User Manual

Aqua Control+ UNI
Rainwater System Controller

Item no.: 351008

For standard or pressure sensor.

Design and specifications are subject to change without notice
Dated: August 2016; Version: AQ+ U3.2U

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Figure 1: View of equipment

1: LED for power supply
2: Information Display
3: LED for drinking water operation
4: LED for faults and malfunction
5: Operating buttons
6: Lower cover of the System Control
7: The main fuse for the rainwater system controller is under this cover.
Figure 2: Sensor assembly

12: Data cable
13: Wire seal 3
14: Connection of the data cable is polarity protected.
15: connect white wire here
16: connect red wire here
17: data cable terminal
Important notes on safety:

Please read and follow safety instructions carefully before assembly or using the device!

Equipment using a 120 V ~ supply may only be installed and commissioned by a qualified tradesman. The assembly place must allow all possible safety precautions when laying the attached cables. Power supply cables and data cables mast not be damaged or pinched in any way. Plan the assembly place so that you can reach the transformer easily and unplug it from the electrical outlet in dangerous situations. Choose the assembly place so that children cannot play or be near the device and its connections without supervision. Before opening the device, disconnect it from the main supply (unplug) otherwise there is a serious danger of an electrical shock. Fuses may only be replaced with standard-compliant parts with the same nominal value. All liability is excluded for damages which result from non-compliance of these instructions or from improper handling of the device. At chosen intervals in this handbook we will give directions for safety precautions. These safety precautions have been specially marked:

STOP Before opening the equipment unplug the transformer from the outlet!
1. Description

The AquaControl+ is an electronic water management control system. It has been developed especially for rainwater usage systems. It can be used with a wide variety of tank systems. Tanks made from metal or steel reinforced cement may only be used when the following conditions have been correctly followed. Metal tanks lead to faulty readings. It is optimal to install the device so that the sensor is as far as possible from the metal sides so, for example, in the center of a cylindrical tank. The system controls offer an easy to use guide for the switch programming. Using an LCD display the fill measurement is shown in 1% stages (in relation to the height of the tank). The sensor operates with 12 volts DC, supplied from the main control unit.

All programmed values such as the tank height are retained after disconnection of the power supply or after loss of power.

Performance features:

- Fill level measurement display in 1% steps with a bar type indicator
- Freely variable switching points in 1% steps for drinking water refill
- Automatic flushing of the system intervals in days, and duration in minutes are programmable
- Dialog oriented user guidance (choice of language)
- Equipment indication using 3 additional LED
- Supervision of the sensor control box and the sensor
- Error indications in simple text
- Analog output for connection to external systems: 0-10V DC
- Usable for various sensor systems: Capacitive or pressure sensor

Technical data:

<table>
<thead>
<tr>
<th>Control electronics</th>
<th>Measurement sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating current</td>
<td>:24V AC</td>
</tr>
<tr>
<td>Fused</td>
<td>:T500mA</td>
</tr>
<tr>
<td>Power consumption</td>
<td>:3VA</td>
</tr>
<tr>
<td>Tank height</td>
<td>:9.8 feet (optional 20 feet)</td>
</tr>
<tr>
<td>Measurements</td>
<td>:6.1&quot;x6.5&quot;x3.5&quot;</td>
</tr>
<tr>
<td>Measurement voltage</td>
<td>:12V DC</td>
</tr>
<tr>
<td>Measuring frequency</td>
<td>:0.2-20)kHz</td>
</tr>
<tr>
<td>Data cable length</td>
<td>:165 feet, maximum</td>
</tr>
<tr>
<td>Measurements</td>
<td>:3.6&quot;x3.2&quot;x2&quot;</td>
</tr>
</tbody>
</table>
Terminal 1

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>: 24V AC</th>
<th>Operating voltage</th>
<th>: 24V AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Current</td>
<td>: 5Amps</td>
<td>Maximum Current</td>
<td>: 1Amps</td>
</tr>
</tbody>
</table>

Terminal 5

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>: 120V AC/DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Current</td>
<td>: 3Amps</td>
</tr>
</tbody>
</table>

Analogue outlet:

<table>
<thead>
<tr>
<th>Minimal apparent ohmic resistance</th>
<th>: 20K Ohm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short circuit protection</td>
<td>: Yes</td>
</tr>
<tr>
<td>Short circuit current</td>
<td>: Approx 15mA</td>
</tr>
<tr>
<td>Cable length</td>
<td>: 650 feet, maximum; shielded</td>
</tr>
</tbody>
</table>

Note:

Only the control electronics in the device are protected by the fuse. Valves and pump connections are not protected. These are protected only by the mains supply via the circuit breaker.

The yellow LED indicating “Drinking water operation”[3] is lit as soon as the valve switches over to the mains supply. The user is made aware that the system now uses water from the mains supply. The red LED for “Faults and malfunctions” [4] is lit as soon as the system identifies a fault. The display will then show a warning that describes the cause of the fault in plain text.

2. Assembly

2.1 Control system

The mains plug of the transformer serves as an on / off switch.

STOP Before opening the equipment, unplug the transformer from the outlet!

- Loosen the fastening screws of the lower cover [6] and remove the cover

Select the measurement system “Pressure sensor”. There appears an additional menu point:

| CALIBRATION START NO |

The process is now explained in the following text.

Figure 19: Sub- menu “DEVICE ADJUSTMENT”

To begin the calibration the “NO” is replaced by “YES”. Then a short press the “ENTER” button. The word “NO” begins to blink. The “+” button will change the word to “YES”. The device will save the “YES” when the “ENTER” button is pressed. There appears the following readout:

| CALIBRATION ACTIVATED |

The readout appears for approximately 10 seconds. During this time the device completes the calibration process. As soon as the process is completed the display will revert to the following readout:

| CALIBRATION START NO |

Now the calibration is completed and the menu can be closed. To do this simply press the “MENU” button.
2. Calibration:

Calibration is made without water, therefore the tank must be empty. The pressure sensor must be installed in the tank at the correct operating height slightly above the tanks bottom. The distance above the tanks bottom depends on a number of factors as follows: Because the supply of rain water will transport an amount of debris and particles that will settle on the tanks bottom and in relation to how often the tank is cleaned, there could accumulate a layer of sludge of a few centimetres each year. This is a critical fact because the pressure sensor must be suspended in near water above the sludge to function correctly. As a rough guide, about 5cm to 8cm above the bottom of the tank should be enough.

Note: Make sure to check that there is no water in the tank before beginning the calibration. The zero level of the system is to be calibrated.

On the calibration menu are the following points:

<table>
<thead>
<tr>
<th>DEVICE ADJUSTMENT</th>
<th>Main menu level</th>
</tr>
</thead>
<tbody>
<tr>
<td>key “ENTER”</td>
<td></td>
</tr>
<tr>
<td>LANGUAGE ENGLISH</td>
<td></td>
</tr>
<tr>
<td>+/-</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNITS / CM</th>
<th>Sensor capacitive; Continue with the “+” button.</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCH / CM</td>
<td></td>
</tr>
<tr>
<td>+/-</td>
<td></td>
</tr>
<tr>
<td>MEASURING LENGTH</td>
<td>Sensor 4mA to 20mA; for selection press the “ENTER” button.</td>
</tr>
<tr>
<td>30-600cm</td>
<td></td>
</tr>
<tr>
<td>.BigInteger</td>
<td></td>
</tr>
<tr>
<td>+/-</td>
<td></td>
</tr>
</tbody>
</table>

- Mark out drilling points and drill according to sketch
- Fasten the device with the enclosed installation hardware (screw anchor and screws)

Figure 3: Drilling outline for housing outline

2.2 Connection of the capacitive sensor and data cable:

Assembly and connections for the pressure sensor are explained in point 7 of these instructions!

The sensor electronics comprise of a stainless steel probe [22] with red and white connecting wires [27] and the sensor control box [28].

Figure 4: Sensor technology

1. Now the sensor control box [28] (cover removed) should be installed on the tank wall (preferably in the man hole shaft of the Graf synthetic tank). The location of the mounted sensor control box should be between 4" and 6" above the overflow [25]. The enclosed screws should be used to secure the device. After fully tightening the screws, the points that are showing themselves on the outside of the tank must be blunted to avoid injury [24].


3. Shorten the connection cable to suit the measured height.
4. Connect the sensor cable to the sensor as described in the following instructions: Remove approximately 1/4" of insulation from both of the wires. Next, pass the red wire through the wire seal [19] and tighten this lightly, then connect the red wire to the terminal [16]. The free white wire is now passed through the wire seal 2 [18] and tightened lightly, then connect the white wire to the terminal [15].

5. Now pass the end of the data cable [12] through the wire seal 3 [13]. Lightly tighten the wire seal and connect the cable wire cores of the data cable [12] to the double terminal [14]. The connection of the data cable is reverse polarity protected. **Attention! The screws should be tightened with care to ensure that they are not damaged through over tightening.**

6. Now recheck that all the connections and the sensor components have been fitted correctly. Replace the cover of the sensor control box and secure this with the appropriate fastening screws.

7. At the main system control unit, remove the jacket from the ends of the sensor data cables, strip about 1/4" of insulation from the wires, and insert each wire into the appropriate terminal. Tighten the terminal screws securely.

**Note:**

*The red and the white wires going down to the probe should be straight and smooth to be drawn taught by the weight of the stainless steel probe. The stainless steel probe must hang just above the tank floor.*

4. Now recheck that the balance box and all the screwed components are well secured. Replace the cover of the balance box and secure with the appropriate fastening screws.

5. The final step of the sensor assembly is the correct laying of the data cable to the system control [12 in figure 17]. Lead the data cable through the wire seal into the system control and connect the data cable to the correct terminal “SENSOR”:

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*Figure 18: Connection of the data cable in the system control*
26: Tank or riser wall  
27: Pressure sensor  
28: Balance box

Figure 17: Connection of the pressure sensor in the tank

The sensor electronic in the tank comprises of the pressure sensor which is suspended above the bottom of the tank and the balance box which is mounted in the dome of the tank. The balance box houses the electrical junction from the connection cable of the sensor to the data cable and also the end of the pressure equalisation pipe [17 in figure 17] from the sensor. The pressure equalisation pipe ends in the balance box and is simply left open. The purpose is to supply the pressure sensor with the ambient air pressure.

Please be sure to mount the balance box sufficiently above the tank overflow level. Flooding the balance box must never happen, even under extreme heavy rain conditions!

Flooding the balance box may destroy the pressure sensor due to water entering the sensor by way of the pressure equalisation pipe.

The pressure sensor functions with a current loop from 4mA to 20mA. For this reason it is very important that the polarity of the cable connections are correct throughout!

1. Now the balance box (cover removed) should be installed on the tank wall (in the Graf synthetic tank preferably in the tank dome). The assembly position of the balance box should be between 10cm and 20cm above the overflow [25 in figure 17]. This is secured with the supplied screws. To avoid injury the points of the screws should be blunted after tightening [24 in figure 17].

2. Measure the length of the pressure sensor cable according to the height of the tank. Cut the cable if required. Please remember that the pressure sensor must be suspended freely some centimetres above the bottom of the tank. This is required because a layer of sludge will collect on the bottom of the tank (for this reason the tank should be examined and cleaned from time to time).

3. Lead the end of the data cable through the wire seal [13 in figure 17]. Now screw the connection lightly closed. Pay attention when connecting the data cable that the polarity is correct! Connect the positive terminal
2.3. Electrical wiring diagram

The AquaControl+ offers the rain water system a dry run protection for the pump or the house water system when equipped with an external pump relay. In order for the dry run protection to function properly the rain water system must be wired according to the following diagram.

![Diagram showing electrical wiring diagram]

**Figure 6: electrical wiring diagram**

For the supply of 24V AC to operate valves and other accessories, external power must be supplied to the 24V AC input terminals using a transformer sufficient for the needs of the attached devices.

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7.1 Pressure sensor assembly:

![Diagram showing pressure sensor assembly]

- 12: Data cable
- 13: Wire seal 3
- 14: Connect the positive terminal of the data cable here
- 15: Connect the positive terminal of the pressure sensor here
- 16: Connect the negative terminal of the pressure sensor here
- 17: Pressure equalisation pipe
- 18: Wire seal 2
- 20: Active measuring length
- 23: Tank floor
- 24: Screws must be blunted ! (danger of injury)
- 25: Overflow
3. Activation and calibration process

Before the energizing the equipment, be sure that all electrical connections are correctly insulated and all covers are properly closed.

Now open the transparent cover of the system controls. Plug the transformer into the outlet (this outlet must be exclusively for the equipment and be on its own breaker). The system runs a self-test automatically.

For the duration of the system check (approx. 10 seconds) the following signal will be displayed in the window:

Figure 7: Display during the equipment check

The equipment type is shown on the first line and the software check in progress is shown in the second line.

If after the initial installation check all is correct, the LCD indicator will display the fill level (in %).

Figure 8 shows the LCD-display in the operation mode. The display shows the filling level and the operating modes as abbreviations: "FV" and "P". These abbreviations correspond as follows:

- FV+: filter cleaning valve opened
- FV-: filter cleaning valve closed
- P+: (pump on) house waterworks in operation
- P-: (pump off) no water currently being withdrawn

Figure 8: Display in the operation mode

- Status of rain water filter flushing valve
- Status house waterworks (pump + on / - off)
- Fill level in %
- Visual display of the fill level
4. Set up of the system control:

After putting into operation, the system control must be adjusted and programmed according to the conditions and requirements of the individual user's system. The required settings are easily programmed. There are four buttons for this purpose. All necessary programming data entries follow a menu displayed by the LCD. For the set up, follow all the points listed in table 1 in the sequence shown. Should any error in the sequence occur then it is necessary to begin the set up again from the beginning starting with the tank height. Begin the programming of the settings by pressing the button marked "MENU". With the buttons “+” or “-” the menu may be scrolled backwards and forwards. With the respective menu point shown the values may be altered. For this the button “ENTER” must be used. The value begins to flash. With the “+” or “-” the desired value may now be entered according to individual requirements. When the desired value has been entered this must be confirmed by pressing the “ENTER” button. The value is only then taken over and stored in the programming of the unit. Through pressing the “MENU” button again the display changes back to the operation mode.

It is possible to reset the unit to the factory setting standard values at any time. The resetting can only be carried out in the operation mode (Display see Figure 7): To do this press the “ENTER” button and hold it pressed. Now simultaneously in addition press the “MENU” button. After a short wait the following display will be shown:

```
DEFAULT VALUES
23%
```

**Figure 9: Message reset to standard factory settings**

As soon as this message is displayed the buttons may be released

If the electrical outlet is working properly, then unplug the transformer from the system control. Once the system has been de-energized open the lower cover of the system control (see Figure 1) and check the rainwater system controller main.

6. Analog output:

Your device has been fitted with an analogue terminal. This terminal shows percent values from the system control (0% -100%) by a voltage range from 0V to 10V DC. The following connection values apply:

- Minimal apparent ohmic resistance: 20K Ohm
- Short circuit protection: Yes
- Short circuit current: Approx 15mA
- Cable length: 650 feet, maximum; shielded

**Note:**

The system control is only capable of displaying whole percent values (no fractions). These are shown on the analogue signal display.
The reason for this error is that the white sensor wire has been damaged.

Error possibilities:
- The data cable of the sensor control box is not connected to the data cable terminal [14] but has been connected to the sensor terminal
- Wires of the data cable have been damaged

The sensor control box delivers no signal and must be replaced.

For further diagnosis, remove the stainless steel weight [22] out of the water. If the error indication has now stopped, then the sensor itself was the cause of the fault. If the error indication continues, this implies that the sensor control box is defective.

The communication between the system control to the sensor control box is interrupted.

First try re-setting the system control to the factory default settings. If the error message continues to be displayed then it is necessary to contact your service partner.

Note: After resetting to the factory default settings all the newly programmed setting values will have been overwritten and must be re-programmed!

Device shows no function at all then check whether the main electrical supply lines current and also check the house breakers.

The menu structure integrated in the system control is outlined in Figure 9. To bring up the menu, press and hold the „MENU“ button for longer than 5 seconds. All outputs are inactive when the menu level has been activated and operation of the device is suspended. The system automatically returns to operating mode when no entries have been received for approximately 30 seconds.

Figure 10: Main menu level

Press the „ENTER“ button to arrive at each of the listed sub-menu functions. Through pressing the „MENU“ button again the display changes back to the operation mode.

Pump ON (The numerical value is always smaller than with BACKUP ON.)

Pump OFF (The numerical value is always smaller than with PUMP ON.)

Supply with municipal drinking water - ON (The numerical value is always smaller than with BACKUP OFF.)
Supply with municipal drinking water - OFF

Flush the drinking water supply piping every 14 days. The value "0" switches the flushing off.

Flush the drinking water supply pipes for 30 seconds.

Cleaning the rainwater filter every 14 days
The value 0 switches the cleaning process off.

Cleaning the rainwater filter for 5 seconds

Cleaning the rainwater filter when the fill level has increased by 2% after rainfall. If the fill level continues to increase, the rinsing will be repeated every 3 hours.

Cleaning the drain tank every "x" days.

Cleaning the drain tank for "x" minutes.

This enables water to be pumped out of the main tank. The chosen numeric value “Transfer from” should always be greater than the numeric value “BACKUP OFF”!
The water will be pumped off when it rises above the set value. To prevent constant switching on and off of this function, it is pumped off to 2% under the opposed value.

Time scale in days; elapsed since the last filter rinse.

Activation of the filter rinse. The RINSE valve remains permanently switched on until reprogrammed to original setting.

The refill function may also be regulated by hand. The REFILL valve remains permanently switched on until reprogrammed to original setting.

Activation of the drain tank cleaning. The DRAIN TANK valve remains permanently switched on until reprogrammed to original setting.

Figure 14: Sub-menu “Manual functions”

5. Error messages and fault correction:

The operation of the system control should be checked at regular intervals (at least every 4 weeks).

The error messages provide an indication of general symptoms. Additional troubleshooting will be required to determine the underlying cause and necessary actions.

Please also note that the system control device cannot sense any malfunction of the municipal water supply or house water system. (No malfunction sign is supplied by external water supplies or devices to the system control device).

If faults are recognized by the tank level sensor, the system control cannot continue to work properly.

The following faults are shown in the plain text on the display:
Figure 13: Allocation of the relay outputs

The last part of the operation level covers the manual functions:

**MANUAL OPERATION**

- **LAST FLUSH BACKUP 0**
  - Time scale in days; elapsed since the last flush using municipal drinking water
- **HAND FLUSH BACKUP NO**
  - Activation of the flushing process for the municipal drinking water inlet pipe. The switch-over valve remains permanently switched on until reprogrammed to original setting.

**REFILL ON**

0 - 100 %

Numeric value is always greater than the value "BACKUP ON" and less than the value for "REFILL OFF".

**REFILL OFF**

0 - 100 %

Numeric value is always greater than the value for "REFILL ON".

Figure 11: Sub-menu "Switching points"

Press the "ENTER" button to alter the respective switching points. The value to be altered will begin to blink. The value may then be adjusted by using the "+" and the "-" buttons. Press the "ENTER" button again when the displayed value should be accepted.

The following is an introduction to the general device settings:

<table>
<thead>
<tr>
<th><strong>DEVICE ADJUSTMENT</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>key &quot;ENTER&quot;</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>LANGUAGE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENGLISH</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>UNITS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INCH / CM</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MEASURING LENGTH</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>30-600cm 200</td>
</tr>
</tbody>
</table>

(A 20 feet Sensor may be ordered.)
The menu will only be shown when the measurement system “Pressure sensor” is selected.

Output 1 has been configured for the "Refill" function and NO = normally open. Therefore the valve (or the pump) for the function "Refill" should be attached at terminal 1.

Output 2 has been configured for the "Backup" function and NC = normally closed.

Output 3 has been configured for the "Pump" function and NO = normally open.

Output 4 has been configured for the "Drain" function and NO = normally open.

Output 6 has been configured for the "Error" function and NC = normally closed.

For each terminal the selection between the following functions exists:

- Booster Pump NO
- Booster Pump NC
- Cleaner NO
- Cleaner NC
- Backup NO
- Backup NC
- Transfer NO
- Transfer NC
- Refill NO
- Refill NC
- Pump NO
- Pump NC
- Drain NO
- Drain NC

Note:
Please configure each output according the requirements of your rainwater harvesting system requirements.

The function of the output can be specified for each terminal separately (normally open or normally closed). Please consider the maximum current values for each individual terminal:

- Terminal 1: 5Amps
- Terminal 2: 1Amps
- Terminal 3: 1Amps
- Terminal 4: 1Amps
- Terminal 6: 3Amps
The menu will only be shown when the measurement system “Pressure sensor” is selected.

Output 1 has been configured for the "Refill" function and NO = normally open. Therefore the valve (or the pump) for the function "Refill" should be attached at terminal 1.

Output 2 has been configured for the "Backup" function and NC = normally closed.

Output 3 has been configured for the "Pump" function and NO = normally open.

Output 4 has been configured for the "Drain" function and NO = normally open.

Output 6 has been configured for the "Error" function and NC = normally closed.

For each terminal the selection between the following functions exists:

- BOOSTER PUMP NO
- BOOSTER PUMP NC
- CLEANER NO
- CLEANER NC
- BACKUP NO
- BACKUP NC
- TRANSFER NO
- TRANSFER NC
- REFILL NO
- REFILL NC
- PUMP NO
- PUMP NC
- DRAIN NO
- DRAIN NC

Note:

Please configure each output according the requirements of your rainwater system requirements.

The function of the output can be specified for each terminal separately (normally open or normally closed). Please consider the maximum current values for each individual terminal:

- Terminal 1: 5Amps
- Terminal 2: 1Amps
- Terminal 3: 1Amps
- Terminal 4: 1Amps
- Terminal 6: 3Amps
Figure 13: Allocation of the relay outputs

The last part of the operation level covers the manual functions:

**MANUAL OPERATION**

- **LAST FLUSH**
  - **BACKUP**: 0
  - **+/-**
  - Time scale in days: elapsed since the last flush using municipal drinking water

- **HAND FLUSH**
  - **BACKUP**: NO
  - **+/-**
  - Activation of the flushing process for the municipal drinking water inlet pipe. The switch-over valve remains permanently switched on until reprogrammed to original setting.

**Figure 11: Sub-menu “Switching points”**

Press the “ENTER” button to alter the respective switching points. The value to be altered will begin to blink. The value may then be adjusted by using the “+” and “-” buttons. Press the “ENTER” button again when the displayed value should be accepted.

The following is an introduction to the general device settings:

- **DEVICE ADJUSTMENT**
  - **key “ENTER”**

- **LANGUAGE**
  - **ENGLISH**
  - **+/-**

- **UNITS**
  - **INCH / CM**
  - **+/-**

- **MEASURING LENGTH**
  - **30-600cm**
  - **200**
  - (A 20 feet Sensor may be ordered.)

- **MEASUREMENT**
  - **PRESSURE SENSOR**

**REFILL ON**

0 - 100 %

**+/-**

Numeric value is always greater than the value for “BACKUP ON” and less than the value for “REFILL OFF”. Numeric value is always greater than the value for “REFILL ON”.

Page 18
Supply with municipal drinking water - OFF

Flush the drinking water supply piping every 14 days. The value “0” switches the flushing off.

Flush the drinking water supply pipes for 30 seconds.

Cleaning the rainwater filter every 14 days
The value 0 switches the cleaning process off.

Cleaning the rainwater filter for 5 seconds

Cleaning the rainwater filter when the fill level has increased by 2% after rainfall. If the fill level continues to increase, the rinsing will be repeated every 3 hours.

Cleaning the drain tank every “x” days.

Cleaning the drain tank for “x” minutes.

This enables water to be pumped out of the main tank. The chosen numeric value “Transfer from” should always be greater than the numeric value “BACKUP OFF”!
The water will be pumped off when it rises above the set value. To prevent constant switching on and off of this function, it is pumped off to 2% under the opposed value.

Time scale in days; elapsed since the last filter rinse.

Activation of the filter rinse. The RINSE valve remains permanently switched on until reprogrammed to original setting.

The refill function may also be regulated by hand. The REFILL valve remains permanently switched on until reprogrammed to original setting.

Activation of the drain tank cleaning. The DRAIN TANK valve remains permanently switched on until reprogrammed to original setting.

Figure 14: Sub-menu “Manual functions”

5. Error messages and fault correction:

The operation of the system control should be checked at regular intervals (at least every 4 weeks).

The error messages provide an indication of general symptoms. Additional troubleshooting will be required to determine the underlying cause and necessary actions.

Please also take note that the system control device cannot sense any malfunction of the municipal water supply or house water system. (No malfunction signal is supplied by external water supplies or devices to the system control device).

If faults are recognized by the tank level sensor, the system control cannot continue to work properly.

The following faults are shown in the plain text on the display:
The reason for this error is that the white sensor wire has been damaged.

Error possibilities:
- The data cable of the sensor control box is not connected to the data cable terminal [14] but has been connected to the sensor terminal
- Wires of the data cable have been damaged

The sensor control box delivers no signal and must be replaced.

For further diagnosis, remove the stainless steel weight [22] out of the water. If the error indication has now stopped, then the sensor itself was the cause of the fault. If the error indication continues, this implies that the sensor control box is defective.

The communication between the system control to the sensor control box is interrupted.

First try re-setting the system control to the factory default settings. If the error message continues to be displayed then it is necessary to contact your service partner.

Note: After resetting to the factory default settings all the newly programmed setting values will have been overwritten and must be re-programmed!

If the device shows no function at all then check whether the main electrical supply provides current and also check the house breakers.

The menu structure integrated in the system control is outlined in Figure 9. To bring up the menu, press and hold the „MENU“ button for longer than 5 seconds. All outputs are inactive when the menu level has been activated and operation of the device is suspended. The system automatically returns to operating mode when no entries have been received for approximately 30 seconds.

```
TANK:  
23% [ ]

key „MENU“ (>5s)

SWITCHING POINTS  DEVICE ADJUSTMENT  MANUAL OPERATION

Figure 10: Main menu level
```

Press the „ENTER“ button to arrive at each of the listed sub-menu functions. Through pressing the „MENU“ button again the display changes back to the operation mode.

```
SWITCHING POINTS

key „ENTER“

PUMP ON
0-100%  8%

Pump ON (The numerical value is always smaller than with BACKUP ON.)

PUMP OFF
0-100%  6%

Pump OFF (The numerical value is always smaller than with PUMP ON.)

BACKUP ON
0-100%  10%

Supply with municipal drinking water - ON (The numerical value is always smaller than with BACKUP OFF.)
```
4. Set up of the system control:

After putting into operation, the system control must be adjusted and programmed according to the conditions and requirements of the individual user's system. The required settings are easily programmed. There are four buttons for this purpose. All necessary programming data entries follow a menu displayed by the LCD. For the set up, follow all the points listed in table 1 in the sequence shown. Should any error in the sequence occur then it is necessary to begin the set up again from the beginning starting with the tank height. Begin the programming of the settings by pressing the button marked “MENU”.

With the buttons “+” or “-” the menu may be scrolled backwards and forwards. With the respective menu point shown the values may be altered. For this the button “ENTER” must be used. The value begins to flash. With the “+” or “-” the desired value may now be entered according to individual requirements. When the desired value has been entered this must be confirmed by pressing the “ENTER” button. The value is only then taken over and stored in the programming of the unit. Through pressing the “MENU” button again the display changes back to the operation mode.

It is possible to reset the unit to the factory setting standard values at any time. The resetting can only be carried out in the operation mode (Display see Figure 7). To do this press the “ENTER” button and hold it pressed. Now simultaneously in addition press the “MENU” button. After a short wait the following display will be shown:

<table>
<thead>
<tr>
<th>DEFAULT VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>23%</td>
</tr>
</tbody>
</table>

Figure 9: Message reset to standard factory settings

As soon as this message is displayed the buttons may be released

If the electrical outlet is working properly, then unplug the transformer from the system control. Once the system has been de-energized open the lower cover of the system control (see Figure 1) and check the rainwater system controller main fuse.

6. Analog outlet:

Your device has been fitted with an analogue terminal. This terminal shows the percent values from the system control (0%-100%) by a voltage range from 0V to 10V DC. The following connection values apply:

- Minimal apparent ohmic resistance: 20K Ohm
- Short circuit protection: Yes
- Short circuit current: Approx 15mA
- Cable length: 650 feet, maximum; shielded

Note:

The system control is only capable of displaying whole percent values (no fractions). These are shown on the analogue signal display.
7. Option pressure sensor:

Your device may be equipped with an optional pressure sensor for the measurement of the fill level. The measurement range of the pressure sensor must be adjusted to suit the tank height due to the resolution of the measurement values. The pressure sensor delivers a signal in a range from 4mA to 20mA and thereby establishes the fill level. The manufacture of such pressure sensors may have an offset inaccuracy of a few 0.1mA which cause a measurement error. This will affect mainly the range around the zero point. To compensate this error, the device has an additional menu point “Calibration”. The calibration is found in the main operation level under the point “DEVICE ADJUSTMENT” (see figure 10).

3. Activation and calibration process

Before the energizing the equipment, be sure that all electrical connections are correctly insulated and all covers are properly closed.

Now open the transparent cover of the system controls. Plug the transformer into the outlet (this outlet must be exclusively for the equipment and be on its own breaker). The system runs a self-test automatically.

For the duration of the system check (approx. 10 seconds) the following signal will be displayed in the window:

```
AQ +
REV U3.2U
```

**Figure 7: Display during the equipment check**

The equipment type is shown on the first line and the software check in progress is shown in the second line.

If after the initial installation check all is correct, the LCD indicator will display the fill level (in %).

Figure 8 shows the LCD-display in the operation mode. The display shows the filling level and the operating modes as abbreviations: "FV" and "P". These abbreviations correspond as follows:

- **FV+**: filter cleaning valve opened
- **FV-**: filter cleaning valve closed
- **P+**: (pump on) house waterworks in operation
- **P-**: (pump off) no water currently being withdrawn

**Figure 8: Display in the operation mode**
2.3. Electrical wiring diagram

The AquaControl+ offers the rain water system a dry run protection for the pump or the house water system when equipped with an external pump relay. In order for the dry run protection will function properly the rain water system must be wired according to the following diagram.

![Electrical wiring diagram](image)

1: Terminal 1  
2: Terminal 2  
3: Terminal 3  
4: Terminal 4  
5: 24V / 60Hz  
P: 24V / 60Hz  
NC : Normally closed  
COM : Common  
0-10V : Analogue terminal  
NO : Normally opened  
SENSOR : Sensor terminal

Figure 6: electrical wiring diagram

For the supply of 24V AC to operate valves and other accessories, external power must be supplied to the 24V AC input terminals using a transformer sufficient for the needs of the attached devices.

7.1 Pressure sensor assembly:

![Pressure sensor diagram](image)

12: Data cable  
13: Wire seal 3  
14: Connect the positive terminal of the data cable here  
15: Connect the positive terminal of the pressure sensor here  
16: Connect the negative terminal of the pressure sensor here  
17: Pressure equalisation pipe  
18: Wire seal 2  
20: Active measuring length  
23: Tank floor  
24: Screws must be blunted ! (danger of injury)  
25: Overflow
26: Tank or riser wall  
27: Pressure sensor  
28: Balance box

Figure 17: Connection of the pressure sensor in the tank

The sensor electronic in the tank comprises of the pressure sensor which is suspended above the bottom of the tank and the balance box which is mounted in the dome of the tank. The balance box houses the electrical junction from the connection cable of the sensor to the data cable and also the end of the pressure equalisation pipe [17 in figure 17] from the sensor. The pressure equalisation pipe ends in the balance box and is simply left open. The purpose is to supply the pressure sensor with the ambient air pressure.

Please be sure to mount the balance box sufficiently above the tank overflow level. Flooding the balance box must never happen, even under extreme heavy rain conditions!

Flooding the balance box may destroy the pressure sensor due to water entering the sensor by way of the pressure equalisation pipe.

The pressure sensor functions with a current loop from 4mA to 20mA. For this reason it is very important that the polarity of the cable connections are correct throughout!

1. Now the balance box (cover removed) should be installed on the tank wall (in the Graf synthetic tank preferably in the tank dome). The assembly position of the balance box should be between 10cm and 20cm above the overflow [25 in figure 17]. This is secured with the supplied screws. To avoid injury the points of the screws should be blunted after tightening [24 in figure 17].

2. Measure the length of the pressure sensor cable according to the height of the tank. Cut the cable if required. Please remember that the pressure sensor must be suspended freely some centimetres above the bottom of the tank. This is required because a layer of sludge will collect on the bottom of the tank (for this reason the tank should be examined and cleansed from time to time).

3. Lead the end of the data cable through the wire seal [13 in figure 17]. Now screw the connection lightly closed. Pay attention when connecting the data cable that the polarity is correct! Connect the positive terminal
4. Connect the sensor cable to the sensor as described in the following instructions: Remove approximately 1/4" of insulation from both of the wires. Next, pass the red wire through the wire seal 1 [19] and tighten this lightly, then connect the red wire to the terminal [16]. The free white wire is now passed through the wire seal 2 [18] and tightened lightly, then connect the white wire to the terminal [15].

5. Now pass the end of the data cable [12] through the wire seal 3 [13]. Lightly tighten the wire seal and connect the cable wire cores of the data cable [12] to the double terminal [14]. The connection of the data cable is reverse polarity protected. **Attention! The screws should be tightened with care to ensure that they are not damaged through over tightening.**

6. Now recheck that all the connections and the sensor components have been fitted correctly. Replace the cover of the sensor control box and secure this with the appropriate fastening screws.

7. At the main system control unit, remove the jacket from the ends of the sensor data cables, strip about 1/4" of insulation from the wires, and insert each wire into the appropriate terminal. Tighten the terminal screws securely.

**Note:**
The red and the white wires going down to the probe should be straight and smooth to be drawn taught by the weight of the stainless steel probe. **The stainless steel probe must hang just above the tank floor.**

4. Now recheck that the balance box and all the screwed components are well secured. Replace the cover of the balance box and secure with the appropriate fastening screws.

5. The final step of the sensor assembly is the correct laying of the data cable to the system control [12 in figure 17]. Lead the data cable through the wire seal into the system control and connect the data cable to the correct terminal “SENSOR”:

![Diagram showing connection of the data cable in the system control](image)

*Figure 18: Connection of the data cable in the system control*
7.2. Calibration:

Calibration is made without water, therefore the tank must be empty. The pressure sensor must be installed in the tank at the correct operating height slightly above the tanks bottom. The distance above the tanks bottom depends on a number of factors as follows: Because the supply of rain water will transport an amount of debris and particles that will settle on the tanks bottom and in relation to how often the tank is cleaned, there could accumulate a layer of sludge of a few centimetres each year. This is a critical fact because the pressure sensor must be suspended in clear water above the sludge to function correctly. As a rough guide, about 5cm to 10cm above the bottom of the tank should be enough.

Note:
Be sure to check that there is no water in the tank before beginning the calibration. The zero level of the system is to be calibrated.

In the calibration menu are the following points:

<table>
<thead>
<tr>
<th>DEVICE ADJUSTMENT</th>
<th>Main menu level</th>
</tr>
</thead>
<tbody>
<tr>
<td>key “ENTER”</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LANGUAGE</th>
<th>ENGLISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ / -</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNITS</th>
<th>INCH / CM</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ / -</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEASURING LENGTH</th>
<th>Sensor capacitive; Continue with the “+” button.</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-600cm</td>
<td>200</td>
</tr>
</tbody>
</table>

| MEASUREMENT PRESSURE SENSOR | Sensor 4mA to 20mA; for selection press the “ENTER” button. |

- Mark out drilling points and drill according to sketch
- Fasten the device with the enclosed installation hardware (screw anchor and screws)

![Drilling outline for housing outline](image)

Figure 3: Drilling outline for housing outline

2.2 Connection of the capacitive sensor and data cable:

Assembly and connections for the pressure sensor are explained in point 7 of these instructions!

The sensor electronics comprise of a stainless steel probe [22] with red and white connecting wires [27] and the sensor control box [28].

![Sensor technology](image)

Figure 4: Sensor technology

1. Now the sensor control box [28] (cover removed) should be installed on the tank wall (preferably in the man hole shaft of the Graf synthetic tank). The location of the mounted sensor control box should be between 4" and 6" above the overflow [25]. The enclosed screws should be used to secure the device. After fully tightening the screws, the points that are showing themselves on the outside of the tank must be blunted to avoid injury [29].


3. Shorten the connection cable to suit the measured height.
Terminal 2-4

operating voltage : 24V AC  
maximum Current : 5Amps

Terminal 2-4

operating voltage : 24V AC  
maximum Current : 1Amps

Terminal 5

operating voltage : 120V AC/DC  
maximum Current : 3Amps

analogue outlet:

minimum apparent ohmic resistance : 20K Ohm  
short circuit protection : Yes  
short circuit current : Approx 15mA  
shielded length : 650 feet, maximum

note:

only the control electronics in the device are protected by the fuse. Valves and pump connections are not protected. These are protected only by the mains supply or the circuit breaker.

the yellow LED indicating “Drinking water operation”[3] is lit as soon as the valve switches over to the mains supply. The user is made aware that the system now uses water from the mains supply. The red LED for “Faults and alarm functions” [4] is lit as soon as the system identifies a fault. The display will then show a warning that describes the cause of the fault in plain text.

2. Assembly

2.1 Control system

the mains plug of the transformer serves as an on/ off switch.

Loosen the fastening screws of the lower cover [6] and remove the cover

Select the measurement system “Pressure sensor”. There appears an additional menu point:

<table>
<thead>
<tr>
<th>CALIBRATION</th>
<th>START</th>
<th>NO</th>
</tr>
</thead>
</table>

The process is now explained in the following text.

**Figure 19: Sub-menu “DEVICE ADJUSTMENT”**

To begin the calibration the “NO” is replaced by “YES”. Then a short press of the “ENTER” button. The word “NO” begins to blink. The “+” button will change the word to “YES”. The device will save the “YES” when the “ENTER” button is pressed. There appears the following readout:

<table>
<thead>
<tr>
<th>CALIBRATION</th>
<th>ACTIVATED</th>
</tr>
</thead>
</table>

The readout appears for approximately 10 seconds. During this time the device completes the calibration process. As soon as the process is completed the display will revert to the following readout:

<table>
<thead>
<tr>
<th>CALIBRATION</th>
<th>START</th>
<th>NO</th>
</tr>
</thead>
</table>

Now the calibration is completed and the menu can be closed. To do this simply press the “MENU” button.
1. Description

The AquaControl+ is an electronic water management control system. It has been developed especially for rainwater usage systems. It can be used with a wide variety of tank systems.

Tanks made from metal or steel reinforced cement may only be used when the following conditions have been correctly followed:

Metal tanks lead to faulty readings. It is optimal to install the device so that the sensor is as far as possible from the metal sides so, for example, in the center of a cylindrical tank. The system controls offer an easy to use guide for the switch programming. Using an LCD display the fill measurement is shown in 1% stages (0-100% relation to the height of the tank). The sensor operates with 12 volts DC, supplied from the main control unit.

All programmed values such as the tank height are retained after disconnection of the power supply or after loss of power.

Performance features:

- Fill level measurement display in 1% steps with a bar type indicator
- Freely variable switching points in 1% steps for drinking water reflux
- Automatic flushing of the system intervals in days and duration in hours and minutes are programmable
- Dialog oriented user guidance (choice of language)
- Equipment indication using 3 additional LED
- Supervision of the sensor control box and the sensor
- Error indications in simple text
- Analog output for connection to external systems: 0-10V DC
- Usable for various sensor systems: Capacitive or pressure sensor

Technical data:

<table>
<thead>
<tr>
<th>Control electronics</th>
<th>Measurement sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating current</td>
<td>:24V AC</td>
</tr>
<tr>
<td>Fused</td>
<td>:T500mA</td>
</tr>
<tr>
<td>Power consumption</td>
<td>:3VA</td>
</tr>
<tr>
<td>Tank height</td>
<td>:9.8 feet (optional 20 feet)</td>
</tr>
<tr>
<td>Measurements</td>
<td>:6.1”x6.5”x3.5”</td>
</tr>
<tr>
<td></td>
<td>:3.6”x3.2”x”</td>
</tr>
</tbody>
</table>
Important notes on safety:

Please read and follow safety instructions carefully before assembly or using the device!

Equipment using a 120 V ~ supply may only be installed and commissioned by a qualified tradesman. The assembly place must allow all possible safety precautions when laying the attached cables.

Power supply cables and data cables must not be damaged or pinched in any way. Plan the assembly place so that you can reach the transformer easily and unplug it from the electrical outlet in dangerous situations.

Choose the assembly place so that children cannot play or be near the device and its connections without supervision.

Before opening the device, disconnect it from the main supply (unplug) otherwise there is a serious danger of an electrical shock.

Fuses may only be replaced with standard-compliant parts with the same nominal value.

All liability is excluded for damages which result from non-compliance of these instructions or from improper handling of the device. At chosen intervals in this handbook we will give directions for safety precautions. These safety precautions have been specially marked:

STOP Before opening the equipment
unplug the transformer from the outlet!

Attachment A – Symbols used:

- Attention! Pull out the mains plug from the socket before opening the device.

- Attention! An error has occurred.

- Mains drinking water operation

- Page down

- Page up

- Only for use in a dry areas.

Room for your notes:
User Manual
Aqua Control+ UNI
Rainwater System Controller

Item no.: 351008

For standard or pressure sensor.

Design and specifications are subject to change without notice
Dated: August 2016 ; Version: A6+ U3.2U