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## 1 Included items

Before putting the equipment into operation please check that all items are included. If any components are missing please contact your supplier immediately.

### 1.1 Battery-powered measuring instrument

The following items are included:

- an aquastar alpha pH measuring instrument
- a pre-installed 9V battery
- a pH-electrode
- one calibration solution of pH4 and one of pH7

### 1.2 Control unit

A power source with switch socket (Power Station Art.No. 1050) is also supplied with the battery-powered measuring instrument (see 1.1).

## 2 General description

The micro-processor-controlled aquastar alpha system enables you to take precise pH measurements. The instrument incorporates several special functions which are briefly mentioned below:

- **automatic calibration with sensor test**
- **measurement memory**
- **automatic switch off (Energy-saving mode)**
- **Temperature compensation**
- **Alarm function**
- **Controllable in 2 directions (only in connection with the Power Station Art.-No.1050)**

You will very quickly appreciate the benefits of these functions during daily use. The aquastar alpha systems are also currently available in the versions aquastar alpha Redox and aquastar alpha Temperature. During the course of 1999 we expect to extend this range of systems to include the instruments aquastar alpha Oxygen (combined with temperature and air pressure) and aquastar alpha Conductivity.

### 3 The keypad

This instrument is operated via a sealed keypad. This incorporates the following 4 keys:



This key enables you to move from menu to menu, increase various values and change settings. Please observe that in the following text the “**upward arrow**” is depicted as the **symbol** - .

This key also enables you to move from menu to menu, reduce values and change settings. Please observe that the “**arrow pointing right**” key is subsequently depicted as the **symbol** ® .



This key is used to confirm input and to activate menus. In the following text it ( otherwise known as the **Enter key**) is depicted as the **symbol** ↵ .



The instrument is turned either on or off with the help of this key. In the following text it is referred to as the **On/Off key**.



**Z** If you want to increase values with the - key or reduce them with the ® key, you can do so by keeping it pressed. This will enable you to reach the required value more rapidly.

### 4 Factory pre-settings

The system is supplied with the following pre-settings:

- temperature compensation 25 °C
- automatic switch off is activated
- measurement memory is switched off
- the alarm function is deactivated

Section 12 describes how you can return the system to the factory pre-settings at any time.

## 5 The menu structure

The purpose of this section is to describe the menu structure of the aquastar alpha system to you in more detail. As you can see in Figure 1, there are six menu fields that can be selected by pressing the  $\leftarrow$  or the  $\rightarrow$  key. To activate a menu you must press  $\rightarrow$ . As only four symbols can be presented on the display, an abbreviation requiring some explanation represents the functions contained within each menu. To give you a clearer idea of what each term signifies you will find below a list of the menu fields and their respective functions:

1. The **MESS** menu: This is used to commence measurement or control (see Section 8).
2. The **CAL** menu: This is used to calibrate the measurement sequence (see Section 7).
3. The **MEM** menu: In this menu you determine whether and how you want to save or download measurements (see Section 10).
4. The **dOSE** menu Here you can input control- and alarm values (see Section 9).
5. The **AUS** menu: You use this menu to activate or deactivate the automatic switch-off (see Section 6.3).
6. The **PC-d** menu: This is where you start the data transfer to the PC (see Section 11).

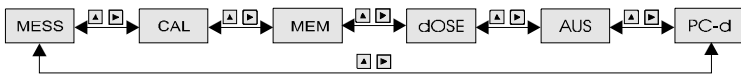


Figure 1

## 6 Operation

### 6.1 pH-electrode connection

Connect the electrode to the BNC port labelled 'sensor' on your aquastar alpha.

## 6.2 Switch on/off

Press the **On/Off** key (see Section 3). All segments of the LCD display will then light up briefly before the temperature compensation value (Standard 25°C) appears. The temperature value remains displayed for ca. 20 seconds (**Hint:** Press  $\zeta$  to continue immediately). Whether you have waited the 20 seconds or not, **MESS** must now appear on the display.

## 6.3 Automatic switch-off (**AUS**)

The benefit of this function is quite clear. For example, you are interrupted in some way while you are taking measurements (Interrupt) and forget to turn the instrument off. Two days later you want to carry on from where you stopped and find that the battery is empty. Of course you have several other batteries in the house but, equally naturally, they don't fit. It's late and the shops have already closed. Your last chance is your television's or stereo's remote control unit. You can avoid such frustrating situations with the automatic switch-off. If it is activated, the instrument will switch itself off automatically after about **four minutes** (after pressing the last key). **Please note that only in measurement and control mode does the system not switch itself off automatically.** In other words, if you carry out any adjustments and take longer than four minutes to press a key, the instrument will turn itself off (even when the function is deactivated)!!

### 6.3.1 Activating/deactivating the automatic switch-off

Press the - key or the ® key repeatedly until the **AUS** menu appears on the display. Then press  $\zeta$ . Now you will see **An** or **AUS** on the display. By pressing the - key you can select between **An** (automatic switch-off activated) and **AUS** (automatic switch-off deactivated). Confirm by pressing  $\zeta$ . Now you will find yourself back in the main menu **AUS**.

**Z** If you possess a Power Station you should ensure that the automatic switch-off is deactivated.

## 7 Calibration (**CAL**)

Please note that no correct measurements can be taken without initial calibration. As the construction of pH-electrodes is such that they are prone to wear, we recommend that they are recalibrated regularly at least every two months.

### 7.1 Temperature compensation

Temperature compensation has been pre-set in the factory at 25°C. Before commencing calibration you should set the system with the temperature of the calibration solutions. When you have finished the calibration process you must then set the water temperature in the same way. To do this, turn the system on as described in Section 6.2. If the display shows 25.0C you can increase this value by pressing the - key and reduce it by pressing the ® key. Once you have set the value, press the ↵ key. **MESS** is now shown on the display.

**Z** If you adjust the calibration solution to the temperature of the water in your aquarium you don't have to change the temperature values.

### 7.2 Commencing calibration

Press the - key or the ® key repeatedly until the **CAL** appears on the display. Then press the ↵ key. You will now be requested to place the sensor in the calibration solution of pH7 (**BUF7**) (Ensure that the sensor is immersed at least two centimetres into the solution and that the protective- or storage cap has been removed). Do this and confirm by pressing the ↵ key. The figure eight will now run from right to left on the display. After about one minute the text **BUF** will appear on the display. Now remove the sensor from the pH7 solution and rinse it thoroughly with distilled water.

After rinsing, wipe and remove the residual water from the tip of the electrode with a soft cloth. Now place the electrode in the pH4 solution and press ↵. Again, the figure eight will run across the display from right to left. After about one minute the text **BUF4** will appear on the display. Now press the ↵ key.

The calibration procedure is completed. Should one of the error announcements **ERR1** or **ERR2** appear, please refer to Section 15 for details about their significance.

**Z Don't throw away the protective- or storage cap under any circumstances.**

### 7.3 Calibration solutions

The instrument can recognise the calibration solutions pH4, pH7 and pH9. Correct calibration, and thus precise measurement, is only possible with these solutions. As the pH9 is relatively unstable we recommend that you carry out calibration with pH7 and pH4.

**Z Do not put the pH-electrodes into the solution containers as they will otherwise soon lose their stated values. Empty a measure of the solutions into a test-tube (if you don't have one, a small glass will do). It is best to throw the portion of the solution you have used away when you have finished with it.**

## 8 Measurement (**MESS**)

Press the - key or the ® key repeatedly until **MESS** appears on the display.

### 8.1 Commence measurement

Press √. The measurement value now appears on the display. The instrument is now in the measurement- and control mode. When the comma on the display is flashing then a control process is active (the socket is switched on). Don't forget to set the temperature (see Section 7.1).

### 8.2 End measurement

Press √. The **MESS** menu will reappear on the display.

## 9 Control (**dOSE**)

If you don't wish to carry out a control procedure then you can leave out this section. **Important:** Before programming a control procedure you should deactivate the automatic switch-off in the **AUS** menu (see Section 6.3.1). With the help of a control procedure you can raise or lower the pH value of your tank (e.g. addition of CO<sub>2</sub>). How you programme your instrument to do this is explained in this section with the aid of an example. In order to carry out a control procedure you require the Power Station (Art.-No.1050) with an integrated switch socket. Now connect this to the port labelled 'Pow' on your aquastar alpha and insert the mains plug into a mains socket. We strongly recommend that you use the alarm function as it will enable you to rescue the organisms in your aquarium in case of a defective sensor, for example.

**Example:** You want the switch socket to switch on when a pH value of 7.00 is exceeded and then switch off again when a value of 6.95 has been reached. Furthermore, you want an alarm signal to be activated when a pH value rises above 8.00 or falls below 6.50.

**Z** Check the battery from time to time by disconnecting the Power Station from the instrument. If the message **Accu** appears on the display then you must fit a new battery. If there is a cut in power during the control procedure and the battery is empty, the instrument will switch off automatically and remain switched off even when mains power is restored! This test is advisable particularly when you intend to be absent for a longer period, on holiday for example.

### 9.1 Activation of the **dOSE** menu

Press the - key or the ® key repeatedly until **dOSE** appears on the display.

## 9.2 Programming control- and alarm values

Now press  $\downarrow$ . **ON** appears briefly on the display. Then the value **7.50** subsequently appears. Now press the  $\text{\textcircled{R}}$  key repeatedly until you reach the value 7.00. Now press  $\downarrow$ . **OFF** appears briefly and then the value **7.05**. Now press the  $\text{\textcircled{R}}$  key again. You can now see the value **6.95** on the LCD. Confirm this by pressing  $\downarrow$ . Now **AL**  $\text{\textcircled{C}}$  will appear briefly on the display followed by **OFF**. Keep the  $\text{\textcircled{R}}$  key pressed until the desired value **8.00** appears ( If you have inadvertently gone below the value 8.00 by releasing the key too late, you can adjust it with the help of the - key). Reconfirm by pressing  $\downarrow$ . Now **AL**  $\text{\textcircled{E}}$  appears briefly on the display and then **OFF**. Now keep the - key pressed until the desired value **6.50** appears (if you have gone beyond the target then you can adjust the value with the  $\text{\textcircled{R}}$  key). Confirm the value by pressing  $\downarrow$ . You will now find yourself back in the main menu **dOSE**. Now you can commence the control procedure (see Section 8).

**Z** A flashing comma on the display shows when the control procedure is active (socket switched on). When an alarm value has been reached the control procedure (socket) switches off at all events. For this reason it is very important to select the alarm values carefully.

## 9.3 General notes about the control procedure

The control procedure operates on the principal of dual point control. The smallest difference (switch hysteresis) between the switching on and switching off point is pH 0.05. You determine the direction of the control procedure with the aid of the switch points. In other words: If you want to increase the control value, you must select the switch point ON lower than the switch point OFF. If you want to reduce the control value, you have to select the switch point ON higher than the switch point OFF.

## 10 Memory storage of measurements (**MEM**)

If you do not require this function you can skip this section. The measurement memory is a tool which enables you to do without a notepad and pencil.

### 10.1 Measurement memory

The measurement memory is a so-called captive memory. In other words, the measurements are retained even when the instrument is off or the battery (battery replacement) is empty. You can store up to 470 measurements. When the measurement memory is full, the text **FULL** appears on the display when in the measurement- and control mode. To store additional values you must then clear the memory (see Section 10.2).

### 10.2 Erase memory (**dEL**)

Press the - key or the  $\text{\textcircled{R}}$  key repeatedly until **MEM** appears on the display. Press  $\text{\textcircled{.}}$ . Press the - key repeatedly (three times) until you see **dEL** on the display. Press  $\text{\textcircled{.}}$ . The memory is now erased. You now find yourself back in the main menu **MEM**.

### 10.3 Manual memory store (**Man**)

Press the - key or the  $\text{\textcircled{R}}$  key repeatedly until **MEM** appears on the display. Press  $\text{\textcircled{.}}$ . **AUTO** appears on the display. Press the - key repeatedly (twice) until **Int** is displayed. Press  $\text{\textcircled{.}}$ . Now **OFF** is on the display. Confirm with the  $\text{\textcircled{R}}$  key. Now you will see **Man** on the LCD. Enter with  $\text{\textcircled{.}}$ . You now find yourself back in the main menu **MEM**. Now commence measurement (see Section 8). Each time you press the  $\text{\textcircled{R}}$  key the current measurement will be stored. **MEM** appears briefly on the display.

## 10.4 Automatic memory store (*int*)

You can automatically store measurements at certain intervals. For this the minimum interval is 0.25 hours, the maximum 24 hours.

Press the - key or the ® key repeatedly until **MEM** appears on the display. Press ↵. **Auto** appears on the display. Press the - key repeatedly (twice) until **int** is displayed. Press ↵. Now **OFF** is on the display. Press the - key repeatedly until the interval you require appears on the display. Enter with ↵. You now find yourself back in the main menu **MEM**. In the measurement- and control mode the brief appearance of **MEM** on the display signals the memory store of a measurement.

## 10.5 Display stored measurements

Of course it only makes sense to store measurements if you can view the stored values easily. This section tells you what options the instrument provides you with. Please note that the measurement last stored occupies the memory position number 1.

### 10.5.1 Automatic display of measurements

Press the - key or the ® key repeatedly until **MEM** appears on the display. Press ↵. **Auto** now appears on the display. Press ↵. First of all the number of the memory position will be displayed automatically and then subsequently the corresponding measurement. After the last stored measurement has been shown, the text **nuL** appears on the display. You now find yourself back in the main menu **MEM**.

### 10.5.2 Manual display of measurements

Press the - key or the ® key repeatedly until **MEM** appears on the display. Press ↵. Press the - key. **ManU** now appears on the display. Press ↵. The first measurement appears on the display. You can view the other stored measurements by pressing the - key. Once the last stored measurement has

been shown, **nuL** appears on the display. You find yourself back in the main menu **MEM**.

## 11 The PC interface (**PC-d**)

The PC interface enables you to download the measurement memory. A special lead is required to connect the instrument to the PC. This lead is automatically included when you purchase the software.

### 11.1 Windows® 95 Software

With the aquastar alpha PC programme, which will be available during the course of 1999, you will be able to comfortably manage, organise and graphically analyse measurement values. This programme enables you to access the stored measurements in the instrument or transfer the measurements on-line to a database.

Windows is a registered trademark of the Microsoft Corporation

### 11.2 Download measurement memory

Press the - key or the ® key repeatedly until **PC-d** appears on the display. Press ↵. **dUMP** appears on the display. The instrument is now ready to receive commands from the PC. If no PC (with the appropriate software) is connected, you can only exit this menu by switching the instrument off.

### 11.3 Measurements on-line to the PC

To transfer measurements to the PC on-line, you must activate the measurement- and control mode (see Section 8).

## 12 Restore factory settings

When you are in the main menu selection you can restore the instrument to its original factory settings by simultaneously pressing (for about 2 seconds) the - and ® keys. The text **init** then appears briefly on the display.

## 13 Notes about installation

### **The instrument:**

Screw two screws 5cm apart into the wall. Check first of all that the screwheads fit into the slots in the base of instrument intended for this purpose. You should mount the instrument at a location where it is protected from water.

### **Power Station:**

Attach the socket panel to the wall with two screws. Please make sure that you attach the instrument to a place that is protected from water.

### **Sensor:**

If you want to carry out constant measurements then you should set up the sensor in a location that is as dark as possible. This prevents it from becoming quickly covered with algae. The pH-electrode must be immersed to at least three centimetres in the water. Under no circumstances is the lead connection to the sensor to be placed under water! It is also **important** that the sensor is placed and set vertically from above. Sensors fitted horizontally or upside down do not operate correctly.

## 14 Maintenance and care

### 14.1 pH-electrode

The sensor is a low maintenance, gel-filled, single-rod measurement electrode. Experience has shown that these electrodes function reliably for up to three years.

#### 14.1.1 Cleaning

pH-electrodes are sensitive to dirt or algae. Algae that have attached themselves to the sensor element can be easily removed with a soft cloth under warm, running water. Do not use any mechanical aids such as brushes, scouring pads etc.

### 14.1.2 Storage

To store the electrode place the protective cap filled with a 3 mol/ltr. KCL solution carefully over the tip of the electrode. Please make sure that you never store the electrode dry or in distilled water. Under no circumstances is the electrode to be stored at temperatures below 0°C.

## 14.2 Battery replacement

After the message **Accu** appears on the display, the instrument turns itself off automatically as no more measurements can be carried out correctly. In this situation you must replace the battery (9V block cell) . To do this, proceed as follows:

1. Place the instrument in front you on the table with the display to your left at 9-o-clock and the sensor connection (BNC port) at 3-o-clock.
2. Hold the upper section of the instrument's grey housing firmly in your left hand. Now hold the BNC plug of the connected sensor firmly with your index finger and thumb. Now pull on this plug towards 3-o-clock until you can pull away the upper housing section upwards.
3. Now you can detach the connecting clip on the old battery and install the new one. Snap the housing back together. The instrument is ready for operation again.

## 15 Error messages

The table below shows the instrument's possible messages, their cause and how you can rectify them. If you can't remedy a potential malfunction with the help of this table, please don't hesitate to call our Hotline under 0049-7202-941193.

Message	Cause	Remedy
<b>Accu</b>	Battery empty	-Replace battery
<b>AL Ū</b>	pH value is above the set alarm value	-pH value too high -sensor defective ⇒ replace sensor
<b>AL ũ</b>	pH value is below the set alarm value	-pH value too low -sensor defective ⇒ replace sensor
<b>ERR1</b>	Calibration solution pH4 or pH 9 has not been recognised	-Check the buffer solution and replace if necessary -sensor defective ⇒ replace sensor
<b>ERR2</b>	the established electrode slope is below 50mV/pH at 25°C	-Check the buffer solution and replace if necessary -sensor defective ⇒ replace sensor
<b>ERR3</b>	Measurement beyond the control range	-Value really is too high -sensor defective ⇒ replace sensor

## 16 Technical data

Display:	4-figure LCD
Power supply:	9V-
Measurement/control range:	pH 3-13
Resolution:	pH 0.01
Operating temperature:	0-50°C
Temperature compensation:	manual
Switch hysteresis:	freely adjustable (but $\geq$ pH 0.05)
PC interface:	yes
Calibration:	semi-automatic
Measurement memory:	for 470 measurements
<sup>1)</sup> Socket output load max.:	1500W at 230 V~

- 1) only in connection with Power Station

## 17 Guarantee

The product is guaranteed for 1 year from the invoice date. It covers defects in materials and manufacturing faults. Chemical sensors and batteries are subject to natural wear and, where legally permitted, are not covered by this guarantee.

We guarantee the supplied product corresponds with the specifications and that the product has no apparent faults in materials or construction. We accept no liability for the correctness of the operating instructions. Neither do we accept any liability for damage of any kind caused by incorrect operation or location or environment unsuitable for the instrument. Furthermore, where legally permitted, we accept no liability for direct damage, indirect damage, subsequent damage nor damage to third parties. We do not guarantee that the product package meets the purchaser's demands. The guarantee is void if the supplied original product is damaged or altered in any way.

## 18 Customer service

Before you send the instrument in to us, please call our technical service under the Hotline number 0049-7202-941193. Unfortunately, for administrative reasons, we cannot accept shipments sent to us 'ex works'. Repairs with which no sales receipt has been included will be invoiced.

## 19 Registration

Please complete the enclosed registration form and send it to us. Only when we have received this can we keep you up-to-date with new developments and additions. Your details will be treated confidentially and under no circumstances whatsoever passed on to third parties.

## 20 Declaration of conformity

The company iks ComputerSysteme GmbH hereby declares that the type of construction of the following device in the model sold by us complies with the these relevant EEC-Directives:

- ***iks aquastar alpha pH***

Relevant EEC-Directives:

73/23/EEC (Low Voltage Directive)

as changed by 93/68/EEC

89/336/EEC (Elektromagnetic Compatibility)

as changed by 91/263/EEC; 92/31/EEC; 93/68/EEC

Applied harmonized standards:

EN 60950 (VDE 0805/ 11.97, IEC 950)

EN 50081-1 together with EN 55022

EN 50082-1 together with EN 55024

This device has been tested in a typical situation.

Karlsbad, August 30, 2000

Gerhard Kugel

Jürgen Walch