Model for

Hydroponics control systems for Nutrients Dosage and pH control.

HP100

Hydroponics Controllers

USER MANUAL

April 2013 Version 15.2

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Aquarius Water Treatment Controllers

Congratulations

We know you will be happy with your decision to purchase a new Aquarius Technologies Controller. These units are now supplied with standard features that are considered optional extras in most other systems, if available at all.

The updated software now incorporates our newly released Aquarius Proprietary Logic (APL), which has capabilities to control monitoring and responses to much tighter tolerances that were ever possible in earlier models.

If you have not already included the remote access option, you have the comfort of knowing that these models are all sold as 'Web ready', capable of connecting to a smart phone or computer, by the addition of a web communications package. This package only requires the addition of a suitable modem and antenna.

Let us help you to learn about your new Controller. This manual will take you through all of the functions available from the keyboard and display, and provide a clear and logical sequence for processing the configuration settings.

Please also take the time to send us details of the Installation on the Registration Form provided. This will enable us to provide the very best level of technical support should you need to contact us for any reason.

Models covered by this Manual

- Models for Hydroponics using Nutrients and Hydrochloric Acid - HP Series

Where to find the serial number

Model HP100

Serial Identification Label

All Aquarius Technologies Controllers are manufactured with a Serial Identification Label (SIL).

This will be affixed to the wall of the controller, on the outside face on the right side.

The label is the best reference for making inquiries for service or Technical Assistance.

Any controller that does not show evidence of the SIL may have the warranty voided.

Key data being:

Model: e.g. HP100
This is actual Controller model and indicates the configuration.

Build: e.g. OCT-12
Would indicate this controller was manufactured in October 2012

Serial No: e.g. 1210HP10011
Is the specific serial number for this Controller

Section Contents

1 Installation Guidelines

2 System Configuration

2 System Configuration

3 Warranty & Registration

1 Installation Guidelines

Important

1. It should not be installed within the holding tank zone, i.e. within 3 meters of the water according to current definition.

2. If the supply cord is damaged, it shall be replaced by the manufacturer or its service agents or similarly qualified person in order to avoid a hazard.

Before you start

Select a suitable location for installation - preferably in close proximity to the main system, protected from the public and environmental factors such as direct sunlight. A wall area of approx. 0.75 m. wide by 1.0 m. high is ideal for mounting your controller. A minimum floor area of approx. 1.5 m x 0.6 m below the controller is required for the chemical tanks. This will vary according to the number and type of chemicals being used for dosing.

It is important to consider environmental elements when installing. It is a requirement to provide protection for accidental spills of chemicals and that includes any leaks that can develop from pump pressure lines. Some chemicals will damage materials used in construction of buildings, particularly roofing. Never assume that the equipment will not leak, under certain conditions that will occur. It is the responsibility of the installer to ensure that such events do not create damage that should have been avoided by correct site selection and the provision of adequate bunding at the time of installation.

Minimum system requirements

There are several minimum requirements that should be established BEFORE the controller is installed;

- Minimum 20 mm (3/4) take-off and line to supply sample water to the system,
- Minimum 12 litres/minute supply flow to ensure proper operation of sample readings, dosage and bleed off rates.
- Adequate bunding is provided for the system and chemical drums to prevent spills causing damage.
- Availability of approved connection to power. A 'clean' 220 - 250 vac 50 Hz @ 10 amps supply (some options may need more than one outlet, or increased current capability).

The terminal strips supplied with the controller activate a 240V AC supply rated @ 7A combined. These terminals are active when the Relay Output for the specific function is activated, e.g., pH terminal will go active 240Vac when the pH monitored value is outside the set-point. These outputs should be wired by a qualified electrician. The Neutral and Earth connections for each output must be connected to the commoning blocks using the terminals.

To install

Unpack the equipment and check for any damage. Ensure all parts are accounted for.

Assemble the inlet and outlet PVC valves on the sensor manifold. Remove the protective cap and fit the pH/ORP probe into the manifold.

Connect a 20 mm line from the circulating pump discharge line, or system common discharge header, to the inlet of the manifold. Connect a return line from the manifold outlet valve preferably in PVC pipe to the discharge side of the filter. (see page 9)

Install chemical tanks as required, and ensure each dose pump discharge tubing is connected to a recirculation tank or to the manifold injection points provided.

Run a flow of water through the system under normal operating pressures. Check for, and repair any leaks. The Aquarius Controller is now ready for use. Liaise with your chemical specialist for advice regarding any bunding requirements, floor drainage requirements and fresh water supply in the vicinity of chemical tanks. In addition check on local authority regulations for discharge of trade waste, chemical storage and hazards control etc.

Maintenance and Care of Sensors

Foulants can lead to inaccurate sensor readings. Sensors should be cleaned and calibrated regularly using the following procedures.

Cleaning of Flow/Conductivity/Temp Sensor

Isolate the flow to the manifold.

Remove the locking nut from the Flow/ Conductivity/Temp sensor.

Abrade the sensor surface with 300–400 grade wet–and–dry paper until the surface is clean, the two carbon electrode surfaces are clearly visible, and the surface wets out freely.

Ensure flow paddle is free from debris. Rinse the sensor in fresh water and replace it in the manifold.

Cleaning of pH sensor

Isolate flow to the manifold.

Remove the sensors from the manifold by loosening the lock nut and withdrawing the sensor from the manifold.

Rinse the sensors in fresh tap water and remove any visible fouling. This should be done carefully by lightly scrubbing with a tooth brush or similar.

Place the sensors in the Electrode Cleaner solution (AS9500) for about 5 minutes to completely dissolve any trace of inorganic foulants.

Remove and rinse thoroughly in fresh water before replacing it in the manifold.

Proceed to calibration or verification of sensors as outlined in the commissioning section.

Accessories and Spare Parts

Reagents

AS1413 -1413 uS/cm conductivity solution
AS7004 - pH 4 buffer solution
AS7007 - pH 7 buffer solution

Sensors

PR_FCT – Combination Conductivity, Flow and Temperature Sensor.
PR_pHRG – Combination pH, ORP and Ground reference Sensor

Peristaltic Pumps

AP_PERI_S_KIT – AP PERI SERVICE KIT
(Maximum service interval - 12 mths)
Included in this Kit are the following
- AP_TUBE4824 (1)
- AP_INJECT (1)
- TUBESUCTION(2)
- TUBEDISCHARGE (2)

AP_PERI_O_KIT – AP PERI OVERHAUL KIT
(Maximum service interval - 2 years)
Included in this Kit are the following
- AP_TUBE4824 (1)
- AP_INJECT (1)
- AP_ROLLBACK (1)
- AP_DWEIGHT (1)
- AP_LID (1)
- TUBESUCTION (2
- TUBEDISCHARGE (2)

Test Meters required

HI9813 Portable pH/cond meter

Routine Testing

The use of an Aquarius control system will automatically vary the dosages and maintain Nutrient levels through conductivity and pH, control, even where there are wide fluctuations in system load or demand.

The principles of “Best Practice” and “Duty of Care” that are the responsibility of the system owner dictate that all systems should be routinely serviced and tested chemically and the results logged.

1 Installation Guidelines

Warnings

Chemicals used as part of the treatment program may be hazardous. Refer to the Material Safety Data Sheets (MSDS) provided by your chemical supplier and ensure personnel involved are aware of the handling and safety procedures.

Please read and understand all safety warnings on chemical containers before servicing any dosing equipment.

Wear as a minimum - safety goggles and gloves when servicing the dosing equipment.

Do not mix concentrated acids and oxidising agents as explosion, and/or toxic and lethal gas may be evolved, and/or fire result. Keep all chemical containers sealed and free from contamination.

Regular inspections and Maintenance

For optimum results and continued accuracy the complete operation of the controller system should be verified at least on a monthly basis.

All sensors should be inspected, cleaned and calibrated as necessary every month.

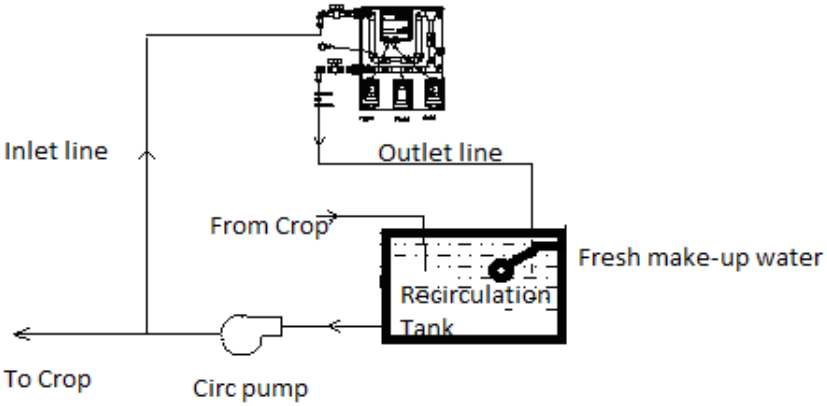
The pH sensor ages with time and temperature, and have a typical life span of 2-3 years depending on the application in which they are operating. They should be replaced accordingly.

Where fitted, flow sensors, solenoid valves and wire strainers should be checked for correct operation and cleaned of any debris every month.

Injection non-return valves and pumps should be cleaned and checked at least annually.

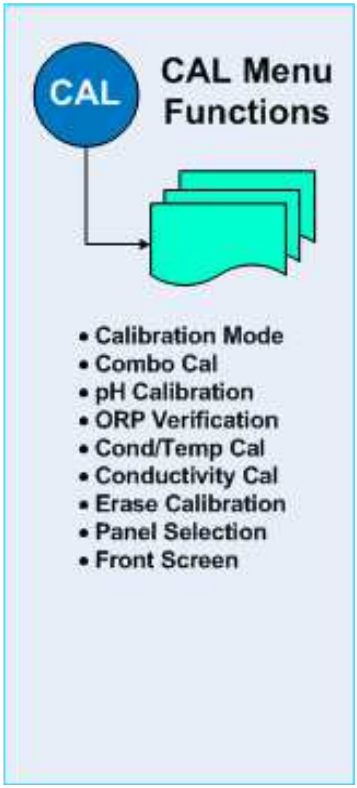
On the peristaltic dose pumps, the squeeze tubes and roller block should be checked at least annually and should be replaced every 1-2 years. Lubricate squeeze tubes using pump_grease as required. Please call us to place an order. More regular maintenance may be required for the larger 3.0 l/hr pumps, due to increased pumping rates.
Chemical suction and discharge tubes should be inspected monthly and replaced as necessary

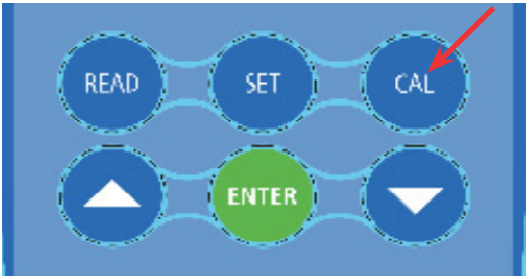
Maintenance	1 Month	3 Months	6 Months	1 Year	2 Years
Clean and Calibrate FCT Probe	√				
Verify Flow ON/OFF	√				
Verify pH Probe	√				
Test Outputs	√				
Test Pumps/Solenoid Operation	√				
Clean and Calibrate pH Probe		√			
Check/Clean Injectors		√			
Inspect Suction/Discharge Tubing		√			
Check/Clean Solenoids			√		
Peri. Pump - AP Service Kit				√	
Peri. Pump - AP Overhaul Kit					√



Typical Installation Schematic

2 System Configuration





Aquarius Control Systems

Your new Aquarius controller system features a front panel that consists of:-

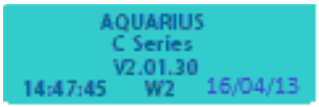
Screen

A 4x20 line alphanumeric display

Buttons

The six button key pad is the primary user interface. The buttons provide the means to navigate the screens and set the operational parameters for your desired treatment program.

READ:	Used to display READ only screens.
SET:	Used to display SET screens.
CAL:	Used to access sensor calibration screens.
↑ (Up) & ↓ (Down) arrows	Used to scroll between screens or alter values for input.
ENT (Enter):	Used to complete or confirm an action. This will move the process to the next programmable function.



Default Screen

The factory setting is to show the 'default' screen on power-up. The Aquarius 'default' screen displays Company Name, name identifier of the equipment, firmware version, and the current system date and time. If there is an active system alarm, details will be displayed on the fourth line instead of LSI and alarm reading. Users may also configure the controller to show the current sensor readings instead of the default screen. If the sensor readings screen is selected, all current values of measured parameters are displayed.

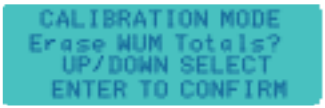
Calibration – Access from the CAL button

The following instructions provide a detailed explanation of the Probes, Conductivity, and Temperature Calibration.

Press the CAL button on the front panel. The calibration mode selection screen will appear on the alphanumeric display. By pressing the ↑ (Up) and ↓ (Down) arrows the user can cycle all of the calibration modes indicated in the menu tree diagram.

Combination Calibration Mode

* Not applicable to this Model



ae Water Usage Meter (WUM) Totals Mode

M total value can be reset from here. Pressing ENT will bring to a second screen for confirmation.

pH Calibration Mode

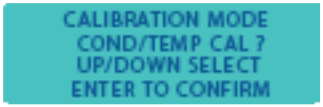
To calibrate pH press ENT for pH calibration. Then place the probe in pH solution and press ENT when ready. The screen will display the message 'PROBE STABILISING PLEASE WAIT'.
When complete the screen will display the value and prompt the user to press ENT to continue. At this point, the menu will return to the 'CHOOSE CAL MODE ?' screen.

Part Number: AS7004 - pH 4.01

Part Number: AS7007 - pH 7.01

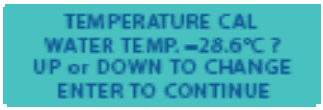
ORP Verification Mode

- Not applicable to this model



Cond/Temp Mode

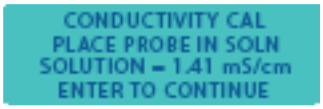
To calibrate Cond/Temp press ENT for Cond/Temp calibration. Press the ENT key on the key pad to access the temperature calibration sub menu.



Steps in Temperature Calibration

Conductivity is calibrated by first setting temperature and this is important or invalid performance may result. To set the water temperature sensor, enter the actual temperature (as read from a thermometer) or accept the temperature value displayed on the screen. The temperature value is changed via the ↑ (Up) and ↓ (Down) arrows on the key pad. To accept the reading displayed, press the ENT key on the key pad.

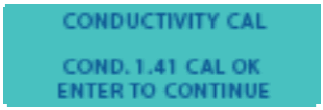
The message screen changes to indicate 'PLEASE WAIT'. When the calibration is complete the screen will display 'TEMPERATURE CAL OK' press ENT on the key pad and the conductivity calibration screen displays.



Steps in Conductivity Calibration

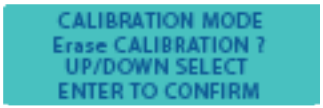
This screen is used to calibrate the conductivity sensor. To begin, enter the actual conductivity of the solution being used for calibration. If using tower system water, the value is read from the independent conductivity meter. Or enter your calibration solution value into the screen.

When performing a calibration, change the conductivity value via the ↑ (Up) and ↓ (Down) arrows on the key pad. If required after your calibration solution figure is showing on the screen, place the probe in the solution and press ENT and the screen will display the message 'PROBE STABILISING PLEASE WAIT'. Press ENT key on the key pad when complete and the screen will display 'COND. (VALUE) CAL OK'. Press the ENT key a second time and the menu will return to the 'CHOOSE CAL MODE ?' screen.



Note: It is important to clean the conductivity probe before calibrating conductivity.

Part Number: AS1413 - 1413 uS/cm



Erase Calibration Mode

There may be times when the user decides to set the controller calibration back to factory defaults. This is achieved by erasing the controller's calibration data.

The user will be asked to confirm this action and once accepted the menu will return to the 'CHOOSE CAL MODE
?' screen. The controller will then have settings that are factory defaults as outlined in the product specification sheet. It is very likely that in this event the user will need to perform the calibration process again.

Panel Selection Mode

While in calibration mode the user has the choice of viewing either the standard Aquarius default screen or having all sensor data displayed as the default screen. To make this selection press ENT and there will be a prompt to select the default option.

Factory Alert Screen

The Factory Alert Screen provides a warning function and will display when configuration is required from factory settings. This screen prompts the user to start a major system setup.

Source Data Screen

The Source Data screen is accessed by holding down the SET key.

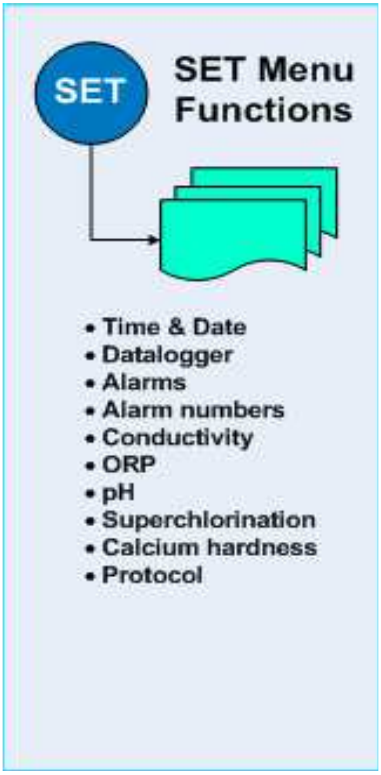
XX Series: Series of Controller
SN: Controller Serial Number
V2.01.30: Firmware Version
CHK: Firmware Checksum
BV1.0.18: Bootloader version
19/01/05: Date of Manufacture

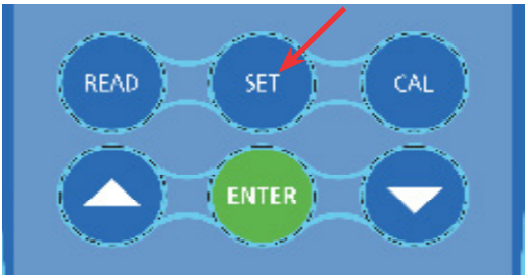
2 System Configuration

Set Screens Menu

All Aquarius controllers come loaded with preset default values for all of the treatment program parameters. On start up the controller will operate according to those defaults. However, every application should have a planned treatment program developed. Decisions need to be made on what values are most appropriate for pH and Conductivity requirements. Once the program has been determined, it may be set in the Aquarius controller, as described in the following sections.

The SET button gives access to the thirteen separate screens which may be used in setting a water treatment program as shown in the following graphic.



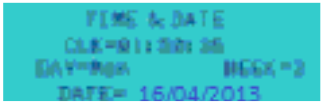


Key pad Function

The convention followed here is: that the ↑ (Up) and ↓ (Down) arrow keys will cycle first through the screens and the ENT button will set the cursor position within the screen. The arrow keys are then able to adjust those values highlighted by the blinking cursor. Pressing ENT on completion will take the user to the next function. When the cursor is returned to the top left corner of the screen the arrow keys can be used to progress to the next or previous screen.

Note: Modes have the following meanings:

OFF:	Output is SET OFF.
FLOW:	Output only cycles while FLOW=ON.
CON:	Output cycles continuously.
ORP:	(Oxidation Reduction Potential) Output only cycles while the ORP output is ON.
DUTY:	Regulates output capacity.
TIM:	**Output only cycles while the Timer is ON**
TIM FLOW:	Output only and cycles when flow is present



Set Time and Date Screen

The current time, day, week, and date are important for managing the treatment program and timing of ORP, biocide control, and for time stamping the data log. Only two values are adjustable but each contains several components.

CLK denotes clock time in 24–hour format. Hours and minutes are set separately.

DATE denotes the current date. Day, month, and year are set separately. This screen also displays the day of the week which it calculates from the date and the week number according to the following outline. The week is determined by the controller and changes at midnight between Saturday and Sunday. Week is used in the set up of biocide dosing programs.

Set Alarms Screen

Allows the user to configure various alarm functions within the
controller.

IGNORE FLOW: [OFF]
When set to ON disables loss of flow alarm.
Options: OFF/ON
Use arrow keys to cycle these selections.

IGNORE CAL: [ON]
When set to OFF enables out of calibration' alarms.
Options: OFF/ON
Use arrow keys to cycle these selections.

Note: This option is only available with GSM Modem Option.

2 System Configuration

Set Alarm Screen - Name and Phone

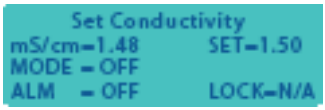
Allows the user to enter up to three names and contact phone numbers to receive notification of system alarms via mobile phone sms alerts. **Only available when a Communications Kit is fitted to the controller and can only be set on Aquareporter. Please see Aquareporter manual for instructions.**

Set Conductivity Screen

Refer to Table 1. Adjacent.

Allows the user to set the conductivity options for the controller.

mS/cm is a read only value generated by the controller. It conveys the actual value measured by the conductivity sensor, in millisiemens per centimetre.



SET: [value from Table 1]
Options: Value range 00.20 to 10.00.
Use arrow keys to cycle these selections.

MODE:
[FLOW) Options: OFF/FLOW/ CON.

Use arrow keys to cycle these selections.

ALM: [+/-]
Options:
+ (alarm if above specified value)
- (alarm if below specified value)
+/- (alarm if outside specified range)
OFF (Alarm disabled)
Use arrow keys to cycle these selections.

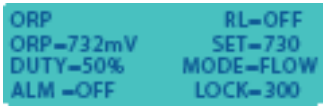
Table 1.

Models Conductivity	CT Series	C [x] Series	HP Series	T Series	A & P Series
Options Available	Above	Above	Above/ Below	Above/ Below	Below
Default Mode	Above	Above	Above	Above	Below

When the cursor is on one of the alarm modes press ENT to change the numerical values associated with that alarm. Select from the values of 0.1, 0.2, 0.4, 0.8, 1.0, 1.5 and 2.0. These values are the range from the set point that will trigger an alarm. Press the ENT again to move to the next set conductivity item.

LOCK: is not applicable to Conductivity.

The controller will alert the user after five minutes if actual value deviates greatly from the set point value. This aids the prevention of false alarms.



SET:
[value from Table 2] Options:
Value range of 0 to 999 mV.
Use arrow keys to cycle these selections

DUTY:
[50%] = Pump Dose Duty.
Options: Values in the range of 1 to 100%. Use the arrows to cycle these selections.

MODE: [FLOW]
Options: FLOW/CON/TIM/ OFF.
Use arrow keys to cycle these selections.

ALM: [+/-]
Options:
+ (alarm if above specified value)
- (alarm if below specified value)
+/- (alarm if outside specified range)
OFF (Alarm disabled)
Use arrow keys to cycle these selections.

Set ORP Screen

* Not applicable to this Model

Not Available on all Controllers. Refer to table 2. Adjacent.

Allows the user to set the ORP options for the controller.

Table 2.

Models - ORP	CT Series	C [x] Series	HP Series	T Series	A & P Series
Options Available	Not Fitted	Oxidising (Not Visible)	Oxidising (Not Visible)	Oxidising/ Reducing	Oxidising (Not Visible)
Default Mode		Oxidising	Oxidising	Oxidising	Oxidising
Unsafe minimum ORP warning	N/A	400	600	No warning	500
Unsafe maximum ORP warning	N/A	750	850	No warning	850
Default Values	N/A	500	725	500	550

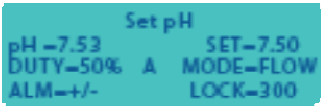
When the cursor is on one of the alarm modes press ENT to change the numerical values associated with that alarm. Select from the values of 25, 50, 100, 150, 200, 300, and 400. These values are the range from the set point that will trigger an alarm. Press the ENT again to move to the next set ORP item.

Alarm defaults: Min: 400 / Max: 750.
The controller has factory defaults which will issue alarms when these values are exceeded.

LOCK: [OFF]
Options: (Preferred lockout period)
Value In the range of 10 to 990 minutes,
OFF - disabled
Use arrow keys to cycle these selections.

If the lockout time is greater than 10 the lockout function is active. The controller will then “lock out” output after the selected time has elapsed without the controller having reached its nominated set point for ORP. This is a safety feature to prevent overdosage in case of sensor failure.

2 System Configuration



Set pH Screen

Refer to Table 3. Adjacent.

Allows the user to set the pH options. This screen should never require changing whilst in a monitoring mode. pH is a read only value generated by the controller and is not a value that can be set from this screen.

Table 3.

Models - pH	CT Series	C [x] Series	HP Series	T Series	A & P Series
Options Available	Not Fitted	Acid/ Base	Acid/ Base	Acid/Base	Acid (Not Visible)
Default Mode	N/A	Acid	Acid	N/A	Acid
Unsafe minimum pH warning	N/A	6.5	6.5	No warnings	6.0
Unsafe maximum pH warning	N/A	9.5	8.5	No warnings	Window 6.00-8.00
Default Values	N/A	8.20	7.40	Window 6.00-8.00	6.50

SET: [7.50]
Options: Values in the range 3.00 to 11.00
Use arrow keys to cycle these selections.

DUTY: [50%] = Pump Dose Duty.
Options: Values in the range 1 to 100%
Use arrow keys to cycle these selections.

DOSE STATE: [A]
Options: A/B
Use arrow keys to cycle these selections.

The pH controller can be configured to dose acid (A) or base (B). When configured to A the controller will dose acid when the pH value rises above the set point. If the controller is configured to B it will dose alkaline solution to increase the pH value.

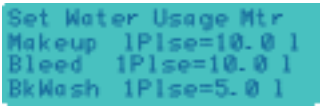
MODE: [FLOW] Options: FLOW/CON/OFF. Use arrow keys to cycle these selections.

ALM: [+/-]

Options:
+ (alarm if above specified value)
- (alarm if below specified value)
+/- (alarm if outside specified range)
OFF (Alarm disabled) Use arrow keys to cycle these selections.
When the cursor is on one of the alarm modes press ENT to change the numerical values associated with that alarm. Select from the values of 0.5, 1.0, 1.5, 2.0, 3.0, and 3.5. These values are the range from the set point that will trigger an alarm. Press the ENT again to move to the next set pH item. Alarm defaults: Min: 6.5 / Max: 9.5.

The controller will issue alarms when these values are exceeded.

LOCK: [OFF] Options: (Preferred lockout period)
Value In the range of 10 to 990 minutes,
OFF - disabled Use arrow keys to cycle these selections.
If the lockout time is greater than 10 the lockout function is active. The controller will then “lock out” output after the selected time has elapsed without the controller having reached its nominated set point for pH. This is a safety feature to prevent overdosage in case of sensor failure



Set Water Usage Meter (WUM) Screen

Allows user to set amount of water per impluse.
Use the ENT key to switch between the items. Then use the arrow keys to cycle these selections.
Value for Makeup/Bleed/Bkwash can be set from Disabled to 1000 ltr per Pulse.

Eg,
1 Plse = 0.25l would be used if water meter provides 4 pulses per litre.

1 Plse = 10.0l would indicate 1 pulse per 10 litres.

Water Meter Cable Connection
Water Meter for Makeup line is to be connected to mainboard through the terminals for WM & Gnd.

Set Superchlorination Screen

* Not applicable to this Model

Refer to the Table 4. below. Allows the user to utilise a function of the controller that applies a boost disinfection (superchlorination) by means of raising the ORP control set point and dosing oxidising biocide according to the program set. This program is for a time interval in hours on any one day of the week, on any frequency of weeks. The program allows the user to enter the day, start time, duration, frequency interval, and the ORP control set point.

Table 4.

Models - Disinfection Super Chlorination	CT Series	C [x] Series	HP Series	T Series	A & P Series
Options Available	Not Fitted	Disinfection	Super Chlorination	Not Fitted	Disinfection
Minimum ORP		500	600		600
Maximum ORP		850	900		850
Default Value		550	850		750

DAY: [OFF]

Options: (day of Superchlorination) Day/OFF.

Use arrow keys to cycle these selections.

START: [0]

Options: (Superchlorination start) 24 hr timer.

Use arrow keys to cycle these selections.

DUR: [0]

Options: (Superchlorination duration)

Value between 1 and 24 hrs.

Use arrow keys to cycle these selections.

INT: [0]

Options: (Superchlorination frequency)

Value in the range of 1 to 12 weeks.

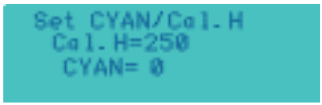
Use arrow keys to cycle these selections.

Superchlorination operates on the next available SET day after the program has been entered. If Superchlorination is set to operate at the current date and time it will occur on the next available SET day unless a one week interval is set in which case Superchlorination will begin immediately.

SET: [550]

Options: (ORP control point) In the range of 500 to 850 mV.
Use arrow keys to cycle these selections

Warning default: Min 350/ Max 850. The controller will issue a warning when these values are exceeded.



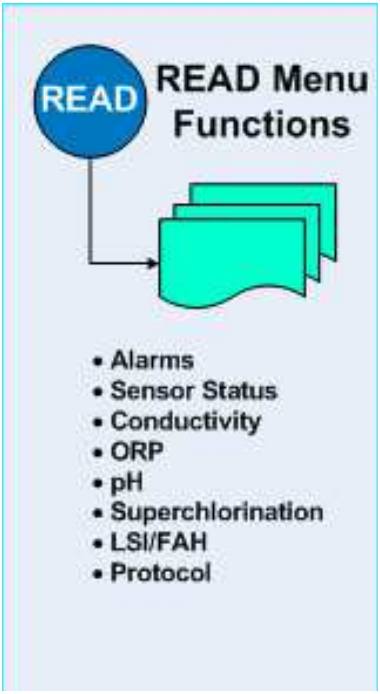
Set Calcium Hardness Screen

* Not applicable to this Model

Allows user to enter the calcium hardness of the system water. This value is used in LSI (Langelier Saturation Index) calculations. Also allows the user to enter Cyanuric Acid level for FAH calculations.

Cal.H: [250]
Options: Value in the range of 10 and 500.
Use arrow keys to cycle these selections.

CYAN: [0]
Options: Value in the range of 0 to 95.
Use arrow keys to cycle these selections.



The Read Status Mode:

Aquarius controllers offer a number of read–only screens that show the status of the current treatment program. These are read–only screens and cannot be used to modify a program.

Moving Between Read–only Screens and Set Program Screens.

It is possible to jump from a read-only screen to the corresponding set program screen by pressing the SET key. Similarly, the user can move from a set program screen to the corresponding read–only screen by pressing the READ key.

Alarm Read Screen

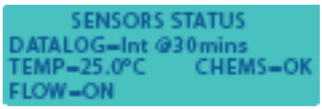
The alarm read screen shows the configuration of the system alarms. The second line of the display shows how often alarms will be retransmitted. The third line displays current active alarm.

Note: where multiple alarms are active the screen will briefly rotate each alarm into view.

Thus the following could appear on the third line display:

Temp:	Temp:
CAL ORIG	OUT OF CAL
Cond:	Cond:
CAL ORIG	OUT OF CAL
ORP:	ORP:
CAL ORIG	OUT OF CAL
pH:	pH:
CAL ORIG	OUT OF CAL
Conductivity	300s
ORP	300s
pH	300s

Sensor Alarms have a five minute delay. The 300s (Seconds) will count down to zero before the alarm is activated.



Sensors Status Screen

This screen displays the status of sensors.

FLOW:	ON/OFF
CHEMS:	LO/OK
TEMP:	Current Temperature of the System (in ^{O}C)
DATALOG:	The Interval set for Logging

Conductivity Read Screen

This screen displays the conductivity status.

RL (relay):	OFF/ON
mS/cm:	millisiemens /centimetre
SET:	the current control set value for Conductivity
FLOW:	ON/OFF
ALM:	Will flash a value if alarmed
LOCK:	Not available on Conductivity

For descriptions and information on setting these items, refer to the Set Conductivity Screen.

2 System Configuration

ORP Read Screen
* Not applicable to this Model

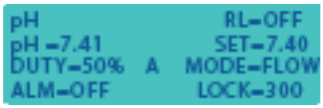
This screen displays the ORP status.

RL (relay): OFF/ON
ORP: The current value of the ORP in millivolts
SET: the current control setting for ORP in millivolts
DUTY: The current dose pump duty set
MODE: ORP/FLOW/CON/OFF **ALM**:
Will flash a value if alarmed
LOCK: Lockout period in minutes or OFF

For descriptions and information on setting these items, refer to the section Set ORP screen.

Note: If LOCK is flashing the controller is exercising lockout. This can only be released after correcting the cause and visiting the Set ORP Screen.

The reset is achieved by toggling the lock OFF then re-entering the lock value.



pH Read Screen

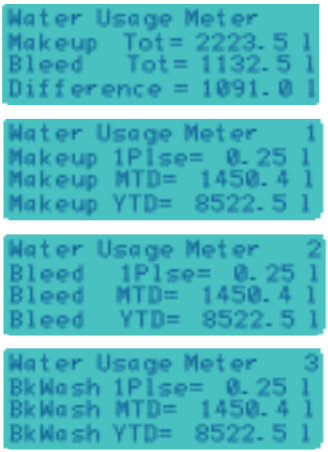
This screen displays the pH status.

RL (relay): OFF/ON
pH: Current value of pH
SET: The current control set value for pH
DUTY: The current duty set
Acid/Base indicator: A/B
MODE: **FLOW** ON/OFF
ALM: Will flash a value if alarmed
LOCK: Lockout period in minutes or OFF

For descriptions and information on setting these items, refer to the section Set pH Screen.

Note: If LOCK is flashing the controller is exercising lockout. This can only be released after correcting the cause and visiting the Set pH Screen.

The reset is achieved by toggling the lock OFF then re-entering the lock value.



Water Usage Meter (WUM) Read Screen

This screen displays the total water usage readings for Makeup, Bleed & their Difference. These values can be reset in the Calibration menu.

The corresponding screens display the Makeup, Bleed and BackWash water-meter readings. It also shows the usage as a Month to Date (MTD) & Year to Date (YTD) figure.

MTD figure will reset automatically on the 1st day of the new month.

YTD figure will reset automatically on 1st Jan.
The measurements in litres of each water meter will be data logged for the selected datalog period.

Note: Changing of log intervals within the time period will result in inaccurate readings in Aquareporter.

Superchlorination Read Screen

* Not applicable to this Model

This screen displays information about the Superchlorination routines for the system.

ON/OFF: Superchlorination ON or OFF
DAY: The day selected for Superchlorination
START: Start time
DUR: Dosing duration in hours
SET: ORP control set point for Superchlorination

The WK and NXT fields are only visible if a Superchlorination program is set.

WK: The interval between cycles in weeks
NXT: Date next Superchlorination will occur.

For descriptions and information on setting these items, refer to the section Set Superchlorination Screen.

2 System Configuration

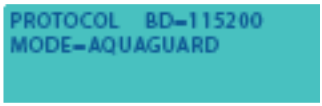
LSI/FAH Read Screen

* Not applicable to this Model

This screen displays the calculated values for Langelier Saturation Index and Free Available Halogen.

LSI: Current calculated value for LSI
CAL. H: Value entered for calcium hardness
FAH: Current calculated value of FAH

For descriptions and information on entering user data, refer to the relevant Set Screen sections.



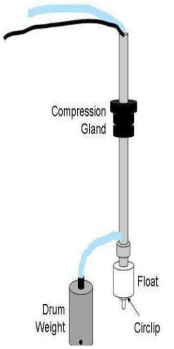
Protocol Read Screen

This screen displays the selected protocol mode of the controller.

BD: 115200/9600
MODE: AQUAGUARD/MODBUS
Slave Addr: Current address assigned for MODBUS
TX: Current status of transmit
RX: Current status of receive
ERR: Current indication of communication errors

For descriptions and information on setting the protocol, refer to the section Set Protocol Screen.

For further instructions on the operation of this interface refer to Aquareporter Brochure and Manual.

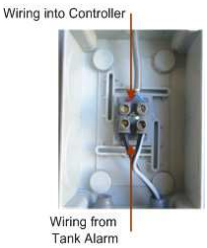


Tank Alarm

Tank alarms come in two sizes TANK_ALARM_SM (500mm) complete with 3m suction tube, drum weight and 3m connection cable or TANK_ALARM_LG (1000mm) complete with 5m suction tube, drum weight and 5m connection cable.

Tank Alarms can be configured for closed contact on empty (default) or open contact on empty. To change, remove circlip from bottom of Tank Alarm and reverse the float.

Designed for simple installation. Simply cut or drill 25mm hole in the drum cap, mount the compression gland into the cap, insert the Tank Alarm through the bottom of the gland, adjust height to desired depth and tighten compression gland.



For wiring into Tank Alarm Box, refer to diagram on the left.

Data Logging and Communications Set up

Data logging facilities are a standard in HP series controllers

Down loading the Data Log

The data in the data log can be retrieved in a numbers of ways namely -

1. The data log can be down loaded locally to a laptop using the **Free** HyperTerminal program available in Microsoft Windows pro- gram, via a Serial cable attached to a laptop and to the DB9 connector fitted internally in the controller.
2. If a GSM/3G modem and a SIM data card have been fitted, the data log can be retrieved re- motely by accessing www.aquareporter.com * please see Aquareporter brochure for more details.

The first method of retrieving the data log in text format will need further importation into an Excel spreadsheet for trending and graphing for reporting means.

HyperTerminal Setup

1. Start **Programs, Accessories, Communication, HyperTerminal** to start the program (the program that is run is **hypertrm.exe**)
2. Start a session called **Download** (or another meaningful name).
3. Select using '**Direct to Com 1**' (the most likely communications port). It will then ask for settings of COM1. Select **9600 baud, 8 bits, no parity, 1 stop bit and no flow con- trol.**
4. Select **Transfer Capture Text** and name your file as normal download file names i.e. Site-month-year.txt (e.g. **XYZ0406.txt** for a April 2006 download at site XYZ).
5. Press **"?"** then downloads will start as normal.
6. At the end of the download, select **Transfer Capture Text Stop.**
7. The file with a .ht extension will be saved by selecting **File Save.**
8. Make a short cut on the desktop to this file. All the settings will then be configured so when you go into it from the short cut start from step 4.

   We now have the downloaded data from the controller in text form. The txt file can now be imported into an Excel spreadsheet to obtain trend graphs etc..
9. Open up the Excel spreadsheet, it will ask you what file you would like to import. Select the file as named in step 4.
10. The data will import into the spreadsheet and you can commence to set up trend reports, graphs, etc.

2 System Configuration

BMS 4 - 20 mA. Interface

Introduction

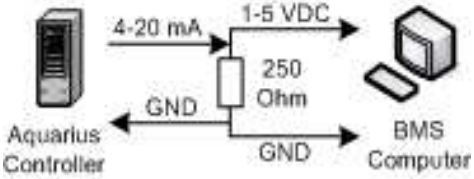
The Building Management System output option for your controller provides a local BMS/PLC/ SCADA system with 4-20 mA signals proportional to measured values, along with ON/OFF, clean contact relays for Alarm, Flow, and the status of all output relays.

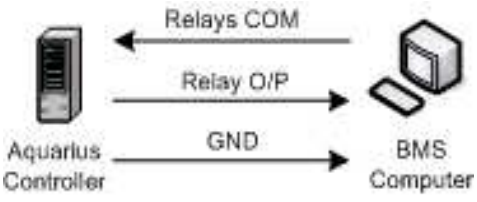
Connections

All connections for BMS outputs are made via the BMS Connector Board, cabled through spare glands in the base of the enclosure. The BMS Connector Board provides clear labelling of all 4-20 mA and relay status outputs. The configuration of the event outputs is discussed below.

4-20 mA Outputs

The BMS output option is available in 4 channel ("C" series) or 8 channel configurations (8 channel KPI only), with 4-20 mA signals proportional to Temperature, Conductivity, pH and ORP, (along with umPY and PIT rates on two metals for KPI 3 series controllers.)





It is recommended that a 250 Ohm sense resistor is used at the BMS end of the connection for each 4-20 mA input – providing the BMS a 1- 5 volt DC input across the range of measurement.

Note: In cases where the BMS requires a 2-10 volt analog input (500 Ohm sense resistor), the 4-20 mA output may only be accurate up to 95% of the maximum scale.

Event Outputs

Both the 4 channel ("C" Series) and 8 channel (KPI 3) BMS options provide for ON/OFF, clean contact switching for the current status of Alarm, Flow and all available relay outputs.
Relay numbering is consistent within each family of controllers, but dynamic across the full range, so relay numbers may change depending on your software configuration. The relay numbering for each software configuration is easily obtained by running the Test Outputs routine.

To enter the Test Outputs routine, press and hold the **READ** key for 5 seconds. Now press the **ENTER** key to move the cursor to the **MAN/AUTO** selection. Press the **DOWN** arrow key to select **AUTO** Test outputs operation. The controller will now cycle the output relays from REL1 through all available relays for 5 seconds each. As each output turns ON, the module and relay number are displayed in the Test Outputs window as follows: **Line 3: RL1 – pH ON (5)**
Flow and Alarm relays are common across all controllers and are clearly labelled on the BMS Connector Board.

The COMMON of each Event Output relay can be supplied by a USER signal (+5, +12, etc, from BMS into RLY(S) COM) or use an internal +12 volt DC signal from the controller (for isolated inputs). This selection is made by placing the jumper on JP2 to either +12V or RLYS COMM.

The jumpers on JP1 are connecting each Event Output relay COMMON to the supply selected with JP2 (to save on external wiring – in most cases a common supply is sufficient). By removing these jumpers the user can choose to individually wire each relay, providing true clean contact switching for all outputs.

Conversions to Engineering Units

Each 1 - 5 volt DC analog input will need to be converted back into its appropriate unit of measurement.

Conversions for each input are as follows:

Parameter	Conversion		Units
Temperature	(0 – 99.9)	= ((value) – 1) / 4 * 100	^{o}C
Conductivity	(0 – 9.99)	= ((value) – 1) / 4 * 10	mS/cm
ORP	(0 – 999)	= ((value) – 1) / 4 * 1000	mV
pH	(0 – 14.00)	= ((value) – 1) / 4 * 14.00	pH
Corrosion Rates			
as umPY1	(0 – 1000)	= ((value) – 1) / 4 * 1000	umPY
as PIT1	(0 – 1000)	= ((value) – 1) / 4 * 1000	PIT
as umPY2	(0 – 1000)	= ((value) – 1) / 4 * 1000	umPY
as PIT2	(0 – 1000)	= ((value) – 1) / 4 * 1000	PIT

Note: (value) = DC volts @ input = 4.00 Volts

Example: pH = ((4) – 1) / 4 * 14.00

= (3) / 4 * 14.00

= 0.75 * 14.00 = 10.50 pH

Testing

Once all connections have been made and all conversions entered into the BMS, the BMS interface must be verified.

For all analog inputs the reading on your BMS display should be within 1% of the reading displayed in the data display window on the controller. If the BMS allows, these readings can be calibrated to more accurately represent the controllers' reading.

If one or more readings is out of tolerance or cannot be calibrated check your conversions and record voltages at the input. If the voltage is OK the problem is most likely in the conversion. If the voltage is not OK, check the sense resistor value and all cabling. LED's L1 thru 8, on the 4-20
Interface Board, illuminate to highlight open circuit or high resistance current loops.

For testing of Event Outputs, run the Test Outputs routine whilst watching the BMS display. You should see each relay output cycle ON for 5 seconds them OFF. Turn Flow ON and OFF and watch for the flow indication at the BMS. Set an Alarm in the controller (remove sensor, alter SET point etc.) and look for an Alarm indication at the BMS.

Useful Contact Information

Aquarius Technologies Pty Ltd
ABN 94 010 393 254

Technical Support:
Phone: **+ 617 3274 4750**
Fax: **+ 617 3274 4736**

Postal Address:
PO Box 71
Coopers Plains Q 4108
Australia

Delivery Address:
1/21 Richland Avenue
Coopers Plains Q 4108
Australia

Trading hours:
08:00 to 17:00 Monday - Friday
Australian EST

Record details of your controller here:

Controller:
Serial Number: .....

Date Installed: .....

Pumps:
1 - serial number .....
2 - serial number .....
3 - serial number .....
4 - serial number .....
5 - serial number .....
6 - serial number .....

3 Manufacturer's Product Warranty

AQUARIUS TECHNOLOGIES PTY LTD

Manufacturer's Product Warranty **Definitions**
"Aquarius" means Aquarius Technologies Pty Ltd ABN 94 010 393 254

"Product" means:-

(i) goods purchased from Aquarius that have been manufactured in whole by Aquarius; and

(ii) the Aquarius manufactured components in third party goods.

"Buyer" means any person or entity who buys
product for consideration from Aquarius.

"The Law" means and includes the Trade Practices Act (Commonwealth) 1974 and relevant State and Territory fair trading or other consumer protection legislation and includes any statute amending, consolidating or replacing the same from time to time.

Warranty

1. Aquarius warrants that:-

(i) all Product is produced under a Quality Assurance System to ISO9001:2001 standards;

(ii) the Product conforms to the written description in the purchase order quotation and related purchase documentation accepted by Aquarius in writing except for such defects that are normally regarded as being commercially acceptable;

(iii) the Product will be reasonably fit for the purpose of use described by Aquarius, however Aquarius accepts no responsibility for third party misrepresentation;

(iv) the Product will be of merchantable quality and free from defects in material and workmanship.

2. If within twelve (12) months (from either the date of purchase by the Buyer or the date of installation, whichever is the earliest) the Buyer gives to Aquarius written notice that the Product does not correspond with the description or is defective (and such defect could not have been detected at the time of delivery) and Aquarius agrees then, PROVIDED:-

(i) that Aquarius, via its customer service department, is contacted promptly;

(ii) that the Buyer supplies to Aquarius sufficient proof of purchase, the model number and serial number of the Product;

(iii) that if necessary, the Product is returned by prepaid freight to Aquarius Technologies P/L factory headquarters:-

(a) within fourteen (14) days of detection of the alleged fault; and

(b) in the same order and condition as that in which it was delivered

(c) packaged to prevent any damage in transit;

(d) that the product contains the return authorisation number, customer identification number, and return delivery details

AND

(iv) if any alleged defect or failure to correspond with description has not arisen from:

- alleged defect or failure to correspond with description
- improper or incorrect installation or site preparation;
- improper maintenance, adjustment, modification or contamination caused or induced by the Buyer;
- the Product being used or attempted to be used in a manner which is beyond normal commercial capacity and application of the Product;
- any abuse or misuse of the Product including operation of the Product in circumstances where there may be subject to irregular electrical supply;

then, Aquarius will at its option either:-

(v) repair any part of the Product which is proven to be defective in material or workmanship upon the Aquarius' examination. The repairs will be carried out by Aquarius personnel or persons appointed by Aquarius at Aquarius premises or at the site or premises of the supplier to Aquarius. This warranty does not include removal, installation costs, or liability exceeding the selling price of the Product. Aquarius warrants that all repairs on returned Product will be free from defects in materials and workmanship for a period of sixty (60) days; or

(vi) replace the Product.

3. The Buyer will be liable to Aquarius for all reasonable costs incurred by Aquarius in relation to the investigation, analysis and testing of a Product which are not defective in the reasonable opinion of Aquarius.

4. In no circumstances will Aquarius:-

(i) incur liability in respect of, or arising out of, or in connection with harm or injury suffered or incurred by the Buyer;

(ii) incur liability in respect of any special consequential direct or indirect loss or damage;

(iii) accept liability for the cost of any repair or attempted repair by the Buyer by any unauthorised third party.

Commissioning & Warranty Registration

This form should be completed by the Equipment OWNER promptly after installation & commissioning. When signed is should be faxed to Aquarius Technologies Pty Ltd on +617 3274 4736. This will ensure the equipment details are logged to our confidential Warranty Database to activate your warranty registration and assist our ability to process any future service inquiries.

Please print all details except for signatures

Model: ..... Serial No: .....

Date of Installation: .....

The above equipment was satisfactorily commissioned for:

Owner (Company Name): .....

Address 1: .....

Address 2: .....

State: ..... Country:.....

Signed for and on behalf of the Equipment OWNER

Name: .....

Date: ..... Signature: .....

Commissioning Company Name: .....

Address: .....

State: ..... Country:.....

Technician Name .....

Date: ..... Signature:.....

Thank you for your very valuable support, purchase and installation

Aquarius Technologies Pty Ltd

3 Warranty Registration

Faxing Instructions for Registration

Fax this form immediately to

Aquarius Technologies Pty Ltd
+617 3274 4736

Upon receipt your controller will be registered in our equipment database. This will provide a ready confirmation of the actual equipment installed, and the configuration characteristics at your specific installation. This information will assist greatly with our treatment of technical and service inquiries in the future.

AQUARIUS
TECHNOLOGIES PTY LTD
WATER QUALITY CONTROL