

User Manual

Aqua Control+ UNI Rainwater System Controller

Item no.: 351008



For standard or pressure sensor.

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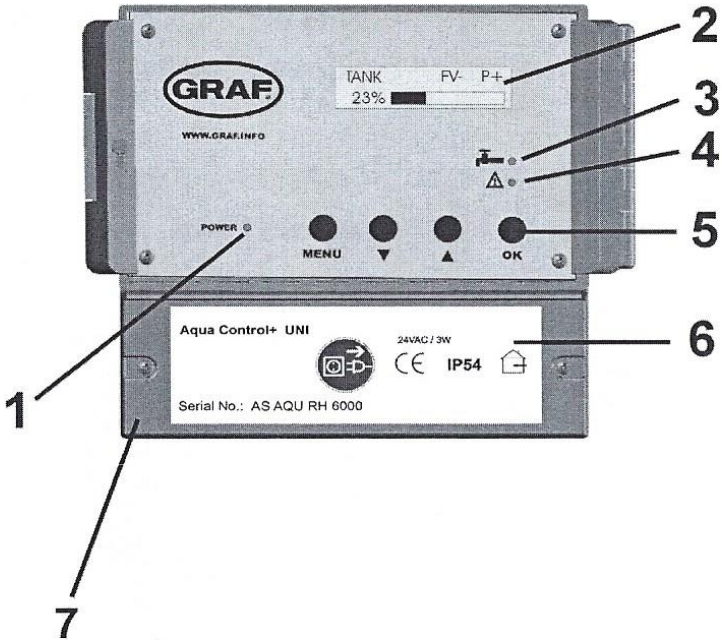


Figure 1: View of equipment

- 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.

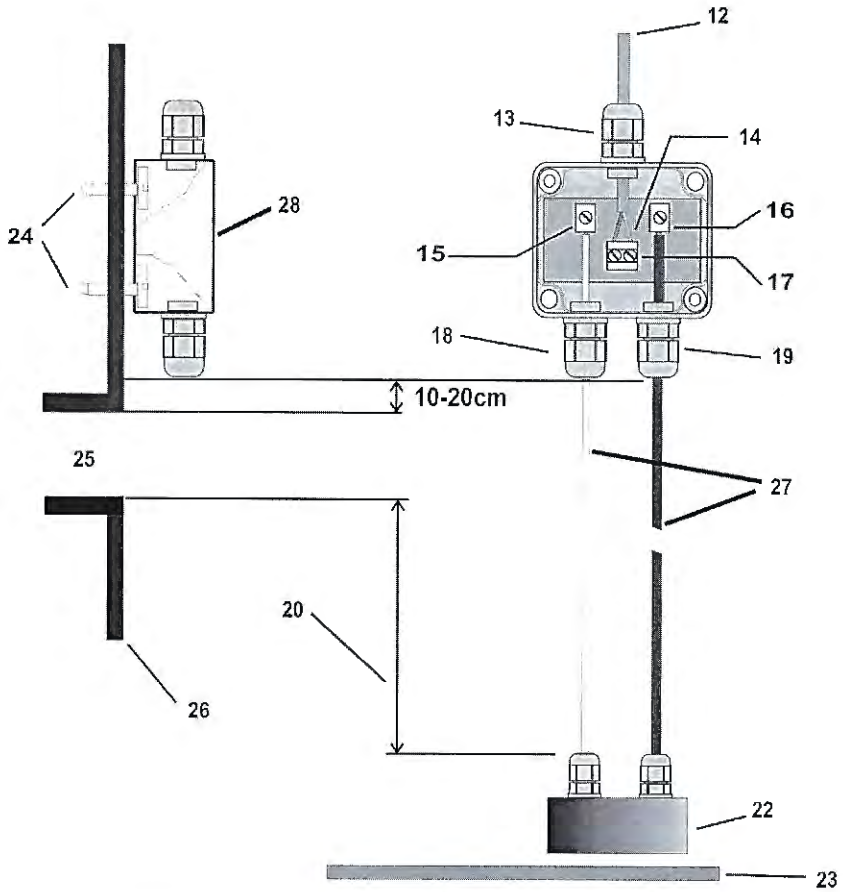


Figure 2: Sensor assembly

- 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

- 18: Wire seal 2
- 19: Wire seal 1
- 20: active measuring length
- 22: Stainless steel probe
- 23: Tank floor
- 24: Screws must be blunted ! (danger of injury)
- 25: overflow
- 26: Tank or riser wall
- 27: Sensor
- 28: Sensor control box

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!**

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 programinable
- 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:

Control electronics

Operating current :24V AC
Fused :T500mA
Power consumption :3VA

Tank height :9.8 feet (optional 20 feet)

Measurements

:6.1"x6.5"x3.5"

Measurement sensors

Measurement voltage :12V DC
Measuring frequency :(0.2-20)kHz
Data cable length :165 feet,
maximum

Measurements :3.6"x3.2"x2"

Terminal 1

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:

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

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

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

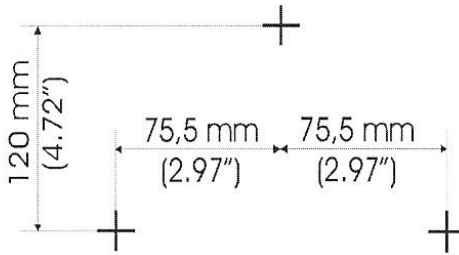


Figure 3: Drilling outline for housing outline

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].

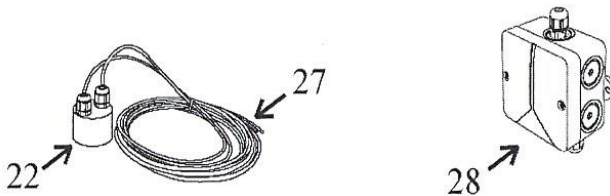


Figure 4: Sensor technology

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].
2. Measure the height from the bottom of the tank [23] to the end of the terminals [15] and [16] on the [28].
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 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.

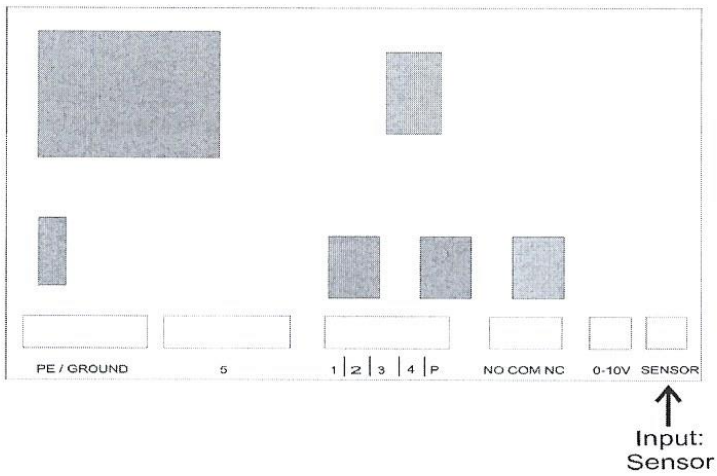
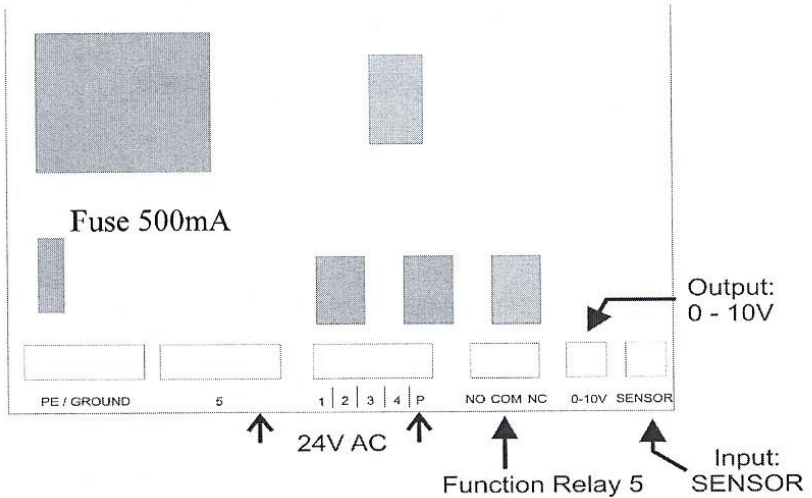


Figure 5: Connection of the sensor system at the System Control

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.



1: Terminal 1
2: Terminal 2
5: 24V / 60Hz

3: Terminal 3
4: Terminal 4
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.

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

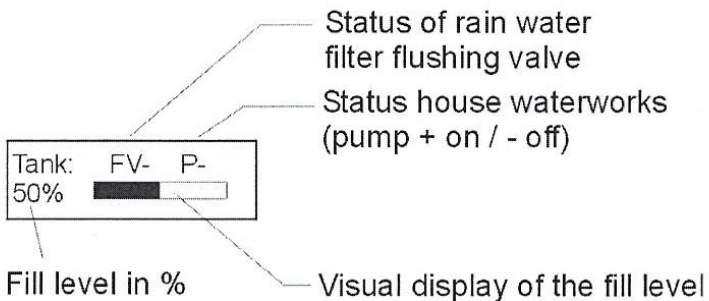


Figure 8: Display in the operation mode

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:

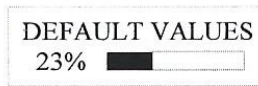


Figure 9: Message reset to standard factory settings

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

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.

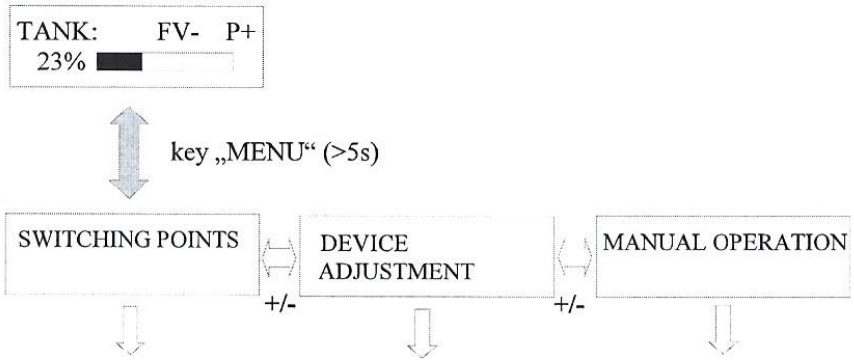
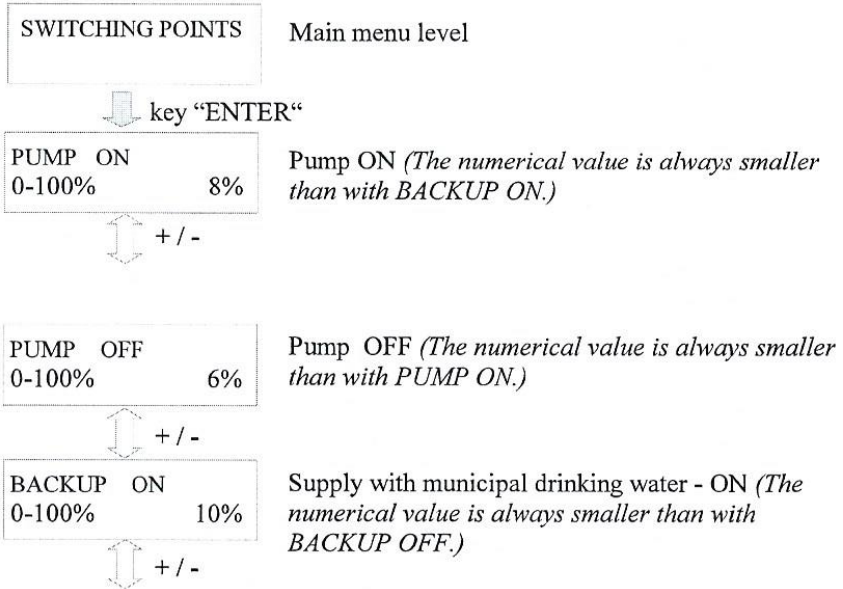


Figure 10: Main menu level

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.



BACKUP OFF 12%
0-100%



Supply with municipal drinking water - OFF

BACKUP INTERVAL 14
0-14 DAYS



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

BACKUP 30
0-60 SEC



Flush the drinking water supply pipes for 30 seconds.

CLEANER INTERVAL 14
0-14 DAYS



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

CLEANER DURATION 5
0-60 SEC



Cleaning the rainwater filter for 5 seconds

CLEANER RINSE AT INCREMENT 2%
2%



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.

DRAIN DELAY
0-60 DAYS



Cleaning the drain tank every "x" days.

DRAIN TIME
0-60 MIN



Cleaning the drain tank for "x" minutes.

TRANSFER FROM
0-100 %



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.

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".

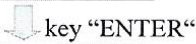
Figure 11: Sub-menu "Switching points"

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:

DEVICE
ADJUSTMENT

Main menu level



LANGUAGE
ENGLISH



UNITS
INCH / CM

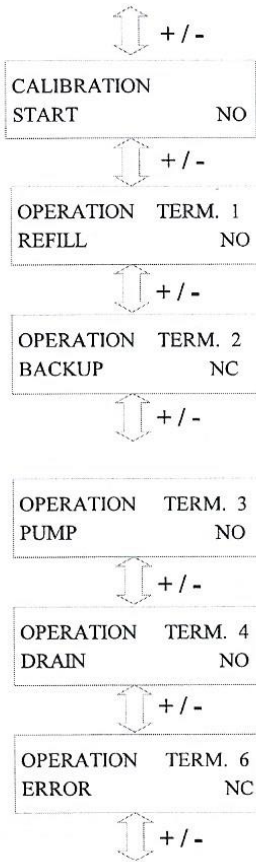


MEASURING LENGTH
30-600cm 200

(A 20 feet Sensor may be ordered.)



MEASUREMENT
PRESSURE SENSOR



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.

Figure 12: Sub-menu "General device description"

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 to 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

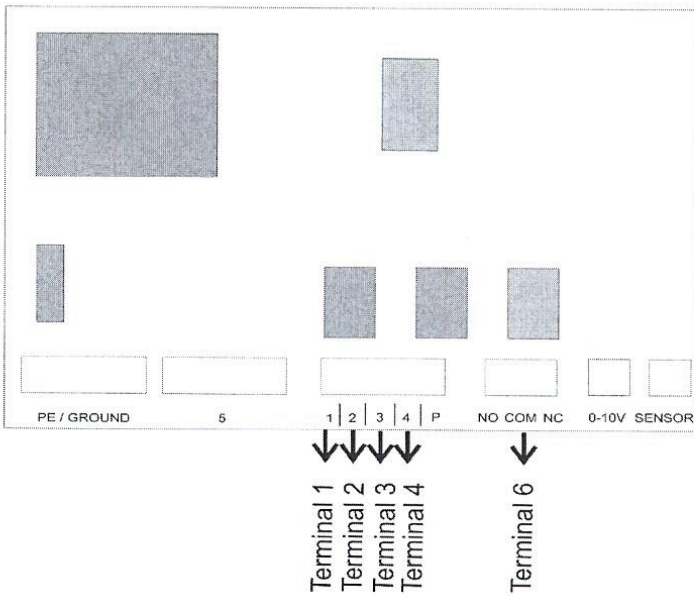
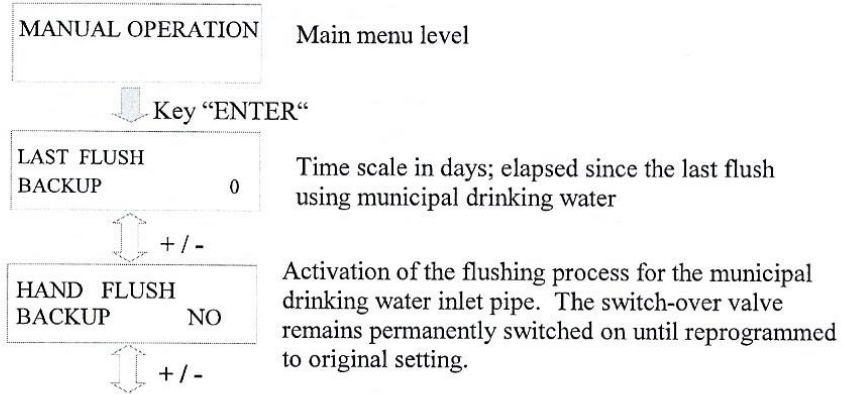


Figure 13: Allocation of the relay outputs

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



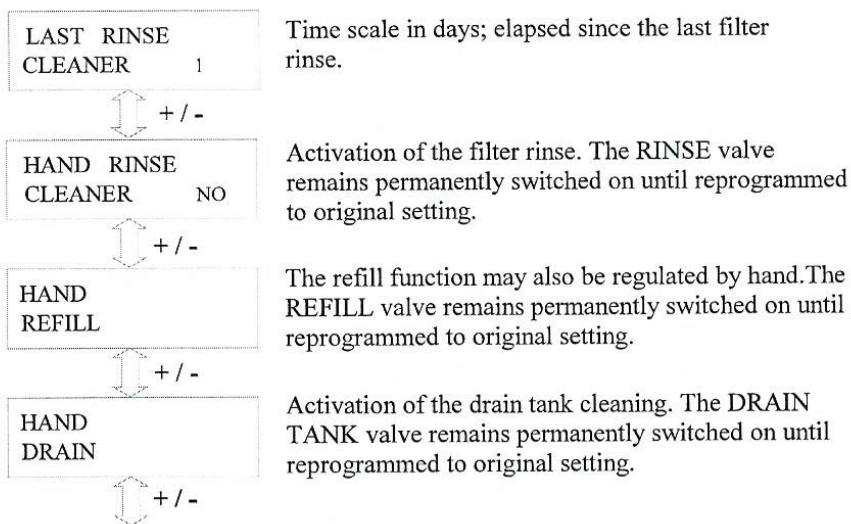


Figure 14: Sub-menu “Manual functions”

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:

ERROR
SENSOR

The reason for this error is that the white sensor wire has been damaged.

ERROR
DL SHORT CIRCUIT

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

ERROR
SENSOR CONTROL

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

ERROR
SENSOR SYSTEM

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.

ERROR
NO SIGNAL

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

ERROR
MEMORY

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!*

Figure 15: Error messages

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



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

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.

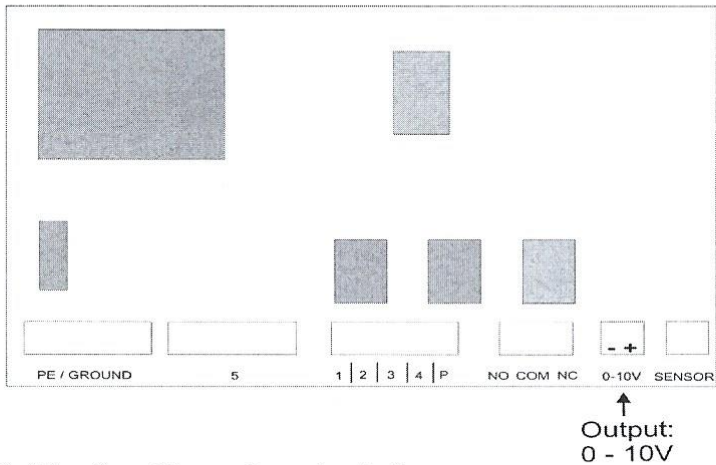


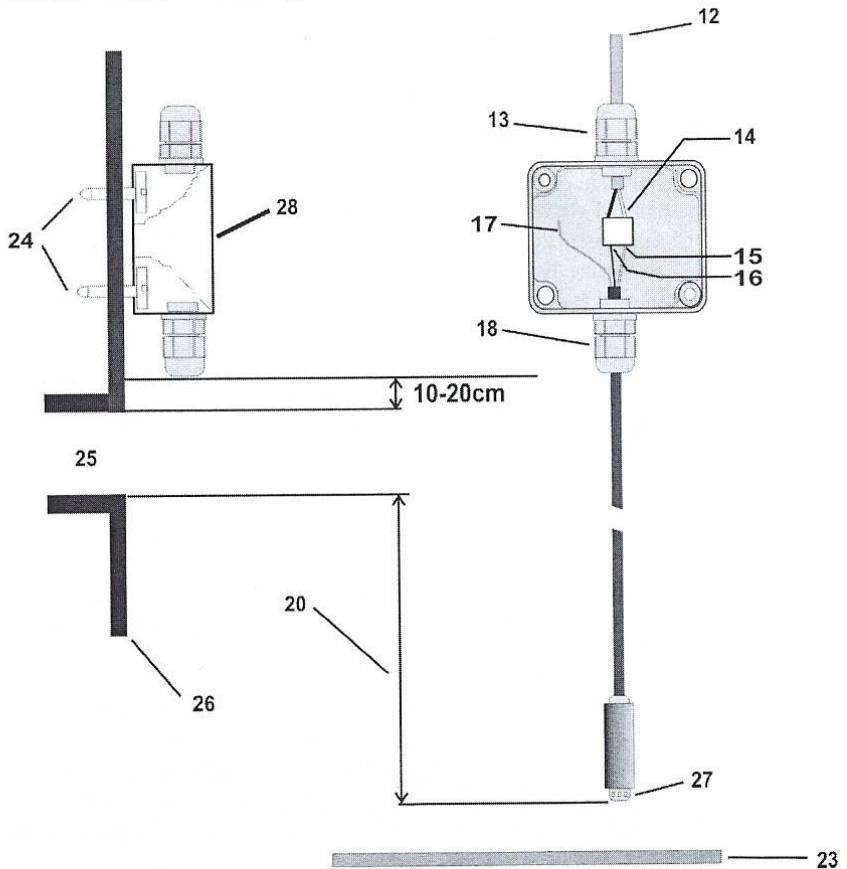
Figure 16: Allocation of the analogue terminal

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).

7.1 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

- 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

of the data cable with the positive terminal of the sensor (red wire). The negative terminal of the data cable is connected to the negative terminal of the sensor (black wire).

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":

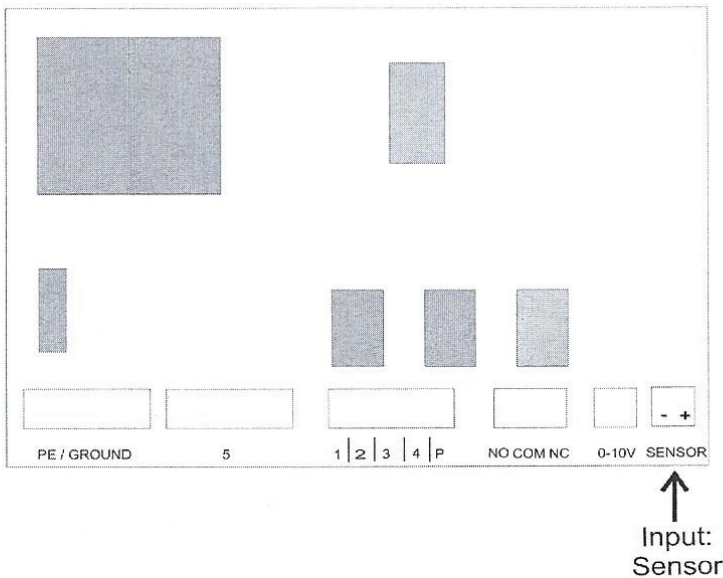


Figure 18: Connection of the data cable in the system control

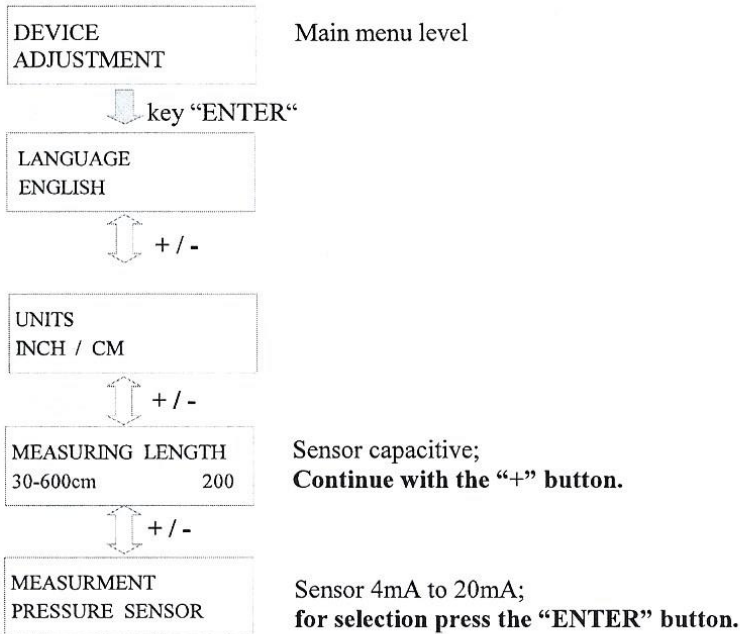
7.2. Calibration:

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:



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 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:

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:

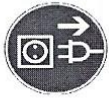
CALIBRATION START	NO
----------------------	----

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

Additional information:

1. The calibration must be made just once when installing the equipment. For the calibration process the tank must be empty. If the tank is not empty, it is also possible to calibrate in any other dry conditions. It is important that the tube to the pressure sensor is rolled out without obstructions or bends for a free feed to the ambient air.
2. The zero level is to be calibrated for an empty tank.
3. The calibration may also be repeated at a later time when the tank is empty.

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:

Purchase date :
Device serial number / Type : AS AQU RH.....
Tank height :
Software level AQ+ REV : U3.2U

Distributed in the US by:



www.RainHarvest.com

(800) 654-9283

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