AQUARIUS
TECHNOLOGIES PTY LTD
ACN 010 393 254
WATER QUALITY CONTROL

Quality System

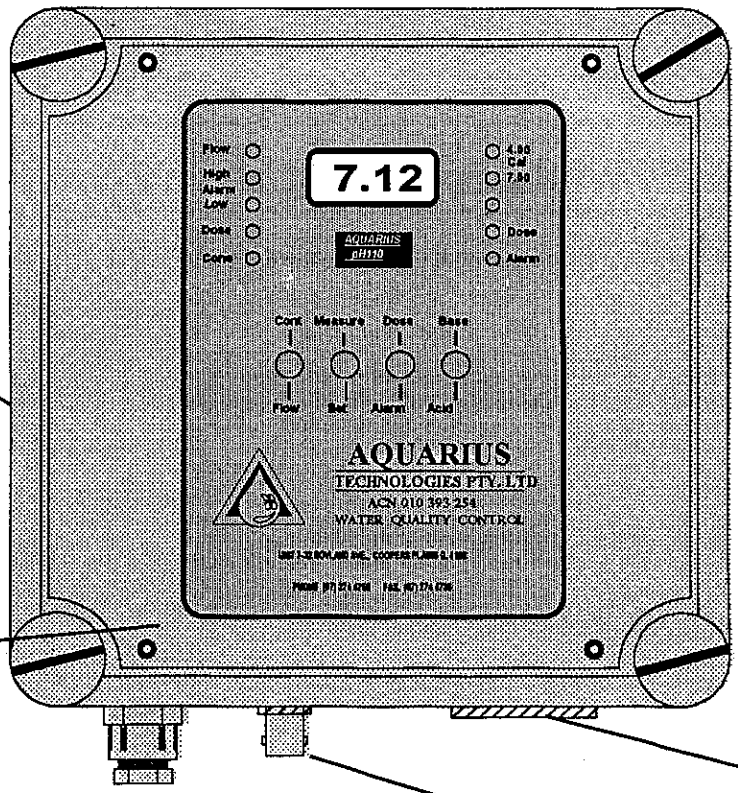
Quality Endorsed Company

ISO 9001
Lic. No. 5403

Water Treatment Control

AQUARIUS - Model - pH110

For Single pH CONTROL



Enclosure to IP65

3 Pin plug with 1.5 m Lead as 240 V input

3 Pin Socket for Controlled Output

BNC Connector For Probe

Proudly Designed and Built in AUSTRALIA and *Distributed & Serviced By*

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TECHNICAL DESCRIPTION

The ***AQUARIUS - pH110 Control Systems*** have been designed from a background of both water treatment chemical experience and the latest electronic design techniques, to provide "State of the Art" control systems ***designed for automatic water treatment control based on the actual demand from the system.***

AQUARIUS pH110 Control Systems feature the following:-

1. pH control module and sensor which senses and displays the pH value in range from 0 - 14.00. of the circulating water in the manifold and displays the value on a 15 mm LCD. The module is capable of controlling the dosage of either base e.g. Caustic, Sodium carbonate, or Sodium Bicarbonate solutions, etc or Acids e.g. Hydrochloric or Sulphuric Acids etc. at any desired set point between zero and 14.00 pH. The user can set Alarm set points from 0 to 3.5 pH units both above and below set point.

2. A Controlled Output Socket is provided on the base of enclosure for direct plug in of a dosage pump, solenoid, or other dosage device. The output is controlled via a 10 Amp relay.

3. ***Enclosure is rated to IP65***, features a clear front panel for easy viewing of values, set points, indicator leds, etc. Cable gland entry is via glands on the enclosure. Controlled outputs are internally wired directly to marked terminals on the individual PCB's. The Unit is fitted with a 3 pin plug and lead for ease of installation and servicing.

4. The pH110 allows for siting the electrode in a sump or pit up to 10 metres away from unit. BNC extension leads are available for extended runs to the probe.Additional pump discharge tubing in excess of 3 metres provided can be supplied at minimal charge.

5. Installation and Electrical wiring is simple and easy - and at minimum costs -mount controller on wall, plug 3 pin plug supplied into a standard 240 Vac 10 Amp outlet, Siting of the electrode in the pit or sump, and running cable back to controller, and running delivery chemical lines to sump as required, make for simple installation.

6. OPTIONAL EXTRA - Analog and Event status outputs - an 8 pin DIN chassis plug on the base of the enclosure provides a 4-20 mA. analog signal and event status of various relays which are suitable under most conditions for ***direct Data Acquisition to computers, or DDC, or BCMS computer systems without further conditioning.***

Din plug outputs are as follows: -

1. Analog 4 - 20 mA. = pH value 0 - 14.00
2. Analog 4 - 20 mA. = Not Used.
3. Analog GROUND signal for 1 & 2 above.
4. pH relay 1 status = Relay output for dosing base or acid as selected.
5. pH relay 2 status = Not used
6. ORP relay status = Not Used.
7. Alarm relay status = either or all of High, Low alarm or Loss of Power = Alarm on
8. Either a +5 or +12 volt signal FROM the computer or BCMS system as common supply signal for event status in 4-7 above.

SHIELD. - should be connected to GROUND at the computer or BCMS system ***and NOT at the pH110 controller*** to minimise interference to the low voltage signals being sent to the computer.

The ***Event or status outputs are optically isolated*** and are configured as NO VOLT outputs, being supplied by either a +5 or +12 volt supply from the host computer system.

In certain circumstances, and in particular where there are significant potential differences between Ground in pin 3 above - and at Shield or ground at the host computer it may be necessary to install isolation transformers on the 4-20 mA. signals to provide reliable signals at the host computer.

OPTIONS AVAILABLE

1. Model - pH110

Comprises pH110 module, switch select either Base or Acid dosage on one set point, in a weatherproof enclosure

2. Optional Extra -

Add - /94BCMS ***to above for 4-20 mA. outputs and events as outlined above in item 6. - via DIN plug output.***

3. Extra = pH sensor: ***- to suit the particular application, Please consult with us for assistance in correct probe selection.***

SPECIFICATIONS

Modules	***pH110***
Operating Range	0 - 14.00. pH
Resolution	0.01 pH.
Accuracy	+/-0.02 pH.
Repeatability	+/-0.02 pH.
Alarm Range	+&- 3.5 pH units
Dead Band	0.1 pH.
Control Relays	2 @ 10 amp.
Dosage Pumps	1000 mls/Hr.
Probe/Sensor Model =	***PRP100/15***
Probes MAX Temperature	60 °C
Probes MAX Pressure	300 Kpa.
Electrical Supply	220 - 250 Vac 50 - 60 Hz 10 Amps
Temperature Range	1 °C - 60 °C
Pressure Range	50 - 300 Kpa.
Power Consumption	300 mA.
Shipping Weight	3 Kgs.
Dimensions	185 mm horizontal by 210 mm vertical and 125 mm depth
Plumbing Ports/manifold	15 mm BSP female ports

Assessories for Checking/calibration pH buffers - pH 7.01 and either pH 4.01 or 10.01

Installation Guidelines

1. Carefully unpack unit and check for any damage in transit.

2. Select a vertical flat wall area or surface, with sufficient floor space for chemical tanks as required, and convenience for service.

3. Mount unit at "eyeball" level using suitable screws.

4. Install the probe and connect to controller, run pump discharge lines to dosing point.

5. Provide electrical supply as outlined above.

6. Advise your Water Treatment Specialist, the unit is installed and ready for commissioning of the Water Treatment Program and setting the various parameters.

7. See remainder of operating instructions for individual items and assistance in commissioning and optimising the water treatment program or fault finding when necessary.

FRONT PANEL FUNCTIONS AND FEATURES

pH110 - Model

INDICATOR LEDS

1. **Flow** - gives an indication from a Flow Sensor when in use and when **switch 1** is in **Flow** position - **Led ON = Flow** in manifold and led OFF = nil flow.
2. **Alarm leds - High Alarm led is ON** when the measured value **exceeds Dose Set Point pH plus the Alarm set value.**
3. **Low Alarm led is ON** when the measured value is lower than the **Dose Set Point and the Alarm Set value.**
4. Dose Leds - Dose Led is **ON** when the set point **relay is energised to dose.**
5. **CONS Led Is ON** when Conscent is available to allow control and dosage of additional reagents.

PROGRAM SWITCHES

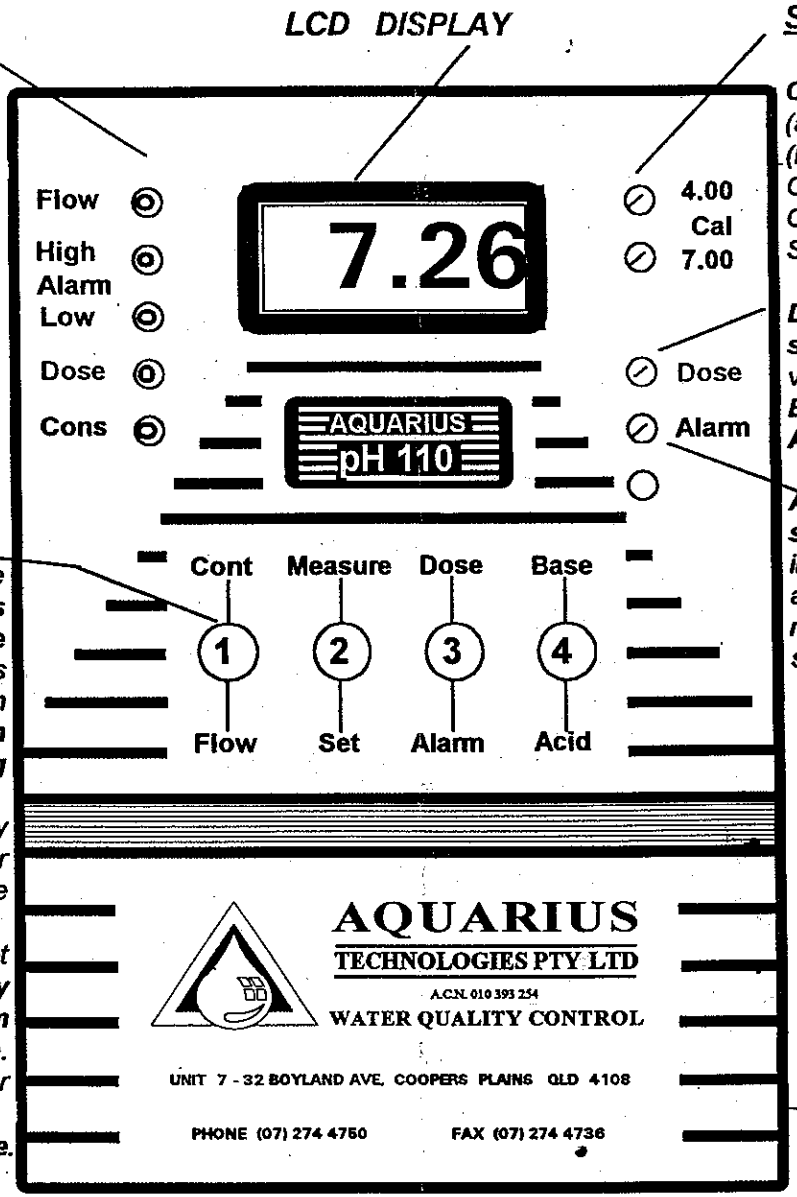
Switch 1. - Cont/Flow - Cont mode allows the relays and alarm to turn on as required **- use as test mode or where manifold and sensor are not in use.** **Flow** setting only allows dosing and/or alarm when the **FLOW SENSOR** in manifold is **ON** for **flow - use this setting when ever the manifold is installed to prevent dosing when system is off line.**

Switch 2.- Measure/Set - Measure allows display to show pH value at sensor during run mode or calibration. **Set** allows display to show the dose and or alarm set points .

Switch 3. - Dose/Alarm - Used with switch 2 set to **Set** mode - **Dose allows switch 4 to display the Dose set point for Base or Acid** and **Alarm** displays the amount in addition to set point above.

Switch 4. - Base/Acid - Set for either **Acid** or **Base** dosage as required for the system.

Base or caustic dose brings pH up the scale.
Acid dosing brings pH down the scale.



SET POINT & CALIBRATION POTS

Cal - 10 turn pots allow for calibration when -
(a) the probe is in the appropriate **Buffer.**
(b) Switch 2 is in the **Measure** position.
Calibration is effected by turning the appropiate Cal trim pot to give that value in the LCD display. Set 7.00 first, then 4.00. for accurate calibration.

Dose Set Point - **With switch 2 set to SET, switch 3 set to DOSE** , - turn trim pot to set the pH value in LCD display where dosing is to cease. **Base or caustic dosing brings pH up the scale. Acid dosing brings pH down the scale.**

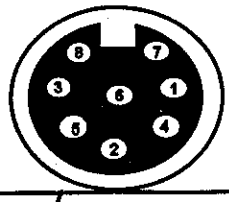
Alarm Set Point - with **switch 2 set to SET, switch 3 set to ALARM,** - turn the trim pot to show in the LCD display the amount the **DOSE** set points are to be exceeded by, to bring on **ALARM** relay - range is 0 - 3.00 pH units above or below the Dose set point.

AQUARIUS - pH110 - Control Systems

Electrical Wiring Requirements

Cabling to BCMS

8 Pin Din line plug + shield are supplied. Run line in quality computer cable to BCMS system, solder wires to Din line plug as below.

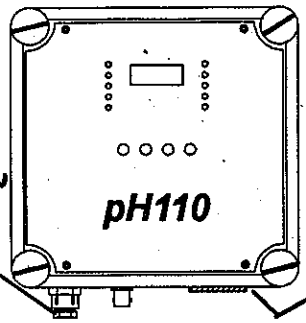


See page 2 for outputs from each pin.

Looking into Din chassis socket outside enclosure

Power Supply

Provide a standard 240 Vac GPO to mate with 3 pin plug & 1.5 m lead provided



Commissioning of pH110 Controllers

1. Calibrate the pH110 controller and pH probe using suitable pH Buffers, - See Front Panel Functions later in the manual.

2. Install Electrode and set ***Switch 1*** set to ***Cont*** mode.

3. Set appropriate pH ***Dose*** Set point value and ***Alarm*** deviation amounts.

4. Set ***Acid/Base*** to appropriate setting for reagent being dosed

5. Ensure chemical tank is charged with chemicals, pump is primed up and flow available, etc.

Maintenance Guidelines

For optimum results and best accuracy the probes should be periodically removed and cleaned with a recommended cleaning solution for the particular fouling, the probes rinsed with water and checked or recalibrated, - monthly on "clean" systems and more frequently on 'dirty" effluent systems. - See maintenance of pH & ORP probes.

Probe life is normally 12 to 24 months before replacement, or less at higher temperatures, and ***Warranty on Probes is Six Months if used as directed*** and spare probes should be kept on site!

Recommended Accessories

1. Reliable quality portable pH & millivolt meter and probes.

2. pH Buffer solutions 7.01 and 4.01/10.0.

3. Spare pH probe kept on-site.

Notes on pH electrodes:

1. What is pH ?

pH is the universally accepted scale for concentration of hydrogen ions in aqueous solutions, which gives a indication of the acidity /alkalinity of the solution. pH is defined as the negative logarithm of the molar concentration of the active hydrogen ions

(pH = - log H+)

2. Measurement

Certain types of glass membrane produce a voltage at the glass/liquid interface which is sensitive to hydrogen ions. This voltage is proportional to pH, with the voltage change per pH unit called the "slope" of the electrode. A reference electrode is needed to complete the circuit and this is usually built into the pH electrode.

3. Accuracy

The accuracy of pH measurements always depend on the accuracy and correct use of buffers, and following precautions should be used when using buffers:

(a) Always use pH 7.00 buffer first for calibration and then a second buffer near the operating pH for slope adjustment. e.g. pH 4.00 buffer

(b) Rinse electrode before and after each buffer and allow 30-60 seconds immersion in buffer for stabilisation of reading

(c) Always replace cap on buffer solutions as adsorption of carbon dioxide effects accuracy, also mould growths and contamination may effect accuracy.

4. Proper electrode for application

In industrial applications and where electrode is mounted in a manifold, it is essential that the electrode be a solid filled electrode capable of taking the pressure and temperature in the manifold,

5. Handling

The electrode should be handled carefully as any damage to the surface of the pH glass bulb membrane such as scratching, abrasion may cause inaccuracies or slow the response. New electrodes should be allowed to wet out in a tap water for 6 - 8 hours before calibration and buffering for best accuracy.

6. Testing of Electrodes

The condition of a new or used electrode may be checked with a pH meter set to read mV. as follows:

(a) With electrode in pH 7.01 the mV. reading should be within 0 - +30 mV. - readings outside this range indicate a problem in reference

(b) With electrode in pH 4.01 buffer reading should be within + 150 - + 175 mV. readings less than this indicate insufficient slope probably due to ageing or some other problem with the pH membrane.

7. Aging & Poisoning

Once the electrode is wet the unit is continually aging, and has a maximum life expectancy of 3 years at ambient temperatures but only a few weeks at temperatures of 120 °C. Poisoning of the reference may also shorten the life, due to water penetration into reference electrode due to excessive pressures, or when chemical reactions occur between the sample and reference electrolyte.

8. Cleaning & Rejuvenation

Inorganic deposits are best treated with alternate immersion in 5% HCl for 5 mins. followed by 5% NaOH for 5 minutes, or soaking overnight, followed by thorough rinsing.

Organic deposits can be removed by a wash in detergent, alcohol, acetone, etc, with careful brushing of the glass bulb for difficult deposits.

Protein deposits can normally be removed with a solution of 1% Pepsin in 5% HCl followed by thorough rinsing.

9. Regular Inspection

Electrodes should be frequently inspected cleaned and calibrated to maintain best accuracy and reliability.

Notes :

WARRANTY

These instructions are offered in good faith to aid in the use of equipment manufactured by ***AQUARIUS TECHNOLOGIES PTY. LTD.***

As we do not have control of the complete installation the ***WARRANTY IS LIMITED*** to a guarantee that the equipment is free from defects in material and workmanship.

The warranty is valid for a period of twenty-four months from the date of manufacture or twelve months from the date of installation, which ever is the shorter. Probes or sensors carry manufacturers warranty of six months from date of purchase only.

The seller shall not be liable to the buyer or any other person for loss or damage directly or indirectly arising from the use of the equipment, or any special consequential damages.

Should a unit fail to function normally, return to factory, prepaid and adequately packaged. If in the opinion of the factory failure was due to materials or workmanship, repair or replacement will be made with out charge.

A reasonable service charge will be made for diagnosis and/or repairs due to normal wear, abuse, tampering or damage in transit.

AQUARIUS TECHNOLOGIES P/L reserve the right to continue development of the unit and therefore minor changes may occur due to improvements and a policy of continuing development.

Notes: