AL-MS
AQUALOOP Membrane station and controller
Installation and operating instructions

Water, we're in our element

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1. Introduction and general instructions

AQUALOOP components are designed for water treatment / sanitation of wastewater. The following types of raw water can be treated and sanitised with AQUALOOP:

- Clear water
- Surface and ground water
- Clear discharge water
- Grey water

Five AQUALOOP components are combined and dimensioned depending on the existing input water quality or use.

Fig.: AQUALOOP components

The updated application range of all AQUALOOP components, along with their application examples, and the operational dimensioning of each AQUALOOP component related to treatment, water quality and required tank volume for the bioreactor and clear water tank, can be found at:

http://www.intewa.de/en/products/aqualoop/technology/dimensioning/

General background knowledge for water treatment and grey water utilization can be found at:

http://wiki.intewa.net/index.php/Wasseraufbereitung_und_Grauwassernutzung/en

This manual describes the assembly, settings and start-up procedure of the membrane assembly, which is the basis of each application.

2. Safety instructions

This installation and operating manual of this device is to be read carefully before installation. The specified instructions are to be followed exactly otherwise any respective warranty claim may be voided. This also applies to any separate modifications made to the mechanical and electrical components.

The electronic housing of the current-carrying components may only be opened by a certified electrician or approved installer.

The electrical circuit used for the system must be secured by a circuit breaker (16 A). Likewise, an ELCB (earth leakage circuit breaker), with the maximum operating current is to be inserted, if not already present.

The owner/operator is responsible for compliance of safety and installation provisions.

3. Guidelines, testing, environment

All electric components design and construction, as well as the circuitry, comply with the basic safety and health standards of EC guidelines for machines. This declaration of validity lapses with any modification of electronic components not approved by us.
The components particularly fulfil the following specifications of EU guidelines:

EC guideline machines (89/392/EEC) as amended in 91/368/EEC
EC low voltage guideline (73/23/EEC)
EC guideline electromagnetic compatibility (89/336/EEC) as amended in 93/31/EEC

The conformity of components to the above E guidelines is confirmed by CE symbol.

Applied harmonised EU standards:
EN 60335-1: 1194/A1/A11/A12/A13/A14, EN 60335-2-41: 1996

Test symbol: DC switching power supply

Kindly recycle the packaging in an environment-friendly way.

Do not dispose of the electronic components in domestic trash! According to European Guidelines 2002/96/EC on electronic and old electronic devices and their application in European countries, components should be collected separately and disposed through the use of environment-friendly recycling.

4. Scope of delivery

1. Permeate backflushing container
2. Pump unit with suction and backflushing pump incl. 2 O-Ring seals
3. Permeate - distribution nozzle incl. 5 pc. screw caps each with flat seal
4. Central aeration pipe with 2 pc. flat seals
5. 2 pc. stainless steel wheel weight
6. Aeration distribution nozzle incl. 5 pc. closing caps (each with flat seal)
7. DC switching power supply incl. network cable
8. DC switching power supply part - wall bracket
9. Controller with LCD Display incl. network cable
10. 2 pc. float switch (15 m) incl. counterweight

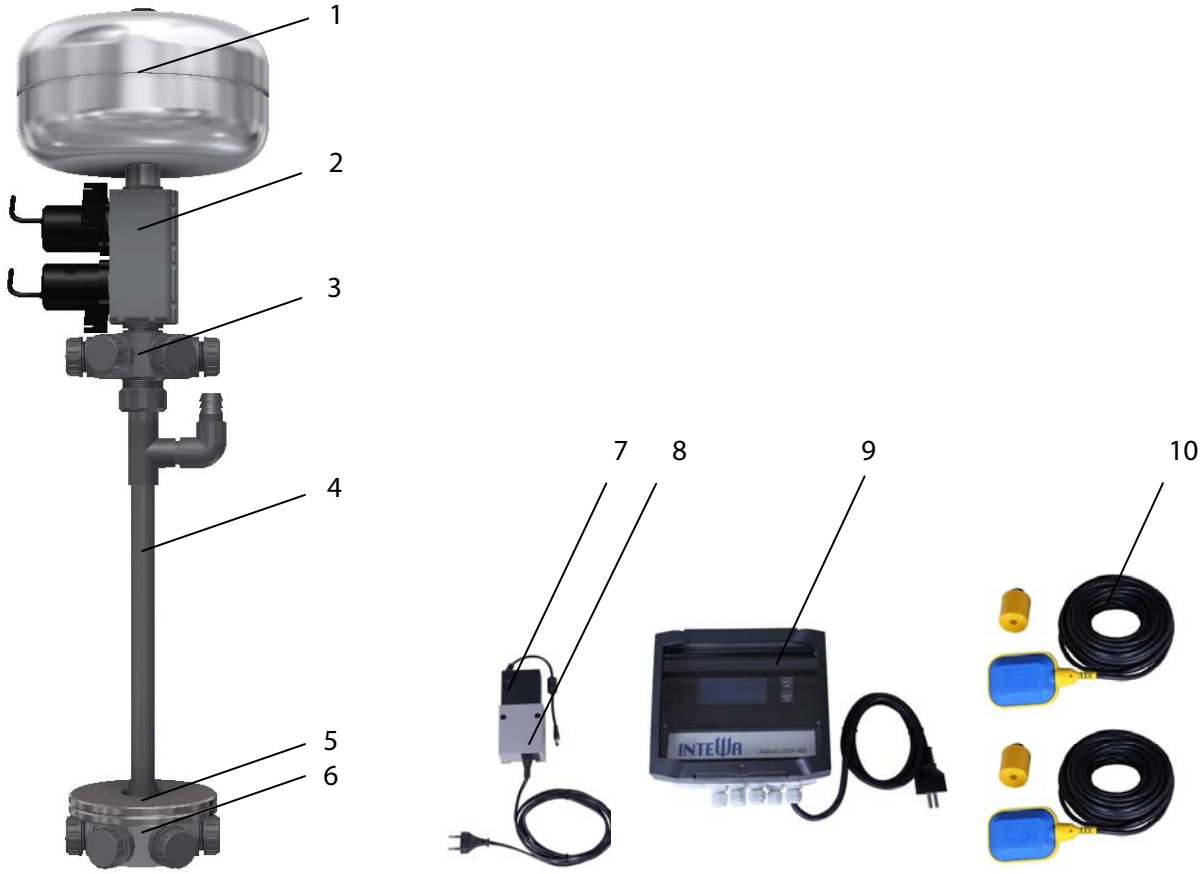


Fig.: Scope of delivery

5. Technical data

Controller:	
Dimensions (H x W/(incl. AC switching power supply) x T):	201 x 198 (329) x 110 mm
Mains supply central controller (230V-IN):	110 - 230 V AC / 50-60 Hz
AC switching power supply input:	110 - 230 V AC / 50-60 Hz (24 V DC, 4.0 A)
AC switching power supply output:	24 V DC, 4.0 A
Cable length of mains supply:	3 x 1.0 mm^2 x 1.5 m
Cable length of AC switching power supply:	3 x 0.75 mm^2 x 2.0 m
Power outputs:	
- Blower (230V Air):	110 - 230 V AC / 50-60 Hz, max. 4 A
- Sludge pump (230V Sludge):	110 - 230 V AC / 50-60 Hz, max. 4 A
Low voltage outputs:	
- Suction pump (Pump Suction):	24 V DC, max. 4 A
- Backflushing pump (Pump Backflush):	24 V DC, max. 4 A
- Blower (Air):	24 V DC, max. 4 A (alternative)
Signal inputs:	
- Bioreactor MIN (BR min):	Floating switch, normally open contact
- Clear water tank MAX (CL max):	Floating switch , normally open contact
- Clear water tank MIN (CL min):	Pot, free contact (alternative)
Potential-free signal output:	
- Clear water tank MIN (CL min OUT):	Signal of CL max
Signal inputs:	
- Pressure sensor Membrane hub (ADr):	4 … 20 mA
- Pressure sensor blower (ADg):	4 … 20 mA
Programmed connection:	6 pol., RM 2.53
Protection type:	IP54
Float switch:	
Function:	Normally open contact (MIN = closed contact)
Cable length x Diameter:	15 m x Ø8 mm, 2 x 0.75mm^2
Protection type:	IP68
Membrane station:	
Dimension (Ø x H):	max. Ø 504 x 833 mm (with max. mounting)
Permeate distribution connection:	lateral: 6 x 1“ AG; top: 1“ IG; bottom: 1 ½“ AG
Aeration distribution connection:	Lateral: 6 x 1“ AG; top 1 ½“ AG
Central blower connection:	Nozzle, Ø 25 mm
Backflushing container connection:	¾“ AG
Volume flow rate:	max. 10 l/min
Pumping height: l	max. 0,55m
Pump cable	2 x 0.75mm^2 x Ø 6mm, 3 m
Protection type of pump:	IP68
Total weight (total/gross):	11.0 kg / 12.5 kg

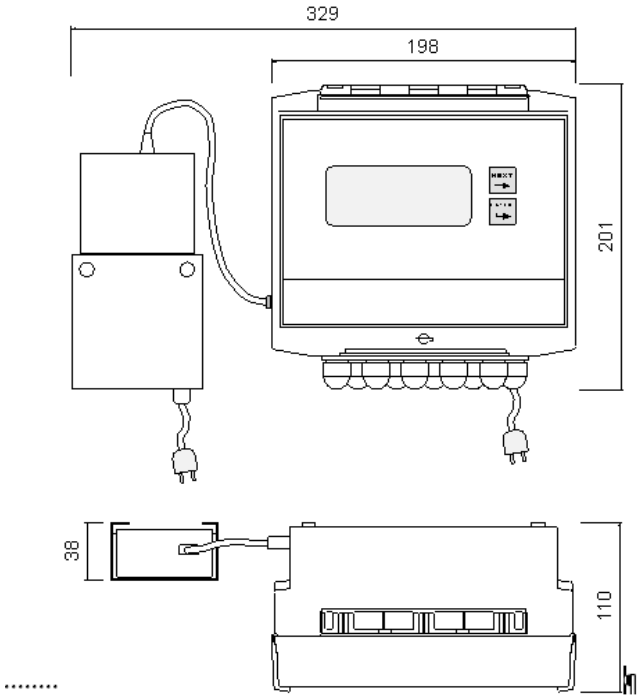


Fig.: Dimensions of controller with DC switching power supply (Front and top view)

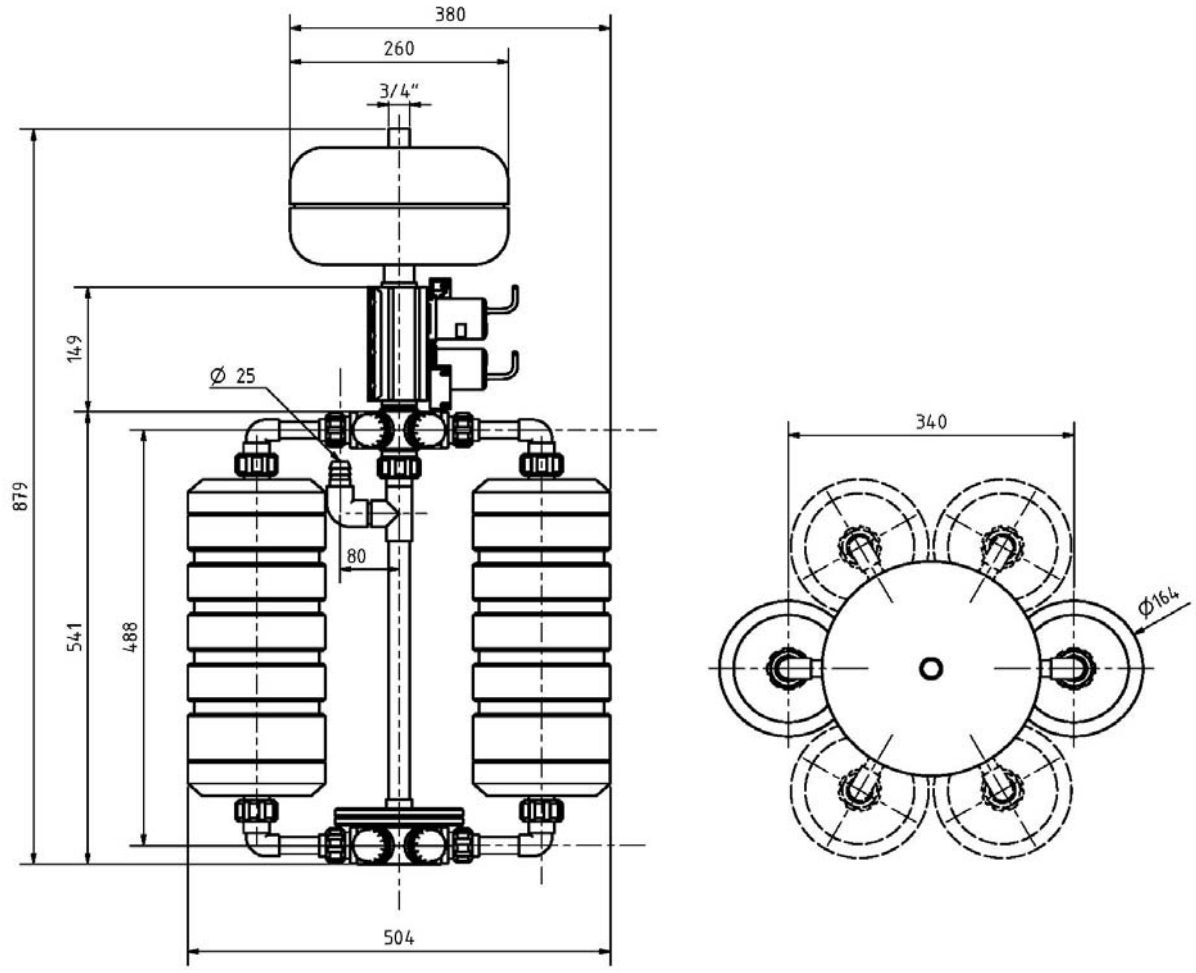


Fig. Dimensions of Membrane station (lateral and top view)

6. Instructions for controller

6.1 Electronic connections

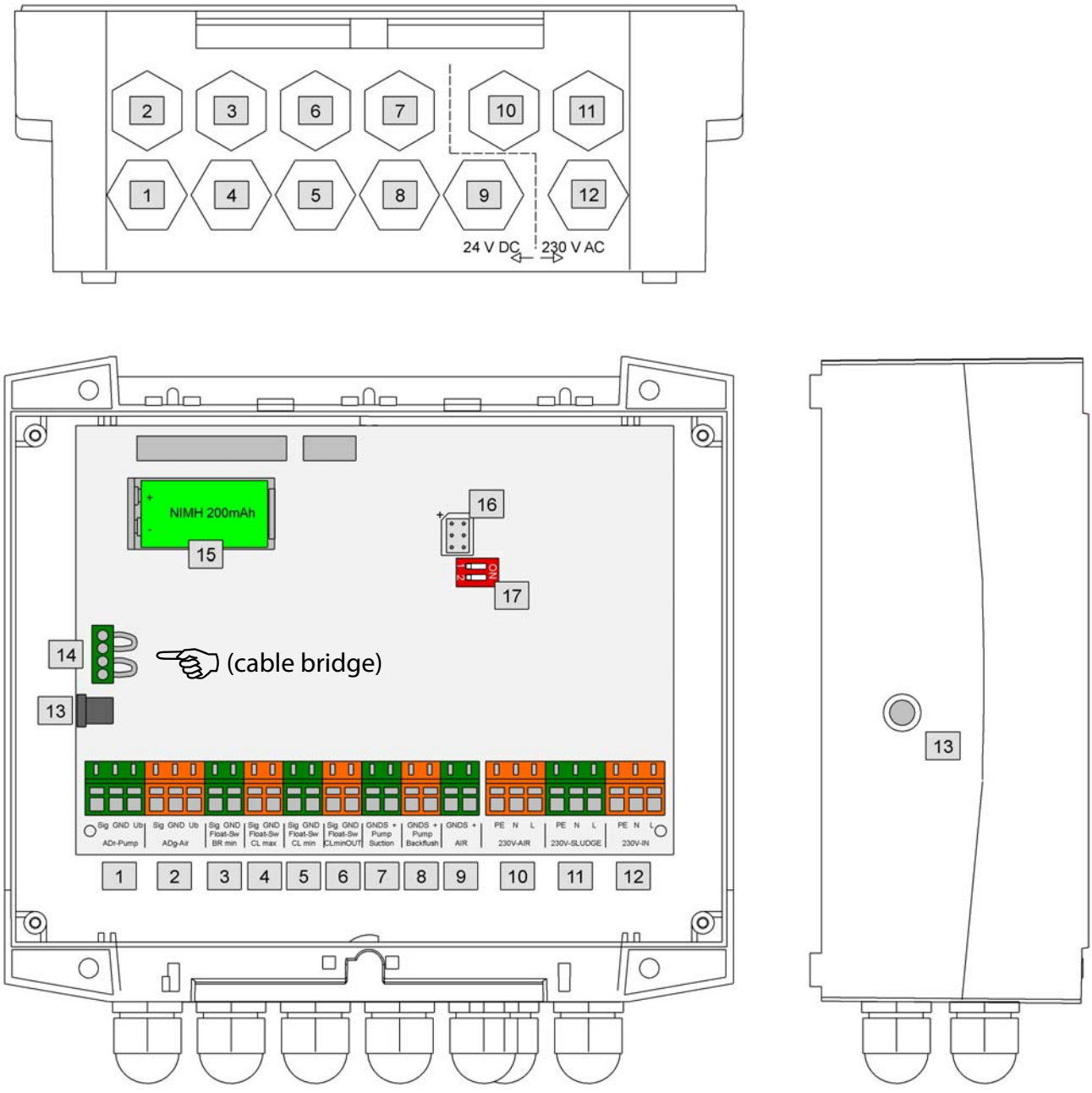


Fig.: Electrical connections of control board and assigning cable routings

Item	Connection	Description	Connecting contact/Function
1	ADr Pump	Analogue pressure sensor for suction and backflushing pump monitoring	Sig = green GND = gray Ub + = brown
2	ADg Air	Analogue pressure sensor, for monitoring blower	Sig = green GND = gray Ub + = brown
3	Float Sw BR min	Float switch in bioreactor for minimum water level	Pot. free contact, normally open contact, no polarity
4	Float Sw CL max	Float switch in clear water tank for maximum water level	Pot. free contact, normally open contact, no polarity
5	Float –Sw CL min	No function	--
6	Float –Sw CL min out	No function	--
7	Pump Suction	24 V DC suction pump for filtration process	GND = blue + = brown
8	Pump Backflush	24 V DC backflushing pump For cleaning process	GND = blue + = brown
9	Air	Only for use with a 24 Volt DC blower (alternative to 230V blower)	GND = blue + = brown
10	230V- Air	230 V AC / 50 Hz blower	PE = Green/yellow N = blue L = brown
11	230V-Sludge	Sludge pump 230 V AC / 50 Hz (Optional)	PE = Green/yellow N = blue L = brown
12	230V-IN	Mains voltage supply 110- 230 V AC / 50 Hz	PE = Green/yellow N = blue L = brown
13	24 V DC-IN	24 V DC switching power supply,	Stereo jack Ø5.5mm, Centre positive
14	Cable bridge	For activation of rechargeable battery and switching power supply **(install cable bridge while start-up installation)**	4-pin plug , reverse-polarity protected
15	9V rechargeable battery	9 V battery, 200 mA, NIMH Attention: Only a rechargeable battery must be used when changing the internal battery!	Pay attention to polarity while changing
16	6-pin	6-pin programmed connection (for update programming)	Pay attention to polarity
17	DIL	DIL switch Factory setting 1 = ON Factory setting 2 = OFFN	1=ON : Alarm* with battery operation ON 1=OFF : Alarm with battery operation OFF 2=ON /Off: without function ** A short beep sounds at an interval of 5 seconds indicating the battery alone is being used!!*

Tab.: Connection description of control board

6.2 Operation mode display

With different applications, one differentiates between two operating modes:

- Aeration / treatment mode
- Filtration / Pump cycle mode

The biological treatment is done in the aeration mode. Aeration mode does not run permanently, but is run at intervals to save energy. The exact functioning is set by the controller. If aeration is not required (for instance, with rainwater treatment) then the ventilation parameter is set (Air ON/OFF = 0/0).

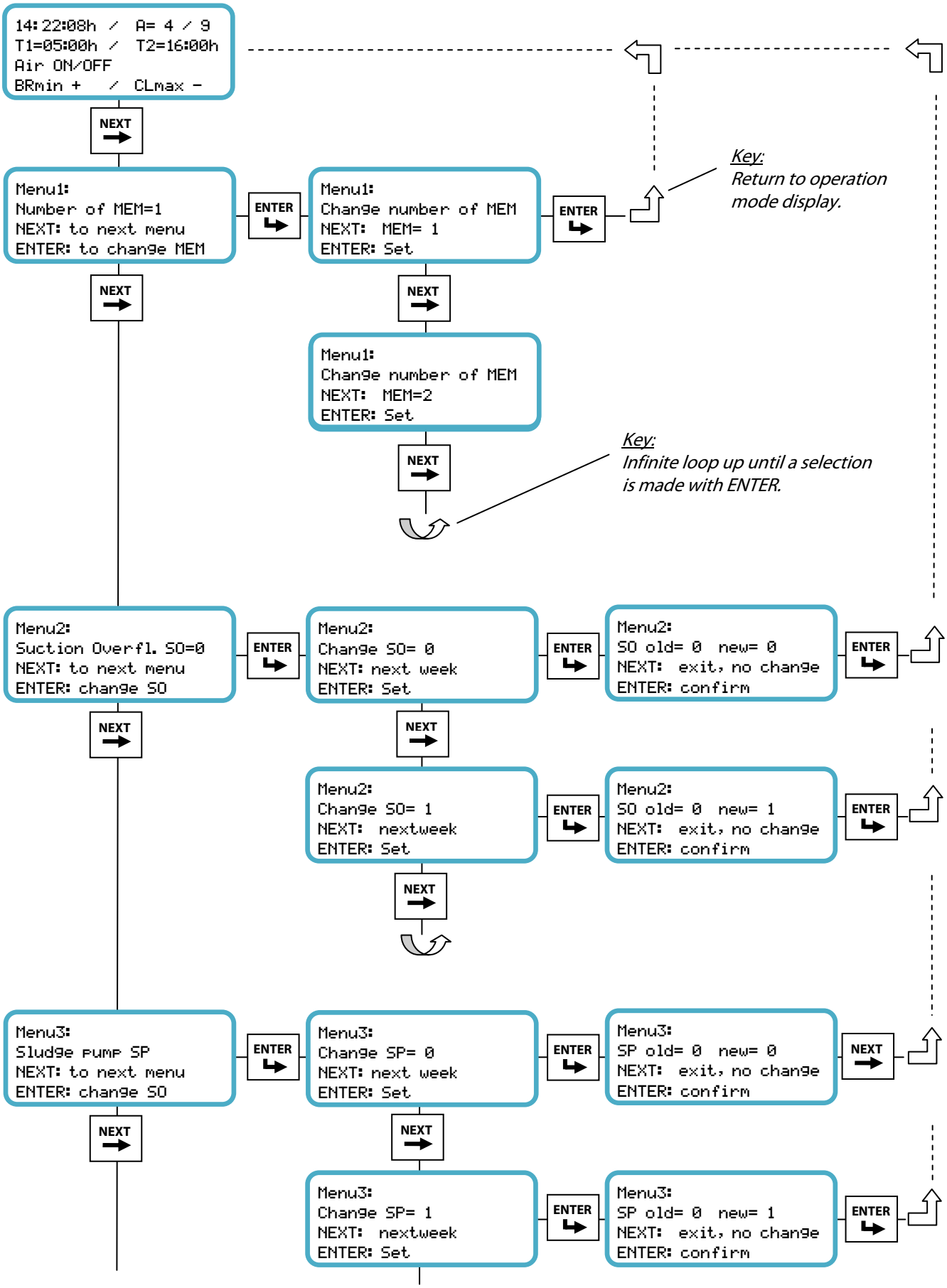
The biologically treated water is filtered via membranes in the filtration mode and routed to the clear water tank. The filtration start time (T1/T2) and filtration duration (A1/A2) can also be separately adjusted.

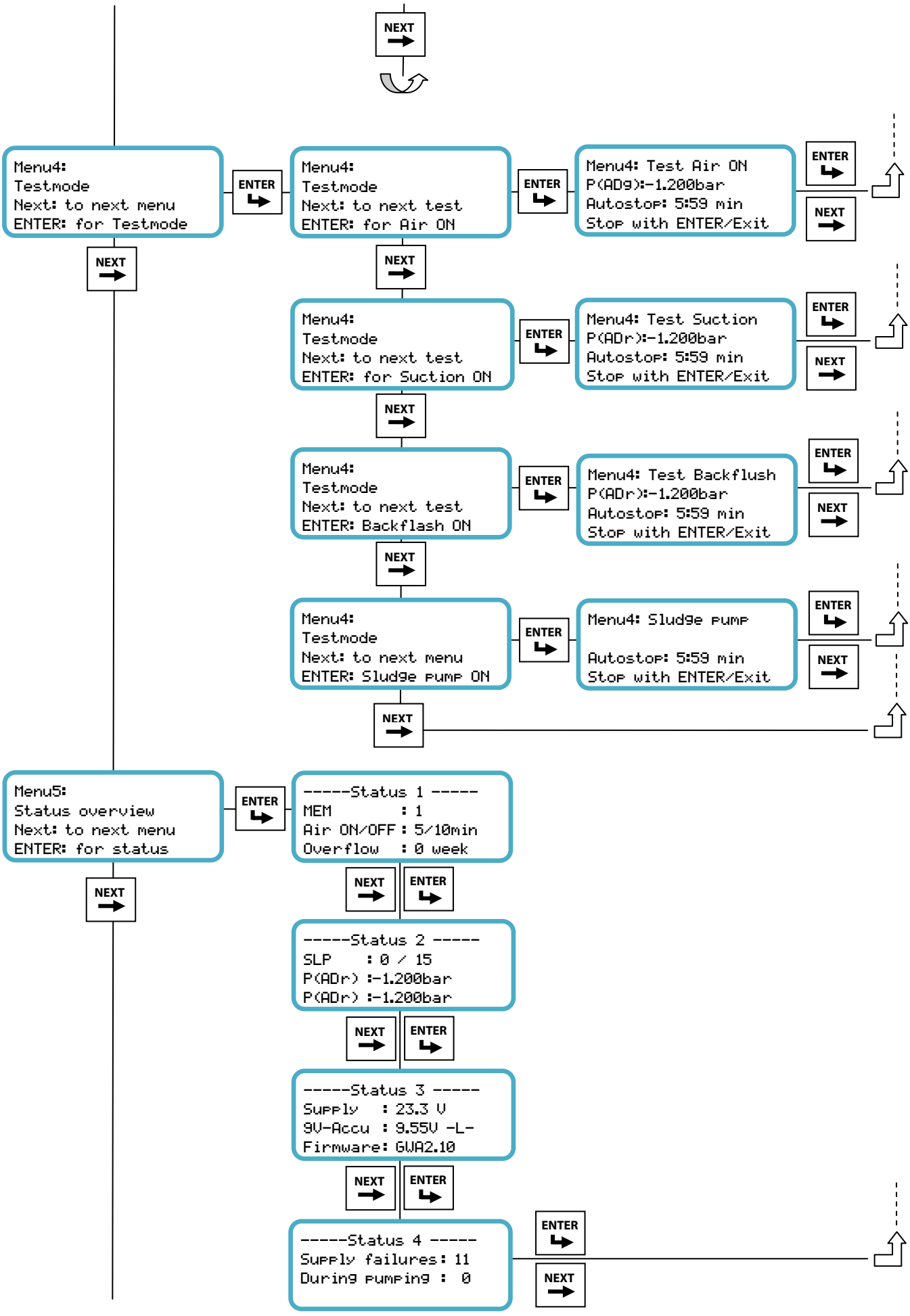
Neither aeration nor filtration operations occur in pause mode.

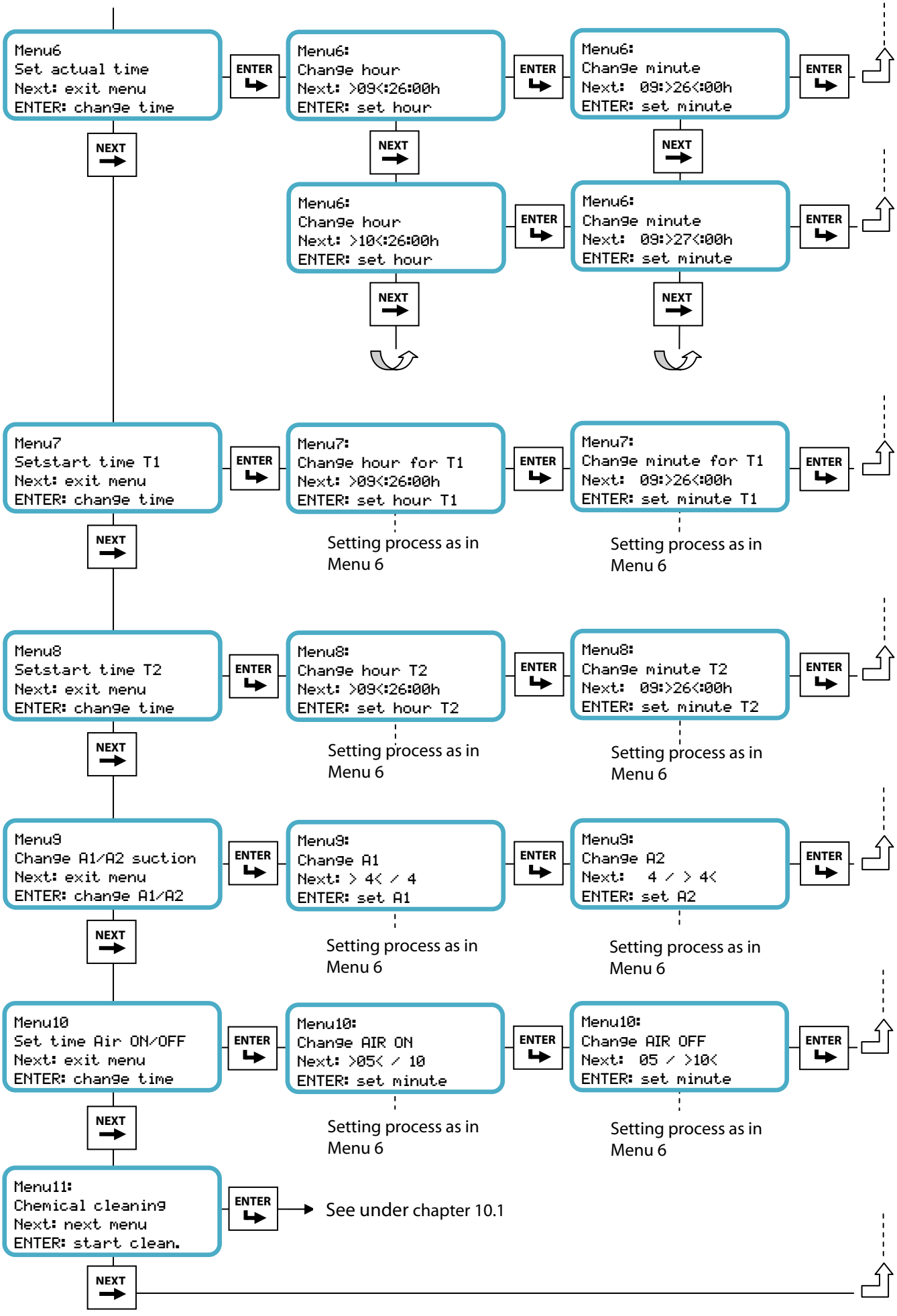
Application	**Filtration type**	**Aeration setting**	**Pump cycles setting value**	**Average flow rate (each membrane and day)**
Clear water sterilization	Direct filtration BOD < 5 mg/l	Air ON/OFF = 0/0	A1/ A2= 20/25	4 l/min / 1600 l/d
Surface ground water (Rainwater)	Direct filtration BOD < 25 mg/l	Air ON/OFF =1/15	A1/ A2= 18/20	2.5 l/min / 800 l/d
Clear discharged water	Direct filtration BOD < 25 mg/l	Air ON/OFF = 1/15	A1/ A2= 10/18	2-2.5 l/min/ 800 l/d
Gray water recycling	MBR Filtration BOD <200 mg/l	Air ON/OFF = 5/10	A1/ A2= 5 / 9	1-1.5 l/min / 300 l/d

Tab.: Parameter examples for various applications

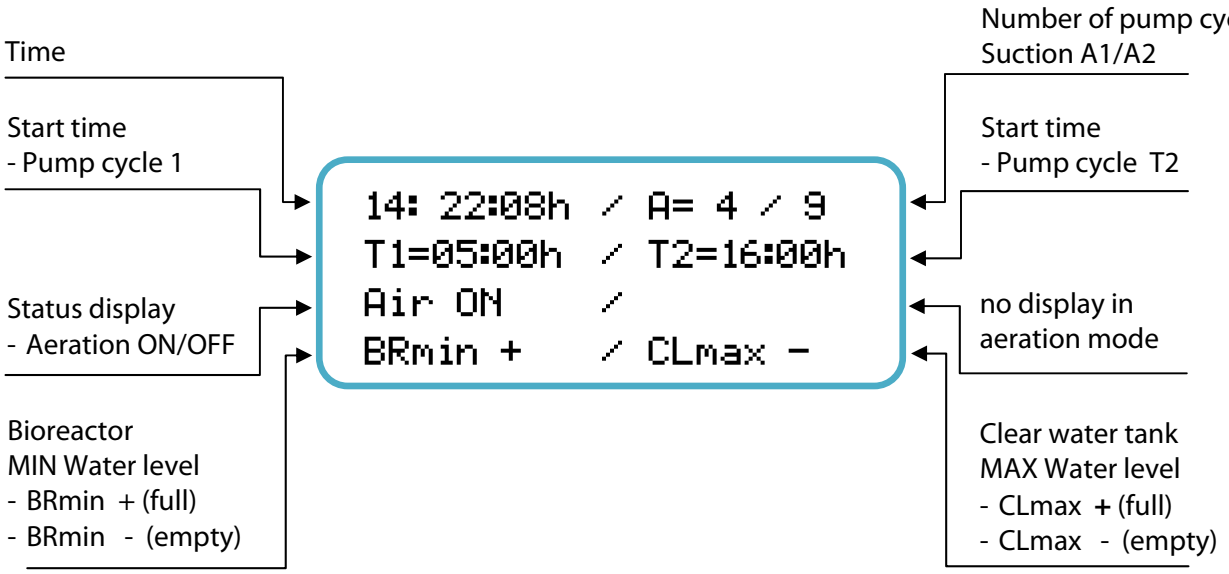
6.3 Menu overview



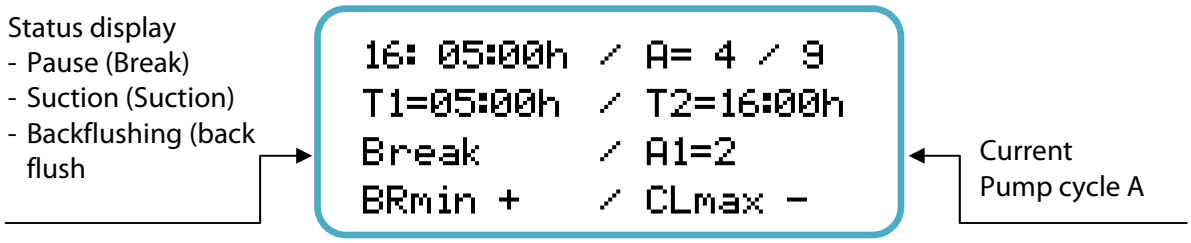

NEXT
Menu4:
Testmode
Next: to next menu
ENTER: for Testmode
ENTER
Menu4:
Testmode
Next: to next test
ENTER: for Air ON
ENTER
Menu4: Test Air ON
P(AD9):-1.200bar
Autostop: 5:59 min
Stop with ENTER/Exit
ENTER
NEXT
NEXT
Menu4:
Testmode
Next: to next test
ENTER: for Suction ON
ENTER
Menu4: Test Suction
P(ADr):-1.200bar
Autostop: 5:59 min
Stop with ENTER/Exit
ENTER
NEXT
NEXT
Menu4:
Testmode
Next: to next test
ENTER: Backflash ON
ENTER
Menu4: Test Backflush
P(ADr):-1.200bar
Autostop: 5:59 min
Stop with ENTER/Exit
ENTER
NEXT
NEXT
Menu4:
Testmode
Next: to next menu
ENTER: Sludge pump ON
ENTER
Menu4: Sludge pump
Autostop: 5:59 min
Stop with ENTER/Exit
ENTER
NEXT
NEXT
Menu5:
Status overview
Next: to next menu
ENTER: for status
ENTER
-----Status 1 -----
MEM : 1
Air ON/OFF : 5/10min
Overflow : 0 week
NEXT
ENTER
-----Status 2 -----
SLP : 0 / 15
P(ADr) :-1.200bar
P(ADr) :-1.200bar
NEXT
ENTER
-----Status 3 -----
Supply : 23.3 V
9V-Accu : 9.55V -L-
Firmware: GWA2.10
NEXT
ENTER
-----Status 4 -----
Supply failures: 11
During pumping : 0
ENTER
NEXT
NEXT


Menu6
Set actual time
Next: exit menu
ENTER: change time
ENTER
Menu6:
Change hour
Next: >09<:26:00h
ENTER: set hour
ENTER
Menu6:
Change minute
Next: 09:>26<:00h
ENTER: set minute
ENTER
NEXT
NEXT
NEXT
Menu6:
Change hour
Next: >10<:26:00h
ENTER: set hour
ENTER
Menu6:
Change minute
Next: 09:>27<:00h
ENTER: set minute
ENTER
NEXT
NEXT
Menu7
Setstart time T1
Next: exit menu
ENTER: change time
ENTER
Menu7:
Change hour for T1
Next: >09<:26:00h
ENTER: set hour T1
ENTER
Menu7:
Change minute for T1
Next: 09:>26<:00h
ENTER: set minute T1
ENTER
NEXT
Setting process as in Menu 6
Setting process as in Menu 6
Menu8
Setstart time T2
Next: exit menu
ENTER: change time
ENTER
Menu8:
Change hour T2
Next: >09<:26:00h
ENTER: set hour T2
ENTER
Menu8:
Change minute T2
Next: 09:>26<:00h
ENTER: set minute T2
ENTER
NEXT
Setting process as in Menu 6
Setting process as in Menu 6
Menu9
Change A1/A2 suction
Next: exit menu
ENTER: change A1/A2
ENTER
Menu9:
Change A1
Next: > 4< / 4
ENTER: set A1
ENTER
Menu9:
Change A2
Next: 4 / > 4<
ENTER: set A2
ENTER
NEXT
Setting process as in Menu 6
Setting process as in Menu 6
Menu10
Set time Air ON/OFF
Next: exit menu
ENTER: change time
ENTER
Menu10:
Change AIR ON
Next: >05< / 10
ENTER: set minute
ENTER
Menu10:
Change AIR OFF
Next: 05 / >10<
ENTER: set minute
ENTER
NEXT
Setting process as in Menu 6
Setting process as in Menu 6
Menu11:
Chemical cleaning
Next: next menu
ENTER: start clean.
ENTER
See under chapter 10.1
NEXT

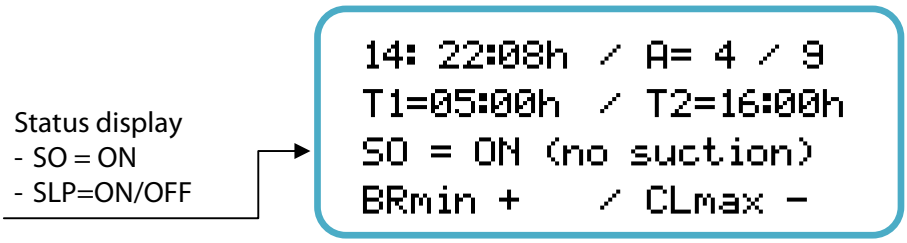
Operating mode display: **Aeration cycle/Rest cycle**



Operation display: **Pump cycle T1 or T2 active**

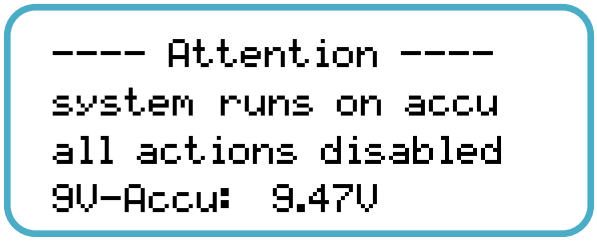


Operation display: **Siphon or sludge pump mode**



Operation display: **Emergency mode (battery)**

If no AC switching power supply is connected or following a power failure:



Instruction:

If there is a power breakout an electrical short circuit of the suction- or back flushing pump during the test mode, the pumps and blower will stop operating. The display continues to run via the built-in 9V battery. The parameters are thereby secured as the timer will continue to operate.

6.3.1 Menu settings and description

Any menu can be retrieved by selecting NEXT on the operation display. One is directed to respective menu settings by selecting ENTER. After leaving the menu setting, the display reverts back to the standard operation display screen.

Generally, inputs or settings are displayed in addition to NEXT and ENTER.

If there is no input within 6 minutes in a menu mode, then the display automatically switches back to the standard operation mode display.

Each menu setting must be set to the respective position the first time the controller is used. Any adjustments are permanently stored in the internal memory, and can be overwritten at any time.

RESET Function / Factory settings:

The device can be reset to factory settings by the simultaneous pressing of both the NEXT and ENTER buttons (for approx. 5 s)

1. Time: 12:00:00 hrs
2. Number of membranes: MEM = 1
3. Start time T1: T1 = 04:00 hrs
4. Start time T2: T2 = 16:00 hrs
5. Pump cycles: A1/A2 = 4 / 9
6. Blower time: Air ON / Air OFF = 5 / 10 (min/min)
7. Suction overflow: SO=0 week
8. Sludge pump: SLP/t=0 /0 (Weeks/min)

Menu 1: Number of membranes

(MEM = 1 to 6)

With this setting, the number of installed membranes is confirmed. This has reference to the best setting for suction pump performance in the filtration process.

Note: MEM can always be modified even while flushing/backflushing is in progress.

Menu 2: Suction overflow

(Suction Overflow SO = 0 to 4)

This setting determines how many weeks shall pass before the pump will automatically enforce a controlled overflow of the bioreactor tank.

With this function, through the AQUALOOP pre-filter, the sediment at the bottom of the tank is siphoned out via the suction overflow. As the water level rises, the surface contaminants are sucked out through the overflow skimmers.

- SO week = 0: Not operating.
- SO week = 1 to 4: Suction overflow after first, second, third or every fourth week. (The aeration Air ON/OFF further runs in normal rhythm.)

Menu 3: Sludge pump (optional)

(Sludge pump SLP=0 to 9, t=0 to 60min)

This setting determines the weekly cycle of sludge pumping and the duration of the pumping.

Note: This function is crucial only for MBR applications where solid material content must be minimised in the Bioreactor (for background knowledge Link Chap. 1). This function is not required for other applications. In these other cases the sludge pump feature is deactivated on the controller. (SLP=0, corresponds to factory settings)

- SLP = 0 (Weeks)/ t=0 min The sludge pump is not activated with this setting
- SLP = 1 to 9 (Weeks): The pump frequency is set from 1 to 9 weeks for 24h with this setting. Then the sludge pump starts at specified period t. Aeration runs at the same time. If the pump runtime is interpreted by "BR min – ", it restarts with "BR min + ". This mode is left if the sludge pump has worked for the entire running period t.

  Recommendation: The running time t should be selected in such a way so that the pump pumps out at least half the bioreactor volume.

Menu 4: Test menu

(Test menu for blower, suction pump, back flushing pump and sludge pump)

The blower (air), suction pump (suction pump) back flushing pump (back flush pump) and sludge pump (sludge pump) can be separately controlled and tested via the test menu. The test mode can be terminated at anytime with NEXT/ENTER. The time until automatic stop (max. 6 min) is shown on the display by a count-down stopwatch.

A test can be performed anytime, however there must be sufficient water for pump activation (BR min +). If the water level falls below minimum, (BR min -) then the display shows that a pump test is not possible.

Menu 5: Status overview

(Status Overview: Status 1 to 4)

The overview mode can be viewed at anytime. All other activities, such as aeration mode and pump frequency, continue in the background. All current settings and operating status can be viewed in this mode.

Status 1:

Number of membranes:	MEM	: 1
Aeration settings:	AIR ON/OFF	: 5 / 10 min
Suction overflow:	Overflow	: 1 week

Status 2:

Sludge pump:	SLP	: 5 / 20
Pressure sensor Pumps:	P(ADr)	: -1,200 bar
Pressure sensor blower:	P(ADg)	: -1,200 bar

Status 3:

Voltage power supply :	Supply	: 23,3 V
Battery voltage:	9V battery	: 9,55 V -L-
Software version:	Firmware	: GWA2.10

Status 4:

Number of current interruptions in 24 V supply):	Supply : 11
Number of current interruptions (24 V) with pump frequency:	during pumping: 0

Menu 6: Setting time

The set time is critical for pump start times T1 and T2. The clock will operate for approx. 5 hours on battery life in the event of a power failure. Thereafter, the capacity of battery is exhausted (Display switches off). When the external AC switching power supply comes on again after battery ran off, the clock must be re-set in order to correctly restart the cycle times T1 and T2 corresponding to real time.

Note: A started pumping cycle is terminated independent of the corrected time.

The time can be adjusted at any time.

Menu 7/8: Start time T1 and T2

(Starting time point T1 and T2 for pumping cycle)

Note for selection of start time points T1 and T2:

The pump starting times T1 and T2 are primarily set according to the times of input water (for instance, grey water) being processed in the bioreactor with MBR Filtration. There must be at least 6 hours of biological treatment between grey water intake and the pump starting. This treatment time is required to ensure a long life of the membrane filter.

Example: If the taking of showers is scheduled mostly in the morning between 7:00-8:00 hrs, then the pump cycle T1 must be finished before 7:00 hrs.

Shorter times for direct filtration are possible up to direct filtration at incoming times.
It is important that a pump cycle run time is not overlapped with next start time. If this is the case then the second timed start will not occur as required.

Menu 9: Number of pump intervals A1/A2

The numbers A1 and A2 determine how many pump intervals A (each with 15min run time/15s backflushing) must be passed in pump cycles T1 and T2.

The number of pump intervals is adjustable from A=1 to A= 25.

The pump cycle starts when the starting time point T1 or T2 is reached. The first pump interval begins after a 5 minute rest phase. The potentially connected blower is deactivated during the suction operation. In conjunction with back flushing, it is then activated to support back flushing cleaning process with air.
There is a temporary aeration after every fourth pump interval, followed by a 5 minute rest phase. Then it is continued forth with the next pump block. The pump cycle is terminated when all pump intervals have been performed.

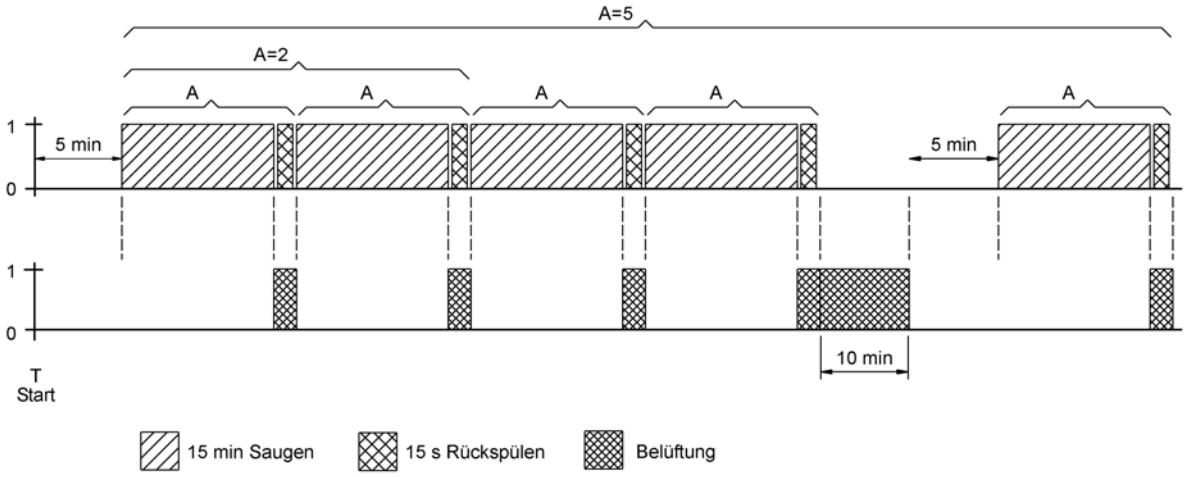


Fig.: Example of a pump cycle with A = 5

The pump cycle can be interrupted by the float switch "BR min –" (when the water level for the membrane falls below the minimum allowed level) and "CL max +" (when the clear water tank is full).

Menu 10: Blower times and intervals

The blower run time (Air ON) and blower pause time (Air OFF) can be set within the range of 1 to 15 min. The set blower operation is performed in total aeration mode and interrupted only by the pump cycle. The aeration always starts with "Air ON" after any adjustments to the time have been made.

Setting example for various aeration types:

Timed aeration: Air ON/Off = 5 / 10 (5 Minutes aeration, 10 Minutes Pause)

Continuous aeration: Air ON/OFF = 15 / 0

Deactivated aeration Air ON/OFF = 0 / 0

Menu 11: Chemical cleaning

See under section "Maintenance and chemical cleaning"

6.5 Installing controller and switching power supply bracket

The controller housing and power supply brackets are mounted to the wall next to each other.

Note: Pay attention that there is space to open the housing lid above the housing and a place for cable routings below the housing installation space (each at least 190 mm).

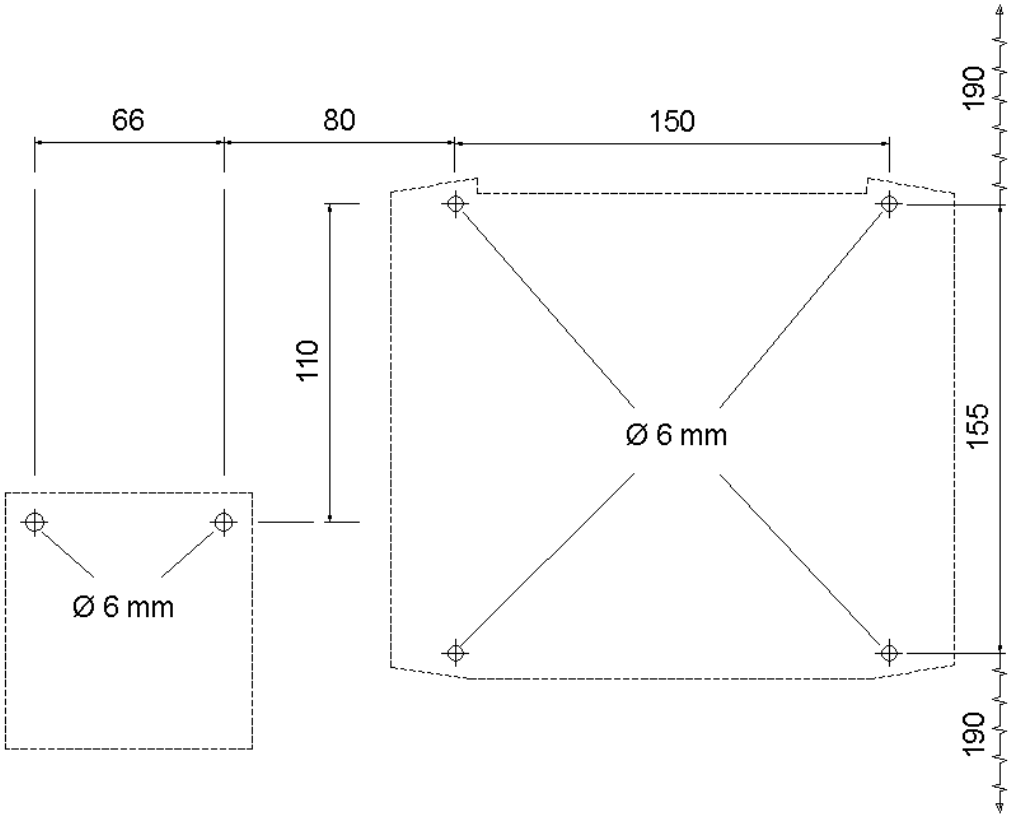
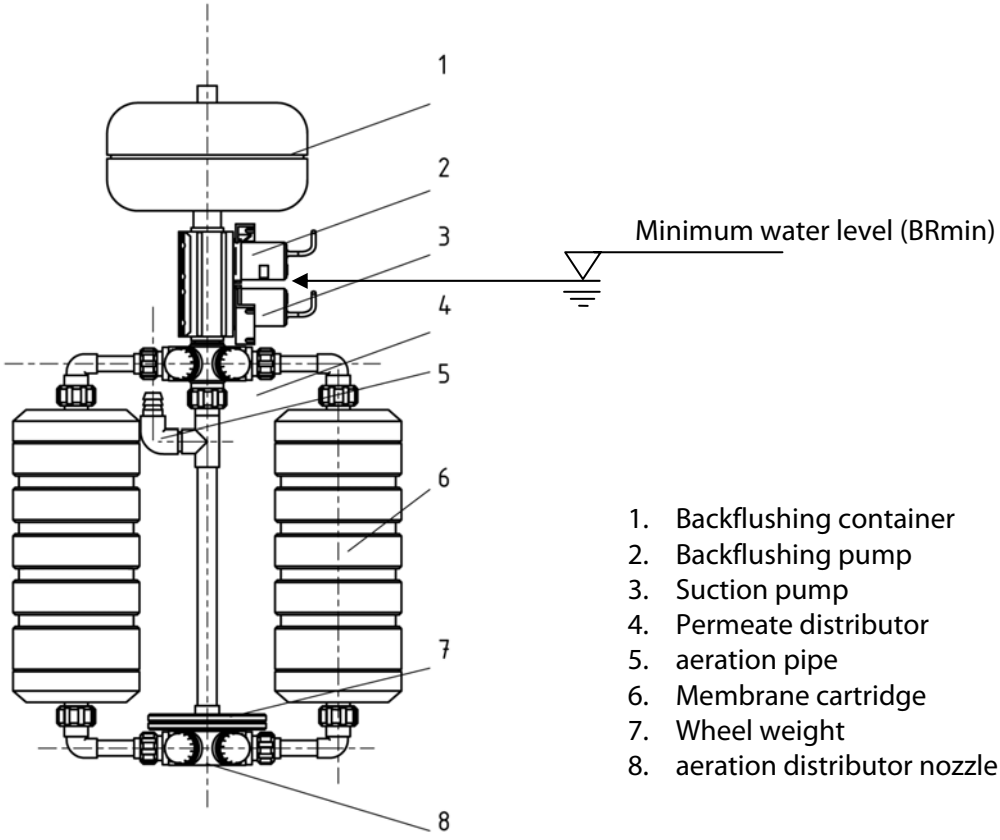


Fig.: Drilled hole distances of controller housing and DC switching power supply brackets

7 Instructions for membrane station



1. Backflushing container
2. Backflushing pump
3. Suction pump
4. Permeate distributor
5. aeration pipe
6. Membrane cartridge
7. Wheel weight
8. aeration distributor nozzle

Fig.: Overview of Membrane station

7.1 Installing the membrane station

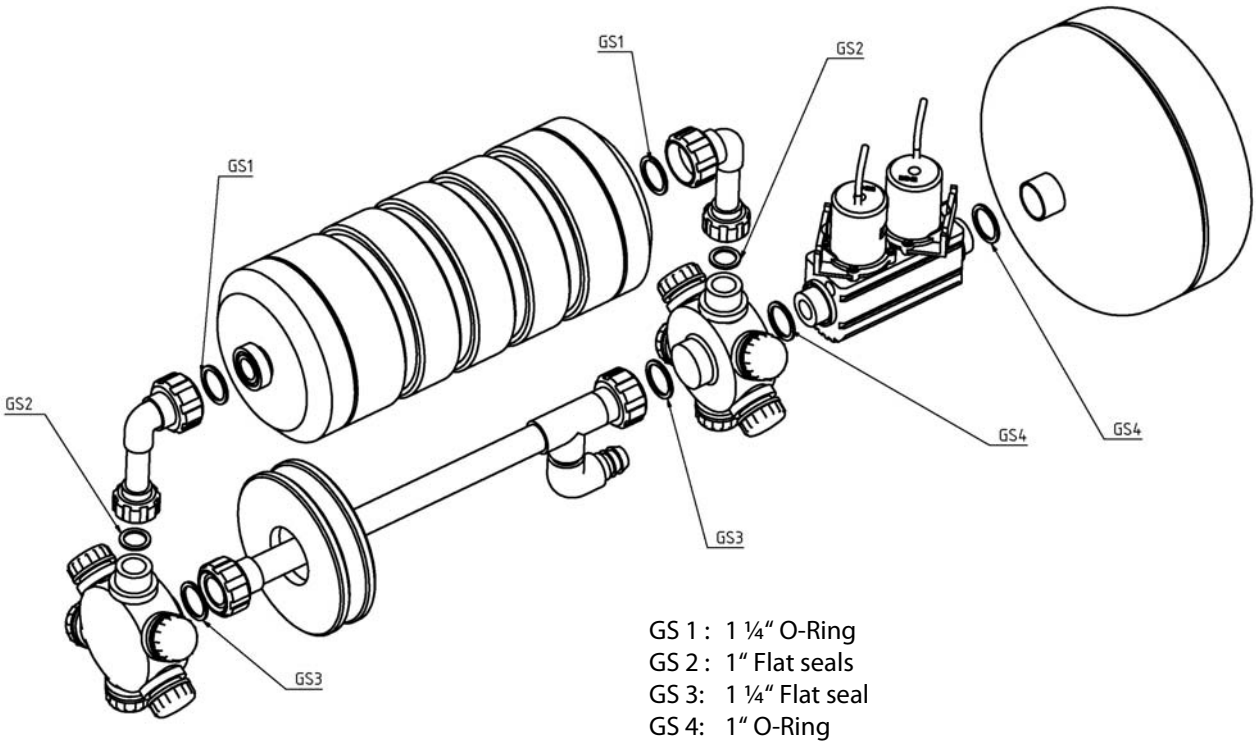
The membrane station is delivered in separate parts. All connection points are sealed with O-rings or flat seals.

Installation sequence:

- Central pipe is connected with lower and top and distributor (do not forget to add weight wheels).
- Assemble the membrane cartridge with supplied bends and screw them into the top and bottom of the distributor.

  ! Mount the membranes on the pipe the right-way-up! See mounting instruction AL-MEM!

  Note:
  All screws must first be fitted loosely to ensure a tight and water-proof installation. Only when at least 1 or 2 membrane cartridges are positioned in place, should all screws be firmly tightened on the central pipe.
- The pump unit is screwed on top of the distribution nozzle until tight (seal via built-in O-Ring in Pump screw fixing). The pump unit can be installed in any direction because both pumps are identical. NOTE: It must be observed during connection of the electrical wiring that the bottom pump is the **suction pump** (clamp terminal: suction pump) and the top pump is the **back flushing pump** (clamp terminal: back flush pump).
- The back flushing container is screwed onto the top of the pump connection until it is tight.



GS 1 : 1 ¼“ O-Ring
GS 2 : 1“ Flat seals
GS 3: 1 ¼“ Flat seal
GS 4: 1“ O-Ring

Fig: Layout of the membrane station

8. System start-up process

General:

For regular maintenance and service works, it should be noted that the membrane station can be pulled out of the tank even, when full with water.
The electric pump cables should be measured to ensure that the entire membrane station can be extracted without first having to disconnect the wiring from the controller. The blower and clear water hose should be installed with quick detachable connections, so that simple removal of the membrane station is possible. This facilitates easy maintenance and service works.

Leak tightness test:

Attention:

The water tightness of all screw fixings is particularly important so that none of the contaminated water contaminates the clear water. Furthermore, any wastewater which accidently enters through poorly tightened screw fittings is sent to the membranes hollow fibres which may cause clogging of the fibres. Therefore, a water tightness test must be performed before the start-up process.

Suggestion: Before connecting the blower hose to the aeration pipe, it should be connected to the ¾" connection on top of the back flushing tank in order to pressurize the membrane station with pressure (0.2bar). (The required adapter (3/4" IG x Ø25 sleeve) is included in scope of delivery.)

Then the blower is started in test mode. The membrane station is then immersed in tank water up to the mid line of the back flushing tank. If no bubbles can be seen in the water then all screw connections are water tight and the assembly can be finally installed.
! Note: run the test for 5 minutes!

Blower and clear water connection

The ready to install membrane station is set up in the tank. Blower and membrane station are connected to each other via a flexible hose (Ø26mm internal).
(Note: The central connection is simply left open when using the system without aeration.)

The clear water hose is connected to the back flushing tank and then led to the clear water tank.
(Respect decline from clear water tank down to the tank with the membrane station to be able to fill in cleaning liquid for chemical cleaning later.

Fig.: Blower hose connection

Electric connections

- All electric cables are now to be connected to the controller. The spring terminal is opened with the supplied screwdriver.

  1.) Insert slotted screwdriver in the top opening, then press from top (arrow direction) and hold.

  2.) Insert cable in the opening underneath. Then release the screwdriver (terminal closes) and remove.

  Note:

- NOTE: It must be observed during connection of the electrical wiring that the bottom pump is the suction pump (clamp terminal: suction pump) and the top pump is the back flushing pump (clamp terminal: back flush pump).

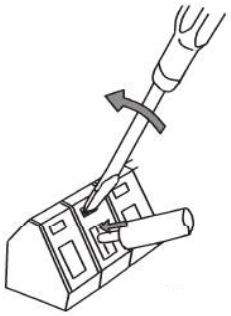


Fig.: Operating mode spring termina

Finally, insert the cable bridge plug and firmly press until it is fully inserted.

Fig.: cable bridge

Float switch setting

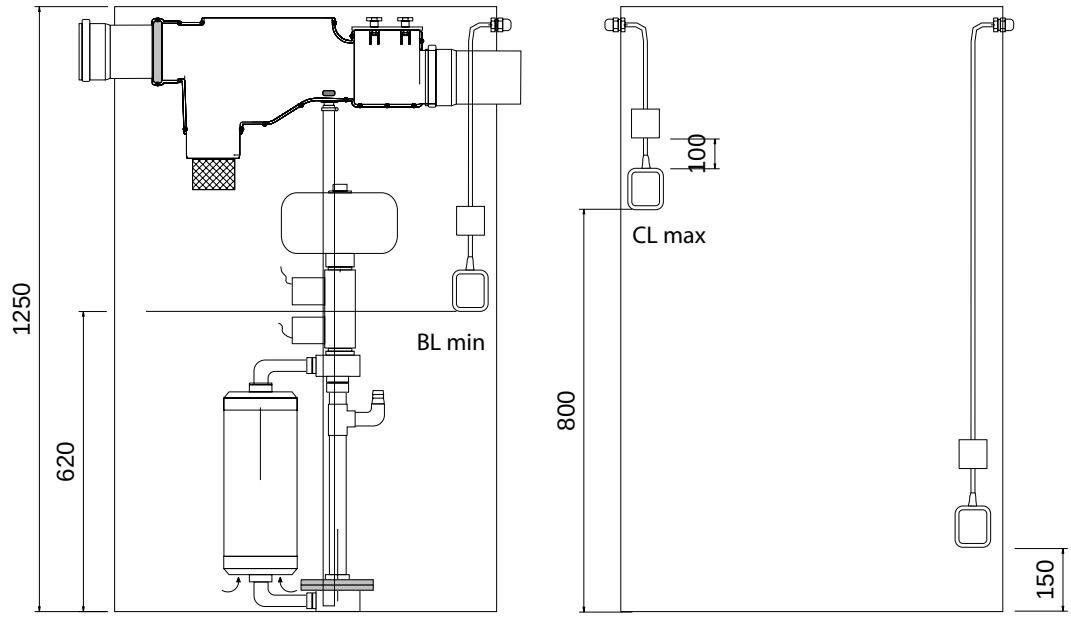


Fig.: Diagram on functions of float switches in the system

Note: Distance between float switch and counterweight 100 mm!

Parameter setting

The parameters are adjusted to the specific tasks (s. section 6.3).

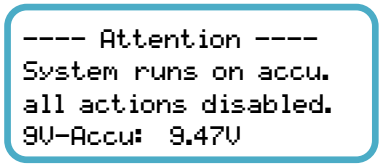
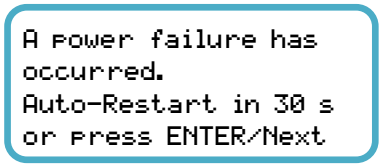
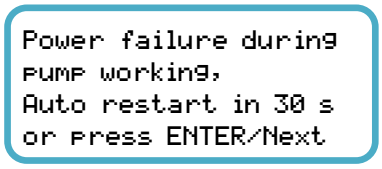
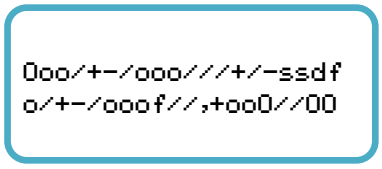
Start-up process:

The membrane station should be set in water up to the mid line of the back flushing tank for start-up. It may take up to 30 minutes for the water to be pressurized in the suction chamber of the pump. Initially, Only now the test mode of the suction pump can be started as the pumps are not self-priming. The suction pump must be run until the water flows from the clear water hose.

The backflushing pump can be monitored only indirectly in the system. For this purpose, it is activated in test mode for one minute. Thereafter revert back to suction pump. If the suction pump requires some time to refill the backflushing tank then, before the permeate flows out of the clear water hose, it can be noted that the back flushing pump is working.

The system is ready to use after termination of test mode.

9. Self-help in case of failure

Symptom	Cause	Remedy
No display 	- Jumper (s. section 6.1) not inserted - No 24 V voltage supply and discharged battery - Display cable is loose or defective	- Plug in jumper - Check AC switching power supply, recharge battery via internal charging switch. * - Check display cable or change display
Battery operating mode display 	- Power failure - 24 V Switching power supply is not connected - 24 V Switching power supply is defective	- Wait for power to come back on - Connect AC switching power supply - Change AC switching power supply
Display after power failure 	- Display (for 30 seconds) after power failure of 24 V voltage supply	- Check the number of failures in status mode in a period of 24 h, for instance. If the number increases and the reason is not a general power failure, then the power supply is to be checked.
Display after power failure 	- Display with power failure during pump cycle	- Check pumps via test menu. If there is a power failure even in test mode, then check for defect in respective pump or power supply.
Less clear water running into clear water tank	- Defective suction pump - Incorrectly installed float switch BR min or Cl max or defective	- Check suction pump in test mode and change if necessary - Check the position and function of float switch and change if necessary
Low operating life of Membrane(s)	- Backflushing pump does not flush the membrane regularly - Leakage clogs the membrane fibres	- Check backflushing pump in test mode (see. start-up process) and change if necessary - Perform leakage test (see. section 8) and remove source of leak if necessary
Display failure 	- Display crashed - for instance, by voltage surge in power supply (lightning) or electrostatic effect Note: The program runs normally in future.	- Restore the display function by RESET (adjusted parameters are lost) or disconnect the cable bridge (s. section 6.1) on control board.

* Note: If the battery voltage does not reach more than 8.5 Volt (see. Status display) after a charging period of approx. 14 h, then the battery needs to be replaced.

10. Maintenance and cleaning

A functioning test of the pumps and blowers must be done every six months. Every pump and blower can be separately run in test mode. The float switch is manually positioned into the two switching positions (ON/OFF) while the display is checked.

The battery voltage is controlled shown in the menu. The battery voltage is constant on 9.6 Volt when new. If the battery voltage displays a value below 8.5 Volt (when not discharged by a previous power failure) then the battery must be replaced. Only rechargeable Nimh batteries are allowed!

General specifications of maintenance and mechanical cleaning of the membrane can be seen in the AQUALOOP Membrane manual.
Subsequently, the additional cleaning options of chemical cleaning of AQUALOOP membrane station are described in Tank system.

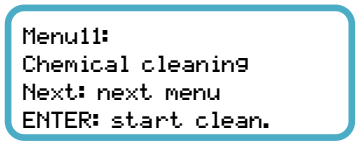
10.1 Chemical cleaning of AQUALOOP Membrane station

An intensive chemical cleaning of the membrane(s) is done only if the filtration performance is significantly reduced. (Detailed information can be obtained from the AQUALOOP Membrane manual.)

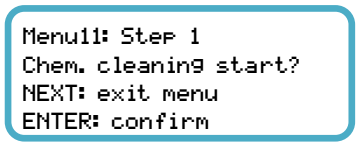
Chemical cleaning routine for the AQUALOOP System:
A cleaning option is available in the control menu of the AQUALOOP Membrane controller. A semi-automatic cleaning of membrane cartridges can be performed without the need to dismount the membranes.

Menu start of cleaning routine

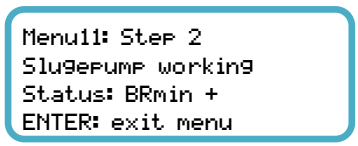
Selection of menu 11



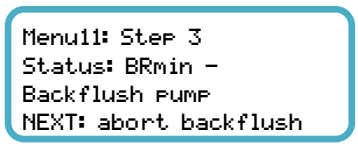
1.) Security questions for starting the cleaning routine



2.) Controller automatically starts the sludge pump until the minimum level of water is reached in the bioreactor (BRmin).
Note: If no internal sludge pump is connected, then the bioreactor should be pumped with an external pump until "BRmin -" appears in the display (with a simultaneous sound of 5 beep tones)
Attention: The suction pump must not be allowed to run dry!



3.) If the controller shows "BRmin -", then a back flush process is automatically performed to empty the backflushing tank. This procedure ends automatically or can also be terminated manually.



4.) Now the cleaning solution (see. chapter 10.2.) can be added using the clear water hose (Respect decline from clear water tank down to the tank with the membrane station). At small tank systems with good accessibility (for instance, AL-System 6) the cleaning liquid can be filled directly into the back flushing tank.

Menu11: Step 4
Chem. liquid filled?
NEXT: menu exit
ENTER: Start cleaning

Note:
The cleaning solution must be refilled during the cleaning process in case of more than three membranes installed as the back flushing tank has only approx. 6 l holding capacity.

5.) If the cleaning solution is filled, then the cleaning cycle starts with ENTER. An internal routine now runs. The routine takes about one hour.

Menu11: Step 5
Cleaning working
Time: 60: 00min
ENTER: exit cleaning

6.) After the completion of the cleaning routine a clear water flushing must be started. At least two litres of clear water are filled into the back flushing tank for each membrane.

Menu11: Step 6
Clearwater filled in?
NEXT: exit flushing
ENTER: start flushing

7.) With ENTER the clear water flushing is confirmed. The routine takes about max. 4 minutes.

Menu11: Step 7
Clearwater flushing
Time: 04: 00min
ENTER: exit flushing

After the completion of the clear water flushing, the operation mode appears in the display and the normal program continues to operate further, corresponding to the set parameters.

14:22:08h / A= 4 / 9
T1=05:00h / T2=16:00h
Air ON/OFF
BRmin + / CLmax -

For a further cleaning step the cleaning menu must be started again.

ATTENTION!
If chlorine cleaning is performed after acid cleaning, then the pipes must be sufficiently rinsed (see description Step 6.)

10.2 Cleaning solution

We recommend the cleaning solution be made from regular domestic cleaning agents and should be mixed as follows:

1) Acid cleaning against deposits such as calcium carbonate
   Citric acid: Available in all drug stores as granulate packets
   Dissolve 200 g per cartridge in 2 l warm, clean water (30°C) .

2) Alkali cleaning against excessive Biofouling
   Domestic cleaner with chlorine base (such as Bref-Henkel, DanKlorix):
   Available in all drug stores as liquid concentrate (0.5% Chlorine portion).
   Dilute 0.5 l per cartridge in 2 l warm, clean water (30°C).

ATTENTION!

Never mix acids and alkali!
All pipes and connections must be rinsed well with water after being cleaned with acid before cleaning with alkali and the other way around!
Follow the warning and safety instructions of the chemicals used!
Protective gloves and glasses are to be used during all cleaning operations!

11. Spare parts

Article description	**Drawing no.** (s. chap. 4)	**Order description**
AQUALOOP controller	[9]	ALMS-CU
AQUALOOP AC switching power supply 24 V DC, 4A	[7]	ALMS-PSS-4A
AQUALOOP Float switch 15 m	[10]	ALMS-FS15m
AQUALOOP Double pumping unit	[2]	ALMS-P

12. Optional accessory

Order description: AL-PCS
AQUALOOP Pressure sensor for monitoring pump performance

Measuring range: -0.8 to +0.8 bar,
Connection: 4-20 mA, ventilated 3 line terminals
Cable: Ø6mm, 3 m length

Order description: AL-BCS
AQUALOOP Pressure sensor for monitoring blower performance

Measuring range: 0 to +0.4 bar
Connection: 4-20 mA, 3 line terminals
Cable: Ø5mm, 2 m length

Order description: VIP-130-6
Submersible pump (sludge pump)

Operating voltage: 230 V AC/ 50 Hz, 4A
Dimension: Ø165 x 290 mm
Lifting height: max. 6 m
Lifting volume: max. 120 l/min
Pressure connection: 1 ¼ “, hose bush Ø 25mm
Cable length: 10 m
Weight: 4 kg

13. Warranty / Contact

The warranty provisions are included in our sales conditions, and can be viewed at:

www.intewa.de/en/cs/contact/legal-conditions/

For any queries, orders for spare parts or service enquiries, please get in touch with your local dealer or visit the service domain at the INTEWA website of your country.
Always keep your purchase invoice handy.

www.intewa.com

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Version: 1.0
Subject to technical changes.