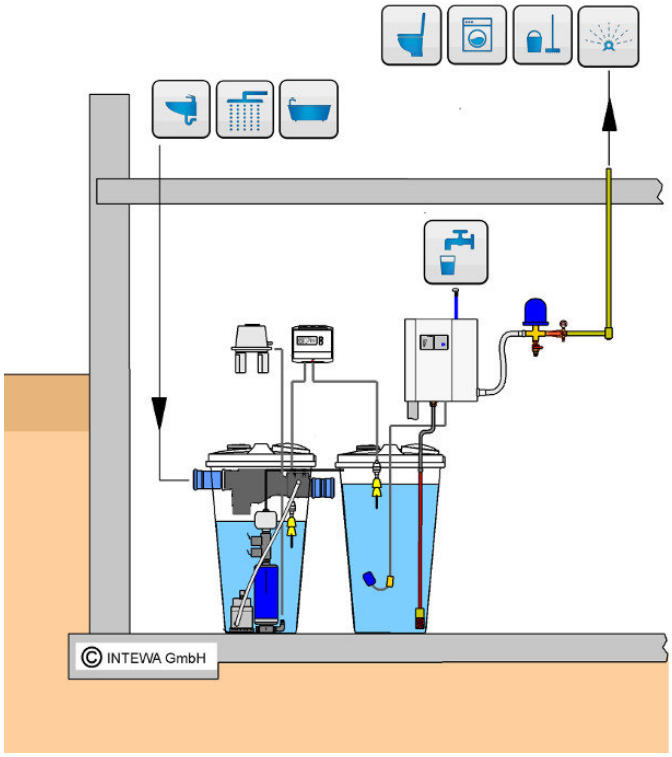


AL-GW300

AQUALOOP grey water treatment 300 l/day

Assembly and operating instructions

WATER IS OUR ELEMENT

www.intewa.com

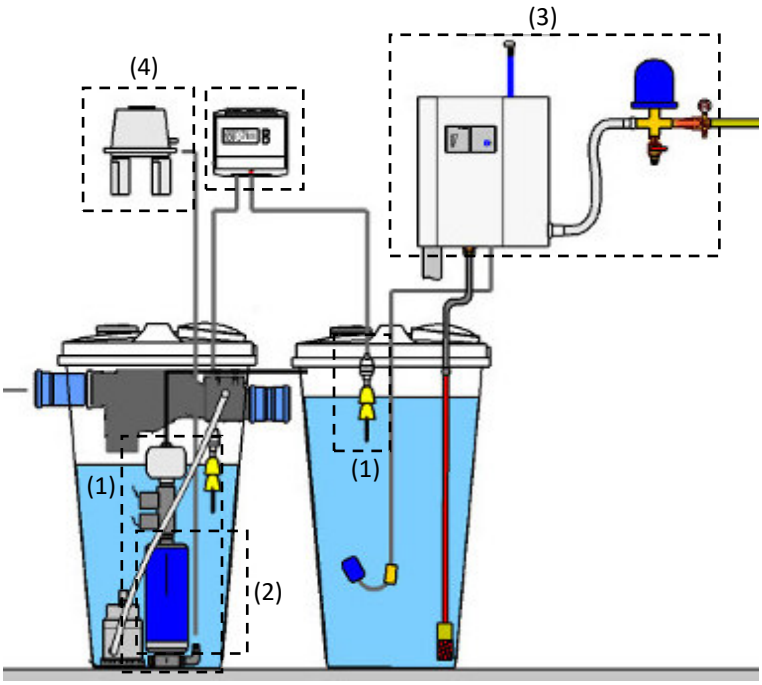
Table of contents

1 Introduction and general information

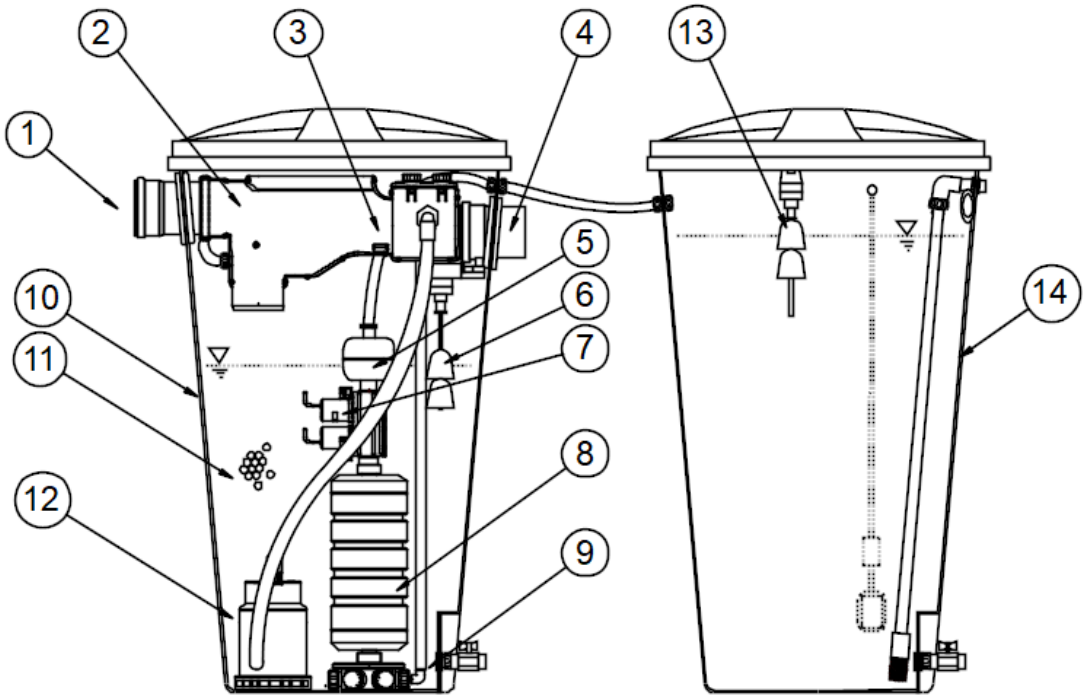
The AQUALOOP system AL-GW 300 is specially designed for greywater utilisation in detached houses.
These instructions describe the assembly of the pre-assembled storage units and the subsequent commissioning as a brief description.

For more detailed information on the components used, see the following instructions:

- AQUALOOP membrane station (1)
- AQUALOOP membrane (2)
- Rainmaster Eco (3)
- AQUALOOP blower (4)
- Check maintenance list



1.1 Functional description



Picture: AQUALOOP grey water 300 system

The grey water (1) from the bathroom (bathtub, shower, and washbasin) is first filtered through the pre-filter (2) and then enters the bioreactor (10). When the bioreactor is filled with water, the grey water flows via the filter overflow into the canal (4) when the water level has reached the maximum capacity, the water flows through the integrated skimmer (3) at the pre-filter and removes the floating impurities (foam, grease, oil) from the water surface. The sludge pump (12) is used for regular desludging of the system. The discharge is led into the sewage system via the overflow.

In the bioreactor, the grey water is treated biologically (aeration + growth body). The aeration is carried out by the blower and is regulated by the AQUALOOP control unit. The aeration line (9) is connected to the bottom of the membrane station (8). This ensures that the bioreactor is supplied with sufficient oxygen and that the membrane fibres are simultaneously cleaned by the air.

After the biological treatment, the control unit controls the ultrafiltration process, in which the water is filtered into the clear water tank (14) via the ultrafiltration membrane (8). After a filtration cycle, the membrane is backwashed with water from the backwash tank (5).

The minimum level of the bioreactor is monitored by a float switch (6). The filtration process is interrupted when the minimum level in the bioreactor or the maximum level in the clear water tank (14) is reached, which is monitored via a float switch (13). The bioreactor is vented via the vented grey water inlet line (1) or via a separate vent line.

1.2 Inlet water quality

The AQUALOOP greywater recycling system is designed for the treatment of greywater. The grey water certified for this listing is combined bath and shower water and sink water. Toilet, dishwasher, washing machine and kitchen wastewater are excluded from this listing due to their high pollutant load or grease content.

The quality of the incoming grey water must not exceed the test values of NSF/ANSI 350. The parameters of the grey water supplied to the plant must be as follows:

Table: Water quality requirements for the inlet water

Parameter	**Maximum Values / Ranges**
COD (mg/L)	< 400
BOD5 (mg/L)	< 180
TSS (mg/L)	< 160
Turbidity (NTU)	< 100
Temperature	25 - 35 °C
E. coli (cfu/100 mL)	$< 10^3$
PH	6.5 - 8.0
Total phosphorus value - P (mL)	< 3.0
Total Kjeldahl Nitrogen - N (mL)	< 5.0
Organically bound carbon (TOC)	< 100
Total coliform bacteria	$< 10^4$
Fats and oils (mg/L)	< 37
Degree of hardness (°dH)	< 7.3

Permitted use of the following detergents and cleaning agents:

- All common cleaning products for personal use (soap, shampoo, shaving foam, toothpaste, etc.) must be biodegradable.
- All household cleaners should be used according to the manufacturer's instructions for safe household use.

Attention:

Water quality should be monitored to ensure that no undesirable substances enter the system. The function of the membranes and the system in general may be affected if excessive amounts enter the system and damage to the equipment may occur.

Water inlet qualities and substances that are not permitted:

- Water from toilets, kitchens, washing machines
- Fats and oils
- Chemicals such as varnishes, thinners and cleaning chemicals
- Hair dyes (can cause discolouration of the filtered water)

2 General safety instructions

Live components may only be installed by an approved electrician. In the event of malfunction of electrical equipment, the product must not be put back into operation until it has been repaired by an approved electrician. There is a risk of electric shock!

The socket circuit used for the unit must be protected by a circuit breaker (16 A in many countries). Likewise, a residual current circuit breaker with a maximum response current of 30 mA must be connected upstream if not available.

Before installing the product, the assembly and operating instructions and their specific safety instructions must be read carefully. The instructions given there must be followed exactly. Modifications to the product are not permitted, otherwise any warranty claim will be voided.

The following points must also be observed for installation and operation:

- Inspect the product for any visible defects before installation. If there are any defects, do not install the product. Damaged products can be dangerous.
- Installations on the drinking water pipe network may only be carried out by an approved installation company.
- A floor drain must be provided near the installation site that can absorb the unintentional water leakage (e.g. in case of pump failure, pipe break, etc.) and prevent water damage in the building.
- The masonry behind a water-bearing system must be protected from water (e.g. waterproof

paint).

- Make sure that existing emergency overflows are connected and sufficiently dimensioned.
- Unplug the mains plug if you are going to be absent for more than 24 hours (follow the instructions in the chapter Holiday mode).
- Shut off the drinking water line in front of the unit if you will be absent for more than 24 hours.
- All products must be checked regularly for proper condition. The minimum inspection times are given in the maintenance instructions.
- Electrical appliances and water storage tanks can be dangerous for children. Therefore, keep children away from these products at all costs. Do not let children play with the product.
- Never install water-carrying products in places where the temperature can drop below 0°C.
- Do not install electrical products in rooms at risk of flooding.
- The operator is responsible for compliance with the safety and installation regulations.

3. Guidelines, tests, environment

Electrical guidelines and test certificates

All electrical components comply in their design and construction, as well as in the version placed on the market by us, with the basic safety and health requirements of the EC Machinery Directive (see the

respective specific instructions).

British Standard BS-8525-22011:

In Europe, there is currently (as of 05.2021) only the British test standard BS-8525-22011 for testing greywater systems. This has been positively tested by the PIA Testing Institute for Wastewater Technology. (For test results, see www.intewa.com).

According to BS-8525-22011, an additional UV system must be provided after the pump system. You can find these, for example, in our INTEWA Store.

PIA
Testing Institute for Wastewater Technology

PERFORMANCE RESULTS
Test performed according to BS 8525-2:2011

Manufacturer
INTEWA GmbH, Jülicher Straße 336, 52070 Aachen/Germany

AQUALOOP-System 6
Membrane Bioreactor with UV Disinfection
for the Treatment of Greywater

Class of greywater input	Bathroom greywater including washing machine effluent
Class of treated water output	Spray application
Nominal hydraulic daily load	200 l/d
Acceptance flow rate	1l/sec
Acceptance volume	100 l
Maximum storage time	21 days
Details of desinfection process	UV desinfection after storage
Nominal occupancy	4 beds
Power supply requirements	230 volts, 1 amps, Single phase

Performance tested by:
PIA – Prüfinstitut für Abwassertechnik GmbH
(PIA GmbH)
Hergenrather Weg 30
52074 Aachen, Germany

Certified according to ISO 9001:2008
Notified Body No.: 1739

Dr. rer. nat. Martina Dellen April 2014

NSF 350-2012:

The INTEWA systems ALGW300 - AL GW5400 are the first and so far only systems to be certified according to "Class C" (as of 05.2021). (For test results, see www.intewa.com).

According to NSF 350-2012, an additional UV system must be provided after the pump system. You can find these in our INTEWA Store, for example.

OFFICIAL LISTING

NSF certifies that the products appearing on this Listing conform to the requirements of NSF/ANSI 350 - Onsite Residential and Commercial Water Reuse Treatment Systems

This is the Official Listing recorded on February 5, 2020.

INTEWA Ingenieur-Gesellschaft für Energie- und Wassertechnik GmbH
Auf der Hüls 182
Aachen 52068
Germany
49 241 966 050

Facility: Aachen, Germany

Model Number	Rated Capacity Gallons/Day	Classification	Type
AQUALOOP System GW300	79	Class C	Laundry & Bathing
AQUALOOP System GW600	158	Class C	Laundry & Bathing
AQUALOOP System GW900	238	Class C	Laundry & Bathing
AQUALOOP System GW1200	317	Class C	Laundry & Bathing
AQUALOOP System GW1500	396	Class C	Laundry & Bathing
AQUALOOP System GW1800	476	Class C	Laundry & Bathing
AQUALOOP System GW3600	951	Class C	Laundry & Bathing
AQUALOOP System GW5400[1]	1427	Class C	Laundry & Bathing

[1] Larger systems available in accordance with treatment volume and duration specified in the INTEWA NSF Final Report and Certification.

Approval of effluent quality NSF:

During the certification process, the INTEWA AQUALOOP greywater recycling system produces a clear water that successfully meets the performance requirements of NSF/ANSI Standard 350 Class C for multi-family residential or commercial sites:

Table: Wastewater requirement and certification results for AQUALOOP

Measurement	NSF/ANSI 350 Class C Request		Class C AQUALOOP test result NSF approval Certificate No.: C0241944 - 01	
Measurement	Test Average	Single sample maximum	Result Average	Single sample maximum
BOD_5 (mg/L)	10	25	6	17
AFS (mg/L)	10	30	2	8
Turbidity (NTU)	2	5	0.5[1]	4.0
E. coli[2] (MPN/100 mL)	2.2[2]	200	2.0[2]	13.0
pH (SU)	6.0 - 9.0	NA[3]	6.7 - 8.0	NA1
Colour	MR[2]	NA[3]	MR[4]	NA1
Smell	Non offensive	NA[3]	Non offensive	NA1
Oily film and foam	Non-detectable	Non-detectable	Non-detectable	Non-detectable

1 median, 2 geometric mean, 3 NA: not applicable, 4 MR: only measured and indicated

Packaging and disposal:

Please recycle the packaging in an environmentally friendly manner.

Do not throw electronic components into household waste! According to the European Directive 2002/96/EC on waste electrical and electronic equipment and its implementation in national law, electronics that are no longer usable must be collected separately and recycled in an environmentally sound manner.
Please contact us if you have any questions regarding the return of systems and electrical components.

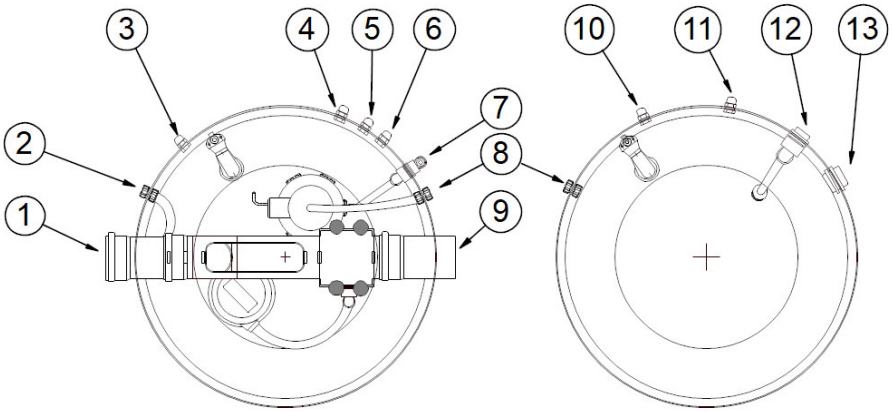
4. Technical data

Bioreactor

Storage dimension (Ø x H):	Ø740 x 1275 mm
Inlet connection:	DN100 (Ø110mm), socket
Inlet height:	1045 mm
Emergency overflow connection:	DN100 (Ø110 mm), spigot end
Emergency overflow height:	980 mm
Total volume:	200 l
Processing volume per cycle:	100 l
Cable gland en:	PG 11, (suction pump, backwash pump, float switch BR min, pressure sensor (optional))
Blower connection:	1 ¼" male, Ø25mm grommet
Weight incl. lid:	11,5 kg

Clear water tank

Storage dimension:	Ø740 x 1275 mm
Storage volume:	250 l
Clear water inlet:	Hose, Ø21
Emergency overflow:	1" ET
Cable gland	PG 11,)
Clear water withdrawal :	¾ " AG
Weight incl. lid	11,5 kg

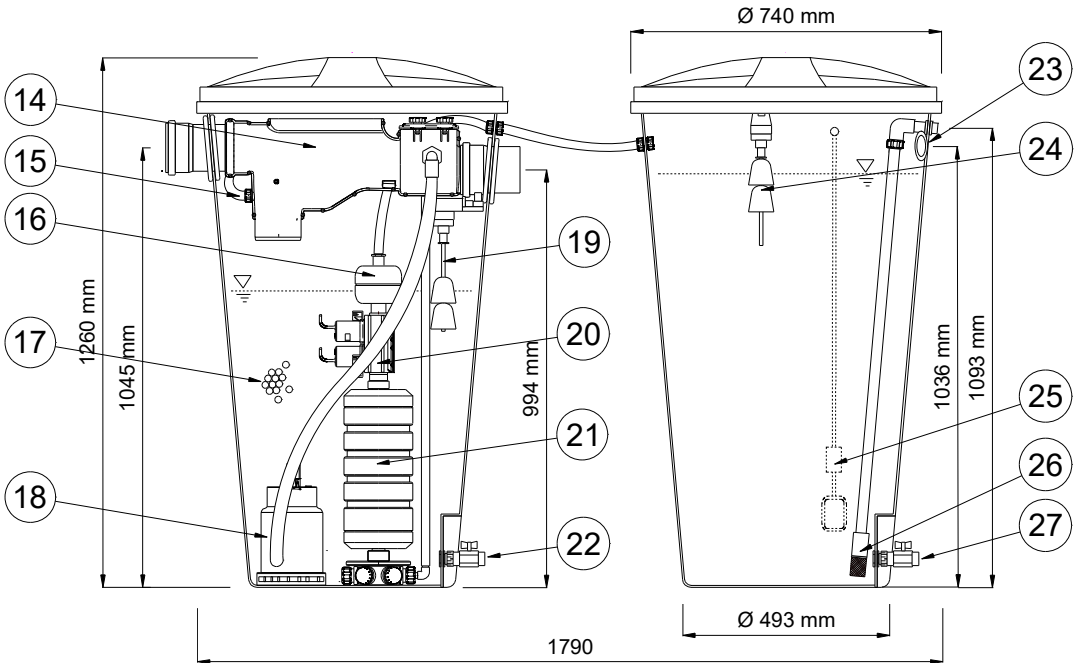


Bioreactor connections:

1. Inlet connection grey water (DN 100)
2. Connection filter backwash
3. Cable bushing Float switch BR_{min} (minimum water level control)
4. Cable gland filtration (suction) pump
5. Cable gland backwash pump
6. Cable gland sludge pump
7. Fan connection
8. Permeate connection for corrugated hose to the clear water
9. Emergency overflow connection (DN 100)

Clear water tank connections:

10. Cable gland Float switch CL_{max} (control maximum water level)
11. Cable gland for Rainmaster Eco float switch (included in delivery)
    RM-Eco included)
12. Intake line connection (Rainmaster Eco)
13. Emergency overflow connection (DN 50)



Components Bioreactor:

14. PURAIN prefilter
15. PURAIN Backwash nozzle
16. backwash tank membrane station
17. Growing bodies / fillers
18. sludge pump
19. float switch, BR_{min}
20. filtration and backwash pump
21. AQUALOOP membrane, ultrafiltration
22. drain cock bioreactor

Components Clear water tank:

23. clear water overflow (DN50)
24. float switch, CL_{max}
25. float switch, RAINMASTER Eco
26. intake filter screen
27. drain cock clear water tank

5. Scope of delivery and assembly instructions

1. Bioreactor storage tank 350 litres, pre-assembled, incl. lid
2. Clear water storage tank 350 L, pre-assembled, incl. lid
3. AQUALOOP control unit with switching power supply (24V) and mains plug (230V)
4. AQUALOOP-BL60, blower incl. wall bracket
5. AQUALOOP-FK30l, Packing material
6. Rainmaster Eco 10
7. Accessories/mounting material

1

2

3

4

5

6

Accessories 7

	Mounting material for the suction line (connection between clear water tank and pump system) The mounting material is suitable for suction in ½" or in 1". We recommend a ½" suction line (3m suction hose included) when using the **Rainmaster Ecos** and a 1" suction line (not included) for larger systems such as the **Rainmaster Favorit.**
	Mounting material for the permeate line/ filtration line. (Connection between bioreactor and clear water tank) 1 m hose ½"
	Mounting material for the pre-installed filter backwash nozzle Allows a connection port for cleaning the filter screen. ½" connection hose is not included in the scope of delivery.
	Mounting material for the fan connection (connection between blower and bioreactor) 3 m connection hose 1"
	Reducer for the leak test

6. Assembly

Wall mounting of the control unit and the power supply unit holder

For installation instructions for the control box and the power supply unit bracket (drilling distances, etc.), see the AQUALOOP membrane station instructions.

Wall mounting of the fan

For installation instructions (drilling distances, etc.), see the AQUALOOP blower instructions.

Bioreactor

Pre-assembled, see illustration

Clear water tank

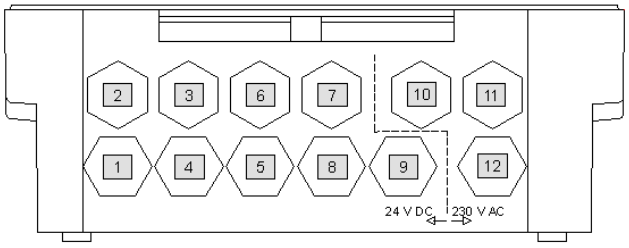
Pre-assembled, see illustration

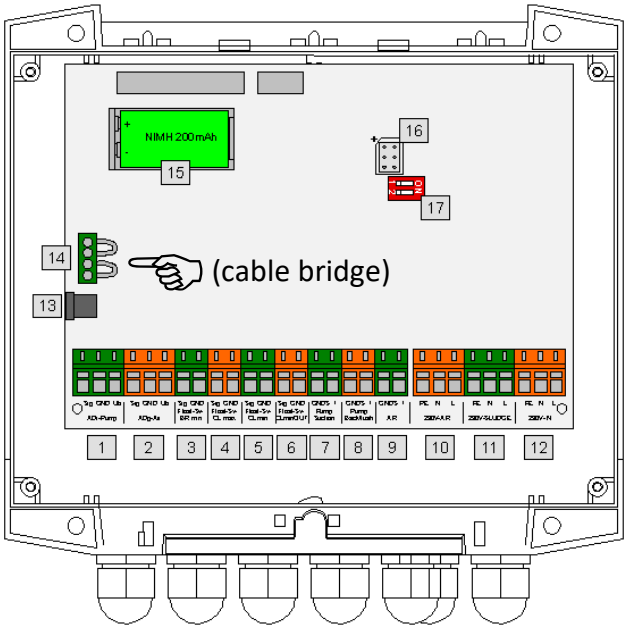
Wall mounting and hydraulic connection of the RM Eco For installation instructions (drilling distances, etc.), see Rainmaster Eco instructions.	

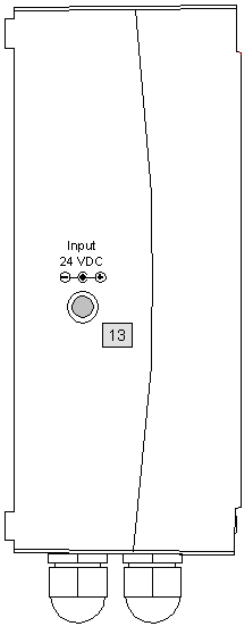
7. Connection of all electrical components to the control unit

Connection of the electrical components

- S. Connection description of the control board







Pos.	Connection	Description	Connection contacts/function
1	ADr-Pump	Analogue pressure sensor for suction and backwash pump monitoring	Sig= green GND= grey Ub += brown
2	ADg-Air	Analogue pressure sensor, for fan monitoring	Sig= green (angular connector PIN 3) GND= grey (angled connector PIN 2) Ub + = brown (angular connector PIN 1)
3	Float-Sw BR min	Float switch in the bioreactor for minimum water level	Potential-free contact, normally open No polarity
4	Float-Sw CL max	Float switch in the clear water tank for maximum water level	Potential-free contact, normally open No polarity
5	Float -Sw CL min	Special function:	Potential-free contact, normally open No polarity
6	Float -Sw CL min out	Special function:	Potential-free contact, normally open No polarity
7	Pump Suction	Suction pump 24 V DC for filtration process	GND = blue + = brown
8	Pump Backflush	Backwash pump 24 V DC for cleaning process	GND = blue + = brown
9	Air	Pre-filter backwash 24 VDC blower or valve	GND = blue + = brown
10	230V- Air	Fan 230 V AC / 50 Hz	PE = Green/yellow N = blue L = brown
11	230V sludge	Sludge pump 230 V AC / 50 Hz	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	Supply 24 V DC switching power supply,	Jack plug Ø5,5mm, centre positive
14	Cable bridge	To activate the battery and the switching power supply unit (Insert cable bridge during initial installation)	4-pole plug (reverse polarity protected)
15	Battery 9V	9 V block battery, 200 mA, NiMH Attention: When replacing the internal battery, use only a rechargeable battery again!	Observe polarity when changing
16	6-pin	Programming connection 6 pin (for update programming)	Note polarity
17	DIL	DIL switch Factory setting 1 = ON Factory setting 2 = OFF	1=ON : Alarm* in battery mode ON 1=OFF : Alarm OFF during battery operation 2=ON /OFF: without function ** In battery mode, a short beep sounds at*

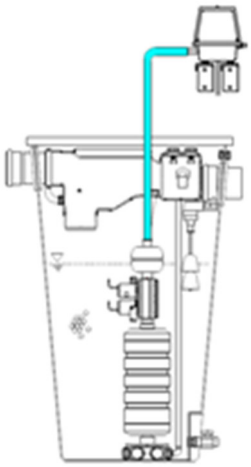
			intervals of 5 seconds!

8. leak test of the membrane station

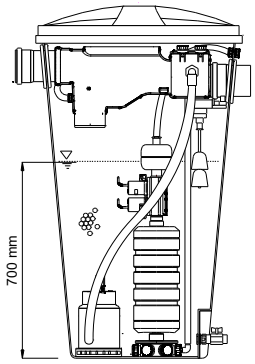
For leak testing, the blower is connected to the backwash tank (membrane station)

- Use the 1" male thread to ¾" male thread reduction nipple included in the accessories.
- Loosen the union nut of the metal hose at the top of the bioreactor and connect the metal hose to the reducer. Then the black angled grommet can be screwed onto the reducer and the blower hose can be used to make the connection between the blower and the membrane station.

Note: Make sure that the sealing ring is not lost in the union fitting and that it sits straight in the fitting during assembly.



- Filling the bioreactor with water (up to the middle of the backwash tank)



Attention:
The tightness of all screw connections is particularly important so that no dirty water contaminates the clear water. In addition, dirty water that unintentionally enters the hollow fibre from the permeate side can lead to blockage of the fibres. Therefore, a leak test must be carried out before commissioning.

The fan is started via the test mode (menu 4). The membrane station is then immersed up to the middle of the backwash tank. If no bubbles appear at the screw connections, the tightness is given and the station can finally be installed.

Hint:
Small bubbles from the cartridge (=membrane fibres) can be ignored.
The pressure test must be carried out for 5 minutes!

9. Commissioning and parameter settings

Note: More detailed background information on the parameter settings can be found in the AQUALOOP membrane station manual.

Starting from the operating display, each menu can be called up with NEXT. ENTER then takes you to the respective menu setting. After leaving the menu setting, the display returns to the operating display. In general, NEXT and ENTER always indicate which entry or action is associated with them. If no entry is made in a menu mode within 6 minutes, the display automatically returns to the operating display. The menu settings must be adjusted once to the respective system. The set values are permanently stored in the internal memory, but can be overwritten at any time.

Factory setting:

1. Time: 00:00:00 (Menu 6)
2. Number of membranes: MEM = 1 (menu 1)
3. Start time T1: T1 = 15:00 (menu 7)
4. Start time T2: T2 = 03:00 (menu 8)
5. Pump cycles: A1/A2 = 55 / 0 (menu 10)
6. Fan cycle: Air ON / Air OFF = 5 / 5 (min/min) (menu 11)
7. Suction overflow: SO=0 week
8. Sludge pump: SLP/t=0 /0 (days/sec.) (menu 3)

Recommended settings

1. Time: (set current time) (menu 6)
2. Number of membranes: MEM = 1 (menu 1)
3. Start time T1: T1 = 15:00 (menu 7)
4. Start time T2: T2 = 03:00 (menu 8)
5. Pump cycles: A1/A2 = 43/43 (menu 10)
6. Blower cycle: Air ON / Air OFF = 5 /10 (min/min) (menu 11)
7. Suction overflow: SO=0 week
8. Sludge pump: SLP/t=2 /6 (days/sec.) (menu 3)

Menu 1: Number of diaphragms (setting MEM= 1)

(MEM = 1 to 6) This setting is used to adjust the installed number of membranes. This serves to optimally adapt the suction pump performance to the filtration process.

Menu 2: Suction overflow (setting = factory setting SO = 0)

Menu 3: Sludge pump (setting SLP 1 / 5)

This setting determines the rhythm in which sludge is to be pumped out and how long the pump is to run.

With the above setting, the pump runs for 6 seconds every 2 days.

Menu 4: Test menu (test menu for blower, suction pump, backwash pump and sludge pump)

In the test menu, the blower (Air), the suction pump (Suction pump), the backflush pump

(Backflush pump) and the sludge pump (Sludge pump) can be controlled and tested individually. The test mode can be terminated at any time with NEXT/ENTER. The time until automatic termination (max. 6 min) is shown in the display by a backwards running time measurement. A test can be carried out at any time, but there must be sufficient water for the pump to operate (BR min +). If the water level falls below the minimum level (BR min -), the display shows that a pump test is not possible. Furthermore, the clear water tank must not be full. The display should then show (CL Max-).
If the test is to be carried out nevertheless, the float switches can be operated manually for a short time (bypassed).

Menu 5: Status overview (serves only as an overview)

Menu 6: Time (setting current time)

The set time is decisive for the pump start times T1 and T2. In the event of a power failure, the set time continues to run for approx. 3 hours via the battery.

Menu 7/8: Start time T1 and T2 (setting T1 = 15:00 h / T2 = 03:00 h)

The setting of the two start times must have a difference of 12 hours. Only in this way can the complete filtration cycle of A1/A2 of 43 / 43 be utilised.

Menu 9: Not available

Menu 10: Number of pump intervals A1/A2 (setting A1/A2= 43/43)

The number A1 or A2 determines how many pump intervals A (each with 15min running time/15s backwash) are run through from the start times T1 or T2.

Menu 11: Aeration cycles (Recommended setting = 5/10)

The ventilation (Air ON) and the ventilation pause (Air OFF) can each be set in the range from 1 to 15 min.

Setting: 5 / 10 corresponds to 5 minutes ventilation ON , 10 minutes ventilation OFF

Menu 12: Chemical cleaning

Semi-automatic cleaning routine for chemical in-situ cleaning of the membrane

s. Chapter chem. Cleaning

Menu 13: Aeration 24V / Filter backwash 24 V

Setting of filter backwash duration (0-120 s) and filter backwash interval (0-30 days).

Factory setting: 60 s / 5 d (means: 60 seconds backwash every 5 days)

For the grey water treatment application we recommend a setting of 30 s / 1d

Final commissioning For the final start-up of the membrane station in the storage tank, the membrane station must be in the water up to the middle of the backwash tank. After approx. 30 minutes, water has pressed into the suction chamber of the pump. Only now can the test operation of the suction pump be started, as the pumps are not self-priming. The suction pump must now continue to pump until water flows out of the clear water hose. The backwash pump can only be checked indirectly in the system. To do this, it is activated in test mode. When the backwash tank is empty, the sound changes→ Then switch off immediately. This confirms that the backwash pump is working. When the test mode is finished, the system is ready for operation.	
The fillers are simply added to the bioreactor. Please make sure that no fillers get into the PURAIN filter.	
Running-in phase The microbiology builds up in the bioreactor within approx. 3 weeks due to the continuous grey water supply. Until this time, there may be fluctuations in the biological cleaning performance and thus in the permeate quality.	

10. Maintenance and cleaning

Information on maintenance and cleaning can also be found in the instructions for the components used. You can find an overview here:

Maintenance overview GW 200 system

	Product	Test interval [Months]	Cleaning interval [Months]	Exchange-Interval
 	AL-F100 GS prefilter with backwash nozzle Grey water	3	3-6 Check that the sieve is clean, here you can see the circle that the backwash nozzle flushes clear. Remove dirt that collects in the filter trough with a disposable paper cloth, e.g. hairballs can accumulate here. Check the backflow flap for freedom of movement; to do this, you can press your hand through the filter into the RS flap. Backwash nozzle every 6 months Activate in the test menu and carry out a function test	-
	AQUALOOP membrane Grey water (BOD < 200mg/l)	3	< 0.22 l/min (300 l/day/MEM) approx. 3-6 months See chapter 10.1 & 10.2. (Mechanical and dry cleaning)	After 10 years
	Suction pump / Backwash pump	6	-	after 20,000 hrs. running time
	Al-BLxx Blower	6 In test mode 4, the blower can be activated for testing.	6	Filter set: after 4 years. Blower piston after 20,000 hours of operation.
	Float switch in the bioreactor and in the clear water tank	6		-

	Sludge pump	6 In test menu 4 the sludge pump can be activated for testing. Run the sludge pump for 5 seconds, check function and drainage (it is OK for a certain partial flow to run back into the BR through the backwater flap and the skimmer openings of the PURAIN prefilter).		-
	Bioreactor	3-6	3-6 The bioreactor should be cleaned regularly. For this purpose, the water is completely pumped out with the sludge pump in test mode and the tank, including the membrane station, sludge pump and the packing is rinsed out with a hose. The fillers must not be cleaned chemically, so that the biofilm is not lost This also removes sludge that has settled in dead zones.	-
	Clear water tank	3	6 The clear water storage tank should be cleaned approx. every six months. To do this, just open the floor drain tap and rinse with the hose from above. If necessary, use a small scrubbing brush and some citric acid to remove deposits from the walls, hoses and cables, rinse, done!	-

10.1 Mechanical membrane cleaning

To remove the blue protective jacket of the cartridge, only turn the outer ring from the LOCK position to the OPEN position (counterclockwise). When doing so, the grey underside of the membrane must be held against it.

Attention:

Do not loosen the head-side counter screw connections, as it is very difficult to reassemble the cartridge without auxiliary tools.

Outer ring with arrow marking turned from position LOCK to position OPEN

In the OPEN position, the outer ring can be removed. Then the blue outer casing can be pulled off upwards.

Blue outer jacket, membrane cartridge and outer ring

The hollow fibre bundles are now exposed and can be rinsed from the outside with a sharp jet of water (no high-pressure cleaner!).

Note:

Damaged or torn fibres are simply knotted at the end in order to pass the leak test of the quality assurance. If a fibre tears during operation, it heals itself in such a way that the fibre blocks and thus closes itself.

Rinsing the membrane fibre bundles

10.2 Chemical membrane cleaning in the in-situ process

ATTENTION!

Never mix acid and chlorine!
All pipes and connections must be rinsed well with water before dosing with acid or chlorine!
Observe the warning and safety instructions for the chemicals used!
Protective gloves and goggles must be used during cleaning!

Cleaning routine for chemical cleaning IN-Situ in the AQUALOOP system :

There is a cleaning menu in the control menu of the AQUALOOP membrane station. This allows semi-automatic cleaning of the membrane cartridge in the system without having to remove it.

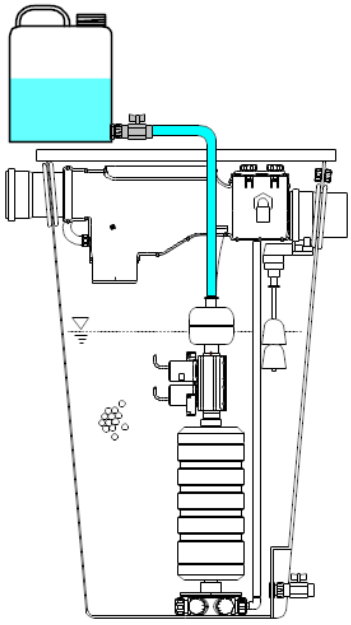
Hint:

- With 'in-situ chemical cleaning', the growth bodies can remain in the bioreactor. The amount of chlorine used has little effect on the bacteria on the growth bodies. The chlorine is mainly oxidised by the BOD in the membrane cartridge.
  Therefore, the chlorine concentration/amount should not be higher than described below.
- After chemical in-situ cleaning, a volume flow of more than 1.0 l/min should be achieved. If this is not the case, the chemical in-situ cleaning can be repeated.

Example mixing ratio:

Base granules citric acid	Target concentration of the cleaning solution with citric acid	Mixing ratio water/acid
100% (mixture 1:1) (e.g. AL-ACID)	1%	2 litres / 20g

Base concentration chlorine	Target concentration of the cleaning solution with chlorine	Mixing ratio water/chlorine
5% (e.g. AL-Chlor-DAN)	0,25%	2 litres / 105 ml
12.5% (e.g. AL-Chlor Kx)	0,25%	2 litres / 44 ml



Picture: Feeding the cleaning solution via a cleaning tank into the membrane backwash tank.

Menu start of the cleaning routine Calling up the menu item 12	Menu12: Chemical cleaning Next: next menu ENTER: start
1.) Security prompt for starting the cleaning routine Connect the cleaning tank to the C-Kit or directly to the backwash tank and fill in cleaning liquid (see chapter 10.2). Keep the stopcock closed.	Menu12: Step 1 Chem. cleaning start? NEXT: exit menu
2.) The control unit automatically starts the sludge pump until the minimum water level in the bioreactor is reached (BRmin). **Note:** If no internal sludge pump is connected, use an external pump to pump out the bioreactor until exactly "BRmin -" is shown in the display (5 beeps sound simultaneously). Now open the stopcock from the cleaning tank. **Attention: The suction pump must not run dry!**	Menu12: Step 2 Slugepump working Status: BRmin + ENTER: exit menu

3.) If the control unit detects "BRmin -", a backwash process takes place automatically to draw the cleaning liquid into the backwash tank. This process is terminated automatically or can also be terminated manually when the cleaning tank is empty. **Tilt the cleaning container slightly if necessary.**	Menu12: Step 3 Status: BRmin - Backflush pump NEXT: abortion
4.) Once the cleaning solution has been filled in, the cleaning cycle is started with ENTER	Menu12: Step 4 Chem. liquid filled? NEXT: menu exit ENTER: Start
5.) An internal routine is now running. This routine takes about one hour.	Menu12: Step 5 Cleaning working Time: 60: 00min ENTER: exit cleaning
6.) At the end of the cleaning routine, a clear water rinse must be carried out. For this purpose, at least 2 litres of clear water per membrane are fed to the backwash tank.	Menu12: Step 6 Clearwater filled in?
7.) Press ENTER to start the clear water rinse. The routine takes approx. 6 minutes. After the clear water rinse has finished, the operating display appears in the display and the process continues according to the set parameters.	Menu12: Step 7 Clearwater flushing Time: 06: 00min

If a second cleaning is to follow, the cleaning menu must be called up repeatedly.

ATTENTION!
If chlorine cleaning is to be carried out after acid cleaning with citric acid, the pipes must be flushed sufficiently
(see description step 6.).

11. Vacation mode

For safety reasons, the greywater recycling system must never be left unattended for more than 24 hours. In the event of a longer period of absence, we recommend cleaning the bioreactor and clear water tank as described in the chapter "Maintenance and cleaning". Since no further dirt load enters the bioreactor during the absence phase, further aeration can then also be dispensed with. To avoid anaerobic putrefaction, the bioreactor is cleaned beforehand. After cleaning, the membrane station should be immersed in water at least up to the top of the membrane so that it does not dry out and can be quickly put back into operation. Commissioning is carried out again as described in the chapter "Commissioning". The unit can then be disconnected from the mains. Make sure that no more water can flow into the system.

If the system is to be taken out of operation for several months, the bioreactor including the packing and the membrane must be cleaned mechanically (see AL-MS instructions). The membrane can then be stored assembled in the bioreactor without water. When putting the bioreactor back into operation later (see chapter "Commissioning"), wait about 30 minutes after filling the bioreactor with water until the membrane is completely soaked again.

12. Troubleshooting

Shortoverview: Fast membrane blocking

A membrane can block too quickly in the following ways:

- Fouling: insufficient function of the bioreactor due to too little oxygen, too little sludge removal, too much inflow, too poor inflow water quality, too much washing machine water connected.
- Mineral deposits (limescale) due to excessively hard water dH >...
- FLUX already below 0.2 l/min: if the FLUX is too low, there is an increased risk of mineral precipitation due to the rising negative pressure, which in turn reduces the FLUX.
- Sludge in the cartridge, blower too small, slanting cartridge, too little sludge removal, too much inflow, too poor inflow water quality, too much washing machine water connected.
- Fats / oils (kitchen waste water) => these must not be fed into the system under any circumstances, as they lead to a complete blockage of the membrane.

Display indications

Symptom	Cause	Remedy
No display	• Jumper (s. ch. 6.1) not pluged	• Plug in jumper
	• No 24 V power supply and battery discharged	• Check switching power supply unit, battery recharges via the internal charging circuit. *
	• Display cable loose or defective	• Check display cable or replace display

Pump stop in test mode Menu4: Test Suction Suction not possible Autostop: 6:00 min Stop with ENTER/NEXT	• The water level in the clear water tank has reached the maximum or the float switch CLmax has not been connected. • Water level in bioreactor has reached minimum	• Wait until water levels allow test operation again • Check water levels • If necessary, correct the switching positions of the float switches.
Battery power indicator ---- Attention ---- System runs on accu. all actions disabled. 9V Accu: 9.47V	• Power failure • 24 V switching power supply not connected • 24 V switching power supply defective	• Waiting until power is restored • Connecting the switching power supply • Change switching power supply unit
Display after power failure A power failure has occurred. Auto restart in 30 s or press ENTER/Next	• Display (for 30 seconds) after a power failure of the 24 V voltage supply	• Check the number of failures in status mode over a period of e.g. 24 hours. If the number increases and the cause is not a general mains failure, check the power supply unit.
Display after power failure Power failure during pump working, Auto restart in 30 s or press ENTER/Next	• Power failure indication during the pumping cycle	• Check the pumps via the test menu. If a power failure occurs again during the test operation, it can be concluded that the respective pump or the power supply unit is defective.
No clear water pumping into the clear water storage tank	• Suction pump defective • Float switch BR min or Cl max incorrectly mounted or defective	• Check suction pump in test mode and replace if necessary. • Check the float switch position and function, and replace if necessary.
Low service life of the diaphragm(s)	• Backwash pump does not regularly flush the diaphragm free • Leakage blocks the fibres from the inside	• Check backwash pump in test mode and replace if necessary. • Carry out a leakage test (see chap. 8) and remedy the leakage if necessary.

Symptom	Cause	Remedy
Error message backwash pump Failure pressure back flush confirm with ENTER or NEXT *(optional: only with pressure sensor connected)*	• A backwash pressure < 0.1 bar was detected in four consecutive backwash cycles (standard 0.3 - 0.5 bar)	• Carry out the backwash pump test via the test menu • In case of error, replace backwash pump and/or pump controller
Stagnation indicator Storage time exceeded Discharge clear water tank! Confirm with ENTER or NEXT	• The clear water in the clear water tank has not been replaced for at least 21 days and the filtration operation has been automatically interrupted	• Empty the clear water tank if necessary • Acknowledge display with NEXT or ENTER to reactivate filtration mode (see chapter 6.2).
Voltage error Power failure > 21d? Check storage time clear water! Confirm with ENTER or NEXT	• Power failure for more than 2 hours	• If the power failure is less than 21 days, please confirm with NEXT. • In the event that the storage time of 21 days has been exceeded due to a power failure (or standstill) of the system, the clear water storage tank must be emptied.
Display failure Ooo/+-/ooo//+/-ssdf o/+-/ooof//,+ooO//OO	• Display crash e.g. due to voltage peaks in the power supply (lightning strike) or electrostatic effects. Note: The programme usually continues to run normally in the background.	• The display can be restored by RESET (setting values are lost) or by pulling the cable bridge (see chapter 6.1) on the power board.

* Note: If the battery voltage does not reach more than 8.5 volts after a charging time of approx. 14 hours (see status display), the battery must be replaced.

Symptom	Cause	Remedy
Filtration/backwash process does not work	• Filtration pump/backwash pump defective • Incorrectly set operating times • Float switches in the bioreactor and clear water tank do not give a release. Target: BRmin+ / CLmax-	• Replace pump assembly • Checking the parameters. See chapter "Commissioning and parameter setting • Check float switch and replace if necessary.
Prefilter blocked	• Excessive debris on the sieve • Valve of the backwash nozzle is defective	• Clean the sieve by hand • Check the parameter settings in menu 13 • Check the function of the solenoid valve. If necessary. Renew solenoid valve

Insufficient water quality

Symptom	Cause	Remedy
Strong foam formation in the bioreactor	• **Plant has only been in operation for a short time, therefore** bacterial cultures have not yet developed • Novel water was discharged such as kitchen wastewater or washing machine wastewater • System is not yet run in	• Remove foam in time so that the entire system does not stick, it should not dry on • Reduce aeration for a few days, as aeration can increase foaming • Check whether new waste water has been fed into the system recently, e.g. grease from kitchen waste water or washing machine waste water. Shut this off immediately • Drain the water faster with the sludge pump for a while to give the bacteria no time to form foam. **Note**: In most cases, increased foam formation is only to be expected at the beginning. This will subside once the system has been run in.

Water in the bioreactor smells sulphurous	• Insufficient oxygen supply in the bioreactor (< 4 mg/l)	• Increase the oxygen input by increasing the blower run time • **Note:** Prolonged aeration of the membranes (>8 h/day) reduces the lifetime of the membrane
	• Insufficient sludge removal in the bioreactor	• Start sludge pump more often
	• BOD in the inlet (dirt inlet) of the bioreactor > than 200 mg/L	• Minimisation of pollution • We recommend not to discharge the washing machine waste water into the bioreactor. **Note:** Kitchen waste water and black water must not be discharged.
The water in the clear water tank smells sulphurous	See above	See above
	• Biological treatment in the bioreactor insufficient (clear water quality BOD > 10 mg/L)	• Ensuring a temperature of > 15°C in the bioreactor • If necessary, drain the water and clean the clear water tank.
Turbidity of the clear water	• The treatment of the bioreactor is not sufficient. This can lead to the BOD in the clear water tank being > 10 mg/l (biological degradation processes can take place).	See above
	• Damaged membrane fibres	• Carry out a leak test of the diaphragm • Membrane fibre repair or membrane replacement
	• Particles in the permeate e.g. due to damaged membrane fibres or due to deposits in the permeate hose (e.g. detached components such as lime after chemical cleaning).	• See above (membrane fibres damaged) • Clean permeate hose

	• Screw connections leaking (backwash tank of the diaphragm pump)	• Carry out a leak test of the diaphragm and tighten the screw connections if necessary.
	• Membrane cartridge connected the wrong way round	• Installing the diaphragm correctly • It is recommended to filter into the canal for 24 hours
Discolouration of the clear water	• Treatment of the bioreactor not sufficient. Clear water tank BOD > 10 mg/l	See above
	• Dissolved substances cannot be retained by the membrane • Hair dye • Urea (yellowish) • Humic substances (brownish)	• Check if toilets or kitchens are connected • Check if users urinate while showering • Adding an activated carbon filter system • Insertion of an extended oxidation state

Flow rate too low < 0.2l/min/membrane	• Clogging of the membrane due to excessive sludge content in the water or due to fouling	• Reduce the dirt input, if necessary do not connect the washing machine. • Carry out mechanical or chemical cleaning of the membrane

13. Warranty / Contact

The warranty conditions can be found in our terms and conditions of sale under:
https://www.intewa.com/de/agb/

For questions, spare parts orders and service cases, please contact your dealer directly with the purchase invoice or visit the service section on the
INTEWA website www.intewa.com.
Of course you can also contact us by phone. 0241-96605-0