *not* be listed in its Control Menu. For the Chemical Pump control usage however, these "add-on" modes would appear after the "28-Day Timer" mode.)

Add PreBleed: This is an optional mode that "adds" a pre-bleed feature to the first four Timer Start & Stop Modes described above. It is designed to turn on the Bleed valve for a period before one of the above Timer cycle activations.

Add Pre-Feed: This is another optional mode that "adds" a pre-feed feature to the first four Timer Start & Stop Modes. It allows the user to have a different relay activate, and run for a pre-set amount of time, before one of the above Timer cycle activations.

Next, the individual Timer Start & Stop Modes are explained, in the order they would appear in the menu.

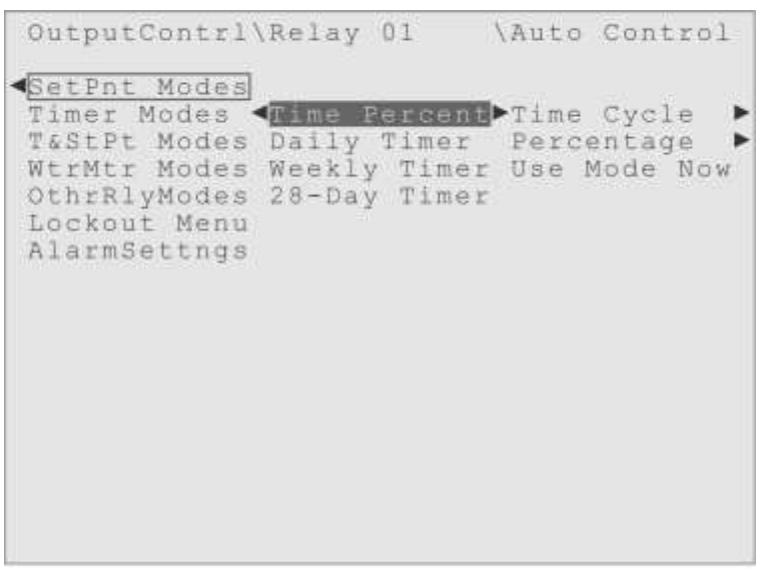


Figure 6-15. The Time Percentage Control Mode.

Timer Start & Stop Modes: Time Percent (Time Percentage)

This is the simplest of the Timer Start & Stop Modes, and the only one that allows more than ten activations per day. In this mode, the user specifies a recurring time period (**Time Cycle**) and the percentage of that time period (**Percentage**) for which the relay should be activated. For example, the user could choose 60 minutes and 50%, which would result in the relay activating for 30-minutes out of every hour.

When the user is ready to employ this mode, they would highlight the "Use Mode Now" menu item and press the Enter key. The "active box" would be drawn around that item, and the “Time Percent” item to show that mode is now being used. That would also cause the active control mode category to be Timer Modes, and the "active box" would be drawn around that menu item as well.

The user can also add a Pre-Bleed or Pre-Feed operation to these Time Percent activations. (Remember that the Add PreBleed and Add Pre-Feed menus are not shown in the timer control menu of a Relay controlling a Bleed Valve!) The explanations about the Add PreBleed and Add Pre-Feed options appear later in this section.

Time Cycle: This menu is where the user defines the recurring time period, the time cycle. They may set times from 10 minutes to 1440 minutes (1440 minutes = 24 hours). The default value is 60 minutes.

Percentage: This menu item is for setting what portion of the Time Cycle for which the relay will be activated. The user can enter values from 0 to 100%, although 100% would mean the relay would be activated constantly, as the time cycle is recurring, and 0% would mean the relay never activates. The default value is 0%.

Timer Start & Stop Modes: Daily Timer (Daily Cycle)

This is another simple control mode, that lets the user choose a time of day the relay activates and the amount of time it stays activated, up to ten times a day.

The user can have the relay activate as many as ten different times a day, with different durations, but every day will be the same. They can set the time of day for each individual activation and how long the relay should stay activated each time.
The first Daily Timer submenu has the ten time slots listed, "Time 01 Menu", "Time 02 Menu" through the "Time 10 Menu". The user should go to those submenus, described

below, and change the settings before they start to use, or activate, this control mode.

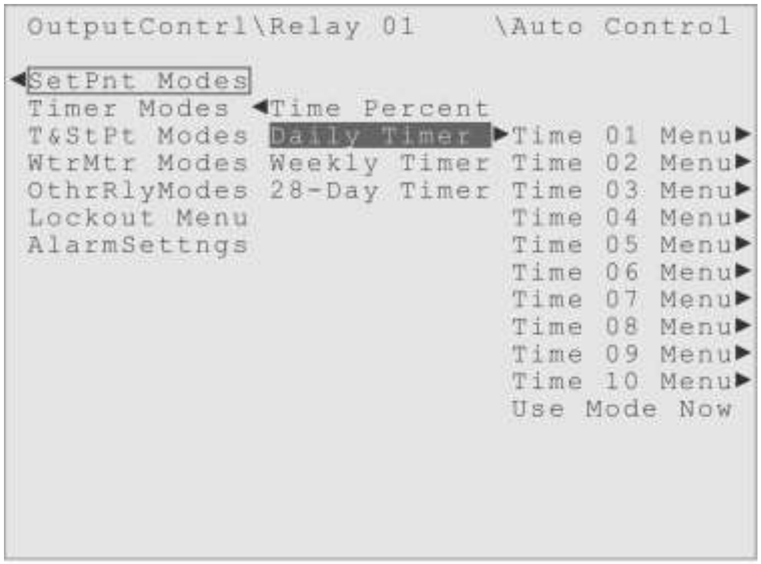


Figure 6-16. The Daily Timer Control Mode.

When the "On Duration" value is changed from zero, the time slot will automatically become active, with the "active box" around it. After setting the time slots they want to use, the user would then highlight "Use Mode Now" at the bottom of the list and press Enter, to activate the Daily Timer control mode. The "active box" would be drawn around the Daily Timer menu prompt and the control mode category, Timer Modes, to indicate they are now in use.

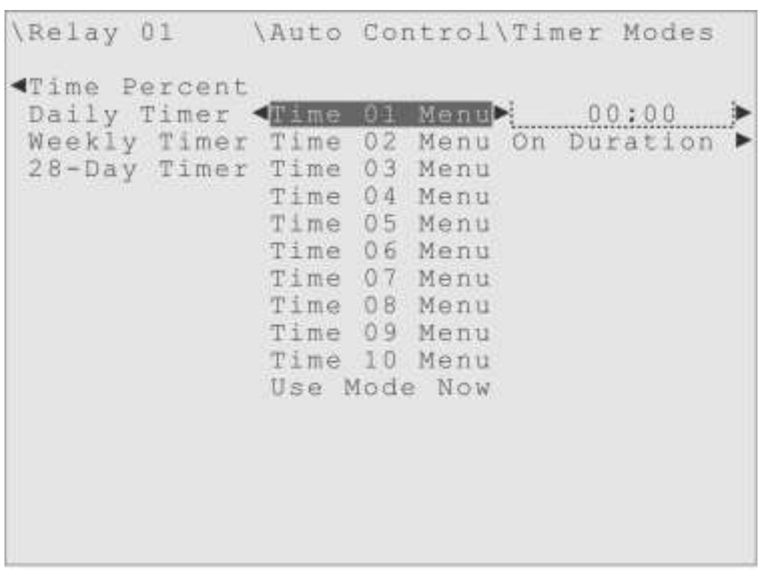


Figure 6-17. The Time 01 Menu.

The user can also add a Pre-Bleed or Pre-Feed operation to the Daily Cycle activations. (Remember that Add PreBleed and Add Pre-Feed menus are not shown in the Control menu of a Relay controlling a Bleed Valve!) More details about the Add PreBleed and Add Pre-Feed options are in the sections explaining them, later in this chapter.

Each of the "Time 01 Menu" through "Time 10 Menu" time slots have the same two submenu items, described below, to control the time of day that the relay will activate and for how long the relay will remain activated, that is to say the duration of that particular activation.

00:00: This menu item shows the time of day, in 24-hour format, that the relay activation would start. For all time of day menus in a Triton controller, 00:00 = begin of Day, 12:00 = Noon, 23:59 = end of Day. Select the “Edit Value” submenu item to change the start time.

On Duration: This is where the user sets the duration of the activation, how long the relay will be activated for the particular time slot. The user can enter from 0 to 1440 minutes (24 hours). Remember that setting the duration to anything but zero “selects” that time slot, but the user must also select the “Use Mode Now” item at the end of the list to start the Daily Timer control mode. To deselect a particular time slot, just set the On Duration back to zero.

Timer Start & Stop Modes: Weekly Timer (Weekly Cycle)

The Weekly Cycle control mode allows the user to activate a relay once each day, of a 7-day cycle. The user defines what days of the week the relay activates on, the time of day each activation starts, and how long it stays activated on that particular day.

The first Weekly Timer submenu has the days of the week listed, Sunday, Monday through Saturday. The user should go to the submenus, described below, and change the settings before they activate the mode to start using it. When the “On Duration” value is changed from zero, the day will automatically become active, with the “active box” around it. After setting the days they want to use, the user would then highlight “Use Mode Now” at the bottom of the list and press Enter, to activate the Weekly Timer control mode. The "active box" would be drawn around the Weekly Timer menu prompt and the control mode category, Timer Modes, to indicate they are now in use.

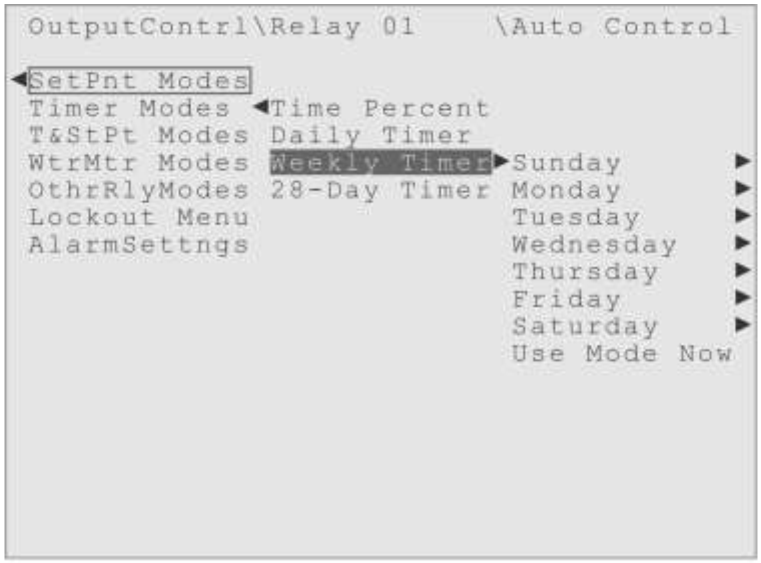


Figure 6-18. The Weekly Timer Control Mode.

The user can also add a Pre-Bleed or Pre-Feed operation to the Weekly Cycle activations. (Remember that Add PreBleed and Add Pre-Feed menus are not shown in the timer control menus of a Relay controlling a Bleed Valve!) More details about the Add PreBleed and Add Pre-Feed options are in their own explanation sections below.

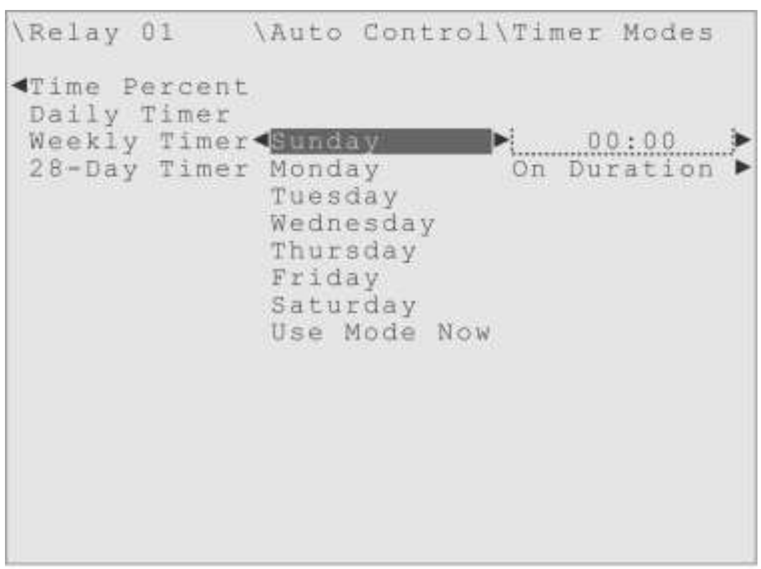


Figure 6-19. The Weekly Timer, Sunday Menu.

Each of the days, "Sunday" through "Saturday", has the same submenu items, shown in Figure 6-19, to control the relay.

00:00: This menu item shows the time of day, in 24-hour format, that the relay activation would start on that particular day. The start time and the activity duration can be different for each day. For all time of day menus in a Triton controller, 00:00 = begin of Day, 12:00 = Noon, 23:59 = end of Day. Select the "Edit Value" submenu item to change the start time.

On Duration: This is where the user sets the duration of the activation, how long the relay will be activated for that particular day. The user can enter from 0 to 1440 minutes (24 hours). Remember that setting the duration to anything but zero "selects" that day, but the user must also select the "Use Mode Now" item at the end of the list to start the Weekly Timer control mode. To deselect a particular day, just set the On Duration back to zero minutes.

Timer Start & Stop Modes: 28-Day Timer (28-Day Cycle)

The 28-Day Cycle control mode is essentially the same as the Weekly Cycle mode. The difference is that the user can schedule 28 days of activation instead of just one week. This would only be useful if the user needs different timer settings to be used on different weeks, instead of the same timer settings being used every week.

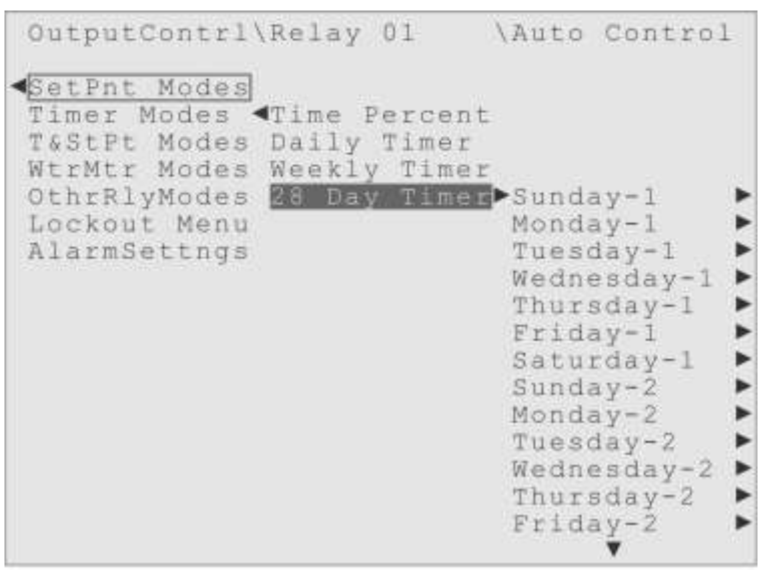


Figure 6-20. The 28-Day Timer Control Mode.

The first 28-Day Timer submenu lists the 28 days in four "cycle weeks", Sunday-1 through Saturday-1, then Sunday-2 through Saturday-2, and so forth. The user should go to the submenus, described below, and change the settings before they activate this mode.

When the “On Duration” value is changed from zero, the day will automatically become active, with the “active box” around it. After setting the days they want to use, the user must then highlight “Use Mode Now” way down at the bottom of the list and press Enter, to activate the 28-Day Timer control mode. The "active box" would be drawn around the 28-Day Timer menu prompt and the control mode category, Timer Modes, to indicate they are now in use.

The user can also add a Pre-Bleed or Pre-Feed operation to the 28-Day Cycle activations. (Remember that Add PreBleed and Add Pre-Feed menus are not shown in the timer control menus of a Relay controlling a Bleed Valve!) More details about the Pre-Bleed and Pre-Feed options are in their own explanation sections below.

Each of the days "Sunday-1" through "Saturday-4" has the same two submenu items, pictured in Figure 6-21, to control the relay.

00:00: This menu item shows the time of day, in 24-hour format, that the relay activation would start. For all time of day menus in a Triton controller, 00:00 = begin of Day, 12:00 = Noon, 23:59 = end of Day. Select the “Edit Value” submenu item to change the start time.

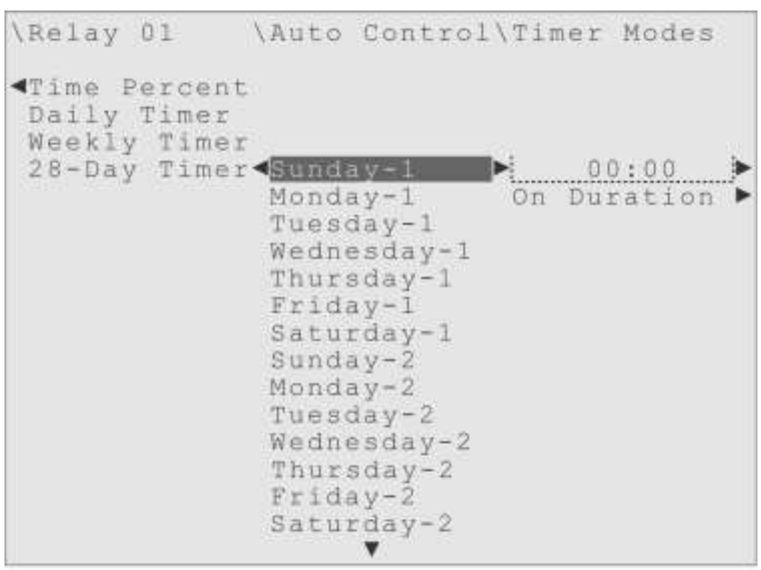


Figure 6-21. The 28-Day Timer, Sunday-1 Menu.

On Duration: This is where the user sets the duration of the activation, how long the relay will be activated for that particular day. The user can enter from 0 to 1440 minutes (24 hours). Remember that setting the duration to anything but zero "selects" that day, but the user must also select the "Use Mode Now" item at the end of the list to start the 28-Day Timer control mode. To deselect a particular day, just set the On Duration back to zero minutes.

. . .

Add PreBleed and Add Pre-Feed

The next two control modes in the Timer Only category, Add PreBleed and Add Pre-Feed, are not independent control modes. These two "additional" or optional control modes, *add* their features to any of the four previous Timer Start & Stop Modes. The user must be using one of the previous Timer Modes, for these modes to have any effect. (In this description, Relay 02 is used as an example of the Pump Relay usage, which has these "add-on" modes available. The Bleed Valve usage does not offer these modes.)

The **Add PreBleed** mode allows the user to bleed water from the system *before* the normally programmed Timer activation they have set up in one of the previous four modes. This mode can bleed for a preset amount of time, or have a Conductivity Set Point control when the bleed should stop.

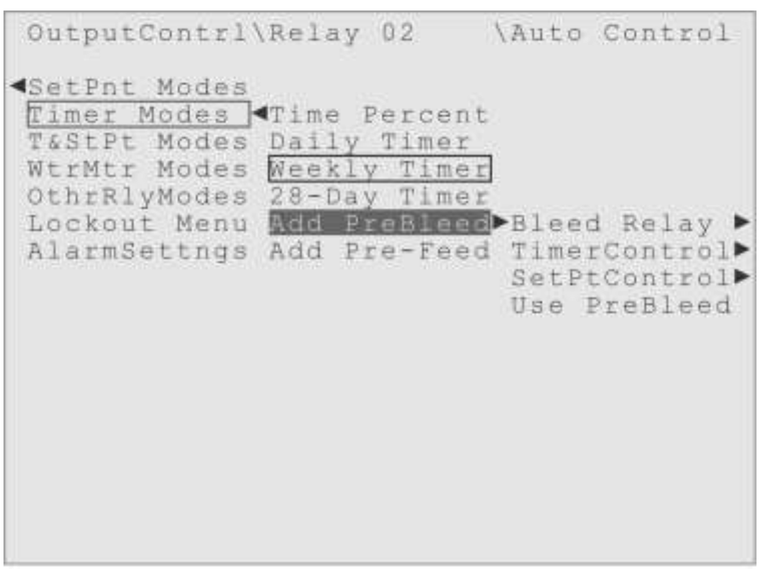


Figure 6-22. Relay 02 Auto Control Menu, showing the Add PreBleed menus.

The **Add Pre-Feed** mode allows the user to have another Relay activate *before* the normally programmed Timer activation they have set up in one of the previous Timer Start & Stop Modes. This mode can only pre-feed for a preset amount of time.

These two additional modes cannot be used together, only one can be used at a time, and always have to be used *with* one of the four previous Timer activation modes.

Timer Start & Stop Modes: Add PreBleed
The Add PreBleed mode allows the user to bleed water from the system *before* the normally programmed Timer activation they have set up in one of the previous four Timer Start & Stop Modes. They can bleed for a pre-set amount of time by using the TimerControl menu, or have a Conductivity Set Point control when the bleed should stop by using the SetPtControl menu.

Bleed Relay: This submenu is where the user would choose which relay should be activated in order to bleed the system before the normal Timer cycle activation. The user can choose any relay other than one they are controlling with the Timer activation mode, but typically Relay 01 is assigned to control the Bleed Valve.

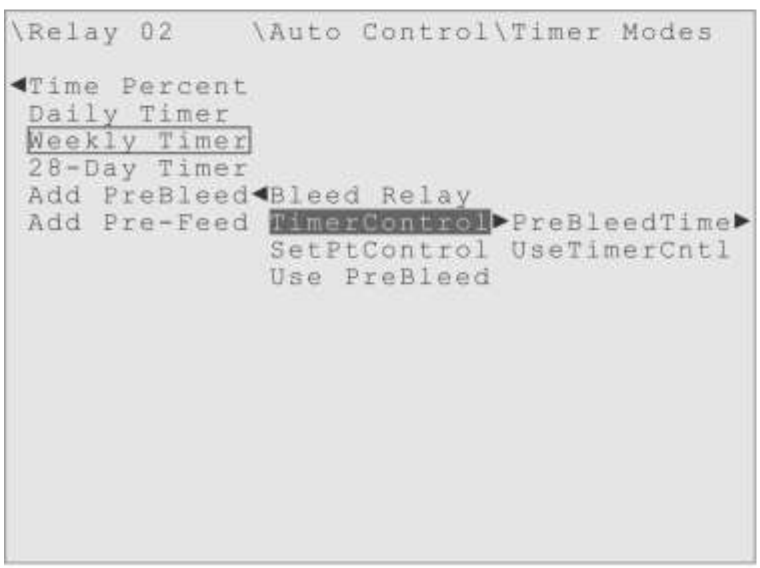


Figure 6-23. The Pre-Bleed, TimerControl Menu.

TimerControl: The Timer Control menu is for setting a pre-bleed for a fixed amount of time. The user would use the PreBleedTime (Pre-Bleed Time) submenu to set how long they want the Bleed to drain, and then highlight the UseTimerCntl menu item press the Enter key to activate this feature. After activating TimerControl, the user would also have to activate Add PreBleed by selecting the “Use PreBleed” activator seen in Figure 6-23. The user may have to experiment and try several Bleed times to determine what time is best to use for this setting at a particular installation.

SetPtControl: The Set Point Control menu is for using a conductivity measurement to determine when the Pre-Bleed should stop. Use its submenu items to set up the Pre-Bleed control, then highlight the UseSetPtCntl menu item and press Enter to activate this feature. A pre-bleed that is being controlled by a Conductivity Set point always starts 90 minutes before the primary feed. This should be enough time to accomplish the pre-bleed before the primary feed is scheduled to start, on all but the largest systems. If the pre-bleed has not finished when the time comes for the primary feed to begin, the pre-bleed is stopped so the primary feed can begin at the time it was scheduled to start.

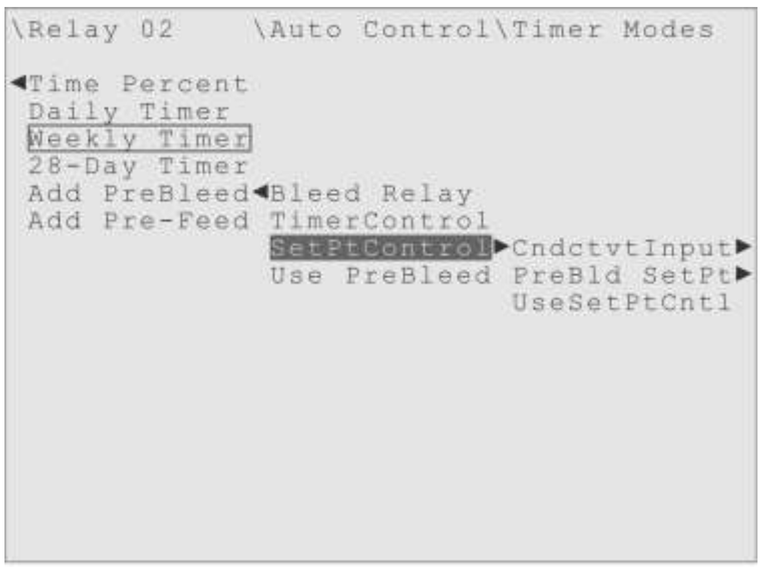


Figure 6-24. The Pre-Bleed, SetPtControl Menu.

The submenu items for the Set Point Control method are:

CndctvtInput (Conductivity Input) is the menu where the user can choose which Input is measuring the system water's conductivity. By default, it is set to the first conductivity sensor, named Conductivity at the factory.

PreBld SetPt (Pre-Bleed Set Point) is where the user would enter the Conductivity value that should *stop* the Bleed drain. This should be significantly lower than any set point established to *start* a Bleed. The user may have to experiment to find the best value for this setting, depending on their goals and the physical situation at a particular installation.

UseSetPtCntl (Use Set Point Control) is the ‘activator” for this control option. After making the settings they desire the user must highlight the “UseSetPtCntl” item and press Enter to select this control option. After activating SetPtControl, the user would also have to select the “Use PreBleed” activator (Figure 6-24) to activate Add PreBleed.

Timer Start & Stop Modes: Add Pre-Feed

The Add Pre-Feed menu allows the user to activate another relay *before* the relay they are controlling with one of the four previous Timer Start & Stop Modes. The pre-feed relay can only be activated for a fixed amount of time.

This optional mode is typically used to introduce a Dispersant, Penetrant or Surfactant, before the addition of the chemical being controlled by one of the Timer control modes.

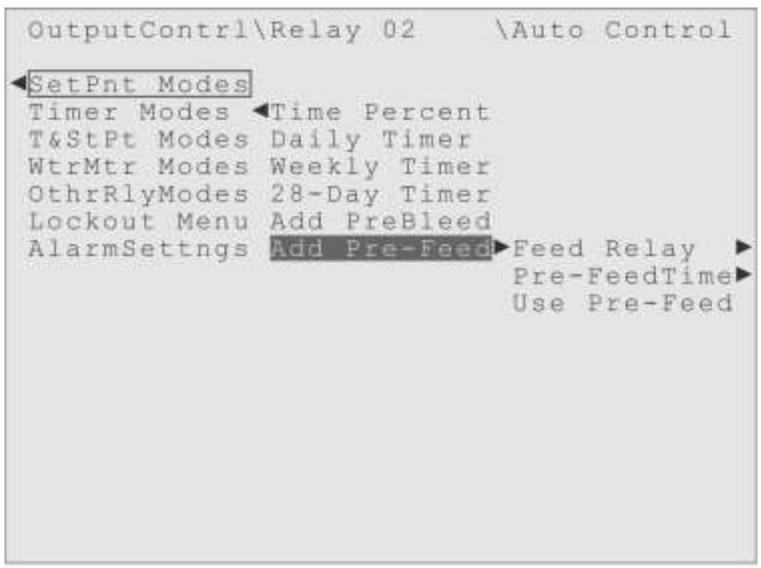


Figure 6-25. The Add Pre-Feed Menu.

This optional Add Pre-Feed mode has only three submenu items.

Feed Relay: This submenu is where the user would select which one of the other relays will be activated before the normal Timer activation. The user can choose any relay other than one they are controlling with the Timer Start & Stop Mode.

To make the selection, simply move the highlight until the appropriate relay is highlighted and then press the Enter key.

Pre-FeedTime: The Pre-Feed Time submenu is where the user can see and adjust the amount of time that the pre-feed relay will remain activated before the regular Timer controlled relay is activated. The user can choose from 0 to 1440 minutes (24 hours) for this feed duration. The default value for Pre-FeedTime is zero minutes.

Use Pre-Feed: This is the “activator” for this add-on mode. The user must highlight this menu item and press Enter to activate the Add Pre-Feed feature.

. . .

That's all there is to explain about the Timer Start & Stop Modes. The next category of control modes is the Timer Start with Set Point Stop control modes (T&StPt Modes).

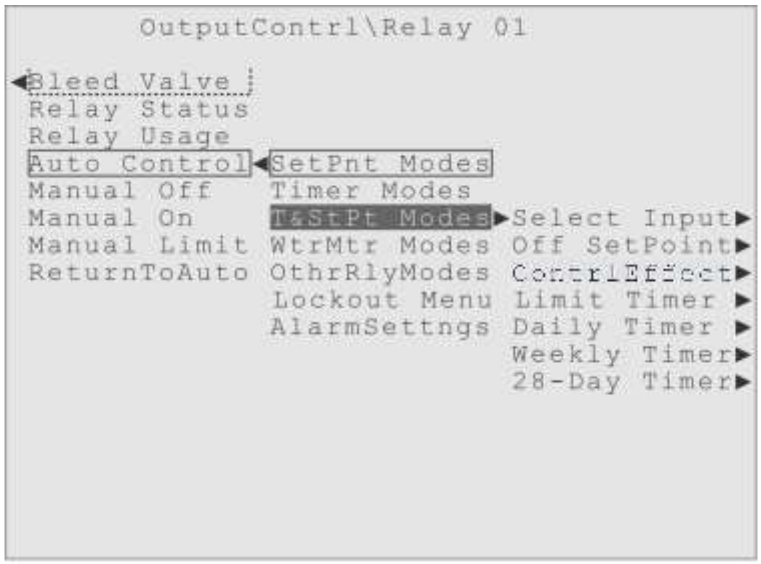


Figure 6-26. The Timer Start with Set Point Stop Control Mode Category.

Timer Start with Set Point Stop Control Modes (T&StPt Modes)

The first three Timer Start with Set Point Stop control modes are very similar to the Daily Timer, Weekly Timer and 28-Day Timer modes explained above.

These new modes, as the category name implies, differ in what deactivates the relay. They start at a time-of-day setting, but instead of deactivating after a timed duration, these modes use an Input measurement Set Point to control when the relay deactivates.

And just like the previous Timer Modes category, the T&StPt Modes category has the same two additional modes, Add PreBleed and Add Pre-Feed, with identical purposes and settings.

Select Input: This is where the user selects the Input, whose measurement value will be used to deactivate this relay. This selection used for whatever time cycle is employed.

Off SetPoint: This menu is where the Set Point can be defined, which will be used to deactivate this relay. Remember this is a Set Point for *deactivation,* so it should be significantly lower (or higher, depending on the Input) than a Set Point for activation. This setting is used for every deactivation, in whatever time cycle is selected.

ContrlEffect (Control Effect): This submenu is where the user must set whether the relay activation is going to lower the input measurement (Force Low) or whether the relay activation is going to raise the input measurement (Force High).

Limit Timer (Activation Limit Timer): Any mode that uses an Input for control has this activation time limit menu, to take control of the relay after the time value defined, in case there is a problem with the Input. The default time limit is 90 minutes.

Daily Timer (Daily Cycle): This mode can be programmed to activate the relay up to 10 different times a day. The Input Set Point defined earlier controls the deactivation.

Weekly Timer (Weekly Cycle): This mode can be programmed to activate the relay once a day for each day of the week. The user defines what days they want to use, and at what time of day the relay activates, and the defined Set Point controls the deactivation.

28-Day Timer (28-Day Cycle) This mode is just like the weekly cycle except the user can activate a relay once a day on a 28 day schedule, with Set Point deactivation.

(Since Relay 01 is being used in this explanation, with the Bleed Valve control relay usage, the "Add PreBleed" and “Add Pre-Feed” control modes described below would *not* be listed in its timer control menus. For the Chemical Pump control usage however, these "add-on" modes would appear after the "28-Day Timer" mode.)

Add PreBleed: This is an optional mode that "adds" a pre-bleed feature to the first three T&StPt modes described above. It is designed to turn on the Bleed valve for a period before one of the above T&StPt activations.

Add Pre-Feed: This is another optional mode that "adds" a pre-feed feature to the first three T&StPt Modes above. It allows the user to have a different relay activate, and run for a pre-set amount of time, *before* the normal relay activation.

Timer Start with Set Point Stop Modes: Daily Timer (Daily Cycle)

This control mode lets the user choose up to ten times of day to activate the relay and uses an Input measurement (Set Point) to control the deactivation. The user can have the relay activate up to ten different times a day. Since the deactivation settings are made in the previous menus, all the user defines here is which of the ten time slots are in use, and the time of day the activation starts, for each time slot being used.

The user can also add a Pre-Bleed or Pre-Feed operation to the Daily Cycle activations. (Remember that the Add PreBleed and Add Pre-Feed menus are not shown in the timer control menus of a Relay controlling a Bleed Valve.) There are more details about the Add PreBleed and Add Pre-Feed options in their own sections later in this chapter.

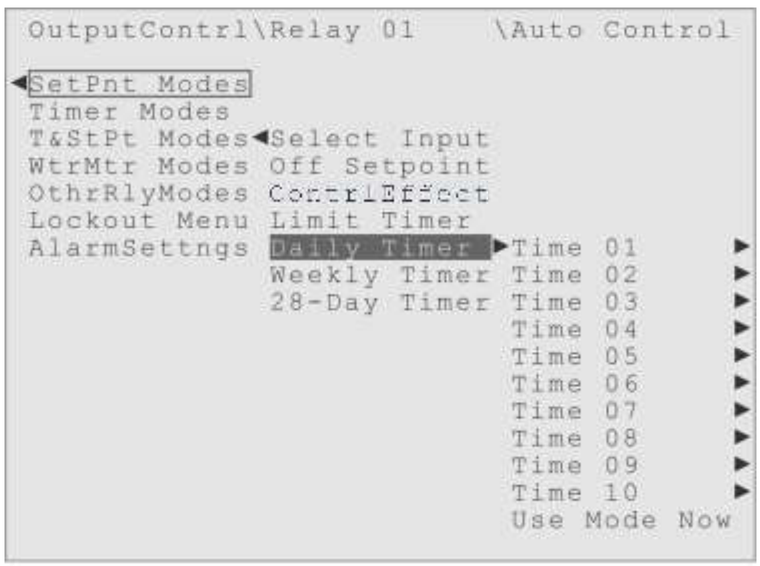


Figure 6-27. The Timer & Set Point, Daily Timer Control Mode.

The first Daily Timer submenu has the ten time slots listed, "Time 01 Menu", "Time 02 Menu" through "Time 10 Menu". To use one of the times, the user would go to the submenus, set the start time, and since there is no duration to change from zero in this mode, the user needs to select the “Use ThisTime” menu item to indicate the time slot is active. The Time slot would then get the “active box” drawn around it. After setting the time slots they want to use, the user must then highlight “Use Mode Now” at the bottom of the list of times and press Enter, to activate the Daily Timer control option. The "active box" would be drawn around the Daily Timer menu prompt and the control mode category, T&StPt Modes, to indicate they are now in use.

Each of the "Time 01 Menu" through "Time 10 Menu" time slots has the same two submenu items; one to set the start time, and the other to activate the time slot.

00:00 This submenu item shows the time of day, in 24-hour format, that the relay activation would start. For all time of day menus in a Triton controller, 00:00 = begin of Day, 12:00 = Noon, 23:59 = end of Day. Select the “Edit Value” submenu item to change the start time.

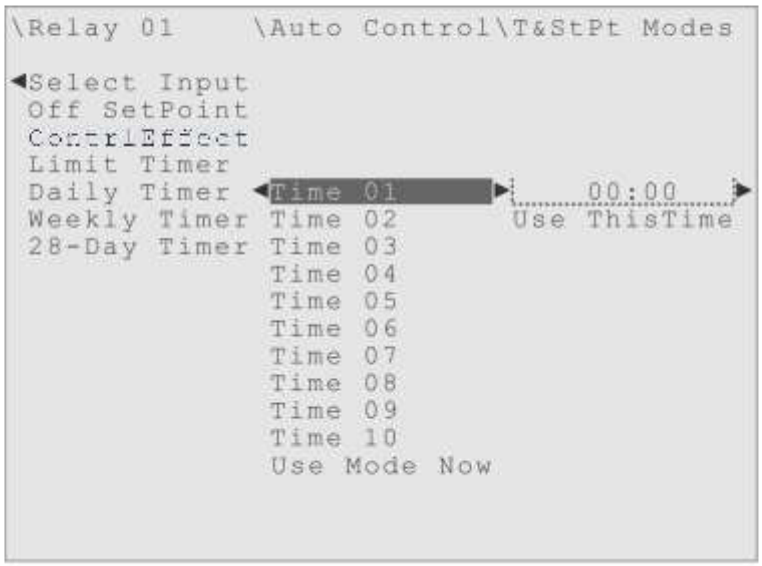


Figure 6-28. The Timer & Set Pont, Daily Timer, Time 01 Menu.

Use ThisTime (Use This Time): This is the “activator” for the particular time slot. Since there is no duration in this mode, the user needs to highlight the “Use ThisTime” menu item and press Enter, to indicate this time slot is in use. The “active box” will be drawn around the time slot menu item to show it has been selected, but don’t forget to also select the “Use Mode Now” menu item at the bottom of the list of times, to active the Daily Timer control mode.

Timer Start w/ Set Point Stop Modes: Weekly Timer (Weekly Cycle)

The Weekly Timer control mode only allows the user to activate the relay once a day, on a weekly cycle. Since the deactivation settings are made in the previous menus, all the user defines here is what day of the week the relay activates on, and the time of day the activation starts, on each day that is being used.

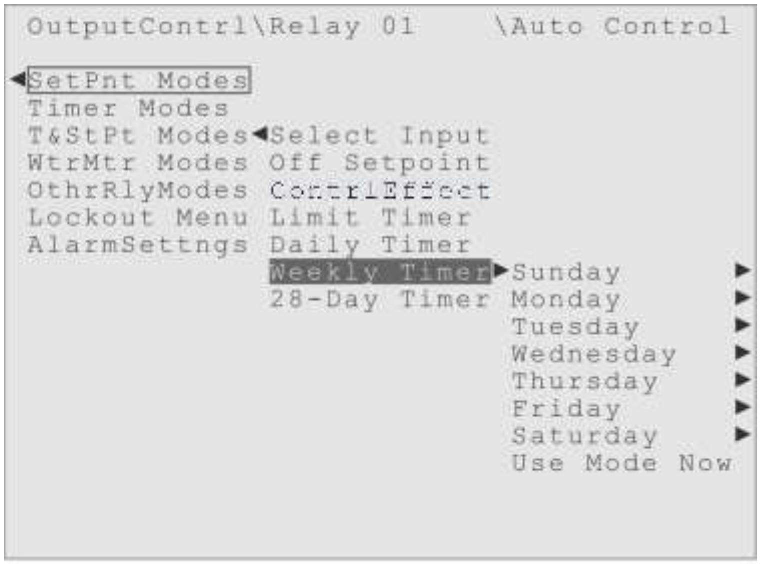


Figure 6-29. The Timer & Set Point, Weekly Timer Control Mode.

The user can also add a Pre-Bleed or Pre-Feed operation to the Weekly Cycle activations. (Remember that the Add PreBleed and Add Pre-Feed menus are not shown in the timer control menus of a relay controlling a Bleed Valve.) There are more details about the Add PreBleed and Add Pre-Feed options in their own sections below.

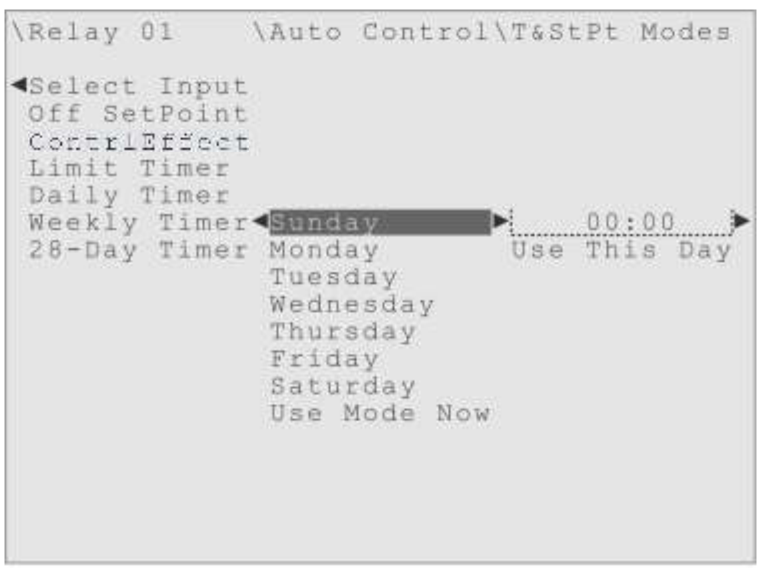


Figure 6-30. The Timer & Set Point, Weekly Timer, Sunday Menu.

The first Weekly Timer submenu has the seven days of the week listed, "Sunday", "Monday" through "Saturday". To use one of the days, the user would go to the submenus, set the start time, and since there is no duration to change from zero in this mode, the user needs to select the “Use This Day” menu item to indicate the day is active. The day prompt would then get the “active box” drawn around it. After setting the days they want to use, the user must then highlight “Use Mode Now” at the bottom of the list of days and press Enter, to activate the Weekly Timer control option. The "active box" would be drawn around the Weekly Timer menu prompt and the control mode category, T&StPt Modes, to indicate they are now in use.

Each day, "Sunday" through "Saturday", has the same two submenu items; one to set the start time, and the other to activate the day.

00:00 This submenu item shows the time of day, in 24-hour format, that the relay activation would start. For all time of day menus in a Triton controller, 00:00 = begin of Day, 12:00 = Noon, 23:59 = end of Day. Select the “Edit Value” submenu item to change the start time.

Use This Day: This is the “activator” for the particular day. Since there is no duration that is changed from zero in this mode, the user needs to highlight the “Use This Day” menu item and press Enter, to indicate this day is in use. The “active box” will be drawn around the day menu item to show it has been selected, but don’t forget to also select the “Use Mode Now” menu item at the bottom of the list of times, to active the Weekly Timer control mode.

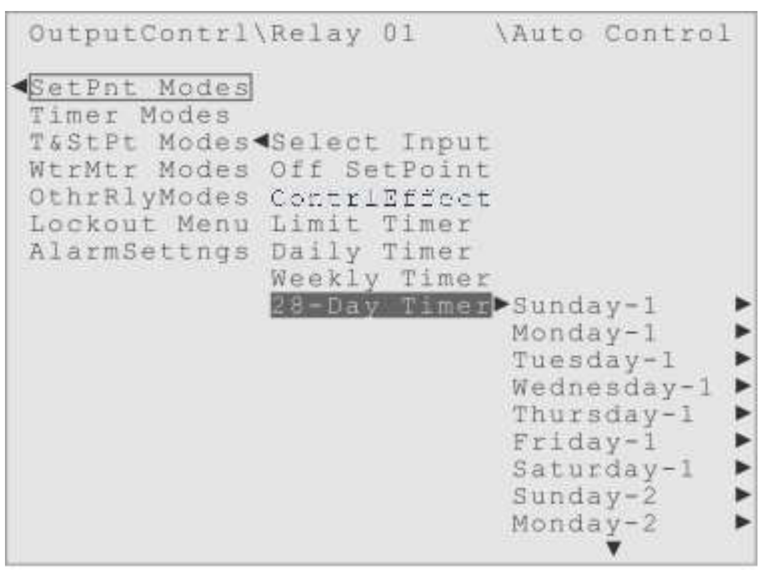


Figure 6-31. The Timer & Set Point, 28-Day Timer Control Mode.

Timer Start w/ Set Point Stop Modes: 28-Day Timer (28-Day Cycle)
The 28-Day Timer control mode is essentially the same as the Weekly Timer mode. The difference is the user can schedule 28 days of activation instead of just one week. This would only be useful if the user needs different timer settings to be used on different weeks, instead of the same timer settings being used every week. Since the deactivation settings are made in the previous menus, all the user defines here is what days the relay activates on, and the time of day the activation starts on each day being used.

The user can also add a Pre-Bleed or Pre-Feed operation to the 28-Day Cycle activations. (Remember that the Add PreBleed and Add Pre-Feed menus are not shown in the timer control menus of a Relay controlling a Bleed Valve.)There are more details about the Add PreBleed and Add Pre-Feed options in the own explanation sections later in this section.

The first 28-Day Timer submenu lists the 28 days in four "cycle weeks", Sunday-1 through Saturday-1, then Sunday-2 through Saturday-2, and so forth. To use one of the 28 days, the user would go to a day's submenus, set the start time, and since there is no duration to change from zero in this mode, the user needs to select the "Use This Day" menu item to indicate the day is active. The day prompt would then get the "active box" drawn around it. After setting the days they want to use, the user must then highlight "Use Mode Now" way down at the bottom of the list of 28 days and press Enter, to activate the 28-Day Timer control option. The "active box" would be drawn around the 28-Day Timer menu prompt and the control mode category, T&StPt Modes, to indicate they are now in use.

Each of the 28 days, starting with "Sunday-1" and going through "Saturday-4" has the same two submenu items, as shown in Figure 6-32; one to set the start time for that day, and the other to "activate" the day.

00:00 This submenu item shows the time of day, in 24-hour format, that the relay activation would start. For all time of day menus in a Triton controller, 00:00 = begin of Day, 12:00 = Noon, 23:59 = end of Day. Select the "Edit Value" submenu item to change the start time.

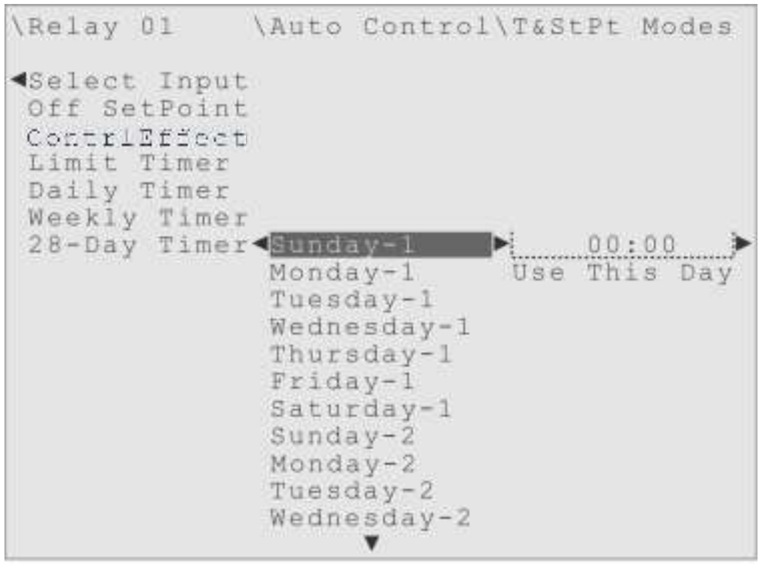


Figure 6-32. The Timer & Set Point, 28-Day Timer, Sunday-1 Menu.

Use This Day: This is the “activator” for the particular day. Since there is no duration that is changed from zero in this mode, the user must highlight the “Use This Day” menu item and press Enter, to indicate the day is in use. The “active box” will be drawn around the day to show it has been selected, but the user must also select the “Use Mode Now” item at the bottom of the list of days, to active the 28-Day Timer control mode.

. . .

Add PreBleed and Add Pre-Feed

The next two control modes in the Timer Start with Set Point Stop category, Add PreBleed and Add Pre-Feed, are not independent control modes. These two "additional" or optional control modes, *add* their features to any of the three previous Timer Start with Set Point Stop modes. The user must be using one of the previous T&StPt Modes, for these modes to have any effect. (In this description, Relay 02 is used as an example of the Pump Relay usage, which has these “add-on” modes available. The Bleed Valve usage does not offer these modes.)

The Add PreBleed mode allows the user to bleed water from the system *before* the normally programmed Timer activation they have set up in one of the previous four modes. This mode can bleed for a preset amount of time, or have a Conductivity Set Point control when the bleed should stop.

The Add Pre-Feed mode allows the user to have another Relay activate *before* the normally programmed Timer activation they have set up in one of the previous Timer Start & Stop Modes. This mode can only pre-feed for a preset amount of time.

These two additional modes cannot be used together, only one can be used at a time, and always have to be used *with* one of the three previous Timer activation modes.

Timer Start with Set Point Stop Modes: Add PreBleed

The Add PreBleed mode allows the user to bleed water from the system *before* the normally programmed Timer activation they have set up in one of the previous three Timer Start with Set Point Stop Modes. They can bleed for a preset amount of time by using the TimerControl menu, or have a Conductivity Set Point control when the bleed should stop by using the SetPtControl menu.

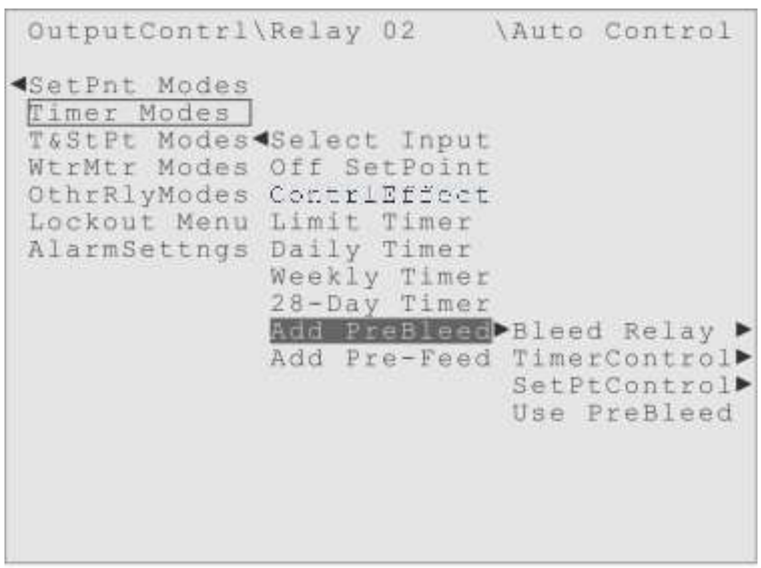


Figure 6-33. The Timer & Set Point, Add PreBleed Menu.

(The Add PreBleed control menu is not seen when the Relay Usage is Bleed Valve control, like Relay 01 being used in these explanations, so Figures 6-33 to 6-35 show an example Control Menu for Relay 02, designated as a Pump Relay.)

Bleed Relay: This submenu is where the user would choose which relay should be activated in order to bleed the system before the normal Timer cycle activation. The user can choose any relay other than one they are controlling with the Timer activation mode, but typically Relay 01 is assigned to control the Bleed Valve.

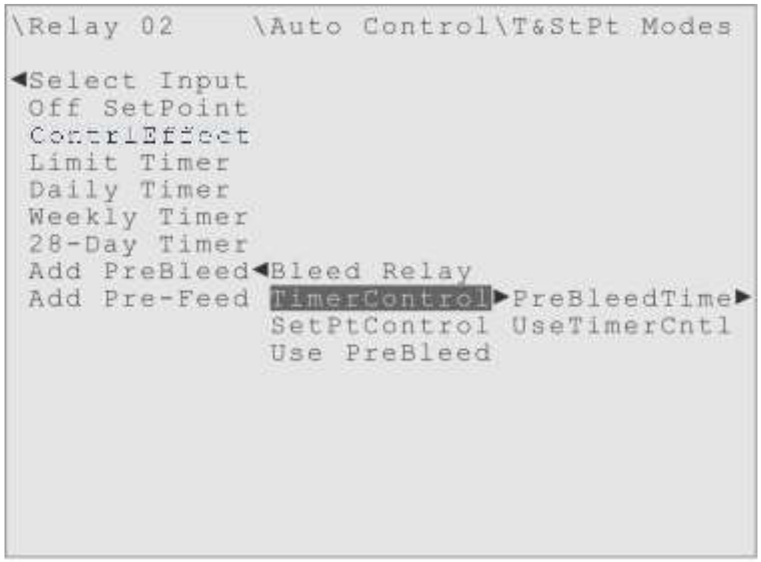


Figure 6-34. The Timer & Set Point, Pre-Bleed, TimerControl Menu.

TimerControl: The Timer Control menu is for setting a pre-bleed for a fixed amount of time. The user would use the PreBleedTime (Pre-Bleed Time) submenu to set how long they want the Bleed to drain, and then highlight the UseTimerCntl menu item press the Enter key to select this deactivation method. After activating TimerControl, the user would also have to activate Add PreBleed by selecting the “Use PreBleed” activator seen in Figure 6-34. The user may have to experiment and try several Bleed times to determine what time is best to use for this setting at a particular installation.

SetPtControl: The Conductivity Set Point Control menu is for using a conductivity measurement to determine when the Pre-Bleed should stop. Use its submenu items to set up the Pre-Bleed control, then highlight the UseSetPtCntl menu item and press the Enter key to activate this feature. A pre-bleed that is being controlled by a Conductivity Set point is different from the Timer Control method in that the Pre-Bleed starts at the time defined for the primary feed, since there is no way to know how long the Set Point controlled bleed will last. The pre-bleed will run until the user defined Conductivity value is reached, then the primary feed will begin.

The three submenu items for the Set Point Control method are:

CndctvtInput (Conductivity Input) is the menu where the user can choose which Input is measuring the system water's conductivity. By default it is set to the first Input listed, which is usually the conductivity sensor, named Conductivty at the factory.

PreBld SetPt (Pre-Bleed Set Point) is where the user would enter the Conductivity value that should *stop* the Bleed drain. This should be significantly lower than any set point established to *start* a Bleed. The user may have to experiment to find the best value for this setting, depending on their goals and the physical situation at a particular installation.

UseSetPtCntl (Use Set Point Control) is the 'activator" for this control option. After making the settings they desire the user must highlight the "UseSetPtCntl" item and press Enter to select this control option. After activating Set Point Control, the user would also have to activate Add PreBleed by selecting the "Use PreBleed" activator seen in Figure 6-35.

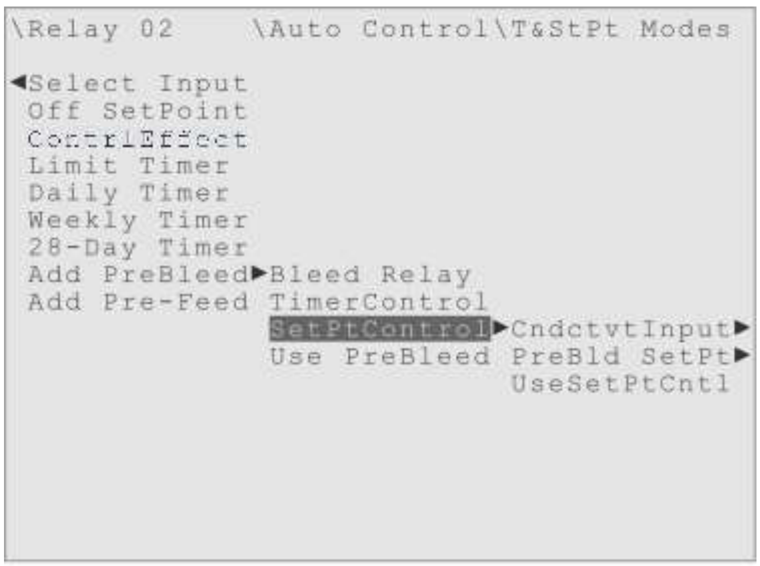


Figure 6-35. The Timer & Set Point, Pre-Bleed, SetPntContrl Menu.

Timer Start with Set Point Stop Modes: Add Pre-Feed

The Add Pre-Feed menu allows the user to activate another relay *before* the relay they are controlling with one of the three previous Timer Start with Set Point Stop modes. The pre-feed relay can only be activated for a fixed amount of time.

This optional mode is typically used to introduce a Dispersant, Penetrant or Surfactant, before the addition of the chemical being controlled by the Timer Start with Set Point Stop control mode. The Add Pre-Feed mode only has three submenu items.

Feed Relay: This submenu is where the user would select which one of the other relays

will be activated before the normal Timer activation. The user can choose any relay other than one they are controlling with the Timer Start & Stop Mode.
To make the selection, simply move the highlight until the appropriate relay is highlighted and then press the Enter key.

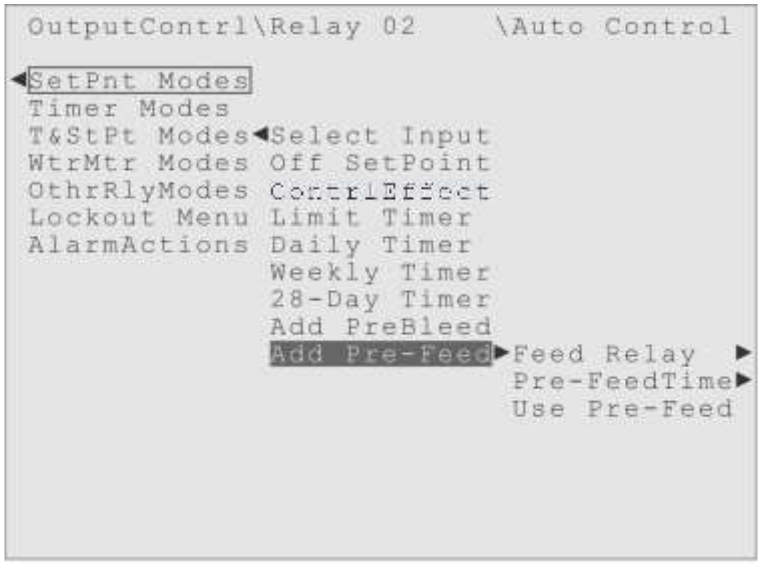


Figure 6-36. The Timer & Set Point, Add Pre-Feed Menu.

Pre-FeedTime: The Pre-Feed Time submenu is where the user can see and adjust the amount of time that the pre-feed relay will remain activated before the regular Timer controlled relay is activated. The user can choose from 0 to 1440 minutes (24 hours) for this feed duration.

The default value for Pre-FeedTime is zero minutes. Setting Pre-FeedTime to a non-zero value will automatically activate the Add Pre-Feed "add-on" mode. To deactivate Add Pre-Feed simply set the Pre-FeedTime value back to zero.

Use Pre-Feed: This is the "activator" for this add-on mode. The user must highlight this menu item and press Enter to activate the Add Pre-Feed feature.

. . .

That's all there is to explain about the Timer Start with Set Point Stop Modes. The next category of control modes is the Water Meter control modes (WtrMtr Modes). The Water Meter control modes activate the Relay based on a volume measurement of the water flowing past a Water Meter, connected to the Triton controller.

Water Meter Control Modes (WtrMtr Modes)

These two control modes activate a Relay based on a measurement of water volume, made by a water meter connected to one of the Digital Inputs.

The Water Meter & Time mode (WatrMtr&Time) uses a Timer setting to control how long the relay stays activated, and is available for relays controlling Bleed Valves or Chemical Pumps.

The Bleed On Make-up mode (BleedOnMakUp) is only available when the Relay Usage designates Bleed Valve control, and there must be two Water Meters connected to the Digital Inputs. This mode activates the Bleed Valve when a user-defined volume of Make-up water has flowed past the Make-up water meter Input, then deactivates when a user-defined volume of Bleed water has flowed past the Bleed water meter Input.

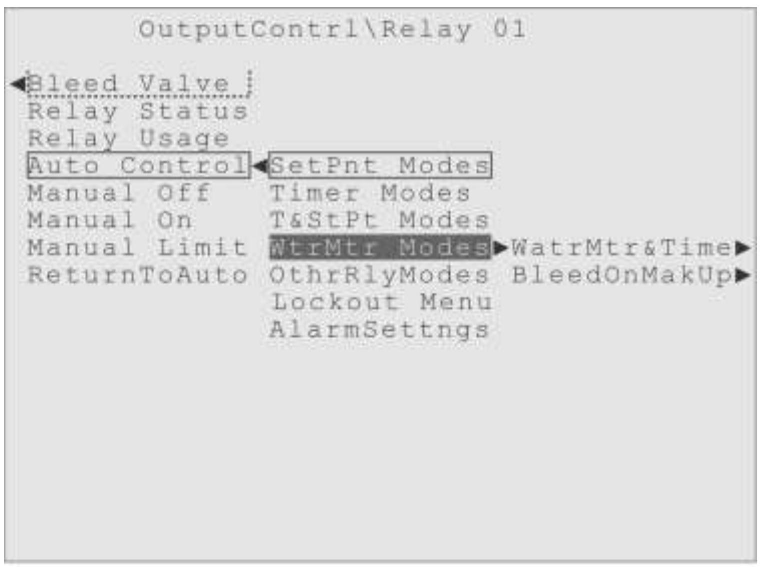


Figure 6-37. The Water Meter Control Mode Category.

Water Meter Modes: WatrMtr&Time (Water Meter & Timer)

This mode activates the relay when the amount of water passing some water meter exceeds a volume setting defined by the user. How long the relay stays activated is controlled by a user-defined Timer setting.

The Measurement menu item, for this mode, displays the current accumulated water volume, for reference. This is only the volume of water that has passed the meter since the last Bleed activation, not a lifetime accumulation. Each time the relay being controlled is activated, the Measurement is reset to zero.

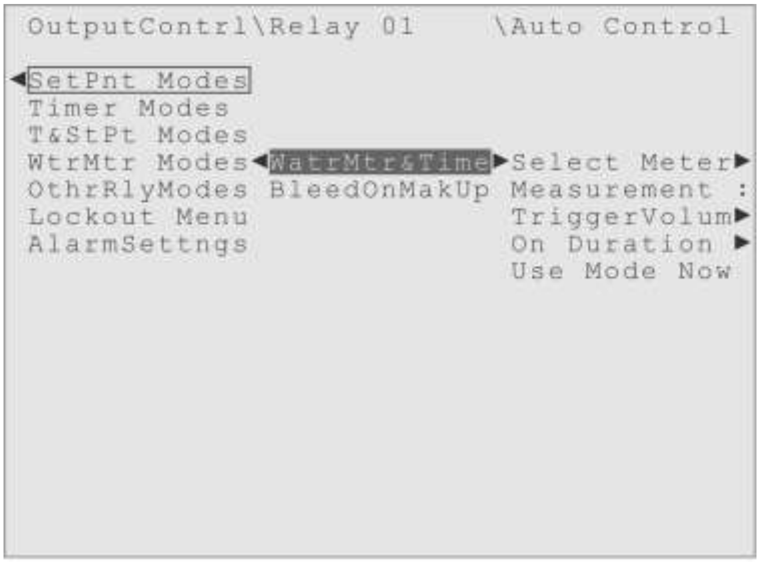


Figure 6-38. The Water Meter & Timer Control Mode.

Select Meter: This submenu displays the currently selected water meter and has a submenu list of connected water meters from which the user can choose. The first item in the list, usually the first Digital Input that is set to a water meter usage, will be selected by default. Both Reed Switch (Dry Contact) and Hall Effect (Paddlewheel) water meters are supported, when connected to one of the Digital Inputs.

Measurement: This submenu displays a "live" measurement of accumulated water volume, as measured by the water meter selected in the first submenu, for reference.
The value displayed is only the volume of water measured by the water meter since the last relay activation, not a lifetime accumulation. When the relay is activated, or a water meter is first selected, this Measurement value is reset to zero.

TriggerVolum (Trigger Volume): This submenu is used to set the volume of water that should cause the relay to activate. The user can specify from 0 to 999,999 gallons.

On Duration: This submenu is where user defines how long the relay should remain activated, once the volume of water has exceeded the trigger volume. The user can specify durations from 1 to 1440 minutes (24 hours). 5 minutes is the default entry.

Use Mode Now: This is the “activator” for this control mode. After adjusting the settings in the previous menus, the user would highlight this menu item and press Enter, to start this control mode. The “active box” would be drawn around this menu item, and the Water Meter Modes category menu item, to indicate which control mode is active.

Water Meter Modes: BleedOnMakUp (Bleed based on Make-up)
This is a very specific water meter control mode. The BleedOnMakUp control mode bleeds a user-defined volume of water from the system, activated by a user-defined volume of Make-up water that has entered the system.

This control mode assumes there are two or more water meters available as inputs, and is only shown in the Water Meter Modes menu when the Relay Usage is set to Bleed Valve control.

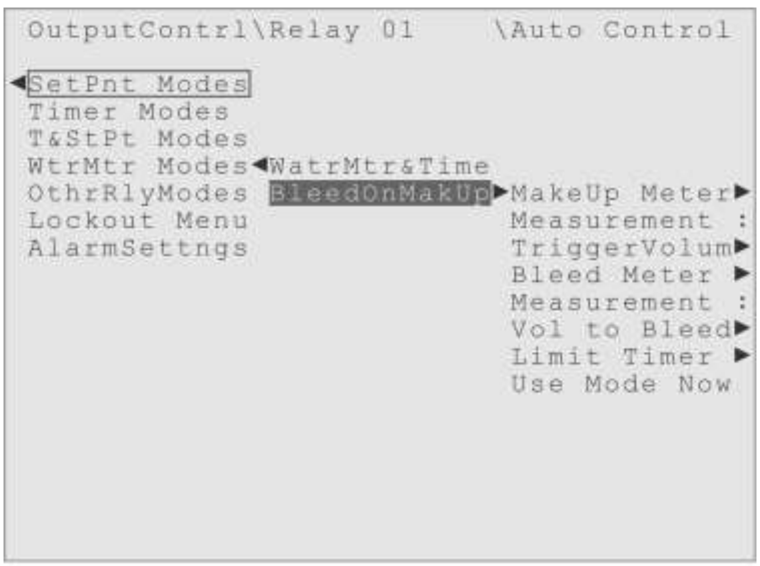


Figure 6-39. The Bleed based on Make-up control mode.

One use for this control mode is to consider the amount of make-up water entering the system as a measurement of evaporation loss, which is raising the TDS, and to use that measurement to define when a Bleed should occur, to lower the TDS.

MakeUp Meter (Make-Up Meter): This menu displays the currently selected Make-up water meter and has a submenu where the user can select which water meter is monitoring the Make-Up water, by highlighting the Input name in a list and pressing the Enter key.

There is also a handy "Go To Set-up" shortcut will take the user directly to the Input

Set-up menu of the Input selected. Just highlight and press Enter!

Measurement: This menu item is a live display of the volume measurement from the Input selected as the Make-Up Meter. This accumulation value is reset to zero each time this control mode activates the Bleed Valve, so it is not a lifetime Make-Up volume.

The displayed value can serve as an indication of how soon the next Bleed activation will be, comparing this live measurement to the Trigger Volume.

TriggerVolum (Trigger Volume): This menu is where the user defines what volume of Make-up water should cause the relay to activate, in gallons. The user can specify from 1 to 999,999 gallons.

Bleed Meter: This menu displays the currently selected Bleed water meter and has a submenu where the user can select which water meter is monitoring the Bleed water, by highlighting the Input name in a list and pressing the Enter key.

There is also a handy "Go To Set-up" shortcut will take the user directly to the Input Set-up menu of the Input selected. Just highlight and press Enter!

Measurement: Another input value display, this time a live display of the Bleed Water Meter volume measurement. This accumulation value is reset to zero each time this control mode activates the Bleed Valve.

NOTE: This can be a very useful measurement, but it is easy to misunderstand. The displayed value is reset to zero at the *beginning* of each Bleed activated by this mode. The value should then increase until it matches the "Volume to Bleed" setting, and then stop as the Bleed Valve is deactivated.

But this display of the Bleed Meter measurement is "live" and if the Bleed Valve is activated by some other process, the measurement may increase well beyond the "Volume to Bleed" setting.

This can be a useful indication that "other Bleeds" are occurring, if this measurement significantly exceeds the "Volume to Bleed" setting below.

Vol To Bleed (Volume To Bleed): This menu is where the user defines what volume of water to Bleed out of the system, in gallons. The user can specify from 1 to 999,999 gallons.

Limit Timer (Activation Limit Timer): The Limit Timer menu in the BleedOnMakUp control mode is just like every other activation time limit menu, a setting to take control of the relay if the normal deactivation does not occur. The factory default time limit is 90 minutes. If this time limit is exceeded, the "OvrTimeLimit" Alarm condition occurs, and the relay activates or deactivates depending on its RlayReaction setting in the Alarms Actions menu. When the cause of the problem is resolved, the user can go to the ActiveAlarms menu (explained in the Active Alarms chapter of this manual) and use the "Clear Alarm" to restore normal operation. The relay will not operate normally until the Alarm is cleared.

Use Mode Now: This is the "activator" for the control mode. After adjusting the settings in the previous menus, the user would highlight this menu item and press Enter, to start using this control mode. The "active box" would be drawn around this menu item, and the Water Meter Modes category menu item, to indicate which control mode is active.

. . .

That's all there is to explain about the Water Meter control modes (WtrMtr Modes). The next category of control modes is the Other Relay control modes, where the activation of some *other* relay activates the relay under control.

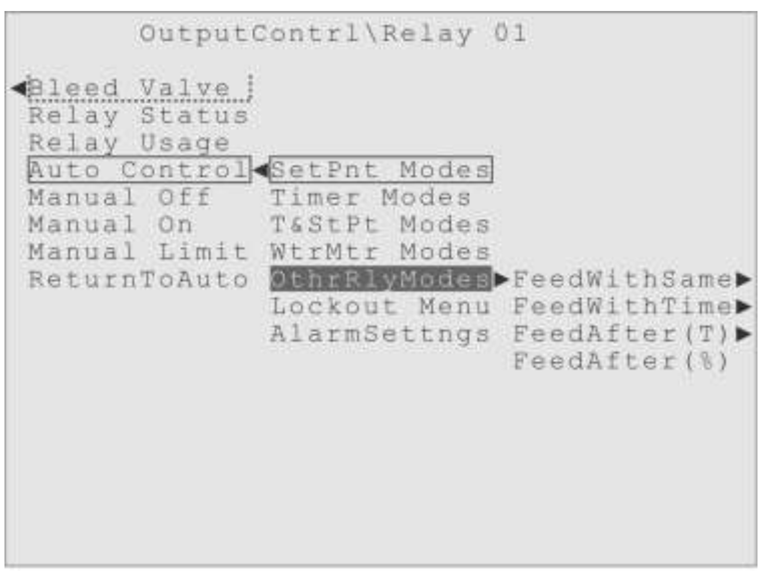


Figure 6-40. The Other Relay Control Mode Category.

Other Relay Control Mode Category (OthrRlyModes)

These four very simple control modes use the activation of some other relay as the signal to activate this relay (the relay being controlled by this control mode).

FeedWithSame - Both relays activate and deactivate together, at the same time.
FeedWithTime - This relay activates when the "other" relay activates, with an optional delay, but stays activated for a user-defined time duration.
FeedAfter(T) - This relay activates after the "other" relay deactivates, with an optional delay, and stays activated for a user-defined, fixed time duration.
FeedAfter(%) - This relay activates after the "other" relay deactivates, with an optional delay, and stays activated for a user-defined percentage of the other relay's activation time.

Notice the FeedWithTime and both of the FeedAfter… modes have an optional "Additional Delay" setting, to delay the activation for a user-defined time beyond the "other" relay's activation or deactivation.

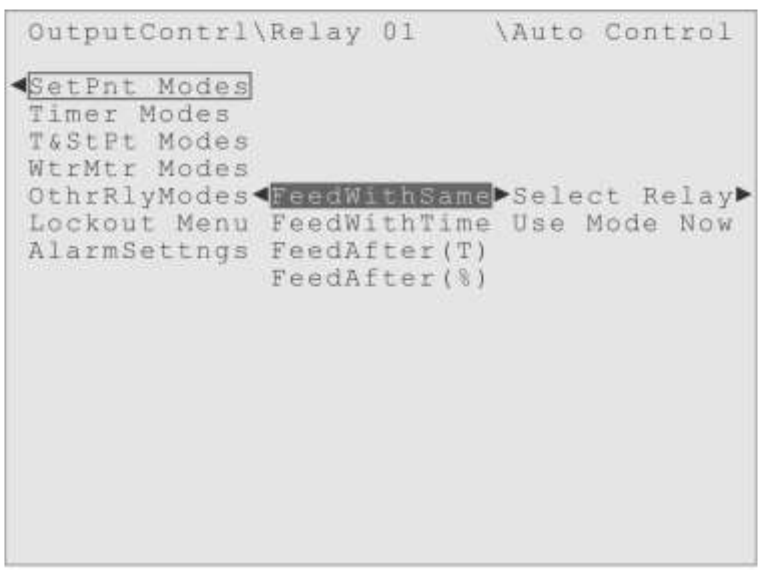


Figure 6-41. The "Feed With Other Relay - Same" Control Mode.

Other Relay Modes: FeedWithSame (Feed With Other Relay - Same)

When this mode is employed, the two relays activate and deactivate together.

Select Relay: This submenu is where the user selects which relay is the "other" relay. The default selection will be the relay with the lowest identifier number that is not the relay being controlled.

Use Mode Now: This is the “activator” for the FeedWithSame control mode. After selecting the “other” relay, the user would highlight this menu item and press Enter, to start using this mode.

Other Relay Modes: FeedWithTime (Feed With Other Relay - Timed)

In this mode, the relay being controlled can activate at the same time as the “other” relay, or after a user–defined delay. Then it stays activated for a user-defined time duration. There are four submenus for this control mode.

Select Relay: In this submenu, the user selects which relay is the "other" relay. The default selection will be the relay with the lowest identifier number that is not the relay being controlled.

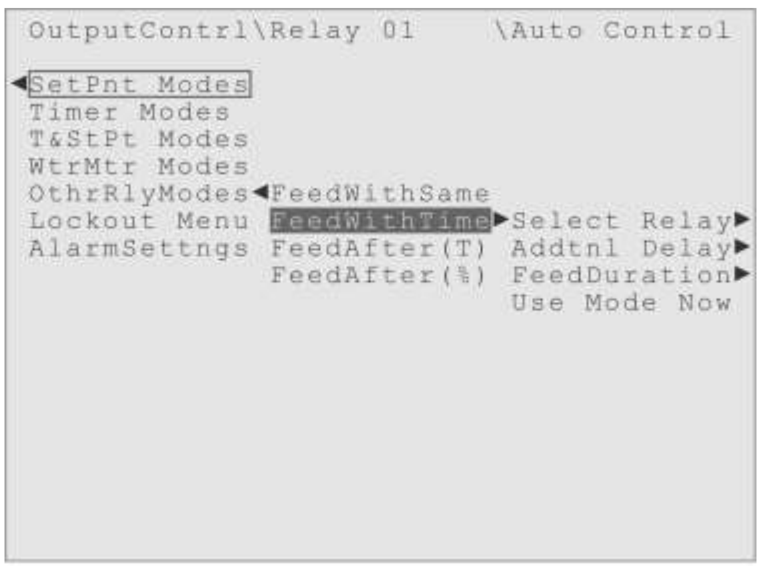


Figure 6-42. The "Feed With Other Relay - Timed" Control Mode.

Addtnl Delay (Additional Delay): This submenu allows the user to specify an amount of time that will delay the activation of this relay beyond the activation of the other relay. The range is 0 to 1440 minutes, with the default at zero minutes.

FeedDuration (Feed Duration): Here the user simply sets the amount of time this relay should stay activated. The range is 0 to 1440 minutes (1440 minutes = 24 hours), with zero as the default.

Use Mode Now: This is the “activator” for the FeedWithSame control mode. After selecting the “other” relay, the user would highlight this menu item and press Enter, to start using this mode.

Other Relay Modes: FeedAfter(T) (Feed After Other Relay - Timed)

In this mode the relay being controlled will run *after* another relay *deactivates*. Then it stays activated for a user-defined time. There are four submenus for this control mode.

After Relay: In this submenu the user selects which relay is the "other" relay. The default selection will be the relay with the lowest identifier number that is not the relay being controlled.

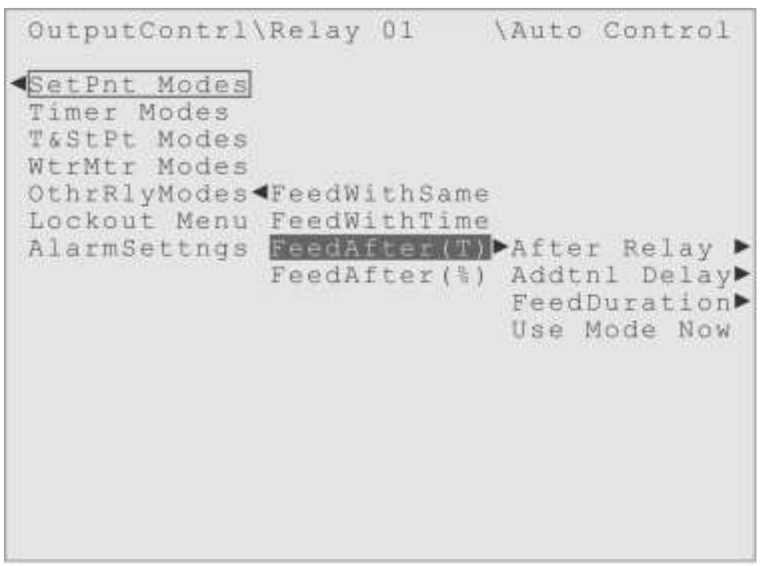


Figure 6-42. The "Feed After Other Relay - Timed" Control Mode.

Addtnl Delay (Additional Delay): This submenu allows the user to specify an additional amount of time that will delay the activation of this relay beyond the deactivation of the other relay. The range is 0 to 1440 minutes, with a default of zero.

FeedDuration (Feed Duration): Here the user simply sets the amount of time this relay should stay activated. The range is 0 to 1440 minutes, with zero as the default.

Use Mode Now: This is the “activator” for the FeedWithSame control mode. After selecting the “other” relay, the user would highlight this menu item and press Enter, to start using this mode.

Other Relay Modes: FeedAfter(%) (Feed After Other Relay - Percentage)
This is very similar to the previous mode, the relay being controlled will run *after* another relay *deactivates,* except here the controlled relay is activated for a percentage of the time the other relay was activated for. There are four submenu items for this control mode.

After Relay: In this submenu the user selects which relay is the "other" relay. The default selection will be the relay with the lowest identifier number that is not the relay being controlled.

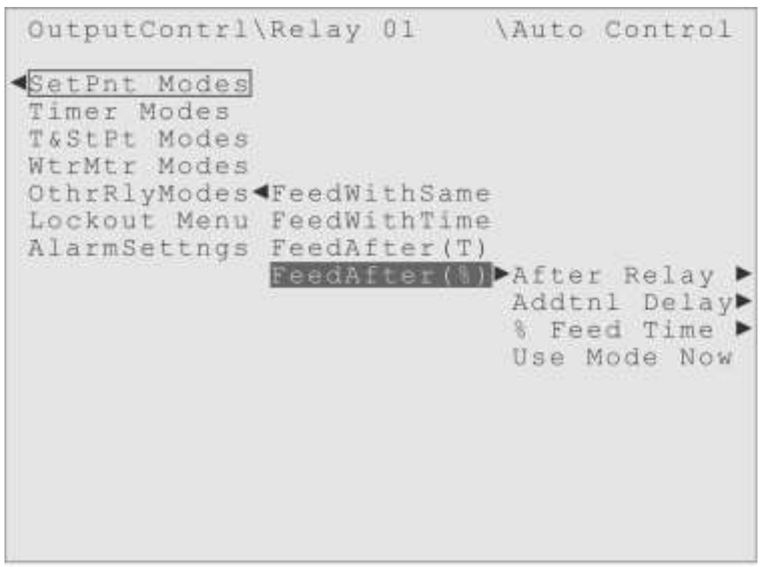


Figure 6-43. The "Feed After Other Relay - Percentage" Control Mode.

Addtnl Delay (Additional Delay): This submenu allows the user to specify an additional amount of time, which will delay the activation of this relay beyond the deactivation of the other relay. The range is 0 to 1440 minutes, with a default of zero.

% Feed Time (Percent of Other Relay's On Time to Feed). This menu is where the user sets the percentage of the first relay's activation time, for which the relay being controlled will be activated. The range is from 0 to 100%, with a default value of 0%.

Use Mode Now: This is the “activator” for the FeedWithSame control mode. After selecting the “other” relay, the user would highlight this menu item and press Enter, to start using this mode.

. . .

That was the last explanation of the individual control modes. The next menu item in the Auto Control menu for Bleed Valve or Chemical Pump Output is the Lockout menu.

Lockout Menu

After the Auto Control menu, the next item in the Output Control menu for a Relay controlling a Bleed Valve or Chemical Pump is the **Lockout Menu**. Only Relays set to the Bleed Valve and Pump Relay Usage will be listed in the Lockout menu, but not the Relay this menu is under. Relays whose Usage is “Alarm Relay” or "Not In Use" are not shown in a Lockout menu.

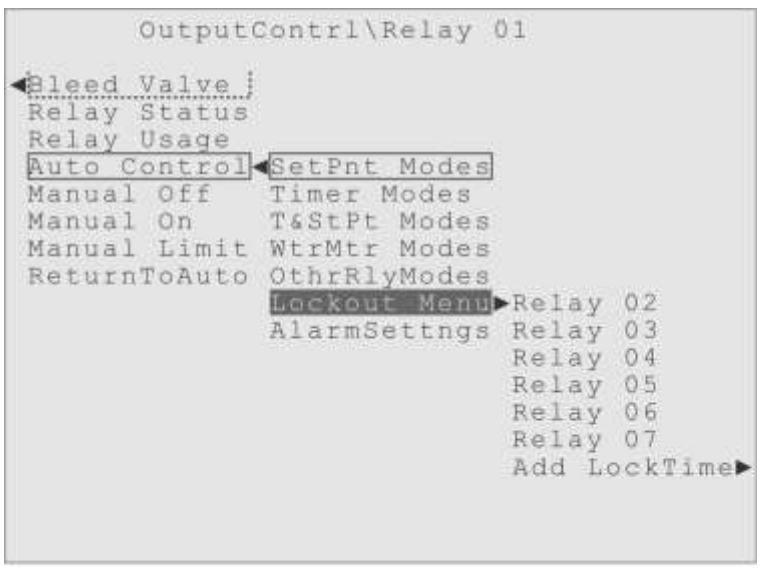


Figure 6-44. The Relay 01, Lockout Menu.

Lockouts - Why and When?

The idea of a Lockout is to prevent some other relay, or relays, from activating while this relay is active.

Say, for example, there is a biocide addition scheduled for 13:00 every day, which has to remain in the water for 2 hours to be effective. But at 12:55 on a particular day, the TDS increases to the point where the Conductivity measurement passes the Set Point to open the Bleed valve. It would be a waste of money, and chemical, to introduce the biocide while the Bleed valve is draining water out of the system.

A Lockout could be set to prevent that problem. The Lockout would be set in the Lockout Menu of the Bleed Valve relay, by highlighting the name of the Biocide relay and pressing the Enter key. The user is declaring, "That Biocide relay is in Lockout, anytime the Bleed Valve relay is activated."

To continue this example, say that once the biocide has been introduced, it needs to stay in the system for two hours. What if during that time, some sensor measurement would activate the Bleed Valve relay? The biocide would be drained from the system before it had time to do its job.

One solution could be another Lockout. This time the Lockout would be set in the Lockout Menu of the Biocide relay, on the Bleed Valve, with an Additional Delay of two hours. The user is declaring, "The Bleed Valve Relay is in Lockout, anytime this Biocide Relay is activated, and for two hours after it deactivates."

Any activation that is prevented from occurring by a Lockout is simply postponed until the Lockout ends, and any programmed additional delay expires. Then the activation that was locked out will begin. If more than one activation was postponed, they will activate in the order they were postponed, the first locked out activation starting first and so forth.

(Even though the Lockout is easy to use, there may be instances where the Other Relay control modes, or the Timer Mode options for Pre-Bleed and Pre-Feed, will serve the user's needs more effectively.)

The Lockout menu is a list every Relay with the Bleed Valve or Pump Relay Usage, except for the Relay whose Auto Control menu the Lockout menu is in. To set a Lockout on one of the listed Relays, the user simply highlights the Relay name and presses the Enter key. The active box will be drawn around the name to indicate it has been selected.

At the end of the list of relays, there is one more submenu:

Add LockTime (Additional Lockout Time): In this menu, the user can set from 0 to

1440 minutes of additional lockout time. The default value is zero minutes. Normally, the relay activation postponed by a Lockout will begin as soon as the relay that set the Lockout deactivates. If the user needs to delay the locked-out activation beyond that point, they should set their desired additional delay time in this menu.

Output Alarms

AlarmSettngs: The last item in the Auto Control menu, for both the Bleed Valve and Pump Relay Usage, is the Alarm Settings menu.

The settings in this menu, and its submenus, define what happens if an Output Alarm occurs. Most alarms are associated with the Input sensors, a High Alarm, Low Alarm and so forth. The Input Alarm settings are described and explained in the Input Set-up and Calibration menu, explained later in this manual.

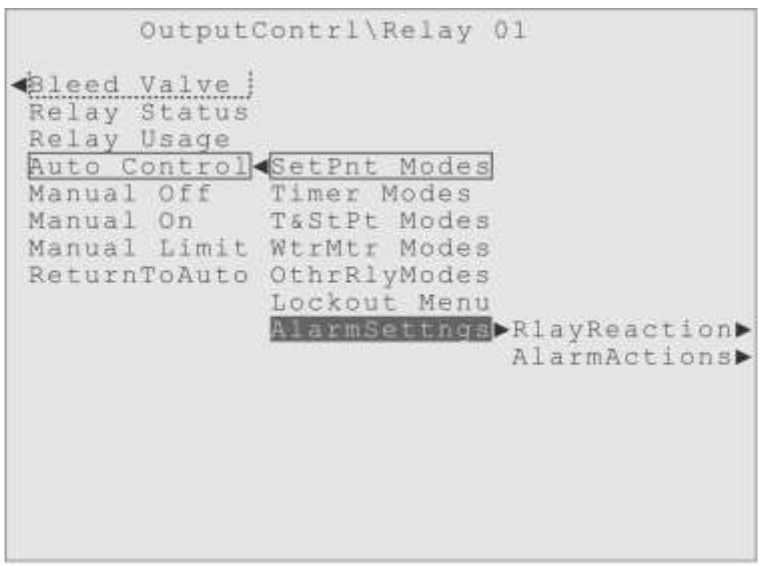


Figure 6-46. The Relay 01, Alarm Settings Menu.

There are two possible Output Alarms, with corresponding Status Displays, but they both use the same Alarm Settings. If a relay stays activated longer than its Activation Limit Timer (Limit Timer), then the relays goes into an alarm condition and the status changes to “OvrTimeLimit”. If the relay is being controller by an Input device, and that Input develops a “Sensor Error”, the relay goes into an alarm condition and the status changes to “Input Error”. Both of these alarms use the same Alarm Settings.

The Alarm Settings menu (AlarmSettngs) for Outputs has two sections.

RlayReaction: The "Relay Reaction" menu is where the user defines what "this" relay does when either of the alarms occurs. The two choices are:

1) **Force Off**: Have the relay deactivated and "locked" so it cannot be re-activated until the alarm is cleared.
2) **Force Active**: Have the relay activated and "locked" so it cannot be deactivated until the alarm is cleared.

For example, if a Pump Relay goes into alarm, its default Relay Reaction is forced deactivation (Force Off).

AlarmActions: The "Alarm Actions" is where the user defines what happens to the other relays when either of the alarms occurs, along with some other alarm associated actions like turning on the Alarm Lamp on the front panel of the enclosure. The user can turn on other relays (Alarm Relays are selected automatically for this choice), or they can "Lockout" other relays so they cannot be activated until the alarm is cleared. For example, if a relay controlling a Bleed Valve goes into alarm, by default it puts a Lockout on all Pump Relays, until the alarm is cleared.

The entire Output Alarm Settings menu structure is presented below in an outline form:

	(Menu Abbreviation)
Alarm Settings	(AlarmActions)
This Relay's Reaction	(RlayReaction)
Forced Deactivation	(Force Off)
Forced Activation	(Force Active)
Alarm Actions	(AlarmActions)
No Alarm Action	(No AlarmActn)
Alarm Lamp	(Alarm Lamp)
Turn a Relay On	(TurnRelay On)
Lockout a Relay	(AlarmLockout)
Send Alarm Emails	(Send Email)

Reasonable default alarm actions are pre-set at the factory by Hydro Systems, but the user needs to understand the Triton Output Alarm system so they can review the settings and make any adjustments appropriate for their installation.

RlayReaction (This Relay's Reaction): This menu allows the user to specify the "reaction" of this relay if an alarm occurs. There are two choices:

Force Off: This relay will be forced to deactivate, and stay deactivated until the alarm is cleared.

Force Active: This relay will be forced to activate, and stay activated until the alarm is cleared.

AlarmActions (Alarm Actions) This menu allows the user to specify what "alarm actions" should take place if an alarm occurs. There are several options:

No AlarmActn: (No Alarm Action): Take no additional action, do nothing other than the Relay Reaction defined. All Alarms are logged in the System Activity Log, even if no alarm actions are specified. Selecting this item automatically deselects or "turns off" all the other Alarm Actions listed below.

Alarm Lamp: The bright red lamp on the front panel of the controller be can turned on, flashing or constantly, or it can be left turned off.

TurnRelay On: Allows the user to activate other relays if an alarm occurs. Any Alarm Relay is pre-selected by default.

AlarmLockout: Allows the user to Lockout other relays if an alarm occurs.

Send Email: (Send Alarm Email): If "active", alarm emails will be sent over the IP network, using the addresses from the Network Configuration menu.

The Send Email action requires the controller be connected to an internal network or the Internet, or have an optional Cell Modem installed, respectively. The action won't do anything useful until email addresses have been entered into their appropriate menus, in the Communications Settings submenu (CommSettings) of the Network Configuration (NetwrkConfig) menu.

What happens when an Alarm occurs?

Sensible default Alarm settings are pre-programmed into the Triton controller, but like in the Auto Control menu, the default settings depend on the Relay Usage selected.

For example, the default Relay Reaction of a relay set to Bleed Valve control is to *activate* on an Alarm, while the default Relay Reaction of a relay set to Chemical Pump control is to *deactivate* on an Alarm. A relay assigned to the Alarm Relay Usage will be pre-selected in the "Turn Relay On" menus for all Alarms.

It is very important for the user of a Triton controller to examine the Alarm Settings menus for all the Outputs they are using, to see if they want to use the default settings or change them to behaviors they prefer.

4-20 mA Analog General Purpose Outputs

Besides the high-capacity electro-mechanical Relays, the Triton controller has one more kind of controllable Output, the analog 4-20 milliamp (mA) outputs on the optional 4-20mA Output Boards.

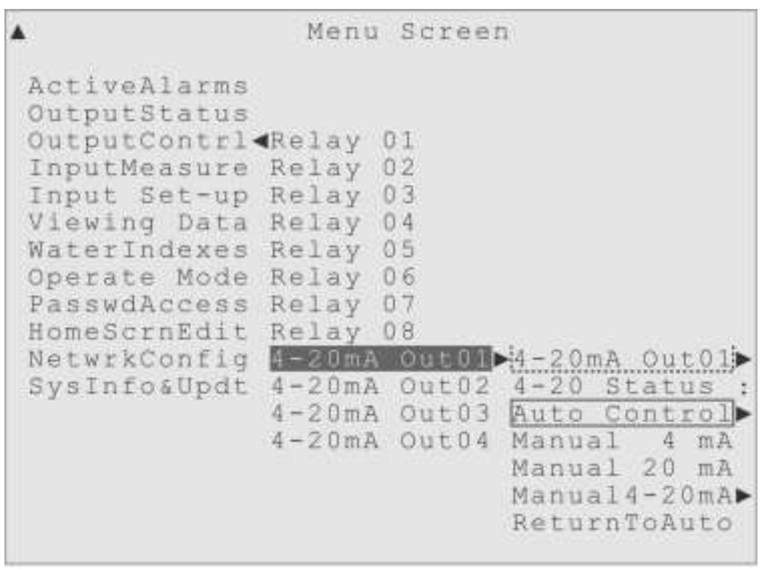


Figure 6-49. Highlight on Output Control, 4-20mA Out01.

These outputs are typically used to indicate the status of one of the inputs, by varying its electrical current output from 4 to 20 milliamps to reflect the status of the input.

Although manual controls are available for testing and calibration, the default use is to have this output ‘track’ the status of an input like the conductivity sensor, where (by default) the lowest conductivity value would be represented by the 4mA current level and the highest conductivity value would be represented by the 20mA current. (The user can change these default mappings, as explained below.)

Figure 6-49 shows the highlight on the first 4-20 mA output listed in the Output Control menu, with its submenus to the right: custom name, status display, automatic and manual controls.

(**Custom Name**)
4-20 Status (4-20mA Output Status)
Auto Control
Manual 4 mA
Manual 20 mA
Manual4-20mA
ReturnToAuto

(Custom Name): This menu displays the custom name for the 4-20mA output, and has a submenu "Set New Name" to the right. Any custom name takes the place of the "4-20mA Out01" name everywhere *except* the first submenu of the OutputContrl menu, which always lists the outputs in their numerical order, with their numerical names.

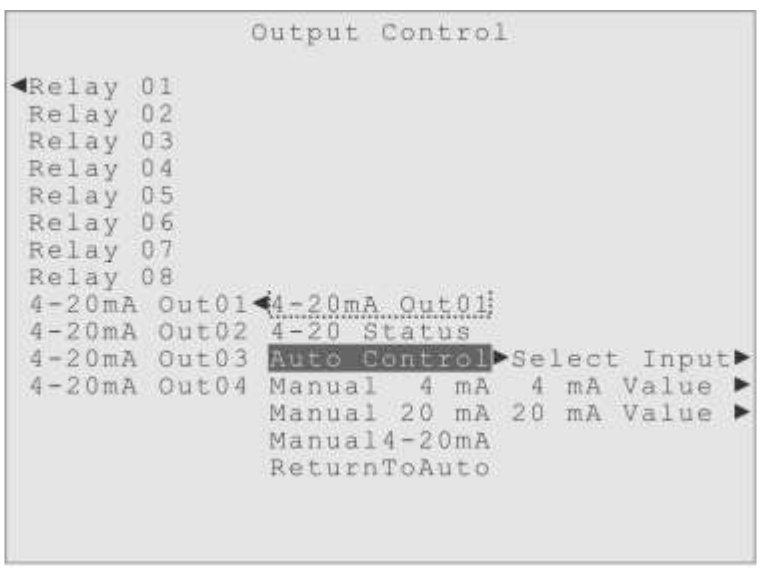


Figure 6-50. Highlight on the 4-20mA Output Auto Control Menu.

4-20 Status: The "4-20 mA Output Status" menu displays either a live display of the milliamp output, or the “Input Error” status, which indicates the Input being tracked is having some problem. The 4-20 mA Output does not go “into alarm” if the Input being tracking has an error, but the Status changes so the user can see there is a problem with the Input. In fact, there are no error conditions for a 4-20 mA Output, they just “keep on tracking”.

Auto Control: This is where the automatic tracking control settings will be found. This is the typical, and default, usage for a 4-20 mA output, where the changes in the 4-20 mA current 'mirror' or track the performance or measurements of some other device. The user can simply select the input they want tracked, and the controller will automatically map the full measurement range of the input to the 4-20 mA Output range. The user can change these mappings using the 4 mA Value and 20 mA Value menus.

This type of output is often used this way so the information can be recorded by an external recorder, like a chart recorder or data logger, or be sent to a Building Maintenance System or some other performance auditing system.

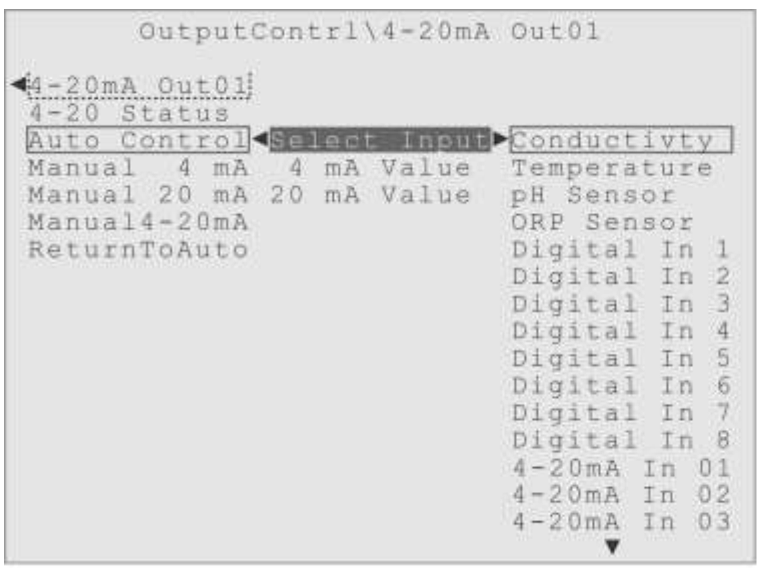
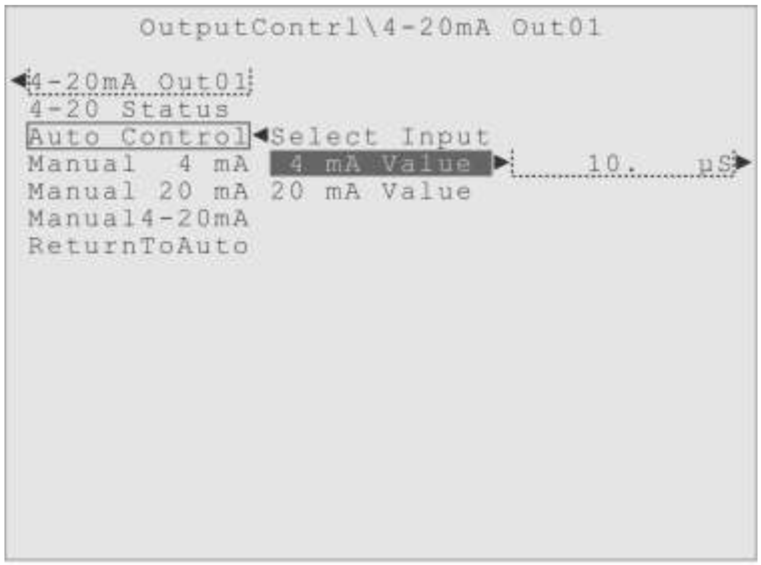


Figure 6-51. 4-20mA Out01, Auto Control, Select Input menu.

The 4-20 mA Output Auto Control Menu is shown in Figure 6-50. There are three submenu items:

Select Input: This menu is where the user selects which Input they want the 4-20 mA output to follow. Just move the highlight to the Input desired and press Enter to select it. As always, shown in Figure 6-51, the first Input listed is the default selection and there is a handy “Go To Set-up” shortcut item at the end of the list, that can take the user directly to the setup menu for the selected Input, for their convenience.

4 mA Value: This menu, shown in Figure 6-52, is where the user can change the input value that will correspond to the 4 mA output level. This would be the lowest normal value for the input, by default



. Figure 6-52. The Auto Control, 4 mA Value menu, for 4-20mA Out01.

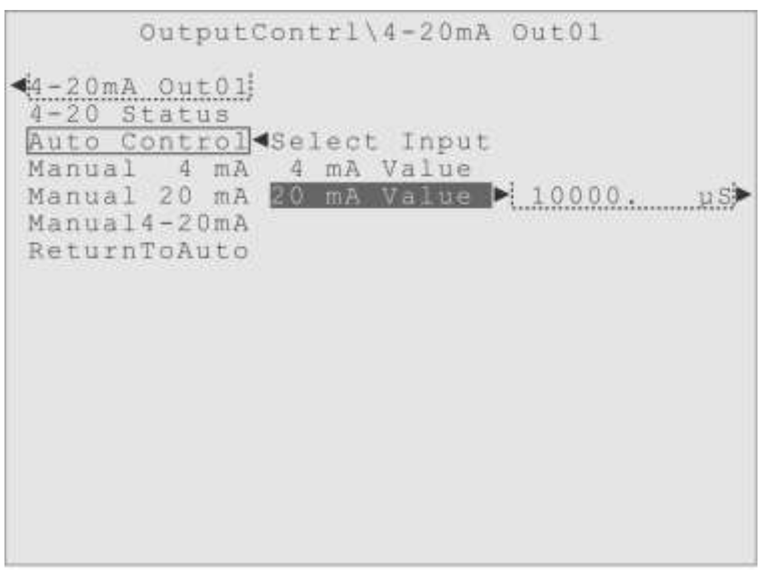


Figure 6-53. The Auto Control, 20 mA Value menu, for 4-20mA Out01.

20 mA Value: Correspondingly, this menu is where the user can change the input value that will correspond to the 20mA output level. By default, this would be the highest normal value for the input selected.

Current Loop Calibration or 4-20 mA Loop Calibration: The manual controls can be useful whenever the receiving device needs to be calibrated to the 4-20 mA signals coming from the controller. This is often called a "Current Loop Calibration" or "4-20 mA Loop Calibration", and the manual controls allow the user to calibrate an external device to the controller's output.

Manual 4mA: This item adjusts the output to precisely 4 mA of electrical current. The user just highlights this item and presses Enter, and the "active box" will appear around the item, and 4 mA of current will be output.

Manual 20mA: Works the same way, but adjusting the output amperage to precisely 20 mA when selected.

Manual4-20mA: This menu item allows the user to set the output to any amperage from 4.0 to 20.0 mA. When the desired output level is set in the submenu, which is set to 12 mA by default, the user can highlight the Manual4-20mA menu prompt and press the Enter key to match the output amperage to the setting value. The setting value can also be changed while this control is active.

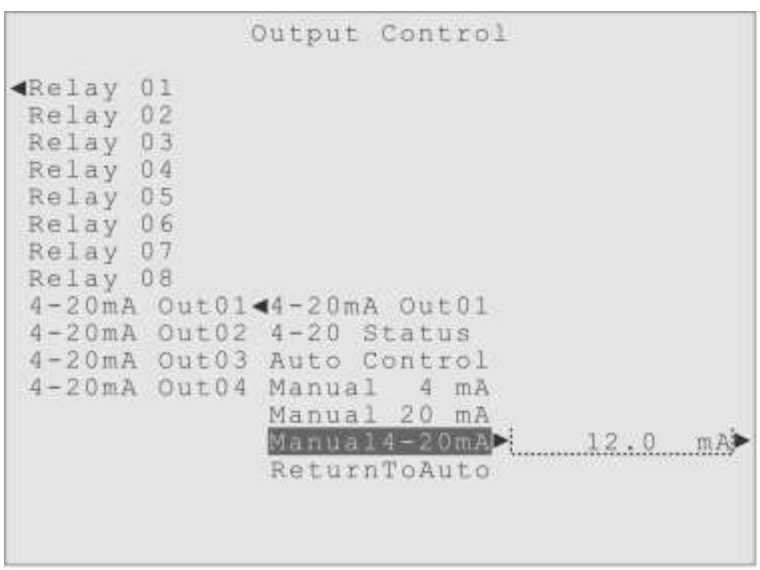


Figure 6-54. 4-20mA Out01, Manual4-20mA menu, showing setting sub-menu.

ReturnToAuto: This menu item is a how the user can return to the normal 'tracking' function for the 4-20 mA Output, after using one of the manual controls. Just highlight the ReturnToAuto menu item and press the Enter key, and the Active Box will be drawn around the Auto Control menu item, to show that automatic control has been restored.

7 Active Alarms

Overview

The Triton water treatment controller has various "Alarm conditions", to indicate problems with the water treatment system.

The Alarm conditions are set-up in the Input Set-up and Output Control menus. For Inputs the user can control what will cause an alarm, and for Inputs and Outputs the user can define what will happen if an alarm occurs. Refer to the sections in this manual named "Input Set-up and Calibration" and "Output Control" for the details of setting the Alarm values and the Alarm Actions.

ActiveAlarms

If an Alarm occurs, the ActiveAlarms menu is the place to go. The easiest way is simply to press the Alarm key on the front panel. That will move the front panel display to the Active Alarms menu, as shown in Figure 7-2, in one easy step!

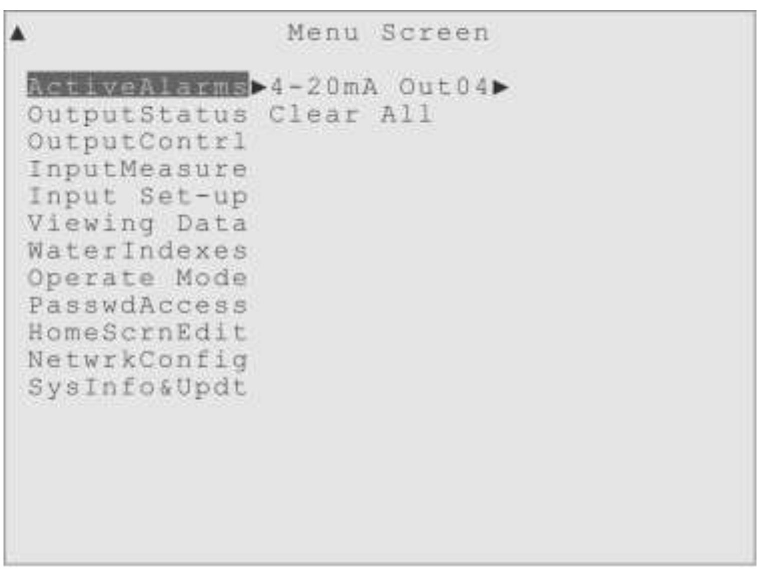


Figure 7-1. Highlight on ActiveAlarms (with Alarm example shown) and the Alarm key.

The submenu to the right of the Active Alarms menu item will display either:

1) A list of Outputs or Inputs that are in Alarm, followed by the "Clear All" item.
2) The text "No Alarms".

In Figure 7-1, an Alarm associated with the fourth of the 4-20 mA Outputs is displayed as an example.

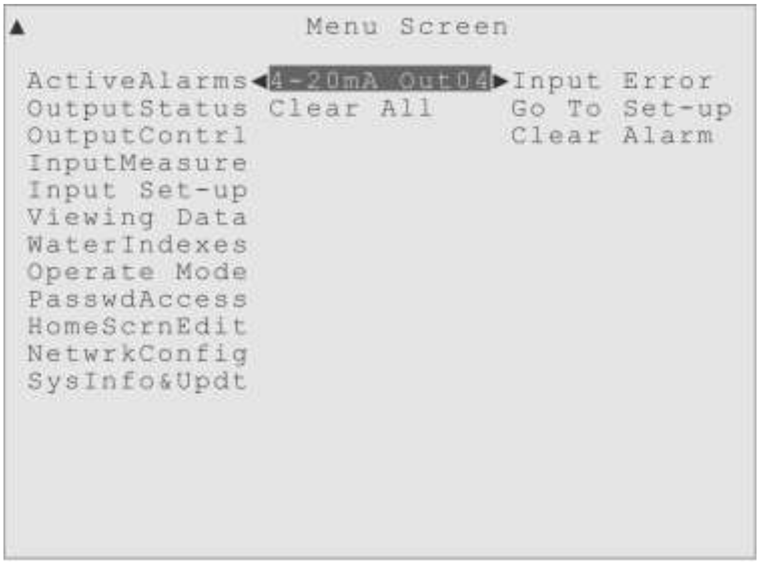


Figure 7-2. Highlight on a device in Alarm, showing the sub-menus.

Highlighting an individual Alarm, in the list of alarms, will display the submenus shown in Figure 7-2. This is also where the “direct access” Alarm key moves to.

Status: The Status of the Output or Input, which may help define the type of Alarm.

Measurement: If an Input is in Alarm, its current measurement is displayed next. (Figure 7-2 shows an Output in Alarm, which do not have the Measurement item.)

Go To Set-up: This shortcut item will take the user directly to the Input Set-up or Output Control menu for the device in alarm, so the user can inspect or change its control or alarm settings. Just highlight and press Enter.

Clear Alarm: A menu item that allows the user to "clear" this individual alarm condition, without affecting other Alarms. There is also a Clear All item in the preceding menu if the user wanted to clear all the active alarms at once.

Every occurrence of any Alarm condition is logged in the System Activity Log, and can be viewed on the front panel display. It may be easier to interpret the System Activity Log when it is downloaded, either to a USB "Data Stick" and transferred to a computer, or directly to a computer. Each Input and Output also has their own Data Log, wherein the status or measurement value is recorded periodically. These informational records can be a great help in producing reports and diagnosing problems, and provide a valuable record of the system's activities and performance.

Clearing Alarms
When an Alarm condition occurs, the Input or Output associated with the Alarm is typically affected in some way. Relays may be forced to activate or deactivate, Input Alarms will affect any output that is using the Input sensor measurements for control.

Normal operation of the controller cannot resume until the problem causing the alarm is taken care of, and the Alarm is "cleared", either “auto cleared” by the controller, or by the user using an individual **Clear Alarm** menu item or the **Clear All** item in the Active Alarms menu. If the value causing a High or Low Alarm returns to the normal range on its own, the associated alarm will “auto clear”, and Alarm emails and phone calls will be sent to notify that the “Auto Clear” as occurred. Relay “OvrTimeLimit” alarms do not ‘auto clear”, and must be manually cleared by the user.

Notice the first step is to fix whatever problem is causing the alarm! The problem should be resolved *before* the alarm condition is "cleared" from the controller. If the situation that caused the alarm is still present when the alarm is cleared, the alarm will just reoccur.

In some situations, like a malfunctioning Input sensor, the alarm will reoccur immediately (there may be some small delay before the controller notices), but there will be other situations where the alarm will not reoccur until sometime later, when an Output activation is attempted, for example.

In any case, the user should find and resolve the problem that caused the alarm, before clearing the alarm condition at the controller.

“Turn off that bell!”
If the controller has a relay designated as an Alarm Relay, that relay is normally activated by any alarm, by default. It is intended to control some external alarm indicator, like a strobe light or alarm bell. If the alarm cannot be resolved quickly, and the user wants to deactivate the external alarm indicator, they can simply go to the Control Menu for the Alarm Relay, highlight the “Relay Off” menu item and press Enter. This does not “clear” the alarm, but it will deactivate the external alarm indicator. Since “Relay Off” is the normal default for an Alarm Relay, this deactivation is safe, in that any subsequent alarm condition will again activate the Alarm Relay.

8 Input Set-up and Calibration

Overview

The Inputs to the Triton water treatment controller are the electronic signals from the outside world, which the controller monitors to make its decisions about activating relays or setting off alarms. They also provide information about the water's condition.

Some of the incoming signals are very precise and continuously changing, like the measurements provided by the Conductivity, Temperature and pH sensors, but other signals are much simpler, like the "on-off" signals from a simple Flow Switch, or the pulses coming from a Reed Switch Water Meter.

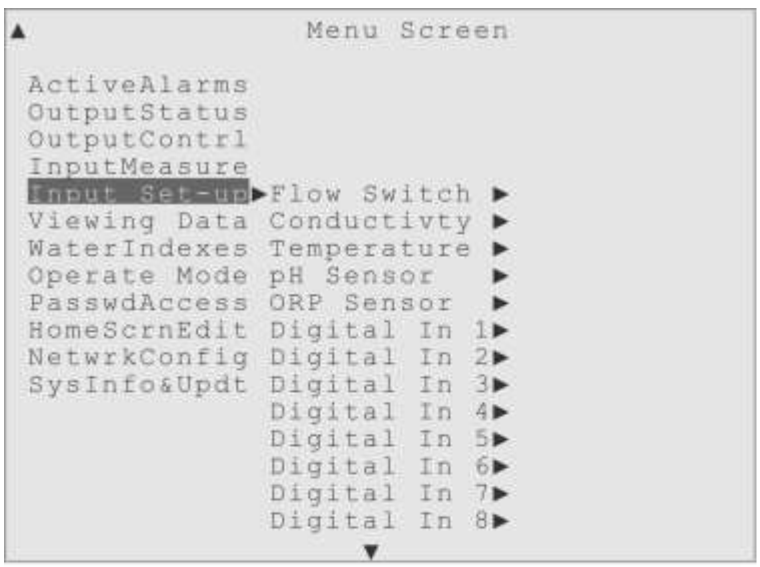


Figure 8-1. Highlight on Input Set-up, showing the list of Inputs.

The Triton controller could be used just to observe or monitor these Input signals and have the measurements stored in the Data Logs, without using the signals to control anything. But it's more likely the user will employ the information provided to make output control decisions, and set off alarms.

The Temperature sensor is an example of an Input that is *not* often used to control an output, yet the user can easily set High or Low Alarms for its measurements, in case the water temperature becomes too extreme.

Other Inputs, like the Conductivity sensor, often have their measurements involved in control decisions, like having the Relay controlling the Bleed Valve activate if the Conductivity measurement goes beyond a user-defined Set Point value.

If a user looks at the Auto Control modes explained in the Output Control chapter, earlier in this manual, it can be seen that some control modes use an Input sensor's measurements to decide when a Relay activates and/or deactivates. But there are also control modes that make no use of an Input, that do their control strictly based on time, or the activation of some other relay.

Two features of the Triton controller make this Input Set-up chapter smaller, the digital Modbus network used for Input expansion and the emphasis on "Control by Output".

The Modbus digital network means there is less setting up and configuring for an installer to do; initially or when expansion is required.

Whenever a Modbus network sensor is connected to the controller, the Triton automatically knows what kind of sensor has been added, what its measurement range is, and even assigns the Input a meaningful default custom name.

The new Input is then automatically listed in the menu structure, right after any similar inputs, ready for the user to monitor or use in controlling their outputs.

The Control by Output philosophy means that many of the control settings found in an Input section of another controller's menus are under the Output Control menu of the Triton controller, where they make more sense. But for the Input Sensors there are still important calibration and alarm settings under this Input Set-up and Calibration menu, as described in the following explanations.

Typical Inputs

A Triton controller is usually equipped with a Cooling Tower Probe (CTP) that combines a sophisticated Conductivity and Temperature sensor and a reliable mechanical Flow Switch. At any time, when initially ordered or later in the field, the user can add our digital pH sensors, ORP sensors, additional CTP probes or Relay Expansion Boxes, and these devices will be automatically identified and added to the menus. Every Triton comes with eight Digital Inputs, which usage settings for Reed Switch or Hall Effect water meters, Digital Counters, Drum Level sensors, or Flow Switches. Up to three optional 4-20 mA boards may be installed, with two or four 4-20 mA Inputs each, to interpret any analog sensor.

Figure 8-2 shows the order in which the different types of Inputs are listed, in a Triton controller. The order is always the same, but which Inputs are listed depends on the Inputs connected to the controller. The Input listing order is:

Flow Switch	Flow Switches on the digital network are always displayed first.
Conductivty	CTP Conductivity sensor(s) are listed next, in installation order.
Temperature	CTP Temperature sensor(s) are shown after Conductivity sensor(s).
pH Sensor	Any pH sensors are listed next, after the Temperature sensor(s).
ORP Sensor	These biocide sensors are always listed next, after pH if present.
Digital In XX	Every Triton has eight, fully configurable, Digital Inputs.
4-20mA In XX	The optional 4-20 mA Inputs are always the last Inputs listed.

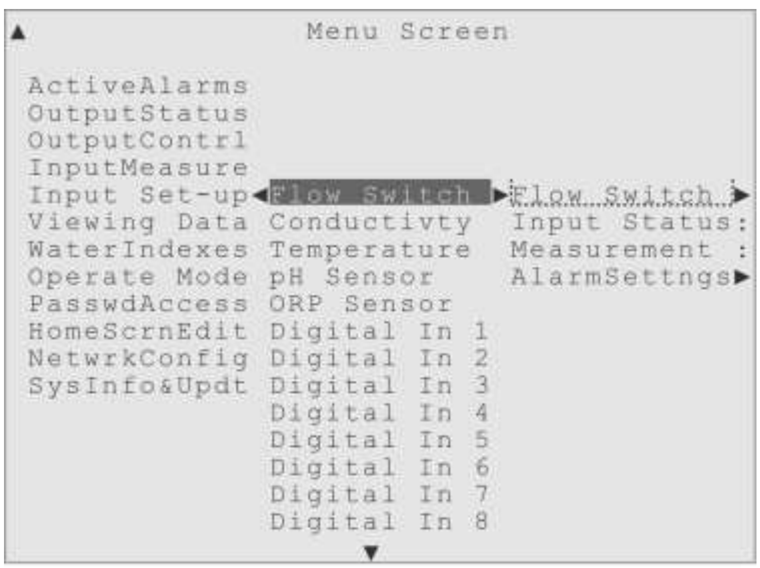


Figure 8-2. Highlight on Input Set-up, for the Flow Switch.

The user can plug in as many Modbus network Inputs as they need, up to 32, and the new Inputs will automatically appear in the menus, right after any existing sensor of the same type. Plug in a second Conductivity sensor, and it appears in the menus, already named Conductivty2, right below the original Conductivty menu item, ready to use.

The following text will explain the Input Set-up submenus, and their functions, for the various Inputs. The very simplified submenus for a Flow Switch Input are shown in Figure 8-2. There is a submenu for giving it a custom name, a status display, a live display of its measurement value, a menu of Alarm settings.

But a Flow Switch does not have a Calibration menu, typical Alarm Settings, or the Not For Control option, so a better example for explaining the Input Set-up and Calibration submenus is the Conductivity sensor (Conductivty) shown in Figure 8-3.

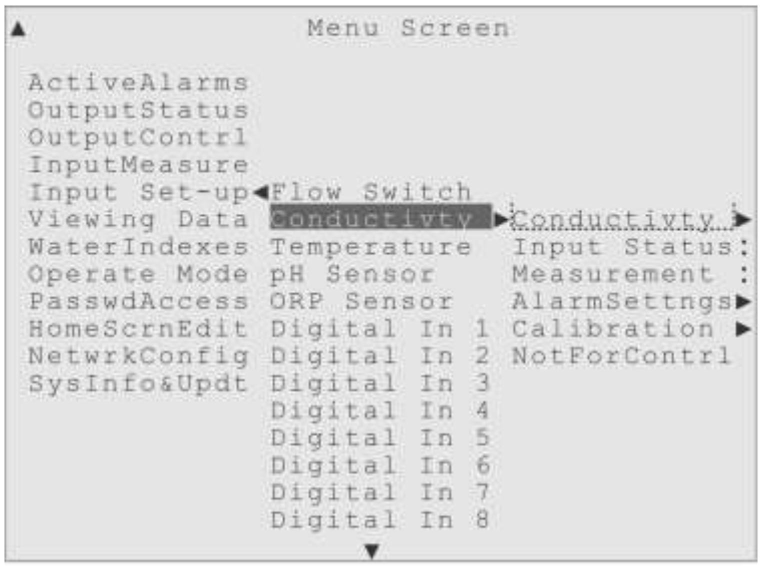


Figure 8-3. Highlight on Input Set-up, for the Conductivity sensor.

(Custom Name): The first submenu is for giving the Input any 12 character custom name the user would prefer. Some Inputs may have default custom names assigned to them, like “Conductivty” seen in Figure 8-3, but the name can be changed with the "Set New Name" submenu item, indicated by the rightward pointing arrowhead.

Input Status: The second submenu item displays the current status for this Input, for the user's reference. Different types of Inputs have different status displays.
Most Input sensors, that provide continuous measurement values, use the following status displays:

Normal: The sensor measurement is within range, between the Alarm values.
High Alarm: The sensor measurement is above the user-defined High Alarm value.
Low Alarm: The sensor measurement is below the user-defined Low Alarm value.
Sensor Error: The sensor is reporting values "out-of-range" or is disabled.

The Flow Sensor, however, only displays either:

Normal: Displayed when the water flow is sufficient for normal operation.
Flow Alarm: Displayed when water flow stops or is insufficient.

The Digital Inputs display varying status codes depending on the Digital Input Usage selected by the user.

A Reed Switch (or Dry Contact) Water Meter installed would display either of:

Normal:	When total volume measurement has not exceeded the alarm limit.
High Alarm:	If the total volume measured exceeds the preset limit.

A Hall Effect (or Paddlewheel) Water Meter would display one of the following:

Normal:	When volume and flow values have not exceeded their alarm limits.
High Alarm:	If the volume measured total exceeds the preset volume limit.
Hi FlowAlarm:	If the flow rate exceeds the preset high flow rate limit.
LowFlowAlarm:	If the flow rate falls below a preset low flow rate limit.

The Digital Counter usage for a Digital Input would display one of the following:

Normal:	When total count and rate values do not exceed their alarm limits.
High Alarm:	If the interpreted Total Count exceeds the preset limit.
Hi RateAlarm:	If the interpreted Count Rate exceeds the preset limit.
LowRateAlarm:	If the interpreted Count Rate falls below the preset limit.

Any General Purpose Digital Input would use one of these two status displays:

Normal or	
DigitalAlarm:	These displays are based on the user's settings for this usage.

A Flow Switch Digital Input would display either of:

Normal:	Displayed when the water flow is sufficient for normal operation.
Flow Alarm:	Displayed when the water flow stops or becomes insufficient.

Measurement: The third submenu item is a live display of the Input sensor's current measurement, for the user's reference. The magnitude and units will vary with the Input. (The "µS" or micro-Siemens unit shown for Conductivity is an abbreviation of the true measurement unit, "µS / cm" - micro-Siemens per centimeter.)

Alarm Settings

AlarmSettngs (Alarm Settings):

The fourth submenu is one of the main reasons a user would come to these Input Set-up and Calibration menus; to set the Input Alarm conditions, High Alarm, Low Alarm and so forth, and to define what Alarm Actions should occur if an alarm occurs.

Under the Alarm Settings menu will be submenus for whatever Alarm conditions apply to a particular Input. As shown in Figure 8-4, the Conductivity sensor has three alarm conditions, a High value alarm, a Low value alarm, and a Sensor Error alarm. (A Sensor Error occurs if an Input reports values "out-of-range" or fails.)

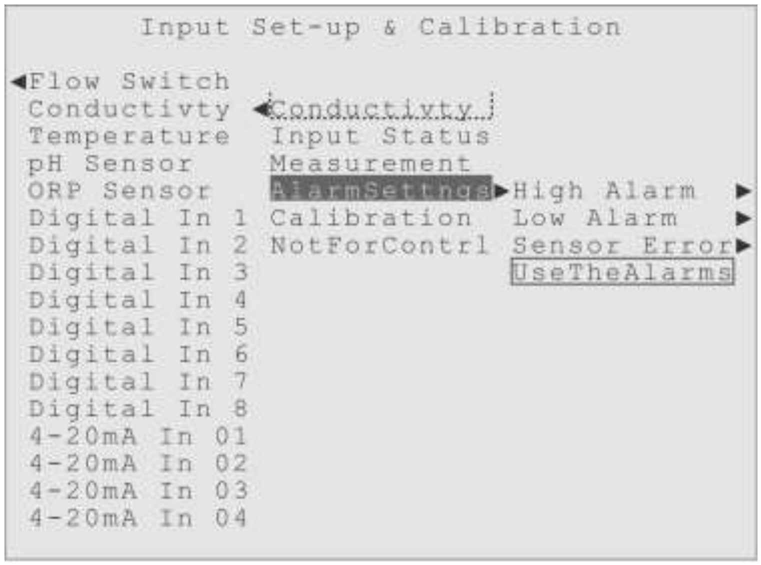


Figure 8-4. Alarm Settings menu, for the Conductivity sensor.

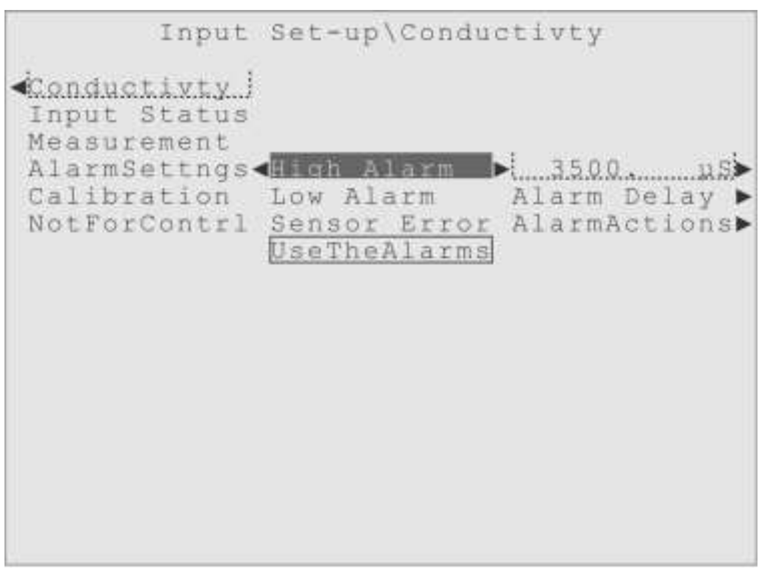


Figure 8-5. High Alarm sub-menus, for the Conductivity sensor.

Then, under each of the alarm condition menus are the same submenus, shown for the High Alarm in Figure 8-5.

(3500. µS): The current setting value for this alarm, with "Edit Valve" to the right.
Alarm Delay: An optional delay, to prevent transient issues from triggering Alarms.
AlarmActions: A list of user-definable actions, like Alarm Actions for Outputs.

High Alarm

3500. µS: The first submenu under High Alarm displays and allows for editing of the High Alarm setting value, shown as set to 3500. µS/cm in Figure 8-5, with the usual Input Tray and Edit Value submenu for changing the value.

Alarm Delay: The second submenu (Alarm Delay, shown in Figure 8-6) is for defining the amount of time an error condition must persist before an Alarm condition occurs. Very useful to prevent "transient" events (momentary false signals or brief spikes in the water condition) from setting off this Alarm.

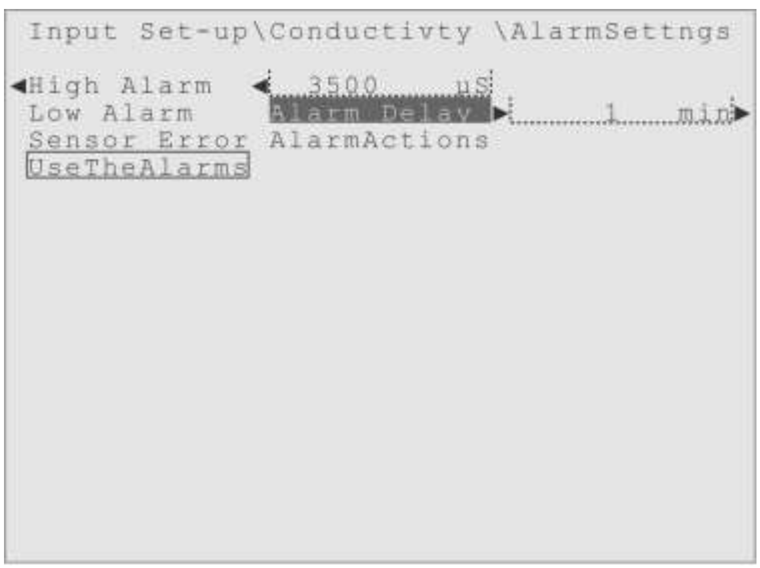


Figure 8-6. Highlight on the Alarm Delay menu, for Conductivity High Alarm.

There are the usual Input Tray and Edit Value submenus for adjusting the Alarm Delay time setting, the factory default Alarm Delay is one (1) minute, but it can set from 0 to 1440 minutes (1440 minutes = 24 hours).

AlarmActions: The third menu (Alarm Actions, shown in Figure 8-7) is just like the "Alarm Actions" menu in the Output Control menus, where the user can control what happens if an Alarm occurs.

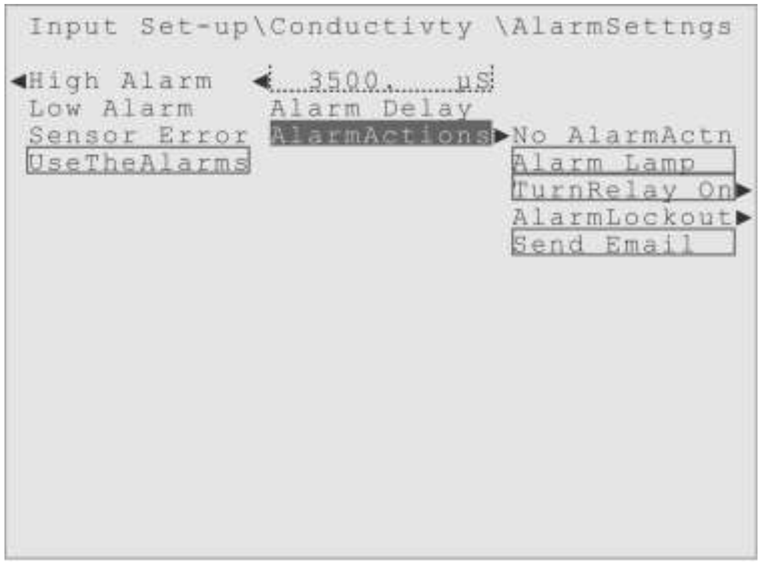


Figure 8-7. Highlight on the Alarm Actions menu, for Conductivity High Alarm.

Since Inputs don't have a "reaction" to Alarms like Relays, there is only the menu of alarm actions, with the same settings as the Alarm Actions menu explained in the Output Control chapter.

NoAlarmActn (No Alarm Action): Take no action, do nothing. Of course, all Alarms are logged in the System Activity Log, even if the user chooses to take no action.

Alarm Lamp: On Flashing by default, this menu gives control over the bright red Alarm lamp on the front panel of the controller.

TurnRelay On (Turn On Relay): Here the user can control what other relay to activate if there is an alarm. By default the Alarm Relay is selected.

AlarmLockout (Alarm Lockout): This menu allows the user to lockout one of more outputs while the Alarm condition exists. The Lockout is removed when the Alarm is cleared.

Send Email (Send Alarm Emails): This will send an email with a user-defined text message and data summary, to up to three user-defined Internet email addresses. This requires an IP connection to the controller, or an optional Cellular Modem.

The Send Email alarm action requires the controller be connected to either an Ethernet network, the Internet, or have a Cellular Modem installed. The action won't do anything useful until email address have been entered into their appropriate menus, which are in the Communications Settings menu (CommSettings) under the Network Configuration (NetwrkConfig) menu.

Looking at Figure 8-7, the "active box" drawn around the menu items indicates that the default "Alarm Actions" for a High Alarm on a Conductivity sensor are:

Alarm Lamp	On Flashing
Turn RelayOn	The default Alarm Relay, Relay 08, is pre-set to activate.
Send Email	This is on by default, but needs addresses to be entered by the user.

No Lockouts are set for this particular alarm, also notice that the only Relay activated by default is the Alarm Relay. The user should consider also activating the Relay controlling the Bleed Valve, usually Relay 01, when a High Alarm on the Conductivity sensor occurs or a Low Alarm on a pH sensor.

The user can have more than one of the Alarm Actions selected at a time, so that multiple actions take place, with the exception of the No Alarm Action (**NoAlarmActn**) menu item.

If the user highlights the NoAlarmActn item and presses Enter, all the other items become de-selected automatically, the "active box" is removed from around them, and only the NoAlarmActn item will be selected and have the "active box" around it.

The user can also individually select and deselect the various options, with an automatic feature that if they deselect all the real "action" items on the menu, the "NoAlarmActn" will be selected automatically and have the active box around it. Similarly, if the NoAlarmActn item is selected, and the user highlights one of the other options and presses Enter, the NoAlarmActn item is deselected automatically.

Clearing Alarms

When an Alarm condition occurs on an Input, any Relay being controlled by the Input is also affected in some way. The Relay may be forced to activate or deactivate, and Relays have their own Action Alarms settings that may cause other effects.

Normal operation of the controller cannot resume until the problem causing the alarm is taken care of and the Alarm is "cleared", either automatically or by the user in the Active Alarms menu.

The problem that caused the alarm should be resolved *before* the alarm condition is "cleared" from the controller. If the situation that caused the alarm is still present when the alarm is cleared, the alarm will just reoccur. In some situations, like a malfunctioning Input sensor, the alarm will reoccur immediately (there may be some small delay before the controller notices), but there will be other situations where the alarm will not reoccur until sometime later, when an Output Relay is activated for example. In any case, the user should find and resolve the problem that caused the alarm, before clearing the alarm condition at the controller.

. . .

Now that the Alarm Settings menus have been examined in detail, it is time to look at the next submenu, of the Input Set-up for the Conductivity sensor; the Calibration menu. From Figure 8-7, pressing the Left arrow twice and the Down arrow once would bring the user to Figure 8-8.

Calibration Menu

Input sensor calibration, during installation or periodic maintenance, is another common reason for visiting the Input Set-up and Calibration menu. Almost every Input can be "calibrated" is some way, to increase or confirm the accuracy of its measurements.

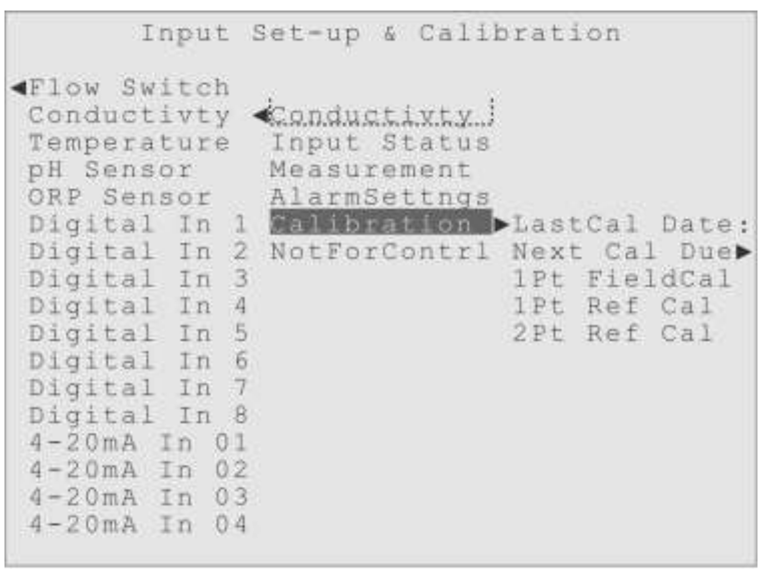


Figure 8-8. Highlight on the Calibration menu, for the Conductivity sensor.

Most Inputs, as will be shown with the Conductivity sensor, can be calibrated using two different methods, with two variations of the second method. The two methods are:

1) Calibrating to match a measurement taken "in the field".

2) Calibrating to match a fixed "reference" sample/solution.

The first method is often called a "Field Calibration" while the second method is often referred to as a "Reference Calibration". And there are usually two variations of the Reference Calibration method available:

2a) Using only one reference for calibration, called a "1 Point Reference Calibration".

2b) Using two references for calibration, known as a "2 Point Reference Calibration".

Field Calibration

Complexity: This is the simplest calibration method. A separate device is used to measure a characteristic of the system water, and the user compares that value to the measurement from the controller. The “field” value can be used as the new "calibrated" measurement.

Probe Removal: The probe does not have to be removed for a field calibration, although this might be a good opportunity to clean and rinse the probe. But look at "Suspension of Control" below, for issues related to probe removal.

Suspension of Control: The user will be asked when they start a 1Pt FieldCal, if they will be removing the probe, or reducing flow. If they answer "No", normal controller operations are not affected during the field calibration, in other words, there is no general suspension of control. If they answer "Yes" however, it is assumed that the flow is going to be stopped, which means that **water treatment control will be suspended** for the duration of the calibration: all relay outputs are deactivated, scheduled events are ignored, no alarms are allowed, and so forth. Normal operations resume as soon as the calibration process is over, either because the calibration was successful, was canceled or failed.

Accuracy: This method is prone to error if the characteristics of the water at the sample point are not similar to the condition of the water surrounding the sensor being calibrated. Temperature, pressure or velocity differences (as well as other factors) could affect the measurement value, reducing the accuracy of this type of calibration. Field Calibration accuracy is also dependant on the accuracy of the external device used to make the field measurement.

1 Point Reference Calibration

Complexity: More complex than the Field Calibration, as the probe typically must be removed and cleaned before the calibration, so the flow must be stopped through the probe manifold, then after calibration the probe must be re-installed and the system checked for leaks.

On the less complex side, a fixed reference is used for this calibration, instead of a possibly inaccurate external measurement device.

Probe Removal: You usually have to remove the probe from its housing, to calibrate it to the reference. The sensor may need to be cleaned, physically and/or chemically before it is calibrated, and finally the probe has to be re-installed and the system checked for leaks.

Suspension of Control: Since it is assumed the user will stop the water flow and remove the probe, when a 1Pt Ref Cal begins, the controller will remind the user that **water treatment control will be suspended** for the duration of the calibration. This means all relay outputs are deactivated, scheduled events are ignored, no alarms allowed, and so forth. Normal operations resume when the calibration process is over, either because the calibration was successful, was canceled or failed.

Accuracy: This method is considered to be more accurate than the Field Calibration, as the reference solution or device can be produced with high precision. On the other hand, care must be taken with the handling of the reference and proper technique must be used to realize the full accuracy potential of this type of calibration.

2 Point Reference Calibration

Complexity: This is most complex calibration method. The probe typically must be removed and cleaned before the first calibration is performed, cleaned again between the first and second reference measurement, and cleaned once again after the calibrations are finished. Then the user must re-install the probe and check the system for leaks. There are also two references to measure, and maintain.

Probe Removal: Just like the 1 Point Calibration, it is assumed the user will remove the probe from its housing, to calibrate it to the references. The sensor may need to be cleaned (physically and/or chemically) before the first calibration, between reference measurements, and finally the probe has to be re-installed and the system checked for leaks.

Suspension of Control: Since it is assumed the user will stop the water flow and remove the probe, when a 2Pt Ref Cal begins, the controller will remind the user that **water treatment control will be suspended** for the duration of the calibration. This means all relay outputs are deactivated, scheduled events are ignored, no alarms allowed, and so forth. Normal operations resume as soon as the user leaves the calibration menu, either because the calibration was successful, was canceled or failed.

Accuracy: This is considered the most accurate calibration method, since the measurements are corrected at two points in the range, instead of just one. But there are also two theories about 2 Point Reference Calibration, Wide Spread and Narrow Range.

Calibrate Temperature First?

Although the Temperature Sensor (built into the combination Conductivity and Temperature Probe) may not be the first item in the list of Inputs, the user should consider calibrating the Temperature sensor first, or at least verifying its accuracy.

The Conductivity sensor needs an accurate temperature compensation to produce accurate conductivity measurements, as do other types of sensors, like pH. For that reason, the user should consider calibrating the Temperature sensor first, unless they know the other Input does not use temperature compensation.

In addition, unless a pH probe has its own temperature sensor (the Digital pH probe that Hydro Systems sells for use with the Triton does not), the user should install the pH probe relatively close to the controller's Conductivty probe, so the Conductivity probe's temperature measurement is accurate and appropriate for the pH sensor.

Now that the merits of the various calibration methods have been discussed, we will examine the typical Calibration menus, using the Conductivity sensor as an example.

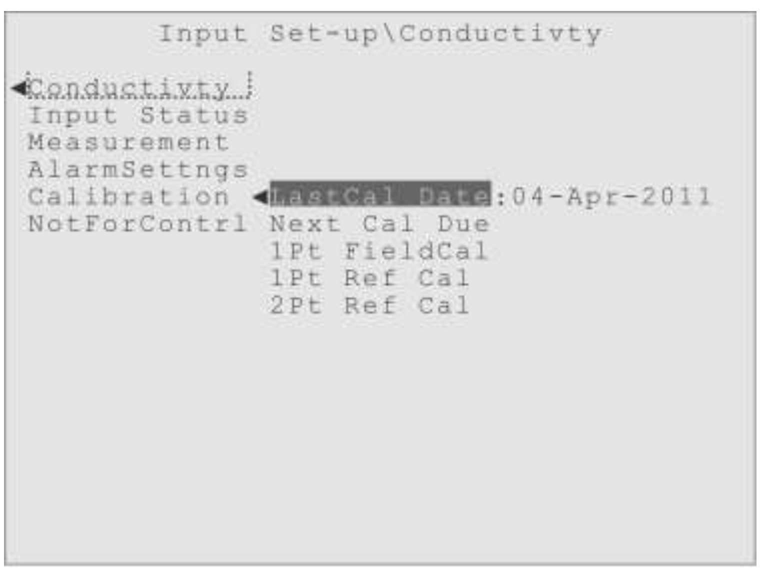


Figure 8-9. Input Set-up, Calibration, LastCal Date menu for Conductivity sensor.

LastCal Date (Last Calibration Date): This menu item just displays the last date the Input was successfully calibrated, for the user's reference (Figure 8-9).

This date is updated automatically every time a successful calibration is performed on this Input. The date is displayed in the same format that is chosen for the Front Panel date display, which is selected in the Home Screen Edit menu.

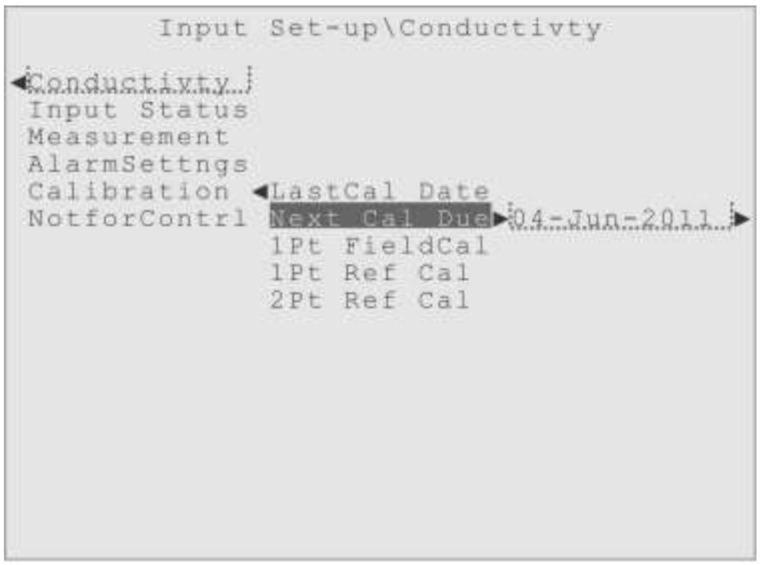


Figure 8-10. Input Set-up, Calibration, Next Cal Due menu for Conductivity sensor.

Next Cal Due (Next Calibration Due Date): This menu allows the user to set a date for when the next calibration is due for this input. This just displays the date the user enters as a reminder for when the next calibration should be done.

Nothing happens if the Next Cal Due date passes without a calibration, this is not an Alarm condition.

1Pt FieldCal (1 Point Field Calibration)

These menus allow the user to perform a "Field Calibration" on this Input. The user employs some instrument to measure a characteristic of the system water, and then they can adjust the Input's measurement to this new value (Figure 8-11).

Remember that the accuracy of a field calibration has a lot to do with where the water is sampled, and if that location is representative of the water the Input sensor is measuring. For example, taking a temperature reading from a location where the water is much warmer than it is near the Temperature sensor being calibrated, would not yield an accurate calibration.

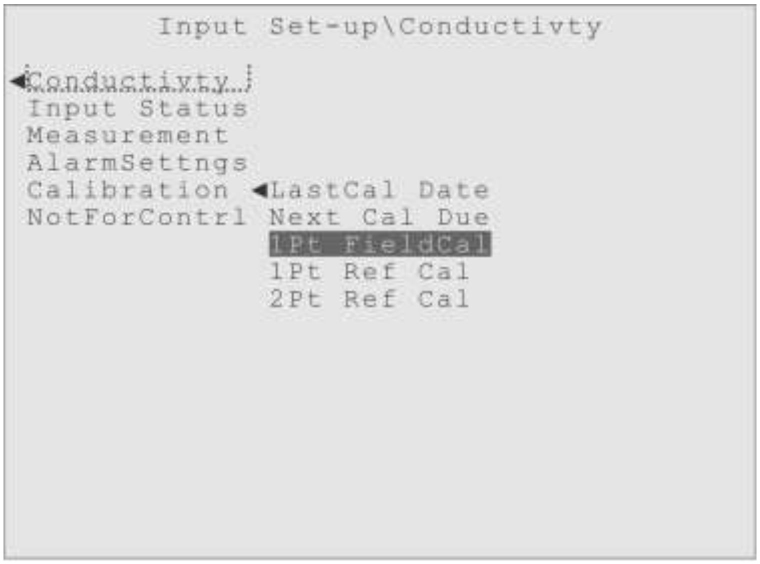


Figure 8-11. Input Set-up, Calibration, 1Pt FieldCal menu for Conductivity sensor.

When the user highlights the 1Pt FieldCal menu item, and presses Enter to begin the calibration, the controller will display a series of interactive dialog windows, the first of which is shown in Figure 8-12.

Calibrate Temperature First? This display is just a reminder that many Input sensors rely on an accurate temperature measurement, supplied by the temperature sensor built into the Triton's combination Flow Switch/Conductivity/Temperature probe, in order to perform a temperature compensation on their own measurements.

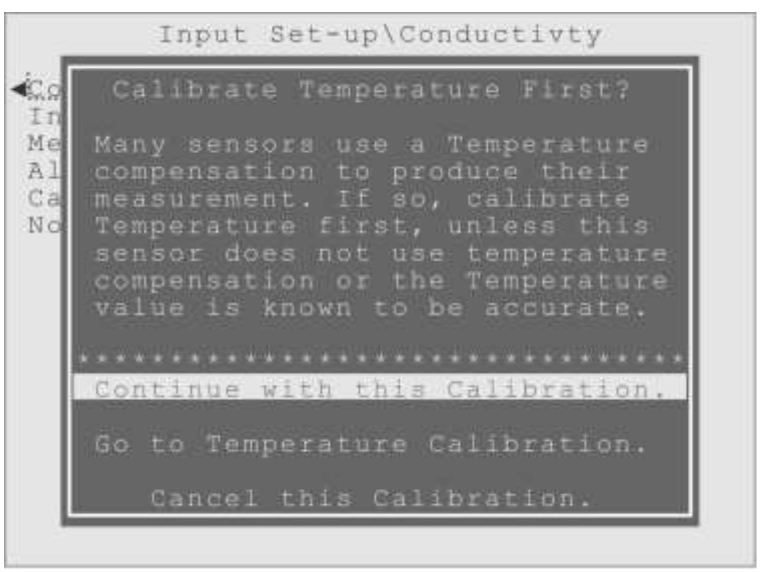


Figure 8-12. 1Pt FieldCal - Reminder to consider calibrating Temperature first.

For this reason, it is often best to calibrate the Temperature sensor first, or at least check its accuracy, before any other calibrations. On the other hand, if the user knows the Input they are calibrating does not use the temperature measurement, or that the temperature sensor is measuring accurately, they can move forward with confidence.

Notice the dialog allows three choices, to Continue by simply pressing Enter, to Go to the Temperature sensor Calibration menu immediately, or to Cancel this Calibration.

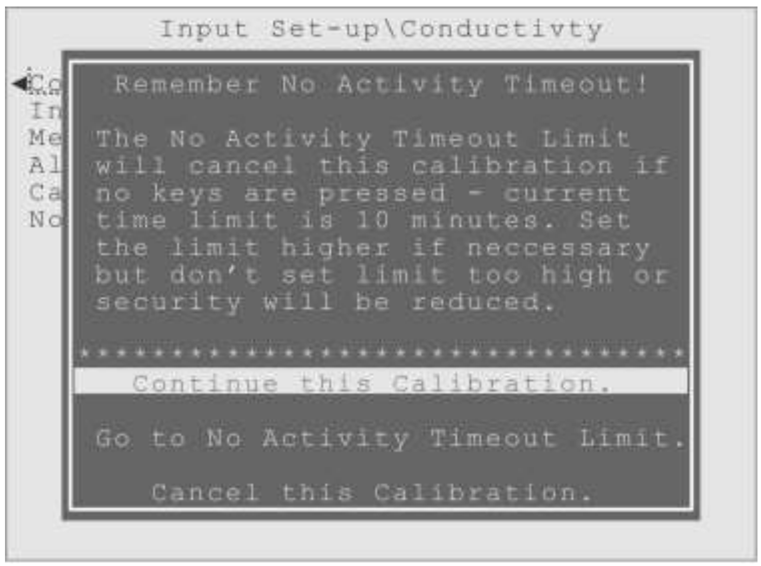


Figure 8-13. 1Pt FieldCal - Reminder about the No Activity Timeout Limit.

Remember No Activity Timeout! The second interactive dialog window is a reminder that the Triton controller has a "No Activity Timeout Limit" (NATL) that will "log out" the user and return the controller's display to the Home Screen, after a certain amount of time has passed with no keys being pressed on the front panel (Figure 8-13).

As part of its display, the submenu shows the current setting for the NATL, the factory default is ten (10) minutes. Notice that one of the responses available is to go immediately to the NATL menu, where the user can adjust the time limit as necessary.

Will Flow stop? Probe be removed? Usually when a Field Calibration is performed, the probe does *not* have to be removed, so the water flow through the probe manifold is not affected, and the controller can continue with its normal control program.

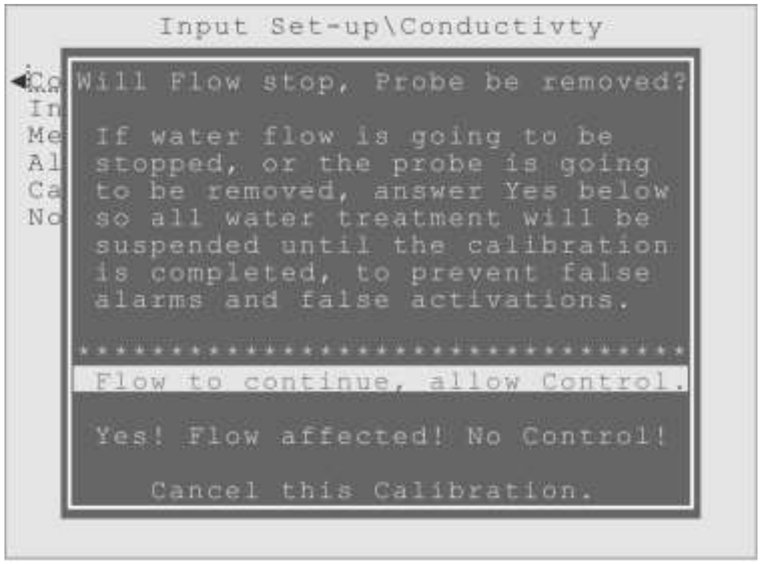


Figure 8-14. 1Pt FieldCal - Question about Suspension of Control.

However, if the probe *is* going to be removed, for cleaning, inspection, or whatever, or if the water flow through the probe manifold *is* going to be reduced or stopped, then **water treatment control must be suspended** during the calibration, to prevent the lack of flow or unusual sensor measurements from causing false alarms and unexpected relay activations (Figure 8-14).

There are three choices offered; to move forward allowing control to continue, to suspend water treatment while doing the calibration, or to Cancel this Calibration.

If the user chooses to suspend control for the duration of the calibration, the front panel Alarm lamp will illuminate, but with constant illumination, not flashing. This is just a helpful signal that the water treatment program has been suspended, and the lamp will be extinguished as soon as the calibration is completed or canceled, to show when control has been re-established.

When the user is finished with those confirmation windows, the actual Field Calibration will begin (Figure 8-15). The first dialog displays the current measurement value from the controller's Input sensor, and the second an Input Tray where the user can enter the value from the external instrument. Once the value has been entered, the highlight moves to the choices to either calibrate to the entered value, re-enter the value, or cancel the calibration.

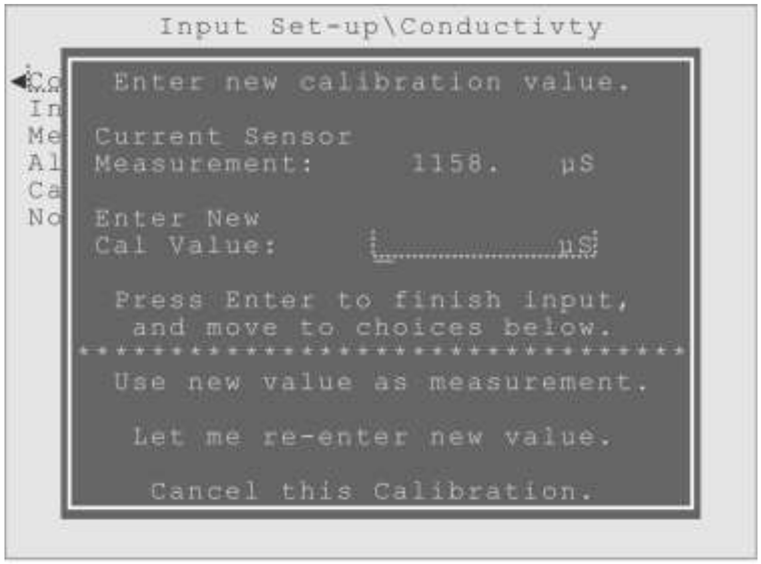


Figure 8-15. Input Set-up, 1 Pt. Field Cal, Measurement Entry for Conductivity sensor.

Calibration can fail! Due to the way input sensors interpret their electrical signals into the measurement values they report, they cannot be calibrated if the error is too large. Each type of sensor has a different allowable error, but if the difference between the new value and the sensor measurement is too large, the calibration will "fail" and the Input measurement will revert to its old value. Failure may indicate that the sensor is dirty and needs to be cleaned, that the sensor is malfunctioning, worn out and needs to be replaced, or that the controller itself is malfunctioning.

1Pt Ref Cal (1 Point Reference Calibration)

The Reference Calibration method (Figure 8-16) differs from the Field Calibration in several ways, but perhaps the most important is that the probe is expected to be removed from the system, and used to measure the external Reference, which means **water treatment control must be suspended** for the length of the calibration, to prevent false alarms and unexpected relay activations.

Similar to the field calibration process, when the user highlights the 1Pt Ref Cal menu item, and presses Enter to begin the calibration, the controller will display a few interactive dialog windows, to remind the user of some critical aspects of performing a Reference Calibration.

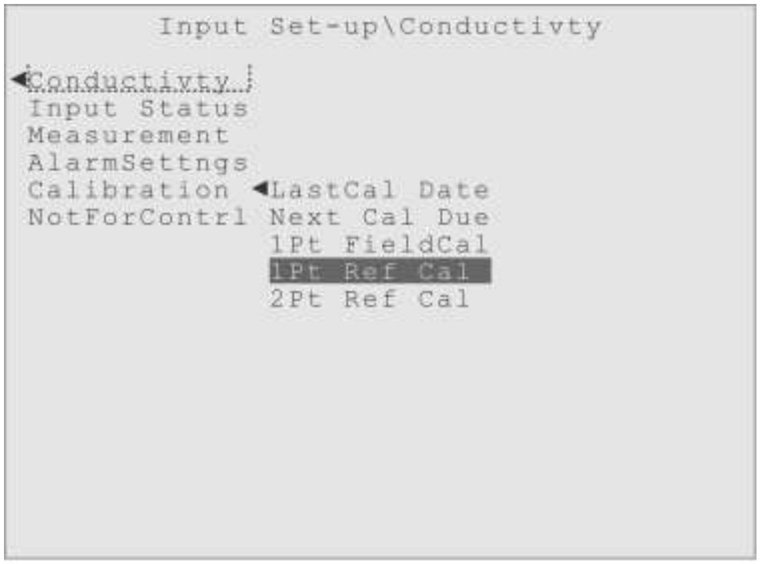


Figure 8-16. Input Set-up, Calibration, 1Pt Ref Cal menu for Conductivity sensor.

Calibrate Temperature First? This display is a reminder that many Input sensors rely on an accurate temperature measurement, supplied by the temperature sensor built into the Triton's combination Flow Switch/Conductivity/Temperature probe, in order to perform a temperature compensation on their own measurements (Figure 8-17).

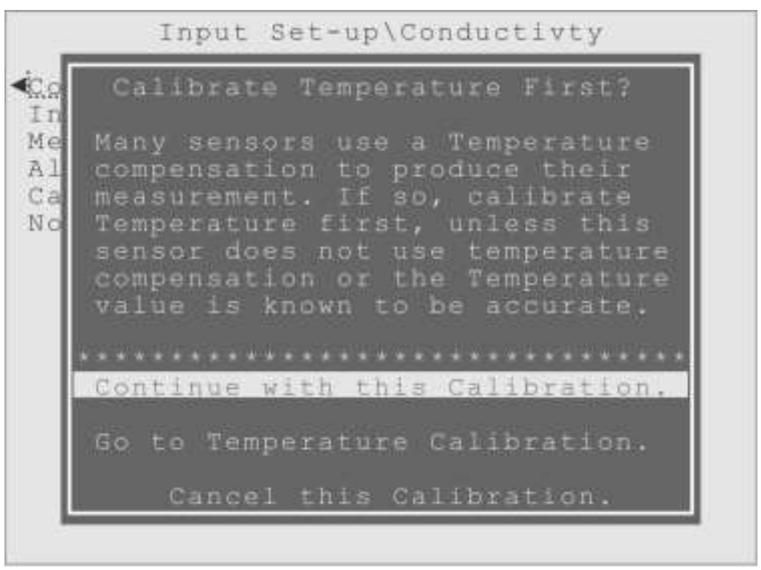


Figure 8-17. 1Pt Ref Cal - Reminder to consider calibrating Temperature first.

For this reason, it is often best to calibrate the Temperature sensor first, or at least check its accuracy, before any other calibrations. On the other hand, if the user knows the Input they are calibrating does not use the temperature measurement, or that the temperature sensor is measuring accurately, they can move forward with confidence.

Notice the dialog allows three choices, to simply Continue by pressing Enter, to Go to the Temperature Calibration menu immediately, or to Cancel this Calibration.

Remember No Activity Timeout! The second interactive dialog window is a reminder that the Triton controller has a "No Activity Timeout Limit" (NATL) that will "log out" the user and return the controller's display to the Home Screen, after a certain amount of time has passed with no keys being pressed on the front panel (Figure 8-18).

As part of its display, it shows the current setting for the NATL, which from the factory is set to ten (10) minutes. Notice that one of the three responses available is to go immediately to the NATL menu, where the user can adjust the time limit as necessary.

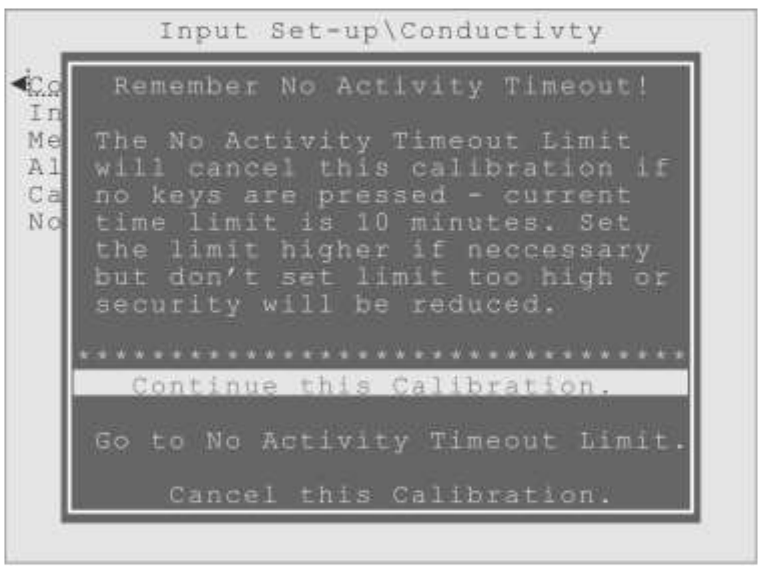


Figure 8-18. 1Pt Ref Cal - Reminder about the No Activity Timeout Limit.

Water Treatment Control will be Suspended... An important reminder, that water treatment control will be suspended for the duration of this calibration (Figure 8-19).

Since the probe normally has to be removed from the system, so it can measure the external reference, the water flow also has to be reduced or stopped. Therefore normal water treatment control must be halted, while the calibration is in progress. Otherwise false alarms and unexpected relay activations could occur, which might be dangerous!

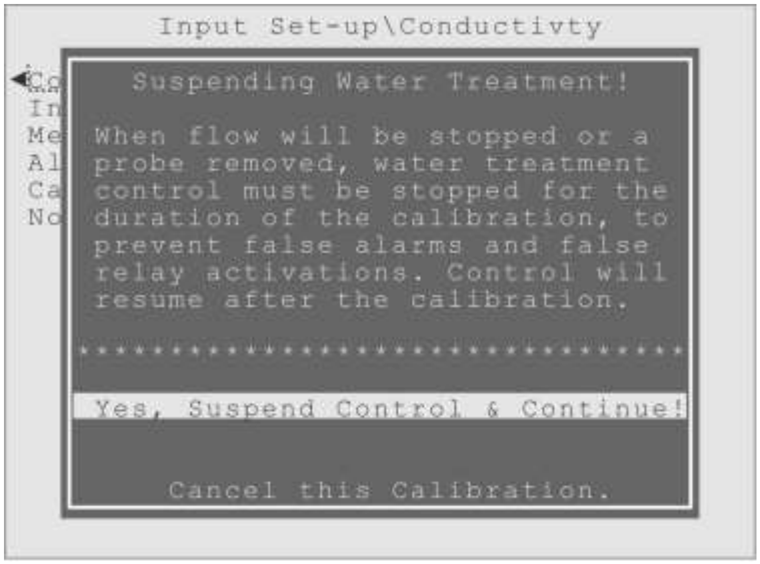


Figure 8-19. 1Pt Ref Cal - Reminder about Suspension of Control.

When control is suspended, the front panel Alarm lamp will turn on, but constant, not flashing, as a warning that water treatment has been suspended. The lamp will turn off as soon as the calibration is completed, to show when control has been re-established.

The two choices in this dialog are to agree that control must be suspended and to continue, or to Cancel this Calibration.

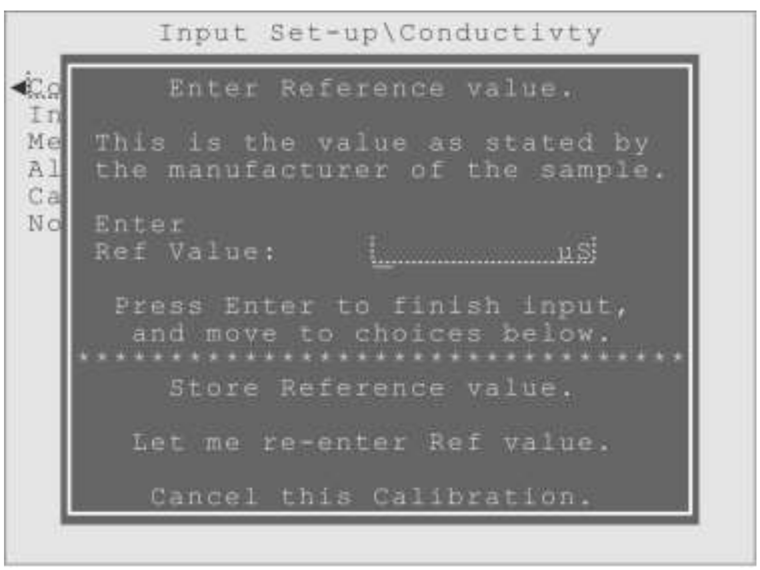


Figure 8-20. Input Set-up, Calibration, 1Pt Ref Cal, Reference Value Entry.

When the user has indicated the calibration should continue in all three dialogs, the actual 1 Point Reference Calibration will begin, and they can enter the value for the reference sample they will be measuring (Figure 8-20).

The reference sample is a laboratory prepared liquid sample that the probe is placed into, so the sensor's measurement can be compared with the known characteristics of the reference sample. The samples are made to a specific value, so the user knows what the measurement *should* be. The user should consult the label or paperwork of the reference sample and determine what the reference value for that particular sample is, and enter that value in the Input Tray. Figure 8-21 shows an example where the user has entered 8,000 µS/cm as the Reference Value and is about to press Enter to store that value.

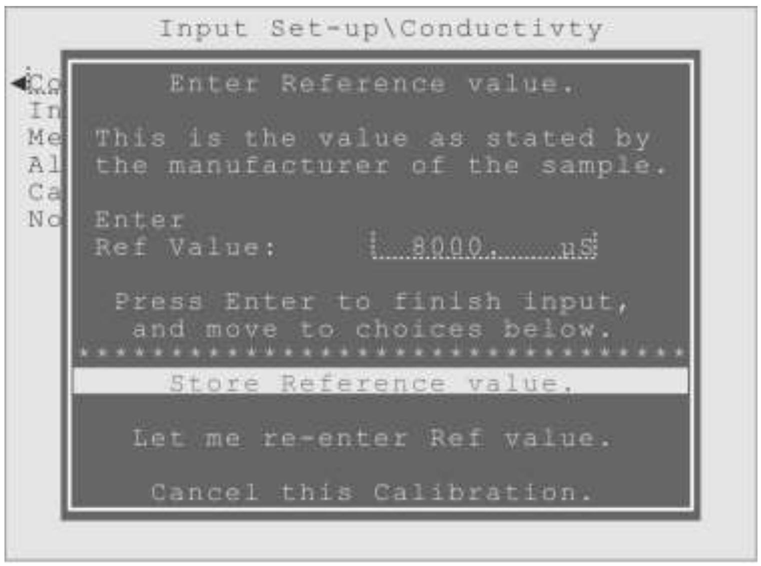


Figure 8-21. 1Pt Ref Cal, about to store 8,000 µS/cm as the Reference Value.

When the user presses the Enter key to store their Reference Value entry, the controller will display a reminder dialog telling them to clean and rinse the probe, then use it to measure the Reference Sample.

Measure Reference: Now that the probe has been cleaned and rinsed, it is time to use the sensor being calibrated to measure the reference. Usually the reference sample is a small container of fluid that the probe is put into, to check if the sensor measures the sample accurately. As the dialog shown in Figure 8-22 explains, once the probe is measuring the reference sample, the user can choose to calibrate the probe to the reference value, just keep using the measurement value displayed, or cancel this calibration.

Calibration can fail! Due to the way input sensors interpret their electrical signals into the measurement values, they cannot be calibrated if the error is too large. Each type of sensor has a different allowable error, and if the difference between the Reference value and the Sensor measurement is too large, trying to calibrate the sensor to match the reference will fail, and the sensor measurement will revert to its original value. Failures can indicate a sensor is dirty and needs to be cleaned, that a sensor is malfunctioning, worn out and needs to be replaced, or the controller itself is malfunctioning.

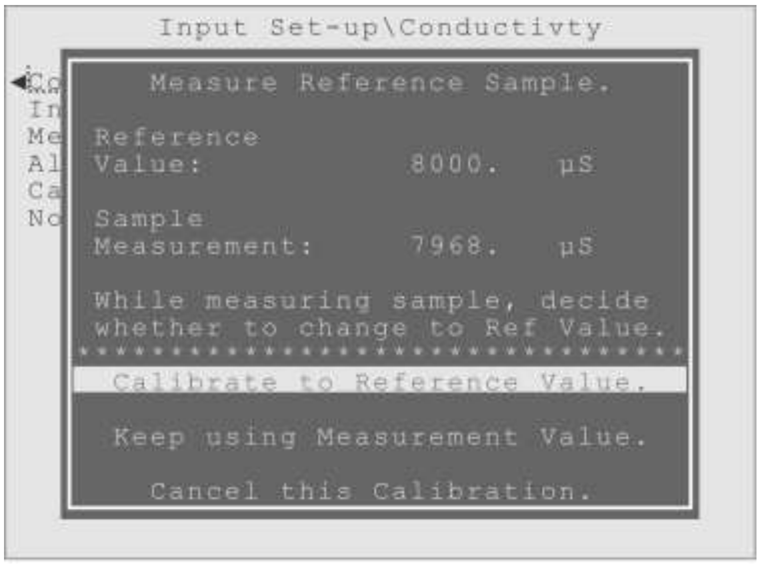


Figure 8-22. 1Pt Ref Cal, Display of Reference and Measurement values.

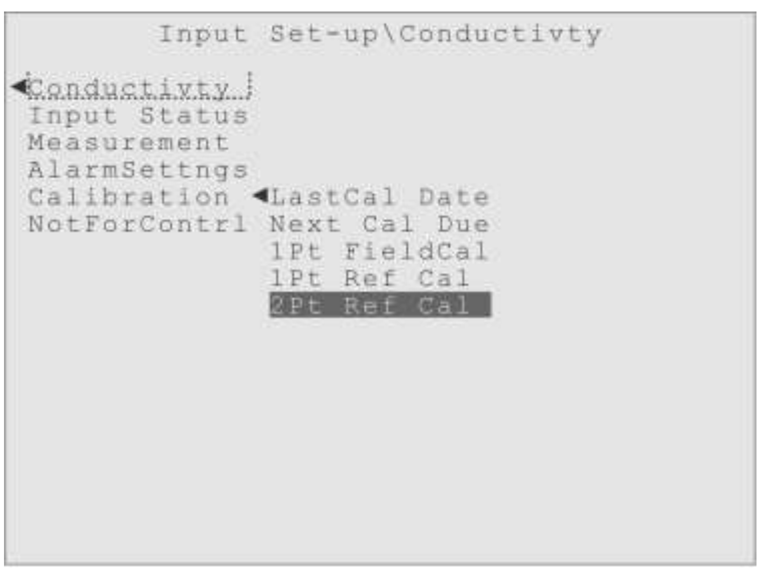


Figure 8-23. Input Set-up, Calibration, 2Pt Ref Cal menu item for Conductivity sensor.

2Pt Ref Cal (2 Point Reference Calibration)

A 2 Point Reference Calibration is just like doing two of the 1 Point Reference Calibrations, one after another. The theory is that by calibrating the sensor at two points within its range of measurements, a more accurate correction can be calculated, yielding a more accurate calibration (Figure 8-23).

Remember when doing any Reference Calibration, the probe is expected to be removed from the system and used to measure the external References, which means **water treatment control will be suspended** for the length of the calibration, to prevent false alarms and unexpected relay activations.

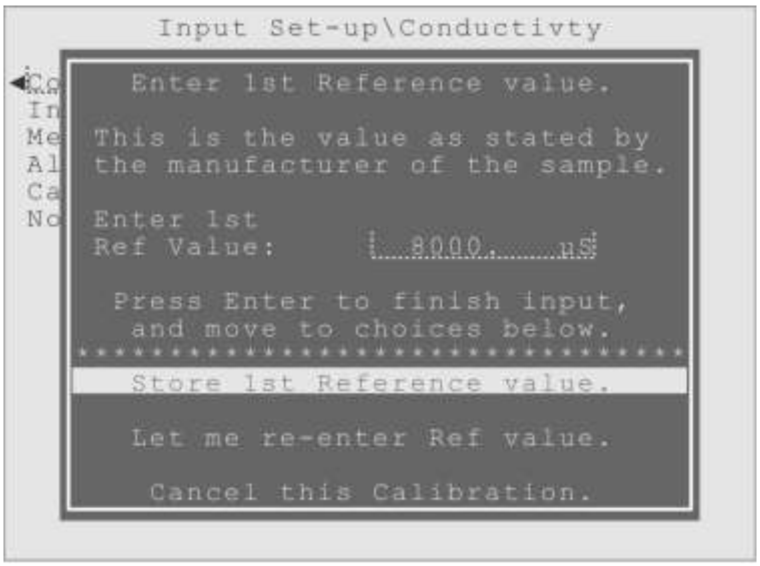


Figure 8-24. 2Pt Ref Cal, with 8,000 µS/cm entered for 1st Reference Value.

The user will see the same three "reminder" dialogs as were shown for the 1 Point Reference Calibration earlier, and then be asked to input the first Reference value, just like they would in the 1 Point Reference Calibration.

Figure 8-24 shows the user has entered 8,000 µS/cm as the first Reference value. The calibration process and dialogs are exactly the same as the 1 Point Reference Calibration, except that there are two sets of them, one for the first (1st) Reference and another for the second (2nd) Reference. Refer to the 1 Point Reference Calibration explanation just before this section, for detailed descriptions of the displays and responses expected when going through this reference style calibration process.

Input “NotForContrl”

One final control option for any Input is the menu item "NotForContrl" (Not For Control). If selected, this option will prevent the Input from appearing in any of the Output Control menus. It is meant to allow an Input to be used to monitor the water quality, for the user to be able set alarms for the Input’s measurements and have its measurement stored in the Data Log, but not allow the Input to be used for control of an Output. Hence the name, “NotForContrl”.

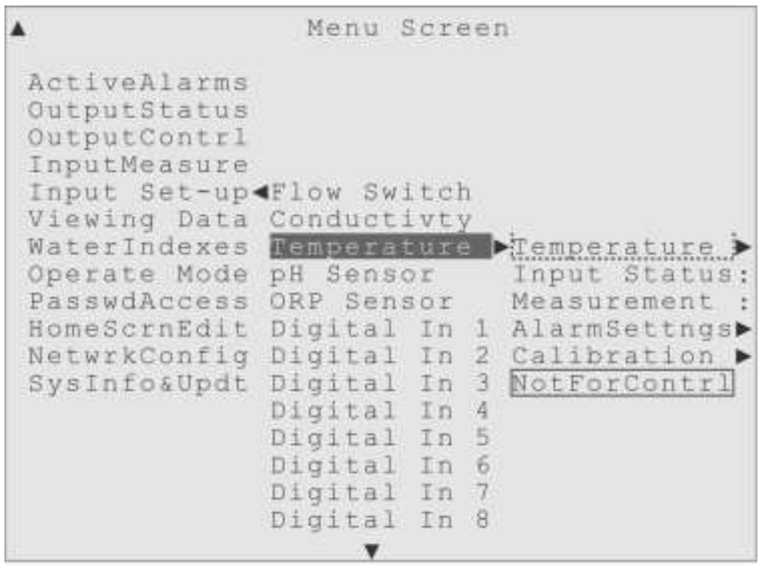


Figure 8-25. “Active Box" around "NotForContrl" for Temperature sensor.

The user may select this option by highlighting the NotForContrl menu item for a particular Input, and pressing the Enter key. The "active box" would be drawn around the NotForContrl item to show they have made that selection, and the Input would be removed from all the Output Control menus (Figure 8-25).

Remember, this only hides the Input within the Output Control menus. The Input is still listed in the Input Set-up menu, and its measurements are available for monitoring the water quality, setting Alarms, and are stored in the Data Log for viewing and graphing on the front panel display, or downloading onto a USB “data stick” or computer. After the detailed explanations of all the Input Set-up options above, it's easy to forget this useful option, which simplifies the Output Control menus and prevents an Input from being selected that a user does want used for output control.

Input options and settings

Now that the basic menu structure and control choices for the Inputs have been explained, the following text examines a list of Inputs typically connected to a Triton controller, to detail what options and settings are available for each type of Input Sensor.

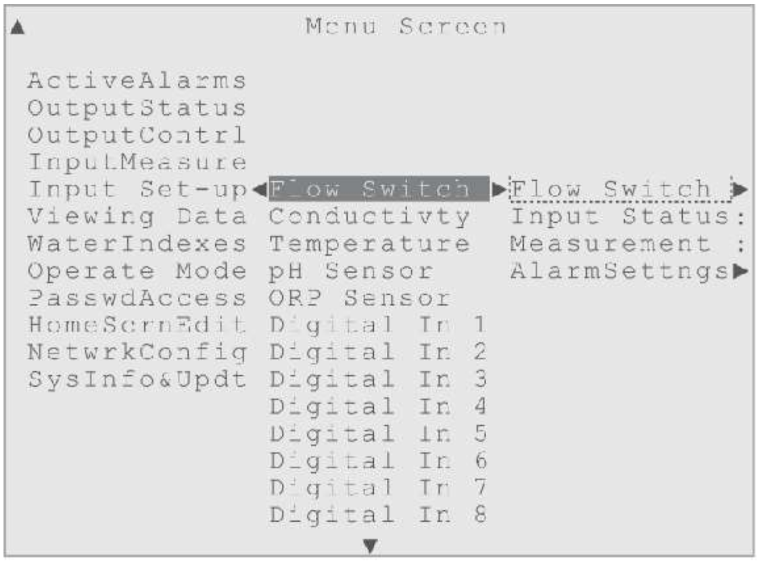


Figure 8-26. Highlight on Input Set-up, for the Modbus Flow Switch.

Flow Switch (Modbus Flow Switch)
Always the first Input listed. A Triton controller will typically be equipped with a mechanical Flow Switch that connects through the Conductivity / Temperature probe to the Modbus digital network. Unlike the common "float style" flow switches, the Triton Flow Switch can be mounted in several different orientations, for greater flexibility.

(Custom Name): Looking at the menus under the Flow Switch, the first submenu (as it is for all Inputs) is for setting an 12 character custom name, the factory default name of "Flow Switch" is still in use here (Figure 8-26).

Status: The Status menu is next, also true for all Inputs, where the three possible status codes for a Flow Switch are displayed. An Alarm condition on the Flow Switch disables all Outputs by default, effectively halting water treatment control!

Normal: When flow sufficient for sensor measurements and chemical dispersion.
Flow Alarm: When flow is stopped or insufficient for normal operation.
Sensor Error: If the sensor reports values "out-of-range" or malfunctions.

Measurement: The third menu item, typical for all Inputs, is a Measurement display, a live view of the sensor's measurement value. For a Flow Switch there are only two "measurements":

Flow On - Indicates sufficient flow for accurate sensor measurements and chemical dispersion. This corresponds with the "Normal" status.

Flow Off !! - When flow is stopped or insufficient for normal operation. This "measurement" corresponds with the "Flow Alarm" status display.

AlarmSettngs: The fourth menu, as it will be for any Input Sensor, is the Alarm Settings menu. For a Flow Switch there only one type of alarm, the "Flow Alarm", with the usual settings for Alarm Actions and an Alarm Delay.

A Flow Switch does not have a Calibration menu, nor does it have the usual "Not For Control" menu item, as it is already not listed in the menus under Output Control from which the "NotForContrl" menu item would hide an Input.

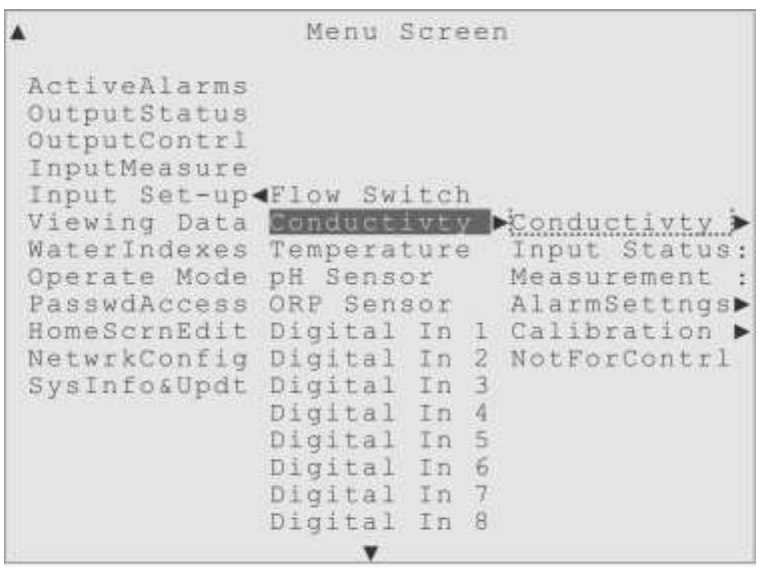


Figure 8-27. Highlight on Input Set-up, for the Conductivity sensor.

Conductivity (CTP Conductivity Sensor)

Always listed after any Modbus Flow Switch inputs. A Triton controller will typically be equipped with a combination Flow Switch / Conductivity / Temperature probe we call the Cooling Tower Probe (CTP). Most Conductivity sensors need a temperature compensation to produce an accurate measurement, so it is common to have these two sensors combined in a single probe (Figure 8-27).

(Custom Name): Showing again the factory default name, "Conductivity" for this Input.

Status: The Conductivity sensor has four possible status codes:

Normal: When the sensor is reporting values within its normal range.
High Alarm: If the conductivity measurement goes above a user-defined value.
Low Alarm: If the conductivity measurement goes below a user-defined value.
Sensor Error: If the sensor reports values "out-of-range" or the controller recognizes that the sensor has failed.

Measurement: The live display of the sensor's measurement value. The Conductivity sensor can report values from 10 to 15,000 µS/cm.

AlarmSettngs: The Conductivity sensor has three possible alarm conditions, with sub-menus for setting the Alarm Actions and Alarm Delay for each of them:

High Alarm: If the conductivity measurement goes above a user-defined value.
Low Alarm: If the conductivity measurement goes below a user-defined value.
Sensor Error: If the sensor reports values "out-of-range" or the controller recognizes the sensor has failed.

Calibration: The submenus under this item (explained in detail earlier in this chapter) are where the sensor's measurements can be adjusted for greater accuracy, or calibrated. Like many sensors, three types of calibration are offered for the Conductivity sensor:

Field Calibration - A simple 1 point calibration that does not require probe removal.
1 Point Reference Calibration - A more involved calibration, usually requires probe removal and cleaning, and may use laboratory prepared reference samples.
2 Point Reference Calibration - Like doing two of the 1 Point Reference Calibrations, it should be the most accurate method, but only if done carefully!

NotForContrl: And lastly, the handy "Not For Control" option. This would remove the Conductivity Input from all the Output Control menus, preventing this Conductivity sensor from being used to control an output relay. It would still be listed here in the Input Set-up menu so it can be used to monitor the water quality, have the user set alarms, and have the sensor’s measurements stored in the Data Log.

Temperature (CTP Temperature Sensor)

The Temperature sensor is always listed after any Flow Switch and Conductivity inputs. A Triton controller will typically be equipped with a combination Conductivity / Temperature probe we call the Cooling Tower Probe (CTP). Most Conductivity sensors need a temperature compensation to produce an accurate conductivity measurement, so it is common to have these two sensors combined in a single probe (Figure 8-28).

(Custom Name): Showing the factory default name of "Temperature". Remember if a second CTP probe is installed (to measure Make-up conductivity, or before and after temperatures for Energy Management) the new inputs are named and listed after any existing sensors, automatically. The second temperature sensor would be named Temperature2 and listed right after the Temperature menu item.

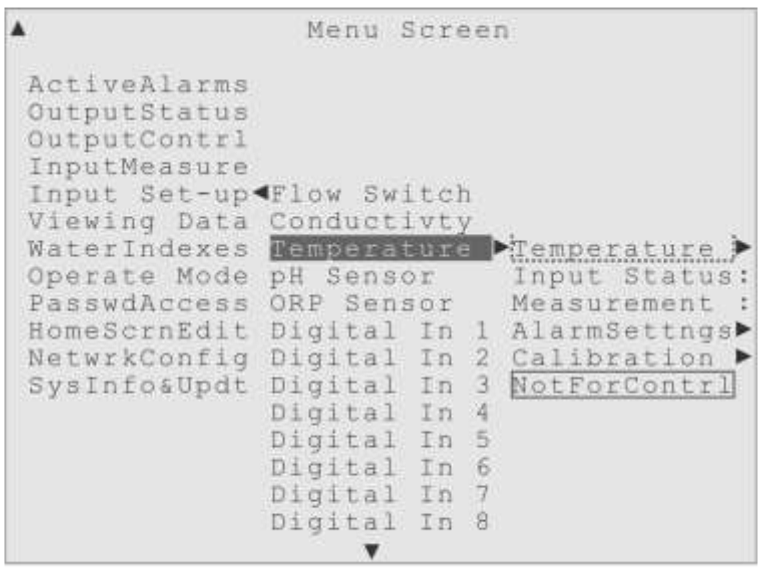


Figure 8-28. Highlight on Input Set-up, for the Temperature sensor.

Status: The Temperature sensor has four possible status codes:

Normal:	When the sensor is reporting values within its normal range.
High Alarm:	If the temperature measurement goes above a user-defined value.
Low Alarm:	If the temperature measurement goes below a user-defined value.
Sensor Error:	If the sensor reports values "out-of-range" or the controller recognizes that the sensor has failed.

Measurement: The live display of the sensor's measurement value. The Temperature sensor can report values from 14 to 158°F (-10 to 70°C).

AlarmSettngs: The Conductivity sensor has three possible alarm conditions, with submenus for setting the Alarm Actions and Alarm Delay for each of them:

High Alarm: If the conductivity measurement goes above a user-defined value.
Low Alarm: If the conductivity measurement goes below a user-defined value.
Sensor Error: If the sensor reports values "out-of-range" or the controller recognizes the sensor has failed

Calibration: The submenus under this item (explained in detail earlier in this chapter) are where the sensor's measurements can be adjusted for greater accuracy, or calibrated. Unlike most sensors, only one type of calibration is offered for Temperature sensors:

Field Calibration - A simple 1 point calibration that does not require probe removal.

NotForContrl: And lastly, the handy "Not For Control" option. This would remove the Temperature Input from all the Output Control menus, preventing this Temperature sensor from being used to control an output relay. It would still be listed here in the Input Set-up menu so it can be used to monitor the water quality, have the user set alarms, and have the sensor’s measurements stored in the Data Log.

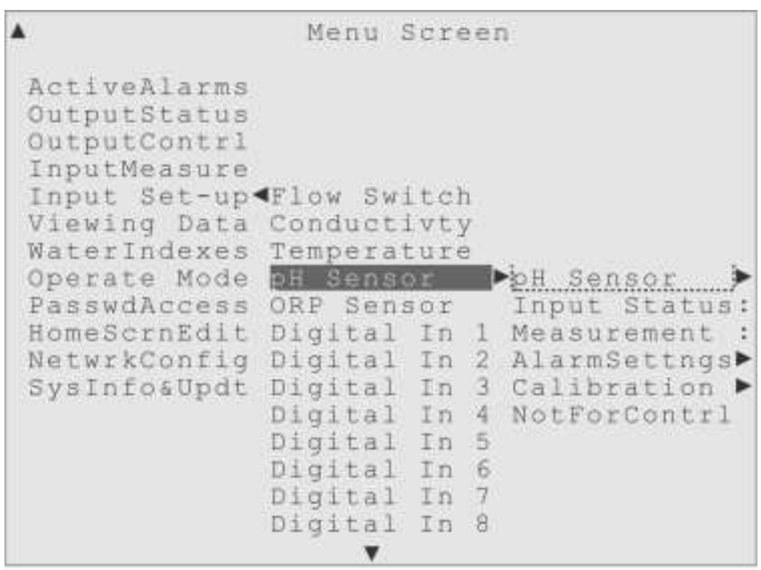


Figure 8-29. Highlight on Input Set-up, for the pH sensor.

pH Sensor

Always listed after any CTP Temperature inputs. The pH sensor measures the relative acid/base level in the water. This measurement can be important for corrosion protection and when using treatment chemicals that work best at certain pH ranges (Figure 8-29).

(Custom Name): Showing the factory default name of "pH Sensor". Remember if a second pH probe is installed, it would be named “pH Sensor 2” and listed right after the first pH sensor in the menu, automatically.

Status: A pH sensor has four possible status codes:

Normal: When the sensor is reporting values within its normal range.
High Alarm: If the pH measurement goes above a user-defined value.
Low Alarm: If the pH measurement goes below a user-defined value.
Sensor Error: If the sensor reports values "out-of-range" or the controller recognizes that the sensor has failed.

Measurement: The live display of the sensor's measurement value. A pH sensor can report values from 2 to 14 pH.

AlarmSettngs: A pH sensor has three possible alarm conditions, with submenus for setting the Alarm Actions and Alarm Delay for each of them:

High Alarm: If the pH measurement goes above a user-defined value.
Low Alarm: If the pH measurement goes below a user-defined value.
Sensor Error: If the sensor reports values "out-of-range" or the controller recognizes the sensor has failed

Calibration: The submenus under this item (explained in detail earlier in this chapter) are where the sensor's measurements can be adjusted for greater accuracy, or calibrated. Like many sensors, three types of calibration are offered for a pH sensor:

Field Calibration - A simple 1 point calibration that does not require probe removal.
1 Point Reference Calibration - A more involved calibration, usually requires probe removal and cleaning, and may use laboratory prepared reference samples.
2 Point Reference Calibration - Like doing two of the 1 Point Reference Calibrations, it should be the most accurate method, but only if done carefully!

NotForContrl: And lastly, the handy "Not For Control" option. This would remove the pH Input from all the Output Control menus, preventing this pH sensor from being used to control an output relay. It would still be listed here in the Input Set-up menu so it can be used to monitor the water quality, have the user set alarms, and have the sensor's measurements stored in the Data Log.

ORP Sensor (Oxygen Reduction Potential Sensor)

An ORP sensor is always listed after any pH or CTP Temperature inputs. The ORP sensor measures the amount of oxidizer in the water, usually a chlorine or bromine product. This measurement is a common method of monitoring the effective level of oxidizing biocide in the system's water (Figure 8-30).

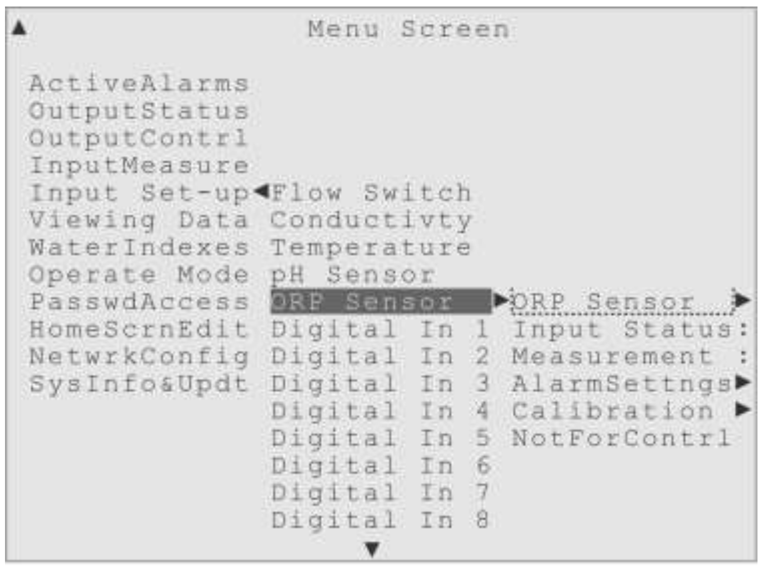


Figure 8-30. Highlight on Input Set-up, for the ORP sensor.

(Custom Name): Showing the factory default name of "ORP Sensor". Any 12 character name can be assigned by the user.

Status: An ORP sensor has four possible status codes:

- Normal: When the sensor is reporting values within its normal range.
- High Alarm: If the pH measurement goes above a user-defined value.
- Low Alarm: If the pH measurement goes below a user-defined value.
- Sensor Error: If the sensor reports values "out-of-range" or the controller recognizes that the sensor has failed.

Measurement: The live display of the sensor's measurement value. An ORP sensor can report values from -1400 to 1400 millivolts (mV).

AlarmSettngs: An ORP sensor has three possible alarm conditions, with submenus for setting the Alarm Actions and Alarm Delay for each of them:

High Alarm: If the ORP measurement goes above a user-defined value.

Low Alarm: If the ORP measurement goes below a user-defined value.

Sensor Error: If the sensor reports values "out-of-range" or the controller recognizes the sensor has failed

Calibration: The submenus under this item (explained in detail earlier in this chapter) are where the sensor's measurements can be adjusted for greater accuracy, or calibrated. Unlike most sensors, only two types of calibration are offered for an ORP sensor:

Field Calibration - A simple 1 point calibration that does not require probe removal.

1 Point Reference Calibration - A more involved calibration, usually requires probe removal and cleaning, and may use laboratory prepared reference samples.

An ORP sensor has two unique Calibration items, related to how accurate the calibration process has been over time. The two additional menu items are:

Calc'd Slope (Calculated Slope) - This displays the slope (Change in the mV output of the ORP electrode / expected mV Change) of the ORP electrode as of the last calibration. A perfect electrode would have a slope of 1.0. This slope value can be helpful when troubleshooting, and deciding if the electrode needs to be replaced.

Calc'dOffset (Calculated Offset) – This displays the "calibrated" mV offset of the ORP sensor electrode when the signal is at 0mV, as of the last calibration. This offset value can be helpful when troubleshooting, and deciding if the electrode needs to be replaced.

NotForContrl: And lastly, the handy "Not For Control" option. This would remove the ORP Input from all the Output Control menus, preventing this ORP sensor from being used to control an output relay. It would still be listed here in the Input Set-up menu so it can be used to monitor the water quality, have the user set alarms, and have the sensor's measurements stored in the Data Log.

The Digital Inputs

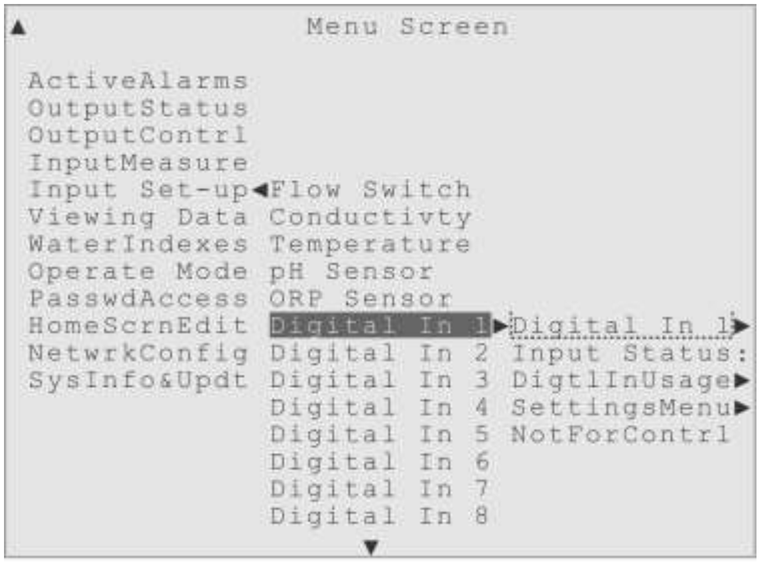


Figure 8-31. Highlight on Input Set-up, for Digital Input 1.

Every Triton water treatment controller comes equipped with eight, fully configurable, Digital Inputs. The simple devices that are connected to these inputs can only cause "pulses" of voltage change, but volume information can be associated with each pulse, and the rate at which regular pulses are detected can be measured as well (Figure 8-31).

In order for the controller to interpret these signals properly, the user must specify the appropriate "Digital Input Usage". This is very similar to the Relay Usage selection in the Output Control menu, the Digital Input Usage choice alters what Status displays are used and what items are listed under the Settings Menu for that Digital Input.

Before the Digital Input Usage explanation, there are two preceding menu items to describe first.

(Custom Name): The first submenu for every Digital Input is this Custom Name menu, where a user can assign any 12-character name. The assigned name is then used throughout the menu system, so the function of the input can be made clear. The first digital input is still using the factory default style name for these inputs, "Digital In 1".

Status: This is a live display of the status for this Digital Input. A digital input's status display will differ depending on the Digital Input Usage selected.

Reed Switch: A Reed Switch (Dry Contact) Water Meters installed would display:

Normal: as long as the total volume has not exceeded the preset limit.
High Alarm: if the total volume measured exceeds the preset limit.

Hall Effect: A Hall Effect (or Paddlewheel) Water Meter would display:

Normal: when the volume or flow values do not exceed their preset limits.
High Alarm: if the volume measured exceeds the preset volume limit.
Hi FlowAlarm: if the flow rate exceeds the preset high flow rate limit.
LowFlowAlarm: if the flow rate falls below a preset low flow rate limit.

Counter: The Digital Counter usage for a Digital Input would display:

Normal: as long as total count and rate values do not exceed preset limits.
High Alarm: if the interpreted Total Count exceeds the preset limit.
Hi RateAlarm: if the interpreted Count Rate exceeds the preset limit.
LowRateAlarm: if the interpreted Count Rate falls below the preset limit.

General Purpose: The General Purpose / Drum Level usage has only two "states". The user defines which one is "Normal" and which is the "Alarm" state. They display either:

Normal: if the state the Input is in was defined as "Normal" by the user.
DigitalAlarm: if the state the Input is in was defined as "Alarm" by the user.

Flow Switch: The Flow Switch usage has only two "states", like General Purpose usage, but has special alarm defaults appropriate for a Flow Switch. If the Digital Input Flow Switch will be used in place of the standard Modbus Flow Switch, go to the Alarm Actions menu for the Modbus Flow Switch and deactivate the alarms by deselecting the “UseTheAlarms” men item. Flow Switch status displays are:

Normal: when flow sufficient for sensor operation and chemical dispersion.
Flow Alarm: when flow is stopped or insufficient for normal operation.

The third menu item is the Digital Input Usage menu, where the user must declare how the Digital Input is going to be used in their water treatment system.

DigtlInUsage: Figure 8-32 shows the Usage menu for Digital In 2, that has been assigned the "Reed Switch Water Meter" Usage (WatrMtr-Reed), indicated by the active box around that menu item. Figure 8-32 shows all five Digital Input Usage choices:

WatrMtr-Reed (Reed Switch Water Meter) - Volume measurement only, with a High Volume Alarm available.

WatrMtr-Hall (Hall Effect Water Meter) - Volume and Flow Rate measurements, with High Volume, High and Low Flow Rate Alarms offered.

DigtlCounter (Digital Event Counter) - Count thousands of events, with a High Total Count Alarm as well as High and Low Count Rate Alarms available.

GenrlPurpose (Drum Level / General Purpose) - This usage can only sense two "states" for the Input, Closed and Open, which can be assigned "logical" values like Good and Bad, or Full and Empty, by the user. The user also decides which of these states should cause an Alarm condition.

Flow Switch – A usage to support simple "two state" Flow Switches, usually these are the "float" style flow switches. Very simple menus, with specific flow switch alarm defaults.

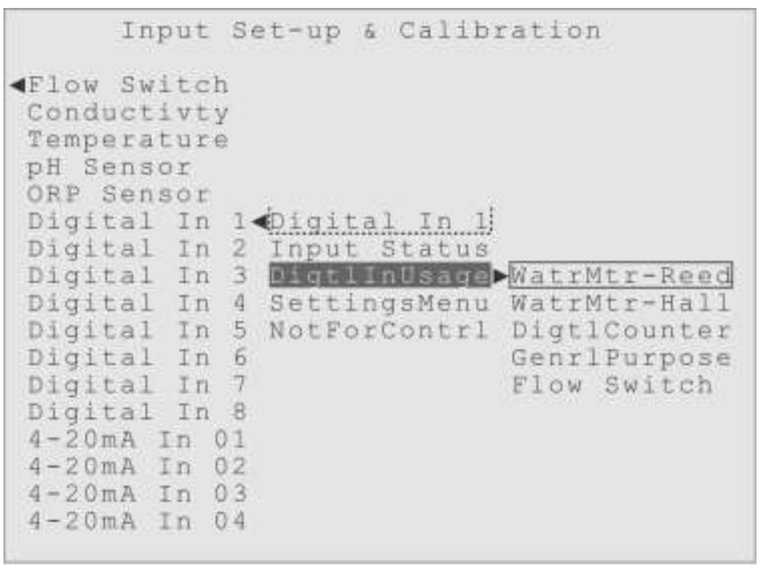


Figure 8-32. Highlight on Digital Input Usage, under Input Set-up for Digital In 1.

SettingsMenu: This is the main menu for these Inputs, where the configuration and alarm settings are found. The particular menu items available will vary based on the Digital Input Usage selected. There is a complete explanation of all the various Setting Menu items right after this menu overview.

NotForContrl: And lastly, the handy "Not For Control" option. This would remove the Digital Input from all the Output Control menus, preventing the Digital Input from being used to control an output relay. It would still be listed here in the Input Set-up menu so it can be used to monitor the water quality, have the user set alarms, and have the input's measurements stored in the Data Log.

Settings Menu details based on Digital Input Usage:

The submenu items under the Settings Menu change, based on what Digital Input Usage is chosen. The next few pages will describe all the possible menus, showing the changes to the Settings Menu based on each Digital Input Usage selection.

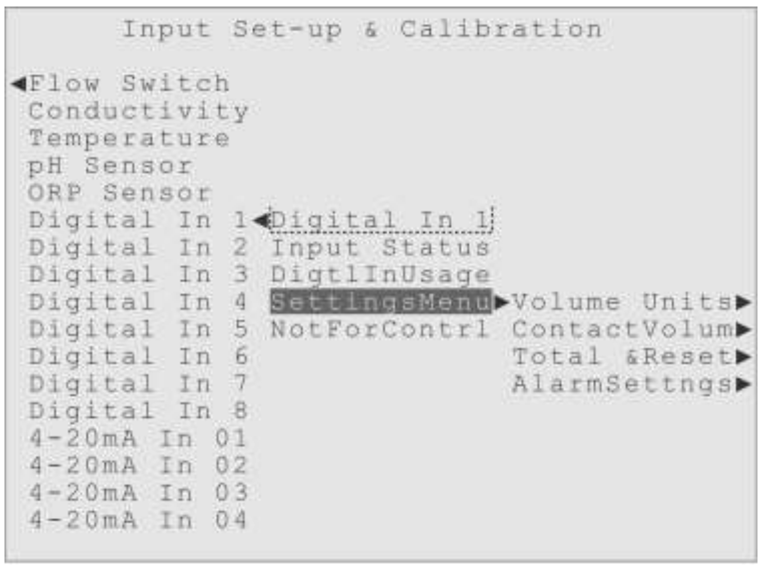


Figure 8-33. Highlight on Settings Menu, for "WatrMtr-Reed" Digital Input Usage.

Digital Input Usage - WatrMtr-Reed: Since Figure 8-32 shows the first Usage selection is for a Reed Switch Water Meter, it makes sense to look at the Settings Menu for that usage first (Figure 8-33).

Volume Units: Here is the list of volume units that the user can pick from, to go with the Contact Volume numerical value defined in the menu below this one. This item's submenu simply lists the three choices:

gal (US Fluid Gallons)
ltr (Metric Fluid Liters)
m3 (Metric Cubic Meters)
ml (Metric Cubic Milliliters - designed for flow verification meters)

The user highlights the units they want to use and presses the Enter key to make the choice. The active box is drawn around their selection. The factory default is Gallons.

ContactVolum (Contact Volume): This menu is where the user defines a number, which will represent what unit volume of fluid each contact or pulse from the Reed Switch Water Meter represents. However, in this menu the user only defines the number. What that unit volume is; gallons, liters or cubic meters, is set in the Volume Units menu above this one.

In this ContactVolum menu, the user is setting whether each pulse represents one (1) of those units of volume, or ten (10), or a tenth (0.1), or a thousand (1,000). The user can set this value from 0.1 to 9999.

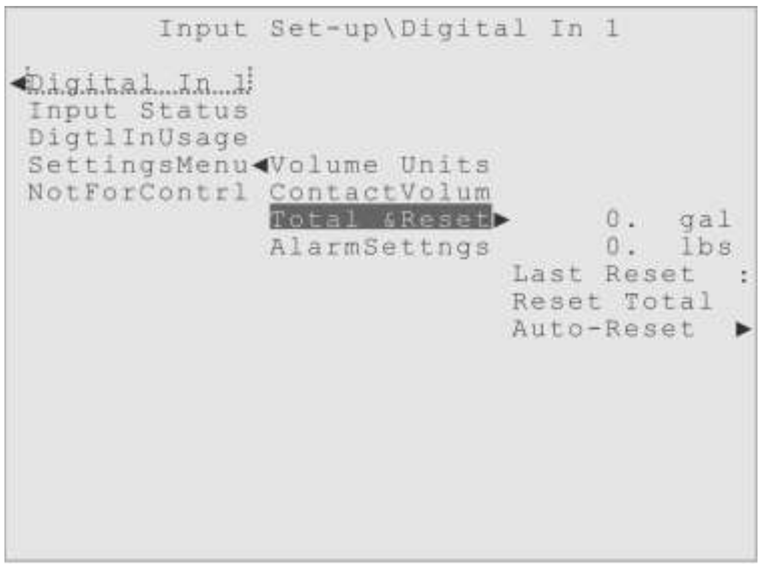


Figure 8-34. Highlight on Settings Menu, Total &Reset, for WatrMtr-Reed Usage.

Total &Reset (Totalization and Reset): Now that the user has defined the volume units, and how many of them each pulse represents, the controller can start to produce a "Totalization" value, a measurement of the Volume of water that has flowed past this water meter (Figure 8-34).

The first Total &Reset submenu shows the current water volume Totalization value, since the last reset. Up to 999,999 units of volume can be displayed.

Right below the volume Totalization is a display of the weight of that volume of water. This is calculated on the fly from the volume Totalization value, using a nominal conversion factor of 8.329 lbs/gal (the Specific Weight at 70°F). If the user selected “gal” as the volume unit, the weight will be displayed in “lbs”. If the user selected either “ltr” or “m3” as the volume unit, the weight will be displayed in “kg”.

Last Reset: The Date of Last Reset menu item displays the date upon which a Reset was last performed on the Totalization value, either manually (using the Reset Total) item just below) or automatically using the daily reset feature called Auto-Reset.

Reset Total: The Reset Totalization menu item is a manual method of resetting the Totalization value. The user highlights the menu item and presses the Enter key, to reset the volume Totalization value to zero. This will also reset the weight display.

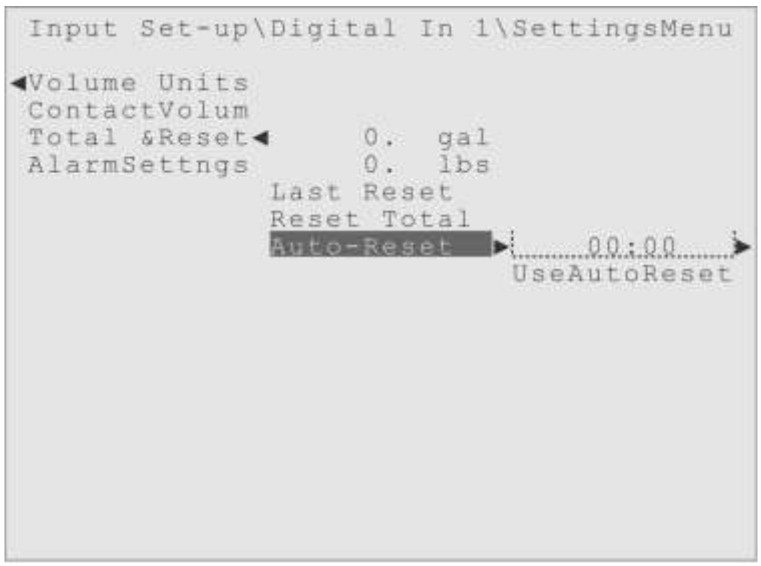


Figure 8-35. Highlight on Digital In 1, Control Menu, Total &Reset, Auto-Reset menu.

Auto-Reset: The Automatic Totalization Reset menu shown in Figure 8-35 provides a way for the volume and weight Totalization to be reset to zero every day, automatically. The submenu has a 24-hour clock the user can use to set at what time each day the Totalization is to be reset (00:00 = begin of Day, 12:00 = Noon, 23:59 = end of Day).

Once the time is set, the user would highlight the "UseAutoReset" menu item and press the Enter key to activate this option. The "Active Box" will be drawn around the menu item to show it has been selected.

Now that the Totalization and Reset (Total &Reset) submenus have been examined, this explanation will go to the last Settings Menu item, the Alarm Settings.

Alarm Settings: This is a typical Triton Alarm Settings menu, as shown in Figure 8-36. The submenus allow the user to control what happens for the only alarm condition a

Reed Switch Water Meter has, a High Volume Alarm.

The High Alarm menu offers the usual submenus for an alarm, one for defining the Volume that should cause an alarm, one for setting an optional Alarm Delay, then an Alarm Actions menu for setting what should happen if a High Volume Alarm occurs.

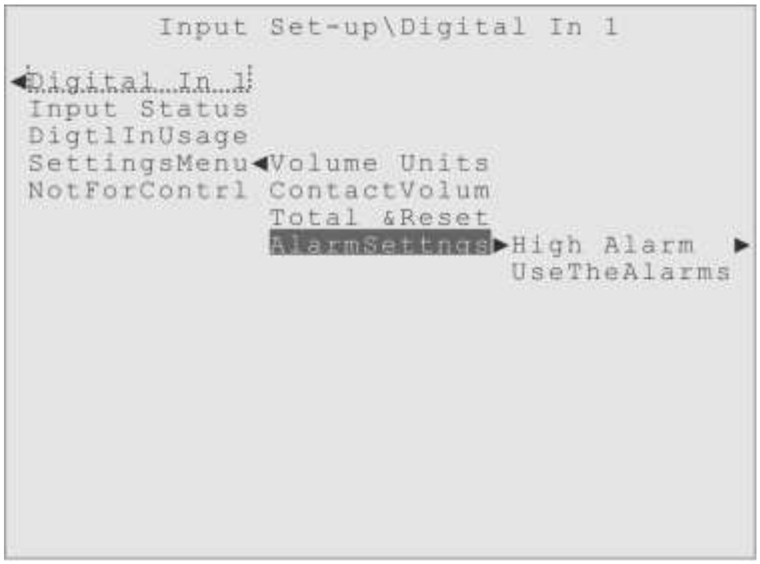


Figure 8-36. Highlight on Digital In 1, Settings Menu, Alarm Settings.

The “UseTheAlarms” menu item is the “activator” for all the Alarm Settings. This gives the user an easy one-step method to enable or disable the Alarms for an Input, and prevents factory default settings from causing alarms until the user is ready.

Digital Input Usage - WatrMtr-Hall: This is the Digital Input Usage designed to be used with a "Hall Effect Water Meter", also called a "paddlewheel" water meter (Figure 8-37). These water meters provide a more continuous measurement than the Reed Switch style, and can provide flow rate measurements and alarms as well as volume.

Figure 8-37 shows the Usage selection for “WatrtMtrHall” while 8-38 shows the Settings Menu for Digital Input 2, designated as being a "Hall Effect Water Meter". Notice there are several more submenu items under the Settings Menu than there were for a Reed Switch Water Meter.

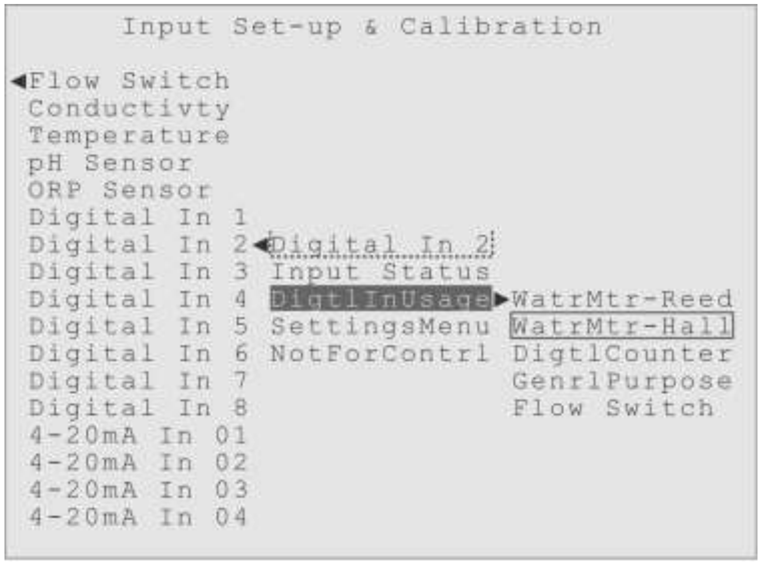


Figure 8-37. Highlight on Digital Input Usage for Digital In 2, set to "WatrMtr-Hall".

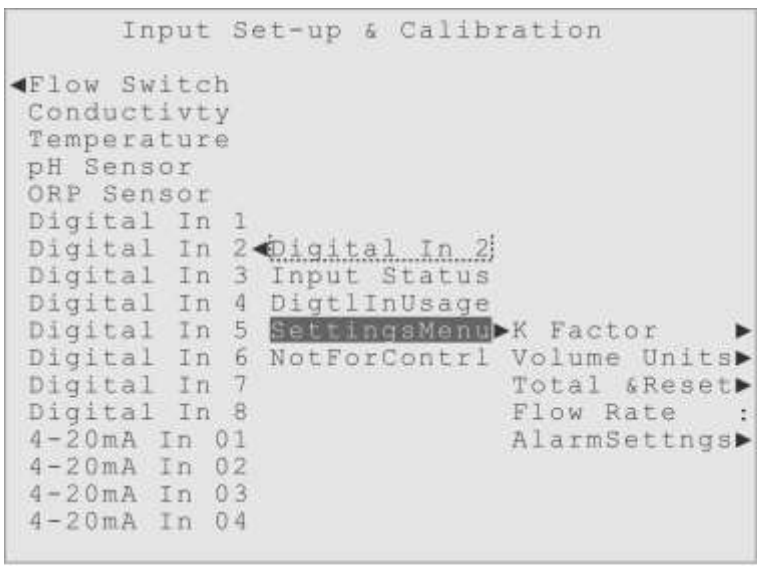


Figure 8-38. Highlight on Settings Menu, for "WatrMtr-Hall" Digital Input Usage.

K Factor (Pulses per Unit Volume): Here the user must define the number of pulses the meter will transmit for each unit of volume. This setting is the opposite of what the user sets for a Reed Switch water meter.

Again, this setting value is just a number, the Volume Unit (gal, ltr, m3 or ml) unit was set in the previous menu.

The number the user enters here is how many pulses the meter is going to transmit for each unit of volume. The allowed setting range is from 0.01 (which would mean each pulse represent 100 volume units) to 20,000 (which would mean 20,000 pulses would represent one volume unit). The factory default setting is one (1).

Volume Units (Volume Units): Here is the list of volume units that the user can pick, to go with the K Factor value previously defined. This submenu simply lists three choices:

gal (US Fluid Gallons)

ltr (Metric Fluid Liters)

m3 (Metric Cubic Meters)

ml (Metric Cubic Milliliters - designed for flow verification meters)

The user highlights the units they want to use and presses the Enter key to make the choice. The “Active Box” is drawn around their selection. The factory default is “gal”.

Total &Reset (Totalization and Reset): This menu is exactly the same as it is for the Reed Switch Usage, with the same submenus and settings.

Now that the user has defined the volume units and how many pulses represent one of them, the controller can start to produce a volume "Totalization" value, a measurement of the Volume of water that has flowed past this water meter.

The first submenu shows the current volume Totalization value, since the last reset. Up to 999,999 units of volume can be displayed. Right below the volume Totalization is a display of the weight of that volume of water. This is calculated on the fly from the volume Totalization value. If the user selected “gal” as the volume unit, the weight will be displayed in “lbs”. If the user selected either “ltr” or “m3” as the volume unit, the weight will be displayed in “kg”.

Last Reset: The Date of Last Reset submenu item displays the date upon which a Reset was last performed on the Totalization value, either manually (using the Reset Total item just below) or automatically using the daily reset feature called Auto-Reset.

Reset Total: The Reset Totalization submenu item is a manual method of resetting the Totalization value. The user highlights the menu item and presses the Enter key, to reset the volume Totalization value to zero.

Auto-Reset: The Automatic Totalization Reset submenu provides a way for the volume Totalization to be reset to zero every day, automatically. The submenu has a 24-hour clock the user can use to set at what time each day the Totalization is to be reset (00:00 = begin of Day, 12:00 = Noon, 23:59 = end of Day).

Once the time is set, highlight the “UseAutoReset" menu item and press the Enter key to activate this option. The "active box" will be drawn around the menu item to show it has been selected.

Flow Rate: This is a live display of the calculated water flow rate past this water meter, for reference. The volume units will be the same as those chosen for the volume display, and the time scale is permanently set to “per minute”.

An especially handy reference display if a High or Low Flow Rate Alarm occurs.

Alarm Settings: There are three alarm conditions for a Hall Effect Water Meter, each with their own submenus: High Alarm, Hi RateAlarm and the LowRateAlarm.

High Alarm (High Volume Alarm): Exactly the same as the menu under the Reed Switch Settings Menu. A typical Triton Alarm menu, with a submenu is for setting the Volume at which the user want the Alarm to occur. The range is 0 to 999,999 units of volume. After the setting submenu are the usual Alarm submenus, one for setting a optional Alarm Delay, then an Alarm Actions menu for setting what the user wants to happen if a High Volume Alarm occurs, and finally a submenu to "clear" a High Volume Alarm.

Hi RateAlarm (High Flow Rate Alarm): This Alarm menu is much like the High Volume Alarm menu, with a submenu where the rate value at which an Alarm should occur can be defined, with a range from 0.0 to 9999.9 volume units/minute. Then there are the usual submenus for the optional Alarm Delay and the Alarm Actions.

LowRateAlarm (Low Flow Rate Alarm): This menu is just like the High Flow Rate Alarm menu just described, except the user is setting the low flow alarm value instead of the high flow alarm value.

Digital Input Usage - DigtlCounter: Figure 8-39 show the third digital input, Digital In 3, designated as a "Digital Counter" in its Digital Input Usage menu. The Digital Counter usage is a simple one, each signal detected is added to a "count value", which the user can have interpreted in various ways, as defined in the Settings Menu.

This usage provides a Totalization value with a High Total Alarm, and High and Low Rate Alarms based on the rate at which the signals are being detected. Figure 8-40 shows the Settings Menu submenus for Digital In 3, designated as a "Digital Counter".

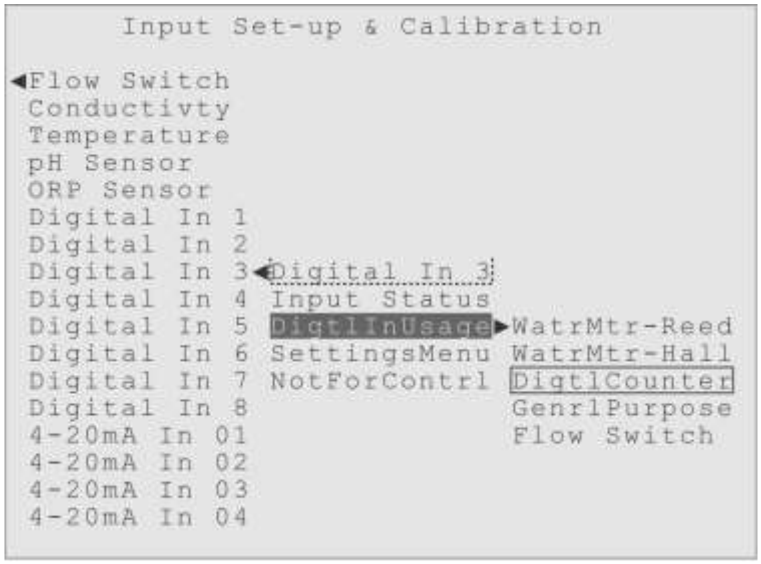


Figure 8-39. Highlight on Digital Input Usage for Digital In 3, set to "DigtlCounter".

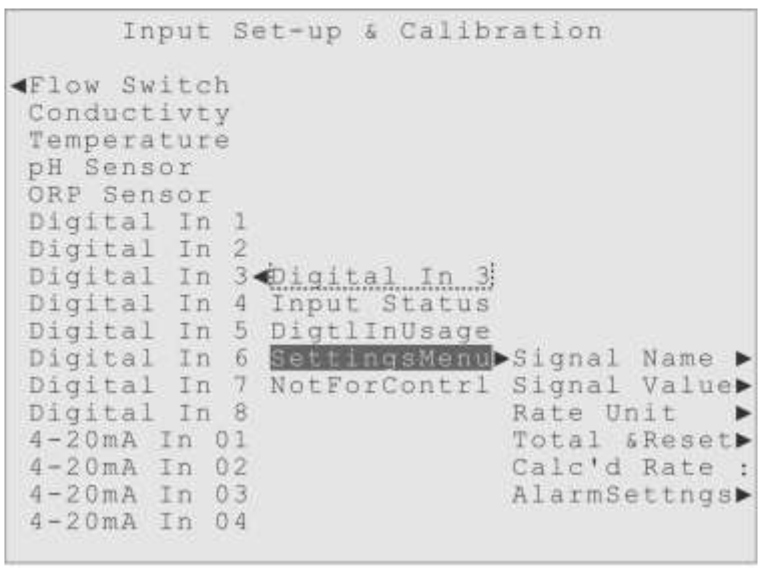


Figure 8-40. Highlight on Settings Menu, for "DigtlCounter" Digital Input Usage.

Signal Name: A three (3) character custom name can be given to the "signals" to make them more meaningful. The factory default name is "Cnt" (Counts) but consider giving a more meaningful name to what is being counted, for example, "Shp" (Sheep).

Signal Value: In this submenu, the user can define how many "Sheep" each pulse from the digital input represents. The factory default is one (1), but for this explanation, let's say the user has set this "per Signal" value to ten (10), so each pulse detected by this

Digital Input now represents 10 Sheep.

Rate Unit: In this submenu the user can define what time period they want the controller to count by. The factory default is to show the rate as "/h" (per hour), but the user may select a rate unit of:

/s per second
/m per minute
/h per hour
/d per day
/w per week.

Total &Reset (Totalization and Reset): This menu has two functions. The first is to display the current Total of whatever is being counted, in our example total "Sheep", along with the last date upon which the total was reset to zero. The second function is to reset the Total to zero, either manually or by setting a time of day at which the Total will be reset automatically, every day.

Remember this is a display of total "Sheep", not necessarily total signals. In this example, the "Signal Value" is set to 10, so each signal represents 10 Sheep. In this example, if 30 pulses have been detected, this Totalization would show " 300 Shp".

Calc'd Rate (Calculated Rate): A live display of the rate at which "Sheep" ((Pulses x Signal Value) / Rate Unit) are being detected.

If the Signal Value is set to one (1), this display also shows the rate that the raw pulses are being detected, but if the Signal Value is greater than one, then this is only the rate at which "Sheep" are being counted, not the rate at which the signals are being seen.

Since this rate display has only three characters for the Units, only the first letter of the "Signal Name" can be used for the Calculated Rate display. For the example being used, the "Sheep per hour" units would be shown as "S/h".

Alarm Settings: There are three possible alarm conditions for a Digital Counter, each with their own submenus; High Alarm, Hi RateAlarm and the LowRateAlarm.

High Alarm (High Total Alarm): A typical "high value" alarm menu, this one allows the user to define a value for the Totalization that will cause an Alarm if exceeded. Remember that the Totalization is of "Sheep" not signals or counts. The submenus for this Alarm setting have all the usual alarm options, lighting the front panel lamp, turning on Relays (the Alarm Relay is turned on by default), using Lockout on Outputs, sending emails, making phone calls and clearing the Alarm. The range of settings is from 0 to 999,999.

Hi RateAlarm (High Rate Alarm): Another typical "high value" alarm menu, this alarm is designed to alert personnel if the counts are increasing too rapidly, that is to say if the rate that "Sheep" are being counted has increased beyond this user-defined value. It is very important to remember these alarms are being set on the rate at which the count of "Sheep" is increasing, not the rate at which the signals are being detected, although the two may be closely related. The submenus for this Alarm setting have all the usual alarm options, lighting the front panel lamp, turning on Relays (the Alarm Relay is turned on by default), using Lockout on Outputs, sending emails, making phone calls and clearing the Alarm. The range of settings is from 0 to 999,999 Counts/RateUnit.

LowRateAlarm (Low Rate Alarm): A typical "low value" alarm menu, this alarm can alert personnel if the counts are increasing too slowly, or in other words if the rate that "Sheep" are being counted has decreased below the user-defined value (or has stopped). Remember these alarms are being set on the rate at which "Sheep" are being counted, not the rate at which the signals are being detected, although they may be closely related. The submenus for this Alarm setting have all the usual alarm options, lighting the front panel lamp, turning on Relays (the Alarm Relay is turned on by default), using Lockout on Outputs, sending emails, making phone calls and clearing the Alarm. The range of settings is from 0 to 999,999 Counts/RateUnit.

Digital Input Usage - GenrlPurpose: Figure 8-41 is showing the fourth Digital Input, "Digital In 4", with the "General Purpose" (GenrlPurpose) Usage selected. This is the appropriate Usage choice for any "binary" or "two state" Digital Input use, such as a typical Drum Level sensor, or any two-state digital device.

Digtl-Closed
Digital-Open
The General Purpose Usage is an extremely simple Digital Input Usage. The sensor will only have two "states" or conditions. One state is considered "closed" and the factory

default name for this state is "Digtl-Closed". The other possible state is considered "open" and the factory default name for that state is "Digital-Open".

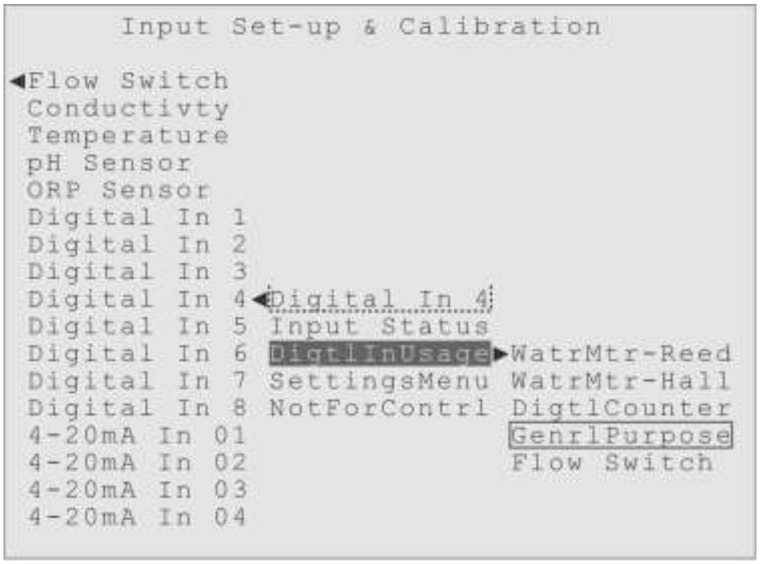


Figure 8-41. Highlight on Digital Input Usage for Digital In 4, set to "GenrlPurpose".

The user can put custom labels or names on these "states", instead of the factory names "Digtl-Closed" and "Digital-Open". The user can also set either one of the two states to be the Alarm condition. Therefore, it is the user that decides which state is the "good" one and which is the "bad" state, and then they can set the alarm conditions to match.

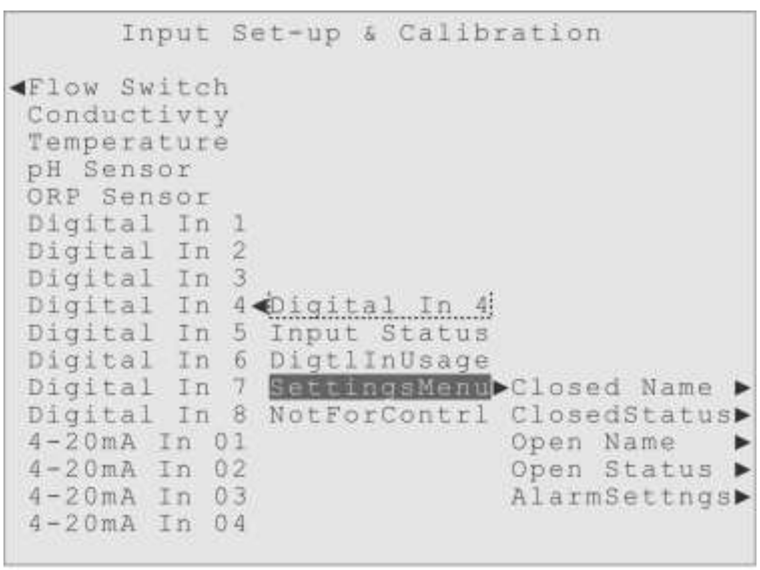


Figure 8-42. Highlight on Settings Menu, for "GenrlPurpose" Digital Input Usage.

The factory default settings are to have the "Closed" state defined as "Normal" and therefore the "Open" state is the "DigitalAlarm" condition. Then there are the standard Alarm Settings menus for an Alarm Delay and the Alarm Actions. The Settings Menu items are shown in Figure 8-42.

Closed Name (Closed State Name): The user can choose any 12 character name for the Closed state of this Input.

Digtl-Closed: Use a name that makes the condition as clear as possible, for example a name like "DrumLevel OK" will paint a better picture of what this state means than the factory default, "Digtl-Closed".

ClosedStatus (Closed State Status): Here the user can choose whether the "closed" state for this Digital Input should be considered the "Normal" or "DigitalAlarm" status.

Normal is the default Closed Status.

There are the usual alarm menus below this item (in the main menu), for controlling what happens if an Alarm occurs, but in these ClosedStatus and Open Status menus, the user must decide which one will cause the Alarm to occur.

One state will always be set to "Normal" and the other state set to "DigitalAlarm". If ClosedStatus is set to "Normal", then Open Status will automatically be set to "DigitalAlarm", and if ClosedStatus is set to "DigitalAlarm", then Open Status will automatically be set to "Normal".

Open Name (Open State Name): The user can choose any 12 character name for the Open state of this Input.

Digital-Open is the default Open Name.

Care should be taken to use a name that makes the condition as clear as possible, for example a name like "Drum Empty!!" will paint a better picture of what this state means than the factory default name, "Digital-Open".

Open Status (Open State Status): Here the user can choose whether the "open" state for this Digital Input should be considered the "Normal" or "DigitalAlarm" status.

DigitalAlarm is the default Open Status.

One state will always be set to "Normal" and the other state set to "DigitalAlarm". If ClosedStatus is set to "Normal", then Open Status will automatically be set to "DigitalAlarm", and if ClosedStatus is set to "DigitalAlarm", then Open Status will automatically be set to "Normal".

Alarm Settings: There only one possible alarm conditions for a General Purpose Digital Input, the DigitalAlarm explained above.

Alarm Delay: This Alarm Delay menu gives the user an optional Alarm Delay setting for this alarm, used to prevent transient, momentary problems from triggering the Alarm condition. The time entered here is how long the potential alarm condition must persist before the Alarm is actually initiated. An Alarm Delay of one (1) minute is the factory default.

AlarmActions (Alarm Actions): This menu appears just below the Alarm Delay menu, and has the usual list of Alarm Actions that the user can modify, to control what happens if an Alarm occurs. By default, the Alarm lamp on the controller's front panel is set to turn on. The only Relay that is set to turn on is the Alarm Relay. No Lockouts are set on any Outputs. The option to send emails is on by default, but it won't do anything useful until email addresses have been entered by the user.

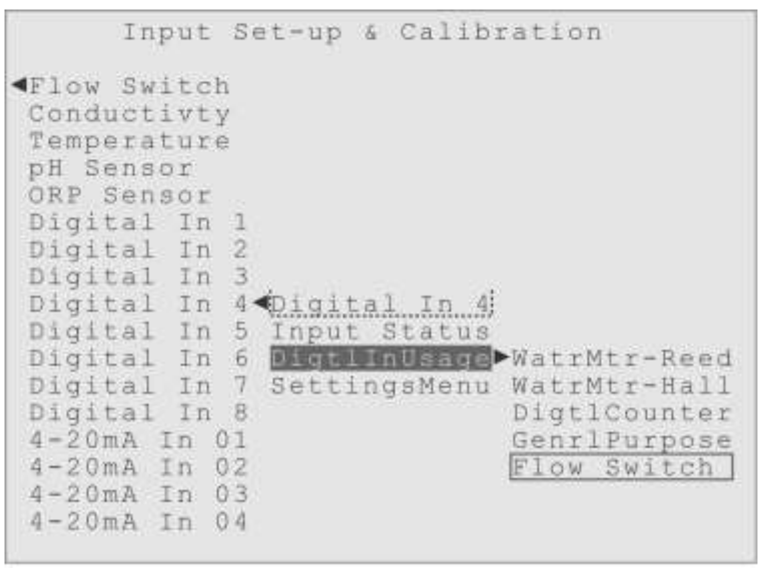


Figure 8-43. Highlight on Digital Input Usage for Digital In 4, set to "Flow Switch".

Digital Input Usage – Flow Switch: Figure 8-43 shows the fourth Digital Input again, but now with the "Flow Switch" Usage selected. This is another "binary" or "two state" Digital Input use, but specially designed for simple Flow Switches.

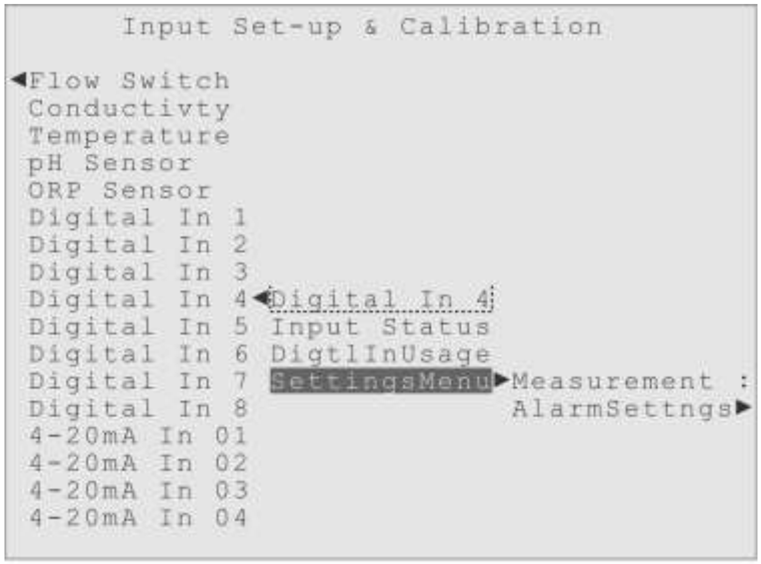


Figure 8-44. Highlight on Settings Menu, for "Flow Switch" Digital Input Usage.

The Flow Switch Usage is the simplest Digital Input Usage. This usage will only recognize two "states" or conditions of the simple Flow Switch connected to it. The "closed" or “high” condition is always considered to indicate “Flow On”, while the "open" or “low” condition is always interpreted as “Flow Off !!”. Unlike the General Purpose Usage, the user cannot adjust what the “closed” and “open” conditions indicate about the flow condition.

Because this usage is so simplified, the Settings Menu consists of only a Measurement display, and an Alarm Settings Menu for the one alarm condition for this usage, the NoFlow Alarm associated with the “No Flow !!” status. (Figure 8-44)

Measurement: Like all Measurement display menus, this shows a “live” displays of the current “measurement” from the Flow Switch. And like the Modbus Flow Switch these are text measurements: “Flow On” or “Flow Off !!”. No adjustments can be made in this menu; it is for display only.

Alarm Settings: There only one alarm condition for a Flow Switch Digital Input, the NoFlow Alarm explained above. It has the standard submenus, explained below.

Alarm Delay: This Alarm Delay menu gives the user an optional Alarm Delay setting for this alarm, used to prevent transient, momentary problems from triggering the Alarm condition. The time entered here is how long the potential alarm condition must persist before the Alarm is actually initiated. An Alarm Delay of zero (0) minutes is the factory default for a Flow Switch.

AlarmActions (Alarm Actions): This menu appears just below the Alarm Delay menu, and has the usual list of Alarm Actions that the user can modify, to control what happens if an Alarm occurs. By default, the Alarm lamp on the controller's front panel is set to turn on. The only Relay that is set to turn on is the Alarm Relay. However, unlike most other Inputs, Lockouts are set on all Pump Relays when a NoFlow Alarm occurs. The option to send alarm emails is active by default, but it will not actually do anything useful until email addresses have been entered in the NetwrkConfig menu by the user.

The 4-20 mA Analog Inputs

Any Triton water treatment Controller can be equipped with up to three optional 4-20 mA Input or Output boards. Each of the three boards can be equipped with two or four 4-20 milliamp (mA) analog Inputs or two or four 4-20 mA analog Outputs.

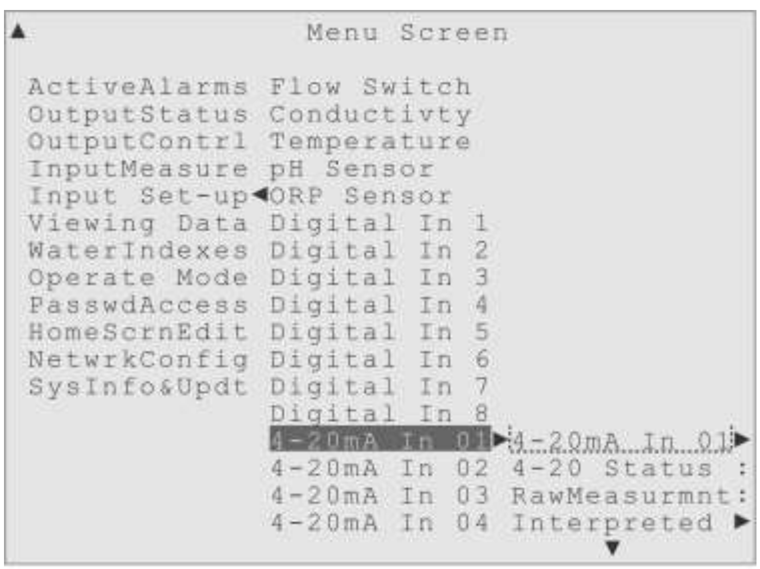


Figure 8-45. Highlight on Input Set-up, for "4-20mA In 01".

The following text will examine the 4-20 mA Inputs, see the Output Control chapter in this Reference Manual for a detailed description of the 4-20 mA Outputs.

The 4-20 mA Inputs are very simple input "sensors". They merely "monitor" the changes in current (amperage) that occur on the circuit they are connected to, and allow the user to "interpret" those changes as measurements of some phenomena occurring outside of the controller. As well as interpreting the amperage changes, the user can also set levels for a "High Alarm" and "Low Alarm" condition, and control what happens if either of those Alarms occur. Figure 8-45 shows the submenus for the first of these Inputs.

(Custom Name): Still using the factory default name "4-20mA In 01" in Figure 8-45. Any 12-character name can be assigned by the user, and the custom name will be used throughout the menus. A well-chosen name can make the Input's function clear. For example, a 4-20 mA input monitoring chiller temperature might be more recognizable with a custom name "Chiller Temp", instead of the default name "4-20mA In 01".

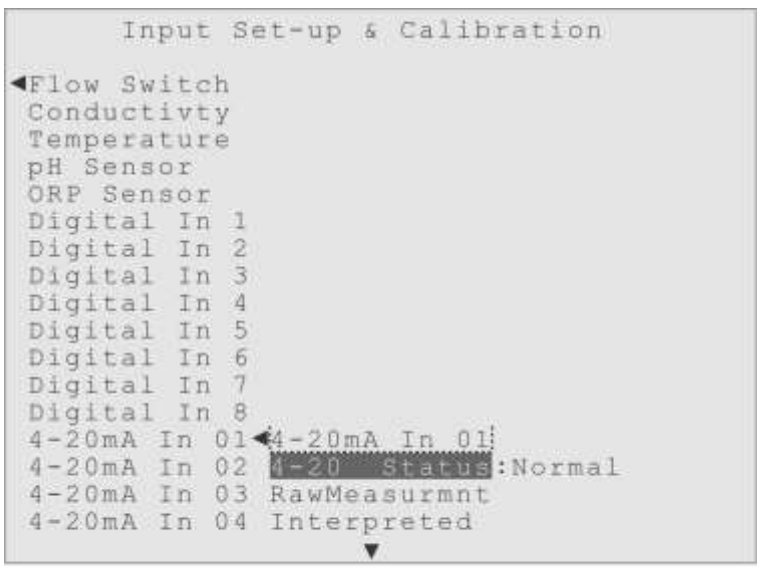


Figure 8-46. Highlight on the Status display menu, for 4-20mA In 01.

Status (Current Input Status)

As shown in Figure 8-46, this is a live display of the status of this Input, for reference. A 4-20 mA Input will display one of the following four status codes:

- Normal: When the input is within 4-20 mA, with no Alarm limits violated.
- High Alarm: If the interpreted value exceeds the High Alarm setting.
- Low Alarm: If the interpreted value falls below the Low Alarm setting.
- Sensor Error: If the input goes outside of the 4-20 mA range, or the sensor fails.

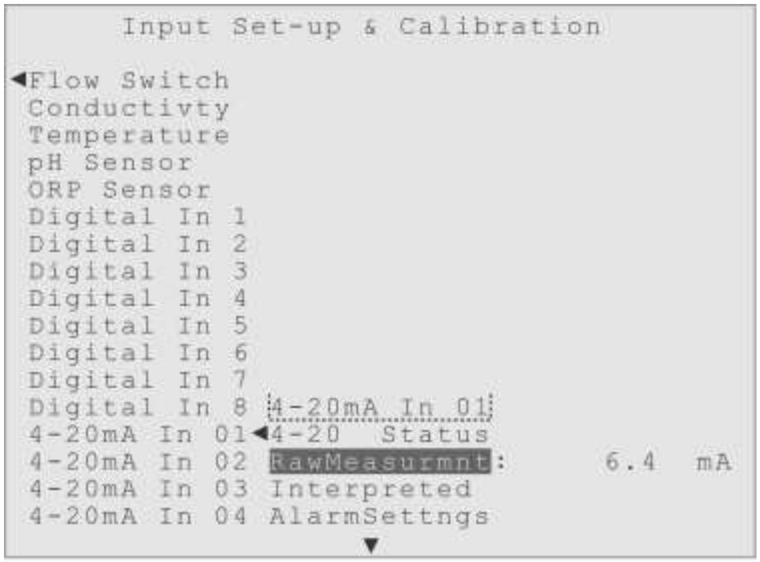


Figure 8-47. Highlight on the Raw Measurement menu, for 4-20mA In 01.

RawMeasurmnt (Raw Measurement)

A live display of the raw measurement being seen by this input, in milliamps (mA). As shown in Figure 8-47, 4-20mA In 01 is "seeing" an incoming amperage of 6.4 mA. This display can be very handy when trouble-shooting a problem, or checking the raw amperage changes against the changes in the Interpreted Measurement display.

Interpreted (Interpreted Measurement)

In this menu the user defines the value and the unit text. As shown in Figure 8-48, the 6.4 mA raw measurement has been interpreted by the user settings to indicate 15.0 Grm.

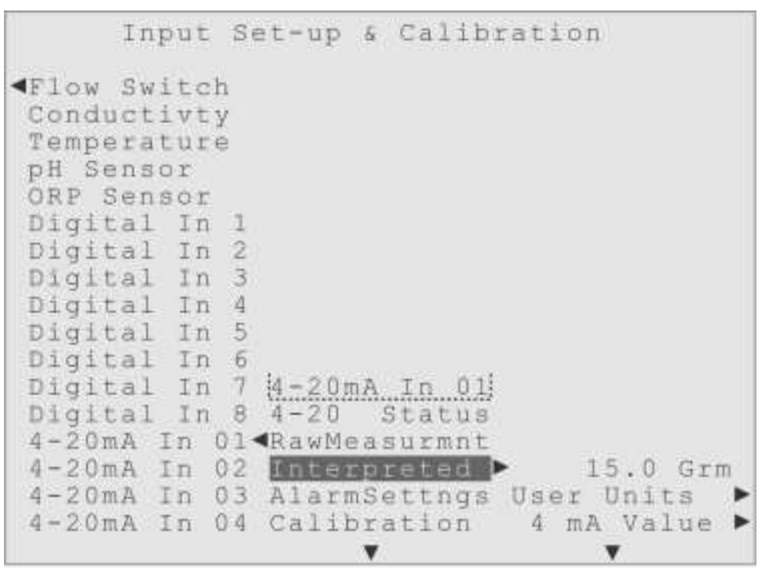


Figure 8-48. Highlight on the Interpreted Measurement menu, for 4-20mA In 01.

The user controls this Interpreted Measurement, both the value and the unit display, by using the submenus shown to the right of the Interpreted menu item.

15.0 Grm: The first submenu item, displaying "15.0 Grm" in Figure 8-48, is the "live" calculated value for the Interpreted Measurement. It is not editable (no "input tray") but its value and units come from the settings made in the menus that follow.

User Units: This is where the user defines the 3 character "units" for the Interpreted Measurement (Figure 8-49). The factory default unit is " mA", so in the example the user must have used the Set New Name menu to change the User Units to "Grm".

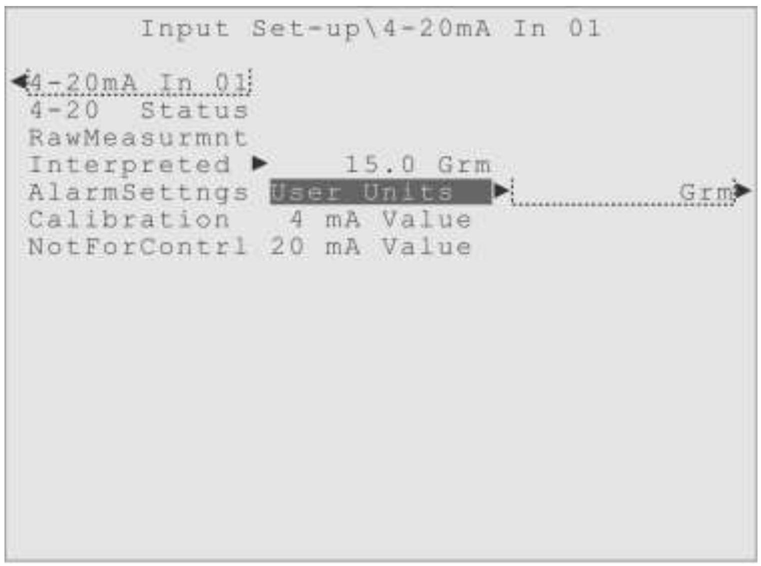


Figure 8-49. Highlight on the Interpreted Measurement sub-menu, User Units.

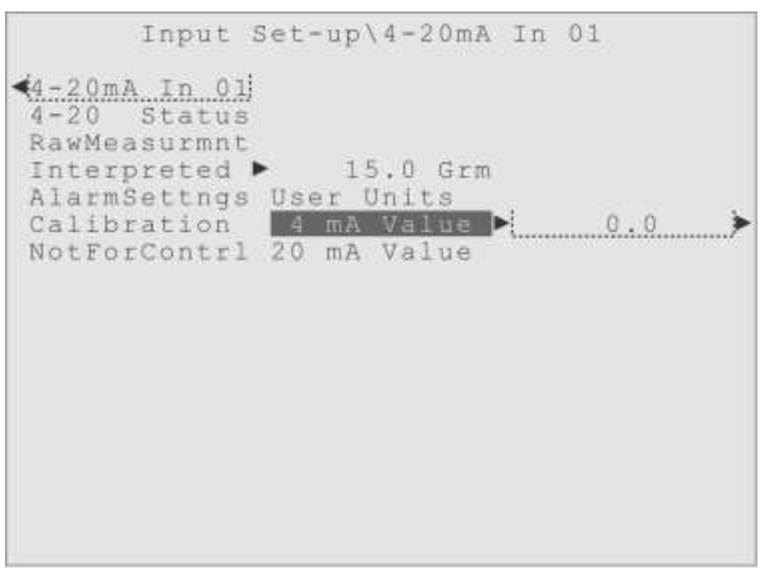


Figure 8-50. Highlight on the Interpreted Measurement sub-menu, 4 mA Value.

4 mA Value: This Interpreted Measurement submenu is where the user defines the value that should be "assigned" to the 4 mA amperage reading. Since 4 mA is the bottom of this Input's sensing range, usually the lowest value for the Interpreted Measurement is entered here, such as the zero (0.0) value shown in Figure 8-50.

20 mA Value: The next Interpreted Measurement submenu is where the user defines the value that should be "assigned" to the 20 mA amperage reading. Since 20 mA is the top of this Input's sensing range, the user should enter the highest expected value for the Interpreted Measurement here.

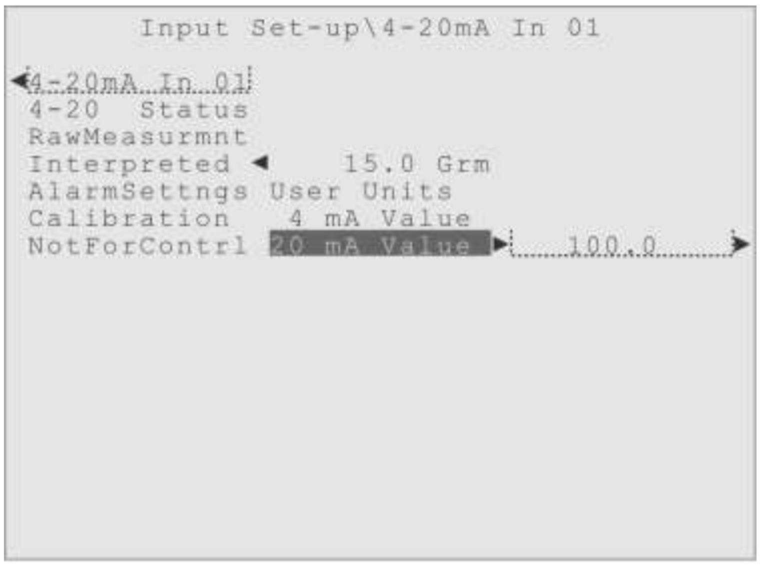


Figure 8-51. Highlight on the Interpreted Measurement sub-menu, 20 mA Value.

Entering too low a value could result in false "out-of-range" alarms, so be sure the value entered is the maximum expected value for the device the 4-20 mA Input is monitoring.

In Figure 8-51, a value of 100 can be seen as the 20 mA Value setting. If one were to "do the math", the settings used in the examples above would "interpret" the "6.4 mA" raw measurement into the "15.0 Grm" interpreted measurement, shown in Figure 8-51.

AlarmSettngs (Alarm Settings)

Now going back to the main menus for this 4-20 mA input, the next item to describe is the Alarm Settings menu (Figure 8-52). Like for most inputs, there are submenus where the user defines the High and Low Alarm values and for controlling what Alarm Actions should take place if either of those alarms, or a Sensor Error, should occur.

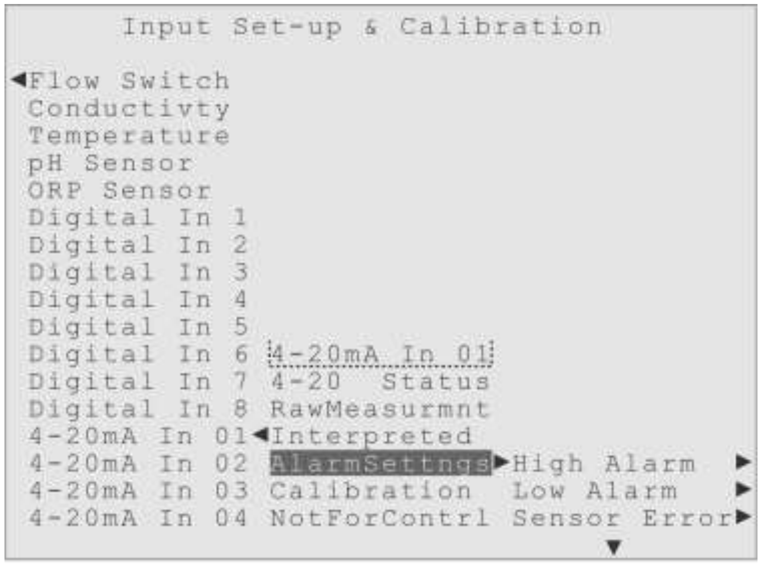


Figure 8-52. Highlight on the Alarm Settings menu, for 4-20mA In 01.

When setting Alarms for a 4-20 mA Input, like the High Alarm shown in Figure 8-53, it is important to understand that the Interpreted Measurement values are what are used for these definitions, not the raw mA measurements.

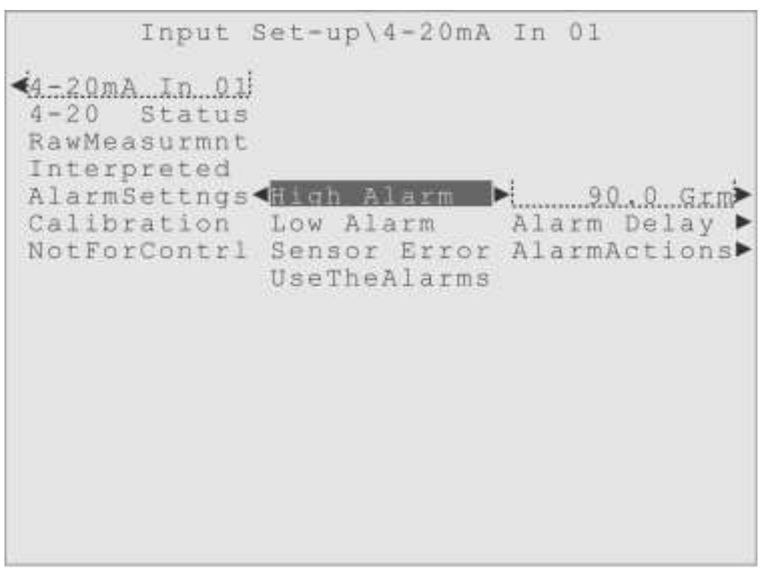


Figure 8-53. Highlight on the High Alarm menu, for 4-20mA In 01.

The user-defined "units" are displayed inside the "input tray" for the alarm setting value, as a reminder that an Interpreted Measurement value is being used for this definition.

The optional Alarm Delay and the Alarm Actions menus are the standard Alarm control menus that have been explained before. The Alarm Delay menu lets the user set an optional time that a condition must persist before an Alarm occurs, to prevent momentary measurement spikes or signal transients from setting off false alarms. The Alarm Actions menu is where the user decides what should happen if the Alarm occurs; light the front panel Alarm lamp, Activate or Lockout Relays, and have the controller send alarm emails.

The Low Alarm menu has the same submenus and functions as the High Alarm menu. The Sensor Error menu has no value settings, as this alarm happens "automatically" if the input starts reporting values out-of-range or if the controller detects the input sensor has failed. It does have the usual Alarm Delay menu and the Alarm Actions menus where the user can light the front panel Alarm lamp, Activate or Lockout Relays, and have the controller send alarm emails, if a Sensor Error occurs.

The “UseTheAlarms” menu item, as always, is the “activator” for all three alarms, and must be selected to have the menu settings made in the three previous menus take effect. The user should make their Alarm settings in the previous menus, and then highlight the UseTheAlarms menu item and press the Enter key to activate the Alarms. The “active box” will be drawn around the UseTheAlarms menu item to show it has been selected.

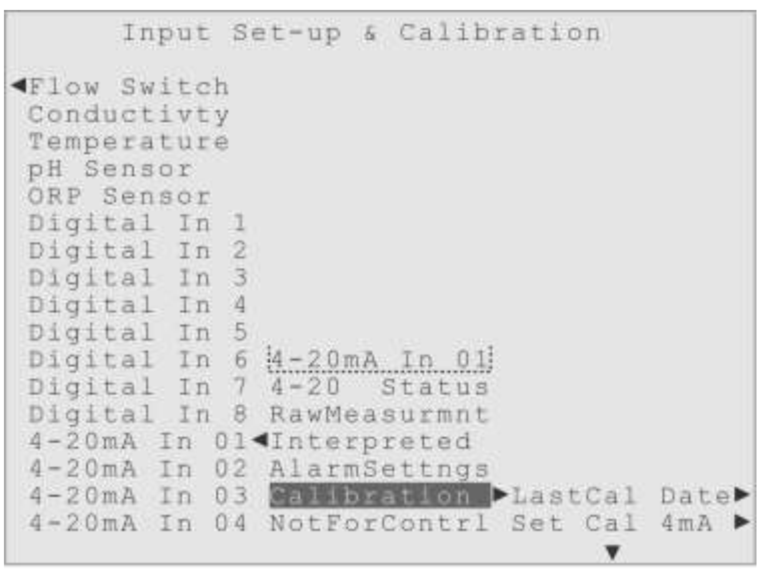


Figure 8-54. Highlight on the Calibration menu, for 4-20mA In 01.

Calibration

The Calibration menus for the 4-20 mA inputs are designed for factory calibration, not for field use. A very accurate reference current (amperage) must be supplied to the controller, at either 4 mA or 20 mA precisely, and then the input measurement can be adjusted to match the reference (Figure 8-54). If a user attempts to employ these menus with bad results, they can use the Reset Cal menu item to restore factory default values.

LastCal Date: The Date of Last Calibration (LastCal Date) submenu displays the date upon which the last successful calibration was performed.

NotForContrl (Not For Control)

The last menu item for a 4-20 mA Input is the handy "Not For Control" option (Figure 8-56). Selecting this menu item would remove the Digital Input from all the Output Control menus, preventing the Digital Input from being used to control an output relay. It would still be listed here in the Input Set-up menu so it can be used to monitor the water quality, have the user set alarms, and have the input's measurements stored in the Data Log.

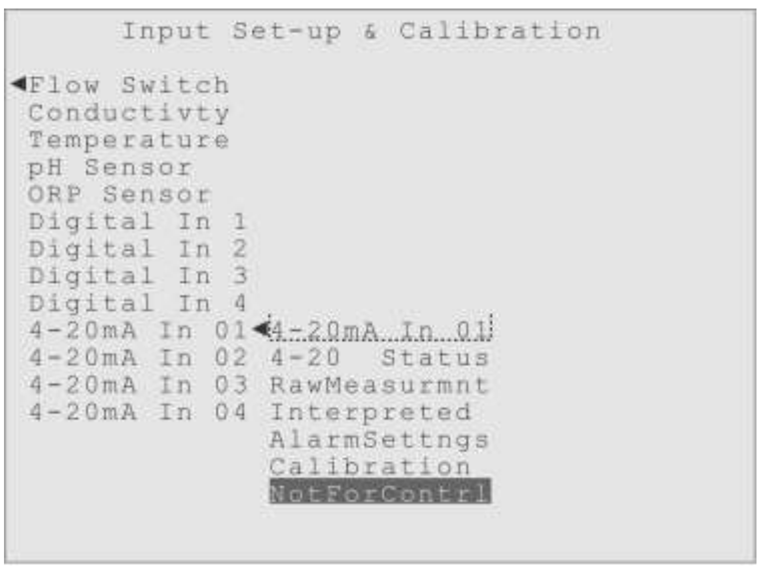


Figure 8-56. Highlight on "NotForContrl", for 4-20mA In 01.

9 Viewing Data

Overview

The concept of data history, the recording of a water treatment controller's measurements and performance, is becoming more and more important every year. Having detailed records of sensor measurements and controller actions can be invaluable in keeping old customers, winning new customers, and can provide information about whether a problem was caused by an action or inaction of the water treatment controller.

USB Data Stick vs. Ethernet connection

If the user is at the site where the controller is installed, the simplest way to download the data history is to insert a USB Data Stick (or "Thumb Drive") into the larger of the two front panel USB ports, the “Type A” USB port. That will automatically bring up the password dialog, and once authorized, automatically download the System Activity Log and the Data Logs to the USB drive.

But the Triton controller can also send the logs as an attachment to an email, over an Ethernet connection. There is even an Auto-Download option that can periodically send the logs to three different email addresses, automatically!

Yet another way the user can examine the stored data is at the front panel of the controller using the Viewing Data menu, as explained below. (See Figure 9-1)

System Activity Log and the Data Logs

There are two different kinds of "log files" kept by the Triton controller. There is the "System Activity Log" and then there is a "Data Log" associated with every Input and Output installed.

System Activity Log: This log contains a comprehensive record of all the "activity" that occurs on the Triton controller: every login attempt, every alarm condition, and every changes made to any settings, even preserving the “before” and “after” values!

The Triton System Activity Log also records what the setting was before and after the change, so if a change was made in error, the user has a record of what the setting was before the change!

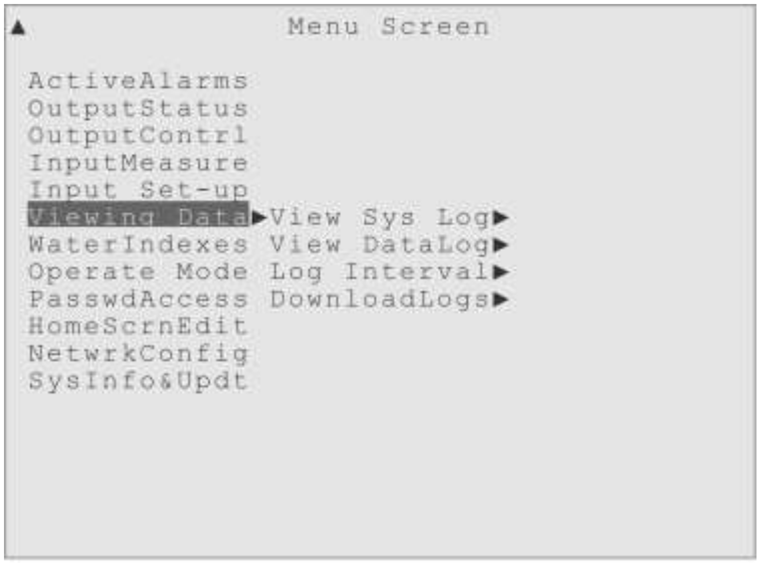


Figure 9-1. Highlight on the Viewing Data menu.

Figure 9-2 shows the two submenus related to the System Activity Log, one to view the System Activity Log (**View Sys Log**) on the front panel display and the other, down at the bottom of the list, to download the log (**DownloadLogs**), which is explained later in this section.

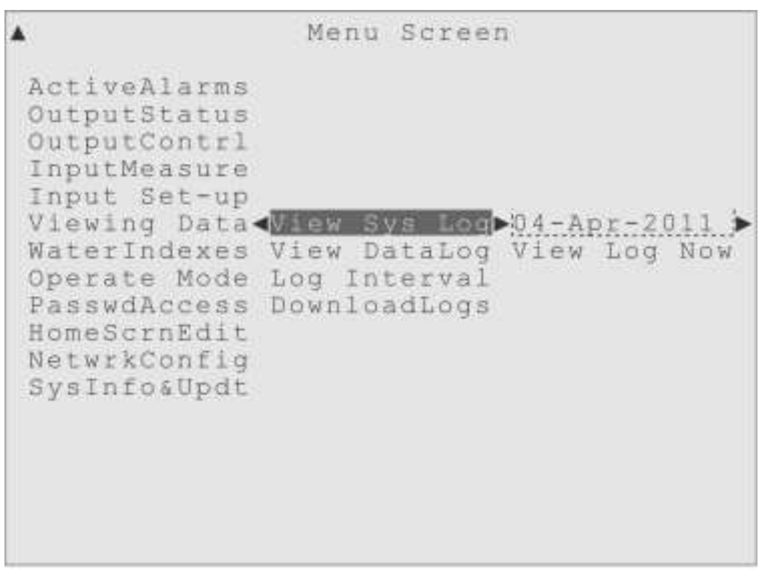


Figure 9-2. Highlight on the Viewing Data, View Sys Log menu.

View Sys Log (View System Activity Log): The first submenu under View Sys Log is a date, and then a menu item used to display the data for that date. The current date is the default date entry. The user first selects the date they want to see the data for, then they highlight the “View Log Now” item and press Enter to see the data for that date.

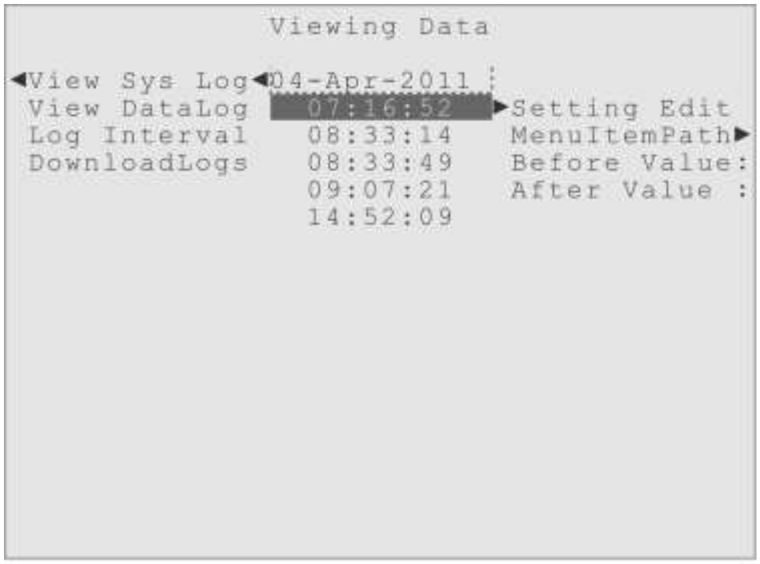


Figure 9-3. Highlight in the View Sys Log sub-menu, showing Date-Time entry style.

If there is more than one event for a particular date, they are listed by the time of day, as shown in Figure 9-3. Remember that the Triton controller uses a 24-hour clock for these time displays, where 00:00:00 is the beginning of the day, 12:00:00 is the middle of the day and 23:59:59 is the end of the day. To view a particular activity, the user can move the highlight to one of the times listed, and the submenus for that event will appear (Figure 9-3). The Triton controller has nine categories of system activity, and the submenus differ slightly from one type to another.

(ActivityType): The first submenu of every entry is always the "Activity Type" display item, that identifies the category of system activity, for that entry. There are several different Activity Type categories for recording the System Activity of the controller. And the menu items below the Activity Type change depending on the activity. The example shown in Figure 9-3 has the "Setting Edit" Activity Type, with the appropriate menu items, “MenuItemPath”, "Before Value" and "After Value", below it.

LoginAttempt (Login Attempt)
A record of each appearance of the password screen and what happened on it.
Menus: **Access Level** - shows what Access level was granted, after a proper password

was entered, if one is entered. The level is indicated by either Admin Level, User Level 1, User Level 2, Read Only or No Access !!.

Pswrd Entry (Password Entry) stores the characters that were entered for this password entry attempt. If user has Admin level access, the actual characters are shown, otherwise just asterisks are shown.

Pswrd Result (Password Entry Result): Good Passwrd or Bad Password.

Auto-Logout

An entry showing when the controller did its "auto-logout" due to inactivity.

Menu: **MenuItemPath** - Identifies what menu item was highlighted when the log-out occurred. A list of menu items is displayed, showing the "path" to the menu item being identified.

Setting Edit (Setting Change)

A record of any setting change made to any setting. (Change must be "successful".)

Menus: **MenuItemPath** - Identifies the "change location" by showing the menu item whose value was altered. A list of menu items showing the "path" to the menu item being identified.

Before Value - Display of setting value before the change made.

After Value - Display of setting value after the change was made.

Alarm - User (Alarm - User Defined)

A record of anytime something exceeds a user alarm setting. Could be a High or Low Alarm on a Sensor Input, a Limit Timer Alarm for an Output, and so forth.

Menus: **MenuItemPath** - Identifies the "alarm location" by showing the menu item whose setting was violated. A list of menu items showing the "path" to the menu item being identified.

AlarmSetting - The user defined alarm value that was violated.

ValueAtAlarm - The value at the time the Alarm occurred. Depending on the Alarm Delay setting, this value could differ significantly from the Alarm Setting value, and the difference could be informative!

Alarm - Auto (Alarm - Automated)

A record of anytime an Alarm occurs that is not a violation of a user definition. Like a Sensor Error or Power Failure (and power restoration, even though it’s not an alarm).

Menu: **MenuItemPath** - For these Alarms, the appropriate menu item is identified to show which Alarm is being recorded. A list of menu items showing the "path" to the item being identified. Since there is no menu item for power restoration, just the text “PowerRestore” is used to identify that event.

AlarmCleared (Alarm Cleared)

A record made when any Alarm is cleared.

Menu: **MenuItemPath** - Identifies the Alarm that was cleared. Corresponds to an entry for one of the two Alarms explained just above. A list of menu items showing the "path" to the item being identified.

New Device (New Device Added)

A record made whenever a new Input or Output is detected on the Modbus network.

Menu: **MenuItemPath** - Identifies the new device, by displaying a list of menu items that show the "path" to the new device.

DeviceRemovd (Device Removed)

A record made whenever an Input or Output is removed from the Modbus network.

Menu: **MenuItemPath** - Identifies what device was removed, by displaying a list of menu items, showing the "path" to the menu item for the device, as it appeared before it was removed.

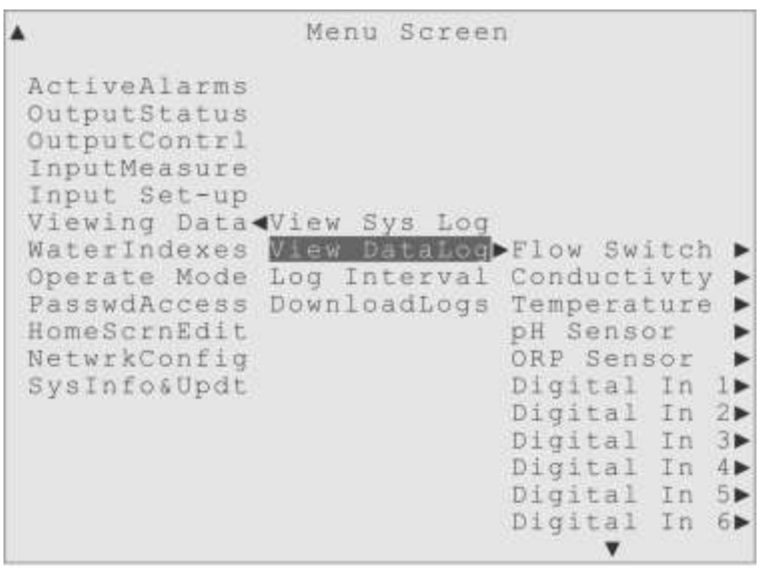


Figure 9-4. Highlight on the Viewing Data, View DataLog menu.

View DataLog: The user can look at the contents of any data log, on the front panel display of the controller, by using the View Data Log menu.

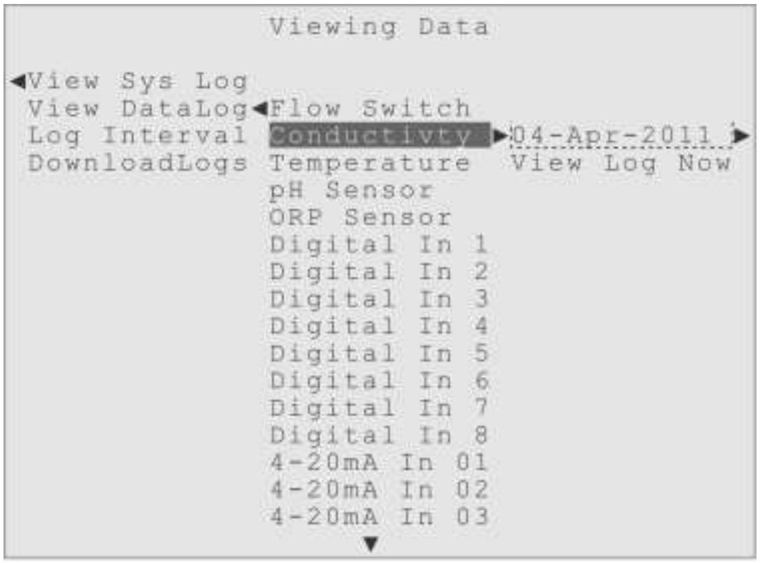


Figure 9-5. Highlight on View DataLog\Conductivty, showing date entry item.

The first submenu of the View Data Log menu is a list of every Input and Output installed, as shown in Figure 9-4. Inputs are listed first, in the order they appear in the Input Set-up menu, then Outputs in the order they appear in the Output Control menu.

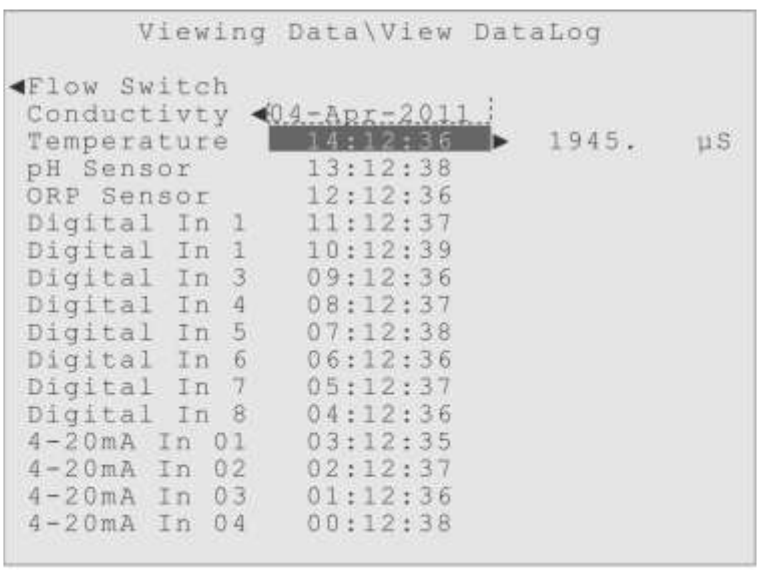


Figure 9-6. Highlight on Conductivty 04-Apr-2011, 2:12 pm entry.

When the highlight is moved to a particular device, as shown in Figure 9-5, the first submenu is a date entry field, and then a menu item used to display the data for that date.

The current date is the default date entry. The user first selects the date they want to see the data for, then highlight the “View Log Now” item and press Enter to see the data.

If there is more than one data entry for a particular date, the times are listed below the date, along with the data for that log entry, as shown in Figure 9-6. The user can simply move the highlight up or down to display any data log entry.

The next menu, after the "View Data Log" item, is a menu for setting the "Log Interval" that is used to define when sensor data is logged.

Log Interval: The sensor logging interval is used with all the sensor style Inputs (which includes some of the Digital Input usages) and the optional 4-20 mA Outputs. Since these devices provide continuous measurements that may be constantly changing, their measurements are recorded periodically, at a fixed time interval (the Log Interval) as defined by the user in this menu.

The default interval is 30-minutes, but the user can set the interval from one minute to 1440 minutes (once a day). There are enough memory locations to provide over 45 days worth of data recording for each and every device, using a log interval of 30-minutes.

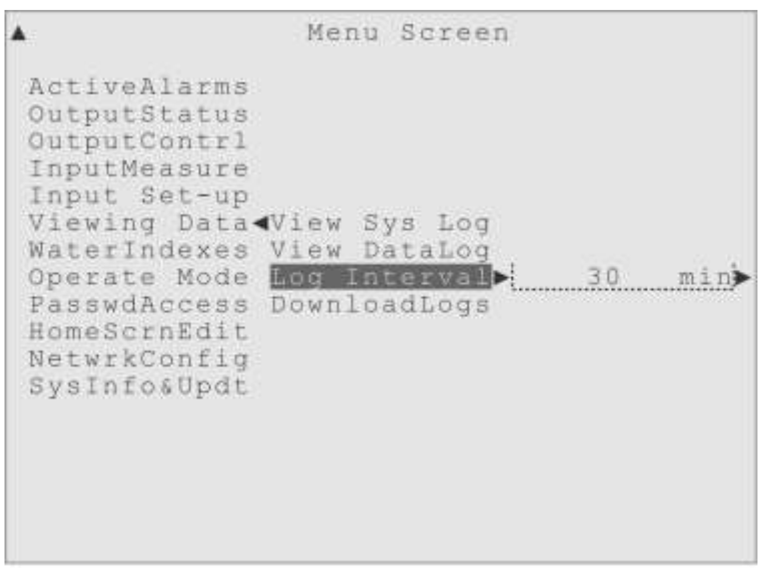


Figure 9-7. Highlight on Log Interval menu, showing the input tray and default value.

The example shown in Figure 9-7 shows the "input tray" for the user definition of the Sensor Logging Interval, with its factory default setting of 30-minutes. There is the usual

Edit Value submenu for changing the interval. The interval can be set from one minute to as much as 1440 minutes (24 hours). All the sensor style devices use this one same interval; it is not possible to use different intervals with different sensors.

Besides the "sensor style" Inputs and the 4-20 mA Outputs, there are also "two state" devices like the Flow Switch, some of the Digital Input Usages and the Relay Outputs. These devices do not provide continuous measurements that change constantly, but rather have only two "states" that they can be in, like "Flow On" and "Flow Off !!".

Therefore entries to the Data Log for these "two state" types of devices are "event driven" rather than periodic. Instead of using the Log Interval, a log entry is made for these devices whenever they change state. For the Relay Outputs for example, a log entry is made each time they activate and each time they deactivate.

DownloadLogs: This menu, shown in Figure 9-8, is used to either 1) email logs using the Ethernet connection, or 2) download logs to a USB drive plugged into the controller.

The user would move the highlight to one of first two submenus, “**Via Email**” or “**To USB Drive**”, depending on whether they want the logs sent out as an attachment to an email, or if they want to download the logs to a USB drive plugged into the front panel of the controller.

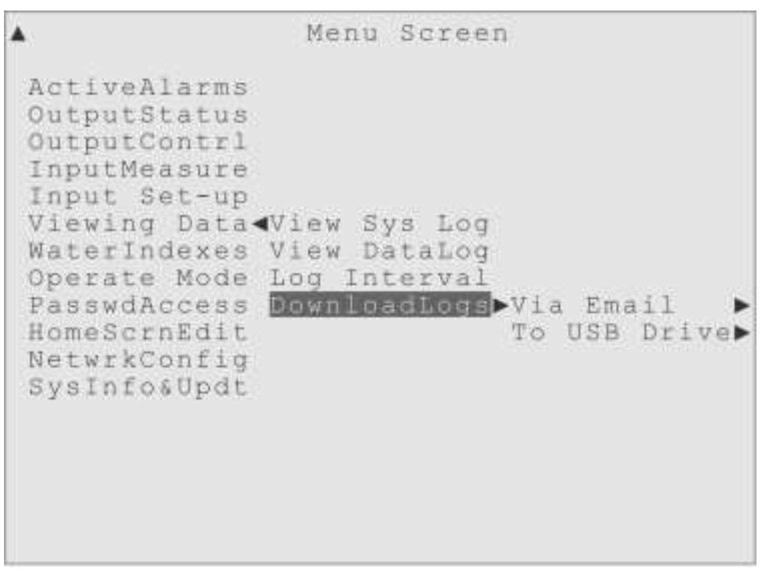


Figure 9-8. Highlight on the Viewing Data, DownloadLogs menu.

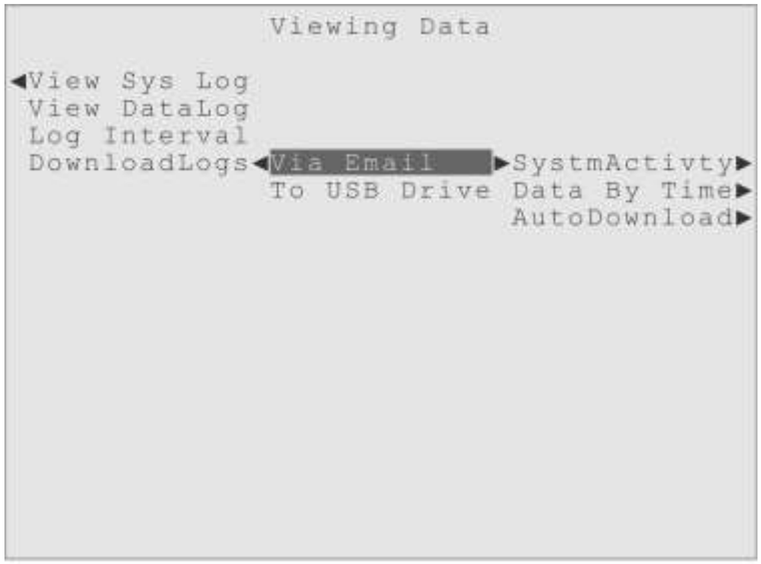


Figure 9-9. Highlight on the Viewing Data, DownloadLogs, Via Email menu.

Via Email: Under the “Via Email” menu are three submenus, shown in Figure 9-9. The first two can immediately email a log to up to three email addresses, while the third submenu is for setting up a periodic, automatic data download via email. The email addresses are defined in the “NetwrkConfig” menu, in the “Dwnld Emails” submenu.

Figure 9-10. Highlight on the SystmActivty menu, showing Download Now.

SystmActivty: This first submenu allows the user to email the System Activity Log immediately to up to three email addresses, assuming the controller is connected to an Ethernet connection and that all the appropriate IP settings and email addresses have been configured properly in the NetwrkConfig menu.

Figure 9-11. The dialog indicating the System Activity Log has been emailed.

There is only one submenu for the SystmActivty menu, the Download Now item, as shown in Figure 9-11. To email the System Activity Log the user simply highlights the Download Now menu item and presses the Enter key. First, a message window will appear indicating the log file is being generated, and then a second dialog will appear, indicating the email has been sent. The user would press Enter to get back to the menus.

Figure 9-12. Highlight on the Data By Time menu, showing Download Now.

Data By Time: The second Via Email submenu item (Figure 9-12) allows the user to manually email the “By Time” formatted Data Log, assuming the controller is connected to an Ethernet connection and that all the appropriate IP settings and email addresses have been configured properly in the NetwrkConfig menu. This “By Time” data log is in a common format, a “flat database” comma separated variable (.csv) file, compatible with most third party data acquisition systems, such as LXF’s Track 3.

There is only one submenu, “Download Now”. To email the “By Time” formatted Data Log the user simply highlights the Download Now menu item and presses the Enter key. The user would see a message that the data log is being generated, and then a dialog that indicates the email was sent.

AutoDownload: Instead of the immediate, manual operations described above, the last of the Via Email submenus is the AutoDownload menu (shown in Figure 9-13). This menu is for setting up an automatic, periodic download of either or both of the log files, sent to up to three email addresses.

For this feature to work however, the Triton controller must be connected to an Ethernet network, and all the appropriate settings and email addresses must be properly defined, since the logs are sent as an attachment to an email. (The IP settings and email addresses are entered by the user in the Network Configuration menus, described later in this Reference Manual.)

Figure 9-13. Highlight on DownloadLogs, Via Email, AutoDownload menu.

Select Logs: The first AutoDownload submenu allows to user to select which of the logs they want included in the automatic download, the System Activity Log, the “By Time” Data Log, or both. The user can simply highlight the menu item for the log they want downloaded and press Enter. When a log has been selected the "active box" is drawn around the menu item, and the AutoDownload menu item will also become selected, to show this feature is now active, as shown in Figure 9-14.

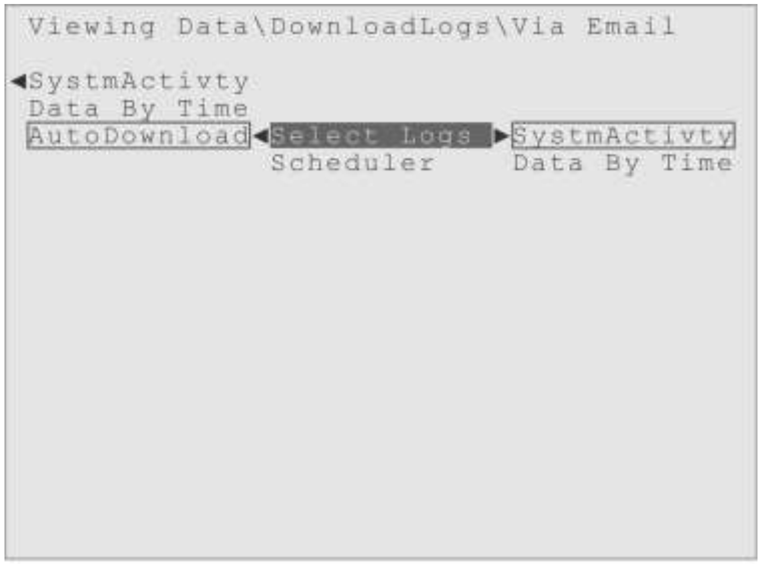


Figure 9-14. Highlight on Select Logs, after one log selected, with AutoDownload “active”.

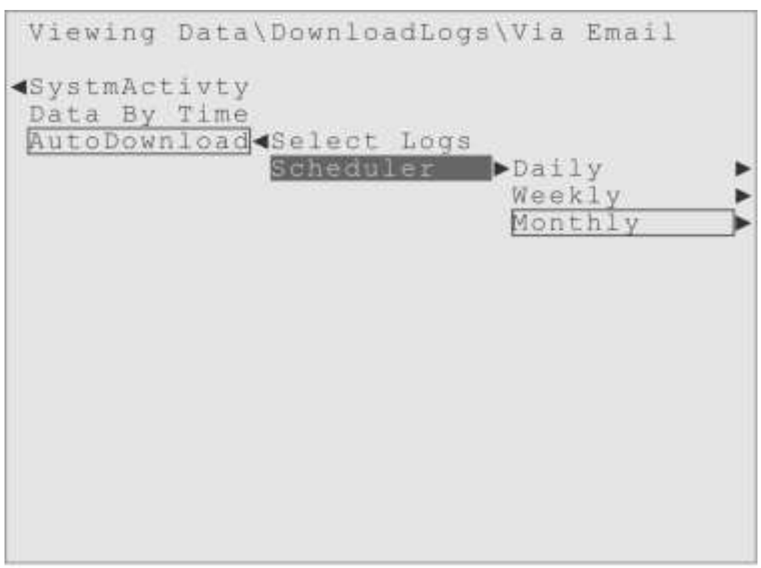


Figure 9-15. Highlight on Scheduler, with its three sub-menus. Monthly is active by default.

Scheduler: This AutoDownload submenu is where the user defines what "period" with which they want the logs downloaded. As shown in Figure 9-15, the default setting is to have the logs sent once a month, but they can also choose to have the logs automatically emailed once a week or once a day. (Remember that the user would also have to select at least one of the logs to be downloaded, as described above, for the settings made in the Scheduler menu to have any effect.)

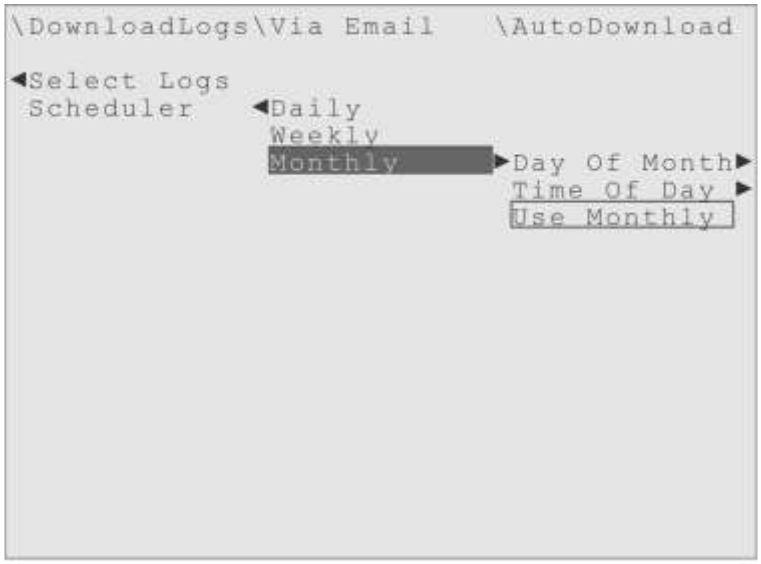


Figure 9-16. Highlight on the Monthly option of the Scheduler, showing its sub-menus.

In the "Daily" menu the user can define the time of day they would like the logs to be sent each day. The standard 24 hour clock is used for this definition, with 00:00 being the beginning of each day, 12:00 being midday and 23:59 indicating the end of the day.

This pattern continues in the "Weekly" menu, where the user can choose the day of the week (Sunday-Saturday), as well as the time on that day, when the logs will be sent to the user-defined email address.

The last choice is the Monthly cycle, which is selected by default, indicated by the "active box" in Figure 9-15. In the "Day Of Month" submenu, shown in Figure 9-16, the user defines what day of each month they want the logs sent, limited to 1-28 to maintain consistency. In the "Time Of Day" submenu they can define what time of that day the logs should be sent, using the standard 24 hour clock. The factory default settings are the first day of the month, first thing in the morning (Day = 1, Time = 00:00).

To USB Drive: These menus allow a user to download either or both of the log files to a USB drive that is plugged into the USB Type A port on the front panel of the controller. Under the “To USB Drive” menu are two simple submenus, shown in Figure 9-17. The first one can download the System Activity Log, while the second submenu can download the “By Time” formatted Data Log.

Figure 9-17. Highlight on “To USB Drive”, under the Viewing Data\DownloadLogs menus.

SystmActivty: This first submenu allows the user to download the System Activity Log to a USB drive that is plugged into the front panel of the controller. After inserting a USB drive into the larger USB Type A port on the front panel of the controller, the user can highlight a “Download Now” sub-menu item and press Enter to start the download.

First there will be a message window that indicates that the System Activity Log is being generated, and then a second message will appear as the log is being downloaded, warning the user not to remove the USB drive until the download is complete, as shown in Figure 9-18.

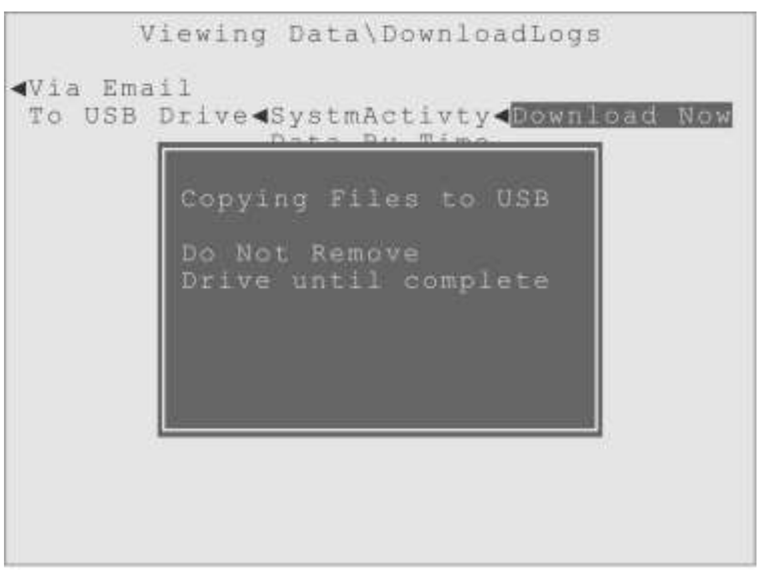


Figure 9-18. A download of the System Activity log, in progress.

Figure 9-19. Highlight on the Data By Time menu, showing Download Now.

Data By Time: The second submenu under the “To USB Drive” menu, shown in Figure 91-9, allows the user to manually download the “By Time” formatted Data Log to a USB Drive plugged into the USB Type A port on the front panel of the controller. This “By Time” data log is in a common format, a “flat database” comma separated variable (.csv) file, compatible with most third party data acquisition systems, such as LXF’s Track 3.

Figure 9-20. The message that the data log is being generated.

To start the download the user simply highlights the Download Now sub-menu item and presses the Enter key. A message display, as shown in Figure 9-20, will indicate the data log is being generated **which may take a few minutes if the data log is full**. A second message will appear when the file is being downloaded, do not remove the USB drive until the second message, shown in Figure 9-21, disappears.

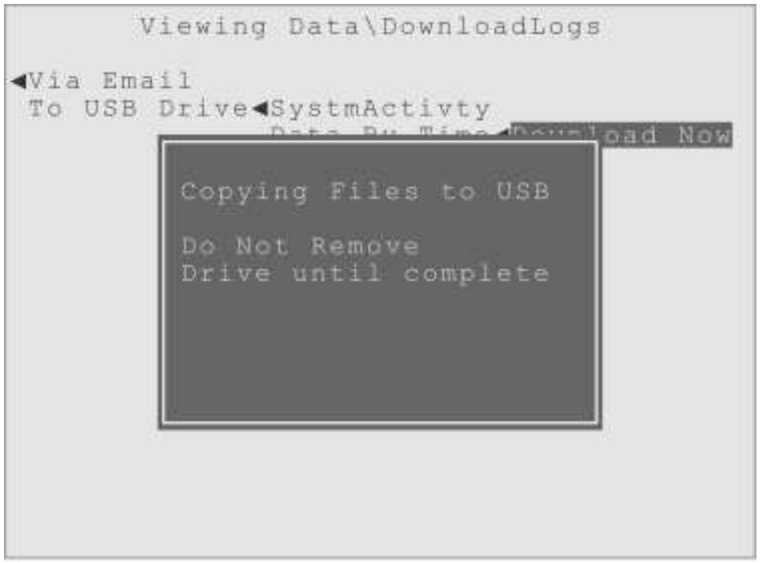


Figure 9-21. The message that the data log is being copied to the USB drive.

10 Output Status and Input Measure

Overview

Here is a list of the Menu Screen items for the Triton controller, and which preceding chapter of this Reference Manual has already described that menu:

ActiveAlarms - Chapter 7
OutputStatus
OutputContrl - Chapter 6
InputMeasure
Input Set-up - Chapter 8
Viewing Data - Chapter 9
WaterIndexes
Operate Mode - Chapter 5
PasswdAccess
HomeScrnEdit
NetwrkConfig
SysInfo&Updt

Before moving on to the Water Indexes menu, Password Access menu and so forth, this chapter will briefly describe the Output Status and Input Measurement (InputMeasure) menus, which are both simple reference displays with no control settings in them.

OutputStatus

This is the second menu displayed on the Menu Screen, as shown in Figure 10-1. It is just a reference display of every Output device, with their current status displayed next to each one. This menu is just an information display; no changes can be made here.

The first submenu of the Output Status menu item is a list of all the Outputs, displaying the Custom Name for convenience. To the right of each Output name is a "display item" that shows its current Status message. If a controller has so many Outputs installed that the list goes past the bottom of the display, the user can simply move the highlight into the list and scroll down using the Down Arrow until they can see the Output they wish. In the example shown in Figure 10-1 all the Outputs can be seen without scrolling.

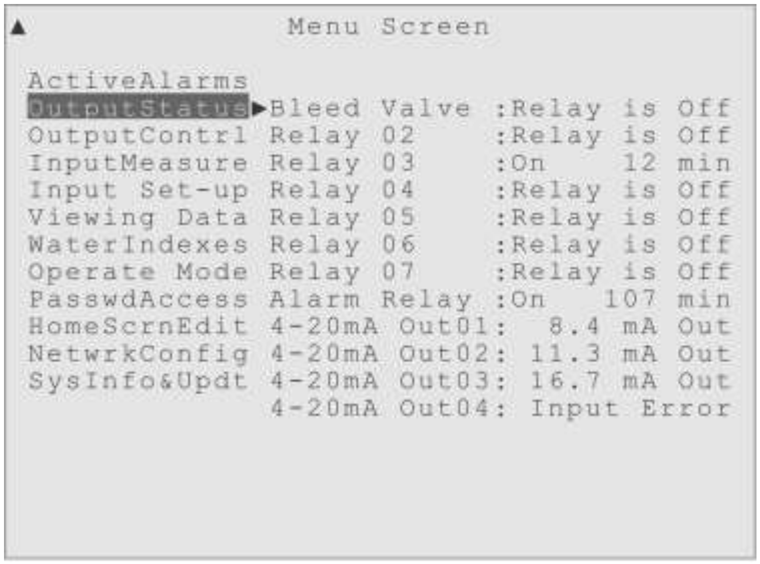


Figure 10-1. Highlight on OutputStatus menu, showing the list and status displays.

All Relays use one of the following Status displays:

"On: NNNN min"	Displays the total minutes of the relay's current activation.
"Relay is Off"	Indicates the relay is deactivated, normally.
"LkOut NN min"	Shows the relay is currently locked-out by some other control.
"OvrTimeLimit"	When the Limit Timer setting has been exceeded.
"Input Error"	Means the input that is controlling the relay has reported an error.
"Not In Use"	A usage setting that hides the relay from most menus.

The optional 4-20 mA outputs use one of the following Status displays:

"NN.N mA Out"	Displays the current output value in milliamps.
"Input Error"	Means the input to the 4-20 mA output is reporting an error.

InputMeasure

This menu is like the Output Status menu, but for the Inputs. It is a reference display of every Input, with their current measurement value displayed next to each Input. This menu is just an information display; no changes can be made here.

The first submenu of the InputMeasure menu item is a list of all the Inputs installed, displaying the Custom Name for convenience. To the right of each Input name is a "display item" that shows its current measurement value. If a controller has so many Inputs installed that the list goes past the bottom of the display, the user can simply move the highlight into the list and scroll down using the Down Arrow until they can see the Input they wish. In the example shown in Figure 10-2 not all the Inputs can be seen without scrolling, as some of the optional 4-20 mA Inputs have been installed.

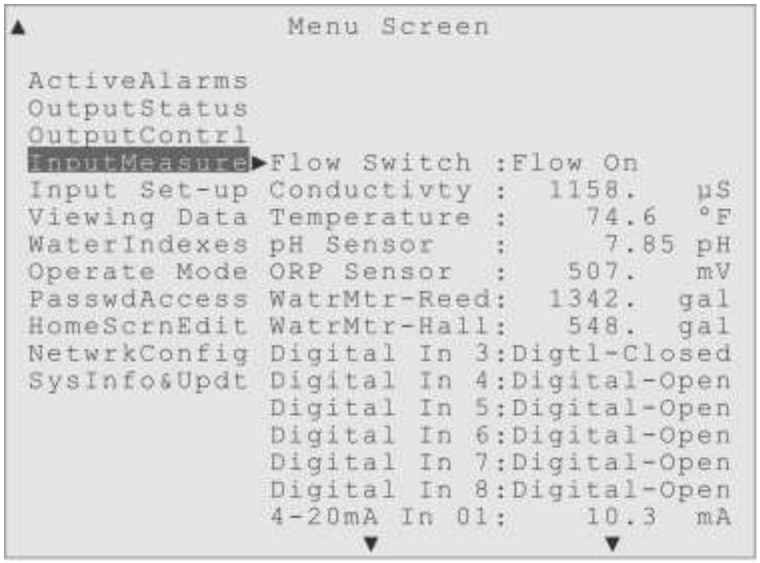


Figure 10-2. Highlight on InputMeasure menu, showing the list and value displays.

That is all there is to the Output Status and Input Measurement menus. They are just reference displays for the Outputs and Inputs, so the user can get a quick overall view of what is happening in their water treatment system.

Now the descriptions and explanations for the rest of the menus continue below, Water Indexes, Password Access, Home Screen Edit and so forth.

11 Water Condition Indexes

Overview

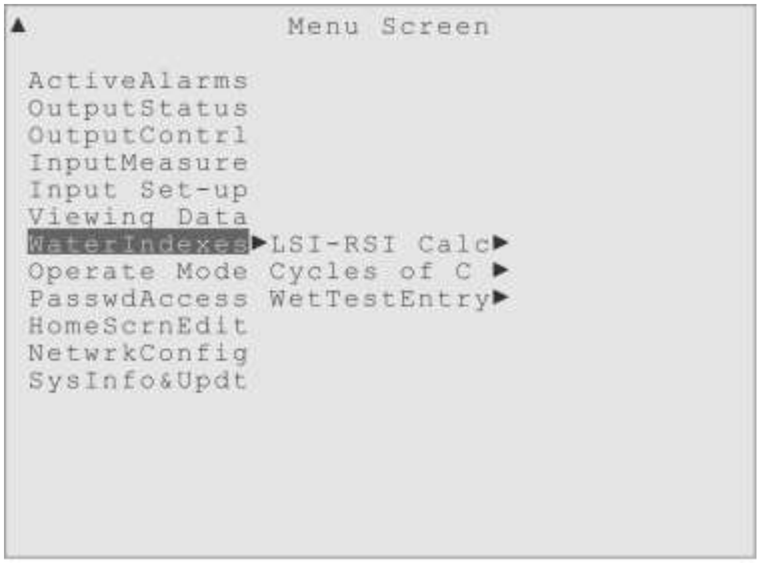


Figure 11-1. Highlight on the Water Indexes menu.

The Triton controller can calculate the following Indexes (shown in Figure 11-1):

Langelier Saturation Index (LSI Index)

Ryznar Stability Index (RSI Index)

Cycles of Concentration Value (Cycles of C)

These are three popular water condition "indexes" used in Cooling Tower Water Treatment. The first two (LSI and RSI) are focused on predicting scale formation, but give some insight into corrosion, especially if the pipes in the system are ferrous, made of iron. If the system includes significant sections of copper or cupronickel piping, the corrosion predicting value of these indexes is reduced.

Be careful with interpreting those two Indexes, however! The LSI and RSI calculations both require the results of manual "wet tests" on the system's water, and the results have to be entered into the controller before the Indexes can be properly calculated.

As the condition of the water changes over time, the Index displayed may no longer accurately reflect the water's quality. The indexes can only be considered good indicators of the water's quality when the results of manual wet tests are entered often and regularly. The controller displays the last date the results of a wet test were entered, to help you judge how useful the index is.

Cycles of Concentration is technically the amount of dissolved solids in the system water divided by the amount of dissolved solids in the make-up water, but more subjectively it is a measure of water re-use. The higher the "Cycles" value the more water is being reused, so the make-up water and chemical cost savings are greater.

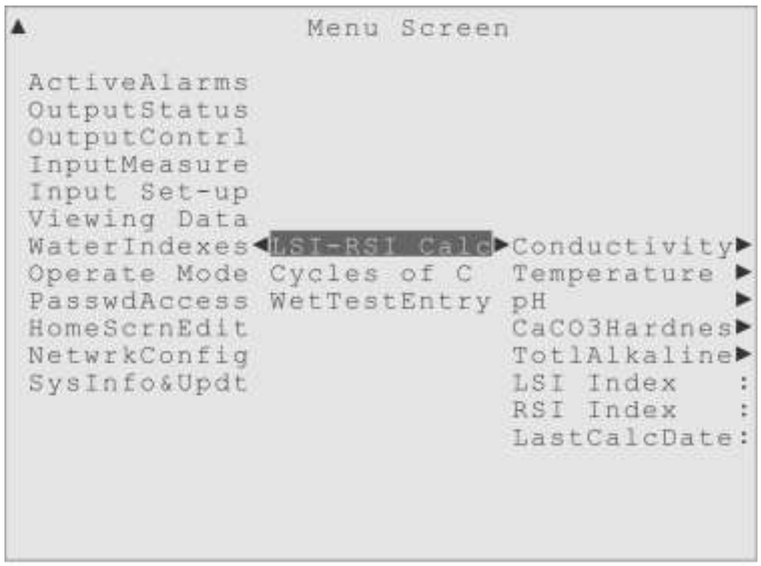


Figure 11-2. Highlight on the Water Indexes, LSI-RSI Calc menu.

LSI-RSI Calc:

Figure 11-2 shows the submenus of the LSI-RSI Calculations menu.

Conductivity: The first submenu is where the user must enter a Conductivity value for the index calculations. There are two submenus to the right of this item; the first is ValueForCalc, where the user enters the Conductivity value in micro-Siemens, and then a Sensor Value display item that shows the measurement from the first CTP Conductivity sensor for reference. The ValueForCalc Input Tray will display "* Expired *" until a value is entered, and changes back to the expired indicator when the value is more than two weeks old.

Temperature: The next submenu is where the user must enter a Temperature value for the index calculations. Just like the previous parameter, there is a ValueForCalc Input Tray where the user enters the Temperature value, and then a Sensor Value display item that shows the measurement from the first CTP Temperature sensor for reference. The ValueForCalc Input Tray will display "* Expired *" until a value is entered, and revert to the expired indicator when the value is older than two weeks.

pH: The third submenu is where the user must enter a pH value for the LSI and RSI index calculations. Like the previous parameters, there is a ValueForCalc Input Tray where the user enters the pH value, and a Sensor Value display item that will show the measurement from the first pH sensor, if installed, for reference. The ValueForCalc Input Tray will display "* Expired *" until a value is entered, and revert to the expired indicator when the value is more than two weeks old.

CaCO3Hardnes: This submenu is where the user must enter a Calcium Carbonate Hardness value, from a wet test they have performed on the system water. This parameter entry menu has only the ValueForCalc Input Tray, where the user enters the CaCo3Hardnes value. The Input Tray will display "* Expired *" until a value is entered, and revert to the expired indicator when the value is older than two weeks.

TotlAlkaline: This submenu is where the user must enter a Total Alkalinity value (as C_aCO^3), from a wet test they have performed on the system water. This parameter entry menu has only the ValueForCalc Input Tray, where the user enters the TotlAlkaline value. The Input Tray will display "* Expired *" until a value is entered, and revert to the expired indicator when the value is more than two weeks old.

LSI Index: This is the submenu that display the calculated LSI Index value. All the parameters must have values entered and be less than two weeks old, or the display will show as "* Expired *". Here are some typical interpretations for the LSI Index:

2.0	Scale forming but non-corrosive
0.5	Slight scale forming & corrosive
0.02	Balanced but possible pitting
-0.5	Slightly corrosive but no scale
-2.0	Serious corrosion

RSI Index: This submenu displays the calculated RSI Index value. All the parameters must have values entered and be less than two weeks old, or the display will show as "* Expired *". Some typical interpretations for the RSI Index are:

4.0 - 5.0	Heavy scale
5.0 - 6.0	Light scale
6.0 - 7.0	Little scale or corrosion
7.0 - 7.5	Corrosion significant
7.5 - 9.0	Heavy corrosion
> 9.0	Corrosion intolerable

Cycles of C (Cycles of Concentration)

The second submenu in the Water Indexes menu is for the "Cycles of Concentration" value. This menu item will only be useful if the controller has more than one Conductivity sensor installed on the Triton network, and one is measuring the System water and another is measuring the Make-up water (Figure 11-3).

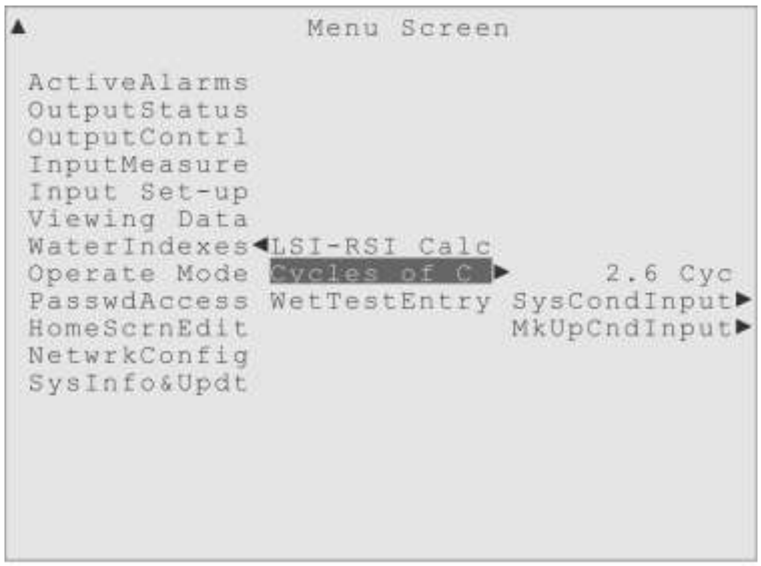


Figure 11-3. Highlight on the Water Indexes, Cycles of Concentration menu.

The Cycles of Concentration is a very simple, traditional water index that provides a measurement of solids concentration in the system water, usually the result of evaporation. It is calculated as the total amount of dissolved solids (TDS) in the System water, divided by the TDS of the Make-up water. It is the only one of the three indexes that does not require a manual "wet test" to calculate.

In a Triton water treatment controller the Conductivity sensor is used to measure the TDS, so two Conductivity sensors are required, one measuring the System water and a second Conductivity sensor measuring the Make-up water.

Then the Cycles value is simply calculated as the ratio of the conductivity of the System water divided by the conductivity of the Make-up water.

The three submenus, shown in Figure 11-3, are the live display of the Cycles value ("* No Entry *" until the two conductivity sensors are selected) and the two menus where the user selects the system and make-up conductivity sensors. The controller will by default select the first conductivity sensor installed (named Conductivity by default) as the System Conductivity sensor and the second network sensor (if present, named Conductivty2 by default) as the Make-up Conductivity sensor. If a Conductivity sensor is connected to the controller via the 4-20 mA Inputs, the user will have to select that sensor manually in the submenus.

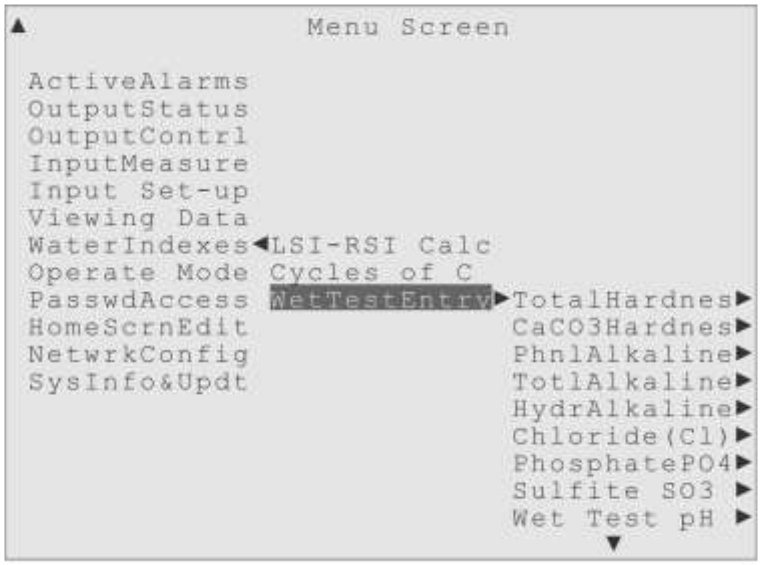


Figure 11-4. Highlight on the Water Indexes, Wet Test Entry menu.

WetTestEntry (Wet Test Entry)

The Wet Test Entry menu is just a place where the user can record the results of their manually performed water condition testing, which allows the values entered to be downloaded with the controller's own sensor data.

The values entered by the user cannot be used to control anything. The only reason for entering the wet test values in this menu is so that the values can be downloaded together with the controller's data.

Only one value can be stored for each test, and the date and time of the entry is recorded along with the value, each time a test result is entered.

As shown in Figure 11-4, there are several wet tests whose results can be entered on the controller. If the user has any doubt about what wet test a particular menu item is for, they can simply press the Help key on the front panel of the controller, when the menu item is highlighted. Below is a brief description of the wet test that each of the menu items is designed to record the value of.

TotalHardnes (Total Hardness) Total hardness is the sum of concentrations of calcium and magnesium ions present when these are both expressed as $CaCO_3$.

CaCO3Hardnes (Hardness as $CaCO_3$) Hardness as $CaCO_3$, or carbonate hardness, is the measure of Calcium and Magnesium and other hard ions associated with carbonate (CO_3^{2-}) and bicarbonate (HCO_3^-) ions contained in the water.

PhnlAlkaline (Phenol Alkalinity) "P" or Phenol Alkalinity, is a measure of the water's alkalinity at higher pH levels, above the indicator phenolphthalein's end point of pH 8.2-8.4.

TotlAlkaline (Total Alkalinity) Also known as "M" Alkalinity, is a measure of the water's alkalinity taken at lower pH levels, above the indicator methyl-orange's endpoint of pH 4.2 to 4.4.

HydrAlkaline (Hydrate Alkalinity) Hydrate Alkalinity is a measure of the alkalinity of the water due to the presence of the hydroxyl ion OH.

Chloride(Cl) (Chloride - as Chlorine) Is a measurement of Chloride solution concentrations (Chloride salts in water).

PhosphatePO4 (Phosphate - as PO_4) Is a measurement of the Phosphates usually added to cooling system water as corrosion inhibitors, and sequestering agents that help control scale.

Sulfite SO3 (Sulfite - as SO_3) A measurement of the Sulfite compounds generally added to boiler water as an oxygen scavenger to reduce corrosion.

Wet Test pH This is a place where the user can store the results of a wet test on the system water that indicates the pH level.

Wet Test Cnd (Wet Test Conductivity) This menu will store the wet test measurement of the Conductivity of the system water, in micro-Siemens (µS - which is an abbreviation for the true units, micro-Siemens per centimeter or µS/cm).

12 Password and Access Control

Overview

A Triton water treatment controller has four levels of access to its menus and controls. The first three levels require a password entry to gain access, and to be able to make changes.

Administrator Level is the highest level of control. Entering the proper Admin password ("admin" by default) will allow the user to change any setting, including passwords.

User Level 1 is the second highest level of control. From the factory, the User 1 password ("user1" by default) allows about the same ability to make changes as the Admin password, but an Admin Level can restrict the User 1 access control to read only access.

User Level 2 is the lowest level of control that can make changes. From the factory, the User 2 password ("user2" by default) will give the user very little control ability, but an Admin or User Level 1 user can increase the control ability to match User Level 1, or restrict access control until User Level 2 has read only access, with a password.

Read Only Access does not allow any changes to be made. By default, anyone can press the Enter key when asked for a password, and will be given "read only" access to all the menus and displays in the Triton menu structure. Of course, sensitive information like passwords are hidden from read only access, but all the other menu screens and control settings, that can be seen by the higher level users, can be seen in Read Only access. If that is a problem, Read Only access can be disabled by an Admin or User Level 1 password user.

Whenever a user presses a key on the front panel of the controller, that would move the display away from the Home screen (or accesses the controller over the Ethernet connection), they will be asked to enter a password. The level of access they are given depends on the password they enter.

PasswdAccess (Password and Access Control)

The Password and Access control menu (PasswdAccess) is where higher-level users, as determined by what password they enter, can control the access of lower level users, including disabling Read Only access.

Only the Admin password gives the ability to assign passwords, and control the User Level 1 access.

Both the Admin and User Level 1 passwords allow control over the User Level 2 access and the Read Only Access, by default.

The User Level 2 password, by default, only gives change access to two “top level” menus (Active Alarms, Water Indexes) and to the NoActTimeOut submenu in the Password Access menu. Higher level users, however, can increase the User Level 2 access until it parallels that of User Level 1.

All three passwords give change access, by default, to the menu for adjusting the "No Activity Timeout Limit" (NoActTimeOut). The No Activity Timeout Limit (NATL) is a time setting in minutes. If there are no key presses on the front panel (or no clicks over the Ethernet connection) for the number of minutes defined, the display will return to the Home Screen automatically, and a password will be requested again to move away from that screen.

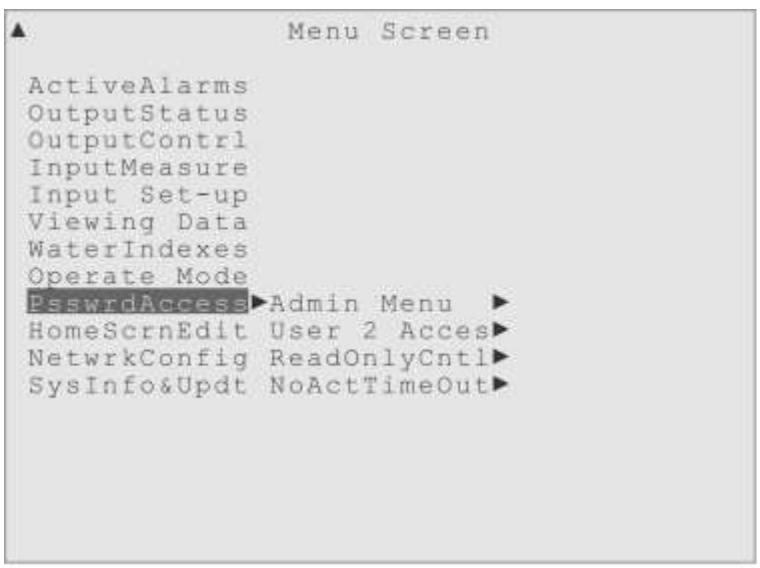


Figure 12-1. Highlight on PasswdAccess menu, showing sub-menus.

Let us examine the submenus for the Password and Access (PasswdAccess) control menu (shown in Figure 12-1) and what level of access can use each menu.

A user logged in with the Admin Level password can use always all four of the submenus; to change passwords, adjust the ability of the other levels to make changes, control Read Only access, and adjust the No Activity Timeout Limit.

A user logged in with the User Level 1 password can only use the last three menus. By default, User Level 1 access can control the User Level 2 access, control the Read Only access, and adjust the No Activity Timeout Limit. An Admin Level user can deny the User Level 1 access however.

A user logged in with the User Level 2 password can only use the last menu, by default, to adjust the No Activity Timeout Limit. But this ability can be denied by a User Level 1 or Admin Level user, or those higher level users can *increase* the change access of User Level 2 until it parallels that of User Level 1.

Any user can normally press the Enter key to look in the menus (Read Only access), but passwords will be hidden and they cannot make any changes. But even this Read Only access can be denied to non-password users, by an Admin or User Level 1 user.

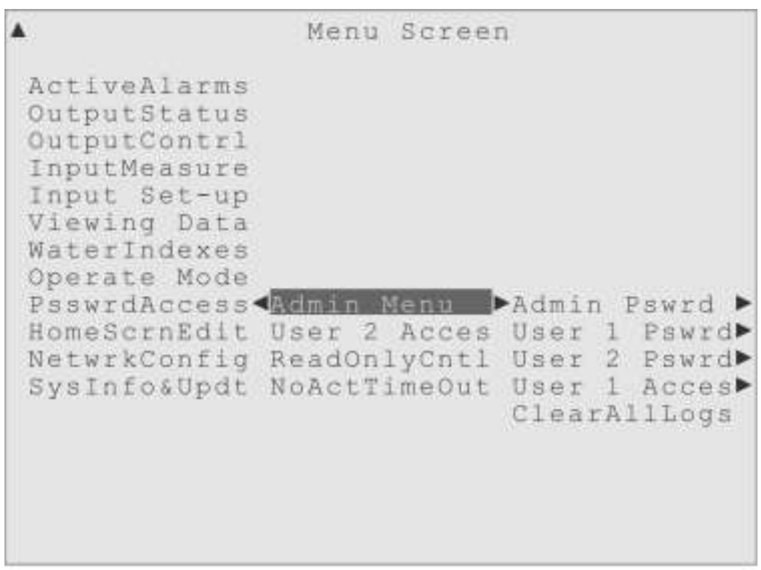


Figure 12-2. Highlight on PasswdAccess, Admin menu, showing sub-menus.

Admin Menu: Figure 12-2 shows the submenus for the Admin Menu. The first submenu is for changing the Admin Level password, the second is for changing the User Level 1 password, the third is for changing the User Level 2 password, the fourth is for adjusting the User 1 Level change access, and the fifth clears all the logs files.

Admin Pswrd (Admin Level Password): This menu is where the Admin Level user can change their password. An example password is shown "in clear" in Figure 12-3, which is what an Admin Level user would see, and there is the usual "Edit Value" submenu to the right so they can change their password. A lower level user would see only a string of asterisks (************) for the password.

Figure 12-3. Highlight on PasswdAccess, Admin Menu, Admin Pswrd, showing password.

Figure 12-4. Highlight on PasswdAccess, Admin Menu, User 1 Pswrd, showing password.

User 1 Pswrd: This menu is where a user logged in with an Admin Level password can change the User Level 1 password. An example password is shown "in clear" in Figure 12-4, which is what an Admin Level user would see, and there is the usual "Edit Value" submenu to the right so they can change the password. A lower level user would see only a string of asterisks (************) for the password.

Figure 12-5. Highlight on PasswdAccess, Admin Menu, User 2 Pswrd, showing password.

User 2 Pswrd: This menu is where a user logged in with the Admin Level password can change the User Level 2 password. An example password is shown "in clear" in Figure 12-5, which is what an Admin Level user would see, and there is the usual "Edit Value" submenu to the right so they can change the password. A lower level user would see only a string of asterisks (************) for the password.

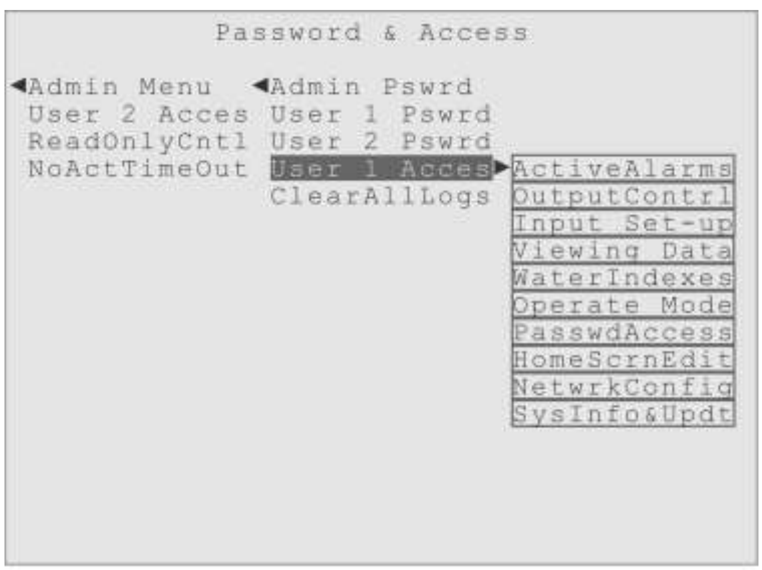


Figure 12-6. Highlight on PasswdAccess\Admin Menu\User 1 Acces, showing menu access list.

User 1 Acces (User Level 1 Access): The third submenu under the Admin Menu is where the Admin Level user can adjust the User Level 1 change access to the menus. Figure 12-6 shows, by the 'active box' drawn around the menu names, that by default User Level 1 is given change access to all the menus that contain settings.

(All users have "access" to the two menus that contain no settings, the Output Status and InputMeasure menus. The access settings described are only for menus where changes can be made.)

The Admin Level user can easily deny the User Level 1 control access to any of these menus, by moving the highlight to the menu name they wish to restrict and pressing the Enter key, to remove the "active box" from around the menu name. Then when a User Level 1 tried to change a setting in that menu, they would see an error message, informing them that change access has been denied.

Be careful when denying access control to User Level 1, and think about what tasks they will be asked to perform. The User Level 1 may need access control to some or all of the menus listed in order to perform their assigned duties.

Figure 12-7. Highlight on PasswdAccess, Admin Menu, ClearAllLogs menu item.

ClearAllLogs (Clear All Logs): The Clear All Logs menu item can be used by an Admin Level user to erase all the entries in the System Activity Log and the Data Logs. This is not expected to be a commonly used function, but does allow all the normally stored data to be erased if necessary.

User 2 Acces: Figure 12-8 shows the submenus for the User 2 Acces menu. This menu allows an Admin or User Level 1 password user the ability to increase or restrict the menus in which the User Level 2 password user can make changes.

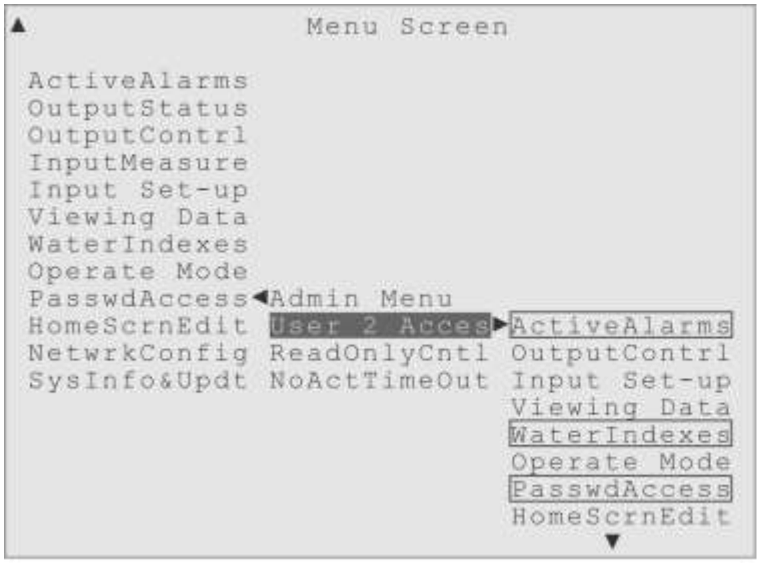


Figure 12-8. Highlight on PasswdAccess, User 2 Acces, showing the menu list.

Figure 12-8 shows, by the 'active box' drawn around only three menu names, that by default User Level 2 is given very little change access to the menus that contain settings.

The Admin Level or User Level 1 can easily increase, or further restrict, the User Level 2 control access to any of these menus, by moving the highlight to one of the menu names listed and pressing the Enter key, to place or remove the "active box" from around the menu name.

Be careful when increasing or further restricting access control to User Level 2, and think about what tasks they will be asked to perform. The User Level 2 was intended for personnel that should not need control access to most of the menus in order to perform their duties. By default, the only change access a User Level 2 has is to the Active Alarms, Water Indexes and No Activity Timeout menus.

And remember that even if User level 2 has no change access to *any* menus, they can always "read" any of the menus in the system (with sensitive information like passwords hidden of course). This is a feature of the Triton controller, which allows a high level user to deny the normal "Enter key only" method of Read Only access, and restrict all User Level 2 access control, thus creating a User Level 2 that has Read Only access under password control.

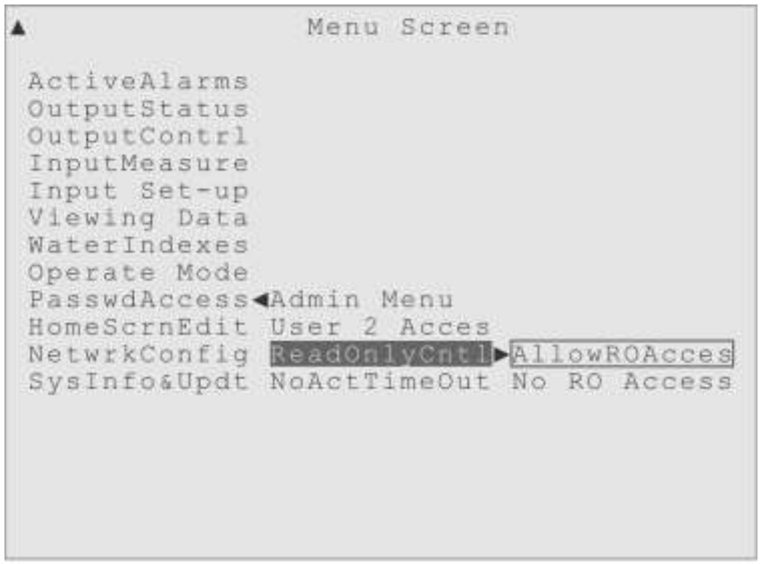


Figure 12-9. Highlight on PasswdAccess, ReadOnlyCntl, showing two sub-menu items.

ReadOnlyCntl (Read Only Access Control): The third submenu in the PasswdAccess menu is the simple ReadOnlyCntl menu, shown in Figure 12-9, which has only two items. One is to allow the "Enter key only" method of obtaining Read Only access, and the second item to turn off, or deny, that way of getting Read Only access.

Recall that when someone standing in front of a Triton controller presses any key that would move the display away from the Home Screen, they are asked to enter a password. By default they can press just the Enter key to be given Read Only access to the entire menu system (with sensitive data hidden). Figure 12-9 shows the default setting that allows this access, with the "active box" around **AllowROAcces** (Allow Read Only Access).

But an Admin Level or User Level 1 can turn off' that feature in this menu, by moving the highlight to the **No RO Access** item and pressing Enter. Then "No RO Access" will have the "active box" drawn around it, and if someone presses the Enter key only at the password request, they will see a message that the Read Only feature has been disabled, and the front panel display will remain at the Home Screen.

NoActTimeOut (No Activity Timeout Limit): This is another simple menu, shown in Figure 12-10, where a user can adjust the No Activity Timeout Limit. The default time limit is 10 minutes, with an allowable range of 1 to 1440 minutes. There is the usual "Edit Value" menu to the right, for adjusting the setting.

Figure 12-10. Highlight on PasswdAccess, NoActTimeOut, showing 10 minute default.

The No Activity Timeout Limit (NATL) is a back-up security feature that will automatically log out a user if no keys are pressed for the time set. (This same limit applies over the Ethernet connection.) The controller will abort any changes in progress, reverting the value to its previous setting, move the front panel display back to the Home Screen, and log off the user so a password will again be requested to move away from the Home screen.

This limit may need to be increased if a process involving the controller is going to take longer than ten minutes without any keys being pressed on the controller. A long calibration of an Input sensor could be such a process, where the user might want to increase this limit.

13 Home Screen Edit

Overview

The Triton water treatment controller has a large, daylight read-able LCD on its front panel, shown in Figure 13-1.

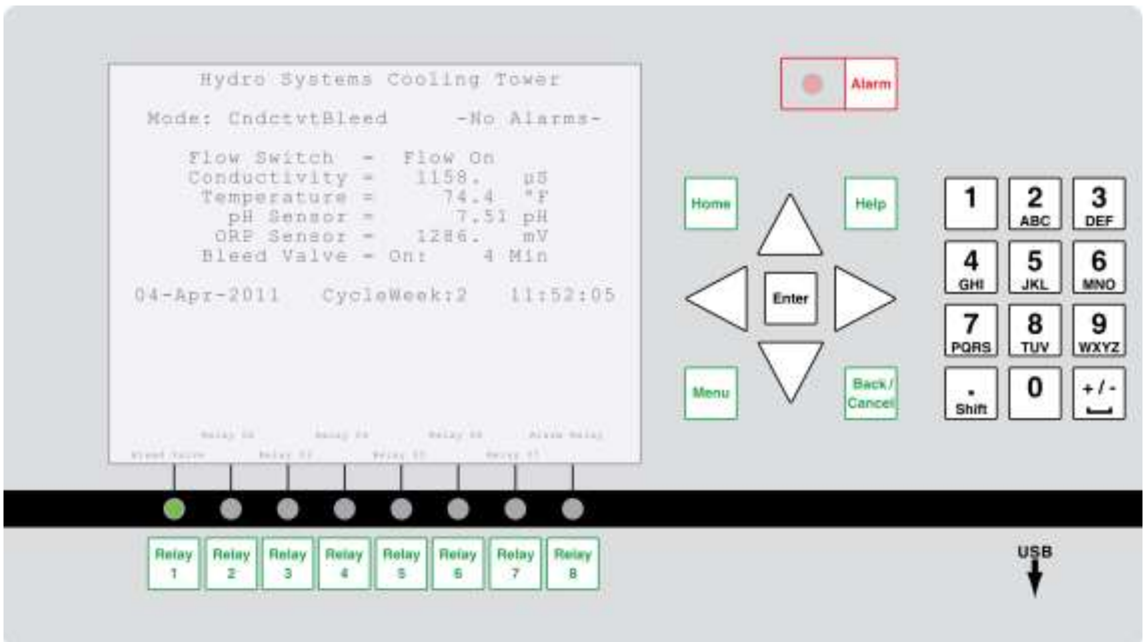


Figure 13-1. Triton Front Panel. showing large LCD with Home Screen displayed.

The default display for the controller is called the Home Screen, shown in Figure 13-2. It is a system summary display, which allows a quick overview of the water treatment system. Several elements of the display can be changed by the user, and those changes are done using the Home Screen Edit menu (HomeScrnEdit).

Home Screen Edit

The Home Screen Edit (**HomeScrnEdit**) menu has a deceptively simple name. Although it is the menu where the user can modify the appearance of the Home screen, some of the choices affect all the displays in the entire menu system. A Home Screen display is shown in Figure 13-2. It has 20 rows of up to 40 characters.

The first row of text on the Home screen can hold up to 40 characters of text, which is auto-centered on the display. The user can edit the text under the **Top Row Edit** menu to hold any text they would like, usually the site name or location is a good idea.

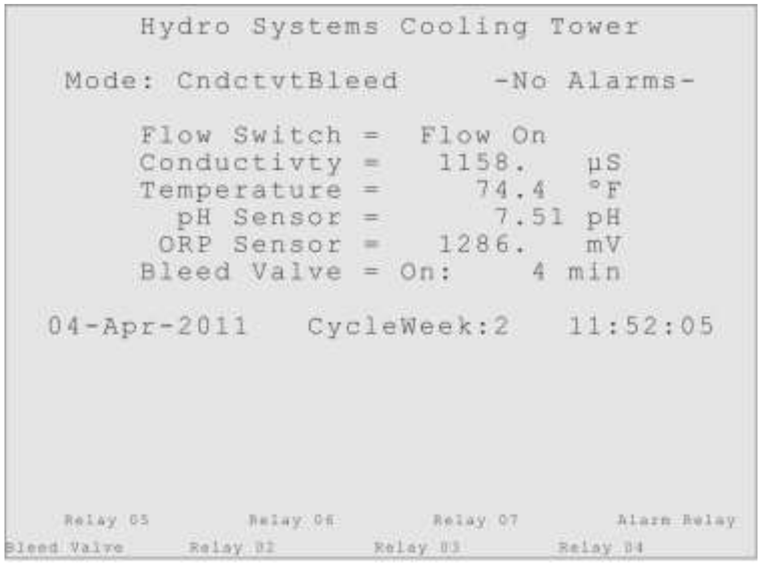


Figure 13-2. The Home Screen.

The second row of text is left blank, and then the third row shows the current Operation mode in use and the Alarm status.

After a blank fourth row, rows 5 through 10 are used for a Status Display. The user can choose any six Inputs or Outputs to display their current measurement or status, which can be very handy. The user can display a Relay's status, Water Meter volumes, Flow Switch status, Input sensor values and so forth. By default, these six items will start with the Bleed Valve status, the three standard sensors (Flow Switch, Conductivity and Temperature) along with the next two Input sensors in the system, but in the **6 Row Status** menu the user can choose any six Inputs or Outputs to be used for this display.

The row 11 is left blank, followed by a display of the current date, a reminder of what week of a 28-Day cycle the controller is in, and the current time.

Rows 13 through 18 are reserved for Password Requests, and on the bottom two rows are Relay identification displays, that will use whatever custom name the user assigns to the Relays. The Relay Names are staggered over their respective Relay Activity Lamps, and use a smaller font (see Figure 13-1).

Home Screen Edit Menu (HomeScrnEdit)

The user can edit the Home Screen display by using the Home Screen Edit menu.

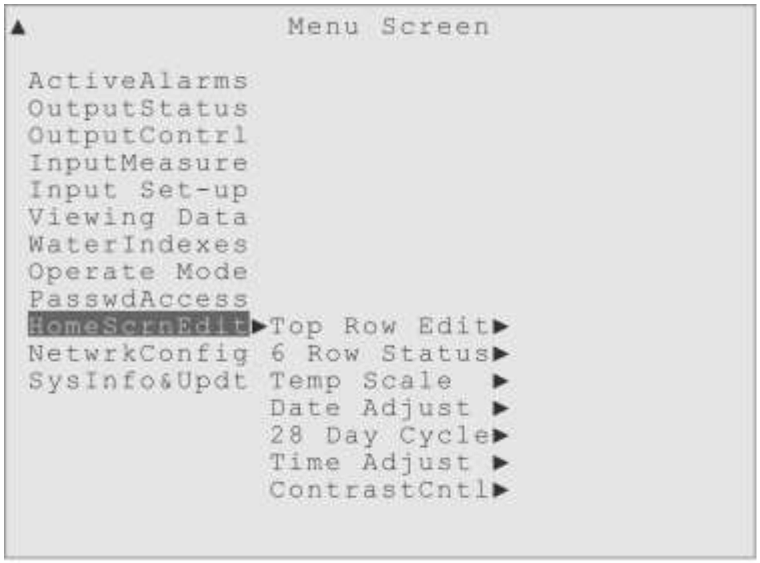


Figure 13-3. Highlight on the Home Screen Edit menu.

Top Row Edit allows the user to change the text displayed on the first row of the Home Screen. This text is normally used to identify the controller or its installation site. To edit the top row text, the user would move the highlight across the Tow Row Edit menu to the submenu on the right named "EnterToEdit" and press the Enter key.

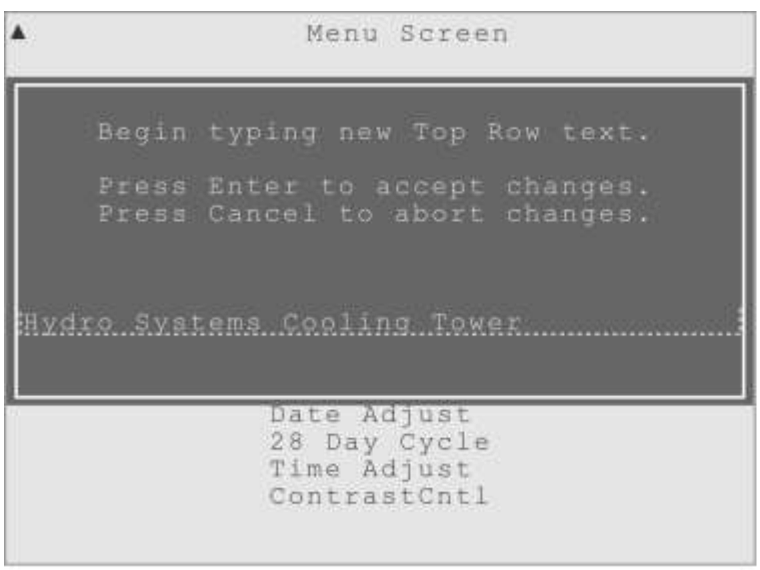


Figure 13-4. The Home Screen Top Row Text editing dialog.

That will display a special entry dialog where the user can enter the new text, using the keypad on the front panel (See Figure 13-4). The keypad works like the keys on a cell phone, using multiple key presses to enter the letters associated with each numeral, and a "Shift" key on the lower left for capitalization. (There are detailed keypad instructions in the "Inputting Values and Text" section of Chapter 3.)

When the desired text has been entered, the user would press the Enter key to accept the new text. The user can use the Back/Cancel key to cancel the entire entry process.

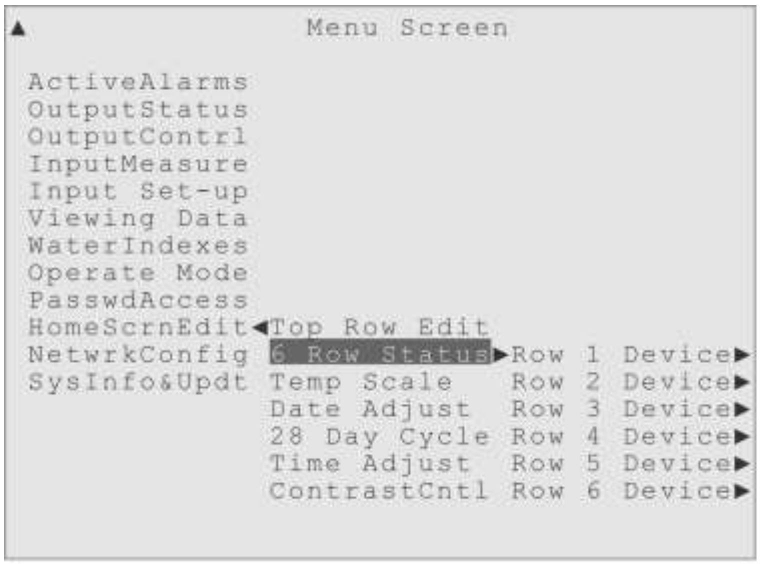


Figure 13-5. Highlight on HomeScrnEdit, 6 Row Status, showing the row sub-menus.

6 Row Status is the menu where the user can choose which six Inputs or Outputs will have their current measurement value or status displayed on the Home Screen. When the 6 Row Status menu is highlighted, six submenus are displayed to the right, one for each of the status rows, as shown in Figure 13-5.

When an individual row menu is highlighted, a submenu will list all the devices in use to the right, as shown in Figure 13-6, with an "active box" drawn around the current selection.

To change what device is shown on that row, the user would simply navigate the list and press Enter when the highlight is on the device they want displayed that Home Screen status row.

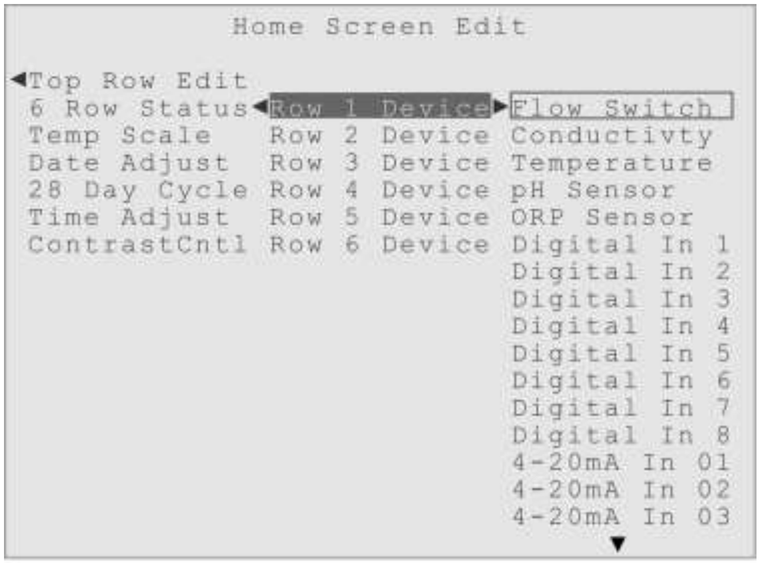


Figure 13-6. Highlight on Row 1 Device, showing the device list and current selection.

Temp Scale is the menu that allows the user to choose whether the Fahrenheit (°F) or Centigrade (°C) scale will be used for Temperature displays. This choice affects *all* the Triton controller's temperature displays, not just the Home Screen.

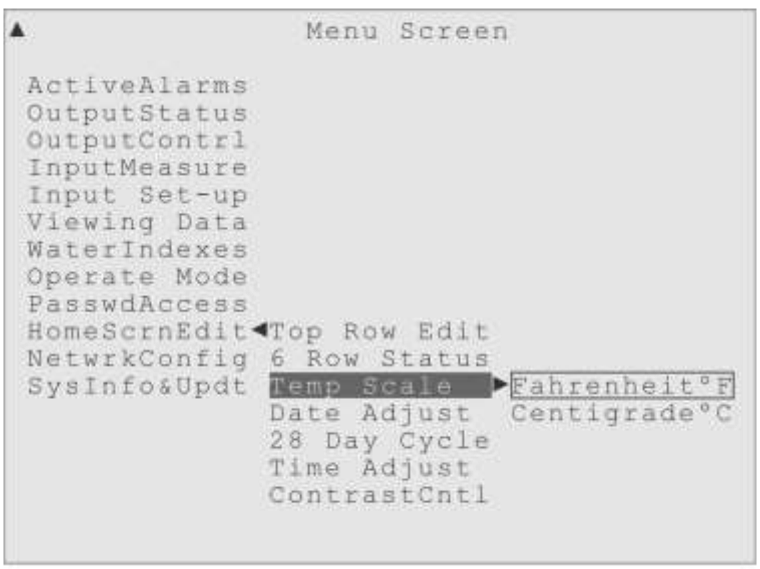


Figure 13-7. Highlight on Temp Scale, showing the sub-menus and current selection.

As shown in Figure 13-7, when the Temp Scale menu is highlighted, two submenus are displayed to the right, one for displaying temperatures using the Fahrenheit scale (°F) and the other for displaying temperatures using the Centigrade scale (°C). The "active box" shows which scale is currently in use, and the user can change which scale is used by moving the highlight onto the desired scale and pressing the Enter key.

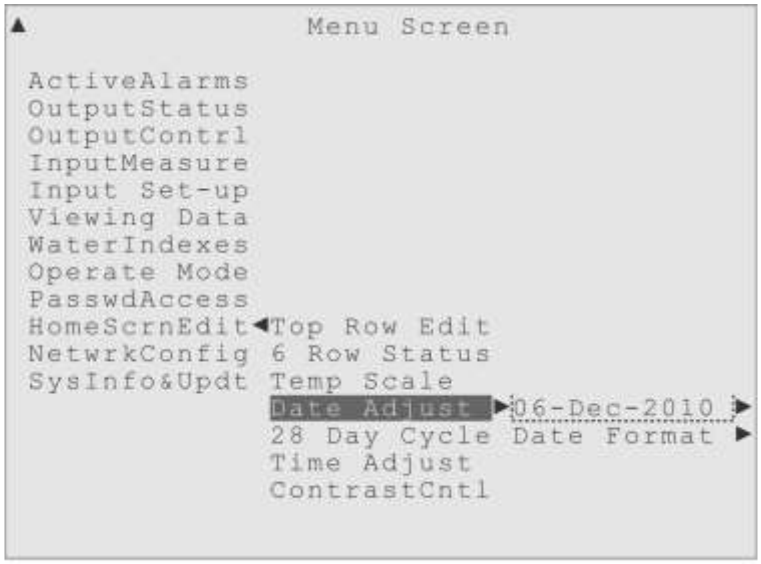


Figure 13-8. Highlight on Date Adjust, showing the date edit and format menus.

Date Adjust is the menu where the user can set or adjust the current date. When the Date Adjust menu item is highlighted, the two submenus are displayed to the right, as shown in Figure 13-8. The first submenu is just a display of the current date setting with the usual Edit Value to the right for changing the date. The other menu allows the user to choose the display format for all dates.

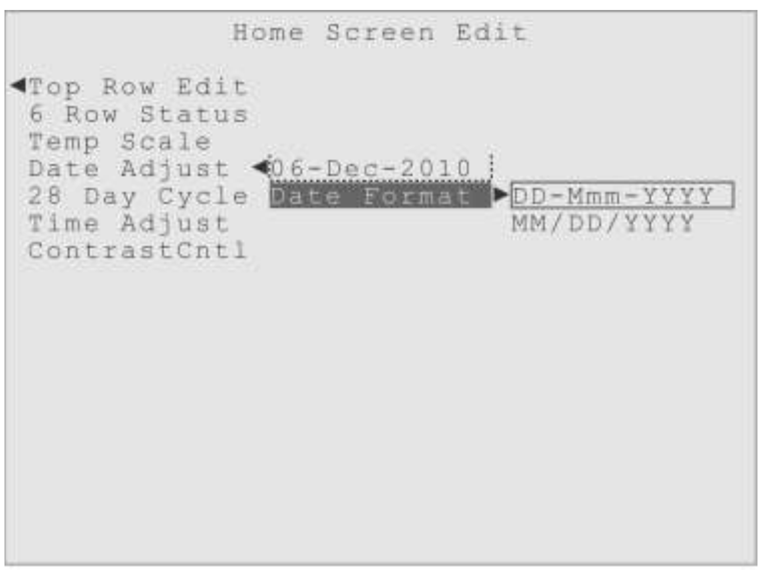


Figure 13-9. Highlight on Date Format, showing the format choices and current selection.

The **Date Format** submenu gives the user a choice of two Date display formats. The first choice is a display style that puts the day value first and uses an alphabetic month abbreviation, DD-Mmm-YYYY, and the second choice is an all-numerical style with the month value first, MM/DD/YYYY. Like the other formatting choices in these menus, the user's choice affects all of the controller's date displays, not just the date display on the Home Screen.

When the user highlights the Date Format submenu item, the two choices are displayed to the right, shown in Figure 13-9, with the current format indicated by the "active box".

To change the date format the user can simply move the highlight onto the desired submenu item and press the Enter key. The "active box" will be drawn around the submenu item and all date displays will immediately change to the selected format.

28-Day Cycle is a Home Screen Edit menu that allows the user to set the date when the first "cycle week" begins, and synchronizes any control modes using a 28-Day Cycle.

There is also a submenu item to remove the display of the "cycle week" from the Home Screen, shown in Figure 13-10, in case the user is not using any 28-Day cycle control modes and/or doesn't want the "cycle week" displayed.

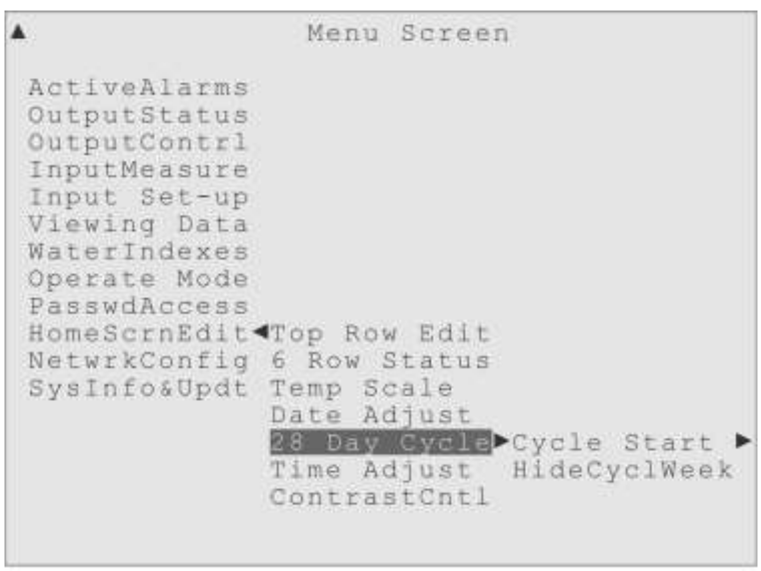


Figure 13-10. Highlight on 28-Day Cycle, showing the two sub-menus.

When the user highlights the Cycle Start menu item, the first submenu displays the last cycle start date, with the usual Edit Value item to right for editing. A 28-Day cycle always starts on a Sunday, even if the date entered here is not a Sunday. If a date is entered that is not a Sunday, the previous Sunday is the first day of the new 28-Day cycle. This can help the user start a new 28-Day cycle at the beginning of a month, without worrying about what day of the week that is.

Figure 13-11. Highlight on Cycle Start, showing last start date and StartNewCycl item.

The Start Cycle reference display is shown in Figure 13-11 as 01-Jan-2010, which shows the last setting that was used to start a 28-Day cycle. But there are two ways a 28-Day cycle can be started. On a new controller, that has never had a 28-Day cycle started, one way a cycle can be started is when the user employs a control mode that uses a 28-Day Cycle. The Start Cycle date will automatically become the Sunday before that mode was selected, and the cycle will move forward from there. (A message is also displayed to inform the user they have started a 28-Day Cycle, that they are in "Week 1" and that they need to come to this menu if they want to change the Start Cycle date.) Of course, if the user came to this menu first and set a Start Cycle date, the reference display in Figure 13-11 would immediately show that date, and any 28-Day Cycle control modes employed afterward would be synchronized to that date. (Note: If the user employs a control mode using a 28-Day Cycle *after* the Start Cycle date has been established, they see a reminder message about what "Cycle Week" the controller is currently in, and that they can use this menu to adjust the Start Cycle date.)

The "HideCyclWeek" item does just that, when it has the "active box" drawn around it, the display of the Cycle Week is removed from the Home Screen display. The user toggles this choice by simply highlighting the menu item and pressing the Enter key.

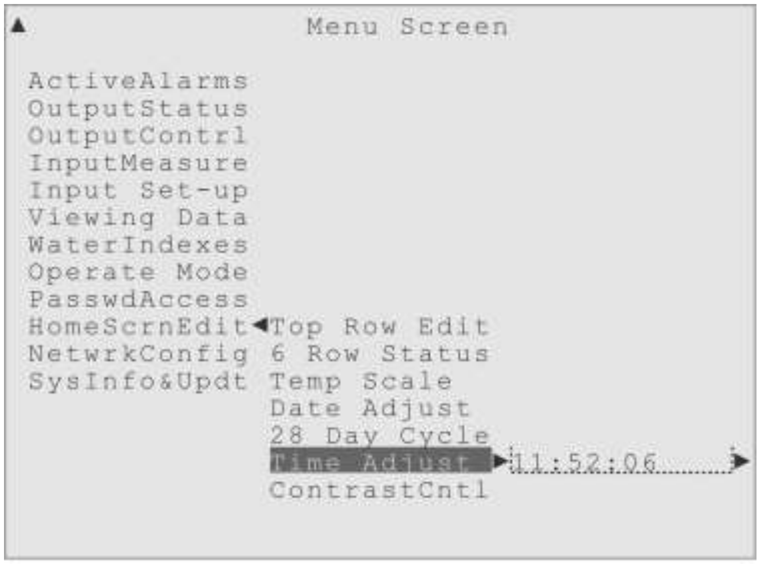


Figure 13-12. Highlight on Time Adjust, showing the current time setting.

Time Adjust is the menu where the user can set or adjust the current time, as shown in Figure 13-12. When the Time Adjust menu item is highlighted, the current time setting is displayed, with the Edit Value item to the right. Although the time display here shows the seconds, there is no direct adjustment for the seconds. Instead, the seconds value is reset to zero automatically whenever a time setting edit is finalized with the Enter key.

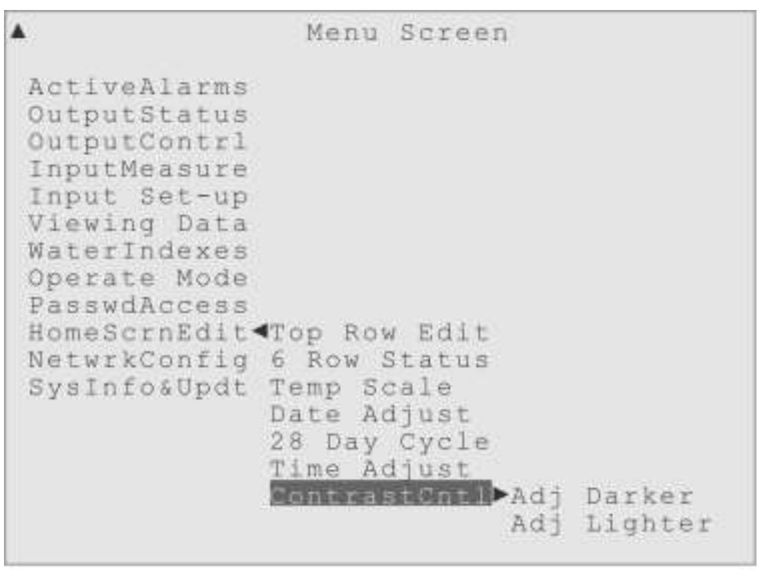


Figure 13-13. Highlight on HomeScrnEdit, ContrastCntl, showing sub-menus.

ContrastCntl (Contrast Control) is the very last submenu in the Home Screen Edit menu. It allows the user to adjust the contrast of the front panel's liquid crystal display (LCD). The user can highlight either the Adj Darker of Adj Lighter menu item, shown in Figure 13-13, and then press Enter repeatedly to adjust the contrast.

(The user can also adjust the display contrast when the Home Screen itself is showing on the display, by pressing the Left Arrow key to decrease contrast and the Right Arrow key to increase contrast. There are 20 ‘steps’ of adjustment available.)

14 Help System

Overview

The Triton controller has a very useful, context sensitive Help system, which can also be customized to fine tune the Help text to a user's particular needs.

A user can get help text displayed on a Triton controller by simply pressing the Help key on the front panel. If the display is on the Home Screen, the user will get help about the Home Screen. If the user has moved into the menus, so a menu item is highlighted, the help display will be about the menu item that is highlighted.

For example, Figure 14-1 shows the Menu Screen with the highlight on the Output Control (OutputContrl) menu.

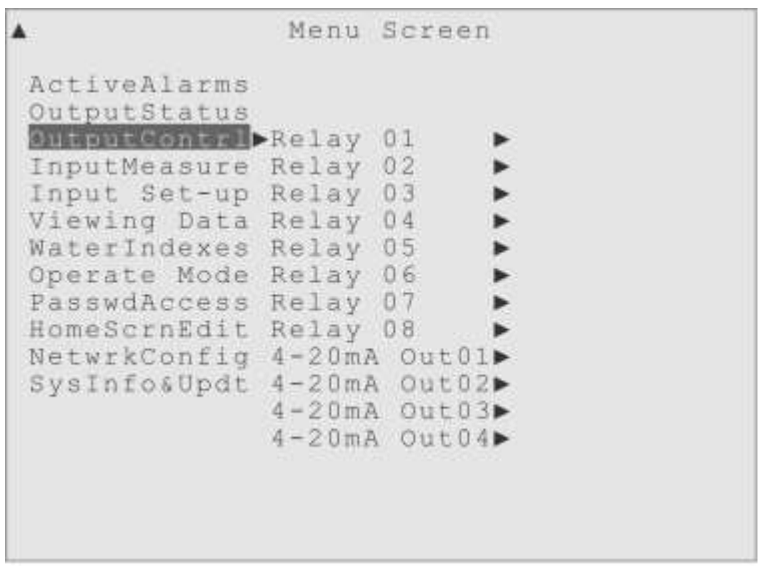


Figure 14-1. Highlight on Output Control menu, showing list of Outputs.

To see the help text for the Output Control menu item, the user can simply press the Help key on the front panel of the controller, while the highlight is on the Output Control menu item, as shown in Figure 14-1.

That will cause the Help Window to appear, with context-sensitive help text displayed within, as shown in Figure 14-2. The downward pointing arrowhead at the bottom of the window indicates the text continues out-of-sight, and a single press of the Down Arrow key will move the text ahead, one page per press. To get out of the Help system once it has been invoked, simply press Help again, the Back/Cancel key, or any non-Arrow key on the front panel to get back to the normal display.

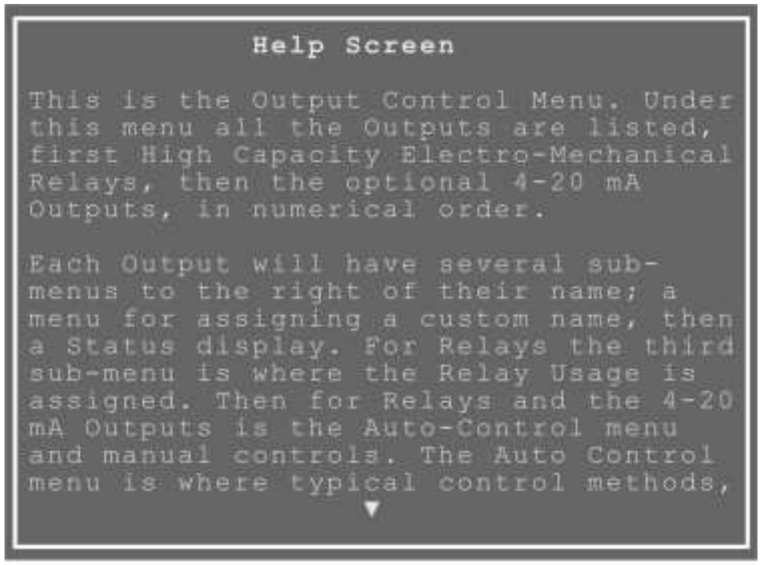


Figure 14-2. Help window, showing the help text for Output Control menu.

One special group of help screens are the entry-check help screens. These will appear automatically if the user tries to enter a value somewhere that is illegal or out of range, and provide help with what the problem was with the attempted entry.

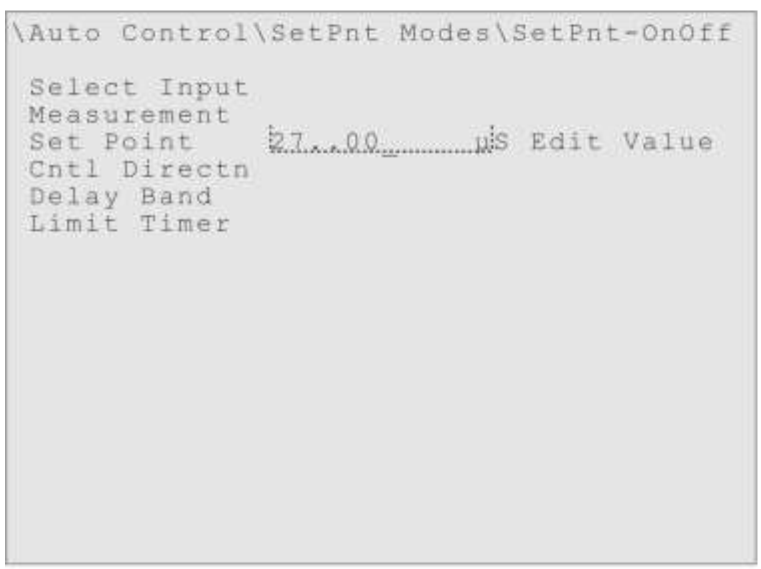


Figure 14-3. Conductivity Set Point edit in progress, with an illegal entry.

Figure 14-3 shows such a situation, where the user was trying to change the Set Point for a Conductivity sensor to 2700 µS/cm, but accidentally pressed the 'decimal point' key twice after they entered the '7'. Were they to press the Enter key, to try and 'accept' that value, they would see the 'entry check' Help display shown in Figure 14-4.

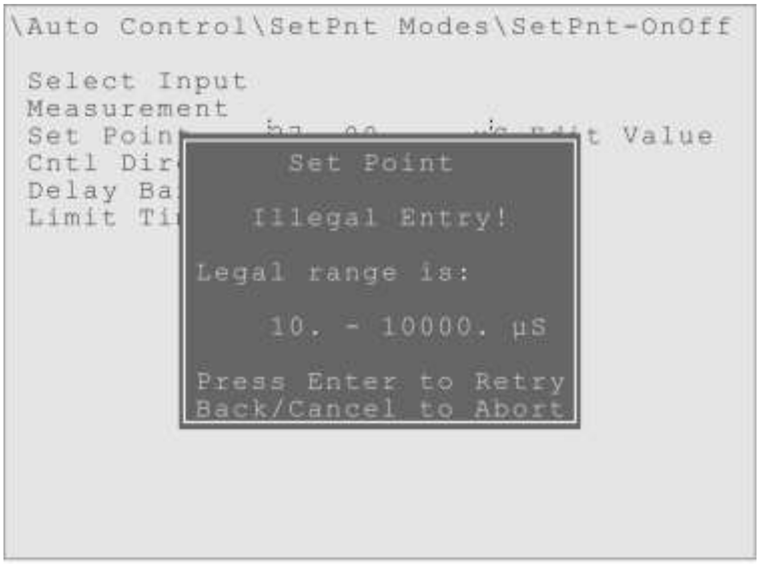


Figure 14-4. Conductivity Set Point entry check help, describing error.

Help System Menu

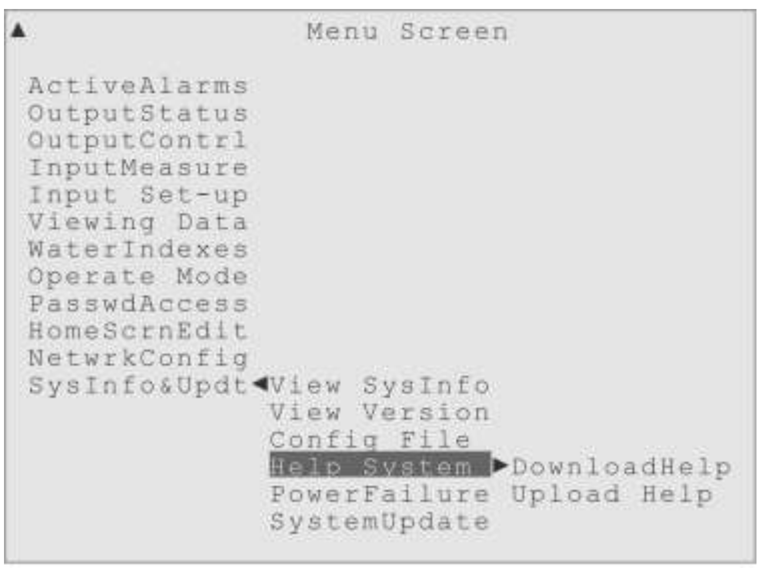


Figure 14-5. Highlight on the Help System menu, showing its sub-menus.

The **Help System** menu, however, has a different purpose. The Help System menu is in the submenus of the System Information & Update menu, as shown in Figure 14-5. Using the two Help System submenus, the user can download the entire Help text file to a USB flash drive, or upload a copy of the Help text file from a USB drive. The user would simply move the highlight onto the appropriate submenu item, and press Enter. A "completion message" will be displayed once the Help file is done being downloaded or uploaded, as shown in Figure 14-6.

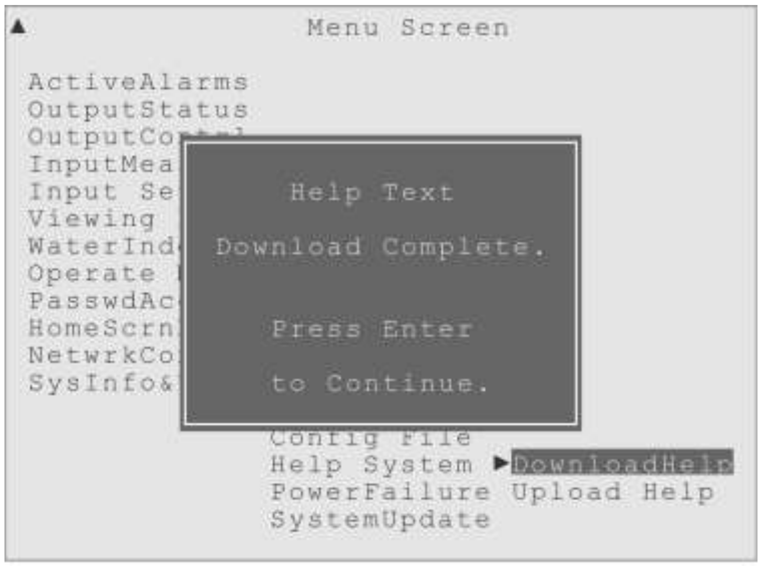


Figure 14-6. Help System menu, Download completion message.

The Help file is downloaded as a text file, with entries linked to the menu items, with the associated Help text. The user could edit that text file as they see fit, customizing help instructions for their installation, adding contact phone numbers, perhaps even include a translation to another language! Then the modified Help file could be uploaded to the same controller, or brought to and uploaded to other Triton controllers.

15 Network Configuration

Overview

The Network Configuration menu has two different sections, shown in Figure 15-1. The Communications Settings menu (CommSettings) is for setting up the IP and Ethernet connections to the controller, while the Plug'n'Play menu is for managing the Modbus digital network devices, either probes or relay expansion boxes.

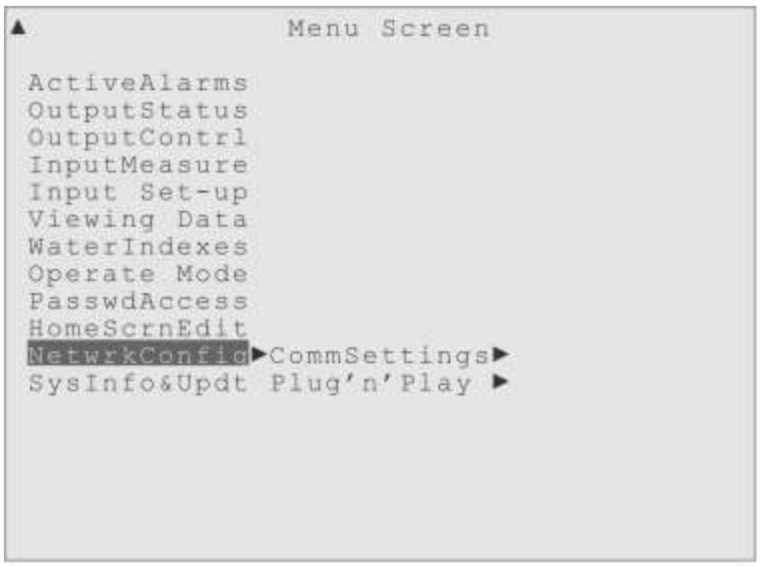


Figure 15-1. Highlight on the NetwrkConfig menu, showing the two sections.

CommSettings

The Communications Settings menu has four submenus, as shown in figure 15-2.

LAN IP Setup is where all the settings are that relate to an IP Network connection. The first definition is whether the user will connect the controller using a Dynamic Host Configuration Protocol (DHCP) or using a "static" IP address.

USB IP Setup menu holds the settings for communicating to a computer using the USB Mini-B port on the front panel of the controller. These settings should not have to be modified by the user.

EmailSetting is where the email addresses can be entered by the user, so the controller can send Alarm Emails or periodically send data downloads by email. There are also other email related settings stored here.

MAC Address is a display-only menu that shows the Media Access Control address (MAC address) for a particular controller. The setting is assigned at the factory and is used to create a unique identifier for any device communicating an Ethernet or IP network.

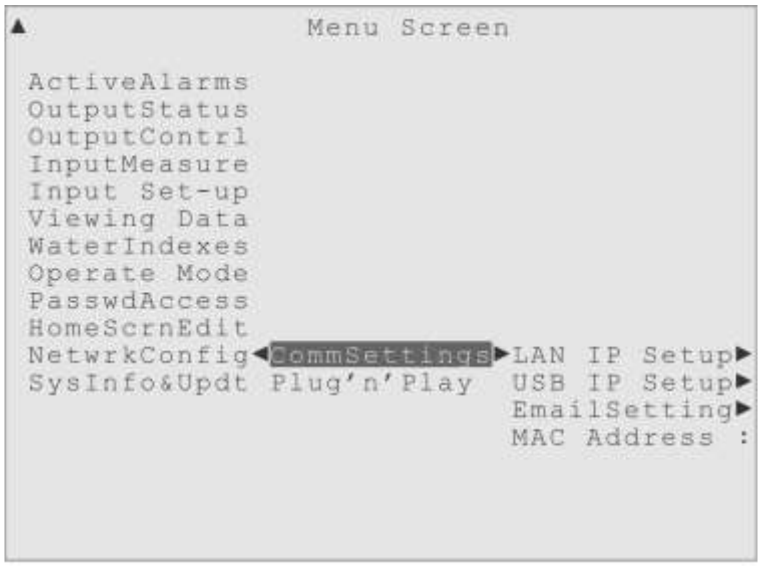


Figure 15-2. Highlight on the CommSettings menu, showing the four sub-menus.

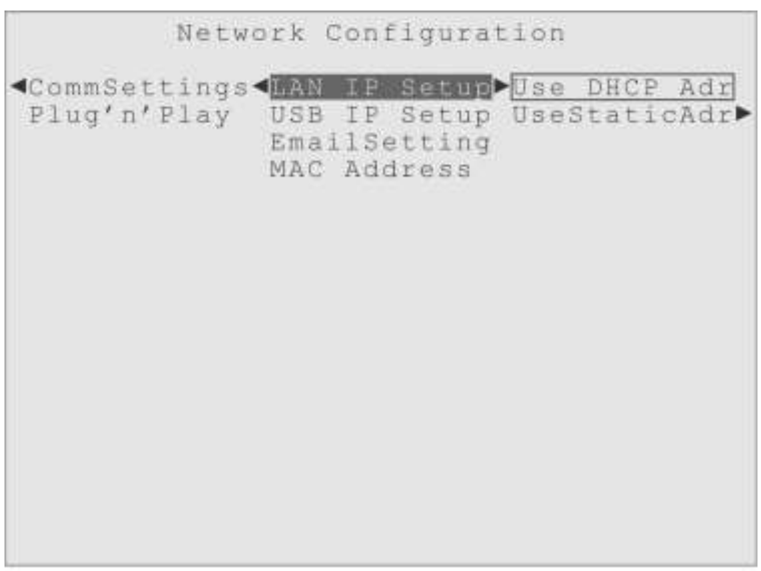


Figure 15-3. Highlight on the LAN IP Setup menu, showing the two address modes.

LAN IP Setup

DHCP vs. Static Addressing: Each system has pluses and minuses, talk to the network administrator at the installation site to determine which method to use. “Use DHCP Adr” will be selected as the default. If the highlight is moved to the UseStaticAdr menu, its four submenus and the activator are revealed, as in Figure 15-4.

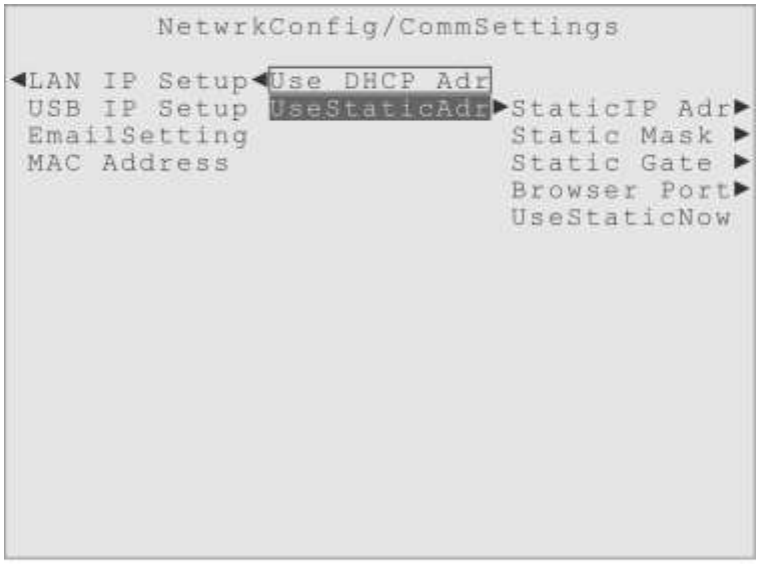


Figure 15-4. Highlight on UseStaticAdr menu, showing four submenus and activator.

StaticIP Adr is the menu where the user enters the static IP address assigned by their network administrator. There are the usual Input Tray and Edit Value items, but a special dialog is used when entering the value, so that up to 40 digits can be employed.

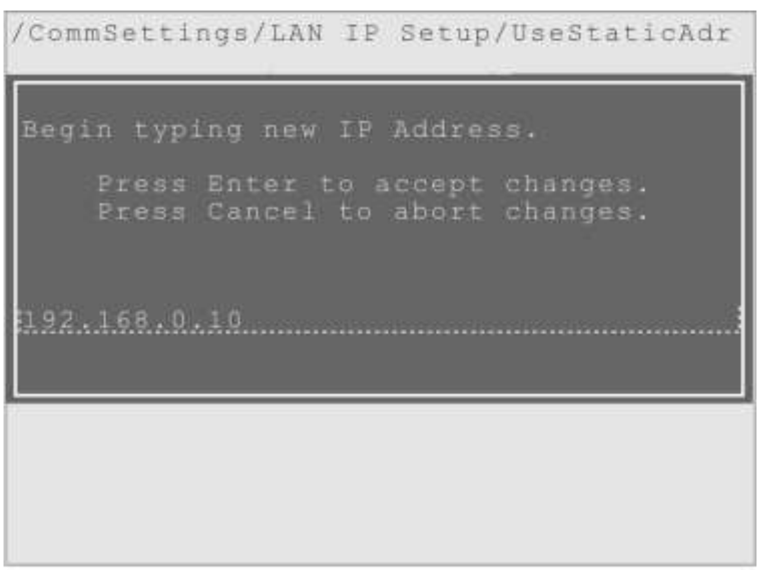


Figure 15-5. Special dialog for StaticIP Adr menu, to allow up to 40 digit entry.

Static Mask is the menu where the user enters the static mask address assigned by their network administrator. The default address, shown in Figure 15-6, is appropriate for the Wireless Ethernet communication option for the Triton controller, as are all the defaults in the UseStaticAdr menus.

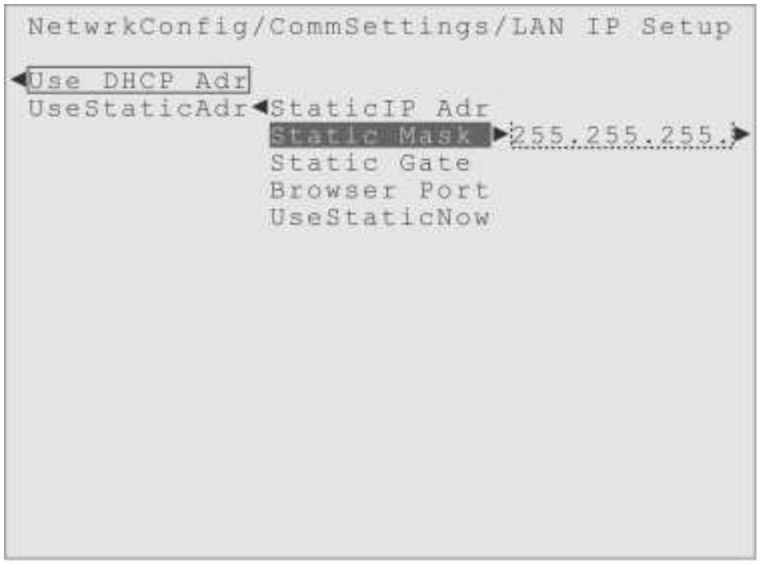


Figure 15-6. Highlight on the Static Mask menu, showing default assignment.

Static Gate is where the user can enter the gateway address assigned by the network administrator for this controller. The default address is shown in Figure 15-7.

Figure 15-7. Highlight on the Static Mask menu, showing default assignment.

Browser Port is the menu for defining the browser port to be used with the controller for IP communication. The default address is “80”, shown in Figure 15-8.

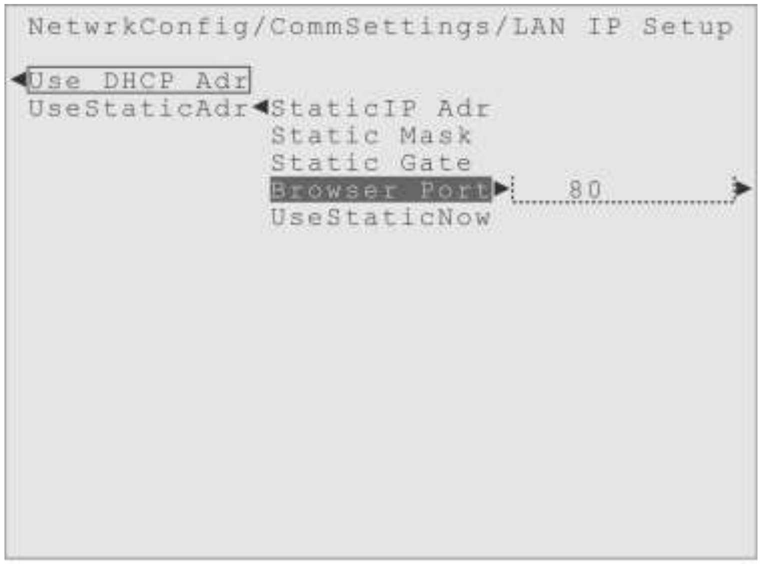


Figure 15-8. Highlight on the Static Mask menu, showing default assignment.

UseStaticNow is the “activator” for using Static IP Addressing. After adjusting the settings in the menus above it, the last thing to do is highlight the “UseStaticNow” menu item and press Enter to select it. The Active Box will drawn around that menu item and the parent “UseStaticAdr” menu item to indicate that communication method has been selected. (Figure 15-9)

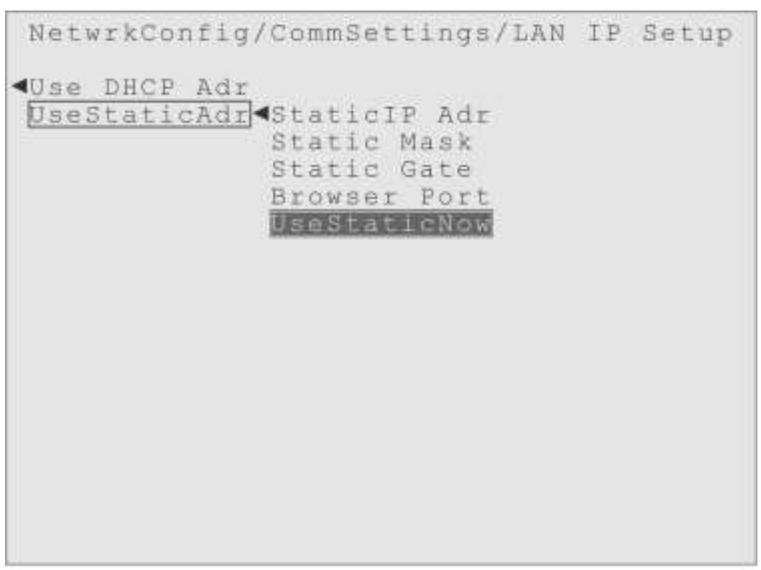


Figure 15-9. Highlight on the UseStaticNow, showing Active Boxes when selected.

Going back a couple of levels, to the first CommSettings submenus, the next menu item to consider is the USB IP Setup menu.

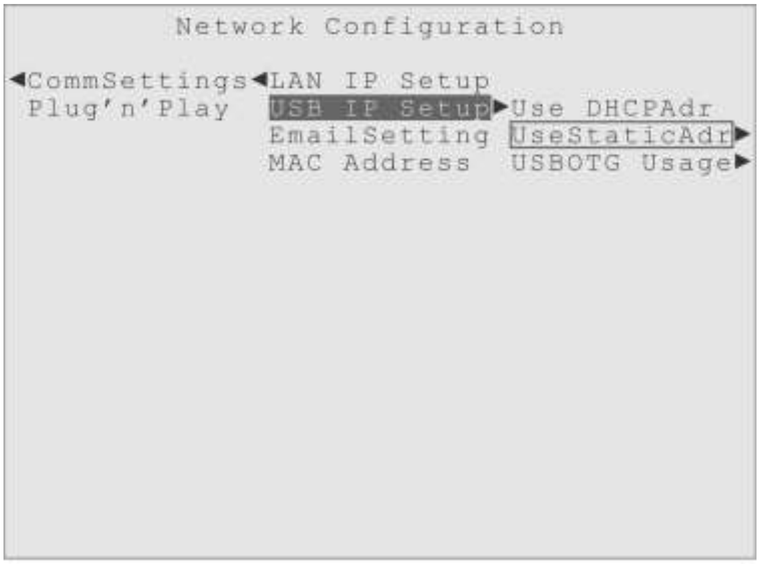


Figure 15-10. Highlight on USB IP Addrs menu, showing two familiar submenus.

USB IP Setup

DHCP vs. Static Addressing: This setup menu, shown in Figure 15-10 and 15-11, is *only* related to using a computer plugged into the Mini USB port on the front panel of the controller to access the controller's web interface.

Figure 15-11. Highlight on UseStaticAdr menu, showing its submenus and activator.

The user should not have to adjust these settings, as the UseStaticAdr definitions have been preset at the factory to work with almost any computer. These settings have nothing to do with plugging a USB data stick into the USB Type A port, nor do they have any effect on the Ethernet connection.

EmailSetting

The Email Setting menu is where emails addresses can be entered for the Alarm emails and the automatic data downloads. As shown in Figure 5-12, there are also two submenus for setting the Simple Mail Transfer Protocol (SMTP) server address and port. There is a fifth submenu where the user would enter their “return” email address and a sixth menu for controlling email authentication.

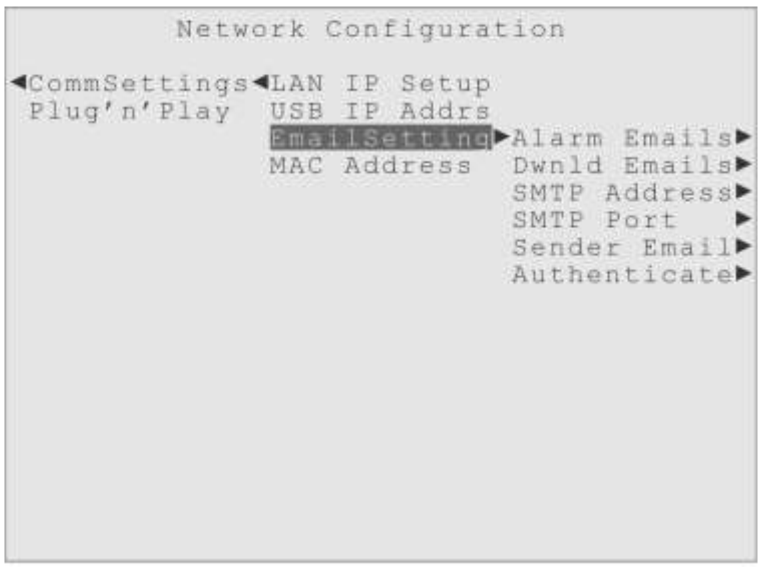


Figure 15-12. Highlight on CommSettings\EmailSetting, showing its submenus.

Alarm Emails is a simple menu. There are three places for email addresses, shown in Figure 15-13, and every time an Alarm occurs these email addresses can be sent a message (if activated), detailing the nature of the alarm and including a “data dump” showing the input values and output status at the time of the alarm. Each of the three alarm email menus have the same sub-menus, also shown in Figure 15-13.

(Email Address) is the first of the sub-menus. This is where the user can enter an email address to which the alarm emails will be sent. Although the 12 character Input Tray may not display the entire address, a special dialog is used when the Edit Value item is selected, so email addresses up to 40 characters can be used.

AlarmMessage is the second sub-menu, where up to 40 characters of additional text can be sent along with the standard Alarm Email message. In its sub-menus are the usual

Input Tray and Edit Value items, and this feature also uses a special dialog so up to 40 characters can be input for this message.

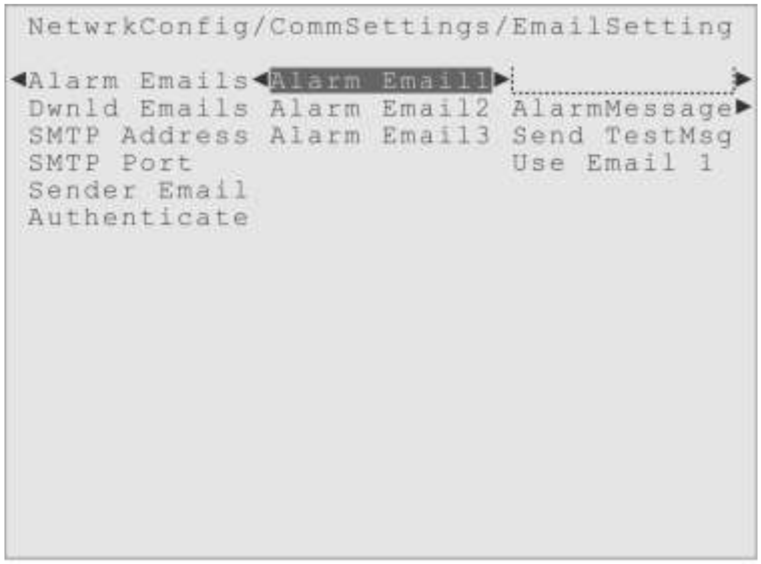


Figure 15-13. Highlight on “Alarm Email1”, showing its submenus.

Send TestMsg does just what its name implies, it will immediately send an alarm “test” email to the particular Alarm Email address, Alarm Email1 in Figure 15-13, so the user can be sure a real alarm email will be received if an actual alarm condition occurs. The Send TestMsg will send the email even if the Alarm Email is not “activated”, but remember that the “Use Email 1” activator must be selected before the Alarm Email address is “active” for normal alarm emails (see below).

Use Email 1 is the activator for the first alarm email address. The user must select this menu item when they want this email address to receive alarm emails. The Active Box will be drawn around the activator and the parent menu item, Alarm Email1, to indicate it is active. The activator allows the user to turn on and off the alarm emails to a particular address, without having to erase or re-enter the email address.

The other two Alarm Email menus do the same thing, and have the same sub-menus as the “Alarm Email1” example explained above.

Dwnld Emails is a menu similar to Alarm Emails. There are three menus in which email addresses can be defined, shown in Figure 15-14, and if an “AutoDownload” has been set up (in the Viewing Data\DownloadLogs\Via Email menu) these email addresses are the ones to which the logs will be sent. Each of the three email definition menus have the same two sub-menus, also shown in Figure 15-14.

(Email Address) is the first of the sub-menus. This is where the user can enter an email address to which the data logs will be sent. Although the 12 character Input Tray may not display the entire address, a special dialog is used when the Edit Value item is selected, so email addresses up to 40 characters can be used.

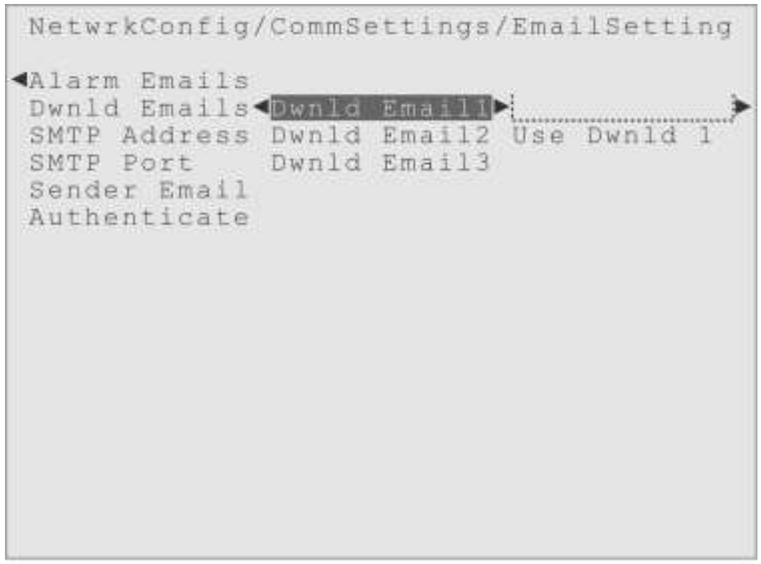


Figure 15-14. Highlight on “Dwnld Email1”, showing its submenus.

Use Dwnld 1 is the activator for the first download email address. The user must select this menu item when they want this email address to receive automatic data downloads. The Active Box will be drawn around the activator and the parent menu item, Dwnld Email1, to indicate it is active. The activator allows the user to turn on and off the data download emails to a particular address, without having to erase or re-enter the email address.

The other two Dwnld Email menus do the same thing, and have the same sub-menus as the “Dwnld Email1” example explained above.

SMTP Address is the menu where the Simple Mail Transfer Protocol (SMTP) server address can be defined by the user. The default entry is appropriate for a cellular modem that can be purchased from Hydro Systems, but if the controller is being used with some other Ethernet network, this address would need to be changed to address of the SMTP server in use on that network.

There is only a single sub-menu, as shown in Figure 15-15, the Input Tray for the

SMTP server address, with the usual Edit Value item it its right. Although the 12 character Input Tray may not display the entire address that has been defined, a special dialog appears when the Edit Value item is selected, so addresses up to 40 characters can be input.

Figure 15-15. Highlight on “SMTP Address”, showing the one submenu.

SMTP Port is the fourth EmailSetting sub-menu. The default port assignment, 25, is appropriate for the cellular modem available from Hydro Systems, but should also work for most Ethernet networks. Check with the IT specialist responsible for the installation site to make sure. Figure 15-16 shows the Input Tray sub-menu with the default value.

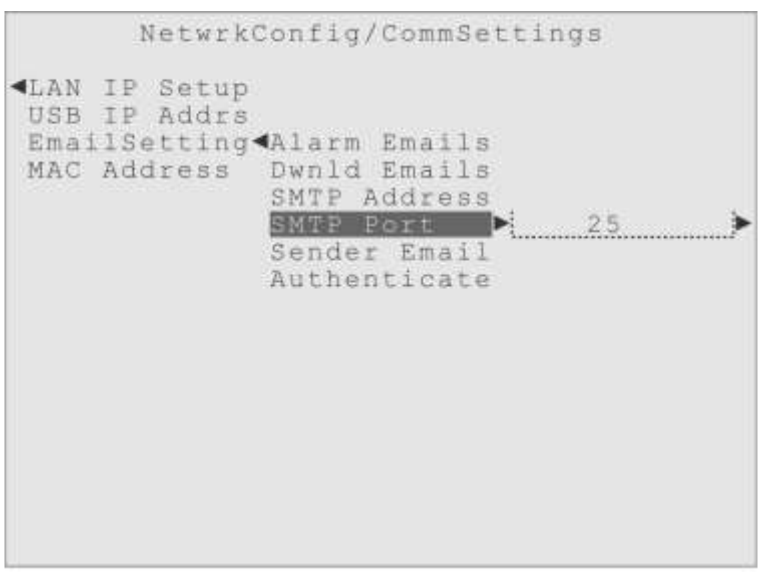


Figure 15-16. Highlight on “SMTP Port”, showing the default port assignment.

Sender Email is the fifth EmailSetting sub-menu, shown in Figure 15-17. The Input Tray is initially empty, and usually has to be filled in with a valid Internet email address, as specified by the Internet service provider.

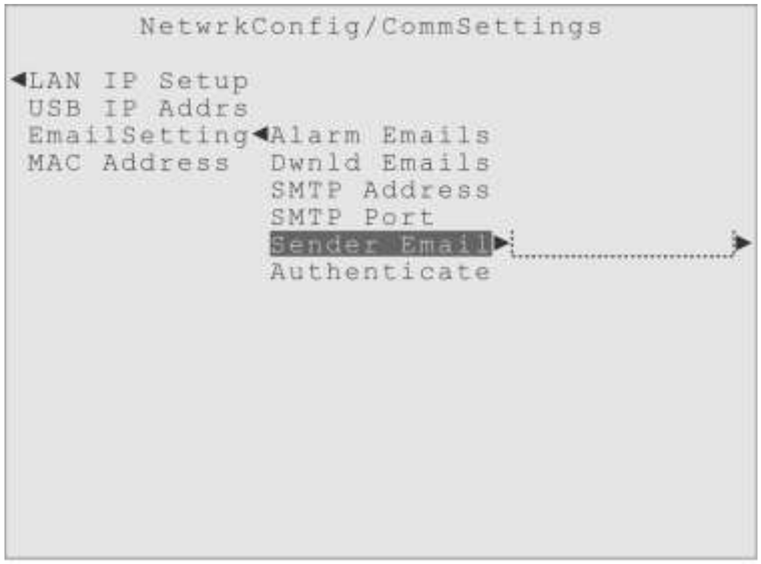


Figure 15-17. Highlight on “Sender Email”, showing the empty Input Tray.

For example, with the cellular modem system from Hydro Systems, the address looks like: hydrosystemsNNNN@mmillie.com (NNNN is part of the modem identification code). There is the usual Edit Value menu item to the right of the Input Tray, that brings up the special 40 character input dialog for editing the address.

Authenticate is the last EmailSetting sub-menu, with sub-menu for a User Name, Password and an activator, shown in Figure 15-18. If the email server associated with the controller requires authentication the user name and password assigned by the Internet provider must be entered in their menus and the “Use Auth” activator must be selected to activate email authentication.

The User Name and Password menus have the typical Input Tray to their right with an Edit Value control and use the special entry dialog so up to 40 characters can be input. And like other activators, the user would move the highlight onto the “Use Auth” menu item and press Enter to activate authentication. The Active Box would then be drawn around the activator and the Authenticate “parent” menu item. The Triton controller only supports the “AUTH PLAIN” protocol for email authentication.

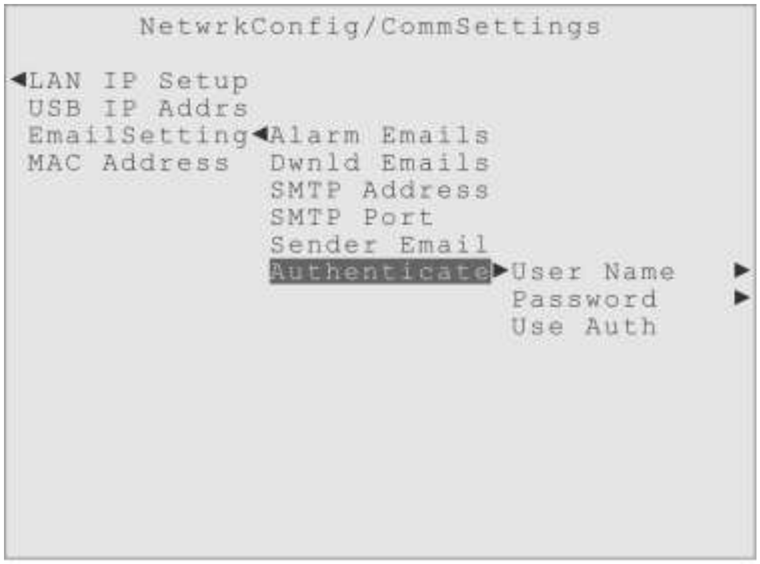


Figure 15-18. Highlight on “Authenticate”, showing its submenus and activator.

Figure 15-19. Highlight on “MAC Address” menu, with its display item.

MAC Address

The MAC Address menu is the last of the CommSettings sub-menus under the Network Configuration (NetwrkConfig) menu. As shown in Figure 15-19, it is a “display-only” menu that shows the controller’s Media Access Control address (MAC address). This is a unique number that is assigned to any device that wants to communicate on networks such as Ethernet. MAC address are often displayed in the format NN-NN-NN-NN-NN-NN (where NN is a two digit hexadecimal number) but the dashes have been removed in the Triton display so the value will fit in a 12 digit format.

Plug’n’Play

The second sub-menu under NetwrkConfig is “Plug’n’Play”, as shown in Figure 15-20.

Figure 15-20. Highlight on “Plug’n’Play” menu, showing its sub-menus.

The “Plug’n’Play” menu is where the user can manage their Modbus digital network. They can manually search for devices that have been added to the network (an automatic search also occurs when the controller is powered up), or they can remove a single device from the network, or remove all connected devices.

The menus to remove a device from the digital network say, “Reset” because as well as removing them from the controller’s menus, they also reset the ‘address’ of the device to a ‘default’ value, which makes them easy to use in the future, either when reconnected to the same controller, or used with another one. Please remember to use one of these “Reset” menus before physically disconnecting a digital network device that is being removed from the system.

SearchForNew

When a new digital network device is connected to the controller’s network, it will be automatically added to the menu system either by the search that occurs when the controller is powered up, or when the user selects the “SearchForNew” menu item.

Typically the controller will be powered down when a new digital network device is being installed, for example because the water flow is going to be stopped as a new sensor is being “plumbed” into the sample loop. Then, when the controller is turned back on, the new device will be found automatically by the search that occurs at power up, and added to the appropriate menus, with an appropriate name and proper range values.

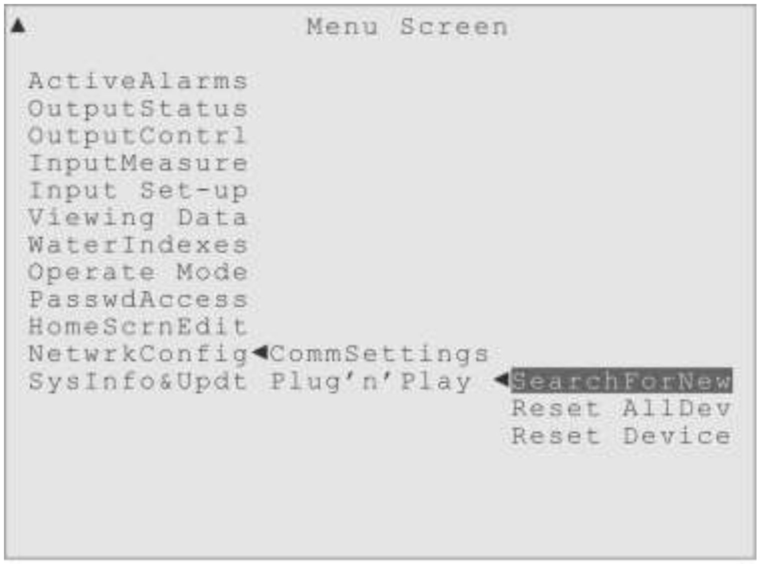


Figure 15-21. Highlight on “SearchForNew” menu item, before Enter key is pressed.

But if the device is connected when the controller is already active, the user can use the SearchForNew menu item shown in Figure 15-21, to add the device to the menu system.

Figure 15-22. The window seen when “SearchForNew” is scanning for new devices.

The Modbus digital network devices are logically arranged in “families”. The five families of digital network devices currently available are Cooling Tower Probes (CTP), Boiler Control Probes (BCP), pH Probes, ORP probes and Relay Expansion Boxes (REB). As an example, the first CTP probe found by the controller is given the 'address' CTP1, the second one added to the system is assigned CTP2 and so forth.

IMPORTANT! Although unlikely, if two devices of the same family, that both still have the 'default' address (have never been assigned an address), are connected to the controller at the same time, the search process will assign them both the *same* address, and the controller will think you have only added one new device. To fix this, use the "Reset Device" menu and pick the new item that was added incorrectly, then disconnect one of the devices, search and when the first device is assigned an address, connect the second device and it will be correctly assigned the next address. Figure 15-23 shows an example of this process, where the second CTP probe was left disconnected until the first CTP probe was seen to be assigned the "CTP1" address, and then the second probe was connected to the network and was assigned the "CTP2" address. The search will continue until the user presses the Enter key to indicate all new devices have been found.

Figure 15-23. The SearchForNew window, showing the network devices found.

Reset AllDev

The second Plug'n'Play sub-menu is "Reset AllDev", which will reset all the connected digital network devices to their default address and remove them from the controller's menu system. To invoke this function the user would highlight the "Reset AllDev" menu item and press Enter. Figure 15-24 shows the message indicating the removal-reset is complete. This feature allows multiple devices to be removed from the system at once, but probably won't be used in normal circumstances but can be helpful if an addressing issue occurs.

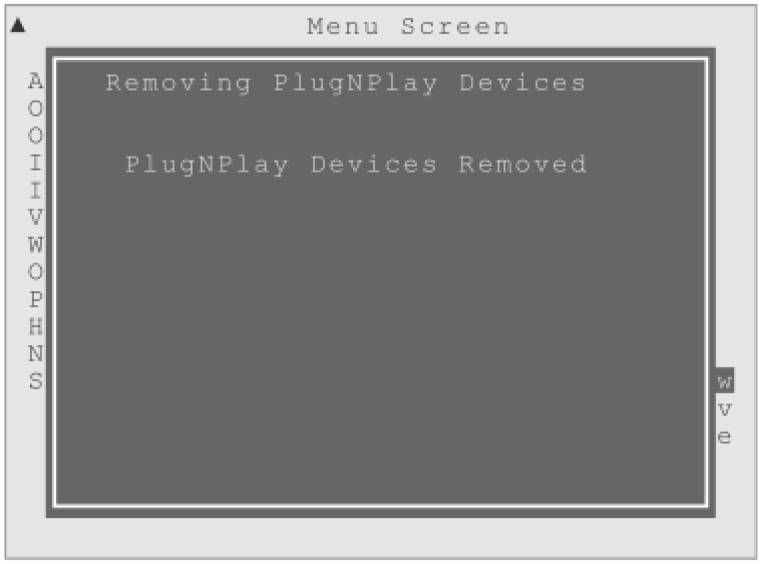


Figure 15-24. The "Reset AllDev" message, that all network devices have been removed.

Reset Device

This Reset menu works on a single digital network device, and will reset just the device selected to its default address and remove it from the controller's menu system.

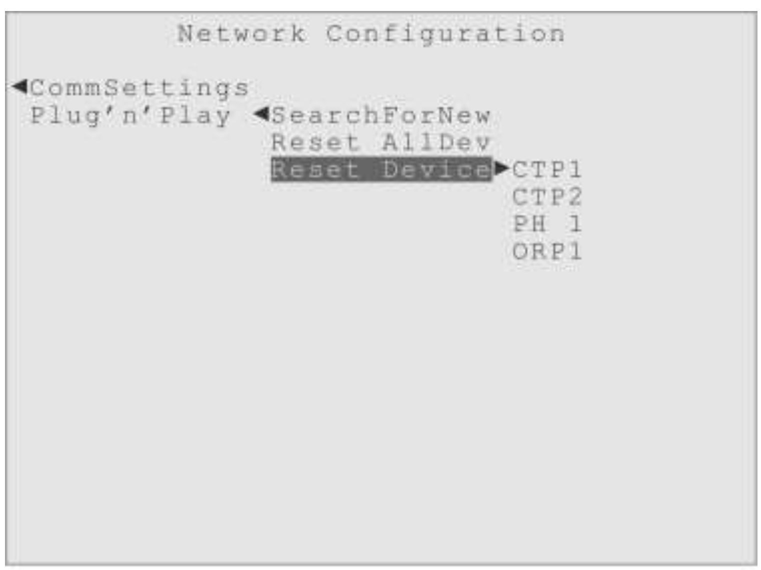


Figure 15-25. Highlight in "Reset Device", showing the list of network devices.

Figure 15-25 shows the highlight on the "Reset Device" menu, with an example list of devices displayed; two Cooling Tower Probes (CTP1 and CTP2), a pH probe (PH 1) and an ORP probe (ORP1). To reset and remove a device from the network and menus, the user would move the highlight onto the device they wish to reset (as shown in Figure 15-26) and press the Enter key. The same message as shown in Figure 15-24 would appear to indicate the device has been successfully removed.

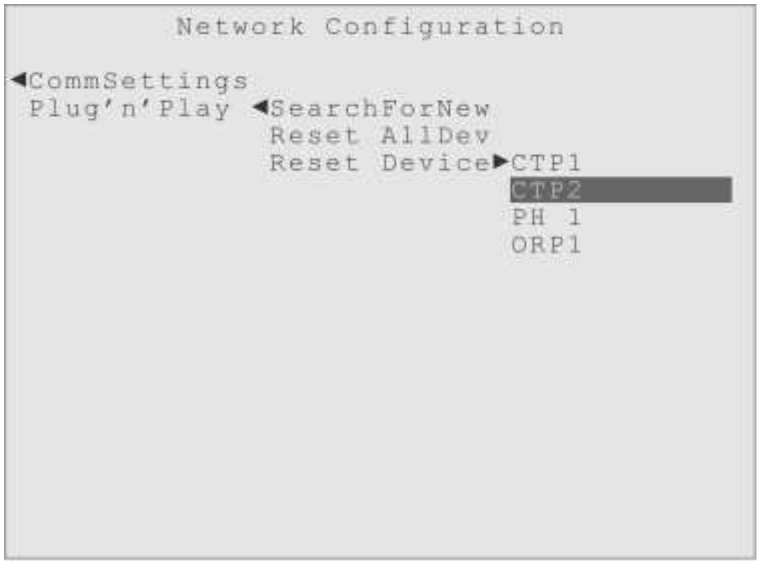


Figure 15-26. Highlight on CTP2 network device, about to be reset and removed.

It is highly recommended that before a network device is disconnected from a Triton controller that it first be reset and removed using this "Reset Device" menu. Doing so will not only remove the device from the controller menus, and prevent errors when the device cannot be found, it also allows the device to be properly found by the network search if it is ever connected to a controller again.

16 System Information & Update

Overview

The System Information and Update menu has five submenus.

The View System Information (ViewSysInfo) menu displays information about the hardware like the serial number and build date.

The View Version menu displays information about the software versions and template files in the controller.

The Configuration File menu (Config File) allows the user to download and upload a "configuration file" that holds all the settings made on the controller. This is like doing a "backup" of all the settings, and they can also be transferred to another controller.

The Help System menu allows the user to download or upload a copy of the Help text, which is used by the context-sensitive Help system.

The System Update menu allows the user to update the firmware of the controller, either from a USB flash drive or over the Internet.

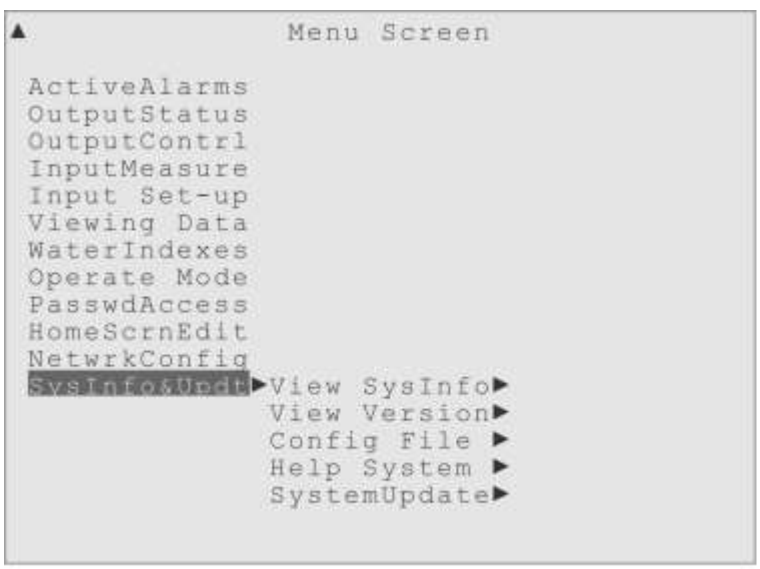


Figure 16-1. Highlight on the SysInfo&Updt menu, showing the five sub-menus.

View System Information

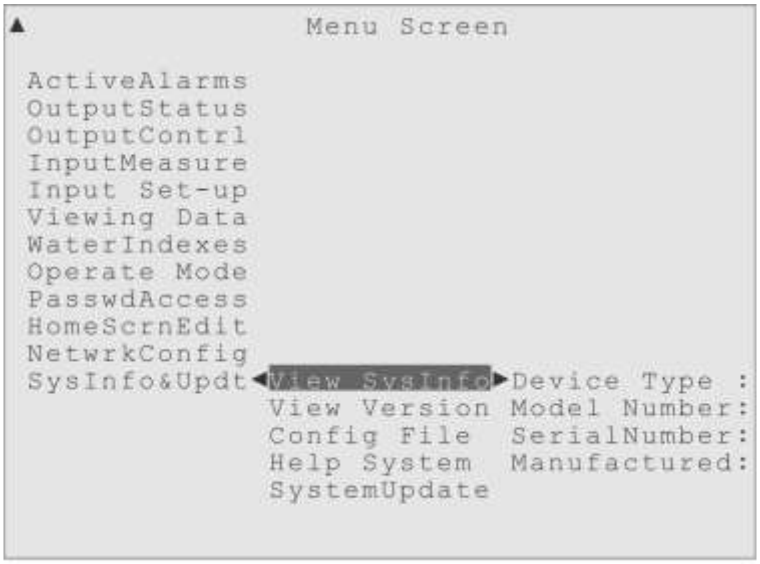


Figure 16-2. Highlight on the View SysInfo menu, showing its sub-menus.

The View SysInfo menu is a display only menu that shows information about the controller hardware, like the overall type of controller it is, the more specific model number, and unique serial number of the controller and when it was manufactured.

View Versions

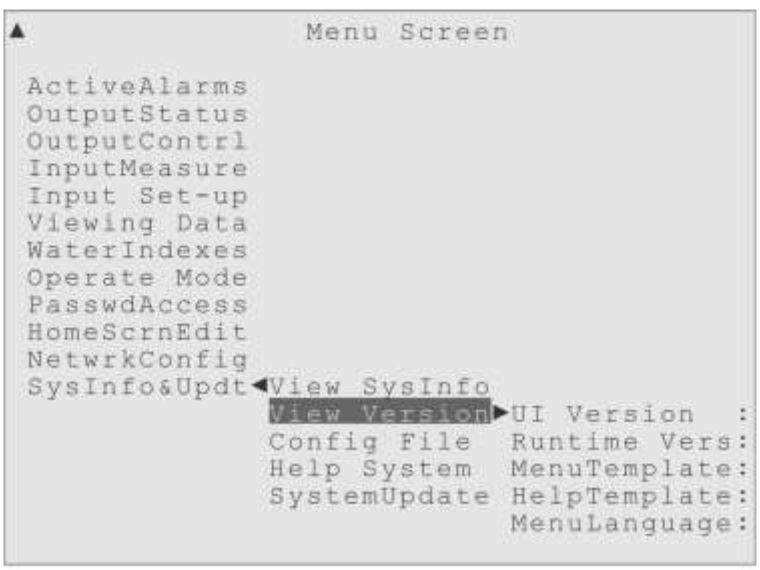


Figure 16-3. Highlight on the View Version menu, showing its sub-menus.

The View Version menu displays information about the software and menu templates

being used by the controller. This menu could be used to determine if these files are the latest ones available from Hydro Systems. To check for any software updates to the Triton Controller use your web browser and visit:
http://www.hydro-watertreatment.com/water-treatment-controllers/triton-controller.html

The Configuration File

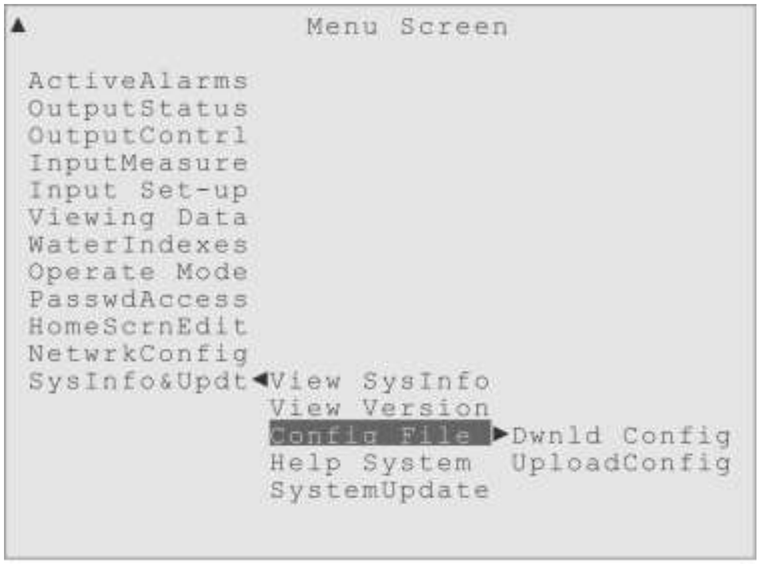


Figure 16-4. Highlight on the Config File menu, showing both sub-menus.

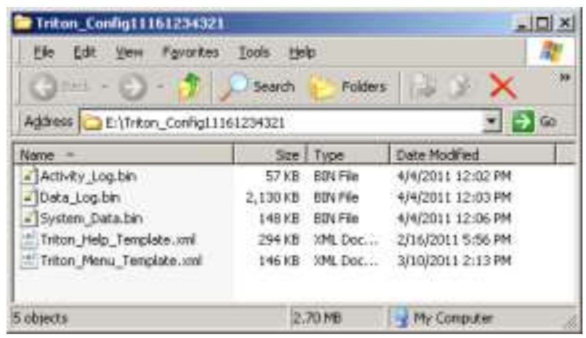
The Configuration file holds every setting made to the controller; every custom name, control setting, alarm value, password, changes made to Ready To Use operation modes and all the User Modes. Downloading the Config File to a USB Flash Drive inserted into the larger USB Type A port on the front panel of the controller allows the user to make a "backup" of all the settings made to the controller.

This Config File could then be uploaded to the same controller or some other controller, and (after a power cycle) the controller would become exactly like the controller at the time the Config File was downloaded. **Warning**: When the "UploadConfig" feature is used, the controller will automatically restart after the upload is completed, which may mean that timer mode pumps will turn on and other configured actions will occur!

One use for this powerful feature is that a company could develop a "base" configuration they want to use with all their controllers, and by uploading that to each new controller as a starting point, they could save the installer a lot of set up time!

The Triton controller always downloads the configuration files into a folder at the top level of the USB device. (The folder will be created if it does not exist.) The name of the folder will include the serial number of the particular controller the files were downloaded from, so you can download from multiple controllers without overwriting the configuration from one controller with that of another. In the example shown, the folder name is “Triton_Config1161234321”.

There are several flies that are downloaded into the configuration folder, as shown on the right. The file that we call the “Config File” is actually the binary file with the name “System_Data.bin”. (The other two binary files are the unformatted system activity and data logs, and the two XML files are the menu and help system files.) It is the System_Data.bin file that stores all the configuration data for the controller.



Downloading the Config File (“System_Data.bin”)

To download the configuration file, insert a standard USB flash drive or equivalent into the large USB Type A port on the front panel of the controller. Log in and navigate to the last main menu, the “SysInfo&Updt” menu, then to the “Config File” sub-menu as shown in Figure 16-4.

Then move the highlight to the right, onto the “Dwnld Config” menu item and press Enter. A dialog box will appear saying the download is in progress. When the download is complete, you can remove the USB device, or continue to use the menus to download other files.

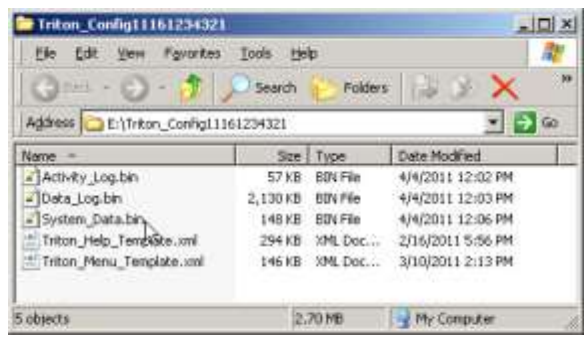
Uploading the Config File

Copying the “System_Data.bin” file

Uploading the configuration data is very simple, but there is one trick; the “System_Data.bin” file has to be copied out of the “Triton_Config…” folder to the “top level” of the USB drive that is going to be used for the upload. This has to be done using a computer, before you attempt the upload at the controller.

1. Insert the USB drive into the computer, and a window will open showing its contents. The window will probably be named “Removable Disk (E:)”. A typical window is shown in the picture to the right.

2. Double-click the folder named “Triton_Config…” to open it. A window will open showing the contents of that folder. An example of what the window should look like is shown to the right.

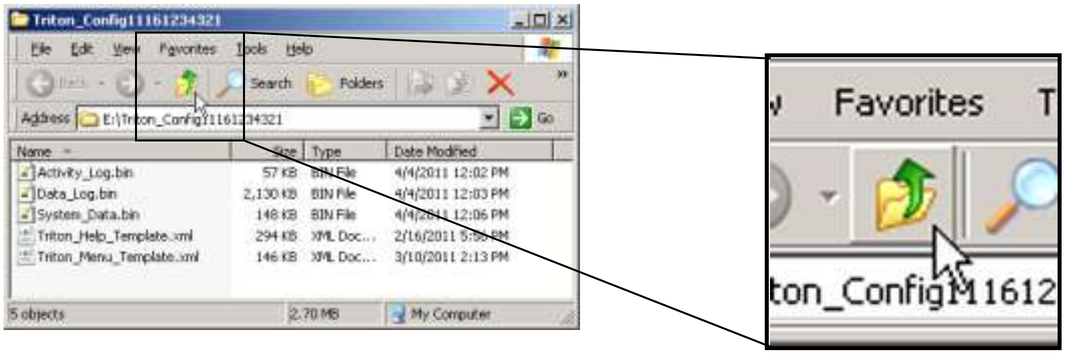


The file to copy up to the top level of the USB drive is named “System_Data.bin”. (The cursor arrow pointing to it in the picture above.) There are many ways to copy the file, and this procedure will document two easy methods.

<u>Copy Method A - “Copy” and “Paste”</u>

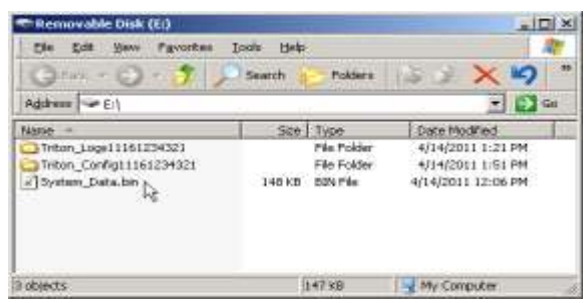
A1. Single-click the System_Data.bin file so it is highlighted. Then click on the “Edit” menu of the window, move the cursor arrow to the “Copy” item and click the “Copy” command when it is highlighted. That will make a copy of the file to the computer’s “clipboard”. The picture above shows the file highlighted along with the “Copy” command.

A2. After clicking “Copy”, find the icon for “Go Up One Level” (shown below) and click it to go back to the top level of the USB drive.



A3. Now the user would be back at the top level of the USB drive, the window that first opened up when the USB drive was inserted. They would click on the “Edit” menu of the window, move the cursor arrow to the “Paste” item and click the “Paste” command. That will put a copy of the (System_Data.bin) into this window. The picture shows the “Paste” command highlighted, ready to click.

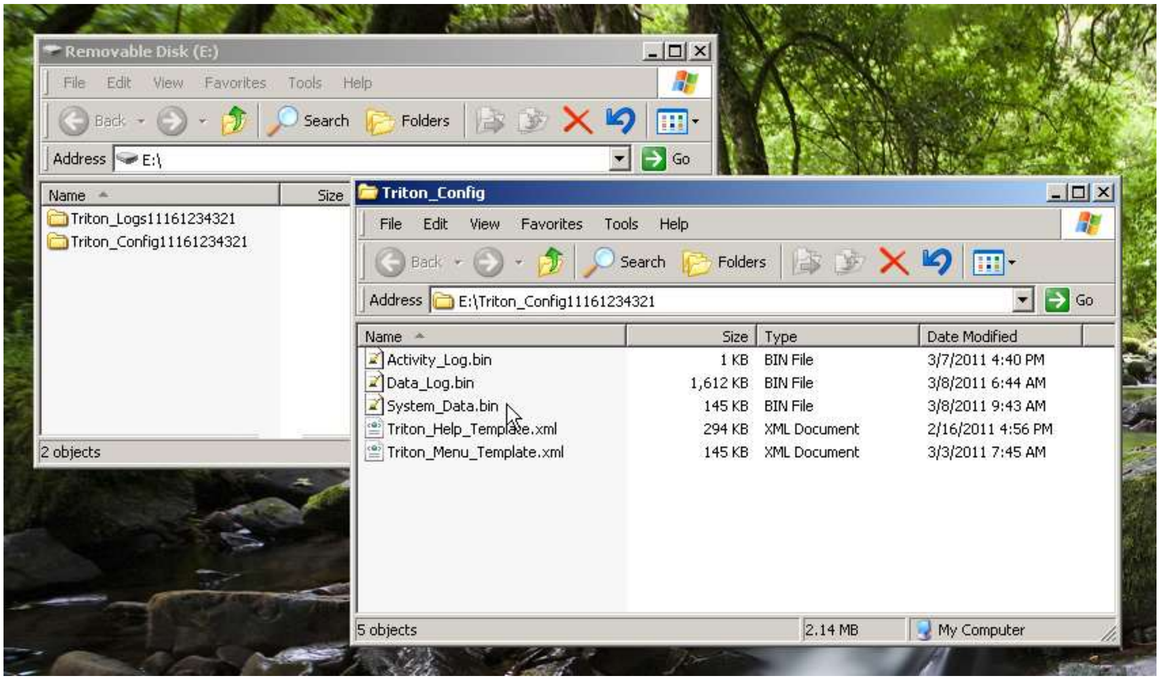
A4. When the System_Data.bin file has been copied to the top level of the USB drive, the user is ready to upload the “Config File” to the Triton Controller. The picture to the right shows the System_Data.bin file successfully copied.



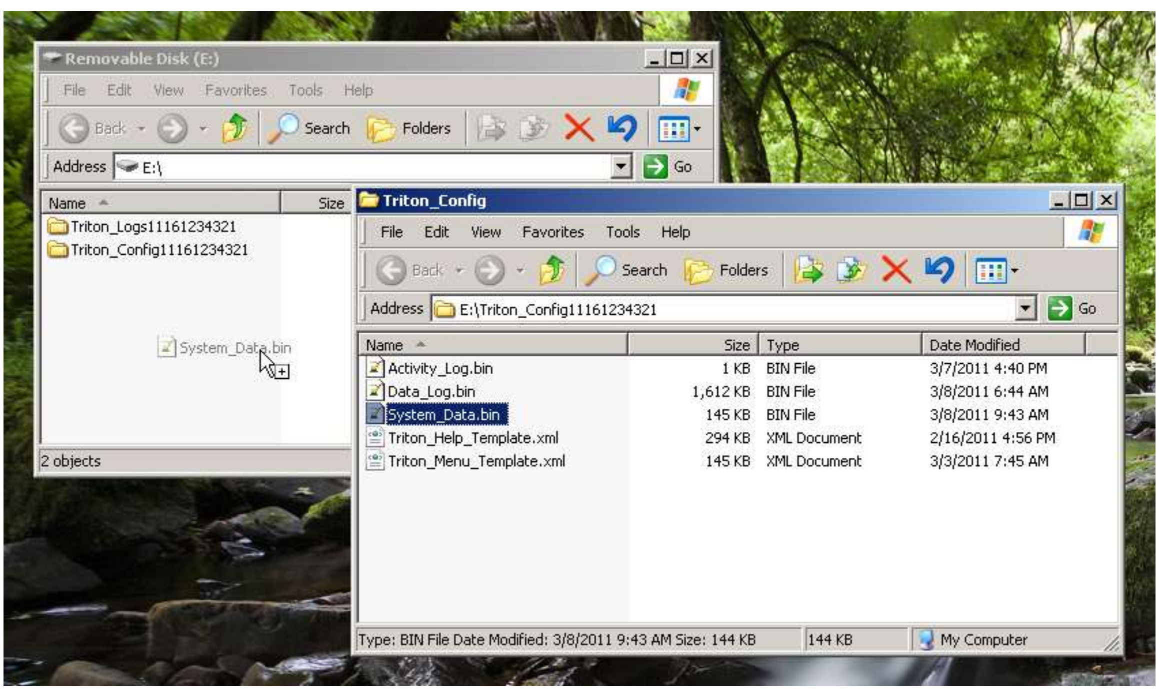
<u>Copy Method B - “Cntl-Drag and “Drop”</u>

(If you did Copy Method A, skip to “**Uploading**…” below!)

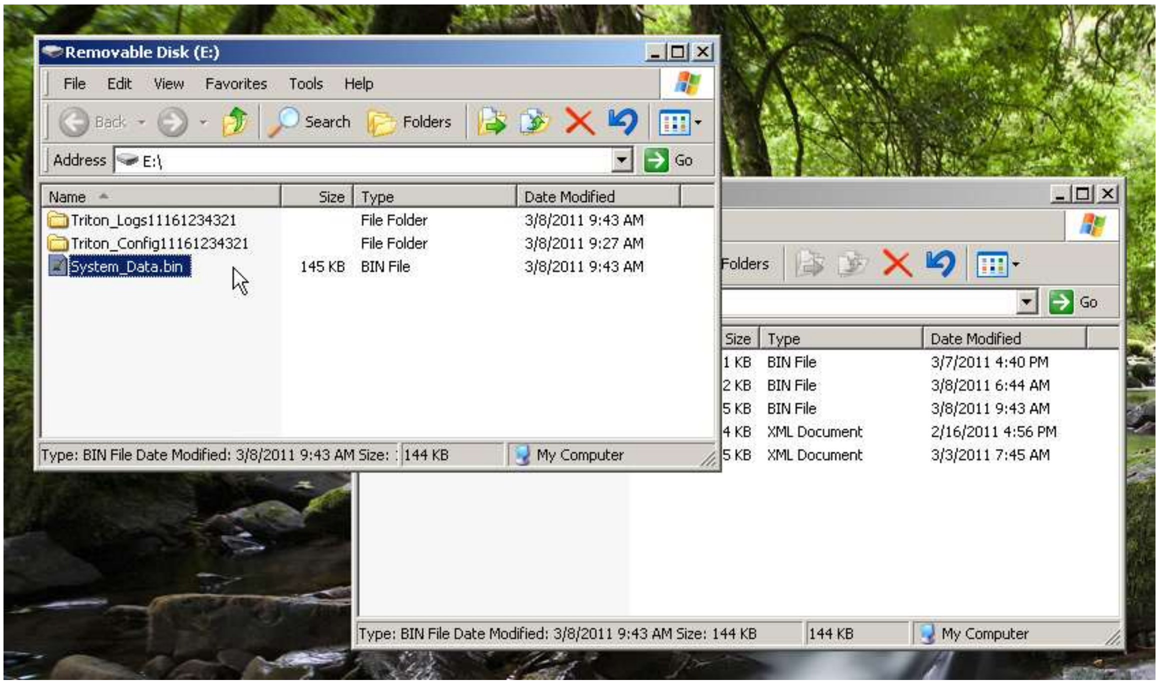
B1. To use the “Cntl-Drag and Drop” method of copying the System-Data.bin file, the user will have to have the original window, typically named “Removable Disk (E:)”, and the “Triton_Config…” window open at the same time. The picture below shows them open, and arranged so the user can drag the file from one to the other.



B2. Holding down the "Ctrl" key (usually one is at the left lower corner of your keyboard), click on the "System_Data.bin" file and "drag" a copy to the window of the USB drive (while still holding down the "Ctrl" key). You can tell you are making a copy buy the little "+" sign next to the cursor arrow. The picture below shows this "Ctrl-Drag" in progress.



B3. Once the "ghost-image" of the file is inside the window of the top level of the USB drive, as shown in the picture above, release the mouse button to "Drop" the copy into that window. The copy of the System_Data.bin file will be made into the top level of the USB drive and that window will be bought to the foreground. The picture below shows the copy completed, and you should now be ready to upload the "Config File" (the file named System_Data.bin) to the Triton Controller.



The user should now remove the USB flash drive (or "data stick") from the computer and bring it to the Triton controller onto which they want to load the configuration.

Uploading the Config File ("System_Data.bin")

To upload the configuration data, insert the USB flash drive (with the "System_Data.bin" file at the top level) into the large USB Type A port on the front panel of the controller. Log in using a high access level password (usually the "admin" or "user1" level) and navigate to the last main menu, the "SysInfo&Updt" menu, then to the "Config File" sub-menu as shown in Figure 16-5.

Then move the highlight to the right and down, onto the "UploadConfig" menu item, as shown in Figure 16-6, and press Enter. A dialog box will appear asking the user to confirm the upload, and warning that the controller will restart as soon as the upload is complete.

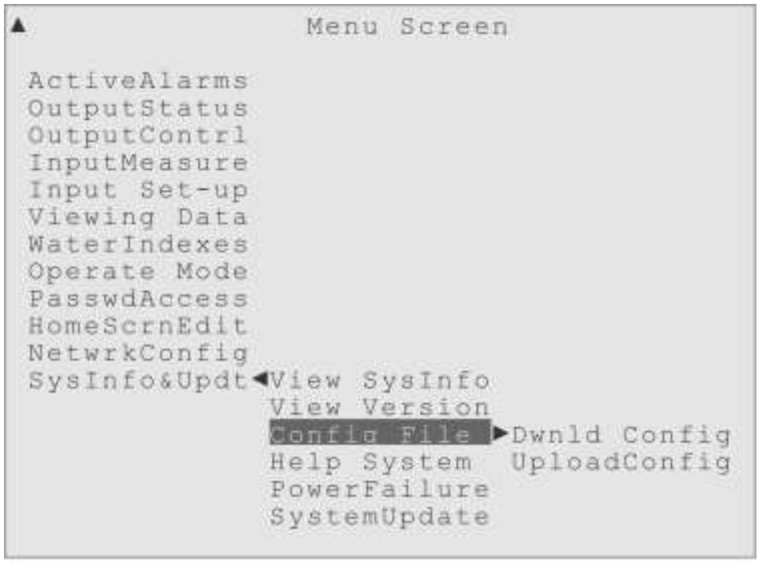


Figure 16-5. Highlight on the Config File menu, showing both sub-menus.

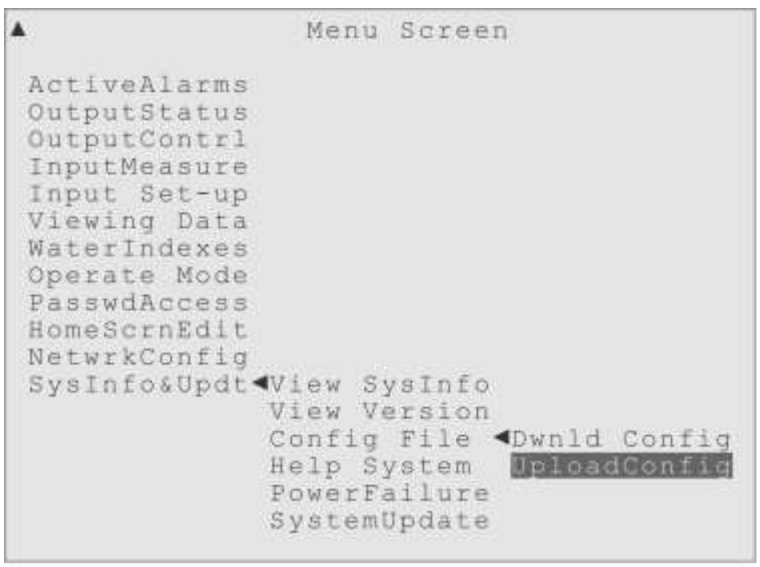


Figure 16-6. Highlight on the UploadConfig menu item, ready to press Enter.

When the upload is complete, a message window will announce that the controller is going to restart and the user may remove the USB device. When the controller finishes rebooting the new configuration file that was uploaded will be in use.

The Help System

The Triton controller has a unique, context-sensitive Help System that provides comprehensive help text on any menu item, simply by pressing the Help key. This feature is explained in Chapter 14 of this Reference Manual. The Help System menu under the SysInfo&Updt menu, as shown in Figure 16-7, has a different purpose.

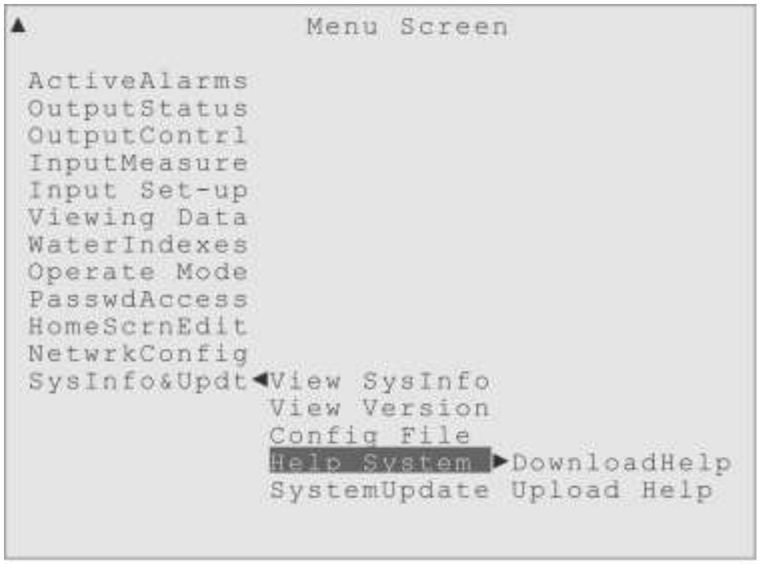


Figure 16-7. Highlight on the Help Systems menu item, showing the two sub-menus.

Using the two Help System submenus, the user can download the entire Help text file to a USB Drive inserted into the port on the front panel of the controller, or upload a copy of the Help text file. The user would simply move the highlight onto the appropriate submenu item, and press Enter. A "completion message" will be displayed once the Help file is done being downloaded or uploaded, as shown in Figure 16-8.

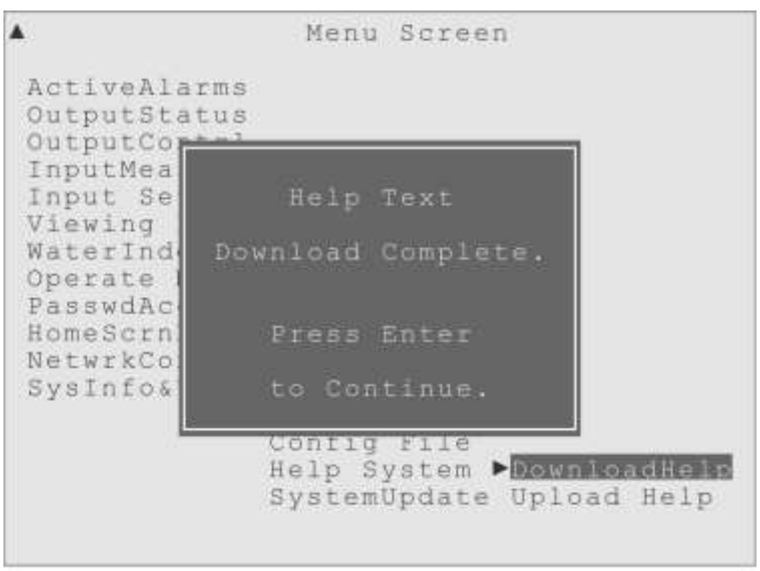


Figure 16-8. Help System menu, Download completion message.

The Help file is downloaded as a text file, with entries linked to the menu items, with the associated Help text. The user could edit that text file as they see fit, customizing help instructions for their installation, adding contact phone numbers, perhaps even include a translation to another language! Then the modified Help file could be uploaded to the same controller, or brought to and uploaded to other Triton controllers.

System Update

The System Update menu has one function, to upload a new version of the controller software if an update becomes available. A user can contact Hydro Systems to determine if a newer version is available or check at the Hydro Systems Water Treatment website: http://www.hydro-watertreatment.com/water-treatment-controllers/triton-controller.html
A Triton software update will be made available in two forms, an executable updater if the user has remote access to the controller and a zip archive that can be expanded onto a USB flash drive for a "manual" update using the front panel USB port with the UploadUpdate menu item shown in Figure 16-9.

Figure 16-9. Highlight on SystemUpdate, showing its UploadUpdate sub-menu.

Remote Update

If a user has remote access to the Triton controller, a URL that they use to access the controller's web interface, they can download the "executable" system updater from the Triton website at Hydro Systems and run that program to perform a system update. In the updater, all they have to do is enter the same URL that they use to access the web interface and the updater will upload the system update. To restart the controller, in order for the new system software to take over, the user can use the web interface by clicking the Restart button on the System Info page.

"Manual" Update

To perform a system update using a USB flash drive, the user would first download the "zip archive" version of the update from the Triton website at Hydro Systems. When the zip file is expanded it will create two folders, named "Triton_Controller_Update" and "Triton_Web_Update". These folders must be placed at the top level of the USB drive. Then that USB drive can be brought to the Triton controller to perform the system update. The user would log in to the controller, using a password that has "change access" to the SysInfo&Updt menu, and navigate to the "UploadUpdate" menu as shown in Figure 16-10.

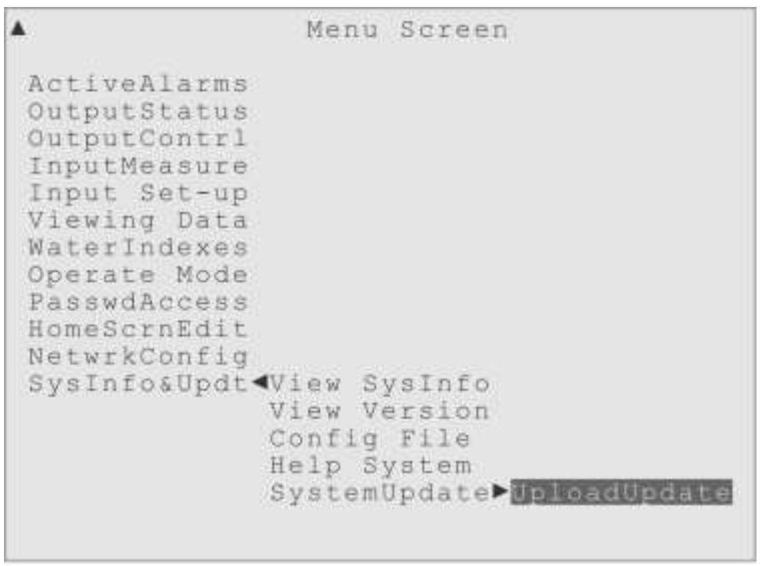


Figure 16-10. Highlight on UploadUpdate menu, ready to perform a system update.

Insert the USB flash drive into the larger USB Type A port on the front panel of the controller. After the message, 'USB Flash Drive Inserted!" appears, the user can press Enter to start the system update. First a large dialog window will appear, warning the user that the controller will automatically restart after the update is completed, which may cause timer mode pumps to turn on and other configured actions! This warning dialog is shown in Figure 16-11. If the user moves the highlight down to the "Yes" response and presses the Enter key, the system update will begin. A smaller message window will inform the user that the update is "Uploading Applications" then indicate it is "Uploading Web Files". Finally the update will complete, and a final message window will indicate the controller is about to restart, as shown in Figure 16-12. When the controller starts back up, the new system software is be in use.

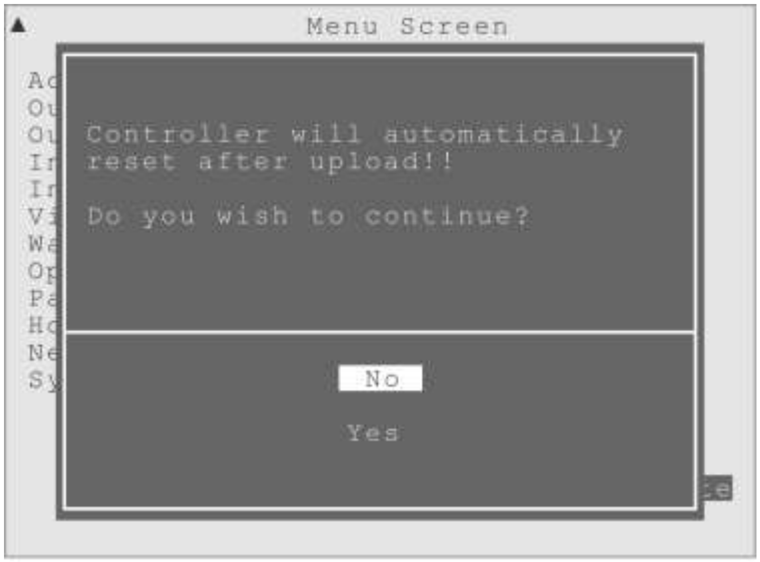


Figure 16-11. System update warning that the controller will restart when complete.

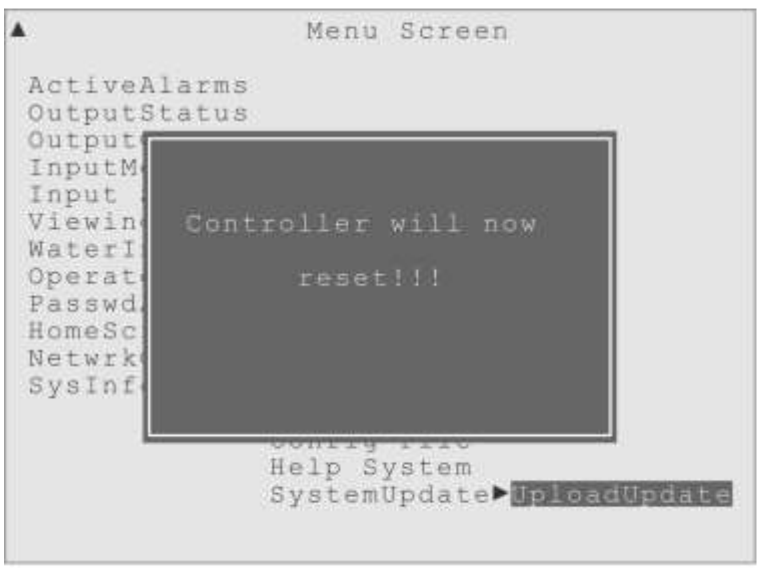


Figure 16-12. Message after update is complete, indicating controller is about to restart.

17 Maintenance and Troubleshooting

Overview

The Triton controller should require less maintenance and troubleshooting than other controllers, as its digital sensors should need less calibrations and the menus make most controls easy for a user to find on their own. But, all sensors need cleaning eventually.

Modbus Sensor Maintenance

These sophisticated digital sensors are extremely reliable and due to the digital Modbus network protocol they use for communication to the controller they are immune from most forms of electromagnetic interference. However, like any water condition sensor, the sensor end is subject to fouling and chemical interactions that can reduce the accuracy of their measurement.

Cleaning the Conductivity Sensor, **pH Sensor** or **ORP Sensor:**

The Conductivity probe has stainless steel conductivity sensor tips that can be cleaned. The pH and ORP sensors have a glass sensor window at their base that may also need periodic cleaning.

To clean any of them, close the isolation valves in your sample loop, closing the inflow valve first to relieve the pressure in the loop. Then unscrew the probe body from its "T" manifold, and pull it straight out. Be careful not to damage or misplace the O-ring at the top of the "T" manifold.

To remove loose debris, simply wipe the end of the sensor with a clean cloth. To remove scale deposits, dip the end of the sensor into vinegar or a dilute (2% - 5%) solution of hydrochloric acid, and then rinse thoroughly. To remove oily deposits, even fingerprints, wash the end of the sensor with a detergent solution or isopropyl alcohol and then rinse thoroughly. **Do NOT use any abrasive materials such as a toothbrush, wire brush, steel wool or plastic abrasive pad.** The thermally conductive material on the bottom of the Conductivity / Temperature probe, or the glass window of the pH and ORP sensors will be damaged by abrasive materials.

When reassembling the CTP probe into its “T” manifold, only screw it in until the arrowhead “▼” on the probe body lines up with the arrowhead “▲” on the “T” manifold. The pH and ORP probe bodies have a vertical indicator line “ | ” that will line up with the arrowhead “▲” on the “T” manifold when sufficiently tight.

When the probes(s) are re-installed, open the isolation valves and check for leaks. If after cleaning, you wish to calibrate the conductivity measurement, go to the “Input Set-up” menu and then to the “Calibration” sub-menu for the probe you wish to calibrate.

Troubleshooting Modbus Sensors

If a new Modbus sensor is connected to the controller, it will automatically be assigned an “address” on the network when the password request dialog appears, or if you go to the “NetwrkConfig” menu, then to the “Plug’n’Play” submenu and select the “SearchForNew” menu item.

Conversely, if you are going to remove a Modbus sensor from the network, you should go to the “NetwrkConfig” menu, then to the “Plug’n’Play” submenu and select the “RemoveDevice” menu item. This will delete the address of that sensor from the network and prevent “device not found” errors (Sensor Error) when you disconnect the device from the Modbus network.

This “RemoveDevice” action will also set the “address” in the Modbus sensor back to the “blank” default value, so it can be properly added to another system. Therefore it is important to always use the “RemoveDevice” menu item before you permanently disconnect a Modbus sensor from the controller.

If you add a Modbus sensor to a controller, and it is added to the menus with a incorrect sequence number, it will operate correctly, but you may use the “RemoveDevice” function and “SearchForNew” menu item so that it is added to the menus with the proper sequence number, if you so desire.

For example if you had one CTP probe already (CTP1) and attached a second CTP probe, and it was already assigned the network address of “CTP3”, it would be added to the network as CTP3, and the default names for the sensors would appear as Flow Switch3, Conductivty3, and Temperature3.

This would not cause any functional problems, but if you used the “RemoveDevice” function and selected the CTP3 address, then did the SearchForNew, the new CTP probe would be assigned the proper sequence number as CTP 2.

This is one reason it is important to use the “RemoveDevice” function before permanently disconnecting a Modbus sensor from the network, which will reset that sensor’s address to the “blank” default value, and allow it to be properly added to another system.

If you add a Modbus sensor to a controller, and the automatic search at power up or the “SearchForNew” menu item does not find the new sensor, it probably indicates the new sensor you added has the same network ‘address’ as a Modbus sensor that is already installed.

For example if you had one CTP probe already (CTP1) and attached a second CTP probe that was already assigned the CTP 1 address, the controller would not be able to distinguish it from the CTP 1 that was already installed.

To resolve this problem, you would use the “RemoveDevice” function on the CTP 1 address, *while both probes are still attached to the network.* Then disconnect the new sensor from the network and use the SearchForNew to find the original CTP 1, then attach the new sensor and let the search properly indentify the new sensor as CTP2.

This is another reason it is important to use the “RemoveDevice” function before permanently disconnecting a Modbus sensor from the network, which will reset that sensor’s address to the “blank” default value, and allow it to be properly added to another system.

Software or Menu System Troubleshooting

Ready to Use vs. User Mode - From the factory, a Triton controller is set to the “User Mode 1”, which allows the user to employ every relay and every possible auto control mode. Any of the four User Modes allow the user full control with no restrictions. If however, one of the Ready to Use modes is selected, various restrictions are enforced; relays disappear, auto control modes disappear, only certain control modes can used with certain relays, and the Relay Usage settings are “locked”.

So, if a user finds relays and/or control modes “missing”, the most likely reason is that a “Ready to Use” operation mode has been selected. Check under the “Operate Mode” menu and see which mode has the Active Box drawn around it. By the way, if a

Ready to Use mode has had its settings configured, the user can take advantage of the "Copy Mode" feature of a User Mode to copy all those settings into the User Mode.

Activating a Control Mode - Under the "Auto Control" menu are various categories of automatic control modes. Under each category are the individual control modes. If an automatic control mode is "active" it will have the "Active Box" drawn around its name, and there will also be an Active Box drawn around the category name and the "Auto Control" menu item. The most common way an automatic control mode is activated is by selecting the "Use Mode Now" menu item, which will be the last menu item under the individual control mode. The user would move the highlight onto the "Use Mode Now" menu item and press Enter to select it.

So, if a user has adjusted the settings of an automatic control mode, but there is no Active Box around its name, nor around the "Auto Control" menu item, the user probably has not selected the "Use Mode Now" menu item for that control mode.

Also, after setting up and activating an automatic control mode, the user can always select the "Manual On" or Manual Off" menu items to manually control the relay. To return to the previously active automatic control mode, the user can either allow the "Manual Limit" time to expire, or simply select the "ReturnToAuto" menu item.

Activating the Alarms - Similar to the automatic control modes for the relays, the inputs or sensors have alarms that need to be activated by the user before they have any effect. Every input listed under the "Input Set-up" menu has its own AlarmSettngs menu that has a "UseTheAlarms" menu item. After adjusting the values for the alarms, the user must highlight the UseTheAlarms item and press Enter to 'activate' the alarms.

Relay Usage - By selecting a usage from the "Relay Usage" menu, the user can let *any* relay control a Bleed Valve, or a Chemical Pump, or be an Alarm Relay.

From the factory Relay 01 is pre-assigned the BleedValvUse, Relays 02 to 07 are pre-assigned the PumpRelayUse and Relay 08 is pre-assigned the AlarmRlayUse. But the user can change the Relay Usage as they desire. So for example, if they don't need an Alarm Relay they can change the Relay Usage for Relay 08 to PumpRelayUse and control another chemical pump. Or multiple relays can be assigned the BleedVlavUse to control multiple towers.

Digital Input Usage - Similar to the usage feature for relays, the eight Digital Inputs also have a DigtlInUsage menu where the user can indicate how a particular digital input will be used. Each choice changes the settings available, to be appropriate to the digital input usage selected.

There are choices for a Hall Effect (or Paddlewheel) Water Meter, a Reed Switch Water Meter, a Digital Counter, a simple "two-state" General Purpose device like a Drum Level switch, and a special Flow Switch usage for simple On/Off flow switches, like the "float" style switch that is often employed.

Note that the Reed Switch Water Meter and Digital Counter usages have a special settings menu "Filter Time" that allows the user to set the "debounce" time for that input. A 100 msec debounce time should work fine for any Reed Switch, but depending on the quality of the switch connected to the Digital Counter, the user may have to use debounce times as long as 400 to 500 msec. Of course long debounce times will limit how quickly the Digital Counter can count, so if a very fast Digital Counter is required and high quality switch may have to be employed.

Accessories and Replacement Parts

Enclosure Parts

• Relay "Pigtails" (120/230 VAC cables, 10 inch, includes fittings for enclosure.)
One set of relay "Pigtails" (8) with Cordgrip fittings (3) Part # 10094652

• Single Relay "Pigtail" (120/230 VAC cable, 10 inches long, female plug)
One relay "Pigtail" (1) Part # 10094688

• Clear Front Cover
One clear front cover (1) Part # 10094689

• 120/230 VAC Power Cord (12 feet, 1/4" female spade main board connectors attached)
One AC power cord (1) Part # 10094691

Modbus Devices and Cables

(Accessory Probes and REBs do not include a Modbus cable. Order cables separately, as necessary.)

• Single Modbus communication cables (Female-Female to connect two probes.)

One (1) Modbus cable - One foot in length (1')	Part Number 10094693
One (1) Modbus cable - Four feet in length (4')	Part Number 10094694
One (1) Modbus cable - Ten feet in length (10')	Part Number 10094695
One (1) Modbus cable - Twenty-five feet in length (25')	Part Number 10096235
One (1) Modbus cable - Fifty feet in length (50')	Part Number 10096236
One (1) Modbus cable - One hundred feet in length (100')	Part Number 10096237
One (1) Modbus cable-One hundred-fifty feet in length (150')	Part Number 10096238

• Conductivity Probe Assembly w/ PVC "T" Manifold (both ends female 1" NPT)

Modbus Conductivity Probe Assembly — Part Number 10094641

• pH Probe Assembly w/ PVC "T" Manifold (both ends female 1" NPT)

Modbus pH Probe Assembly — Part Number 10094642

• ORP Probe Assembly w/ PVC "T" Manifold (both ends female 1" NPT)

Modbus ORP Probe Assembly — Part Number 10094643

• Relay Expansion Box (REB) Adds 4 Relays and 4 Digital Inputs

One Relay Expansion Box, w/ "Pigtail" Cord Connections	Part Number 10094628
One Relay Expansion Box, for Conduit Connection	Part Number 10094619

4-20 mA Input and Output Boards

Boards are available with either 2 or 4 channels, so the maximum total of 4-20 mA Inputs and Outputs combined is 12.

• 4-20 mA Input Boards

4 Channel 4-20 mA Input Board	Part # 10094654
2 Channel 4-20 mA Input Board	Part # 10094655
4 Channel 4-20 mA Output Board	Part # 10094656
2 Channel 4-20 mA Output Board	Part # 10094647

Main Board Fuses

Two (2) 16 ampere "slow blow" main fuses (Schurter PN# 0034.3129) and eight (8) 6.3 ampere "slow blow" relay fuses (Schurter PN# 0034.3125).

• Main Board Replacement Fuses (Size 5x20mm)
One set of main board fuses (2 x 16A and 8 x 6.4A) Part # 10094690

USB Connectivity Kit

• USB Connectivity Kit (Controller to Computer Cable and USB Flash Drive)
One USB Type A to Mini-B cable (1), one USB flash drive (1) Part # 10094692

Contact Information

For help with any questions or problems, please contact Hydro Systems, tell us you are calling about the Triton controller and ask for Customer Service.

Hydro Systems Co.
3798 Round Bottom Road, Cincinnati, OH 45244
Phone: (513) 271-8800
Toll Free: (800) 543-7184
Fax: (513) 271-0160
http://www.hydrosystemsco.com