

Am Dobben 4 26639 Wiesmoor Germany Tel.: + 49 4944 6060 Fax: + 49 4944 6061 info@ammermann-umwelt-gmbh.de

Instruction Manual ECO Compact Firmware 3.x

Control Unit for Small Sewage Treatment Plants

Edition: 20.02.2016 Version: 1 Author: S. Wempen

Contents

1. Introduction	3
2. Technical Details	6
3. Front View of Control Unit	7
4. Ecocompact Control Unit	8
5. SBR Sequence Program	9
6. Operation	11
7. Alarm Reset	12
8. Menu Manual Operation	13
9. System Monitoring	15
10. Service Menu	16
10.1. Changing Step Times	18
10.2. Pressure / Water	20
10.3. High Water	24
10.4. ECO (economy) Mode	24
11. Possible Alarm Displays	25
12. Measurement of Water-Level	27
12.1. Clear-Water Removal	28
12.2. Recalibrate Measurement	28
12.3. High-Water Measurement	29
12.4. Calibration	30
12.5. Filling	30
12.6. Measurement of ECO (economy) Mode	31
12.7. Aeration, Settling, Sludge-Removal	32

1. Introduction

Basic Information for ECOcompact SBR-Control Unit ECO = Economy SBR = Sequencing Batch Reactor

The control unit is equipped with a 2 x 16 row LCD-Display. In this guide, the respective program steps, operating hours, alarms and menus are shown.

The ECOcompact SBR-Control Unit is equipped with a pressure sensor measurement as a significant feature. This feature measures the water-level in the tank. Thereby, with the use of additional float switches, a high or low-water measurement can be avoided.

In the event of a power failure, the control unit saves the last completed step and restarts when power is restored.

The control unit is operated by using only 3 buttons.

To highlight more features, 3 additional LEDs are located on the front of the unit. Red – Alarm / Green – ON (system in operation) / Green – Eco-operation (system in economy mode). Another remarkable feature is the use of step motors instead of traditional electromagnetic valves. These new valves have been successfully tested in small sewage treatment plants since 2008.

What are the differences?

Magnetic valves always need power while they are open. That means a run-time of the unit from 7 to 10 hours per day. During that time electricity is used. Step motors only need electricity for some seconds during opening and closing. The saving in electricity is approximately 95%. The noise of magnetic valves during switching on and off can be disturbing. This "clicking" is not present with step motors. They open and close almost noiselessly.

For installation, the separate wall mounting must be removed from the control unit by sliding it upwards with your fingers or a screwdriver. (See pictures)



After removal, the wall mounting can be attached with screws to the available wallspace. (See pictures)



Then the control unit can be installed onto the wall mounting by sliding it into the guide rails and pushing it downwards into the wall mounting. (See pictures)



To change the micro-fuse in the event of a fault, proceed as follows:

Remove the control unit from the wall mounting. On the bottom of the control unit several screws are located (see picture). Remove only the 4 screws which are located at the corner points and which are marked with an arrow.



NB Caution: 230 Volts alternating current can kill! Disconnect the power! Remove the power plug before removing the cover. This work must only be done by qualified personnel.

Below is a photograph of the board with the most important details:



Connection for power failure battery

Changing Battery **NB**: Replace with the same battery type only. The batteries are accessed via the battery cover. The cover must be unscrewed. (See picture). Please ensure the correct polarity of the batteries.





2. Technical Details

Feature

Dimensions (D x W x H); Weight

Ambient temperature

Protection / UV-Protection (housing)

Display / LED

Signal-Inputs

Data interface

Electrical outputs

Power supply in case of power failure

Air inlet valve block

Air outlet valve block

Maximum pressure

Power supply

Protection

Value

118mm x 241mm x 181mm; 1,9kg

- 20°C to + 50°C

IP 53 / optional UV-Protection

Alphanumerical LCD Up to 3 LED

Up to 3 x digital inputs (Option) Pressure measurement 0-400 mbar

RS-232

To customer specification, up to 4 relay outputs e.g. 230 V / 300 VA (Option)

2 x NiMH batteries (size AA)

³⁄4 "

1⁄2 "

450 mbar

230VAC,12W max.

3.15 A T, 5 x 20mm G-fuse

3. Front View of Control Unit

Display features, buttons and LEDs

The control unit has a digital display (LCD-Display). The complete system of the control unit is operated by only 3 buttons!



4. ECOcompact Control Unit

When starting or re-starting the following steps are shown:

FW:	EA px03.00.018
SW:	01.20

ECOcompact Weber - Ammermann

for SBR-System Class C + Eco

Valves operating

5. SBR-Sequence-Program-Control-Unit Type 2015

Basic program-standard-display mode, (read only for the end-client). The following list is dependent on the respective cycle phase.

Weber – Ammermann Filling 007:41

Weber – Ammermann Comp:1 120 mbar

Line 2 changes every 4 seconds

Weber – Ammermann Level? 000:20

Line 2 changes every 4 seconds

Weber – Ammermann Comp:1 120 mbar

Weber – Ammermann Aeration 015:00

Line 2 changes every 4 seconds

Weber – Ammermann Comp:1 120 mbar

Weber – Ammermann Aeration 015:00

Line 2 changes every 4 seconds

Weber – Am	nmermann	
Comp:0	*** mbar	

In the standard display the procedure in operation and the respective switch state of the aggregates is as follows:

Line 1: Weber – Ammermann or alarm state

Line 2: actual state: Compressor 0/1 = off/on *** mbar = no measured value, compressor off

The water level is being measured here. If the water level is low – change to ECO mode, see page 23. Weber – Ammermann Sediment. 097:48

Line 2 changes every 4 seconds

Weber – Ammermann Clear water-Rem 008:02

Line 2 changes every 4 seconds

Weber – Ammermann Comp:1 120 mbar

Weber – Ammermann Sludge-Rem 001:00

Line 2 changes every 4 seconds

Weber – Ammermann Comp:1 120 mbar

Weber – Ammermann Level? 000:20

Line 2 changes every 4 seconds

Weber – Ammermann Comp:1 000:15

Weber – Ammermann System 000:00

Weber – Ammermann Calib-Level 000:00

6. Operation

Use the \checkmark button to select the following menus:



Press \checkmark button



The acoustic alarm can be reset by the OK button. The visual alarm can be reset by entering the number 9999 in the service menu. (See page 15)

8. Menu Manual Operation

Manual Control Press <ok></ok>	
Press OK button	
Valves running	
Green LED goes out	
System Monitoring Button=>OK	See page 14
Press 🔸 button	
Name RE 05 OFF ON/OFF=> OK	Not Active.
Press 🕹 button	
Compr. OFF ON/OFF=> OK	
In exchange	Manual switching on/off of compressor
Press.= 000[mbar] ON/OFF=> OK	
Press 🕹 button	
Sludge OFF ON/OFF=> OK	Manual switching on/off & compressor starts.
Press 🕹 button	
Clearwat. OFF ON/OFF=> OK	Manual switching on/off &
Press 🕹 button	
Aeration OFF ON/OFF=> OK	Manual switching on/off & compressor starts.

Press 🕹 button

Filling ON/OFF=> OK	OFF	\longrightarrow
------------------------	-----	-------------------

Press \checkmark button

Level Beep OFF ON/OFF=> OK

Press \checkmark button

Back Press <OK>

Press OK button. Green LED turns on.

Man. Control Press <OK>

Press the \uparrow button 6 times to return to the standard display.

Manual switching on/off & compressor starts.

The function of the digital input can be tested here. The acoustic signal changes depending on switching state. Useful in case of suspected cable break in float supply.

9. System Monitoring

Systemmonitoring Press <OK>

Press OK button to start automatic / manual mode.

PAUSE	
Valves running	
Valve closed Time:	10
Valve 01 + Comp Time:	10
Valve closed Time:	10
Valve 02 + Comp Time:	10
Valve closed Time:	10
Valve 03 + Comp Time:	10
Valve closed Time:	10
Valve 03 + Comp Time:	10
Valves closed Time:	10

Termination possible at any time by pressing OK button

Auto-Man-Control OFF

System monitoring. Press <OK>

10. Service Menu

These settings should only be made by qualified service personnel.



Press 🖊	button
---------	--------

Service Alarm Limit Press <ok></ok>	$ \longrightarrow$	Setting number of days to the next service.
Press 🖖 button		
Biology Build Up Press <ok></ok>	$ \longrightarrow$	See page 18
Press 🕹 button		
Power Setting (Not Used)	$] \longrightarrow$	Only active when measuring (special equipment).
Press 🖖 button		
Pressure / Water Press <ok></ok>	$] \longrightarrow$	See page 19
Press ᢣ button		
Relay Status Comp:1		
Press 🕹 button		
Valve Status A0 B0 C0 D1		Display shows the switching state of relay, valve or input.
Press 🔸 button		
Input Status Inp1:0		
Press 🕹 button		
EXIT Press <ok></ok>		Press OK button to return to the main menu.

10.1 Changing Step Times

Change Step Time Press <OK>

Press =>OK button

Filling OK: to change

Press \checkmark button

Aeration OK: to change

Press ↓button

Sediment. OK: to change

Press \checkmark button

Clear water removal OK: to change

Press 🖊 button

Overfill! OK: to change

Press 🖊 button

Sludge Removal OK: to change

Press \checkmark button

EcoFill OK: to change

Press 🔸 button

Eco-Aeration OK: to change Press OK button to change step times. Selected unit flashes and can be changed by arrow buttons. Then confirm with OK button.

NB: Do not exceed or underrun total cycle of 6 hours (360 min).

Press \checkmark button

Back Press OK

Return to service menu by pressing OK button.

Change Step Time Press OK

Changes to interval-, pause- and repeat times are possible. The explanation here is based on aeration:

Aeration	
Press OK	

Press OK button

Aeration	015:00	
Time:		

Press the OK button again, to return to the change mode. In the event of a multi-digit input, the highest mode is changed by pressing \checkmark and \uparrow arrow buttons. The selected option can be confirmed with the OK button.

Press 🔸 button

Aeration Pause: 015:00

Changes as described above.

Press \checkmark button

Aeration Repeat: 008

A change of total time is possible.

Aeration	
Total Time:	240:00

Change as described above.

Biology Build Up Press <OK>

Here you can adjust the number of days after which the sludge removal is activated for the first time. The count-down is from 90 to 0. You can see at any time the number of days remaining until activation of sludge recirculation.

NB: If times have changed you must adjust the total time of each function.

10.2 Pressure / Water

This part of the program should only be done by qualified service personnel.

Setting of Eco mode (Offset 1) and High Water mode (Offset 2). There is a detailed explanation of this in part 12 of this manual.

After the removal of clear water there is a level measurement (depth of water). If this level is above the previously entered Offset 2, there is a second removal of clear water. The display shows Clear Water 2. If after the third cycle of Clear Water removal a further increased high level is measured, the display shows High Water Alarm.

Pressure / Water	
Press <ok></ok>	



Menu for setting Offset, pressure and calibration.

Press OK button

Switch Level 1 Press <OK> Automatic value. This must not be altered. Value (slurp-point clear water plus Offset 1) results from the automatic level measurement.

Press OK button

Switch Level 1				
[cm]	0130			

Press \checkmark button

EXIT	
Press <ok></ok>	

Press OK button

Press \checkmark button

Switch Level 2 Press <OK>

Press OK button

Switch Level 2 [cm] 0140 Automatic value. This must not be altered. Value (slurp point clear water plus Offset 2) results from the automatic level meaurement.

Press OK button

Press \checkmark button

Exit Press <OK>

Press OK button

Press \checkmark button

Offset Level 1 Press <OK> Press OK button Offset Level 1 [cm] 0006 Press ↓ button Exit Press <OK> Press OK button Press ↓ button Offset Level 2 Press <OK>

Press OK button

Offset Level 2 [cm] 0012 Offset 1 determines the area of work for the Ecomode. This value is preset to 6cm at the factory. Information about the setting is found in part 12 of this manual.

Offset 2 determines the area of work for the High Water recognition. This value is preset to 12cm at the factory. Information about the setting is found in part 12 of this manual. Press OK button

Press 🕹 button

EXIT Press <OK>

Press OK button

Press **V** Taste

Manual calibration Press <OK>

Press OK button

Minimum [mbar] 130

Press OK button

Press 🖊 button

Exit Press <OK>

Press OK button

Press \checkmark button

Pressure Minimum Alarm Press <OK>

Press OK button

Pressure Minimum [mbar] 0020

Press OK button

Press \checkmark button

Exit Press <OK>

Press OK button

NB Caution: This step deactivates the automatic calibration and should therefore only be done in special cases by qualified personnel.

Setting minimal pressure alarm for ¹ pressure too low'.

↓ Taste	drücken
---------	---------



10.3 High Water

Weber – Ammermann				
Level?	000:20			

Line 2 changes every 4 seconds

Weber – Ammermann Level? 000:20 Display in line 2 can vary according to program step.

Recognition of the High Water Alarm is regulated by Offset 2. This value must be set individually to the size of the tank. Information about the settings can be found in part 12 of this manual.

10.4 Eco (economy) Mode

Weber – Ammermann Level? 000:20		
Line 2 changes every 4 seconds		
Weber – Ammermann Comp:1 000:15		
Weber – Ammermann Eco-Aeration 005:00		
Line changes every 4 seconds	Aeration ON	
Weber – Ammermann Comp:1 120 mbar		
		6 repetitions
Weber – Ammermann Eco-Aeration 053:36		
Line 2 changes every 4 seconds	Aeration OFF	
Weber – Ammermann Comp:0 *** mbar		



11. Possible Alarm Displays

In the event of power failure: The alarm is not active without batteries (2 x AA). In the event of power failure there is no access to menu. NB:Use only rechargeable batteries (2 x AA).

Power failure Settling 037:42

Line 2 changes every 4 seconds

Line 2. Different displays possible depending on program step.

Power failure Comp:0 *** mbar

No battery: Battery not charged, please reset the alarm in the Service Menu by entering the password 9999.Leave the Control Unit on so that the battery can be recharged. Battery defect or not inserted, please see page 3 for insertion of replacement.

NO BATTERY Settling

037:42

Line 2 changes every 4 seconds

NO BATTERY Comp:0 *** mbar Line 2. Different displays possible depending in program step. Defect fuse: To replace fuse please see page 3.

Caution Danger! Switch off power and remove plug before opening the Control Unit.

FUSE DEFECT Settling 037:42

Line 2 changes every 4 seconds

FUSE DEFEKT Comp:0 *** mbar Line 2. Different displays possible depending on program step

HIGH Pressure Alarm: This is activated when the pressure is higher than set in the Control Unit. There could be a blockage in the air system or in the stepper motor.

PRESSURE TOO HIGH Filling 004:12

Line 2 changes every 4 seconds

PRESSURE TOO HIGH Comp:1 498 mbar Line 2. Different displays possible depending on program step

The Low Pressure Alarm will be activated if the pressure is lower than set in the Control Unit. A defect in the compressor (membrane tear) or a break in the air supply could have occurred.

PRESSURE TOO LOW Aeration 239:26 Line 2. Different displays possible depending on program step

PRESSURE TOO LOW Comp:1 10 bar

Page 26 of 33

12.Water Level Measurement ECO®compact with Firmware 3.X

The water level measurement is made via the measuring of the air-pressure during aeration.

The air-pressure cuts out when there is:

- flow resistance on hoses
- flow resistance on aerator plates, aerator pipes
- counter pressure of the water above the aerator

NB: with time the flow resistance can change, the rubber material can age and harden, the resistance (usually) increases. **Therefore the plant must be in automatic recalibration.**



Purification Process with Measurement Steps:

This simpler procedure starts with the removal of clear water.

For simplicity the sludge removal was omitted.

12.1 Clear Water Removal



The water is removed by the CW pump as far as the CW removal point.

For a reliable measurement of all functions (High Water; Normal / Eco) it is essential for the CW removal point to be reached. All the water must be pumped away by the mammoth pump (until there is a "slurp" noise.

12.2 Measurement Recalibration

Now a measurement is made to determine whether the Control Unit can recalibrate (see page 27). Recalibration can only be done, when the water level has in fact reached the clear water removal point.

How does the Control Unit recognise that the clear water removal point was reached? The Control Unit measured the water level in the previous cycle after the CW removal and it compares the value of the present cycle with the previous cycle.

How is it measured?

The Control Unit aerates the tank for approx. 30 secs and measures the counter pressure. If there is more than the programmed *Offset 1* (lilac arrow) higher -> no calibration.



12.3 Measurement of High Water Yes / No

Now there is a measurement to determine whether there is high water. For this a new, second Offset was added from the Firmware 3.X.

What is High Water?

High water means that after the the CW removal there is still more than approx. 12cm of water (=Offset 2) in the reactor above the CW removal point (= water level at "slurp").

How does the Control Unit know that?

The Control Unit measured the water level in the previous cycle after the CW removal and compares the value of the actual cycle with the previous cycle.

How is it measured?

The Control Unit aerates the tank for approx. 30 secs. and measures the counter pressure. If this is higher than the programmed Offset (lilac arrow) -> High Water Alarm (after X appears).



Red arrow = Water level higher than the last water level measured after the CW Removal + Offset 2 => High water alarm

Green arrow = Water level lower than 'last water level measured after the CW removal + Offset 2 => Everything OK, next step"

Offset 2 applied here is also applied as the deciding criterium for Normal or Ecomode (see 12.5).

12.4 Calibrating

When no high water is present the Control Unit recalibrates.

Why is there recalibration?

The flow resistance on hoses and aerators changes with time, the rubber materials age and harden, there is a slight increase in resistance. Therefore the plant recalibrates automatically.

The Control Unit aerates the tank for approx. 30 secs and measures the counter pressure. The Control Unit saves this as the new pressure value at a waterlevel which corresponds with the CW removal point.



During filling the water level in the pre-cleaning chamber sinks and the water level in the reactor rises.

Now there is the question of how much water was pumped into the reactor. Should Normal Mode be continued or should there be a change to Ecomode.

Therefore there is now the measurement for Ecomode Yes / No.

12.6 Measurement of Ecomode Yes/No

Now there is a measurement for whether enough water was pumped in for Normal Mode.

What is enough water?

Enough water for Normal Mode means that after filling takes place the water level in the reactor is **at least approx. 5cm (=Offset) above** the water level in the reactor of the last CW removal point (=water level at "slurp") measured and calibrated in Step 3.

How is it measured?

The Control Unit aerates the tank for approx. 30 secs. and measures the counter pressure. If this is more than the programmed Offset (lilac arrow) -> Normal Mode.

If this is NOT more than the programmed Offset (lilac arrow) -> Ecomode.



Once more in detail:

12).



Black arrow = water level higher than the last measured level after CW removal => Normal Mode Green arrow = water level lower than the last measured level after CW removal => Ecomode The Offset applied here is also applied as the deciding criterium for high water / all OK (see point

12.7 Aeration, Settling, Sludge

Aeration takes place (Normal or Ecomode) according to the previous measurement of water level.



Settling Phase



Sludge Removal Phase



And now return to 12.1 Clear Water Removal