

Operating instructions

WASTEWATER RECYCLING PLANT

BIO-FILTROMAT

RM 15 RM 25 RM 35





View BIO-FILTROMAT RM15-35





General

• Intended purpose

The plant is intended **<u>exclusively</u>** for the conditioning and recycling of wastewater from car-washing bays.

• Procedure

BIO - FILTROMAT is a biological recycling station that recycles wastewater from carwashing bays for a further reuse. The following physical, mechanical and biochemical processes are generated by the Bio - Filtromat plant with the aim of obtaining an optimal cleaning process:

Sedimentation	Wastewater components heavier than water are sedimented in a sludge collector dimensioned according to the applicable standards.
Biological cleaning	Due to metabolism of self-adapting microorganisms and to oxygenation almost all organic components of the wastewater are eliminated
Centripetal separation	Due to a centripetal flow in the water area of the sand filter the matters in suspension and the bio-flocks are separated
Gravitational deep-bed filtering	While the treated wastewater oozes through a gravity sand filter finest particles are filtered out without pressure



The configuration of the system is described in the following chart:



Sedimentation

The wastewater from washing plants includes numerous particles that deposit easily when adequately tranquilized. Therefore the first phase of the cleaning process consists in a sludge collector dimensioned according to the provisions of the applicable standards.

Due to the tranquilization all possibly introduced light liquids mount to the water surface. When leaving the sludge collector approximately one third of the impurities of the wastewater have already been separated. The wastewater then contains only the dissolved or half dissolved ingredients and the turbid wastewater reaches the aeration tank free of sinking constituents.



Biological purification

An adequate aeration encourages the growth of numerous aerobic microorganisms, which, due to their metabolism, eliminate or transform dissolved ingredients of the wastewater. These microorganisms deposit on the sides of the sludge collecting system and/or are spread in liquidity in the entire system. Such a biology is extremely adaptable and reacts automatically to changes of the quantity of wastewater and of the ingredients.

Due to the aeration and the circulation within the container the waste load is thoroughly mingled and is contaminated with microorganisms thus guaranteeing a high rate of degradation. After the oxidation process the decomposition products consist especially in sludge flocks, carbon dioxide and water. If biologically cleaned there will be no further waste products from wastewater.

Centripetal solid separator

By means of a suction pump the pre-cleaned water is pumped from the aeration tank for a further cleaning into the water part of the pressure-free sand filter, that is designed as a centripetal separator.

Due to special guiding plates in the centripetal separator the water is submitted to a gyratory movement. The discharge of the water takes place on the surface in the centre of the separator thus provoking an ascentional flow in the centre and at the same time a return of bio-flocks and suspended matters contained in the water into the sludge collector.

The sludge collector is simultaneously aerated by means of oxygenated water which does not have any negative effects on the desired sedimentation.

Gravitational deep-bed filtering

After the solid separation the necessary washing water is purified in the gravity sand filter. Due to the static pressure of the water column in the filter, water is unloaded through the filter medium by gravity. Micro-particles are reliably retained by laminar flow velocity within the filter and by the translaminar effect of the filter.

The filter is regularly rinsed automatically by compressed air and by water. The scoured waste load is evacuated into the sludge collector.

The filtered water is collected in a pure water tank and is then supplied to the washing plant.

The pure water tank is equipped with a fresh water supply with level control for emergency operation and change-over to fresh water supply in the event of salinization of the process water.

The high degree of oxygen in the water of the entire system prevents effectively any anaerobic processes and simultaneously the production of disagreeable smells of the process water.







• Technical data

	Bio-Filtromat RM15	Bio-Filtromat RM25	Bio-Filtromat RM35	
Dimensions including free	length = 3100 mm	length = 3400 mm	length = 3750 mm	
space for assembling and	width = 920 mm	width = 1090 mm	width = 1290 mm	
maintenance	heigth = 1880 mm	heigth = 1880 mm	heigth = 1880 mm	
Weight	280 kg	360 kg	420 kg	
Material	Base frame: St37 powder	Base frame: St37 powder	Base frame: St37 powder	
	coated	coated	coated	
	Basins: Polyethylene (PE)	Basins: Polyethylene (PE)	Basins: Polyethylene (PE)	
	Pipes: PVC / malleable cast	Pipes: PVC / malleable cast	Pipes: PVC / malleable cast	
	iron	iron	iron	
	Pumps: gray cast iron	Pumps: gray cast iron	Pumps: gray cast iron	
Connected load				
standard	3,0 KW 400 VAC	4,0 KW 400 VAC	8,2 KW 400 VAC	
without process water pump				
Connected load	2,2 kW 400 VAC	2,2 kW 400 VAC	2,2 kW 400 VAC	
process water pump	3 kW 400 VAC	3 kW 400 VAC	3 kW 400 VAC	
Supply cable	cable 5x 2,5 mm ² , series	cable 5x 4 mm ² , series	cable $5x 6 \text{ mm}^2$, series	
	tuse ZUA	fuse 25A	TUSE 32A	
Supply compressed air	1/2 ** max. 10 bar	⁷ /2" max. 10 bar	¹ /2 [°] max. 10 bar	
max. process water capacity	15 m³/h	<u>25 m³/h</u>	35 m ³ /h	
Filter fineness	50 m	50 m	50 m	
Aeration standard	Rotary compressor 10 m ³ /h with 500 mbar	Rotary compressor 16 m ³ /h with 500 mbar	Rotary compressor 2x16 m ³ /h with 500 mbar	
Process water supply standard	900 litres	1400 litres	2000 litres	
Process water supply upper	300 litres	550 litres	750 litres	
part				
Fresh water backfeed	5/4" via level control	6/4" via level control	2" via level control	
	switch in the event of water	switch in the event of water	switch in the event of	
	failure according to DIN	failure according to DIN	water failure according	
	1988	1988	to DIN 1988	
Cleaning suction filter basket	Automatic with	Automatic with	Automatic with	
	compressed air	compressed air	compressed air	
OPTIONS:				
Process water pump	8 m³ with 3,5 bar 2,2 KW	8 m³ with 3,5 bar 2,2 KW	8 m³ with 3,5 bar 2,2 KW	
	400 VAC	400 VAC	400 VAC	
	15 m ³ with 4 bar 3 KW 400	15 m ³ with 4 bar 3 KW 400	15 m ³ with 4 bar 3 KW 400	
	VAC	VAC	VAC	
Adjustment of conductivity	Through freely adjustable	Through freely adjustable	Through freely adjustable	
	conductivity by adding	conductivity by adding	conductivity by adding	
	fresh water	fresh water	fresh water	
Remote malfunction messages	Malfunction message	Malfunction message	Malfunction message	
	through visual and	through visual and	through visual and	
	audible signal	audible signal	audible signal	
Evacuation into sewerage	I hrough level control by	I hrough level control by	I hrough level control by	
	magnetic valve	magnetic valve	magnetic valve	



Operation

• Energy supply

BIO-FILTROMAT must <u>constantly</u> be supplied with compressed air and electricity. The plant should not be de-energized longer than 3 days as otherwise the real time clock in the SPS control must be newly set.

• Automatic operation

Turn disconnecting switch to position **1**. During automatic operation all cleaning and rinsing processes are executed fully automatically.

In case of "Malfunctions - warning", the plant automatically switches to fresh water supply. No message is sent to the washing bay. In the event of "Malfunctions - intervention", messages are sent immediately to the washing bay and the washing process is interrupted.

Moreover, all operational and malfunction messages are displayed in the text display 1 (fig. 1) on the control panel.

Disconnecting switch position **0** plant OFF background lighting white



Fig. 1

Disconnecting switch position I

Process water operation

plant ON background lighting green NO errors

proce	ess wat	er opei	ation	JUST		
F1 Reset errors	F2 back wash	F3 fresh water	F4 error	SET 1,70		
						ESC
	12	13		10	TAB a/A	ACK
						VIIIII



Operational messages

Process water	Normal operational display, plant
operation	ready for operation
Withdrawal of water	Washing plant withdraws water
Filter rinsing	The cleaning cycle is activated;
	duration approx. 35 min.
Plant off	Main switch activated,
	disconnecting switch on position 0;
	plant not ready for operation
Maintenance suction	Necessary operating hours of
pump	suction pump reached for
	maintenance
Maintenance aerator	Necessary operating hours of
	aerator reached for maintenance
Maintenance process	Necessary operating hours of
water pump	process water pump reached for
	maintenance
Evacuation into	Evacuation of clean water into
sewerage	sewerage
Maintenance boost	Necessary operating hours of filler
pump	pump reached for maintenance
Conductivity fresh	Adjusted conductivity exceeded
water operation	Fresh water operation until
	conductivity is reduced to less than
	10% of demand value

Disconnecting switch position I Process water operation plant ON background lighting red

ERROR



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• Malfunctions - warning

Are **not** signalled to the washing bay. Warning is displayed on the control panel in plain language and fresh water operation is activated automatically.

Motor contactor aerator	Motor contactor aerator activated
Malfunction pressure switch	Insufficient or no pressure by suction
	pump
Motor contactor filler pump	Motor contactor filler pump activated
Motor contactor suction pump	Motor contactor suction pump activated
Safety shut-down fresh water	Safety shut-down fresh water

• Malfunctions - intervention

Are signalled to the washing bay and the washing cycle is interrupted.

Motor contactor process water pump	Motor contactor process water pump		
	activated		
Lack of water	Not enough water in the clean water basin		
Plant OFF	Plant switched off		

• Option: Remote malfunction display

The remote malfunction display sends information about all malfunctions, necessary maintenances as soon as the plant is operated with clean water by a visual and auditable signal directly into the inside of the service station..





• Manual shift to fresh water operation

Disconnecting switch position I plant ON background lighting yellow Fresh water operation



A shift from process water to fresh water operation is possible by simply pushing the button fresh water 2 (fig. 3) on the control panel. By pushing again the button fresh water 2 (fig. 3), it is possible to return to process water operation. The respective operation mode is displayed in clear language.

If the plant does not have an automatic adjustment of conductivity (salt content) the conductivity of process water must be controlled daily, especially during winter time, by means of a conductivity meter. If the measured conductivity is more than 1.7 mS, the plant must be operated in fresh water mode. As soon as the conductivity has decreased to less than 1.5 mS, the plant may again be operated in process water mode.



• Option: automatic adjustment of conductivity (regulation of salt content)

The automatic adjustment of conductivity is preset to 1.7mS. As soon as the conductivity exceeds the value preset, the plant shifts automatically to fresh water operation - message displayed on panel 1 (fig. 1): Conductivity fresh water operation.

If the measured conductivity is approx. 10% below the value preset, the plant shifts automatically back to process water operation.



Conductivity control

Fig. 5

• Option: ONLINE adjustment of conductivity (regulation of salt content)





Cleaning

• Cleaning of halls

Specification cleaning agents for washing halls and washing plants:

Biologically degradable cleaning agents on phosphoric acid and surfactant basis (no hydrofluoric or hydrochloric acids).

Application:

Determine the pH-value and the conductivity of the process water before starting the cleaning of the hall.

Apply the cleaning agent by means of a sprayer in the recommended concentration and leave it on for several minutes. Flush the treated surfaces with a pressure hose or a high-pressure cleaner using a lot of fresh water (dilution of cleaning agent).

Check pH-value and conductivity of process water after cleaning process. The pH-value should not be less than 7.0 and should not exceed 8.5. After the cleaning of the hall the conductivity should not exceed 150 S.

In case these values do not correspond to the above mentioned limits, change washing facility to fresh water operation until the values of the process water correspond to the values as mentioned above (experience has shown that it needs approx. 20 washing cycles with fresh water until the values are acceptable again).

Industrial cleaning of halls:

Due to the aggressiveness of the cleaning agents and the mostly negative effects on the quality of drying after car washing processes, we recommend to have the washing halls and plants cleaned by a professional cleaning service who will take care to close the drain in the middle gutter of the washing hall, evacuate the sewage water of the cleaning separately and who will not introduce it back into the recycling loop.

• Cleaning of the sludge separator

When filled up to a max. of 1/3, the sludge separator must be duly evacuated and cleaned through an authorized sewer cleaning company.

Prior to the cleaning of the basins, the recycling plant must be shut off (plant switch on position 0).

After the cleaning process, the entire basin system must be refilled completely.

In case the plant had not be shut down, or if after switching on the malfunction message "Malfunction pressure button" is displayed, the suction line must be deaerated as described on page 14.



Troubleshooting

• Self help in case of malfunctions

Malfunction	Possible causes	Remedial actions
messages		
Motor contactor suction pump	Motor contactor suction pump triggered	 Activate motor contactor
	• Ampere adjustment too low	 Adjust motor contactor (according to specification plate)
	• Bearing of the pump defective	 Inform after sale service
Motor contactor aerator	Motors contactor aerator triggered	 Activate motor contactor Adjust motor contactor (according
	• Ampere adjustment too low	to specification plate)
Motor contactor boost pump	• Motor contactor filler pump	Activate motor contactor
	 Ampere adjustment too low 	 Adjust motor contactor (according to specification plate)
Motor contactor process water pump	Motor contactor process water pump triggered Ampere adjustment too low	 Activate motor contactor Adjust motor contactor (according to specification plate)
Malfunction pressure switch	 Pollution of suction filter basket in the removal basin Suction pump has aspirated air Suction line to suction pump is leaky Adjustment of pressure switch 	 Clean manually the suction filter basket De-aerate the suction line Inform after sale service Adjust pressure switch (see instruction for start-up)
Lack of water	 Pollution of fresh water switch in clean water basin Pollution of water-failure switch No compressed air 	 Clean fresh water switch in clean water basin Clean water-failure switch Check supply of compressed air
Safety shut-down fresh water	 Level switch fresh water in clean water basin is either polluted or defective no compressed air 	 Clean the level switch fresh water in clean water basin Inform after sale service Check supply of compressed air



View meter readings

Hour counter - Select with F7, switch pages using arrows up and down



Water meter - Select with F7, switch pages using arrows up and down

INS		SIMATIC PANEL	SIEMENS		SIMATIC PANEL
	Flow meter			Flow meter	
FW flow meter	00000m ³		Sewerage Flow meter	+00000m ³	
PW flow meter 1	00000m ³				
PW flow meter 2	00000m ³				
		ESC			ESC
F1 F2 F3	F4 F5		F1 F2 F3	F4 F5	ТАВ АСК
F6 F7 F8	F9 F10	DEL HELP LINTER	F6 F7 F8	F9 F10	DEL HELP ENTER



Exhaust the air from the suction line of the suction pump

The clear language message "Malfunction pressure button suction pump" is displayed on the control panel.

Exhaust the air from the suction line with filler hose 6 (fig. 7):

- 1. Turn disconnecting switch **13** (fig. 9) on position 0.
- 2. Fix filler hose for fresh water supply on Gardena coupling 7 (fig. 7).
- 3. Open ball valve 8 (fig. 7).
- 4. Open ball valves 9, 10 (fig. 6) to refill fresh water into the suction line.
- 5. After 1 minute of filling, start suction pump by pushing the button Reset Malfunction (see also chapter Activation of manual operation switch). The manometer **11** (fig. 6) should indicate a constant pressure of approx. 1 bar.
- 6. The message displayed in clear language should flash alternately Plant OFF and Manual operation suction pump.
- 7. In case the pressure remains constant, close ball valve **8** (fig. 7) and ball valve **9** (fig. 6).
- 8. Shut off manual operation mode (see chapter Activation of manual operation switch)
- 9. Turn disconnecting switch **13** (fig. 9) to position I.

According to the respective state of operation, the message displayed in clear language should either be process water operation, fresh water operation or removal of water.

However, if after approx. 7 seconds, the message "Malfunction pressure switch suction pump" is displayed, the suction line has not been completely de-aerated and the process as mentioned under item 1 to 8 should be repeated.

After the successful de-aeration, please remove the filler hose 6 (fig. 7) from the Gardena coupling 7 (fig. 7) in order to avoid an accidental supply of fresh water into the suction line.









Activating manual operation

All units can be controlled manually.

Turn disconnecting switch (page 1) to position 0.



Manual operation page1



Manual operation page 2





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Password protected database on www.activADS.info

- Connection to the plant with personal user and password possible at any time
- Display all operation data in charts and diagrams
- Options regarding automatic data recording
- Notifications can be sent via SMS and/or e-mail







