

# Aquatronica

Instruction Manual



## High Range Conductivity Interface (Density) ACQ210-D



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Water density (or conductivity) is one of the parameters fundamental for the survival of fish and invertebrates in an aquarium.

The amount of salt in the water can be established in various ways with different units of measure. Electronically, however, electric conductivity can be measured once and through a series of mathematical calculations the same quantity can be expressed with different measurement units.

Aquatronica customers can therefore view the saltwater density in four different ways, as they prefer.

So it is possible to choose which of the following values will be displayed:

**Conductivity:** Representing the content of mineral salts dissolved in water. It can be measured electrically and is expressed in mS/cm (milliSiemens per centimeter) or  $\mu$ S/cm (microSiemens per centimeter).

**Salinity:** Representing the amount of salts dissolved in a water sample. It can be expressed in parts per thousand (ppt or PSU).

**Density:** Representing the ratio between the mass and volume of a liquid. Usually expressed for water in g/l (grams per liter).

**Specific Gravity:** Also called relative density, it is a dimensionless value representing the ratio between the density of a liquid and the density of the same volume of water at 4°C. A table on the back shows these values in their relative units of measure.

**Aquatronica's** High-Range Conductivity Interface connects an Aquatronica high conductivity probe to the "Aquarium Controller" system to measure and control the density (conductivity) in aquariums.

### Pack contents

You will find:

- One high conductivity probe connection interface.
- One BUS cable for connecting the interface to the power unit.

### Connection diagram



### Connection to "Aquarium Controller" system

1. Connect the conductivity probe's connector to the interface (ACQ210-D).
2. Connect the ACQ210-D interface to the power unit (or HUB) using the provided BUS cable

**NOTE: Insert the correct end of the connector into the power unit; inserting it in the other direction can seriously damage the equipment.**

New device connected

S01

Density

(Fig. 1)

After connection, the control unit will display a Plug-In screen (Fig. 1), where a name can be assigned to the connected sensor.

It may take several seconds for the control unit to recognize the connected interface.

**NOTE: The sensor's name can be changed using the control unit's keypad.**

If more than one of these sensors is connected, the user may assign different names for each one to facilitate menu navigation.

Mon 11/06/07 15:05

PU01 A B C D E F G H

Density 1.0232

(Fig. 2)

## Displaying the read value

After the probe has been connected through the appropriate interface, the values read by the probe will be displayed on the main screen.

If several sensors were connected, their values can be checked in order by pressing the  $\uparrow$  and  $\downarrow$  keys.

Density

Change Name

Programs

Data Record

Alarm

Calibrate Sensor

Measurement Unit

(Fig. 3)

## Density Menu

Once the probe and interface are connected, the "Density" menu will appear in the "Main Menu", where all of its settings can be programmed. All sensor menus have the same structure in order to make them more intuitive and simple.

In this menu it is possible to change the name of the connected sensor, calibrate it in order to obtain a more accurate reading, enable an acoustic or visual alarm, read the conductivity (density) of the previous day, week or month (selected in the "Settings" menu) and enable/disable the outputs based on the read value.

Dens\_

(Fig. 4)

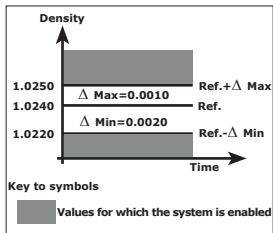
## Change name

This option modifies the name given to the sensor (Fig. 4).

To use this option, proceed as follows:

**Main screen  $\Rightarrow$  Main Menu  $\Rightarrow$  Density  $\Rightarrow$  Change Name.**

- Select the letter to insert using the  $\uparrow$ / $\downarrow$  keys and move within the word using the  $\leftarrow$ / $\rightarrow$  keys. When finished, press "Enter".



## Density

**Insert**

(Fig. 5)

Programs	
Ref.	1.0240
ΔMIN:	ΔMAX:
0.0020	0.0010
Sockets	Confirm

(Fig. 6)

## Programs

This option is used to create programs based on the Density value.

To set up a program, the following must be established:

- A **reference value**, defined as the Density for the tank, which the system will aim to maintain.
- A **Δ Max value**, defined as the tolerance that must be observed with respect to values higher than the reference value.

For example: If the reference is set to 1.0240 and the Δ Max is 0.0010, the system will be enabled at values higher than 1.0250 (see chart).

- A **Δ Min value**, defined as the tolerance that must be observed with respect to values lower than the reference value.

For example: If the reference is set to 1.024 and the Δ Min is 0.0020, the system will be enabled at values lower than 1.0220 (see chart).

To insert a program, proceed as follows:

**Main screen** ⇨ **Main Menu** ⇨ **Density** ⇨ **Programs**.

- Select "**Insert**" using the  $\uparrow\downarrow$  keys and press "**Enter**" (Fig. 5).

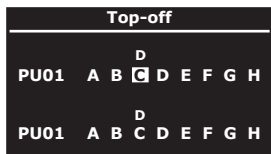
## Insert

Here it is possible to choose a desired Conductivity (density) value as well as set a minimum and maximum tolerance (Ex. Fig. 6).

To set this program, proceed as follows:

**Main screen** ⇨ **Main Menu** ⇨ **Density** ⇨ **Programs** ⇨ **In-**

- Select the relative conductivity value using the  $\leftarrow\rightarrow$  keys and set the desired value using the  $\uparrow\downarrow$  keys.
- Set the "**ΔMIN**" and "**ΔMAX**" tolerances; select the desired parameters using the  $\leftarrow\rightarrow$  keys and modify their values using the  $\uparrow\downarrow$  keys.
- Select "**Sockets**" using the  $\leftarrow\rightarrow$  keys to choose how the outputs will function when the conductivity level goes above or below the set values. Then press "**Enter**".
- Select the outputs to be controlled using the  $\leftarrow\rightarrow$  keys. The selected output will blink on both lines. The outputs on the upper line determine which devices must be enabled/disabled when the conductivity (density) goes above the set maximum value (Ref. + ΔMAX); the outputs on the upper line are set using the  $\uparrow$  key.



(Fig. 7)

The example in (Fig. 7) shows enabling of the socket "C": pressing the  $\uparrow$  key once, the socket is highlighted and the symbol **D** appears above it.

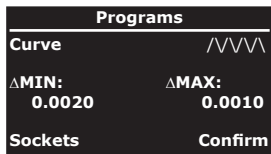
To disable a socket, press the  $\uparrow$  key a second time; in this case, only the symbol **D** will appear above the selected socket.

The outputs on the lower line determine which devices will be enabled/disabled when the conductivity goes below the set minimum value (Ref. -  $\Delta$ MIN); the outputs on the lower line are set using the  $\downarrow$  key.

The example in (Fig. 7) shows disabling of the socket "C"; only the symbol **D** appears.

After the desired sockets have been set, press "**Enter**" to return to the previous menu (Ex. Fig. 6).

The "**Confirm**" field is automatically selected: by pressing "**Enter**" the inserted program is saved.



(Fig. 8)

If different conductivity (density) values are desired based on the time of day, these can be set graphically.

To program this function, proceed as follows:

**Main screen**  $\Rightarrow$  **Main menu**  $\Rightarrow$  **Density**  $\Rightarrow$  **Programs**  $\Rightarrow$  **Insert**.

- Using the  $\leftarrow \rightarrow$  keys, select the conductivity reference parameter (**Ref.**). Using the  $\uparrow \downarrow$  keys, select "**Curve**" (Ex. Fig. 8). Afterwards move to the  $\wedge \vee \vee \vee \wedge$  symbol and press "**Enter**".



(Fig. 9)

A screen opens where the desired conductivity value can be graphically modeled over 24 hours (Ex. Fig. 9).

- Using the  $\leftarrow \rightarrow$  keys, select the time of day (in 2-hour intervals, lower left corner). Using the  $\uparrow \downarrow$  keys, modify the conductivity value (lower right corner) for the selected time. When finished, press the "**Enter**" key.

Do you want to  
modify or delete?

**Modify**  
Delete Program

(Fig. 10)

Do you want to  
delete this  
program?

Enter: Confirm  
Esc: Cancel

(Fig. 11)

Do you want to  
delete all of  
the programs?

Enter: Confirm  
Esc: Cancel

(Fig. 12)

### View/Mod/Del

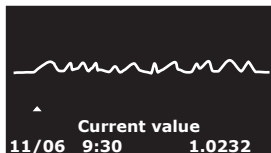
In this menu the inserted programs can be viewed (View), modified (Mod) or deleted (Del). To use this function, proceed as follows:

- Access the program to be modified or deleted by pressing "Enter" on the "View/Mod/Del" field.
- Use the  $\leftarrow$  $\rightarrow$  keys to view the desired program (Ex. Fig. 8).
- Press the "Enter" key. The specific screen appears on the display (Fig. 10).
- Select "Mod" using the  $\uparrow$  $\downarrow$  keys to modify the program or change the desired parameters. Then press "Enter" to confirm the changes.
- Select "Delete Program" using the  $\uparrow$  $\downarrow$  keys to delete the program. The delete screen will appear (Fig. 11). Press "Enter" to delete or "Esc" to cancel.

### Delete All (Fig. 12)

In this menu all of the programs inserted in the menu can be deleted at one time. To use this function, proceed as follows:

- Select "Delete All" using the  $\uparrow$  $\downarrow$  keys and press "Enter". The delete screen will appear. Press "Enter" to delete or "Esc" to cancel.



(Fig. 13)

### Data Record

The Data Record graphically displays variations in the conductivity (density) during the previous 24 hours with a minimum interval of 30 minutes (Ex. Fig. 13).

To display the data, proceed as follows:

**Main screen** ⇨ **Main menu** ⇨ **Density** ⇨ **Data Record**.

- Using the  $\uparrow\downarrow$  keys, select the maximum (MAX), minimum (MIN) or current conductivity (density). Using the  $\leftarrow\rightarrow$  keys, move within the chart to view the conductivity of a given time. Press **"Enter"** when finished.

### Alarm

A visual or acoustic alarm can be set to notify the user if the conductivity level goes below or above the **"Less than"** or **"Greater than"** values (Ex. Fig. 14).

If the conductivity value exceeds these limits, the conductivity value on the main screen will blink if the alarm is set to **"No Sound"**.

If the alarm is set to **"Sound"**, the value will blink, an acoustic signal will sound and the  $\text{🔊}$  icon will appear on the main screen.

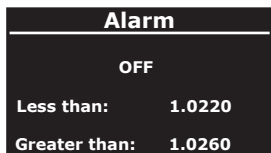
To program this function, proceed as follows:

**Main screen** ⇨ **Main menu** ⇨ **Density** ⇨ **Alarm**.

- Select the desired option using the  $\uparrow\downarrow$  keys:
  - OFF** = alarm disabled
  - Sound** = alarm and acoustic signal enabled
  - No Sound** = alarm enabled and acoustic signal disabled

- Select **"Less than"** using the  $\leftarrow\rightarrow$  keys and then **"Greater than"** and with the  $\uparrow\downarrow$  keys program the desired conductivity to set the limits beyond which the alarm will be enabled.

After programming the various settings, press **"Enter"**.



(Fig. 14)

## Calibrate Sensor

**New**  
**Reset**

(Fig. 15)

Do you want to  
return to default  
calibration values?

Enter: Confirm  
Esc: Cancel

(Fig. 16)

Set reference and  
wait for adjustment

Read value	51.4 mS
Calib. value	52.0 mS 1/1

(Fig. 17)

Calibration OK

Press any key to  
continue

(Fig. 18)

## Measurement Unit

**mS/cm -  $\mu$ S/cm**  
ppt - Psu  
GS  
g/l

(Fig. 19)

## Calibrate Sensor

This menu allows you to calibrate the density probe through the interface. By using the keys  $\uparrow\downarrow$ , you may choose whether to perform a new calibration by selecting "New", or to delete a previous one and reset the interface to the default settings by selecting "Reset" (Fig. 16). A calibration should be performed when the interface is first connected to the system.

**Note:** Before performing the calibration, the probe must be rinsed using tap water, dried carefully and inserted in the Aquatronica conductivity (density) solution.

In order to correctly calibrate the sensor, proceed as follows:

**Main screen**  $\Rightarrow$  **Main menu**  $\Rightarrow$  **Density**  $\Rightarrow$  **Calibrate Sensor**  $\Rightarrow$  **New**.

1) Select the function "New" by using the keys  $\uparrow\downarrow$  then press "Enter" (Fig 15).

2) Using the keys  $\uparrow\downarrow$  set the value of the standard solution next to "Calib. Value" (Fig. 17).

3) Wait 10 minutes in order to allow the probe's read value to stabilize. The read value may stabilize on a value that is slightly different than the reference.

**NOTE:** keep the probe as straight as possible inside the solution container.

4) Once 10 minutes have elapsed, press "Enter".

5) The controller will display the calibration result (Fig. 18); rinse the probe and insert in aquarium

**Note:** the calibration may be cancelled at any time by pressing "Esc". This will return the calibration parameters to those of the last completed calibration.

## Measurement Unit

The measurement unit of the conductivity read by the control unit may be modified (Fig. 17).

To modify this parameter, proceed as follows:

**Main screen**  $\Rightarrow$  **Main menu**  $\Rightarrow$  **Density**  $\Rightarrow$  **Measurement Unit**.

- Select the measurement unit using the  $\uparrow\downarrow$  keys and press "Enter".

**Note:** See conversion table at the end of this manual.

## Aquatronica

FW version: x.y

Press any key to  
continue

(Fig. 20)

## Device Disconnected

S01: Density

(Fig. 21)

Mon 11/06/07 15:05

PU01 A B C D E F G H

Density ??

?

(Fig. 22)

## Density

Change Name  
Programs  
Alarm  
Measurement Unit  
**Disconnect**

(Fig. 23)

## Disconnect

Density

Enter: Confirm  
Esc: Cancel

(Fig. 24)

## About

Provides information on the control unit's firmware version. To use this function, proceed as follows:

Main screen ⇒ Main menu ⇒ Density ⇒ About.

## Disconnect

If the density interface is disconnected, a message will appear on the display (Fig. 21). Press "Enter" to indicate that the message has been read.

On the main screen the "?" icon will appear next to the name of the "Density" sensor and in the lower left corner (Fig. 22).

If the conductivity interface is reconnected, the control unit will automatically begin displaying the read value again.

To definitively eliminate the density sensor from the system, after disconnecting it, proceed as follows:

Main screen ⇒ Main menu ⇒ Density ⇒ Disconnect.

The "Data Record" and "Calibrate Sensor" functions disappear from the "Density" menu (Fig. 23) and the "Disconnect" function appears.

- Select this function using the  $\uparrow\downarrow$  keys and press "Enter".

- The disconnection screen will appear (Fig. 24). Press "Enter" to disconnect or "Esc" to cancel.

**Suggestions for an accurate reading of the Conductivity (density)**

Precise readings depend greatly on proper maintenance of the connected sensor. Beyond its intrinsic qualities, how the sensor is cared for is particularly important. This will, in fact, provide reliable readings. Below is a list of some simple suggestions for optimum conductivity (density) readings in aquariums:

- Handle the probe with care.
  - If the probe is stored out of the water, it must be thoroughly dried to prevent oxidation of the electrodes.
- Periodically clean the probe (every week) with tap water, subsequently drying it thoroughly to eliminate any deposits.
- **Periodically calibrate the instrument (approximately every month as indicated to page 24) to correct any reading imperfections due to probe wear.**
  - Replace the probe after a period of approximately 15 months.
  - Do not install the interface in direct contact with wet or damp parts.
  - Never use calibration solutions that have been left open or have expired.
  - After the bottled solution has been opened, it must be used in 6 months (if properly closed after use). After this period it must be replaced.
  - Position the probe in the tank or sump away from strong currents to prevent excessive oxygenation inside the latter.
  - Do not immerse the probe completely in water. The cable's seam must always be approximately 2 cm above the water.

**IMPORTANT**

**For reliable conductivity readings, use only AQUATRONICA electrodes and calibration solutions.**

**The use of other brands of electrodes could cause incorrect readings of the instrument.**

**NOTE: in case of malfunctions or any doubts about the use of this interface, please contact AQUATRONICA'S free Technical Assistance.**

## DISPOSAL OF ELECTRIC AND ELECTRONIC PARTS

Pursuant to Article 13 of Legislative Decree No. 151 of 25 July 2005, "Implementation **of Directives 2002/95/CE, 2002/96/CE and 2003/108/CE, regarding the reduction in use of dangerous substances in electrical and electronic equipment, as well as waste disposal**":



Products bearing the barred dustbin symbol must be disposed of separately from other waste. The user must therefore dispose of the product in question at suitable recycling centers for electronic and electro-technical waste, or he/she must turn over the used product to the retailer when buying a new equivalent product, on a one-to-one basis.

Separate waste collection allows used equipment to be recycled, treated and disposed of without negative consequences for the environment and health, and it allows the materials in the equipment to be recycled. Illegal dumping of the product by the user entails the administrative sanctions stated in Legislative Decree No. 22/1997 (Article 50 et seq of Legislative Decree No. 22/1997).



Separate collection of used products and packaging allows materials to be recycled and used again. Reuse of recycled materials helps prevent environmental pollution and reduces the demand for raw materials.

Local regulations may provide for the separate collection of household appliances at municipal waste sites or retailers when a new product is purchased.



# Declaration of Conformity

## DECLARATION OF CONFORMITY



Standard of reference ISO/IEC Guide 22 and EN 45014

**Number of conformity: 003-2006**

Name of the manufacturer: **Aquatronica division of A.E.B. srl**  
Address: via dell'Industria, 20  
Corte Tegge  
42025 Cavriago (RE) Italy

### DECLARES THAT THE ELECTRONIC UNITS

Code: **ACQ012** (6 shuko plugs + I/O)  
**ACQ012 AUS** (6 australian plugs + I/O)  
**ACQ012 F** (6 french plugs + I/O)  
**ACQ012 UK** (6 english plugs + I/O)  
**ACQ012 ZA** (6 South Africa plugs + I/O)  
**ACQ013** (4 shuko plugs + 4 F plugs + I/O)  
**ACQ013 CH** (8 swiss plugs + I/O)  
**ACQ220** (PC interface)  
**ACQ200** (I/O interface)  
**ACQ210-RX** (REDOX sonde interface)  
**ACQ210-PH** (PH sonde interface)  
**ACQ210-TL** (temperature and level sonde interface)  
**ACQ210-MS** (conductibility sonde interface)  
**ACQ210-D** (density sonde interface)  
**ACQ450** (dosing pump 4 modules)

### ARE IN COMPLIANCE WITH THE FOLLOWING PRODUCT SPECIFICATIONS:

FIELD	Directive	Description	References	Test Result
EMC	89/336/EEC	EMC directive	<i>Official Journal of the European Union L139 May 23 1989</i>	applied
LVD	73/23/EEC	Low voltage directive	<i>Official Journal of the European Union L077 March 26 1973</i>	applied

### THEREFORE THEY ARE IN COMPLIANCE WITH THE REQUISITES OF THE CE MARK

*The equipment was checked in a typical working configuration*

Place of issue: **Cavriago (RE) Italy**

Date of issue: **05/23/06**

**The A.E.B. srl legal representative**  
*Paterlini Ivan*

# Conversion Table



## CONDUCTIVITY - DENSITY - SALINITY - SPECIFIC GRAVITY

Conductivity (mS/cm)	Density (g/l)	Salinity (ppt/PSU)	Specific Gravity
35,5 mS/cm	1.013,8 g/l	22,4 ppt/PSU	1,0164
36 mS/cm	1.014,1 g/l	22,7 ppt/PSU	1,0166
36,5 mS/cm	1.014,4 g/l	23,0 ppt/PSU	1,0169
37 mS/cm	1.014,6 g/l	23,4 ppt/PSU	1,0172
37,5 mS/cm	1.014,9 g/l	23,8 ppt/PSU	1,0174
38 mS/cm	1.015,1 g/l	24,1 ppt/PSU	1,0177
38,5 mS/cm	1.015,4 g/l	24,5 ppt/PSU	1,0179
39 mS/cm	1.015,7 g/l	24,8 ppt/PSU	1,0182
39,5 mS/cm	1.015,9 g/l	25,2 ppt/PSU	1,0185
40 mS/cm	1.016,2 g/l	25,5 ppt/PSU	1,0187
40,5 mS/cm	1.016,5 g/l	25,9 ppt/PSU	1,0190
41 mS/cm	1.016,7 g/l	26,2 ppt/PSU	1,0193
41,5 mS/cm	1.017,0 g/l	26,6 ppt/PSU	1,0195
42 mS/cm	1.017,3 g/l	26,9 ppt/PSU	1,0198
42,5 mS/cm	1.017,5 g/l	27,3 ppt/PSU	1,0201
43 mS/cm	1.017,8 g/l	27,7 ppt/PSU	1,0204
43,5 mS/cm	1.018,1 g/l	28,0 ppt/PSU	1,0206
44 mS/cm	1.018,4 g/l	28,4 ppt/PSU	1,0209
44,5 mS/cm	1.018,6 g/l	28,7 ppt/PSU	1,0212
45 mS/cm	1.018,9 g/l	29,1 ppt/PSU	1,0214
45,5 mS/cm	1.019,2 g/l	29,5 ppt/PSU	1,0217
46 mS/cm	1.019,4 g/l	29,8 ppt/PSU	1,0220
46,5 mS/cm	1.019,7 g/l	30,2 ppt/PSU	1,0223
47 mS/cm	1.020,0 g/l	30,5 ppt/PSU	1,0225
47,5 mS/cm	1.020,3 g/l	30,9 ppt/PSU	1,0228
48 mS/cm	1.020,5 g/l	31,3 ppt/PSU	1,0231
48,5 mS/cm	1.020,8 g/l	31,6 ppt/PSU	1,0234
49 mS/cm	1.021,1 g/l	32,0 ppt/PSU	1,0236
49,5 mS/cm	1.021,4 g/l	32,4 ppt/PSU	1,0239
50 mS/cm	1.021,6 g/l	32,7 ppt/PSU	1,0242
50,5 mS/cm	1.021,9 g/l	33,1 ppt/PSU	1,0245
51 mS/cm	1.022,2 g/l	33,5 ppt/PSU	1,0248
51,5 mS/cm	1.022,5 g/l	33,8 ppt/PSU	1,0250
52 mS/cm	1.022,8 g/l	34,2 ppt/PSU	1,0253
52,5 mS/cm	1.023,0 g/l	34,6 ppt/PSU	1,0256
53 mS/cm	1.023,3 g/l	34,9 ppt/PSU	1,0259
53,5 mS/cm	1.023,6 g/l	35,3 ppt/PSU	1,0262
54 mS/cm	1.023,9 g/l	35,7 ppt/PSU	1,0264
54,5 mS/cm	1.024,2 g/l	36,1 ppt/PSU	1,0267
55 mS/cm	1.024,4 g/l	36,4 ppt/PSU	1,0270
55,5 mS/cm	1.024,7 g/l	36,8 ppt/PSU	1,0273
56 mS/cm	1.025,0 g/l	37,2 ppt/PSU	1,0276
56,5 mS/cm	1.025,3 g/l	37,6 ppt/PSU	1,0278
57 mS/cm	1.025,6 g/l	37,9 ppt/PSU	1,0281
57,5 mS/cm	1.025,9 g/l	38,3 ppt/PSU	1,0284
58 mS/cm	1.026,1 g/l	38,7 ppt/PSU	1,0287
58,5 mS/cm	1.026,4 g/l	39,1 ppt/PSU	1,0290
59 mS/cm	1.026,7 g/l	39,6 ppt/PSU	1,0293
59,5 mS/cm	1.027,0 g/l	39,8 ppt/PSU	1,0296
60 mS/cm	1.027,3 g/l	40,2 ppt/PSU	1,0299

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