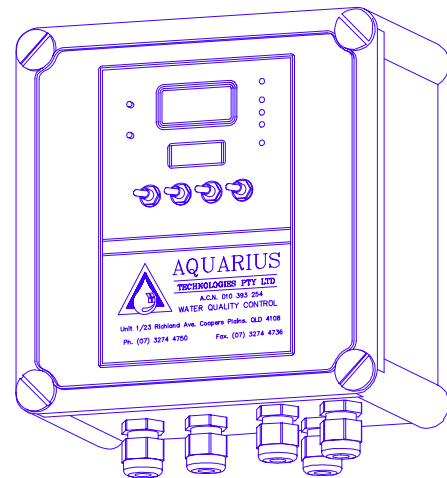


AQUARIUS

DT220 Conductivity Controllers

Microprocessor Control
of
Conductivity
for
Ultrapure Water Systems
and with an optional
Data Acquisition package

Model - DT220



- ✓ Microprocessor Control
- ✓ Digital Readout Display
- ✓ Dual conductivity range
- ✓ Titanium Conductivity Electrodes
- ✓ Monitoring of Temperature for calculation
of Temperature compensated Conductivity
- ✓ High Alarm notification
- ✓ Weatherproof Enclosure

With Options for

- ✓ Data Acquisition Package
- ✓ Loop Isolated 4 - 20 mA.
- ✓ 2 x Opto - Events Outputs



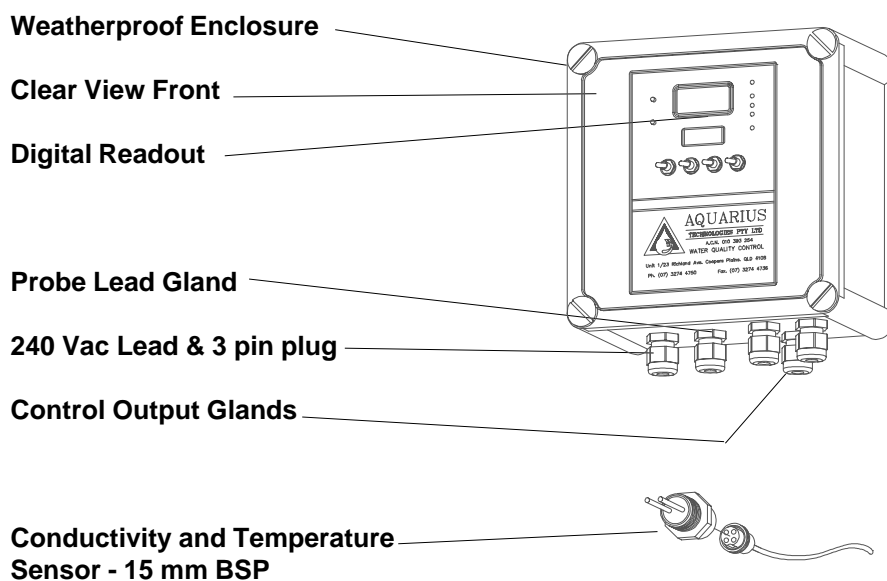
ADVANCED TECHNOLOGY FOR THE NEW MILLENNIUM

Aquarius DT220 Conductivity Controllers

Features and Benefits

1. "State of the Art" - Microprocessor Control with embedded custom software for control of Conductivity Levels for Ultrapure Water applications.
2. Titanium conductivity electrodes are used to minimise the corrosivity effects of ultrapure water.
3. Shielded cable is used between the unit and Conductivity/Temperature probe to minimise effects of lead capacitance on the reading.
4. ON/OFF control is provided to maintain tight control to the desired set point.
5. Utilisation of a precision temperature sensor to aid in calculating the temperature compensated conductivity for all temperature compensation gradients.
6. High alarm facilities are available on conductivity level and signals via a NO VOLT common alarm relay. The Alarm facility is delayed for 5 minutes to prevent any false alarms.
7. Comprehensive computer Data Acquisition output capabilities are an OPTION available on all models.
 - Loop Isolated 4 - 20 mA. analog outputs on Conductivity Values.
 - Optically isolated event outputs on CONTROL relay and Alarm relay
 - Data log to a Lap top, or to a PC with appropriate software
 - Remote data acquisition and monitoring via modem and appropriate software.
 - Historical hard copy record of system performance.
8. Manufactured under a Quality Assurance system to ISO 9001 standards, from a life time experience in water treatment, with many years experience in design of dosing and control equipment.

DT220 controller with Probe



Aquarius DT220 Conductivity Controllers

TECHNICAL DESCRIPTION

Aquarius DT220 Series Conductivity Control Systems have been designed with the benefit of a life time background of water treatment chemistry and features tried and proven technology built up from a long and successful range of predecessor equipment.

Aquarius DT220 Conductivity control systems are offered as the solution to automatically control Pure Water generation systems down to 1.0 uS/cm (1 Meg.) or less.

At the heart of the **DT220 series controller** is a microprocessor based Printed Circuit Board which processes the inputs from the various front panel controls, and from the Conductivity/Temperature sensor and sets outputs according to the results of this processing.

All electronics is housed in an IP65 rated enclosure which enables the unit to be used in all weather conditions.

The conductivity section of the **DT220 controller** utilises titanium electrodes to eliminate the dissolving properties of ultrapure water thereby permitting measurements in excess of 1 Mohm (1.0 uS/cm).

The DT220 can operate in High range (0-100.0 uS/cm) for Pure Water applications or in Low range (0-10.00 uS/cm) for Ultra Pure Water applications.

The conductivity probe also incorporates a precision temperature sensor, the results of which can also be displayed. Thus, the temperature compensated conductivity value for any temperature gradient solution can be easily calculated.

No Volt Alarm contacts are provided on all **DT220 controllers** to signify a High Alarm condition, or loss of power. The microprocessor delays the High Alarm for 5 minutes to avoid unwarranted false alarms resulting from unavoidable operating condition changes (i.e. removal of probe for inspection).

Four switches on the front panel control the modes of operation and information displayed, while two indicator LEDs quickly identify the status of the CONTROL signal and the High alarm.

Aquarius DT220 series controllers can be supplied as an **OPTION with a Data Acquisition output package** to allow for remote monitoring performance to a BCMS or to a laptop computer.

An eight pin socket fitted to the base of the enclosure provides for a loop isolated 4-20 mA. signal proportional to the conductivity value. In addition optically isolated outputs report the status of the outputs.

Refer to the Electrical Wiring Requirements drawing on page 7.

Aquarius DT220 Conductivity Controllers

SPECIFICATIONS

Controllers

Conductivity Module

Module designation

DT220

CONDUCTIVITY FEATURES

High range:

Low range:

Operating Range	0 - 100.0 uS/cm	0 - 10.0 uS/cm
Resolution	0.1 uS/cm	0.1uS/cm
Accuracy	+/- 0.2 uS/cm	+/-0.2uS/cm
Repeatability	+/- 0.2 uS/cm	+/-0.2uS/cm
Alarm Range	0 - 50uS/cm	0 - 5 uS/cm
Dead Band	2.5 uS/cm	0.3 uS/cm
Control Relays	1 @ 10 Amp	
Control Type	ON/OFF	

TEMPERATURE FEATURES

Operating Range	0 - 60 °C
Resolution	0.1 °C
Accuracy	+/- 0.2 °C
Repeatability	+/- 0.2 °C

Probe or Sensor Part No.	PRDT220
Probe or Sensor Rating	500 kPa. @ 60 °C
Electrical Supply	220 -240 Vac. 10 Amps. 50/60 Hz..
Enclosure Rating	IP65 Electrical enclosures.

Shipping & Weights

Weight

Dimensions

DT220	3 kgs.	200 mm H x 200 mm W x 100 mm D
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Aquarius DT220 Conductivity Controllers

Installation, Commissioning & Operating Instructions

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Aquarius DT220 Conductivity Controllers

INSTALLATION and PLUMBING GUIDELINES

Select a suitable location for installation of the package, - preferably in close proximity to the system being controlled, shielded from the public, and extremes of the environment. The controller LCD displays should be protected from direct sunlight.

A wall area of approx. 0.25 m. wide by 0.25 m high at eye level is ideal for mounting the **Aquarius DT220** series controller.

1. Carefully unpack all the gear and check for any apparent damage in transit. Identify all parts and ensure they are located before discarding the cartons.
2. Wall mount the controller and plumb in the Conductivity Tee piece as per the drawing on page 2 in this brochure.
3. Connect pumps, solenoids as required to the CONTROL OUTPUT terminal strip of the DT220 controller.
4. Refer to page 7 for electrical wiring for power and wiring connections to the **Optional** computer Data Acquisition outputs.
5. Run a flow of water through the system under normal operating pressures. Check for, and repair any leaks, etc.
6. The **Aquarius DT220** series system is now ready for commissioning.

COMMISSIONING and START UP GUIDELINES

Inspect the installation for completeness and ensure an adequate flow of water is passing the conductivity/temperature sensor and that no leaks are evident.

Check that all solenoids, pumps etc are correctly wired to the controller.

Power up the unit and with flow isolated commence to set up the controller functions as follows.

Remove the conductivity/temperature sensor and thoroughly dry with clean tissues.

See front panel functions and features on page 8.

Set the DT220 High/Low range switch to the required range position and all other switches in the up position.

Allow two minutes for the display to stabilise then adjust the Null potentiometer for a reading of 0.00 in air.

Refit the Conductivity/Temperature sensor to the system.

Set the appropriate Set Point and Alarm deviation values for the controller.

CARE of, CLEANING & CALIBRATION OF CONDUCTIVITY/TEMPERATURE SENSOR

The DT220 conductivity/temperature probe is a robust sensor that requires minimum servicing. Maintenance is restricted to periodically cleaning the electrodes with tissues and ensuring that the two electrodes are aligned parallel.

Verification procedure

1. With the **DT220 - Measure / Set** switch set to **Measure** and the **COND/TEMP** switch set to **COND**, proceed to verify as follows
2. After cleaning and rinsing, completely dry the electrodes with clean tissues.
3. Set the **DT220 High/Low** switch to the **High** range position.
4. Allow two minutes for the display to stabilise then adjust the **Null** potentiometer for a reading of 0.00 in air.
5. Fit the verification network to the tips of the electrodes and adjust the **Cond Cal** potentiometer for a reading of 50.0.
6. With the **DT220 - Measure / Set** switch set to **Measure** and the **COND/TEMP** switch set to **TEMP**, adjust the **Temp Cal** potentiometer to calibrate the temperature sensor to an accurate thermometer.
7. Remove the verification network and refit the probe to the manifold.
8. From time to time verify the conductivity calibration of the **DT220** controller with a suitable instrument ie. Hanna UPW conductivity meter.

Routine Testing

Whilst the use of an **Aquarius DT220** series will automatically maintain good conductivity control, **both "Best Practice" and "Duty of Care" responsibilities dictate that all systems should be routinely serviced and tested on a regular basis and results logged as required to ensure maximum control and performance.**

RECOMMENDED ACCESSORIES AND SPARE PARTS for - DT220 SERIES MODELS.

Sensor

PRDT220 Replacement Conductivity Sensor

Aquarius DT220 Conductivity Controllers

TROUBLE SHOOTING & FAULT FINDING GUIDELINES

INCORRECT CONDUCTIVITY LEVEL

1. Check the **Conductivity sensor is clean & calibrated**, by following the procedure in Care of, Cleaning & Calibration of Sensors on page 6.
2. Check the **set point** Conductivity value is set at the desired level.
3. Check the operation of the control output equipment (solenoids, pumps etc).

Analog & Events Outputs wiring to BCMS or DDC systems

An eight pin chassis sockets on the right hand side of base of the controller provide for **loop isolated 4-20 mA. analog signals** for Conductivity values, as well as event status of the control output and alarm relays.

These signals are suitable under most industrial conditions for **direct Data Acquisition to computers, such as DDC, BCMS or Lap top computer systems without further conditioning.**

BCMS sockets outputs on the DT220 series Controllers are as follows: -

BCMS Socket

1. Analog 4 - 20 mA. = Conductivity Value as 0 - 20.00 uS/cm in High Range
= Conductivity Value as 0 - 2.00 uS/cm in Low Range
2. Analog 4 - 20 mA. = Current return to the DT220
3. Not Used in this application
4. Not Used in this application
5. Control O/P Solid State Relay status = HIGH =ON
6. Not Used in this application
7. High Alarm relay status = HIGH =ON
8. Either a + 5 or + 12 volt signal **FROM the computer or BCMS system as common supply signal for event status in items 5 & 7 above.**

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

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

ELECTRICAL WIRING REQUIREMENTS

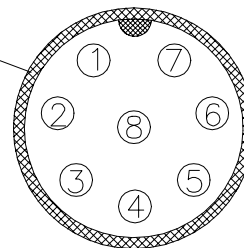
DT220 series control systems are presented as complete packages, they are internally wired and only require a continuously powered single G.P.O. outlet rated at 220 - 240 Vac, 10 Amps, and 50 or 60 Hz. with a weatherproof G.P.O. recommended for external installations.

The power circuit should be a "clean circuit" free from power surges, spikes and interference, similar to that for computer requirements.

BCMS outputs - wiring diagram

The diagram below shows the MIC socket for BCMS plug connections, fitted to the bottom right bottom side of the enclosure and the "pin outs" shown are looking into the socket from the outside of the enclosure.

FRONT OF ENCLOSURE



Aquarius DT220 Conductivity Controllers

FRONT PANEL FUNCTIONS AND FEATURES Module - DT220 - Conductivity Controller

INDICATOR LEDS

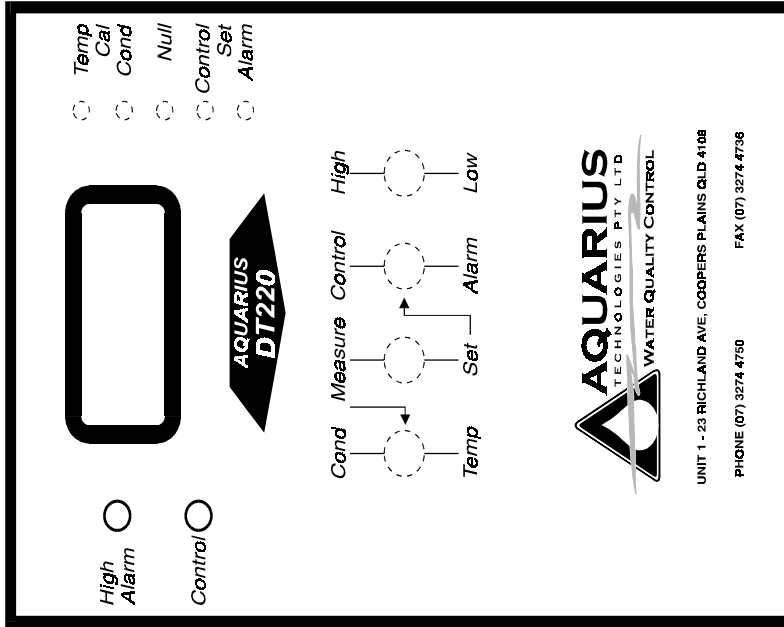
- 1. Alarm Led - High Alarm Led is ON** when the measured value exceeds the **Set Point conductivity value plus the Alarm set value**. A 5 minute delay is used before this led is illuminated, to avoid any false signals to the BCMS.
- 2. Control Led - is ON** when the **Conductivity exceeds the Set Point** and is used to energise a solenoid relay in ON/OFF control.

PROGRAM SWITCHES

- Switch 1. - Cond/Temp** - Used with switch 2 to select which parameter to display in Measure mode; **Conductivity or Temperature.**
- Switch 2. - Measure/Set** - **Measure** allows the display to show the Conductivity or Temperature value at the sensor during run mode or calibration. **Set** allows the display to show the Control set point or Alarm deviation value.
- Switch 3. - Control/Alarm** - Used with switch 2 to **SET** mode - **Control** setting displays the Conductivity set point above which the unit will respond. **Alarm** displays the amount + to the conductivity set point above, to activate Alarm outputs.
- Switch 4. - High/Low** - Selects conductivity range to measure. **High setting** selects **0-100.0 uS/cm range** with **0-100.0 uS/cm set point adjustment** and **0-50.0 uS/cm alarm deviation adjustment**. **Low setting** selects **0-10.0 uS/cm range** with **0-10.0 uS/cm set point adjustment** and **0-5.0 uS/cm alarm deviation adjustment**.

SET POINTS & CALIBRATION POTS

- Temp Cal** - a 10 turn pot allows for calibration when
- the probe is placed in a solution of known temperature (using an accurate thermometer).
 - Switch 2** is in the **Measure** position and **Switch 1** is in the **Temp** position.
- Allow 3-5 mins for temperature stabilisation then slowly adjust calibration for correct display reading.
- Cond Cal** - a 10 turn pot allows for calibration of the probe after cleaning when
- the probe is placed in the appropriate conductivity standard solution for the range involved
 - Switch 2** is set to the **Measure** position and **Switch 1** is set to the **Cond** position.
- Calibration is effected by turning the **Cal** trim pot to give the value of the conductivity standard in the LCD display.
- Null** - a 10 turn pot allows for fine tuning of the conductivity section to display a true 0.00 uS/cm reading when the probe is not in solution. Calibrate as follows:
- Select desired operating range, **High** or **Low**.
 - Set **Switch 2** to **Measure** and **Switch 1** to **Cond**.
 - Completely dry electrodes of the probe.
 - Slowly adjust **Null** pot for a displayed reading of 0.00 uS/cm.
- Set Control** - With **switch 2** set to **Set**, **switch 3** set to **Control**, - turn the **Control trim pot** to set the desired Conductivity value in the LCD display. Above this value the control output relay will be energised.



- Alarm Set Points** - with **switch 2** set to **Set**, and **switch 3** set to **Alarm**, - turn the trim pot to show in the LCD display the amount the **Control** set point is to be exceeded by to bring on the **Alarm** relay - the range is 50 % of the total range, above the **Control** set point.
- 0 - 100.0 uS/cm range has an alarm window of 0 - 50.0 uS/cm
- 0 - 10.0 uS/cm range has a window of 0 - 5.0 uS/cm

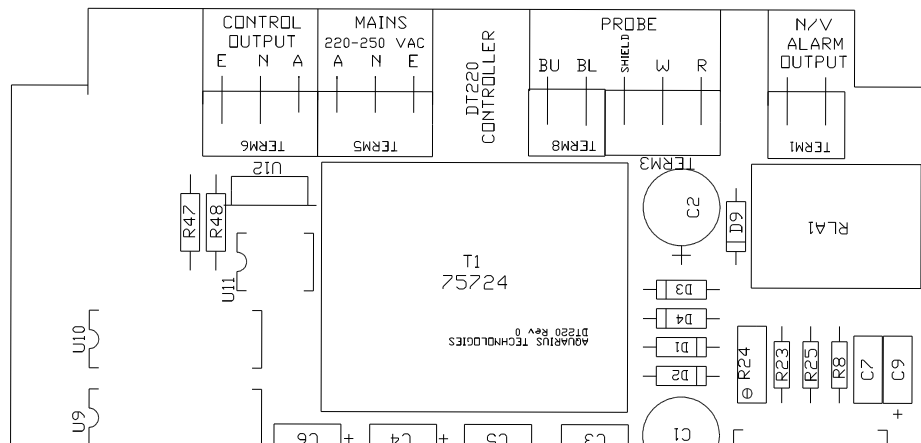
Aquarius DT220 Conductivity Controllers

PRINTED CIRCUIT BOARD LAYOUT for DT220 PRINTED CIRCUIT BOARD - TERMINALS and OUTPUTS

240 V AC
Connections

Conductivity
and
Temperature
Sensor

Fail Safe No Volt Relay
Contacts rated 240 V AC
10 amp
Closes on High
Conductivity or
Loss of Power



NOTES

Aquarius DT220 Conductivity Controllers

MANUFACTURER'S PRODUCT WARRANTY

AQUARIUS TECHNOLOGIES PTY. LTD. manufactures a range of equipment under a Quality Assurance system to ISO9001:1994 standards and warrants equipment of its manufacture to be free of defects in material or workmanship.

Liability under this policy extends for 12 months from the date of installation, or 24 months from the date of shipment from our factory, whichever ever occurs first. The manufacturer's liability is limited to repair or replacement of any failed equipment or part of, which is proven to be defective in material or workmanship upon the manufacturer's examination. This warranty does not include removal or installation costs and in no event shall the manufacturer's liability exceed its selling price of such equipment or part.

Aquarius Technologies Pty Ltd. disclaims all liability for damage to its products through improper installation, maintenance, use or attempts to operate such products beyond their functional capacity, intentionally or otherwise, or any unauthorised repair. Aquarius Technologies Pty Ltd. will not be responsible for any consequential or other damages, injuries, or expense incurred through use of its products.

This warranty is in lieu of any other warranty, either expressed or implied. Aquarius Technologies Pty Ltd. make no warranty of fitness or merchantability. No agent of ours is authorised to provide any warranty other than above.

This warranty does not exclude any condition or warranty implied by the Trade Practices Act 1974 or separate State Laws in Australia and is in addition to any other right that the original purchaser or any subsequent purchaser may have under Australian law.

Should a unit fail to function normally, please contact our Customer Service Department by phone or fax quoting, Model Number, and Serial Number, for initial discussion of the problems encountered, and if it is necessary to return the item to the factory, a Return Authorisation number will be given to facilitate return, and repair or replacement of the item.

The item for return should be carefully packaged to prevent any damage in transit, contain the Return Authorisation identification number, customer identification, and return delivery details, and the freight prepaid to our factory. If in the opinion of our factory, after examination, the failure was due to materials or workmanship, repair or replacement will be made without charge for parts, labour and return freight. A reasonable service charge will be made for diagnosis and/or repairs due to normal wear, abuse, tampering or damage in transit.

AQUARIUS TECHNOLOGIES PTY Ltd. reserve the right to continue development and improvement of the entire range of our equipment, and therefore minor changes may occur due to these improvements and the continuing development.

Aquarius DT220 Conductivity Control

Aquarius Technologies Pty Ltd Commissioning & Warranty Validation Report

This form should be completed by the Equipment OWNER ,
promptly after installation & commissioning
duly signed and faxed to Aquarius on (07) 3274 4736
to enable the equipment installation date and details
to be logged to our confidential Warranty Database
and to validate your 12 months warranty registration.

Please print all details except for signatures

Model :- Serial No.

The above equipment was satisfactorily commissioned for :-

Equipment Owner - Company Name

Address.....

State Date of Installation

by

Commissioning - Company Name.....

Address.....

State

Technician Name Signature.....

Signed for and on behalf of the Equipment OWNER

Name.....

Signature.....

Date.....

Thank you for your very valuable support, purchase and installation

Aquarius Technologies Pty Ltd